

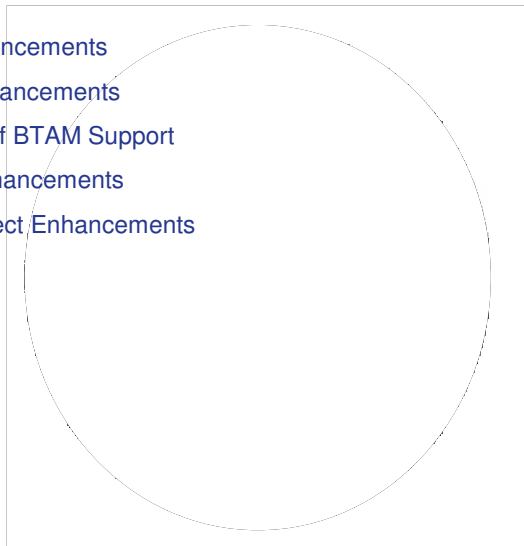
IMS 10 Transaction Manager and Connectivity Enhancements

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Transaction Manager and Connectivity Enhancements

- MSC Enhancements
- APPC Enhancements
- Removal of BTAM Support
- OTMA Enhancements
- IMS Connect Enhancements





MSC Enhancements



Highlights

- Removal of old routing exit routines DFSCMTR0, DFSNPRT0, DFSCMLR0, DFSCMPR0
 - Replaced by DFMSMCE0 which was introduced in IMS V7
 - Several IMS releases provided dual support and the ability to migrate
- Increased bandwidth to improve MSC link performance
- MSC VGR support



Increased Bandwidth - Background

- Prior Releases
 - Input and output buffer to send messages on a physical link
 - Defined via BUFSIZE on MSPLINK macro at system definition
 - *Applicable for the duration that the link is active*
 - Issues
 - Buffer size is fixed and may not account for increased traffic
 - Only one message or response can be sent per buffer
 - *Even if the buffer is large enough to hold multiple messages/responses*
 - The next message is not sent until the partner IMS responds that it has
 - *Received, queued, and logged the message*



Increased Bandwidth...

- **IMS V10 Bandwidth mode**
 - Improves the efficiency and performance of the link protocols
 - Improves the efficiency and performance of the link protocols
 - Allows for reduction in MSC parallel links to support throughput
 - Enhanced blocking and response technique
 - **Multiple messages are sent in one buffer**
 - MSC continually edits messages into the link send buffer
 - *The buffer is sent when*
 - *It is full or there is no more data to send*
 - Maximum buffer size specification increased to 65536 (was 32K)
 - The mode is set by a command - UPDATE
- **Considerations**
 - Bandwidth mode is established on a link by link basis
 - Both sides must be V10
 - *Otherwise, defaults to non-bandwidth mode*



Increased Bandwidth...

- Reduced Logger I/O
 - Prior Releases
 - IMS Check Writes (CHKW) to the WADS
 - *Recoverable messages*
 - *On the send side when the last part of a message is sent*
 - *On the receive side when the message is enqueued*
 - IMS V10
 - Bandwidth mode
 - *One CHKW per send buffer regardless of the number of messages in the buffer*
 - *E.g., 5 messages in one buffer, results in 1 CHKW on the send side*
 - *1 CHKW per message on the receive side*
 - Non-bandwidth mode
 - *One CHKW per message on the send side (same as pre-V10 systems)*
 - *E.g., 5 messages are sent in 5 buffers and result in 5 CHKWs on the send side*
 - *1 CHKW per message on the receive side*



Increased Bandwidth - Statistics

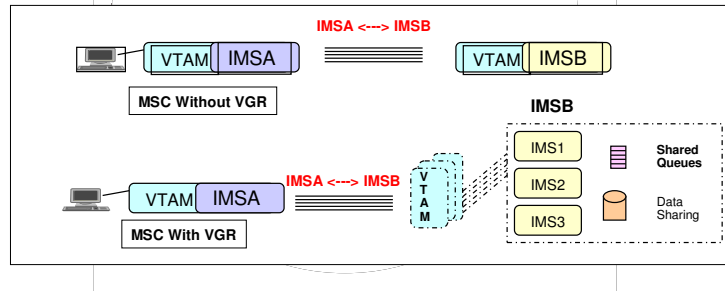
- Support for statistics on the MSC logical links
 - Log records
 - New Type x'4513' at each system checkpoint
 - One record for each logical link containing the link name and number
 - Mapped by the DFSL4513 macro
 - Query Command
 - Supports a request to view individual statistics for each MSLINK
- Provides the ability to fine tune and analyze MSC link performance
 - Quick and easy access to link statistics
 - Information that can assist in defining optimum buffer sizes

```
QRY MSLINK NAME(name) SHOW(STATISTICS)
```



