Communication Controller for Linux® on zSeries® Version 1 Release 1

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Agenda

- History
- Overview
- Components and Connectivity
- Requirements
- CCL Usage, Summary, and Contacts

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Notes:

- This presentation introduces a new networking software product that is called the Communication Controller for Linux on zSeries - from hereon in this presentation referred to as CCL.
- CCL provides a software-based migration path for selected functions of the IBM Communication Controller hardware. CCL allows a Systems Network Architecture (SNA) Network Control Program (NCP) to be moved from a hardware Communication Controller, such as an IBM 3745/46, to a Linux operating system running on the zSeries hardware platform.
- The CCL Announcement Letter is 205-030, located at http://www.ibm.com/common/ssi/fcgi-bin/ssialias?infotype=an&subtype=ca&appname=GPA&htmlfid=897/ENUS205-030

History

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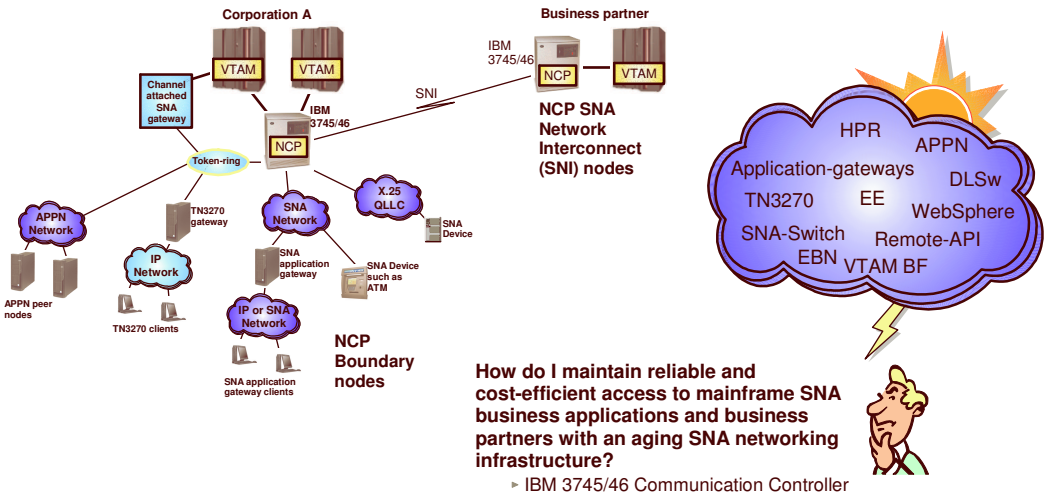
Notes:

A Traditional SNA Network Infrastructure



How do I maintain reliable and cost-efficient access to mainframe SNA business applications and business partners with an aging SNA networking infrastructure?

- IBM 3745/46 Communication Controller
- Token-ring technology
- ESCON channel-attached SNA controllers in general
- IBM 2216 Nways Multi-access Connector
- AnyNet

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Notes:

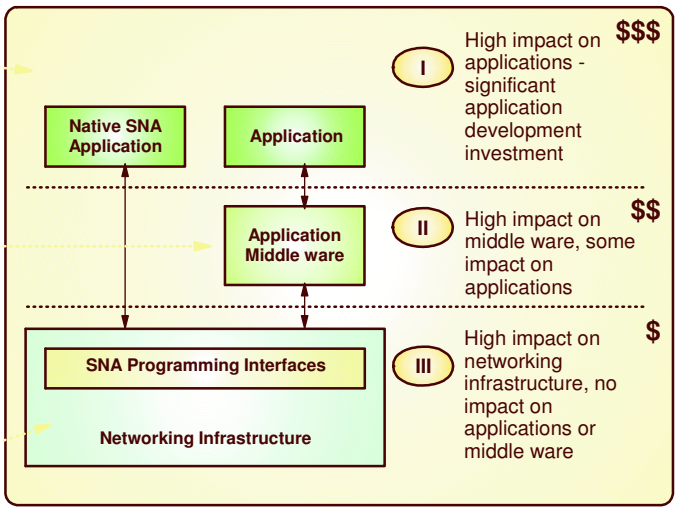
- SNA today exists in three main architectural levels:
  1. The original SNA network that today is referred to as a traditional SNA or Subarea SNA network.
  2. Advanced Peer-to-Peer Networking (APPN).
  3. High Performance Routing (HPR) including HPR over IP - or also known as Enterprise Extender.
- An IBM Communication Controller and an NCP that runs inside the Communication Controller originates from the original SNA architecture level - the SNA subarea network.
- An SNA subarea network is very hierarchic and very structured. Virtual Telecommunication Access Method (VTAM) is the ultimate control point in such a network determining which SNA nodes can establish communication (sessions) with which SNA applications. The NCP running in the IBM Communication Controller manages the physical communication over serial lines or local area networks (LANs) with peripheral SNA nodes and with business partner SNA networks.
- For peripheral nodes, the NCP performs what is generally known as boundary functions (BF) - transforming various data formats and translating addressing information from local addressing on serial lines or LANs to SNA network-wide addressing within the SNA network.
- For business partner communication that is based on SNA Network Interconnection (SNI), the NCP performs the SNI gateway NCP function. The NCP SNI gateway functions, among other things, serve the purpose of providing an isolation layer between the SNA networks that are involved in the SNI communication.
- When IBM announced the withdrawal from marketing of the IBM 3745/46 hardware platform in September 2002, IBM did not at that time identify a transparent replacement technology, but pointed SNA installations to a series of alternative technologies. Those alternatives ranged in general from re-writing SNA application programs so they would use IP-based programming interfaces instead of SNA programming interfaces to implementing various integration technologies allowing installations to retain SNA applications, but transport the SNA traffic over an IP-based networking infrastructure.
- Some of the alternative technologies are themselves aging technologies and some have also been withdrawn from marketing, such as various channel-attached SNA gateway technologies - the IBM 2216 and the Cisco Channel Interface Processor (CIP). Token-ring technology in general is being phased out of most LAN vendors' product offerings. Token-ring was the preferred SNA LAN technology because of SNA load-balancing and availability features that are not directly available with an Ethernet infrastructure.
- Although many of the alternative technologies were both promising and offered many valuable features, they also in many cases proved to be costly from an implementation and operational point of view. Many SNA installations therefore decided to continue using the IBM 3745/46 in the hope that support and spare parts would continue to be offered for as long as their SNA applications continued to have business value.
- CCL is a continuation of the IBM Communication Controller hardware providing a migration platform for the NCP functions in an SNA network infrastructure - allowing customers to continue using an NCP in their SNA network infrastructure without dependency on the IBM 37xx Communication Controller hardware.

Where to Transform SNA Access to IP?

Redevelop native SNA application and use non-SNA APIs, such as:
- WebSphere Application Server based APIs
- Non-SNA CICS or IMS APIs
- Native sockets

Use middle ware capabilities to replace network access, while preserving interfaces to applications riding on top of middle ware:
- CICS WEB interface
- CICS IIOP
- IMS-Connect
- etc.

