Personal Communications for Windows, Version 5.7

Emulator Programming

SC31-8478-07

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Note
Before using this information and the product it supports, read the information in Appendix G, "Notices", on page 469.

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This edition applies to Version 5.7 of IBM Personal Communications for Windows (program number: 5639–I70) and to all subsequent releases and modifications until otherwise indicated in new editions.

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About This Book

This book provides necessary programming information for you to use the IBM® Personal Communications for Windows® Emulator High-Level Language Application Program Interface (EHLLAPI), Dynamic Data Exchange (DDE), Personal Communications Session API (PCSAPI), and Server-Requester Programming Interface (SRPI). The Host Access Class Library is described in *Host Access Class Library*.

EHLLAPI/DDE/PCSAPI is used with Personal Communications to provide a way for users and programmers to access the host presentation space with a set of functions that can be called from an application program running in a workstation session.

In this book, *Windows* refers to Windows 95, Windows 98, Windows NT®, Windows Me, Windows 2000, and Windows XP. When information is relevant only to a specific operating system, this will be indicated in the text.

Who Should Read This Book

This book is intended for programmers who write application programs that use the APIs documented in this book.

A working knowledge of Windows is assumed. For information about Windows, refer to the list of publications under "Where To Find More Information".

The programmer must also be familiar with connecting to a host system from a terminal or from a workstation with terminal emulation software.

This book assumes you are familiar with the language and the compiler that you are using. For information on how to write, compile, or link-edit programs, refer to Where To Find More Information for the appropriate references for the specific language you are using.

Where To Find More Information

The Personal Communications library includes the following publications:

- *CD-ROM Guide to Installation*
- *Quick Beginnings*
- *Access Feature*
- *5250 Emulator User's Reference*
- *3270 Emulator User's Reference*
- *VT Emulator User's Reference*
- *Administrator's Guide and Reference*
- *Emulator Programming*
- *Client/Server Communications Programming*
- *System Management Programming*
- *CM Mouse Support User's Guide and Reference*
- *Host Access Class Library*
- *Configuration File Reference*

In addition to the printed books, there are Hypertext Markup Language (HTML) documents provided with Personal Communications:

Host Access Class Library
: This HTML document describes how to write an ActiveX/OLE 2.0–compliant application to use Personal Communications as an embedded object.

Host Access Beans for Java™
: This HTML document describes Personal Communications emulator functions delivered as a set of JavaBeans™.

Open Host Interface Objects (OHIO) for Java
: This HTML document describes how to write an OHIO-compliant application to use Personal Communications as an embedded object.

Following is a list of related publications:

- *IBM 3270 Information Display System Data Stream Programmer's Reference*, GA23-0059
- *IBM 5250 Information Display System Functions Reference Manual*, SA21-9247

Refer to the IBM Glossary of Computing Terms at http://www.networking.ibm.com/nsg/nsgmain.htm for definitions of technical terms used throughout this book.

Notation

A table at the beginning of each section explains API or DDE functions in Chapter 3, "EHLLAPI Functions", on page 27, Chapter 5, "PCSAPI Functions", on page 189, Chapter 6, "DDE Functions in a 32–bit Environment.", on page 197, and Appendix E, "DDE Functions in a 16-Bit Environment", on page 339. It shows whether a function is supported for the products that provide the function described in the section. Yes means it is supported for a host type, and No means not supported. For example, the following table indicates that a function is available for 3270 and VT sessions but not for 5250 sessions.

3270	*5250*	*VT*
Yes	No	Yes

Chapter 1. Introduction to Emulator APIs

The IBM Personal Communications product supplies several application programming interfaces (APIs). Each interface has a specific set of functions and may be used for different purposes. Choose the programming interface that best matches the functional requirements of your application. Some applications may use more than one interface to achieve the desired results. The programming interfaces are:

- **Emulator High Level Language API (EHLLAPI)**: This interface provides functions to access emulator ″presentation space″ data such as characters on the host screen. It also provides functions for sending keystrokes to the host, intercepting user-entered keystrokes, querying the status of the host session, uploading and downloading files, and other functions. This interface is often used for *automated operator* applications which read host screens and enter keystrokes without direct user intervention. See Chapter 3, “EHLLAPI Functions”, on page 27.
  - **IBM Standard HLLAPI Support**: This is a standard programming interface which allows programmatic access to a host emulator session. See Chapter 2, “Introduction to IBM Standard EHLLAPI, IBM Enhanced EHLLAPI and WinHLLAPI Programming”, on page 5.
  - **IBM Enhanced HLLAPI Support**: This interface is based on the IBM Standard HLLAPI interface. It provides all of the existing functionality but uses modified data structures. See Chapter 2, “Introduction to IBM Standard EHLLAPI, IBM Enhanced EHLLAPI and WinHLLAPI Programming”, on page 5.
  - **Windows High Level Language API (WinHLLAPI)**: This interface provides much of the same functionality of IBM Standard EHLLAPI and adds some extensions that take advantage of the Windows environment. See Chapter 2, “Introduction to IBM Standard EHLLAPI, IBM Enhanced EHLLAPI and WinHLLAPI Programming”, on page 5.
  - **REXX EHLLAPI**: This allows programmers who are using EHLLAPI to write REXX language application programs.
- **Dynamic Data Exchange (DDE)**: This interface is similar to the EHLLAPI interface in that it provides a programmable means to read the host screen, send keystrokes, and perform related functions. It has some additional functions for access to the emulator clipping rectangle, intercepting mouse events, and adding/removing commands on the emulator menu bar. See Chapter 6, “DDE Functions in a 32–bit Environment.”, on page 197.
- **Personal Communications Session API (PCSAPI)**: This interface is used to start, stop, and control emulator sessions. See Chapter 5, “PCSAPI Functions”, on page 189.
- **Server-Requestor Programming Interface (SRPI)**: This interface is used in cooperation with an IBM Enhanced Connectivity Facility (ECF) application running on a host system. This API provides functions for writing synchronous call-return interfaces to remote server programs. See Chapter 8, “Server-Requester Programming Interface (SRPI) Support”, on page 305.
- **IBM Personal Communications Host Access Class Library (ECL)**: ECL is a set of objects that allow application programmers and scripting language writers to access host applications easily and quickly. Personal Communications supports three different ECL layers (C++ objects, ActiveAutomation (OLE), and

LotusScript Extension (LSX)). Refer to *Personal Communications Version 5.7 Host Access Class Library (HACL)* for more details.

Using API Header Files

The application program should include operating system header files before including API header files. For example:

```
#include <windows.h>      // Windows main header
#include "pcsapi.h"       // PComm PCSAPI header
...
```

Critical Sections

Use critical sections (**EnterCriticalSection** function) carefully when your program calls emulator APIs. Do not make emulator API calls within a critical section. If one thread of an application establishes a critical section and another thread is within an emulator API call, the call is suspended until you exit from the critical section.

During processing of an API call, all signals (except numeric coprocessor signals) are delayed until the call completes or until the call needs to wait for incoming data. Also, **TerminateProcess** issued from another process is held until the application completes an API call it might be processing.

Stack Size

Emulator APIs use the calling program's stack when they are executed. The operating system, the application, and the API all require stack space for dynamic variables and function parameters. At least 8196 bytes (8K) of stack space should be available at the time of an API call. It is the responsibility of the application program to ensure sufficient stack space is available for the API.

Running 16-bit Windows EHLLAPI programs in Windows NT, 2000, or XP

In Windows NT, 2000, or XP (any NT-based operating system), if you are running multiple 16-bit Windows EHLLAPI tasks that use any of the 16-bit EHLLAPI DLLs, each 16-bit EHLLAPI task must run under a separate NTVDM. You can use any of the following methods to accomplish this:

- Shortcuts used to start 16-bit EHLLAPI applications must specify that the program run in a separate memory space (NTVDM).
- To start a 16-bit EHLLAPI application such as hllapi16.exe from a command prompt or batch program, type the following command:

  ```
  start /separate hllapi16.exe
  ```

- If a Win32 application spawns a 16-bit EHLLAPI application using the Windows API CreateProcess, it must use the Process creation flag named CREATE_SEPARATE_WOW_VDM.

Sample Programs

Several sample programs are provided, each of which illustrates the use of one of the Personal Communications APIs. If you choose to install the sample programs, they will be installed in the \SAMPLES directory.

Note: International Business Machines Corporation provides these files as is, without warranty of any kind, either express or implied, including, but not limited to, the implied warranties of merchantability or fitness for a particular purpose.

The sample program files include source and supporting files for the following Personal Communications APIs:

- Emulator High-Level Language Programming Interface (EHLLAPI)
- Dynamic Data Exchange (DDE)
- Server-Requester Programming Interface (SRPI)
- PCSAPI Functions

The following files are installed in the \SAMPLES directory.

Table 1. Sample Program Files

File Name	Description
DDE_C.H	DDE include file
EHLAPI32.H	IBM standard 32-bit EHLLAPI include file
WHLLAPI.H	WinHLLAPI 16-bit include file
HAPI_C.H	EHLLAPI include file
PCSAPI.H	PCSAPI include file
PCSCALLS.LIB	Import library for standard interface
PCSCAL32.LIB	Import library for enhanced interface
EHLAPI32.LIB	Import library for IBM Standard 32-bit EHLLAPI interface
WHLLAPI.LIB	Import library for WinHLLAPI 16-bit interface
WHLAPI32.LIB	Import library for WinHLLAPI 32-bit interface
UUCCPRB.H	SRPI include file

The following subdirectories are created in the \SAMPLES directory.

Table 2. Sample Program Subdirectories

File Name	Description
DDXFER	Shows how EHLLAPI can be used to create a “Drag and Drop” application; in this case, for file transfer
ECL	HACL sample files
HLLSMP	Shows how to use EHLLAPI to request a keystroke and log on to a VM system
LISTFILE	Illustrates how DDE can make use of the LOAD button to transfer files from the host
PCSMAIN	Illustrates the use of PCSAPI to start and stop sessions, query the session status, and query the profile for the session
SPL2FILE	A program that uses DDE to save an iSeries™ spool file as an ASCII file on the PC
SRPSMP	Illustrates the use of the Server Requester Programming Interface (SRPI)
VBDDE	VBDDE sample files
VBHLLAPI	VBHLLAPI sample files

Table 2. Sample Program Subdirectories (continued)

File Name	Description
VBPCSAPI	VBPCSAPI sample files

Chapter 2. Introduction to IBM Standard EHLLAPI, IBM Enhanced EHLLAPI and WinHLLAPI Programming

This chapter provides information needed to incorporate IBM Standard EHLLAPI (16- and 32-bit), WinHLLAPI (16- and 32-bit), and IBM Enhanced 32-bit EHLLAPI (EHLAPI32) functions into applications written in a high level language. It provides details on call format, memory allocation considerations, initializing the interfaces, and compiling and linking applications. Also included is a short sample EHLLAPI program and the compile/link instructions used to build it. Finally, a set of possible uses for the EHLLAPI interface (scenarios) is described.

An EHLLAPI application is any application program which uses the EHLLAPI interface to access the host 3270/5250/VT presentation space. The presentation space includes the visible emulator character data, fields and attribute data, keystroke data, and other information.

EHLLAPI Overviews

Following are overviews for HLLAPI programming interfaces.

IBM Standard EHLLAPI

EHLLAPI is a standard programming interface which allows programmatic access to a host emulator session. Functions are provided for reading host screen data (such as the characters and attributes), for sending keystrokes, and performing other emulator-related functions.

The EHLLAPI interface is a single call-point interface. There is a single callable API through which all EHLLAPI functions are requested. On each call to the interface the application provides a function number which identifies the function requested, a pointer to a data buffer, a pointer to the length of the data buffer, and a pointer to a return code (see "EHLLAPI Call Format" on page 6).

WinHLLAPI

WinHLLAPI is based on the familiar EHLLAPI.API. It encompasses all of the existing functionality and adds extensions that take advantage of the Windows message driven environment. Users of the IBM Personal Communications EHLLAPI interface will notice no functional difference unless they incorporate the WinHLLAPI extensions.

The WinHLLAPI extension functions and any functions that deviate from the EHLLAPI form are described in Chapter 4, "WinHLLAPI Extension Functions", on page 177. For information on common functions, refer to Chapter 3, "EHLLAPI Functions", on page 27.

WinHLLAPI and IBM Standard EHLLAPI

The entry symbol for WinHLLAPI, is appropriately, **WinHLLAPI**. EHLLAPI users wishing to switch to the WinHLLAPI implementation must change from the **hllapi** standard entry. New users should follow all of the directions in Chapter 3, "EHLLAPI Functions", on page 27, and use the **WinHLLAPI** entry in place of the standard **hllapi** entry.

IBM Enhanced EHLLAPI and IBM Standard EHLLAPI

IBM Enhanced EHLLAPI is based on the familiar EHLLAPI API. It encompasses all of the existing functionality but takes advantage of the 32-bit environment and uses modified data structures. Standard interface users wishing to switch to IBM Enhanced 32-bit EHLLAPI need to change only the entry symbol from LPWORD to LPINT in the first, third, and fourth parameters. New users should use the procedures in the following sections.

Languages

Any programming language which can invoke an entry point in a DLL with the "Pascal" calling convention can be used to execute EHLLAPI functions. However, the Personal Communications EHLLAPI toolkit provides header files and function prototypes only for the C++ languages. A clear understanding of data structure layout and calling conventions is required to use any other language. The EHLLAPI toolkit supports the following C/C++ compilers:

- IBM VisualAge® for C/C++
- Microsoft® Visual C/C++ Version 4.0 and higher

Most other C/C++ compilers will also work with the toolkit.

EHLLAPI C/C++ applications must include the Personal Communications EHLLAPI header file (HAPI_C.H). This file defines the layout of data structures and provides a prototype for the EHLLAPI entry point.

Note: The data structure layout for 16- and 32-bit applications are not the same (see "Standard and Enhanced Interface Considerations" on page 21).

EHLLAPI Call Format

The EHLLAPI entry point (**hllapi**) is always called with the following four parameters:

1. EHLLAPI Function Number (input)
2. Data Buffer (input/output)
3. Buffer Length (input/output)
4. Position (input); Return Code (output)

The prototype for IBM Standard EHLLAPI is:

```
[long hllapi (LPWORD, LPSTR, LPWORD, LPWORD);
```

The prototype for IBM Enhanced EHLLAPI is:

```
[long hllapi (LPINT, LPSTR, LPINT, LPINT);
```

Each parameter is passed by *reference* not by value. Thus each parameter to the function call must be a *pointer* to the value, not the value itself. For example, the following is a correct example of calling the EHLLAPI Query Session Status function:

```
#include "hapi_c.h"
struct HLDQuerySessionStatus QueryData;
int    Func, Len, Rc;
long   Rc;

memset(QueryData, 0, sizeof(QueryData)); // Init buffer
QueryData.qsst_shortname = 'A';          // Session to query
Func = HA_QUERY_SESSION_STATUS;          // Function number
```

```
Len  = sizeof(QueryData);               // Len of buffer
Rc   = 0;                               // Unused on input

hllapi(&Func, (char *)&QueryData, &Len, &Rc);  // Call EHLLAPI
if (Rc != 0) {                          // Check return code
  // ...Error handling
}
```

All the parameters in the **hllapi** call are pointers and the return code of the EHLLAPI function is returned in the value of the 4th parameter, not as the value of the function. For example, the following is **not** correct:

```
if (hllapi(&Func, (char *)&QueryData, &Len, &Rc) != 0) { // WRONG!
  // ...Error handling
}
```

Although the **hllapi** function is defined to return a **long** data type for IBM Standard and Enhanced EHLLAPI, and **void** data type for WinHLLAPI, its value is undefined and should not be used.

The second through fourth parameters of the **hllapi** call can return information to the application. The description of each EHLLAPI function describes what, if any, information is returned in these parameters.

Data Structures

Many EHLLAPI functions use a formatted data structure to pass information to or from the application program. The description of each function shows the layout of the data structure. The data passed to or from the EHLLAPI function must exist in storage exactly as documented, byte for byte. Note that the structure layout is the same for all IBM Standard and WinHLLAPI 16- and 32-bit applications. Data structures for the IBM Enhanced 32-bit applications are packed to a 4-byte alignment.

It is *highly recommended* that the supplied header file and data structure definitions be used to ensure proper data alignment and layout. Although it is technically possible, the following is *not* recommended:

```
char QueryData[20];  // Not recommended
...
Func = HA_QUERY_SESSION_STATUS;
hllapi(&Func, QueryData, &Len, &Rc);
if (QueryData[13] == 'F') {
  // ...this is a 5250 session
}
```

The recommended way to write this function would be:

```
#include "hapi_c.h"
struct HLDQuerySessionStatus QueryData;  // Recommended
...
Func = HA_QUERY_SESSION_STATUS;
hllapi(&Func, (char *)&QueryData, &Len, &Rc);
if (QueryData.qsst_sestype == 'F') {
  // ...this is a 5250 session
}
```

Memory Allocation

EHLLAPI functions do not allocate or free memory. The application program must preallocate buffer space for EHLLAPI functions which require it before calling the **hllapi** entry point. The buffer space may be pre-allocated as a dynamic variable such as:

```
struct HLDQuerySessionStatus QueryBuff;
```

or it may be allocated by a call to a C library or operating system function such as:

```
struct HLDQuerySessionStatus *QueryBuff;
...
QueryBuff = malloc(sizeof(struct HLDQuerySessionStatus));
```

In any case, the application is responsible for allocating sufficient buffer space before calling EHLLAPI functions and for freeing buffers when they are not needed.

EHLLAPI Return Codes

EHLLAPI functions return a completion code or return codein the 4th parameter of the **hllapi** function call (except for the **Convert Position** or **RowCol** (99) function). The return code indicates the success or failure of the requested function.

Unless indicated otherwise in the description of each function, the following table shows the meaning of each return code value. Some functions may have a slightly different interpretation of these return codes; refer to the individual function descriptions for details.

Table 3. EHLLAPI Return Codes

Return Code	Explanation
0	The function successfully executed, or no update since the last call was issued.
1	An incorrect host presentation space ID was specified. The specified session either was not connected, does not exist, or is a logical printer session.
2	A parameter error was encountered, or an incorrect function number was specified. (Refer to the individual function for details.)
4	The execution of the function was inhibited because the target presentation space was busy, in X CLOCK state (X []), or in X SYSTEM state.
5	The execution of the function was inhibited for some reason other than those stated in return code 4.
6	A data error was encountered due to specification of an incorrect parameter (for example, a length error causing truncation).
7	The specified presentation space position was not valid.
8	A functional procedure error was encountered (for example, use of conflicting functions or missing prerequisite functions).
9	A system error was encountered.
10	This function is not available for EHLLAPI.
11	This resource is not available.
12	This session stopped.
24	The string was not found, or the presentation space is unformatted.
25	Keystrokes were not available on input queue.

Table 3. EHLLAPI Return Codes (continued)

Return Code	Explanation
26	A host event occurred. See **Query Host Update** (24) for details.
27	File transfer was ended by a Ctrl+Break command.
28	Field length was 0.
31	Keystroke queue overflow. Keystrokes were lost.
32	An application has already connected to this session for communications.
33	Reserved.
34	The message sent to the host was canceled.
35	The message sent from the host was canceled.
36	Contact with the host was lost.
37	Inbound communication has been disabled.
38	The requested function has not completed its execution.
39	Another DDM session is already connected.
40	The disconnection attempt was successful, but there were asynchronous requests that had not been completed at the time of the disconnection.
41	The buffer you requested is being used by another application.
42	There are no outstanding requests that match.
43	The API was already locked by another EHLLAPI application (on LOCK) or API not locked (on UNLOCK).

Compiling and Linking

Applications using EHLLAPI functions must include the appropriate header file to obtain the proper function prototypes, constants, and data structure definitions. These header files may be used with any of the supported C/C++ compilers (see "Languages" on page 6). If a different compiler or language is used, then you must provide your own equivalent definitions and structures.

There are two possible ways to link the application program, depending on how the entry point is to be resolved. The simplest way is to statically link the application with the appropriate Personal Communications library. This will resolve the entry point at link time. The operating system will load the correct DLL with the application when it starts. Another way to link to the entry point is to perform dynamic linking. In this case, the application uses operating system calls to load the correct DLL and obtain the entry point address at run time.

The following table shows which header files to use, which .LIB should be used for static linking, and which .DLL should be used for dynamic loading.

Interface	Entry Point	Header File	LIB	DLL
IBM Standard (16-bit)	hllapi	hapi_c.h	PCSCALLS.DLL	PCSHLL.DLL
IBM Standard (32-bit)	hllapi	ehlapi32.h	EHLAPI32.LIB	EHLAPI32.DLL
IBM Enhanced (32-bit)	hllapi	hapi_c.h	PCSCAL32.LIB	PCSHLL32.DLL
WinHLLAPI (16-bit)	winhllapi	whllapi.h	WHLLAPI.LIB	WHLLAPI.DLL
WinHLLAPI (32-bit)	winhllapi	whllapi.h	WHLAPI32.LIB	WHLAPI32.DLL

Static Link Method

Using the static link method the application can simply call the **hllapi** entry point when needed such as:

```
#include "hapi_c.h"
int HFunc, HLen, HRc;                                   // Function parameters
char HBuff[1];                                          // Function parameters
...
HFunc = HA_RESET_SYSTEM;                                // Run EHLLAPI function
HLen  = 0;
HRc   = 0;
hllapi(&Func, HBuff, &HLen, &HRc);
if (HRc != 0) {
  // ... EHLLAPI access error
}
```

When the application is linked, the appropriate Personal Communications library files must be linked with the application executable code. For example, the following link command might be used (IBM VisualAge C/C++):

```
ilink /de /noe pcscal32.lib sample.obj
```

When the operating system loads an application constructed in this way, the Personal Communications EHLLAPI module is loaded automatically.

Dynamic Link Method

Using the dynamic link method the application makes calls to the operating system at run time to load the Personal Communications EHLLAPI module and to locate the **hllapi** entry point within it. This method requires more code in the application but gives the application greater control over error conditions. For example, the application can display a specific error message to the user if the Personal Communications EHLLAPI module cannot be found.

To use dynamic linking, the application needs to load the appropriate Personal Communications module and locate the entry point. It is recommended that the entry point be located by its ordinal number and not by name. The ordinal number is defined in the header file. The following 32-bit Windows code loads the IBM Standard 32-bit EHLLAPI module, locates the **hllapi** entry point, and makes an EHLLAPI function call.

```
#include "hapi_c.h"

HMODULE Hmod;                                           // Handle of PCSHLL32.DLL
long (APIENTRY hllapi)(int *, char *, int *, int *);   // Function pointer
int HFunc, HLen, HRc;                                   // Function parameters
char HBuff[1];                                          // Function parameters

Hmod = LoadLibrary("PCSHLL32.DLL");                     // Load EHLLAPI module
if (Hmod == NULL) {
  // ... Error, cannot load EHLLAPI module
}

hllapi = GetProcAddress(Hmod, MAKEINTRESOURCE(ord_hllapi));
                                                        // Get EHLLAPI entry point
if (hllapi == NULL) {
  // ... Error, cannot find EHLLAPI entry point
}

HFunc = HA_RESET_SYSTEM;                                // Run EHLLAPI function
HLen  = 0;
HRc   = 0;
```

```
(*hllapi)(&Func, HBuff, &HLen, &HRc);
if (HRc != 0) {
  // ... EHLLAPI access error
}
```

Multithreading

IBM Enhanced EHLLAPI (32-bit) and IBM Standard EHLLAPI 16-bit connect on a per process basis. All threads access the same connected host session. The thread that performs the connections must also perform the disconnection.

IBM Standard EHLLAPI (32-bit) and WinHLLAPI connect on a per thread basis. Each thread must maintain its own connections. This allows a multithreaded process to maintain connections to more than one connected host session at a time. This eliminates the need for multi-process schemes when using a WinHLLAPI program to coordinate data between different hosts. It also puts the burden of connecting and disconnecting as necessary on the individual thread.

Presentation Spaces

Many EHLLAPI functions require a *presentation space ID (PSID)* to indicate which host emulator session is to be used for the function. (This is also referred to as the *short session ID*). A presentation space ID is a single character in the range A to Z. There are a maximum of 26 sessions.

IBM Enhanced 32-Bit Interface Presentation Space IDs

For IBM Enhanced EHLLAPI applications, the session ID is extended with three additional bytes. These extended session bytes must be set to zero for future compatibility. This is most easily accomplished by setting the contents of EHLLAPI buffers to all binary zero before filling them in with the required information. For example, the following might be used to query the status of session B:

```
#include "hapi_c.h"
int HFunc, HLen, HRc;                                  // Function parameters
struct HLDPMWindowStatus StatusData;                   // Function parameters

Func = HA_PM_WINDOW_STATUS;
HLen = sizeof(StatusData);
HRc  = 0;

// Set data buffer to zeros and fill in request
memset(&StatusData, 0x00, sizeof(StatusData));
StatusData.cwin_shortname = 'B';     // Short session ID
StatusData.cwin_option    = 0x02;    // Query command

hllapi(&Func, (char *)&StatusData, &HLen, &HRc);
```

Types of Presentation Spaces

An emulator session can be configured as a display session or a printer session. EHLLAPI applications cannot connect to printer or router sessions of PC400. The **Query Sessions (10)** function can be used to determine the type of a particular session.

Size of Presentation Spaces

An emulator display session can be configured for a range of screen sizes from 1920 bytes (24x80 screen size) to 9920 bytes (62x160 screen size). Some EHLLAPI functions such as **Copy PS to String (8)** require the application to allocate enough

storage to hold (possibly) the entire presentation space. The size of the presentation space for a given session can be obtained using the **Query Session Status (22)** function.

Presentation Space IDs

EHLLAPI functions interact with only one presentation space at a time. The presentation space ID (PSID) is used to identify the particular presentation space in which a function is to operate.

For some functions, the PSID is contained in a preceding call to the **Connect Presentation Space** (1) function. For other functions, the PSID is contained in the calling data string parameter.

Host-Connected Presentation Space

Connection to the host presentation space (or session) is controlled by using the **Connect Presentation Space** (1) and **Disconnect Presentation Space** (2) functions. The status of the connection determines whether some functions can be executed. It also affects how the PSID is defined. The following text explains how to control the status of the connection to the host presentation space:

- At any given time, there can be either no host-connected presentation space, or there can be one and only one host-connected presentation space.
- There is no default host-connected presentation space.
- Following a connect, there is one and only one host-connected presentation space. The host presentation space that is connected is identified in the calling data string parameter of the connect function.
- A subsequent call to connect can be executed with no intervening disconnect. In this case, there is still one and only one host-connected presentation space. Again, the host presentation space that is connected is identified in the calling data string parameter of the connect function.
- Following a disconnect, there is no host-connected presentation space. This rule applies following multiple consecutive calls to connect or following a single call to connect.
- You cannot connect to a logical printer session.

Presentation Space ID Handling

The PSID is used to specify the host presentation space (or session) in which you desire a function to operate. The way the PSID is handled is affected by two factors:

1. The method used to specify the PSID:
   a. As the calling data string parameter of a preceding call to the **Connect Presentation Space** (1) function
   b. As a character in the calling data string of the function being executed. Handling varies depending on whether the character is:
      - A letter *A* through *Z*
      - A blank or a null
2. The status of the connection to the host presentation space.

The following paragraphs describe how the PSID is handled for the various combinations of these two factors.

PSID Handling for Functions Requiring Connect

Some functions interact only with the host-connected presentation space. These functions require the **Connect Presentation Space** (1) function as a prerequisite call. The PSID for these functions is determined by the **Connect Presentation Space** (1) and the **Disconnect Presentation Space** (2) functions as follows:

- When there is no host-connected presentation space, these functions do not interact with any presentation space. A return code of 1 is generated.
- When there is one host-connected presentation space, these functions interact with the presentation space specified in the calling data string parameter of the most recent call to the **Connect Presentation Space** (1) function.

PSID Handling for Functions Not Requiring Connect

Some functions can interact with a host presentation space whether it is connected or not. These functions allow you to specify the PSID in the calling data string parameter. They are as follows:

- **Connect Presentation Space** (1)
- **Convert Position RowCol** (99)
- **Get Key** (51)
- **Post Intercept Status** (52)
- **Query Close Intercept** (42)
- **Query Host Update** (24)
- **Query Session Status** (22)
- **Start Close Intercept** (41)
- **Start Host Notification** (23)
- **Start Keystroke Intercept** (50)
- **Stop Close Intercept** (43)
- **Stop Host Notification** (25)
- **Stop Keystroke Intercept** (53)

All except the first two of these functions allow you to specify the PSID using either:

- A letter *A* through *Z*
- A blank or a null

The first two functions require that a letter be used to specify the PSID.

When there is no host-connected presentation space, the following rules apply:

- The function can interact with any host presentation space if a letter, not a blank or a null, is used to specify the PSID.
- If a blank or a null is used to specify the PSID, a return code of 1 is generated. The function does not execute.
- Using a letter to specify the PSID does not establish a host-connected presentation space, except on a connect PS request.

When there is one host-connected presentation space, the following rules apply:

- The function can interact with any host presentation space if a letter is used to specify the PSID.
- If a blank or a null is used to specify the PSID, the function operates in the presentation space identified in the most recent call to the **Connect Presentation Space** (1) function.

- Using a letter to specify the PSID does not change the established PSID of the host-connected presentation space, except on a connect PS request.

The following functions are available for printer sessions:

- **Start Host Notification** (23)
- **Query Host Update** (24)
- **Stop Host Notification** (25)

Sharing EHLLAPI Presentation Space between Processes

More than one EHLLAPI application can share a presentation space if the applications support sharing (that is, if they were developed to work together or if they exhibit predictable behavior[1]). To determine which applications support sharing, EHLLAPI applications are specified as one of following types:

- Supervisory
- Exclusive write with read privilege allowed
- Exclusive write without read privilege allowed
- Super write
- Read

The type of shared access can be defined by setting the following read and write sharing options for each function in the **Set Session Parameters** (9) function call:

SUPER_WRITE

The application allows other applications that allow sharing and have write access permissions to concurrently connect to the same presentation space. The originating application performs supervisory-type functions but does not create errors for other applications that share the presentation space.

WRITE_SUPER

The application requires write access and allows only supervisory applications to concurrently connect to its presentation space. This is the default value.

WRITE_WRITE

The application requires write access and allows partner or other applications with predictable behavior to share the presentation space.

WRITE_READ

The application requires write access and allows other applications that perform read-only functions to share the presentation space. The application is also allowed to copy the presentation space and perform other read-only operations as usual.

WRITE_NONE

The application has exclusive use of the presentation space. No other applications are allowed to share the presentation space, including supervisory applications. The application is allowed to copy the presentation space and perform read-only operations as usual.

READ_WRITE

The application requires only read access to monitor the presentation space and allows other applications that perform read or write, or both, functions to share the

1. This means that two EHLLAPI programs will not be vying for the same Presentation Space at the same time; or that there is logic in those programs which will allow the program to wait until the PS is available; or that the applications never use the Session in a way which would lock out other applications.

presentation space. The application is also allowed to copy the presentation space and perform other read-only operations as usual.

Note: Sharing presentation space is not available between threads in a process.

Table 4. EHLLAPI Read and Write Sharing Option Combinations

Calling Application	Super_Write	Write_Super	Write_Write	Write_Read	Write_None	Read_Write
Super_Write	Yes	Yes	Yes	No	No	Yes
Write_Super (default)	Yes	No	No	No	No	No
Write_Write	Yes	No	Yes	No	No	Yes
Write_Read	No	No	No	No	No	Yes
Write_None	No	No	No	No	No	No
Read_Write	Yes	No	Yes	Yes	No	Yes

In addition to specifying compatible read and write access options, applications that are designed to work together but cannot allow others to work in the same presentation space can optionally define a keyword, KEY$nnnnnnnn, in the **Set Session Parameters** (9) function call. This keyword allows only those applications that use the same keyword to share the presentation space.

Notes:

1. The **Start Keystroke Intercept** (50) function is non-shareable. Only one application at a time can trap keystrokes.
2. The **Connect To Presentation Space** (1) and **Start Keystroke Intercept** (50) functions share common subsystem functions. Successful requests by an application to share either of these functions can affect the requests of these two functions by other applications. For example, if application A successfully requests a **Connect To Presentation Space** (1) with Write_Read access and KEY$abcdefgh as the keyword, a request by application B to **Connect To Presentation Space** (1) or **Start Keystroke Intercept** (50) is successful only if both applications have set compatible read and write options.

Table 5. Prerequisite Functions and Associated Dependent Functions

Prerequisite Call	Functions	Access
Allocate Communications Buffer (120)	Free Communication Buffer (120)	N/A
Connect Window Service (101)	Change PS Window Name (106) Change Switch List Name (105) Disconnect Window Service (102) Query Window Service (103) Window Status (104)	Write Read Query=Read Set=Write Write

Table 5. Prerequisite Functions and Associated Dependent Functions (continued)

Prerequisite Call	Functions	Access
Connect Presentation Space (1)	Copy Field to String (34) Copy OIA (13) Copy Presentation Space (5) Copy Presentation Space to String (8) Copy String to Field (33) Copy String to Presentation Space (15) Disconnect Presentation Space (2) Find Field Length (32) Find Field Position (31) Query Cursor Location (7) Query Field Attribute (14) Release (12) Reserve (11) Search Field (30) Search Presentation Space (6) Send key (3) Set Cursor (40) Start Playing Macro (110) Wait (4)	Read Read Read Read Write Write Write Read Read Read Read Write Write Read Read Read Write Write Read
Connect Structured Field (120)	Disconnect Structured Field (121) Get Request Completion (125) Read Structured Field (126) Write Structured Field (127)	N/A
Read Structured Field (126)	Get Request Completion (125)	N/A
Start Close Intercept (41)	Query Close Intercept (42) Stop Close Intercept (43)	N/A
Start Host Notification (23)	Query Host Update (24) Stop Host Notification (25)	
Start Keystroke Intercept (50)	Get Key (51) Post Intercept Status (52) Stop Keystroke Intercept (53)	N/A
Write Structured Field (127)	Get Request Completion (125)	N/A

Locking Presentation Space

An application, even if specified with shared presentation space, can obtain exclusive control of a presentation space by using the **Lock Presentation Space API** (60) or the **Lock Windows Services API** (61) functions. Requests by the other applications to use a presentation space locked by these functions are queued and processed in first-in-first-out (FIFO) order when the originating application unlocks the presentation space.

If the application that locked the presentation space does not unlock it by using the same call with an **Unlock** option or **Reset System** (21) call, the lock is removed when the application terminates or the session stops.

ASCII Mnemonics

Keystrokes originating at a host keyboard might have a corresponding ASCII value. The response of the **Get Key** (51) function to a keystroke depends on whether the key is defined and also on whether the key is defined as an ASCII value or an ASCII mnemonic.

The keyboard for one session might not be capable of producing some codes needed by the another session. ASCII mnemonics that represent these codes can be included in the data string parameter of the **Send Key** (3) function.

The capabilities of the **Send Key** (3) function and the **Get Key** (51) function allow sessions to exchange keystrokes that might not be represented by ASCII values or by an available key. A set of mnemonics that can be generated from a keyboard is provided. These mnemonics let you use ASCII characters to represent the special function keys of the workstation keyboard.

Mnemonics for unshifted keys consist of the escape character followed by an abbreviation. This is also true for the shift keys themselves, Upper shift, Alt, and Ctrl. Mnemonics for shifted keys consist of the mnemonic for the shift key followed by the mnemonic for the unshifted key. Hence the mnemonic for a shifted key is a 4-character sequence of escape character, abbreviation, escape character, abbreviation.

The default escape character is `@`. You can change the value of the escape character to any other character with the `ESC=c` option of the **Set Session Parameters** (9) function. The following text uses the default escape character, however.

Shift indicators that are not part of the ASCII character set are represented to the host application by 2-byte ASCII mnemonics as follows:

Upper shift	@S
Alt	@A
Ctrl	@r

Mnemonics for these shift indicators are never received separately by an application. Likewise, they are never sent separately by an application. Shift indicator mnemonics are always accompanied by a non-shift-indicator character or mnemonic.

The abbreviations used make the mnemonics for special keys easy to remember. An alphabetic key code has been used for the most common keys. For example, the Clear key is *C*; the Tab key is *T*, and so on. Please note that the uppercase and lowercase alphabetic characters are mnemonic abbreviations for different keys.

The following text describes the use of these functions.

General

All defined keys are represented by either:

- A 1-byte ASCII value that is part of the 256-element ASCII character set, or
- A 2-, 4-, or 6-byte ASCII mnemonic

To represent a key defined as an ASCII character, a 1-byte ASCII value that corresponds to that character is used.

To represent a key defined as a function, a 2-, 4-, or 6-byte ASCII mnemonic that corresponds to that function is used. For example, to represent the backtab key, `@B` is used. To represent PF1, `@1` is used. To represent Erase Input, `@A@F` is used. See the following lists:

`@B`	Left Tab	`@0`	Home	`@h`	PF17
`@C`	Clear	`@1`	PF1/F1	`@i`	PF18

@D	Delete	@2	PF2/F2	@j	PF19
@E	Enter	@3	PF3/F3	@k	PF20
@F	Erase EOF	@4	PF4/F4	@l	PF21
@H	Help (PC400)	@5	PF5/F5	@m	PF22
@I	Insert	@6	PF6/F6	@n	PF23
@J	Jump	@7	PF7/F7	@o	PF24
@L	Cursor Left	@8	PF8/F8	@q	End
@N	New Line	@9	PF9/F9	@u	Page UP (PC400)
@O	Space	@a	PF10/F10	@v	Page Down (PC400)
@P	Print	@b	PF11/F11	@x	PA1
@R	Reset	@c	PF12/F12	@y	PA2
@T	Right Tab	@d	PF13	@z	PA3
@U	Cursor Up	@e	PF14	@@	@ (at) symbol
@V	Cursor Down	@f	PF15	@$	Alternate Cursor
@X	DBCS	@g	PF16	@<	Backspace
@Z	Cursor Right				

@A@C	Test (PC400)	@A@e	Pink (PC/3270)
@A@D	Word Delete	@A@f	Green (PC/3270)
@A@E	Field Exit	@A@g	Yellow (PC/3270)
@A@F	Erase Input	@A@h	Blue (PC/3270)
@A@H	System Request	@A@i	Turquoise (PC/3270)
@A@I	Insert Toggle	@A@j	White (PC/3270)
@A@J	Cursor Select	@A@l	Reset Host Color (PC/3270)
@A@L	Cursor Left Fast	@A@t	Print (Personal Computer)
@A@Q	Attention	@A@u	Rollup (PC400)
@A@R	Device Cancel	@A@v	Rolldown (PC400)
@A@T	Print Presentation Space	@A@y	Forward Word Tab
@A@U	Cursor Up Fast	@A@z	Backward Word Tab
@A@V	Cursor Down Fast	@A@-	Field - (PC400)
@A@Z	Cursor Right Fast	@A@+	Field + (PC400)
@A@9	Reverse Video	@A@<	Record Backspace (PC400)
@A@b	Underscore (PC/3270)	@S@E	Print Presentation Space on Host (PC400)
@A@c	Reset Reverse Video (PC/3270)	@S@x	Dup
@A@d	Red (PC/3270)	@S@y	Field Mark

Notes:

1. The first @ symbol in the first table represents the escape character. The first and second @ symbol in the second table is the escape character. The @ symbol is the default escape character. You can change the value of the escape character using the ESC=c option of the **Set Session Parameters** (9) function.

   If you change the escape character to #, the literal sequences used to represent the Backtab, Home, and Erase Input keys become #B, #0, and #A#F, respectively.

   Also, the literal sequence used to represent the @ symbol becomes #@.
2. If you send the mnemonic for print screen (that is, either @P or @A@T), place it at the end of the calling data string.
3. If you send the mnemonic for device cancel (that is, @A@R), it is passed through with no error message; however, local copy is not stopped.

Get Key (51) Function

If the terminal operator types a key defined as an ASCII character, the host application receives a 1-byte ASCII value that corresponds to that character.

If the operator types a key defined as a function, the host application receives a 2-, 4-, or 6-byte ASCII mnemonic that corresponds to that function. For example, if the **Backtab** key is typed, `@B` is received. If **PF1** is pressed, `@1` is received. If **Erase Input** is pressed, `@A@F` is received.

If the operator types a defined shift key combination, the host application receives the ASCII character, or the 2-, 4-, or 6-byte ASCII mnemonic that corresponds to the defined character or function.

If the operator types an individual key that is not defined, the **Get Key** (51) function returns a return code of 20 and nothing is sent to the host application.

The **Get Key** (51) function prefixes all characters and mnemonics sent to the host application with two ASCII characters. The first ASCII character is the PSID of the host presentation space to which the keystrokes are sent. The other character is an *A*, *S*, or *M* for ASCII, special shift, or mnemonic, respectively. See "Return Parameters" on page 88.

Send Key (3) Function

To send an ASCII character to another session, include that character in the data string parameter of the **Send Key** (3) function.

To send a function key to another session, include the ASCII mnemonic for that function in the data string parameter of the **Send Key** (3) function.

If the **Send Key** (3) function sends an unrecognized mnemonic to the host session a return code rejecting the key might result.

Debugging

As an aid in debugging EHLLAPI applications, the Trace Facility of Personal Communications may be used. This facility will produce a log of all EHLLAPI calls, parameters, return values, and return codes. For more information on using the Trace Facility, refer to *Personal Communications Version 5.7 Administrator's Guide and Reference*.

A Simple EHLLAPI Sample Program

The following sample Windows application will enter the character string ″Hello World!″ in the first input field of host session 'A'.

```
#include <stdlib.h>
#include <stdio.h>
#include <windows.h>
#include "hapi_c.h"

int main(char **argv, int argc) {
  int HFunc, HLen, HRc;
  char HBuff[1];
  struct HLDConnectPS ConnBuff;
  // Send Key string for HOME+string+ENTER:
  char SendString[] = "@0Hello World!@E";

  HFunc = HA_RESET_SYSTEM;
  HLen  = 0;
  HRc   = 0;
  hllapi(&HFunc, HBuff, &HLen, &HRc);
  if (HRc != HARC_SUCCESS) {
    printf("Unable to access EHLLAPI.\n");
    return 1;
  }
```

```
    HFunc = HA_CONNECT_PS;
    HLen  = sizeof(ConnBuff);
    HRc   = 0;
    memset(&ConnBuff, 0x00, sizeof(ConnBuff));
    ConnBuff.stps_shortname = 'A';
    hllapi(&HFunc, (char *)&ConnBuff, &HLen, &HRc);
    switch (HRc) {
      case HARC_SUCCESS:
      case HARC_BUSY:
      case HARC_LOCKED: // All these are OK
        break;
      case HARC_INVALID_PS:
        printf("Host session A does not exist.\n");
        return 1;
      case HARC_UNAVAILABLE:
        printf("Host session A is in use by another EHLLAPI application.\n");
        return 1;
      case HARC_SYSTEM_ERROR:
        printf("System error connecting to session A.\n");
        return 1;
      default:
        printf("Error connecting to session A.\n");
        return 1;
    }

    HFunc = HA_SENDKEY;
    HLen  = strlen(SendString);
    HRc   = 0;
    hllapi(&HFunc, SendString, &HLen, &HRc);
    switch (HRc) {
      case HARC_SUCCESS:
        break;
      case HARC_BUSY:
      case HARC_LOCKED:
        printf("Send failed, host session locked or busy.\n");
        break;
      default:
        printf("Send failed.\n");
        break;
    }

    HFunc = HA_DISCONNECT_PS;
    HLen  = 0;
    HRc   = 0;
    hllapi(&HFunc, HBuff, &HLen, &HRc);

    printf("EHLLAPI program ended.\n");
    return 0;
}
```

The following MAKEFILE file could be used to build this application with the IBM VisualAge C/C++ for Windows compiler (assuming the source file is named SAMPLE.C):

```
all: sample.exe

hlldir = C:\PCOMWIN\SAMPLES
hlllib = C:\PCOMWIN\SAMPLES

.SUFFIXES: .C .OBJ

.c.obj:
    icc.exe /Ti /Gh /Gm /Gd /C /I $(hlldir) /Tc $*.c
```

```
sample.exe: sample.obj
    ilink.exe /de /noe $(hlllib)\pcscal32.lib $**

sample.obj: sample.c
```

The application could be built with the following command:

```
nmake /a all
```

Standard and Enhanced Interface Considerations

There is no functional difference between the standard and enhanced EHLLAPI interfaces on a given platform. However there are other important differences:

- The enhanced EHLLAPI interface extends the presentation space ID (PSID) from 1 byte to 4 bytes. Currently the additional bytes are not used, but your application should set them to binary zeros to ensure compatibility with future versions of enhanced EHLLAPI.
- The position (offset) of data elements in memory buffers passed to and from EHLLAPI functions are different. Data elements in enhanced EHLLAPI are aligned to double-word boundaries. Data elements in standard EHLLAPI are not aligned in any particular way. EHLLAPI applications should not be coded to set or retrieve data in the buffers by offset (byte) values. Instead, the supplied data structures in the HAPI_C.H file should be used to set and retrieve data elements. This will ensure that data is set and retrieved from the correct position for both 16- and 32-bit programs.

By prefilling EHLLAPI data buffers with binary zeros, and using the data structures supplied in HAPI_C.H, an application can be compiled for standard or enhanced operation without any source code changes. For example, the following section of code would work for standard EHLLAPI but would fail for enhanced EHLLAPI:

```
#include "hapi_c.h"
...
int Func, Len, Rc;
char Buff[18];
char SessType;

Func = HA_QUERY_SESSION_STATUS;   // Function
Len  = 18;                        // Buffer length
Rc   = 0;
Buff[0] = 'A'                     // Session to query
hllapi(&Func, Buff, &Len, &Rc);   // Execute function

SessType = Buff[9];               // Get session type
...
```

The above example would fail if compiled as a enhanced EHLLAPI application because:

- The application does not set the extended session ID bytes to zero.
- The buffer length for this function is 20, not 18.
- The session type indicator is not at offset 9 in the data buffer, it is at offset 12.

The following is the same function written to work correctly if compiled for standard or enhanced operation. Changed lines are indicated with a >:

```
   #include "hapi_c.h"
   ...
   int Func, Len, Rc;
>  struct HLDQuerySessionStatus Buff;
   char SessType;
```

```
   Func = HA_QUERY_SESSION_STATUS;   // Function
>  Len  = sizeof(Buff);              // Buffer length
   Rc   = 0;
>  memset(&Buff, 0x00, sizeof(Buff));// Zero buffer
>  Buff.qsst_shortname = 'A';        // Session to query
   hllapi(&Func, (char *)&Buff, &Len, &Rc);   // Execute function

>  SessType = Buff.qsst_sestype;     // Get session type
   ...
```

Host Automation Scenarios

The sample scenarios presented here provide conceptual information about activities that can be facilitated by using EHLLAPI. The scenarios deal with the duties your EHLLAPI programmed operator can perform in these areas:

- Host system operation, including:
  - Search function
  - Sending keystrokes
- Distributed processing, including:
  - Data extraction
  - File transfer
- Integrating interfaces

Scenario 1. A Search Function

There are four phases in a typical host system transaction:

1. Starting the transaction
2. Waiting for the host system to respond
3. Analyzing the response to see if it is the expected response
4. Extracting and using the data from the response

Your programmed operator can use a series of EHLLAPI functions to mimic these actions. After determining the correct starting point for the host system transaction, the programmed operator can call the **Search Presentation Space** (6) function to determine which keyword messages or prompting messages are on the display screen.

Next, the programmed operator can use the **Send Key** (3) function to type data into a host system session and enter a host system transaction. Then the programmed operator can:

- Use the **Wait** (4) function that waits for the X CLOCK, X [], or X SYSTEM condition to end (or returns a keyboard-locked condition if the terminal has locked up).

  If the keyboard is inhibited, your EHLLAPI program can call the **Copy OIA** (13) function to get more information about the error condition.
- Use the **Search Presentation Space** (6) function to look for an expected keyword to validate that the proper response had been received.
- Use the **Copy Presentation Space to String** (8) function (or any of several data access functions) to extract the desired data.

The **Search Presentation Space** (6) function is critical to simulate another task of the terminal operator. Some host systems do not stay locked in X CLOCK, X [], or X SYSTEM mode until they respond; instead, they quickly unlock the keyboard and allow the operator to stack other requests. In this environment, the terminal operator depends on some other visual prompt to know that the data has returned

(perhaps a screen title or label). The **Search Presentation Space** (6) function allows your EHLLAPI program to search the presentation space while waiting. Also, while waiting for a response, calling the **Pause** (18) function allows other DOS sessions to share the central processing unit resource. The **Pause** (18) function has an option that allows your EHLLAPI program to wait for a host system update event to occur.

If no host system event occurs after a reasonable time-out period, your EHLLAPI program could call a customized error message such as:

```
No Response From Host.  Retry?
```

In this environment, program revisions become very important considerations, because the programmed operator must be reprogrammed for even minor changes in the display messages.

For example, if a terminal operator expects the message:

```
Enter Part Number:
```

as a prompt, he or she will probably be able to respond properly to an application change that produces the message:

```
Enter Component Number:
```

However, because the programmed operator is looking for a literal keyword string, subtle changes in message syntax, even as trivial as uppercase versus lowercase, can make the program take a preprogrammed error action.

Scenario 2. Sending Keystrokes

There are several considerations that demand attention in designing programs that send keystrokes to the host system. In some application environments, issuing a command is as simple as typing a string and pressing Enter. Other applications involve more complex formatted screens in which data can be entered into any one of several fields. In this environment you must understand the keystrokes required to fill in the display screen.

The Tab key mnemonic (@T; see "General" on page 17 for a full list of mnemonics) can be used to skip between fields. When sending keystrokes to a field using the **Send Key** (3) function, you should be aware of the field lengths and contents. If you fill the fields completely and the next attribute byte is autoskip, your cursor will then be moved to the next field. If you then issued a tab, you would skip to yet another field.

Likewise, if your keystrokes do not completely fill the field, there might be data left from prior input. You should use the Erase End of Field (EOF) command to clear this residual data.

Scenario 3. Distributed Processing

Some applications fall into the category called *collaborative*. These applications provide a single end-user interface, but their processing is performed at two or more different physical locations.

An EHLLAPI application can interact with host system applications by intercepting the communication between the host system and the terminal user. The host system presentation space is the vehicle used to intercept this data. The local application can request to be notified each time the presentation space is updated or whenever an AID key is pressed by the operator.

This workstation application can then cooperate with a host system application in any of the following ways:

- On a field or presentation space basis using either the copy functions that address fields (**Copy String to Field** (33) function or **Copy Field to String** (34) function) or the functions that let you copy from and into presentation spaces (for example, **Copy String to Presentation Space** (15) function or **Copy Presentation Space to String** (8) function).
- On a keystroke basis, using the **Send Key** (3) function.
- On a file basis, for large blocks of data. You can have your application use the EHLLAPI file transfer capability (using **Send File** (90) function or **Receive File** (91) function) to transfer data or functions (such as load modules) and have it processed locally or remotely.

Scenario 4. File Transfer

In this scenario, assume that you want to automate a file transfer:

- You could begin by using the procedure discussed in the search scenario earlier to log on to a host system session.
- Instead of using one of the copy functions (which are inefficient for copying many screens of data), your EHLLAPI program could call file transfer functions **Send File** (90) and **Receive File** (91) to transfer data.
- Upon successful completion:
  - If the **Send File** (90) function finished executing, your EHLLAPI program could submit a batch job using either a copy function or the **Send Key** (3) function before logging off.
  - If the **Receive File** (91) function finished executing, your EHLLAPI program could start up a local application.

Scenario 5. Automation

An application can provide all the keystrokes for another application or can intersperse keystrokes to the target destination with those from the keyboard. Sometimes, to do this, the application must lock out other sources of keystroke input that might be destined for a target application or presentation space (using the **Reserve** (11) function) and the later unlock it (using the **Release** (12) function).

The origin of keystrokes presented to any application is determined by the design of the application. Keystrokes can originate from:

- The keyboard
- Data integrated into the source application
- Secondary storage retrieved through the DOS interface
- The Personal Communications interface

In all cases the keystrokes that are provided to the target application are indistinguishable from the ordinary operator input.

Scenario 6. Keystroke Filtering

An application that acts as a filter can intercept a keystroke coming from EHLLAPI (either from the keyboard or a source application) that is targeted for another destination. The keystroke can then be:

- Ignored (that is, deleted)
- Redirected to another application
- Validated
- Converted (for example, uppercase to lowercase)

- Enhanced (through keyboard macros)

Figure 1 provides a simplified representation of the keystroke flow and the objects within a keyboard enhancement environment.

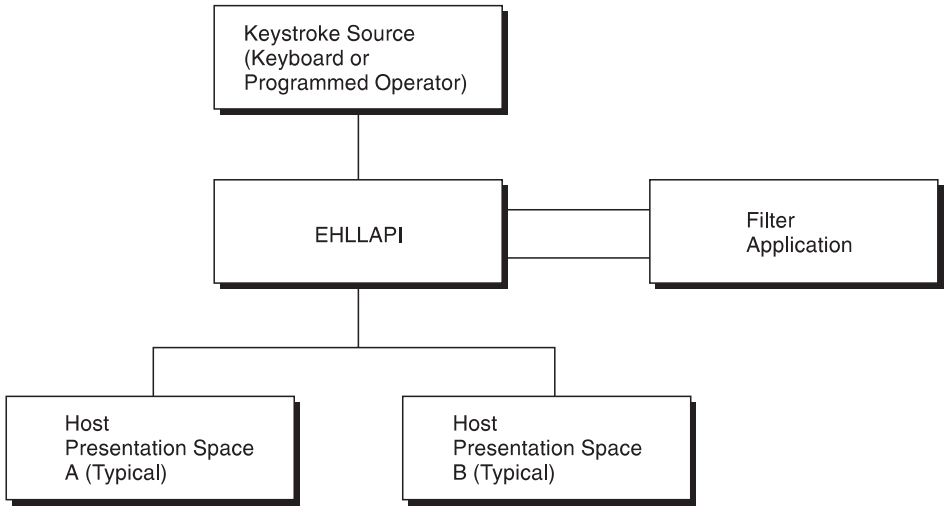

Figure 1. Keystroke Flow

Scenario 7. Keyboard Enhancement

This scenario makes use of filtering to create an **enhancer application program**. An enhancer application program is one that monitors the data coming in from the keyboard and changes it in some specified way. Typically, these application programs use instructions called **keyboard macros**, which tell them what keystrokes to look for and what changes to make. The change might involve suppressing a keystroke (so it appears to the target application as though it was never sent), replacing a keystroke with another, or replacing single keystroke with a series of keystrokes.

To do this using EHLLAPI, you might construct this scenario:

1. Your EHLLAPI application program calls the **Connect Presentation Space** (1) function to connect to the presentation space whose keystrokes are to be filtered.
2. Your EHLLAPI program next calls the **Start Keystroke Intercept** (50) function specifying the L option. This causes all keystrokes to be routed to the filtering application program.
3. The filtering application program can now define a loop in which:
   a. The **Get Key** (51) function intercepts all keystrokes being sent to the target presentation space.
   b. The filtering application examines each keystroke and performs a keyboard macro task, such as:
      - Abbreviating program commands so that three- or four-keystroke command can be condensed into a single keystroke
      - Customizing commands so that they are easier to remember or consistent with other software packages
      - Creating **boiler plates** for contracts or frequently used letters
      - Rearranging the keyboard for concurrent applications that use the same keys for differing functions

For example, the filtering application might convert a key combination such as Alt+Y into a command to move the cursor to column 35 of the second line in presentation space and write the string “XYZ Tool Corporation, Dallas, Texas”.

c. If a keystroke is rejected, your EHLLAPI program can cause a beep to be sounded, using the **Post Intercept Status** (52) function.

4. After your EHLLAPI program exits the filtering loop, **Stop Keystroke Intercept** (53) function to end the filtering process.

Chapter 3. EHLLAPI Functions

This chapter describes each individual Personal Communications EHLLAPI function in detail and explains how to use the EHLLAPI program sampler. The functions are arranged alphabetically by name. The functions are explained for both the standard and enhanced interfaces.

Note: Throughout this chapter WinHLLAPI, IBM Standard 32-bit HLLAPI and 16-bit EHLLAPI are referred to as Standard Interface, and IBM Enhanced 32-bit EHLLAPI is referred to as Enhanced Interface.

Unicode Support for Code Pages 1390/1399 and 1137

The following EHLLAPI functions are enabled for Japanese code page 1390/1399 and Hindi code page 1137 support on a Unicode session:

- Convert Position or Convert RowCol (1137 only)
- Copy Field to String
- Copy Presentation Space
- Copy Presentation Space to String
- Copy String to Field
- Copy String to Presentation Space
- Get Key
- Search Field
- Search Presentation Space
- Send Key
- Set Cursor (1137 only)
- Set Session Parameters

See the specific section for each function for details on Japanese code page 1390/1399 and Hindi code page 1137.

Notes:

1. EHLLAPI 1390/1399 and 1137 code page support on a Unicode session is supported only for Windows NT and Windows 2000.
2. The string containing the Unicode characters to be sent to the PCOMM session should be typecast to `WCHAR *` for code page 1390/1399 and to `char *` for code page 1137.
3. EHLLAPI 1390/1399 Unicode functionality is available only for 3270 and 5250 sessions. EHLLAPI 1137 Unicode functionality is available only for 5250 sessions.

Page Layout Conventions

All EHLLAPI function calls are presented in the same format so that you can quickly retrieve the information you need. The format is:

Function Name (Function Number)

Prerequisite Calls

Call Parameters

Return Parameters

Notes on Using This Function

Prerequisite Calls

"Prerequisite Calls" lists any calls that must be made prior to calling the function being discussed.

Call Parameters

"Call Parameters" lists the parameters that must be defined in your program to call the discussed EHLLAPI function and explains how those parameters are to be defined. If a parameter is never used by a function, then *NA* (not applicable) is listed. If a parameter can be overridden by certain values of session parameters defined with calls to the **Set Session Parameters** (9) function, such session parameters are named.

Return Parameters

"Return Parameters" lists the parameters that must be received by your program after a call to the discussed EHLLAPI function and explains how to interpret those parameters.

Notes on Using This Function

"Notes on Using This Function" lists any session options that affect the function under discussion. It also provides technical information about using the function and application development tips.

Summary of EHLLAPI Functions

Table 6 is the summary of the EHLLAPI functions:

Table 6. EHLLAPI Functions Summary

No.	Function	3270	5250	VT	Page
1	Connect Presentation Space (1)	Yes	Yes	Yes	35
2	Disconnect Presentation Space (2)	Yes	Yes	Yes	82
3	Send Key (3)	Yes	Yes	Yes	133
4	Wait (4)	Yes	Yes	Yes	167
5	Copy Presentation Space (5)	Yes	Yes	Yes	56
6	Search Presentation Space (6)	Yes	Yes	Yes	127
7	Query Cursor Location (7)	Yes	Yes	Yes	105
8	Copy Presentation Space to String (8)	Yes	Yes	Yes	64
9	Set Session Parameters (9)	Yes	Yes	Yes	145
10	Query Sessions (10)	Yes	Yes	Yes	110
11	Reserve (11)	Yes	Yes	Yes	121
12	Release (12)	Yes	Yes	Yes	121
13	Copy OIA (13)	Yes	Yes	Yes	48
14	Query Field Attribute (14)	Yes	Yes	Yes	106
15	Copy String to Presentation Space (15)	Yes	Yes	Yes	76
18	Pause (18)	Yes	Yes	Yes	98
20	Query System (20)	Yes	Yes	Yes	112
21	Reset System (21)	Yes	Yes	Yes	122
22	Query Session Status (22)	Yes	Yes	Yes	109
23	Start Host Notification (23)	Yes	Yes	Yes	158

Table 6. EHLLAPI Functions Summary (continued)

No.	Function	3270	5250	VT	Page
24	Query Host Update (24)	Yes	Yes	Yes	108
25	Stop Host Notification (25)	Yes	Yes	Yes	165
30	Search Field (30)	Yes	Yes	Yes	123
31	Find Field Position (31)	Yes	Yes	Yes	85
32	Find Field Length (32)	Yes	Yes	Yes	83
33	Copy String to Field (33)	Yes	Yes	Yes	72
34	Copy Field to String (34)	Yes	Yes	Yes	40
40	Set Cursor (40)	Yes	Yes	Yes	144
41	Start Close Intercept (41)	Yes	Yes	Yes	154
42	Query Close Intercept (42)	Yes	Yes	Yes	102
43	Stop Close Intercept (43)	Yes	Yes	Yes	164
45	Query Additional Field Attribute (45)	No	Yes	No	101
50	Start Keystroke Intercept (50)	Yes	Yes	Yes	161
51	Get Key (51)	Yes	Yes	Yes	87
52	Post Intercept Status (52)	Yes	Yes	Yes	100
53	Stop Keystroke Intercept (53)	Yes	Yes	Yes	166
60	Lock Presentation Space API (60)	Yes	No	No	95
61	Lock Window Services API (61)	Yes	No	No	97
80	Start Communication Notification (80)	Yes	Yes	Yes	156
81	Query Communication Event (81)	Yes	Yes	Yes	104
82	Stop Communication Notification (82)	Yes	Yes	Yes	164
90	Send File (90)	Yes	Yes	No	181
91	Receive File (91)	Yes	Yes	No	119
92	Cancel File Transfer (92)	Yes	Yes	Yes	31
99	Convert Position or Convert RowCol (99)	Yes	Yes	Yes	38
101	Connect Window Services (101)	Yes	Yes	Yes	37
102	Disconnect Window Service (102)	Yes	Yes	Yes	82
103	Query Window Coordinates (103)	Yes	Yes	Yes	113
104	Window Status (104)	Yes	Yes	Yes	168
105	Change Switch List LT Name (105)	Yes	Yes	Yes	33
106	Change PS Window Name (106)	Yes	Yes	Yes	31
110	Start Playing Macro (110)	Yes	Yes	Yes	163
120	Connect for Structured Fields (120)	Yes	No	No	34
121	Disconnect from Structured Fields (121)	Yes	No	No	81
122	Query Communications Buffer Size (122)	Yes	No	No	103
123	Allocate Communications Buffer (123)	Yes	No	No	30
124	Free Communications Buffer (124)	Yes	No	No	86
125	Get Request Completion (125)	Yes	No	No	93
126	Read Structured Fields (126)	Yes	No	No	114
127	Write Structured Fields (127)	Yes	No	No	171

Allocate Communications Buffer (123)

3270	*5250*	*VT*
Yes	No	No

The **Allocate Communications Buffer** function obtains a buffer from the operating system. A buffer address must be passed on both the **Read Structured Fields** (126) and **Write Structured Fields** (127) functions.

Prerequisite Calls

There are no prerequisite calls for this function.

Call Parameters

	Standard Interface	**Enhanced Interface**
Function Number	Must be 123	
Data String	See the following table	
Length	Must be 6	Must be 8
PS Position	NA	

The calling data string can contain:

Byte		**Definition**
Standard	Enhanced	
1–2	1–4	32-bit or 16-bit buffer length. (0 < size ≤ (64 KB–256 bytes)=X'FF00')
3–6	5–8	32-bit allocated buffer address (returned)

Return Parameters

Return Code	**Explanation**
0	The **Allocate Communications Buffer** function was successful.
2	An error was made in specifying parameters.
9	A system error occurred.
11	Resource unavailable (memory unavailable).

Notes on Using This Function

1. The EHLLAPI obtains a buffer from the operating system memory management and places the buffer address into the return parameter string. The requested buffer size (length) is also passed in the parameter string. The buffer size can be from 1 byte to 64 KB minus 256 bytes (X'FF00' bytes) in length.

   See "**Query Communications Buffer Size** (122)" for information regarding buffer size.
2. Buffers obtained using this function must not be shared among different processes. If this is attempted, the applications will experience unpredictable results.
3. An EHLLAPI application must issue a **Free Communications Buffer** (124) function to free the allocated memory.

4. A maximum of 10 buffers can be allocated to an application. If this limit is reached, a return code for resource unavailable (RC=11) will be returned.
5. The **Reset System** (21) function frees buffers allocated by this function.

Cancel File Transfer (92)

3270	*5250*	*VT*
Yes	Yes	Yes

The **Cancel File Transfer** function causes any current EHLLAPI initiated **Send File** or **Receive File** for the specified session to immediately return.

Prerequisite Calls

Send File (90) or **Receive File** (91)

Call Parameters

	Enhanced Interface
Function Number	Must be 92
Data String	1-character short name of the host presentation space. A blank or null indicates request for updates to the host-connected presentation space
Length	4 is implied
PS Position	NA

The calling data structure contains these elements

Byte	**Definition**
1	A 1-character presentation space short name (PSID)
2-4	Reserved

Return Parameters

Return Code	**Definition**
0	The function was successful
1	An incorrect PSID was specified
8	No prior call to **Start Communication Notification** (80) function was called for the PSID
9	A system error was encountered

Notes on Using This Function

Since both **Send File** (90) and **Receive File** (91) are blocking calls, this function must always be issued on a different thread.

Change PS Window Name (106)

3270	*5250*	*VT*
Yes	Yes	Yes

The **Change PS Window Name** function allows the application to specify a new name for the presentation space window or reset the presentation space window to the default name.

Prerequisite Calls

Connect Window Services (101)

Call Parameters

	Standard Interface	Enhanced Interface
Function Number	Must be 106	
Data String	See the following table	
Length	Must be specified (See note.)	Must be 68
PS Position	NA	

Note: The data string length must be specified (normally 3–63 for PC/3270, 4–63 for PC400, 68 for enhanced interface).

The calling data string can contain:

Byte		Definition
Standard	Enhanced	
1	1	A 1-character presentation space short name (PSID)
	2–4	Reserved
2	5	A change request option value, select one of: • X'01' for changing the presentation space window name. • X'02' for resetting the presentation space window name.
3–63	6–66	An ASCII string of from 1 (for PC/3270) or 2 (for PC400) to 61 bytes including a terminator byte. The ASCII string must end with a NULL character. This string must contain at least one non-NULL character followed by a NULL character.
	67–68	Reserved

Return Parameters

Return Code	Explanation
0	The **Change PS Window Name** function was successful.
1	An incorrect host presentation space short session ID was specified, or the host presentation space was not connected.
2	An error was made in specifying parameters.
9	A system error occurred.
12	The session stopped.

Notes on Using This Function

A string is ended at the first NULL character found. The NULL character overrides the specified string length. If the NULL character is not at the end of the specified length, the last byte at the specified length is replaced by a NULL character, and

the remainder of the data string is lost. If the NULL character is found before the specified length, the string is truncated at that point, and the remainder of the data string is lost.

If the application fails to reset the presentation space name before exiting, the exit list processing resets the name.

Change Switch List LT Name (105)

3270	*5250*	*VT*
Yes	Yes	Yes

The **Change Switch List LT Name** function allows the application to change or reset a switch list for a selected logical terminal (LT). The application must specify on the call the name to be inserted in the switch list.

Note: This is for compatibility with Communication Manager EHLLAPI, and has the same result as the **Change PS Window Name** (106) function.

Prerequisite Calls

Connect Window Services (101)

Call Parameters

	Standard Interface	**Enhanced Interface**
Function Number	Must be 105	
Data String	See the following table	
Length	Normally 4–63	Must be 68
PS Position	NA	

The calling data string can contain:

Byte		**Definition**
Standard	Enhanced	
1	1	A 1-character presentation space short name (PSID)
	2–4	Reserved
2	5	A change request option; select: • X'01' for changing a switch list LT name • X'02' for resetting a switch list LT name
3–63	6–66	An ASCII string of 2 to 61 bytes including a terminator byte. The ASCII string must end with a NULL character. This string must contain at least one non-NULL character followed by a NULL character.
	67–68	Reserved

Return Parameters

Return Code	**Explanation**
0	The **Change Switch List LT Name** function was successful.

Return Code	Explanation
1	An incorrect host presentation space short session ID was specified, or the host presentation space was not connected.
2	An error was made in specifying parameters.
9	A system error occurred.
12	The session stopped.

Notes on Using This Function

A string is ended at the first NULL character found. The NULL character overrides the specified string length. If the NULL character is not at the end of the specified length, the last byte at the specified length is replaced by a NULL character, and the remainder of the data string is lost. If the NULL character is found before the specified length, the string is truncated at that point, and the remainder of the data string is lost.

If the application fails to reset the switch list LT name before exiting, the exit list processing resets the name.

Connect for Structured Fields (120)

3270	*5250*	*VT*
Yes	No	No

The **Connect for Structured Fields** function allows an application to establish a connection to the emulation program to exchange structured field data with a host application. The workstation application must provide the Query Reply data field and must point to it with in the parameter string. The destination/origin ID returned by the emulator will be returned to the application.

Prerequisite Calls

There are no prerequisite calls for this function.

Call Parameters

	Standard Interface	Enhanced Interface
Function Number	Must be 120	
Data String	See the following table	
Length	7 or 11	Must be 16
PS Position	NA	

The calling data string can contain:

Byte		Definition
Standard	Enhanced	
1	1	A 1-character presentation space short name (PSID)
	2–4	Reserved
2–5	5–8	Address of the Query Reply data buffer
6–7	9–10	Destination/origin unique ID. (16-bit word, returned)
	11–12	Reserved

Byte		Definition
8–11	13–16	The data in these position is ignored by EHLLAPI. However, no error is caused if the migrating program has data in these positions. This data is accepted to provide compatibility with migrating applications.

Return Parameters

Return Code	Explanation
0	The **Connect for Structured Fields** function was successful.
1	A specified host presentation space short session ID was not valid, or the host presentation space was not connected.
2	An error was made in specifying parameters.
9	A system error occurred.
10	The function is not supported by the emulation program.
32	An application has already connected to this session for communications (successful connect).
39	One DDM session is already connected to this session.

Notes on Using This Function

1. EHLLAPI scans the query reply buffers for the destination/origin ID (DOID) self-defining parameter (SDP) to determine the contents of the DOID field of the query reply. If this value is X'0000', the emulator will assign a DOID to the application and EHLLAPI will fill in the DOID field of the query reply with the assigned ID. If the value specified by the application in the DOID field of the query reply is a nonzero value, the emulator will assign the specified value as the application's DOID, assuming that the ID has not been previously assigned. If the specified DOID is already in use, a return code of 2 will be returned by EHLLAPI.
2. The application should build the Query Reply Data structures in the application's private memory. Refer to Appendix A, "Query Reply Data Structures Supported by EHLLAPI", on page 313, for the detailed formats and usages of the query reply data structures supported by EHLLAPI.
3. Only cursory checking is performed on the Query Reply Data. Only the ID and the length of the structure are checked for validity.
4. Only one DDM base type connect is allowed per host session. If the DDM connection supports the self-defining parameter (SDP) for the destination origin ID (DOID), then multiple connects are allowed.
5. If return code RC=32 or RC=39 is received, an application is already connected to the selected session and use of that presentation space should be approached with caution. Conflicts with SRPI, file transfer, and other EHLLAPI applications might result.

Connect Presentation Space (1)

3270	*5250*	*VT*
Yes	Yes	Yes

The **Connect Presentation Space** function establishes a connection between your EHLLAPI application program and the host presentation space.

Prerequisite Calls

There are no prerequisite calls for this function.

Call Parameters

	Standard Interface	Enhanced Interface
Function Number	Must be 1	
Data String	1-character short name of the host presentation space	
Length	1 is implied	Must be 4
PS Position	NA	

The calling data string can contain:

Byte		Definition
Standard	Enhanced	
1	1	A 1-character presentation space short name (PSID)
	2–4	Reserved

Return Parameters

The **Connect Presentation Space** function sets the return code to indicate the status of the attempt and, if successful, the status of the host presentation space.

Return Code	Explanation
0	The **Connect Presentation Space** function was successful; the host presentation space is unlocked and ready for input.
1	An incorrect host presentation space ID was specified. The specified session either does not exist or is a logical printer session. This return code could also mean that the API Setting for DDE/EHLLAPI is not set on.
4	Successful connection was achieved, but the host presentation space is busy.
5	Successful connection was achieved, but the host presentation space is locked (input inhibited).
9	A system error was encountered.
11	This resource is unavailable. The host presentation space is already being used by another system function.

Notes on Using This Function

1. The **Connect Presentation Space** function is affected by the `CONLOG/CONPHYS` session option.
2. An EHLLAPI application cannot be connected to multiple presentation spaces concurrently. Calls requiring the **Connect Presentation Space** function as a prerequisite use the currently connected presentation space. For example, if an application is connected to presentation space A, B, and C in that order, the application must connect to B or A again to issue functions.
3. Each thread that requests a **Connect Presentation Space** must have a corresponding **Disconnect Presentation Space** (2), or one of the threads must issue a **Reset System** (21), which affects all threads and disconnects any remaining connections.

4. More than one EHLLAPI application can share a presentation space, if the applications support sharing (that is, if they were developed to work together and if they exhibit predictable behavior) and have compatible read/write access and keyword options as set in the **Set Sessions Parameters** (9) function. For more information, see "Set Session Parameters (9)" on page 145.
5. Because the **Connect Presentation Space** and **Start Keystroke Intercept** (50) functions share common subsystem functions, successful requests by an application to share either of these functions for the same session can affect the request of these two functions by other applications. For example, if application A successfully requests a **Connect Presentation Space** for a session with Write_Read access and KEY$abcdefgh as the keyword, a request by application B to **Connect Presentation Space** for a session and **Start Keystroke Intercept** is successful only if both applications have set compatible read/write options.
6. You cannot connect to a session that is defined as a logical printer session. Refer to *Personal Communications Version 5.7 Administrator's Guide and Reference*.

Connect Window Services (101)

3270	*5250*	*VT*
Yes	Yes	Yes

The **Connect Window Services** function allows the application to manage the presentation space windows. Only one EHLLAPI application at a time can be connected to a presentation space for window services.

An EHLLAPI application can connect to more than one presentation space concurrently for window services.

Prerequisite Calls

There are no prerequisite calls for this function.

Call Parameters

	Standard Interface	**Enhanced Interface**
Function Number	Must be 101	
Data String	1-character short session ID of the host presentation space	
Length	1 is implied	Must be 4
PS Position	NA	

The calling data string can contain:

Byte		**Definition**
Standard	Enhanced	
1	1	A 1-character presentation space short name (PSID)
	2–4	Reserved

Return Parameters

Return Code	**Explanation**
0	The **Connect Window Services** function was successful.

Return Code	Explanation
1	An incorrect host presentation space short session ID was specified, or the Sessions Window Services manager was not connected. This return code could also mean that the API Setting for DDE/EHLLAPI is not set on.
9	A system error occurred.
10	The function is not supported by the emulation program.
11	This resource is unavailable. The host presentation space is already being used by another system function.

Notes on Using This Function

1. An EHLLAPI application can be connected to multiple presentation space windows at the same time. The application can go back and forth between the connected presentation space windows without having to disconnect. For example, if an application is connected to presentation space windows A, B, and C, the application can access all of A, B, and C at the same time, and the other applications cannot access A, B, or C.
2. A **Connect Window Services** function is sufficient for the process. However, each thread that requests a **Connect Window Services** must have a corresponding **Disconnect Window Services** (102), or one of the threads must issue a **Reset System** (21), which affects all threads and disconnects any remaining connections.

Convert Position or Convert RowCol (99)

3270	*5250*	*VT*
Yes	Yes	Yes

The **Convert Position** or **Convert RowCol** function converts the host presentation space positional value into the display row and column coordinates or converts the display row and column coordinates into the host presentation space positional value. This function does not change the cursor position.

Prerequisite Calls

There are no prerequisite calls for this function.

Call Parameters

	Standard Interface	Enhanced Interface
Function Number	Must be 99	
Data String	Host presentation space short name *and* `P` for the **Convert Position** function (for example, `AP` converts the presentation space position of session A); *or* Host presentation space short name and `R` for the **Convert RowCol** function (for example, `AR` converts the row and column coordinates of session A).	

	Standard Interface	Enhanced Interface
Length	Row, when R is specified as the second character in the data string parameter. The lower limit for valid input is 1. The upper limit for valid input depends on how your host presentation space is configured. See "Notes on Using This Function" on page 40. NA when P is specified as the second character in the data string parameter.	
PS Position	Column, when R is specified as the second character in the data string parameter. The lower limit for valid input is 1. The upper limit for valid input ranges from 24 to 43 depending on how your host presentation space is configured. See "Notes on Using This Function" on page 40. Host presentation space position, when P is specified as the second character in the data string parameter. The lower limit for valid input is 1. The upper limit for valid input ranges from 1920 to 3564 depending on how your host presentation space is configured. See "Notes on Using This Function" on page 40.	

The calling data string can contain:

Byte		Definition
Standard	Enhanced	
1	1	A 1-character presentation space short name (PSID)
	2–4	Reserved
2	5	**Convert** option P or R
	6–8	Reserved

Return Parameters

This function returns a length and a return code.

Length:

For the **Convert Position** function (P as the second character in the calling data string), a number between 1 and 43 (for PC/3270) or 27 (for PC400) is returned. This value is the number of the row that contains the PS position contained in the calling PS position parameter. The upper limit can be smaller than 43 (for PC/3270) or 27 (for PC400) depending on how the host presentation space is configured.

For the **Convert RowCol** function (R as the second character in the calling data string), a value of 0 indicates an error in the input value for row (calling length parameter).

Return Code:

The **Convert Position or RowCol** function is the exception to the rule that the fourth return parameter always contains a return code. For this function, the value returned in the fourth parameter is called a status code. This status code can contain data or a return code. Your application must provide for processing of this status code to prevent unpredictable results or an error.

- If the value of the fourth parameter is 0, 9998, or 9999, it is a return code.

- For the **Convert Position** function (P as the second character of the calling data string), a value in the range of 1–132 is the number of the column that contains the PS position passed in the calling PS Position parameter. The upper limit can be smaller than 132 depending on how the host presentation space is configured.
- For the **Convert RowCol** function (R as the second character of the calling data string), a value in the range of 1–3564 represents the host presentation space position that corresponds to the row and column values passed in the calling length and PS position parameters, respectively. The upper limit can be smaller than 3564 depending on how the host presentation space is configured.

The following status codes are defined:

Status Code	Explanation
0	This is an incorrect PS position or column.
>0	This is the PS position or column.
9998	An incorrect host presentation space ID was specified or a system error occurred.
9999	Character 2 in the data string is not P or R.

Notes on Using This Function

1. To configure your presentation space, refer to *Personal Communications Version 5.7 Administrator's Guide and Reference*
2. To find out how many rows and columns are in your presentation space, examine the returned data string parameter for the **Query Session Status** (22) function. See "Query Session Status (22)" on page 109.

1137 Code Page Support

Unicode functionality is supported only on 5250 sessions.

Convert Position or Convert RowCol is Hindi enabled in order to return the beginning of the cluster. The usage of **Convert Position or Convert RowCol** is the same as the SBCS session.

Copy Field to String (34)

3270	*5250*	*VT*
Yes	Yes	Yes

The **Copy Field to String** function transfers characters from a field in the host-connected presentation space into a string.

The **Copy Field to String** function translates the characters in the host source presentation space into American National Standard Code for Information Interchange (ASCII). Attribute bytes and other characters not represented in ASCII normally are translated into blanks.

Prerequisite Calls

Connect Presentation Space (1)

Call Parameters

	Standard Interface	Enhanced Interface
Function Number	Must be 34	
Data String	Preallocated target data string. When the **Set Session Parameters** (9) function with Extended Attribute Bytes (EAB) option is issued, the length of the data string must be at least twice the length of the field. **DBCS Only:** When Extended Attributes Double-byte (EAD) option is specified, the length of the data string must be at least three times the length of the field. When both EAB and EAD options are specified, the length of the data string must be at least four times the length of the field.	
Length	Number of bytes to copy (the length of the data string).	
PS Position	Identifies the target field. This can be the PS position of any byte within the target field. Copy always starts at the beginning of the field.	

Return Parameters

This function returns a data string, length, and a return code.

Data String:

A string containing data from the identified field in the host presentation space. The first byte in the returned data string is the beginning byte of the identified field in the host presentation space. The number of bytes in the returned data string is determined by the smaller of:

- Number of bytes specified in the calling length parameter
- Number of bytes in the identified field in the host presentation space

Length:

The length of the data returned.

Return Code:

The following codes are defined:

Return Code	Explanation
0	The **Copy Field to String** function was successful.
1	Your program is not connected to a host session.
2	An error was made in specifying parameters.
6	The data to be copied and the target field are not the same size. The data is truncated if the string length is smaller than the field copied.
7	The host presentation space position is not valid.
9	A system error was encountered.
24	Unformatted host presentation space.

Notes on Using This Function

1. The field position and length information can be found by using the **Find Field Position** (31) and **Find Field Length** (32) functions. The **Copy Field to String** function can be used with either protected or unprotected fields, but only in a *field-formatted* host presentation space.
2. The copy is ended when one of the following conditions is encountered:

- When the end of the field is reached
- When the length of the target string is exceeded

3. **DBCS Only:** If the target string is ended at the higher byte of the DBCS character, the byte is translated into a blank. If the EAD option is set to on, three bytes are returned for each character. If both the EAB and EAD options are set to on, four bytes are returned for each character.

   Note: When the field wraps at the end of the presentation space, wrapping occurs when the end of the presentation space is reached.

4. **DBCS Only:** The **Set Session Parameters** (9) function EAD option is used with this function to return a 2-byte EAD. If the EAD option is specified instead of the EAB option, EAD is returned preceding each character. If both the EAB and EAD options are specified, EAD is returned preceding the EAB.
5. An EAB can be returned when the **Set Session Parameters** (9) function EAB option is used. EAB is related to each character in the presentation space and is returned preceding each character.
6. The **Copy Field to String** function is affected by the ATTRB/NOATTRB/NULLATTRB, the EAB/NOEAB, the XLATE/NOXLATE, the DISPLAY/NODISPLAY, the DISPLAY/NODISPLAY, the EAD/NOEAD (for DBCS only), and the NOSO/SPACESO/SO (for DBCS only) session options. Refer to items 5 on page 147; 13 and 14 on page 150; 17 on page 151; and 20 and 21 on page 152 for more information.

   As previously stated, the return of attributes by the various **Copy** (5, 8, and 34) functions is affected by the **Set Session Parameters** (9) function. The involved set session parameters have the following effect:

   Set Session Parameter
   Effect on the COPY Function

   NOEAB and NOEAD
   Attributes are not returned. Only text is copied from the presentation space to the user buffer.

   EAB and NOXLATE
   Attributes are returned as defined in the following tables.

   EAB and XLATE
   The colors used for the presentation space display are returned. Colors can be remapped; so the attribute colors are not the ones returned by the **COPY** functions when XLATE and EAB are on at the same time.

   EAD Double-byte character set attributes are returned as shown in the following tables.

   The returned character attributes are defined in the following tables. The attribute bit positions are in IBM format with bit 0 the left most bit in the byte.

   3270 character attributes are returned from the host to the emulator. The following table applies when EAB and NOXLATE are set.

Bit Position	Meaning
0–1	Character highlighting 00 = Normal 01 = Blink 10 = Reverse video 11 = Underline

Bit Position	Meaning
2–4	Character color (Color remap can override this color definition.) 000 = Default 001 = Blue 010 = Red 011 = Pink 100 = Green 101 = Turquoise 110 = Yellow 111 = White
5–6	Character attributes 00 = Default value 11 = Double byte character
7	Reserved

5250 character attributes are returned from the host to the emulator. The following table applies when EAB and NOXLATE are set.

Bit Position	Meaning
0	Reverse image 0 = Normal image 1 = Reverse image
1	Underline 0 = No underline 1 = Underline
2	Blink 0 = Not blink 1 = Blink
3	Separator of columns 0 = No separator 1 = Separator
4–7	Reserved

The following table shows Personal Communications character color attributes. The following table applies when EAB and XLATE are set.

Bit Position	Meaning
0–3	Background character colors 0000 = Black 0001 = Blue 0010 = Green 0011 = Cyan 0100 = Red 0101 = Magenta 0110 = Brown (3270), Yellow (5250) 0111 = White

Bit Position	Meaning
4–7	Foreground character colors 0000 = Black 0001 = Blue 0010 = Green 0011 = Cyan 0100 = Red 0101 = Magenta 0110 = Brown (3270), Yellow (5250) 0111 = White 1000 = Gray 1001 = Light blue 1010 = Light green 1011 = Light cyan 1100 = Light red 1101 = Light magenta 1110 = Yellow 1111 = White (high intensity)

- Double-byte character set attributes (for DBCS only)
  - The first byte

Bit Position	Character Position	Field Attribute Position
0	Double-byte character	Reserved
1	The first byte of the double-byte character	Reserved
2	SO	Reserved
3–4	SI (Bit position 3)	5250 DBCS related field When the value of bit position 7 is 0: 00 = Default 01 = DBCS only 10 = Either DBCS or SBCS 11 = Mixture of DBCS and SBCS When the value of bit position 7 is 1: 00 = Reserved 01 = DBCS only without SO/SI 10 = Reserved 11 = Reserved
5	Reserved	SO/SI enable (3270 only)
6	Reserved	Character attributes exist (3270 only)

Bit Position	Character Position	Field Attribute Position
7	Reserved	5250 DBCS related extended field 0 = Basic double-byte field 1 = Extended double-byte field

– The second byte

Bit Position	Character Position	Field Attribute Position
0	Reserved	Left grid line (3270 only)
1	Reserved	Upper grid line (3270 only)
2	Reserved	Right grid line (3270 only)
3	Reserved	Under grid line (3270 only)
4	Left grid line	Left grid line
5	Upper grid line	Upper grid line
6–7	Reserved	Reserved

For a PS/2® monochrome display, the characters in the application (workstation) session appear as various shades of gray. This is required to give users their remapped colors in the EHLLAPI application session so they can get what they see in their host application presentation spaces.

7. To use this function, preallocate memory to receive the returned data string parameter. The statements required to preallocate this memory vary depending on the language in which your application is written. Refer to "Memory Allocation" on page 8 for more information.

Note: 5250 emulation supports a presentation space of 24 rows by 80 columns. In some instances, Communication Manager 5250 emulation displays a 25th row. This occurs when either an error message from the host is displayed or when the operator selects the SysReq key. Personal Communications displays 25th row information on the status bar. By **EXTEND_PS** option, an EHLLAPI application can use the same interface with Communication Manager EHLLAPI and valid presentation space is extended when this condition occurs.

1390/1399 Code Page Support

Unicode functionality is supported only on 3270 and 5250 sessions.

In a Unicode session, the characters in the host source presentation space are translated into Unicode. Attribute bytes are normally translated into blanks.

The XLATE option (that can be specified using the **Set Session Parameters** function) is not supported in a Unicode session. This means that even if this option is issued, the EABs will not be translated to the PC color graphics adapter (CGA) format.

Prerequisite Calls: **Connect Presentation Space** (1)

Call Parameters:

	Standard Interface	Enhanced Interface
Function Number	Must be 34	
Data String	Preallocated target data string. When the **Set Session Parameters** (9) function with Extended Attribute Bytes (EAB) option is issued, the length of the data string must be at least twice the length of the EBCDIC field.	
Length	The length of the target data string in Unicode characters.	
PS Position	Identifies the target field. This can be the PS position of any byte within the target field. Copy always starts at the beginning of the field.	

Return Parameters: This function returns a data string, length, and a return code.

Data String:
String containing the Unicode data is returned.

Length:
Number of Unicode characters copied into string.

Return Code:
The following codes are defined:

Return Code	Explanation
0	The **Copy Field to String** function was successful.
1	Your program is not connected to a host session.
2	An error was made in specifying parameters.
6	The data to be copied and the target field are not the same size. The data is truncated if the string length is smaller than the field copied.
7	The host presentation space position is not valid.
9	A system error was encountered.
24	Unformatted host presentation space.

Notes on Using This Function: The following options are supported in a Unicode session for **Copy Field To String** (34) and function in the same way as in DBCS:

- NOATTRB
- ATTRB
- NULLATTRB
- EAB
- NOEAB
- NOXLATE
- DISPLAY
- NODISPLAY

1137 Code Page Support

Unicode functionality is supported only on 5250 sessions.

In a Unicode session, the characters in the host source presentation space are translated into Unicode. Attribute bytes are normally translated into blanks.

The XLATE option (that can be specified using the **Set Session Parameters** function) is not supported in a Unicode session. This means that even if this option is issued, the EABs will not be translated to the PC color graphics adapter (CGA) format.

Prerequisite Calls: **Connect Presentation Space** (1)

Call Parameters:

	Standard Interface	**Enhanced Interface**
Function Number	Must be 34	
Data String	Preallocated target data string. The length should be twice the number of EBCDIC bytes required to be copied from the presentation space. When the **Set Session Parameters** (9) function with Extended Attribute Bytes (EAB) option is issued, the length of the data string must be at least four times the length of the EBCDIC field.	
Length	The length of the target data string in bytes. This length should be at least 2 in a Unicode session. If not, an error code of 2 is returned.	
PS Position	Identifies the target field. This can be the PS position of any byte within the target field. Copy always starts at the beginning of the field.	

Return Parameters: This function returns a data string, length, and a return code.

Data String:
String containing the Unicode data is returned.

Length:
Number of Unicode characters copied into string. To get the number of bytes, multiply by 2.

Return Code:
The following codes are defined:

Return Code	**Explanation**
0	The **Copy Field to String** function was successful.
1	Your program is not connected to a host session.
2	An error was made in specifying parameters.
6	The data to be copied and the target field are not the same size. The data is truncated if the string length is smaller than the field copied.
7	The host presentation space position is not valid.
9	A system error was encountered.
24	Unformatted host presentation space.

Notes on Using This Function: The following options are supported in a Unicode session for **Copy Field To String** and function in the same way as in SBCS:

- NOATTRB
- ATTRB
- NULLATTRB
- EAB

- NOEAB
- NOXLATE
- DISPLAY
- NODISPLAY

Copy OIA (13)

3270	*5250*	*VT*
Yes	Yes	Yes

The **Copy OIA** function returns the current operator information area (OIA) data from the host-connected presentation space.

The OIA is located under the bottom dividing line of the screen and is used to display session status information about the connection between the workstation and the host.

Prerequisite Calls

Connect Presentation Space (1)

Call Parameters

	Standard Interface	**Enhanced Interface**
Function Number	Must be 13	
Data String	Preallocated target data string	
Length	103	104
PS Position	NA	

Return Parameters

This function returns a data string and a return code.

Data String:

A 103-byte string for 16-bit and 104-byte string for 32-bit. See "Format of the Returned OIA Data String" on page 49 for more information.

Return Code:

The following codes are defined:

Return Code	Explanation
0	OIA data is returned. The target presentation space is unlocked.
1	Your program is not connected to a host session.
2	An error was made in specifying string length. OIA data was not returned.
4	OIA data is returned. The target presentation space is busy.
5	OIA data is returned. The target presentation space is locked. (Input inhibited)
9	An internal system error was encountered. OIA data was not returned.

Notes on Using This Function

1. The OIA Group consists of the bits that show the status of the connected sessions. The group is categorized by the represented host function. (For example, Group 8 consists of the bits that show all conditions of the input inhibit in the session.) The states of each group are ordered so that the high-order bits represent the indicators of higher priority. That is, bit 7 has priority over bit 0. Therefore, if more than one state is active within a group, the state with the highest priority is the active state within that group.
2. To use this function, preallocate memory to receive the returned data string parameter. The statements required to preallocate this memory vary depending on the language in which your application is written. Refer to "Memory Allocation" on page 8 for more information.