MSC VGR Support

- Single MSC system image for the IMS instances in an IMSplex
 - New enhancement to the existing IMS VGR functionality
 - Access through MSC links using VTAM Generic Resources (VGR)
 - Initial implementation for MSC VGR
 - Local mode with VTAM-managed affinities
 - *Local mode - No MSC data in CF, no support for the Resource Manager*
 - Future - Global mode and RM



APPC Enhancements



Highlights

- Enhanced timeout granularity
- Support for /LOCK and /UNLOCK
 - From both APPC and OTMA clients
- Local LU Support



Enhanced Timeout Granularity

- Support for APPC/MVS timeout in seconds
 - Enhancement in z/OS V1R7
 - Prior releases provided the timeout capability in minutes
- IMS enhancements to:
 - APPCIOT specification in DFSDCxx member of IMS.PROCLIB
 - New specification for seconds:

```
APPCIOT=(mmmmA:ssA,mmmmB)
```

where mmmmA is 0-1440 and **ssA= 0-59** and mmmmB is 0-1440

- CHANGE command
 - Enhanced timeout in seconds

```
/CHANGE APPC TIMEOUT mmmm:ss
```



Support for /LOCK and /UNLOCK

- New capability for APPC and OTMA clients to send in the /LOCK and /UNLOCK commands
 - Supports keywords DATABASE, PROGRAM and TRANSACTION
 - The /LOCK and /UNLOCK command functionality remains unchanged

<p>APPC: ALLOCATE LUNAME=IMSLU, TPN=/LOCK. ... SEND_DATA DB database1 RCV_AND_WAIT DEALLOCATE</p>	<pre><-----DFS058 LOCK COMMAND COMPLETED</pre>
<p>IMS Connect/OTMA: CONNECT WRITE LLLL llzz IRM (/LOCK in IRM_TRNCOD) llzz /LOCK DB database1 EOM READ DEALLOCATE</p>	<pre><-----DFS058 LOCK COMMAND COMPLETED</pre>



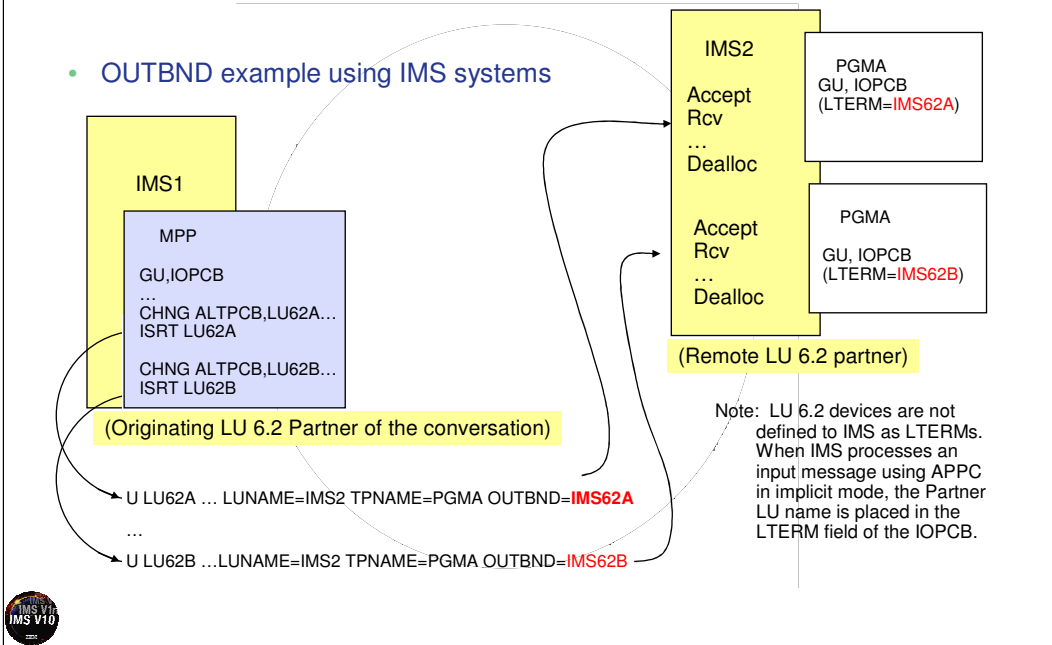
Local LU

- Enhancement that allows greater control when specifying which LU name is to be used for asynchronous outbound conversations
 - Allows IMS application to request any LOCAL LU name through a new **OUTBND** descriptor keyword for **ALTPCB** requests
 - Allows incoming LU name (if not the BASE) to be used for outbound asynchronous responses to the **IOPCB**
 - **APPCLLU= Y|N** in DFSDCxxx
 - Terminology
 - Base LU - primary and default LU name associated with APPC/IMS
 - *Defined as such in the APPCPMxx member of SYS1.PROCLIB*
 - Local LU - name of an alternate LU that can also be associated with an APPC/IMS system