Preserve mainframe middle ware and application SNA view by implementing application-transparent SNA/IP integration technologies in the networking infrastructure:
- TN3270
- Enterprise Extender
- DLSw
- Remote SNA API client/server
- Application-layer gateways



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Notes:

- EE is the premier SNA/IP integration technology
  - EE offers a one-stop solution for SNA/IP integration that supports both branch and business partner communication and offers the opportunity for use of IP network flows end-to-end
  - Use of EE requires no changes to SNA applications
  - Network infrastructure is native IP, which allows the router infrastructure to maximize router efficiency - no need for routers to perform functions beyond native IP routing
  - Use of EE can reduce the APPN network complexity by collapsing the APPN Network Node (NN) topology into the data center
    - Minimizes the effect of APPN network searches
  - EE can be used to implement business partner communication based on the APPN Extended Border Node (EBN) function
    - SNA over IP end-to-end with z/OS business partners
- So - why don't all z/OS installations use EE on z/OS?
  - Requires APPN and HPR enablement of the z/OS environment
  - EE uses UDP packets and that causes problems for firewall administrators
  - EE requires coordinated actions by both end-points
    - Issue for business to business communication
    - Not all business partners are able to make similar changes

Network Control Program (NCP) Needed?

- The IBM 3745/46 hardware was withdrawn from marketing in September 2002.
  - The hardware is currently still supported and serviced by IBM.
  - The NCP software was not withdrawn and it is still currently supported and serviced by IBM.
- The Network Control Program (NCP) runs on the IBM 3745/46 hardware and continues to be an integral part of a traditional SNA network infrastructure:
  - Boundary functions for peripheral devices such as ATMs, terminal controllers, PC-based servers, etc.
  - SNA Network Interconnection (SNI) functions for SNA-based business partner communication.
- Networking technologies to help remove dependency on an NCP have been made available, but implementing some of those technologies can be both time consuming and costly:
  - Moving boundary functions to other platforms, such as VTAM, can be an administrative challenge.
  - SNA/IP integration products are abundant. They all require some amount of network infrastructure changes.
  - Upgrading to newer SNA architecture levels, such as Advanced Peer to Peer Networking (APPN), High Performance Routing (HPR), and eventually Enterprise Extender (EE), have many benefits but requires solid SNA skills, SNA network topology changes, and detailed coordination of network definitions across both an internal network and business partner networks.
- Not all zSeries operating systems that today are using the services of an NCP have appropriate alternative technologies available:
  - Only z/OS supports Enterprise Extender. VSE/ESA, z/VM, and TPF do not support EE technology.
  - SNI still requires at least one NCP.
- SNA applications are still abundant and many of those SNA applications will most likely exist for years to come.
  - Justifying the cost of rewriting SNA applications to IP-based applications just for the sake of removing NCP dependency is in many cases difficult.

YES, an NCP continues to be of value in many data center installations.

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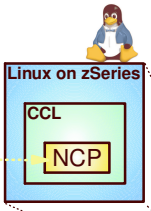
Notes:

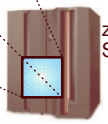
- The IBM 3745/46 was first introduced in 1988 and withdrawn from marketing in September 2002. An NCP runs in a Communication Controller, so a replacement was needed for the IBM 3745/46 in order for the NCP to be carried forward.
- The NCP is still extensively used - both for connecting peripheral nodes to the mainframe and especially for connecting business partners together using the functions of SNA Network Interconnect (SNI).
- Many technologies and products have been made available to migrate away from the functions of an NCP, but they have proven to not always be easy to implement. Boundary functions can be moved to other platforms, including to VTAM - but it requires configuration definition changes and increased CPU resources by VTAM to do so. Business partner communication can be migrated to an APPN/HPR base using Extended Border Node (EBN) technology, but it requires that both business partners make coordinated SNA architecture upgrades and configuration changes. HPR traffic can be exchanged over an IP network that uses Enterprise Extender technology. If both business partners are at a level where EE is a realistic alternative, then using EE/EBN for business partner communication is the preferred technology - HPR offers availability characteristics that do not exist in a traditional SNI solution.
- Some mainframe operating systems do not support all the relevant migration technologies, such as EE/EBN for business partner communication. They do not have a realistic alternative to SNI and SNI requires at a minimum one NCP - best two.
- An alternative is to rewrite all SNA applications to IP-based applications. Even though this is a possibility, it is often a very time consuming and costly approach that is difficult to justify.
- So there is still a need for some of the functions of an NCP - and that is what the CCL addresses.

IBM Communication Controllers Since 1974

The SNA application portfolio has been developed during the last 30 years. It is very unlikely that SNA applications will disappear overnight.

Move with no or minor changes to the NCP definitions.





zSeries Server

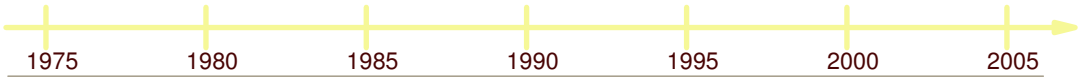
1982:
The IBM 3725 **Communication Controller** (NCP V4R3.1)

1988:
The IBM 3745 **Communication Controller** (NCP V7R3+) and the IBM 3746 Multiprotocol Controller

1974:
The IBM 3705 **Communication Controller**

1985:
The IBM 3720 **Communication Controller** (NCP V5R4)

2005:
The IBM **Communication Controller** for Linux (CCL) on zSeries (Program Number 5724-J38) (NCP V7R5+)



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Notes:

- Back in the early 1970s when SNA was introduced; it was a major revolution from an application point of view. SNA was what allowed us to design, develop, and implement online applications on a large scale - based on IBM 3270 terminals, various specialized remote SNA controllers (IBM 3600, IBM 4700, IBM 8100, and so forth) combined with the transaction environments of both Customer Information Control System (CICS) and Information Management System (IMS). We have ever since developed literally millions of SNA-based application programs - thirty years of application development is not a small investment and many of those SNA applications will continue to be valuable from a business perspective for years to come.
- Throughout those many years we depended on the functions of an NCP to connect remote locations via serial lines and later Token-ring LANs to our mainframe computer. The NCP ran in specialized hardware generally referred to as the Communication Controller that over the years went through its own evolution from IBM 3705, IBM 3725, IBM 3720, and lastly IBM 3745/46 hardware technology.
- CCL is a continuation of the functions the IBM Communication Controller provides to the NCP. CCL is basically a software implementation that emulates an IBM 3745-31A allowing the NCP to be moved from an IBM 37xx to a CCL running in Linux on the zSeries hardware platform.
- The name Communication Controller for Linux on zSeries was deliberately chosen to emphasize the continuation of the IBM Communication Controller family of products.