Format of the Returned OIA Data String

The OIA data string contains the following information:

Byte		Definition
Standard	Enhanced	
1	1	The OIA format byte. The value is 1 (PC/3270), 9 (PC400), or 5 (VT).
2–81	2–81	The OIA image in the host code points.
82–103	82–103	OIA group indicator meanings.
	104	Reserved.

PC/3270 OIA Group Indicator Meanings and Its Image: The OIA image group consists of an 80-byte ASCII character string with no attribute bytes that contains the OIA image in host code points. Figure 2 on page 50 shows the hexadecimal codes found in the host presentation space, and the characters they represent. The returned data can be translated into OIA graphics characters. Refer to the *Personal Communications Version 5.7 Quick Beginnings* for information on the OIA indicators.

To translate the returned data into OIA graphics characters, proceed as follows:

1. Print the data returned in bytes 2 through 81 to the screen or to a printer.
2. Using the code page chart applicable to the device on which the output appears, find the hexadecimal value corresponding to each character.
3. Using Figure 2 on page 50, find the OIA graphics character corresponding to each hexadecimal value found in step 2.

Note: Group 8 (byte 0) machine, communications, and program check images are followed by a three-digit number related to the type of check.

The online and screen ownership group images are for non-SNA 3274 controller configurations. For SNA, the CD hex value is translated by CD (see Figure 2 on page 50). If running on a 3174 controller or SDLC connection, the hex value X'F4' is replaced by X'B2' or X'22'. The highlight indicator is a corresponding image (in the first 80 bytes of the data string) of the "Group 5 (offset 86: Highlight group 1" byte. The highlight indicator is followed by either X'F9' (blink), X'FC' (underscore), X'D2' (reverse video), or X'80' (host default).

The short session ID followed by X'20' is in column 7.

All group images are represented by Main Frame Interactive (MFI) hex code points.

Note: The OIA image data string position minus 1 position equals the OIA column.

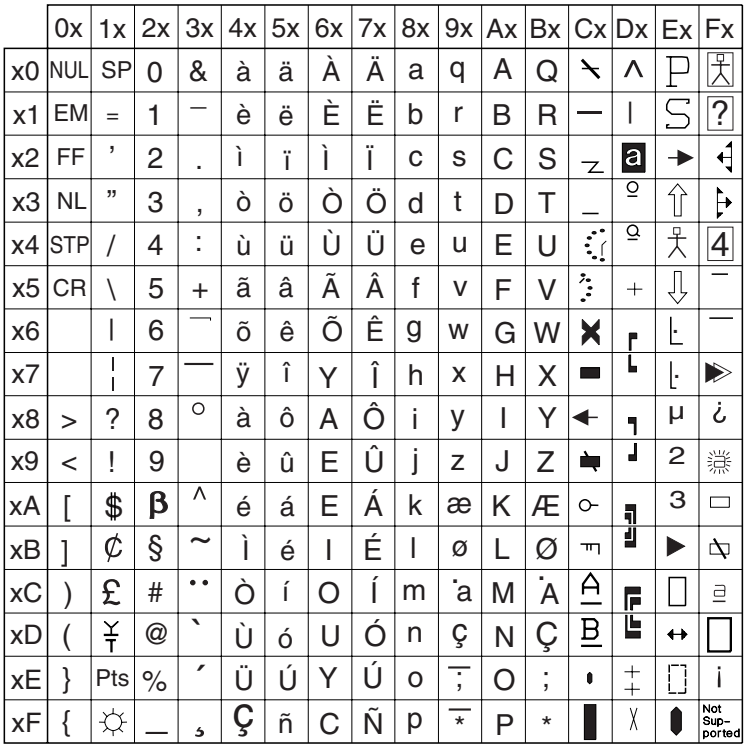

Figure 2. Host Presentation Space Characters

- Group 1 (Offset 82): Online and Screen Ownership

Bit	Meaning
0–1	Reserved
2	SSCP-LU session owns screen
3	LU-LU session owns screen
4	Online and not owned
5	Subsystem ready
6–7	Reserved

- Group 2 (Offset 83): Character Selection

Bit	Meaning
0	Reserved
1	APL
2	Katakana (Japan only)
3	Alphanumeric
4–5	Reserved
6	Hiragana (Japan only)
7	Double-byte character

- Group 3 (Offset 84): Shift State

Bit	Meaning
0	Upper shift
1	Numeric
2	CAPS
3–7	Reserved

- Group 4 (Offset 85): PSS Group 1

Bit	Meaning
0–7	Reserved

- Group 5 (Offset 86): Highlight Group 1

Bit	Meaning
0	Operator selectable
1	Field inherit
2–7	Reserved

- Group 6 (Offset 87): Color Group 1

Bit	Meaning
0	Operator selectable
1	Field inherit
2–7	Reserved

- Group 7 (Offset 88): Insert

Bit	Meaning
0	Insert mode
1–7	Reserved

- Group 8 (Offset 89–93): Input Inhibited (5 bytes)
  - Byte 1 (Offset 89)

Bit	Meaning
0	Non-resettable machine check
1	Reserved
2	Machine check
3	Communications check
4	Program check
5–7	Reserved

  - Byte 2 (Offset 90)

Bit	Meaning
0	Device busy
1	Terminal wait

Bit	Meaning
2	Minus symbol
3	Minus function
4	Too much entered
5–7	Reserved

– Byte 3 (Offset 91)

Bit	Meaning
0–2	Reserved
3	Incorrect dead key combination, limited key.
4	Wrong place
5–7	Reserved

– Byte 4 (Offset 92)

Bit	Meaning
0–1	Reserved
2	System wait
3–7	Reserved

– Byte 5 (Offset 93)

Bit	Meaning
0–7	Reserved

• Group 9 (Offset 94): PSS Group 2

Bit	Meaning
0–7	Reserved

• Group 10 (Offset 95): Highlight Group 2

Bit	Meaning
0–7	Reserved

• Group 11 (Offset 96): Color Group 2

Bit	Meaning
0–7	Reserved

• Group 12 (Offset 97): Communication Error Reminder

Bit	Meaning
0-6	Communications error
1–7	Reserved

- Group 13 (Offset 98): Printer State

Bit	Meaning
0–7	Reserved

- Group 14 (Offset 99): Graphics

Bit	Meaning
0–7	Reserved

- Group 15 (Offset 100): Reserved
- Group 16 (Offset 101): Automatic Key Play/Record State

Bit	Meaning
0–7	Reserved

- Group 17 (Offset 102): Automatic Key Quit/Stop State

Bit	Meaning
0–7	Reserved

- Group 18 (Offset 103): Expanded State

Bit	Meaning
0–7	Reserved

PC400 OIA Group Indicator Meanings and Its Image: Details of the OIA group are listed in the following tables.

- Group 1 (Offset 82): Online and Screen Ownership

Bit	Meaning	Beginning Position of Data String
0–2	Reserved	
3	System available	1
4	Reserved	
5	Subsystem ready	
6–7	Reserved	

- Group 2 (Offset 83): Character Selection

Bit	Meaning	Beginning Position of Data String
0–1	Reserved	
2	Katakana (Japan only)	
3	Alphanumeric	
4–5	Reserved	
6	Hiragana (Japan only)	
7	Double-byte character	

- Group 3 (Offset 84): Shift State

Bit	Meaning	Beginning Position of Data String
0	Reserved	
1	Keyboard shift	39
2	CAPS	
3–6	Reserved	
7	Double-byte character input available	

- Group 4 (Offset 85): PSS Group 1

Bit	Meaning	Beginning Position of Data String
0–7	Reserved	

- Group 5 (Offset 86): Highlight Group 1

Bit	Meaning	Beginning Position of Data String
0–7	Reserved	

- Group 6 (Offset 87): Color Group 1

Bit	Meaning	Beginning Position of Data String
0–7	Reserved	

- Group 7 (Offset 88): Insert

Bit	Meaning	Beginning Position of Data String
0	Insert mode	68
1–7	Reserved	

- Group 8 (Offset 89–93): Input Inhibited (5 bytes)
  - Byte 1 (Offset 89)

Bit	Meaning	Beginning Position of Data String
0–7	Reserved	

  - Byte 2 (Offset 90)

Bit	Meaning	Beginning Position of Data String
0–7	Reserved	

  - Byte 3 (Offset 91)

Bit	Meaning	Beginning Position of Data String
0–4	Reserved	
5	Operator input error	64
6–7	Reserved	

– Byte 4 (Offset 92)

Bit	Meaning	Beginning Position of Data String
0–1	Reserved	
2	System wait	64
3–7	Reserved	

– Byte 5 (Offset 93)

Bit	Meaning	Beginning Position of Data String
0–7	Reserved	

• Group 9 (Offset 94): PSS Group 2

Bit	Meaning	Beginning Position of Data String
0–7	Reserved	

• Group 10 (Offset 95): Highlight Group 2

Bit	Meaning	Beginning Position of Data String
0–7	Reserved	

• Group 11 (Offset 96): Color Group 2

Bit	Meaning	Beginning Position of Data String
0–7	Reserved	

• Group 12 (Offset 97): Communication Error Reminder

Bit	Meaning	Beginning Position of Data String
0	Communications Error	
1–5	Reserved	
7	Message wait	3

• Group 13 (Offset 98): Printer State

Bit	Meaning	Beginning Position of Data String
0–7	Reserved	

• Group 14 (Offset 99): Graphics

Bit	Meaning	Beginning Position of Data String
0–7	Reserved	

• Group 15 (Offset 100): Reserved
• Group 16 (Offset 101): Automatic Key Play/Record State

Bit	Meaning	Beginning Position of Data String
0–7	Reserved	

- Group 17 (Offset 102): Automatic Key Quit/Stop State

Bit	Meaning	Beginning Position of Data String
0–7	Reserved	

- Group 18 (Offset 103): Expanded State

Bit	Meaning	Beginning Position of Data String
0–7	Reserved	

VT Host OIA Group Indicator Meanings and Its Image: Details of the VT Host OIA group are listed in the following tables.

- Group 1 (Offset 82): Online and Screen Ownership

Bit	Meaning
5	Subsystem ready

- Group 2 (Offset 83): Character Selection

Bit	Meaning
0	Upper shift
2	CAPS

- Group 7 (Offset 88): Insert

Bit	Meaning
0	Insert mode

Some columns on the OIA line display different messages for VT than those messages displayed for 3270/5250. See the following table for specific details.

Column	Symbol
1–7	VT220 7
	VT220 8
	VT100
	VT52
	VTANSI
9 - 12	LOCK
61 - 64	HOLD

Copy Presentation Space (5)

3270	*5250*	*VT*
Yes	Yes	Yes

The **Copy Presentation Space** function copies the contents of the host-connected presentation space into a data string that you define in your EHLLAPI application program.

The **Copy Presentation Space** function translates the characters in the host source presentation space into ASCII. Attribute bytes and other characters not represented in ASCII normally are translated into blanks. If you do not want the attribute bytes translated into blanks, you can override this translation with the ATTRB option under the **Set Session Parameters** (9) function.

Prerequisite Calls

Connect Presentation Space (1)

Call Parameters

	Standard Interface	Enhanced Interface
Function Number	Must be 5	
Data String	Preallocated target string the size of your host presentation space. This can vary depending on how your host presentation space is configured. When the **Set Session Parameters** (9) function with the EAB option is issued, the length of the data string must be at least twice the length of the presentation space. **DBCS Only:** When the EAD option is specified, the length of the data string must be at least three times the length of the presentation space. When both the EAB and EAD options are specified, the length of the data string must be at least four times the length of the presentation space.	
Length	NA (the length of the host presentation space is implied).	
PS Position	NA.	

Return Parameters

This function returns a data string, length, and a return code.

Data String:
Contents of the connected host presentation space.

Length:
Length of the data copied.

Return Code:
The following codes are defined:

Return Code	Explanation
0	The host presentation space contents were copied to the application program. The target presentation space was active, and the keyboard was unlocked.
1	Your program is not connected to a host session.
4	The host presentation space contents were copied. The connected host presentation space was waiting for host response.
5	The host presentation space was copied. The keyboard was locked.
9	A system error was encountered.

Notes on Using This Function

1. An EAB can be returned when the **Set Session Parameters** (9) function EAB option is used. EAB is related to each character in the presentation space and is returned preceding each character.

2. **DBCS Only:** The **Set Session Parameters** (9) function EAD option is used with this function to return a 2-byte EAD. If the EAD option is specified instead of the EAB option, EAD is returned preceding each character. If both the EAB and EAD options are specified, EAD is returned preceding the EAB.

   If the start position of the copy is at the second byte in the double-byte character, or the end position is at the first byte in the double-byte character, the bytes are translated into blanks.
3. The **Copy Presentation Space** function is affected by the following session options:
   - ATTRB/NOATTRB/NULLATTRB
   - EAB/NOEAB
   - XLATE/NOXLATE
   - BLANK/NOBLANK
   - DISPLAY/NODISPLAY
   - EAD/NOEAD (for DBCS only)
   - NOSO/SPACESO/SO (for DBCS only)
   - EXTEND_PS/NOEXTEND_PS

Refer to items 5 on page 147; 13, 14, 15 and 17 on page 151; and 20 and 21 on page 152 for more information.

If the target data string provided is not long enough to hold the requested data, unpredictable results can occur.

As previously stated, the return of attributes by the various **Copy** (5, 8, and 34) functions is affected by the **Set Session Parameters** (9) function. The involved set session parameters have the following effect:

Set Session Parameter
: **Effect on the COPY Function**

NOEAB and NOEAD
: Attributes are not returned. Only text is copied from the presentation space to the user buffer.

EAB and NOXLATE
: Attributes are returned as defined in the following tables.

EAB and XLATE
: The colors used for the presentation space display are returned. Colors can be remapped; so the attribute colors are not the ones returned by the **Copy** functions when XLATE and EAB are on at the same time.

EAD
: Double-byte character set attributes are returned as shown in the following tables.

NOSO/SPACESO/SO
: When NOSO is specified, it works as SPACESO. The size of the presentation space is not changed.

The returned character attributes are defined in the following tables. The attribute bit positions are in IBM format with bit 0 the left most bit in the byte.

3270 character attributes are returned from the host to the emulator. The following table applies when EAB and NOXLATE are set.

Bit Position	Meaning
0–1	Character highlighting 00 = Normal 01 = Blink 10 = Reverse video 11 = Underline
2–4	Character color (Color remap can override this color definition.) 000 = Default 001 = Blue 010 = Red 011 = Pink 100 = Green 101 = Turquoise 110 = Yellow 111 = White
5–6	Character attribute 00 = Default value 11 = Double-byte character
7	Reserved

5250 character attributes are returned from the host to the emulator. The following table applies when EAB and NOXLATE are set.

Bit Position	Meaning
0	Reverse image 0 = Normal image 1 = Reverse image
1	Underline 0 = No underline 1 = Underline
2	Blink 0 = Not blink 1 = Blink
3	Separator of columns 0 = No separator 1 = Separator
4–7	Reserved

The following table shows Personal Communications character color attributes. The following table applies when EAB and XLATE are set.

Bit Position	Meaning
0–3	Background character colors 0000 = Black 0001 = Blue 0010 = Green 0011 = Cyan 0100 = Red 0101 = Magenta 0110 = Brown (3270), Yellow (5250) 0111 = White
4–7	Foreground character colors 0000 = Black 0001 = Blue 0010 = Green 0011 = Cyan 0100 = Red 0101 = Magenta 0110 = Brown (3270), Yellow (5250) 0111 = White 1000 = Gray 1001 = Light blue 1010 = Light green 1011 = Light cyan 1100 = Light red 1101 = Light magenta 1110 = Yellow 1111 = White (high intensity)

- Double-byte character set attributes (for DBCS only)
  - The first byte

Bit Position	Character Position	Field Attribute Position
0	Double-byte character	Reserved
1	The first byte of the double-byte character	Reserved
2	SO	Reserved

Bit Position	Character Position	Field Attribute Position
3–4	SI (Bit position 3)	5250 DBCS related field - When the value of bit position 7 is 0: 00 = Default 01 = DBCS only 10 = Either DBCS or SBCS 11 = Mixture of DBCS and SBCS - When the value of bit position 7 is 1: 00 = Reserved 01 = DBCS only without SO/SI 10 = Reserved 11 = Reserved
5	Reserved	SO/SI enabled (3270 only)
6	Reserved	Character attributes exist (3270 only)
7	Reserved	5250 DBCS related extended field 0 = Basic double-byte field 1 = Extended double-byte field

– The second byte

Bit Position	Character Position	Field Attribute Position
0	Reserved	Left grid line (3270 only)
1	Reserved	Upper grid line (3270 only)
2	Reserved	Right grid line (3270 only)
3	Reserved	Under grid line (3270 only)
4	Left grid line	Left grid line
5	Upper grid line	Upper grid line
6–7	Reserved	Reserved

For a PS/2 monochrome display, the characters in the application (workstation) session appear as various shades of gray. This is required to give users their remapped colors in the EHLLAPI application session so they can get what they see in their host application presentation spaces.

If you want to copy only a portion of the host presentation space, use the **Copy Presentation Space to String** (8) function.

To use this function, preallocate memory to receive the returned data string parameter. The statements required to preallocate this memory vary depending on the language in which your application is written. Refer to “Memory Allocation” on page 8 for more information.

Note: 5250 emulation supports a presentation space of 24 rows by 80 columns. In some instances, Communication Manager 5250 emulation displays a 25th row. This occurs when either an error message from the host is displayed or when the operator selects the SysReq key. Personal Communications displays 25th row information on row 24, or on the status bar. For

information to be displayed on the status bar, the status bar must be configured. Refer to *Personal Communications Version 5.7 Quick Beginnings* for information on configuring the status bar. By the **EXTEND_PS** option, an EHLLAPI application can use the same interface with Communication Manager EHLLAPI and valid presentation space is extended when this condition occurs.

1390/1399 Code Page Support

Unicode functionality is supported only on 3270 and 5250 sessions.

In a Unicode session, the characters in the host source presentation space are translated into Unicode. Attribute bytes are normally translated into blanks.

The XLATE option (that can be specified using the **Set Session Parameters** (9) function) is not supported in a Unicode session. This means that even if this option is issued, the EABs will not be translated to the PC color graphics adapter (CGA) format.

Prerequisite Calls: **Connect Presentation Space** (1)

Call Parameters:

	Standard Interface	**Enhanced Interface**
Function Number	Must be 5	
Data String	Preallocated target Unicode string. When the **Set Session Parameters** (9) function with Extended Attribute Bytes (EAB) option is issued, the length of the data string must be twice the size of the presentation space.	
Length	NA (the length of the host presentation space is implied).	
PS Position	NA	

Return Parameters: This function returns a data string and a return code.

Data String:
String containing the Unicode representation of the contents of presentation space is returned

Return Code:
The following codes are defined:

Return Code	Explanation
0	The host presentation space contents were copied to the application program. The target presentation space was active, and the keyboard was unlocked.
1	Your program is not connected to a host session.
4	The host presentation space contents were copied. The connected host presentation space was waiting for host response.
5	The host presentation space was copied. The keyboard was locked.
9	A system error was encountered.

Notes on Using This Function: The following options are supported in a Unicode session for **Copy Presentation Space (5)** and function in the same way as in DBCS:

- NOATTRB

- ATTRB
- NULLATTRB
- EAB
- NOEAB
- NOXLATE
- DISPLAY
- NODISPLAY
- BLANK
- NOBLANK

1137 Code Page Support

Unicode functionality is supported only on 5250 sessions.

In a Unicode session, the characters in the host source presentation space are translated into Unicode. Attribute bytes are normally translated into blanks.

The XLATE option (that can be specified using the **Set Session Parameters** (9) function) is not supported in a Unicode session. This means that even if this option is issued, the EABs will not be translated to the PC color graphics adapter (CGA) format.

Prerequisite Calls: **Connect Presentation Space** (1)

Call Parameters:

	Standard Interface	**Enhanced Interface**
Function Number	Must be 5	
Data String	Preallocated target Unicode data string. The length (in bytes) should be twice the size (in bytes) of the presentation space. When the **Set Session Parameters** (9) function with Extended Attribute Bytes (EAB) option is issued, the length of the data string must be at least four times the size of the presentation space.	
Length	NA (the length of the host presentation space is implied).	
PS Position	NA	

Return Parameters: This function returns a data string and a return code.

Data String:

String containing the Unicode representation of the contents of presentation space is returned

Return Code:

The following codes are defined:

Return Code	**Explanation**
0	The host presentation space contents were copied to the application program. The target presentation space was active, and the keyboard was unlocked.
1	Your program is not connected to a host session.
4	The host presentation space contents were copied. The connected host presentation space was waiting for host response.
5	The host presentation space was copied. The keyboard was locked.

Return Code	Explanation
9	A system error was encountered.

Notes on Using This Function: The following options are supported in a Unicode session for **Copy Presentation Space (5)** and function in the same way as in SBCS:

- NOATTRB
- ATTRB
- NULLATTRB
- EAB
- NOEAB
- NOXLATE
- DISPLAY
- NODISPLAY
- BLANK
- NOBLANK

Copy Presentation Space to String (8)

3270	*5250*	*VT*
Yes	Yes	Yes

The **Copy Presentation Space to String** function is used to copy all or part of the host-connected presentation space into a data string that you define in your EHLLAPI application program.

The input PS position is the offset into the host presentation space. This offset is based on a layout in which the upper-left corner (row 1/column 1) is location 1 and the bottom-right corner is 3564, which is the maximum screen size for the host presentation space. The value of `PS Position + (Length – 1)` cannot exceed the configured size of your host presentation space.

The **Copy Presentation Space to String** function translates the characters in the host source presentation space into ASCII. Attribute bytes and other characters not represented in ASCII normally are translated into blanks. If you do not want the attribute bytes translated into blanks, you can override this translation with the ATTRB option under the **Set Session Parameters** (9) function.

Prerequisite Calls

Connect Presentation Space (1).

Call Parameters

	Standard Interface	Enhanced Interface
Function Number	Must be 8	

	Standard Interface	Enhanced Interface
Data String	Preallocated target string the size of your host presentation space. When the **Set Session Parameters** (9) function with the EAB option is issued, the length of the data string must be at least twice the length of the presentation space. **DBCS Only:** When the EAD option is specified, the length of the data string must be at least three times the length of the presentation space. When both the EAB and EAD options are specified, the length of the data string must be at least four times the length of the presentation space.	
Length	Length of the target data string.	
PS Position	Position within the host presentation space of the first byte in your target data string.	

Return Parameters

This function returns a data string and a return code.

Data String:
Contents of the host presentation space.

Return Code:
The following codes are defined:

Return Code	Explanation
0	The host presentation space contents were copied to the application program. The target presentation space was active, and the keyboard was unlocked.
1	Your program is not connected to a host session.
2	An error was made in specifying string length, or the sum of (Length – 1) + PS position is greater than the size of the connected host presentation space.
4	The host presentation space contents were copied. The host presentation space was waiting for host response.
5	The host presentation space was copied. The keyboard was locked.
7	The host presentation space position is not valid.
9	A system error was encountered.

Notes on Using This Function

1. An EAB can be returned when the **Set Session Parameters** (9) function EAB option is used. EAB is related to each character in the presentation space and is returned following each character.
2. **DBCS Only:** The **Set Session Parameters** (9) function EAD option is used with this function to return a 2-byte EAD. If the EAD option is specified instead of the EAB option, EAD is returned preceding each character. If both the EAB and EAD options are specified, EAD is returned following the EAB.

   If the start position of the copy is at the second byte in the double-byte character, or the end position is at the first byte in the double-byte character, the bytes are translated into blanks. If the EAD option is set to on, three bytes are returned for each character. If both the EAB and EAD options are set to on, four bytes are returned for each character.
3. The **Copy Presentation Space to String** function is affected by the following options:

- ATTRB/NOATTRB/NULLATTRB
- EAB/NOEAB
- XLATE/NOXLATE
- BLANK/NOBLANK
- DISPLAY/NODISPLAY
- EAD/NOEAD (for DBCS only)
- NOSO/SPACESO/SO (for DBCS only)
- EXTEND_PS/NOEXTEND_PS

Refer to items 5 on page 147; 13 and 14 on page 150; 15 on page 150; 17 on page 151; and 20 and 21 on page 152

If the target data string provided is not large enough to hold the requested number of bytes, the copy ends successfully (RC=0, 4, or 5) when the end of the target data string is reached.

As previously stated, the return of attributes by the various **Copy** (5, 8, and 34) functions is affected by the **Set Session Parameters** (9) function. The involved set session parameters have the following effect:

Set Session Parameter
Effect on the Copy Function

NOEAB and NOEAD
Attributes are not returned. Only text is copied from the presentation space to the user buffer.

EAB and NOXLATE
Attributes are returned as defined in the following tables.

EAB and XLATE
The colors used for the presentation space display are returned. Colors can be remapped, so the attribute colors are not the ones returned by the **Copy** functions when XLATE and EAB are on at the same time.

EAD Double-byte character set attributes are returned as shown in the following tables.

The returned character attributes are defined in the following tables. The attribute bit positions are in IBM format with bit 0 the left most bit in the byte.

- 3270 character attributes are returned from the host to the emulator. The following table applies when EAB and NOXLATE are set.

Bit Position	Meaning
0–1	Character highlighting 00 = Normal 01 = Blink 10 = Reverse video 11 = Underline

Bit Position	Meaning
2–4	Character color (Color remap can override this color definition.) 000 = Default 001 = Blue 010 = Red 011 = Pink 100 = Green 101 = Turquoise 110 = Yellow 111 = White
5–7	Reserved

- 5250 character attributes are returned from the host to the emulator. The following table applies when EAB and NOXLATE are set.

Bit Position	Meaning
0	Reverse image 0 = Normal image 1 = Reverse image
1	Underline 0 = No underline 1 = Underline
2	Blink 0 = Not blink 1 = Blink
3	Separator of columns 0 = No separator 1 = Separator
4–7	Reserved

- VT character attributes are returned from the host to the emulator. The following table applies when EAB and NOXLATE are set.

Bit Position	Meaning
0-3	Reserved
4	Bold 1 = On 0 = Off
5	Underscore 1 = On 1 = Off
6	Blink 1 = On 0 = Off
7	Reverse 0 = On 1 = Off

- The following table shows Personal Communications character color attributes. The following table applies when EAB and XLATE are set.

Bit Position	Meaning
0–3	Background character colors 0000 = Black 0001 = Blue 0010 = Green 0011 = Cyan 0100 = Red 0101 = Magenta 0110 = Brown (3270), Yellow (5250) 0111 = White
4–7	Foreground character colors 0000 = Black 0001 = Blue 0010 = Green 0011 = Cyan 0100 = Red 0101 = Magenta 0110 = Brown (3270), Yellow (5250) 0111 = White 1000 = Gray 1001 = Light blue 1010 = Light green 1011 = Light cyan 1100 = Light red 1101 = Light magenta 1110 = Yellow 1111 = White (high intensity)

- Double-byte character set attributes
  - The first byte

Bit Position	Character Position	Field Attribute Position
0	Double-byte character	Reserved
1	The first byte of the double-byte character	Reserved
2	SO	Reserved

Bit Position	Character Position	Field Attribute Position
3–4	SI (Bit position 3)	5250 DBCS related field When the value of bit position 7 is 0: 00 = Default 01 = DBCS only 10 = Either DBCS or SBCS 11 = Mixture of DBCS and SBCS When the value of bit position 7 is 1: 00 = Reserved 01 = DBCS only without SO/SI 10 = Reserved 11 = Reserved
5	Reserved	SO/SI enable (3270 only)
6	Reserved	Character Attributes exist (3270 only)
7	Reserved	5250 DBCS related extended field 0 = Basic double-byte field 1 = Extended double-byte field

– The second byte

Bit Position	Character Position	Field Attribute Position
0	Reserved	Left grid line (3270 only)
1	Reserved	Upper grid line (3270 only)
2	Reserved	Right grid line (3270 only)
3	Reserved	Under grid line (3270 only)
4	Left grid line	Left grid line
5	Upper grid line	Upper grid line
6–7	Reserved	Reserved

For a PS/2 monochrome display, the characters in the application (workstation) session appear as various shades of gray. This is required to give users their remapped colors in the EHLLAPI application session so they can get what they see in their host application presentation spaces.

4. To use this function, preallocate memory to receive the returned data string parameter. The statements required to preallocate this memory vary depending on the language in which your application is written. Refer to “Memory Allocation” on page 8 for more information.

Note: 5250 emulation supports a presentation space of 24 rows by 80 columns. In some instances, Communication Manager 5250 emulation displays a 25th row. This occurs when either an error message from the host is displayed or

when the operator selects the SysReq key. Personal Communications displays 25th row information on row 24, or on the status bar. For information to be displayed on the status bar, the status bar must be configured. Refer to *Personal Communications Version 5.7 Quick Beginnings* for information on configuring the status bar. By the **EXTEND_PS** option, an EHLLAPI application can use the same interface with Communication Manager EHLLAPI and valid presentation space is extended when this condition occurs.

1390/1399 Code Page Support

Unicode functionality is supported only on 3270 and 5250 sessions.

In a Unicode session, the characters in the host source presentation space are translated into Unicode. Attribute bytes are normally translated into blanks.

The XLATE option (that can be specified using the **Set Session Parameters** (9) function) is not supported in a Unicode session. This means that even if this option is issued, the EABs will not be translated to the PC color graphics adapter (CGA) format.

Prerequisite Calls: **Connect Presentation Space** (1)

Call Parameters:

	Standard Interface	**Enhanced Interface**
Function Number	Must be 8	
Data String	Preallocated target Unicode string. When the **Set Session Parameters** (9) function with Extended Attribute Bytes (EAB) option is issued, the length of the data string must be at least twice the length of the presentation space.	
Length	The length of the target Unicode string in Unicode characters.	
PS Position	Position within the host presentation space of the first byte in your target data string.	

Return Parameters: This function returns a data string and a return code.

Data String:
String containing the Unicode data is returned

Return Code:
The following codes are defined:

Return Code	**Explanation**
0	The host presentation space contents were copied to the application program. The target presentation space was active, and the keyboard was unlocked.
1	Your program is not connected to a host session.
2	An error was made in specifying string length, or the sum of (Length – 1) + PS position is greater than the size of the connected host presentation space.
4	The host presentation space contents were copied. The host presentation space was waiting for host response.
5	The host presentation space was copied. The keyboard was locked.

Return Code	Explanation
7	The host presentation space position is not valid.
9	A system error was encountered.

Notes on Using This Function: The following options are supported in a Unicode session for **Copy Presentation Space to String** and function in the same way as in DBCS:

- NOATTRB
- ATTRB
- NULLATTRB
- EAB
- NOEAB
- NOXLATE
- DISPLAY
- NODISPLAY
- BLANK
- NOBLANK

1137 Code Page Support

Unicode functionality is supported only on 5250 sessions.

In a Unicode session, the characters in the host source presentation space are translated into Unicode. Attribute bytes are normally translated into blanks.

The XLATE option (that can be specified using the **Set Session Parameters** (9) function) is not supported in a Unicode session. This means that even if this option is issued, the EABs will not be translated to the PC color graphics adapter (CGA) format.

Prerequisite Calls: **Connect Presentation Space** (1)

Call Parameters:

	Standard Interface	Enhanced Interface
Function Number	Must be 8	
Data String	Preallocated target data string. The length should be at least twice the number of EBCDIC bytes required to be copied from the presentation space. When the **Set Session Parameters** (9) function with Extended Attribute Bytes (EAB) option is issued, the length of the data string must be at least four times the length of the EBCDIC string that is to be copied from the presentation space.	
Length	The length of the target Unicode string in bytes. This length should be at least 2 in a Unicode session. If not, an error code of 2 is returned.	
PS Position	Position within the host presentation space of the first byte in your target data string.	

Return Parameters: This function returns a data string and a return code.

Data String:
Contents of the host presentation space.

Return Code:
The following codes are defined:

Return Code	Explanation
0	The host presentation space contents were copied to the application program. The target presentation space was active, and the keyboard was unlocked.
1	Your program is not connected to a host session.
2	An error was made in specifying string length, or the sum of (Length – 1) + PS position is greater than the size of the connected host presentation space.
4	The host presentation space contents were copied. The host presentation space was waiting for host response.
5	The host presentation space was copied. The keyboard was locked.
7	The host presentation space position is not valid.
9	A system error was encountered.

Notes on Using This Function: The following options are supported in a Unicode session for **Copy Presentation Space to String** and function in the same way as in SBCS:

- NOATTRB
- ATTRB
- NULLATTRB
- EAB
- NOEAB
- NOXLATE
- DISPLAY
- NODISPLAY
- BLANK
- NOBLANK

Copy String to Field (33)

3270	*5250*	*VT*
Yes	Yes	Yes

The **Copy String to Field** function transfers a string of characters into a specified field in the host-connected presentation space. This function can be used only in a *field-formatted*host presentation space.

Prerequisite Calls

Connect Presentation Space (1)

Call Parameters

	Standard Interface	Enhanced Interface
Function Number	Must be 33	

	Standard Interface	Enhanced Interface
Data String	String containing the data to be transferred to a target field in the host presentation space.	
Length	Length, in number of bytes, of the source data string. Overridden if in EOT mode.	
PS Position	Identifies the target field. This can be the PS position of any byte within the target field. Copy always starts at the beginning of the field.	

Return Parameters

Return Code	Explanation
0	The **Copy String to Field** function was successful.
1	Your program is not connected to a host session.
2	Parameter error or zero length for copy.
5	The target field was protected or inhibited, or incorrect data was sent to the target field (such as a field attribute).
6	Copy was completed, but data is truncated.
7	The host presentation space position is not valid.
9	A system error was encountered.
24	Unformatted host presentation space.

Notes on Using This Function

1. The **Copy String to Field** function is affected by the following options:
   - STRLEN/STREOT
   - EOT
   - EAB/NOEAB
   - XLATE/NOXLATE
   - PUTEAB/NOPUTEAB

   Refer to items 1 and 2 on page 146; 13 and 14 on page 150; 18 on page 151; and 20 and 21 on page 152 for more information.
2. The string to be transferred is specified with the calling data string parameter. The string ends when one of these three conditions is encountered:
   - When an end-of-text (EOT) delimiter is encountered in the string if EOT mode was selected using the **Set Session Parameters** (9) function. (See "Set Session Parameters (9)" on page 145).
   - When the number specified in the length is reached if not in EOT mode.
   - When an end-of-field is encountered in the field.

   Note: If the field at the end of the host presentation space wraps, wrapping occurs when the end of the presentation space is reached.
3. The keyboard mnemonics (see **Send Key** (3) function) cannot be sent using the **Copy String to Field** function.
4. The first byte of the data to be transferred is always placed at the beginning of the field that contains the specified PS position.
5. **DBCS Only:** Double-byte characters can be included as a part of the string.

Note: PC400 does not add SO and SI to the string. When you write the strings, including double-byte characters at the DBCS mixed field, generate SO and SI and create the area where double-byte characters are written by using the **Send Key** (3) function in advance.

If both single-byte and double-byte characters exist in a string, the data might be truncated because the data length in EBCDIC is longer than in JISCII. In this case, only the first byte or the second byte of the double-byte character is not written.

If the last character in the original string is the first byte of the double-byte character, the character is not written and not counted in the length.

A control character is converted from single-byte character to double-byte character, or from double-byte character to single-byte character depending on the field condition. A pair of NULL+Control Character between SO and SI is treated as a double-byte control character. For example, the following strings are copied into the single-byte character field or the double-byte character field:

String	Meanings	Single-byte character field	Double-byte character field
X'000C'	(NULL)(FF) X'00'X'0C'	(SB NULL)(SB FF) X'00'X'0C'	(DB NULL)(DB FF) X'0000'X'000C'
X'0E000C0F'	(SO)(DB FF)(SI) X'0E'X'000C'X'0F'	–S error	(DB FF) X'000C'
Note: SB means single-byte characters and DB means double-byte characters.			

Note: 5250 emulation supports a presentation space of 24 rows by 80 columns. In some instances, Communication Manager 5250 emulation displays a 25th row. This occurs when either an error message from the host is displayed or when the operator selects the SysReq key. Personal Communications displays 25th row information on row 24, or on the status bar. For information to be displayed on the status bar, the status bar must be configured. Refer to *Personal Communications Version 5.7 Quick Beginnings* for information on configuring the status bar. By the **EXTEND_PS** option, an EHLLAPI application can use the same interface with Communication Manager EHLLAPI and valid presentation space is extended when this condition occurs.

1390/1399 Code Page Support

Unicode functionality is supported only on 3270 and 5250 sessions.

STREOT option is not supported in a Unicode session. Please refer to “Set Session Parameters (9)” on page 145 for details.

The XLATE option (that can be specified using the **Set Session Parameters** (9) function) is not supported in a Unicode session. This means that even if this option is issued, the EABs will not be translated to the PC color graphics adapter (CGA) format.

Prerequisite Calls: **Connect Presentation Space** (1)

Call Parameters:

	Standard Interface	Enhanced Interface
Function Number	Must be 33	
Data String	String containing the Unicode data to be transferred to a target field in the host presentation space.	
Length	Length, in number of Unicode characters, of the source Unicode string. **Note:** The EOT mode is not supported in a Unicode session; therefore, length should be specified for proper functioning of this function in a Unicode session.	
PS Position	Identifies the target field. This can be the PS position of any byte within the target field. Copy always starts at the beginning of the field.	

Return Parameters:

Return Code	Explanation
0	The **Copy String to Field** function was successful.
1	Your program is not connected to a host session.
2	Parameter error or zero length for copy.
5	The target field was protected or inhibited, or incorrect data was sent to the target field (such as a field attribute).
6	Copy was completed, but data is truncated.
7	The host presentation space position is not valid.
9	A system error was encountered.
24	Unformatted host presentation space.

Notes on Using This Function: The following options are supported in a Unicode session for **Copy String to Field** and function in the same way as in DBCS:

- STRLEN
- EAB
- NOEAB
- NOXLATE
- PUTEAB
- NOPUTEAB

1137 Code Page Support

Unicode functionality is supported only on 5250 sessions.

STREOT option is not supported in a Unicode session. Please refer to “Set Session Parameters (9)” on page 145 for details.

The XLATE option (that can be specified using the **Set Session Parameters** (9) function) is not supported in a Unicode session. This means that even if this option is issued, the EABs will not be translated to the PC color graphics adapter (CGA) format.

Prerequisite Calls: **Connect Presentation Space** (1)

Call Parameters:

	Standard Interface	Enhanced Interface
Function Number	Must be 33	
Data String	String containing the Unicode data to be transferred to a target field in the host presentation space.	
Length	Length, in number of bytes, of the source Unicode string. The length should be at least 2 bytes. If not, an error code of 2 is returned. **Note:** The EOT mode is not supported in a Unicode session; therefore, length should be specified for proper functioning of this function in a Unicode session.	
PS Position	Identifies the target field. This can be the PS position of any byte within the target field. Copy always starts at the beginning of the field.	

Return Parameters:

Return Code	Explanation
0	The **Copy String to Field** function was successful.
1	Your program is not connected to a host session.
2	Parameter error or zero length for copy.
5	The target field was protected or inhibited, or incorrect data was sent to the target field (such as a field attribute).
6	Copy was completed, but data is truncated.
7	The host presentation space position is not valid.
9	A system error was encountered.
24	Unformatted host presentation space.

Notes on Using This Function: The following options are supported in a Unicode session for **Copy String to Field** and function in the same way as in SBCS:

- STRLEN
- EAB
- NOEAB
- NOXLATE
- PUTEAB
- NOPUTEAB

Copy String to Presentation Space (15)

3270	*5250*	*VT*
Yes	Yes	Yes

The **Copy String to Presentation Space** function copies an ASCII data string directly into the host presentation space at the location specified by the PS position calling parameter.

Prerequisite Calls

Connect Presentation Space (1)

Call Parameters

	Standard Interface	Enhanced Interface
Function Number	Must be 15.	
Data String	String of ASCII data to be copied into the host presentation space.	
Length	Length, in number of bytes, of the source data string. Overridden if in EOT mode.	
PS Position	Position in the host presentation space to begin the copy, a value between 1 and the configured size of your host presentation space.	

Return Parameters

Return Code	Explanation
0	The **Copy String to Presentation Space** function was successful.
1	Your program is not connected to a host session.
2	Parameter error or zero length for copy.
5	The target presentation space is protected or inhibited, or incorrect data was sent to the target presentation space (such as a field attribute byte).
6	The copy was completed, but the data was truncated.
7	The host presentation space position is not valid.
9	A system error was encountered.

Notes on Using This Function

1. The **Copy String to Presentation Space** function is affected by the following options:
   - STRLEN/STREOT
   - EOT
   - EAB/NOEAB
   - XLATE/NOXLATE
   - PUTEAB/NOPUTEAB
   - EAD/NOEAD (for DBCS only)
   - NOSO/SPACESO/SO (for DBCS only)
   - EXTEND_PS/NOEXTEND_PS

   Refer to items 1 and 2 on page 146; 13 and 14 on page 150; 18 on page 151; and 20 and 21 on page 152 for more information.
2. The keyboard mnemonics (see **Send Key** (3) function) cannot be sent using the **Copy String to Presentation Space** function.
3. The string ends when an end-of-text (EOT) delimiter is encountered in the string if EOT mode was selected using the **Set Session Parameters** (9) function. (See "Set Session Parameters (9)" on page 145).
4. Although the **Send Key** (3) function accomplishes the same purpose, this function responds with the prompt and enters a command more quickly. Because the **Send Key** (3) function emulates the terminal operator typing the data from the keyboard, its process speed is slow for an application operating with a lot of data. This function provides a faster input path to the host.

5. The original data (the copied string) cannot exceed the size of the presentation space.
6. **DBCS Only:** Double-byte characters can be included as a part of the string.

   Note: PC400 does not add SO and SI to the string. When you write the strings, including double-byte characters at the DBCS mixed field, generate SO and SI and create the area where double-byte characters are written by using the **Send Key** (3) function in advance.

   If both single-byte and double-byte characters exist in a string, the data might be truncated because the data length in EBCDIC is longer than in JISCII. If only the first byte or the second byte of the double-byte character must be written into the string, a blank is written.

   If the last character in the original string is the first byte of the double-byte character, the character is not written and not counted in the length.

   If the character to be written into the last character of the target presentation space is SO/SI or the first byte of the double-byte character, the character is not written and truncated, and not counted in the length.

   A control character is converted from single-byte character to double-byte character, or from double-byte character to single-byte character depending on the field condition. A pair of NULL+Control Character between SO and SI is treated as a double-byte control character. For example, the following strings are copied into the single-byte character field or the double-byte character field:

String	Meanings	Single-byte character field	Double-byte character field
X'000C'	(NULL)(FF) X'00'X'0C'	(SB NULL)(SB FF) X'00'X'0C'	(DB NULL)(DB FF) X'0000'X'000C'
X'0E000C0F'	(SO)(DB FF)(SI) X'0E'X'000C'X'0F'	–S error	(DB FF) X'000C'
Note: SB means single-byte characters and DB means double-byte characters.			

   Note: 5250 emulation supports a presentation space of 24 rows by 80 columns. In some instances, Communication Manager 5250 emulation displays a 25th row. This occurs when either an error message from the host is displayed or when the operator selects the SysReq key. Personal Communications for Windows 95, Windows 98, Windows NT, Windows Me, Windows 2000, and Windows XP always displays the same information on the 24th row. By the **EXTEND_PS** option, an EHLLAPI application can use the same interface with Communication Manager EHLLAPI and valid presentation space is extended when this condition occurs.
7. This function call may cause a cursor movement to an unexpected position with some host applications. A SendKey function may be a better choice for filling a field than this function.

   Note: This only occurs with VT sessions or connections to an ASCII host.

1390/1399 Code Page Support

Unicode functionality is supported only on 3270 and 5250 sessions.

STREOT option is not supported in a Unicode session. Please refer to “Set Session Parameters (9)” on page 145 for details.

The XLATE option (that can be specified using the **Set Session Parameters** (9) function) is not supported in a Unicode session. This means that even if this option is issued, the EABs will not be translated to the PC color graphics adapter (CGA) format.

Prerequisite Calls: **Connect Presentation Space** (1)

Call Parameters:

	Standard Interface	**Enhanced Interface**
Function Number	Must be 15	
Data String	String containing the Unicode data to be transferred into the host presentation space.	
Length	Length, in number of Unicode characters, of the source Unicode string. **Note:** The EOT mode is not supported in a Unicode session; therefore, length should be specified for proper functioning of this function in a Unicode session.	
PS Position	Position in the host presentation space to begin the copy, a value between 1 and the configured size of your host presentation space.	

Return Parameters:

Return Code	**Explanation**
0	The **Copy String to Presentation Space** function was successful.
1	Your program is not connected to a host session.
2	Parameter error or zero length for copy.
5	The target presentation space is protected or inhibited, or incorrect data was sent to the target presentation space (such as a field attribute byte).
6	The copy was completed, but the data was truncated.
7	The host presentation space position is not valid.
9	A system error was encountered.

Notes on Using This Function: The following options are supported in a Unicode session for **Copy String to Presentation Space** and function in the same way as in DBCS:

- STRLEN
- EAB
- NOEAB
- NOXLATE
- PUTEAB
- NOPUTEAB

1137 Code Page Support

Unicode functionality is supported only on 5250 sessions.

STREOT option is not supported in a Unicode session. Please refer to “Set Session Parameters (9)” on page 145 for details.

The XLATE option (that can be specified using the **Set Session Parameters** (9) function) is not supported in a Unicode session. This means that even if this option is issued, the EABs will not be translated to the PC color graphics adapter (CGA) format.

Prerequisite Calls: **Connect Presentation Space** (1)

Call Parameters:

	Standard Interface	**Enhanced Interface**
Function Number	Must be 15	
Data String	String containing the Unicode data to be transferred into the host presentation space.	
Length	Length, in number of Unicode characters, of the source Unicode string. The length should be at least 2 bytes. If not, an error code of 2 is retuned. **Note:** The EOT mode is not supported in a Unicode session; therefore, length should be specified for proper functioning of this function in a Unicode session.	
PS Position	Position in the host presentation space to begin the copy, a value between 1 and the configured size of your host presentation space.	

Return Parameters:

Return Code	**Explanation**
0	The **Copy String to Presentation Space** function was successful.
1	Your program is not connected to a host session.
2	Parameter error or zero length for copy.
5	The target presentation space is protected or inhibited, or incorrect data was sent to the target presentation space (such as a field attribute byte).
6	The copy was completed, but the data was truncated.
7	The host presentation space position is not valid.
9	A system error was encountered.

Notes on Using This Function: The following options are supported in a Unicode session for **Copy String to Presentation Space** and function in the same way as in SBCS:

- STRLEN
- EAB
- NOEAB
- NOXLATE
- PUTEAB
- NOPUTEAB

Disconnect from Structured Fields (121)

3270	*5250*	*VT*
Yes	No	No

The **Disconnect from Structured Fields** function drops the connection between the emulation program and the EHLLAPI application. The EHLLAPI application must disconnect from the emulation program before exiting from the system. The EHLLAPI application should issue this function request if a previous **Connect for Structured Fields** was issued.

The **Reset System (21)** function will also disconnect any outstanding SF connections.

Prerequisite Calls

Connect for Structured Fields (120)

Call Parameters

	Standard Interface	**Enhanced Interface**
Function Number	Must be 121	
Data String	See the following table	
Length	Must be 3	Must be 8
PS Position	NA	

Data String Contents

Byte		**Definition**
Standard	Enhanced	
1	1	A 1-character presentation space short name (PSID).
	2–4	Reserved.
2–3	5–6	Destination/origin unique ID returned by the Connect for structured field (120) functions.
	7–8	Reserved.

Return Parameters

Return Code	**Explanation**
0	The **Disconnect from Structured Fields** function was successful.
1	A specified host presentation space short session ID was not valid or was not connected.
2	An error was made in specifying parameters.
9	A system error occurred.
40	Disconnected with asynchronous requests pending.

Notes on Using This Function

1. When a **Disconnect from Structured Fields** function is called, any outstanding asynchronous **Read Structured Fields** (126) or **Write Structured Fields** (127) function requests are returned if the application issues the **Get Request**

Completion (125) function call. Use the asynchronous form of this function when cleaning up after issuing a Disconnect call.

2. The **Reset System** (21) function will also free any outstanding asynchronous requests (requests that have not been retrieved by the application using the **Get Request Completion** (125) function).

Disconnect Presentation Space (2)

3270	*5250*	*VT*
Yes	Yes	Yes

The **Disconnect Presentation Space** function drops the connection between your EHLLAPI application program and the host presentation space. Also, if a host presentation space is reserved using the **Reserve** (11) function, it is released upon execution of the **Disconnect Presentation Space** function.

Prerequisite Calls

Connect Presentation Space (1)

Call Parameters

	Standard Interface	**Enhanced Interface**
Function Number	Must be 2	
Data String	NA	
Length	NA	
PS Position	NA	

Return Parameters

Return Code	**Explanation**
0	The **Disconnect Presentation Space** function was successful.
1	Your program was not currently connected to the host presentation space.
9	A system error was encountered.

Notes on Using This Function

1. After the **Disconnect Presentation Space** function is called, functions that interact with the host-connected presentation space are no longer valid (for example, the **Send Key** (3), **Wait** (4), **Reserve** (11) and **Release** (12) functions).
2. Your EHLLAPI application should disconnect from the host presentation space before exiting.
3. The **Disconnect Presentation Space** function does not reset the session parameters to the defaults. Your EHLLAPI application must call the **Reset System** (21) function to accomplish this.

Disconnect Window Service (102)

3270	*5250*	*VT*
Yes	Yes	Yes

The **Disconnect Window Service** function disconnects the window services connection between the EHLLAPI program and the specified host presentation space window.

Prerequisite Calls

Connect Window Services (101)

Call Parameters

	Standard Interface	Enhanced Interface
Function Number	Must be 102	
Data String	See the following table	
Length	1	4
PS Position	NA	

Data String Contents

Byte		Definition
Standard	Enhanced	
1	1	A 1-character presentation space short name (PSID)
	2–4	Reserved

Return Parameters

Return Code	Explanation
0	The **Disconnect Window Service** function was successful.
1	Your program is not connected for Window Services.
9	A system error occurred.

Notes on Using This Function

After the **Disconnect Window Service** function has been called, your application no longer manages the presentation space window.

Before exiting the application, you should request a **Disconnect Window Service** function for all presentation spaces that have been connected for Presentation Manager® services. If the application exits with an outstanding connection for window services, the subsystem cancels the outstanding connection.

Find Field Length (32)

3270	*5250*	*VT*
Yes	Yes	Yes

The **Find Field Length** function returns the length of a target field in the connected presentation space. This function can be used to find either protected or unprotected fields, but only in a *field-formatted* host presentation space.

This function returns the number of characters contained in the field identified using the call PS position parameter. This includes all characters from the beginning of the target field up to the character preceding the next attribute byte.

Prerequisite Calls

Connect Presentation Space (1)

Call Parameters

	Standard Interface	Enhanced Interface
Function Number	Must be 32	
Data String	See the following table	
Length	NA	NA
PS Position	See note	

Note: PS Position: Identifies the field within the host presentation space at which to start the **Find**. It can be the PS position of any byte within the field in which you desire the **Find** to start.

The calling 2-character data string can contain:

Code	Explanation
␣␣ or T␣	This field
P␣	The previous field, either protected or unprotected.
N␣	The next field, either protected or unprotected
NP	The next protected field
NU	The next unprotected field
PP	The previous protected field
PU	The previous unprotected field

Note: The ␣ symbol represents a required blank.

Return Parameters

This function returns a length and a return code.

Length:

The following lengths are valid:

Length	Explanation
= 0	When return code = 28, field length is 0. When return code = 24, host presentation space is not field formatted.
> 0	Required field length in the host presentation space.

Return Code:

The following codes are defined:

Return Code	Explanation
0	The **Find Field Length** function was successful.
1	Your program is not connected to a host session.
2	A parameter error was encountered.
7	The host presentation space position is not valid.
9	A system error was encountered.
24	No such field was found.

Return Code	Explanation
28	Field length of 0 bytes.

Notes on Using This Function

Except when ƀƀ or Tƀ is used as the calling data string, if the field found is the same as the field from which the **Find** started, a return code of 24 is returned.

Find Field Position (31)

3270	*5250*	*VT*
Yes	Yes	Yes

The **Find Field Position** function returns the beginning position of a target field in the host-connected presentation space. This function can be used to find either protected or unprotected fields but only in a *field-formatted* host presentation space.

Prerequisite Calls

Connect Presentation Space (1)

Call Parameters

	Standard Interface	Enhanced Interface
Function Number	Must be 31	
Data String	See the following table	
Length	NA	NA
PS Position	See note	

Note: PS Position: Identifies the field within the host presentation space at which to start the **Find**. It can be the PS position of any byte within the field in which you want the **Find** to start.

The calling 2-character data string can contain:

Code	Explanation
ƀƀ or Tƀ	This field
Pƀ	The previous field, either protected or unprotected
Nƀ	The next field, either protected or unprotected
NP	The next protected field
NU	The next unprotected field
PP	The previous protected field
PU	The previous unprotected field

Note: The ƀ symbol represents a required blank.

Return Parameters

This function returns a length and a return code.

Length:

The following lengths are valid:

Length	Explanation
= 0	When return code = 28, field length is 0. When return code = 24, host presentation space is not field formatted.
> 0	Relative position of the requested field from the origin of the host presentation space. This position is defined to be the first position after the attribute byte.

Return Code:

The following codes are defined:

Return Code	Explanation
0	The **Find Field Position** function was successful.
1	Your program is not connected to a host session.
2	A parameter error was encountered.
7	The host presentation space position is not valid.
9	A system error was encountered.
24	No such field was found.
28	Field length of 0 bytes.

Notes on Using This Function

Except when ƀƀ or Tƀ is used as the calling data string, if the field found is the same as the field from which the **Find** started, a return code of 24 is returned.

Free Communications Buffer (124)

3270	*5250*	*VT*
Yes	No	No

The **Free Communications Buffer** function returns to management memory a buffer that is no longer required by the application. The application should free the buffer prior to exiting the system.

Prerequisite Calls

Allocate Communications Buffer (123)

Call Parameters

	Standard Interface	Enhanced Interface
Function Number	Must be 124	
Data String	See the following table	
Length	Must be 6	Must be 8
PS Position	NA	

Data String Contents

Byte		Definition
Standard	Enhanced	

Byte		Definition
1–2	1–4	Must be 0
3–6	5–8	The address of the buffer

Return Parameters

Return Code	Explanation
0	The **Free Communications Buffer** function was successful.
2	An error was made in specifying parameters.
9	A system error occurred.
41	The buffer is in use.

Notes on Using This Function

1. If the application attempts to free an in use buffer, the free request will be denied and a return code of 41 will be returned.
2. An application should request the **Free Communications Buffer** (124) function before exiting for all communication buffers that have been allocated using the **Allocate Communications Buffer** (123) function.
3. The **Reset System** (21) function will free buffers allocated by the **Allocate Communications Buffer** (123) function.

Get Key (51)

3270	*5250*	*VT*
Yes	Yes	Yes

The **Get Key** function lets your EHLLAPI application program retrieve a keystroke from a session specified by the **Start Keystroke Intercept** (50) function and either process, accept, or reject that keystroke. By placing this function in a loop, you can use it to intercept a string.

Prerequisite Calls

Start Keystroke Intercept (50)

Call Parameters

	Standard Interface	Enhanced Interface
Function Number	Must be 51	
Data String	See the following table	
Length	8	12
PS Position	NA	

Data String Contents

Byte		Definition
Standard	Enhanced	

Byte		Definition
1	1	One of the following values: • A 1-character presentation space short name (PSID) • A blank or null indicating a function call for the host-connected presentation
	2–4	Reserved
2–8	5–11	Blanks that hold space for the symbolic representation of the requested data
	12	Reserved

Return Parameters

This function returns a data string and a return code.

Data String:

See the following table:

Byte		Definition
Standard	Enhanced	
1	1	One of the following values: • A 1-character presentation space short name (PSID) • A blank or null indicating a function call for the host-connected presentation
	2–4	Reserved
2	5	An option code character, one of the following characters: • `A` for ASCII returned • `M` for keystroke mnemonic • `S` for special mnemonic
3–8	6–11	These 6 bytes of the preallocated buffer space are used internally to enqueue and dequeue keystrokes. Possible combinations include: • Byte 3 contains an ASCII character and byte 4 contains X'00' • Bytes 3 and 4 contains a double-byte character • Bytes 3 contains the escape character (either `@` or another character specified using the `ESC=c` option of function 9) and byte 4 contains a 1-byte abbreviation for a function. (See "ASCII Mnemonics" on page 16) • Bytes 5 through 8 might be similar to bytes 3 and 4 if the returned ASCII mnemonic is longer than 2 bytes (for example, if the ASCII mnemonic represents Attn `@A@Q`, byte 5 contains `@` and byte 6 contains `Q`). If not used, bytes 5 through 8 are set to zero (X'00').

For clarification, some examples of returned data strings are provided below:

Note: The `@` symbol is the default escape character. The value of the escape character can be set to any keystroke represented in ASCII by using the `ESC=c` option of the **Set Session Parameters** (9) function. If the escape character has been changed to another character using this option, the `@` symbol in the following examples is replaced by the other character.

16-Bit Interface

EAt E is the presentation space short name. The keystrokes are returned as ASCII (A), and the returned key is the lowercase letter t. (Bytes 4–8 = X'00').

EM@2 E is the presentation space short name. The keystrokes are returned as mnemonics, and the returned key is PF2 (Bytes 5–8 = X'00').

32-Bit Interface

EbbbAt E is the presentation space short name. The keystrokes are returned as ASCII (A), and the returned key is the lowercase letter t. (Bytes 7–11 = X'00').

EbbbM@2
E is the presentation space short name. The keystrokes are returned as mnemonics, and the returned key is PF2 (Bytes 8–11 = X'00').

Return Code:
The following codes are valid:

Return Code	Explanation
0	The **Get Key** function was successful.
1	An incorrect presentation space was specified.
5	You specified the AID only option under the **Start Keystroke Intercept** (50) function, and non-AID keys are inhibited by this session type when EHLLAPI tries to write incorrect keys to the presentation space.
8	No prior **Start Keystroke Intercept** (50) function was called for this presentation space.
9	A system error was encountered.
20	An undefined key combination was typed.
25	The requested keystrokes are not available on the input queue.
31	Keystroke queue overflowed and keystrokes were lost.

Notes on Using This Function

1. If a return code of 31 occurs for the **Get Key** function, either:
   - Increase the value of the calling length parameter for the **Start Keystroke Intercept** (50) function, or
   - Execute the **Get Key** function more frequently.

   An intercepted keystroke occupies 3 bytes in the buffer. The next intercepted keystroke is placed in the adjacent three bytes. When the **Get Key** function retrieves a keystroke (first in first out, FIFO), the three bytes that it occupied are made available for another keystroke. By increasing the size of the buffer or the rate at which keystrokes are retrieved from the buffer, you can eliminate buffer overflow.

   For the PC/3270, another way to eliminate return code 31 is to operate the PC/3270 emulator in the resume mode.
2. You can use the **Send Key** (3) function to pass both original keystrokes and any others that your EHLLAPI application might need to the host-connected presentation space.

3. Keystrokes arrive asynchronously and are enqueued in the keystroke queue that you have provided in your EHLLAPI application program using the **Start Keystroke Intercept** (50) function.
4. The **Get Key** function behaves like a read. When keystrokes are available, they are read into the data area that you have provided in your application.
5. In the case of field support for a session, the application might be interested only in AID keys, for example the Enter key. If so, the **Start Keystroke Intercept** (50) function option code should be set to `D` (meaning for AID Keys only).
6. To use this function, preallocate memory to receive the returned data string parameter. The statements required to preallocate this memory vary depending on the language in which your application is written. Refer to "Memory Allocation" on page 8 for more information.

1390/1399 Code Page Support

Unicode functionality is supported only on 3270 and 5250 sessions.

The session option ESC is not supported in a Unicode session; using this option you cannot set a Unicode character as an ESC character. Use the default ESC character @ in a Unicode session. See "Set Session Parameters (9)" on page 145 for details.

Prerequisite Calls: **Start Keystroke Intercept** (50)

Call Parameters:

	Standard Interface	**Enhanced Interface**
Function Number	Must be 51	
Data String	See the following table	
Length	8	12
PS Position	NA	

Data String Contents:

Byte		**Definition**
Standard	Enhanced	
1	1	One of the following values: • A 1-character presentation space short name (PSID) • A blank or null indicating a function call for the host-connected presentation
	2–4	Reserved
2–8	5–11	Blanks that hold space for the symbolic representation of the requested data
	12	Reserved

Return Parameters: This function returns a data string and a return code.

Data String:

See the following table for 32–bit interface:

Byte	Definition
1	One of the following values: • A 1-character presentation space short name (PSID) • A blank or null indicating a function call for the host-connected presentation
2–4	Reserved
5	U is the option code character for a Unicode session.
6–11	The definition of these bytes is similar to the DBCS session; the only difference is that the Unicode character value is stored in bytes 6 and 7 when the option code character is U. In a DBCS session, the ASCII character value is stored in byte 3 and byte 4 contains 0X'00' when the option code character is A.

Return Code:

The following codes are valid:

Return Code	Explanation
0	The **Get Key** function was successful.
1	An incorrect presentation space was specified.
5	You specified the AID only option under the **Start Keystroke Intercept** (50) function, and non-AID keys are inhibited by this session type when EHLLAPI tries to write incorrect keys to the presentation space.
8	No prior **Start Keystroke Intercept** (50) function was called for this presentation space.
9	A system error was encountered.
20	An undefined key combination was typed.
25	The requested keystrokes are not available on the input queue.
31	Keystroke queue overflowed and keystrokes were lost.

1137 Code Page Support

Unicode functionality is supported only on 5250 sessions.

The session option ESC is not supported in a Unicode session; using this option you cannot set a Unicode character as an ESC character. Use the default ESC character @ in a Unicode session. See "Set Session Parameters (9)" on page 145 for details.

Prerequisite Calls: Start Keystroke Intercept (50)

Call Parameters:

	Standard Interface	Enhanced Interface
Function Number	Must be 51	
Data String	See the following table	
Length	8	12
PS Position	NA	

Data String Contents:

Byte		Definition
Standard	Enhanced	
1	1	One of the following values: • A 1-character presentation space short name (PSID) • A blank or null indicating a function call for the host-connected presentation
	2–4	Reserved
2–8	5–11	Blanks that hold space for the symbolic representation of the requested data
	12	Reserved

Return Parameters: This function returns a data string and a return code.

Data String:

See the following table for 32–bit interface:

Byte	Definition
1	One of the following values: • A 1-character presentation space short name (PSID) • A blank or null indicating a function call for the host-connected presentation
2–4	Reserved
5	`U` is the option code character for a Unicode session.
6–11	The definition of these bytes is similar to the SBCS session, the only difference is that the Unicode character value is stored in bytes 6 and 7 when the option code character is `U`. In a DBCS session, the ASCII character value is stored in byte 3 and byte 4 contains 0X'00' when the option code character is `A`.

Return Code:

The following codes are valid:

Return Code	Explanation
0	The **Get Key** function was successful.
1	An incorrect presentation space was specified.
5	You specified the AID only option under the **Start Keystroke Intercept** (50) function, and non-AID keys are inhibited by this session type when EHLLAPI tries to write incorrect keys to the presentation space.
8	No prior **Start Keystroke Intercept** (50) function was called for this presentation space.
9	A system error was encountered.
20	An undefined key combination was typed.
25	The requested keystrokes are not available on the input queue.
31	Keystroke queue overflowed and keystrokes were lost.

Get Request Completion (125)

3270	*5250*	*VT*
Yes	No	No

The **Get Request Completion** function allows an application to determine the status of a previous asynchronous function request issued to the EHLLAPI and to obtain the function parameter list before using the data string again. This function is valid only if the user specified asynchronous (A) completion on a previous function call such as **Read Structured Fields** (126) or **Write Structured Fields** (127).

Each asynchronous request requiring the **Get Request Completion** function will return a unique ID from the asynchronous request. The application must save this ID. This ID is the identification used by the **Get Request Completion** function to identify the desired request. The user has three request options using this function:

1. The application can query or wait for a specific asynchronous function request by supplying the request ID of that function and a nonblank session short name.
2. The application can query or wait for the first completed asynchronous function request for a specified session by supplying a request ID of X'0000' and a nonblank session short name.

Prerequisite Calls

Connect Structured Fields (120) and **Allocate Communications Buffer** (123)

and

Read Structured Fields (126) or **Write Structured Fields** (127)

Call Parameters

	Standard Interface	**Enhanced Interface**
Function Number	Must be 125	
Data String	See the following table	
Length	Must be 14	Must be 24
PS Position	NA	

Data String Contents

Byte		**Definition**
Standard	Enhanced	
1	1	A 1-character presentation space short name (PSID)
	2–4	Reserved
2	5	N or W N=NOWAIT is required W=WAIT is required
	6–8	Reserved
3–4	9–10	Function request ID.
5–6	11–12	Reserved
7–10	13–16	Reserved
11–12	17–20	Reserved

Byte		Definition
13–14	21–24	Reserved

The **Get Request Completion** function behaves differently depending upon the second character of the parameter string, which is one of the following characters:

N Nowait option: If a specific request ID was supplied and the function has completed, control will be returned to the application with a return code of zero and a completed data string as defined in "Return Parameters". If a request ID of zero was supplied and any eligible asynchronous function has completed, control will be returned to the application with a return code of zero and a completed data string as defined in "Return Parameters".

W Wait option: If a specific request ID was supplied and the function has not completed, the call will wait until the function has completed before returning to the application. If the supplied request ID was zero and no eligible asynchronous function has completed, the call will wait until a function completes before returning to the calling application. On return, the return code value will be zero and the data string will be completed as defined in "Return Parameters".

Return Parameters

Byte		Definition
Standard	Enhanced	
5–6	11–12	Function number of the completed asynchronous function (126 or 127). (returned)
7–10	13–16	Address of the data string of the completed asynchronous function call. (The application must not reuse the data string until the request has completed). (returned)
11–12	17–20	Length of the data string of the completed asynchronous function call. (returned)
13–14	21–24	Return code of the completed asynchronous function call. (returned)

Return Code	Explanation
0	The **Get Request Completion** function was successful.
2	An error was made in specifying parameters.
9	A system error was encountered.
38	Requested function was not complete.
42	No matching request was found.

There are some differences between return codes 38 and 42:

1. Return code 38
   a. If a specific request ID and session were requested, both the session and ID were found but the request is pending (not in a completed state).
   b. If a zero request ID and a specific session were requested, the specified session has pending requests, but they are not satisfied (complete).

c. If a zero request ID and a blank session were requested, pending requests were found but none were satisfied (complete).

2. Return code 42
   a. If a specific request ID and session were requested, the specific request ID was not found in either a pending or a completed state.
   b. If a zero request ID and a specific session were requested, the specific session contains no pending or completed requests.
   c. If a zero request ID and a blank session were requested, no pending or completed requests were found.

Notes on Using This Function

1. This function is valid only if the user specified asynchronous completion (A for Asynchronous) on a previous function call such as **Read Structured Fields** or **Write Structured Fields**.
2. If the return code is a 0, the application should check the returned data string for information pertaining to the completion of the requested asynchronous function.

Lock Presentation Space API (60)

3270	*5250*	*VT*
Yes	No	No

The **Lock Presentation Space API** function allows the application to obtain or release exclusive control of the presentation space window over other Windows 32–bit applications. While locked, no other application can connect to the presentation space window.

Successful processing of this function with the Lock causes EHLLAPI presentation space window functions requested from other EHLLAPI applications to be queued until the requesting application unlocks the presentation space. Requests from the locking application are processed normally.

Prerequisite Calls

Connect to Presentation Space (1)

Call Parameters

	Standard Interface	**Enhanced Interface**
Function Number	Must be 60	
Data String	See the following table	
Length	Must be 3	Must be 8
PS Position	NA	

Data String Contents

Byte		**Definition**
Standard	Enhanced	
1	1	A 1-character presentation space short name (PSID).
	2–4	Reserved.

Byte		Definition
2	5	One of the following characters: • L to lock the API. • U to unlock the API.
3	6	One of the following characters: • R to return if the presentation space is already locked by an application. • Q to queue the Lock request if the presentation space is already locked by an application.
	7–8	Reserved.

Return Parameters

Return Code	Explanation
0	The **Lock Presentation Space API** function was successful.
1	An incorrect host presentation space short session ID was specified or was not connected.
2	An error was made in specifying parameters.
9	A system error was encountered.
43	The API was already locked by another EHLLAPI application (on LOCK) or API not locked (on UNLOCK).

Notes on Using This Function

The following EHLLAPI functions are queued when a lock is in effect:

- **Send Key** (3)
- **Copy Presentation Space** (5)
- **Search Presentation Space** (6)
- **Copy Presentation Space to String** (8)
- **Release** (11)
- **Reserve** (12)
- **Query Field Attribute** (14)
- **Copy String to Presentation Space** (15)
- **Search Field** (30)
- **Find Field Position** (31)
- **Find Field Length** (32)
- **Copy String to Field** (33)
- **Copy Field to String** (34)
- **Set Cursor** (40)
- **Send File** (90)
- **Receive File** (91)
- **Connect to Presentation Space** (1) with the CONPHYS parameter set in a previous **Set Sessions Parameter** (9) function call.

These queued requests are not serviced until the lock is removed. When the lock is removed, the queued requests are processed in first-in-first-out (FIFO) order. EHLLAPI functions not listed are run as if there was no lock. The requesting application unlocks the presentation space window by one of the following methods:

- Disconnecting from the presentation space while still owning the Lock.
- Issuing the **Reset System** (21) function while still owning the Lock.

- Stopping the application while still owning the Lock.
- Stopping the session.
- Successfully issuing the **Lock Presentation Space API** with the Unlock option.

Before exiting the application, you should unlock any presentation space windows that have been locked with the **Lock Presentation Space API** function. If the application exits with outstanding locks, or a **Reset System** (21), or **Disconnect Presentation Space** (2) function is issued, the locks are released.

It is recommended that applications lock the presentation space only for short periods of time and only when exclusive use of the presentation space is required.

Lock Window Services API (61)

3270	*5250*	*VT*
Yes	No	No

The **Lock Window Services API** function allows the application to obtain or release exclusive control of the presentation space window over other Windows 32-bit applications. While locked, no other application can connect to the presentation space window.

Successful processing of this function with the Lock causes EHLLAPI presentation space window functions requested from other EHLLAPI applications to be queued until the requesting application unlocks the presentation space. Requests from the locking application are processed normally.

Prerequisite Calls

Connect Window Services (101)

Call Parameters

	Standard Interface	**Enhanced Interface**
Function Number	Must be 61	
Data String	See the following table.	
Length	Must be 3	Must be 8
PS Position	NA	

Data String Contents

Byte		**Definition**
Standard	Enhanced	
1	1	A 1-character presentation space short name (PSID).
	2–4	Reserved.
2	5	One of the following characters: • L to lock the API. • U to unlock the API.
3	6	One of the following characters: • R to return if the presentation space is already locked by an application. • Q to queue the Lock request if the presentation space is already locked by an application.

Byte		Definition
5–6	11–12	Function number of the completed asynchronous function (126 or 127). (returned)
	7–8	Reserved.

Return Parameters

Return Code	Explanation
0	The **Lock Window Services API** function was successful.
1	An incorrect host presentation space short session ID was specified or was not connected.
2	An error was made in specifying parameters.
9	A system error was encountered.
38	Requested function was not complete.
43	The API was already locked by another EHLLAPI application (on LOCK) or API not locked (on UNLOCK).

Notes on Using This Function

The following EHLLAPI functions are queued when a lock is in effect:

- **Window Status** (104)
- **Change Switch List Name** (105)
- **Change PS Window Name** (106)

These queued requests are not serviced until the lock is removed. When the lock is removed, the queued requests are processed in first-in-first-out (FIFO) order.

The requesting application unlocks the presentation space window by one of the following methods:

- Successfully issuing the **Lock Window Services API** with the UNLOCK option.
- Disconnecting from the presentation space while still owning the Lock.
- Issuing the **Reset System** (21) function while still owning the Lock.
- Stopping the application while still owning the Lock.
- Stopping the session.

Before exiting the application, you should Unlock any presentation space windows that have been locked with the **Lock Window Services API**function. If the application exits with outstanding locks, the subsystem releases the locks.

It is recommended that applications lock the presentation space only for short periods of time and only when exclusive use of the presentation space is required.

Pause (18)

3270	*5250*	*VT*
Yes	Yes	Yes

The **Pause** function waits for a specified amount of time. It should be used in place of *timing loops* to wait for an event to occur. A **Pause** function can be ended by a host event if a prior **Start Host Notification** (23) function has been called and the IPAUSE option is selected.

Prerequisite Calls

There are no prerequisite calls for this function.

Call Parameters

	Standard Interface	Enhanced Interface
Function Number	Must be 18	
Data String	NA	
Length	Contains the pause duration in half-second increments	
PS Position	NA	

Return Parameters

Return Code	Definition
0	The wait duration has expired.
9	An internal system error was encountered. The time results are unpredictable.
26	The host session presentation space or OIA has been updated. Use the **Query Host Update** (24) function to get more information.

Notes on Using This Function

1. Selecting the FPAUSE or IPAUSE option using the **Set Session Parameters** (9) function affects the length of the pause you get when you call this function. See item 6 on page 147 for more information.
2. The value entered in the calling length parameter is the maximum number of half-second intervals that the **Pause** function waits. For a pause of 20 seconds, a hex value of `0028` (decimal 40) must be passed in the calling length parameter.
3. If you use the IPAUSE option and the pause value is zero, then the function waits up to 2400 half-second intervals, unless interrupted sooner. If you use the FPAUSE option and the pause value is zero, then the function returns immediately.
4. If you use the IPAUSE option, once a pause has been satisfied by a host event, you should call the **Query Host Update** (24) function to clear the queue prior to the next **Pause** function. The **Pause** function will continue to be satisfied with the pending event until the **Query Host Update** (24) function is completed.
5. A practical maximum value for the **Pause** function is `2400`. You should not use the **Pause** function for these kinds of tasks:
   - Delay for very long durations (of several hours, for example).
   - Delay for more than a moderate length of time (20 minutes) before checking the system time-of-day clock and proceeding with your EHLLAPI program execution.
   - With applications requiring a high-resolution timer because the time interval created by a **Pause** function is approximate.
   - Set the time interval to zero in a loop.

6. IPAUSE set and the interruptible pause allow an EHLLAPI application to determine whether the specified host presentation space (PS) or operator information area (OIA) is updated. The following three functions are used:
   - **Start Host Notification** (23)
   - **Query Host Update** (24)
   - **Stop Host Notification** (25)

   By using IPAUSE when the **Start** function is called, you can make an application wait until the host presentation space or OIA (or both) receives an update. When the receive is completed and the application can issue the **Query** function to determine the changes, **Pause** terminates. Then the application issues the **Search Presentation Space** (6) to check whether the expected update occurred.

Post Intercept Status (52)

3270	*5250*	*VT*
Yes	Yes	Yes

The **Post Intercept Status** function informs the Personal Communications emulator that a keystroke obtained through the **Get Key** (51) function was accepted or rejected. When the application rejects a keystroke, the **Post Intercept Status** function issues a beep.

Prerequisite Calls

Start Keystroke Intercept (50)

Call Parameters

	Standard Interface	**Enhanced Interface**
Function Number	Must be 52	
Data String	See the following table	
Length	Must be 2	Must be 8
PS Position	NA	

The calling data string can contain:

Byte		**Definition**
Standard	Enhanced	
1	1	One of the following values: • The 1-letter short name of the presentation space. • A blank or null indicating a function call for the host-connected presentation space.
	2–4	Reserved
2	5	One of the following characters: • A for accepted keystroke. • R for rejected keystroke.
	6–8	Reserved.

Return Parameters

Return Code	Explanation
0	The **Post Intercept Status** function was successful.
1	An incorrect presentation space was specified.
2	An incorrect session option was specified.
8	No prior **Start Keystroke Intercept** (50) function was called for this presentation space ID.
9	A system error was encountered.

Query Additional Field Attribute (45)

3270	*5250*	*VT*
No	Yes	No

The **Query Additional Field Attribute** function returns additional information about the 5250 field containing the input host presentation space position. This information is returned in the data string parameter in the form of a defined structure.

Prerequisite Calls
Connect Presentation Space (1)

Call Parameters

	Standard Interface	Enhanced Interface
Function Number	Must be 45.	
Data String	8 bytes long character string.	
Length	8 is implied.	
PS Position	Identifies the target. This can be the PS position of any byte within the target field.	

The calling data string can contain:

Byte	Definition
1–8	Reserved

Return Parameters
This function returns a data string and a return code.

Data String:

The function returns the following data string.

Byte	Definition
1–6	Reserved
7–8	Two 8–bit unsigned characters that return: • R if field is RTL and L if field is LTR. • U if field is upper case and L if field is a normal case field.

Return Code:

The following return codes are defined:

Return Code	Explanation
0	The **Query Additional Field Attribute** was successful.
1	Your program is not currently connected to a host session.
7	The host presentation space position is not valid.
9	No field was found in this position.
24	Field is unformatted.

Query Close Intercept (42)

3270	*5250*	*VT*
Yes	Yes	Yes

The **Query Close Intercept** function allows the application to determine if the close option was selected.

Prerequisite Calls

Start Close Intercept (41)

Call Parameters

	Standard Interface	Enhanced Interface
Function Number	Must be 42	
Data String	See the following table.	
Length	Must be 1	Must be 4
PS Position	NA	

The calling data string can contain:

Byte		Definition
Standard	Enhanced	
1	1	1-character short session ID of the host presentation space, or a blank or null indicating request for querying the host-connected session
	2–4	Reserved

Return Parameters

Return Code	Explanation
0	A close intercept event did not occur.
1	The presentation source was not valid.
2	An error was made in specifying parameters.
8	No prior **Start Close Intercept** (41) function was called for this host presentation space.
9	A system error occurred.

Return Code	Explanation
12	The session stopped.
26	A close intercept occurred since the last query close intercept call.

Query Communications Buffer Size (122)

3270	*5250*	*VT*
Yes	No	No

The **Query Communications Buffer Size** function allows an application to determine both the maximum and the optimum buffer sizes supported by the emulation program.

Prerequisite Calls

There are no prerequisite calls for this function.

Call Parameters

	Standard Interface	Enhanced Interface
Function Number	Must be 122	
Data String	See the following table	
Length	Must be 9	Must be 20
PS Position	NA	

The calling data string can contain:

Byte		Definition
Standard	Enhanced	
1	1	A 1-character presentation space short name (PSID)
	2–4	Reserved
2–3	5–8	16- or 32-bit field for the optimum supported inbound buffer size (Returned value)
4–5	9–12	16- or 32-bit field for the maximum supported inbound buffer size (Returned value)
6–7	13–16	16- or 32-bit field for the optimum supported outbound buffer size (Returned value)
8–9	17–20	16- or 32-bit field for the maximum supported outbound buffer size (Returned value)

Return Parameters

Return Code	Explanation
0	The **Query Communications Buffer Size** function was successful.
1	A specified host presentation space short session ID was not valid or was not connected.
2	An error was made in specifying parameters.
9	A system error occurred.

Return Code	Explanation
10	The function was not supported by the emulation program.

Notes on Using This Function

1. There is no way to require the user to use this function. It is not a required function so that the application can be tailored to run on any system.
2. The buffer sizes returned represent the record sizes that are actually transmitted across the medium. For a DDM connection, the 8-byte header supplied in the **Read** and **Write Structured Fields** data buffer is stripped off and 1 byte containing the structured field AID value is prefixed. The application should compare the size of the actual data in the data buffer (which does not include the 8-byte header) with the buffer sizes returned by the **Query Communications Buffer Size** minus 1 byte. For destination/origin connections, the 8-byte header supplied in the **Read** and **Write Structured Fields** data buffer is stripped off and 9 bytes are then prefixed to the data. The application should compare the size of the actual data in the data buffer (which does not include the 8-byte header) with the buffer size returned by the **Query Communications Buffer Size** minus 9 bytes.
3. The maximum buffer sizes returned represent the maximum number of bytes supported by the workstation hardware and by the emulator. The maximum buffer size can be used only if the host is also configured to accept at least these maximum sizes.
4. The optimum buffer sizes returned represent the optimum number of bytes supported by the both the workstation hardware and the emulator. Some network configurations might set transmission limits smaller than these values. In these cases, the data transfer buffer size override value in the emulator configuration profile will be used for structured field support. The **Query Communications Buffer Size** will reflect any buffer size override values entered in the emulator configuration profile.

Query Communication Event (81)

3270	*5250*	*VT*
Yes	Yes	Yes

The **Query Communication Event** function lets the EHLLAPI program determine whether any communication events have occurred.

Prerequisite Calls

Start Communication Notification (80)

Call Parameters

	Enhanced Interface
Function Number	Must be 81
Data String	1-character short name of the host presentation space or a blank or null indicating request for updates to the host-connected presentation space
Length	4 is implied
PS Position	NA

The calling data structure contains these elements:

Byte	Definition
1	A 1-character presentation space short name (PSID)
2-4	Reserved

Return Parameters

Return Code	Definition
0	The function was successful
1	An incorrect PSID was specified
8	No prior call to **Start Communication Notification** (80) function was called for the PSID
9	A system error was encountered
21	The indicated PSID was connected
22	The Indicated PSID was disconnected

Query Cursor Location (7)

3270	*5250*	*VT*
Yes	Yes	Yes

The **Query Cursor Location** function indicates the position of the cursor in the host-connected presentation space by returning the cursor position.

Prerequisite Calls
Connect Presentation Space (1)

Call Parameters

	Standard Interface	Enhanced Interface
Function Number	Must be 7	
Data String	NA	
Length	NA	
PS Position	NA	

Return Parameters
This function returns a length and a return code.

Length:
Host presentation space position of the cursor.

Return Code:
The following codes are defined:

Return Code	Explanation
0	The **Query Cursor Location** function was successful.
1	Your program is not currently connected to a host session.
9	A system error was encountered.

Query Field Attribute (14)

3270	*5250*	*VT*
Yes	Yes	Yes

The **Query Field Attribute** function returns the attribute byte of the field containing the input host presentation space position. This information is returned in the returned length parameter.

For the PC/3270, note also that:

- The returned length parameter is set to 0 if the screen is unformatted.
- Attribute bytes are equal to or greater than hex C0.

Prerequisite Calls

Connect Presentation Space (1)

Call Parameters

	Standard Interface	**Enhanced Interface**
Function Number	Must be 14.	
Data String	NA.	
Length	NA.	
PS Position	Identifies the target. This can be the PS position of any byte within the target field.	

Return Parameters

This function returns a length and a return code.

Length:

The attribute value if the screen is formatted, or 0 if the screen is unformatted.

Return Code:

The following codes are defined:

Return Code	Explanation
0	The **Query Field Attribute** was successful.
1	Your program is not currently connected to a host session.
7	The host presentation space position is not valid.
9	A system error was encountered.
24	Attribute byte not found or unformatted host presentation space.

Notes on Using This Function

The returned field attributes are defined in the following tables. The bit positions are in IBM format with bit 0 as the left most bit in the byte.

- 3270 field attribute:

Bit Position	Meaning
0–1	Both = 1, field attribute byte

Bit Position	Meaning
2	Unprotected/protected 0 = Unprotected data field 1 = Protected field
3	A/N 0 = Alphanumeric data 1 = Numeric data only
4–5	I/SPD 00 = Normal intensity, pen not detectable 01 = Normal intensity, pen detectable 10 = High intensity, pen detectable 11 = Nondisplay, pen not detectable
6	Reserved
7	MDT 0 = Field has not been modified 1 = Field has been modified

- 5250 field attributes:

Bit Position	Meaning
0	Field attribute flag 0 = Nonfield attribute flag 1 = Field attribute flag
1	Visibility 0 = Nondisplay 1 = Display
2	Unprotected/protected 0 = Unprotected data field 1 = Protected field
3	Intensity 0 = Normal intensity 1 = High intensity
4–6	Field type 000 = Alphanumeric data: All characters are available 001 = Alphabet only: Uppercase and lowercase, comma, period, hyphen, blank, or Dup key are available 010 = Numeric shift: Automatic shift for number 011 = Numeric data only: 0–9, comma, period, plus, minus, blank, or Dup key are available 101 = Numeric data only: 0–9, or Dup key are available 110 = Magnetic stripe reading device data only 111 = Signed-numeric data: 0–9, plus, minus, or Dup key are available
7	MDT 0 = Field has not been modified 1 = Field has been modified

Query Host Update (24)

3270	*5250*	*VT*
Yes	Yes	Yes

The **Query Host Update** function lets the programmed operator determine if the host has updated the host presentation space or OIA because:

- The **Start Host Notification** (23) function was called (on first call to the **Query Host Update** function only)
- The previous call to the **Query Host Update** function (for all calls to the **Query Host Update** function except the first).

Prerequisite Calls

Start Host Notification (23)

Call Parameters

	Standard Interface	**Enhanced Interface**
Function Number	Must be 24	
Data String	1-character short name of the host presentation space, or a blank or null indicating request for updates to host-connected presentation space	
Length	1 is implied	4 is implied
PS Position	NA	

The calling data string can contain:

Byte		**Definition**
Standard	Enhanced	
1	1	A 1-character presentation space short name (PSID)
	2–4	Reserved

Return Parameters

Return Code	**Definition**
0	No updates have been made since the last call.
1	An incorrect host presentation space was specified.
8	No prior **Start Host Notification** (23) function was called for the host presentation space ID.
9	A system error was encountered.
21	The OIA was updated.
22	The presentation space was updated.
23	Both the OIA and the host presentation space were updated.
44	Printing has completed in the printer session.

Notes on Using This Function

The target presentation space must be specified in the data string, even though a connection to the host presentation space is not necessary to check for updates.

Query Session Status (22)

3270	*5250*	*VT*
Yes	Yes	Yes

The **Query Session Status** function is used to obtain session-specific information.

Prerequisite Calls

There are no prerequisite calls for this function.

Call Parameters

	16-bit	**32-bit**
Function Number	Must be 22.	
Data String	An 18/20-byte string consisting of a 1-byte short name of the target presentation space plus 17 bytes for returned data. Position 1 can be filled with: 1. A blank or a null to indicate a request for the host_connected presentation space. 2. An * (asterisk) to indicate a request for the keyboard-owner presentation space.	
Length	Must be 18	Must be 20
PS Position	NA	

Return Parameters

This function returns a data string and a return code.

Byte		**Definition**
Standard	Enhanced	
1	1	A 1-character presentation space short name (PSID)
	2–4	Reserved
2–9	5–12	Session long name (same as profile name; or, if profile not set, same as short name)
10	13	**Session Type** **D** 3270 display **E** 3270 printer **F** 5250 display **G** 5250 printer **H** ASCII VT
11	14	Session characteristics expressed by a binary number including the following session-characteristics bits **Bit 0** EAB 0: Session has the basic attribute. 1: Session has the extended attribute **Bit 1** PSS 0: Session does not support the programmed symbols 1: Session supports the programmed symbols **Bits 2–7** Reserved

Byte		Definition
12–13	15–16	Number of rows in the host presentation space, expressed as a binary number
14–15	17–18	Number of columns in the host presentation space, expressed as a binary number
16–17	19–20	Host code page expressed as a binary number
18		Reserved

Return Code:

The following codes are defined:

Return Code	Explanation
0	The **Query Session Status** function was successful.
1	An incorrect host presentation space was specified.
2	An incorrect string length was made.
9	A system error was encountered.

Notes on Using This Function

1. To use this function, preallocate memory to receive the returned data string parameter. The statements required to preallocate this memory vary depending on the language in which your application is written. See "Memory Allocation" on page 8 for more information.

Query Sessions (10)

3270	*5250*	*VT*
Yes	Yes	Yes

The **Query Sessions** function returns a 16-byte (12-byte for standard interface) data string describing each host session.

Prerequisite Calls

There are no prerequisite calls for this function.

Call Parameters

Function	Description	
	Standard Interface	Enhanced Interface
Function Number	Must be 10	
Data String	Preallocated string of 16*n* bytes long (12*n* for 16-bit) (*n* =number of sessions) or more	
Length	12*n* bytes	16*n* bytes
PS Position	NA	

Note: When the length is not matched to the number of sessions, the return code is 2.

Return Parameters

This function returns a data string, a length, and a return code.

Data String:

The returned data string is 16*n* bytes long (12*n* for standard interface), where *n* is the number of host sessions. The descriptors are concatenated into the data string and each session type, and presentation space size of a host session.

The format of each 16-byte (12-byte for standard interface) session descriptor is as follows:

Byte		Definition
Standard	Enhanced	
1	1	A 1-character presentation space short name (PSID)
	2–4	Reserved
2–9	5–12	Session long name (same as profile name; or, if profile not set, same as short name)
10	13	Connection type H=host
	14	Reserved
11–12	15–16	Host presentation space size (this is a binary number and is not in display format). If the session type is a print session, the value is 0.

Length:

The number of host sessions started.

Return Code:

The following codes are defined:

Return Code	Explanation
0	The **Query Sessions** function was successful.
2	An incorrect string length was made.
9	A system error was encountered.

Notes on Using This Function

1. If an application program receives RC=2 or RC=0, the number of the active sessions is returned in the length field. The application program can recognize the minimum string length by this number.
2. The **Query Sessions** function is affected by the CFGSIZE/NOCFGZISE session option (see item 16 on page 150 for more information) and by the EXTEND_PS/NOEXTEND_PS option (see item 22 on page 152 for more information).

Notes:

1. When NOCFGSIZE is set in **Set Session Parameters** (9) for a 5250 session, the value of presentation space size returned in byte position 11 and 12 from **Query Sessions**(10) will be changed in accordance with the selection of EXTEND_PS or NOEXTEND_PS.
2. When EXTEND_PS is set in **Set Session Parameters** (9), presentation space size returned from **Query Sessions** (10) will include the size of the message line, if it exists.
3. When NOEXTEND_PS is set, the value will not change regardless of the existence of a message line. In the case of 25 row, 80 column presentation space, the value can be 1920 or 2000.

Query System (20)

3270	*5250*	*VT*
Yes	Yes	Yes

The **Query System** function can be used by an EHLLAPI application program to determine the level of Personal Communications support and other system-related values. This function returns a string that contains the appropriate system data. Most of this information is for use by a service coordinator when you call the IBM Support Center after receiving a return code 9 (a system error was encountered).

The bytes in this returned string are defined in "Return Parameters".

Prerequisite Calls

There are no prerequisite calls for this function.

Call Parameters

	Standard Interface	**Enhanced Interface**
Function Number	Must be 20	
Data String	Preallocated string of 35 bytes	36 bytes
Length	Must be 35	Must be 36
PS Position	NA	

Return Parameters

This function returns a data string and a return code.