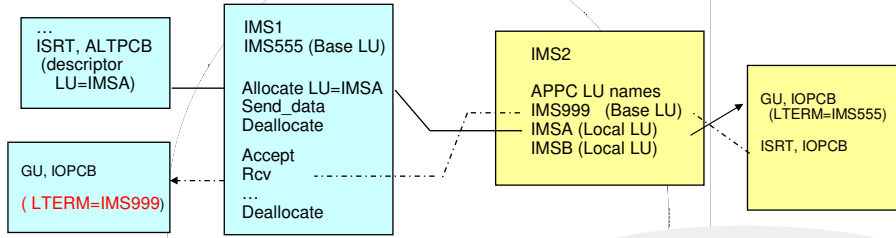
Local LU ...

- OUTBND example using IMS systems

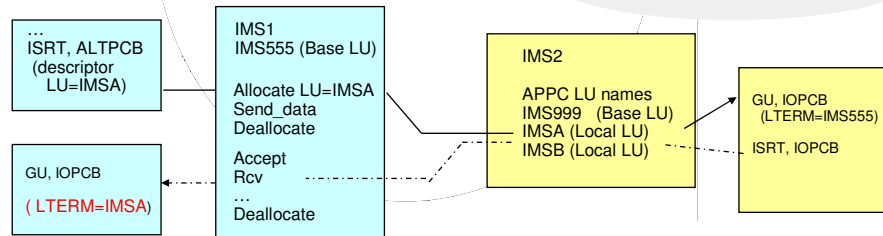


Local LU ...

- **APPCLU=N example**
 - default, same as releases prior to IMS V10



- **APPCLU=Y example**



Separate conversations



Local LU...

- Security
 - RACROUTE VERIFY
 - IMS V10 Passes the applicable LU (Local or Base) as the invoking application to the security product
 - Previous releases
 - *Always passed the Base LU name even if the request came in through a Local LU name*
 - *Some transactions could pass APPC/MVS security and then fail in IMS with a security violation*
 - *Userid security access can differ based on LU names*





Removal of BTAM Support



Highlights

- IBM BTAM products were withdrawn from service several years ago
 - IMS continued to support BTAM through IMS V9
- IMS 10 removes BTAM support
 - Ignores all macro statements associated with the unsupported BTAM terminals during IMS system definition
 - Issues warning message
 - G411 MACRO STATEMENT ASSOCIATED WITH AN UNSUPPORTED BTAM TERMINAL
 - *A severity code of 2 is issued to allow system definition to continue*
 - Devices such as Spool, Reader, Printer, Punch, Tape and Disk are not affected.



OTMA Enhancements



Highlights

- OTMA addresses high availability requirements through
 - Routing Enhancements
 - Destination Routing descriptors
 - Resume TPIPE security
 - Automatic flood detection and control of input messages
 - Time-out control
 - TPIPE storage clean-up
 - TMEMBER / USER level security enhancements
 - Asynchronous message enhancements
 - Enhanced OTMA display information
 - OTMA restart options
 - CM0 Ignore Purge



Routing Enhancements

- Capability that enhances asynchronous outbound IMS application messages (ALTPCB) when OTMA is enabled
 - Through the use of OTMA Destination Routing descriptors
 - Without requiring the OTMA exit routines - DFSYPRX0, DFSYDRU0
 - *Exits are invoked if they exist*
 - Supports
 - Remote destinations through IMS Connect
 - Non-OTMA destinations such as LTERM destinations
 - *SNA Terminals and printers*
 - Future consideration for MQ
- Provides the OTMA support for the Callout function



Routing Enhancements ...