Communication Controller for Linux on zSeries (CCL) Overview

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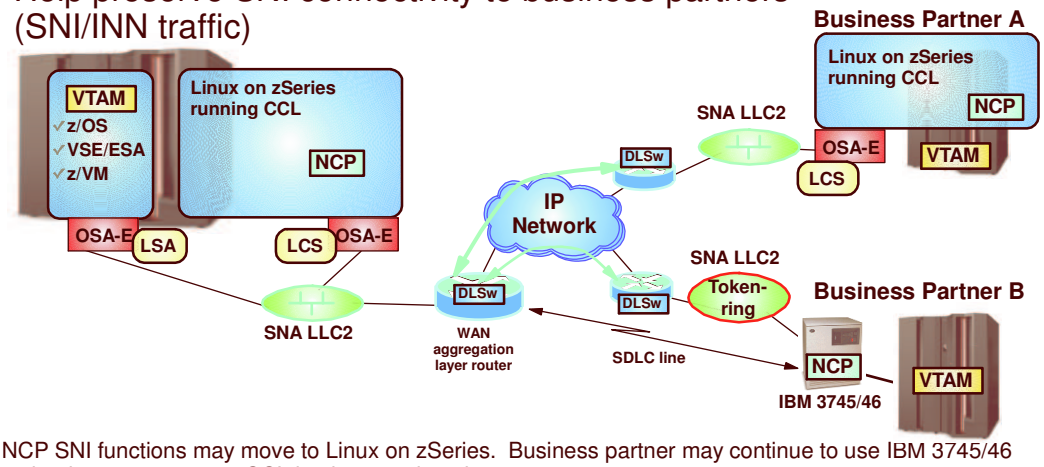
Notes:

CCL Release 1 - SNI/INN Traffic

Help preserve SNI connectivity to business partners (SNI/INN traffic)



- NCP SNI functions may move to Linux on zSeries. Business partner may continue to use IBM 3745/46 technology or move to a CCL implementation also.
  - SNA traffic leaves/enters the Communication Controller for Linux on zSeries as SNA network flows (SNA LLC2) over an OSA adapter operating in LCS mode.
  - VTAM sees the NCP as a LAN-attached remote NCP over its LSA OSA adapter.
  - SNA traffic can be tunneled (typically DLSw) over an IP network to the business partner's location.
  - An SDLC line from the business partner's IBM 3745/46 can be terminated in a local wide area network aggregation layer router (a router with WAN interfaces).
  - Has no impact on existing SNI topology.

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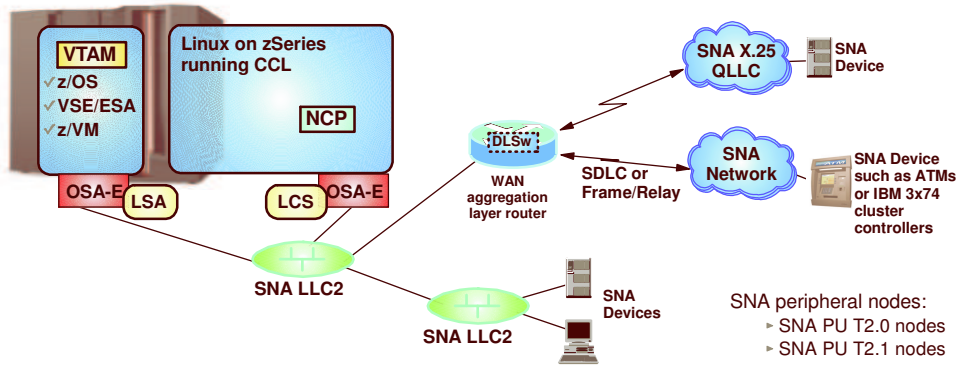
Notes:

- AT&T announced during 2004 that it will withdraw the SDLC line technology for its SNI connectivity services and instead migrate to a DLSw-based technology.
  - Such a change has no impact on the SNI topology or the SNI services in general.
  - Migrating our data center NCP to the CCL environment is a simple follow-on step when the DLSw infrastructure is in place.
- Communication Controller for Linux on zSeries Version 1 Release 1 will preserve the SNI capabilities and selected boundary function capabilities of the IBM 37xx/NCP environment.
- Instead of loading the SNI NCP into an IBM 3745, it is loaded into CCL running in Linux on zSeries - and the NCP will perform its SNI NCP gateway functions just as before.
- The physical connectivity may change - after all zSeries doesn't have serial line interface couplers to attach remote lines to. The model is that all SNA traffic enters/leaves zSeries over an OSA port via a LAN (can be either Token-ring or Ethernet IEEE802.3).
- Wide area connectivity can be either IP or SNA. IP will be based on the usual DLSw setup, which is the direction AT&T is moving to for all its SNI connectivity. AT&T announced mid 2004 that it will withdraw SNI line connectivity services and replace serial SDLC lines by DLSw connectivity over the AT&T IP-based wide area network infrastructure. If the business partner provides a direct SDLC link connectivity today, that link can be moved from the local IBM 37xx to an aggregation layer router that internally will use DLSw technology to switch the SNA traffic between the SDLC line and the LAN to which the OSA port is attached.
- Business partners may continue to use IBM 37xx hardware or move to CCL. In most cases there will be no changes required to the business partner NCP definitions. The current IBM 37xx token-ring interface coupler (TIC) Media Access Control (MAC) address can be configured as the OSA MAC address.

CCL Release 1 - BNN Traffic

Help preserve selected NCP boundary functions (BNN traffic)



- SNA wide area network links, such as SDLC, F/R, and SNA X.25 QLLC termination, can be moved from the IBM 3745/46 to a wide area network aggregation layer router that switches the SNA frames between the lines and the local SNA LAN
  - SDLC, Frame Relay, and SNA X.25 QLLC links are supported
    - The X.25 SNA support (QLLC) does not imply full NPSI support
  - NCP boundary function support includes standard availability functions such as SSCP takeover, support for duplicate MAC addressing, and XRF
  - NPA-LU, NTuneMON, and NRF are also supported
- Remote SNA LANs can be connected to the data center LAN by bridges or DLSw technology

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Notes:

- BNN considerations: CCL NCP or VTAM
  - Ease of migration
    - Migrating resources from NCP to VTAM requires more system administration and configuration rework
  - Preserving network topology
    - Leaving the resources connected through the NCP preserves the network topology (subarea)
  - Failover and availability
    - Resources that are connected through the NCP continue to have SSCP takeover and XRF support
  - System resources
    - BNN resources consume system resources :
      - Network Element addresses – VTAM requires low order element addresses, which are limited
      - Virtual storage – VTAM storage increase would be in the z/OS ECSA
      - CPU cycles – CCL NCP can run in an IFL
- These are the same considerations that exist today with BNN resources
- Peripheral node connectivity will use the aggregation layer router technology to switch the SNA traffic from the SNA wide area links to the LAN to which the OSA port is attached. SNA nodes that are attached to the data center LAN infrastructure will also be able to connect to the NCP running in CCL via the OSA port. Existing DLSw infrastructure for transporting remote SNA traffic to the data center can be reused for connection to the NCP running in the CCL environment.
- SDLC, frame relay, and SNA QLLC lines are all supported by the aggregation layer router technology for peripheral SNA nodes.
- SNA QLLC support means SNA over an X.25 circuit, it doesn't mean non-SNA X.25 support. CCL V1R1 does not support the NCP Packet Switching Interface (NPSI) product.
- The usual NCP and VTAM capabilities for boundary function nodes, such as Network Performance Monitor (NPM), NtuneMON, System Services Control Point (SSCP) takeover/giveback, eXtended Recovery Facility (XRF), duplicate MAC addressing, and so forth are all supported in this environment.