Data String:

A data string of 35 bytes (for 16–bit) or 36 bytes (for 32–bit) is returned. The bytes are defined as follows:

Byte		**Definition**
Standard	Enhanced	
1	1	EHLLAPI version number
2–3	2–3	EHLLAPI level number
4–9	4–9	Reserved
10–12	10–12	Reserved
13	13	Hardware base, U=Unable to determine
14	14	Program type, where P=IBM Personal Communications
15–16	15–16	Reserved
17–18	17–18	Personal Communications version/level as a 2-byte ASCII value
19	19	Reserved
20–23	20–23	Reserved
24–27	24–27	Reserved
28–29	28–29	Reserved
	30	Reserved
30–31	31–32	NLS type expressed as a 2-byte binary number

Byte		Definition
33–35	34–36	Reserved

Return Code
The following codes are defined:

Return Code	Explanation
0	The **Query System** function was successful; data string has been returned.
1	EHLLAPI is not loaded. (PC/3270 only)
2	An incorrect string length was specified. (PC/3270 only)
9	A system error was encountered.

Notes on Using This Function
To use this function, preallocate memory to receive the returned data string parameter. See "Memory Allocation" on page 8 for more information.

Query Window Coordinates (103)

3270	*5250*	*VT*
Yes	Yes	Yes

The **Query Window Coordinates** function requests the coordinates for the window of a presentation space. The window coordinates are returned in pels.

Note: (0,0) indicates the top-left of the window.

Prerequisite Calls
Connect Window Services (101)

Call Parameters

	Standard Interface	Enhanced Interface
Function Number	Must be 103	
Data String	1-character short session ID of the host presentation space	
Length	17 is implied	20 is implied
PS Position	NA	

The calling data string can contain:

Byte		Definition
Standard	Enhanced	
1	1	One of the following values: • A 1-character presentation space short name (PSID) • A blank or null indicating a function call for the current connection presentation space
	2–4	Reserved
2-17	5–20	Reserved

Return Parameters

This function returns a data string and a return code.

Byte		Definition
Standard	Enhanced	
1	1	One of the following values: • A 1-character presentation space short session ID • A blank or null indicating a function call for the current connection presentation space
	2–4	Reserved
2–17	5–20	Four 32-bit unsigned integers that return:
2–5	5–8	XLeft Long integer in pels of the left X coordinate of the rectangular window relative to the desktop window
6–9	9–12	YBottom Long integer in pels of the bottom Y coordinate of the rectangular window relative to the desktop window
10–13	13–15	XRight Long integer in pels of the right X coordinate of the rectangular window relative to the desktop window
14–17	16–20	YTop Long integer in pels of the top Y coordinate of the rectangular window relative to the desktop window

Return Code:

The following codes are defined:

Return Code	Explanation
0	The **Query Window Coordinates** function was successful.
1	Your program was not currently connected to the host session.
9	A system error occurred.
12	The session stopped.

Read Structured Fields (126)

3270	*5250*	*VT*
Yes	No	No

The **Read Structured Fields** function allows an application to read structured field data from the host application. If the call specifies S (for Synchronous), the application does not receive control until the **Read Structured Fields** is completed. If the call specifies A (for Asynchronous), the application receives control immediately after the call. If the call specifies M (for Asynchronous, message mode), the application receives control immediately after the call. The application can wait for the message. In any case (S, A, or M), the application provides the buffer address in which the data from the host is to be placed.

For a successful asynchronous completion of this function, the following statements apply:

The return code field in the parameter list might not contain the results of the requested I/O. If the return code is not 0, the request failed. The application must take the appropriate action based on the return code.

If the return code for this request is 0, the application must use the request ID returned with this function call to issue the **Get Request Completion** function call to determine the completion results of the function associated with the request ID. The **Get Request Completion** function call returns the following information:

1. Function request ID
2. Address of the data string from the asynchronous request
3. Length of the data string
4. Return code of the completed function

Prerequisite Calls

Connect for Structured Fields (120) and **Allocate Communication Buffer** (123)

Call Parameters

	Standard Interface	**Enhanced Interface**
Function Number	Must be 126	
Data String	See the following table	
Length	8, 10 or 14	20
PS Position	NA	

The calling data string can contain:

Byte		**Definition**
Standard	Enhanced	
1	1	A 1-character presentation space short name (PSID).
	2–4	Reserved.
2	5	S or A or M **S =** Synchronous. Control is not returned to the application until the read is satisfied. **A =** Asynchronous. Control is returned immediately to the application, can wait for the event object. **M =** Asynchronous. Control is returned immediately to the application, can wait for the message.
	6	Reserved.
3–4	7–8	2-byte destination/origin ID.
5–8	9–12	4-byte address of the buffer into which the data is to be read. The buffer must be obtained using the **Allocate Communications Buffer** (123) function.
9–10	13–16	Reserved.
11–12	17–20	When M is specified in position 2 the window handle of the window that receives the message should be set. The message is a return value of RegisterWindowMessage (“PCSHLL”)(not equal 0).
13–14		The data in these positions is ignored by EHLLAPI. However, no error is caused if the migrating program has data in these positions. This data is accepted to provide compatibility with migrating applications.

Return Parameters

This function returns a data string and a return code.

Data String:

If A (asynchronous) is specified in position 5, (2 for standard interface) and the function is completed successfully, the following data string is returned:

Byte		Definition
Standard	Enhanced	
9–10	13–14	2-byte function request ID. It is used by the **Get Request Completion** (125) function to determine the completion of this function call.
	15–16	Reserved.
	17–20	4-byte value in which the event object address is returned by EHLLAPI. The application can wait for this event object. When the event object is cleared, the application must issue the **Get Request Completion** (125) function call (32-bit only).

Note: A event object address is returned for each successful asynchronous request. The event object should not be used again. A new event object is returned for each request and is valid for only the duration of that request.

Data String:

If "M" (asynchronous message mode) is specified in position 5 (2 for 16-bit applications) and the function is completed successfully, the following data string is returned:

Byte		Definition
9–10	13–14	A 2-byte function request ID. It is used by the **Get Request Completion (125)** function to determine the completion of this function call.
	15–16	Reserved.
11–12	17–18	Task ID of asynchronous message mode.
	19–20	Reserved.

Note: If the function is completed successfully, an application window receive a message. The message is a return value of RegisterWindowMessage (PCSHLL). The wParam parameter contains Task ID returned by the function call. The HIWORD of lParam parameter contains Return Code 0, which shows the function was successful, and LOWORD of lParam parameter contains function number 126.

Return Code:

The following codes are defined:

Return Code	Explanation
0	The **Read Structured Fields** function was successful.
1	A specified host presentation space short session ID was not valid or was not connected.
2	An error was made in specifying parameters.
9	A system error occurred.

Return Code	Explanation
11	Resource unavailable (memory unavailable).
35	Request rejected. An outbound transmission from the host was canceled.
36	Request rejected. Lost contact with the host.
37	The function was successful, but the host is inbound disabled.

Notes on Using This Function

1. Return code 35 will be returned when the first **Read Structured Fields** or **Write Structured Fields** is requested after an outbound transmission from the host is canceled. Corrective action is the responsibility of the application.
2. Return code 36 requires that the application disconnect from the emulation program and then reconnect to reestablish communication with the host. Corrective action is the responsibility of the application.
3. Return code 37 will be returned if the host is inbound disabled. The **Read Structured Fields** function was successfully requested.
4. The EHLLAPI allows for a maximum of 20 asynchronous requests per application to be outstanding. A return code for unavailable resources (RC=11) is returned if more than 20 asynchronous requests are attempted.
5. If you are using an IBM Global Network® connection, the maximum number of asynchronous requests is 10.

The structured field data contains the application structured fields received from the host. Structured field headers are removed by the EHLLAPI before the structured field data reaches the application.

The structured field data format is as follows:

Offset	Length	Contents
0	1 word	X'0000'.
2	1 word	m (message length: The number of bytes of data in the message, the number does not include the buffer header prefix, which contains 8 bytes). This value is returned by EHLLAPI.
4	1 word	n (buffer size: the supplied length of the data buffer that does include the 8-byte message header). This value must be set by the application.
6	1 word	X'C000'.
8	8 bytes	Length of the first (or only) structured field message.
10	1 byte	First nonlength byte of the structured field message.
		:
m+7	1 byte	Last byte in the structured field message.

Bytes 0 through 7 are the buffer header. These first 8 bytes are used by the emulation program. The user section of the buffer begins with offset 8. Bytes 8 and 9 contain the number of bytes in the first structured field (a structured field message can contain multiple structured fields), including 2 bytes for bytes 8 and

9. Bytes 8 through *m*+7 are used for the structured field message received from the host (which could contain multiple structured fields).

The using application must furnish the complete buffer with the word at offset 0 set to zero. The buffer length must be in the word at offset 4. The word at offset 6 must be X'C000'. The emulation program will place the data message beginning at offset 8 and place the length of the message in the word at offset 2. The buffer length is not disturbed by EHLLAPI.

Synchronous Requests: When **Read Structured Fields** is requested synchronously (the S option in the data string), control is returned to the application only after the request is satisfied. The application can assume:

- The return code is correct.
- The data in the communications buffer (read buffer) is correct.
- The host is no longer processing the **Read Structured Fields** request.

Asynchronous Requests: When **Read Structured Fields** is requested asynchronously (the A option in the data string), the application *cannot* assume:

- The return code is correct.
- The data in the communications buffer (read buffer) is correct.
- The host is no longer processing the **Read Structured Fields** request.

When requested asynchronously, EHLLAPI returns the following values:

- A 16-bit Request ID in positions 13–14 (9–10 for standard interface) of the data string
- The address of a event object in positions 17—20 of the data string

These are used to complete the asynchronous **Read Structured Fields** call.

The following steps must be completed to determine the outcome of an asynchronous **Read Structured Fields** function call:

- If the EHLLAPI return code is not zero, the request failed. No asynchronous request has been made. The application must take appropriate actions before attempting the call again.
- If the return code is zero, the application should wait until the event object is in the signaled state by using the **Get Request Completion** (125) function or **Wait For Single Object**. The event object should not be reused. The event object is valid only for the duration of the **Read Structured Fields** function call through the completion of the **Get Request Completion** (125) function call.
- Once the event object is in the signaled state, use the returned 16-bit Request ID as the Request ID parameter in a call to the **Get Request Completion** (125) function. The data string returned from the **Get Request Completion** (125) function call contains the final return code of the **Read Structured Fields** function call.

When **Read Structured Fields** is requested asynchronously (the M option in the data string), the application *cannot* assume:

- The return code is correct.
- The data in the communications buffer (read buffer) is correct.
- The host is no longer processing the **Read Structured Fields** request.

When requested asynchronously with the M option, EHLLAPI returns the following values:

- A 16-bit Request ID in positions 13–14 (9–10 for standard interface) of the data string
- Task ID of asynchronous message mode in positions 17–18 (11–12 for standard interface) of the data string.

These are used to complete the asynchronous **Read Structured Fields** call.

Receive File (91)

3270	*5250*	*VT*
Yes	Yes	No

The **Receive File** function is used to transfer a file from the host session to the workstation session. It is used the same way as the RECEIVE command is used in the PC/3270. The **Receive File** function can be called by an EHLLAPI application program.

Prerequisite Calls

There are no prerequisite calls for this function.

Call Parameters

	Standard Interface	**Enhanced Interface**
Function Number	Must be 91.	
Data String	Refer to the examples.	
Length	Length, in number of bytes, of the data string. Overridden if in EOT mode.	

Following are examples of the data strings for a single-byte character set (SBSC):

3270 Session

- To receive the file from the VM/CMS host system:
  pc_filename [*id:*]*fn ft* [*fm*] [(*option*]
- To receive the file from the MVS/TSO host system:
  pc_filename[*id:*]*dataset*[(*member*)] [*/password*] [*option*]
- To receive the file from the CICS® host system:
  pc_filename [*id:*]*host_filename* [(*option*]

5250 Session

- To receive the file from the iSeries host system:
  pc_filename [*id:*]*library file member* [*option*]

Following are examples of the data strings for a double-byte character set (DBCS):

3270 Session

- To receive the file from the VM/CMS host system:
  pc_filename [*id:*]*fn ft* [*fm*] [(*option*]
- To receive the file from the MVS/TSO host system:
  pc_filename [*id:*]*dataset*[(*member*)] [*/password*] [(*option*]
- To receive the file from the CICS host system:
  pc_filename [*id:*]*host_filename* [(*option*]

5250 Session

- To receive the file from the iSeries host system:
  pc_filename [*id:*]*library file member* [*option*]

Note: Parameters within [ ] are optional. Available options are listed below.

Host System	Common Options
VM/CMS	ASCII, JISCII, CRLF, APPEND, TIME n, CLEAR, NOCLEAR, PROGRESS, QUIET
MVS/TSO	ASCII, JISCII, CRLF, APPEND, TIME (n), CLEAR, NOCLEAR, PROGRESS, QUIET, AVBLOCK|TRACKS|CYLINDERS
CICS	ASCII, JISCII, CRLF, NOCRLF, BINARY, TIME n, CLEAR, NOCLEAR, PROGRESS, QUIET
OS/400®	ASCII, JISCII, CRLF, APPEND, TIME n, CLEAR, NOCLEAR, PROGRESS, QUIET
Note: JISCII is valid in a DBCS session for Japan only and ASCII is valid for all other SBCS and DBCS sessions. Other options specified will be passed to the host transfer program. The file transfer program on the host side either uses them, ignores them, or returns an error. Consult the host transfer program documentation to see a complete list of the options supported.	

Return Parameters

Return Code	Explanation
2	Parameter error or you have specified a length that is too long (more than 255 bytes) for the EHLLAPI buffer. The file transfer was unsuccessful.
3	File transfer complete.
4	File transfer complete with segmented records.
9	A system error was encountered.
27	File transfer terminated because of either a Cancel button or the timeout set by the **Set Session Parameter** (9) function.
101	File transfer was successful (transfer to/from CICS).

If you receive return code 2 or 9, there is a problem with the system or with the way you specified your data string.

Other return codes can also be received, which relate to message numbers generated by the host transfer program. For transfers to a CICS host transfer program, subtract 100 from the return code to give you the numeric portion of the message. For example, a return code of 101 would mean that the message number INW0001 was issued by the host. For other host transfer programs, just use the return code as the numerical part of the message. For example, a return of 34 would mean that message TRANS34 was issued by the host transfer program. The documentation for your host transfer program should give more information about the meanings of the specific messages.

Operating system error codes reported by EHLLAPI are greater than 300. To determine the error code, subtract 300 and refer to the operating system documentation for return codes.

Notes on Using This Function

1. Four sets of parameters under the **Set Session Parameters** (9) function are related to this function. They are the STRLEN/STREOT, EOT=c, QUIET/NOQUIET and the TIMEOUT=c/TIMEOUT=0 session options. See items 1 and 2 on page 146 and items 7 and 8 on page 148 for more information.
2. If no path is specified when the **Receive File** function is executed, the received file is stored in the current subdirectory, which is the directory in which your application is running.

Release (12)

3270	*5250*	*VT*
Yes	Yes	Yes

The **Release** function unlocks the keyboard that is associated with the host presentation space reserved using the **Reserve** (11) function.

Prerequisite Calls

Connect Presentation Space (1)

Call Parameters

	Standard Interface	**Enhanced Interface**
Function Number	Must be 12	
Data String	NA	
Length	NA	
PS Position	NA	

Return Parameters

Return Code	Explanation
0	The **Release** function was successful.
1	Your program is not connected to a host session.
9	A system error was encountered.

Notes on Using This Function

If you do not **Release** a host presentation space reserved by using the **Reserve** (11) function, you are locked out of that session until you call the **Reset System** (21) function, you call the **Disconnect Presentation Space** (2) function, or you terminate the EHLLAPI application program.

Reserve (11)

3270	*5250*	*VT*
Yes	Yes	Yes

The **Reserve** function locks the keyboard that is associated with the host-connected presentation space to block input from the terminal operator.

The reserved host presentation space remains locked until one of the following occurs:

- **Connect** (1) function is executed to a new session.
- **Disconnect Presentation Space** (2) function is executed.
- **Release** (12) function is executed.
- **Reset System** (21) function is executed.
- **Start Keystroke Intercept** (50) function is executed.
- EHLLAPI application program is terminated.

Prerequisite Calls

Connect Presentation Space (1)

Call Parameters

	Standard Interface	Enhanced Interface
Function Number	Must be 11	
Data String	NA	
Length	NA	
PS Position	NA	

Return Parameters

Return Code	Explanation
0	The **Reserve** function was successful.
1	Your program is not connected to a host session.
5	Presentation space cannot be used.
9	A system error was encountered.

Notes on Using This Function

1. If your EHLLAPI application program is sending a series of transactions to the host, you might need to prevent the user from gaining access to that session until your application processing is complete.
2. The keyboard input that a user makes while the keyboard is locked by this function is enqueued and processed after the session is terminated.
3. This function locks both the mouse and the keyboard input. The application program must unlock the presentation space to enable either the mouse or the keyboard input.

Reset System (21)

3270	*5250*	*VT*
Yes	Yes	Yes

The **Reset System** function reinitializes EHLLAPI to its starting state. The session parameter options are reset to their defaults. Event notification is stopped. The reserved host session is released. The host presentation space is disconnected. Keystroke intercept is disabled.

You can use the **Reset System** function during initialization or at program termination to reset the system to a known initial condition.

Prerequisite Calls
There are no prerequisite calls for this function.

Call Parameters

	Standard Interface	Enhanced Interface
Function Number	Must be 21	
Data String	NA	
Length	NA	
PS Position	NA	

Return Parameters

Return Code	Definition
0	The **Reset System** function was successful.
1	EHLLAPI is not loaded.
9	A system error was encountered.

Notes on Using this Function
For the PC/3270, this function can be used to check whether EHLLAPI is loaded. Place a call to this function at the start of your application and check for a return code of 1.

Search Field (30)

3270	*5250*	*VT*
Yes	Yes	Yes

The **Search Field** function examines a field within the connected host presentation space for the occurrence of a specified string. If the target string is found, this function returns the decimal position of the string numbered from the beginning of the host presentation space. (For example, in a 24-row by 80-column presentation space, the row 1, column 1 position is numbered *1* and the row 5, column 1 position is numbered *321*.)

This function can be used to search either protected or unprotected fields, but only in a *field-formatted* host presentation space.

Note: If the field at the end of the host presentation space wraps, wrapping occurs when the end of the presentation space is reached.

Prerequisite Calls
Connect Presentation Space (1)

Call Parameters

	Standard Interface	Enhanced Interface
Function Number	Must be 30.	
Data String	Target string for search.	

	Standard Interface	Enhanced Interface
Length	Length of the target data string. Overridden in EOT mode.	
PS Position	Identifies the target field. For SRCHALL, this can be the PS position of any byte within the target field. For SRCHFROM, it is the beginning point of the search for SRCHFRWD or the ending point of the search for SRCHBKWD. See note 3.	

Return Parameters

This function returns a length and a return code.

Length:

The following codes are defined:

Length	Explanation
= 0	The string was not found.
> 0	The string was found at the indicated host presentation space position.

Return Code:

The following codes are defined:

Return Code	Explanation
0	The **Search Field** function was successful.
1	Your program is not connected to a host session.
2	Parameter error. Either the string length was zero, or EOT mode was specified but no EOT character was found in calling data string.
7	The host presentation space position is not valid.
9	A system error was encountered.
24	The search string was not found, or the host presentation space was unformatted.

Notes on Using This Function

1. Four sets of parameters under the **Set Session Parameters** (9) function are related to this function. They are the SRCHALL/SRCHFROM, STRLEN/STREOT, SRCHFRWD/SRCHBKWD, and the EOT=c session options. See items 1 on page 146 through 4 on page 147 for more information.
2. You can use the **Set Session Parameters** (9) function to determine whether your searches proceed forward (SRCHFRWD) or backward (SRCHBKWD) in a field.
3. The **Search Field** function normally checks the entire field (SRCHALL default mode). However, you can use the function 9 to specify SRCHFROM. In this mode, the calling PS position parameter does more than identify the target field. It also provides a beginning or ending point for the search.
   - If the SRCHFRWD option is in effect, the search for the designated string begins at the specified PS position and proceeds toward the end of the field.
   - If the SRCHBKWD option is in effect, the search for the designated string begins at the end of the field and proceeds backward toward the specified PS position. If the target string is not found, the search ends at the PS position specified in the calling PS position parameter.
4. **DBCS Only:** If the start position of the specified search function is the second byte in a double-byte character, the search is started from the next character for

SRCHFRWD and from the character for SRCHBKWD. If the last character of the specified string is the first byte of a double-byte character, the character is not searched for.

The search ignores a pair of SO and SI in the presentation space. When you search a double-byte control character, put SO (X'0E') before the character and SI (X'0F') after it. For example, X'0E000C0F' in the data string is treated as a double-byte character FF (X'000C').

Note: 5250 emulation supports a presentation space of 24 rows by 80 columns. In some instances, Communication Manager 5250 emulation displays a 25th row. This occurs when either an error message from the host is displayed or when the operator selects the SysReq key. Personal Communications displays 25th row information on row 24, or on the status bar. For information to be displayed on the status bar, the status bar must be configured. Refer to *Personal Communications Version 5.7 Quick Beginnings* for information on configuring the status bar. By the **EXTEND_PS** option, an EHLLAPI application can use the same interface with Communication Manager EHLLAPI and valid presentation space is extended when this condition occurs.

1390/1399 Code Page Support

Unicode functionality is supported only on 3270 and 5250 sessions.

STREOT option is not supported in a Unicode session. Please see "Set Session Parameters (9)" on page 145 for details.

Prerequisite Calls: **Connect Presentation Space** (1)

Call Parameters:

	Standard Interface	Enhanced Interface
Function Number	Must be 30.	
Data String	Target Unicode string for searching.	
Length	Length of the target Unicode string in Unicode characters. **Note:** The EOT mode is not supported in a Unicode session; therefore, length should be specified for proper functioning of this function in a Unicode session.	
PS Position	Identifies the target field. For `SRCHALL`, this can be the PS position of any byte within the target field. For `SRCHFROM`, it is the beginning point of the search for `SRCHFRWD` or the ending point of the search for `SRCHBKWD`. See note 3 on page 124.	

Return Parameters: This function returns a length and a return code.

Length:

The following codes are defined:

Length	Explanation
= 0	The string was not found.
> 0	The string was found at the indicated host presentation space position.

Return Code:

The following codes are defined:

Return Code	Explanation
0	The **Search Field** function was successful.
1	Your program is not connected to a host session.
2	Parameter error. Either the string length was zero, or EOT mode was specified but no EOT character was found in calling data string.
7	The host presentation space position is not valid.
9	A system error was encountered.
24	The search string was not found, or the host presentation space was unformatted.

Notes on Using This Function: The following options are supported in a Unicode session for **Search Field** and function in the same way as in DBCS:

- STRLEN
- SRCHALL
- SRCHFROM
- SRCHFRWD
- SRCHBKWD

1137 Code Page Support

Unicode functionality is supported only on 5250 sessions.

STREOT option is not supported in a Unicode session. Please see "Set Session Parameters (9)" on page 145 for details.

Prerequisite Calls: **Connect Presentation Space** (1)

Call Parameters:

	Standard Interface	Enhanced Interface
Function Number	Must be 30.	
Data String	Target Unicode string for search.	
Length	Length of the target Unicode string in bytes. **Note:** The EOT mode is not supported in a Unicode session; therefore, length should be specified for proper functioning of this function in a Unicode session.	
PS Position	Identifies the target field. For `SRCHALL`, this can be the PS position of any byte within the target field. For `SRCHFROM`, it is the beginning point of the search for `SRCHFRWD` or the ending point of the search for `SRCHBKWD`. See note 3 on page 124.	

Return Parameters: This function returns a length and a return code.

Length:

The following codes are defined:

Length	Explanation
= 0	The string was not found.
> 0	The string was found at the indicated host presentation space position.

Return Code:

The following codes are defined:

Return Code	Explanation
0	The **Search Field** function was successful.
1	Your program is not connected to a host session.
2	Parameter error. Either the string length was zero, or EOT mode was specified but no EOT character was found in calling data string.
7	The host presentation space position is not valid.
9	A system error was encountered.
24	The search string was not found, or the host presentation space was unformatted.

Notes on Using This Function: The following options are supported in a Unicode session for **Search Field** and function in the same way as in SBCS:

- STRLEN
- SRCHALL
- SRCHFROM
- SRCHFRWD
- SRCHBKWD

Search Presentation Space (6)

3270	*5250*	*VT*
Yes	Yes	Yes

The **Search Presentation Space** function lets your EHLLAPI program examine the host presentation space for the occurrence of a specified string.

Prerequisite Calls

Connect Presentation Space (1)

Call Parameters

	Standard Interface	Enhanced Interface
Function Number	Must be 6.	
Data String	Target string for search.	
Length	Length of the target data string. Overridden in EOT mode.	
PS Position	Position within the host presentation space where the search is to begin (SRCHFRWD option) or to end (SRCHBKWD option). Overridden in SRCHALL (default) mode.	

Return Parameters

This function returns a length and a return code.

Length:

The following codes are defined:

Length	Explanation
= 0	The string was not found.
> 0	The string was found at the indicated host presentation space position.

Return Code:

The following codes are defined:

Return Code	Explanation
0	The **Search Presentation Space** function was successful.
1	Your program is not connected to a host session.
2	An error was made in specifying parameters.
7	The host presentation space position is not valid.
9	A system error was encountered.
24	The search string was not found.

Notes on Using This Function

1. Four sets of parameters under the **Set Session Parameters** (9) function are related to this function. They are the SRCHALL/SRCHFROM, STRLEN/STREOT, SRCHFRWD/SRCHBKWD, and the EOT=c session options. See items 1 on page 146 through 4 on page 147 through for more information.
2. You can use the **Set Session Parameters** (9) function to specify SRCHBKWD. When this option is in effect, the search operation locates the *last* occurrence of the string.
3. The **Search Presentation Space** function normally checks the entire host presentation space. However, you can use the **Set Session Parameters** (9) function to specify SRCHFROM. In this mode, the calling PS position parameter specifies a beginning or ending point for the search.
   - If the SRCHFRWD option is in effect, the search for the designated string begins at the specified PS position and proceeds toward the end of the host presentation space.
   - If the SRCHBKWD option is in effect, the search for the designated string begins at the end of the PS and proceeds backward toward the specified PS position. If the target string is not found, the search ends at the PS position specified in the calling PS position parameter.
4. The SRCHFROM option is also useful if you are looking for a keyword that might occur more than once in the host presentation space.
5. The **Search Presentation Space** function is useful in determining when the host presentation space is available. If your EHLLAPI application is expecting a specific prompt or message before sending data, the **Search Presentation Space** function allows you to check for a prompt message before continuing.
6. **DBCS Only:** If the start position of the specified search function is the second byte in a double-byte character, the search is started from the next character for SRCHFRWD and from the character for SRCHBKWD. If the last character of the specified string is the first byte of a double-byte character, the character is not searched for.

   The search ignores a pair of SO and SI in the presentation space. When you search a double-byte control character, put SO (X'0E') before the character and SI (X'0F') after it. For example, X'0E000C0F' in the data string is treated as a double-byte character FF (X'000C').

Note: 5250 emulation supports a presentation space of 24 rows by 80 columns. In some instances, Communication Manager 5250 emulation displays a 25th row. This occurs when either an error message from the host is displayed or when the operator selects the SysReq key. Personal Communications displays 25th row information on row 24, or on the status bar. For information to be displayed on the status bar, the status bar must be configured. Refer to *Personal Communications Version 5.7 Quick Beginnings* for information on configuring the status bar. By the **EXTEND_PS** option, an EHLLAPI application can use the same interface with Communication Manager EHLLAPI and valid presentation space is extended when this condition occurs.

1390/1399 Code Page Support

Unicode functionality is supported only on 3270 and 5250 sessions.

STREOT option is not supported in a Unicode session. Please refer to "Set Session Parameters (9)" on page 145 for details.

Prerequisite Calls: **Connect Presentation Space** (1)

Call Parameters:

	Standard Interface	Enhanced Interface
Function Number	Must be 6.	
Data String	Target Unicode string for search.	
Length	Length of the target Unicode string in Unicode characters. **Note:** The EOT mode is not supported in a Unicode session; therefore, length should be specified for proper functioning of this function in a Unicode session.	
PS Position	Position within the host presentation space where the search is to begin (SRCHFRWD option) or to end (SRCHBKWD option). Overridden in SRCHALL (default) mode.	

Return Parameters: This function returns a length and a return code.

Length:

The following codes are defined:

Length	Explanation
= 0	The string was not found.
> 0	The string was found at the indicated host presentation space position.

Return Code:

The following codes are defined:

Return Code	Explanation
0	The **Search Presentation Space** function was successful.
1	Your program is not connected to a host session.
2	An error was made in specifying parameters.
7	The host presentation space position is not valid.
9	A system error was encountered.

Return Code	Explanation
24	The search string was not found.

Notes on Using This Function: The following options are supported in a Unicode session for **Search Presentation Space** (6) and function in the same way as in DBCS:

- STRLEN
- SRCHALL
- SRCHFROM
- SRCHFRWD
- SRCHBKWD

1137 Code Page Support

Unicode functionality is supported only on 5250 sessions.

STREOT option is not supported in a Unicode session. Please refer to "Set Session Parameters (9)" on page 145 for details.

Prerequisite Calls: **Connect Presentation Space** (1)

Call Parameters:

	Standard Interface	Enhanced Interface
Function Number	Must be 6.	
Data String	Target Unicode string for search.	
Length	Length of the target Unicode data string in bytes. **Note:** The EOT mode is not supported in a Unicode session; therefore, length should be specified for proper functioning of this function in a Unicode session.	
PS Position	Position within the host presentation space where the search is to begin (SRCHFRWD option) or to end (SRCHBKWD option). Overridden in SRCHALL (default) mode.	

Return Parameters: This function returns a length and a return code.

Length:

The following codes are defined:

Length	Explanation
= 0	The string was not found.
> 0	The string was found at the indicated host presentation space position.

Return Code:

The following codes are defined:

Return Code	Explanation
0	The **Search Presentation Space** function was successful.
1	Your program is not connected to a host session.
2	An error was made in specifying parameters.

Return Code	Explanation
7	The host presentation space position is not valid.
9	A system error was encountered.
24	The search string was not found.

Notes on Using This Function: The following options are supported in a Unicode session for **Search Presentation Space** (6) and function in the same way as in SBCS:

- STRLEN
- SRCHALL
- SRCHFROM
- SRCHFRWD
- SRCHBKWD

Send File (90)

3270	*5250*	*VT*
Yes	Yes	No

The **Send File** function is used to transfer a file from the workstation session where EHLLAPI is running to a host session.

Prerequisite Calls

There are no prerequisite calls for this function.

Call Parameters

	Standard Interface	Enhanced Interface
Function Number	Must be 90.	
Data String	Refer to the examples.	
Length	Length of the target data string. Overridden in EOT mode.	
PS Position	Must be 0.	

Following are examples of the data strings for SBCS

3270 Session

- To send the file to the VM/CMS host system:
  pc_filename [*id:*]*fn ft* [*fm*] [(*option*]
- To send the file to the MVS/TSO host system:
  pc_filename [*id:*]*dataset*[(*member*)] [/*password*] [*option*]
- To send the file to the CICS host system:
  pc_filename [*id:*]*host_filename* [(*option*]

5250 Session

- To send the file to the iSeries host system:
  pc_filename [*id:*]*library file member* [*option*]

Following are examples of the data strings for DBCS:

3270 Session

- To send the file to the VM/CMS host system:

  pc_filename [*id:*]*fn ft* [*fm*] [(*option*]
- To send the file to the MVS/TSO host system:

  pc_filename [*id:*]*dataset*[(*member*)] [*/password*] [(*option*]
- To send the file to the CICS host system:

  pc_filename [*id:*]*host_filename* [(*option*]

5250 Session

- To send the file to the iSeries host system:

  pc_filename [*id:*]*library file member* [*option*]

Note: Parameters within [ ] are optional. Available options are listed below. For more information about the options, refer to *Personal Communications Version 5.7 Administrator's Guide and Reference*.

Host System	Common Options
VM/CMS	ASCII, JISCII, CRLF, APPEND, LRECL n, RECFM v|f, TIME n, CLEAR, NOCLEAR, PROGRESS, QUIET
MVS/TSO	ASCII, JISCII, CRLF, APPEND, LRECL (n), RECFM (v|f|u), TIME (n), CLEAR, NOCLEAR, PROGRESS, QUIET, BLKSIZE (n), SPACE (n[,m]), AVBLOCK|TRACKS|CYLINDERS
CICS	ASCII, JISCII, CRLF, BINARY, TIME n, CLEAR, NOCLEAR, PROGRESS, QUIET
OS/400	ASCII, JISCII, CRLF, APPEND, SRC, LRECL n, TIME n, CLEAR, NOCLEAR, PROGRESS, QUIET

Note:

JISCII is valid in a DBCS session for Japan only and ASCII is valid for all other SBCS and DBCS sessions.
Note: Time, if specified, overrides the value in Set Session parameters.
Note:

Other options specified will be passed to the host transfer program. The file transfer program on the host side either uses them, ignores them, or returns an error. Consult the host transfer program documentation to see a complete list of the options supported.

Return Parameters

Return Code	Explanation
2	Parameter error or you have specified a length that is too long (more than 255 bytes) for the EHLLAPI buffer. The file transfer was unsuccessful.
3	File transfer complete.
4	File transfer complete with segmented records.
5	Workstation file name is not valid or not found. File transfer was canceled.
9	A system error was encountered.
27	File transfer terminated because of either a Cancel button or the timeout set by the **Set Session Parameter** (9) function.

Return Code	Explanation
101	File transfer was successful (transfer to/from CICS).

If you receive return code 2 or 9, there is a problem with the system or with the way you specified your data string.

Other return codes can also be received which relate to message numbers generated by the host transfer program. For transfers to a CICS host transfer program, subtract 100 from the return code to give you the numeric portion of the message. For example, a return code of 101 would mean that the message number INW0001 was issued by the host. For other host transfer programs, just use the return code as the numerical part of the message. For example, a return of 34 would mean that message TRANS34 was issued by the host transfer program. The documentation for your host transfer program should give more information about the meanings of the specific messages.

Operating system error codes reported by EHLLAPI are greater than 300. To determine the error code, subtract 300 and refer to the operating system documentation for return codes.

Notes on Using This Function

1. Four sets of parameters under the **Set Session Parameters** (9) function are related to this function. They are the QUIET/NOQUIET, STRLEN/STREOT, TIMEOUT=c/TIMEOUT=0, and the EOT=c session options. See items 1 and 2 on page 146 plus items 7 and 8 on page 148 for more information.

Send Key (3)

3270	*5250*	*VT*
Yes	Yes	Yes

The **Send Key** function is used to send either a keystroke or a string of keystrokes to the host presentation space.

You define the string of keystrokes to be sent with the calling data string parameter. The keystrokes appear to the target session as though they were entered by the terminal operator. You can also send all attention identifier (AID) keys such as Enter and so on. All host fields that are input protected or are numeric only must be treated accordingly.

Prerequisite Calls

Connect Presentation Space (1)

Call Parameters

	Standard Interface	Enhanced Interface
Function Number	Must be 3.	
Data String	A string of keystrokes, maximum 255. Uppercase and lowercase ASCII characters are represented literally. Function keys and shifted function keys are represented by mnemonics. See “Keyboard Mnemonics” on page 135.	
Length	Length of the source data string. Overridden if in EOT mode.	

	Standard Interface	Enhanced Interface
PS Position	NA	

Return Parameters

Return Code	Explanation
0	The keystrokes were sent; status is normal.
1	Your program is not connected to a host session.
2	An incorrect parameter was passed to EHLLAPI.
4	The host session was busy; all of the keystrokes could not be sent.
5	Input to the target session was inhibited or rejected; all of the keystrokes could not be sent.
9	A system error was encountered.

Notes on Using This Function

1. The parameters under the **Set Session Parameters** (9) function are related to this function. They are the AUTORESET/NORESET, STRLEN/STREOT, EOT=c, ESC=c, and RETRY/NORETRY session options. See items 1 and 2 on page 146, 9 and 10 on page 148, and 19 on page 151 for more information.
2. Keystrokes cannot be sent to the host session when the keyboard is locked or busy. You can check this condition with the **Wait** (4) function.
3. If the host is busy, input might be rejected.
4. The length of the data string must be explicitly defined by the default length parameter, but it can be defined implicitly by the EOT=c option of the **Set Session Parameters** (9) function.

   When explicitly defining length (see item 1), the value for the length parameter passed by the application must be calculated. For this calculation, allow 2 bytes for compound keystrokes such as `@E` and allow 4 bytes for compound keystrokes such as `@A@C`.
5. To send special control keys, a compound character coding scheme is used. In this coding scheme, one keystroke is represented by a sequence of two to four ASCII characters. The first and third character are always the escape character. The second and fourth character are always a keycode.

   To send the sequence `LOGON ABCDE` followed by the Enter key, you would code the string `LOGON ABCDE@E`. A complete list of these keycodes is represented in "Keyboard Mnemonics" on page 135.

   This compound coding technique allows an ASCII string representation of all necessary keystroke codes without requiring the use of complex hexadecimal key codes.

   The default escape character is `@`. The value of the escape character can be changed to any other character with the ESC=c option of the **Set Session Parameters** (9) function.
6. Users needing higher levels of performance should use the **Copy String to Field** (33) or **Copy String to Presentation Space** (15) function rather than send keystrokes with the **Send Key** (3) function. But remember, only the **Send Key** (3) function can send the special control keys.
7. Refer to **Set Session Parameters (9)** session option 10 on page 148 (NORESET option) to improve the performance of this function.

Unless NORESET is required, the reset mnemonic is added to the keystroke strings as a prefix. Therefore, all resettable status except input inhibit are reset.

The NORESET option is not the same as the **Reset System** (21) function.

8. The keystroke strings, including the AID key, are sent to the host via multiple paths. Each path sends the strings before the first AID key (or including the AID key). EHLLAPI adjusts the string length and the start position of each path. For a host application program, any keystroke might be lost by the AID key process. Therefore, you should not send a keystroke list that includes plural AID keys.
9. During the `@P` (Print) or `@A@T` (Print Presentation Space) process, all requests that update the presentation space are rejected. If the presentation space is busy or the interruption request occurs during the print request, the mnemonic @A@R (Device Reset – Cancel to print the Presentation Space) cancels the request and resets the status.

Keyboard Mnemonics

The keyboard mnemonics provide the ASCII characters representing the special function keys of the keyboard in the workstation. The abbreviation codes make the mnemonics for special keys easy to remember. An alphabetic key code is used for the most common keys. For example, the **Clear** key is *C*, and the **Tab** key is *T*.

Table 7 shows the mnemonics using uppercase alphabetic characters:

Table 7. Mnemonics with Uppercase Alphabetic Characters

Mnemonic	Meaning	3270	5250	VT
@B	Left Tab	Yes	Yes	No
@C	Clear	Yes	Yes	No
@D	Delete	Yes	Yes	No
@E	Enter	Yes	Yes	No
@F	Erase EOF	Yes	Yes	No
@H	Help	No	Yes	No
@I	Insert	Yes	Yes	No
@J	Jump (Set Focus)	Yes	Yes	No
@L	Cursor Left	Yes	Yes	Yes
@N	New Line	Yes	Yes	Yes
@O	Space	Yes	Yes	Yes
@P	Print	Yes	Yes	Yes
@R	Reset	Yes	Yes	No
@T	Right Tab	Yes	Yes	Yes
@U	Cursor Up	Yes	Yes	Yes
@V	Cursor Down	Yes	Yes	Yes
@X*	DBCS (Reserved)	Yes	Yes	No
@Z	Cursor Right	Yes	Yes	Yes

Table 8 on page 136 shows the mnemonics using a number or lowercase alphabetic characters.

Table 8. Mnemonics with Numbers or Lowercase Characters

Mnemonic	Meaning	3270	5250	VT
@0	Home	Yes	Yes	No
@1	PF1/F1	Yes	Yes	No
@2	PF2/F2	Yes	Yes	No
@3	PF3/F3	Yes	Yes	No
@4	PF4/F4	Yes	Yes	No
@5	PF5/F5	Yes	Yes	No
@6	PF6/F6	Yes	Yes	Yes
@7	PF7/F7	Yes	Yes	Yes
@8	PF8/F8	Yes	Yes	Yes
@9	PF9/F9	Yes	Yes	Yes
@a	PF10/F10	Yes	Yes	Yes
@b	PF11/F11	Yes	Yes	Yes
@c	PF12/F12	Yes	Yes	Yes
@d	PF13	Yes	Yes	Yes
@e	PF14	Yes	Yes	Yes
@f	PF15	Yes	Yes	Yes
@g	PF16	Yes	Yes	Yes
@h	PF17	Yes	Yes	Yes
@i	PF18	Yes	Yes	Yes
@j	PF19	Yes	Yes	Yes
@k	PF20	Yes	Yes	Yes
@l	PF21	Yes	Yes	No
@m	PF22	Yes	Yes	No
@n	PF23	Yes	Yes	No
@o	PF24	Yes	Yes	No
@q	End	Yes	Yes	No
@u	Page Up	No	Yes	No
@v	Page Down	No	Yes	No
@x	PA1	Yes	Yes	No
@y	PA2	Yes	Yes	No
@z	PA3	Yes	Yes	No

Table 9 shows the mnemonics using the combination @A and @alphabetic uppercase (A–Z) key.

Table 9. Mnemonics with @A and @ Uppercase Alphabetic Characters

Mnemonic	Meaning	3270	5250	VT
@A@C	Test	No	Yes	No
@A@D	Word Delete	Yes	Yes	No
@A@E	Field Exit	Yes	Yes	No
@A@F	Erase Input	Yes	Yes	No

Table 9. Mnemonics with @A and @ Uppercase Alphabetic Characters (continued)

Mnemonic	Meaning	3270	5250	VT
@A@H	System Request	Yes	Yes	No
@A@I	Insert Toggle	Yes	Yes	No
@A@J	Cursor Select	Yes	Yes	No
@A@L	Cursor Left Fast	Yes	Yes	No
@A@Q	Attention	Yes	Yes	No
@A@R	Device Cancel (Cancels Print Presentation Space)	Yes	Yes	No
@A@T	Print Presentation Space	Yes	Yes	Yes
@A@U	Cursor Up Fast	Yes	Yes	No
@A@V	Cursor Down Fast	Yes	Yes	No
@A@Z	Cursor Right Fast	Yes	Yes	No

Table 10 shows the mnemonics using the combination @A and @number or @A and @alphabetic lowercase (a–z) key.

Table 10. Mnemonics with @A and @ Lowercase Alphabetic Characters

Mnemonic	Meaning	3270	5250	VT
@A@9	Reverse Video	Yes	Yes	No
@A@b	Underscore	Yes	No	No
@A@c	Reset Reverse Video	Yes	No	No
@A@d	Red	Yes	No	No
@A@e	Pink	Yes	No	No
@A@f	Green	Yes	No	No
@A@g	Yellow	Yes	No	No
@A@h	Blue	Yes	No	No
@A@i	Turquoise	Yes	No	No
@A@j	White	Yes	No	No
@A@l	Reset Host Colors	Yes	No	No
@A@t	Print (Personal Computer)	Yes	Yes	No
@A@y	Forward Word Tab	Yes	Yes	No
@A@z	Backward Word Tab	Yes	Yes	No

Table 11 on page 138 shows the mnemonics using the combination @A and @special character.

Table 11. Mnemonics with @A and @ Alphanumeric (Special) Characters

Mnemonic	Meaning	3270	5250	VT
@A@–	Field –	No	Yes	No
@A@+	Field +	No	Yes	No
@A@<	Record Backspace	No	Yes	No

Table 12 shows the mnemonics using the combination @S and @alphabetic lowercase.

Table 12. Mnemonics with @S (Shift) and @ Alphabetic Characters

Mnemonic	Meaning	3270	5250	VT
@S@E	Print Presentation Space on Host	No	Yes	No
@S@x	Dup	Yes	Yes	No
@S@y	Field Mark	Yes	Yes	No

DBCS Only: Table 13 shows the mnemonics using the combination @X and @number or @alphabetic lowercase (a–z).

Table 13. Mnemonics Using @X and @Alphabetic Lowercase (For DBCS Only)

Mnemonic	Meaning	3270	5250	VT
@X@1	Display SO/SI	Yes	Yes	No
@X@5	Generate SO/SI	No	Yes	No
@X@6	Display Attribute	No	Yes	No
@X@7	Forward Character	No	Yes	No
@X@c	Split vertical bar (¦)	No	Yes	No

VT Only: Table 14 shows the mnemonics using the combination @M and @number or @alphabetic lowercase (a-z)

Table 14. Mnemonics Using @M, @Q and @Alphabetic Lowercase (For VT Only)

Mnemonic	Meaning	3270	5250	VT
@M@0	VT Numeric Pad 0	No	No	Yes
@M@1	VT Numeric Pad 1	No	No	Yes
@M@2	VT Numeric Pad 2	No	No	Yes
@M@3	VT Numeric Pad 3	No	No	Yes
@M@4	VT Numeric Pad 4	No	No	Yes

Table 14. Mnemonics Using @M, @Q and @Alphabetic Lowercase (For VT Only) (continued)

Mnemonic	Meaning	3270	5250	VT
@M@5	VT Numeric Pad 5	No	No	Yes
@M@6	VT Numeric Pad 6	No	No	Yes
@M@7	VT Numeric Pad 7	No	No	Yes
@M@8	VT Numeric Pad 8	No	No	Yes
@M@9	VT Numeric Pad 9	No	No	Yes
@M@-	VT Numeric Pad -	No	No	Yes
@M@,	VT Numeric Pad ,	No	No	Yes
@M@.	VT Numeric Pad .	No	No	Yes
@M@e	VT Numeric Pad Enter	No	No	Yes
@M@f	VT Edit Find	No	No	Yes
@M@i	VT Edit Insert	No	No	Yes
@M@r	VT Edit Remove	No	No	Yes
@M@s	VT Edit Select	No	No	Yes
@M@p	VT Edit Previous Screen	No	No	Yes
@M@n	VT Edit Next Screen	No	No	Yes
@M@a	VT PF1	No	No	Yes
@M@b	VT PF2	No	No	Yes
@M@c	VT PF3	No	No	Yes
@M@d	VT PF4	No	No	Yes
@M@h	VT HOld Screen	No	No	Yes
@M@(space)	Control Code NUL	No	No	Yes
@M@A	Control Code SOH	No	No	Yes
@M@B	Control Code STX	No	No	Yes
@M@C	Control Code ETX	No	No	Yes
@M@D	Control Code EOT	No	No	Yes
@M@E	Control Code ENQ	No	No	Yes
@M@F	Control Code ACK	No	No	Yes

Table 14. Mnemonics Using @M, @Q and @Alphabetic Lowercase (For VT Only) (continued)

Mnemonic	Meaning	3270	5250	VT
@M@G	Control Code BEL	No	No	Yes
@M@H	Control Code BS	No	No	Yes
@M@I	Control Code HT	No	No	Yes
@M@J	Control Code LF	No	No	Yes
@M@K	Control Code VT	No	No	Yes
@M@L	Control Code FF	No	No	Yes
@M@M	Control Code CR	No	No	Yes
@M@N	Control Code SO	No	No	Yes
@M@O	Control Code SI	No	No	Yes
@M@P	Control Code DLE	No	No	Yes
@M@Q	Control Code DC1	No	No	Yes
@M@R	Control Code DC2	No	No	Yes
@M@S	Control Code DC3	No	No	Yes
@M@T	Control Code DC4	No	No	Yes
@M@U	Control Code NAK	No	No	Yes
@M@V	Control Code SYN	No	No	Yes
@M@W	Control Code ETB	No	No	Yes
@M@X	Control Code CAN	No	No	Yes
@M@Y	Control Code EM	No	No	Yes
@M@Z	Control Code SUB	No	No	Yes
@M@u	Control Code ESC	No	No	Yes
@M@v	Control Code FS	No	No	Yes
@M@w	Control Code GS	No	No	Yes
@M@x	Control Code RS	No	No	Yes
@M@y	Control Code US	No	No	Yes
@M@z	Control Code DEL	No	No	Yes
@Q@A	VT User Defined Key 6	No	No	Yes

Table 14. Mnemonics Using @M, @Q and @Alphabetic Lowercase (For VT Only) (continued)

Mnemonic	Meaning	3270	5250	VT
@Q@B	VT User Defined Key 7	No	No	Yes
@Q@C	VT User Defined Key 8	No	No	Yes
@Q@D	VT User Defined Key 9	No	No	Yes
@Q@E	VT User Defined Key 10	No	No	Yes
@Q@F	VT User Defined Key 11	No	No	Yes
@Q@G	VT User Defined Key 12	No	No	Yes
@Q@H	VT User Defined Key 13	No	No	Yes
@Q@I	VT User Defined Key 14	No	No	Yes
@Q@J	VT User Defined Key 15	No	No	Yes
@Q@K	VT User Defined Key 16	No	No	Yes
@Q@L	VT User Defined Key 17	No	No	Yes
@Q@M	VT User Defined Key 18	No	No	Yes
@Q@N	VT User Defined Key 19	No	No	Yes
@Q@0	VT User Defined Key 20	No	No	Yes
@Q@a	VT Backtab	No	No	Yes
@Q@r	VT Clear Page	No	No	Yes
@Q@s	VT Edit	No	No	Yes

The following table shows the mnemonics using a special character.

Table 15. Mnemonics with Special Character Keys

Mnemonic	Meaning	3270	5250	VT
@@	@	Yes	Yes	Yes
@$	Alternate Cursor (The Presentation Manager Interface only)	Yes	Yes	Yes
@<	Backspace	Yes	Yes	Yes

The following table shows BIDI key mnemonics:

Table 16. BIDI Key Mnemonics

Mnemonic	Meaning	3270	5250	VT
@:@s	Screen Reverse	Yes	Yes	Yes
@:@n	Bidi Layer	Yes	Yes	Yes
@:@l	Latin Layer	Yes	Yes	Yes
@:@F	Field Reverse	Yes	Yes	No
@:@p	Push	Yes	No	No
@:@e	End Push	Yes	No	No
@:@a	Auto Push	Yes	No	No
@:@r	Auto Reverse	Yes	No	No
@:@d	CSD	Yes	No	No
@:@f	Final	Yes	No	No
@:@i	Isolated	Yes	No	No
@:@m	Middle	Yes	No	No
@:@t	Initial	Yes	No	No
@:@h	Field Shape	Yes	No	No
@:@u	Field Base	Yes	No	No
@:@b	Base	No	Yes	No
@:@o	Close	No	Yes	No
@:@K	Column Heading	No	No	Yes
@:@B	Cursor Direction	No	No	Yes
@:@D	Encoding Mode	No	No	Yes

The following character keys are interpreted as they are.

a–z	!	'	’	<	}
A–Z	$	(	.	>	[
0–9	%	)	/	=	]
~	&	*	:	?	|
#	"	+	;	{	

1390/1399 Code Page Support

Unicode functionality is supported only on 3270 and 5250 sessions.

STREOT option is not supported in a Unicode session. Please see “Set Session Parameters (9)” on page 145 for details.

The session option ESC is not supported in a Unicode session; using this option, you cannot set a Unicode character as an ESC character. Use the default ESC character @ in a Unicode session. Please see “Set Session Parameters (9)” on page 145 for details.

Prerequisite Calls: Connect Presentation Space (1)

Call Parameters:

	Standard Interface	Enhanced Interface
Function Number	Must be 3	
Data String	A Unicode string of keystrokes, maximum 255. Uppercase and lowercase ASCII characters are represented literally. Function keys and shifted function keys are represented by mnemonics. See "Keyboard Mnemonics" on page 135.	
Length	The length of the Unicode string in Unicode characters.	
PS Position	NA	

Return Parameters:

Return Code	Explanation
0	The keystrokes were sent; status is normal.
1	Your program is not connected to a host session.
2	An incorrect parameter was passed to EHLLAPI.
4	The host session was busy; all of the keystrokes could not be sent.
5	Input to the target session was inhibited or rejected; all of the keystrokes could not be sent.
9	A system error was encountered.

Notes on Using This Function: Before sending keystrokes to a PCOMM session, be sure that the session is a Unicode session and that the current platform is Windows NT or Windows 2000. If the session is an ANSI session or the current platform is Windows 95, Windows 98, or Windows ME, and a Unicode string is sent, junk characters will be displayed.

The string length should indicate the number of Unicode characters and not the number of ANSI characters to be sent.

1137 Code Page Support

Unicode functionality is supported only on 5250 sessions.

STREOT option is not supported in a Unicode session. Please see "Set Session Parameters (9)" on page 145 for details.

The session option ESC is not supported in a Unicode session; using this option, you cannot set a Unicode character as an ESC character. Use the default ESC character @ in a Unicode session. Please see "Set Session Parameters (9)" on page 145 for details.

Prerequisite Calls: Connect Presentation Space (1)

Call Parameters:

	Standard Interface	Enhanced Interface
Function Number	Must be 3	
Data String	A Unicode string of keystrokes, maximum 255. Uppercase and lowercase ASCII characters are represented literally. Function keys and shifted function keys are represented by mnemonics. See "Keyboard Mnemonics" on page 135.	

	Standard Interface	Enhanced Interface
Length	Length of the Unicode data string in bytes. If the length is not a multiple of 2 then an error code of 2 is returned.	
PS Position	NA	

Return Parameters:

Return Code	Explanation
0	The keystrokes were sent; status is normal.
1	Your program is not connected to a host session.
2	An incorrect parameter was passed to EHLLAPI.
4	The host session was busy; all of the keystrokes could not be sent.
5	Input to the target session was inhibited or rejected; all of the keystrokes could not be sent.
9	A system error was encountered.

Notes on Using This Function: Before sending keystrokes to a PCOMM session, be sure that the session is a Unicode session. If the session is ANSI and a Unicode string is sent, junk characters will be displayed.

The string length should indicate the number bytes and not the number of Unicode characters to be sent. Therefore the length should be a multiple of 2. If not, a parameter error will be returned by the function.

Set Cursor (40)

3270	*5250*	*VT*
Yes	Yes	Yes

The **Set Cursor** function is used to set the position of the cursor within the host presentation space. Before using the **Set Cursor** function, a workstation application must be connected to the host presentation space.

Prerequisite Calls

Connect Presentation Space (1)

Call Parameters

	Standard Interface	Enhanced Interface
Function Number	Must be 40	
Data String	NA	
Length	NA	
PS Position	Desired cursor position in the connected host presentation space	

Return Parameters

Return Code	Explanation
0	Cursor was successfully located at the specified position.

Return Code	Explanation
1	Your program is not connected to a host session.
4	The session is busy.
7	A cursor location less than 1 or greater than the size of the connected host presentation space was specified.
9	A system error occurred.

Notes on Using This Function

DBCS Only: If the specified cursor is the second byte of the double-byte character, the cursor moves to the first byte of the character and an error code is not returned.

1137 Code Page Support

The usage of **Set Cursor** in a Unicode session is the same as that for a SBCS session except:

- Unicode functionality is supported only on 5250 sessions.
- In a Unicode session only, if the specified cursor is in the middle of a cluster (for example, a Hindi language cluster), then the cursor is positioned to the beginning of the cluster automatically.

Set Session Parameters (9)

3270	*5250*	*VT*
Yes	Yes	Yes

The **Set Session Parameters** function lets you change certain default session options in EHLLAPI for all sessions. When EHLLAPI is loaded, the default settings for session options are as indicated by the underscored entries in the tables that appear in "Session Options" on page 146. Any, some, or all of these settings can be changed by including the desired option in the calling data string as explained below. Specified settings remain in effect until:

- Changed by a subsequent **Set Session Parameters** (9) function that specifies a new value.
- The **Reset System** (21) function is executed.
- The EHLLAPI application program is terminated.

The following table lists those EHLLAPI functions that are affected by session options. Functions not listed in the table are not affected by any of the session options. Session options that affect each function are indicated by corresponding entries in the "See Items" column. These entries are indexed to the list that follows "Call Parameters" on page 146.

Function Number	Function Name	See Items
1	**Connect Presentation Space**	**11, 23, 24**
3	**Send Key**	**1, 2, 9, 10, 19**
4	**Wait**	**12**
5	**Copy Presentation Space**	**5, 13, 14, 15, 17, 20, 21, 22**
6	**Search Presentation Space**	**1, 2, 3, 4**

Function Number	Function Name	See Items
8	**Copy Presentation Space to String**	**5, 13, 14, 15, 17, 20, 21, 22**
10	**Query Sessions**	**16, 22**
15	**Copy String to Presentation Space**	**1, 2, 13, 14, 18, 20, 21, 22**
18	**Pause**	**6**
30	**Search Field**	**1, 2, 3, 4, 22**
33	**Copy String to Field**	**1, 2, 13, 14, 18, 20, 21, 22**
34	**Copy Field to String**	**5, 13, 14, 17, 20, 21, 22**
51	**Get Key**	**9, 12**
90	**Send File**	**1, 2, 7, 8**
91	**Receive File**	**1, 2, 7, 8**
101	**Connect Window Services**	**23, 24**
Note: Items 20 and 21 in this table are for DBCS only		

Prerequisite Calls

There are no prerequisite calls for this function.

Call Parameters

	Standard Interface	Enhanced Interface
Function Number	Must be 9.	
Data String	String containing the desired values of those session options that are to be changed. The data string can contain any of the values in the tables of "Session Options". The values should be placed on the data string line, separated by commas or blanks. The sets of parameters are explained in terms of the functions they affect.	
Length	Explicit length of the source data string (the STREOT option is not allowed).	
PS Position	NA.	

Session Options

The following tables show the session options. The default is underlined.

1. The values in the following table determine how the data string length is defined for functions **Send Key** (3), **Search Presentation Space** (6), **Copy String to Presentation Space** (15), **Search Field** (30), **Copy String to Field** (33), **Send File** (90), and **Receive File** (91).

Value	Explanation
STRLEN	An explicit length is passed for all strings.
STREOT	Lengths are not explicitly coded. Calling (source) data strings are terminated with an EOT character.

2. The statement in the following table is used to specify the character that is used as the end-of-text (EOT) delimiter in the calling (source) data string for EHLLAPI functions **Send Key** (3), **Search Presentation Space** (6), **Copy String to Presentation Space** (15), **Search Field** (30), **Copy String to Field** (33), **Send File** (90), and **Receive File** (91).

Value	Explanation
EOT=c	Allows you to specify the EOT character for string terminators (in STREOT mode). Binary zero is the default. Do not leave a blank after the equal sign.

To be valid, `c` must be entered as a 1-byte string literal character with no preceding blanks. The EOT character specified by this statement is used to determine the length of a calling data string only when the STREOT option (see item 1) is in effect.

3. The values in the following table affect the **Search Presentation Space** (6) and **Search Field** (30) search functions.

Value	Explanation
SRCHALL	The **Search Presentation Space** (6) function and **Search Field** (30) function scan the entire host presentation space or field.
SRCHFROM	The **Search Presentation Space** (6) function and **Search Field** (30) function start from a specified PS position (for `SRCHFRWD`) or end at a specified PS position (for `SRCHBKWD`).

4. The values in the following table affect the **Search Presentation Space** (6) and **Search Field** (30) search functions. They determine the direction for the search.

Value	Explanation
SRCHFRWD	The **Search Presentation Space** (6) function and **Search Field** (30) function perform in an ascending direction.
SRCHBKWD	The **Search Presentation Space** (6) function and **Search Field** (30) function perform in a descending direction. A search is satisfied if the first character of the requested string starts within the bounds specified for the search.

5. The values in the following table determine how attribute bytes are treated for functions **Copy Presentation Space** (5), **Copy Presentation Space to String** (8), and **Copy Field to String** (34).

Value	Explanation
NOATTRB	Convert all unknown values to blanks.
ATTRB	Pass back all codes that do not have an ASCII equivalent as their original values.
NULLATTRB	Convert all field attributes to null characters.

6. The values in the following table affect the **Pause** (18) function.

Value	Explanation
FPAUSE	A full-duration pause lasts for however long you specified in the **Pause** (18) function.
IPAUSE	Interruptible pause. After the **Start Host Notification** (23) function is executed, a host event satisfies a pause.

7. The values in the following table determine whether messages generated by file transfer functions **Send File** (90) and **Receive File** (91) are displayed.

Value	Explanation
NOQUIET	SEND and RECEIVE messages are displayed.
QUIET	SEND and RECEIVE messages are not displayed.

8. The statements in the following table determine how long Personal Communications EHLLAPI waits before it automatically issues a Cancel during execution of file transfer functions **Send File** (90) and **Receive File** (91). To be valid, c must be an Arabic number 0–9 or a capital letter J–N and must not be preceded by a blank.

Value	Explanation
TIMEOUT=0	A Cancel is automatically issued following a 20-second (approximate) delay.
TIMEOUT=c	A Cancel is automatically issued following a specified delay. A 1-character indicator from the table below tells Personal Communications how many 30-second cycles it should accept before issuing a Cancel itself. **Character** — **Value (in minutes)** **1** — 0.5 **2** — 1.0 **3** — 1.5 **4** — 2.0 **5** — 2.5 **6** — 3.0 **7** — 3.5 **8** — 4.0 **9** — 4.5 **J** — 5.0 **K** — 5.5 **L** — 6.0 **M** — 6.5 **N** — 7.0

9. The statement in the following table is used to define the escape character for keystroke mnemonics. This session option affects functions **Send Key** (3) and **Get Key** (51). The value of c must be entered as a 1-byte literal character string with no preceding blanks.

Value	Explanation
ESC=c	Specifies the escape character for keystroke mnemonics (@ is the default). Do not leave a blank after the equal sign. A blank is not a valid escape character.

10. The values in the following table determine whether EHLLAPI automatically precedes strings sent using the **Send Key** (3) function with a reset.

Value	Explanation
AUTORESET	EHLLAPI attempts to reset all inhibited conditions by prefixing all strings of keys sent using the **Send Key** (3) function with a reset.
NORESET	Do not AUTORESET.

11. The values in the following table affect the manner in which the **Connect Presentation Space** (1) command function.

Value	Explanation
CONLOG	Establishes a logical connection between the workstation session and a host session. During Connect, does not jump to the requested presentation space.
CONPHYS	Establishes a physical connection between the workstation session and a host session. During Connect, jumps to the requested presentation space.

12. The values in the following table affect the **Wait** (4) function and **Get Key** (51) function. For each value, there are two different effects, one for each function.

Value	Explanation
TWAIT	For the **Wait** (4) function, waits up to a minute before timing out on XCLOCK (X []) or XSYSTEM. For the **Get Key** (51) function, does not return control to your EHLLAPI application program until it has intercepted a key (normal or AID key based on the option specified under the **Start Keystroke Intercept** (50) function).
LWAIT	For the **Wait** (4) function, waits until XCLOCK (X [])/XSYSTEM clears. This option is not recommended, because control does not return to your application until the host is available. For the **Get Key** (51) function, does not return control to your EHLLAPI application program until it has intercepted a key (normal or AID key based on the option specified under the **Start Keystroke Intercept** (50) function).
NWAIT	For the **Wait** (4) function, checks status and returns immediately (no wait). For the **Get Key** (51) function, returns return code 25 (keystrokes not available) in the fourth parameter if nothing is queued matching the option specified under the **Start Keystroke Intercept** (50) function.

Note: Use of NWAIT is recommended.

13. The values in the following table affect **Copy Presentation Space** (5), **Copy Presentation Space to String** (8), **Copy String to Presentation Space** (15), **Copy String to Field** (33), and **Copy Field to String** (34). Extended attribute bytes (EAB) include extended character attributes and extended field attributes.

Value	Explanation
NOEAB	Pass data only, no EABs.

Value	Explanation
EAB	Pass the presentation space data with extended attribute bytes. For each character that appears on the screen, 2 bytes of data are passed. Therefore, a buffer twice the size of the presentation space must be preallocated; for example 2 x 1920 = 3840 for a 24-row by 80-column presentation space. Extended attributes for a string of characters may be reported as attributes of the field byte, rather than as attributes of each individual character in the field. In this case, to tell if a particular character or set of characters on a screen is underscored, do a CopyPStoString specifying the position of the field attribute byte (the byte before the field that is displayed on the screen) to get the EAB information that applies to all of the characters in that field.

Note: When using **EHLLAPI Copy PS to String**, text is copied which should be invisible to the operator. Use the EHLLAPI Set Session Parameters function to set the NODISPLAY option to determine if there is hidden data. This causes EHLLAPI to return nondisplay fields as nulls. Another common procedure for hiding data is to set the foreground and background colors the same (BLACK, for instance) so the text is displayed, but not visible to the human operator. The only way for your application to detect this is to use the EAB and XLATE session parameters and then copying the PS. The foreground/background color of each position is returned and you can determine which characters are invisible.

14. The values in the following table affect **Copy Presentation Space** (5), **Copy Presentation Space to String** (8), **Copy String to Presentation Space** (15), **Copy String to Field** (33), and **Copy Field to String** (34).

Value	Explanation
NOXLATE	EABs are not translated.
XLATE	EABs are translated to the PC color graphics adapter (CGA) format.

15. The values in the following table affect **Copy Presentation Space** (5) and **Copy Presentation Space to String** (8) if NOATTRB and NOEAB are specified.

Value	Explanation
BLANK	Convert all unknown values to X'20'.
NOBLANK	Convert all unknown values to X'00'.

The default value is BLANK. If you want to change the default value to NOBLANK, add the following statement in the PCSWIN.INI file located in the Personal Communications user-class application data directory:

```
[API]
NullToBlank=NO
```

16. The values in the following table affect the presentation space size that is returned by the **Query Sessions** (10).

Value	Explanation
CFGSIZE	Returns the configured size of the connected presentation space. This option ignores any override of the configured size by the host.
NOCFGSIZE	Returns the current size of the connected presentation space.

17. The values in the following table affect **Copy Presentation Space** (5), **Copy Presentation Space to String** (8), and **Copy Field to String** (34).

Value	Explanation
DISPLAY	Copy nondisplay fields in the presentation space to the target buffer area in the same manner as display fields. Current applications function normally.
NODISPLAY	Do not copy nondisplay fields in the presentation space to the target buffer area. Copy the nondisplay fields to the target buffer as a string of null characters. This allows applications to display the copied buffers in the presentation widow without displaying confidential information, such as passwords.

18. The values in the following table affect **Copy String to Presentation Space** (15) and **Copy String to Field** (33).

Value	Explanation
NOPUTEAB	EAB (or EAD for DBCS) is not contained in the data string of **Copy String to Presentation Space** or **Copy String to Field**.
PUTEAB	EAB is contained with character data in the data string of **Copy String to Presentation Space** or **Copy String to Field**.

    This option is used for the compatibility with Communication Manager/2. For Communication Manager/2, the data string, which is specified in **Copy String to Presentation Space** or **Copy String to Field**, must be contain EAB (or EAD) with character data when EAB (or EAD) is valid in **Set Session Parameters**. Whereas, for the previous Personal Communications, the data string specified in these functions must consist of character data only even if EAB (or EAD) is valid. But Personal Communications for Windows 95, Windows 98, Windows NT, Windows Me, Windows 2000, and Windows XP allows that the data string contains EAB (or EAD) by setting PUTEAB to provide the compatibility with Communication Manager/2.

19. The values in the following table affect the **Send Key** (3) function. Keystrokes are not processed if the keyboard is blocked or in use. The options determine whether the function tries to resend the keystrokes until a 4-minute timeout occurs or if the function returns immediately after determining the keyboard is blocked or in use.

Value	Explanation
RETRY	Continues to attempt to send keystrokes until they are sent or until a 4-minute timeout occurs.
NORETRY	Returns immediately after determining the keyboard is blocked or in use.

20. **DBCS Only:** The values in the following table affect **Copy Presentation Space** (5), **Copy Presentation Space to String** (8), **Copy String to Presentation Space** (15), **Copy String to Field** (33), and **Copy Field to String** (34).

Value	Explanation
NOEAD	DBCS attribute characters are not passed.
EAD	Pass the presentation space data and two attribute characters for the double-byte character set (DBCS). (Users receive 2 bytes for each character other than the data. Therefore, a buffer twice the size of the presentation space must be preallocated.)

21. **DBCS Only:** The values in the following table affect **Copy Presentation Space** (5), **Copy Presentation Space to String** (8), **Copy String to Presentation Space** (15), **Copy String to Field** (33), and **Copy Field to String** (34).

Value	Explanation
NOSO	Pass the presentation space data except Shift-in (SI) and Shift-out (SO) control characters.
SO	Pass the presentation space data including translated SI control character to X'0E' and SO control character to X'0F'. The allocated buffer size depends on the length of the stored data.
SPACESO	Pass the presentation space data including translated SI and SO control characters to X'20' (blank). The allocated buffer size depends on the length of the stored data.

22. The values in the following table affect **Copy Presentation Space** (5), **Copy Presentation Space to String** (8), **Copy String to Presentation Space** (15), **Copy String to Field** (33), **Copy Field to String** (34) **Search Field** (30) and **Query Sessions.** (10)

Value	Explanation
EXTEND_PS	5250 emulation supports a presentation space of 24 rows by 80 columns. In some instances, Communication Manager 5250 emulation displays a 25th row. This occurs when either an error message from the host is displayed or when the operator selects the SysReq key. Personal Communications displays 25th row information on row 24, but EHLLAPI normally sees the *real* 24th row. By **EXTEND_PS** option, an EHLLAPI application can use the same interface with Communication Manager EHLLAPI and valid presentation space is extended when this condition occurs.
NOEXTEND_PS	The presentation space is not extended when the above condition occurs. This is the default value.

23. The values in the following table affect the **Connect Presentation Space** (1) and **Connect Window Services** (101) functions. The options specify whether an application can or will share the presentation space to which it is connected with another application. Only one of the following values can be specified with each **Set Session Parameter** call.

Value	Explanation
SUPER_WRITE	The application allows other applications that allow sharing and have write access permissions to concurrently connect to the same presentation space. The originating application performs supervisory-type functions but does not create errors for other applications that share the presentation space.
WRITE_SUPER	The application requires write access and allows only supervisory application to concurrently connect to its presentation space. This is the default value.

Value	Explanation
WRITE_WRITE	The application requires write access and allows partner or other applications with predictable behavior to share the presentation space.
WRITE_READ	The application requires write access and allows other applications that perform read-only functions to share the presentation space. The application is also allowed to copy the presentation space and perform other read-only operations as usual.
WRITE_NONE	The application has exclusive use of the presentation space. No other applications are allowed to share the presentation space, including supervisory applications. The application is allowed to copy the presentation space and perform read-only operations as usual.
READ_WRITE	The application requires only read access to monitor the presentation space and allows other applications that perform read or write, or both, functions to share the presentation space. The application is also allowed to copy the presentation space and perform other read-only operations as usual.

24. The values in the following table allow applications that have presentation space sharing requirements to limit the sharing to a partner application (an application that was developed to work with it).

Value	Explanation
NOKEY	Allows the application to be compatible with existing applications that do not specify the **KEY** parameter.
KEY$*nnnnnnnn*	Uses a keyword to restrict sharing access to the presentation space that it supports. The keyword must be exactly 8 bytes in length.

Return Parameters

This function returns a length and a return code.

Length:
Number of valid session parameters that are set.

Return Code:
The following codes are defined:

Return Code	Explanation
0	The session parameters have been set.
2	One or more parameters were not valid.
9	A system error was encountered.

1390/1399 and 1137 Code Page Support

Code page 1390/1399 Unicode functionality is available only for 3270 and 5250 sessions. Code page 1137 Unicode functionality is available only for 5250 sessions.

The following session option differences must be noted for 1390/1399 and 1137 code page support in a Unicode session:

- The session option STREOT should not be used for Unicode strings for the following reasons:
  - The session option STREOT specifies that the length of the string is not explicitly given. An EOT character indicates the end of the string. By scanning

for the EOT character, the length of the string can be found. This EOT character is stored as a single-byte value. The single-byte EOT character cannot be used for Unicode strings.

- *Scenario:* A user sets the EOT character as 'A' whose ASCII value is 0X'41'. If the string buffer that the user passes to the function contains a Unicode character, then the low byte of this Unicode character will be taken as the string delimiter. Therefore, a single-byte EOT character cannot be used as a string delimiter.

– The EOT character cannot be stored as a Unicode character since the **Set Session Parameter** function is independent of the PCOMM session and the same setting applies to all the sessions of PCOMM. If the EOT is to be stored as a Unicode character, then SBCS and DBCS implementations will be affected by the way the EOT character is passed. At present, the EOT character is expected to be a single-byte value.

Note: If you use the session option STREOT, then the results may not be as expected. You can use a single-byte delimiter with the Unicode strings if you are certain that the single-byte delimiter will not be a part of the Unicode values that you are passing in the buffer.

- The session option ESC is not supported in a Unicode session for the same reason as listed for "STREOT" on page 153.
- The session option XLATE is not supported in Unicode. Even if this option is set, it will be ignored.

Start Close Intercept (41)

3270	*5250*	*VT*
Yes	Yes	Yes

The **Start Close Intercept** function allows the application to intercept close requests generated when a user selects the close option from the emulator session window. This function intercepts the close request and discards it until a **Stop Close Intercept** (43) function is requested.

After using this function, your application program can use the **Query Close Intercept** (42) function to determine when a close request has occurred.

Prerequisite Calls

There are no prerequisite calls for this function.

Call Parameters

Byte	**Definition**	
	Standard Interface	Enhanced Interface
Function Number	Must be 41	
Data String	See the following table	
Length	5 or 6	Must be 12
PS Position	NA	

The data string contains the following items.

Byte		Definition
Standard	Enhanced	
1	1	A 1-character presentation space short name (PSID).
	2–4	Reserved.
4–5		The data in these positions is ignored by EHLLAPI. However, no error is caused if the migrating program has data in these positions. This data is accepted to provide compatibility with migrating applications.
6	5	Specify M to request asynchronous message mode (Windows only).
	6–8	Reserved.
2–3	9–12	When M is specified in position 5 (6 for 16-bit), the window handle of the window that receives the message should be set. The message is a return value of RegisterWindowMessage (PCSHLL) (not equal 0).

Return Parameters

This function returns a data string and a return code.

Data String:

If asynchronous message mode is not specified in position 5 (6 for standard interface) and the function is completed successfully, the following data string is returned.

Byte		Definition
Standard	Enhanced	
1	1	A 1-character presentation space short name (PSID).
	2–8	Reserved.
	9–12	4 byte value in which the event object address is returned by EHLLAPI. The application can wait for this event object. (32-bit only).

Data String:

If M (asynchronous message mode) is specified in position 5 (6 for standard interface) and the function is completed successfully, the following data string is returned.

Byte		Definition
Standard	Enhanced	
1	1	A 1-character presentation space short name (PSID)
	2–8	Reserved
2–3	9–10	Task ID of asynchronous message mode

Note: If a user selects the close option, an application window receives a message. The message is a return value of RegisterWindowMessage (PCSHLL). The wParam parameter will contain the Task ID returned by this function call. The HIWORD of the lParam parameter will contain the Return Code 26, which shows a close intercept occurred, and the LOWORD of the lParam parameter will contain the function number 41.

Return Code:

The following codes are defined:

Return Code	Explanation
0	The **Start Close Intercept** function was successful.
1	An incorrect host presentation space was specified.
2	A parameter error occurred.
9	A system error occurred.
10	The function is not supported by the emulation program.

Notes on Using This Function

1. The returned event object or semaphore is in a non-signaled state when the start request function returns. The event object is in the signaled state each time a close request occurs. To receive notification of multiple close request events, put the event object into the signaled state each time using **SetEvent** or the **Query Close Intercept** (42) function.
2. After using this function, your application program can use the **Query Close Intercept** (42) function to determine when a close request has occurred. The application can wait on the returned event object to determine when the event has occurred.
3. This is not an exclusive call. Multiple applications can request this function for the same short session ID.
4. If there are no applications intercepting close requests for a session, any subsequent close requests selected by the user from the emulator operations dialog result in a normal stop requested for that session.

Start Communication Notification (80)

3270	*5250*	*VT*
Yes	Yes	Yes

The **Start Communication Notification** function begins the process by which your EHLLAPI application can determine whether the specified session is connected to a host.

After using this function, the application can use **Query Communication Event** (81) to determine whether the session is connected or disconnected.

Prerequisite Calls

There are no prerequisite calls for this function.

Call Parameters

	Enhanced Interface
Function Number	Must be 80
Data String	Preallocated structure; see the following table
Length	16
PSPosition	NA

The calling data structure contains these elements

Byte	Definition
1	A 1-character presentation space short name (PSID).
2-4	Reserved
5	One of the following values: • The character C asks for notification when the session either disconnects or connects to the host. • The character A requests the asynchronous mode of notification. When A is specified, position 9-12 returns the address of an event object (Windows). The character C must be placed in position 13. • The character M requests the asynchronous message mode of the notification. When M is specified, the event selection character C must be placed in position 13.
6-8	Reserved
9-12	When M is specified in position 5, the window handle of the window that receives the message should be set. The message is a return value of RegisterWindowMessage (PCSHLL)—(not zero).
13	This should contain the character C if position 5 is A or M.
14-16	Reserved

Data String

If A (asynchronous mode) is specified in position 5 of the calling data structure and the function is completed successfully, the following data string is returned:

Byte	Definition
1	A 1-character presentation space short-name (PSID)
2-8	Reserved
9-12	4-byte binary value in which the event object handle is returned by EHLLAPI. The application can wait for this event object.

If M (asynchronous message mode) is specified in position 5 of the calling data structure and the function is completed successfully, the following data string is returned:

Byte	Definition
1	A 1-character presentation space short-name (PSID)
2-8	Reserved
9-10	Task ID of asynchronous message mode

When the session connects or disconnects an application window receives a message. The message is the return value of RegisterWindow Message (PCSHLL). The wParam contains the Task ID returned by the function call. HIWORD of lParam contains a 21 if the session is connected to the host or a 22 if the session is disconnected. The LOWORD of lParam contains the function number 80.

Return Parameters

Return Code	Definition

0	The function was successful
1	An incorrect PSID was specified
2	An error was made in designating parameters
9	A system error was encountered

Notes on using this Function

1. An application program can issue this function for multiple host sessions. The **Query Communication Event** (81) function can be used to determine the session communication status.
2. If the application chooses the asynchronous option, it can use the Windows SDK call **WaitForSingleObject** to wait until the sessions communication status has changed.
3. The event object is initially in a non-signaled state. It is signaled each time an event occurs. To receive notification for multiple events the application must put the event object into the non-signaled state each time it is signaled, by using the Windows SDK call **ResetEvent**, or by using function 81 **Query Communications Event**.
4. Multiple calls to this function with the same options from the same application will be ignored.
5. This is not exclusive to one application. Several applications can request this function for the same Session ID.

Start Host Notification (23)

3270	*5250*	*VT*
Yes	Yes	Yes

The **Start Host Notification** function begins the process by which your EHLLAPI application program determines if the host presentation space or OIA have been updated.

After using this function, your application program can use the **Query Host Update** (24) function to determine when a host event has occurred.

Prerequisite Calls

There are no prerequisite calls for this function.

Call Parameters

	Standard Interface	**Enhanced Interface**
Function Number	Must be 23	
Data String	Preallocated string; see the following table	
Length	6 or 7 implied	16
PS Position	NA	

The calling data string contains these elements:

Byte		**Definition**
Standard	Enhanced	

Byte		Definition
1	1	One of the following values: • A 1-character presentation space short name (PSID) • A blank or null indicating a request for the host-connected host presentation space
	2–4	Reserved.
2	5	One of the following values: • The character B asking for notification of both host presentation space and OIA updates. • The character O asking for notification of only OIA updates. • The character P asking for notification of only host presentation space updates. • The character A requesting the asynchronous mode of the notification When A is specified, position 9–12 returns the address of an event object. The event selection character B, O, or P must be placed in position 13. • The character M requesting the asynchronous message mode of the notification. When M is specified, the event selection character B, O, or P must be placed in position 13 (7 for 16-bit). • E The character E asking for notification of completion during a printer session.
	6–8	Reserved.
3–4	9–12	When M is specified in position 5 (2 for 16-bit), the window handle of the window that receives the message should be set. The message is a return value of RegisterWindowMessage (PCSHLL) (not equal 0).
7	13	One of the following values if position 5 (2 for 16-bit) is A or M: • The character B asking for notification of both host presentation space and OIA updates • The character O asking for notification of only OIA updates • The character P asking for notification of only host presentation update.
	14–16	Reserved.

Return Parameters

This function returns a data string and a return code.

Data String:

If A (asynchronous mode of notification) is specified in position 5 and the function is completed successfully, the following data string is returned:

Byte		Definition
Standard	Enhanced	

Byte		Definition
1	1	A 1-character presentation space short name (PSID).
	2–8	Reserved.
	9–12	4-byte value in which the event object address is returned by EHLLAPI. The application can wait for this event object (32-bit only).

Data String:

If M (asynchronous message mode) is specified in position 5 (2 for standard interface) and the function is completed successfully, the following data string is returned:

Byte		Definition
Standard	Enhanced	
1	1	A 1-character presentation space short name (PSID)
	2–8	Reserved
3–4	9–10	Task ID of asynchronous message mode

Note: If OIA or presentation space is updated, an application window receives a message. The message is a return value of RegisterWindowMessage (PCSHLL). The wParam parameter contains the Task ID returned by the function call. HIWORD of lParam contains Return Code 21 (shows the OIA is updated), 22 (shows the host presentation space is updated), or 23 (shows both the OIA and the host presentation space are updated), and LOWORD of lParam parameter contains function number 23.

Return Code:

The following codes are defined:

Return Code	Definition
0	The **Start Host Notification** function was successful.
1	An incorrect host presentation space was specified.
2	An error was made in designating parameters.
9	A system error was encountered.

Notes on Using This Function

1. An application program can issue this function for multiple host sessions. The **Pause** (18) function can notify the application when one or more host sessions (PS, OIA, or both of them) are updated. The **Query Host Update** (24) function can be used to determine whether a PS, OIA, or both of them have been updated.
2. If the application chooses the asynchronous option, it can wait for the returned event object or semaphore to determine when a host event has occurred.
3. The event object or semaphore is initially in a non-signaled state and is signaled each time an appropriate event occurs. To receive notification for multiple events, the application must put the event object into the non-signaled state each time it has been signaled using either the **ResetEvent** or the **Query Host Update** (24) function.
4. An application cannot request Start Host Notification more than once with the same options.

5. This is not an exclusive call. Multiple applications can request this function for the same short session ID.

Start Keystroke Intercept (50)

3270	*5250*	*VT*
Yes	Yes	Yes

The **Start Keystroke Intercept** function allows a workstation application to filter any keystrokes sent to a session by a terminal operator. After a call to this function, keystrokes are intercepted and saved until the keystroke queue overflows or until the **Stop Keystroke Intercept** (53) function or **Reset System** (21) function is called. The intercepted keystrokes can be:

- Received through the **Get Key** (51) function and sent to the same or another session with the **Send Key** (3) function
- Accepted or rejected through the **Post Intercept Status** (52) function
- Replaced by other keystrokes with the **Send Key** (3) function
- Used to trigger other processes

Prerequisite Calls

There are no prerequisite calls for this function.

Call Parameters

	Standard Interface	**Enhanced Interface**
Function Number	Must be 50	
Data String	See the following table	
Length	Keystroke buffer size EHLLAPI allocates 32 bytes minimum for this buffer.	
PS Position	NA	

The calling data string contains:

Byte		**Definition**
Standard	Enhanced	
1	1	One of the following values: • A specific host presentation space short name (PSID) • A blank or null indicating a request for the host-connected host presentation space
	2–4	Reserved.
2	5	An **option code** character: • D for AID keystrokes only. • L for all keystrokes. • M for requesting the asynchronous message mode of the notification (Windows only). When M is specified, a code character D, or L must be placed in position 13 (7 for 16-bit).
	6–8	Reserved.

Byte		Definition
3–4	9–12	When M is specified in position 5 (2 for 16-bit), the window handle of the window that receives the message should be set. The message is a return value of RegisterWindowMessage (PCSHLL) (not equal 0).
7	13	One of the following values if position 5 (2 for 16-bit) is M: • D for AID keystrokes only. • L for all keystrokes.
	14–16	Reserved.

Data String:

If M (asynchronous message mode) is specified in position 5 (2 for standard interface) and the function is completed successfully, the following data string is returned:

Byte		Definition
Standard	Enhanced	
1	1	A 1-character presentation space short name (PSID)
	2–8	Reserved
3–4	9–10	Task ID of asynchronous message mode

Note: If a user sends keystrokes to a session, an application window receives a message. The message is a return value of RegisterWindowMessge (PCSHLL). The wParam parameter contains the Task ID returned by the function call. HIWORD of lParam parameter contains return code 0, which shows that the function was successful, and LOWORD of lParam parameter contains function number 50.

Return Parameters

Return Code	Explanation
0	The **Start Keystroke Intercept** function was successful.
1	An incorrect presentation space was specified.
2	An incorrect option was specified.
4	The execution of the function was inhibited because the target presentation space was busy.
9	A system error was encountered. Release is being used.

Notes on Using This Function

1. If a return code of 31 occurs for the **Get Key** (51) function, either:
   - Increase the value of the calling length parameter for this function, or
   - Execute the **Get Key** (51) function more frequently.

   An intercepted keystroke occupies 3 bytes in the buffer. The next intercepted keystroke is placed in the adjacent 3 bytes. When the **Get Key** (51) function retrieves a keystroke (first-in first-out, or FIFO), the 3 bytes that it occupied are made available for another keystroke. By increasing the size of the buffer or the rate at which keystrokes are retrieved from the buffer, you can eliminate buffer overflow.

In the PC/3270, another way to eliminate return code 31 is to operate the PC/3270 emulator in the resume mode.

2. If option code D is provided, EHLLAPI writes intercepted non-AID keys to the presentation space to which they were originally intended, and returns only AID keys to the application.
3. Call the **Stop Keystroke Intercept** (53) function before exiting your EHLLAPI application. Otherwise, keystroke interception remains enabled with unpredictable results.

Start Playing Macro (110)

3270	*5250*	*VT*
Yes	Yes	Yes

The **Start Playing Macro** function invokes a macro. The macro will be executed in the connected session.

Note: This macro must exist in the Personal Communications user-class application data directory and no extension should be specified in the function call for the macro name.

Prerequisite Calls

Connect Presentation Space (1)

Call Parameters

	Standard Interface
Function Number	Must be 110
Data String	See the following table
Length	Length of macro name, plus 3
PS Position	NA

Byte		**Definition**
Standard	Enhanced	
1-2		Reserved
3-n		Null terminated macro name

Return Parameters

Return Code	**Explanation**
0	The **Start Playing Macro** function was successful.
1	The programs is not connected to a host session.
2	An error was made in specifying parameters.
9	A system error was encountered.

Stop Close Intercept (43)

3270	*5250*	*VT*
Yes	Yes	Yes

The **Stop Close Intercept** function allows the application to turn off the **Start Close Intercept** (41) function. After the application has issued the **Stop Close Intercept** function, subsequent close requests result in a normal stop sent to the logical terminal session.

Prerequisite Calls

Start Close Intercept (41)

Call Parameters

	Standard Interface	**Enhanced Interface**
Function Number	Must be 43	
Data String	1-character short session ID of the host presentation space	
Length	1	Must be 4
PS Position	NA	

The calling data string can contain:

Byte		**Definition**
Standard	Enhanced	
1	1	A 1-character presentation space short name (PSID)
	2–4	Reserved

Return Parameters

Return Code	**Explanation**
0	The **Stop Close Intercept** function was successful.
1	An incorrect host presentation space was specified.
2	An error was made in specifying parameters.
8	No previous **Start Close Intercept** (41) function was issued.
9	A system error occurred.
12	The session stopped.

Stop Communication Notification (82)

3270	*5250*	*VT*
Yes	Yes	Yes

The **Stop Communication Notification** function disables the capability of the **Query Communication Event** (81) function to determine whether any communication events have occurred in the specified Session.

Prerequisite Calls
Start Communication Notification (80)

Call Parameters

	Enhanced Interface
Function Number	Must be 82
Data String	1-character short name of the host presentation space, or a blank or null indicating request for updates to the host-connected presentation space
Length	4 is implied
PSPosition	NA

The calling data structure contains these elements:

Byte	**Definition**
1	A 1-character presentation space short name (PSID)
2-4	Reserved

Return Parameters

Return Code	**Definition**
0	The function was successful
1	An incorrect PSID was specified
8	No prior call to **Start Communication Notification** (80) function was called for the PSID
9	A system error was encountered

Stop Host Notification (25)

3270	*5250*	*VT*
Yes	Yes	Yes

The **Stop Host Notification** function disables the capability of the **Query Host Update** (24) function to determine if the host presentation space or OIA has been updated. This function also stops host events from affecting the **Pause** (18) function.

Prerequisite Calls
Start Host Notification (23)

Call Parameters

	Standard Interface	**Enhanced Interface**
Function Number	Must be 121	
Data String	See the following note	
Length	1 is implied	Must be 4
PS Position	NA	

The calling data string can contain:

Byte		Definition
Standard	Enhanced	
1	1	A 1-character presentation space short name (PSID)
	2–4	Reserved

Note: 1-character short name of the target presentation space ID, or a blank or a null to indicate a request for the host-connected presentation space.

Return Parameters

Return Code	Definition
0	The **Stop Host Notification** function was successful.
1	An incorrect host presentation space was specified.
8	No previous **Start Host Notification** (23) function was issued.
9	A system error was encountered.

Stop Keystroke Intercept (53)

3270	*5250*	*VT*
Yes	Yes	Yes

The **Stop Keystroke Intercept** function ends your application program's ability to intercept keystrokes.

Prerequisite Calls

Start Keystroke Intercept (50)

Call Parameters

	Standard Interface	Enhanced Interface
Function Number	Must be 53	
Data String	Short name of the target presentation space (PSID)	
Length	1 is implied	Must be 4
PS Position	NA	

The calling data string can contain:

Byte		Definition
Standard	Enhanced	
1	1	A 1-character presentation space short name (PSID)
	2–4	Reserved

Return Parameters

Return Code	Explanation
0	The **Stop Keystroke Intercept** function was successful.

Return Code	Explanation
1	An incorrect presentation space was specified.
8	No prior **Start Keystroke Intercept** (50) function was called for this presentation space.
9	A system error was encountered.

Wait (4)

3270	*5250*	*VT*
Yes	Yes	Yes

The **Wait** function checks the status of the host-connected presentation space. If the session is waiting for a host response (indicated by XCLOCK (X []) or XSYSTEM), the **Wait** function causes EHLLAPI to wait up to 1 minute to see if the condition clears.

Prerequisite Calls

Connect Presentation Space (1)

Call Parameters

	Standard Interface	Enhanced Interface
Function Number	Must be 4	
Data String	NA	
Length	NA	
PS Position	NA	

Return Parameters

Return Code	Definition
0	The keyboard is unlocked and ready for input.
1	Your application program is not connected to a valid session.
4	Timeout while still in XCLOCK (X []) or XSYSTEM.
5	The keyboard is locked.
9	A system error was encountered.

Notes on Using This Function

1. The **Wait** function is used to give host requests like those made by the **Send Key** (3) function the time required to be completed. Using the **Set Session Parameters** (9) function, you can request the `TWAIT`, `LWAIT`, or the `NWAIT` option. See item 12 on page 149.
2. You can use this function to see if the host OIA is inhibited.
3. The **Wait** function is satisfied by the host unlocking the keyboard. Therefore, a return code of 0 does not necessarily mean that the transaction has been completed. To verify completion of the transaction, you should use the **Search Field** (30) function or **Search Presentation Space** (6) function combined with the **Wait** function to look for expected keyword prompts.