- New 'D' descriptor type in DFSYDTx member of IMS.PROCLIB

```
D destname          TYPE={IMSCON|NONOTMA} TMEMBER=name TPIPE=name
                   SMEM={NO|YES} ADAPTER=adapname CONVERTR=convname
```

- Example

<p>Existing "M" descriptor type →</p> <p>Masked descriptor →</p> <p>continuation →</p> <p>Masked descriptor ↻</p>	<pre>M HWSICON1 DRU=DFSYDRU0 INPUT=5000 T/O=5 D OTMACL99 TYPE=IMSCON TMEMBER=HWS1 TPIPE=HWS1TP01 D OTMACL* TYPE=IMSCON TMEMBER=HWS2 D PRNTR3A TYPE=NONOTMA D SOAPGW1 TYPE=IMSCON TMEMBER=HWS2 TPIPE=HWS2SOAP D SOAPGW1 ADAPTER=XMLADPTR CONVERTR=XMLCNVTR D SOAPGW* TYPE=IMSCON TMEMBER=HWS3 TPIPE=HWS3SOAP D SOAPGW* ADAPTER=XMLADPTR CONVERTR=XMLCNVT3</pre>
---	---

Masked descriptor
Also note that for this specific example, all destination matches for any destination beginning with SOAPGW... will be routed to the single TPIPE HWS3SOAP

Note: any descriptors that result in syntax errors are ignored



Resume TPIPE Security

- **Addresses security exposure**
 - Asynchronous output messages retrieved by a Resume TPIPE request
- **New RIMS SAF/RACF security resource class**
 - Security definition association between
 - TPIPE name
 - Userid/group that can access the TPIPE
- **OTMA security user exit routine DFSYRTUX**
 - Invoked after the call to SAF/RACF regardless of result
 - Always invoked if it exists regardless of whether or not RIMS is defined



Message Flood Detection and Control

- Capability that automatically monitors the growth of active input messages
 - Sets a default max threshold of **5000** active input messages
 - If > 5000 unprocessed input messages from an OTMA member
 - *Any new input message from the same member is rejected*
 - Overrides provided
 - Descriptor, /STA TMEMBER command
 - **INPUT= 0 to 9999**
 - *0 turns off the support,*
 - *0-200 resets to 200*
 - *>9999 resets to 9999*
 - OTMA client-bid
 - Prevents possible S40D IMS Abends due to large number of OTMA control blocks associated with the queued requests
 - Also delivered in IMS V8 (PK04461) and IMS V9 (PK04463)



CM1 (Send-then-Commit) ACK Time-out

- New Time-out control for CM1 (Send-then-Commit) interactions
 - For Synclevel=confirm or synclevel=syncpt processing
 - IMS waits for an ACK/NAK after sending the response
 - *“Wait-Syncpoint” or “Wait-RRS” status*
 - *Locks are held, dependent region is occupied*
 - Backout occurs if ACK/NAK is not received within a time limit
 - **Default time-out value is 120 seconds**
 - *Values range from 0 to 255 seconds*
 - Overrides provided through
 - **T/O=** descriptor keyword
 - **Timeout=** keyword in the /STA TMEMBER command
 - Client-bid protocol message
 - Individual message override

Note: A value of zero turns off the capability and is accepted only via the descriptor or command



TPIPE Storage Clean-up

- Enhancement to release storage associated with unused TPIPEs
 - Idle for two checkpoints
 - At each checkpoint
 - All existing TPIPEs are scanned to see if input or output activities have occurred
 - If yes, then the TPIPE is not idle, otherwise TPIPE is marked idle
 - In the subsequent checkpoint,
 - Idle TPIPEs with still no activity are candidates for removal
 - Note: Certain TPIPEs are never considered for clean-up:
 - Synchronized TPIPEs from MQ
 - TPIPEs with status conditions such as TRA and STO
 - Not in Resume TPIPE Auto or Single wait mode for a msg
- This capability is available in IMS V8 and IMS V9
 - IMS V8: PQ99983, IMS V9: PK00386



TMEMBER / USER Level Security

- **New /SECURE OTMA command capabilities**
 - Allows each OTMA member to define its own security setting
 - FULL, CHECK, NONE, or PROFILE
 - Dynamic change of security level
 - *Note - Messages are processed with the security level that was in effect when the message was received*
- `/SECURE OTMA security-option TMEMBER member-name`
(where security-option is FULL | CHECK | NONE | PROFILE)
- Prior Releases
 - *OTMA security was a system-wide setting for all OTMA members*
-
- **New option for a specific user profile**
- `/SECURE OTMA REFRESH USER userid`
(where acee may be in multiple TMEMBERS)
- Prior Releases provided a command to refresh
 - *All ACEEs for all TMEMBERS in OTMA*
 - *All ACEEs in a specific TMEMBER*