Quick functional matrix

CCL Functional Overview Matrix	CCL R1 supports	CCL R1 support of serial lines via an aggregation layer router	CCL R1 does not support
Software	NCP (V7R5 and above) and compatible levels of NRF SSP, NTuneMON, NetView, and NPM continue to work as they have in the past		Other IBM 3745 software products: NPSI, XI/NSF, EP, NTO, NSI, MERVA, and TPNS Functions provided by the IBM 3746 MAE or NNP NCP-based IP routing
Physical network interfaces	OSA token-ring and Ethernet LAN (uses an LCS interface that is only supported by certain, copper-based, OSA cards) Though NCP only supports SNA over token-ring, CCL transparently converts Ethernet frames to token-ring for the NCP	SDLC, Frame Relay, X.25 QLLC, and ISDN serial line interfaces are not supported directly by CCL, but are supported via an aggregation layer router	Channel, BSC, ALC, Start/Stop, and X.25 non-SNA lines

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Notes:

Components and Connectivity

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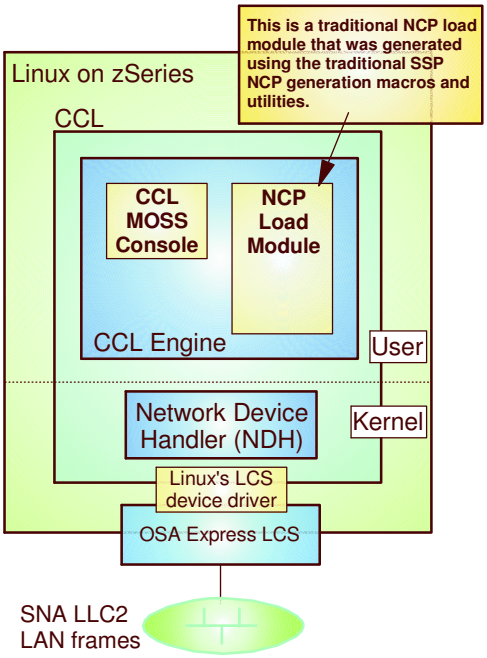
Notes:

CCL Structure and Components



- **CCL** consists of both user-space and kernel-space functions:
  - **CCL engine** emulates an IBM 3745-31A with 16 MB memory supporting an NCP load module and a MOSS console interface.
  - The **MOSS console** is accessed through a standard Web browser.
  - **Network Device Handler (NDH)** is a kernel extension that acts as the interface between an OSA port operating in LCS mode and the NCP Token-Ring Interface (NTRI).
    - The only supported network interface from an NCP perspective is an SNA TIC (token-ring) interface.
    - The actual LAN to which the OSA port is connected may be either token-ring or IEEE802.3 Ethernet (NDH will transform between the frame formats).
- **NDH components**
  - NDH itself consists of two components:
    - A small source code isolation module that is built during installation of CCL
    - An object code only NDH module
  - Both are dynamically loaded into kernel space. No kernel rebuild/reboot is required.

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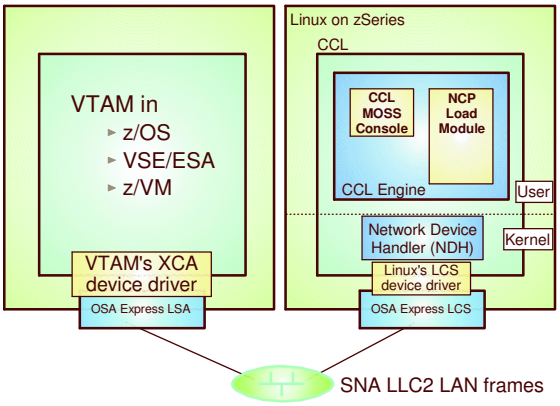
Notes:

- CCL engine
  - Runs in user space and enables the NCP software to run in this new environment
  - Each instance of the CCL engine loads one NCP load module
  - Each NCP instance is separately licensed as today with the IBM 374x hardware, but on a different tier structure
- CCL Network Device Handler
  - The NDH itself is Object Only code that runs in the Linux kernel
    - There is an open source isolation module that provides the interface from the CCL Network Device Handler to the Linux kernel.
      - This was written by IBM and licensed under Berkeley Software Distribution (BSD).
      - The isolation module is provided as source code and is built during install of the CCL.
      - Both the isolation module and the NDH itself are dynamically loaded into the kernel.
  - Interface from the Linux LCS device driver to the CCL engine
  - Dynamically learns which adapter to use for connections (no configuration from user is required)
  - Transparently bridges Token-Ring to Ethernet when applicable without any configuration
- CCL MOSS console
  - A browser interface that provides similar function as the MOSS console of the IBM 374x hardware
  - Each instance of the CCL engine will select a port for the CCL MOSS console
  - Multiple CCL engines within one Linux image require unique ports for their MOSS console browsers
- CCL is software that establishes an environment that allows a real NCP to execute in what the NCP sees as an IBM 3745-31A with 16 MB memory.
- The NCP definition and generation process is unchanged. An NCP source deck must be coded, the System Services Product (SSP) NCP generation utility needs to be executed, and the generated NCP load module transferred to the CCL.
- An NCP that runs in a CCL environment should be generated with a memory size of 16 MB to allow the NCP to take full advantage of the available memory.
- Components are:
  - The IBM 3745 emulator itself (the engine)
  - A MOSS console interface
  - Linux infrastructure referred to as the Network Device Handler that resides within the Linux kernel
- The NDH interfaces between the NCP and the Linux LAN device driver, which in this context is the LAN Channel Station (LCS) device driver that operates an OSA copper-based port configured in LCS mode.
- NDH consists of a small isolation module (distributed in source form under a BSD open software license to be built during install) and the NDH code itself. The NDH components are dynamically loaded into the kernel when Linux is started. No kernel rebuild and reboot is needed.