Window Status (104)

3270	*5250*	*VT*
Yes	Yes	Yes

The **Window Status** function allows the application to query or change a window's presentation space size, location, or visible state.

Prerequisite Calls

Connect Window Services (101)

Call Parameters

	Standard Interface	**Enhanced Interface**
Function Number	Must be 104	
Data String	See the following table	
Length	16 or 20	24 or 28
PS Position	NA	

The calling data string can contain:

Byte		**Definition**
Standard	Enhanced	
1	1	A 1-character presentation space short name (PSID)
	2–4	Reserved
2	5	A request option value, select one of the following values: • X'01' for set status **Note:** When the session is embedded In-Place in a compound OLE document, the set form of this function (byte 5 = X'01') always returns 0 but has no effect. • X'02' for query for status • X'03' for query for extended status
	6	Reserved

If the request option value is X'01' (set status):

Byte		**Definition**
Standard	Enhanced	

Byte		Definition
3–4	7–8	A 16- or 32-bit word containing the status set bits if the request option is 1 (set status). The following codes are valid return values if the request option is set status: **X'0001'** Change the window size. (Not valid with minimize, maximize, restore, or move.) **X'0002'** Move the window. (Not valid with minimize, maximize, size, or restore.) **X'0004'** ZORDER window replacement. **X'0008'** Set the window to visible. **X'0010'** Set the window to invisible. **X'0080'** Activate the window. (Sets focus to window and places it in the foreground unless ZORDER is specified. In this case, the ZORDER placement is used.) **X'0100'** Deactivate the window. (Deactivates the window and makes the window the bottom window unless ZORDER is also specified. In this case, the ZORDER placement is used.) **X'0400'** Set the window to minimized. (Not valid with maximize, restore, size, or move.) **X'0800'** Set the window to maximized. (Not valid with minimize, restore, size, or move.) **X'1000'** Restore the window. (Not valid with minimize, maximize, size, or move.)
5–6	9–12	A 16- or 32-bit word containing the X window position coordinate. (Ignored if the move option is not set.)
7–8	13–16	A 16- or 32-bit word containing the Y window position coordinate. (Ignored if the move option is not set.)
9–10	17–20	A 16- or 32-bit word containing the X window size in device units. (Ignored if the size option is not set.)
11–12	21–24	A 16- or 32-bit word containing the Y window size in device units. (Ignored if the size option is not set.)
13–16	25–28	A 16- or 32-bit word containing a window handle for relative window placement. These two words are only for the set option. (Ignored if the ZORDER option is not set.) Valid values are as follows: X'00000003' Place in front of all sibling windows. X'00000004' Place behind all sibling windows.

If the request option value is X'02' (query for status):

Byte		Definition
Standard	Enhanced	

Byte		Definition
3–4	7–8	A 16- or 32-bit word containing X'0000' if the request option is 2 (query for status). The following codes are possible return values if the request option is query for status. More than one state is possible. **X'0008'** The window is visible. **X'0010'** The window is invisible. **X'0080'** The window is activated. **X'0100'** The window is deactivated. **X'0400'** The window is minimized. **X'0800'** The window is maximized.
5–6	9–12	A 16- or 32-bit word containing the X window position coordinate. (Ignored if the move option is not set.)
7–8	13–16	A 16- or 32-bit word containing the Y window position coordinate. (Ignored if the move option is not set.)
9–10	17–20	A 16- or 32-bit word containing the X window size in device units. (Ignored if the size option is not set.)
11–12	21–24	A 16- or 32-bit word containing the Y window size in device units. (Ignored if the size option is not set.)
13–16	25–28	A 16- or 32-bit word containing a window handle for relative window placement. These two words are only for the set option. (Ignored if the ZORDER option is not set.) Valid values are as follows: X'00000003' Place in front of all sibling windows. X'00000004' Place behind all sibling windows.

If the request option value is X'03' (query for extended status):

Byte		Definition
Standard	Enhanced	
3–4	7–8	A 16- or 32-bit word containing X'0000' if the request option is 3 (query for extended status). The following codes are possible return values if the request option is query for extended status. More than one state is possible. **X'0008'** The window is visible. **X'0010'** The window is invisible. **X'0080'** The window is activated. **X'0100'** The window is deactivated. **X'0400'** The window is minimized. **X'0800'** The window is maximized.
5–6	9–10	A 16- or 32-bit word containing the current font size in the X-dimension. The value is in screen pels.
7–8	11–12	A 16- or 32-bit word containing the current font size in the Y-dimension. The value is in screen pels.
9–12	13–16	Reserved. This value is always zero.

Byte		Definition
13–14	17–18	A 16- or 32-bit word containing the row number of the first visible character of the presentation space. This value is usually one, unless the Fixed Size font option is in effect, and the window has been resized such that some of the presentation space is hidden.
15–16	19–20	A 16- or 32-bit word containing the column number of the first visible character of the presentation space.
17–20	21–24	A 16- or 32-bit word containing the presentation space window handle of the session.

Return Parameters

Return Code	Explanation
0	The **Window Status** function was successful.
1	The presentation space was not valid or not connected.
2	An incorrect option was specified.
9	A system error occurred.
12	The session stopped.

Notes on Using This Function

The logical terminal (LT) windows use character cells. When resizing the LT windows, the LT rounds the number to prevent character cell truncation. The requested size and position might be slightly different from what was requested. Follow the set option with a query option to determine the final Presentation Manager window position and size. All x and y coordinate positions and sizes are in pels.

Write Structured Fields (127)

3270	*5250*	*VT*
Yes	No	No

The **Write Structured Fields** function allows an application to write structured field data to the host application. If the call specifies S (for Synchronous), the application does not receive control until the **Write Structured Fields** function is completed. If the call specifies A (for Asynchronous), the application receives control immediately after the call. If the call specifies M, the application receives control immediately after the call. The application may wait for the message. In any case (S, A or M), the application provides the buffer address in which data to the host is to be placed.

For a successful asynchronous completion of this function, the following statements apply:

The return code field in the parameter list might not contain the results of the requested I/O. If the return code is not 0, then the request failed. The application must take the appropriate action based on the return code.

If the return code for this request is 0, the application must use the request ID returned with this function call to issue the **Get Request Completion** function call

to determine the completion results of the function associated with the request ID. The **Get Request Completion** function call returns the following information:

1. Function request ID
2. Address of the data string from the asynchronous request
3. Length of the data string
4. Return code of the completed function

Prerequisite Calls

Connect for Structured Fields (120) **Allocate Communication Buffer** (123)

Call Parameters

	Standard Interface	**Enhanced Interface**
Function Number	Must be 127	
Data String	See the following table	
Length	8, 10, or 14	Must be 20
PS Position	NA	

The calling data string can contain:

Byte		**Definition**
Standard	Enhanced	
1	1	A 1-character presentation space short name (PSID).
	2–4	Reserved.
2	5	S or A or M **S =** Synchronous. Control is not returned to the application until the read is satisfied. **A =** Asynchronous. Control is returned immediately to the application, can wait for the event object. **M =** Asynchronous. Control is returned immediately to the application, can wait for the message.
	6	Reserved.
3–4	7–8	2-byte destination/origin ID.
5–8	9–12	4-byte address of the buffer from which the data is to be written. The buffer must be obtained using the **Allocate Communications Buffer** (123) function.
9–10	13–16	Reserved.
11–12	17–20	When "M" is specified in position 5 (2 for 16-bit), the window handle of the window that receives the message should be set, The message is a return value of RegisterWindowMessage ("PCSHLL") (not equal 0).
13–14		The data in these positions is ignored by EHLLAPI However, no error is caused if the migrating program has data in these positions. This data is accepted to provide compatibility with migrating applications.

Return Parameters

This function returns a data string and a return code.

Data String:

If A (asynchronous) is specified in position 5 (2 for standard interface) and the function is completed successfully, the following data string is returned:

Byte		Definition
9–10	13–14	2-byte Function Request ID. It is used by the **Get Request Completion** (125) function to determine the completion of this function call.
	15–16	Reserved.
	17–20	4-byte value in which the event object address is returned by EHLLAPI. The application can wait for this event object. When the event object is cleared, the application must issue the **Get Request Completion** (125) function call to get results of the **Write Structured Fields** request. (32-bit only).

Note: An event object is returned for each successful asynchronous request. The event object should not be used again. A new event object is returned for each request and is valid for only the duration of that request.

Data String:

If M (asynchronous message mode) is specified in position 5 (2 for standard interface) and the function is completed successfully, the following data string is returned:

Byte		Definition
9–10	13–14	2-byte Function Request ID. It is used by the **Get Request Completion** (125) function to determine the completion of this function call.
	15–16	Reserved.
11–12	17–18	Task ID of asynchronous message mode.
	19–20	Reserved.

Note: If the function is completed successfully, an application window receive a message. The message is a return value of RegisterWindowMessage (PCSHLL). The wParam parameter contains the Task ID returned by the function call. HIWORD of lParam parameter contains return code 0, which shows the function was successful, and LOWORD of lParam parameter contains function number 127.

Return Code:

The following codes are defined:

Return Code	Explanation
0	The **Write Structured Fields** function was successful.
1	A specified host presentation space short session ID was not valid or was not connected.
2	An error was made in specifying parameters.
9	A system error occurred.
11	Resource unavailable (memory unavailable).
34	The message sent inbound to the host was canceled.
35	An outbound transmission from the host was canceled.

Return Code	Explanation
36	Request rejected. Lost contact with the host.
37	Failed. The host is inbound disabled.

Notes on Using This Function

1. Return code 35 will be returned when the first **Read Structured Fields** or **Write Structured Fields** is requested after an outbound transmission from the host is canceled. Corrective action is the responsibility of the application.
2. Return code 36 requires that the application disconnect from the emulation program and then reconnect to reestablish communications with the host. Corrective action is the responsibility of the application.
3. Return code 37 will be returned if the host is inbound disabled.
4. The EHLLAPI allows for a maximum of 20 asynchronous requests per application to be outstanding. A return code for unavailable resources (RC=11) is returned if more than 20 asynchronous requests are attempted.
5. If you are using IBM Global Network connections, the maximum number of asynchronous requests is 10.

The structured field data format is as follows:

Offset	Length	Contents
0	1 word	X'0000'
2	1 word	m (message length: the number of bytes of data in the message, the number does not include the buffer header prefix, which contains 8 bytes) This value must be set by the application.
4	1 word	X'0000'
6	1 word	X'0000'
8	8 bytes	Length of the first (or only) structured field message.
10	1 byte	First nonlength byte of the structured field message.
		⋮
m+7	1 byte	Last byte in the structured field message.

Bytes 0 through 7 are the buffer header. These first 8 bytes are used by the emulation program. The user section of the buffer begins with offset 8. Bytes 8 and 9 contain the number of bytes in the first structured field (a structured field message can contain multiple structured fields) including 2 bytes for bytes 8 and 9. Bytes 8 through *m*+7 are used for the structured field message sent to the host.

Synchronous Requests: When **Write Structured Fields** is requested synchronously (the S option in the data string), control is returned to the application only after the request is satisfied. The application can assume:

- The return code is correct.
- The data in the communications buffer (read buffer) is correct.
- The host is no longer processing the **Write Structured Fields** request.

Asynchronous Requests: When **Write Structured Fields** is requested asynchronously (the A option in the data string), the application *cannot* assume:

- The return code is correct.
- The data in the communications buffer (write buffer) is correct.
- The host is no longer processing the **Write Structured Fields** request.

When requested asynchronously, EHLLAPI returns the following values:

- A 16-bit Request ID in positions 13–14 (9–10 for standard interface) of the data string
- The address of a event object in positions 17–20 of the data string.

These are used to complete the asynchronous **Write Structured Fields** call.

The following steps must be completed to determine the outcome of an asynchronous **Write Structured Fields** function call:

- If the EHLLAPI return code is not zero, the request failed. No asynchronous request has been made. The application must take appropriate actions before attempting the call again.
- If the return code is zero, the application should wait until the event object is in the signaled state by using the **Get Request Completion** (125) function. The event object **Get Request Completion** (125) function) and should not be reused. The event object is valid only for the duration of the **Write Structured Fields** function call through the completion of the **Get Request Completion** (125) function call.
- Once the event object is in the signaled state use the returned 16-bit Request ID as the Request ID parameter in a call to the **Get Request Completion** (125) function. The data string returned from the **Get Request Completion** (125) function call contains the final return code of the **Write Structured Fields** function call.

Asynchronous Requests: When **Write Structured Fields** is requested asynchronously (the M option in the data string), the application cannot assume:

- The return code is correct
- The data in the communications buffer (write buffer) is correct
- The host is no longer processing the **Write Structured Fields** request

When requested asynchronously with the M option, EHLLAPI returns the following values:

- A 16-bit request ID in positions 13–14 (9–10 for standard interface) of the data string
- Task ID of asynchronous message mode in position 17–18 (11–12 for standard interface)

These are used to complete the asynchronous **Write Structured Fields** call.

Chapter 4. WinHLLAPI Extension Functions

This chapter describes the extension functions provided when using WinHLLAPI programming support.

Summary of WinHLLAPI Functions

Table 17 shows the summary of the WinHLLAPI functions:

Table 17. WinHLLAPI Function Summary

No.	Function	3270	5250	VT	Page
4	Wait (4)	Yes	Yes	Yes	178
23	Start Host Notification (23)	Yes	Yes	Yes	178
41	Start Close Intercept (41)	Yes	Yes	Yes	179
50	Start Keystroke Intercept (50)	Yes	Yes	Yes	180
90	Send File (90)	Yes	Yes	Yes	181
91	Receive File (91)	Yes	Yes	Yes	182

WinHLLAPI Asynchronous Functions

The following sections describe the WinHLLAPI asynchronous functions.

WinHLLAPIAsync

This entry point is used for six WinHLLAPI functions that often take a long time to complete. With WinHLLAPIAsync, the function will be launched asynchronously and will not interfere with the continued progression of the calling application. These functions are: **Wait** (04), **Start Host Notify** (23), **Start Close Intercept** (41), **Start Keystroke Intercept** (50), **Send File** (90), and **Receive File** (91), and are described in Chapter 4, "WinHLLAPI Extension Functions".

HANDLE WinHLLAPIAsync (HWIND hWnd, LPWORD *lpnFunction*, LPBYTE *lpData*, LPWORD *lpnLength*, LPWORD *lpnRetC*)*

The parameter list is the same as WinHLLAPI except a window handle is required before the function number. Since the function operates asynchronously, its completion is signaled by a registered message. The window handle is required as the target of the message.

There are two messages that must be registered by the WinHLLAPI application through calls to **RegisterWindowsMessage()** with the strings **WinHLLAPIAsync**(for all functions except 90 and 91) and **WinHLLAPIAsyncFileTransfer** (for functions 90 and 91). The standard format is as follows:

WPARAM
contains the Task Handle returned by the original function call.

LPARAM
the high word contains the error code and the low word contains the original function number.

Wait (4)

This function determines whether the Host session is in an inhibited state. If, for some reason, the session is in an inhibited state, this function will signal your application with a message when either the inhibited state expires or your wait period has expired. The amount of time to wait is set with the **Set Session Parameters (9)** function.

Prerequisite Functions: Connect Presentation Space (1)

WinHLLAPIAsync(*hWnd, lpwFunction, lpbyString, lpwLength, lpwReturnCode***)**

Call Parameters:

Parameter	Description
Data String	NA
Data Length	NA
PS Position	NA

Return Codes:

Code	Description
WHLLOK	The PS is uninhibited and ready for input.
WHLLNOTCONNECTED	Your WinHLLAPI application is not connected to a valid host session.
WHLLPSBUSY	Function timed out while still inhibited.
WHLLNHIBITED	The PS is inhibited.
SHLLSYSERROR	The function failed due to a system error.
WHLLCANCEL	The asynchronous function was cancelled.

Remarks: Asynchronous Wait is used to notify the calling application when the inhibited state of the PS is expired. When inhibited state has expired, this version of **Wait** will post a **WinHLLAPIAsync** message to the window specified by the *hWnd*. The session options **TWAIT**, **LWAIT**, and **NWAIT**affect the length of time that this function will wait. See “Set Session Parameters (9)” on page 145 for details on these session options.

Note: If **NWAIT** is specified in the session parameters and the application registers using revision 1.1 of the WinHLLAPI implementation, the **WINHLLAPIAsync** call will work the same as the **WinHLLAPI** call and not send a message. If revision 1.0 is being used then **Wait** will return a message immediately with the inhibited status of the PS.

Start Host Notification (23)

This function enables you to notify your WinHLLAPI application of changes in the Host Session Presentation Space (PS) or Operation Information Area (OIA).

Prerequisite Functions: There are no prerequisite functions for this function.

WinHLLAPIAsync (*hWnd, lpwFunction, lpbyString, lpwLength, lpwReturnCode***)**

Call Parameters:

Parameter	Description
Data String	A 7-byte string in the following format: **Byte 1** Short name session ID of the desired Host session, or space or null for the current Host session. **Byte 2** Notification mode. ″P″ for presentation space update only, ″O″ for OIA update only, ″B″ for both presentation space and OIA updates. When calling WinHLLAPIAsync, this position can be ″A″. **Byte 3-6** Not used. Provided for compatibility with older applications. **Byte 7** Reserved or replaced with one of the following if using WinHLLAPIAsync and A in byte 2: P for presentation space update only, O for OIA update only; and B for both presentation space and OIA updates.
Data Length	Length of Host event buffer (256 recommended).
PS Position	NA

Return Parameters:

Parameter	Description
Data String	Same as *Data String* on the call.

Return Codes:

Code	Description
WHLLOK	Host notification enabled.
WHLLNOTCONNECTED	The specified Host session is invalid.
WHLLPARAMETERERROR	One of more parameters are invalid.
WHLLSYSERROR	The function failed due to a system error.
WHLLCANCEL	The asynchronous function was cancelled.

Remarks: Once enabled, Host notification is enabled until you call **Stop Host Notification (25)** or **WinHLLAPICancelAsyncRequest()**. The function initiates host notification and immediately returns control to your Windows HLLAPI application. This frees your application to perform other tasks while waiting for host updates. When an update occurs, the function will notify the window specified by *hWnd* with the registered message **WinHLLAPIAsync**.

Start Close Intercept (41)

This function intercepts user requests to close Personal Communications.

Prerequisite Functions: There are no prerequisite functions for this function.

WinHLLAPIAsync (*hWnd, lpwFunction, lpbyString, lpwLength, lpwReturnCode***)**

Call Parameters:

Parameter	Description
Data String	A 5-byte string for returned semaphore address. The first byte is the session short name of the session to query, or space or null for the current session.
Data Length	Must be specified.
PS Position	NA

Return Parameters:

Parameter	Description
Data String	A 5-byte string with the following format: **Byte 1** Session short name, or space or null for the current session **Bytes 2-5** Semaphore address.

Return Code:

Code	Description
WHLLOK	The function was successful.
WHLLNOTCONNECTED	An invalid presentation space was specified.
WHLLPARAMETERERROR	An invalid option was specified.
WHLLSYSERROR	The function failed due to a system error.
WHLLCANCEL	The asynchronous function was cancelled.

Remarks: Once enabled, Host notification remains enabled until you call **Stop Close Intercept (43)** or **WinHLLAPICancelAsyncRequest ()**. Initially, the semaphore is set. After using this function, close requests from the user are discarded and the semaphore is cleared.

The function initiates close intercept and immediately returns control to your Windows HLLAPI application. This frees your application to perform other tasks while waiting for close requests. When a close request occurs, the function will notify the window specified by *hWnd* with the registered message **WinHLLAPIAsync**.

Start Keystroke Intercept (50)

This function intercepts keystrokes sent to a session by the user.

Prerequisite Functions: There are no prerequisite functions for this function.

WinHLLAPIAsync (*hWnd, lpwFunction, lpbyString, lpwLength, lpwReturnCode***)**

Call Parameters:

Parameter	Description
Data String	A 6-byte string in the following format: **Byte 1** Session short name, or space or null for the current Host session. **Byte 2** Keystroke intercept code. ″D″ causes only AID keystrokes to be intercepted; ″L″ causes all keystrokes to be intercepted. **Bytes 3-6** Reserved
Data Length	Variable (256 is recommended)
PS Position	NA

Return Code:

Code	Description
WHLLOK	Keystroke intercept has been initiated.
WHLLNOTCONNECTED	The Host session presentation space is invalid.
WHLLPARAMETERERROR	One or more parameters are invalid.
WHLLPSBUSY	Session is busy.
WHLLSYSERROR	Function failed due to a system error.
WHLLCANCEL	Asynchronous function was cancelled.

Remarks: The function initiates keystroke intercept and immediately returns control to your Windows HLLAPI application. This frees your application to perform other tasks while waiting for keystrokes. Once initiated, the function will post a **WinHLLAPIAsync** message to the window specified by *hWnd* whenever the user sends a key to the PS. After notification, the intercepted keystrokes can be handled in any way that is allowed by a normal EHLLAPI application. Take note that the keystroke buffer is of limited size so each keystroke should be handled and removed from the buffer.

Send File (90)

This function transfers a file from the PC to the Host.

Prerequisite Functions: There are no prerequisite functions for this function.

WinHLLAPIAsync (*hWnd, lpwFunction, lpbyString, lpwLength, lpwReturnCode***)**

Call Parameters:

Parameter	Description
Data String	SEND command parameters.
Data Length	Length of *Data String*. NA if session option EOT is specified.
PS Position	NA

Return Codes:

Code	Description
WHLLOK	File transfer started successfully.
WHLLPARAMETERERROR	Parameter error or *Data Length* is zero or greater than 255.
WHLLFTXCOMPLETE	File transfer complete.
WHLLFTXSEGMENTED	Transfer is complete with segmented records.
WHLLSYSERROR	The function failed due to a system error.
WHLLTRANSABORTED	File transfer aborted, either due to the user clicking the cancel button or because the timeout period has elapsed.
WHLLFILENOTFOUND	PC file not found.
WHLLFTXCOMPLETECICS	File transfer was successful (transfer to CICS).
WHLLACCESSDENIED	Access denied to PC file.
WHLLMEMORY	Insufficient memory.
WHLLINVALIDENVIRONMENT	Invalid environment.

Remarks: Only one file transfer operation is supported per connected Host session.

The function initiates the file transfer and immediately returns control to your Windows HLLAPI application. This frees your application to perform other tasks while the file transfer is occurring. Once initiated the function will regularly post **WinHLLAPIAsyncFileTransfer** messages to the window specified by *hWnd*. These messages will notify the WinHLLAPI application of the status of the transfer and send a final message when the transfer is complete.

wParm
Is the status indicator: the high byte contains the Session ID, the low byte contains the status. If the low byte is zero, the file transfer is still in progress. If the low byte is one, the file transfer has completed.

lParm If the low byte of *wParm* is zero (in progress), *lParm* is the number of bytes transferred. If the low byte *wParm* is one (completed), *lParm* is the completion code.

Receive File (91)

This function transfers a file from the PC to the Host.

Prerequisite Functions: There are no prerequisite functions for this function.

WinHLLAPIAsync (*hWnd, lpwFunction, lpbyString, lpwLength, lpwReturnCode***)**

Call Parameters:

Parameter	Description
Data String	RECEIVE command parameters.

Parameter	Description
Data Length	Length of *Data String*. NA if session option EOT is specified.
PS Position	NA

Return Codes:

Code	Description
WHLLOK	File transfer started successfully.
WHLLPARAMETERERROR	Parameter error or *Data Length* is zero or greater than 255.
WHLLFTXCOMPLETE	File transfer complete.
WHLLFTXSEGMENTED	Transfer is complete with segmented records.
WHLLSYSERROR	The function failed due to a system error.
WHLLTRANSABORTED	File transfer aborted, either due to the user clicking the cancel button or because the timeout period has elapsed.
WHLLFILENOTFOUND	PC file not found.
WHLLFTXCOMPLETECICS	File transfer was successful (transfer to CICS).
WHLLACCESSDENIED	Access denied to PC file.
WHLLMEMORY	Insufficient memory.
WHLLINVALIDENVIRONMENT	Invalid environment.

Remarks: Only one file transfer operation is supported per connected Host session.

The function initiates the file transfer and immediately returns control to your Windows HLLAPI application. This frees your application to perform other tasks while the file transfer is occurring. Once initiated the function will regularly post **WinHLLAPIAsyncFileTransfer** messages to the window specified by *hWnd*. These messages will notify the WinHLLAPI application of the status of the transfer and send a final message when the transfer is complete.

wParm
Is the status indicator: the high byte contains the Session ID, the low byte contains the status. If the low byte is zero, the file transfer is still in progress. If the low byte is one, the file transfer has completed.

lParm If the low byte of *wParm* is zero (in progress), *lParm* is the number of bytes transferred. If the low byte *wParm* is one (completed), *lParm* is the completion code.

WinHLLAPICancelAsyncRequest

This function cancels an outstanding asynchronous function launched by a call to **WinHLLAPIAsync()**.

Syntax
int WinHLLAPICancelAsyncRequest (HANDLE *hAsyncTask*, WORD *wFunction***)**

Parameters
hAsyncTask
The handle returned by WinHLLAPIAsync() when the function was initiated.

wFunction
The function number of the asynchronous task to cancel. Because this parameter is required for revision 1.1 but not in 1.0, it is optional.

With this function, any asynchronous task previously initiated by a call to WinHLLAPIAsync() may be canceled while still outstanding.

Returns
The return value indicates if the specified function was, in fact, canceled. If the function was canceled then the return value is WHLLOK (0). If the outstanding asynchronous function was not cancelled, one of the following codes will be returned.

WHLLINVALID
hAsyncTask is not a valid task handle.

WHLLALREADY
The asynchronous task specified by hAsyncTask has already completed.

Initialization and Termination Functions

The following section describes the initialization and termination functions of WinHLLAPI programming support.

WinHLLAPI Startup

This function is used to register the application with the WinHLLAPI implementation and should be called before any other call to the WinHLLAPI implementation. This implementation supports Versions 1.0 and 1.1 of the WinHLLAPI specification. The WinHLLAPI application should negotiate version compatibility with this function.

Syntax
int WinHLLAPIStartup(WORD *wVersionRequired,* LPWHLLAPIDATA *lpData***)**

Parameters
wVersionRequired
This is the version required by the WinHLLAPI application. The low byte contains the major version number and the high byte contains the minor version (or revision) number.

lpData
This is a pointer to a WHLLAPIDATA structure which will receive the implementations version number and a string describing the WinHLLAPI implementation provider. The WHLLAPIDATA structure is defined as:

```
#define  WHLLDESCRIPTION_LEN   127
typedef  struct  tagWHLLAPIDATA
{
     WORD  wVersion;
     Char  szDescription[WHLLDESCRIPTION_LEN + 1];
}WHLLAPIDATA,  *  PWHLLAPIDATA,  FAR  *LPWHLLAPIDATA;
```

Returns
The return value indicates success or failure of registering the WinHLLAPI application with the implementation. If registration was successful, the return value is WHLLOK (zero). Otherwise, it is one of the following:

WHLLSYSNOTREADY
Indicates that the underlying network subsystem is unavailable.

WHLLVERNOTSUPPORTED
Indicates that the version requested is not provided by this implementation. This implementation supports Versions 1.0 and 1.1 only.

WinHLLAPI Cleanup
The WinHLLAPI specification recommends that this function be used by the WinHLLAPI application to de-register from the WinHLLAPI implementation.

Syntax
BOOL WinHLLAPICleanup()

Returns
Returns TRUE if the unregistration was successful. Otherwise, it returns FALSE.

Blocking Routines
The following sections describe the blocking routines supported by WinHLLAPI programming.

Note: Although blocking routines are supported for WinHLLAPI compliance, use of them is not recommended. Use of the WinHLLAPIAsync functions are the recommended method for asynchronous processing.

WinHLLAPIIsBlocking
This function tells the calling WinHLLAPI application thread whether it is in the process of executing a blocking call. A blocking call is any synchronous function that takes a long time to execute and does not return until complete. There are five blocking calls in this implementation of WinHLLAPI. The blocking calls are: **Get Key (51)**, **Wait (4)**, **Pause (18)**, **Send File (90)**, and **Receive File (91)**.

Syntax
BOOL WinHLLAPIIsBlocking()

Returns
If the WinHLLAPI application thread is in the middle of a blocking call, the function returns TRUE, otherwise, it returns FALSE.

Remarks
Because the default blocking-hook allows messages to be processed during blocking calls, it is possible to call the blocking call again.

WinHLLAPISetBlockingHook
This function sets an application-defined procedure to be executed while waiting for the completion of a blocking call. A blocking call is any synchronous function that takes a long time to execute and does not return until complete. There are five blocking calls in this implementation of WinHLLAPI. The blocking calls are: **Get Key (51)**, **Wait (4)**, **Pause (18)**, **Send File (90)**, and **Receive File (91)**.

Syntax
FARPROC WinHLLAPISetBlockingHook(FARPROC *lpfnBlockingHook***)**

Parameters
lpfnBlockingHook
This is a pointer to the new blocking procedure.

Description
The WinHLLAPI implementation has a default blocking procedure that consists of nothing more than a message handler. This default mechanism is shown in the following example:

```
BOOL    DefaultBlockingHook
{
      MSG msg;

      if (PeekMessage (&msg, NULL, 0, 0, xfPM_NOREMOVE))
      {
            if(msg.message = = WM_QUIT)
            {
                return FALSE;
            }
            PeekMessage (&msg, NULL, 0, 0, PM_REMOVE);
            TranslateMessage (&msg);
            DispatchMessage (&msg);
      }
return TRUE;
}
```

The blocking hook is implemented on a per-thread basis. A blocking hook set by this function will stay in effect for the thread until it is replaced by another call to **WinHLLAPISetBlockingHook()** or until the default is restored by a call to **WinHLLAPIUnhookBlockingHook()**.

The Blocking function must return **FALSE** if it receives a **WM_QUIT** message so WinHLLAPI can return control to the application to process the message and terminate gracefully. Otherwise, the function should return **TRUE**.

Returns
This function returns a pointer to the blocking function being replaced.

WinHLLAPIUnhookBlockingHook
This function restores the default blocking-hook for the calling thread.

Syntax
BOOL WinHLLAPIUnhookBlockingHook()

Returns
This function returns TRUE if the default blocking mechanism was successfully restored, otherwise it returns FALSE.

WinHLLAPICancelBlockingCall
This function cancels an executing blocking call in the *current thread*. A blocking call is any synchronous function that takes a long time to execute and does not return until complete. There are five blocking calls in this implementation of WinHLLAPI. The blocking calls are **Get Key** (51), **Wait** (4), **Pause** (18), **Send File** (90), and **Receive File** (91). If one of these is blocking calls are cancelled, the cancelled function will return WHLLCANCEL.

Syntax

int WinHLLAPICancelBlockingCall()

Returns

The return value indicates if the specified function was, in fact, canceled. If the function was canceled, then the return value is WHLLOK (0). If there are no outstanding blocking functions, then the following return code will be returned:

WHLLINVALID

Indicates that there is no blocking call currently executing.

Chapter 5. PCSAPI Functions

Personal Communications provides an API set, which is defined here and called *PCSAPI*. Whereas EHLLAPI is used to manage the interaction between a workstation application program and host systems after the session is established, the PCSAPI can be used to control the Personal Communications session itself.

This chapter describes each individual PCSAPI function in detail. The functions are arranged alphabetically by name.

How to Use PCSAPI

You can write application programs using the PCSAPI in C or C++. To develop a PCSAPI application:

1. Prepare source code and add the appropriate PCSAPI calls.
2. Include the header file PCSAPI.H in the application program.
3. Compile the source code.
4. Link the resultant .OBJ files with the appropriate object file or libraries.

   You must also link it with the PCSAPI import library, PCSCALLS.LIB for 16-bit and PCSCAL32.LIB for 32-bit.

Page Layout Conventions

All PCSAPI function calls are presented in the same format so that you can quickly retrieve the information you need. The format is:

Function Name

- Function Type
- Parameter Type and Description
- Return Code

Function Type

"Function Type" shows the type of the function in the following format:

TYPE FunctionName(*TYPE Parameter1, ...***)**

Parameter Type and Description

"Parameter Type and Description" lists the type and describes each of the parameters to be specified in the PCSAPI function call.

Return Code

"Return Code" lists the codes that must be received by your program after a call to the PCSAPI function.

pcsConnectSession

3270	*5250*	*VT*
Yes	Yes	Yes

The **pcsConnectSession** function starts the communications with a host session specified by the short session ID. This function is valid for both 3270 and 5250 sessions. The session must already be started. This call is equivalent to the Communications-Connect pull-down menu item on the emulator window.

Function Type

BOOL WINAPI pcsConnectSession(*char cShortSessionID***)**

Parameter Type and Description

char cShortSessionID

Presentation space short session ID.

Return Code

Return Code	Meaning
TRUE	Function ended successfully.
FALSE	It means one of the following things: • The session has not started. • An incorrect session ID was specified. • Call failed.

pcsDisconnectSession

3270	*5250*	*VT*
Yes	Yes	Yes

The **pcsDisconnectSession** function stops the communications link with a host session specified by the short session ID. This function is valid for both 3270 and 5250 sessions. This only disconnects the link, it does not stop the session. This call is equivalent to the Communications-Disconnect pull-down menu item on the emulator window.

Function Type

BOOL WINAPI pcsDisconnectSession(*char cShortSessionID***)**

Parameter Type and Description

char cShortSessionID

Presentation space short session ID.

Return Code

Return Code	Meaning
TRUE	Function ended successfully.
FALSE	It means one of the following things: • The session has not started. • An incorrect session ID was specified. • Call failed.

pcsQueryConnectionInfo

3270	*5250*	*VT*
Yes	No	No

The **pcsQueryConnectionInfo** function returns information about the Telnet connection of the specified host session. The resulting information is returned into the buffer supplied by the application.

Function Type

BOOL WINAPI pcsQueryConnectionInfo(*char cShortSessionID, CONNECTIONINFO *ConnectionInfo***)**

Parameter Type and Description

char cShortSessionID
Presentation space short session ID.

CONNECTIONINFO *ConnectionInfo
Pointer to a CONNECTIONINFO structure where the connection info data will be returned.

Return Code

Return Code	Meaning
TRUE	Function ended successfully.
FALSE	It means one of the following things: • The session has not started. • An incorrect session ID was specified. • The session specified was not a supported connection type for this API (not Telnet).

ConnectionInfo

The CONNECTIONINFO structure will be filled with the information about the host connection, consisting of the following information:

Structure	Information
Host name	States the name of the currently connected Telnet host.
LU name	States the LU name currently assigned.
Port number	States the host port number being used for the connection.
SSL indicator	Indicates a Secure Connection (1 = secure; 0 = not secure).

Note: This API is valid only with the 32–bit version of PCSAPI, and only works for Telnet connections.

Example

```
typedef struct_CONNECTIONINFO
{ //Description of a connection @WD06A
 char hostName[63];    //telnet host name      @WD06A
 char reserved[1];     //reserved              @wD06A
 int portNumber;       //host port number      @WD06A
 char luName[17];      //LU name               @WD06A
 char reserved2[3];    //reserved              @WD06A
```

```
 BOOL sslIndicator;    //Secure Connection     @WD06A
                              indicator
 char reserved3[256];  //reserved              @WD06A
}CONNECTIONINFO;
```

pcsQueryEmulatorStatus

3270	*5250*	*VT*
Yes	Yes	Yes

The **pcsQueryEmulatorStatus** function returns the status of the host session specified by the short session ID.

Function Type

ULONG WINAPI pcsQueryEmulatorStatus(*char cShortSessionID***)**

Parameter Type and Description

char cShortSessionID

Presentation space short session ID.

Return Code

The return code value should be processed bit-significantly, that is, by either one of the following values or an ORed value out of the following values:

Return Code	Value	Meaning
PCS_SESSION_STARTED	0x00000001	Specified session has started. When this bit is off, the specified session has not started or an incorrect session ID was specified.
PCS_SESSION_ONLINE	0x00000002	Specified session is online (connected). When this bit is off, the specified session is offline (disconnected).
PCS_SESSION_API_ENABLED	0x00000004	API (EHLLAPI, DDE) is enabled on the specified session. If this bit is off, API is disabled on this session.

pcsQuerySessionList

3270	*5250*	*VT*
Yes	Yes	Yes

The **pcsQuerySessionList** function returns a list of all the current host sessions. The application must supply an array of SESSINFO structures as defined in the PCSAPI.H file, and a count of the number of elements in the array. This function fills in the structures with information about each session and returns the number of sessions found.

If the array has fewer elements than there are host sessions, then only the supplied elements of the array are filled in. The function always returns the actual number of sessions, even if the array is too small.

An application can call this function with zero array elements to determine how many sessions exist. A second call can then be made to obtain the session information.

Function Type

ULONG WINAPI pcsQuerySessionList(*ULONG Count, SESSINFO *SessionList***)**

Parameter Type and Description

ULONG Count
Number of elements in the SessionList array.

SESSINFO *SessionList
Pointer to an array of SESSINFO structures as defined in PCSAPI.H.

Return Parameters

Return Code
Total number of Personal Communications sessions. This may be greater than or less than the Count parameter.

SessionList
The array of SESSINFO structures is filled with information about the host sessions. Sessions may be placed in the list in any order. Each SESSINFO structure contains the following fields (defined in PCSAPI32.H)

Name A union of char and ULONG which contains the session ID (A– Z). In the current implementation of Personal Communications, only the lower byte (char) is used, the other bytes are returned as zero.

Status A combination of bit flags which indicate the current status of the session. The flags (PCS_SESSION_*) are defined in the following table.

The status value should be processed bit-significantly, that is, by either one of the following values or an ORed value out of the following values:

Return Code	Meaning
PCS_SESSION_STARTED	The session is running. If this flag is not set, all others are undefined.
PCS_SESSION_ONLINE	The session has established a communications link to the host (this is, the session is connected).
PCS_SESSION_API_ENABLED	The session is enabled for programming APIs. If this flag is not set, the EHLLAPI and Host Access Class Library APIs cannot be used on this session.

Example

```
ULONG      NumSessions, i;  // Session counters
SESSINFO   *SessList;       // Array of session information structures
// Find out number of sessions that exist
NumSessions = pcsQuerySessionList (0,NULL);
if (NumSessions == 0) {
  printf("There are no sessions.");
  exit;
```

```
}

// Allocate array large enough for all sessions
SessList = (SESSINFO *)malloc(NumSessions * sizeof(SESSINFO));
memset(SessList, 0x00, NumSessions * sizeof(SESSINFO));

// Now read actual session info
pcsQuerySessionList(NumSessions, SessList);

for (i=0; i<NumSessions; i++) {
  if ((SessList[i].Status & PCS_SESSION_STARTED) &&
      (SessList[i].Status & PCS_SESSION_ONLINE))  {

     printf("Session %c is started and connected.",
            SessList[i].Name.ShortName);
  }
}

exit;
```

pcsQueryWorkstationProfile

3270	*5250*	*VT*
Yes	Yes	Yes

The **pcsQueryWorkstationProfile** function returns the workstation profile name that has been used to invoke the host session. To specify the host session, the short session ID must be used. The workstation profile name is copied to the work buffer supplied by the application.

Function Type

BOOL WINAPI pcsQueryWorkstationProfile(*char cShortSessionID, PSZ lpBuffer***)**

Parameter Type and Description

char cShortSessionID
Presentation space short session ID.

PSZ lpBuffer
Work buffer to copy a null-terminated workstation profile name. The buffer must be large enough to contain a fully qualified file name.

Return Code

Return Code	Meaning
TRUE	Function ended successfully.
FALSE	It means one of the following things: • The session has not started. • An incorrect session ID was specified.

pcsSetLinkTimeout

3270	*5250*	*VT*
Yes	Yes	Yes

The **pcsSetLinkTimeout** function sets the idle timeout of a Telnet link which is SSCP owned. This function has no effect on non-TN connections or connections which are not in SSCP owned state. If the timeout value is set to zero the link will not time out. Otherwise the link will time out (disconnect) after being idle in SSCP-owned state for the number of minutes specified.

Function Prototype

ULONG WINAPI pcsSetLinkTimeout(*char cShortSessionID, USHORT Timeout***)**

Parameter Type and Description

char cShortSessionID
Presentation space short session ID.

USHORT Timeout
Timeout value in minutes. A value of zero disables timeout.

Return Code

Return Code	Meaning
PCS_SUCCESSFUL	The function ended successfully.
PCS_SYSTEM_ERROR	A system error occurred.

pcsStartSession

3270	*5250*	*VT*
Yes	Yes	Yes

The **pcsStartSession** function starts a host session by using a specified workstation profile. A short session ID can also be specified.

Function Type

ULONG WINAPI pcsStartSession(*PSZ lpProfile, char cShortSessionID, USHORT fuCmdShow***)**

Parameter Type and Description

PSZ lpProfile
Path and complete filename of the profile to load. Path is optional but complete filename must be specified, (.ws is not assumed).

char cShortSessionID
Presentation space short session ID. Space or NULL indicates the next available session ID.

USHORT fuCmdShow
Specifies how the window is to be displayed. One of the following values from PCSAPI.H:

- PCS_HIDE
- PCS_SHOW
- PCS_MINIMIZE
- PCS_MAXIMIZE

Return Code

Return Code	Value	Meaning
PCS_SUCCESSFUL	0	The function ended successfully.
PCS_INVALID_ID	1	An incorrect session ID was specified.
PCS_USED_ID	2	The specified short session ID is already used.
PCS_INVALID_PROFILE	3	An error was made in specifying the workstation profile, or the window parameter was not valid.
PCS_SYSTEM_ERROR	9	A system error occurred.

pcsStopSession

3270	*5250*	*VT*
Yes	Yes	Yes

The **pcsStopSession** function stops a host session specified by the short session ID.

Function Type

BOOL WINAPI pcsStopSession(*char cShortSessionID, USHORT fuSaveProfile***)**

Parameter Type and Description

char cShortSessionID

Presentation space short session ID.

USHORT fuSaveProfile

This parameter can be one of the following values:

fuSaveProfile	Value	Meaning
PCS_SAVE_AS_PROFILE	0	Save the profile as specified in the current profile.
PCS_SAVE_ON_EXIT	1	Save the profile on exit.
PCS_NOSAVE_ON_EXIT	2	Do not save the profile on exit.

Return Code

Return Code	Meaning
TRUE	The function ended successfully.
FALSE	It means one of the following things: • The session has not started. • An incorrect session ID was specified.

Chapter 6. DDE Functions in a 32–bit Environment.

This chapter contains information for DDE functions, as used in a Windows 32–bit environment.

Personal Communications provides a 32-bit dynamic data exchange (DDE) interface that allows applications to exchange data. The exchange of data between two Windows applications can be thought of as a conversation between a client and a server. The *client* initiates DDE conversations. The *server* in turn responds to the client. Personal Communications is a DDE server for the open sessions that Personal Communications is managing. For more information about DDE, refer to *Microsoft Windows Software Development Kit Guide to Programming*.

Note: If you use DDE functions with Visual Basic, see Chapter 7, "Using DDE Functions with a DDE Client Application", on page 273.

Personal Communications also supports 16-bit DDE applications. See Appendix E, "DDE Functions in a 16-Bit Environment", on page 339.

Personal Communications DDE Data Items

Microsoft Windows DDE uses a three-level naming scheme to identify data items: application, topic, and item. Table 18 describes these levels.

Table 18. Naming Scheme for Data Items

Level	Description	Example
Application	A Windows task or a particular task of an application. In this book, the application is Personal Communications.	IBM327032
Topic	A specific part of an application.	SessionA
Item	A data object that can be passed in a data exchange. An item is an application-defined data item that conforms to one of the Windows clipboard formats or to a private, application-defined, clipboard format. For more information regarding Windows clipboard formats, refer to *Microsoft Windows Software Development Kit Guide to Programming*	PS (presentation space)

Personal Communications supports IBM327032 and IBM525032 applications as Win32 DDE server.

You can use the following topics:

- System
- SessionA, SessionB, ..., SessionZ
- LUA_xxxx, LUB_xxxx, ..., LUZ_xxxx

In DDE, *atoms* identify application names, topic names, and data items. Atoms represent a character string that is reduced to a unique integer value. The character string is added to an atom table, which can be referred to for the value of the string associated with an atom. Atoms are created with the GlobalAddAtom

function call. Refer to *Microsoft Windows Software Development Kit Guide to Programming* for more information about how to create and use atoms.

Using System Topic Data Items

Applications that provide a DDE interface should also provide a special topic SYSTEM. This topic provides a context for items of information that might be of general interest to an application. The SYSTEM topic for Personal Communications contains these associated data items:

Item	Function
Formats	Returns the list of clipboard formats (numbers) that Personal Communications is capable of rendering.
Status	Returns information about the status of each Personal Communications session.
SysCon	Returns the level of Personal Communications support and other system related values.
SysItems	Returns the list of data items that are available when connected to the Personal Communications system topic.
Topics	Returns the list of Personal Communications topics that are available.

Using Session Topic Data Items

For each Session topic, the following data items are supported:

Item	Function
CLOSE	Retrieves the window close requests.
CONV	Requests Code Conversion from ASCII to EBCDIC and EBCDIC to ASCII.
EPS	Retrieves the session presentation space with additional data.
EPSCOND	Retrieves the presentation space service condition.
FIELD	Retrieves the field in the presentation space of the session.
KEYS	Retrieves the keystrokes.
MOUSE	Retrieves the mouse input.
OIA	Retrieves the operator information area status line.
PS	Retrieves the session presentation space.
PSCOND	Retrieves the session advise condition.
SSTAT	Retrieves the session status.
STRING	Retrieves the ASCII string data.
TRIMRECT	Retrieves the session presentation space within the current trim rectangle.

Using LU Topic Data Items (3270 Only)

For each LU topic, the following data items are supported:

Item	Function
SF	Retrieves the destination/origin structured field data.
SFCOND	Retrieves the query reply data.

DDE Functions

Table 19 on page 199 lists the DDE functions that are available for use with Personal Communications, and the page number in this section where more details can be found.

Table 19. DDE Functions Available for Personal Communications

Function	3270	5250	VT	Page
Code Conversion	Yes	Yes	Yes	200
Find Field	Yes	Yes	Yes	202
Get Keystrokes	Yes	Yes	Yes	204
Get Mouse Input	Yes	Yes	Yes	205
Get Number of Close Requests	Yes	Yes	Yes	208
Get Operator Information Area	Yes	Yes	Yes	209
Get Partial Presentation Space	Yes	Yes	Yes	210
Get Presentation Space	Yes	Yes	Yes	212
Get Session Status	Yes	Yes	Yes	214
Get System Configuration	Yes	Yes	Yes	216
Get System Formats	Yes	Yes	Yes	217
Get System Status	Yes	Yes	Yes	218
Get System SysItems	Yes	Yes	Yes	219
Get System Topics	Yes	Yes	Yes	220
Get Trim Rectangle	Yes	Yes	Yes	220
Initiate Session Conversation	Yes	Yes	Yes	221
Initiate Structured Field Conversation	Yes	No	No	222
Initiate System Conversation	Yes	Yes	Yes	222
Put Data to Presentation Space	Yes	Yes	Yes	223
Search for String	Yes	Yes	Yes	224
Send Keystrokes	Yes	Yes	Yes	225
Session Execute Macro	Yes	Yes	Yes	226
Set Cursor Position	Yes	Yes	Yes	234
Set Mouse Intercept Condition	Yes	Yes	Yes	235
Set Presentation Space Service Condition	Yes	Yes	Yes	238
Set Session Advise Condition	Yes	Yes	Yes	239
Set Structured Field Service Condition	Yes	No	No	240
Start Close Intercept	Yes	Yes	Yes	241
Start Keystroke Intercept	Yes	Yes	Yes	242
Start Mouse Input Intercept	Yes	Yes	Yes	243
Start Read SF	Yes	No	No	246
Start Session Advise	Yes	Yes	Yes	248
Stop Close Intercept	Yes	Yes	Yes	249
Stop Keystroke Intercept	Yes	Yes	Yes	250
Stop Mouse Input Intercept	Yes	Yes	Yes	251
Stop Read SF	Yes	No	No	251
Stop Session Advise	Yes	Yes	Yes	252
Terminate Session Conversation	Yes	Yes	Yes	253
Terminate Structured Field Conversation	Yes	No	No	253
Terminate System Conversation	Yes	Yes	Yes	253
Write SF	Yes	No	No	254

Refer to “Summary of DDE Functions in a Windows 32-Bit Environment” on page 267 for a summary of the DDE functions.

Naming Conventions for Parameters

Most DDE parameter names have local variables. These variables have a prefix that indicates the general type of the parameter, followed by one or more words that describe the content of the parameter. Prefixes presented in this book are:

a Atom

c Character (a 1-byte value)

f Bit flags packed into a 16-bit integer

h 16-bit handle

p Short (16-bit) pointer

lp Long (32-bit) pointer

w Short (16-bit) unsigned integer

u Unsigned integer

sz Null-terminated character string

Code Conversion

3270	*5250*	*VT*
Yes	*Yes*	*Yes*

The **Code Conversion** function allows a client application to convert ASCII to EBCDIC or EBCDIC to ASCII. This function is only available to 32–bit applications.

Send the message as follows:

```
PostMessage (hServerWnd,
            WM_DDE_POKE,
            hClientWnd,
            PackDDEIParam (WM_DDE_POKE, hData, aCONV));
```

where:

hDATA

```
typedef struct tagWCDDE_CONV
{
    BYTE         ddepoke[(sizeof(DDEPOKE)-1)];
    char         szSourceName[256];   // name of memory-mapped file
    char         szTargetName[256];   // name of memory-mapped file
    BYTE         ConvType;            // Conversion method
    WORD         uSourceLength;       // Length of source buffer
    WORD         uTargetLength;       // Length of target buffer
}WCDDE_CONV;

typedef union tagDDE_CONV
{
     DDEPOKE     DDEpoke;
     WCDDE_CONV     DDEConv;
}DDE_CONV;

typedef DDE_CONV FAR *LPDDE_CONV;
```

Conversion Types

```
ConvType = 0x01   ASCII to EBCDIC
ConvType = 0x02   EBCDIC to ASCII
```

Note: The string to be converted must be stored in a memory block that is accessible across processes. In Win32, this can only be accomplished by use of memory-mapped files. The global memory is created and named in the client application and the names are sent to Personal Communications

through the DDE message. The steps required to implement this are demonstrated in the following example:

```
//Steps for a Source Buffer (done in client application)
HANDLE hMapFile;
LPVOID lpMapAddress;
ATOM   aCONV;

hMapFile = CreateFileMapping((HANDLE)0xFFFFFFFF,  // not a real file
    NULL,                                         // Default security.
    PAGE_READWRITE,                               // Read/write
    (DWORD)0,                                     // Ignored
    (DWORD)nStringLength,                         // Length of string
    (LPCTSTR)szSourceName);                       // Name of
                                                  // mapping object.

If (hMapFile == NULL)
{
    MessageBox ("Could not create file-mapping Source object.");
    return;
}
// Now treat buffer like local memory
strcpy((LPSTR)lpMapAddress, szConcersionString);

// Repeat steps for a Target Buffer
.....
.....
// Set up ATOM information

aCONV = GlobalAddAtom("CONV"); // MUST be this string

// Post DDE Message Now ....

// When done with memory blocks, clean up
if (!UnmapViewOfFile(lpMapAddress))
{
     MessageBox ("Could not unmap view of Target.");
}

CloseHandle(hMapSFile);

// CODE ENDS
```

Personal Communications Response

The function responds with a WM_DDE_ACK message for DDE_POKE. A result value is returned in the high-order byte of the fsStatus word. The following return codes are valid:

Return Code	Explanation
0x0000	Normal End
0x0200	An incorrect conversion type or incorrect parameter was specified
0x0600	An incorrect format was specified
0x0900	A system error occurred
0x1000	The destination buffer was exceeded
0x1100	An internal translation error occurred

Find Field

3270	5250	VT
Yes	Yes	Yes

The **Find Field** function returns information about the specified field to the client. It can be used in two ways.

Send the message as follows:

```
PostMessage( hServerWnd,
             WM_DDE_REQUEST,
             hClientWnd,
             MAKELPARAM(cfFormat, aFIELD) );
```

where:

cfFormat
Identifies the format for the field information. This value can be CF_DSPTEXT or CF_TEXT.

aFIELD
Is the atom that specifies the **Find Field** function. The string identified by the atom can have different values depending on the value of **cfFormat**.

CF_DSPTEXT

If **CF_DSPTEXT** is specified for **cfFormat** then **aFIELD** must be an atom that represents the string, `FIELD`. The PS position must be specified in a previous call to the **Set Presentation Space Service Condition** function. This version will return information only about the field which contains that position. The information will be returned in a `WM_DDE_DATA(hData, aFIELD)` message where:

hData Represents

```
typedef struct tagFINDFIELD
{
  unsigned char
  data[sizeof(DDEDATA)-1];
  unsigned short uFieldStart;   //Field start position
  unsigned short uFieldLength;  //Field Length
  unsigned char  cAttribute;    //Attribute character value
  unsigned char  ubReserved;    //reserved, no information for client
} FINDFIELD;

typedef union tagDDE_FINDFIELD
{
  DDEDATA   DDEdata;
  FINDFIELD DDEfield;
} DDE_FINDFIELD, *lpDDE_FINDFIELD;
```

CF_TEXT

If **CF_TEXT** is specified for **cfFormat** then **aFIELD** must be an atom that represents the string, `FIELD (pos, "XX")` where:

pos Is the PS position

XX Is a code representing which field relative to **pos** for which information will be returned. These codes are described below:

Type	Meaning
ƀƀ or Tƀ	The field containing **pos**.
Pƀ	The field previous to **pos**, either protected or unprotected.
PP	The previous protected field to **pos**.
PU	The previous unprotected field to **pos**.
Nƀ	The next field after **pos**, either protected or unprotected.
NP	The next protected field after **pos**.
NU	The next unprotected field after **pos**.

Note: The ƀ symbol represents a required blank.

These codes must appear in quotes as demonstrated above. The information will be returned in a WM_DDE_DATA(hData, aFIELD) message where:

hData Represents

```
typedef struct tagFINDFIELD_CF_TEXT
{
  uchar  data[sizeof(DDEDATA)-1];
  uchar  Fielddata[80];
} FINDFIELD_CF_TEXT;


typedef FINDFIELD_CF_TEXT FAR *LPFINDFIELD_CF_TEXT;

typedef union tagDDE_FIELD
{
  DDEDATA   DDEdata;
  FINDFIELD DDEFindField;
  FINDFIELD_CF_TEXT DDEFindField_cftext;
} DDE_FIELD;

typedef DDE_FIELD FAR *LPDDE_FIELD;
```

Personal Communications Response

If the function is successful, it will respond with a WM_DDE_DATA message with information as described above. If it fails, it will return with a WM_DDE_ACK(wStatus, aFIELD). A result value is returned in the low-order byte of the wStatus word. The following return codes are valid:

Return Code	Explanation
0x0001	PS position is not valid.
0x0002	PS is unformatted.
0x0006	The specified format is not valid.
0x0009	A system error occurred.

Structure of the Field Information

The field information will be returned in the **Fielddata** member of the FINDFIELD_CF_TEXT structure as a string in the following formats.

For 3270:

```
"Formatted\t%01d\t%01d\t%01d\t%01d\t%04d\t%04d"
```

FA bit 2	Unprotected / Protected	0 or 1
FA bit 3	Alphanumeric / Numeric	0 or 1
FA bit 4–5	Intensity / High / Normal	1, 2 or 3
FA bit 7	Unmodified / Modified	0 or 1
Start Pos	Field Start Position (excluding FA)	
Length	Field Length (excluding FA)	

Note: FA = Field Attribute

For 5250:

```
"Formatted\t%01d\t%01d\t%01d\t%01d\t%01d\t%01d\t%04d\t%04d"
```

FA bit 0	Field Attribute Flag	0 or 1
FA bit 1	Invisible / Visible	0 or 1
FA bit 2	Unprotected / Protected	0 or 1
FA bit 3	Intensity Low/High	0 or 1
FA bit 4–6	Field Type 0 = Alphanumeric 1 = Alphabetic 2 = Numeric Shift 3 = Numeric 4 = Default 5 = Digits only 6 = Mag-Stripe Reader Data 7 = Signed Numeric	0 — 7
FA bit 7	Unmodified / Modified	0 or 1
Start Pos	Field Start Position (excluding FA)	
Length	Field Length (excluding FA)	

Note: FA = Field Attribute

Get Keystrokes

3270	*5250*	*VT*
Yes	*Yes*	*Yes*

The **Get Keystrokes** function returns to the client the keystrokes that are intercepted by the **Start Keystroke Intercept** function. The client sends the following message to receive the keystroke information.

```
PostMessage( hServerWnd,
             WM_DDE_REQUEST,
             hClientWnd,
             MAKELPARAM(cfFormat, aKEYS) );
```

where:

cfFormat
Identifies the format for the keystroke information. This must be CF_DSPTEXT.

aKEYS
Identifies a keystroke data item.

Personal Communications Response

Personal Communications either returns the keystrokes in a DDE data message, or responds with one of these ACK messages containing status information:

- WM_DDE_DATA(hData, aKEYS)
- WM_DDE_ACK(wStatus, aKEYS)

If Personal Communications cannot return the keystroke information, one of the following status codes is returned in the low-order byte of the wStatus word:

Return Code	Explanation
2	No keystroke was intercepted.
6	The specified format is not valid.
9	A system error occurred.

Structure of the Keystroke Information

Personal Communications returns the keystroke information in the following structure:

```
typedef struct tagKEYSTROKE
{
  unsigned char  data[(sizeof(DDEDATA)-1)];
  unsigned short uTextType;      /* Type of keystrokes
  unsigned char  szKeyData_1[1];   /* Keystrokes
} KEYSTROKE;

typedef union tagDDE_GETKEYSTROKE
{
  DDEDATA     DDEdata;
  KEYSTROKE   DDEkey;
} DDE_GETKEYSTROKE, *lpDDE_GETKEYSTROKE;
```

The format for the keystrokes parameters is the same as for the **Session Execute Macro** function SENDKEY command.

The following key text types are supported:

```
PCS_PURETEXT   0         /* Pure text, no HLLAPI commands
PCS_HLLAPITEXT 1         /* Text, including HLLAPI tokens
```

Get Mouse Input

3270	*5250*	*VT*
Yes	*Yes*	*Yes*

The **Get Mouse Input** function returns the latest mouse input intercepted by the **Start Mouse Input Intercept** function to the client.

Note: The client must call the **Start Mouse Input Intercept** function before using this function.

The client sends the following command to receive the mouse input information.

```
PostMessage( hServerWnd,
             WM_DDE_REQUEST,
             hClientWnd,
             MAKELPARAM(cfFormat, aMOUSE) );
```

where:

cfFormat
Identifies the format for the presentation space. Valid values are CF_TEXT or CF_DSPTEXT. The structure of the mouse input data, in these two formats, is shown below.

aMOUSE
Identifies the mouse input as the item.

Personal Communications Response

Personal Communications either returns the mouse input data in a DDE data message, or responds with one of these ACK messages:

- WM_DDE_DATA(hData, aMOUSE)
- WM_DDE_ACK(wStatus, aMOUSE)

If Personal Communications cannot return the mouse input information, one of the following status codes is returned in the low-order byte of the wStatus word:

Return Code	Explanation
2	No mouse input information was intercepted.
6	The specified format is not valid.
9	A system error occurred.

Structure of the Mouse Input Information

If the format is CF_TEXT, Personal Communications returns the mouse input information in the following format:

```
typedef struct tagMOUSE_CF_TEXT
{
  unsigned char data[(sizeof(DDEDATA)-1)];
  unsigned char PSPos[4];       /* PS Offset - Mouse position
  unsigned char Tab1[1];        /* Tab character
  unsigned char PSRowPos[4];    /* ROW number of Mouse position
  unsigned char Tab2[1];        /* Tab character
  unsigned char PSColPos[4];    /* Col number of Mouse position
  unsigned char Tab3[1];        /* Tab character
  unsigned char PSSize[4];      /* Size of Presentation Space
  unsigned char Tab4[1];        /* Tab character
  unsigned char PSRows[4];      /* Row number of PS
  unsigned char Tab5[1];        /* Tab character
  unsigned char PSCols[4];      /* Column number of PS
  unsigned char Tab6[1];        /* Tab character
  unsigned char Button[1];      /* Type of clicked mouse button
  unsigned char Tab7[1];        /* Tab character
  unsigned char Click[1];       /* Type of clicking
  unsigned char Tab8[1];        /* Tab character
  unsigned char zClickString[1];/* Retrieved string
} MOUSE_CF_TEXT;
```

```
typedef union tagDDE_MOUSE_CF_TEXT
{
  DDEDATA        DDEdata;
  MOUSE_CF_TEXT  DDEmouse;
} DDE_MOUSE_CF_TEXT, *lpDDE_MOUSE_CF_TEXT;
```

The following table shows the values in the parameters:

Parameter Name	Meaning	Value
PSPos	PS offset of the position where the mouse was clicked	0 ... (PSSize – 1)
PSRowPos	Row number of the position where the mouse was clicked	0 ... (PSRows – 1)
PSColPos	Column number of the position where the mouse was clicked	0 ... (PSCols – 1)
PSSize	Size of the presentation space	
PSRows	Number of rows of presentation space	
PSCols	Number of columns of presentation space	
ButtonType	Type of the clicked mouse button	**L** Left button **M** Middle button **R** Right button
ClickType	Type of clicking	**S** Single click **D** Double click
ClickString	Retrieved string to which the mouse pointed	A character string terminated with a '\0'
Tab1–8	A tab character for delimiter	'\t'

If the format is CF_DSPTEXT, Personal Communications returns the mouse input information in the following format:

```
typedef struct tagMOUSE_CF_DSPTEXT
{
  unsigned char  data[(sizeof(DDEDATA)-1)];
  unsigned short uPSPos;                    /* PS Offset of the Mouse position
  unsigned short uPSRowPos;                 /* ROW number of Mouse position
  unsigned short uPSColPos;                 /* Column number of Mouse position
  unsigned short uPSSize;                   /* Size of Presentation Space
  unsigned short uPSRows;                   /* Row number of PS
  unsigned short uPSCols;                   /* Column number of PS
  unsigned short uButtonType;               /* Type of clicked mouse button
  unsigned short uClickType;                /* Type of clicking
  unsigned char  zClickString[1];             /* Retrieved string
} MOUSE_CF_DSPTEXT;

typedef union tagDDE_MOUSE_CF_DSPTEXT
{
  DDEDATA           DDEdata;
  MOUSE_CF_DSPTEXT  DDEmouse;
} DDE_MOUSE_CF_DSPTEXT, *lpDDE_MOUSE_CF_DSPTEXT;
```

The following table shows the values in the parameters:

Parameter Name	Meaning	Value
uPSPos	PS offset of the position where the mouse was clicked	0 ... (uPSSize – 1)
uPSRowPos	Row number of the position where the mouse was clicked	0 ... (uPSRows – 1)
uPSColPos	Column number of the position where the mouse was clicked	0 ... (uPSCols – 1)
uPSSize	Size of the presentation space	
uPSRows	Number of rows of the presentation space	
uPSCols	Number of columns of the presentation space	
uButtonType	Type of the clicked mouse button	**0x0001** Left button **0x0002** Middle button **0x0003** Right button
uClickType	Type of clicking	**0x0001** Single click **0x0002** Double click
szClickString	Retrieved string that the mouse pointed to	A character string terminated with a '\0'

Get Number of Close Requests

3270	*5250*	*VT*
Yes	*Yes*	*Yes*

The **Get Number of Close Requests** function returns to the client the number of the close requests that are intercepted by the **Start Close Intercept** function. The client sends the following message to receive the number of the close requests.

```
PostMessage( hServerWnd,
             WM_DDE_REQUEST,
             hClientWnd,
             MAKELPARAM(cfFormat, aCLOSE) );
```

where:

cfFormat
Identifies the format for the close intercept information. This must be CF_DSPTEXT.

aCLOSE
Identifies a close intercept data item.

Personal Communications Response

Personal Communications either returns the number of the close requests in a DDE data message, or responds with one of these ACK messages:

- WM_DDE_DATA(hData, aCLOSE)
- WM_DDE_ACK(wStatus, aCLOSE)

If Personal Communications cannot return the close intercept information, one of the following status codes is returned in the low order byte of the wStatus word:

Return Code	Explanation
6	The specified format is not valid.
9	A system error occurred.

Structure of the Number of the Close Requests Information

Personal Communications returns the close intercept information in the following structure:

```
typedef struct tagCLOSEREQ
{
  unsigned char  data[(sizeof(DDEDATA)-1)];
  unsigned short uCloseReqCount; /* Number of the close requests.
} CLOSEREQ;

typedef union tagDDE_CLOSEREQ
{
  DDEDATA   DDEdata;
  CLOSEREQ  DDEclose;
} DDE_CLOSEREQ, *lpDDE_CLOSEREQ;
```

Get Operator Information Area

3270	*5250*	*VT*
Yes	*Yes*	*Yes*

The **Get Operator Information Area** (OIA) function returns a copy of the OIA to the client. The client sends the following message to request the OIA.

```
PostMessage( hServerWnd,
             WM_DDE_REQUEST,
             hClientWnd,
             MAKELPARAM(cfFormat, aOIA) );
```

where:

cfFormat
Identifies the format for the OIA. For the OIA, this format must be CF_DSPTEXT.

aOIA Identifies the operator information area as the item.

Personal Communications Response

Personal Communications either returns the OIA in a DDE data message, or responds with one of these ACK messages:

- WM_DDE_DATA(hData, aOIA)
- WM_DDE_ACK(wStatus, aOIA)

If Personal Communications cannot return the OIA, one of the following status codes is returned in the low-order byte of the wStatus word:

Return Code	Explanation
6	The specified format is not valid.

Return Code	Explanation
9	A system error occurred.

Structure of the Operator Information Area

Personal Communications returns the operator information area in the following structure:

```
typedef struct tagOIADATA
{
  unsigned char  data[(sizeof(DDEDATA)-1)];
  unsigned char  OIA[80];
} OIADATA;

typedef union tagDDE_OIADATA
{
  DDEDATA   DDEdata;
  OIADATA   DDEoia;
} DDE_OIADATA, *lpDDE_OIADATA;
```

Get Partial Presentation Space

3270	*5250*	*VT*
Yes	*Yes*	*Yes*

The **Get Partial Presentation Space** function returns all or part of the session presentation space to the client.

Note: The client must set the start PS position and either the PS length or End of Field (EOF) flag by using the **Set Presentation Space Service Condition** function before using this function. If the EOF flag is set to `PCS_EFFECTEOF`, the function will return the entire field specified by the start PS position

The client sends the following command to get the presentation space.

```
PostMessage( hServerWnd,
             WM_DDE_REQUEST,
             hClientWnd,
             MAKELPARAM(cfFormat, aEPS) );
```

where:

cfFormat
Identifies the format for the presentation space. Valid values are CF_TEXT or CF_DSPTEXT. The structure of the presentation space, in these two formats, is shown below.

aEPS Identifies the session presentation space as the item.

Personal Communications Response

Personal Communications either returns the presentation space data, or responds with one of these ACK messages containing an error code in the low order byte of the wStatus word:

- WM_DDE_DATA(hData, aEPS)
- WM_DDE_ACK(wStatus, aEPS)

If Personal Communications cannot return the presentation space, one of the following status codes is returned in the low-order byte of the wStatus word:

Return Code	Explanation
1	No prior **Set Presentation Space Service Condition** function was called, or an incorrect parameter was set.
6	The specified format is not valid.
9	A system error occurred.

Structure of the Presentation Space

Personal Communications returns the part of the presentation space in the format specified in the **Get Partial Presentation Space** request.

If the format is CF_DSPTEXT, Personal Communications returns the presentation space in the following format:

```
typedef struct tagEPS_CF_DSPTEXT
{
  unsigned char  data[(sizeof(DDEDATA)-1)];
  unsigned short uPSPosition;       /* Position of the part of PS
  unsigned short uPSLength;         /* Length of the part of the PS
  unsigned short uPSRows;           /* PS number of rows
  unsigned short uPSCols;           /* PS number of columns
  unsigned short uPSOffset;         /* Offset to the presentation space
  unsigned short uFieldCount;       /* Number of fields
  unsigned short uFieldOffset;      /* Offset to the field array
  unsigned char  PSData[1];     /* PS + Field list Array(lpPSFIELDS)
} EPS_CF_DSPTEXT;

typedef union tagDDE_EPS_CF_DSPTEXT
{
  DDEDATA         DDEdata;
  EPS_CF_DSPTEXT  DDEeps;
} DDE_EPS_CF_DSPTEXT, *lpDDE_EPS_CF_DSPTEXT;

# The PSFIELDS structure is replaced with below structure.

typedef struct tagPSFIELDS
{
  unsigned short uFieldStart;    /* Field start offset
  unsigned short uFieldLength;   /* Field Length
  unsigned char  cAttribute;     /* Attribute character
  unsigned char  ubReserved;     /* *** Reserved ***
} PSFIELDS, *lpPSFIELDS;
```

Note: The following examples show how to obtain long pointers to the PS and the PSFIELDS array.

```
lpDDE = (lpDDE_EPS_CF_DSPTEXT)GlobalLock(hData);
lpps = lpDDE->DDEeps.PSData + lpDDE->DDEeps.uPSOffset;
lppsfields = lpDDE->DDEeps.PSData + lpDDE->DDEeps.uFieldOffset;
```

If the format is CF_TEXT, Personal Communications returns the part of the presentation space in the following format:

```
typedef struct tagEPS_CF_TEXT
{
  unsigned char  data[(sizeof(DDEDATA)-1)];
  unsigned char  PSPOSITION[4];/* Position of part of the PS
  unsigned char  Tab1[1];      /* Tab character
  unsigned char  PSLENGTH[4];  /* Length of the part of the PS
  unsigned char  Tab2[1];      /* Tab character
```

```
  unsigned char  PSROWS[4];    /* Number of rows in the PS
  unsigned char  Tab3[1];      /* Tab character
  unsigned char  PSCOLS[4];    /* Number of Cols in the PS
  unsigned char  Tab4[1];      /* Tab character
  unsigned char  PS[1];        /* PS
} EPS_CF_TEXT;

typedef union tagDDE_EPS_CF_TEXT
{
  DDEDATA      DDEdata;
  EPS_CF_TEXT  DDEeps;
} DDE_EPS_CF_TEXT, *lpDDE_EPS_CF_TEXT;
```

Following the PS in the buffer is the following additional structure of fields that compose the field list.

```
typedef struct tagFL_CF_TEXT
{
  unsigned char  Tab5[1];        /* Tab character
  unsigned char  PSFldCount[4];  /* Number of fields in the PS
  unsigned char  Tab6[1];        /* Tab character
  PS_FIELD       Field[1];       /* Field List Array
} FL_CF_TEXT, *lpFL_CF_TEXT;

typedef struct tagPS_FIELD
{
  unsigned char  FieldStart[4];
  unsigned char  TabF1[1];
  unsigned char  FieldLength[4];
  unsigned char  TabF2[1];
```

Note: The following examples show how to obtain long pointers to the PS and the PS_FIELD array.

```
lpDDE = (lpDDE_EPS_CF_TEXT)GlobalLock(hData);
lpps = lpDDE->DDEeps.PS;
lpps_field = lpDDE->DDEeps.PS
           + atoi(lpDDE->DDEeps.PSLENGTH)
           + ((atoi(lpDDE->DDEeps.PSROWS) -1) * 2) // CR/LF
           + 1 + 1 + 4 + 1;  // Tabs + size of field count
```

Get Presentation Space

3270	*5250*	*VT*
Yes	*Yes*	*Yes*

The **Get Presentation Space** function returns the session presentation space to the client. The client sends the following command to get the presentation space.

```
PostMessage( hServerWnd,
             WM_DDE_REQUEST,
             hClientWnd,
             MAKELPARAM(cfFormat, aPS) );
```

where:

cfFormat
Identifies the format for the presentation space. Valid values are CF_TEXT or CF_DSPTEXT. The structure of the presentation space, in these two formats, is shown below.

aPS Identifies the session presentation space as the item.

Personal Communications Response

Personal Communications either returns the presentation space and a list of the fields that comprise the presentation space, or responds with one of these ACK messages containing an error code in the low-order byte of the wStatus word:

- WM_DDE_DATA(hData, aPS)
- WM_DDE_ACK(wStatus, aPS)

If Personal Communications cannot return the presentation space, one of the following status codes is returned in the low-order byte of the wStatus word:

Return Code	Explanation
6	The specified format is not valid.
9	A system error occurred.

Structure of the Presentation Space

Personal Communications returns the presentation space in the format specified in the **Get Presentation Space** request.

If the format is CF_DSPTEXT, Personal Communications returns the presentation space in the following format:

```
typedef struct tagPS_CF_DSPTEXT
{
  unsigned char  data[(sizeof(DDEDATA)-1)];
  unsigned short uPSSize;        /* Size of the presentation space
  unsigned short uPSRows;        /* PS number of rows
  unsigned short uPSCols;        /* PS number of columns
  unsigned short uPSOffset;      /* Offset to the presentation space
  unsigned short uFieldCount;    /* Number of fields
  unsigned short uFieldOffset;   /* Offset to the field array
  unsigned char  PSData_1[1];    /* PS and Field list Array(lpPSFIELDS)
} PS_CF_DSPTEXT;

typedef union tagDDE_PS_CF_DSPTEXT
{
  DDEDATA        DDEdata;
  PS_CF_DSPTEXT  DDEps;
} DDE_PS_CF_DSPTEXT, *lpDDE_PS_CF_DSPTEXT;

typedef struct tagPSFIELDS
{
  unsigned short uFieldStart;    /* Field start offset
  unsigned short uFieldLength;   /* Field Length
  unsigned char  cAttribute;     /* Attribute character
  unsigned char  ubReserved;     /* *** Reserved ***
} PSFIELDS, *lpPSFIELDS;
```

Note: The following examples show how to obtain long pointers to the PS and the PSFIELDS array.

```
lpDDE = (lpDDE_PS_CF_DSPTEXT)GlobalLock(hData);
lpps = lpDDE->DDEps.PSData + lpDDE->DDEps.uPSOffset;
lppsfields = lpDDE->DDEps.PSData + lpDDE->DDEps.uFieldOffset;
```

If the format is CF_TEXT, Personal Communications returns the presentation space in the following format:

```
typedef struct tagPS_CF_TEXT
{
  unsigned char  data[(sizeof(DDEDATA)-1)];
```

```
  unsigned char  PSSIZE[4];      /* Size of the PS
  unsigned char  Tab1[1];        /* Tab character
  unsigned char  PSROWS[4];      /* Number of rows in the PS
  unsigned char  Tab2[1];        /* Tab character
  unsigned char  PSCOLS[4];      /* Number of Cols in the PS
  unsigned char  Tab3[1];        /* Tab character
  unsigned char  PS[1];          /* PS
} PS_CF_TEXT;

typedef union tagDDE_PS_CF_TEXT
{
  DDEDATA     DDEdata;
  PS_CF_TEXT  DDEps;
} DDE_PS_CF_TEXT, *lpDDE_PS_CF_TEXT;
```

Following the PS in the buffer is the following additional structure of fields that compose the field list.

```
typedef struct tagPS_FIELD
{
  unsigned char  FieldStart[4];
  unsigned char  TabF1[1];
  unsigned char  FieldLength[4];
  unsigned char  TabF2[1];
  unsigned char  Attribute;
  unsigned char  TabF3[1];
} PS_FIELD, *lpPS_FIELD;
```

Note: The following example shows how to obtain long pointers to the PS and the PS_FIELD array.

```
lpDDE = (lpDDE_PS_CF_TEXT)GlobalLock(hData);
lpps = lpDDE->DDEps.PS;
lpps_field = lpDDE->DDEps.PS
           + atoi(lpDDE->DDEps.PSSIZE)
           + ((atoi(lpDDE->DDEps.PSROWS) -1) * 2) // CR/LF
           + 1 + 1 + 4 + 1;  // Tabs + size of field count
```

Get Session Status

3270	*5250*	*VT*
Yes	*Yes*	*Yes*

The **Get Session Status** function returns the status of the connected session. The client sends the following message to request session status:

```
PostMessage( hServerWnd,
             WM_DDE_REQUEST,
             hClientWnd,
             MAKELPARAM(cfFormat, aSSTAT) );
```

where:

cfFormat
Identifies the DDE format for the status information. The value used is CF_TEXT.

aSSTAT
Identifies session status as the data item requested.

Personal Communications Response

Personal Communications either returns the session status in a DDE data message, or responds with one of these ACK messages containing status information:

- WM_DDE_DATA(hData, aSSTAT)
- WM_DDE_ACK(wStatus, aSSTAT)

If Personal Communications cannot return the session status, one of the following status codes is returned in the low-order byte of the wStatus word:

Return Code	Explanation
6	The specified format is not valid.
9	A system error occurred.

Format of Status Information

Personal Communications returns the session status as text in CF_TEXT format. The following fields are returned with the following possible values:

Fields	Returned Values	Description
Status	Closed, Invisible, Maximized, Minimized, Normal	The window is in one of these states.
Usage	DDE, User	The session is connected in either a DDE session or a user session.
ScreenX	NN	Defines the horizontal size of the screen.
ScreenY	NN	Defines the vertical size of the screen.
CursorX	NN	Defines the horizontal position of the cursor. (0 ... ScreenX – 1)
CursorY	NN	Defines the vertical position of the cursor. (0 ... ScreenY – 1)
TrimRect Status	Closed, Moved, Sized	The current status of the trim rectangle.
Trim Rectangle X1	N	The top-left corner X position of the trim rectangle in character coordinates.
Trim Rectangle Y1	N	The top-left corner Y position of the trim rectangle in character coordinates.
Trim Rectangle X2	N	The lower-right corner X position of the trim rectangle in character coordinates.
Trim Rectangle Y2	N	The lower-right corner Y position of the trim rectangle in character coordinates.

Fields	Returned Values	Description
Session Presentation Space Status	N	The current status of the presentation space. The following values are possible: **0:** The presentation space is unlocked. **4:** The presentation space is busy. **5:** The presentation space is locked.
Session Window Handle	XXXX	Window handle of the session.

Note:

- The status of each field is updated each time the status is requested.
- A new field might be added in a future version of Personal Communications.

Get System Configuration

3270	*5250*	*VT*
Yes	*Yes*	*Yes*

The **Get System Configuration** function returns the level of Personal Communications support and other system-related values. Most of this information is for use by a service coordinator when a customer calls the IBM Support Center after receiving a system error.

```
PostMessage( hServerWnd,
             WM_DDE_REQUEST,
             hClientWnd,
             MAKELPARAM(cfFormat, aSYSCON) );
```

where:

cfFormat
Identifies the DDE format for the data item requested. The value used is CF_TEXT.

aSYSCON
Identifies system configuration as the data item requested.

Personal Communications Response

Personal Communications either returns the system configuration data item in a DDE DATA message, or responds with one of these ACK messages containing status information:

- WM_DDE_DATA(hData, aSYSCON)
- WM_DDE_ACK(wStatus, aSYSCON)

If Personal Communications cannot return the system configuration, a DDE ACK message is returned with an error code in the low-order byte of the wStatus word:

```
WM_DDE_ACK(wStatus, aSYSCON)
```

Return Code	Explanation
9	A system error occurred.

Format of System Configuration Information

Personal Communications returns the system configuration as text in CF_TEXT format. The following fields are returned with the following possible values:

Fields	Returned values	Description
Version	N	The version of Personal Communications
Level	NN	The level of Personal Communications
Reserved	XXXXXX	Reserved
Reserved	XXXX	Reserved
Monitor Type	MONO, CGA, EGA, VGA, XGA	Type of the monitor
Country Code	NNNN	Country code used with 3270 or 5250

Get System Formats

3270	*5250*	*VT*
Yes	*Yes*	*Yes*

The **Get System Formats** function returns the list of Windows clipboard formats supported by Personal Communications. The client application sends the following message to retrieve the format list supported by Personal Communications:

```
PostMessage( hServerWnd,
             WM_DDE_REQUEST,
             hClientWnd,
             MAKELPARAM(cfFormat, aFORMATS) );
```

where:

cfFormat
Identifies the DDE format for the data item requested. The value used is CF_TEXT.

aFORMATS
Identifies formats as the data item requested.

Personal Communications Response

Personal Communications returns the list of supported Windows clipboard formats in CF_TEXT format in a DDE DATA message.

```
WM_DDE_DATA(hData, aFORMATS)
```

The following Windows clipboard formats are supported by Personal Communications:

- `CF_TEXT`
- `CF_DSPTEXT`

If Personal Communications cannot return the formats data item, a DDE ACK message is returned with an error code in the low-order byte of the wStatus word:

```
WM_DDE_ACK(wStatus, aFORMATS)
```

Return Code	Explanation
9	A system error occurred.

Get System Status

3270	*5250*	*VT*
Yes	*Yes*	*Yes*

The **Get System Status** function returns the status of each 3270 or 5250 session that is available with the current Personal Communications configuration. The client application sends the following message to retrieve the status data item:

```
PostMessage( hServerWnd,
             WM_DDE_REQUEST,
             hClientWnd,
             MAKELPARAM(cfFormat, aSTATUS) );
```

where:

cfFormat
Identifies the DDE format for the data item requested. The value used is CF_TEXT.

aSTATUS
Identifies status as the data item requested.

Personal Communications Response

Personal Communications returns the status data item in CF_TEXT format in a DDE DATA message:

```
WM_DDE_DATA(hData, aSTATUS)
```

For each opened session, Personal Communications returns a line of status information. Each line contains a series of fields with the following range of values:

Fields	Range of values	Description
Session ID	A, B, ..., Z	The short ID of the session.
Host Type	370, 400, ASCII	The host system currently supported by Personal Communications.
Emulation Type	3270, 5250, VT	The emulation type supported by Personal Communications.
Session Status	Closed, Invisible, Normal, Minimized, Maximized	The current status of the session's window.

If Personal Communications cannot return the status data item, a DDE ACK message is returned with an error code in the low-order byte of the wStatus word:

```
WM_DDE_ACK(wStatus, aSTATUS)
```

Return Code	Explanation
9	A system error occurred.

Get System SysItems

3270	*5250*	*VT*
Yes	*Yes*	*Yes*

Personal Communications supports the DDE system topic so that a client application can connect to the system topic and retrieve information about Personal Communications and the status of the sessions that Personal Communications is managing.

The **Get System SysItems** function returns the list of data items available in the Personal Communications system topic. The client application sends the following message to get the system topic data items:

```
PostMessage( hServerWnd,
             WM_DDE_REQUEST,
             hClientWnd,
             MAKELPARAM(cfFormat, aSYSITEMS) );
```

where:

cfFormat
Identifies the DDE format for the data item requested. The value used is CF_TEXT.

aSYSITEMS
Identifies SysItems as the data item requested.

Personal Communications Response

Personal Communications returns the list of system topic data items in CF_TEXT format in a DDE DATA message.

```
WM_DDE_DATA(hData, aSYSITEMS)
```

The following data items are supported by Personal Communications:

- SysItems
- Topics
- Status
- Formats
- SysCon

If Personal Communications cannot return the system data items, a DDE ACK message is returned with an error code in the low-order byte of the wStatus word:

```
WM_DDE_ACK(wStatus, aSYSITEMS)
```

Return Code	Explanation
9	A system error occurred.

Get System Topics

3270	5250	VT
Yes	Yes	Yes

The **Get System Topics** function returns the list of active DDE topics currently supported by Personal Communications. The client application sends the following message to the system topic to retrieve the list of topics that are currently active:

```
PostMessage( hServerWnd,
             WM_DDE_REQUEST,
             hClientWnd,
             MAKELPARAM(cfFormat, aTOPICS) );
```

where:

cfFormat
Identifies the DDE format for the data item requested. The value used is CF_TEXT.

aTOPICS
Identifies topics as the data item requested.

Personal Communications Response

Personal Communications returns the list of DDE topics in CF_TEXT format in a DDE DATA message.

```
WM_DDE_DATA(hData, aTOPICS)
```

The following list of topics are supported by Personal Communications:

- System – System Topic
- SessionA – Session A Topic

  ⋮
- SessionZ – Session Z Topic

Note: The actual number of session topics supported depends on the number of sessions currently opened. The client program should always query the topics data item of the system topic to obtain the list of sessions currently opened.

If Personal Communications cannot return the list of topics, a DDE ACK message will be returned with an error code in the low-order byte of the wStatus word:

```
WM_DDE_ACK(wStatus, aTOPICS)
```

Return Code	Explanation
9	A system error occurred.

Get Trim Rectangle

3270	5250	VT
Yes	Yes	Yes

The **Get Trim Rectangle** function returns to the client the area of the presentation space that is within the current trim rectangle. The client sends the following message to receive the trim rectangle.

```
PostMessage( hServerWnd,
             WM_DDE_REQUEST,
             hClientWnd,
             MAKELPARAM(cfFormat, aTRIMRECT) );
```

where:

cfFormat
Identifies the format for the trim rectangle. This is CF_TEXT.

aTRIMRECT
Identifies trim rectangle as the data item requested.

Personal Communications Response

Personal Communications either returns trim rectangle in a DDE data message, or responds with one of these ACK messages:

- WM_DDE_DATA(hData, aTRIMRECT)
- WM_DDE_ACK(wStatus, aTRIMRECT)

If Personal Communications cannot return the trim rectangle, one of the following status codes is returned in the low-order byte of the wStatus word:

Return Code	Explanation
6	The specified format is not valid.
9	A system error occurred.

Initiate Session Conversation

3270	*5250*	*VT*
Yes	*Yes*	*Yes*

The **Initiate Session Conversation** function connects a client application to an available session of Personal Communications. Once a session conversation has been established, the session is reserved for exclusive use by the client until the conversation is terminated.

The client application sends the following message to initiate a DDE conversation with a session:

```
SendMessage( -1,
             WM_DDE_INITIATE,
             hClientWnd,
             MAKELPARAM(aIBM327032, aSessionN) );
```

where:

aIBM327032
Identifies the application atom. The string used to create atom aIBM327032 is IBM327032. In the PC400, the application atom is aIBM525032 and the string IBM525032 is used to create it.

aSessionN
Identifies the topic atom. The string used to create atom aSessionN is either NULL or Session appended with the session ID A, B, ..., Z.

Personal Communications Response

If a specific topic is selected and Personal Communications can support a conversation with the client application, Personal Communications acknowledges the INITIATE transaction with:

```
WM_DDE_ACK(aIBM327032, aSessionN)
```

If a topic is not selected (aSessionN = NULL), Personal Communications responds by acknowledging all topics that are currently available:

```
WM_DDE_ACK(aIBM327032, aSystem)
WM_DDE_ACK(aIBM327032, aSessionA)
⋮
WM_DDE_ACK(aIBM327032, aSessionZ)
```

The client application selects the conversation it wishes to communicate with from the returned list of topics and terminates all other unwanted conversations.

Initiate Structured Field Conversation

3270	*5250*	*VT*
Yes	*No*	*No*

The **Initiate Structured Field Conversation** function connects a client application and a host application. This allows the applications to send data to each other and to receive data from each other.

The client sends the following command to initiate a structured field conversation:

```
SendMessage( -1,
             WM_DDE_INITIATE,
             hClientWnd,
             MAKELPARAM(aIBM327032, aLUN_xxxx) );
```

Where:

aIBM327032
Identifies the application atom.

aLUN_xxxx
Identifies the topic atom. The string used to create atom aLUN_xxxx is LU appended with the session ID A, B, ..., Z, appended with an underscore (_), and appended with the user-defined string of any length.

PC/3270 Response

If PC/3270 can support a structured field conversation with the client application, it returns an acknowledgment message with the following parameter:

```
WM_DDE_ACK(aIBM327032, aLUN_xxxx)
```

Initiate System Conversation

3270	*5250*	*VT*

Yes	*Yes*	*Yes*

The **Initiate System Conversation** function connects a client application to the system conversation. Only one client can be connected to the system conversation at a given time. The client sends the following command to initiate a system conversation:

```
SendMessage( -1,
             WM_DDE_INITIATE,
             hClientWnd,
             MAKELPARAM(aIBM327032, aSystem) );
```

where:

aIBM327032
Identifies the application atom.

aSystem
Identifies the topic atom.

Personal Communications Response

If Personal Communications can support a system topic conversation with the client application, it returns an acknowledgment message with the following parameters:

```
WM_DDE_ACK(aIBM327032, aSystem)
```

Put Data to Presentation Space

3270	*5250*	*VT*
Yes	*Yes*	*Yes*

The **Put Data to Presentation Space** function sends an ASCIIZ data string to be written into the host presentation space at the location specified by the calling parameter. The client sends the following message to the session to send the string.

```
PostMessage( hServerWnd,
             WM_DDE_POKE,
             hClientWnd,
             PackDDElParam(WM_DDE_POKE,
             hdata, aEPS) );
```

where:

hData

Identifies a handle to a Windows global memory object that contains the string to be sent to the session. The global memory object contains the following structure:

```
typedef struct tagPutString
{
  unsigned char  poke[(sizeof(DDEPOKE)-1)];
  unsigned short uPSStart;                      /* PS Position
  unsigned short uEOFflag;                      /* EOF effective switch
  unsigned char  szStringData[1];                /* String Data
} PUTSTRING;

typedef union tagDDE_PUTSTRING
```

```
{
  DDEPOKE    DDEpoke;
  PUTSTRING  DDEputstring;
} DDE_PUTSTRING, *lpDDE_PUTSTRING;
```

These values are valid at the uEOFflag field:

```
PCS_UNEFFECTEOF 0       /* The string is not truncated at EOF.
PCS_EFFECTEOF   1       /* The string is truncated at EOF.
```

aEPS Identifies the presentation space atom as the item.

Personal Communications Response

Personal Communications receives the string data and sends them to the presentation space, and returns a positive ACK message.

If the presentation space does not accept the string data, Personal Communications returns a negative ACK message containing one of the following status codes in the low-order byte of the wStatus word:

```
WM_DDE_ACK(wStatus, aEPS)
```

Return Code	Explanation
1	PS position is not valid.
2	Length is not valid.
3	The value of EOF flag is not valid.
5	Input to the target PS was inhibited.
6	The specified format is not valid.
7	The string was truncated (successful putting).
9	A system error occurred.

Search for String

3270	*5250*	*VT*
Yes	*Yes*	*Yes*

This function allows a client application to examine the presentation space for a specified string in a specified area.

Note: The client must set the start PS position, string to be searched for, and either the PS Length and Search Direction or End of Field (EOF) flag by using the **Set Presentation Space Service Condition** function before using this function. If the EOF flag is set to `PCS_EFFECTEOF`, the function will search the entire field specified by the Start PS Position parameter.

The client sends the following message to search for the string.

```
PostMessage( hServerWnd,
             WM_DDE_REQUEST,
             hClientWnd,
             MAKELPARAM(cfFormat, aSTRING) );
```

where:

cfFormat
Identifies the format for the search information. This must be CF_DSPTEXT.

aSTRING
Identifies the search data item.

Personal Communications Response

Personal Communications returns the start position of the string in a DDE data message if the string was found in the specified area:

- WM_DDE_DATA(hData, aSTRING)
- WM_DDE_ACK(wStatus, aSTRING)

If Personal Communications cannot return the start position of the string, one of the following status codes is returned in the low-order byte of the wStatus word:

Return Code	Explanation
1	PS position is not valid or the string is too long.
2	The string cannot be found.
6	The specified format is not valid.
9	A system error occurred.