OTMA /DISPLAY Command Enhancements

- /DIS OTMA and /DIS TMEMBER output
 - Additional information
 - Message flood threshold value, Current number of active input messages, Time-out value, Super Member name, DRU exit name
 - New USER-STATUS indicators
 - *SMQ BACKEND*
 - *STO-INPUT*
 - *FLOOD*
- /DIS TMEMBER TPIPE
 - Enhanced to display the number of input messages
 - *New column "INPCT"*
 - *Number wraps after 65535*



Asynchronous Output Enhancements

- **Super Member support allows shared access to asynchronous messages**
 - From multiple IMS Connects in a Sysplex
 - From any IMS in a shared queues environment
 - IMS V8 PK09944, PK30103, IMS Connect V2.2 PK10910
IMS V9 PK09946, PK30086, PK10911
- **Reroute and Purge support**
 - Allows asynchronous messages that cannot be delivered to be rerouted to an alternate TPIPE or to be purged from the IMS message queue
 - IMS V8 PK21868, PK09542, IMS Connect V2.2 PK12012
IMS V9 PK16934, PK22840, PK09543, PK12013



CM0 Ignore Purge Option

- **CM0 Ignore Purge Option**
 - Affects messages sent with multiple ISRT/PURGE calls to the IOPCB
 - Default
 - *CM1 messages are sent as a single multi-segment message*
 - *CM0 messages are sent as multiple messages*
 - Consideration when message is changed from CM1 to CM0, e.g., with the IMS TM resource adapter
 - New flag setting added to the OTMA prefix
 - Requests purge calls to the IOPCB be ignored for CM0
 - *Result in a single multi-segment message*
 - *TMAMIPRG bit setting in TMAMHCFL flag byte*
 - IMS TM resource adapter
 - New ignorePURGCall property added to IMSInteractionSpec
 - *Default for ignorePURGCall is false*
 - *Valid for SYNC_SEND_RECEIVE interactions on shareable persistent socket connections*



OTMA Processing during Restart

- **New OTMA=M option in DFSPBxx**
 - Option to control OTMA functionality during all restarts including ERE
 - IMS does not enable OTMA during the system initialization
 - /START OTMA commands are not recovered during restarts
- **/START OTMA NOCHECK**
 - Command to start OTMA as a non-recoverable request during restart
 - Capability is introduced for OTMA=N users
- **Also delivered in IMS V8 and IMS V9**
 - IMS V8: PK14679, IMSV9: PK14680



IMS Connect Enhancements



Highlights

- **IMS Connect enhancements include**
 - ACEE aging value support
 - Client password change request
 - RACF mixed case password
 - Message flood control
 - CM1 timeout ack support - ACKTO
 - Resume TPIPE Enhancements
 - Alternate clientid
 - PORTAFF
 - XML Adapter support
 - IMS SOA Composite Business Application Support



ACEE Aging Value Support

- Supports the OTMA capability
- New OAAV parameter in the DATASTORE statement of the HWSCFGxx file
 - OTMA ACEE aging value in seconds

• Example: `DATASTORE ID=... OAAV=360`

- OTMA aging value in effect can be displayed
 - VIEWHWS/VIEWDS command output
 - MVS Modify Command QUERY MEMBER and QUERY DATASTORE

• Example: `RACF APPL NAME=
OTMA ACEE AGING VALUE=360`



Client Password Change Request

- New mechanism for a remote client to request that a SAF/RACF password be changed

```
LLLL IRM LLzzHWSPWCH old-password / new-password-1 / new-password-2 EOM
```

where new-password-1 and new-password-2 are the same value

- **HWSPWCH**
 - Defined keyword supported by HWSSMPL0, HWSSMPL1, HWSJAVA0
 - To enable the function
 - HWSPWCH0 address must be established in the exit routine
 - *Include the HWSPWCH0 object code*
 - *Define 'INCLUDE TEXT(HWSPWCH0)' statement in the Binder JCL*



RACF Mixed Case Password Support

- Enhancement to enable RACF mixed case passwords
 - PSWDMC parameter in HWS statement in IMS Connect HWSCFGxx

```
HWS ...PSWDMC = Y | N
```

- New IMS Connect command

```
SETPWMC-----ON-----  
          -OFF-
```

- IMS Connect UPDATE command

```
-F-imsconnproc, -UPDATE-MEMBER-TYPE (IMSCON) --SET (PSWDMC ( --ON-- ) ) --  
          -OFF-
```