CCL and VTAM Communication



- VTAM sees the CCL NCP as a LAN-attached remote NCP through its XCA (eXternal Communications Adapter) interface, such as an OSA LSA interface
  - VTAM may either be the owning host or a data host to the CCL NCP
  - For VTAM to be the owning host, a VTAM PTF will be made available for VTAM to activate and own a CCL NCP through an XCA network interface:
    - New keyword on the XCA PU statement to allow VTAM to activate and own CCL NCP resources over an XCA interface
      - ALLOWACT=NO/YES
- No SNA subarea topology changes - VTAM is still a PU Type 5 and the NCP is a PU Type 4
  - In most cases no changes to SNA subarea path definitions
- No or minor changes to VTAM definitions and operations.
- In most cases no changes to NetView definitions and operations.

VTAM maintenance details:
- OS/390 and z/OS VTAM: APAR OA10425
- VSE/ESA VTAM: APAR DY46311
- z/VM VTAM: APAR VM63677

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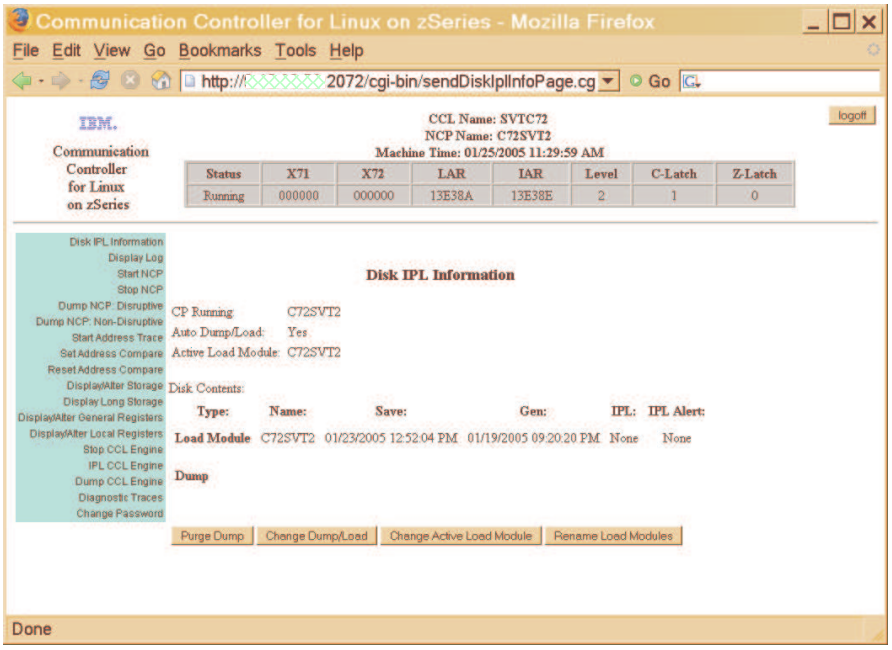
Notes:

- How does VTAM see the NCP inside the CCL?
- A real local IBM 3745/46 is seen over an ESCON channel running the Channel Data Link Control (CDLC) channel protocol. That protocol can unfortunately not be fitted into a Channel-to-Channel (CTC) model but requires a traditional channel, control unit, device type of topology - which we cannot establish inside a zSeries box.
- So the solution is to re-use VTAM's existing capability to communicate with an NCP over its LAN interface - an eXternal Channel Adapter (XCA) interface, such as an OSA port configured in LSA mode.
- Before CCL, VTAM could not activate and own an NCP over its LSA interface. A PTF to VTAM has been made available to enable that capability. This PTF is available for all current VTAM levels on z/OS, OS/390, VSE/ESA, and z/VM.
- No SNA subarea topology changes are required. VTAM continues to be an SNA PU Type 5 and the NCP an SNA PU Type 4. If a migration plan to CCL is based on preserving the existing NCP subarea structure, then no changes to the overall SNA routing infrastructure is needed.
- VTAM's usual management interfaces that are used by NetView and other management products are still available for management of the NCP and its resources.
- So from a VTAM point of view, moving an NCP from an IBM 37xx to the CCL is, apart from the fact that there is no channel any longer, like moving from an existing IBM 37xx to a new IBM 37xx hardware level.

CCL and the MOSS Console Interface



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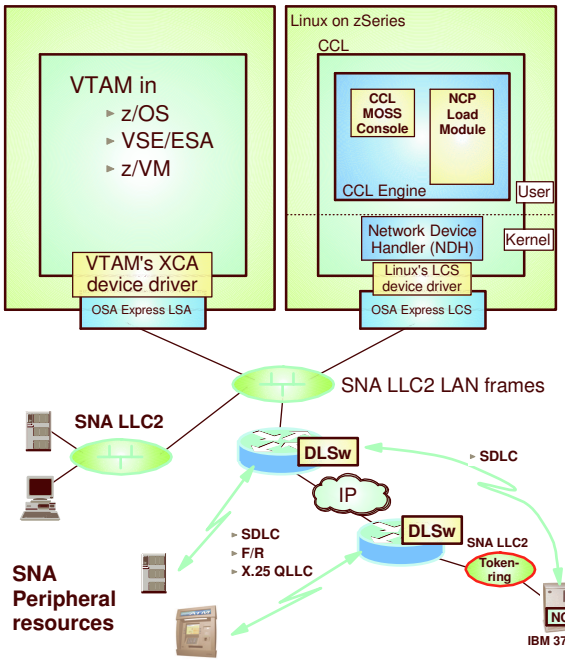
Notes:

- A MOSS console interface example. The CCL MOSS console is accessed via a traditional web browser. The MOSS console is password protected. The password is specified during initial installation of CCL, but can later be changed.
- The traditional MOSS console functions are available, such as displaying status, registers, memory content and so forth.
- The MOSS console interface also includes an emulated MOSS disk where NCP load modules, dumps, and traces are located.
- VTAM's traditional command interface to transfer new NCP load modules to the MOSS disk and schedule a timed IPL is supported in this environment.

CCL and Downstream SNA Connectivity



- Remote SNA lines need to be terminated in an aggregation layer router - a router with wide area network interface support such as a Cisco 3600 family router.
- The DLSw software in the router will internally switch the SNA PDUs between the wide area network link and LAN LLC2 frames:
  - Ethernet
  - Token-ring
- The NCP will see the remote resources as NCP token-ring interface attached resources.
  - If migrating an NCP that today owns SDLC lines, the SDLC line definitions need to be changed to NCP token-ring interface definitions.
- All NCP functions for PU Type 2.0 or PU Type 2.1 nodes are supported in the CCL NCP environment - including XRF sessions.