Structure of the Search Information

Personal Communications returns the search information in the following structure:

```
typedef struct tagSEARCH
{
  unsigned char  data[(sizeof(DDEDATA)-1)];
  unsigned short uFieldStart;    /* String start offset
} SEARCH;

typedef union tagSEARCH
{
  DDEDATA  DDEdata;
  SEARCH   DDEsearch;
} DDE_SEARCH, *lpDDE_SEARCH;
```

Send Keystrokes

3270	*5250*	*VT*
Yes	*Yes*	*Yes*

The **Send Keystrokes** function sends keystrokes to the connected session. The client sends the following message to the session to send keystrokes.

```
PostMessage( hServerWnd,
             WM_DDE_POKE,
             hClientWnd,
             PackDDElParam(WM_DDE_POKE,
             hData, aKEYS) );
```

where:

hData Identifies a handle to a Windows global memory object that contains the keystrokes to be sent to the session. The global memory object contains the following structure:

```
typedef struct tagKeystrokes
{
  unsigned char  poke[(sizeof(DDEPOKE)-1)];
  unsigned short uTextType;                /* Type of keystrokes
  unsigned short uRetryCount;              /* Retry count 1 .. 16
  unsigned char  szKeyData[1];      /* Keystrokes
} KEYSTROKES;

typedef union tagDDE_SENDKEYSTROKES
{
  DDEPOKE     DDEpoke;
  KEYSTROKES  DDEkeys;
} DDE_SENDKEYSTROKES, *lpDDE_SENDKEYSTROKES;
```

The following key text types are supported:

```
PCS_PURETEXT   0         /* Pure text, no HLLAPI commands
PCS_HLLAPITEXT 1         /* Text, including HLLAPI tokens
```

Note: If the keystrokes are pure text, then specifying PCS_PURETEXT will transfer the keystrokes to the host in the fastest possible manner. If PCS_HLLAPITEXT is specified, then the keystroke data can contain HLLAPI commands interspersed with the text.

aKEYS

Identifies keystrokes as the item.

Personal Communications Response

Personal Communications receives the keystrokes and sends them to the presentation space. If the presentation space does not accept the keystrokes, a reset is sent to the presentation space and the keystrokes are sent again. This procedure continues until the presentation space accepts the keystrokes or the retry count is reached. If Personal Communications cannot send the keystrokes to the host, Personal Communications returns a negative ACK message containing one of the following status codes in the low-order byte of the wStatus word. Otherwise, Personal Communications returns a positive ACK message signalling the keystrokes have been sent.

```
WM_DDE_ACK(wStatus, aKEYS)
```

Return Code	Explanation
1	Retry count is not valid.
2	Type of key strokes is not valid.
6	The specified format is not valid.
9	A system error occurred.

Session Execute Macro

3270	*5250*	*VT*
Yes	*Yes*	*Yes*

You can issue commands and macros with the DDE_EXECUTE function. The DDE_EXECUTE function passes command strings to Personal Communications.

The command strings must conform to DDE specifications. Refer to *Microsoft Windows Software Development Kit Guide to Programming* for more information about the DDE command syntax.

The client sends the following command to issue a DDE_EXECUTE function.

```
PostMessage ( hServerWnd,
              WM_DDE_EXECUTE,
              hClientWnd,
              (LPARAM)hCommands) );
```

where:

hCommands
Identifies a handle to a Windows global memory object containing Personal Communications commands. For a list of commands you can issue, see "Issuing Commands with the Session Execute Macro Function".

Personal Communications Response

If Personal Communications can process the command string, Personal Communications returns an ACK message containing positive status information to the client. If Personal Communications cannot perform the command string, Personal Communications returns an ACK message containing this error code in the low-order word of the wStatus word:

Return Code	Explanation
9	A system error occurred.

Issuing Commands with the Session Execute Macro Function

You can issue the following commands with the **Session Execute Macro** function:

- KEYBOARD
- RECEIVE
- SEND
- SENDKEY
- WAIT
- WINDOW

Use a separate DDE_EXECUTE message for each command.

Note:

- Enclose values that contain nonalphanumeric characters or blanks in double quotation marks ("*value value*").
- To include a double quotation mark within a string, type it twice (for example, "This is a double quotation mark:""").
- The maximum length for any command is 255 characters.

WINDOW Command

```
[WINDOW(action[, "name"])]
```

Performs window actions, where:

```
action = HIDE|RESTORE|MAXIMIZE|MINIMIZE|
         SHOW|CNGNAME
name = LT name or Switch List Entry name
```

Note: *name* should be specified when CNGNAME is specified at *action*. If *name* is a NULL string, the default caption will be displayed.

KEYBOARD Command

```
[KEYBOARD(action)]
```

Enables or disables the session keyboard, including the mouse, where:

```
action= LOCK|UNLOCK
```

SEND Command

```
[SEND("pcfilename","hostfilename","options")]
```

Sends files to the host, where:

```
pcfilename = [path]filename[.ext]
hostfilename =
  For VM system:
    filename filetype[filemode]
  For MVS system:
     [']filename[(membername)]['']
  For CICS system:
  For OS/400 system:
    library name filename member name
```

Any combination of the following file transfer options can be included in *options*: MVS, VM, CICS, QUIET, OS/400, and emulation-specific transfer options, separated by spaces.

Refer to *Personal Communications Version 5.7 Administrator's Guide and Reference* for more information about the transfer options.

RECEIVE Command

```
[RECEIVE("pcfilename","hostfilename","options")]
```

Receives files from the host, where:

```
pcfilename = [path]filename[.ext]
hostfilename =
  For VM system:
    filename filetype[filemode]
  For MVS system:
     [']filename[(membername)]['']
  For CICS system:
  For OS/400 system:
    library name filename member name
```

Any combination of the following file transfer options can be included in *options*: MVS, VM, CICS, QUIET, OS/400, and emulation-specific transfer options, separated by spaces.

Refer to *Personal Communications Version 5.7 Administrator's Guide and Reference* for more information about the transfer options.

SENDKEY Command

```
[SENDKEY(token,token)]
```

Sends keystrokes to Personal Communications, where:

token = text string|command|macro macroname

Notes:

1. Text strings are enclosed in double quotation marks.
2. Macros are prefixed with "macro".
3. The argument string for SENDKEY must be 255 characters or fewer.
4. The following commands are supported.

Table 20. SENDKEY Command List

Command Name	Token	PC/3270	PC400	VT
Alternate Cursor	alt cursor	Yes	Yes	No
Alternate Viewing Mode	alt view	Yes	Yes	No
Attention	sys attn	Yes	Yes	No
Backspace	backspace	Yes	Yes	Yes
Back Tab	backtab	Yes	Yes	No
Backtab Word	backtab word	Yes	Yes	No
Character Advance	character advance	No	Yes	No
Character Backspace	backspace valid	No	Yes	No
Clear Screen	clear	Yes	Yes	No
Clicker	click	Yes	Yes	No
Color Blue	blue	Yes	No	No
Color Field Inherit	field color	Yes	No	No
Color Green	green	Yes	No	No
Color Pink	pink	Yes	No	No
Color Red	red	Yes	No	No
Color Turquoise	turquoise	Yes	No	No
Color White	white	Yes	No	No
Color Yellow	yellow	Yes	No	No
Cursor Blink	cursor blink	Yes	Yes	No
Cursor Down	down	Yes	Yes	Yes
Cursor Left	left	Yes	Yes	Yes
Cursor Right	right	Yes	Yes	Yes
Cursor Select	cursor select	Yes	Yes	No
Cursor Up	up	Yes	Yes	Yes
Delete Character	delete char	Yes	Yes	No
Delete Word	delete word	Yes	Yes	No
Device Cancel	device cancel	Yes	Yes	No
Dup Field	dup	Yes	Yes	No
Edit Clear	edit-clear	Yes	Yes	Yes
Edit Copy	edit-copy	Yes	Yes	Yes
Edit Cut	edit-cut	Yes	Yes	Yes
Edit Paste	edit-paste	Yes	Yes	Yes

Table 20. SENDKEY Command List (continued)

Command Name	Token	PC/3270	PC400	VT
Edit Undo	edit-undo	Yes	Yes	Yes
End Field	end field	Yes	Yes	No
Enter	enter	Yes	Yes	No
Erase EOF	erase eof	Yes	Yes	No
Erase Field	erase field	Yes	No	No
Erase Input	erase input	Yes	Yes	No
Fast Cursor Down	fast down	Yes	Yes	No
Fast Cursor Left	fast left	Yes	Yes	No
Fast Cursor Right	fast right	Yes	Yes	No
Fast Cursor Up	fast up	Yes	Yes	No
Field Exit	field exit	No	Yes	No
Field Mark	field mark	Yes	Yes	No
Field +	field +	No	Yes	No
Field –	field -	No	Yes	No
Graphic Cursor	+cr	Yes	No	No
Help	help	Yes	Yes	No
Highlighting Field Inherit	field hilight	Yes	No	No
Highlighting Reverse	reverse	Yes	No	No
Highlighting Underscore	underscore	Yes	No	No
Home	home	Yes	Yes	No
Host Print	host print	Yes	No	No
Input	input	Yes	Yes	No
Input nondisplay	input nd	Yes	Yes	No
Insert Toggle	insert	Yes	Yes	No
Lower case	to lower	Yes	No	No
Mark Down	mark down	Yes	Yes	Yes
Mark Left	mark left	Yes	Yes	Yes
Mark Right	mark right	Yes	Yes	Yes
Mark Up	mark up	Yes	Yes	Yes
Move Mark Down	move down	Yes	Yes	Yes
Move Mark Left	move left	Yes	Yes	Yes
Move Mark Right	move right	Yes	Yes	Yes
Move Mark Up	move up	Yes	Yes	Yes
New Line	newline	Yes	Yes	Yes
Next Page	page down	No	Yes	No
Pause 1 second	pause	Yes	Yes	No
Previous Page	page up	No	Yes	No
Print Screen	local copy	Yes	Yes	Yes
Program Attention Key 1	pa1	Yes	No	No
Program Attention Key 2	pa2	Yes	No	No

Table 20. SENDKEY Command List (continued)

Command Name	Token	PC/3270	PC400	VT
Program Attention Key 3	pa3	Yes	No	No
Program Function Key 1 : Program Function Key 5	pf1 : pf5	Yes : Yes	Yes : Yes	No : No
Program Function Key 6 : Program Function Key 20	pf6 : pf20	Yes : Yes	Yes : Yes	Yes : Yes
Program Function Key 21 : Program Function Key 24	pf21 : pf24	Yes : Yes	Yes : Yes	No : No
Quit	quit	Yes	Yes	No
Reset	reset	Yes	Yes	No
Response Time Monitor	rtm	Yes	No	No
Roll Down	roll down	No	Yes	No
Roll Up	roll up	No	Yes	No
Rubout	rubout	Yes	Yes	Yes
Rule	rule	Yes	Yes	Yes
SO/SI Display	so si	Yes	Yes	No
SO/SI Generate	so si generate	No	Yes	No
System Request	sys req	Yes	Yes	No
Tab Field	tab field	Yes	Yes	Yes
Tab Word	tab word	Yes	Yes	No
Test	test request	No	Yes	No
Unmark	unmark	Yes	Yes	Yes
Upper case	to upper	Yes	No	No
Upper/Lower Change	to other	Yes	No	No
Wait for bind	wait app	Yes	Yes	No
Wait for System	wait sys	Yes	Yes	No
Wait transition	wait trn	Yes	Yes	No
Wait while input inh.	wait inp inh	Yes	Yes	No
Window Relocation 1 : Window Relocation 8	view 1 : view 8	Yes : X	Yes : X	Yes : X
VT compose	vt compose	No	No	Yes
VT find	vt find	No	No	Yes
VT hold screen	vt hold	No	No	Yes
VT insert here	vt insert	No	No	Yes
VT next screen	vt next	No	No	Yes
VT numeric keypad 0	vt numpad 0	No	No	Yes
VT numeric keypad 1	vt numpad 1	No	No	Yes
VT numeric keypad 2	vt numpad 2	No	No	Yes

Table 20. SENDKEY Command List (continued)

Command Name	Token	PC/3270	PC400	VT
VT numeric keypad 3	vt numpad 3	No	No	Yes
VT numeric keypad 4	vt numpad 4	No	No	Yes
VT numeric keypad 5	vt numpad 5	No	No	Yes
VT numeric keypad 6	vt numpad 6	No	No	Yes
VT numeric keypad 7	vt numpad 7	No	No	Yes
VT numeric keypad 8	vt numpad 8	No	No	Yes
VT numeric keypad 9	vt numpad 9	No	No	Yes
VT numeric keypad -	vt numpad minus	No	No	Yes
VT numeric keypad ,	vt numpad comma	No	No	Yes
VT numeric keypad .	vt numpad period	No	No	Yes
VT numeric keypad enter	vt numpad enter	No	No	Yes
VT PF1	vt pf1	No	No	Yes
VT PF2	vt pf2	No	No	Yes
VT PF3	vt pf3	No	No	Yes
VT PF4	vt pf4	No	No	Yes
VT prev. screen	vt prev	No	No	Yes
VT remove	vt remove	No	No	Yes
VT select	vt select	No	No	Yes
VT user defined function 6	vt user f6	No	No	Yes
VT user defined function 7	vt user f7	No	No	Yes
VT user defined function 8	vt user f8	No	No	Yes
VT user defined function 9	vt user f9	No	No	Yes
VT user defined function 10	vt user f10	No	No	Yes
VT user defined function 11	vt user f11	No	No	Yes
VT user defined function 12	vt 12	No	No	Yes
VT user defined function 13	vt user f13	No	No	Yes
VT user defined function 14	vt user f14	No	No	Yes
VT user defined function 15	vt user f15	No	No	Yes
VT user defined function 16	vt user f16	No	No	Yes
VT user defined function 17	vt user f17	No	No	Yes
VT user defined function 18	vt user f18	No	No	Yes
VT user defined function 19	vt user f19	No	No	Yes
VT user defined function 20	vt user f20	No	No	Yes

Examples:

1. To logon

   ```
   [SENDKEY("Logon")]
   ```

2. To get reader list

```
[SENDKEY("RDRL", enter)]
```

WAIT Command

```
[WAIT("[time out][wait condition]")]
```

Waits until the timeout expires or the wait condition the client specified occurs. For this command, the client has to set at least one option, where:

time out (optional)
: If the client sets a timeout value in the command statements, the following units are available in the wait statement.

  - msec
  - millisecond
  - milliseconds
  - sec
  - second
  - seconds
  - minute
  - minutes
  - hour
  - hours

wait condition (optional)
: For the wait condition option, the client can select the following options:

  while cursor at (cursor row, cursor column)
  : While the cursor is at (cursor row, cursor column), it keeps waiting.

  while "string"
  : While the "string" is somewhere on the screen, it keeps waiting.

  while "string" at (cursor row, cursor column)
  : While the "string" is at (cursor row, cursor column) on the screen, it keeps waiting.

  until cursor at (cursor row, cursor column)
  : Until the cursor moves to (cursor row, cursor column), it keeps waiting.

  until "string"
  : Until the "string" is displayed somewhere on the screen, it keeps waiting.

  until "string" at (cursor row, cursor column)
  : Until the "string" is displayed at (cursor row, cursor column), it keeps waiting.

Examples:

1. To wait 10 seconds
   ```
   [WAIT("10 seconds")]
   ```
2. To wait while "ABCDEF" is displayed at (2,9) on the screen
   ```
   [WAIT("while ""ABCDEF"" at (2,9)")]
   ```
3. To wait until "ABCDEF" is displayed at (2,9) on the screen, or after 8 seconds
   ```
   [WAIT("8 seconds until ""ABCDEF"" at (2,9)")]
   ```

Set Cursor Position

3270	5250	VT
Yes	Yes	Yes

The **Set Cursor Position** function allows the client application to set the cursor position in the session window.

```
PostMessage( hServerWnd,
             WM_DDE_POKE,
             hClientWnd,
             PackDDELParam(WW_DDE_POKE,
             hData, aSETCURSOR) );
```

where:

hData

Identifies a handle to a Windows global memory object that contains the cursor positioning information in the following structure:

```
typedef struct tagSETCURSOR
{
  unsigned char  poke[(sizeof(DDEPOKE)-1)];
  unsigned short uSetCursorType; /* Cursor Set Type
  unsigned short uSetCursor1;    /* Cursor Row or PS Offset
  unsigned short uSetCursor2;    /* Cursor Col
} SETCURSOR;

typedef union tagDDE_SETCURSOR
{
  DDEPOKE    DDEpoke;
  SETCURSOR  DDEsetcursor;
} DDE_SETCURSOR, *lpDDE_SETCURSOR;
```

Personal Communications supports two ways to set the cursor position:

- PS Offset (uSetCursorType = 0)
- Row/Column number (uSetCursorType = 1)

The application specifies which method by setting the uSetCursorType field to the appropriate value, followed by setting the two other fields uSetCursor1 and uSetCursor2 to their appropriate values as follows:

- uSetCursorType = 0 offset
  - uSetCursor1: 0 ... (PSsize – 1)
- uSetCursorType = 1 row/col
  - uSetCursor1: 0 ... (PSrows – 1)
  - uSetCursor2: 0 ... (PScols – 1)

aSETCURSOR

Identifies cursor position as the item.

Personal Communications Response

Personal Communications receives the cursor information and moves the cursor to the specified position in the PS. If the cursor is positioned successfully, Personal Communications returns a positive ACK message to the client application. Otherwise, a negative ACK message is returned with one of the following error codes in the low-order byte of the wStatus word.

```
WM_DDE_ACK(wStatus, aSETCURSOR)
```

Return Code	Explanation
1	Cursor set type is not valid. Must be 0 or 1.
2	Cursor PS offset is not valid. Must be 0 ... (PSsize – 1).
3	Cursor row value is not valid. Must be 0 ... (PSrows – 1).
4	Cursor column value is not valid. Must be 0 ... (PScols – 1).
6	The specified format is not valid.
9	A system error occurred.

Set Mouse Intercept Condition

3270	*5250*	*VT*
Yes	*Yes*	*Yes*

This function specifies the mouse input to be intercepted. The client sends the following command to set the mouse event to be intercepted.

```
PostMessage( hServerWnd,
             WM_DDE_POKE,
             hClientWnd,
             PackDDElParam(WM_DDE_POKE,
             hData, aMOUSE) );
```

where:

hData Identifies a handle to a Windows global memory object that specifies the condition of intercepting the mouse input.

If the format is CF_TEXT, the client program sends the condition in the following structure:

```
typedef struct tagSETMOUSE_CF_TEXT
{
  unsigned char poke[(sizeof(DDEPOKE)-1)];
  unsigned char zMouseCondition[1];
} SETMOUSE_CF_TEXT;

typedef union tagDDE_SETMOUSE_CF_TEXT
{
  DDEPOKE           DDEpoke;
  SETMOUSE_CF_TEXT  DDEcond;
} DDE_SETMOUSE_CF_TEXT, *lpDDE_SETMOUSE_CF_TEXT;
```

The following table shows the parameters' values:

Parameter Name	Meaning	Value
Condition	Condition of intercepting the mouse input	A string terminated with '\0', consists of the constants defined as follows in any order: **L** Enable intercepting the left button **l** Disable intercepting the left button **R** Enable intercepting the right button **r** Disable intercepting the right button **M** Enable intercepting the middle button **m** Disable intercepting the middle button **S** Enable intercepting a single click **s** Disable intercepting a single click **D** Enable intercepting a double click **d** Disable intercepting a double click **T** Retrieve the pointed string **t** Do not retrieve the pointed string

If the format is CF_DSPTEXT, the client program sends the condition in the following structure:

```
typedef struct tagSETMOUSE_CF_DSPTEXT
{
  unsigned char poke[(sizeof(DDEPOKE)-1)];
  BOOL          bLeftButton;     /* Enable intercepting left button
  BOOL          bRightButton;    /* Enable intercepting right button
  BOOL          bMiddleButton;   /* Enable intercepting middle button
  BOOL          bSingleClick;    /* Enable intercepting single click
  BOOL          bDoubleClick;    /* Enable intercepting double click
  BOOL          bRetrieveString; /* Enable intercepting retrieve string
} SETMOUSE_CF_DSPTEXT;

typedef union tagDDE_SETMOUSE_CF_DSPTEXT
{
  DDEPOKE              DDEpoke;
  SETMOUSE_CF_DSPTEXT  DDEcond;
} DDE_SETMOUSE_CF_DSPTEXT, *lpDDE_SETMOUSE_CF_DSPTEXT;
```

The following table shows the values in the parameters:

Parameter Name	Meaning	Value	
bLeftButton	Enable or disable interception of the left mouse button	**True**	Enable intercepting the left button
		False	Disable intercepting the left button
bRightButton	Enable or disable interception of the right mouse button	**True**	Enable intercepting the right button
		False	Disable intercepting the right button
bMiddleButton	Enable or disable interception of the middle mouse button	**True**	Enable intercepting the middle button
		False	Disable intercepting the middle button
bSingleClick	Enable or disable interception of the single click	**True**	Enable intercepting the single click
		False	Disable intercepting the single click
bDoubleClick	Enable or disable interception of the double click	**True**	Enable intercepting the double click
		False	Disable intercepting the double click
bRetrieveString	Retrieve or do not retrieve the pointed string	**True**	Retrieve the pointed string
		False	Do not retrieve the pointed string

aMOUSE
Identifies the mouse as the item.

Personal Communications Response

When receiving the **Set Mouse Intercept Condition** request, Personal Communications returns an ACK message if it can set the intercept condition to the specified status. Otherwise, a negative ACK message is returned to the client with one of the following return codes in the low-order byte of the wStatus field:

```
WM_DDE_ACK(wStatus, aMOUSE)
```

Return Code	Explanation
2	A character in the Condition parameter is not valid.
6	The specified format is not valid.
9	A system error occurred.

Set Presentation Space Service Condition

3270	5250	VT
Yes	Yes	Yes

The **Set Presentation Space Service Condition** function sets the condition for using the following functions:

- **Get Partial Presentation Space**
- **Find Field**
- **Search for String**

The client application sets the condition by calling a function such as:

- **Start PS position**
- **PS length**
- **EOF flag**
- **Search direction**
- **ASCIIZ string**

The client must specify the **Set Presentation Space Service Condition** function before invoking the functions listed above. The conditions set by this function remain in effect until the next **Set Presentation Space Service Condition** function is called. The client sends the following message to set the condition:

```
PostMessage( hServerWnd,
             WM_DDE_POKE,
             hClientWnd,
             PackDDELParam(WM_DDE_POKE,
             (hData, aEPSCOND) );
```

where:

hData

Identifies a handle to a Windows global memory object containing:

```
typedef struct tagPSSERVCOND
{
  unsigned char  poke[(sizeof(DDEPOKE)-1)];
  unsigned short uPSStart;                    /* PS Position
  unsigned short uPSLength;                   /* Length of String or PS
  unsigned short uSearchDir;                  /* Direction for search
  unsigned short uEOFflag;                    /* EOF effective switch
  unsigned char  szTargetString[1];           /* Target String
} PSSERVCOND;

typedef union tagDDE_PSSERVCOND
{
  DDEPOKE     DDEpoke;
  PSSERVCOND  DDEcond;
} DDE_PSSERVCOND, *lpDDE_PSSERVCOND;
```

The following values are valid at the uSearchDir field:

```
 PCS_SRCHFRWD    0        /* Search forward.
 PCS_SRCHBKWD    1        /* Search backward.
```

The following values are valid for the uEOFflag field:

```
 PCS_UNEFFECTEOF 0   /* The PS Area is not truncated at End of Field (EOF).
 PCS_EFFECTEOF   1   /* The PS Area is truncated at End of Field (EOF).
```

If the value of `uEOFflag` is `PCS_EFFECTEOF` then the PS length and Search Direction are not used.

aEPSCOND
Identifies the item for the **Set Presentation Space Service Condition** function.

Personal Communications Response

If Personal Communications can perform the **Set Presentation Space Service Condition** function, then Personal Communications returns an ACK message:

```
WM_DDE_ACK(wStatus, aEPSCOND)
```

If Personal Communications cannot perform the Set Presentation Space Service Condition function, then Personal Communications returns a negative ACK message containing the following return codes in the low-order byte of wStatus:

Return Code	Explanation
1	PS position is not valid.
2	Length is not valid.
3	The value of EOF flag is not valid.
4	The value of Search Direction is not valid.
6	The specified format is not valid.
9	A system error occurred.

Set Session Advise Condition

3270	*5250*	*VT*
Yes	*Yes*	*Yes*

This function sets the condition for the DDE_ADVISE of the **Start Session Advise** function. The client can specify a search string and a region of the screen. When the advise condition is met, the server notifies the client of the condition according to the options specified by the **Start Session Advise** function.

Note: The client must specify the **Set Session Advise Condition** function before invoking **Start Session Advise**. If the advise condition is set after the **Start Session Advise** function is started, the advise condition will be ignored and the client will receive a negative ACK message. See "Start Session Advise" on page 248 for more information about starting the advise.

The client sends the following message to set the advise condition.

```
PostMessage( hServerWnd,
             WM_DDE_POKE,
             hClientWnd,
             PackDDElParam(WM_DDE_POKE,
             (hData, aPSCOND) );
```

where:

hData Identifies a handle to a Windows global memory object containing:

```
typedef struct tagSEARCHDATA
{
  unsigned char  poke[(sizeof(DDEPOKE)-1)];
```

```
  unsigned short uPSStart;                /* PS Position of string
  unsigned short uPSLength;               /* Length of String
  BOOL           bCaseSensitive;          /* Case Sensitive TRUE=YES
  unsigned char  SearchString[1]; /* Search String
} SEARCHDATA;

typedef union tagDDE_SEARCHDATA
{
  DDEPOKE     DDEpoke;
  SEARCHDATA  DDEcond;
} DDE_SEARCHDATA, *lpDDE_SEARCHDATA;
```

aPSCOND
Identifies the item for the **Set Session Advise Condition** function.

Personal Communications Response

If Personal Communications can perform the **Set Session Advise Condition** function, Personal Communications returns this ACK message:

```
WM_DDE_ACK(wStatus, aPSCOND)
```

If Personal Communications cannot perform the **Set Session Advise Condition** function, then Personal Communications returns an negative ACK message containing one of the following return codes in the low-order byte of wStatus:

Return Code	Explanation
1	Advise is already active.
2	Advise condition is already active.
3	PS position is not valid.
4	String length is not valid.
6	The specified format is not valid.
9	A system error occurred.

Set Structured Field Service Condition

3270	*5250*	*VT*
Yes	*No*	*No*

The **Set Structured Field Service Condition** function passes the Query Reply data provided by the client application.

Note: The client must call the **Set Structured Field Service Condition** function before invoking the **Start Read SF** function or the **Write SF** function.

The client sends the following message to set the condition.

```
PostMessage( hServerWnd,
             WM_DDE_POKE,
             hClientWnd,
             PackDDElParam(WM_DDE_POKE,
             (hData, aSFCOND) );
```

where:

hData Identifies a handle to a Windows global memory object containing:

```
typedef struct tagSFSERVCOND
{
  unsigned char  poke[(sizeof(DDEPOKE)-1)];
  unsigned short uBufferLength;             /* Buffer size of Read_SF
  unsigned short uQRLength;                 /* Length of Query Reply dat
  unsigned char  szQueryReply[1];            /* Query Reply data
} SFSERVCOND;

typedef union tagDDE_SFSERVCOND
{
  DDEPOKE     DDEpoke;
  SFSERVCOND  DDEcond;
} DDE_SFSERVCOND, *lpDDE_SFSERVCOND;
```

aSFCOND
Identifies the item for the **Set Structured Field Service Condition** function.

PC/3270 Response

PC/3270 checks the Query Reply ID and Type (not DOID) and the length. If they are valid, then PC/3270 returns an ACK message:

```
WM_DDE_ACK(wStatus, aSFCOND)
```

If PC/3270 cannot perform the **Set Structured Field Service Condition** function, then PC/3270 returns a negative ACK message containing one of the following return codes in the low-order byte of wStatus:

Return Code	Explanation
1	PS SF ID is not valid.
2	Length is not valid.
3	One DDM base type is already connected to this session.
4	Structured Field Service Condition is already set.
6	The specified format is not valid.
9	A system error occurred.

Start Close Intercept

3270	*5250*	*VT*
Yes	*Yes*	*Yes*

The **Start Close Intercept** function allows a client application to intercept close requests generated when a user selects the close option from the emulator session window. This function intercepts the close request and discards it until the **Stop Close Intercept** function is requested. After using this function, the client receives DATA messages notifying it that close requests occurred (CLOSE).

The client sends the following command to begin a session advise.

```
PostMessage( hServerWnd,
             WM_DDE_ADVISE,
             hClientWnd,
             Pack DDElParam(WM_DDE_ADVISE,
             (hOptions, aCLOSE) );
```

where:

hOptions
Is a handle to a Windows global memory object DDEADVISE structure.

If the value of fDeferUpd is 1, DDE Data messages will be sent to the client application with the hData set to NULL. The client must then issue a DDE REQUEST to request the data item.

If the value of fAckReq is 1, the server does not notify the client of further close requests until the server receives an ACK message from the client in response to any previous notification.

The cfFormat field specifies the format to send the close request. (Must be CF_DSPTEXT.)

aCLOSE
Identifies close intercept as the item.

Personal Communications Response

Personal Communications receives the **Start Close Intercept** and returns an ACK message if it can start the intercept. Otherwise a negative ACK message is returned to the client with one of the following return codes in the low-order byte of the wStatus field:

```
WM_DDE_ACK(wStatus, aCLOSE)
```

Return Code	Explanation
1	Close Intercept is already working.
6	The specified format is not valid.
9	A system error occurred.

Once the intercept starts, the client receives DATA messages notifying it that the close request is intercepted:

```
WM_DDE_DATA(hData, aCLOSE)
```

where:

hData Identifies a handle to a Windows global memory object containing:

```
typedef struct tagCLOSEREQ
{
  unsigned char  data[(sizeof(DDEDATA)-1)];
  unsigned short uCloseReqCount; /* Number of the close requests.
} CLOSEREQ;

typedef union tagDDE_CLOSEREQ
{
  DDEDATA   DDEdata;
  CLOSEREQ  DDEclose;
} DDE_CLOSEREQ, *lpDDE_CLOSEREQ;
```

The DATA messages continue until a Stop Close Intercept message is sent to Personal Communications.

Start Keystroke Intercept

3270	*5250*	*VT*
Yes	*Yes*	*Yes*

The **Start Keystroke Intercept** function allows a client application to filter any keystrokes sent to a session by a terminal operator. After a call to this function, keystrokes are intercepted, and the client receives them (KEYS).

The client sends the following command to begin intercept.

```
PostMessage( hServerWnd,
             WM_DDE_ADVISE,
             hClientWnd,
             PackDDElParam(WM_DDE_ADVISE,
             (hOptions, aKEYS) );
```

where:

hOptions
Is a handle to a Windows global memory object DDEADVISE structure.

If the value of fDeferUpd is 1, DDE Data messages are sent to the client application with the hData set to NULL. The client then issues a DDE REQUEST to request the data item.

If the value of fAckReq is 1, the server does not notify the client of further keystrokes until the server receives an ACK message from the client in response to any previous keystrokes notification.

The cfFormat field specifies the format to send the keystrokes when the keystroke is sent by a terminal operator. (Must be CF_DSPTEXT.)

aKEYS
Identifies keystrokes as the item.

Personal Communications Response

Personal Communications receives the **Start Keystroke Intercept** and returns an ACK message if it can start the intercept. Otherwise a negative ACK message is returned to the client with one of the following return codes in the low-order byte of the wStatus field:

```
WM_DDE_ACK(wStatus, aKEYS)
```

Return Code	Explanation
1	Keystroke Intercept is already started.
6	The specified format is not valid.
9	A system error occurred.

Once the intercept has started, the client receives DATA messages notifying it that the keystroke is intercepted:

```
WM_DDE_DATA(hData, aKEYS)
```

The DATA messages continue until a **Stop Keystroke Intercept** message is sent to Personal Communications. The format of the data item is the same format as if the client requested the data item via a DDE_REQUEST.

Start Mouse Input Intercept

3270	*5250*	*VT*

Yes	*Yes*	*Yes*

The **Start Mouse Input Intercept** function allows a client application to intercept mouse input when a terminal operator presses the mouse button on an emulator session window. After calling this function, the client receives DATA messages that include the PS position where mouse input occurred.

The client sends the following command to begin to intercept the mouse input.

```
PostMessage( hServerWnd,
             WM_DDE_ADVISE,
             hClientWnd,
             PackDDElParam(WM_DDE_ADVISE,
             (hOptions, aMOUSE) );
```

where:

hOptions

Is a handle to a Windows global memory object DDEADVISE structure.

If the value of fDeferUpd is 1, DDE Data messages will be sent to the client application with the hData set to NULL. The client must then issue a DDE REQUEST to request the data item.

If the value of fAckReq is 1, the server does not notify the client of further structured field data until the server receives an ACK message from the client in response to any previous notification.

The cfFormat field specifies the format to send the data item has been updated.

aMOUSE

Identifies the mouse as the item.

Personal Communications Response

Personal Communications receives the **Start Mouse Input Intercept** and returns an ACK message if it can start this function. Otherwise a negative ACK message is returned to the client with one of the following return codes in the low-order byte of the wStatus field:

```
WM_DDE_ACK(wStatus, aMOUSE)
```

Return Code	Explanation
1	Mouse Input Intercept has been already started.
6	The specified format is not valid.
9	A system error occurred.

Once the **Mouse Input Intercept** starts, the client receives DATA messages of the structured field:

```
WM_DDE_DATA(hData, aMOUSE)
```

where:

hData

If the format is CF_TEXT, Personal Communications returns the mouse input information in the following format:

```
typedef struct tagMOUSE_CF_TEXT
{
  unsigned char data[(sizeof(DDEDATA)-1)];
  unsigned char PSPos[4];       /* PS Offset - Mouse position
  unsigned char Tab1[1];        /* Tab character
  unsigned char PSRowPos[4];    /* ROW number of Mouse position
  unsigned char Tab2[1];        /* Tab character
  unsigned char PSColPos[4];    /* Col number of Mouse position
  unsigned char Tab3[1];        /* Tab character
  unsigned char PSSize[4];      /* Size of Presentation Space
  unsigned char Tab4[1];        /* Tab character
  unsigned char PSRows[4[;      /* Row number of PS
  unsigned char Tab5[1];        /* Tab character
  unsigned char PSCols[4];      /* Column number of PS
  unsigned char Tab6[1];        /* Tab character
  unsigned char Button[1];      /* Type of clicked mouse butt n
  unsigned char Tab7[1];        /* Tab character
  unsigned char Click[1];       /* Type of clicking
  unsigned char Tab8[1];        /* Tab character
  unsigned char zClickString[1];/* Retrieved string
} MOUSE_CF_TEXT;

typedef union tagDDE_MOUSE_CF_TEXT
{
  DDEDATA        DDEdata;
  MOUSE_CF_TEXT  DDEmouse;
} DDE_MOUSE_CF_TEXT, *lpDDE_MOUSE_CF_TEXT;
```

The following table shows the values in the parameters:

Parameter Name	Meaning	Value
PSPos	PS offset of the position where mouse was clicked	0 ... (PSSize – 1)
PSRowPos	Row number of the position where mouse was clicked	0 ... (PSRows – 1)
PSColPos	Column number of the position where mouse was clicked	0 ... (PSCols – 1)
PSSize	Presentation space size	
PSRows	Number of presentation space rows	
PSCols	Number of presentation space columns	
ButtonType	Type of clicked mouse button	**L** Left button **M** Middle button **R** Right button
ClickType	Type of clicking	**S** Single click **D** Double click
ClickString	Retrieved string to which the mouse pointed	A character string terminated with a '\0'
Tab1–8	A tab character for delimiter	'\t'

If the format is CF_DSPTEXT, Personal Communications returns the mouse input information in the following format:

```
typedef struct tagMOUSE_CF_DSPTEXT
{
  unsigned char  data[(sizeof(DDEDATA)-1)];
  unsigned short uPSPos;                  /* PS Offset  - Mouse position
  unsigned short uPSRowPos;               /* ROW number - Mouse position
  unsigned short uPSColPos;               /* Col number - Mouse position
  unsigned short uPSSize;                 /* Size of Presentation Space
  unsigned short uPSRows;                 /* Row number of PS
  unsigned short uPSCols;                 /* Column number of PS
  unsigned short uButtonType;             /* Type of clicked mouse button
  unsigned short uClickType;              /* Type of clicking
  unsigned char  zClickString[1];          /* Retrieved string
} MOUSE_CF_DSPTEXT;

typedef union tagDDE_MOUSE_CF_DSPTEXT
{
  DDEDATA           DDEdata;
  MOUSE_CF_DSPTEXT  DDEmouse;
} DDE_MOUSE_CF_DSPTEXT, *lpDDE_MOUSE_CF_DSPTEXT;
```

The following table shows the values in the parameters:

Parameter Name	Meaning	Value
uPSPos	PS offset of the position where the mouse was clicked	0 ... (uPSSize – 1)
uPSRowPos	Row number of the position where the mouse was clicked	0 ... (uPSRows – 1)
uPSColPos	Column number of the position where the mouse was clicked	0 ... (uPSCols – 1)
uPSSize	Size of the presentation space	
uPSRows	Number of rows of the presentation space	
uPSCols	Number of columns of the presentation space	
uButtonType	Type of the clicked mouse button	**0x0001** Left button **0x0002** Middle button **0x0003** Right button
uClickType	Type of clicking	**0x0001** Single click **0x0002** Double click
szClickString	Retrieved string to which the mouse pointed	A character string terminated with a '\0'

The DATA messages continue until a **Stop Mouse Input Intercept** message is sent to Personal Communications.

Start Read SF

3270	*5250*	*VT*
Yes	*No*	*No*

The **Start Read SF** function allows a client application to read structured field data from the host application. After using this function, the client receives DATA messages notifying it that close requests occurred.

Note: Before using this function, the client must call the **Set Structured Field Service Condition** function to pass the Query Reply data to the server.

The client sends the following command to begin a Read SF.

```
PostMessage( hServerWnd,
             WM_DDE_ADVISE,
             hClientWnd,
             PackDDElParam(WM_DDE_ADVISE,
             (hOptions, aSF) );
```

where:

hOptions
Is a handle to a Windows global memory object DDEADVISE structure.

If the value of fDeferUpd is 1, DDE Data messages will be sent to the client application with the hData set to NULL. The client must then issue a DDE REQUEST to request the data item.

If the value of fAckReq is 1, the server does not notify the client of further structured field data until the server receives an ACK message from the client in response to any previous notification.

The cfFormat field specifies the format to send the structured field data. (It must be CF_DSPTEXT.)

aSF Identifies structured field as the item.

PC/3270 Response

PC/3270 receives the **Start Read SF** and returns an ACK message if it can start the Read SF. Otherwise a negative ACK message is returned to the client with one of the following return codes in the low-order byte of the wStatus field:

```
WM_DDE_ACK(wStatus, aSF)
```

Return Code	Explanation
1	Read SF is already started.
3	No prior **Set Structured Field Service Condition** function was called.
6	The specified format is not valid.
9	A system error occurred.

Once the Read SF has started, the client receives DATA messages of the structured field:

```
WM_DDE_DATA(hData, aSF)
```

where:

hData Identifies a handle to a Windows global memory object containing:

```
typedef struct tagMOUSE_CF_DSPTEXT
{
  unsigned char  data[(sizeof(DDEDATA)-1)];
  unsigned short uPSPos;                  /* PS Offset  - Mouse position
  unsigned short uPSRowPos;               /* ROW number - Mouse position
```

```
  unsigned short uPSColPos;              /* Col number - Mouse position
  unsigned short uPSSize;                /* Size of Presentation Space
  unsigned short uPSRows;                /* Row number of PS
  unsigned short uPSCols;                /* Column number of PS
  unsigned short uButtonType;            /* Type of clicked mouse button
  unsigned short uClickType;             /* Type of clicking
  unsigned char  zClickString[1];         /* Retrieved string
} MOUSE_CF_DSPTEXT;

typedef union tagDDE_MOUSE_CF_DSPTEXT
{
  DDEDATA           DDEdata;
  MOUSE_CF_DSPTEXT  DDEmouse;
} DDE_MOUSE_CF_DSPTEXT, *lpDDE_MOUSE_CF_DSPTEXT;
typedef struct tagSFDATA
{
  unsigned char  data[(sizeof(DDEDATA)-1)];
  unsigned short uSFLength;               /* Length of SF data
  unsigned char  szSFData[1];             /* SF data
} SFDATA;

typedef union tagDDE_SFDATA
{
  DDEDATA  DDEdata;
  SFDATA   DDEsfdata;
} DDE_SFDATA, *lpDDE_SFDATA;
```

The DATA messages continue until a Stop Read SF message is sent to PC/3270.

Start Session Advise

3270	*5250*	*VT*
Yes	*Yes*	*Yes*

The **Start Session Advise** function establishes a link between the Personal Communications session and the client. This lets the client receive updates of the presentation space (PS), the operator information area (OIA), or the trim rectangle (TRIMRECT) when the data item is updated.

Note: If the client application needs conditional notification when the presentation space is updated, set an advise condition prior to invoking the advise function for the presentation space. See "Set Session Advise Condition" on page 239.

The client sends the following command to begin a session advise.

```
PostMessage( hServerWnd,
             WM_DDE_ADVISE,
             hClientWnd,
             PackDDElParam(WM_DDE_ADVISE,
             hOptions, aItem) );
```

where:

hOptions

Is a handle to a Windows global memory object DDEADVISE structure. This is the structure:

```
typedef struct tagDDEADVISE
{
 unsigned reserved:14;        // Reserved
```

```
 unsigned fDeferUpd:1;        // Send notification only
 unsigned fAckReq:1;          // Client will ACK all notices
 WORD     cfFormat;           // Clipboard format to use
}  DDEADVISE, *lpDDEADVISE;
```

If the value of fDeferUpd is 1, DDE Data messages are sent to the client application with the hData set to NULL. The client must then issue a DDE REQUEST to request the data item.

If the value of fAckReq is 1, the server does not notify the client of further changes to the data item until the server receives an ACK message from the client in response to any previous update notification.

The cfFormat field specifies the format to send the data item when the item has been updated.

aItem Specifies the item of information being requested; in this case, the value can be PS, OIA, or TRIMRECT.

Personal Communications Response

Personal Communications receives the Start Session Advise and returns an ACK message if it can start the advise. Otherwise, a negative ACK message is returned to the client with one of the following return codes in the low-order byte of the wStatus field:

```
WM_DDE_ACK(wStatus, aItem)
```

Return Code	Explanation
1	Advise already active for data item.
6	Advise parameter not valid.
9	A system error occurred.

Once the advise has started, the client receives DATA messages notifying it that the data item (PS, OIA, or TRIMRECT) has changed:

```
WM_DDE_DATA(hData, aItem)
```

The DATA messages continue until a **Stop Session Advise** message is sent to Personal Communications. The format of the data item is the same as if the client requested the data item via a DDE_REQUEST.

Stop Close Intercept

3270	*5250*	*VT*
Yes	*Yes*	*Yes*

The **Stop Close Intercept** function ends a client application's ability to intercept close requests. The client sends the following command to perform the **Stop Close Intercept** function.

```
PostMessage( hServerWnd,
             WM_DDE_UNADVISE,
             hClientWnd,
             MAKELPARAM(NULL, aCLOSE) );
```

where:

aCLOSE
Identifies close intercept as the item.

Personal Communications Response

If Personal Communications can perform the DDE_UNADVISE, Personal Communications returns an ACK message containing positive status information to the client:

```
WM_DDE_ACK(wStatus, aCLOSE)
```

If Personal Communications cannot perform the DDE_UNADVISE, Personal Communications returns an ACK message containing negative status information and one of the following return codes in the low-order byte of the wStatus word:

Return Code	Explanation
1	Advise has not started yet.
9	A system error occurred.

Stop Keystroke Intercept

3270	*5250*	*VT*
Yes	*Yes*	*Yes*

The **Stop Keystroke Intercept** function ends a client application's ability to intercept keystrokes. The client sends the following command to perform the **Stop Keystroke Intercept** function.

```
PostMessage( hServerWnd,
             WM_DDE_UNADVISE,
             hClientWnd,
             MAKELPARAM(NULL, aKEYS) );
```

where:

aKEYS
Identifies keystrokes as the item.

Personal Communications Response

If Personal Communications can perform the DDE_UNADVISE, Personal Communications returns an ACK message containing positive status information to the client:

```
WM_DDE_ACK(wStatus, aKEYS)
```

If Personal Communications cannot perform the DDE_UNADVISE, Personal Communications returns an ACK message containing negative status information and one of the following return codes in the low-order byte of the wStatus word.

Return Code	Explanation
1	Advise has not started yet.
9	A system error occurred.

Stop Mouse Input Intercept

3270	5250	VT
Yes	Yes	Yes

The **Stop Mouse Input Intercept** function ends a client application's ability to intercept mouse input.

The client sends the following command to perform the **Stop Mouse Input Intercept** function.

```
PostMessage( hServerWnd,
             WM_DDE_UNADVISE,
             hClientWnd,
             MAKELPARAM(NULL, aMOUSE) );
```

where:

aMOUSE
Identifies the mouse as the item.

Personal Communications Response

If Personal Communications can perform the DDE_UNADVISE, Personal Communications returns an ACK message containing positive status information to the client:

```
WM_DDE_ACK(wStatus, aMOUSE)
```

If Personal Communications cannot perform the DDE_UNADVISE, Personal Communications returns an ACK message containing negative status information and one of the following return codes in the low-order byte of the wStatus word.

Return Code	Explanation
1	Advise has not started yet.
9	A system error occurred.

Stop Read SF

3270	5250	VT
Yes	No	No

The **Stop Read SF** function ends a client application's ability to read structured field data.

The client sends the following command to perform the **Stop Read SF** function.

```
PostMessage( hServerWnd,
             WM_DDE_UNADVISE,
             hClientWnd,
             MAKELPARAM(NULL, aSF) );
```

where:

aSF Identified structured field as the item.

PC/3270 response

If PC/3270 can perform the DDE_UNADVISE, PC/3270 returns an ACK message containing positive status information to the client:

```
WM_DDE_ACK(wStatus, aSF)
```

If PC/3270 cannot perform the DDE_UNADVISE, PC/3270 returns an ACK message containing negative status information and one of the following return codes in the low-order byte of the wStatus word.

Return Code	Explanation
1	Advise has not started yet.
9	A system error occurred.

Stop Session Advise

3270	*5250*	*VT*
Yes	*Yes*	*Yes*

The **Stop Session Advise** function disconnects a link between Personal Communications and the client. The client sends the following command to perform the **Stop Session Advise** function.

```
PostMessage( hServerWnd,
             WM_DDE_UNADVISE,
             hClientWnd,
             MAKELPARAM(NULL, aItem) );
```

where:

aItem Specifies the item of information being requested; in this case, the value can be PS, OIA, TRIMRECT, or NULL.

If the value of *aItem* is NULL, then the client has requested termination of all active notifications for the conversation.

Personal Communications Response

If Personal Communications can perform the DDE_UNADVISE, Personal Communications returns an ACK message containing positive status information to the client:

```
WM_DDE_ACK(wStatus, aItem)
```

If Personal Communications cannot perform the DDE_UNADVISE, Personal Communications returns an ACK message containing negative status information and one of the following return codes in the low-order byte of the wStatus word.

Return Code	Explanation
1	Advise has not started yet.
9	A system error occurred.

Terminate Session Conversation

3270	5250	VT
Yes	Yes	Yes

The **Terminate Session Conversation** function disconnects the client from the Personal Communications session the client has previously started a conversation with.

The client sends the following command to terminate a session conversation.

```
SendMessage( hServerWnd,
             WM_DDE_TERMINATE,
             hClientWnd,
             0 );
```

Personal Communications Response

Personal Communications acknowledges the terminate command with a terminate message:

```
WM_DDE_TERMINATE
```

Terminate Structured Field Conversation

3270	5250	VT
Yes	No	No

The **Terminate Structured Field Conversation** function disconnects the client from a structured field conversation.

The client sends the following command to terminate a structured field conversation.

```
SendMessage( hServerWnd,
             WM_DDE_TERMINATE,
             hClientWnd,
             0 );
```

PC/3270 Response

PC/3270 acknowledges the terminate command with a terminate message:

```
WM_DDE_TERMINATE
```

Terminate System Conversation

3270	5250	VT
Yes	Yes	Yes

This disconnects the client from a system conversation.

The client sends the following command to terminate a system conversation.

```
SendMessage( hServerWnd,
             WM_DDE_TERMINATE,
             hClientWnd,
             0 );
```

Personal Communications Response

Personal Communications acknowledges the terminate command with this message:

```
WM_DDE_TERMINATE
```

When the user closes a Personal Communications session, any global memory blocks that were allocated by Personal Communications will be freed by Windows. This can cause problems for the client if the client retains any of these global memory objects for long periods of time. If the client application needs to keep the information in a global memory item for a long time, it is suggested that the client make a copy of global memory item into a global memory item the client application owns.

Write SF

3270	*5250*	*VT*
Yes	*No*	*No*

The **Write SF** function allows a client application to write structured field data to the host application.

Note: The client must call the **Set Structured Field Service Condition** function before invoking the **Write SF** function.

The client sends the following message to write structured field data.

```
PostMessage( hServerWnd,
             WM_DDE_POKE,
             hClientWnd,
             PackDDELParam(WM_DDE_POKE,
             hData, aSF) );
```

where:

hData Identifies a handle to a Windows global memory object containing:

```
typedef struct tagWRITESF
{
  unsigned char  poke[(sizeof(DDEPOKE)-1)];
  unsigned short uSFLength;      /* Length of SF data
  unsigned char  Work[8];        /* Work area
  unsigned char  szSFData[1];    /* SF data
} WRITESF;

typedef union tagDDE_WRITESF
{
  DDEPOKE  DDEpoke;
  WRITESF  DDEwritesf;
} DDE_WRITESF, *lpDDE_WRITESF;
```

aSF Identifies structured field as the item.

PC/3270 Response

PC/3270 receives structured field data and sends it to the host application. If the data transmission completes successfully, then PC/3270 returns an ACK message:

```
WM_DDE_ACK(wStatus, aSF)
```

Otherwise PC/3270 returns an negative ACK message containing one of the following return codes in the low-order byte of wStatus:

Return Code	Explanation
2	Length is not valid.
6	The specified format is not valid.
9	A system error occurred.

DDE Menu Item API in a Windows 32-Bit Environment

Personal Communications supports the addition, deletion, and changing of attributes of a dynamic menu item to the session menu bar. A menu will then be created for this menu item with space for up to 16 submenu items.

Personal Communications supports two kinds of DDE conversation. One is Personal Communications, which acts as a DDE menu client application, and the other is Personal Communications, which acts as a DDE menu server.

DDE Menu Client

To add, delete, and change menu items, the following DDE conversation must take place between the session and DDE menu server application.

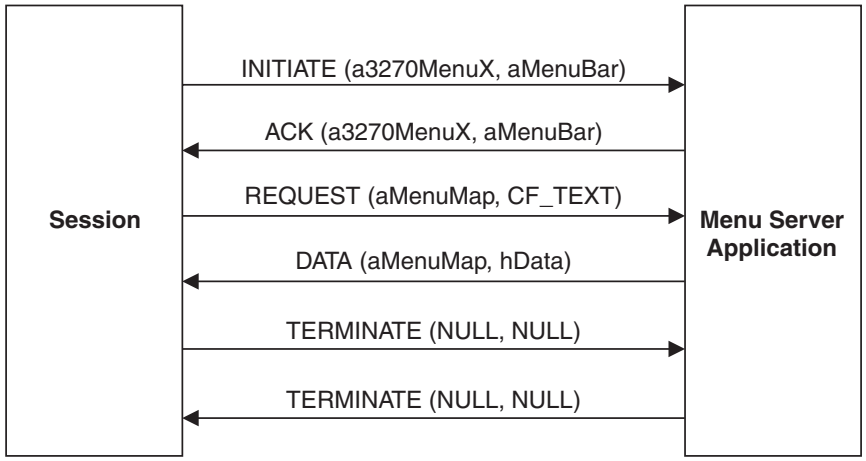

Figure 3. DDE Menu Server Conversation

The following data hierarchy details the menu map Personal Communications expects when adding a dynamic menu item and submenu to a session menu bar:

```
POPUP  "MyMenu"
BEGIN
  MENUITEM "Send Files to Host",        SEND
  MENUITEM "Receive Files from Host",   RECEIVE
  MENUITEM SEPARATOR
  MENUITEM "Convert Files",             CONVERT
END
```

When the user selects a menu item from the new menu, Personal Communications will send a DDE Initiate with 3270MenuN or 5250MenuN as the application and itemN token as the topic. If an ACK is received from the DDE application, Personal Communications will inhibit the session from accepting user input. The

menu client application can then display a dialog, and so on. When the menu server application has completed processing of the menu item, it will send a DDE Terminate to signal Personal Communications the process is complete. Personal Communications will then reenable the window for the user.

DDE Menu Server

To add, delete, and change menu items, the following DDE conversation must take place between the session and a DDE menu client application.

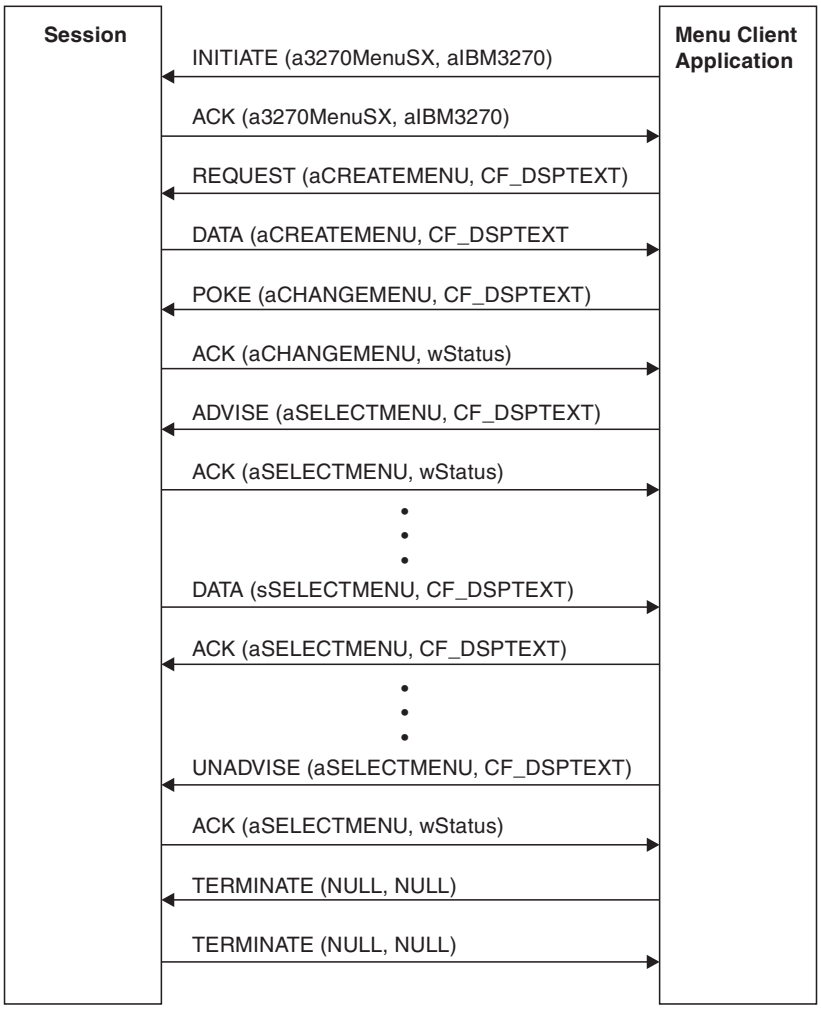

Figure 4. DDE Menu Client Conversation

When the user selects a menu item from the new menu, Personal Communications will send a DDE DATA with aSELECTMENU as the item. When Personal Communications sends DDE DATA to the client application, Personal Communications will inhibit the session from accepting user input. The menu client application can then display a dialog, and so on. When the menu client application has completed processing of the menu item, it will send a DDE ACK to signal Personal Communications the process is complete. Personal Communications will then reenable the window for the user.

DDE Menu Functions

Table 21 lists the DDE Menu Item API functions that are available for use with Personal Communications and the page in this section where each function is more fully documented. PC/3270 Windows mode and PC400 provide all of the following functions.

Table 21. DDE Menu Item API Functions

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Terminate Menu Conversation	267

Change Menu Item

3270	*5250*	*VT*
Yes	*Yes*	*Yes*

The **Change Menu Item** function appends, deletes, inserts, modifies, and removes menu items. The client sends the following message to the session to change a menu.

```
PostMessage( hServerWnd,
             WM_DDE_POKE,
             hClientWnd,
             PackDDElParam(WM_DDE_POKE,
             hData,aCHANGEMENU));
```

where:

hData

Identifies a handle to a Windows global memory object that contains the requests for changing a menu. The global memory object contains the following structure:

```
typedef struct tagChangeMenu
{
  unsigned char  poke[(sizeof(DDEPOKE)-1)];
  HWND           hMenu;                    /* Window handle of menu item
  unsigned long  wIDNew;                   /* Menu ID of new menu item
  unsigned short wPosition;                /* The position of menu item
  unsigned short wOperation;               /* Specifies the operation
  unsigned short wFlags;                   /* Specifies the options
  unsigned char  szItemName[1];  /* String of the item
} CHANGEMENU;

typedef union tagDDE_CHANGEMENU
{
  DDEPOKE     DDEpoke;
  CHANGEMENU  DDEmenu;
} DDE_CHANGEMENU,*lpDDE_CHANGEMENU;
```

The following operations are supported:

```
# MF_APPEND,MF_CHANGE ... MF_BYCOMMANDS are replaced with below commands.
 PCS_INSERT       0x0000   /* Inserts a menu item into a menu.
 PCS_CHANGE       0x0080   /* Modifies a menu item in a menu.
 PCS_APPEND       0x0100   /* Appends a menu item to the end of a menu
 PCS_DELETE       0x0200   /* Deletes a menu item from a menu,
                           /* destroying the menu item.
 PCS_REMOVE       0x1000   /* Removes a menu item from a menu but
                           /* does not destroy the menu item.

 PCS_CHECKED      0x0008   /* Places a check mark next to the item.
 PCS_DISABLED     0x0002   /* Disables the menu item so that it cannot
                           /* be selected, but does not gray it.
 PCS_ENABLED      0x0000   /* Enables the menu item so that it can be
                           /* selected and restores from its grayed
                           /* state.
 PCS_GRAYED       0x0001   /* Disables the menu item so that it cannot
                           /* be selected, and grays it.
 PCS_MENUBARBREAK 0x0020   /* Same as PCS_MENUBREAK except that for
                           /* popup menus, separates the new column
                           /* from the old column with a vertical line
 PCS_MENUBREAK    0x0040   /* Places the item on a new line for menu
                           /* bar items. For popup menus, places the
                           /* item in a new column, with no dividing
                           /* line between the columns.
 PCS_SEPARATOR    0x0800   /* Draws a horizontal dividing line. Can
                           /* only be used in a popup menu. This line
                           /* cannot be grayed, disabled, or
                           /* highlighted. The wIDNew and szItemName
                           /* fields are ignored.
 PCS_UNCHAKED     0x0000   /* Does not place a check mark next to the
                           /* item (default).

 PCS_BYCOMMAND    0x0000   /* Specifies that the nPosition parameter
                           /* gives the menu item control ID number.
                           /* This is the default if neither item
                           /* control ID number. This is the default
                           /* if neither PCS_BYCOMMAND nor
                           /* PCS_POSITION is set.
 PCS_BYPOSITION   0x0400   /* Specifies that the nPosition parameter
                           /* gives the position of the menu item
                           /* to be deleted rather than an ID number.
```

If the MF_APPEND is specified in the wOperation field, the following fields must be filled:

hMenu

Identifies the menu to be appended. To append a new item to a pop-up menu, specify the handle that is returned from Personal Communications when the **Create Menu Item** function is executed. To append a new item to a top-level menu bar, specify NULL.

wIDNew

Specifies the command ID of the new menu item. If a new item is added to the top-level menu bar, the handle of the menu item returned from Personal Communications when **Create Menu Item** function is executed.

wFlags

The following options can be set:

```
MF_CHECKED       // Places a check mark next to
                 // the item.
MF_DISABLED      // Disables the menu item so
                 // that it cannot be selected,
```

```
                    // but does not gray it.
MF_ENABLED          // Enables the menu item so that
                    // it can be selected and
                    // restores from its grayed
                    // state.
MF_GRAYED           // Disables the menu item so
                    // that it cannot be selected,
                    // and grays it.
MF_MENUBARBREAK     // Same as MF_MENUBREAK except
                    // that for pop-up menus,
                    // separates the new column from
                    // the old column with a
                    // vertical line.
MF_MENUBREAK        // Places the item on a new line
                    // for menu bar items.
                    // For pop-up menus, places the
                    // item in a new column, with
                    // no dividing line between the
                    // columns.
MF_SEPARATOR        // Draws a horizontal dividing
                    // line.  Can only be used in a
                    // pop-up menu.  This line cannot
                    // be grayed, disabled, or
                    // highlighted.  The wIDNew and
                    // szItemName fields are
                    // ignored.
MF_UNCHECKED        // Does not place a check mark
                    // next to the item (default).
```

szItemName

Specifies the contents of the new menu item. Contains a null-terminated character string.

If the MF_CHANGE is specified in the wOperation field, fill these fields:

hMenu

Identifies the menu to be changed. To change an item of a pop-up menu, specify the handle that is returned from Personal Communications when the **Create Menu Item** function is executed. To change an item to a top-level menu bar, specify NULL.

nPosition

Specifies the menu item to be changed. The interpretation of the wPosition parameter depends on the setting of the wFlags parameter.

MF_BYPOSITION
Specifies the position of the existing menu item. The first item in the menu is at position zero.

MF_BYCOMMAND
Specifies the command ID of the existing menu item.

wIDNew

Specifies the command ID of the menu item. If an item of the top-level menu bar is changed, the handle of the menu item returned from Personal Communications when the **Create Menu Item** function is executed.

wFlags

The following options can be set:

```
MF_BYCOMMAND     // Specifies that the nPosition
                 // parameter gives the menu
                 // item control ID number.
                 // This is the default if
                 // neither MF_BYCOMMAND nor
                 // MF_BYPOSITION is set.
MF_BYPOSITION    // Specifies that the nPosition
                 // parameter gives the position
                 // of the menu item to be
                 // changed rather than an ID
                 // number.
MF_CHECKED       // Places a check mark next to
                 // the item.
MF_DISABLED      // Disables the menu item so
                 // that it cannot be selected,
                 // but does not gray it.
MF_ENABLED       // Enables the menu item so
                 // that it can be selected and
                 // restores from its grayed
                 // state.
MF_GRAYED        // Disables the menu item so
                 // that it cannot be selected,
                 // and grays it.
MF_MENUBARBREAK  // Same as MF_MENUBREAK except
                 // that for pop-up menus,
                 // separates the new column
                 // from the old column with a
                 // vertical line.
MF_MENUBREAK     // Places the item on a new
                 // line for menu bar items.
                 // For pop-up menus, places the
                 // item in a new column, with
                 // no dividing line between
                 // the columns.
MF_SEPARATOR     // Draws a horizontal dividing
                 // line.  Can only be used in
                 // a pop-up menu.  This line
                 // cannot be grayed, disabled,
                 // or highlighted.  The wIDNew
                 // and szItemName fields are
                 // ignored.
MF_UNCHECKED     // Does not place a check mark
                 // next to the item (default).
```

szItemName

Specifies the contents of the menu item. Contains a null-terminated character string.

If the MF_DELETE is specified in the wOperation field, fill these fields:

hMenu

Identifies the menu to be deleted. To delete an item from a pop-up menu, specify the handle that is returned from Personal Communications when the **Create Menu Item**, function is executed. To delete an item from a top-level menu bar, specify NULL.

nPosition

Specifies the menu item to be deleted. The interpretation of the nPosition parameter depends on the setting of the wFlags parameter.

MF_BYPOSITION
Specifies the position of the existing menu item. The first item in the menu is at position zero.

MF_BYCOMMAND
Specifies the command ID of the existing menu item.

wFlags

The following options can be set:

```
MF_BYCOMMAND     // Specifies that the nPosition
                 // parameter gives the menu
                 // item control ID number.
                 // This is the default if
                 // neither MF_BYCOMMAND nor
                 // MF_BYPOSITION is set.
MF_BYPOSITION    // Specifies that the nPosition
                 // parameter gives the position
                 // of the menu item to be
                 // deleted rather than an ID
                 // number.
```

If the MF_INSERT is specified in the wOperation field, the following fields must be filled:

hMenu

Identifies the menu to be inserted. To insert an item to a pop-up menu, specify the handle that is returned from Personal Communications when the **Create Menu Item** function is executed. To change an item to a top-level menu bar, specify NULL.

nPosition

Specifies the menu item before the new menu item is to be inserted. The interpretation of the nPosition parameter depends on the setting of the wFlags parameter.

MF_BYPOSITION
Specifies the position of the existing menu item. The first item in the menu is at position zero.

MF_BYCOMMAND
Specifies the command ID of the existing menu item.

wIDNew

Specifies the command ID of the menu item or, if an item of the top-level menu bar is changed, the handle of the menu item returned from Personal Communications when the **Create Menu Item** function is executed.

wFlags

The following options can be set:

```
MF_BYCOMMAND         // Specifies that the nPosition
                     // parameter gives the menu
                     // item control ID number. This
                     // is the default if neither
                     // MF_BYCOMMAND nor MF_BYPOSITION
                     // is set.
MF_BYPOSITION        // Specifies that the nPosition
                     // parameter gives the position
                     // of the menu item to be
                     // changed rather than an ID
```

```
                        // number.
MF_CHECKED               // Places a check mark next to
                        // the item.
MF_DISABLED              // Disables the menu item so
                        // that it cannot be selected,
                        // but does not gray it.
MF_ENABLED               // Enables the menu item so
                        // that it can be selected and
                        // restores from its grayed
                        // state.
MF_GRAYED                // Disables the menu item so
                        // that it cannot be selected,
                        // and grays it.
MF_MENUBARBREAK          // Same as MF_MENUBREAK except
                        // that for pop-up menus,
                        // separates the new column
                        // from the old column with a
                        // vertical line.
MF_MENUBREAK             // Places the item on a new
                        // line for menu bar items.
                        // For pop-up menus, places the
                        // item in a new column, with
                        // no dividing line between the
                        // columns.
MF_SEPARATOR             // Draws a horizontal dividing
                        // line.  Can only be used in
                        // a pop-up menu.  This line
                        // cannot be grayed, disabled,
                        // or highlighted. The wIDNew
                        // and szItemName fields are
                        // ignored.
MF_UNCHECKED             // Does not place a check mark
                        // next to the item (default).
```

szItemName

Specifies the contents of the menu item. Contains a null-terminated character string.

If the MF_REMOVE is specified in the wOperation field, the following fields must be filled:

hMenu

Identifies the menu to be removed. To remove an item from a pop-up menu, specify the handle that is returned from Personal Communications when the **Create Menu Item** function is executed. To remove an item from a top-level menu bar, specify NULL.

nPosition

Specifies the menu item to be removed. The interpretation of the nPosition parameter depends upon the setting of the wFlags parameter.

MF_BYPOSITION
Specifies the position of the existing menu item. The first item in the menu is at position zero.

MF_BYCOMMAND
Specifies the command ID of the existing menu item.

wFlags

The following options can be set:

```
MF_BYCOMMAND         // Specifies that the nPosition
                    // parameter gives the menu
                    // item control ID number.
                    // This is the default if
                    // neither MF_BYCOMMAND nor
                    // MF_BYPOSITION is set.
MF_BYPOSITION        // Specifies that the nPosition
                    // parameter gives the
                    // position of the menu item to
                    // be removed rather than an ID
                    // number.
```

Personal Communications Response

Personal Communications receives the requests to change a menu and processes them. If the requests cannot be accepted, Personal Communications returns a negative ACK message containing one of the following status codes in the low-order byte of the wStatus word. Otherwise, Personal Communications returns a positive ACK message signalling that the keystrokes have been sent.

```
WM_DDE_ACK(wStatus,aCHANGEMENU)
```

Return code	Explanation
1	The specified parameters are not valid.
6	The specified format is not valid.
9	A system error occurred.

Create Menu Item

3270	*5250*	*VT*
Yes	*Yes*	*Yes*

The **Create Menu Item** function requests Personal Communications to add a menu item to the menu bar. A pop-up menu will be created at the same time, but it is initially empty and can be filled with menu items by using this function. The string of the new menu item that will be added to a top-level menu bar, is also specified by using the **Change Menu Item** function.

The client sends the following message to create a menu item.

```
PostMessage( hServerWnd,
             WM_DDE_REQUEST,
             hClientWnd,
             MAKELPARAM(cfFormat,aCREATEMENU));
```

where:

cfFormat

Identifies the format for the ID of the new menu item. The valid value is CF_DSPTEXT.

aCREATEMENU

Identifies the create menu item.

Personal Communications Response

Personal Communications returns the handle of the newly created menu item in a DDE data message if the Personal Communications can create a menu item.

```
WM_DDE_DATA(hData,aCREATEMENU)
```

where:

hData

Identifies a handle to a windows global memory object that contains the handle of the menu item. The global memory object contains the following structure:

```
typedef struct tagCreateMenu
{
  unsigned char    data[(sizeof(DDEDATA)-1)];
  HWND             hMemuItem;     /* Handle of the menu item
} CREATEMENU;

typedef union tagDDE_CREATEMENU
{
  DDEDATA     DDEdata;
  CREATEMENU  DDEmenu;
} DDE_CREATEMENU,*lpDDE_CREATEMENU;
```

or

```
WM_DDE_ACK(wStatus,aCREATEMENU)
```

If Personal Communications cannot create a menu item, one of the following status codes is returned in the low-order byte of the wStatus word:

Return Code	Explanation
6	The specified format is not valid.
9	A system error occurred.

Initiate Menu Conversation

3270	*5250*	*VT*
Yes	*Yes*	*Yes*

The **Initiate Menu Conversation** function connects a client application to an available session of Personal Communications. Once a menu conversation is established, the session menu is reserved exclusively for the client until the conversation is terminated.

The client application sends the following message to initiate a DDE conversation with a menu:

```
SendMessage( -1,
             WM_DDE_INITIATE,
             hClientWnd,
             MAKELPARAM(aIBM327032,SN));
```

where:

aIBM327032

Identifies the application atom. The string used to create atom aIBM327032 is IBM327032. In the PC400, the application atom is aIBM525032 and the string IBM525032 is used to create it.

SN

Identifies the topic atom. The string used to create atom a3270MenuSN is 3270MenuS appended with the session ID A, B, ..., Z. In the PC400, the

topic atom is a5250MenuSN and the string 5250MenuS appended with the session ID A, B, ..., Z. is used to create it.

Personal Communications Response

If Personal Communications can support a conversation with the client application, Personal Communications acknowledges the INITIATE transaction with:

```
WM_DDE_ACK(aIBM327032,SN)
```

Start Menu Advise

3270	*5250*	*VT*
Yes	*Yes*	*Yes*

The **Start Menu Advise** function allows a client application to process a user defined routine when the menu item that is added by the client application, is selected. After using this function, the client receives DATA messages indicating which menu item is selected.

The client sends the following command to begin a menu advise.

```
PostMessage( hServerWnd,
             WM_DDE_ADVISE,
             hClientWnd,
             PackDDElParam(WM_DDE_ADVISE,
             hOptions,aSELECTMENU));
```

where:

hOptions

Is a handle to a Windows global memory object with the following structure:

```
typedef struct tagOPTIONS
{
 unsigned reserved:14;       // Reserved
 unsigned fDeferUpd:1;       // Send notification only
                             // (Must be 0)
 unsigned fAckReq:1;         // Client will ACK all notices
                             // (Must be 1)
 WORD     cfFormat;          // Always CF_DSPTEXT
}  OPTIONS,FAR *lpOPTIONS;
```

aSELECTMENU

Identifies a menu advise as the item.

Personal Communications Response

Personal Communications receives the **Start Menu Advise** and returns an ACK message if it can start the function. Otherwise, a negative ACK message is returned to the client with one of the following return codes in the low-order byte of the wStatus field.

Return Code	Explanation
1	Menu Advise has been already started.
6	The specified format is not valid.
9	A system error occurred.

```
WM_DDE_ACK(wStatus,aSELECTMENU)
```

Once the menu item (added to the client application) is selected, the client receives DATA messages notifying it which menu item is selected:

```
WM_DDE_DATA(hData,aSELECTMENU)
```

where:

hData

Identifies a handle to a Windows global memory object containing:

```
typedef struct tagSELECTMENU
{
  unsigned char  data[(sizeof(DDEDATA)-1)];
  unsigned short uIDSelected; /* Command ID of the selected menu item
} SELECTMENU;

typedef union tagDDE_SELECTMENU
{
  DDEDATA     DDEdata;
  SELECTMENU  DDEmenu;
} DDE_SELECTMENU,*lpDDE_SELECTMENU;
```

The DATA messages continue until a Stop Menu Advise message is sent to Personal Communications.

Stop Menu Advise

3270	*5250*	*VT*
Yes	*Yes*	*Yes*

The **Stop Menu Advise** function ends a client application's ability to process a user-defined routine when the menu item added by the client application is selected. The client sends the following command to perform the **Stop Menu Advise** function.

```
PostMessage( hServerWnd,
             WM_DDE_UNADVISE,
             hClientWnd,
             MAKELPARAM(NULL,aSELECTMENU));
```

where:

aSELECTMENU

Identifies a menu advise as the item.

Personal Communications Response

If Personal Communications can perform the DDE_UNADVISE, Personal Communications returns an ACK message containing positive status information to the client:

```
WM_DDE_ACK(wStatus,aCLOSE)
```

If Personal Communications cannot perform the DDE_UNADVISE, Personal Communications returns an ACK message containing negative status information and one of the following return codes in the low-order byte of the wStatus word:

Return Code	Explanation
1	Advise has not started yet.
9	A system error occurred.

Terminate Menu Conversation

3270	5250	VT
Yes	Yes	Yes

The **Terminate Menu Conversation** function disconnects the client from the Personal Communications session with which a conversation had been previously started.

The client sends the following command to terminate a session conversation:

```
SendMessage( hServerWnd,
             WM_DDE_TERMINATE,
             hClientWnd,
             0 );
```

Personal Communications Response

Personal Communications acknowledges the terminate command with this message:

```
WM_DDE_TERMINATE
```

Summary of DDE Functions in a Windows 32-Bit Environment

The following table lists the DDE functions that can be used with PC/3270 or PC400. The table lists the name of the DDE function, the command the client sends to PC/3270 or PC400, the values that can be used for the variables in the client command, and the server response.

Table 22. DDE Function Summary

Function Name	Client Command	Server Response
Code Conversion (system)	`PostMessage(hServerWnd WM_DDE_POKE, hClientWnd, PackDDEIParam(WM_DDE_POKE,hData, aCONV));`	`UnPackDDElParam(WM_DDE_ACK,wStatus,aCONV)`
Initiate System Conversation (system)	`SendMessage(-1, WM_DDE_INITIATE, hClientWnd, MAKELPARAM(aIBM327032,aSystem));`	`LOWORD/HIWORD to unpack WM_DDE_ACK(aIBM327032,aSystem)`

Get System Configuration (system)	`PostMessage(hServerWnd, WM_DDE_REQUEST, hClientWnd, MAKELPARAM(cfFormat,aSYSCON));`
	`cfFormat = CF_TEXT`
		`UnPackDDElParam(WM_DDE_DATA,hData,aSYSCON)`
		`or`
		`UnPackDDElParam(WM_DDE_ACK,wStatus,aSYSCON)`

Get System Formats (system)	`PostMessage(hServerWnd, WM_DDE_REQUEST, hClientWnd, MAKELPARAM(cfFormat,aFORMATS));`
	`cfFormat = CF_TEXT`
		`UnPackDDElParam(WM_DDE_DATA,hData,aFORMATS)`
		`or`
		`UnPackDDElParam(WM_DDE_ACK,wStatus,aFORMATS)`

Get System Status (system)	`PostMessage(hServerWnd, WM_DDE_REQUEST, hClientWnd, MAKELPARAM(cfFormat,aSTATUS));`
	`cfFormat = CF_TEXT`
		`UnPackDDElParam(WM_DDE_DATA,hData,aSTATUS)`
		`or`
		`UnPackDDElParam(WM_DDE_ACK,wStatus,aSTATUS)`

Table 22. DDE Function Summary (continued)

Function Name	Client Command	Server Response

Get System SysItems (system)	`PostMessage(hServerWnd,`
	`  WM_DDE_REQUEST,`
	`  hClientWnd,`
	`  MAKELPARAM(cfFormat,aSYSITEMS));`
	--- 	
	`cfFormat = CF_TEXT`
		`UnPackDDElParam(WM_DDE_DATA,hData,aSYSITEMS)`
		`or`
		`UnPackDDElParam(WM_DDE_ACK,wStatus,aSYSITEMS)`

Get System Topics (system)	`PostMessage(hServerWnd,`
	`  WM_DDE_REQUEST,`
	`  hClientWnd,`
	`  MAKELPARAM(cfFormat,aTOPICS));`
	--- 	
	`cfFormat = CF_TEXT`
		`UnPackDDElParam(WM_DDE_DATA,hData,aTOPICS)`
		`or`
		`UnPackDDElParam(WM_DDE_ACK,wStatus,aTOPICS)`

Terminate System Conversation (system)	`SendMessage(hServerWnd,`
	`  WM_DDE_TERMINATE,`
	`  hClientWnd,`
	`  0);`
		`WM_DDE_TERMINATE`

Initiate Session Conversation (session)	`SendMessage(-1,`
	`  WM_DDE_INITIATE,`
	`  hClientWnd,`
	`  MAKELPARAM(aIBM327032,aSessionN));`
	--- 	
	`N = a session letter A through Z.`
		`LOWORD/HIWORD to unpack`
		`  WM_DDE_ACK(aIBM327032,aSessionN)`

Find Field (session)	`PostMessage(hServerWnd,`
	`  WM_DDE_REQUEST,`
	`  hClientWnd,`
	`  MAKELPARAM(cfFormat,aFIELD));`
	--- 	
	`cfFormat = CF_DSPTEXT`
		`UnPackDDElParam(WM_DDE_DATA,hData,aFIELD)`
		`or`
		`UnPackDDElParam(WM_DDE_ACK,wStatus,aFIELD)`

Get Keystrokes (session)	`PostMessage(hServerWnd,`
	`  WM_DDE_REQUEST,`
	`  hClientWnd,`
	`  MAKELPARAM(cfFormat,aKEYS));`
	--- 	
	`cfFormat = CF_DSPTEXT`
		`UnPackDDElParam(WM_DDE_DATA,hData,aKEYS)`
		`or`
		`UnPackDDElParam(WM_DDE_ACK,wStatus,aKEYS)`

Get Mouse Input (session)	`PostMessage(hServerWnd,`
	`  WM_DDE_REQUEST,`
	`  hClientWnd,`
	`  MAKELPARAM(cfFormat,aMOUSE));`
	--- 	
	`cfFormat = CF_TEXT | CF_DSPTEXT`
		`UnPackDDElParam(WM_DDE_DATA,hData,aMOUSE)`
		`or`
		`UnPackDDElParam(WM_DDE_ACK,wStatus,aMOUSE)`

Get Number of Close Requests (session)	`PostMessage(hServerWnd,`
	`  WM_DDE_REQUEST,`
	`  hClientWnd,`
	`  MAKELPARAM(cfFormat,aCLOSE));`
	--- 	
	`cfFormat = CF_DSPTEXT`
		`UnPackDDElParam(WM_DDE_DATA,hData,aCLOSE)`
		`or`
		`UnPackDDElParam(WM_DDE_ACK,wStatus,aCLOSE)`

Get Operator Information Area (session)	`PostMessage(hServerWnd,`
	`  WM_DDE_REQUEST,`
	`  hClientWnd,`
	`  MAKELPARAM(cfFormat,aOIA));`
	--- 	
	`cfFormat = CF_DSPTEXT`
		`UnPackDDElParam(WM_DDE_DATA,hData,aOIA)`
		`or`
		`UnPackDDElParam(WM_DDE_ACK,wStatus,aOIA)`

Table 22. DDE Function Summary (continued)

Function Name	Client Command	Server Response
Get Partial Presentation Space (session)	PostMessage(hServerWnd, WM_DDE_REQUEST, hClientWnd, MAKELPARAM(cfFormat,aEPS)); cfFormat = CF_TEXT | CF_DSPTEXT	UnPackDDElParam(WM_DDE_DATA,hData,aEPS) or UnPackDDElParam(WM_DDE_ACK,wStatus,aEPS)
Get Presentation Space (session)	PostMessage(hServerWnd, WM_DDE_REQUEST, hClientWnd, MAKELPARAM(cfFormat,aPS)); cfFormat = CF_TEXT | CF_DSPTEXT	UnPackDDElParam(WM_DDE_DATA,hData,aPS) or UnPackDDElParam(WM_DDE_ACK,wStatus,aPS)
Get Session Status (session)	PostMessage(hServerWnd, WM_DDE_REQUEST, hClientWnd, MAKELPARAM(cfFormat,aSSTAT)); cfFormat = CF_TEXT	UnPackDDElParam(WM_DDE_DATA,hData,aSSTAT) or UnPackDDElParam(WM_DDE_ACK,wStatus,aSSTAT)
Get Trim Rectangle (session)	PostMessage(hServerWnd, WM_DDE_REQUEST, hClientWnd, MAKELPARAM(cfFormat,aTRIMRECT)); cfFormat = CF_TEXT	UnPackDDElParam(WM_DDE_DATA,hData,aTRIMRECT) or UnPackDDElParam(WM_DDE_ACK,wStatus,aTRIMRECT)
Put Data to Presentation Space (session)	PostMessage(hServerWnd, WM_DDE_POKE, hClientWnd, PackDDElParam(WM_DDE_POKE, hData,aEPS)); hData = Handle to a global memory object	UnPackDDElParam(WM_DDE_ACK,wStatus,aEPS)
Search for String (session)	PostMessage(hServerWnd, WM_DDE_REQUEST, hClientWnd, MAKELPARAM(cfFormat,aSTRING)); cfFormat = CF_DSPTEXT	UnPackDDElParam(WM_DDE_DATA,hData,aSTRING) or UnPackDDElParam(WM_DDE_ACK,wStatus,aSTRING)
Send Keystrokes (session)	PostMessage(hServerWnd, WM_DDE_POKE, hClientWnd, PackDDElParam(WM_DDE_POKE, hData,aKEYS)); hData = Handle to a global memory object	UnPackDDElParam(WM_DDE_ACK,wStatus,aKEYS)
Session Execute Macro (session)	PostMessage(hServerWnd, WM_DDE_EXECUTE, hClientWnd, (LPARAM)hCommands); hCommands = Handle to a global memory object	UnPackDDElParam(WM_DDE_ACK,wStatus, NULL)

Table 22. DDE Function Summary (continued)

Function Name	Client Command	Server Response

Set Cursor Position (session)	`PostMessage(hServerWnd,`
	`  WM_DDE_POKE,`
	`  hClientWnd,`
	`  PackDDElParam(WM_DDE_POKE,`
	`  hData,aSETCURSOR));`
	
	`hData = Handle to a`
	`  global memory object`
		`UnPackDDElParam(WM_DDE_ACK,wStatus,aSETCURSOR)`

Set Mouse Intercept Condition (session)	`PostMessage(hServerWnd,`
	`  WM_DDE_POKE,`
	`  hClientWnd,`
	`  PackDDElParam(WM_DDE_POKE,`
	`  hData,aMOUSE));`
	
	`cfFormat = CF_TEXT | CF_DSPTEXT`
	`hData = Handle to a`
	`  global memory object`
		`UnPackDDElParam(WM_DDE_ACK,wStatus,aMOUSE)`

Set Presentation Space Service Condition (session)	`PostMessage(hServerWnd,`
	`  WM_DDE_POKE,`
	`  hClientWnd,`
	`  PackDDElParam(WM_DDE_POKE,`
	`  hData,aEPSCOND));`
	
	`hData = Handle to a`
	`  global memory object`
		`UnPackDDElParam(WM_DDE_ACK,wStatus,aEPSCOND)`

Set Session Advise Condition (session)	`PostMessage(hServerWnd,`
	`  WM_DDE_POKE,`
	`  hClientWnd,`
	`  PackDDElParam(WM_DDE_POKE,`
	`  hData,aPSCOND));`
	
	`hData = Handle to a`
	`  global memory object`
		`UnPackDDElParam(WM_DDE_ACK,wStatus,aPSCOND)`

Start Close Intercept (session)	`SendMessage(hServerWnd,`
	`  WM_DDE_ADVISE,`
	`  hClientWnd,`
	`  PackDDElParam(WM_DDE_ADVISE,`
	`  hOptions,aCLOSE));`
	
	`hOptions = Handle to a`
	`  global memory object`
		`UnPackDDElParam(WM_DDE_ACK,wStatus,aCLOSE)`
		`or`
		`UnPackDDElParam(WM_DDE_DATA,hData,aCLOSE)`

Start Keystroke Intercept (session)	`SendMessage(hServerWnd,`
	`  WM_DDE_ADVISE,`
	`  hClientWnd,`
	`  PackDDElParam(WM_DDE_ADVISE,`
	`  hOptions,aKEYS));`
	
	`hOptions = Handle to a`
	`  global memory object`
		`UnPackDDElParam(WM_DDE_ACK,wStatus,aKEYS)`
		`or`
		`UnPackDDElParam(WM_DDE_DATA,hData,aKEYS)`

Start Mouse Input Intercept (session)	`SendMessage(hServerWnd,`
	`  WM_DDE_ADVISE,`
	`  hClientWnd,`
	`  PackDDElParam(WM_DDE_ADVISE,`
	`  hOptions,aMOUSE));`
	
	`hOptions = Handle to a`
	`  global memory object`
		`UnPackDDElParam(WM_DDE_ACK,wStatus,aMOUSE)`
		`or`
		`UnPackDDElParam(WM_DDE_DATA,hData,aMOUSE)`

Table 22. DDE Function Summary (continued)

Function Name	Client Command	Server Response

Start Session Advise (session)	`PostMessage(hServerWnd,`
	`  WM_DDE_ADVISE,`
	`  hClientWnd,`
	`  PackDDElParam(WM_DDE_ADVISE,`
	`  hOptions,aItem));`
	`hOptions = Handle to a`
	`  global memory object`
	`aItem = OIA | PS | TRIMRECT`
		`UnPackDDElParam(WM_DDE_ACK,wStatus,aItem)`
		`or`
		`UnPackDDElParam(WM_DDE_DATA,hData,aItem)`

Stop Close Intercept (session)	`PostMessage(hServerWnd,`
	`  WM_DDE_UNADVISE,`
	`  hClientWnd,`
	`  MAKELPARAM(NULL,aCLOSE));`
		`UnPackDDElParam(WM_DDE_ACK,wStatus,aCLOSE)`

Stop Keystroke Intercept (session)	`PostMessage(hServerWnd,`
	`  WM_DDE_UNADVISE,`
	`  hClientWnd,`
	`  MAKELPARAM(NULL,aKEYS));`
		`UnPackDDElParam(WM_DDE_ACK,wStatus,aKEYS)`

Stop Mouse Input Intercept (session)	`PostMessage(hServerWnd,`
	`  WM_DDE_UNADVISE,`
	`  hClientWnd,`
	`  MAKELPARAM(NULL,aMOUSE));`
		`UnPackDDElParam(WM_DDE_ACK,wStatus,aMOUSE)`

Stop Session Advise (session)	`PostMessage(hServerWnd,`
	`  WM_DDE_UNADVISE,`
	`  hClientWnd,`
	`  MAKELPARAM(NULL,aItem));`
	`aItem = SysItems | Topics | NULL`
		`UnPackDDElParam(WM_DDE_ACK,wStatus,aItem)`

Terminate Session Conversation (session)	`SendMessage(hServerWnd,`
	`  WM_DDE_TERMINATE,`
	`  hClientWnd,`
	`  0);`
		`WM_DDE_TERMINATE`

Initiate Structured Field Conversation (structured field)	`SendMessage(-1,`
	`  WM_DDE_INITIATE,`
	`  hClientWnd,`
	`  MAKELPARAM(aIBM327032,aLUN_xxxx));`
	`N = a session letter A through Z.`
	`xxxx = a user defined string.`
		`LOWORD/HIWORD to unpack`
		`  WM_DDE_ACK(aIBM327032,aLUN_xxxx)`

Terminate Structured Field Conversation (structured field)	`SendMessage(hServerWnd,`
	`  WM_DDE_TERMINATE,`
	`  hClientWnd,`
	`  0);`
		`WM_DDE_TERMINATE`

Set Structured Field Service Condition (structured field)	`PostMessage(hServerWnd,`
	`  WM_DDE_POKE,`
	`  hClientWnd,`
	`  PackDDElParam(WM_DDE_POKE,`
	`  hData,aSFCOND));`
	`hData = Handle to a`
	`  global memory object`
		`UnPackDDElParam(WM_DDE_ACK,wStatus,aSFCOND)`

Table 22. DDE Function Summary (continued)

Function Name	Client Command	Server Response

Start Read SF (structured field)	`PostMessage(hServerWnd,`
	`  WM_DDE_ADVISE,`
	`  hClientWnd,`
	`  PackDDElParam(WM_DDE_ADVISE,`
	`  hOptions,aSF));`
	--- 	
	`hOptions = Handle to a`
	`  global memory object`
		`UnPackDDElParam(WM_DDE_ACK,wStatus,aSF)`
		`or`
		`UnPackDDElParam(WM_DDE_DATA,hData,aSF)`

Stop Read SF (structured field)	`PostMessage(hServerWnd,`
	`  WM_DDE_UNADVISE,`
	`  hClientWnd,`
	`  MAKELPARAM(NULL,aSF));`
		`UnPackDDElParam(WM_DDE_ACK,wStatus,aSF)`

Write SF (structured field)	`PostMessage(hServerWnd,`
	`  WM_DDE_POKE,`
	`  hClientWnd,`
	`  PackDDElParam(WM_DDE_POKE,`
	`  hData,aSF));`
	--- 	
	`hData = Handle to a`
	`  global memory object`
		`UnPackDDElParam(WM_DDE_ACK,wStatus,aSF)`

Initiate Menu Conversation (menu)	`SendMessage(-1,`
	`  WM_DDE_INITIATE,`
	`  hClientWnd,`
	`  MAKELPARAM(aIBM327032,a3270MenuSN));`
	--- 	
	`N = a session letter A through Z`
		`LOWORD/HIWORD to unpack`
		`  WM_DDE_ACK(aIBM327032,a3270MenuSN)`

Change Menu Item (menu)	`PostMessage(hServerWnd,`
	`  WM_DDE_POKE,`
	`  hClientWnd,`
	`  PackDDElParam(WM_DDE_POKE,`
	`  hData,aCHANGEMENU));`
	--- 	
	`hData = Handle to a`
	`  global memory object`
		`UnPackDDElParam(WM_DDE_ACK,wStatus,aCHANGEMENU)`

Create Menu Item (menu)	`PostMessage(hServerWnd,`
	`  WM_DDE_REQUEST,`
	`  hClientWnd,`
	`  MAKELPARAM(cfFormat,aCREATEMENU));`
	--- 	
	`cfFormat = CF_DSPTEXT`
		`UnPackDDElParam(WM_DDE_DATA,hData,aCREATEMENU)`
		`or`
		`UnPackDDElParam(WM_DDE_ACK,wStatus,aCREATEMENU)`

Start Menu Advise (menu)	`PostMessage(hServerWnd,`
	`  WM_DDE_ADVISE,`
	`  hClientWnd,`
	`  PackDDElParam(WM_DDE_ADVISE,`
	`  hOption,aSELECTMENU));`
	--- 	
	`hData = Handle to a`
	`  global memory object`
		`UnPackDDElParam(WM_DDE_ACK,wStatus,aSELECTMENU)`
		`or`
		`UnPackDDElParam(WM_DDE_DATA,hData,aSELECTMENU)`

Stop Menu Advise (menu)	`PostMessage(hServerWnd,`
	`  WM_DDE_UNADVISE,`
	`  hClientWnd,`
	`  MAKELPARAM(NULL,aSELECTMENU));`
		`UnPackDDElParam(WM_DDE_ACK,wStatus,aCLOSE)`

Terminate Menu Conversation (menu)	`SendMessage(hServerWnd,`
	`  WM_DDE_TERMINATE,`
	`  hClientWnd,`
	`  0);`
		`WM_DDE_TERMINATE`

Chapter 7. Using DDE Functions with a DDE Client Application

Windows allows users to run multiple application programs and to exchange data between Windows application programs. Dynamic data exchange (DDE) allows users this data exchange. Data exchange among Windows application programs can be considered as conversations between *server* and *client* application programs. The client application is an application program that starts DDE, and the server application is an application program that responds to the client application.