- Requires that RACF support is enabled

```
RACF SETROPTS(MIXEDCASE)
```



Datastore Access Control

- Provides control for userid access to datastores
 - Takes advantage of RACF Passticket support
 - APPL parameter on the Datastore statement in HWSCFGxx
 - IMS Connect RACF=Y
 - During Password validation IMS Connect issues *RACROUTE REQUEST=VERIFY, APPL=RACF_APPL, ...*
 - *RACF also verifies user's authority to access the application*
 - Applicable even when not using passtickets
 - Note
 - *IMS Connect clients can override the DATASTORE APPL by setting IRM_APPL_NM*
 - *If the datastore access control capability is needed, may need to comment out the override in the message exit*
 - * *MVC OMUSER_APPL_NM, IRM_APPL_NM*



Message Flood Control

- Capability that monitors the growth of active input messages
 - Supports the associated function in the OTMA Enhancements section
 - Prevents flooding IMS with input messages that cannot be processed
- New **MAXI=** parameter in the DATASTORE statement of HWSCFGxx
 - `DATASTORE ID=....., MAXI=5000`
 - 0 to 9999, default in OTMA is 5000
 - Value of 0 is reset to 5000 or whatever is specified in OTMA
 - Values between 0 and 200 are reset to 200
 - Values that exceed OTMA specification are adjusted to OTMA value
- Command support
 - VIEWHWS, VIEWDS, QUERY MEMBER, QUERY DATASTORE
 - Display output

```
...  
OTMA ACEE AGING VALUE=value  
OTMA CM1 TIMEOUT VALUE=value  
OTMA MAX INPUT MESSAGE=value
```
- If input messages are rejected due to message flood protection
 - Remote Client receives RSM status message



CM1 (Send-then-Commit) ACK Time-out

- Time-out Control capability for CM1 interactions
 - Supports the associated function in the OTMA Enhancements section
 - Resolves "Wait-Syncpoint" and "Wait-RRS" situations
 - New **ACKTO=** parameter in the DATASTORE statement of HWSCFGxx
 - `DATASTORE ID=..., ACKTO=120`
 - 0 to 255 seconds, default in OTMA is 120 seconds
 - Value of 0 is reset to 120 or whatever is specified in OTMA
 - Values that exceed OTMA specification are adjusted to OTMA value
 - Command support
 - VIEWHWS, VIEWDS, QUERY MEMBER, QUERY DATASTORE
 - Display output
 - `OTMA ACEE AGING VALUE=value`
 - `OTMA ACK TIMEOUT VALUE=value`
 - If time-out occurs
 - Remote Client receives a deallocate of the connection and an RSM status message



Resume TPIPE Enhancements

- Alternate Clientid

- Capability to request and retrieve asynchronous output messages that are queued to another client
 - Supports a server application that retrieves messages originally destined for another application (clientid)
 - Resume TPIPE request specifies an alternate clientid
 - *OTMA delivers output messages queued to that alternate name*
 - Supported by IMS Connect user message exits
 - HWSSMPL0, HWSSMPL1, HWSSOAP1, HWSJAVA0
 - Note: this support differs from but leverages the existing Reroute capability which only addresses undeliverable and/or NAK'ed messages
 - IMS V9 support added with PK24907




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Resume TPIPE Enhancements

- Port Affinity

- Enhancement to ensure proper delivery of CM0 (Commit-then-Send) messages to the correct Resume TPIPE *clientid* requestor
 - Supports environments that require concurrent requests using the same *clientid* across multiple ports
 - New PORTAFF= parameter in the TCPIP statement of the HWSCFGxx file


```
TCPIP ...MAXSOC=...,PORTAFF= Y | N, PORTID=...
```
 - Also delivered in previous releases
 - IMS Connect with IMS V9: PK23660
 - IMS Connect V2.2: PK17072