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Notes:

- We already discussed how downstream communication is switched to a LAN that is then connected to Linux on zSeries via an OSA copper port.
- An IBM 37xx/NCP environment supports LAN attachment for SNA traffic only via a token-ring LAN interface - known as the NCP Token-Ring Interface (or NTRI).
- The CCL implementation isn't limited to a Token-ring environment. It allows for the actual LAN to be an Ethernet. The NDH will transform frame formats so that the LAN frames the NCP sees will look like Token-ring frames no matter what the actual LAN is.
- This capability will allow for a transition of the current SNA LAN infrastructure that today is based on Token-ring technology towards an Ethernet-based LAN infrastructure.
- Peripheral devices may be any peripheral SNA node type the NCP supports today – PU Type 2.0 or PU Type 2.1 including APPN. The NCP and VTAM may as always be configured to provide the combined functions of an APPN Network Node (NN) - known as a Composite network node (a CNN)

CCL Requirements for OSA Ports

- **CCL R1 exchanges SNA network flows with the network over a Linux LCS device driver interface only:**
  - For NCP to VTAM communication (VTAM attached to shared LAN via an OSA LSA port)
  - For downstream communication where aggregation layer routers switch SNA PDUs to/from wide area network connections or over IP networks (DLSw)
- **Only OSA copper-based interface ports can be configured as LCS ports - not fiber-based ports**
- **OSA/SF is needed for locally administered MAC addresses on OSA ports and for maintenance of the OSA Address Table (OAT) when sharing OSA LCS ports between multiple Linux images.**
  - Locally administered MAC addresses can alternatively be set via the Hardware Management Console (HMC)

Processor type	Required MCL level	Ethernet (OSA Express FCs)	Token-Ring (OSA-2 and OSA Express FCs)
G5/G6		OSA Express FC 2340 Fast Ethernet (10/100 Mb) - 1 port/feature	OSA2 ENTR card FC 5201 (4/16 Mb) - 2 ports/feature (each port can also be configured as a 10 Mb Ethernet port)
z/800 or z/900	**3.5**	OSA Express FC 2366 Fast Ethernet (10/100 Mb) - 2 ports/feature	OSA Express FC 2367 (4/16/100 Mb) - 2 ports/feature
z/890 or z/990	**5.50**	OSA Express FC 1366 (upgraded) 1000BaseT (10/100/1000 Mb) - 2 ports/feature	OSA Express FC 2367 (4/16/100 Mb) - 2 ports/feature

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Notes:

- VTAM requires an OSA LSA port for communication with a CCL NCP. In many cases, VTAM already has such a port in use for communication with SNA devices attached to a local area network infrastructure.
- Linux requires an OSA LCS port.
- Both LSA and LCS OSA ports are copper-based ports only. The OSA Express adapter can be equipped with network features that provide copper-based ports (token-ring 4/16/100 Mb and Ethernet 10/100/1000 Mb).
- The table lists the specific features that will provide such ports on the different hardware platforms.
- OSA Support Facility (OSA/SF) will be needed if an LCS port is to be shared among multiple NCPs (to update the OSA Addressing Table (OAT) and/or to set the locally administered MAC address).
- Sharing of OSA LCS port by multiple Linux systems is only supported by OSA-Express on z800/900 and z890/990 hardware - not on G5/G6.
- As detailed on the following page...
- OSA MAY NOT be shared when:
  - VTAM LSA mode OSA may not be shared with a CCL (LCS mode) when they are talking to each other.
  - CCL LCS mode BNN requires SAP=04 so multiple CCL may not share OSA if more than one BNN is required because only one CCL may configure SAP=04 per OSA.
  - LSA mode OSA may not be shared by multiple VTAMs when they are talking to each other (this is the case even without CCL usage).
- OSA MAY be shared when:
  - VTAM may use a single OSA in LSA and LCS mode if you want an OSA to be used by VTAM for SNA as well as IP traffic.
  - CCL LCS mode OSA may be used for SNA and IP traffic concurrently.
  - VTAM LSA mode OSA may be used to talk to CCL as well as any other SNA traffic (ie. SNA dependent devices) concurrently.
  - CCL LCS mode INN/SNI OSA may be shared with other CCLs for INN/SNI even when talking to each other (UNIQUE=NO required).
  - Linux on zSeries may use a single OSA in LCS mode if you want an OSA to be used by CCL as well as Communications Server (CS) for Linux on zSeries.

OSA Port Usage Rules

1. **Only OSA copper-based ports can be used by CCL R1 for SNA traffic - configured in LCS mode**
2. **A Linux image can use the same OSA LCS port for SNA and IP access**
3. **The physical LAN may be either Token-ring or Ethernet IEEE802.3**
4. **Two VTAMs can share an LSA port as long as they use two unique local SAP numbers (for example SAP 04 and SAP 08)**
5. **VTAM and CCL cannot share an OSA port for communication between them - VTAM's LSA port cannot be the same as CCL's LCS port**
6. **Two CCL NCPs cannot share an OSA LCS port for BNN traffic**
   - The NCP uses local SAP 04 and SAP C8 (HPR) for peripheral node communication. These SAP numbers cannot be overridden in the NCP definitions. BNN traffic to/from a CCL NCP must go to/come from SAP 04 and SAP C8 for HPR
7. **One BNN NCP and one or more INN/SNI NCPs can share an LCS port using different local SAPs for the INN/SNI traffic**
   - The NCP allows overriding the local SAP number for INN/SNI traffic
   - To share an LCS port between two Linux images, OSA/SF must be used to create an OAT (OSA Address Table) that indicates which Linux image a SAP number belongs to.
     - If the OSA LCS port is also used for IP access to Linux, remember also to add the home IP addresses of each Linux image to the OAT
8. **Two INN/SNI NCPs can establish a subarea link between them using a shared OSA port as long as they code UNIQUE=NO on the corresponding subarea PU**

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Notes:

- For zSeries OSA-Express (LCS mode), a port can be shared:
  - The OSA port can be shared, but must be configured through OSA/SF with unique SAP numbers per image that share it:
    - For HOME IP address - specify an address of 0.0.0.x in OSA/SF, where 'x' is the SAP number you want assigned
    - The OSA-Express microcode must be a level 3.50 for z900 and z800 - and 5.50 for z990 and z890
  - SNA defaults to a SAP of 04. Other values are typically 08, 0C, 10, etc.
  - SAP numbers are in general written in hexadecimal, but OAT entries need them in decimal. SAP 0C becomes an OAT entry of 0.0.0.12
  - As usual, there are always two device numbers implied when using LCS - the even-numbered (n) is specified in OSA/SF and the following odd-numbered (n+1) is implied.
    - Both device numbers need to be assigned to the Linux image via HCD or z/VM DEDICATE/ATTACH commands
- The NCP sees all LAN interfaces as being Token-ring
  - A Token-ring MAC address is in the non-canonical form and this form is what must be coded in the NCP generation deck.
  - The NCP requires locally administered MAC addresses
    - MAC addresses starting with B'x1xx xxxx'
  - If the OSA port is Token-ring, then the MAC address in the NCP and in OSA/SF for the OSA port match
  - If the OSA port is Ethernet, then the MAC address in the NCP must be the non-canonical form of the Ethernet canonical MAC address as specified in OSA/SF
  - Canonical is little-endian, while non-canonical is big-endian
  - A utility is provided with CCL to assist in the conversion
    - Canonical
    - Canonical.cmd (REXX version)