The client application needs three names (application program name, topic name, and item name) that are recognized by the server application to start the conversation to exchange data. The client application starts a DDE conversation with the server application by specifying the application program and topic names, and defines the exchange data by specifying the item name.

Personal Communications has a function as a DDE server, and can establish DDE conversations with other Windows application programs (Microsoft Visual Basic, Microsoft Excel, Microsoft Word) that have DDE client functions.

Using the Personal Communications DDE Interface

To start a DDE conversation and data exchange with Personal Communications, client application programs need to know the application program name, topic name, and item name that Personal Communications can recognize. The exchange data type between an application program and Personal Communications is defined with the combination of these names.

Table 23. Naming Scheme for Data Items

Level	Description	Example
Application	A Windows task or a specific task of the application. In this book, application programs are Personal Communications.	IBM327032
Topic	A specific part of application programs.	SessionA
Item	Type of data passed during DDE conversation.	PS (Presentation Space)

Application
As a Windows DDE server, Personal Communications supports application name *IBM327032* or *IBM525032* for 32-bit applications, *IBM3270* or *IBM5250* for 16-bit applications.

Topic Topic specifies the corresponding topic in the application. The following table shows the topics available to the users:

Table 24. Topics for Personal Communications

Topic	Conversation Name	Conversation Type
System	System conversation	Cold link
SessionA, SessionB, ..., SessionZ	Session conversation	Cold link and hot link

Table 24. Topics for Personal Communications (continued)

Topic	Conversation Name	Conversation Type
SessA_xxxx, SessB_xxxx, ..., SessZ_xxxx	Session conversation	Hot link

Item The client application programs can exchange data and information with Personal Communications. Types of data and information are specified by item name.

Explanations for topic conversation procedures and data items to be used follow.

System Conversation

To use the Personal Communications system DDE interface, do as follows:

1. Start the system conversation.
2. Request system information.
3. Terminate the system conversation.

Starting the DDE System Conversation with Personal Communications

To use the DDE interface with Personal Communications, the client application should first start a DDE conversation with Personal Communications. To start a DDE conversation, specify *IBM327032* or *IBM525032* as an application name for 32-bit applications; *IBM3270* or *IBM5250* for 16-bit applications and *System* as a topic name in the DDE function (Initiate) in the client application.

Requesting System Information

After starting the DDE conversation, the client application can request data or information using the DDE function. System information can be requested by specifying the following item names in the DDE function (Request) in the client application:

Item	Return Data	DDE Function
Formats	List of supported Windows clipboard format	Get System Formats
Status	Each session status information	Get System Status
SysCon	Information of emulator support-level and other system-related values	Get System Configuration
SysItems	List of available data items	Get System SysItems
Topics	List of available topics	Get System Topics

Terminating the DDE System Conversation with Personal Communications

To complete the conversation, the client application needs to terminate the DDE conversation with Personal Communications. To terminate the conversation, use the DDE function (Terminate) in the client application.

Session Conversation

To use the Personal Communications session DDE interface, do as follows:

1. Start the session conversation.
2. Use DDE functions (Request, Poke, Execute).
3. Terminate the session conversation.

Starting the DDE Session Conversation

To use the DDE interface with Personal Communications sessions, the client application should start the DDE conversation with Personal Communications. To start DDE conversation, specify *IBM327032* or *IBM525032* as an application name for 32-bit applications; *IBM3270* or *IBM5250* for 16-bit applications and *SessionA*, *SessionB*, ..., *SessionZ* as topic names in the DDE function (Initiate) in the client application.

Requesting Data

After starting the DDE conversation, the client application can request data using the DDE function. Session information can be requested by specifying the following item names in the DDE function (Request) in the client application:

Item	Return Data	DDE Function
EPS(pos,len,bEOF)	All or a part of session presentation space	Get Partial Presentation Space
FIELD(pos,"type")	Field information	Find Field
OIA	Operator Information Area (OIA) status line information	Get Operator Information Area
PS	Session presentation space	Get Presentation Space
SSTAT	Session status information	Get System Status
STRING(pos,bDir,"string")	String offset start	Search for string
TRIMRECT *	Session presentation space of trim rectangle	Get Trim Rectangle
*: Parameter should be added.		

Sending Data to the Emulator Window (Poke)

After starting the DDE conversation, the client application can send data to Personal Communications sessions using the DDE functions. The following table shows the valid items for the DDE functions:

Item	Explanation	DDE Function
EPS(pos,bEOF)	Sends an ASCII data string to the host presentation space	Put Data to Presentation Space
SETCURSOR	Sets the cursor position	Set Cursor Position

Executing Commands

After starting a DDE conversation, the client application can send commands to the Personal Communications session window using the DDE functions. Specify the command in the DDE function (Execute) of the client application. See “Session Execute Macro” on page 226 for details.

Terminating the DDE Session Conversation

The client application should terminate the DDE conversation with Personal Communications when completing the task. To terminate the conversation, use the DDE function (Terminate) in the client application.

Session Conversation (Hot Link)

To use the Personal Communications session DDE interface, do as follows:

1. Start the session conversation.
2. Start the **Advise** function.

3. Stop the **Advise** function.
4. Terminate the session conversation.

Starting the DDE Session Conversation (Hot Link)

To use the DDE interface with Personal Communications sessions, the client application should start the DDE conversation with Personal Communications. To start the DDE conversation, specify *IBM327032* or *IBM525032* as an application name for 32-bit applications; *IBM3270* or *IBM5250* for 16-bit applications, and *SessionA*, *SessionB*, ..., *SessionZ* as topic names in the DDE function (Initiate) in the client application.

Starting the Hot Link with the Session Window

After starting the DDE conversation, the client application can start the **Advise** function. Specify the following item names in the DDE function (Advise) in the client application to start the hot link, which enables the automatic data update:

Item	Explanation	DDE Function
CLOSE	Starts to intercept Window Close requests	Start Close Intercept
KEYS	Starts to intercept keystrokes	Start Keystroke Intercept
PS * OIA TRIMRECT *	Start to retrieve data of PS, OIA, or trim rectangle	Start Session Advise
*: Parameter should be added.		

Stopping the Hot Link with the Session Window

To terminate the **Advise** function, the client application needs to use the DDE function. Specify the following item names in the DDE function, **Unadvise**, in the client application to stop the hot link, which enables the automatic data update:

Item	Explanation	DDE function
CLOSE	Stops to intercept Close request	Stop Close Intercept
KEYS	Stops to intercept keystrokes	Stop Keystroke Intercept
PS * OIA TRIMRECT *	Stops to Advise function for the session	Stop Session Advise
*: Use the same parameter that is used when Start Session Advise was called.		

Terminating the DDE Session Conversation

The client application should terminate the DDE conversation with Personal Communications when completing the task. To terminate the conversation, use the DDE function (Terminate) in the client application.

Personal Communications DDE Interface

This section describes the DDE functions that can be used from the other applications, such as Microsoft Excel, Microsoft Word, and Microsoft Visual Basic.

- DDE functions for system conversation

Function	Page
Initiate System Conversation	279
Get System Configuration	277

Function	Page
Get System Formats	278
Get System Status	278
Get System SysItems	279
Get System Topics	279
Terminate System Conversation	280

- DDE functions for session conversation

Function	Page
Initiate Session Conversation *1	279
Find Field	280
Get Operator Information Area	281
Get Partial Presentation Space	282
Get Presentation Space	283
Get Session Status	284
Get Trim Rectangle	284
Put Data to Presentation Space	285
Search for String	286
Session Execute Macro	287
Set Cursor Position	287
Terminate Session Conversation *2	292

- DDE functions for session conversation (hot link)

Function	Page
Initiate Session Conversation (same as *1)	288
Start Close Intercept	288
Start Keystroke Intercept	289
Start Session Advise	289
Stop Close Intercept	291
Stop Keystroke Intercept	291
Stop Session Advise	291
Terminate Session Conversation (same as *2)	292

DDE Functions for System Conversation

The following DDE functions are provided for Personal Communications system conversation.

Get System Configuration

The **Get System Configuration** function returns Personal Communicationssupport-level and other system-related values.

DDE Parameter	Value
Item	SysCon

The client application can use the Personal Communications DDE function by specifying the DDE function (Request) of the client application with the topic name (System).

Personal Communications Response

The Personal Communications system returns the Personal Communications system configuration data item.

Returned Information: See "Get System Configuration" on page 216 for details.

If Personal Communications do not return the system configuration data item, it may be because:

- An incorrect item name was specified.
- A system error has occurred.

Get System Formats

The **Get System Formats** function returns a list of Windows Clipboard formats that are supported by Personal Communications.

DDE Parameter	Value
Item	Formats

The client application can use the Personal Communications DDE function by specifying the DDE function (Request) of the client application with the item name (Formats).

Personal Communications Response

Personal Communications returns a list of supported Windows Clipboard formats.

If Personal Communications do not return the format data item, it may be because:

- An incorrect item name was specified.
- A system error has occurred.

Get System Status

The **Get System Status** function returns the status of each configured Personal Communicationssession.

DDE Parameter	Value
Item	SysCon

The client application can use the Personal Communications DDE function by specifying the DDE function (Request) of the client application with the item name (SysCon).

Personal Communications Response

Personal Communications returns a series of status information to each open session.

Returned Information: See "Get System Status" on page 218 for details.

If Personal Communications do not return the status data item, it may be because:

- An incorrect item name was specified.

- A system error has occurred.

Get System SysItems

The **Get System SysItems** function returns a list of data items that can be used with the Personal Communications system topic.

DDE Parameter	Value
Item	SysItems

The client application can use the Personal Communications DDE function by specifying the DDE function (Request) of the client application with the item name (SysItems).

Personal Communications Response

Personal Communications returns a list of Personal Communications system topic data items. The following data items are supported by Personal Communications:

- SysItems
- Topics
- Status
- Formats
- SysCon

If Personal Communications do not return the system data item, it may be because:

- An incorrect item name was specified.
- A system error has occurred.

Get System Topics

The **Get System Topics** function returns a list of active DDE topics that are supported by Personal Communications.

DDE Parameter	Value
Item	Topics

The client application can use the Personal Communications DDE function by specifying the DDE function (Request) of the client application with the item name (Topics).

Personal Communications Response

The following topics are supported by Personal Communications:

- System
- SessionA, SessionB, ..., SessionZ

If Personal Communications do not return the system data item, it may be because:

- An incorrect item name was specified.
- A system error has occurred.

Initiate System Conversation

The **Initiate System Conversation** function starts the system conversation. Only one client application can be connected to one system.

DDE Parameter	Value
Topic	System

The client application should start DDE conversation using the DDE function (Initiate) with the Personal Communications application name (IBM327032 or IBM525032 for 32-bit applications) or (IBM3270 or IBM5250 for 16-bit applications) and the topic name (System).

Terminate System Conversation

The **Terminate System Conversation** function terminates the system conversation. Use the DDE function (Terminate) to terminate the DDE conversation from the client application.

DDE Functions for Session Conversation

The following DDE functions are provided for Personal Communications session conversation.

Find Field

The **Find Field** function passes the field information to the client application.

DDE Parameter	Value
Item	FIELD (pos, "type")

Parameter	Value	Explanation
pos	NNNN	PS position.
"type"	"␣␣" or "T␣" "P␣" "N␣" "NP" "NU" "PP" "PU"	This field. The previous field, either protected or unprotected. The next field, either protected or unprotected. The next protected field. The next unprotected field. The previous protected field. The previous unprotected field.

Note: The ␣ symbol represents a required blank.

An item in the IBM Personal Communications Version 3.1 format is also supported.

The client application can use the Personal Communications DDE function by specifying the DDE function (Request) of the client application with the foregoing item name.

Personal Communications Response

The following table shows the field information that PC/3270 returns:

Field	Returned Information	Explanation
Formatted/Unformatted	Formatted, Unformatted	Whether the presentation space is formatted or unformatted. If Unformatted is specified, no other field information will be returned.
Unprotected/Protected	N	0 = Unprotected data field. 1 = Protected data field.

Field	Returned Information	Explanation
A/N	N	0 = Alphanumeric. 1 = Numeric.
I/SPD	N	0 = Normal intensity, undetectable. 1 = Normal intensity, detectable. 2 = High intensity, detectable. 3 = Nondisplay, undetectable.
MDT	N	0 = Field is not changed. 1 = Field is changed.
Field start offset	NNNN	Field starts this field position.
Field length	NNNN	Field length.

The following table shows the field information that PC400 returns:

Field	Returned Information	Explanation
Formatted/Unformatted	Formatted, Unformatted	Whether the presentation space is formatted or unformatted. If Unformatted is specified, no other field information will be returned.
Field attribute	N	0 = Not field attribute byte. 1 = Field attribute byte.
Visibility	N	0 = Nondisplay. 1 = Display.
Unprotected/Protected	N	0 = Unprotected data field. 1 = Protected data field.
Intensity	N	0 = Normal. 1 = High.
Field Type	N	0 = Alphanumeric: all characters allowed. 1 = Alphabet only: uppercase and lowercase letters, comma, period, hyphen, blank, and Dup key allowed. 2 = Numeric shift: automatic shift for numerics. 3 = Numeric only: numbers 0–9, comma, period, plus, minus, blank, and Dup key allowed. 5 = Digits only: numbers 0–9 and Dup key allowed. 6 = Magnetic stripe reader data only. 7 = Sighed numeric: numbers 0–9, plus, minus, and Dup key allowed.
MDT	N	0 = Field is not changed. 1 = Field is changed.
Field start offset	NNNN	Field starts this field position.
Field length	NNNN	Field length.

If Personal Communications do not return the field information, it may be because:

- An incorrect item name was specified.
- A system error has occurred.

Get Operator Information Area

The **Get Operator Information Area** function returns the OIA data information to the client application.

DDE Parameter	Value
Item	OIA

The client application can use the Personal Communications DDE function by specifying the DDE function (Request) of the client application with the item name (OIA).

Personal Communications Response

The following table shows the OIA information that Personal Communications returns:

Offset	Returned Information	Meaning
0	ONLINE LU-LU SSCP-LU	Online, the screen is unowned LU-LU session owns the screen SSCP-LU session owns the screen
9	X X MCHK X CCHK X PCHK X DNW X BUSY X TWAIT X -S X -f X MUCH X UA X -fUA X DEAD X WRONG X SYSTEM X II	Input inhibit Machine check Communication check Program check Device not working Printing Terminal waiting Minus symbol Minus function Input too much Unauthorized operator Unauthorized operator Minus function Incorrect dead key combination Wrong position System waiting Operator input error (PC400)
19	COMM	Communication error
25	MW	Message waiting (PC400)
36	APL	APL (PC/3270)
42	U NUM	Uppercase Numeric
43	A	Caps lock
47	S I	High intensity, operator selectable High intensity, field inherit
49	CS CI	Color, operator selectable Color, field inherit
52	^	Insert mode
61	P-MAL P-PRN P-ASS	Printer malfunction Printer printing Printer assignment

If Personal Communications do not return the OIA information, it may be because:

- An incorrect item name was specified.
- A system error has occurred.

Get Partial Presentation Space

The **Get Partial Presentation Space** function returns whole or partial presentation space data to the client application.

DDE Parameter	Value
Item	EPS (pos, len, bEOF)

Parameter	Value	Explanation
pos	NNNN	PS position

Parameter	Value	Explanation
len	NNNN	PS length
bEOF	1 or 0	EOF switch **1** Yes **0** No

Note: An item in the IBM Personal Communications Version 3.1 format is also supported.

The client application can use the Personal Communications DDE function by specifying the DDE function (Request) of the client application with the foregoing item names.

Personal Communications Response

The following table shows the information Personal Communications returns:

Field	Returned Information	Explanation
PS start position	NNNN	Specified by pos parameter
PS length	NNNN	Specified by len parameter
PS rows	NNNN	Specified by the number of rows
PS columns	NNNN	Specified by the number of columns
PS	NNNN	PS data starts from this position

If Personal Communications do not return the format data items, it may be because:

- An incorrect item name was specified.
- A system error has occurred.

Get Presentation Space

The **Get Presentation Space** function returns presentation space data to the client application.

DDE Parameter	Value
Item	PS

The client application can use the Personal Communications DDE function by specifying the DDE function (Request) of the client application with the item name (PS).

Personal Communications Response

The following table shows the information Personal Communications returns:

Field	Returned Information	Explanation
PS size	NNNN	Size of presentation space
PS rows	NNNN	Number of rows
PS columns	NNNN	Number of columns
PS	NNNN	PS data starts from this position

If Personal Communications do not return the format data items, it may be because:

- An incorrect item name was specified.
- A system error has occurred.

Get Session Status

The **Get Session Status** function returns the connected session status to the client application.

DDE Parameter	Value
Item	SSTAT

The client application can use the Personal Communications DDE function by specifying the DDE function (Request) of the client application with the item name (SSTAT).

Personal Communications Response

Refer to "Get Session Status" on page 353 for the returned information.

If Personal Communications do not return the format data items, it may be because:

- An incorrect item name was specified.
- A system error has occurred.

Get Trim Rectangle

The **Get Trim Rectangle** function returns the presentation space area of the current (or specified) trim rectangle to the client application.

DDE Parameter	Value
Item	TRIMRECT (row1, col1, row2, col2) TRIMRECT (pos1, pos2) TRIMRECT

Parameter	Value	Explanation
row1	NN	Top-left corner row of the trim rectangle
col1	NN	Top-left corner column of the trim rectangle
row2	NN	Bottom-right corner row of the trim rectangle
col2	NN	Bottom-right corner column of the trim rectangle
pos1	NNNN	PS position of the top-left corner of the trim rectangle
pos2	NNNN	PS position of the bottom-right corner of the trim rectangle

Note: An item in the IBM Personal Communications Version 3.1 format is also supported.

The current specified PS trim rectangle is used unless the client application specifies the PS trim rectangle in the parameter.

The client application can use the Personal Communications DDE function by specifying the DDE function (Request) of the client application with the item name (TRIMRECT).

Personal Communications Response

The information returned from Personal Communications is as follows:

Field	Returned Information	Explanation
PS		PS data starts from this position.

If Personal Communications do not return the trim rectangle items, it may be because:

- An incorrect item name was specified.
- A system error has occurred.

Initiate Session Conversation

The **Initiate Session Conversation** function starts a DDE conversation in the available session window. Only one client application can be connected to one session conversation:

DDE Parameter	Value
Topic	SessionA, SessionB, ..., SessionZ

Parameter Value	Explanation
SessionA, SessionB, ..., SessionZ	"SessionA" implies a string combined "Session" and a session ID “A”, “B”, ..., “Z”.

The client application should start the DDE conversation by specifying the DDE function (Initiate) of the client application with the topic name (SessionA, SessionB, ..., SessionZ).

Personal Communications Response

If a topic is not specified, Personal Communications responds after confirming the following available topics:

- System
- SessionA, SessionB, ..., SessionZ

Put Data to Presentation Space

The **Put Data to Presentation Space** function sends an ASCII data string to write on the specified host presentation space.

DDE Parameter	Value
Item	EPS (pos, bEOF)

Parameter	Value	Explanation
pos	NNNN	PS position to start writing the data
bEOF	1 or 0	EOF switch **1** Yes **0** No

Note: An item in the IBM Personal Communications Version 3.1 format is also supported.

The client application can use the Personal Communications DDE function by specifying the DDE function (Poke) of the client application with the foregoing item name.

Personal Communications Response

If Personal Communications do not accept the string data, it may be because:

- An incorrect item name was specified.
- The PS position is not valid.
- The length is not valid.
- The PS input was inhibited.
- A system error has occurred.

Search for String

Using the **Search for String** function, the client application can check whether the specified strings exist within the specified presentation space area.

DDE Parameter **Value**
Item STRING (pos, bDir, "string")

Parameter	Value	Explanation
pos	NNNN	PS start position of the string search
bDir	1 or 0	Search Direction **1** Forward **0** Backward
"string"		Search string • Enclose a string including blanks with double quotation marks. • To specify a double quotation mark within the string, enclose the double quotation mark with another set of double quotation marks. Example: *This is a double quotation" mark.* is specified as *"This is a double quotation""" mark."*

Note: An item in the IBM Personal Communications Version 3.1 format is also supported.

The maximum length of the search string is 255.

The client application can use the Personal Communications DDE function by specifying the DDE function (Request) of the client application with the foregoing item names.

Personal Communications Response

Personal Communications returns the following information:

Field	Returned Information	Explanation
String start offset	NNNN, None	"None" is returned if the string is not found.

If Personal Communications do not return the string start position, it may be because:

- An incorrect item name was specified.
- The PS position is not valid, or the string is too long.
- A system error has occurred.

Session Execute Macro

The **Session Execute Macro** function enables users to send commands and macro strings to Personal Communications.

Refer to “Session Execute Macro” on page 364 for details of commands and macro strings.

The client application can use the Personal Communications DDE function by specifying the DDE function (Execute) of the client application.

Personal Communications Response

A system error can cause Personal Communications not to return the string start position.

Set Cursor Position

Using the **Set Cursor Position** function, the client application can set the cursor position in the session window.

DDE Parameter	Value
Item	SETCURSOR
Data (Cursor position)	NNNN or Rn1Rn2

Parameter Value	Explanation
NNNN	PS offset
Rn1Rn2	Row/column **n1** PS position row **n2** PS position column

The client application can use the Personal Communications DDE function by specifying the DDE function (Poke) of the client application with the foregoing item names.

Personal Communications Response

If Personal Communications do not move the cursor to the specified PS position, it may be because:

- An incorrect item name was specified.

- The Cursor PS offset is not valid (it must be from 0 to PS size–1).
- The Cursor row value is not valid (it must be from 0 to PS row–1).
- The Cursor column value is not valid (it must be from 0 to PS column–1).
- A system error has occurred.

Terminate Session Conversation

The **Terminate Session Conversation** function terminates the DDE conversation between the client application and Personal Communications.

Use the DDE function (Terminate) of the client application to terminate the DDE conversation.

DDE Functions for Session Conversation (Hot Link)

The following DDE functions are provided for Personal Communications session conversation with hot link connection.

Initiate Session Conversation

The **Initiate Session Conversation** function starts a DDE conversation with the available session window.

DDE Parameter	Value
Topic	SessionA, SessionB, ..., SessionZ or SessA_xxxx, SessB_xxxx, ..., SessZ_xxxx

Note: If SessA_xxxx, SessB_xxxx, ..., SessZ_xxxx is used, the client application allows only hot link session conversation.

Parameter Value	Explanation
SessA_xxxx, SessB_xxxx, ..., SessZ_xxxx	String 'SessA_xxxx' indicates session A (SessA_) with any user-defined strings (xxxx). The length of the user-defined strings is not limited.

Specify the Personal Communications application name and the foregoing topic name in the DDE function (Initiate) of the client application to start a DDE conversation.

Start Close Intercept

Using the **Start Close Intercept** function, the client application can intercept the Close request generated by selecting the Close option from the emulator session window. When this service is started, the client application receives the Close request event data.

DDE Parameter	Value
Item	CLOSE

The client application can use the Personal Communications DDE function by specifying the DDE function (Advise) of the client application with the foregoing item name.

Personal Communications Response

Personal Communications returns the following information:

Field	Returned Information	Explanation
Number of PS close request	NNNN	When a Close request is generated, the client application receives "0001".

If Personal Communications do not start to Close intercept, it may be because:

- An incorrect item name was specified.
- The Close intercept for the session has already started with the same topic name.
- A system error has occurred.

Start Keystroke Intercept

Using the **Start Keystroke Intercept** function, the client application can filter keystrokes that are entered by the terminal operator. When started, the keystrokes are intercepted and received by the client application.

DDE Parameter	Value
Item	KEYS

The client application can use the Personal Communications DDE function by specifying the DDE function (Advise) of the client application with the foregoing item name.

Personal Communications Response

Personal Communications returns the following information:

Field	Returned Information	Explanation
Keys		Refer to Table 20, “SENDKEY Command List”, on page 229.

If Personal Communications do not start KeyStroke Intercept, it may be because:

- An incorrect item name was specified.
- The Keystroke Intercept for the session has already started with the same topic name.
- A system error has occurred.

Start Session Advise

The **Start Session Advise** function establishes the link between the client application and Personal Communications. As the data item is changed, the client application receives the changed data of the presentation space (PS), operator information area (OIA), or trim rectangle (TRIMRECT).

DDE Parameter	Value
Item	PS (pos, len, bCaseSen, "string") PS TRIMRECT (row1, col1, row2, col2) TRIMRECT (pos1, pos2) TRIMRECT OIA

The maximum length of the search string is 255.

Parameter	Value	Explanation
pos	NNNN	PS start position of the string search (PS offset)
len	NNNN	Length of the search string
bCaseSen	1 or 0	Case sensitivity **1** Yes **0** No
"string"		Search string • Enclose a string including blanks with double quotation marks. • To specify a double quotation mark within the string, enclose the double quotation mark with another set of double quotation marks. Example: *This is a double quotation" mark.* is specified as *"This is a double quotation"" mark."*

Note: An item in the IBM Personal Communications Version 3.1 format is also supported.

To receive a conditional advice when the presentation space is updated, the client application needs to set the advise conditions as well as the foregoing parameter values. The foregoing parameter values can be used when the presentation space is specified as the item name.

Parameter	Value	Explanation
row1	NN	Top-left corner row of the trim rectangle
col1	NN	Top-left corner column of the trim rectangle
row2	NN	Bottom-right corner row of the trim rectangle
col2	NN	Bottom-right corner column of the trim rectangle
pos1	NNNN	PS position of the top-left corner of the trim rectangle
pos2	NNNN	PS position of the bottom-right corner of the trim rectangle

Note: An item in the IBM Personal Communications Version 3.1 format is also supported.

The current specified presentation space trim rectangle is used unless the client application specifies the presentation space trim rectangle in the item name parameter. This parameter value can be used when TRIMRECT is specified as the item name.

The client application can use the Personal Communications DDE function by specifying the DDE function (Advise) of the client application with the foregoing item name.

Personal Communications Response

Refer to “Get Partial Presentation Space” on page 282, “Get Operator Information Area” on page 281, and “Get Trim Rectangle” on page 284.

If Personal Communications do not start Advise, it may be because:

- An incorrect item name was specified.
- The Advise for the session has already started with the same topic name
- A system error has occurred.

Stop Close Intercept

Using the **Stop Close Intercept** function, the client application stops intercepting the close requests.

DDE Parameter	Value
Item	CLOSE

The client application can use the Personal Communications DDE function by specifying the DDE function, **Unadvise**, of the client application with the foregoing item name.

Personal Communications Response

If Personal Communications do not stop Close Intercept, it may be because:

- The Advise has not been started.
- A system error has occurred.

Stop Keystroke Intercept

Using the **Stop Keystroke Intercept** function, the client application stops intercepting the keystrokes.

DDE Parameter	Value
Item	KEYS

The client application can use the Personal Communications DDE function by specifying the DDE function, **Unadvise**, of the client application with the foregoing item name.

Personal Communications Response

If Personal Communications do not stop Keystroke Intercept, it may be because:

- An incorrect item name was specified.
- The Advise has not been started.
- A system error has occurred.

Stop Session Advise

The **Stop Session Advise** function closes the link between the client application and Personal Communications.

DDE Parameter	Value
Item	PS (pos, len, bCaseSen, "string") PS TRIMRECT (row1, col1, row2, col2) TRIMRECT (pos1, pos2) TRIMRECT OIA

The maximum length of the search string is 255.

The item name must be the same item name that was used when **Start Session Advise** was called.

The client application can use the Personal Communications DDE function by specifying the DDE function, **Unadvise**, of the client application with the foregoing item name.

Personal Communications Response

If Personal Communications do not stop Advise, it may be because:

- An incorrect item name was specified.
- The Advise has not been started
- A system error has occurred.

Terminate Session Conversation

The **Terminate Session Conversation** function terminates the DDE conversation between the client application and the Personal Communications session.

Use the DDE function (Terminate) of the client application to terminate the DDE conversation.

Visual Basic Sample Program

Following is a sample program with Visual Basic:

Note: This sample program is simplified and differs from the actual sample file provided.

```
'/************************************************/
'/*                                              */
'/*     System conversation                      */
'/*                                              */
'/************************************************/

'************************************************
'***                                          ***
'***    Initiate System Conversation          ***
'***                                          ***
'************************************************
'
'  Start DDE Conversation with system
'
Sub Command1_Click ()
On Error GoTo ErrHandlerInit
   Dim COLD As Integer
   COLD = 2
   FunctionComp& = True

   DoEvents
   Text1.LinkTopic = "|System"
   Text1.LinkMode  = COLD

   If FunctionComp&= False Then
      MsgBox "Error has occurred", 48, "DDE sample"
   End If
   Exit Sub

ErrHandlerInit:
   FunctionComp& = False
   Resume Next
End Sub
```

```
'-- note ------------------------------------------
'
' If you use VisualBasic Version2.0, use "DoEvents"
' function before starting DDE conversation by
' calling "LinkMode" function.
'
'-------------------------------------------------
'*************************************************
'***                                           ***
'***    Get System Format                      ***
'***                                           ***
'*************************************************
'
'   Request a list of Personal Communications'   Clipboard Format
'
Sub Command2_Click ()
On Error GoTo ErrHandler
   FunctionComp& = True

   Text1.LinkItem = "Formats"
   Text1.LinkRequest

   If FunctionComp&= False Then
      MsgBox "Error has occurred", 48, "DDE sample"
   End If
   Exit Sub

ErrHandler:
   FunctionComp& = False
   Resume Next
End Sub

'*************************************************
'***                                           ***
'***    Get System Status                      ***
'***                                           ***
'*************************************************
'
'   Requests each Personal Communications'   Session Status
'
Sub Command2_Click ()
On Error GoTo ErrHandler
   FunctionComp& = True

   Text1.LinkItem = "Status"
   Text1.LinkRequest

   If FunctionComp&= False Then
      MsgBox "Error has occurred", 48, "DDE sample"
   End If
   Exit Sub

ErrHandler:
   FunctionComp& = False
   Resume Next
End Sub

'*************************************************
'***                                           ***
'***    Get System Configuration               ***
'***                                           ***
'*************************************************
'
'   Requests Personal Communications'   System Configuration Values
'
Sub Command2_Click ()
On Error GoTo ErrHandler
```

```
   FunctionComp& = True

   Text1.LinkItem = "SysCon"
   Text1.LinkRequest

   If FunctionComp&= False Then
      MsgBox "Error has occurred", 48, "DDE sample"
   End If
   Exit Sub

ErrHandler:
   FunctionComp& = False
   Resume Next
End Sub

'*************************************************
'***                                           ***
'***    Get System SysItems                    ***
'***                                           ***
'*************************************************
'
'   Requests a list of Data Items for
'   Personal Communications System Conversation
'
Sub Command2_Click ()
On Error GoTo ErrHandler
   FunctionComp& = True

   Text1.LinkItem = "SysItems"
   Text1.LinkRequest

   If FunctionComp&= False Then
      MsgBox "Error has occurred", 48, "DDE sample"
   End If
   Exit Sub

ErrHandler:
   FunctionComp& = False
   Resume Next
End Sub

'*************************************************
'***                                           ***
'***    Get System Topics                      ***
'***                                           ***
'*************************************************
'
'   Requests a list of Personal Communications'   Topics
'
Sub Command2_Click ()
On Error GoTo ErrHandler
   FunctionComp& = True

   Text1.LinkItem = "Topics"
   Text1.LinkRequest

   If FunctionComp&= False Then
      MsgBox "Error has occurred", 48, "DDE sample"
   End If
   Exit Sub

ErrHandler:
   FunctionComp& = False
   Resume Next
End Sub

'*************************************************
```

```
'***                                                 ***
'***    Terminate System Conversation                ***
'***                                                 ***
'*****************************************************
'
'  Terminates DDE Conversation with system
'
Sub Command3_Click ()
On Error GoTo ErrHandler
   Dim NONE As IntegerTerm
   NONE = 0
   FunctionComp& = True

   Text1.LinkMode = NONE

   If FunctionComp&= False Then
      MsgBox "Error has occurred", 48, "DDE sample"
   End If
   Exit Sub

ErrHandlerTerm:
   FunctionComp& = False
   Resume Next
End Sub

'/*************************************************/
'/*                                               */
'/*     Session conversation                      */
'/*                                               */
'/*************************************************/

'*****************************************************
'***                                                 ***
'***    Initiate Session Conversation                ***
'***                                                 ***
'*****************************************************
'
'  Initiate DDE Conversation with system
'
Sub Command1_Click ()
On Error GoTo ErrHandlerInit
   Dim COLD As Integer
   COLD = 2
   FunctionComp& = True

   DoEvents
   Text1.LinkTopic = "|SessionA"
   Text1.LinkMode = COLD

   If FunctionComp&= False Then
      MsgBox "Error has occurred", 48, "DDE sample"
   End If
   Exit Sub

ErrHandlerInit:
   FunctionComp& = False
   Resume Next
End Sub

'-- note --------------------------------------------
'
' If you use VisualBasic Version2.0, use "DoEvents"
' function before starting DDE conversation by
' calling "LinkMode" function.
'
'----------------------------------------------------
'*****************************************************
```

```
'***                                                ***
'***    Find Field                                  ***
'***                                                ***
'****************************************************
'
'   Requests 100 Field Information of PS Position
'
Sub Command2_Click ()
On Error GoTo ErrHandler
   FunctionComp& = True

   Text1.LinkItem = "FILED(100,""  "")"
   Text1.LinkRequest

   If FunctionComp&= False Then
      MsgBox "Error has occurred", 48, "DDE sample"
   End If
   Exit Sub

ErrHandler:
   FunctionComp& = False
   Resume Next
End Sub

'****************************************************
'***                                                ***
'***    Get Operator Information Area               ***
'***                                                ***
'****************************************************
'
'   Requests OIA Data
'
Sub Command2_Click ()
On Error GoTo ErrHandler
   FunctionComp& = True

   Text1.LinkItem = "OIA"
   Text1.LinkRequest

   If FunctionComp&= False Then
      MsgBox "Error has occurred", 48, "DDE sample"
   End If
   Exit Sub

ErrHandler:
   FunctionComp& = False
   Resume Next
End Sub
'****************************************************
'***                                                ***
'***    Get Partial Presentation Space              ***
'***                                                ***
'****************************************************
'
'   Requests PS Data Bytes from PS Position from 100 to 1000
'
Sub Command2_Click ()
On Error GoTo ErrHandler
   FunctionComp& = True

   Text1.LinkItem = "EPS(100,1000,1)"
   Text1.LinkRequest

   If FunctionComp&= False Then
      MsgBox "Error has occurred", 48, "DDE sample"
   End If
   Exit Sub
```

```
ErrHandler:
   FunctionComp& = False
   Resume Next
End Sub

'*************************************************
'***                                           ***
'***    Get Presentation Space                 ***
'***                                           ***
'*************************************************
'
'   Requests PS Data
'
Sub Command2_Click ()
On Error GoTo ErrHandler
   FunctionComp& = True

   Text1.LinkItem = "PS"
   Text1.LinkRequest

   If FunctionComp&= False Then
      MsgBox "Error has occurred", 48, "DDE sample"
   End If
   Exit Sub

ErrHandler:
   FunctionComp& = False
   Resume Next
End Sub

'*************************************************
'***                                           ***
'***    Get Session Status                     ***
'***                                           ***
'*************************************************
'
'   Requests Session Connection Status
'
Sub Command2_Click ()
On Error GoTo ErrHandler
   FunctionComp& = True

   Text1.LinkItem = "SSTAT"
   Text1.LinkRequest

   If FunctionComp&= False Then
      MsgBox "Error has occurred", 48, "DDE sample"
   End If
   Exit Sub

ErrHandler:
   FunctionComp& = False
   Resume Next
End Sub
'*************************************************
'***                                           ***
'***    Get Trim Rectangle                     ***
'***                                           ***
'*************************************************
'
'   Requests PS Data in Current Specified Trim Rectangle
'
Sub Command2_Click ()
On Error GoTo ErrHandler
   FunctionComp& = True
```

```
   Text1.LinkItem = "TRIMRECT"
   Text1.LinkRequest

   If FunctionComp&= False Then
      MsgBox "Error has occurred", 48, "DDE sample"
   End If
   Exit Sub

ErrHandler:
   FunctionComp& = False
   Resume Next
End Sub

'************************************************
'***                                          ***
'***    Put Data to Presentation Space        ***
'***                                          ***
'************************************************
'
'   Writes string "Hello, World!" from PS Position 200
'
Sub Command2_Click ()
On Error GoTo ErrHandler
   FunctionComp& = True

   Text1.Text     = "Hello, World!"
   Text1.LinkItem = "EPS(200,1)"
   Text1.LinkPoke

   If FunctionComp&= False Then
      MsgBox "Error has occurred", 48, "DDE sample"
   End If
   Exit Sub

ErrHandler:
   FunctionComp& = False
   Resume Next
End Sub

'************************************************
'***                                          ***
'***    Search for String                     ***
'***                                          ***
'************************************************

'
'   Search forward for string "Hello!" from PS Position 1
'
Sub Command2_Click ()
On Error GoTo ErrHandler
   FunctionComp& = True

   Text1.LinkItem  = "STRING(1,1,""Hello!"")"
   Text1.LinkRequest

   If FunctionComp&= False Then
      MsgBox "Error has occurred", 48, "DDE sample"
   End If
   Exit Sub

ErrHandler:
   FunctionComp& = False
   Resume Next
End Sub

'************************************************
'***                                          ***
```

```
'***    Session Execute Macro                    ***
'***                                             ***
'*************************************************
'
'   Maximize the Session
'
Sub Command2_Click ()
On Error GoTo ErrHandler
   FunctionComp& = True

   Text1.LinkExecute "[WINDOW(MAXIMIZE)]"

   If FunctionComp&= False Then
      MsgBox "Error has occurred", 48, "DDE sample"
   End If
   Exit Sub

ErrHandler:
   FunctionComp& = False
   Resume Next
End Sub

'*************************************************
'***                                             ***
'***    Set Cursor Position                      ***
'***                                             ***
'*************************************************
'
'   Set Cursor Position (Row,Column) = (1,1)
'
Sub Command2_Click ()
On Error GoTo ErrHandler
   FunctionComp& = True

   Text1.Text     = "R1C1"
   Text1.LinkItem = "SETCURSOR"
   Text1.LinkPoke

   If FunctionComp&= False Then
      MsgBox "Error has occurred", 48, "DDE sample"
   End If
   Exit Sub

ErrHandler:
   FunctionComp& = False
   Resume Next
End Sub

'*************************************************
'***                                             ***
'***    Terminate Session Conversation           ***
'***                                             ***
'*************************************************
'
'  Terminate DDE Conversation with session
'
Sub Command3_Click ()
On Error GoTo ErrHandlerTerm
   Dim NONE As Integer
   NONE = 0
   FunctionComp& = True

   Text1.LinkMode = NONE

   If FunctionComp&= False Then
      MsgBox "Error has occurred", 48, "DDE sample"
   End If
```

```
   Exit Sub

ErrHandlerTerm:
   FunctionComp& = False
   Resume Next
End Sub

'/***********************************************/
'/*                                             */
'/*     Session conversation(Hot Link)          */
'/*                                             */
'/***********************************************/

'************************************************
'***                                          ***
'***    Start Close Intercept                 ***
'***                                          ***
'************************************************
'
'  Start Intercepting Close request
'
Sub Command1_Click ()
On Error GoTo ErrHandlerInit
   Dim HOT As Integer
   HOT = 1
   FunctionComp& = True

   DoEvents
   Text1.LinkTopic = "|SessionA"
   Text1.LinkItem  = "CLOSE"
   Text1.LinkMode  = HOT

   If FunctionComp&= False Then
      MsgBox "Error has occurred", 48, "DDE sample"
   End If
   Exit Sub

ErrHandlerInit:
   FunctionComp& = False
   Resume Next
End Sub

'-- note --------------------------------------
'
' If you use VisualBasic Version2.0, use "DoEvents"
' function before starting DDE conversation by
' calling "LinkMode" function.
'
'----------------------------------------------
'************************************************
'***                                          ***
'***    Start Keystroke Intercept             ***
'***                                          ***
'************************************************
'
'  Start Intercepting Keystrokes
'
Sub Command1_Click ()
On Error GoTo ErrHandlerInit
   Dim HOT As Integer
   HOT = 1
   FunctionComp& = True

   DoEvents
   Text1.LinkTopic = "|SessionA"
   Text1.LinkItem  = "KEYS"
   Text1.LinkMode  = HOT
```

```
   If FunctionComp&= False Then
      MsgBox "Error has occurred", 48, "DDE sample"
   End If
   Exit Sub

ErrHandlerInit:
   FunctionComp& = False
   Resume Next
End Sub

'-- note ---------------------------------------
'
' If you use VisualBasic Version2.0, use "DoEvents"
' function before starting DDE conversation by
' calling "LinkMode" function.
'
'-------------------------------------------------
'*************************************************
'***                                           ***
'***    Start Session Advise(PS)               ***
'***                                           ***
'*************************************************
'
'  Receives PS Data when updated
'  (only when "Hello!" is displayed from PS Position 1)
'
Sub Command1_Click ()
On Error GoTo ErrHandlerInit
   Dim HOT As Integer
   HOT = 1
   FunctionComp& = True

   DoEvents
   Text1.LinkTopic = "|SessA_PS"
   Text1.LinkItem  = "PS(1,6,1,""Hello!"")"
   Text1.LinkMode  = HOT

   If FunctionComp&= False Then
      MsgBox "Error has occurred", 48, "DDE sample"
   End If

   Exit Sub

ErrHandlerInit:
   FunctionComp& = False
   Resume Next
End Sub

'-- note ---------------------------------------
'
' If you use VisualBasic Version2.0, use "DoEvents"
' function before starting DDE conversation by
' calling "LinkMode" function.
'
'-------------------------------------------------
'*************************************************
'***                                           ***
'***    Start Session Advise(TRIMRECT)         ***
'***                                           ***
'*************************************************
'
'  Receives PS Data in Trim Rectangle when PS Data in Trim Rectangle
'  specified by R1C1:R20C40 is changed
'
Sub Command1_Click ()
On Error GoTo ErrHandlerInit
```

```
   Dim HOT As Integer
   HOT = 1
   FunctionComp& = True

   DoEvents
   Text1.LinkTopic = "|SessA_TRIMRECT"
   Text1.LinkItem  = "TRIMRECT(1,1,20,40)"
   Text1.LinkMode  = HOT

   If FunctionComp&= False Then
      MsgBox "Error has occurred", 48, "DDE sample"
   End If
   Exit Sub

ErrHandlerInit:
   FunctionComp& = False
   Resume Next
End Sub

'-- note --------------------------------------------
'
' If you use VisualBasic Version2.0, use "DoEvents"
' function before starting DDE conversation by
' calling "LinkMode" function.
'
'--------------------------------------------------
'**************************************************
'***                                            ***
'***    Start Session Advise(OIA)               ***
'***                                            ***
'**************************************************
'
'  Receives OIA Data when changed
'
Sub Command1_Click ()
On Error GoTo ErrHandlerInit
   Dim HOT As Integer
   HOT = 1
   FunctionComp& = True

   DoEvents
   Text1.LinkTopic = "|SessA_OIA"
   Text1.LinkItem  = "OIA"
   Text1.LinkMode  = HOT

   If FunctionComp&= False Then
      MsgBox "Error has occurred", 48, "DDE sample"
   End If
   Exit Sub

ErrHandlerInit:
   FunctionComp& = False
   Resume Next
End Sub

'-- note --------------------------------------------
'
' If you use VisualBasic Version2.0, use "DoEvents"
' function before starting DDE conversation by
' calling "LinkMode" function.
'
'--------------------------------------------------
'**************************************************
'***                                            ***
'***    Terminate Session Conversation(Hot Link) ***
'***                                            ***
'**************************************************
```

```
'
'  Terminate DDE Conversation with session (Hot Link)
'
Sub Command3_Click ()
On Error GoTo ErrHandlerTerm
   Dim NONE As Integer
   NONE = 0
   FunctionComp& = True

   Text1.LinkMode = NONE

   If FunctionComp&= False Then
      MsgBox "Error has occurred", 48, "DDE sample"
   End If
   Exit Sub

ErrHandlerTerm:
   FunctionComp& = False
   Resume Next
End Sub
```

Chapter 8. Server-Requester Programming Interface (SRPI) Support

The Server-Requester Programming Interface (SRPI) is an API that provides access to IBM Enhanced Connectivity Facility (ECF) providing the tools to write SRPI requester programs. SRPI uses a single verb, SEND_REQUEST, to provide a synchronous call-return interface to remote server programs.

Note: SRPI is not available on Personal Communications for iSeries and will not work when connected to an iSeries host.

PC/3270 SRPI for Windows 95, Windows 98, Windows NT, Windows Me, Windows 2000, or Windows XP supports 32-bit SRPI Requester Program written in C or C++.

How to Use SRPI

You can write the application program using the SRPI in C or C++ for Windows 95, Windows 98, Windows NT, Windows Me, Windows 2000, and Windows XP. To develop a SRPI application, do as follows:

1. Prepare the source code and add the appropriate SRPI calls.
2. Include the header file UUCCPRB.H in the application program.
3. Compile the source code.
4. Link the resultant .OBJ files with the appropriate object file or libraries.

You must also link it with the SRPI import library, PCSCAL32.LIB for 32-bit and PCSCALLS.LIB for 16-bit.

SRPI Compatibility

PC/3270 supports the SRPI function with:

- SRPI interface is the same as Personal Communications Version 3.1.
- The SRPI interface is usable via a host connect of the emulator in all modes (except asynchronous and Control Unit Terminal connection) when the physical connection to the host is through a token ring or a coaxial cable, or through SNA or non-SNA protocols.
- If a call is made to the SRPI interface but there is no response from the host due to a communication failure, an associated error is returned to the caller.
- SRPI and EHLLAPI are capable of concurrent operations.
- SRPI is supported only for C requester.
- Server Alias is not supported.
- The 3270 screen update notify is not supported.

PCSSRPI.DLL is provided to support the existing 16-bit SRPI applications for Personal Communications PCSSRPI.DLL converts 16-bit addressing to 32-bit addressing and passes it to PC/3270 SRPI DLL.

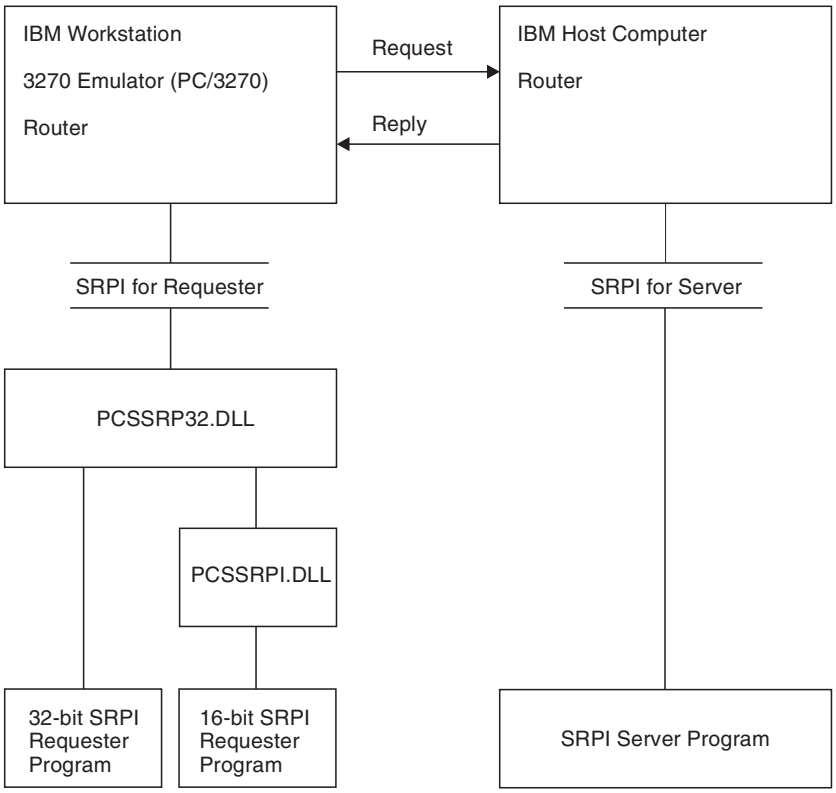

Figure 5. Example of PC/3270 SRPI Requester and Server

Using the Server-Requester Programming Interface

The API between SRPI requesters from the workstation and servers on the host computer is the Server-Requester Programming Interface (SRPI).

Note: For information about a corresponding interface for servers on the IBM host computer, see one of the following publications:

- *TSO/E Version 2 Guide to the Server-Requester Programming Interface*
- *IBM Programmer's Guide to the Server-Requester Programming Interface for VM/System Product*

When used on a workstation, SRPI supports only SRPI requesters. It provides a call-return function for application-to-application communication. Using the **SEND_REQUEST** function, a program on a workstation calls (requests) for service from a partner program on a host computer, which returns (services) the results.

See Figure 6 for an illustration of the workstation and host computer relationship.

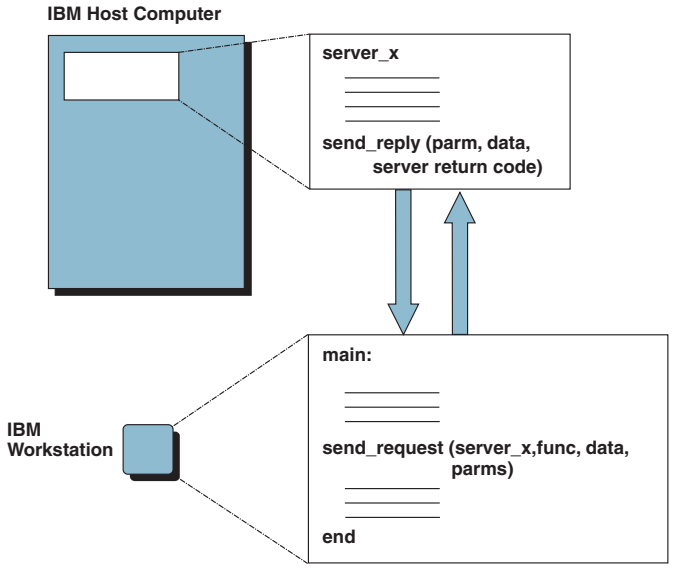

Figure 6. IBM Workstation Requester and IBM Host Computer Server Relationship

Applications use SRPI by issuing the **SEND_REQUEST** verb.

When a workstation SRPI requester issues the **SEND_REQUEST** verb using SRPI:

1. The SRPI router converts the request into a structure that the host computer router recognizes.
2. The SRPI router passes the request to the host computer router, using the appropriate 3270 terminal emulation session.
3. The host computer router passes the request to the appropriate host computer server.
4. The host computer server processes the request and passes a reply back to the host computer router.
5. The host computer router passes the reply back to the SRPI router.
6. The SRPI router converts and returns the reply to the originating SRPI requester application. See Figure 7 for for an illustration of the requester and server flow.

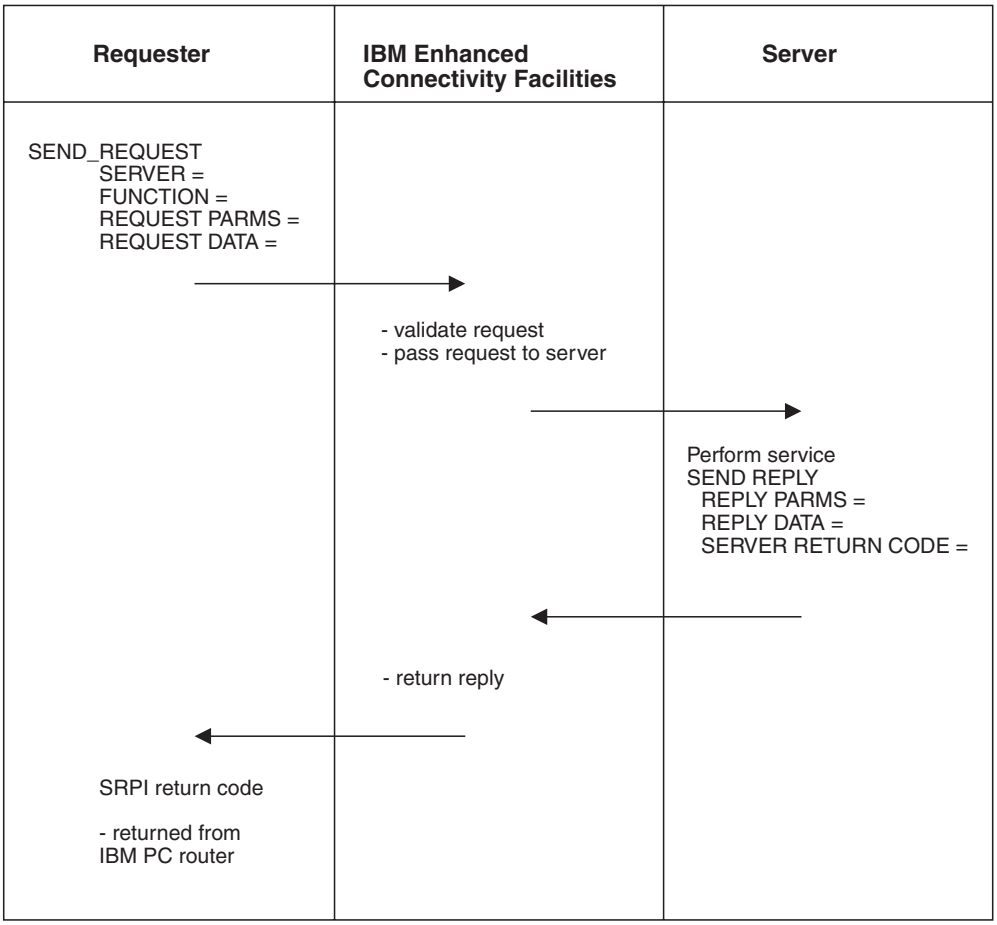

Figure 7. Example of an SRPI Requester and Server Flow

SEND_REQUEST Parameters

The SRPI router sends the request to the host computer using the communication facilities provided by 3270 terminal emulation. SRPI returns control to the SRPI requester with an appropriate return code, optional parameters, and optional data.

The parameters and data associated with the **SEND_REQUEST** function are described in Table 25 on page 308 and in Table 26 on page 310.

Supplied Parameters

Table 25. Parameters Supplied by the SRPI Requester

Name of Parameter	Required/ Optional	Default Value	Description
Function ID	Optional	0	A 2-byte unsigned binary number that specifies the server function being requested. Values of 0 through 65535 are valid for specification by an SRPI requester.

Table 25. Parameters Supplied by the SRPI Requester (continued)

Name of Parameter	Required/ Optional	Default Value	Description
Reply data buffer length	Optional	0	A 2-byte unsigned binary number that specifies the length in bytes of the reply data buffer supplied by the SRPI requester. Values of 0 through 65535 are valid. A value of 0 indicates that no reply data is expected from the server.
Reply data buffer pointer	Optional	0	The 4-byte address of the reply data buffer. A nonzero value in the reply data buffer length indicates that there is reply data to be received.
Reply parameters buffer length	Optional	0	A 2-byte unsigned binary number that specifies the length in bytes of the reply parameter buffer supplied by the SRPI requester. Values of 0 through 32763 are valid. A value of 0 indicates that no reply parameters are expected from the server.
Reply parameters buffer pointer	Optional	0	The 4-byte address of the reply parameter buffer. Its presence is indicated by a nonzero value in the reply parameters buffer length.
Request data length	Optional	0	A 2-byte unsigned binary number that specifies the byte length of the request data to be passed to the server. Values of 0 through 65535 are valid. A value of 0 indicates that there is no request data to be passed.
Request data pointer	Optional	0	The 4-byte address of the data, if any, to be passed to the server. A nonzero value in the request data length indicates that there is data to be passed.
Request parameters length	Optional	0	A 2-byte unsigned binary number that specifies the byte length of the request parameters to be passed to the server. Values of 0 through 32763 are valid. A value of 0 indicates that there are no request parameters to be passed.
Request parameters pointer	Optional	0	The 4-byte address of the parameters, if any, to be passed to the server. A nonzero value in the request parameters length indicates that there are parameters to be passed.

Table 25. Parameters Supplied by the SRPI Requester (continued)

Name of Parameter	Required/ Optional	Default Value	Description
Server name	Required	Blanks	The name of the host computer server must be 8 bytes long (PC/ASCII), left-justified, and padded with blanks (X'20'); leading blanks, embedded blanks, and names consisting of all blanks are not valid. The valid PC/ASCII characters are *A* through *Z* (uppercase and lowercase), 0 through 9, $, #, and @. The name is converted to EBCDIC before the request is sent to the host computer.

Returned Parameters

Table 26. Parameters Returned to the SRPI Requester

Name of Parameter	Description
SRPI return code	A 4-byte value that specifies the results of the **SEND_REQUEST** execution. See Appendix D, for a complete description of SRPI return codes.
Server return code	A 4-byte value returned by the server. The contents and meaning of the return status are defined by the requester or the server, but the length of the field is always 32 bits.
Replied parameter length	A 2-byte unsigned binary storage location that specifies the number, in bytes, of parameters returned by the server. Values of 0 through 32763 are valid. A value of 0 indicates that no reply parameters were received from the server.
Replied data length	A 2-byte unsigned binary storage location that specifies the length in bytes of the data returned by the server. Values of 0 through 65535 are valid. A value of 0 indicates that no reply data was received from the server.

Notes:

1. You can set the default values by using the appropriate request record initialization function.
2. The server name is used to route the **SEND_REQUEST** to a 3270 session and to invoke the host server.
3. SRPI requesters and servers determine the contents and meaning of the application data and parameters pointed to by the addresses in the connectivity programming request block (CPRB).

How PC/3270 Applications Use SRPI

A local application running on PC/3270 can issue the **SEND_REQUEST** verb to an application on a connected remote computer. The local application is the SRPI requester and the remote application is the intended server. The SRPI requester can identify a specific function of the server by specifying a function ID.

If the contact is successful, the remote application can provide its services to the SRPI requester. Information on invoking and implementing the **SEND_REQUEST** function follows.

Invoking SEND_REQUEST

When an application invokes **SEND_REQUEST**, it appears to the program that the main routine (the local application) calls a subroutine (the remote application). The programmer who writes the requester application must perform the following tasks:

1. Obtain storage for the connectivity programming request block (CPRB).
2. Initialize the CPRB. This involves setting the default values and completing the application parameters.

   PC/3270 provides initialization routines and macros for each supported language. These initialization facilities insulate the application from the CPRB mapping and call mechanisms.
3. Call the SRPI dynamic link library (DLL) by issuing **SEND_REQUEST**.
4. Validate the SRPI return code received in the CPRB.

The **SEND_REQUEST** function is implemented as a DLL.

Performance Considerations

The size of the data transfer buffers used by the SRPI router to exchange data with the host computer is calculated automatically by PC/3270. If your SRPI requester produces requests that transfer large blocks of data to and from the server, performance might be improved by overriding the data transfer buffer size calculated by PC/3270. This is accomplished by changing the definition of the logical 3270 display terminals used for SRPI.

The data transfer buffer-size override parameter supplied on the Create/Change Logical 3270 Display Terminal window is used to change the buffer size used by SRPI. A value of 0 indicates that PC/3270 calculates the buffer size. Other values (from 1 through 32) specify the buffer size in multiples of 1024 bytes. Be aware that large values (such as 30) might improve SRPI performance at the expense of overall system performance. Note that the data transfer buffer-size override parameter also sets the size of the data transfer buffers used by the File Transfer feature.

Handling the Interrupt (Ctrl+Break) Key

During processing of a **SEND_REQUEST** verb, all signals (except numeric coprocessor signals) are delayed until verb completion. In particular, pressing the Interrupt (Ctrl+Break) key does not cancel a program during execution of a **SEND_REQUEST** verb.

C Requesters

This section is for programmers who want to write a requester in the C language. It describes:

- C send_request function
- SRPI record definition
- **Send_request** function definition

- SRPI return codes

Sample programs are supplied on the Personal Communications installation.

Note: To follow C conventions, the function called **SEND_REQUEST** in other sections is spelled **send_request** in this section.

C send_request Function

The **send_request** parameters are grouped into a single C structure of type UERCPRB. The **init_send_req_parms** function is provided to initialize all **send_request** parameters in the UERCPRB structure to their defaults. This allows the default values to be set once for parameters not used by a requester. The **send_request** function is provided to make synchronous calls to the server program.

The **init_send_req_parms** and **send_request** functions must be linked with your C application. PCSSRP32.DLL for 32-bit interface and PCSSRPI.DLL for 16-bit interface; both of these object files are provided with PC/3270.

The **send_request** function copies the contents of the UERCPRB structure into a connectivity programming request block (CPRB) and calls the PCSSRP32.DLL. After the server has completed its processing, the **send_request** procedure copies the returned parameters from the CPRB into the UERCPRB structure and returns control to the C application.

If the request parameters or data consist of several structures, the application must convert the data or parameters into a single flat structure that consists of a contiguous sequence of bytes that are stored in a buffer. The requesting program must package the request parameters and data in a format recognizable by the server.

UERCPRB is a packed structure. That is, each structure member after the first member is stored at the first available byte.

The memory used for the request parameters can also be used for the reply parameters; the memory used for the request data can also be used for the reply data. The application program must ensure that the reply data and parameters are written into the request data and parameters buffer only when the request data and parameters are no longer needed.

SRPI Record Definition

The UERCPRB record type defines a record passed to the SRPI router using the **send_request** function. The record is defined in an application program by using the `#include` preprocessor directive to include the UUCCPRB.H file. For the definitions and value ranges of the supplied and returned parameters, see "Supplied Parameters" on page 308 and "Returned Parameters" on page 310.

SRPI Return Codes

See Appendix D, "SRPI Return Codes", on page 331 for the SRPI return codes.

Appendix A. Query Reply Data Structures Supported by EHLLAPI

This appendix lists and defines the query reply structures supported by the EHLLAPI structured field interface for PC/3270. Refer to *IBM 3270 Information Display System Data Stream Programmer's Reference* or, in the case of an IBM licensed program, the documentation for the specific licensed program.

Notes:

1. EHLLAPI must scan the query reply buffers to locate the destination/origin ID (DOID) self-defining parameter (SDP) for the structured field support to work and be reliable. The DOID field is then filled in with the assigned ID.
2. The application should build the query reply data structures in the application's private memory.
3. Only cursory checking is performed on the query reply data. Only the ID and the length of the structure are checked for validity.
4. The 2-byte length field at the beginning of each query reply **is not byte reversed**.
5. Only one distributed data management (DDM) base-type connection is allowed per host session. If the DDM connection supports the SDP for the DOID, multiple connections are allowed.
6. If a nonzero return code is received indicating that an application is already connected to the selected session (RC 32 or 39), use that presentation space with caution. Conflicts with SRPI, File Transfer, and other EHLLAPI applications might result.

The DDM Query Reply

Several DDM query reply formats are supported. Here are some of them:

Table 27. DDM Query Reply Base Format

Offset	Length	Content	Meaning
0	1 word	Length	Length of structure
2	1 byte	X'81'	Query reply ID
3	1 byte	X'95'	Query reply type
4–5	2 bytes	FLAGS	Reserved
6–7	2 bytes	LIMIN	Maximum DDM bytes allowed in inbound transmission
8–9	2 bytes	LIMOUT	Maximum DDM bytes allowed in outbound transmission
10	1 byte	NSS	Number of subsets identifier
11	1 byte	DDMSS	DDM subset identifier

DDM Application Name Self-Defining Parameter

The DDM application name self-defining parameter provides the host application with the name of the application containing control of the DDM auxiliary device. The controlling application is identified by the DOID in the Direct Access self-defining parameter.

This self-defining parameter is optional, but it is necessary if a host application is to identify a distinct DDM auxiliary device when more than one application is in existence at a remote workstation.

Table 28. DDM Application Name Self-Defining Parameter

Offset	Length	Content	Meaning
0	1 byte	Length	Parameter length
1	1 byte	X'02'	DDM application name
2–n	n–2 bytes	NAME	Name of the remote application program

NAME The name consists of 8 characters or less and is the means by which a host application can relate to an application in a remote workstation. It is the responsibility of the host and remote application users to ensure that the name is understood by the application at each end.

PCLK Protocol Controls Self-Defining Parameter

The PCLK Protocol Controls self-defining parameter indicates that the PCLK Protocol Controls structured field, ID = X'1013', can be used for both inbound and outbound in data streams destined to or from the DDM auxiliary device processor.

Table 29. DDM PCLK Auxiliary Device Self-Defining Parameter

Offset	Length	Content	Meaning
0	1 byte	X'04'	Parameter length
1	1 byte	X'03'	PCLK protocol controls
2–3	2 bytes	VERS	Protocol version

VERS The value given in VERS is used to indicate the versions of PCLK installed in the terminal at the time the query reply is returned. For example, X'0001' indicates PCLK Version 1.1.

Refer to *IBM 3270 Information Display System Data Stream Programmer's Reference* for the field definitions for this query reply.

Base DDM Query Reply Formats

The following query reply formats are *examples* of some of the Base + SDP (self-defining parameter) combinations possible. Not all of the combinations are shown.

Table 30. Base DDM Query Reply Format with Name and Direct Access Self-Defining Parameters

Offset	Length	Content	Meaning
0	1 word	Length	Length of structure (includes self-defining parameters)
2	1 byte	X'81'	Query reply ID
3	1 byte	X'95'	Query Reply type
4–5	2 bytes	FLAGS	Reserved
6–7	2 bytes	LIMIN	Maximum DDM bytes allowed in inbound transmission
8–9	2 bytes	LIMOUT	Maximum DDM bytes allowed in outbound transmission
10	1 byte	NSS	Number of subsets supported
11	1 byte	DDMSS	DDM subset identifier
12	1 byte	Length (n+2)	Parameter length
13	1 byte	X'02'	DDM application name
14– (13+n)	n bytes	Name	Name of the remote application program
14+n	1 byte	X'04'	Parameter length
15+n	1 byte	X'01'	Direct access ID
16+n – 17+n	2 bytes	DOID	Destination/origin ID assigned by the subsystem

The self-defining parameters begin at offsets 12 and (14 + *n*) where *n* is the length of the application name supplied at offset 14.

Refer to *IBM 3270 Information Display System Data Stream Programmer's Reference* for the field definitions for this query reply.

Table 31. Base DDM Query Reply Format with Direct Access and Name Self-Defining Parameters

Offset	Length	Content	Meaning
0	1 word	Length	Length of structure (includes self-defining parameters)
2	1 byte	X'81'	Query reply ID
3	1 byte	X'95'	Query reply type
4–5	2 bytes	FLAGS	Reserved

Table 31. Base DDM Query Reply Format with Direct Access and Name Self-Defining Parameters (continued)

Offset	Length	Content	Meaning
6–7	2 bytes	LIMIN	Maximum DDM bytes allowed in inbound transmission
8–9	2 bytes	LIMOUT	Maximum DDM bytes allowed in outbound transmission
10	1 byte	NSS	Number of subsets supported
11	1 byte	DDMSS	DDM subset identifier
12	1 byte	X'04'	Parameter length
13	1 byte	X'01'	Direct access ID
14–15	2 bytes	DOID	Destination/origin ID assigned by the subsystem
16	1 byte	Length (n+2)	Parameter length
17	1 byte	X'02'	DDM application name
16+*n* – 17+*n*	*n* bytes	Name	Name of the remote application program

The self-defining parameters begin at offsets 12 and 16.

Refer to *IBM 3270 Information Display System Data Stream Programmer's Reference* for the field definitions for this query reply.

The IBM Auxiliary Device Query Reply

The Auxiliary Device Reply is used to indicate to the host application the support of an IBM auxiliary device that uses a data stream defined by IBM, see the *IBM 3270 Information Display System Data Stream Programmer's Reference* for more details.

When the function is supported, the query reply is transmitted inbound in reply to a Read Partition structured field specifying Query or Query List (QCODE List = X'9E', Equivalent, or All).

When a workstation supports multiple auxiliary devices, the IBM auxiliary devices query reply must be sent for each device.

Optional Parameters

All parameters shown in the base part of the query reply must be present. Parameters not used are set to X'00'.

At least one self-defining parameter must be present.

Table 32. IBM Auxiliary Device Base Format with Direct Access Self-Defining Parameter

Offset	Length	Content	Meaning
0–1	1 word	Length	Length of structure (includes self-defining parameters)
2	1 byte	X'81'	Query reply ID
3	1 byte	X'9E'	IBM auxiliary device reply
4	1 byte BIT 0 1–7	FLAGS QUERY B'1' RES	Reserved Read Part (Query, Query List) Auxiliary device supports Query Reserved, must be B'0's
5	1 byte	FLAGS	Reserved
6–7	2 bytes	LIMIN	Maximum DDM bytes allowed in inbound transmission
8–9	2 bytes	LIMOUT	Maximum DDM bytes allowed in outbound transmission
10	1 byte	TYPE X'01' X'02' Others	Type of auxiliary device supported IBM auxiliary device display IBM auxiliary device printer Reserved
11	1 byte	X'04'	Parameter length
12	1 byte	X'01'	Direct access
13–14	1 word	DOID	Destination/origin ID assigned by the subsystem

QUERY This bit must be set to B'1' for all IBM auxiliary devices to indicate that it supports receiving a Read Partition (Query, Query List). The host applications can then use a Read Partition directed to the auxiliary device to determine its characteristics. The destination/origin structured field is used to direct the Read Partition structured field to the auxiliary device.

The minimum support level for the IBM auxiliary device is to return the Null query reply in response to the Read Partition.

LIMIN States the maximum number of bytes that can be sent in an inbound transmission. A LIMIN value of X'0000' indicates no implementation limit on the number of bytes transmitted inbound.

LIMOUT States the maximum number of bytes that can be sent to an IBM auxiliary device in an outbound transmission. A LIMOUT value of X'0000' indicates no implementation limit on the number of bytes transmitted outbound.

TYPE Identifies the auxiliary device being supported. Two values are valid. One identifies an auxiliary display and the other identifies an auxiliary printer. All other values are reserved.

The IBM auxiliary device processor supports two self-defining parameters, 01 and 03. These are defined in Table 33 on page 318.

Direct Access Self-Defining Parameter

The direct access self-defining parameter provides the ID for use in the destination/origin structured field in the direct access of the IBM auxiliary device.

This SDP is always required to accompany the base query reply.

Table 33. IBM Auxiliary Device Direct Access Self-Defining Parameter

Offset	Length	Content	Meaning
0	1 byte	X'04'	Parameter length
1	1 byte	X'01'	Direct access ID
2–3	2 bytes	DOID	Destination/origin ID

DOID The value in these bytes is used in the ID field of the destination/origin structured field to identify the auxiliary device as the destination or origin of the data that follows.

PCLK Protocol Controls Self-Defining Parameter

The presence of the PCLK protocol controls self-defining parameter indicates that the PCLK protocol controls structured field, ID = X'1013', can be used for both inbound and outbound in data streams destined to or from the IBM auxiliary device processor.

Table 34. IBM Auxiliary Device PCLK Self-Defining Parameter

Offset	Length	Content	Meaning
0	1 byte	X'04'	Parameter length
1	1 byte	X'03'	PCLK protocol controls
2–3	2 bytes	VERS	Protocol version

VERS The value given in VERS is used to indicate the versions of PCLK installed in the terminal at the time the query reply is returned. For example, X'0001' indicates PCLK version 1.1.

Refer to *IBM 3270 Information Display System Data Stream Programmer's Reference* for the field definitions for this query reply.

The OEM Auxiliary Device Query Reply

The OEM Auxiliary Device query reply format is as follows:

Table 35. OEM Auxiliary Device Base Format with Direct Access Self-Defining Parameter

Offset	Length	Content	Meaning
0–1	1 word	Length	Length of structure (includes self-defining parameters)
2	1 byte	X'81'	Query reply ID
3	1 byte	X'8F'	OEM query reply
4–5	2 bytes	FLAGS	Reserved
6–13	4 words	DTYPE	Device type
14–21	4 words	UNAME	User assigned name
22	1 byte	X'04'	Parameter length
23	1 byte	X'01'	Direct access

Table 35. OEM Auxiliary Device Base Format with Direct Access Self-Defining Parameter (continued)

Offset	Length	Content	Meaning
24–25	1 word	DOID	Destination/origin ID assigned by the subsystem

Refer to *IBM 3270 Information Display System Data Stream Programmer's Reference* for the field definitions for this query reply.

The OEM auxiliary device processor supports two self-defining parameters, 01 and 03. These are defined in Table 36.

Direct Access Self-Defining Parameter

The direct access self-defining parameter provides the ID for use in the destination/origin structured field in the direct access of the OEM auxiliary device.

Table 36. OEM Auxiliary Device Direct Access Self-Defining Parameter

Offset	Length	Content	Meaning
0	1 byte	X'04'	Parameter length
1	1 byte	X'01'	Direct access ID
2–3	2 bytes	DOID	Destination/origin ID

DOID The value in these bytes is used in the ID field of the destination/origin structured field to identify the auxiliary device as the destination or origin of the data that follows.

PCLK Protocol Controls Self-Defining Parameter

The presence of the PCLK protocol controls self-defining parameter indicates that the PCLK Protocol Controls structured field, ID = X'1013', can be used for both inbound and outbound in data streams destined to or from the OEM auxiliary device processor.

Table 37. IBM Auxiliary Device PCLK Self-Defining Parameter

Offset	Length	Content	Meaning
0	1 byte	X'04'	Parameter length
1	1 byte	X'03'	PCLK protocol controls
2–3	2 bytes	VERS	Protocol version

VERS The value given in VERS is used to indicate the versions of PCLK installed in the terminal at the time the query reply is returned. For example, X'0001' indicates PCLK version 1.1.

The Cooperative Processing Requester Query Reply

The Cooperative Processing Requester query reply is also called the SRPI query reply or CPSI query reply. The format is as follows:

Table 38. CPR Query Reply Buffer Format

Offset	Length	Content	Meaning
0	1 word	Length	Length of structure (includes self-defining parameters)
2	1 byte	X'81'	Query reply ID
3	1 byte	X'AB'	Query reply type
4–5	2 bytes	FLAGS	Reserved
6–7	2 bytes	LIMIN	Maximum DDM bytes allowed in inbound transmission
8–9	2 bytes	LIMOUT	Maximum DDM bytes allowed in outbound transmission
10	1 byte	FETAL	Length (in bytes) of the following feature information
11–12	1 word	FEATS	CPR length and feature flags
13– (N*2)+12	0–2 bytes	FEATSs	Additional flags
(N*2)+12	1 byte	X'04'	Length of DOID SDP
(N*2)+13	1 byte	X'01'	Type of D/O ID
(N*2)+14	1 word	DOID	Destination/origin ID assigned by the subsystem

Refer to *IBM 3270 Information Display System Data Stream Programmer's Reference* for the field definitions for this query reply.

The Product-Defined Query Reply

This query reply is used by IBM products using registered subidentifiers within the X'9C' data structure. The Product-Defined Data Stream query reply indicates support of a 3270DS workstation auxiliary device that uses an IBM product-defined data stream. The data stream is *not* defined by a format architecture document having an identifiable control point such as an architecture review board.

When an auxiliary device supports an IBM product-defined data stream, this query reply is transmitted inbound in reply to a Query List (QCODE List = X'9C' or All).

Optional Parameters

All parameters shown in the base part of the query reply and the direct access self-defining parameter must be present.

The format of the Product-Defined query reply is as follows:

Table 39. IBM Product-Defined Query Reply Base Format

Offset	Length	Content	Meaning
0–1	1 word	Length	Length of structure (includes self-defining parameters)
2	1 byte	X'81'	Query reply ID
3	1 byte	X'9C'	IBM product-defined data stream
4–5	2 bytes	FLAGS	Reserved
6	1 byte	REFID	Reference identifier
7	1 byte	SSID	Subset identifier
8	1 byte	X'04'	Parameter length
9	1 byte	X'01'	Direct access
10–11	1 word	DOID	Destination/origin ID assigned by the subsystem

Valid values for REFID (offset 6) and SSID (offset 7) of the Product-Defined query reply are as follows:

Table 40. Valid REFID and SSID Values for the IBM Product-Defined Query Reply

REFID	SSID	Product and Data Stream Documentation
X'01'		5080 Graphics System: This reference ID indicates the 5080 Graphics System data stream is supported by the auxiliary device. Descriptions of the 5080 Graphics Architecture, structured field, subset ID, DOID, and associated function sets are defined in *IBM 5080 Graphics System Principles of Operation*
	X'01' X'02'	5080 HGFD Graphics Subset 5080 RS232 Ports Subset
X'02'		WHIP API (replaced by SRL name when written) This reference ID indicates that the WHIP API data stream is supported by the auxiliary device. A description of the WHIP API architecture is defined in *IBM RT PC Workstation Host Interface Program Version 1.1 User's Guide and Reference Manual*
	X'01'	WHIP Subset 1
X'03' to X'FF'		All other values are reserved.

The IBM product-defined processor supports only the direct access self-defining parameter. It is defined in Table 41 on page 322.

Direct Access Self-Defining Parameter

The presence of the Direct Access ID self-defining parameter indicates that the auxiliary device can be accessed directly by using the destination/origin structured

field. When multiple auxiliary devices are supported that use a product-defined data stream, separate Product-Defined Data Stream query replies must be provided, each of which has a unique DOID.

Table 41. IBM Product-Defined Direct Access Self-Defining Parameter

Offset	Length	Content	Meaning
0	1 byte	X'04'	Parameter length
1	1 byte	X'01'	Direct access ID
2–3	2 bytes	DOID	Destination/origin ID

DOID The value in these bytes is used in the ID field of the destination/origin structured field to identify the auxiliary device as the destination or origin of the data that follows.

The Document Interchange Architecture Query Reply

This query reply indicates the Document Interchange Architecture (DIA) function set supported. The format of the DIA Query Reply is as follows:

Table 42. IBM DIA Base Format

Offset	Length	Content	Meaning
0	1 word	Length	Length of structure (includes self-defining parameters)
2	1 byte	X'81'	Query reply ID
3	1 byte	X'97'	IBM DIA
4–5	2 bytes	FLAGS	Reserved
6–7	2 bytes	LIMIN	Maximum DDM bytes allowed in inbound transmission
8–9	2 bytes	LIMOUT	Maximum DDM bytes allowed in outbound transmission
10	1 byte	NFS	Number of 3-byte function set IDs that follow
11–13	3 bytes	DIAFS	DIA function set identifier
14– (13+(N*3))	N*3 bytes	DIAFSs	Additional DIA function set IDs
14+(N*3)	1 byte	X'04'	Parameter length
15+(N*3)	1 byte	X'01'	Direct access
16+(N*3)	1 word	DOID	Destination/origin ID assigned by the subsystem

The DIA auxiliary device processor supports only the direct access self-defining parameter. It is defined in Table 43 on page 323.

The presence of the direct access ID self-defining parameter indicates that the auxiliary device can be accessed directly by using the destination/origin structured field.

Table 43. IBM Product-Defined Direct Access Self-Defining Parameter

Offset	Length	Content	Meaning
0	1 byte	X'04'	Parameter length
1	1 byte	X'01'	Direct access ID
2–3	2 bytes	DOID	Destination/origin ID

DOID The value in these bytes is used in the ID field of the destination/origin structured field to identify the auxiliary device as the destination or origin of the data that follows.

Refer to *IBM 3270 Information Display System Data Stream Programmer's Reference* for the field definitions for this query reply.

Appendix B. Differences from Communication Manager/2 EHLLAPI

This appendix describes the differences between EHLLAPI of Personal Communications and EHLLAPI for Communication Manager/2.

The following EHLLAPI functions are different from those with the same names in Communication Manager/2. You need to understand the differences when you use these functions:

- **Set Session Parameter** (9)
- **Copy OIA** (13)
- **Copy String to PS** (15)
- **Storage Manager** (17)
- **Copy String to Field** (33)
- **Get Key** (51)
- **Window Status** (104)
- **Query Sessions** (10)
- **Connect for Structured Field** (120)
- **Allocate Communications Buffer** (123)
- ASCII mnemonics

Set Session Parameter (9)

Set Options

Personal Communications does not provide the following set options provided by Communication Manager:

OLDOIA, NEWOIA

COMPCASE, COMPICASE

OLD5250OIA, NEW5250OIA

Return Parameters

When the **Set Session Parameter** (9) function is terminated, Communication Manager returns a length of the valid data string as the third parameter, the data string length. However, Personal Communications returns a number of the valid set options as the data string length.

EAB Option

In Communication Manager/2, a color remap affects the value of the character color in the EAB attribute copied by **Copy PS** (5) or **Copy PS to String** (8) function when the EAB option is specified in the **Set Session Parameter** (9) function.

In Personal Communications, however, the value of the character color in the EAB attribute depends on the contents of the presentation space regardless of a color remap, and it is not affected by a color remap.

Copy OIA (13)

The **Copy OIA** (13) function has the following differences between Communication Manager/2 and Personal Communications. For more information of the group and the column positions, refer to "Copy OIA (13)" on page 48.

- Byte Position 21
  - Personal Communications returns X'F6'.
  - Communication Manager/2 returns X'20'.
- Byte Positions 61–63
  - Personal Communications does not return the printer information.
  - Communication Manager/2 returns the printer information.
- Group 3: Shift State

  Communication Manager/2 does not return the value of bit 2. Bit 2 is reserved, and bit 0 contains both the Upper Shift and the Caps Lock.
- Group 8 Byte 1: Input Inhibited
  - Personal Communications does not return bit 6 (Device not working).
  - Communication Manager/2 can return bit 6.
- Group 8 Byte 3: Input Inhibited
  - Personal Communications does not return bit 1 (Operator unauthorized) and bit 2 (Operator unauthorized -f).
  - Communication Manager/2 can return bits 1 and 2.
- Group 8 Byte 4: Input Inhibited
  - Personal Communications does not return bit 2 (System wait).
  - Communication Manager/2 can return bit 2.
- Group 10: Highlight Group 2
  - Personal Communications does not return bit 0 (Selected).
  - Communication Manager/2 can return bit 0.
- Group 11: Color Group 2
  - Personal Communications does not return bit 0 (Selected).
  - Communication Manager/2 can return bit 0.
- Group 13: Printer Status
  - In Personal Communications, this group is reserved.
  - Communication Manager/2 can return this group.
- Group 14: Graphics

  Communication Manager/2 does not return bit 0 (Graphic cursor).

Copy String to PS (15)

In Communication Manager/2, the EAB option of the **Set Session Parameter** (9) function affects the **Copy String to PS** function. When you specify the EAB option, pass the attribute data that has the same size as the text data to the function with the text data.

In Personal Communications, however, the data to be passed is only text data regardless of EAB option. If you want to use the same interface with Communication Manager/2, use the `PUTEAB` option of **Set Session Parameter** (9).

Storage Manager (17)

Storage Manager (17) function provided by Communication Manager/2 is not supported by Personal Communications. Use the APIs provided by Windows 95, Windows 98, and Windows NT to allocate the memory for the applications.

Copy String to Field (33)

In Communication Manager/2, when the EAB option of the **Set Session Parameter** (9) function is specified, the attribute data is passed to the function as a part of the data. Therefore, when you specify the EAB option, pass the attribute data that has the same size as the text data to the function with the text data.

In Personal Communications, however, the EAB option does not affect the data contents of the **Copy String to Field** (33) function. The data to be passed is not the attribute data, but only the text data. If you want to use the same interface with Communication Manager/2, use the `PUTEAB` option of **Set Session Parameter** (9).

Get Key (51)

Communication Manager/2 returns shift state using @A, @S, or @r, if the shift state of a passed key is not a key or function recognized by the emulator session. Personal Communications does not support these ASCII mnemonics.

Window Status (104)

EHLLAPI function 104 (PM_WINDOW_STATUS) 'query extended status' command (0x03) will return the handle of the emulator presentation space window. This is consistent with the definition of the function and the Communication Manager/2 implementation. However, Personal Communications for Windows EHLLAPI returns the handle of the frame window. EHLLAPI applications written for Personal Communications for Windows using this function need to use the parent of the window handle returned.

Query Sessions (10)

In Communication Manager/2, the descriptor for personal computer is returned. However, the descriptor is not returned in Personal Communications.

Connect for Structured Fields (120)

The event object for communication connection status provided by Communication Manager/2 is not in Personal Communications.

Allocate Communications Buffer (123)

In Communication Manager/2, the maximum value of the requested buffer size is 64 KB minus 8 bytes (X'FFF8').

In Personal Communications, however, it is 64 KB minus 256 bytes (X'FF00').

ASCII Mnemonics

The following ASCII mnemonics are not supported in Personal Communications:

Mnemonics	Meaning
@A@N	Get Cursor
@A@O	Locate Cursor
@A@X	Hexadecimal
@A@Y	Cmd (Function) Key
@A@a	Destructive Backspace
@S@A	Erase EOL
@S@B	Field Advance
@S@C	Field Backspace
@S@D	Valid Character Backspace
@S@P	POR (For sending only)
@S@T	Jump to Task Manager
@/	Overrun of queue (Only in the **Get Key** function)

Get Request Completion (125)

Personal Communications does not support a blank or null session ID.

Appendix C. DOS-Mode EHLLAPI for Windows

Personal Communications supports EHLLAPI applications for DOS. This appendix provides information about this support.

Installation

To install DOS EHLLAPI support for Personal Communications do the following:

1. Select the Emulator Utilities folder from the Utilities folder in the IBM Personal Communications folder.
2. Select DOS EHLLAPI application from the Emulator Utilities folder.
3. Select the check box of the DOS MODE EHLLAPI to enable DOS EHLLAPI support.
4. Enter the major DOS version for which your DOS EHLLAPI applications are written. (For example, 2 for DOS Emulator Version 2.x).
5. Select OK to enable changes.
6. Shut down the workstation and restart it again.

For Windows NT or Windows 2000, this procedure adds the following statement in config.nt.

```
device=%SystemRoot%\system32\drivers\hlldrvr.sys
```

For Windows 95 or Windows 98, this procedure adds the following statement in system.ini.

```
device=<drive:>\windows\system\doshll.vxd
```

Note: DOS EHLLAPI applications assert interrupt X'7F' to request EHLLAPI services. Any other proprietary DOS application using interrupt X'7F' will not work with DOS EHLLAPI enabled and vice-versa.

Appendix D. SRPI Return Codes

This appendix describes error handling in the SRPI environment. Types 0, 1, 2, and 3 return codes and their definitions are listed. Exception class definitions, code values, and object values are listed. Server return codes are also discussed.

Error Handling

An unsuccessful service request in the SRPI environment can result from problems at any of the different layers. SRPI shields applications from transport layer errors as much as possible. Errors within server processing are handled by the applications. The other errors are caused by SRPI and are treated accordingly.

Transport Layer Errors

SRPI tries to recover from transport layer errors. When recovery is not possible, SRPI returns to the requester with a return code indicating transport layer failure. The programmer should handle such failures using the problem determination procedures of the transport mechanism.

Application Errors

SRPI is responsible for routing requests to servers and returning replies to requesters. Requesters and servers are responsible for handling errors (except for abend) that servers encounter. When a server ends abnormally, SRPI returns to the requester with an abend notice in the SRPI return code.

The server return code is set by the server on the IBM host computer running under VM or MVS™. The value and meaning of the server return code is dependent on the requester or the server.

SEND_REQUEST Processing Errors

SRPI return codes can encounter a number of errors in processing the **SEND_REQUEST** function. Such errors include:

- Incorrect function parameters
- Unidentified server
- Inability to contact the server

There are also system error codes for internal SRPI errors.

Types of SRPI Return Codes

SRPI return codes include types 0, 1, 2, and 3:

Type 0
Indicates successful completion of the **SEND_REQUEST** function.

Type 1
Indicates errors detected by the SRPI router that prevent a request from being processed.

Type 2
Indicates errors detected by the SRPI router and reported to the remote computer by an acknowledge interchange unit.

Type 3

Indicates errors detected by the remote computer and reported to the SRPI router by an acknowledge interchange unit.

The return code values are word-reversed and byte-reversed within each word. For example, the SRPI return code X'0100 0402' is stored in the CPRB memory as X'0204 0001'.

Type 0 Return Code Definitions

The type 0 return code (constant return code UERERROK) has the following format: X'0000 0000'. This return code value indicates that the SRPI function completed successfully.

Type 1 Return Code Definitions

Type 1 return codes have the following format: X'0100 nnnn'.

The *nnnn* bytes are the hexadecimal value that indicates the specific error detected.

The return code definitions and descriptions are listed in Table 44.

Table 44. Type 1 Return Code Definitions and Descriptions

Hexadecimal Return Code	Constant Return Code	Description
X'0100 0402'	UERERRT1START	SRPI is not started because the host ECF program is not started.
X'0100 0404'	UERERRT1LOAD	The SRPI router is not loaded.
X'0100 0408'	UERERRT1BUSY	The SRPI router is busy. This return code is not used by the Personal Communications program.
X'0100 040A'	UERERRT1VER	The version ID in the CPRB passed to the SRPI router is not supported by the resident portion of the SRPI router. The version ID is automatically put into the CPRB by the C interface facility.
X'0100 040C'	UERERRT1EMU	Personal Communications is not loaded.
X'0100 040E'	UERERRT1ROUT	The server name supplied in the CPRB is not defined in the server routing table. Default routing is not configured so SRPI is unable to route the request. Use a valid server name or update the configuration to include the server name.
X'0100 0410'	UERERRT1COMMR	Communications resource not available.
X'0100 0412'	UERERRT1REST	3270 emulation has been restarted since the application last used SRPI. End the application and restart it before using SRPI.
X'0100 0414'	UERERRT1INUSE	The request has been routed to a communication session that is in use by File Transfer.
X'0100 0602'	UERERRT1QPLEN	Request parameters length exceeds the maximum value. The maximum value allowed is 32763.