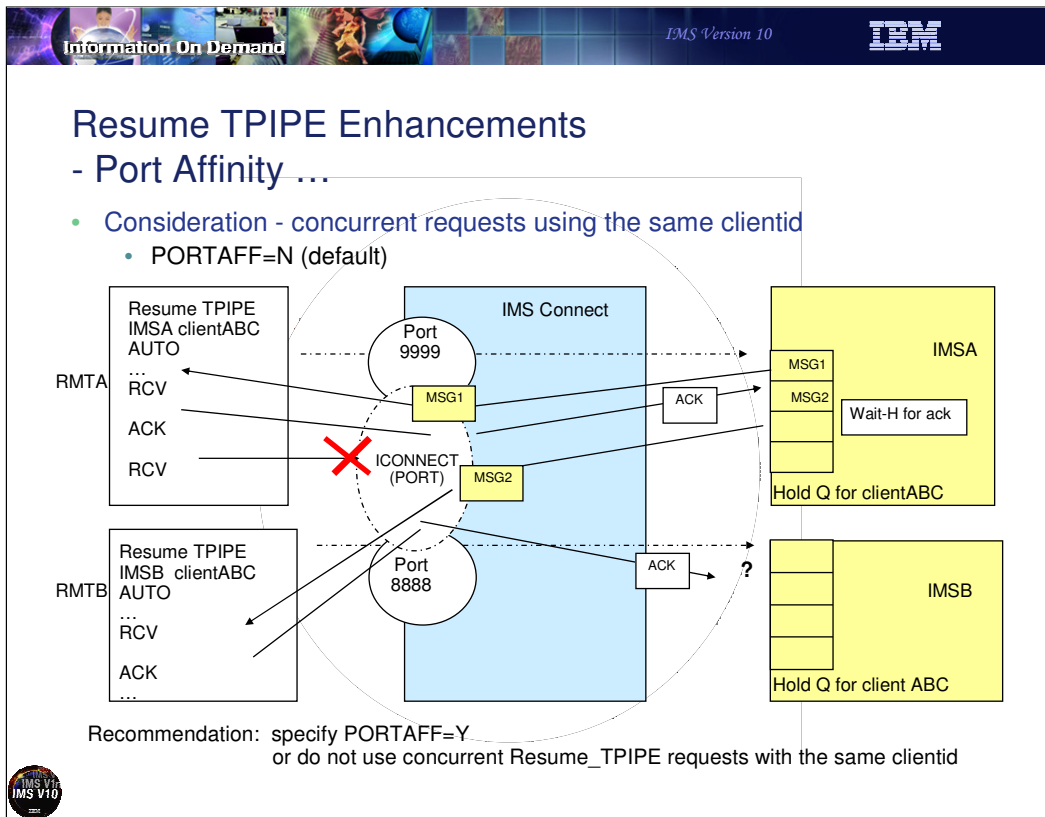


Using concurrent Resume TPIPE connection requests of the same *clientid* across several ports may cause problems such as keeping an IMS OTMA TPIPE in WAIT-H status. To address the issue and support this concurrency requirement, IMS Connect provides a new parameter to enforce all the correlated interaction such as the retrieval of a message and associated ACK or NAK to the same remote client instance. The PORTAFF parameter in the TCPIP statement controls whether commit-then-send (CM0) output messages sent by IMS to an IMS Connect system have affinity to the port on which IMS Connect received the original input message.

When PORTAFF=Y is specified, IMS Connect returns all CM0 output for this IMS Connect client through the same port on which it received the original input message.

When PORTAFF=N is specified, IMS Connect attempts to return the CM0 output to the first client it finds on any available port with an outstanding request from this *clientid*.

NOTE: If running in a sysplex environment that has implemented redundancy, load balancing, and supermember support, etc., PORTAFF=N is a reasonable choice. Using the same instance of a single *clientid* across multiple ports is not recommended.



As mentioned in the previous visual, when PORTAFF=N, IMS Connect attempts to return the CM0 output to the first port found on which the client ID of this IMS connect is present. PORTAFF=N is the default. There is a consideration in this area because if a message is retrieved from the Hold Queue, then the PORTID in OMUSER_PORTID is ignored and IMS Connect assumes the portid is the generic ICONNECT port. This assumption tends not to be a problem unless an error such as a connection failure occurs. When that happens and a message has been received in IMS Connect for delivery, IMS Connect scans all the ports under the generic ICONNECT port and delivers the message to the first one that it finds.

The example on this visual shows a situation where two Resume_TPIPE AUTO requests specifying the same clientid, clientABC, are sent into a single IMS Connect. One request (from RMTA) is sent to IMSA and the other (from RMTB) is sent to IMSB. IMSA has two messages, MSG1 and MSG2, on the Hold Queue. IMSB has no messages at the moment and so clientABC on RMTB just waits. IMSA sends MSG1 to IMS Connect which delivers the message to the outstanding request for clientABC on RMTA which responds with an ACK. In this scenario the connection fails for one of several reasons - ACK timeout, network problem, etc. Since the Resume_TPIPE had originally specified AUTO, IMSA sends MSG2 after the ack for MSG1 is received. When IMS Connect receives the message, it detects that the connection to RMTA is no longer there and scans the ports under ICONNECT to find the first one available. IMS Connect sends MSG2 to the waiting clientABC on RMTB. This instance of ClientABC retrieves the message and sends an ACK back to IMSB which is not expecting an ACK. Meanwhile, IMSA's Hold Queue for clientABC is in WAIT-H status waiting for an ACK that will never be received.