Canonical address (Ethernet)	08	00	3f	e1	4d	a8
Binary	00001000	00000000	00111111	11100001	01001101	10101000
Reverse bits in each byte	00010000	00000000	11111100	10000111	10110010	00010101
Non-Canonical version (Token-ring)	10	00	fc	87	b2	15

  - Example:
    - Canonical: 400030001000
    - Non-canonical: 02000C000800
    - Local MAC address 02000C000800 (non-canonical) - LOCADDR on LINE stmt. in NCP source definitions
    - Local MAC address 400030001000 (canonical) - in OSA/SF panels
    - SNA Link station - destination MAC address 400030001000 (canonical) on Ethernet LAN
    - SNA Link station - destination MAC address 02000C000800 (non-canonical) on bridged Token-ring LAN

Hardware and Software Requirements

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Notes:

CCL Requirements for zSeries Hardware

- **Processor support**
  - G5/G6, z800/z900, or z890/z990
- **CP requirements (can be IFL engines on zSeries)**
  - Depends on workload
    - SNI throughput 14% higher than a fully loaded IBM 3745-61A uses roughly one CP
    - SNA boundary function workload throughput 72% higher than a fully loaded IBM 3745-61A uses roughly one CP
- **OSA port requirement**
  - OSA-2 or OSA Express copper-based ports
    - IEEE802.3 Ethernet including 1000BaseT (10/100/1000 Mb)
    - Token-ring (4/16/100 Mb)
- **Memory requirements**
  - Memory per CCL engine: 20 MB
  - Usual memory requirements for Linux on zSeries
    - Memory: 256 - 512 MB memory (depending on distribution, packages, and kernel level)
- **DASD requirements**
  - DASD for CCL: 55 MB
  - DASD for CCL traces, dumps, logs, NCP load modules: 80 - 100 MB per CCL engine
  - Usual DASD requirements for Linux on zSeries
    - Approximate DASD space equivalent to two 3390-3 DASD volumes
      - Use the Linux Logical Volume Manager (LVM) to group the volumes together

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Notes:

- A VTAM PTF to support activation and ownership of CCL NCP resources through an XCA network interface is available for the following levels of VTAM:
- VM
  - VM/VTAM V4R2 - APAR VM63677
- VSE
  - VSE/VTAM V4R2 - APAR DY46311
- OS/390
  - OS/390 Communications Server V2R10 - APAR OA10425
- z/OS
  - z/OS Communications Server V1R2 - APAR OA10425
  - z/OS Communications Server V1R4 - APAR OA10425
  - z/OS Communications Server V1R5 - APAR OA10425
  - z/OS Communications Server V1R6 - APAR OA10425
- CCL runs on G5/G6, z800/z900, and z890/z990.
- CCL supports both 31-bit and 64-bit Linux distributions.
- Since CCL executes in Linux on zSeries, the processor requirement can be met with an IFL engine.
- In performance tests conducted in the development lab, we observed the following performance characteristics of the CCL environment:
  - With a single z990 processor, CCL can support roughly 14% more SNI workload than the largest IBM 3745/46 environment (an IBM 3745-61A).
  - With a single z990 processor, CCL can support roughly 72% more Boundary Function workload than the largest IBM 3745-61A environment.
- Each CCL requires around 20 MB of memory and around 100 MB DASD space for traces, dumps, NCP load modules, and log files. The CCL code itself requires around 55 MB of DASD space.
- Linux memory and DASD requirements are listed here for reference only. Check with the Linux distribution documentation for distribution-specific recommendations.

CCL Requirements for Linux on zSeries

- **CCL runs under Linux on zSeries:**
  - SUSE
    - SUSE Linux Enterprise Server 8 for IBM zSeries and IBM S/390 (SLES8)
      - Service Pack 4 (SP4) and later
    - SUSE Linux Enterprise Server 9 for IBM zSeries and IBM S/390 (SLES9)
      - This is a Linux 2.6 kernel distribution
      - Service Pack 1 (SP1) and later
  - RedHat
    - RedHat Linux Release 4 (RHEL4 U1) (as of 7/22/2005)
- **Both 31-bit and 64-bit mode distributions are supported**
- **There are specific package requirements to be met depending on the specific service level of the above distributions**

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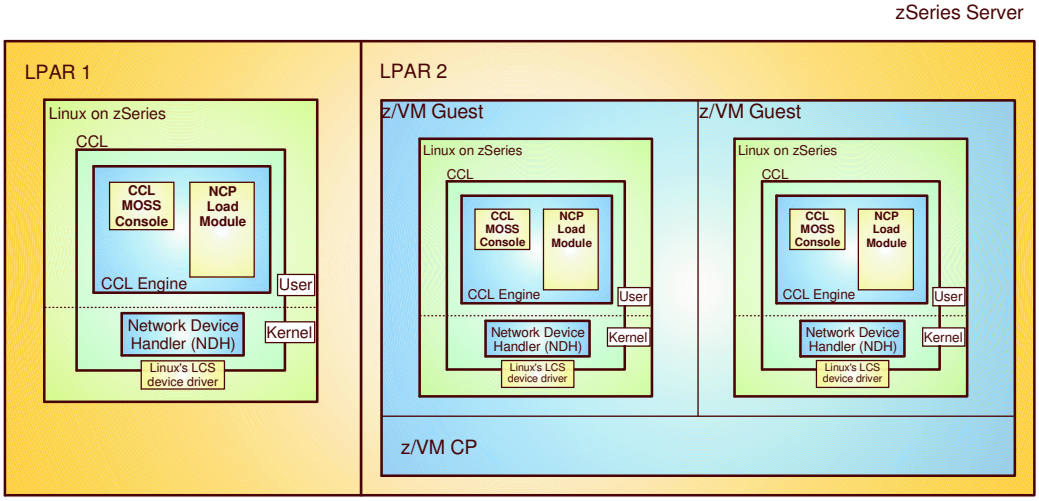
Notes:

- The intial supported distribution was SUSE SLES8 (a 2.4 kernel) or SLES9 (a 2.6 kernel) with the listed service packs.
- CCL requires an updated Linux LCS device driver that is integrated with the Linux kernel. IBM has shipped that updated device driver to the distributors, and SUSE and RedHat have made service packs available with the updated LCS device driver included in the distributed Linux kernel.
- If we were to officially support other distributions without the updated device driver, customers would have to install the new LCS device driver themselves by rebuilding and rebooting the Linux kernel, which normally voids any service contracts the customer may have with the distributor.