Table 44. Type 1 Return Code Definitions and Descriptions (continued)

Hexadecimal Return Code	Constant Return Code	Description
X'0100 0604'	UERERRT1RPLEN	Reply parameters buffer length exceeds the maximum value. The maximum value allowed is 32763.
X'0100 0606'	UERERRT1VERB	Incorrect or unsupported verb type. The verb type in the CPRB passed to the SRPI router is not recognized. The verb type is put into the CPRB automatically by the C interface facility.
X'0100 0608'	UERERRT1SERV	Incorrect server name. One or more characters in the server name could not be converted to EBCDIC for sending to the host.
X'0100 060C'	UERERRT1QPAD	One of the following conditions exists: • The request parameter address is not valid. • The request parameter length extends beyond the end of the request parameter buffer. • The request parameter address is 0 with a nonzero request parameter length.
X'0100 060E'	UERERRT1QDAD	One of the following conditions exists: • The request data address is not valid. • The request data length extends beyond the end of the request data buffer. • The request data address is 0 with a nonzero request data length.
X'0100 0610'	UERERRT1RPAD	One of the following conditions exists: • The reply parameter buffer address is not valid. • The reply parameter buffer length extends beyond the end of the reply parameter buffer. • The reply parameter buffer address is 0 with a nonzero reply parameter length.
X'0100 0612'	UERERRT1RDAD	One of the following conditions exists: • The reply data buffer address is not valid. • The reply data buffer length extends beyond the end of the reply data buffer. • The reply data buffer address is 0 with a nonzero reply data length.
X'0100 0616'	UERERRT1TOPV	The TopView environment is not supported. This return code is not used by the Personal Communications program.

Table 44. Type 1 Return Code Definitions and Descriptions (continued)

Hexadecimal Return Code	Constant Return Code	Description
X'0100 0622'	UERERRT1INV3270 d	Notification of 3270 screen update indicator is not valid. The Notification of 3270 screen update indicator must be set to X'00' (notify user of 3270 screen update) or X'FF' (suppress user notification of 3270 screen update) in the CPRB.
X'0100 0624'	UERERRT1INVCPRB	Incorrect CPRB segment. The CPRB address points to a truncated CPRB structure. Use a read/write data segment large enough to contain the entire CPRB structure.
X'0100 0802'	UERERRT1CNCL	The remote computer canceled the communication session while the request was being processed. You can cause this to happen by stopping the remote program with the F3 key in the emulator session. However, use of this value is not limited to user-initiated cancellation of the session. It is used any time SRPI receives notification from the host that the session is canceled while processing a request.
X'0100 0C00'	UERERRT1CONV	A system error occurred. Conversation with the host ended for one of the following reasons: • The host communication session is not active. • A link-level communication error occurred. • The system was unable to transmit data reliably to or from the host. For example, a sequence error occurred.
X'0100 0C02'	UERERRT1ISE	A system error occurred because of an internal software error in the SRPI router.
X'0100 0C04'	UERERRT1PROT	A system error occurred. This is a protocol violation error or a system software error in the SRPI router or the host.
X'0100 0C06'	UERERRT1SYIN	A system error occurred. The error is caused by system inconsistency. This is a system software error in the SRPI router.

Type 2 Return Code Definitions

Type 2 return codes have the following format: X'02xx yyzz'.

The 3 error-specific bytes consist of the following exception conditions from the acknowledge interchange unit:

- *xx* exception class

- *yy* exception code
- *zz* exception object

Note: No constants are supplied.

Type 3 Return Code Definitions

Type 3 return codes have the following format: X'03xx yyzz'.

The 3 error-specific bytes consist of the following exception conditions from the acknowledge interchange unit:

- *xx* exception class
- *yy* exception code
- *zz* exception object

The return code definitions and descriptions are listed in Table 45.

Table 45. Type 3 Return Code Definitions and Descriptions

Hexadecimal Return Code	Constant Return Code	Description
X'0304 1D00'	UERERRT3NORES	A resource required by the host SRPI router to process the request is not available. This might be a temporary condition.
X'0304 1E00'	UERERRT3NOSER	The server is unknown at the host.
X'0304 1F00'	UERERRT3UNSER	The server is not available at the host.
X'0304 2200'	UERERRT3TERMS	The server terminated in a normal fashion but did not send a reply.
X'0304 2300'	UERERRT3ABNDS	The server terminated abnormally and did not send a reply.

Class Definitions for Type 2 and Type 3

The exception classes are syntax, semantic, and process.

- **Syntax exception class**. This class reports violations of the transmission unit syntax rules (for example, omitting the server return code parameter: X'0202 1A08'). In general, a return code reporting a syntax exception indicates a system software error in the SRPI router or in the host.
- **Semantic exception class**. This class reports conflicting parameters (for example, an incorrect correlation value: X'0203 1B00'). In general, a return code reporting a semantic exception indicates a system software error in the SRPI router or in the host.
- **Process exception class**. This class reports exception conditions during request processing (for example, server unknown: X'0304 1E00').

The exception class definitions are listed in Table 46.

Table 46. Class Definitions for Type 2 and Type 3

Value	Definition
X'00' to X'01'	Reserved
X'02'	Syntax

Table 46. Class Definitions for Type 2 and Type 3 (continued)

Value	Definition
X'03'	Semantic
X'04'	Process
X'05' to X'FF'	Reserved

Exception Code Values for Type 2 and Type 3

The exception code defines a specific error condition and is required with every error. The exception code values are listed in Table 47.

Table 47. Exception Code Values for Type 2 and Type 3

Value	Definition
X'00'	Reserved
X'08'	Segmentation
X'0C'	Incorrect operand ID
X'0F'	Incorrect length
X'16'	Incorrect subfield type
X'18'	Incorrect subfield value
X'19'	Required operand missing
X'1A'	Required subfield missing
X'1B'	Correlation error
X'1C'	Data exceeds allowable maximum length
X'1D'	Resource not available
X'1E'	Server unknown
X'1F'	Server not available
X'20'	Parameter length
X'21'	Data length
X'22'	Normal termination
X'23'	Abnormal termination (server abend)
X'24'	Multiple occurrences of a subfield
X'25'	Multiple occurrences of operand

Note: All exception code values not specified in this table are reserved.

Exception Object Values for Type 2 and Type 3

The exception object defines the incorrect transmission unit object. An exception object is required with syntax errors. The exception object values are listed in Table 48.

Table 48. Exception Object Values for Type 2 and Type 3

Value	Definition
X'00'	Not specified
X'01'	Prefix

Table 48. Exception Object Values for Type 2 and Type 3 (continued)

Value	Definition
X'07'	Command operand
X'08'	Command subfields
X'1C'	Parameters operand
X'1D'	Data operand
X'13'	Suffix

Note: All exception object values not specified in this table are reserved.

Server Return Codes

A server return code is a doubleword (4-byte) return code supplied by the server program and is returned to the requester program. The contents and meaning of the return status are defined by the requester or the server. For information about server return codes, contact your host personnel or see one of the following manuals:

- *TSO/E Version 2 Guide to the Server-Requester Programming Interface*
- *IBM Programmer's Guide to the Server-Requester Programming Interface for VM/System Product*

Appendix E. DDE Functions in a 16-Bit Environment

This appendix describes DDE functions in 16-bit mode. This is useful information when you are migrating from 16-bit to 32-bit mode.

PC/3270 Windows mode and PC400 provide a dynamic data exchange (DDE) interface that allows applications to exchange data. The exchange of data between two Windows applications can be thought of as a conversation between a client and a server. The *client* initiates DDE conversations. The *server* in turn responds to the client. Personal Communications is a DDE server for the open sessions that Personal Communications are managing. For more information about DDE, refer to *Microsoft Windows Software Development Kit Guide to Programming*.

Note: If you use DDE functions with Visual Basic, see Chapter 7, "Using DDE Functions with a DDE Client Application", on page 273.

Personal Communications DDE Data Items in a 16-Bit Environment

Microsoft Windows DDE uses a three-level naming scheme to identify data items: application, topic, and item. Table 49 describes these levels.

Table 49. Naming Scheme for Data Items

Level	Description	Example
Application	A Windows task or a particular task of an application. In this book, the application is Personal Communications.	IBM3270
Topic	A specific part of an application.	SessionA
Item	A data object that can be passed in a data exchange. An item is an application-defined data item that conforms to one of the Windows clipboard formats or to a private, application-defined, clipboard format. For more information regarding Windows clipboard formats, refer to *Microsoft Windows Software Development Kit Guide to Programming*.	PS (presentation space)

Personal Communications supports IBM3270 IBM5250 as Windows DDE server.

You can use the following topics:

- System
- SessionA, SessionB, ..., SessionZ
- LUA_xxxx, LUB_xxxx, ..., LUZ_xxxx

In DDE, *atoms* identify application names, topic names, and data items. Atoms represent a character string that is reduced to a unique integer value. The character string is added to an atom table, which can be referred to for the value of the string associated with an atom. Atoms are created with the GlobalAddAtom function call. Refer to *Microsoft Windows Software Development Kit Guide to Programming* for more information about how to create and use atoms.

Using System Topic Data Items

Applications that provide a DDE interface should also provide a special topic SYSTEM. This topic provides a context for items of information that might be of general interest to an application. The SYSTEM topic for Personal Communications contains these associated data items:

Item	Function
Formats	Returns the list of clipboard formats (numbers) that Personal Communications is capable of rendering.
Status	Returns information about the status of each Personal Communications session.
SysCon	Returns the level of Personal Communications support and other system related values.
SysItems	Returns the list of data items that are available when connected to the Personal Communications system topic.
Topics	Returns the list of Personal Communications topics that are available.

Using Session Topic Data Items

For each Session topic, the following data items are supported:

Item	Function
CLOSE	Retrieves the window close requests.
EPS	Retrieves the session presentation space with additional data.
EPSCOND	Retrieves the presentation space service condition.
FIELD	Retrieves the field in the presentation space of the session.
KEYS	Retrieves the keystrokes.
MOUSE	Retrieves the mouse input.
OIA	Retrieves the operator information area status line.
PS	Retrieves the session presentation space.
PSCOND	Retrieves the session advise condition.
SSTAT	Retrieves the session status.
STRING	Retrieves the ASCII string data.
TRIMRECT	Retrieves the session presentation space within the current trim rectangle.

Using LU Topic Data Items (PC/3270 Only)

For each LU topic, the following data items are supported:

Item	Function
SF	Retrieves the destination/origin structured field data.
SFCOND	Retrieves the query reply data.

DDE Functions in a 16-Bit Environment

Table 50 lists the DDE functions that are available for use with Personal Communications .

Table 50. DDE Functions in a 16–Bit Environment

Function	PC/3270 Windows	PC400	Page
Find Field	Yes	Yes	342
Get Keystrokes	Yes	Yes	343
Get Mouse Input	Yes	Yes	344

Table 50. DDE Functions in a 16–Bit Environment (continued)

Function	PC/3270 Windows	PC400	Page
Get Number of Close Requests	Yes	Yes	347
Get Operator Information Area	Yes	Yes	348
Get Partial Presentation Space	Yes	Yes	349
Get Presentation Space	Yes	Yes	351
Get Session Status	Yes	Yes	353
Get System Configuration	Yes	Yes	354
Get System Formats	Yes	Yes	355
Get System Status	Yes	Yes	356
Get System SysItems	Yes	Yes	357
Get System Topics	Yes	Yes	358
Get Trim Rectangle	Yes	Yes	359
Initiate Session Conversation	Yes	Yes	359
Initiate Structured Field Conversation	Yes	No.	360
Initiate System Conversation	Yes	Yes	361
Put Data to Presentation Space	Yes	Yes	361
Search for String	Yes	Yes	362
Send Keystrokes	Yes	Yes	363
Session Execute Macro	Yes	Yes	364
Set Cursor Position	Yes	Yes	371
Set Mouse Intercept Condition	Yes	Yes	372
Set Presentation Space Service Condition	Yes	Yes	374
Set Session Advise Condition	Yes	Yes	376
Set Structured Field Service Condition	Yes	No	377
Start Close Intercept	Yes	Yes	378
Start Keystroke Intercept	Yes	Yes	379
Start Mouse Input Intercept	Yes	Yes	380
Start Read SF	Yes	No	383
Start Session Advise	Yes	Yes	385
Stop Close Intercept	Yes	Yes	386
Stop Keystroke Intercept	Yes	Yes	387
Stop Mouse Input Intercept	Yes	Yes	387
Stop Read SF	Yes	No	388
Stop Session Advise	Yes	Yes	389
Terminate Session Conversation	Yes	Yes	389
Terminate Structured Field Conversation	Yes	No	390
Terminate System Conversation	Yes	Yes	390
Write SF	Yes	No	391

Refer to “Summary of DDE Functions in a 16-Bit Environment” on page 403 for a summary of the 16-bit DDE functions.

Naming Conventions for Parameters

Most DDE parameter names and local variables. These variables have a prefix that indicates the general type of the parameter, followed by one or more words that describe the content of the parameter. Prefixes presented in this book are:

a Atom

c Character (a 1-byte value)

f Bit flags packed into a 16-bit integer

h 16-bit handle

p Short (16-bit) pointer

lp Long (32-bit) pointer

w Short (16-bit) unsigned integer

u Unsigned integer

sz Null-terminated character string

Find Field

3270	*5250*	*VT*
Yes	Yes	Yes

The **Find Field** function returns to the client the information of the field specified by the **Set Presentation Space Service Condition** function.

Note: The client must set the PS position by using the **Set Presentation Service Condition** function before using this function.

The client sends this following message to receive the field information.

```
PostMessage( hServerWnd,
             WM_DDE_REQUEST,
             hClientWnd,
             MAKELONG(cfFormat, aFIELD) );
```

where:

cfFormat Identifies the format for the field information. This must be CF_DSPTEXT.
aFIELD Identifies field data item.

The **Find Field** function supports a new format like Visual Basic. Using the new format, the **Find Field** function can find a field with specifying its type. The new format is:

```
FIELD (pos, type)
```

pos Position where Personal Communications starts to search a target field.
type Target field type. The field type are:

Type	Meaning
ƀƀ or Tƀ	This field.
Pƀ	The previous field, either protected or unprotected.
Nƀ	The next field, either protected or unprotected.
NP	The next protected field.
NU	The next unprotected field.
PP	The previous protected field.
PU	The previous unprotected field.

Note: The ƀ symbol represents a required blank.

Personal Communications Response

Personal Communications returns the following information of the field in a DDE data message,

- Start PS position
- Length
- Attribute value

```
WM_DDE_DATA(hData, aFIELD)
```

or responds with an ACK message containing status information.

```
WM_DDE_ACK(wStatus, aFIELD)
```

If Personal Communications cannot return the field information, one of the following status codes is returned in the low-order byte of the wStatus word:

Return Code	Explanation
1	PS position is not valid.
2	PS is unformatted.
6	The specified format is not valid.
9	A system error occurred.

Structure of the Field Information

Personal Communications returns the field information in the following structure:

```
typedef struct tagFINDFIELD
{
 unsigned unused:12;        // *** unused ***
 unsigned fResponse:1;      // TRUE = DDE_REQUEST response
 unsigned fRelease:1;       // TRUE = Client frees this data
 unsigned reserved:1;       // *** reserved ***
 unsigned fAckReq:1;        // TRUE = Client returns DDE_ACK
 int      cfFormat;         // Format of Field data CF_DSPTEXT
 unsigned char cAttribute;  // Attribute character
 unsigned uFieldStart;      // Field start offset
 unsigned uFieldLength;     // Field Length;
}  FINDFIELD, far *lpFINDFIELD;
```

Get Keystrokes

3270	*5250*	*VT*
Yes	Yes	Yes

The **Get Keystrokes** function returns to the client the keystrokes that are intercepted by the **Start Keystroke Intercept** function. The client sends the following message to receive the keystroke information.

```
PostMessage( hServerWnd,
             WM_DDE_REQUEST,
             hClientWnd,
             MAKELONG(cfFormat, aKEYS) );
```

where:

cfFormat Identifies the format for the keystroke information. This must be CF_DSPTEXT.

aKEYS Identifies keystroke data item.

Personal Communications Response

Personal Communications either returns the keystrokes in a DDE data message, or responds with one of these ACK messages containing status information:

- WM_DDE_DATA(hData, aKEYS)
- WM_DDE_ACK(wStatus, aKEYS)

If Personal Communications cannot return the keystroke information, one of the following status codes is returned in the low-order byte of the wStatus word:

Return Code	Explanation
2	No keystroke was intercepted.
6	The specified format is not valid.
9	A system error occurred.

Structure of the Keystroke Information

Personal Communications returns the keystroke information in the following structure:

```
typedef struct tagKEYSTROKE
{
 unsigned unused:12;        // *** unused ***
 unsigned fResponse:1;      // TRUE = DDE_REQUEST response
 unsigned fRelease:1;       // TRUE = Client frees this data
 unsigned reserved:1;       // *** reserved ***
 unsigned fAckReq:1;        // TRUE = Client returns DDE_ACK
 int      cfFormat;         // Format of keystroke data CF_DSPTEXT
 unsigned uTextType;        // Type of keystrokes
 unsigned char szKeyData[1];// Keystrokes
}  KEYSTROKE, far *lpKEYSTROKE;
```

The format for the keystrokes parameters is the same as for the **Session Execute Macro** function SENDKEY command.

The following key text types are supported:

```
WC_CHARACTER  0 // Pure text, no command
WC_TOKEN      1 // including commands
```

Get Mouse Input

3270	*5250*	*VT*
Yes	Yes	Yes

The **Get Mouse Input** function returns the latest mouse input intercepted by **Start Mouse Input Intercept** function to the client.

Note: The client must call the **Start Mouse Input Intercept** function before using this function.

The client sends the following command to receive the mouse input information.

```
PostMessage( hServerWnd,
             WM_DDE_REQUEST,
             hClientWnd,
             MAKELONG(cfFormat, aMOUSE) );
```

where:

cfFormat Identifies the format for the presentation space. Valid values are CF_TEXT or CF_DSPTEXT. The structure of the mouse input data, in these two formats, is shown below.

aMOUSE Identifies the mouse input as the item.

Personal Communications Response

Personal Communications either returns the mouse input data in a DDE data message, or responds with one of these ACK messages:

- WM_DDE_DATA(hData, aMOUSE)
- WM_DDE_ACK(wStatus, aMOUSE)

If Personal Communications cannot return the mouse input information, one of the following status codes is returned in the low-order byte of the wStatus word:

Return Code	Explanation
2	No mouse input information was intercepted.
6	The specified format is not valid.
9	A system error occurred.

Structure of the Mouse Input Information

If the format is CF_TEXT, Personal Communications returns the mouse input information in the following format:

```
typedef struct tagMOUSE_CF_TEXT
{
 unsigned      unused:12,       // **** Unused ****
 unsigned      fRespons:1,      // TRUE = DDE_REQUEST response
 unsigned      fRelease:1,      // TRUE = Client frees this data
 unsigned      reserved:1,      // **** Reserved ****
 unsigned      fAckReq:1;       // TRUE = Client returns DDE_ACK
 int           cfFormat;        // CF_TEXT
 unsigned char PSPos[4];        // PS position
 unsigned char Tab1[1];         // TAB character
 unsigned char PSRowPos[4];     // PS row position
 unsigned char Tab2[1];         // TAB character
 unsigned char PSColPos[4];     // PS columns position
 unsigned char Tab3[1];         // TAB character
 unsigned char PSSize[4];       // Size of the PS
 unsigned char Tab4[1];         // TAB character
 unsigned char PSRows[4];       // PS number of rows
 unsigned char Tab5[1];         // TAB character
 unsigned char PSCols[4];       // PS number of columns
 unsigned char Tab6[1];         // TAB character
 unsigned char ButtonType[1];   // Pressed button type
 unsigned char Tab7[1];         // TAB character
 unsigned char ClickType[1];    // Click type
 unsigned char Tab8[1];         // TAB character
 unsigned char ClickString[1];  // Retrieved string
} MOUSE_CF_TEXT, FAR *lpMOUSE_CF_TEXT;
```

The following table shows the values in the parameters:

Parameter Name	Meaning	Value
PSPos	PS offset of the position where mouse was clicked	0 ... (PSSize – 1)

Parameter Name	Meaning	Value
PSRowPos	Row number of the position where mouse was clicked	0 ... (PSRows – 1)
PSColPos	Column number of the position where mouse was clicked	0 ... (PSCols – 1)
PSSize	Size of the presentation space	
PSRows	Number of rows of presentation space	
PSCols	Number of columns of presentation space	
ButtonType	Type of the clicked mouse button	**L** Left button **M** Middle button **R** Right button
ClickType	Type of clicking	**S** Single click **D** Double click
ClickString	Retrieved string to which the mouse pointed	A character string terminated with a '\0'
Tab1–8	A tab character for delimiter	'\t'

If the format is CF_DSPTEXT, Personal Communications returns the mouse input information in the following format:

```
typedef struct tagMOUSE_CF_DSPTEXT
{
 unsigned      unused:12,         // **** Unused ****
 unsigned      fRespons:1,        // TRUE = DDE_REQUEST response
 unsigned      fRelease:1,        // TRUE = client frees the storage
 unsigned      reserved:1,        // **** Reserved ****
 unsigned      fAckReq:1;         // TRUE = client returns DDE_ACK
 int           cfFormat;          // CF_DSPTEXT
 unsigned      uPSPos;            // PS position
 unsigned      uPSRowPos;         // PS row position
 unsigned      uPSColPos;         // PS column position
 unsigned      uPSSize;           // Size of the presentation space
 unsigned      uPSRows;           // PS number of rows
 unsigned      uPSCols;           // PS number of columns
 unsigned      uButtonType;       // Pressed button type
 unsigned      uClickType;        // Click type
 unsigned char szClickString[1];  // Retrieved string
} MOUSE_CF_DSPTEXT, FAR *lpMOUSE_CF_DSPTEXT;
```

The following table shows the values in the parameters:

Parameter Name	Meaning	Value
uPSPos	PS offset of the position where mouse was clicked	0 ... (uPSSize – 1)
uPSRowPos	Row number of the position where mouse was clicked	0 ... (uPSRows – 1)
uPSColPos	Column number of the position where mouse was clicked	0 ... (uPSCols – 1)
uPSSize	Size of the presentation space	

Parameter Name	Meaning	Value
uPSRows	Number of rows of the presentation space	
uPSCols	Number of columns of the presentation space	
uButtonType	Type of the clicked mouse button	**0x0001** Left button **0x0002** Middle button **0x0003** Right button
uClickType	Type of clicking	**0x0001** Single click **0x0002** Double click
szClickString	Retrieved string that the mouse pointed to	A character string terminated with a '\0'

Get Number of Close Requests

3270	*5250*	*VT*
Yes	Yes	Yes

The **Get Number of Close Requests** function returns to the client the number of the close requests that are intercepted by the **Start Close Intercept** function. The client sends the following message to receive the number of the close requests.

```
PostMessage( hServerWnd,
             WM_DDE_REQUEST,
             hClientWnd,
             MAKELONG(cfFormat, aCLOSE) );
```

where:

cfFormat Identifies the format for the close intercept information. This must be CF_DSPTEXT.

aCLOSE Identifies close intercept data item.

Personal Communications Response

Personal Communications either returns the number of the close requests in a DDE data message, or responds with one of these ACK messages:

- WM_DDE_DATA(hData, aCLOSE)
- WM_DDE_ACK(wStatus, aCLOSE)

If Personal Communications cannot return the close intercept information, one of the following status codes is returned in the low-order byte of the wStatus word:

Return Code	Explanation
6	The specified format is not valid.
9	A system error occurred.

Structure of the Number of the Close Requests Information

Personal Communications returns the close intercept information in the following structure:

```
typedef struct tagCLOSEREQ
{
 unsigned unused:12;        // *** unused ***
 unsigned fResponse:1;      // TRUE = DDE_REQUEST response
 unsigned fRelease:1;       // TRUE = Client frees this data
 unsigned reserved:1;       // *** reserved ***
 unsigned fAckReq:1;        // TRUE = Client returns DDE_ACK
 int      cfFormat;         // Format of close intercept data CF_DSPTEXT
 unsigned uCloseReqCount;   // Number of the close requests.
}  CLOSEREQ, far *lpCLOSEREQ;
```

Get Operator Information Area

3270	*5250*	*VT*
Yes	Yes	Yes

The Get Operator Information Area (OIA) function returns a copy of the OIA to the client. The client sends the following message to request the OIA.

```
PostMessage( hServerWnd,
             WM_DDE_REQUEST,
             hClientWnd,
             MAKELONG(cfFormat, aOIA) );
```

where:

cfFormat Identifies the format for the OIA. For the OIA this format must be CF_DSPTEXT.

aOIA Identifies the operator information area as the item.

Personal Communications Response

Personal Communications either returns the OIA in a DDE data message, or responds with one of these ACK messages:

- WM_DDE_DATA(hData, aOIA)
- WM_DDE_ACK(wStatus, aOIA)

If Personal Communications cannot return the OIA, one of the following status codes is returned in the low-order byte of the wStatus word:

Return Code	Explanation
6	The specified format is not valid.
9	A system error occurred.

Structure of the Operator Information Area

Personal Communications returns the operator information area in the following structure:

```
typedef struct tagOIADATA
{
 unsigned unused:12;        // *** unused ***
 unsigned fResponse:1;      // TRUE = DDE_REQUEST response
 unsigned fRelease:1;       // TRUE = Client frees this data
 unsigned reserved:1;       // *** reserved ***
 unsigned fAckReq:1;        // TRUE = Client returns DDE_ACK
 int  cfFormat;             // Format of OIA data CF_DSPTEXT
}  OIADATA, far *lpOIADATA;
```

Get Partial Presentation Space

3270	*5250*	*VT*
Yes	Yes	Yes

The **Get Partial Presentation Space** function returns all or part of the session presentation space to the client.

Note: The client must set the start PS position and the length (or set the EOF flag) by using the **Set Presentation Space Service Condition** function before using this function.

The client sends the following command to get the presentation space.

```
PostMessage( hServerWnd,
             WM_DDE_REQUEST,
             hClientWnd,
             MAKELONG(cfFormat, aEPS) );
```

where:

cfFormat Identifies the format for the presentation space. Valid values are CF_TEXT or CF_DSPTEXT. The structure of the presentation space, in these two formats, is shown below.

aEPS Identifies presentation space atom as the item.

Personal Communications Response

Personal Communications either returns the presentation space data, or responds with one of these ACK messages containing an error code in the low-order byte of the wStatus word:

- WM_DDE_DATA(hData, aEPS)
- WM_DDE_ACK(wStatus, aEPS)

If Personal Communications cannot return the presentation space, one of the following status codes is returned in the low-order byte of the wStatus word:

Return Code	Explanation
1	No prior **Set Presentation Space Service Condition** function was called, or an incorrect parameter was set.
6	The specified format is not valid.
9	A system error occurred.

Structure of the Presentation Space

Personal Communications returns the part of the presentation space in the format specified in the **Get Partial Presentation Space** request.

If the format is CF_DSPTEXT, Personal Communications returns the presentation space in the following format:

```
typedef struct tagEPS_CF_DSPTEXT
{
 unsigned Unused:12,           // Unused
 unsigned fResponse:1,         // TRUE = DDE_REQUEST response
 unsigned fRelease:1,          // TRUE = client frees the storage
 unsigned reserved:1,          // **** Reserved ****
 unsigned fAckReq:1,           // TRUE = DDE_ACK requested
```

```
 int      cfFormat;            // Format data is rendered in
 unsigned uPSPosition;         // Start PS position
 unsigned uPSLength;           // Length of the part of the PS
 unsigned uPSRows;             // PS number of rows
 unsigned uPSCols;             // PS number of columns
 unsigned uPSOffset;           // Offset to the presentation space
 unsigned uFieldCount;         // Number of fields
 unsigned uFieldOffset;        // Offset to the field array
 unsigned char PSData[1];      // PS and Field list Array
} EPS_CF_DSPTEXT, FAR *lpEPS_CF_DSPTEXT;

typedef struct tagPSFIELDS
{
 unsigned char cAttribute;     // Attribute Character
 unsigned uFieldStart;         // Field start offset
 unsigned uFieldLength;        // Field Length
} PSFIELDS, FAR *lpPSFIELDS;
```

Note: The following examples show how to obtain long pointers to the PS and the PSFIELDS array.

```
  lpps = (lp_EPS_CF_DSPTEXT) lpEPS_CF_DSPTEXT->PSData
       + lpEPS_CF_DSPTEXT->uPSOffset;
  lppsfields = (lpPSFIELDS) lpEPS_CF_DSPTEXT->PSData
             + lpEPS_CF_DSPTEXT->uFieldOffset;
```

If the format is CF_TEXT, Personal Communications returns the part of the presentation space in the following format:

```
typedef struct tagEPS_CF_TEXT
{
 unsigned      Unused:12;       // **** Unused ****
 unsigned      fResponse:1;     // TRUE = DDE_REQUEST response
 unsigned      fRelease:1;      // TRUE = Client frees this data
 unsigned      reserved:1;      // **** Reserved ****
 unsigned      fAckReq:1;       // TRUE = Client returns DDE_ACK
 int           cfFormat;        // Format of the data
 unsigned char PSPOSITION[4];   // Start PS position
 unsigned char Tab1[1];         // Tab character
 unsigned char PSLENGTH[4];     // Length of the part of the PS
 unsigned char Tab2[1];         // Tab character
 unsigned char PSROWS[4];       // Number of rows in the Partial PS
 unsigned char Tab3[1];         // Tab character
 unsigned char PSCOLS[4];       // Number of columns in the PS
 unsigned char Tab4[1];         // Tab character
 unsigned char PS[1];           // PS
} EPS_CF_TEXT, FAR *lpEPS_CF_TEXT;
```

Following the PS in the buffer is the following additional structure of fields that compose the field list.

```
typedef struct tagFL_CF_TEXT
{
 unsigned char Tab5[1];       // Tab character
 unsigned char PSFldCount[4]; // Number of fields in the PS
 unsigned char Tab6[1];       // Tab character
 PS_FIELD      Field[1];      // Field List Array
} FL_CF_TEXT, FAR *lpFL_CF_TEXT;

typedef struct tagPS_FIELD
{
 unsigned char FieldStart[4];
 unsigned char TabF1[1];
 unsigned char FieldLength[4];
```

```
 unsigned char TabF2[1];
 unsigned char Attribute;
 unsigned char TabF3[1[;
} PS_FIELD, FAR *lpPS_FIELD;
```

Note: The following examples show how to obtain long pointers to the PS and the PS_FIELD array.

```
  lpps = lpEPS_CF_TEXT->PS;
  lpps_field = (lpPS_FIELD) lpEPS_CF_TEXT->PS
             + atoi(lpEPS_CF_TEXT->PSLENGTH)
             + ((atoi(lpEPS_CF_TEXT->PSROWS) - 1) * 2) // CR/LF
             + 1 + 1 + 4 + 1;   // Tabs + size of field count
```

Get Presentation Space

3270	*5250*	*VT*
Yes	Yes	Yes

The **Get Presentation Space** function returns the session presentation space to the client. The client sends the following command to get the presentation space.

```
PostMessage( hServerWnd,
             WM_DDE_REQUEST,
             hClientWnd,
             MAKELONG(cfFormat, aPS) );
```

where:

cfFormat Identifies the format for the presentation space. Valid values are CF_TEXT or CF_DSPTEXT. The structure of the presentation space, in these two formats, is shown below.

aPS Identifies presentation space atom as the item.

Personal Communications Response

Personal Communications either returns the presentation space and a list of the fields that comprise the presentation space, or responds with one of these ACK messages containing an error code in the low-order byte of the wStatus word:

- WM_DDE_DATA(hData, aPS)
- WM_DDE_ACK(wStatus, aPS)

If Personal Communications cannot return the presentation space, one of the following status codes is returned in the low-order byte of the wStatus word:

Return Code	Explanation
6	The specified format is not valid.
9	A system error occurred.

Structure of the Presentation Space

Personal Communications returns the presentation space in the format specified in the **Get Presentation Space** request.

If the format is CF_DSPTEXT, Personal Communications returns the presentation space in the following format:

```
typedef struct tagPS_CF_DSPTEXT
{
 unsigned Unused:12,           // Unused
 unsigned fResponse:1,         // TRUE = DDE_REQUEST response
 unsigned fRelease:1,          // TRUE = client frees the storage
 unsigned reserved:1,          // **** Reserved ****
 unsigned fAckReq:1,           // TRUE = DDE_ACK requested
 int      cfFormat;            // Format data is rendered in
 unsigned uPSSize;             // Size of the presentation space
 unsigned uPSRows;             // PS number of rows
 unsigned uPSCols;             // PS number of columns
 unsigned uPSOffset;           // Offset to the presentation space
 unsigned uFieldCount;         // Number of fields
 unsigned uFieldOffset;        // Offset to the field array
 unsigned char PSData[1];      // PS and Field list Array
} PS_CF_DSPTEXT, FAR *lpPS_CF_DSPTEXT;

typedef struct tagPSFIELDS
{
 unsigned char cAttribute;     // Attribute Character
 unsigned uFieldStart;         // Field start offset
 unsigned uFieldLength;        // Field Length
} PSFIELDS, FAR *lpPSFIELDS;
```

Note: The following examples show how to obtain long pointers to the PS and the PSFIELDS array.

```
  lpps = (lp_PS_CF_DSPTEXT) lpPS_CF_DSPTEXT->PSData
       + lpPS_CF_DSPTEXT->uPSOffset;
  lppsfields = (lpPSFIELDS) lpPS_CF_DSPTEXT->PSData
             + lpPS_CF_DSPTEXT->uFieldOffset;
```

If the format is CF_TEXT, Personal Communications returns the presentation space in the following format:

```
typedef struct tagPS_CF_TEXT
{
 unsigned      Unused:12;       // **** Unused ****
 unsigned      fResponse:1;     // TRUE = DDE_REQUEST response
 unsigned      fRelease:1;      // TRUE = Client frees this data
 unsigned      reserved:1;      // **** Reserved ****
 unsigned      fAckReq:1;       // TRUE = Client returns DDE_ACK
 int           cfFormat;        // Format of the data
 unsigned char PSSIZE[4];       // Size of the PS
 unsigned char Tab1[1];         // Tab character
 unsigned char PSROWS[4];       // Number of rows in the PS
 unsigned char Tab2[1];         // Tab character
 unsigned char PSCOLS[4];       // Number of Cols in the PS
 unsigned char Tab3[1];         // Tab character
 unsigned char PS[1];           // PS
} PS_CF_TEXT, FAR *lpPS_CF_TEXT;
```

Following the PS in the buffer is the following additional structure of fields that compose the field list.

```
typedef struct tagFL_CF_TEXT
{
 unsigned char Tab4[1];       // Tab character
 unsigned char PSFldCount[4]; // Number of fields in the PS
 unsigned char Tab5[1];       // Tab character
 PS_FIELD      Field[1];      // Field List Array
} FL_CF_TEXT, FAR *lpFL_CF_TEXT;

typedef struct tagPS_FIELD
{
 unsigned char FieldStart[4];
 unsigned char TabF1[1];
```

```
 unsigned char FieldLength[4];
 unsigned char TabF2[1];
 unsigned char Attribute;
 unsigned char TabF3[1];
} PS_FIELD, FAR *lpPS_FIELD;
```

Note: The following example shows how to obtain long pointers to the PS and the PS_FIELD array.

```
lpps = lpPS_CF_TEXT->PS;
lpps_field = (lpPS_FIELD) lpPS_CF_TEXT->PS
           + atoi(lpPS_CF_TEXT->PSSIZE)
           + ((atoi(lpPS_CF_TEXT->PSROWS) - 1) * 2) // CR/LF
           + 1 + 1 + 4 + 1;   // Tabs + size of field count
```

Get Session Status

3270	*5250*	*VT*
Yes	Yes	Yes

The **Get Session Status** function returns the status of the connected session. The client sends the following message to request session status:

```
PostMessage( hServerWnd,
             WM_DDE_REQUEST,
             hClientWnd,
             MAKELONG(cfFormat, aSSTAT) );
```

where:

cfFormat Identifies the DDE format for the status information. The value used is CF_TEXT.

aSSTAT Identifies session status as the data item requested.

Personal Communications Response

Personal Communications either returns the session status in a DDE data message, or responds with one of these ACK messages containing status information:

- WM_DDE_DATA(hData, aSSTAT)
- WM_DDE_ACK(wStatus, aSSTAT)

If Personal Communications cannot return the session status, one of the following status codes is returned in the low-order byte of the wStatus word:

Return Code	Explanation
6	The specified format is not valid.
9	A system error occurred.

Format of Status Information

Personal Communications returns the session status as text in CF_TEXT format. The following fields are returned with the following possible values:

Fields	Returned values	Description
Status	Closed, Invisible, Maximized, Minimized, Normal	The window is in one of these states.

Fields	Returned values	Description
Usage	DDE, User	The session is connected in either a DDE session or a user session.
ScreenX	NN	Defines the horizontal size of the screen.
ScreenY	NN	Defines the vertical size of the screen.
CursorX	NN	Defines the horizontal position of the cursor. (0 ... ScreenX – 1)
CursorY	NN	Defines the vertical position of the cursor. (0 ... ScreenY – 1)
TrimRect Status	Closed, Moved, Sized	The current status of the trim rectangle.
Trim Rectangle X1	N	The top-left corner X position of the trim rectangle in character coordinates.
Trim Rectangle Y1	N	The top-left corner Y position of the trim rectangle in character coordinates.
Trim Rectangle X2	N	The lower-right corner X position of the trim rectangle in character coordinates.
Trim Rectangle Y2	N	The lower-right corner Y position of the trim rectangle in character coordinates.
Session Presentation Space Status	N	The current status of the presentation space. The following values are possible: **0:** The presentation space is unlocked. **4:** The presentation space is busy. **5:** The presentation space is locked.
Session Window Handle	XXXX	Window handle of the session.

Notes:

1. The status of each field is updated each time the status is requested.
2. A new field might be added in a future version of Personal Communications.

Get System Configuration

3270	*5250*	*VT*
Yes	Yes	Yes

The **Get System Configuration** function returns the level of Personal Communications support and other system-related values. Most of this information is for use by a service coordinator when a customer calls the IBM Support Center after receiving a system error.

```
PostMessage( hServerWnd,
             WM_DDE_REQUEST,
             hClientWnd,
             MAKELONG(cfFormat, aSYSCON) );
```

where:

cfFormat Identifies the DDE format for the data item requested. The value used is CF_TEXT.

aSYSCON Identifies system configuration as the data item requested.

Personal Communications Response

Personal Communications either returns the system configuration data item in a DDE DATA message, or responds with one of these ACK messages containing status information:

- WM_DDE_DATA(hData, aSYSCON)
- WM_DDE_ACK(wStatus, aSYSCON)

If Personal Communications cannot return the system configuration, a DDE ACK message will be returned with an error code in the low-order byte of the wStatus word:

```
WM_DDE_ACK(wStatus, aSYSCON)
```

Return Code	Explanation
9	A system error occurred.

Format of System Configuration information

Personal Communications returns the system configuration as text in CF_TEXT format. The following fields are returned with the following possible values:

Fields	Returned values	Description
Version	N	The version of Personal Communications
Level	NN	The level of Personal Communications
Reserved	XXXXXX	Reserved
Reserved	XXXX	Reserved
Monitor Type	MONO, CGA, EGA, VGA, XGA	Type of the monitor
Country Code	NNNN	Country code used with 3270 or 5250

Get System Formats

3270	*5250*	*VT*
Yes	Yes	Yes

The Get System Formats function returns the list of Windows clipboard formats supported by Personal Communications. The client application sends the following message to retrieve the format list supported by Personal Communications:

```
PostMessage( hServerWnd,
             WM_DDE_REQUEST,
             hClientWnd,
             MAKELONG(cfFormat, aFORMATS) );
```

where:

cfFormat Identifies the DDE format for the data item requested. The value used is CF_TEXT.

aFORMATS Identifies formats as the data item requested.

Personal Communications Response

Personal Communications returns the list of supported Windows clipboard formats in CF_TEXT format in a DDE DATA message.

```
WM_DDE_DATA(hData, aFORMATS)
```

The following Windows Clipboard formats are supported by Personal Communications:

- CF_TEXT
- CF_DSPTEXT

If Personal Communications cannot return the formats data item, a DDE ACK message is returned with an error code in the low-order byte of the wStatus word:

```
WM_DDE_ACK(wStatus, aFORMATS)
```

Return Code	Explanation
9	A system error occurred.

Get System Status

3270	*5250*	*VT*
Yes	Yes	Yes

The **Get System Status** function returns the status of each 3270 or 5250

```
PostMessage( hServerWnd,
             WM_DDE_REQUEST,
             hClientWnd,
             MAKELONG(cfFormat, aSTATUS) );
```

where:

cfFormat Identifies the DDE format for the data item requested. The value used is CF_TEXT.

aSTATUS Identifies status as the data item requested.

Personal Communications Response

Personal Communications returns the status data item in CF_TEXT format in a DDE DATA message:

```
WM_DDE_DATA(hData, aSTATUS)
```

For each opened session, Personal Communications returns a line of status information. Each line contains a series of fields with the following range of values:

Fields	Range of values	Description
Session ID	A, B, ..., Z	The short ID of the session.
Host Type	370, 400	The host system currently supported by Personal Communications.
Emulation Type	3270, 5250	The emulation type supported by Personal Communications.
Session Status	Closed, Invisible, Normal, Minimized, Maximized	The current status of the session's window.

If Personal Communications cannot return the status data item, a DDE ACK message is returned with an error code in the low-order byte of the wStatus word:

```
WM_DDE_ACK(wStatus, aSTATUS)
```

Return Code	Explanation
9	A system error occurred.

Get System SysItems

3270	*5250*	*VT*
Yes	Yes	Yes

Personal Communications supports the DDE system topic so that a client application can connect to the system topic and retrieve information about Personal Communications and the status of the sessions that Personal Communications is managing.

The **Get System SysItems** function returns the list of data items available in the Personal Communications system topic. The client application sends the following message to get the system topic data items:

```
PostMessage( hServerWnd,
             WM_DDE_REQUEST,
             hClientWnd,
             MAKELONG(cfFormat, aSYSITEMS) );
```

where:

cfFormat Identifies the DDE format for the data item requested. The value used is CF_TEXT.

aSYSITEMS Identifies SysItems as the data item requested.

Personal Communications Response

Personal Communications returns the list of system topic data items in CF_TEXT format in a DDE DATA message.

```
WM_DDE_DATA(hData, aSYSITEMS)
```

The following data items are supported by Personal Communications:

- SysItems
- Topics
- Status
- Formats
- SysCon

If Personal Communications cannot return the system data items, a DDE ACK message is returned with an error code in the low-order byte of the wStatus word:

```
WM_DDE_ACK(wStatus, aSYSITEMS)
```

Return Code	Explanation
9	A system error occurred.

Get System Topics

3270	*5250*	*VT*
Yes	Yes	Yes

The **Get System Topics** function returns the list of active DDE topics currently supported by Personal Communications. The client application sends the following message to the system topic to retrieve the list of topics that are currently active:

```
PostMessage( hServerWnd,
             WM_DDE_REQUEST,
             hClientWnd,
             MAKELONG(cfFormat, aTOPICS) );
```

where:

cfFormat Identifies the DDE format for the data item requested. The value used is CF_TEXT.

aTOPICS Identifies topics as the data item requested.

Personal Communications Response

Personal Communications returns the list of DDE topics in CF_TEXT format in a DDE DATA message.

```
WM_DDE_DATA(hData, aTOPICS)
```

The following topics are supported by Personal Communications:

- System – System Topic
- SessionA – Session A Topic

  ⋮
- SessionZ – Session Z Topic

Note: The actual number of session topics supported depends on the number of sessions currently opened. The client program should always query the topics data item of the system topic to obtain the list of sessions currently opened.

If Personal Communications cannot return the list of topics, a DDE ACK message is returned with an error code in the low-order byte of the wStatus word:

```
WM_DDE_ACK(wStatus, aTOPICS)
```

Return Code	Explanation
9	A system error occurred.

Get Trim Rectangle

3270	*5250*	*VT*
Yes	Yes	Yes

The **Get Trim Rectangle** function returns to the client the area of the presentation space that is within the current trim rectangle. The client sends the following message to receive the trim rectangle.

```
PostMessage( hServerWnd,
             WM_DDE_REQUEST,
             hClientWnd,
             MAKELONG(cfFormat, aTRIMRECT) );
```

where:

cfFormat Identifies the format for the trim rectangle. This is CF_TEXT.
aTRIMRECT Identifies trim rectangle as the data item requested.

Personal Communications Response

Personal Communications either returns trim rectangle in a DDE data message, or responds with one of these ACK messages:

- WM_DDE_DATA(hData, aTRIMRECT)
- WM_DDE_ACK(wStatus, aTRIMRECT)

If Personal Communications cannot return the trim rectangle, one of the following status codes is returned in the low-order byte of the wStatus word:

Return Code	Explanation
6	The specified format is not valid.
9	A system error occurred.

Initiate Session Conversation

3270	*5250*	*VT*
Yes	Yes	Yes

The **Initiate Session Conversation** function connects a client application to an available session of Personal Communications. Once a session conversation has been established, the session is reserved for exclusive use by the client until the conversation is terminated.

The client application sends the following message to initiate a DDE conversation with a session:

```
SendMessage( -1,
             WM_DDE_INITIATE,
             hClientWnd,
             MAKELONG(aIBM327032, aSessionN) );
```

where:

aIBM327032 Identifies the application atom. The string used to create atom aIBM3270 is IBM3270. In the PC400, the application atom is aIBM5250 and the string IBM5250 is used to create it.

aSessionN Identifies the topic atom. The string used to create atom aSessionN is either NULL or Session appended with the session ID A, B, ..., Z.

Personal Communications Response

If a specific topic is selected and Personal Communications can support a conversation with the client application, Personal Communications acknowledges the INITIATE transaction with:

```
WM_DDE_ACK(aIBM327032, aSessionN)
```

If a topic is not selected (aSessionN = NULL), Personal Communications responds by acknowledging all topics that are currently available:

```
WM_DDE_ACK(aIBM327032, aSystem)
WM_DDE_ACK(aIBM327032, aSessionA)
⋮
WM_DDE_ACK(aIBM327032, aSessionZ)
```

The client application selects the conversation it wishes to communicate with from the returned list of topics and terminates all other unwanted conversations.

Initiate Structured Field Conversation

3270	*5250*	*VT*
Yes	Yes	Yes

The **Initiate Structured Field** Conversation function connects a client application and a host application. This allows the applications to send data to each other and to receive data from each other.

The client sends the following command to initiate a structured field conversation:

```
SendMessage( -1,
             WM_DDE_INITIATE,
             hClientWnd,
             MAKELONG(aIBM3270, aLUN_xxxx) );
```

where:

aIBM3270 Identifies the application atom.

aLUN_xxxx Identifies the topic atom. The string used to create atom aLUN_xxxx is LU appended with the session ID A, B, ..., Z, appended with an underscore (_), and appended with the user-defined string of any length.

PC/3270 Response

If PC/3270 can support a structured field conversation with the client application, it returns an acknowledgment message with the following parameter:

```
WM_DDE_ACK(aIBM3270, aLUN_xxxx)
```

Initiate System Conversation

3270	*5250*	*VT*
Yes	Yes	Yes

The **Initiate System Conversation** function connects a client application to the system conversation. Only one client can be connected to the system conversation at a given time. The client sends the following command to initiate a system conversation:

```
SendMessage( -1,
             WM_DDE_INITIATE,
             hClientWnd,
             MAKELONG(aIBM327032, aSystem) );
```

where:

aIBM327032 Identifies the application atom.
aSystem Identifies the topic atom.

Personal Communications Response

If Personal Communications can support a system topic conversation with the client application, it returns an acknowledgment message with the following parameters:

```
WM_DDE_ACK(aIBM327032, aSystem)
```

Put Data to Presentation Space

3270	*5250*	*VT*
Yes	Yes	Yes

The **Put Data to Presentation Space** function sends an ASCIIZ data string to be written into the host presentation space at the location specified by the calling parameter. The client sends the following message to the session to send the string.

```
PostMessage( hServerWnd,
             WM_DDE_POKE,
             hClientWnd,
             MAKELONG(hData, aEPS) );
```

where:

hData Identifies a handle to a Windows global memory object that contains the string to be sent to the session. The global memory object contains the following structure:

```
typedef struct tagPutString
{
 unsigned unused:13;              // ** unused **
 unsigned fRelease:1;             // Session frees memory
 unsigned freserved:2;            // ** reserved **
 int      cfFormat;               // Always CF_DSPTEXT
 unsigned uPSStart;               // PS Position
 unsigned uEOFflag;               // EOF effective switch
 char     szStringData[1];        // String Data
} PUTSTRING, FAR *lpPUTSTRING;
```

These values are valid at the uEOFflag field:

```
WC_EFFECTEOF   0 // The string is truncated at EOF.
WC_UNEFFECTEOF 1 // The string is not truncated at EOF.
```

aEPS Identifies the presentation space atom as the item.

Personal Communications Response

Personal Communications receives the string data and sends them to the presentation space, and returns a positive ACK message.

If the presentation space does not accept the string data, Personal Communications returns a negative ACK message containing one of the following status codes in the low-order byte of the wStatus word:

```
WM_DDE_ACK(wStatus, aEPS)
```

Return Code	Explanation
1	PS position is not valid.
2	Length is not valid.
3	The value of EOF flag is not valid.
5	Input to the target PS was inhibited.
6	The specified format is not valid.
7	The string was truncated (successful putting).
9	A system error occurred.

Search for String

3270	*5250*	*VT*
Yes	Yes	Yes

This function allows a client application to examine the presentation space for a specified string in a specified area.

Note: The client must set the start PS position, search direction, a string to be searched, and EOF flag by using the **Set Presentation Space Service Condition** function before using this function.

The client sends the following message to search for the string.

```
PostMessage( hServerWnd,
             WM_DDE_REQUEST,
             hClientWnd,
             MAKELONG(cfFormat, aSTRING) );
```

where:

cfFormat Identifies the format for the search information. This is CF_DSPTEXT.
aSTRING Identifies the search data item.

Personal Communications Response

Personal Communications returns the start position of the string in a DDE data message if the string was found in the specified area:

- WM_DDE_DATA(hData, aSTRING)
- WM_DDE_ACK(wStatus, aSTRING)

If Personal Communications cannot return the start position of the string, one of the following status codes is returned in the low-order byte of the wStatus word:

Return Code	Explanation
1	PS position is not valid or the string is too long.
2	The string cannot be found.
6	The specified format is not valid.
9	A system error occurred.

Structure of the Search Information

Personal Communications returns the Search information in the following structure:

```
typedef struct tagSEARCH
{
 unsigned unused:12;        // *** unused ***
 unsigned fResponse:1;      // TRUE = DDE_REQUEST response
 unsigned fRelease:1;       // TRUE = Client frees this data
 unsigned reserved:1;       // *** reserved ***
 unsigned fAckReq:1;        // TRUE = Client returns DDE_ACK
 int      cfFormat;         // Format of Search data CF_DSPTEXT
 unsigned uFieldStart;      // String start offset
}  SEARCH, far *lpSEARCH;
```

Send Keystrokes

3270	*5250*	*VT*
Yes	Yes	Yes

The **Send Keystrokes** function sends keystrokes to the connected session. The client sends the following message to the session to send keystrokes.

```
PostMessage( hServerWnd,
             WM_DDE_POKE,
             hClientWnd,
             MAKELONG(hData, aKEYS) );
```

where:

hData Identifies a handle to a Windows global memory object that contains the keystrokes to be sent to the session. The global memory object contains the following structure:

```
typedef struct tagKeystrokes
{
 unsigned unused:13;              // ** unused **
 unsigned fRelease:1;             // Session frees memory
 unsigned freserved:2;            // ** reserved **
 int      cfFormat;               // Always CF_DSPTEXT
 unsigned uTextType;              // Type of keystrokes
 unsigned uRetryCount;            // Retry count 1 .. 16
 unsigned char szKeyData[1];      // Keystrokes
} KEYSTROKES, FAR *lpKEYSTROKES;
```

The following key text types are supported:

```
WC_PURETEXT   0 // Pure text, no AID, or included HLLAPI
                // commands
WC_HLLAPITEXT 1 // Text, including HLLAPI tokens
```

Note: If the keystrokes are pure text then specifying WC_PURETEXT will transfer the keystrokes to the host in the fastest possible manner. If WC_HLLAPITEXT is specified then the keystroke data can contain HLLAPI commands interspersed with the text.

aKEYS Identifies keystrokes as the item.

Personal Communications Response

Personal Communications receives the keystrokes and sends them to the presentation space. If the presentation space does not accept the keystrokes, a reset is sent to the presentation space and the keystrokes are sent again. This procedure continues until the presentation space accepts the keystrokes or the retry count is reached. If Personal Communications cannot send the keystrokes to the host, Personal Communications returns a negative ACK message containing one of the following status codes in the low-order byte of the wStatus word. Otherwise, Personal Communications returns a positive ACK message signalling the keystrokes have been sent.

```
WM_DDE_ACK(wStatus, aKEYS)
```

Return Code	Explanation
1	Retry count is not valid.
2	Type of key strokes is not valid.
6	The specified format is not valid.
9	A system error occurred.

Session Execute Macro

3270	*5250*	*VT*
Yes	Yes	Yes

You can issue commands and macros with the **DDE_EXECUTE** function. The **DDE_EXECUTE** function passes command strings to Personal Communications.

The command strings must conform to DDE specifications. Refer to *Microsoft Windows Software Development Kit Guide to Programming* for more information about the DDE command syntax.

The client sends the following command to issue a **DDE_EXECUTE** function.

```
PostMessage ( hServerWnd,
              WM_DDE_EXECUTE,
              hClientWnd,
              MAKELONG(NULL, hCommands) );
```

where:

hCommands
: Identifies a handle to a Windows global memory object containing Personal Communications commands. For a list of commands you can issue, see "Issuing Commands with the Session Execute Macro Function".

Personal Communications Response

If Personal Communications can process the command string, Personal Communications returns an ACK message containing positive status information to the client. If Personal Communications cannot perform the command string, Personal Communications returns an ACK message containing this error code in the low-order word of the wStatus word:

Return Code	Explanation
9	A system error occurred.

Issuing Commands with the Session Execute Macro Function

You can issue the following commands with the **Session Execute Macro** function:

- WINDOW
- KEYBOARD
- SEND
- RECEIVE
- SENDKEY
- WAIT

Use a separate DDE_EXECUTE message for each command.

Note:

- Enclose values that contain nonalphanumeric characters or blanks in double quotation marks ("*value value*").
- To include a double quotation mark within a string, type it twice (for example, this is a double quotation mark:"").
- The maximum length for any command is 255 characters.

WINDOW Command

```
[WINDOW(action[, "name"])]
```

Performs window actions, where:

```
action = HIDE|RESTORE|MAXIMIZE|MINIMIZE|
         SHOW|CNGNAME
name = LT name or Switch List Entry name
```

Note: *name* should be specified when CNGNAME is specified at *action*. If *name* is a NULL string, the default caption will be displayed.

KEYBOARD Command

```
[KEYBOARD(action)]
```

Enables or disables the session keyboard, including the mouse, where:

```
action= LOCK|UNLOCK
```

SEND Command

```
[SEND("pcfilename","hostfilename","options")]
```

Sends files to the host, where:

```
pcfilename = [path]filename[.ext]
hostfilename =
  For VM system:
    filename filetype[filemode]
  For MVS system:
     [']filename[(membername)]['] 
  For CICS system:
  For OS/400 system:
    library name filename member name
```

options includes any combination of the following file transfer options: MVS, VM, CICS, QUIET, OS/400, and emulation-specific transfer options, separated by spaces.

Refer to *Personal Communications Version 5.7 Administrator's Reference* for more information about the transfer options.

RECEIVE Command

```
[RECEIVE("pcfilename","hostfilename","options")]
```

Receives files from the host, where:

```
pcfilename = [path]filename[.ext]
hostfilename =
  For VM system:
    filename filetype[filemode]
  For MVS system:
     [']filename[(membername)]['] 
  For CICS system:
  For OS/400 system:
    library name filename member name
```

options includes any combination of the following file transfer options: MVS, VM, CICS, QUIET, OS/400, and emulation-specific transfer options, separated by spaces.

Refer to *Personal Communications Version 5.7 Administrator's Reference* for more information about the transfer options.

SENDKEY Command

`[SENDKEY(token,token)]`

Sends keystrokes to Personal Communications, where:

token = text string|command|macro macroname

Note:

- Text strings are enclosed in double quotation marks.
- Macros are prefixed with "macro".
- The argument string for SENDKEY must be 255 characters or less.
- The following commands are supported.

Table 51. SENDKEY Command List

Command Name	Token	PC/3270	PC400
Alternate Cursor	alt cursor	Yes	Yes
Alternate Viewing Mode	alt view	Yes	Yes
Attention	sys attn	Yes	Yes
Backspace	backspace	Yes	Yes
Back Tab	backtab	Yes	Yes
Backtab Word	backtab word	Yes	Yes
Character Advance	character advance	No	Yes
Character Backspace	backspace valid	No	Yes
Clear Screen	clear	Yes	Yes
Clicker	click	Yes	Yes
Color Blue	blue	Yes	No
Color Field Inherit	field color	Yes	No
Color Green	green	Yes	No
Color Pink	pink	Yes	No
Color Red	red	Yes	No
Color Turquoise	turquoise	Yes	No
Color White	white	Yes	No
Color Yellow	yellow	Yes	No
Cursor Blink	cursor blink	Yes	Yes
Cursor Down	down	Yes	Yes
Cursor Left	left	Yes	Yes
Cursor Right	right	Yes	Yes
Cursor Select	cursor select	Yes	Yes
Cursor Up	up	Yes	Yes
Delete Character	delete char	Yes	Yes
Delete Word	delete word	Yes	Yes
Device Cancel	device cancel	Yes	Yes
Dup Field	dup	Yes	Yes
Edit Clear	edit-clear	Yes	Yes

Table 51. SENDKEY Command List (continued)

Command Name	Token	PC/3270	PC400
Edit Copy	edit-copy	Yes	Yes
Edit Cut	edit-cut	Yes	Yes
Edit Paste	edit-paste	Yes	Yes
Edit Undo	edit-undo	Yes	Yes
End Field	end field	Yes	Yes
Enter	enter	Yes	Yes
Erase EOF	erase eof	Yes	Yes
Erase Field	erase field	Yes	No
Erase Input	erase input	Yes	Yes
Fast Cursor Down	fast down	Yes	Yes
Fast Cursor Left	fast left	Yes	Yes
Fast Cursor Right	fast right	Yes	Yes
Fast Cursor Up	fast up	Yes	Yes
Field Exit	field exit	No	Yes
Field Mark	field mark	Yes	Yes
Field +	field +	No	Yes
Field –	field -	No	Yes
Graphic Cursor	+cr	Yes	No
Help	help	Yes	Yes
Highlighting Field Inherit	field hilight	Yes	No
Highlighting Reverse	reverse	Yes	No
Highlighting Underscore	underscore	Yes	No
Home	home	Yes	Yes
Host Print	host print	Yes	No
Input	input	Yes	Yes
Input nondisplay	input nd	Yes	Yes
Insert Toggle	insert	Yes	Yes
Lower case	to lower	Yes	No
Mark Down	mark down	Yes	Yes
Mark Left	mark left	Yes	Yes
Mark Right	mark right	Yes	Yes
Mark Up	mark up	Yes	Yes
Move Mark Down	move down	Yes	Yes
Move Mark Left	move left	Yes	Yes
Move Mark Right	move right	Yes	Yes
Move Mark Up	move up	Yes	Yes
New Line	newline	Yes	Yes
Next Page	page down	No	Yes

Table 51. SENDKEY Command List (continued)

Command Name	Token	PC/3270	PC400
Pause 1 second	pause	Yes	Yes
Previous Page	page up	No	Yes
Print Screen	local copy	Yes	Yes
Program Attention Key 1	pa1	Yes	No
Program Attention Key 2	pa2	Yes	No
Program Attention Key 3	pa3	Yes	No
Program Function Key 1 : Program Function Key 24	pf1 : pf24	Yes : X	Yes : X
Quit	quit	Yes	Yes
Reset	reset	Yes	Yes
Response Time Monitor	rtm	Yes	No
Roll Down	roll down	No	Yes
Roll Up	roll up	No	Yes
Rubout	rubout	Yes	Yes
Rule	rule	Yes	Yes
SO/SI Display	so si	Yes	Yes
SO/SI Generate	so si generate	No	Yes
System Request	sys req	Yes	Yes
Tab Field	tab field	Yes	Yes
Tab Word	tab word	Yes	Yes
Test	test request	No	Yes
Unmark	unmark	Yes	Yes
Upper case	to upper	Yes	No
Upper/Lower Change	to other	Yes	No
Wait for bind	wait app	Yes	Yes
Wait for System	wait sys	Yes	Yes
Wait transition	wait trn	Yes	Yes
Wait while input inh.	wait inp inh	Yes	Yes
Window Relocation 1 : Window Relocation 8	view 1 : view 8	Yes : X	Yes : X

Examples:

1. To logon
   ```
   [SENDKEY("Logon")]
   ```
2. To get reader list
   ```
   [SENDKEY("RDRL", enter)]
   ```

WAIT Command

`[WAIT("[time out][wait condition]")]`

Waits until the timeout expires or the wait condition the client specified occurs. For this command, the client has to set at least one option, where:

time out (optional)
: If the client sets a time out value in the command statements, the following units are available in the wait statement.

  - msec
  - millisecond
  - milliseconds
  - sec
  - second
  - seconds
  - minute
  - minutes
  - hour
  - hours

wait condition (optional)
: For the wait condition option, the client can select the following options:

  while cursor at (cursor row, cursor column)
  : While the cursor is at (cursor row, cursor column), it keeps waiting.

  while "string"
  : While the "string" is somewhere on the screen, it keeps waiting.

  while "string" at (cursor row, cursor column)
  : While the "string" is at (cursor row, cursor column) on the screen, it keeps waiting.

  until cursor at (cursor row, cursor column)
  : Until the cursor moves to (cursor row, cursor column), it keeps waiting.

  until "string"
  : Until the "string" is displayed somewhere on the screen, it keeps waiting.

  until "string" at (cursor row, cursor column)
  : Until the "string" is displayed at (cursor row, cursor column), it keeps waiting.

Examples:

1. To wait 10 seconds
   ```
   [WAIT("10 seconds")]
   ```
2. To wait while "ABCDEF" is displayed at (2,9) on the screen
   ```
   [WAIT("while ""ABCDEF"" at (2,9)")]
   ```
3. To wait until "ABCDEF" is displayed at (2,9) on the screen, or after 8 seconds
   ```
   [WAIT("8 seconds until ""ABCDEF"" at (2,9)")]
   ```

Set Cursor Position

3270	*5250*	*VT*
Yes	Yes	Yes

The **Set Cursor Position** function allows the client application to set the cursor position in the session window.

```
PostMessage( hServerWnd,
             WM_DDE_POKE,
             hClientWnd,
             MAKELONG(hData, aSETCURSOR) );
```

where:

hData Identifies a handle to a Windows global memory object that contains the cursor positioning information in the following structure:

```
typedef struct tagSETCURSOR
{
 unsigned unused:13;           // ** unused **
 unsigned fRelease:1;          // TRUE = Session frees memory
 unsigned freserved:2;         // ** reserved **
 int      cfFormat;            // Always CF_DSPTEXT
 unsigned uSetCursorType;      // Cursor Set Type
 unsigned uSetCursor1;         // Cursor Row or PS Offset
 unsigned uSetCursor2;         // Cursor Col
} SETCURSOR, FAR *lpSETCURSOR;
```

Personal Communications supports two ways to set the cursor position:

- PS Offset (uSetCursorType = 0)
- Row/Column number (uSetCursorType = 1)

The application specifies which method by setting the uSetCursorType field to the appropriate value, followed by setting the two other fields uSetCursor1 and uSetCursor2 to their appropriate values as follows:

- uSetCursorType = 0 offset
  - uSetCursor1: 0 ... (PSsize – 1)
- uSetCursorType = 1 row/col
  - uSetCursor1: 0 ... (PSrows – 1)
  - uSetCursor2: 0 ... (PScols – 1)

aSETCURSOR Identifies cursor position as the item.

Personal Communications Response

Personal Communications receives the cursor information and moves the cursor to the specified position in the PS. If the cursor is positioned successfully, Personal Communicationsreturns a positive ACK message to the client application. Otherwise, a negative ACK message is returned with one of the following error codes in the low-order byte of the wStatus word.

```
WM_DDE_ACK(wStatus, aSETCURSOR)
```

Return Code	Explanation
1	Cursor set type is not valid. Must be 0 or 1.
2	Cursor PS offset is not valid. Must be 0 ... (PSsize – 1).
3	Cursor row value is not valid. Must be 0 ... (PSrows – 1).
4	Cursor column value is not valid. Must be 0 ... (PScols – 1).

Return Code	Explanation
6	The specified format is not valid.
9	A system error occurred.

Set Mouse Intercept Condition

3270	*5250*	*VT*
Yes	Yes	Yes

This function specifies the mouse input to be intercepted. The client sends the following command to set the mouse event to be intercepted.

```
PostMessage( hServerWnd,
             WM_DDE_POKE,
             hClientWnd,
             MAKELONG(hData, aMOUSE) );
```

where:

hData Identifies a handle to a Windows global memory object that specifies the condition of intercepting the mouse input, CF_TEXT or CF_DSPTEXT.

aMOUSE Identifies Mouse atom as the item.

If the format is CF_TEXT, the client program sends the condition in the following structure:

```
typedef struct tagSETMOUSE_CF_TEXT
{
 unsigned      unused:12,           //
 unsigned      fRelease:1,          //
 unsigned      fReserved:3;         //
 int           cfFormat;            // Always CF_TEXT
 unsigned char Condition[1]         //
} SETMOUSE_CF_TEXT, FAR *lpSETMOUSE_CF_TEXT;
```

The following table shows the parameters' values:

Parameter Name	Meaning	Value
Condition	Condition of intercepting the mouse input	A string terminated with \0, consists of the constants defined as follows in any order: **L** Enable intercepting the left button **l** Disable intercepting the left button **R** Enable intercepting the right button **r** Disable intercepting the right button **M** Enable intercepting the middle button **m** Disable intercepting the middle button **S** Enable intercepting a single click **s** Disable intercepting a single click **D** Enable intercepting a double click **d** Disable intercepting a double click **T** Retrieve the pointed string **t** Do not retrieve the pointed string

If the format is CF_DSPTEXT, the client program sends the condition in the following structure:

```
typedef struct tagSETMOUSE_CF_DSPTEXT
{
 unsigned      unused:12,          //
 unsigned      fRelease:1,         //
 unsigned      fReserved:3;        //
 int           cfFormat;           // Always CF_DSPTEXT
 BOOL          bLeftButton;        //
 BOOL          bRightButton;       //
 BOOL          bMiddleButton;      //
 BOOL          bSingleClick;       //
 BOOL          bDoubleClick;       //
 BOOL          bRetrieveString;    //
} SETMOUSE_CF_DSPTEXT, FAR *lpSETMOUSE_CF_DSPTEXT;
```

The following table shows the values in the parameters:

Parameter Name	Meaning	Value
bLeftButton	Enable or disable interception of the left mouse button	**True** Enable intercepting the left button **False** Disable intercepting the left button
bRightButton	Enable or disable interception of the right mouse button	**True** Enable intercepting the right button **False** Disable intercepting the right button

Parameter Name	Meaning	Value	
bMiddleButton	Enable or disable interception of the middle mouse button	**True**	Enable intercepting the middle button
		False	Disable intercepting the middle button
bSingleClick	Enable or disable interception of the single click	**True**	Enable intercepting the single click
		False	Disable intercepting the single click
bDoubleClick	Enable or disable interception of the double click	**True**	Enable intercepting the double click
		False	Disable intercepting the double click
bRetrieveString	Retrieve or do not retrieve the pointed string	**True**	Retrieve the pointed string
		False	Do not retrieve the pointed string

Personal Communications Response

When receiving the **Set Mouse Intercept Condition** request, Personal Communicationsreturns an ACK message if it can set the intercept condition to the specified status. Otherwise, a negative ACK message is returned to the client with one of the following return codes in the low-order byte of the wStatus field:

```
WM_DDE_ACK(wStatus, aMOUSE)
```

Return Code	Explanation
2	A character in Condition parameter is not valid.
6	The specified format is not valid.
9	A system error occurred.

Set Presentation Space Service Condition

3270	*5250*	*VT*
Yes	Yes	Yes

The **Set Presentation Space Service Condition** function sets the condition for using the following functions:

- **Get Partial Presentation Space**
- **Find Field**
- **Search for String**

The client application sets the condition by calling this function such as:

- Start PS position
- PS length
- EOF flag
- Search direction

- ASCIIZ string

The client must specify the **Set Presentation Space Service Condition** function before invoking the functions listed above. The conditions set by this function remain in effect until the next **Set Presentation Space Service Condition** function is called. The client sends the following message to set the condition:

```
PostMessage( hServerWnd,
             WM_DDE_POKE,
             hClientWnd,
             MAKELONG(hData, aEPSCOND) );
```

where:

hData Identifies a handle to a Windows global memory object containing:

```
typedef struct tagPSSERVCOND
{
 unsigned   unused:13,             //
 unsigned   fRelease:1,            //
 unsigned   fReserved:2;           //
 int        cfFormat;              // Always CF_DSPTEXT
 unsigned   uPSStart;              // PS Position
 unsigned   uPSLength;             // Length of PS
 unsigned   uSearchDir;            // Direction for search
 unsigned   uEOFflag;              // EOF effective switch
 char       szTargetString[1];     // Target String
} PSSERVCOND, FAR *lpPSSERVCOND;
```

The following values are valid at the uSearchDir field:

```
WC_SRCHFRWD    0 // Search forward.
WC_SRCHBKWD    1 // Search backward.
```

The following values are valid at the uEOFflag field:

```
WC_UNEFFECTEOF 0 // The string is not truncated at EOF.
WC_EFFECTEOF   1 // The string is truncated at EOF.
```

aEPSCOND Identifies the item for the **Set Presentation Space Service Condition** function.

Personal Communications Response

If Personal Communications can perform the **Set Presentation Space Service Condition** function, then Personal Communications returns an ACK message:

```
WM_DDE_ACK(wStatus, aEPSCOND)
```

If Personal Communications cannot perform the **Set Presentation Space Service Condition** function, then Personal Communications returns a negative ACK message containing one of the following return codes in the low-order byte of wStatus:

Return Code	Explanation
1	PS position is not valid.
2	Length is not valid.
3	The value of EOF flag is not valid.
4	The value of Search Direction is not valid.
6	The specified format is not valid.
9	A system error occurred.

Set Session Advise Condition

3270	*5250*	*VT*
Yes	Yes	Yes

This function sets the condition for the DDE_ADVISE of the **Start Session Advise** function. The client can specify a search string and a region of the screen. When the advise condition is met, the server notifies the client of the condition according to the options specified by the **Start Session Advise** function.

Note: The client must specify the **Set Session Advise Condition** function before invoking **Start Session Advise**. If the advise condition is set after the **Start Session Advise** function is started, the advise condition will be ignored and the client will receive a negative ACK message. See "Start Session Advise" on page 385 for more information about starting the advise.

The client sends the following message to set the advise condition.

```
PostMessage( hServerWnd,
             WM_DDE_POKE,
             hClientWnd,
             MAKELONG(hData, aPSCOND) );
```

where:

hData Identifies a handle to a Windows global memory object containing:

```
typedef struct tagSEARCHDATA
{
 unsigned   unused:13,             //
 unsigned   fRelease:1,            //
 unsigned   fReserved:2;           //
 int        cfFormat;              // Always CF_DSPTEXT
 WORD       uPSStart;              // PS Position of string
 WORD       uPSLength              // Length of String
 BOOL       bCaseSensitive;        // Case Sensitive TRUE=YES
 char       SearchString[1];       // Search String
} SEARCHDATA, FAR *lpSEARCHDATA;
```

aPSCOND Identifies the item for the **Set Session Advise Condition function**.

Personal Communications Response

If Personal Communications can perform the **Set Session Advise Condition** function, Personal Communications returns this ACK message:

```
WM_DDE_ACK(wStatus, aPSCOND)
```

If Personal Communications cannot perform the **Set Session Advise Condition** function, then Personal Communications returns an negative ACK message containing one of the following return codes in the low-order byte of wStatus:

Return Code	Explanation
1	Advise is already active.
2	Advise condition is already active.
3	PS position is not valid.
4	String length is not valid.
6	The specified format is not valid.
9	A system error occurred.

Set Structured Field Service Condition

3270	*5250*	*VT*
Yes	Yes	Yes

The **Set Structured Field Service Condition** function passes the Query Reply data provided by the client application.

Note: The client must call the **Set Structured Field Service Condition** function before invoking the **Start Read SF** function or the **Write SF** function.

The client sends the following message to set the condition.

```
PostMessage( hServerWnd,
             WM_DDE_POKE,
             hClientWnd,
             MAKELONG(hData, aSFCOND) );
```

where:

hData Identifies a handle to a Windows global memory object containing:

```
typedef struct tagSFSERVCOND
{
 unsigned   unused:12,          //
 unsigned   fRelease:1,         //
 unsigned   fReserved:3;        //
 int        cfFormat;           // Always CF_DSPTEXT
 WORD       uBufferSize;        // Buffer size of Read SF
 WORD       uQRLength;          // Length of Query Reply data
 char       szQueryReply[1];    // Query Reply data
} SFSERVCOND, FAR *lpSFSERVCOND;
```

aSFCOND Identifies the item for the **Set Structured Field Service Condition** function.

PC/3270 Response

PC/3270 checks the Query Reply ID and Type (not DOID) and the length. If they are valid, then PC/3270 returns an ACK message:

```
WM_DDE_ACK(wStatus, aSFCOND)
```

If PC/3270 cannot perform the **Set Structured Field Service Condition** function, then PC/3270 returns a negative ACK message containing one of the following return codes in the low-order byte of wStatus:

Return Code	Explanation
1	PS SF ID is not valid.
2	Length is not valid.
3	One DDM base type is already connected to this session.
4	Structured Field Service Condition is already set.
6	The specified format is not valid.
9	A system error occurred.

Start Close Intercept

3270	5250	VT
Yes	Yes	Yes

The **Start Close Intercept** function allows a client application to intercept close requests generated when a user selects the close option from the emulator session window. This function intercepts the close request and discards it until the Stop Close Intercept function is requested. After using this function, the client receives DATA messages notifying it that close requests occurred (CLOSE).

The client sends the following command to begin a session advise.

```
PostMessage( hServerWnd,
             WM_DDE_ADVISE,
             hClientWnd,
             MAKELONG(hOptions, aCLOSE) );
```

where:

hOptions Is a handle to a Windows global memory object, with the following structure:

```
typedef struct tagOPTIONS
{
 unsigned reserved:14;        // *** reserved ***
 unsigned fDeferUpd:1;        // Send notification only
 unsigned fAckReq:1;          // Client will ACK all notices
 WORD     cfFormat;           // Clipboard format to use
}  OPTIONS, FAR *lpOPTIONS;
```

If the value of fDeferUpd is 1, DDE Data messages will be sent to the client application with the hData set to NULL. The client must then issue a DDE REQUEST to request the data item.

If the value of fAckReq is 1, the server does not notify the client of further close requests until the server receives an ACK message from the client in response to any previous notification.

The cfFormat field specifies the format to send the close request. (Must be CF_DSPTEXT.)

aCLOSE Identified close intercept as the item.

Personal Communications Response

Personal Communications receives the Start Close Intercept and returns an ACK message if it can start the intercept. Otherwise a negative ACK message is returned to the client with one of the following return codes in the low-order byte of the wStatus field:

```
WM_DDE_ACK(wStatus, aCLOSE)
```

Return Code	Explanation
1	Close Intercept is already working.
6	The specified format is not valid.
9	A system error occurred.

Once the intercept starts, the client receives DATA messages notifying it that the close request is intercepted:

```
WM_DDE_DATA(hData, aCLOSE)
```

where:

hData Identifies a handle to a Windows global memory object containing:

```
typedef struct tagCLOSEREQ
}
 unsigned   unused:12,       // *** unused ***
 unsigned   fResponse:1,     // TRUE = DD_REQUEST response
 unsigned   fRelease:1,      // TRUE = Client releases memory
 unsigned   reserved:1,      // *** reserved ***
 unsigned   fAckReq:1,       // TRUE = DDE_ACK is required
 int        cfFormat;        // Always CF_DSPTEXT
 WORD       uCloseReqCount;  // Counter of the Close Requests
} CLOSEREQ, FAR *lpCLOSEREQ;
```

The DATA messages continue until a Stop Close Intercept message is sent to Personal Communications.

Start Keystroke Intercept

3270	*5250*	*VT*
Yes	Yes	Yes

The **Start Keystroke Intercept** function allows a client application to filter any keystrokes sent to a session by a terminal operator. After a call to this function, keystrokes are intercepted, and the client receives them (KEYS).

The client sends the following command to begin intercept.

```
PostMessage( hServerWnd,
             WM_DDE_ADVISE,
             hClientWnd,
             MAKELONG(hOptions, aKEYS) );
```

where:

hOptions Is a handle to a Windows global memory object, with the following structure:

```
typedef struct tagOPTIONS
}
 unsigned reserved:14;        // Reserved
 unsigned fDeferUpd:1;        // Send notification only
 unsigned fAckReq:1;          // Client will ACK all notices
 WORD     cfFormat;           // Clipboard format to use
}  OPTIONS, FAR *lpOPTIONS;
```

If the value of fDeferUpd is 1, DDE Data messages are sent to the client application with the hData set to NULL. The client then issues a DDE REQUEST to request the data item.

If the value of fAckReq is 1, the server does not notify the client of further keystrokes until the server receives an ACK message from the client in response to any previous keystrokes notification.

The cfFormat field specifies the format to send the keystrokes when the keystroke is sent by a terminal operator. (Must be CF_DSPTEXT.)

aKEYS Identified keystrokes as the item.

Personal Communications Response

Personal Communications receives the **Start Keystroke Intercept** and returns an ACK message if it can start the intercept. Otherwise a negative ACK message is returned to the client with one of the following return codes in the low-order byte of the wStatus field:

```
WM_DDE_ACK(wStatus, aKEYS)
```

Return Code	Explanation
1	Keystroke Intercept is already started.
6	The specified format is not valid.
9	A system error occurred.

Once the intercept has started, the client receives DATA messages notifying it that the keystroke is intercepted:

```
WM_DDE_DATA(hData, aKEYS)
```

The DATA messages continue until a Stop Keystroke Intercept message is sent to Personal Communications. The format of the data item will be the same format as if the client requested the data item via a DDE_REQUEST.

Start Mouse Input Intercept

3270	*5250*	*VT*
Yes	Yes	Yes

The **Start Mouse Input Intercept** function allows a client application to intercept mouse input when a terminal operator press the mouse button on emulator session window. After calling this function, the client receives DATA messages that include the PS position where mouse input occurred.

The client sends the following command to begin to intercept the mouse input.

```
PostMessage( hServerWnd,
             WM_DDE_ADVISE,
             hClientWnd,
             MAKELONG(hOptions, aMOUSE) );
```

where:

hOptions Is a handle to a Windows global memory object, with the following structure:

```
typedef struct tagOPTIONS
{
 unsigned reserved:14;        // Reserved
 unsigned fDeferUpd:1;        // Send notification only
 unsigned fAckReq:1;          // Client will ACK all notices
 WORD     cfFormat;           // Clipboard format to use
}  OPTIONS, FAR *lpOPTIONS;
```

If the value of fDeferUpd is 1, DDE Data messages will be sent to the client application with the hData set to NULL. The client must then issue a DDE REQUEST to request the data item.

If the value of fAckReq is 1, the server does not notify the client of further structured field data until the server receives an ACK message from the client in response to any previous notification.

The cfFormat field specifies the format to send the data item has been updated.

aMOUSE Identified MOUSE as the item.

Personal Communications Response

Personal Communicationsreceives the **Start Mouse Input Intercept** and returns an ACK message if it can start this function. Otherwise a negative ACK message is returned to the client with one of the following return codes in the low-order byte of the wStatus field:

```
WM_DDE_ACK(wStatus, aMOUSE)
```

Return Code	Explanation
1	Mouse Input Intercept has been already started.
6	The specified format is not valid.
9	A system error occurred.

Once the **Mouse Input Intercept** starts, the client receives DATA messages of the structured field:

```
WM_DDE_DATA(hData, aMOUSE)
```

where:

hData If the format is CF_TEXT, Personal Communicationsreturns the mouse input information in the following format:

```
typedef struct tagMOUSE_CF_TEXT
{
 unsigned      unused:12,       // **** Unused ****
 unsigned      fRespons:1,      // TRUE = DDE_REQUEST response
 unsigned      fRelease:1,      // TRUE = Client frees this data
 unsigned      reserved:1,      // **** Reserved ****
 unsigned      fAckReq:1;       // TRUE = Client returns DDE_ACK
 int           cfFormat;        // CF_TEXT
 unsigned char PSPos[4];        // PS position
 unsigned char Tab1[1];         // TAB character
 unsigned char PSRowPos[4];     // PS row position
 unsigned char Tab2[1];         // TAB character
 unsigned char PSColPos[4];     // PS columns position
 unsigned char Tab3[1];         // TAB character
 unsigned char PSSize[4];       // Size of the PS
 unsigned char Tab4[1];         // TAB character
 unsigned char PSRows[4];       // PS number of rows
 unsigned char Tab5[1];         // TAB character
 unsigned char PSCols[4];       // PS number of columns
 unsigned char Tab6[1];         // TAB character
 unsigned char ButtonType[1];   // Pressed button type
 unsigned char Tab7[1];         // TAB character
 unsigned char ClickType[1];    // Click type
 unsigned char Tab8[1];         // TAB character
 unsigned char ClickString[1];  // Retrieved string
} MOUSE_CF_TEXT, FAR *lpMOUSE_CF_TEXT;
```

The following table shows the values in the parameters:

Parameter Name	Meaning	Value
PSPos	PS offset of the position where mouse was clicked	0 ... (PSSize – 1)
PSRowPos	Row number of the position where mouse was clicked	0 ... (PSRows – 1)
PSColPos	Column number of the position where mouse was clicked	0 ... (PSCols – 1)
PSSize	Presentation space size	
PSRows	Number of presentation space rows	
PSCols	Number of presentation space columns	
ButtonType	Type of clicked mouse button	**L** Left button **M** Middle button **R** Right button
ClickType	Type of clicking	**S** Single click **D** Double click
ClickString	Retrieved string to which the mouse pointed	A character string terminated with a '\0'
Tab1–8	A tab character for delimiter	'\t'

hData If the format is CF_DSPTEXT, Personal Communicationsreturns the mouse input information in the following format:

```
typedef struct tagMOUSE_CF_DSPTEXT
{
 unsigned      unused:12,         // **** Unused ****
 unsigned      fRespons:1,        // TRUE = DDE_REQUEST response
 unsigned      fRelease:1,        // TRUE = client frees the storage
 unsigned      reserved:1,        // **** Reserved ****
 unsigned      fAckReq:1;         // TRUE = client returns DDE_ACK
 int           cfFormat;          // CF_DSPTEXT
 unsigned      uPSPos;            // PS position
 unsigned      uPSRowPos;         // PS row position
 unsigned      uPSColPos;         // PS column position
 unsigned      uPSSize;           // Size of the presentation space
 unsigned      uPSRows;           // PS number of rows
 unsigned      uPSCols;           // PS number of columns
 unsigned      uButtonType;       // Pressed button type
 unsigned      uClickType;        // Click type
 unsigned char szClickString[1];  // Retrieved string
} MOUSE_CF_DSPTEXT, FAR *lpMOUSE_CF_DSPTEXT;
```

The following table shows the values in the parameters:

Parameter Name	Meaning	Value
uPSPos	PS offset of the position where mouse was clicked	0 ... (uPSSize – 1)
uPSRowPos	Row number of the position where mouse was clicked	0 ... (uPSRows – 1)
uPSColPos	Column number of the position where mouse was clicked	0 ... (uPSCols – 1)
uPSSize	Size of the presentation space	
uPSRows	Number of rows of the presentation space	
uPSCols	Number of columns of the presentation space	
uButtonType	Type of the clicked mouse button	**0x0001** Left button **0x0002** Middle button **0x0003** Right button
uClickType	Type of clicking	**0x0001** Single click **0x0002** Double click
szClickString	Retrieved string to which the mouse pointed	A character string terminated with a \0

The DATA messages continue until a Stop Mouse Input Intercept message is sent to Personal Communications.

Start Read SF

3270	*5250*	*VT*
Yes	Yes	Yes

The **Start Read SF** function allows a client application to read structured field data from the host application. After using this function, the client receives DATA messages notifying it that close requests occurred.

Note: Before using this function, the client must call the **Set Structured Field Service Condition** function to pass the Query Reply data to the server.

The client sends the following command to begin a Read SF.

```
PostMessage( hServerWnd,
             WM_DDE_ADVISE,
             hClientWnd,
             MAKELONG(hOptions, aSF) );
```

where:

hOptions Is a handle to a Windows global memory object, with the following structure:

```
typedef struct tagOPTIONS
{
 unsigned reserved:14;        // Reserved
 unsigned fDeferUpd:1;        // Send notification only
 unsigned fAckReq:1;          // Client will ACK all notices
 WORD     cfFormat;           // Clipboard format to use
}  OPTIONS, FAR *lpOPTIONS;
```

If the value of fDeferUpd is 1, DDE Data messages will be sent to the client application with the hData set to NULL. The client must then issue a DDE REQUEST to request the data item.

If the value of fAckReq is 1, the server does not notify the client of further structured field data until the server receives an ACK message from the client in response to any previous notification.

The cfFormat field specifies the format to send the structured field data. (It must be CF_DSPTEXT.)

aSF Identified structured field as the item.

PC/3270 Response

PC/3270 receives the **Start Read SF** and returns an ACK message if it can start the Read SF. Otherwise a negative ACK message is returned to the client with one of the following return codes in the low-order byte of the wStatus field:

```
WM_DDE_ACK(wStatus, aSF)
```

Return Code	Explanation
1	Read SF is already started.
3	No prior Set Structured Field Service Condition function was called.
6	The specified format is not valid.
9	A system error occurred.

Once the Read SF has started, the client receives DATA messages of the structured field:

```
WM_DDE_DATA(hData, aSF)
```

where:

hData Identifies a handle to a Windows global memory object containing:

```
typedef struct tagSFDATA
{
 unsigned   unused:12,            //
 unsigned   fRelease:1,           //
 unsigned   fReserved:3;          //
 int        cfFormat;             // Always CF_DSPTEXT
 WORD       uSFLength;            // Length of SF data
 char       szSFData[1];          // SF data
} SFDATA, FAR *lpSFDATA;
```

The DATA messages continue until a Stop Read SF message is sent to PC/3270.

Start Session Advise

3270	*5250*	*VT*
Yes	Yes	Yes

The **Start Session Advise** function establishes a link between the Personal Communications session and the client. This lets the client receive updates of the presentation space (PS), the operator information area (OIA), or the trim rectangle (TRIMRECT) when the data item is updated.

Note: If the client application needs conditional notification when the presentation space is updated, set an advise condition prior to invoking the advise function for the presentation space. See "Set Session Advise Condition" on page 376.

The client sends the following command to begin a session advise.

```
PostMessage( hServerWnd,
             WM_DDE_ADVISE,
             hClientWnd,
             MAKELONG(hOptions, aItem) );
```

where:

hOptions Is a handle to a Windows global memory object. This is the structure:

```
typedef struct tagOPTIONS
{
 unsigned reserved:14;        // Reserved
 unsigned fDeferUpd:1;        // Send notification only
 unsigned fAckReq:1;          // Client will ACK all notices
 WORD     cfFormat;           // Clipboard format to use
}  OPTIONS, FAR *lpOPTIONS;
```

If the value of fDeferUpd is 1, DDE Data messages are sent to the client application with the hData set to NULL. The client must then issue a DDE REQUEST to request the data item.

If the value of fAckReq is 1, the server does not notify the client of further changes to the data item until the server receives an ACK message from the client in response to any previous update notification.

The cfFormat field specifies the format to send the data item when the item has been updated.

aItem Specifies the item of information being requested; in this case, the value can be PS, OIA, or TRIMRECT.

Personal Communications Response

Personal Communications receives the **Start Session Advise** and returns an ACK message if it can start the advise. Otherwise, a negative ACK message is returned to the client with one of the following return codes in the low-order byte of the wStatus field:

```
WM_DDE_ACK(wStatus, aItem)
```

Return Code	Explanation
1	Advise already active for data item.
6	Advise parameter not valid.
9	A system error occurred.

Once the advise has started, the client receives DATA messages notifying it that the data item (PS, OIA, or TRIMRECT) has changed:

```
WM_DDE_DATA(hData, aItem)
```

The DATA messages continue until a Stop Session Advise message is sent to Personal Communications. The format of the data item will be the same format as if the client requested the data item via a DDE_REQUEST.

Stop Close Intercept

3270	*5250*	*VT*
Yes	Yes	Yes

The **Stop Close Intercept** function ends a client application's ability to intercept close request. The client sends the following command to perform the **Stop Close Intercept** function.

```
PostMessage( hServerWnd,
             WM_DDE_UNADVISE,
             hClientWnd,
             MAKELONG(NULL, aCLOSE) );
```

where:

aCLOSE Identified close intercept as the item.

Personal Communications Response

If Personal Communications can perform the DDE_UNADVISE, Personal Communications returns an ACK message containing positive status information to the client:

```
WM_DDE_ACK(wStatus, aCLOSE)
```

If Personal Communications cannot perform the DDE_UNADVISE, Personal Communications returns an ACK message containing negative status information and one of the following return codes in the low-order byte of the wStatus word:

Return Code	Explanation
1	Advise has not started yet.
9	A system error occurred.

Stop Keystroke Intercept

3270	*5250*	*VT*
Yes	Yes	Yes

The **Stop Keystroke Intercept** function ends a client application's ability to intercept keystrokes. The client sends the following command to perform the **Stop Keystroke Intercept** function.

```
PostMessage( hServerWnd,
             WM_DDE_UNADVISE,
             hClientWnd,
             MAKELONG(NULL, aKEYS) );
```

where:

aKEYS Identified keystrokes as the item.

Personal Communications Response

If Personal Communications can perform the DDE_UNADVISE, Personal Communications returns an ACK message containing positive status information to the client:

```
WM_DDE_ACK(wStatus, aKEYS)
```

If Personal Communications cannot perform the DDE_UNADVISE, Personal Communications returns an ACK message containing negative status information and one of the following return codes in the low-order byte of the wStatus word.

Return Code	Explanation
1	Advise has not started yet.
9	A system error occurred.

Stop Mouse Input Intercept

3270	*5250*	*VT*
Yes	Yes	Yes

The **Stop Mouse Input Intercept** function ends a client application's ability to intercept mouse input.