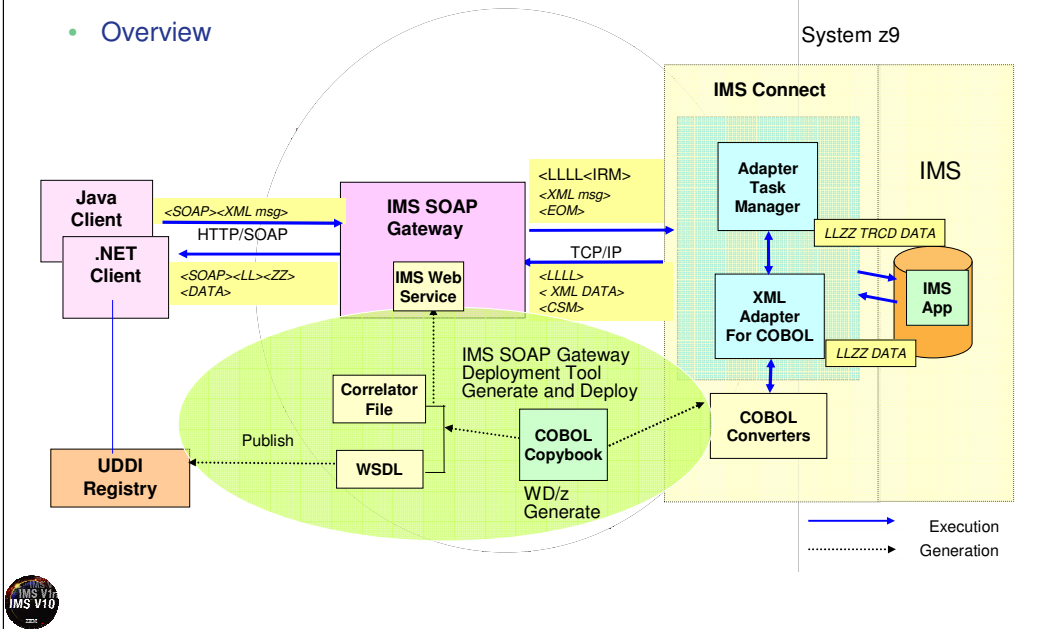
XML Adapter Support

- Capability that supports translation between XML messages and IMS messages
 - IMS Connect client, e.g., IMS SOAP Gateway
 - Sends an XML message with a request for translation
 - IMS Connect
 - Inbound: invokes the XML Adapter to translate message for IMS
 - *Removes XML tags*
 - *If necessary, convert from UNICODE to EBCDIC*
 - Outbound: invokes the XML Adapter to prepare an XML message
 - *If necessary, convert from EBCDIC to appropriate UNICODE encoding schema*
 - *Create XML tags*
- IMS V9 Support - PK24912, PK29938



XML Adapter Support ...

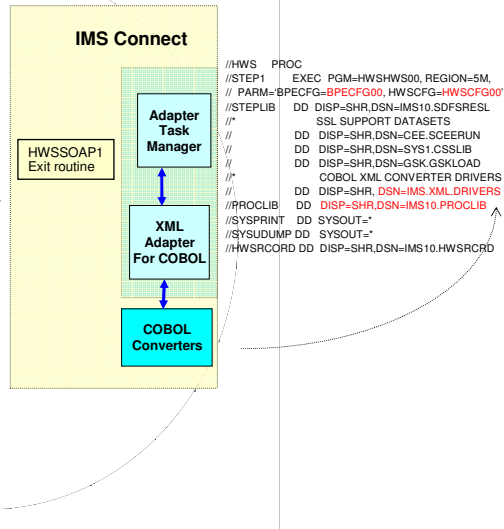
- Overview



XML Adapter Support ...

- User Message Exit HWSSOAP1
 - OCO
 - IRMID *HWSOA1*

- XML converter routines
 - Cobol source code
 - Provide the information needed to perform conversion from tagged data to a byte stream
 - *Unique to each message definition*
 - Can be generated by WDz toolkit
 - Compiled and bound into file that is concatenated into IMS Connect STEPLIB



Support

- New capability for IMS TM Resource Adapter clients that invoke IMS conversational transactions
 - Allows iterations of the conversation to span shareable persistent sockets
 - Application Server on which IMS TM Resource Adapter runs may use different sockets for each iteration
 - IMS TM Resource Adapter client does not have control of the socket that is used
- Supports the WebSphere Process Server
 - Process Choreography function



Summary

- **IMS V10 Transaction Manager and Connectivity Enhancements**
 - Continue to open IMS up to new architectures
 - Enhance existing functionality
 - Address increasing demands for availability, scalability and performance



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