The client sends the following command to perform the **Stop Mouse Input Intercept** function.

```
PostMessage( hServerWnd,
             WM_DDE_UNADVISE,
             hClientWnd,
             MAKELONG(NULL, aMOUSE) );
```

where:

aMOUSE Identified mouse as the item.

Personal Communications Response

If Personal Communicationscan perform the DDE_UNADVISE, Personal Communicationsreturns an ACK message containing positive status information to the client:

```
WM_DDE_ACK(wStatus, aMOUSE)
```

If Personal Communicationscannot perform the DDE_UNADVISE, Personal Communicationsreturns an ACK message containing negative status information and one of the following return codes in the low-order byte of the wStatus word.

Return Code	Explanation
1	Advise has not started yet.
9	A system error occurred.

Stop Read SF

3270	*5250*	*VT*
Yes	Yes	Yes

The **Stop Read SF** function ends a client application's ability to read structured field data.

The client sends the following command to perform the **Stop Read SF** function.

```
PostMessage( hServerWnd,
             WM_DDE_UNADVISE,
             hClientWnd,
             MAKELONG(NULL, aSF) );
```

where:

aSF Identified structured field as the item.

PC/3270 Response

If PC/3270 can perform the DDE_UNADVISE, PC/3270 returns an ACK message containing positive status information to the client:

```
WM_DDE_ACK(wStatus, aSF)
```

If PC/3270 cannot perform the DDE_UNADVISE, PC/3270 returns an ACK message containing negative status information and one of the following return codes in the low-order byte of the wStatus word.

Return Code	Explanation
1	Advise has not started yet.
9	A system error occurred.

Stop Session Advise

3270	*5250*	*VT*
Yes	Yes	Yes

The **Stop Session Advise** function disconnects a link between Personal Communications and the client. The client sends the following command to perform the **Stop Session Advise** function.

```
PostMessage( hServerWnd,
             WM_DDE_UNADVISE,
             hClientWnd,
             MAKELONG(NULL, aItem) );
```

where:

aItem Specifies the item of information being requested; in this case, the value can be PS, OIA, TRIMRECT, or NULL.

If the value of *aItem* is NULL, then the client has requested termination of all active notifications for the conversation.

Personal Communications Response

If Personal Communications can perform the DDE_UNADVISE, Personal Communications returns an ACK message containing positive status information to the client:

```
WM_DDE_ACK(wStatus, aItem)
```

If Personal Communications cannot perform the DDE_UNADVISE, Personal Communications returns an ACK message containing negative status information and one of the following return codes in the low-order byte of the wStatus word.

Return Code	Explanation
1	Advise has not started yet.
9	A system error occurred.

Terminate Session Conversation

3270	*5250*	*VT*
Yes	Yes	Yes

The **Terminate Session Conversation** function disconnects the client from the Personal Communications session the client has previously started a conversation with.

The client sends the following command to terminate a session conversation.

```
SendMessage( hServerWnd,
             WM_DDE_TERMINATE,
             hClientWnd,
             MAKELONG(NULL, NULL) );
```

Personal Communications Response

Personal Communications acknowledges the terminate command with a terminate message:

```
WM_DDE_TERMINATE
```

Terminate Structured Field Conversation

3270	*5250*	*VT*
Yes	Yes	Yes

The **Terminate Structured Field Conversation** function disconnects the client from a structured field conversation.

The client sends the following command to terminate a structured field conversation.

```
SendMessage( hServerWnd,
             WM_DDE_TERMINATE,
             hClientWnd,
             MAKELONG(NULL, NULL) );
```

PC/3270 Response

PC/3270 acknowledges the terminate command with a terminate message:

```
WM_DDE_TERMINATE
```

Terminate System Conversation

3270	*5250*	*VT*
Yes	Yes	Yes

This disconnects the client from a system conversation.

The client sends the following command to terminate a system conversation.

```
SendMessage( hServerWnd,
             WM_DDE_TERMINATE,
             hClientWnd,
             MAKELONG(NULL, NULL) );
```

Personal Communications Response

Personal Communications acknowledges the terminate command with this message:

```
WM_DDE_TERMINATE
```

When the user closes a Personal Communications session, any global memory blocks that were allocated by Personal Communications will be freed by Windows. This can cause problems for the client if the client retains any of these global memory objects for long periods of time. If the client application needs to keep the information in a global memory item for a long period of time, it is suggested that the client make a copy of global memory item into a global memory item the client application owns.

Write SF

3270	*5250*	*VT*
Yes	Yes	Yes

The **Write SF** function allows a client application to write structured field data to the host application.

Note: The client must call the **Set Structured Field Service Condition** function before invoking the **Write SF** function.

The client sends the following message to write structured field data.

```
PostMessage( hServerWnd,
             WM_DDE_POKE,
             hClientWnd,
             MAKELONG(hData, aSF) );
```

where:

hData Identifies a handle to a Windows global memory object containing:

```
typedef struct tagWRITESF
{
 unsigned   unused:12,            //
 unsigned   fRelease:1,           //
 unsigned   fReserved:3;          //
 int        cfFormat;             // Always CF_DSPTEXT
 WORD       uSFLength;            // Length of SF data
 char       Work[8];              // Work area
 char       szSFData[1];          // SF data
} WRITESF, FAR *lpWRITESF;
```

aSF Identified structured field as the item.

PC/3270 Response

PC/3270 receives structured field data and sends them to the host application. If the data transmission completes successfully, then PC/3270 returns an ACK message:

```
WM_DDE_ACK(wStatus, aSF)
```

Otherwise PC/3270 returns an negative ACK message containing one of the following return codes in the low-order byte of wStatus:

Return Code	Explanation
2	Length is not valid.
6	The specified format is not valid.
9	A system error occurred.

DDE Menu Item API in a 16-Bit Environment

Personal Communications supports the addition, deletion, and changing of attributes of a dynamic menu item to the session menu bar. A menu will then be created for this menu item with space for up to 16 submenu items.

Personal Communications supports two kinds of DDE conversation. One is Personal Communications, which acts as a DDE menu client application, and the other is Personal Communications, which acts as a DDE menu server.

DDE Menu Client in a 16-Bit Environment

To add, delete, and change menu items, the following DDE conversation must take place between the session and DDE menu server application.

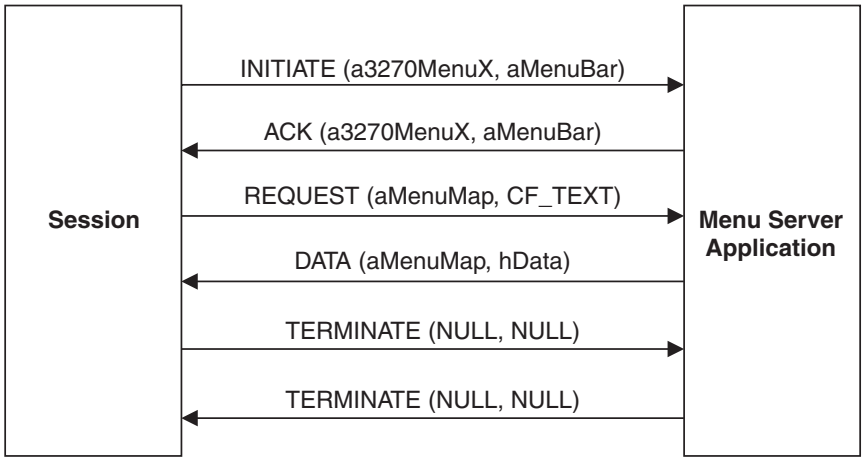

Figure 8. DDE Menu Server Conversation

The following data hierarchy details the menu map Personal Communications expects when adding a dynamic menu item and submenu to a session menu bar:

```
POPUP  "MyMenu"
BEGIN
  MENUITEM "Send Files to Host",         SEND
  MENUITEM "Receive Files from Host",    RECEIVE
  MENUITEM SEPARATOR
  MENUITEM "Convert Files",              CONVERT
END
```

When the user selects a menu item from the new menu, Personal Communications will send a DDE Initiate with 3270MenuN or 5250MenuN as the application and itemN token as the topic. If an ACK is received from the DDE application, Personal Communications will inhibit the session from accepting user input. The menu client application can then display a dialog, and so on. When the menu server application has completed processing of the menu item, it will send a DDE Terminate to signal Personal Communications the process is complete. Personal Communications will then reenable the window for the user.

DDE Menu Server, 32-Bit

To add, delete, and change menu items, the Figure 9 on page 393 must take place between the session and a DDE menu client application.

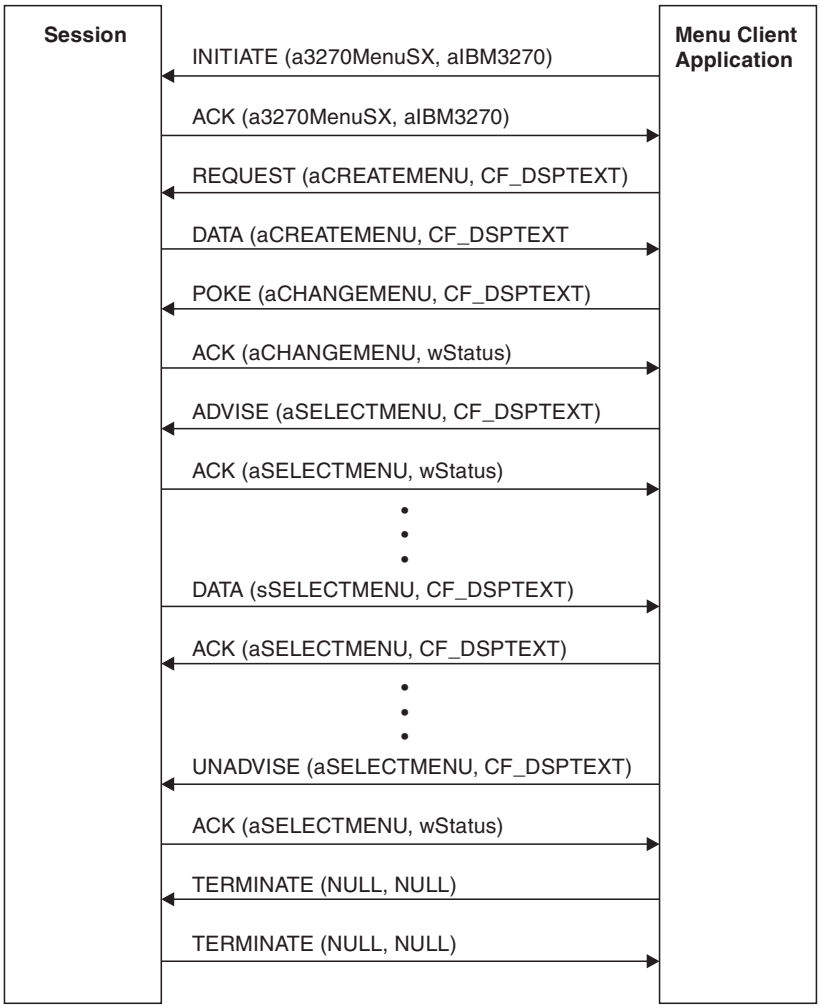

Figure 9. DDE Menu Client Conversation

When the user selects a menu item from the new menu, Personal Communications will send a DDE DATA with aSELECTMENU as the item. When Personal Communications sends DDE DATA to the client application, Personal Communications will inhibit the session from accepting user input. The menu client application can then display a dialog, and so on. When the menu client application has completed processing of the menu item, it will send a DDE ACK to signal Personal Communications the process is complete. Personal Communications will then reenable the window for the user.

DDE Menu Functions in a 16-Bit Environment

The following table lists the DDE Menu Item API functions that are available for use with Personal Communications and the page in this section, where each function is more fully documented. PC/3270 Windows mode and PC400 provide all of the following functions.

Function	Page
Change Menu Item	394
Create Menu Item	399
Initiate Menu Conversation	400

Function	Page
Start Menu Advise	401
Stop Menu Advise	402
Terminate Menu Conversation	403

Change Menu Item

3270	*5250*	*VT*
Yes	Yes	Yes

The **Change Menu Item** function appends, deletes, inserts, modifies, and removes menu items. The client sends the following message to the session to change a menu.

```
PostMessage( hServerWnd,
             WM_DDE_POKE,
             hClientWnd,
             MAKELONG(hData, aCHANGEMENU) );
```

where:

hData Identifies a handle to a Windows global memory object that contains the requests for changing a menu. The global memory object contains the following structure:

```
typedef struct tagChangeMenu
{
 unsigned unused:13;     // ** unused **
 unsigned fRelease:1;    // Session frees memory
 unsigned freserved:2;   // ** reserved **
 int      cfFormat;      // Always CF_DSPTEXT
 HANDLE   hMenu;         // Handle of the menu item
 WORD     wPosition;     // The position of the menu
                         // item
 WORD     wIDNew;        // The menu ID of the new
                         // menu item
 WORD     wOperation;    // Specifies the operation
 WORD     wFlags;        // Specifies the options
 unsigned char szItemName[1]; // String of the item
} CHANGEMENU, FAR *lpCHANGEMENU;
```

The following operations are supported:

```
MF_APPEND  // Appends a menu item to the end of a menu.
MF_CHANGE  // Modifies a menu item in a menu.
MF_DELETE  // Deletes a menu item from a menu, destroying
           // the menu item.
MF_INSERT  // Inserts a menu item into a menu.
MF_REMOVE  // Removes a menu item from a menu but does not
           // destroy the menu item.
```

If the MF_APPEND is specified in the wOperation field, the following fields must be filled:

hMenu Identifies the menu to be appended. To append a new item to a pop-up menu, specify the handle that is returned from Personal Communications when **Create Menu Item** function is executed. To append a new item to a top-level menu bar, specify NULL.

wIDNew Specifies the command ID of the new menu item. If a new item is added to the top-level menu bar, the handle of the menu item returned from Personal Communications when **Create Menu Item** function is executed.

wFlags The following options can be set:

```
MF_CHECKED       // Places a check mark next to
                 // the item.
MF_DISABLED      // Disables the menu item so
                 // that it cannot be selected,
                 // but does not gray it.
MF_ENABLED       // Enables the menu item so that
                 // it can be selected and
                 // restores from its grayed
                 // state.
MF_GRAYED        // Disables the menu item so
                 // that it cannot be selected,
                 // and grays it.
MF_MENUBARBREAK  // Same as MF_MENUBREAK except
                 // that for pop-up menus,
                 // separates the new column from
                 // the old column with a
                 // vertical line.
MF_MENUBREAK     // Places the item on a new line
                 // for menu bar items.
                 // For pop-up menus, places the
                 // item in a new column, with
                 // no dividing line between the
                 // columns.
MF_SEPARATOR     // Draws a horizontal dividing
                 // line.  Can only be used in a
                 // pop-up menu.  This line cannot
                 // be grayed, disabled, or
                 // highlighted.  The wIDNew and
                 // szItemName fields are
                 // ignored.
MF_UNCHECKED     // Does not place a check mark
                 // next to the item (default).
```

szItemName Specifies the content of the new menu item. Contains a null-terminated character string.

If the MF_CHANGE is specified in the wOperation field, fill these fields:

hMenu Identifies the menu to be changed. To change an item of a pop-up menu, specify the handle that is returned from Personal Communications when **Create Menu Item** function is executed. To change an item to a top-level menu bar, specify NULL.

nPosition Specifies the menu item to be changed. The interpretation of the wPosition parameter depends on the setting of the wFlags parameter.

MF_BYPOSITION
Specifies the position of the existing menu item. The first item in the menu is at position zero.

MF_BYCOMMAND
Specifies the command ID of the existing menu item.

wIDNew Specifies the command ID of the menu item. If an item of the top-level menu bar is changed, the handle of the menu item returned from Personal Communications when **Create Menu Item** function is executed.

wFlags The following options can be set:

```
MF_BYCOMMAND     // Specifies that the nPosition
                 // parameter gives the menu
                 // item control ID number.
                 // This is the default if
                 // neither MF_BYCOMMAND nor
                 // MF_BYPOSITION is set.
MF_BYPOSITION    // Specifies that the nPosition
                 // parameter gives the position
                 // of the menu item to be
                 // changed rather than an ID
                 // number.
MF_CHECKED       // Places a check mark next to
                 // the item.
MF_DISABLED      // Disables the menu item so
                 // that it cannot be selected,
                 // but does not gray it.
MF_ENABLED       // Enables the menu item so
                 // that it can be selected and
                 // restores from its grayed
                 // state.
MF_GRAYED        // Disables the menu item so
                 // that it cannot be selected,
                 // and grays it.
MF_MENUBARBREAK  // Same as MF_MENUBREAK except
                 // that for pop-up menus,
                 // separates the new column
                 // from the old column with a
                 // vertical line.
MF_MENUBREAK     // Places the item on a new
                 // line for menu bar items.
                 // For pop-up menus, places the
                 // item in a new column, with
                 // no dividing line between
                 // the columns.
MF_SEPARATOR     // Draws a horizontal dividing
                 // line.  Can only be used in
                 // a pop-up menu.  This line
                 // cannot be grayed, disabled,
                 // or highlighted.  The wIDNew
                 // and szItemName fields are
                 // ignored.
MF_UNCHECKED     // Does not place a check mark
                 // next to the item (default).
```

szItemName Specifies the content of the menu item. Contains a null-terminated character string.

If the MF_DELETE is specified in the wOperation field, fill these fields:

hMenu Identifies the menu to be deleted. To delete an item from a pop-up menu, specify the handle that is returned from Personal Communications when **Create Menu Item** function is executed. To delete an item from a top-level menu bar, specify NULL.

nPosition Specifies the menu item to be deleted. The interpretation of the nPosition parameter depends on the setting of the wFlags parameter.

MF_BYPOSITION
Specifies the position of the existing menu item. The first item in the menu is at position zero.

MF_BYCOMMAND
Specifies the command ID of the existing menu item.

wFlags The following options can be set:

```
MF_BYCOMMAND     // Specifies that the nPosition
                 // parameter gives the menu
                 // item control ID number.
                 // This is the default if
                 // neither MF_BYCOMMAND nor
                 // MF_BYPOSITION is set.
MF_BYPOSITION    // Specifies that the nPosition
                 // parameter gives the position
                 // of the menu item to be
                 // deleted rather than an ID
                 // number.
```

If the MF_INSERT is specified in the wOperation field, the following fields must be filled:

hMenu Identifies the menu to be inserted. To insert an item to a pop-up menu, specify the handle that is returned from Personal Communications when **Create Menu Item** function is executed. To change an item to a top-level menu bar, specify NULL.

nPosition Specifies the menu item before the new menu item is to be inserted. The interpretation of the nPosition parameter depends on the setting of the wFlags parameter.

MF_BYPOSITION
Specifies the position of the existing menu item. The first item in the menu is at position zero.

MF_BYCOMMAND
Specifies the command ID of the existing menu item.

wIDNew Specifies the command ID of the menu item or, if an item of the top-level menu bar is changed, the handle of the menu item returned from Personal Communications when **Create Menu Item** function is executed.

wFlags The following options can be set:

```
MF_BYCOMMAND     // Specifies that the nPosition
                 // parameter gives the menu
                 // item control ID number. This
                 // is the default if neither
                 // MF_BYCOMMAND nor MF_BYPOSITION
                 // is set.
MF_BYPOSITION    // Specifies that the nPosition
                 // parameter gives the position
                 // of the menu item to be
                 // changed rather than an ID
                 // number.
MF_CHECKED       // Places a check mark next to
                 // the item.
MF_DISABLED      // Disables the menu item so
                 // that it cannot be selected,
                 // but does not gray it.
MF_ENABLED       // Enables the menu item so
                 // that it can be selected and
                 // restores from its grayed
                 // state.
MF_GRAYED        // Disables the menu item so
                 // that it cannot be selected,
                 // and grays it.
MF_MENUBARBREAK  // Same as MF_MENUBREAK except
                 // that for pop-up menus,
                 // separates the new column
                 // from the old column with a
                 // vertical line.
MF_MENUBREAK     // Places the item on a new
                 // line for menu bar items.
                 // For pop-up menus, places the
                 // item in a new column, with
                 // no dividing line between the
                 // columns.
MF_SEPARATOR     // Draws a horizontal dividing
                 // line.  Can only be used in
                 // a pop-up menu.  This line
                 // cannot be grayed, disabled,
                 // or highlighted. The wIDNew
                 // and szItemName fields are
                 // ignored.
MF_UNCHECKED     // Does not place a check mark
                 // next to the item (default).
```

szItemName Specifies the content of the menu item. Contains a null-terminated character string.

If the MF_REMOVE is specified in the wOperation field, the following fields must be filled:

hMenu Identifies the menu to be removed. To remove an item from a pop-up menu, specify the handle that is returned from Personal Communications when **Create Menu Item** function is executed. To remove an item from a top-level menu bar, specify NULL.

nPosition Specifies the menu item to be removed. The interpretation of the nPosition parameter depends upon the setting of the wFlags parameter.

MF_BYPOSITION
Specifies the position of the existing menu item. The first item in the menu is at position zero.

MF_BYCOMMAND
Specifies the command ID of the existing menu item.

wFlags The following options can be set:

```
MF_BYCOMMAND     // Specifies that the nPosition
                 // parameter gives the menu
                 // item control ID number.
                 // This is the default if
                 // neither MF_BYCOMMAND nor
                 // MF_BYPOSITION is set.
MF_BYPOSITION    // Specifies that the nPosition
                 // parameter gives the
                 // position of the menu item to
                 // be removed rather than an ID
                 // number.
```

Personal Communications Response

Personal Communications receives the requests to change a menu and processes them. If the requests cannot be accepted, Personal Communications returns a negative ACK message containing one of the following status codes in the low-order byte of the wStatus word. Otherwise, Personal Communications returns a positive ack message signalling that the keystrokes have been sent.

```
WM_DDE_ACK(wStatus, aCHANGEMENU)
```

Return code	Explanation
1	The specified parameters are not valid.
6	The specified format is not valid.
9	A system error occurred.

Create Menu Item

3270	*5250*	*VT*
Yes	Yes	Yes

The **Create Menu Item** function requests Personal Communications to add a menu item to the menu bar. A pop-up menu will be created at the same time, but it is initially empty and can be filled with menu items by using this function. The string of the new menu item that will be added to a top-level menu bar, is also specified by using the change menu item function.

The client sends the following message to create a menu item.

```
PostMessage( hServerWnd,
             WM_DDE_REQUEST,
             hClientWnd,
             MAKELONG(cfFormat, aCREATEMENU) );
```

where:

cfFormat Identifies the format for the ID of the new menu item. The valid value is CF_DSPTEXT.

aCREATEMENU Identifies the create menu item.

Personal Communications Response

Personal Communications returns the handle of the newly created menu item in a dde data message if the Personal Communications can create a menu item.

```
WM_DDE_DATA(hData, aCREATEMENU)
```

or

```
WM_DDE_ACK(wStatus, aCREATEMENU)
```

where:

hData Identifies a handle to a windows global memory object that contains the handle of the menu item. The global memory object contains the following structure:

```
typedef struct tagcreatemenu
}
 unsigned   unused:12,       // *** unused ***
 unsigned   fresponse:1,     // true = dd_request response
 unsigned   frelease:1,      // true = client releases memory
 unsigned   reserved:1,      // *** reserved ***
 unsigned   fackreq:1,       // true = dde_ack is required
 int      cfformat;          // always cf_dsptext
 handle   hmemuitem;         // handle of the menu item
} CREATEMENU, FAR *lpCREATEMENU;
```

If Personal Communications cannot create a menu item, one of the following status codes are returned in the low-order byte of the wStatus word:

Return Code	Explanation
6	The specified format is not valid.
9	A system error occurred.

Initiate Menu Conversation

3270	*5250*	*VT*
Yes	Yes	Yes

The **Initiate Menu Conversation** function connects a client application to an available session of Personal Communications. Once a menu conversation is established, the session menu is reserved exclusively for the client until the conversation is terminated.

The client application sends the following message to initiate a DDE conversation with a menu:

```
SendMessage( -1,
             WM_DDE_INITIATE,
             hClientWnd,
             MAKELONG(aIBM327032, SN) );
```

where:

aIBM327032 Identifies the application atom. The string used to create atom aIBM3270 is IBM3270 In the PC400, the application atom is aIBM5250 and the string IBM5250 is used to create it.

SN Identifies the topic atom. The string used to create atom a3270MenuSN is 3270MenuS appended with the session ID A, B, ..., Z. In the PC400, the topic atom is a5250MenuSN and the string 5250MenuS appended with the session ID A, B, ..., Z. is used to create it.

Personal Communications Response

If Personal Communications can support a conversation with the client application, Personal Communications acknowledges the INITIATE transaction with:

```
WM_DDE_ACK(aIBM327032, SN)
```

Start Menu Advise

3270	*5250*	*VT*
Yes	Yes	Yes

The **Start Menu Advise** function allows a client application to process a user defined routine when the menu item that is added by the client application, is selected. After using this function, the client receives DATA messages indicating which menu item is selected.

The client sends the following command to begin a menu advise.

```
PostMessage( hServerWnd,
             WM_DDE_ADVISE,
             hClientWnd,
             MAKELONG(hOptions, aSELECTMENU) );
```

where:

hOptions Is a handle to a Windows global memory object, with the following structure:

```
typedef struct tagOPTIONS
{
 unsigned reserved:14;       // Reserved
 unsigned fDeferUpd:1;       // Send notification only
                             // (Must be 0)
 unsigned fAckReq:1;         // Client will ACK all notices
                             // (Must be 1)
 WORD     cfFormat;          // Always CF_DSPTEXT
}  OPTIONS, FAR *lpOPTIONS;
```

aSELECTMENU Identified a menu advise as the item.

Personal Communications Response

Personal Communications receives the **Start Menu Advise** and returns an ACK message if it can start the function.

```
WM_DDE_ACK(wStatus, aSELECTMENU)
```

Otherwise, a negative ACK message will be returned to the client with one of the following return codes in the low-order byte of the wStatus field.

Return Code	Explanation
1	Menu Advise has been already started.
6	The specified format is not valid.
9	A system error occurred.

Once the menu item (added to the client application) is selected, the client receives DATA messages notifying it which menu item is selected:

```
WM_DDE_DATA(hData, aSELECTMENU)
```

where:

hData Identifies a handle to a Windows global memory object containing:

```
typedef struct tagSELECTMENU
{
 unsigned   Unused:12,       // *** unused ***
 unsigned   fResponse:1,     // TRUE = DD_REQUEST response
 unsigned   fRelease:1,      // TRUE = Client releases memory
 unsigned   reserved:1,      // *** reserved ***
 unsigned   fAckReq:1,       // TRUE = DDE_ACK is required
 int        cfFormat;        // Always CF_DSPTEXT
 WORD       uIDSelected;     // Command ID of the
                             // selected menu item
} SELECTMENU, FAR *lpSELECTMENU;
```

The DATA messages continue until a Stop Menu Advise message is sent to Personal Communications.

Stop Menu Advise

3270	*5250*	*VT*
Yes	Yes	Yes

The **Stop Menu Advise** function ends a client application's ability to process a user-defined routine when the menu item added by the client application is selected. The client sends the following command to perform the Stop Menu Advise function.

```
PostMessage( hServerWnd,
             WM_DDE_UNADVISE,
             hClientWnd,
             MAKELONG(NULL, aSELECTMENU) );
```

where:

aSELECTMENU Identifies a menu advise as the item.

Personal Communications Response

If Personal Communications can perform the DDE_UNADVISE, Personal Communications returns an ACK message containing positive status information to the client:

```
WM_DDE_ACK(wStatus, aCLOSE)
```

If Personal Communications cannot perform the DDE_UNADVISE, Personal Communications returns an ACK message containing negative status information and one of the following return codes in the low-order byte of the wStatus word:

Return Code	Explanation
1	Advise has not started yet.
9	A system error occurred.

Terminate Menu Conversation

3270	*5250*	*VT*
Yes	Yes	Yes

The **Terminate Menu Conversation** function disconnects the client from the Personal Communications session with which a conversation had been previously started.

The client sends the following command to terminate a session conversation:

```
SendMessage( hServerWnd,
             WM_DDE_TERMINATE,
             hClientWnd,
             MAKELONG(NULL, NULL) );
```

Personal Communications Response

Personal Communications acknowledges the terminate command with this message:

```
WM_DDE_TERMINATE
```

Summary of DDE Functions in a 16-Bit Environment

Table 52 lists the DDE functions that can be used with Personal Communications. The table lists the name of the DDE function, the command the client sends to Personal Communications, and the values that can be used for the variables in the client command.

Table 52. Summary of DDE Functions in a 16-Bit Environment

Function name	**Client command**
Change Menu Item	`PostMessage( hServerWnd, WM_DDE_POKE, hClientWnd, MAKELONG(hData, aCHANGEMENU) );`
	hData = Handle to a global memory object
Create Menu Item	`PostMessage( hServerWnd, WM_DDE_REQUEST, hClientWnd, MAKELONG(cfFormat, aCREATEMENU) );`
	cfFormat = CF_DSPTEXT
Find Field	`PostMessage( hServerWnd, WM_DDE_REQUEST, hClientWnd, MAKELONG(cfFormat, aFIELD) );`
	cfFormat = CF_DSPTEXT
Get Keystrokes	`PostMessage( hServerWnd, WM_DDE_REQUEST, hClientWnd, MAKELONG(cfFormat, aKEYS) );`
	cfFormat = CF_DSPTEXT

Table 52. Summary of DDE Functions in a 16-Bit Environment (continued)

Function name	Client command

Get Mouse Input	`PostMessage( hServerWnd,`
	`WM_DDE_REQUEST,`
	`hClientWnd,`
	`MAKELONG(cfFormat, aMOUSE) );`

	cfFormat = CF_TEXT | CF_DSPTEXT

Get Number of Close Requests	`PostMessage( hServerWnd,`
	`WM_DDE_REQUEST,`
	`hClientWnd,`
	`MAKELONG(cfFormat, aCLOSE) );`

	cfFormat = CF_DSPTEXT

Get Operator Information Area	`PostMessage( hServerWnd,`
	`WM_DDE_REQUEST,`
	`hClientWnd,`
	`MAKELONG(cfFormat, aOIA) );`

	cfFormat = CF_DSPTEXT

Get Partial Presentation Space	`PostMessage( hServerWnd,`
	`WM_DDE_REQUEST,`
	`hClientWnd,`
	`MAKELONG(cfFormat, aEPS) );`

	cfFormat = CF_TEXT | CF_DSPTEXT

Get Presentation Space	`PostMessage( hServerWnd,`
	`WM_DDE_REQUEST,`
	`hClientWnd,`
	`MAKELONG(cfFormat, aPS) );`

	cfFormat = CF_TEXT | CF_DSPTEXT

Get Session Status	`PostMessage( hServerWnd,`
	`WM_DDE_REQUEST,`
	`hClientWnd,`
	`MAKELONG(cfFormat, aSSTAT) );`

	cfFormat = CF_TEXT

Get System Configuration	`PostMessage( hServerWnd,`
	`WM_DDE_REQUEST,`
	`hClientWnd,`
	`MAKELONG(cfFormat, aSYSCON) );`

	cfFormat = CF_TEXT

Get System Formats	`PostMessage( hServerWnd,`
	`WM_DDE_REQUEST,`
	`hClientWnd,`
	`MAKELONG(cfFormat, aFORMATS) );`

	cfFormat = CF_TEXT

Get System Status	`PostMessage( hServerWnd,`
	`WM_DDE_REQUEST,`
	`hClientWnd,`
	`MAKELONG(cfFormat, aSTATUS) );`

	cfFormat = CF_TEXT

Table 52. Summary of DDE Functions in a 16-Bit Environment (continued)

Function name	Client command
Get System SysItems	`PostMessage( hServerWnd, WM_DDE_REQUEST, hClientWnd, MAKELONG(cfFormat, aSYSITEMS) );`
	cfFormat = CF_TEXT
Get System Topics	`PostMessage( hServerWnd, WM_DDE_REQUEST, hClientWnd, MAKELONG(cfFormat, aTOPICS) );`
	cfFormat = CF_TEXT
Get Trim Rectangle	`PostMessage( hServerWnd, WM_DDE_REQUEST, hClientWnd, MAKELONG(cfFormat, aTRIMRECT) );`
	cfFormat = CF_TEXT
Initiate Menu Conversation	`PostMessage( hServerWnd, WM_DDE_INITIATE, hClientWnd, MAKELONG(aIBM327032, SN) );`
	`N = a session letter A through Z`
Initiate Session Conversation	`SendMessage( -1, WM_DDE_INITIATE, hClientWnd, MAKELONG(aIBM327032, aSessionN) );`
	N = a session letter A through Z.
Initiate Structured Field Conversation	`SendMessage( -1, WM_DDE_INITIATE, hClientWnd, MAKELONG(aIBM327032, aLUN_xxxx)`
	N = a session letter A through Z. xxxx = a user defined string.
Initiate System Conversation	`SendMessage( -1, WM_DDE_INITIATE, hClientWnd, MAKELONG(aIBM327032, aSystem) );`
Put Data to Presentation Space	`PostMessage( hServerWnd, WM_DDE_POKE, hClientWnd, MAKELONG(hData, aEPS) );`
	hData = Handle to a global memory object
Search for String	`PostMessage( hServerWnd, WM_DDE_REQUEST, hClientWnd, MAKELONG(cfFormat, aSTRING) );`
	cfFormat = CF_DSPTEXT

Table 52. Summary of DDE Functions in a 16-Bit Environment (continued)

Function name	Client command

Send Keystrokes	`PostMessage( hServerWnd,`
	`WM_DDE_POKE,`
	`hClientWnd,`
	`MAKELONG(hData, aKEYS) );`

	hData = Handle to a global memory object

Session Execute Macro	`PostMessage( hServerWnd,`
	`WM_DDE_EXECUTE,`
	`hClientWnd,`
	`MAKELONG(NULL, hCommands) );`

	hCommands = Handle to a global memory object

Set Cursor Position	`PostMessage( hServerWnd,`
	`WM_DDE_POKE,`
	`hClientWnd,`
	`MAKELONG(hData, aSETCURSOR) );`

	hData = Handle to a global memory object

Set Mouse Intercept Condition	`PostMessage( hServerWnd,`
	`WM_DDE_POKE,`
	`hClientWnd,`
	`MAKELONG(hData, aMOUSE) );`

	hData = Handle to a global memory object

Set Presentation Space Service Condition	`PostMessage( hServerWnd,`
	`WM_DDE_POKE,`
	`hClientWnd,`
	`MAKELONG(hData, aEPSCOND) );`

	hData = Handle to a global memory object

Set Session Advise Condition	`PostMessage( hServerWnd,`
	`WM_DDE_POKE,`
	`hClientWnd,`
	`MAKELONG(hData, aPSCOND) );`

	hData = Handle to a global memory object

Set Structured Field Service Condition	`PostMessage( hServerWnd,`
	`WM_DDE_POKE,`
	`hClientWnd,`
	`MAKELONG(hData, aSFCOND) );`

	hData = Handle to a global memory object

Start Close Intercept	`SendMessage( hServerWnd,`
	`WM_DDE_ADVISE,`
	`hClientWnd,`
	`MAKELONG(hOptions, aCLOSE) );`

	hOptions = Handle to a global memory object

Start Keystroke Intercept	`SendMessage( hServerWnd,`
	`WM_DDE_ADVISE,`
	`hClientWnd,`
	`MAKELONG(hOptions, aKEYS) );`

	hOptions = Handle to a global memory object

Table 52. Summary of DDE Functions in a 16-Bit Environment (continued)

Function name	Client command
Start Menu Advise	`PostMessage( hServerWnd, WM_DDE_ADVISE, hClientWnd, MAKELONG(hOptions, aSELECTMENU) );`
	hOptions = Handle to a global memory object
Start Mouse Input Intercept	`PostMessage( hServerWnd, WM_DDE_ADVISE, hClientWnd, MAKELONG(hOptions, aMOUSE) );`
	hOptions = Handle to a global memory object
Start Read SF	`PostMessage( hServerWnd, WM_DDE_ADVISE, hClientWnd, MAKELONG(hOptions, aSF) );`
	hOptions = Handle to a global memory object
Start Session Advise	`PostMessage( hServerWnd, WM_DDE_ADVISE, hClientWnd, MAKELONG(hOptions, aItem) );`
	hOptions = Handle to a global memory object aItem = OIA | PS | TRIMRECT
Stop Close Intercept	`PostMessage( hServerWnd, WM_DDE_UNADVISE, hClientWnd, MAKELONG(NULL, aCLOSE) );`
Stop Keystroke Intercept	`PostMessage( hServerWnd, WM_DDE_UNADVISE, hClientWnd, MAKELONG(NULL, aKEYS) );`
Start Mouse Input Intercept	`PostMessage( hServerWnd, WM_DDE_ADVISE, hClientWnd, MAKELONG(hOptions, aMOUSE) );`
	hOptions = Handle to a global memory object
Stop Menu Advise	`PostMessage( hServerWnd, WM_DDE_UNADVISE, hClientWnd, MAKELONG(NULL, aSELECTMENU) );`
Stop Read SF	`PostMessage( hServerWnd, WM_DDE_UNADVISE, hClientWnd, MAKELONG(NULL, aSF) );`
Stop Session Advise	`PostMessage( hServerWnd, WM_DDE_UNADVISE, hClientWnd, MAKELONG(NULL, aItem) );`
	aItem = OIA | PS | TRIMRECT | NULL

Table 52. Summary of DDE Functions in a 16-Bit Environment (continued)

Function name	Client command

Terminate Session Conversation	`SendMessage( hServerWnd,`
	`WM_DDE_TERMINATE,`
	`hClientWnd,`
	`MAKELONG(NULL, NULL) );`

Terminate Menu Conversation	`SendMessage( hServerWnd,`
	`WM_DDE_TERMINATE,`
	`hClientWnd,`
	`MAKELONG(NULL, NULL) );`

Terminate Structured Field Conversation	`SendMessage( hServerWnd,`
	`WM_DDE_TERMINATE,`
	`hClientWnd,`
	`MAKELONG(NULL, NULL) );`

Terminate System Conversation	`SendMessage( hServerWnd,`
	`WM_DDE_TERMINATE,`
	`hClientWnd,`
	`MAKELONG(NULL, NULL) );`

Write SF	`PostMessage( hServerWnd,`
	`WM_DDE_POKE,`
	`hClientWnd,`
	`MAKELONG(hData, aSF) );`

	hData = Handle to a global memory object

Appendix F. REXX EHLLAPI Functions

This appendix assists application programmers who are using EHLLAPI to write REXX language application programs. You should be familiar with the REXX command language. An overview of REXX EHLLAPI functions is provided. The functions are listed in alphabetic order, and a detailed description accompanies each function. Information about writing applications using REXX and sample programs is included after the function descriptions.

On Windows platforms, REXX applications require the use of IBM Object REXX for Windows 95, Windows 98, Windows NT, Windows Me, Windows 2000, and Windows XP.

Overview of REXX EHLLAPI Function Calls and Return Values

REXX EHLLAPI is called by either a REXX function or a REXX subroutine. The REXX function returns a value, which is assigned to a variable or return code:

```
rc=HLLAPI( function-string [,parameters ] )
```

The REXX subroutine places the return value in the special REXX variable called `Result` as follows:

```
call HLLAPI function-string [,parameters ]
```

Installation

The REXX EHLLAPI executable file (SAAHLAPI.DLL) is installed with IBM Personal Communications.

EHLLAPI is provided as an external feature and is loaded into memory only when used. To ensure that REXX EHLLAPI functions are available, REXX application programs must contain the following statement:

```
if rxfuncquery('hllapi') then call rxfuncadd 'hllapi','saahlapi','hllapisrv'
```

REXX EHLLAPI provides a *single* function name, which is used with a set of parameters. The function name is the first parameter of the rxfuncadd call above; the default is **HLLAPI**.

Conventions

Each REXX EHLLAPI function description contains the following:

- Function name
- Prerequisite calls
- Supplied syntax
- Supplied parameters
- Returned parameters
- Additional information

Function Name Provides the name and a brief explanation of the function.

Prerequisite Calls Lists any functions that your application program must call before you can use the present function. The word *None* indicates that no prerequisite calls are required. Prerequisite calls for all REXX EHLLAPI functions are listed under "Summary of Prerequisite Calls for Functions" on page 410.

Supplied Syntax Illustrates the syntax of the function call. Refer to "Overview of REXX EHLLAPI Function Calls and Return Values" on page 409 for more information.

Supplied Parameters Lists the parameters that your program must define in order to call the discussed REXX EHLLAPI function.

Every function call uses the name of the function as the first parameter, but the number of parameters that your program must define depends on the function being called. Refer to each function description for the format of the supplied parameters.

Returned Parameters Places values, as either a return code or actual data, in a single variable. If you are using REXX EHLLAPI as a function, these values are put in the receiving variable. If you are using REXX EHLLAPI as a subroutine, the values are placed in a special variable called *result*. Refer to each function description for the format of the returned values.

Additional Information Provides any necessary technical information about the function.

Summary of Prerequisite Calls for Functions

Table 53 lists the prerequisite calls for each REXX EHLLAPI function. Prerequisite calls are required when you use an application program.

Table 53. Prerequisite Calls for Functions

Function	Prerequisite Calls
Change_Switch_Name	Connect_PM
Change_Window_Name	Connect_PM
Connect	None
Connect_PM	None
Convert_Pos	None
Copy_Field_To_Str	Connect
Copy_OIA	Connect
Copy_PS	Connect
Copy_PS_To_Str	Connect
Copy_Str_To_Field	Connect
Copy_Str_To_PS	Connect
Disconnect	Connect
Disconnect_PM	Connect_PM
Find_Field_Len	Connect
Find_Field_Pos	Connect
Get_Key	Start_Keystroke_Intercept
Get_Window_Status	Connect_PM
Intercept_Status	Start_Keystroke_Intercept
Lock_PMSVC	Connect_PM
Lock_PS	Connect
Pause	None
Query_Close_Intercept	Start_Close_Intercept
Query_Cursor_Pos	Connect

Table 53. Prerequisite Calls for Functions (continued)

Function	Prerequisite Calls
Query_Emulator_Status	None
Query_Field_Attr	Connect
Query_Host_Update	Start_Host_Notify
Query_Session_List	None
Query_Session_Status	None
Query_Sessions	None
Query_System	None
Query_Window_Coord	Connect_PM
Query_Workstation_Profile	None
Receive_File	None
Release	Connect
Reserve	Connect
Reset_System	None
Search_Field	Connect
Search_PS	Connect
Send_File	None
Sendkey	Connect
Set_Cursor_Pos	Connect
Set_Session_Parms	None
Set_Window_Status	Connect_PM
Start_Close_Intercept	None
Start_Communication	None
Start_Host_Notify	None
Start_Keystroke_Intercept	None
Start_Session	None
Stop_Close_Intercept	Start_Close_Intercept
Stop_Communication	None
Stop_Host_Notify	Start_Host_Notify
Stop_Keystroke_Intercept	Start_Keystroke_Intercept
Stop_Session	None
Wait	Connect

Summary of EHLLAPI and REXX EHLLAPI Functions

Table 54 lists each EHLLAPI and REXX EHLLAPI function.

Table 54. EHLLAPI and REXX EHLLAPI Functions

EHLLAPI	REXX EHLLAPI
CHANGE SWITCH LIST LT NAME (105)	Change_Switch_Name
CHANGE PS WINDOW NAME (106)	Change_Window_Name
CONNECT PRESENTATION SPACE (1)	Connect

Table 54. EHLLAPI and REXX EHLLAPI Functions (continued)

EHLLAPI	REXX EHLLAPI
CONNECT PM WINDOW SERVICES (101)	Connect_PM
CONVERT POSITION or CONVERT ROWCOL (99)	Convert_Pos
COPY FIELD TO STRING (34)	Copy_Field_To_String
COPY OIA (13)	Copy_OIA
COPY PRESENTATION SPACE (5)	Copy_PS
COPY PRESENTATION SPACE TO STRING (8)	Copy_PS_To_Str
COPY STRING TO FIELD (33)	Copy_Str_To_Field
COPY STRING TO PRESENTATION SPACE (15)	Copy_Str_To_PS
DISCONNECT PRESENTATION SPACE (2)	Disconnect
DISCONNECT PM WINDOW SERVICES (102)	Disconnect_PM
FIND FIELD LENGTH (32)	Find_Field_Len
FIND FIELD POSITION (31)	Find_Field_Pos
GET KEY (51)	Get_Key
PAUSE (18)	Pause
PM WINDOW STATUS (104)	Get_Window_Status and Set_Window_Status
POST INTERCEPT STATUS (52)	Intercept_Status
LOCK PMSVC API (61)	Lock_PMSVC
LOCK PRESENTATION SPACE API (60)	Lock_PS
QUERY CLOSE INTERCEPT (42)	Query_Close_Intercept
QUERY CURSOR LOCATION (7)	Query_Cursor_Pos
QUERY FIELD ATTRIBUTE (14)	Query_Field_Attr
QUERY HOST UPDATE (24)	Query_Host_Update
QUERY PM WINDOW COORDINATES (103)	Query_Window_Coord
QUERY SESSION STATUS (22)	Query_Session_Status
QUERY SESSIONS (10)	Query_Sessions
QUERY SYSTEM (20)	Query_System
RECEIVE FILE (91)	Receive_File
RELEASE (12)	Release
RESERVE (11)	Reserve
RESET SYSTEM (21)	Reset_System
SEARCH FIELD (30)	Search_Field
SEARCH PRESENTATION SPACE (6)	Search_PS
SEND FILE (90)	Send_File
SEND KEY (3)	Sendkey
SET CURSOR (40)	Set_Cursor_Pos
SET SESSION PARAMETERS (9)	Set_Session_Parms

Table 54. EHLLAPI and REXX EHLLAPI Functions (continued)

EHLLAPI	REXX EHLLAPI
START CLOSE INTERCEPT (41)	Start_Close_Intercept
START HOST NOTIFICATION (23)	Start_Host_Notify
START KEYSTROKE INTERCEPT (50)	Start_Keystroke_Intercept
STOP CLOSE INTERCEPT (43)	Stop_Close_Intercept
STOP HOST NOTIFICATION (25)	Stop_Host_Notify
STOP KEYSTROKE INTERCEPT (53)	Stop_Keystroke_Intercept
WAIT (4)	Wait
pcsStartSession	Start_Session
pcsStopSession	Stop_Session
pcsConnectSession	Start_Communication
pcsDisconnectSession	Stop_Communication
pcsQuerySessionList	Query_Session_List
pcsQueryEmulatorStatus	Query_Emulator_Status
pcsQueryWorkstationProfile	Query_Workstation_Profile

Change_Switch_Name

The **Change_Switch_Name** function changes or resets the name of the session listed on the window title bar.

Prerequisite Calls

Connect_PM

Supplied Syntax

The syntax for **Change_Switch_Name** is as follows:

```
HLLAPI( 'Change_switch_name', session_id, type [, new_name ])
```

Supplied Parameters

Function name:	**Change_Switch_Name**
session_id:	The single-character short name of the session to be renamed on the Task List.
type:	One of the following: • **Set** renames the session name (title) for session *session_id* to *new_name*. • **Reset** restores the original session name (title). **Note:** Only the first character of **Set** or **Reset** is significant.

Returned Parameters

Return Code	Explanation
0	The **Change_Switch_Name** function was successful.
1	Your program is not currently connected to the host session.
2	An error was made in specifying parameters.
9	A system error occurred.
12	The session stopped.

Change_Window_Name

The **Change_Window_Name** function changes or resets the name of the session listed on the host window title bar.

Prerequisite Calls

Connect_PM

Supplied Syntax

The syntax for the **Change_Window_Name** function is as follows:

```
HLLAPI( 'Change_window_name', session_id, type [, new_name ])
```

Supplied Parameters

Function name: **Change_Window_Name**

session_id: The single-character short name of the session to be renamed on the title bar.

type: One of the following:

- **Set** changes the window name (title) for session *session_id* to *new_name*.
- **Reset** restores the original window name (title).

Note: Only the first character of **Set** or **Reset** is significant.

Returned Parameters

Return Code	Explanation
0	The **Change_Window_Name** function was successful.
1	Your program is not currently connected to the host session.
2	An error was made in specifying parameters.
9	A system error occurred.
12	The session stopped.

Connect

The **Connect** function connects the REXX application program to the host presentation space.

Prerequisite Calls

There are no prerequisite calls for this function.

Supplied Syntax

The syntax for the **Connect** function is as follows:

```
HLLAPI( 'Connect', session_id )
```

Supplied Parameters

Function name: **Connect**

session_id: The single-character short name of the session window you want to connect to.

Returned Parameters

Return Code	Explanation
0	The **Connect** function was successful.
1	An incorrect host presentation space ID was specified. The specified session either does not exist or is a logical printer session. This return code could also mean that the API Setting for DDE/EHLLAPI is not set on.
4	Successful connection was achieved, but the session is busy.
5	Successful connection was achieved, but the session is locked (input-inhibited).
9	A system error occurred.
11	The session is already being used by another system function.

Connect_PM

The **Connect_PM** function connects the REXX application program to the presentation space window.

Prerequisite Calls

There are no prerequisite calls for this function.

Supplied Syntax

The syntax for the **Connect_PM** function is as follows:

```
HLLAPI( 'Connect_PM', session_id )
```

Supplied Parameters

Function name: **Connect_PM**

session_id: The single-character short name of the session window that you want to connect to.

Returned Parameters

Return Code	Explanation
0	The **Connect_PM** function was successful.
1	An incorrect host presentation space ID was specified. This return code could also mean that the API Setting for DDE/EHLLAPI is not set on.
9	A system error occurred.
10	The function is not supported by your emulation program.
11	The session is already being used by another system function.

Convert_Pos

The **Convert_Pos** function converts the host presentation space positional value into the display row-column coordinates or converts the display row-column coordinates into the host presentation space positional value for the given session_ID.

Note: If row-column conversion is specified, *column* is the second parameter. The valid row-column values are the values you specified when you configured this session. For example, a session with 24 rows and 80 columns contains positions 1 to 1920.

Prerequisite Calls

There are no prerequisite calls for this function.

Supplied Syntax

The syntax for the **Convert_Pos** function is as follows:

```
HLLAPI( 'Convert_pos', session_id, column | position [, row ] )
```

Supplied Parameters

Function name:	**Convert_Pos**
session_id:	The single-character short name of the session.
column:	The column to be converted. It must be specified with the row.
row:	The row to be converted.
position:	The position to be converted.

Returned Parameters

The following values are valid if row-column conversion is requested:

Return Code	Explanation
0	The specified row or column is outside the presentation space.
n	The position of the specified row and column. For example: `HLLAPI ('Convert_pos', 'a', 10, 2) = '170'` converts column 10, row 2 to 170 in a 24x80 presentation space.

The following values are valid if position conversion is requested:

Return Code	Explanation
0	The specified position is outside the presentation space.
c r	Where **c** is the column number and **r** is the row number. For example: `HLLAPI ('Convert_pos', 'a', 170) = '10 2'` converts position 170 to column 10, row 2 in a 24x80 presentation space.

Copy_Field_To_Str

The **Copy_Field_To_Str** function transfers characters from a target field into a data string. Use the **Find_Field_Pos** and **Find_Field_Len** functions to determine the target and its length values.

Prerequisite Calls

Connect

Supplied Syntax

The syntax for the **Copy_Field_To_Str** function is as follows:

```
HLLAPI( 'Copy_field_to_str', pos, length )
```

Supplied Parameters

Function name:	**Copy_Field_To_Str**
pos:	The target field to be copied.
length:	The length, in bytes, of the target data string.

Returned Parameters

Return Code	Explanation
''	Null. No field data was found at *pos*, or a *pos* that is not valid was specified.
data	The contents of the returned data string are determined by the extended attribute bytes (EAB) value in the **Set_Session_Parms** function. If EAB is set off, only text from the presentation space is returned. If EAB is set on, 2 bytes are returned for each byte that is displayed. The first byte contains the EAB value, and the second byte contains the text data. Double-byte EAD can be returned by using the EAD option of the (9) function with the **COPY FIELD TO STRING** function. If the EAD is specified without specifying the EAB option, EAD is returned after each character. If the EAB option is specified, EAD is returned after EAB.

Copy_OIA

This function returns the contents of the operator information area (OIA) from the connected session.

Prerequisite Calls

Connect

Supplied Syntax

The syntax for the **Copy_OIA** function is as follows:

```
HLLAPI( 'Copy_OIA' )
```

Supplied Parameters

There are no supplied parameters for this function.

Returned Parameters

Return Code	Explanation
''	Null. Not connected or other error.
data	The 104-byte copy of the OIA data. Refer to “Copy OIA (13)” on page 48.

Copy_PS

The **Copy_PS** function returns the entire contents of the presentation space for the currently connected session.

Prerequisite Calls
Connect

Supplied Syntax
The syntax for the **Copy_PS** function is as follows:

```
HLLAPI( 'Copy_PS' )
```

Supplied Parameters
There are no supplied parameters for this function.

Returned Parameters

Return Code	Explanation
''	Null. Not connected or other error.
data	The contents of the returned data string are determined by the EAB value in the **Set_Session_Parms** function. If EAB is set off, only text from the presentation space is returned. If EAB is set on, 2 bytes are returned for each byte that is displayed. The first byte contains the EAB value, and the second byte contains the text data. These bytes are returned as a space character if the start position of the copy is the second byte of the double-byte character or if the end position is the first byte of the double-byte character.

Additional Information
COPY_PS results in two calls to EHLLAPI. The first is **QUERY_SESSIONS**, which is used to determine the size of the presentation space. The second call, **COPY_PS_TO_STRING**, is used in place of **COPY_PS** in order to prevent possible buffer overflow.

COPY_PS_TO_STRING is used because of the slim possibility that the size of the presentation space might change between the calls to **QUERY_SESSIONS** and **COPY_PS_TO_STRING**.

Note: Should the presentation space increase in size, only the number of bytes returned on the **QUERY_SESSIONS** are copied. If the size decreases, then the characters beyond the current size should be ignored.

Copy_PS_To_Str

The **Copy_PS_To_Str** function copies data from the currently connected session into a data string.

Prerequisite Calls

Connect

Supplied Syntax

The syntax for the **Copy_PS_To_Str** function is as follows:

```
HLLAPI( 'Copy_PS_to_str', pos, length )
```

Supplied Parameters

Function name:	**Copy_PS_To_Str**
pos:	The target field to be copied.
length:	The length, in bytes, of the target data string.

Note: Do not double the target field value if EAB is set on. REXX EHLLAPI does this for you automatically, if EAD is set on.

Returned Parameters

Return Code	Explanation
''	Null. Not connected or other error.
data	The contents of the returned data string are determined by the EAB value in the **Set_Session_Parms** function. If EAB is set off, only text from the presentation space is returned. If EAB is set on, 2 bytes are returned for each byte that is displayed. The first byte contains the EAB value, and the second byte contains the text data.

Copy_Str_To_Field

The **Copy_Str_To_Field** function copies a string of characters into a specified field at the target field location position of the connected session.

Prerequisite Calls

Connect

Supplied Syntax

The syntax for the **Copy_Str_To_Field** function is as follows:

```
HLLAPI( 'Copy_str_to_field', string, pos )
```

Supplied Parameters

Function name: **Copy_Str_To_Field**
string: The string containing the data to be transferred to the target field.
pos: The target field to be copied.

Returned Parameters

Return Code	Explanation
0	The **Copy_Str_To_Field** function was successful.
1	Your program is not currently connected to the host session.
2	Parameter error.
5	The target field was protected or inhibited, or incorrect data was sent to the target field (such as a field attribute).
6	Copy was completed, but data was truncated.
7	The *pos* parameter was not valid.
9	A system error occurred.
24	The screen has no fields (unformatted).

Copy_Str_To_PS

The **Copy_Str_To_PS** function copies a string of characters into the host presentation space specified by the *pos* parameter.

Prerequisite Calls

Connect

Supplied Syntax

The syntax for the **Copy_Str_To_PS** function is as follows:

```
HLLAPI( 'Copy_str_to_PS', string, pos )
```

Supplied Parameters

Function name:	**Copy_Str_To_PS**
string:	The string containing the data to be transferred to the presentation space.
pos:	The presentation space to be copied.

Returned Parameters

Return Code	Explanation
0	The **Copy_Str_To_PS** function was successful.
1	Your program is not currently connected to the host session.
2	Parameter error.
5	The target field was protected or inhibited, or incorrect data was sent to the target field (such as a field attribute).
6	Copy was completed, but data was truncated.
7	The *pos* parameter was not valid.
9	A system error occurred.

Disconnect

The **Disconnect** function disconnects your application program from the currently connected session.

Prerequisite Calls

Connect

Supplied Syntax

The syntax for the **Disconnect** function is as follows:

```
HLLAPI( 'Disconnect' )
```

Supplied Parameters

There are no supplied parameters for this function.

Returned Parameters

Return Code	Explanation
0	The **Disconnect** function was successful.
1	Your program is not currently connected to the host presentation space.
9	A system error occurred.

Disconnect_PM

The **Disconnect_PM** function disconnects from the session window.

Prerequisite Calls

Connect_PM

Supplied Syntax

The syntax for the **Disconnect_PM** function is as follows:

```
HLLAPI( 'Disconnect_PM', session_id )
```

Supplied Parameters

Function name: **Disconnect_PM**

session_id: The single-character short name of the session you want to connect to.

Returned Parameters

Return Code	Explanation
0	The **Disconnect_PM** function was successful.
1	Your program is not currently connected for Window Services.
9	A system error occurred.

Find_Field_Len

The **Find_Field_Len** function returns the length of the target field along with the attributes specified by the *search_option* parameter.

Prerequisite Calls

Connect

Supplied Syntax

The syntax for the **Find_Field_Len** function is as follows:

```
HLLAPI( 'Find_field_len', search_option, pos )
```

Supplied Parameters

Function name: **Find_Field_Len**
search_option: See the following table.
pos: The target field to be copied.

The following *search_option* values are valid:

Value	Explanation
'ƀƀ' or 'Tƀ'	Current field (the field where the cursor is located).
'Nƀ'	Next field, either protected or unprotected.
'Pƀ'	Previous field, either protected or unprotected.
'NP'	Next protected field.
'NU'	Next unprotected field.
'PP'	Previous protected field.
'PU'	Previous unprotected field.

Returned Parameters

Return Code	Explanation
0	The specified field was not found.
data	The length of the specified field.

Find_Field_Pos

The **Find_Field_Pos** function returns the location of the target field with the attributes specified by the *search_option* parameter.

Prerequisite Calls

Connect

Supplied Syntax

The syntax for the **Find_Field_Pos** function is as follows:

```
HLLAPI( 'Find_field_pos', search_option, pos )
```

Supplied Parameters

Function name: **Find_Field_Pos**
search_option: See the following table.
pos: The target field to be copied.

The following *search_option* values are valid:

Value	Explanation
'ƀƀ' or 'Tƀ'	The current field (the field where the cursor is located).
'Nƀ'	The next field, either protected or unprotected.
'Pƀ'	The previous field, either protected or unprotected.
'NP'	The next protected field.
'NU'	The next unprotected field.
'PP'	The previous protected field.
'PU'	The previous unprotected field.

Returned Parameters

Return Code	Explanation
0	The specified field was not found.
data	The position of the specified field.

Get_Key

The **Get_Key** function allows your application program to intercept keystrokes from the specified *session_id*, or from the currently connected session if *session_id* is blank. The program waits until a keystroke becomes available.

Prerequisite Calls

Start_Keystroke_Intercept

Supplied Syntax

The syntax for the **Get_Key** function is as follows:

```
HLLAPI( 'Get_key', session_id )
```

Supplied Parameters

Function name: **Get_Key**
session_id: The single-character short name of the session.

Returned Parameters

Return Code	Explanation
''	Null. Error or not connected to *session_id*.
data string	The contents of the data string depend on the keys pressed by the 3270 or 5250 session operator. Refer to "Keyboard Mnemonics" on page 135.

Note: The @ (escape) character is set by specifying ESC= in the **Set_Session_Parms** function.

Additional Information

If keystroke interception is active (through the **Start_Keystroke_Intercept** function), no keystrokes are sent to the connected session until you perform the following tasks:

1. Specify the **Get_Key** function to remove the keystroke from the intercept buffer.
2. Specify the **Intercept_Status** function to either accept or reject the keystroke. If you specify *Accept*, the keystroke is sent to the connected session by the **Sendkey** function. If you specify *Reject*, the keystroke is discarded.

Get_Window_Status

The **Get_Window_Status** function returns the current window status as a string of ASCII characters in hexadecimal format.

Prerequisite Calls

Connect_PM

Supplied Syntax

The syntax for the **Get_Window_Status** function is as follows:

```
HLLAPI( 'Get_window_status', session_id )
```

Supplied Parameters

Function name: **Get_Window_Status**
session_id: The single-character short name of the session.

Returned Parameters

Return Code	Explanation
''	Null. Not connected to the window. Refer to the **Connect_PM** function for more information.
0008	The window is visible.
0010	The window is invisible.
0080	The window is activated.
0100	The window is deactivated.
0400	The window is minimized.
0800	The window is maximized.
Note: If more than one of the above states is true, the return codes are added together. For example, if the window is visible (0008), deactivated (0100), and maximized (0800), the return code is 0908.	

Intercept_Status

The **Intercept_Status** function informs the session when a keystroke obtained through the **Get_Key** function was accepted or rejected.

Prerequisite Calls

Start_Keystroke_Intercept

Supplied Syntax

The syntax for the **Intercept_Status** function is as follows:

```
HLLAPI( 'Intercept_status', session_id, status )
```

Supplied Parameters

Function name: **Intercept_Status**
session_id: The single-character short name of the session.
status: See the following table:

Value	Explanation
'A'	Accept the keystroke.
'R'	Reject the keystroke. Signal with a beep.

Returned Parameters

Return Code	Explanation
0	The **Interrupt_Status** function was successful.
1	The presentation space was not valid.
8	No prior **Start_Keystroke_Intercept** function was active.
9	A system error occurred.

Lock_PMSVC

This function locks or unlocks the presentation space window.

Prerequisite Calls

Connect_PM

Supplied Syntax

The syntax for the **Lock_PMSVC** function is as follows:

```
HLLAPI( 'Lock_PMSVC', session_id, status, queue_option )
```

Supplied Parameters

Function name: **Lock_PMSVC**
session_id: The single-character short name of the session.
status: See the following table:

Value	Explanation
'L'	Lock the presentation space window.
'U'	Unlock the presentation space window.

queue_option: See the following table:

Value	Explanation
'R'	Return immediately.
'Q'	Queue if the presentation space window is already locked (for lock only).

Returned Parameters

Return Code	Explanation
0	The **Lock_PMSVC** function was successful.
1	An incorrect host presentation space was specified or not connected.
2	An error was made in specifying parameters.
9	A system error occurred.
43	The API was already locked by another EHLLAPI application (on LOCK), or API not locked (on UNLOCK).

Lock_PS

The **Lock_PS** function locks or unlocks the presentation space.

Prerequisite Calls

Connect

Supplied Syntax

The syntax for the **Lock_PS** function is as follows:

```
HLLAPI( 'Lock_PS', session_id, status, queue_option )
```

Supplied Parameters

Function name: **Lock_PS**
session_id: The single-character short name of the session.
status: See the following table:

Value	Explanation
'L'	Lock the presentation space.
'U'	Unlock the presentation space.

queue_option: See the following table:

Value	Explanation
'R'	Return immediately.
'Q'	Queue if the presentation space is already locked (for LOCK only).

Returned Parameters

Return Code	Explanation
0	The **Lock_PS** function was successful.
1	The presentation space was not valid.
2	An error was made in specifying parameters.
9	A system error occurred.
43	The API was already locked by another EHLLAPI application (on LOCK), or API not locked (on UNLOCK).

Pause

The **Pause** function causes a timed pause of *n* ½-second intervals to occur.

If the **Set_Session_Parms** function is set to IPAUSE and a **Start_Host_Notify** function has been called, the pause is also ended by an update to the host screen. If *sessname* is provided and IPAUSE has been set, only updates to the specified session interrupts the pause. Otherwise, updates to any connected session interrupts the pause (if IPAUSE has been set).

Prerequisite Calls

There are no prerequisite calls for this function.

Supplied Syntax

The syntax for the **Pause** function is as follows:

```
HLLAPI( 'Pause', n [, sessname] )
```

Supplied Parameters

Function name: **Pause**
n: A timed pause.
sessname: An optional parameter. See the following table:

Value	Explanation
'X#'	X is the name of the short-session_id, and # is coded exactly as shown.

Returned Parameters

Return Code	Explanation
0	The wait duration has expired.
9	A system error occurred.
26	The host session presentation space or OIA has been updated. Refer to “Query_Host_Update” on page 439 for more information.

Query_Close_Intercept

The **Query_Close_Intercept** function determines if a close request was started from the session.

Prerequisite Calls

Start_Close_Intercept

Supplied Syntax

The syntax for the **Query_Close_Intercept** function is as follows:

```
HLLAPI( 'Query_close_intercept', session_id )
```

Supplied Parameters

Function name: **Query_Close_Intercept**
session_id: The single-character short name of the host session.

Returned Parameters

Return Code	Explanation
0	A close intercept event did not occur.
1	Your program is not currently connected to the host session.
2	An error was made in specifying parameters.
8	No prior **Start_Close_Intercept** function was called for this host presentation space.
9	A system error occurred.
12	The session stopped.
26	A close intercept occurred since the last **Query_Close_Intercept** function call.

Query_Cursor_Pos

The **Query_Cursor_Pos** function returns the cursor position for the currently connected session.

Prerequisite Calls

Connect

Supplied Syntax

The syntax for the **Query_Cursor_Pos** function is as follows:

```
HLLAPI( 'Query_cursor_pos' )
```

Supplied Parameters

There are no supplied parameters for this function.

Returned Parameters

Return Code	Explanation
0	Your program is not currently connected to the host session.
data	Cursor position.

Query_Emulator_Status

The **Query_Emulator_Status** function returns the status of the specified host session.

Prerequisite Calls

There are no prerequisite calls for this function.

Supplied Syntax

The syntax for the **Query_Emulator_Status** function is as follows:

```
HLLAPI( 'Query_emulator_status', session_id )
```

Supplied Parameters

Function name: **Query_Emulator_Status**

session_id: Specifies the session letter (A-Z) of the session to be queried.

Returned Parameters

Return Code	Explanation
' '	Null. Error has occurred.
1	Session started.
2	Session started and connection to the host requested.
3	Session started, connection requested, and API is enabled for the session.

Query_Field_Attr

The **Query_Field_Attr** function returns the hexadecimal representation of the field attribute in the currently connected session.

Prerequisite Calls

Connect

Supplied Syntax

The syntax for the **Query_Field_Attr** function is as follows:

```
HLLAPI( 'Query_field_attr', pos )
```

Supplied Parameters

Function name: **Query_Field_Attr**

pos: The target field to be copied.

Returned Parameters

Return Code	Explanation
1	Your program is not currently connected to the host session.
data	Attribute bytes (printable hexadecimal characters equal to or greater than X'C0').

Query_Host_Update

The **Query_Host_Update** function determines if the OIA or presentation space for the session has been updated.

Prerequisite Calls

Start_Host_Notify

Supplied Syntax

The syntax for the **Query_Host_Update** function is as follows:

```
HLLAPI( 'Query_host_update', session_id )
```

Supplied Parameters

Function name: **Query_Host_Update**
session_id: The single-character short name of the session.

Returned Parameters

Return Code	Explanation
0	No updates were made since the last call.
1	An incorrect host presentation space was specified.
8	No prior **Start_Host_Notify** function was called for the host presentation space ID.
9	A system error occurred.
21	The OIA has been updated.
22	The presentation space was updated.
23	The OIA and the host presentation space were updated.
44	Printing has completed in the printer session.

Query_Session_List

The **Query_Session_List** function returns a 2–byte entry of each current host session.

Prerequisite Calls

There are no prerequisite calls for this function.

Supplied Syntax

The syntax for the **Query_Session_List** function is as follows:

```
HLLAPI( 'Query_session_list', )
```

Supplied Parameters

There are no supplied parameters for this function.

Returned Parameters

Return Code	Explanation	
' '	Null. Not connected.	
0	No sessions are started.	
data	**Position**	**Definition**
	1	Short session ID.
	2	One of the following values: **1** Session started. **0** Session started and connection to the host requested. **3** Session started, connection requested, and API is enabled for the session.

Query_Session_Status

The **Query_Session_Status** function returns various status information from the host session, or from the currently connected session if *session_id* is blank.

Prerequisite Calls

There are no prerequisite calls for this function.

Supplied Syntax

The syntax for the **Query_Session_Status** function is as follows:

```
HLLAPI( 'Query_session_status', session_id )
```

Supplied Parameters

Function name: **Query_Session_Status**
session_id: The single-character short name of the session.

Returned Parameters

Return Code	Explanation	
' '	Null. Not connected.	
data	**Position**	**Definition**
	1	Short session ID.
	2–9	Long name of session.
	10	Session type, where: • D=3270 host • E=3270 printer • F=5250 host • G=5250 printer • H=ASCII
	11	Session characteristics, expressed as a binary number containing the session characteristics byte explained below: **0** EAB **1** PSS **2–7** Reserved. If bit 0 (EAB) = 0, the session has base attributes. If bit 0 (EAB) = 1, the session has extended attributes. If bit 1 (PSS) = 0, the session does not support programmed symbols. If bit 1 (PSS) = 1, the session supports programmed symbols.
	12–13	Number of rows in the host presentation space. This is a binary number and is not in display format. If the session type is E or G, the value is 0.
	14–15	Number of columns in the host presentation space. This is a binary number and is not in display format. If the session type is E or G, the value is 0.
	16-17	Host code page number, expressed as a binary number.
	18	Reserved.

Note: After you parse the last three fields (row, col, codepage) from the string to obtain their decimal values, use c2d(reverse(x)) to reverse the bytes.

Query_Sessions

The **Query_Sessions** function returns either a 12-byte description of each configured session or a null ('') if an error occurs.

Prerequisite Calls

There are no prerequisite calls for this function.

Supplied Syntax

The syntax for the **Query_Sessions** function is as follows:

```
HLLAPI( 'Query_sessions' )
```

Supplied Parameters

There are no supplied parameters for this function.

Returned Parameters

Return Code	Explanation	
' '	Null. Error has occurred.	
data	**Position**	**Definition**
	1	Short session ID.
	2–9	Long name of session.
	10	Connection type H=host
	11–12	Presentation space size. This is a binary number and is not in display format. If the session type is a print session, the value is 0. (See "Query Sessions (10)" on page 110.)

Note: After you parse the last field (pssize) from the string to obtain its decimal values, use c2d(reverse(x)).

Query_System

The **Query_System** function returns either a 35-byte system configuration string or a null ('') if an error occurs.

Prerequisite Calls

There are no prerequisite calls for this function.

Supplied Syntax

The syntax for the **Query_System** function is as follows:

```
HLLAPI( 'Query_system' )
```

Supplied Parameters

There are no supplied parameters for this function.

Returned Parameters

Return Code	Explanation	
' '	Null. Error has occurred.	
data	**Position**	**Definition**
	1	EHLLAPI version number.
	2–3	EHLLAPI level number.
	4–9	Reserved
	10–12	Reserved.
	13	Hardware base U= unable to determine.
	14	Program type, where P =IBM Personal Communications.
	15–16	Reserved.
	17–18	PCOMM version/level as a 2-byte ASCII value.
	19	Reserved.
	20–23	Reserved
	24–27	Reserved
	28–29	Reserved
	30–31	NLS type expressed as a 2–byte binary number.
	32	1-byte printable ASCII code representing the type of monitor used as follows: • V = VGA • H = XGA • U = unknown
	33–35	Reserved.

Query_Window_Coord

The **Query_Window_Coord** function requests the window coordinates from the window for the host session, or from the currently connected session if *session_id* is blank.

Prerequisite Calls

Connect_PM

Supplied Syntax

The syntax for the **Query_Window_Coord** function is as follows:

```
HLLAPI( 'Query_window_coord', session_id )
```

Supplied Parameters

Function name: **Query_Window_Coord**
session_id: The single-character short name of the session window.

Returned Parameters

Return Code	Explanation
''	Null. Not connected.
data	The data string returns 4 decimal numbers in the following format: `xLeft yBottom xRight yTop`

Query_Workstation_Profile

The **Query_Workstation_Profile** function returns the profile name that was used to start the specified host session.

Prerequisite Calls

There are no prerequisite calls for this function.

Supplied Syntax

The syntax for the **Query_Workstation_Profile** function is as follows:

```
HLLAPI( 'Query_workstation_profile', session_id )
```

Supplied Parameters

Function name: **Query_Workstation_Profile**

session_id: Specifies the session letter (A-Z) of the session to be queried.

Returned Parameters

Return Code	Explanation
' '	Null. Error has occurred.
data	The name of the workstation profile used to start the session.

Receive_File

The **Receive_File** function is used to transfer a file from the host session to the workstation session.

Note: Do not terminate the Receive program while file transfer is in progress; otherwise you will receive an error message.

Prerequisite Calls

There are no prerequisite calls for this function.

Supplied Syntax

The syntax for the **Receive_File** function is as follows:

```
HLLAPI( 'Receive_file', string )
```

Supplied Parameters

Function name: **Receive_File**

string: The same parameters that are specified with RECEIVE command. For additional information on parameters, refer to "Receive File (91)" on page 119.

Returned Parameters

Return Code	Explanation
2	A parameter error occurred, or you specified a data string length that is too short or too long (0 bytes or more than 128 bytes) for the EHLLAPI buffer. The file transfer was unsuccessful.
3	The file transfer was complete.
4	The file transfer was complete and has segmented records.
9	A system error occurred.
27	Either the file transfer ended by a cancel of a file transfer or, if a timeout was specified by the **Set_Session_Parms** function, the timeout expired.
101	File transfer was successful (transfer to/from CICS).
300+x	The Win32 error codes reported by EHLLAPI are greater than 300. To determine the Win32 error code, subtract 300 from the return code and refer to *OS/2 Control Program Programming Reference.*

Other return codes can also be received, which relate to message numbers generated by the host transfer program. For transfers to a CICS host transfer program, subtract 100 from the return code to give you the numeric portion of the message. For example, a return code of 101 would mean that the message number INW0001 was issued by the host. For other host transfer programs, just use the return code as the numerical part of the message. For example, a return of 34 would mean that message TRANS34 was issued by the host transfer program. The documentation for your host transfer program should give more information about the meanings of the specific messages.

Release

The **Release** function unblocks the connected display session keyboard.

Prerequisite Calls
Connect

Supplied Syntax
The syntax for the **Release** function is as follows:

```
HLLAPI( 'Release' )
```

Supplied Parameters
There are no supplied parameters for this function.

Returned Parameters

Return Code	Explanation
0	The **Release** function was successful.
1	Your program is not currently connected to the host session.
9	A system error occurred.

Additional Information
If you disconnect while the keyboard is locked (through the **Reserve** function), the keyboard is released automatically.

Reserve

The **Reserve** function blocks the currently connected session from user input until either a **Reserve** or a **Disconnect** function is executed.

Prerequisite Calls

Connect

Supplied Syntax

The syntax for the **Reserve** function is as follows:

```
HLLAPI( 'Reserve' )
```

Supplied Parameters

There are no supplied parameters for this function.

Returned Parameters

Return Code	Explanation
0	The **Reserve** function was successful.
1	Your program is not currently connected to the host session.
5	The presentation space was inhibited.
9	A system error occurred.

Reset_System

The **Reset_System** function reinitializes the session parameters (set by the **Set_Session_Parms** function) to their defaults and disconnects from all connected resources.

Prerequisite Calls

There are no prerequisite calls for this function.

Supplied Syntax

The syntax for the **Reset_System** function is as follows:

```
HLLAPI( 'Reset_system' )
```

Supplied Parameters

There are no supplied parameters for this function.

Returned Parameters

Return Code	Explanation
0	The **Reset_System** function was successful.
9	A system error occurred.

Search_Field

The **Search_Field** function searches the currently connected presentation space for the occurrence of a specified string beginning at a particular target field. If the SRCHALL (default) option is specified in the **Set_Session_Parms** function, the *pos* parameter is overridden.

Prerequisite Calls

Connect

Supplied Syntax

The syntax for the **Search_Field** function is as follows:

```
HLLAPI( 'Search_field', string, pos )
```

Supplied Parameters

Function name:	**Search_Field**
string:	The string to search for.
pos:	The position of the field within the presentation space.

Returned Parameters

Return Code	Explanation
0	The *string* was not found or the session was not connected.
data	The position of the *string* in the connected presentation space.

DBCS Only: If the specified start position for the search function is the second byte of the double-byte character, the search starts from the next character for SRCHRFWD or from this character for SRCHBKWD. If the last character of the specified string is the first byte of the double-byte character, it is not included.

During a search, SO/SI pairs are ignored in the presentation space. To search the control character of the double-byte character, the string should be placed between SO (X'0E') and SI (X'0I'). For example, X'0E000C0F' in the data string is treated as the double-byte character FF (X'000C').

Search_PS

The **Search_PS** function searches the host presentation space for a particular string.

Prerequisite Calls
Connect

Supplied Syntax
The syntax for the **Search_PS** function is as follows:

```
HLLAPI( 'Search_PS', string, pos )
```

Supplied Parameters

Function name:	**Search_PS**
string:	The string to search for.
pos:	The PS position to begin the search.

Returned Parameters

Return Code	Explanation
0	The *string* was not found or the session was not connected.
data	Position of the *string* in the connected presentation space.

DBCS Only: If the specified start position for the search function is the second byte of the double-byte character, the search starts from the next character for SRCHRFWD or from this character for SRCHBKWD. If the last character of the specified string is the first byte of the double-byte character, it is not included.

During a search, SO/SI pairs are ignored in the presentation space. To search the control character of the double-byte character, the string should be placed between SO (X'0E') and SI (X'0I'). For example, X'0E000C0F' in the data string is treated as the double-byte character FF (X'000C').

Send_File

The **Send_File** function transfers a file from the personal computer session where EHLLAPI is running to a host session.

Note: Do not terminate the Send program while file transfer is in progress; otherwise, you will receive an error message.

Prerequisite Calls

There are no prerequisite calls for this function.

Supplied Syntax

The syntax for the **Send_File** function is as follows:

```
HLLAPI( 'Send_file', string )
```

Supplied Parameters

Function name: **Send_File**

string The same parameters that are specified with SEND command. For additional information on parameters, refer to "Send File (90)" on page 131.

Returned Parameters

Return Code	Explanation
2	A parameter error occurred, or you specified a data string length that was too long or too short for the EHLLAPI buffer. File transfer was unsuccessful.
3	The file transfer was complete.
4	The file transfer was complete and has segmented records.
5	The workstation file name was incorrect or was not found. File transfer was canceled.
9	A system error occurred.
27	Either the file transfer ended by a cancel of a file transfer or, if timeout was specified by the **Set_Session_Parms** function, the timeout expired.
101	File transfer was successful (transfer to/from CICS).
300+x	The Win32 error codes reported by EHLLAPI are greater than 300. To determine the Win32 error code, subtract 300 from the return code and refer to *OS/2 Control Program Programming Reference*

Other return codes can also be received, which relate to message numbers generated by the host transfer program. For transfers to a CICS host transfer program, subtract 100 from the return code to give you the numeric portion of the message. For example, a return code of 101 would mean that the message number INW0001 was issued by the host. For other host transfer programs, just use the return code as the numerical part of the message. For example, a return of 34 would mean that message TRANS34 was issued by the host transfer program. The documentation for your host transfer program should give more information about the meanings of the specific messages.

Sendkey

The **Sendkey** function sends a keystroke or a string of keystrokes to the currently connected host presentation space. The *string* parameter defines the set of keystrokes, which are sent to the host presentation space. Up to 255 keys can be sent at a time.

Prerequisite Calls

Connect

Supplied Syntax

The syntax for the **Sendkey** function is as follows:

```
HLLAPI( 'Sendkey', string )
```

Supplied Parameters

Function name: **Sendkey**

string: The string of keystrokes. Refer to "Keyboard Mnemonics" on page 135.

Returned Parameters

Return Code	Explanation
0	The keystrokes were sent; status was normal.
1	Your program is not currently connected to the host session.
4	The host session was busy; all of the keystrokes could not be sent.
5	Input to the target session was inhibited; keystrokes were rejected, or incorrect keystroke mnemonics were sent. All of the keystrokes could not be sent.
6	Bad keystroke mnemonic.
9	A system error occurred.

Set_Cursor_Pos

The **Set_Cursor_Pos** function positions the cursor at the specified target field within the currently connected host presentation space.

Prerequisite Calls

Connect

Supplied Syntax

The syntax for the **Set_Cursor_Pos** function is as follows:

```
HLLAPI( 'Set_cursor_pos', pos )
```

Supplied Parameters

Function name: **Set_Cursor_Pos**

pos: The target field to be copied.

Returned Parameters

Return Code	Explanation
0	Cursor was successfully located at specified position.
1	Your program is not currently connected to the host session.

Set_Session_Parms

The **Set_Session_Parms** function sets the current session parameters.

Prerequisite Calls

There are no prerequisite calls for this function.

Supplied Syntax

The syntax for the **Set_Session_Parms** function is as follows:

```
HLLAPI( 'Set_session_parms', string )
```

Supplied Parameters

Function name: **Set_Session_Parms**

string: The string containing the session options to be changed.

Returned Parameters

Return Code	Explanation
0	The session parameters were set.
2	One or more parameters were not valid.
9	A system error occurred.

Additional Information

The STREOT and EOT options are not supported in the **Set_Session_Parms** function.

Set_Window_Status

The **Set_Window_Status** function changes the window status of a session.

Prerequisite Calls

Connect_PM

Supplied Syntax

The syntax for the **Set_Window_Status** function is as follows:

```
HLLAPI( 'Set_window_status', session_id, option [, num1 | option1,
num2 ] )
```

Supplied Parameters

Function name: **Set_Window_Status**
session_id: The single-character short name of the session.
option: See the following table:

Option	Explanation
'V'	Make the window visible.
'I'	Make the window invisible.
'A'	Make the window active.
'D'	Make the window inactive.
'R'	Restore the window from maximized or minimized state.
'Z'	Change the window placement based on the first character of *option1*: **Top** Move the emulation window to the foreground. **Bottom** Move the emulation window to the background.
'X'	Maximize the window.
'N'	Minimize the window (reduce to icon).
'M'	Where *num1* and *num2* represent the decimal position of the lower left corner of the new window position.
'S'	Where *num1* and *num2* represent the decimal width and height of the new window.

The *num1* and *num2* parameters are used only for the *Move* ('M') and *Size* ('S') options and the *option1* parameter is used for the *Zorder* ('Z') option.

Returned Parameters

Return Code	Explanation
0	The **Set_Window_Status** function was successful.
1	Your program is not currently connected to the host session.
9	A system error occurred.
12	The session stopped.

Start_Close_Intercept

The **Start_Close_Intercept** function intercepts close requests for the host session.

Prerequisite Calls

There are no prerequisite calls for this function.

Supplied Syntax

The syntax for the **Start_Close_Intercept** function is as follows:

```
HLLAPI( 'Start_close_intercept', session_id )
```

Supplied Parameters

Function name: **Start_Close_Intercept**
session_id: The single-character short name of the session.

Returned Parameters

Return Code	Explanation
0	The **Start_Close_Intercept** function was successful.
1	An incorrect host presentation space was specified.
2	A parameter error occurred.
9	A system error occurred.
10	The function was not supported by the emulation program.

Start_Communication

The **Start_Communication** function starts the communications with the host session for the specified *session_id*. This call is equivalent to doing a 'Communications->Connect' from the emulator window.

Prerequisite Calls

There are no prerequisite calls for this function.

Supplied Syntax

The syntax for the **Start_Communication** function is as follows:

```
HLLAPI( 'Start_communication', session_id )
```

Supplied Parameters

Function name: **Start_Communication**
session_id: The single character short-name of the session.

Returned Parameters

Return Code	Explanation
0	The **Start_Communication** connection was requested successfully.
1	An incorrect session ID was specified.
2	The specified session has not been started.

Start_Host_Notify

The **Start_Host_Notify** function determines if the designated host presentation space or operator information area has been updated.

Prerequisite Calls

There are no prerequisite calls for this function.

Supplied Syntax

The syntax for the **Start_Host_Notify** function is as follows:

```
HLLAPI( 'Start_host_notify', session_id, option )
```

Supplied Parameters

Function name:	**Start_Host_Notify**
session_id:	The single-character short name of the session.
E	Asks for notification of completion during a printer session.
option:	See the following table:

Value	Explanation
'P'	Asks for notification of presentation space update only.
'O'	Asks for notification of OIA update only.
'B'	Asks for notification of both presentation space and OIA updates.

Returned Parameters

Return Code	Explanation
0	The **Start_Host_Notify** function was successful.
1	An incorrect host presentation space was specified.
2	An error was made in specifying parameters.
9	A system error occurred.

Start_Keystroke_Intercept

The **Start_Keystroke_Intercept** function filters any keystrokes sent to the session specified by the *session_id* parameter.

Prerequisite Calls

There are no prerequisite calls for this function.

Supplied Syntax

The syntax for the **Start_Keystroke_Intercept** function is as follows:

```
HLLAPI( 'Start_keystroke_intercept', session_id, option )
```

Supplied Parameters

Function name: **Start_Keystroke_Intercept**
session_id: The single-character short name of the session.
option: See the following table:

Option	Explanation
'D'	AID keys only.
'L'	All keystrokes.

Returned Parameters

Return Code	Explanation
0	The **Start_Keystroke_Intercept** function was successful.
1	The presentation space was not valid.
2	An incorrect option was specified.
4	Resource was unavailable. The requested presentation space was in use by another API application.
9	A system error occurred.

Start_Session

The **Start_Session** function starts a host session using the specified workstation profile and optional *session_id* and start options.

Prerequisite Calls

There are no prerequisite calls for this function.

Supplied Syntax

The syntax for the **Start_Session** function is as follows:

```
HLLAPI( 'Start_session', profile_name, option[,
 session_id] )
```

Supplied Parameters

Function name: **Start_Session**

session_id: An optional parameter, specifies the session letter (A-Z) to be associated with the session to be started. If null, the next available session letter will be used.

profile_name: The filename of the workstation profile to be started. The path can be included but is optional.

option: See the following table:

Option	Explanation
'V'	Start the session with the window visible.
'I'	Start the session with the window invisible.
'X'	Start the session with the window maximized.
'N'	Start the session with the window minimized.

Returned Parameters

Return Code	Explanation
0	The **Start_Session** function was successful.
1	An incorrect session ID was specified.
2	The specified session ID is already in use.
3	The workstation profile name is invalid.
4	An invalid operation was specified.
9	A system error occurred.

Stop_Close_Intercept

The **Stop_Close_Intercept** function allows the application to turn off the **Start_Close_Intercept** function. After the **Stop_Close_Intercept** function is issued, subsequent close requests are accepted for the session specified by *session_id*.

Prerequisite Calls

Start_Close_Intercept

Supplied Syntax

The syntax for the **Stop_Close_Intercept** function is as follows:

```
HLLAPI( 'Stop_close_intercept', session_id )
```

Supplied Parameters

Function name: **Stop_Close_Intercept**
session_id: The single-character short name of the session.

Returned Parameters

Return Code	Explanation
0	The **Stop_Close_Intercept** function was successful.
1	An incorrect host presentation space was specified.
8	No previous **Start_Close_Intercept** function was issued.
9	A system error occurred.
12	The session was stopped.

Stop_Communication

The **Stop_Communication** function stops the communications with the host session for the specified *session_id*. This call is equivalent to doing a Communications->Disconnect from the emulator window.

Prerequisite Calls

There are no prerequisite calls for this function.

Supplied Syntax

The syntax for the **Stop_Communication** function is as follows:

```
HLLAPI( 'Stop_communication', session_id )
```

Supplied Parameters

Function name: **Stop_Communication**
session_id: The single character short-name of the session.

Returned Parameters

Return Code	Explanation
0	The **Stop_Communication** disconnection was requested successfully.
1	An incorrect session ID was specified.
2	The specified session has not been started.

Stop_Host_Notify

The **Stop_Host_Notify** function prevents the **Start_Host_Notification** function from determining if the host session identifier has been updated.

Prerequisite Calls

Start_Host_Notify

Supplied Syntax

The syntax for the **Stop_Host_Notify** function is as follows:

```
HLLAPI( 'Stop_host_notify', session_id )
```

Supplied Parameters

Function name: **Stop_Host_Notify**
session_id: The single-character short name of the session.

Returned Parameters

Return Code	Explanation
0	The **Stop_Host_Notify** function was successful.
1	An incorrect host presentation space was specified.
8	No prior **Start_Host_Notify** function was issued.
9	A system error occurred.

Stop_Keystroke_Intercept

The **Stop_Keystroke_Intercept** function ends your application program's ability to intercept keystrokes for the *session_id*. The **Start_Keystroke_Intercept** function cancels the preceding **Start_Keystroke_Intercept** function.

Prerequisite Calls

Start_Keystroke_Intercept

Supplied Syntax

The syntax for the **Stop_Keystroke_Intercept** function is as follows:

```
HLLAPI( 'Stop_keystroke_intercept', session_id )
```

Supplied Parameters

Function name: **Stop_Keystroke_Intercept**
session_id: The single-character short name of the session.

Returned Parameters

Return Code	Explanation
0	The **Stop_Keystroke_Intercept** function was successful.
1	The host presentation space was not valid.
8	No prior **Start_Keystroke_Intercept** function was called for this presentation space.
9	A system error occurred.

Stop_Session

The **Stop_Session** function stops the host session specified.

Prerequisite Calls

There are no prerequisite calls for this function.

Supplied Syntax

The syntax for the **Stop_Session** function is as follows:

```
HLLAPI( 'Stop_session', session_id, save_option)
```

Supplied Parameters

Function name: **Stop_Session**
session_id: Specifies the session letter (A-Z) of the session to be stopped.
save_option: See the following table:

Option	Explanation
'D'	Use the default profile save option as specified in the profile.
'S'	Save the profile on exit.
'N'	Do not save the profile on exit.

Returned Parameters

Return Code	Explanation
0	The **Stop_Session** function was successful.
1	An incorrect session ID was specified.
2	The specified session ID has not been started.

Wait

The **Wait** function checks the status of the currently connected session. If the controller or host system is busy, this function causes EHLLAPI to wait for a specified time to see if the condition clears. The specified time is determined by the TWAIT, NWAIT, or LWAIT option in the **Set_Session_Parms** function.

Prerequisite Calls

Connect

Supplied Syntax

The syntax for the **Wait** function is as follows:

```
HLLAPI( 'Wait' )
```

Supplied Parameters

There are no supplied parameters for this function.

Returned Parameters

Return Code	Explanation
0	The keyboard was unlocked and ready for input.
1	Your application program was not connected to a valid session.
4	Timeout while busy (in XCLOCK or XSYSTEM state).
5	The keyboard is locked.
9	A system error occurred.

Programming Notes

Several EHLLAPI features are not applicable to the REXX EHLLAPI environment. Structured fields of the EHLLAPI features are not supported by REXX EHLLAPI.

Sample Programs

Sample programs demonstrating the use of REXX EHLLAPI features are included on the CD-ROM.

The first sample program (QTIME.CMD) sets the system clock based on the VM system time (run this program only if connecting to a VM host session).

The second sample program (CMMACRO.CMD) records key strokes on the host system and plays them back. This function simplifies repetitive tasks.

Note: Each sample program disconnects and releases used resources before exiting.

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