Linux deployment model

- **Linux deployment:**
  - LPAR mode - one Linux image in an LPAR (no requirement for z/VM)
  - As a z/VM guest



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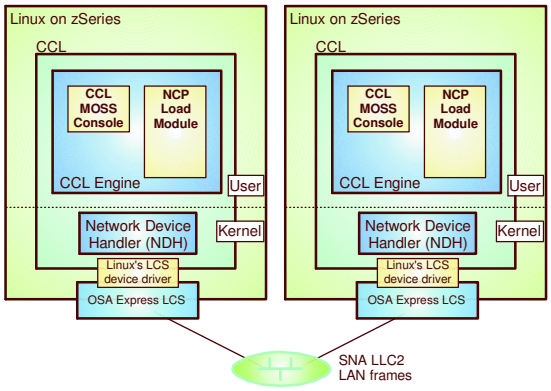
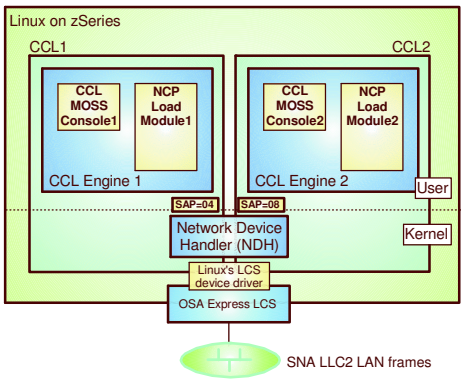
Notes:

- CCL does not dictate any specific Linux deployment model on zSeries.
- Linux may be deployed in individual LPARs or as guests under z/VM.
- If a customer has z/VM installed, an obvious choice would be to run CCL in Linux guests under z/VM.
- If a customer does not have z/VM installed and only needs one or a few CCL linux images, then Linux may be deployed in traditional LPARs.

Deployment models for multiple NCPs



- **One CCL NCP per Linux image**
  - Each NCP operates completely independent of other NCPs
  - Each NCP may run in Linux images that are guests under z/VM or individual LPARs



- **Multiple CCLs per Linux image**
  - One NCP per CCL
  - Each CCL has its own MOSS console
  - Multiple CCLs share one NDH instance

- **No major difference in throughput**
- **Two Linux images may require more overhead (DASD, Memory, CPU) than one**
- **One Linux image may become a single point of failure**

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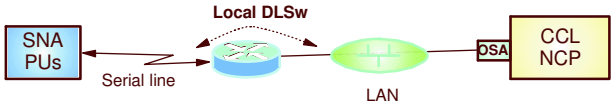
Notes:

- Multiple NCPs can be deployed as multiple Linux images each with one CCL NCP - or multiple CCLs in one Linux image each running an NCP.
- In the latter case, the NDH infrastructure is shared between the CCLs running in a single Linux image.
- There is no significant difference in throughput between these two models. However, running multiple NCPs in one Linux image, will make that linux image a single point of failure for all NCPs running in it.
- See OSA LCS port sharing rules for details on using the same OSA LCS port by more CCL NCPs.

NCP support by CCL R1

- **The CCL emulates an IBM 3745-31A with 16 MB memory**
  - Set MEMSIZE to 16MB on the BUILD statement to use all 16 MB
- **The following NCP levels can be used to generate an NCP for the CCL:**
  - NCP V7R5
  - NCP V7R6
  - NCP V7R7
  - NCP V7R8
  - NCP V7R8.1
- **SSP (System Support Program), NRF (Network Routing Facility), and NTuneMON at levels supported by the above NCP levels are also supported by CCL R1.**
- **Only the NCP Token Ring Interface (NTRI) is supported directly by an NCP running in the CCL:**
  - Any device that can attach to an NCP over a TIC interface should be able to attach to an NCP running in the CCL environment
  - Specifically, the NCP running in CCL sees the token-ring interface as a TIC2 adapter in an IBM 3745
  - The physical LAN to which the OSA adapter is attached may be either token-ring or Ethernet
- **The following native network attachments are not supported directly by an NCP running in CCL R1, but are supported via an aggregation layer router for serial SNA line termination and switching to SNA LAN protocols:**
  - SNA SDLC
  - SNA Frame Relay
  - SNA X.25 QLLC (this does not include NPSI, only current SNA X.25 access to the NCP via the IBM 3746 licensed support feature)



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Notes:

- NCP levels that are supported by CCL. When a new NCP shipment today is requested from IBM, we ship NCP V7R8.1.
- If an installation has any of the supported NCP levels already installed, a CCL NCP can be generated with those levels.
- NCP load modules are generated using the usual NCP generation process.
- The very first time an NCP is started in the CCL environment, the NCP load module has to be transferred to the Linux file system using some form of binary transfer. File Transfer Protocol (FTP) or secure file transfer protocol (sftp) – a file transfer protocol under the Secure Shell (SSH) umbrella can be used.
- The CCL can then be started and load the NCP load module. Use traditional VTAM commands to activate the link to the CCL and the NCP itself over VTAM's LAN interface.
- New NCP load modules can hereafter be transferred to the MOSS disk and a timed IPL of the NCP can be scheduled.
- VTAM is not able to use the traditional LOADFROM=HOST form of the activation command when activating the NCP over a LAN interface.
- LOADFROM=EXTERNAL works for a CCL NCP if the CCL NCP is not directly attached to VTAM over a LAN – or in other words it works for a CCL NCP that is attached to another NCP.
- Since there is no hardware support on the zSeries platform for terminating serial lines, serial line termination must be done on what is referred to as an aggregation layer router or an access layer router outside the zSeries hardware itself. Such a router can be equipped with serial line interfaces to which selected serial lines can be moved from the IBM 3745/46. The router software will then use local DLSw functions to switch the SNA data between the serial lines and a local area network to which the CCL NCP is connected using an OSA port.
- In fact, the only real physical network interface an NCP executing in a CCL environment supports, is a token-ring LAN interface (specifically what the NCP believes is a TIC-2 interface). As mentioned earlier, what the NCP sees as a token-ring interface may in fact be an Ethernet – the CCL infrastructure will handle the necessary frame format conversions between Ethernet and token-ring formats. The LAN between the aggregation layer router and the OSA port that is used by CCL may be either token-ring or Ethernet.
- Serial line SNA interfaces that are known to be supported by such aggregation layer routers are SDLC, Frame Relay, and SNA X.25 QLLC.
- Please note that SNA X.25 QLLC does not mean that CCL R1 has support for NCP Packet Switching Interface (NPSI).

Functions Not Supported by the CCL R1

- **The following native network attachments are specifically not supported by an NCP running in CCL R1:**
  - Channel resources (VTAM and NCP instead communicates over a LAN)
  - SNA BSC 3270 resources attached to the NCP
  - X.25 NPSI resources (both SNA via NPSI and non-SNA via NPSI)
  - Airlines Line Control (ALC) resources
  - Start/Stop resources (for TCAM)
- **The following functions that may normally execute in an IBM 3745 are not supported by the CCL R1 environment:**
  - Emulation Program (EP) or Partitioned Emulation Program (PEP)
  - Tele Processing Network Simulator (TPNS) NCP
  - NCP Packet Switching Interface (NPSI)
  - An NCP running in CCL does not support the NCP-based IP routing functions
  - X.25 SNA Interconnection (XI) and Network Supervisory Function (NSF)
  - Network Terminal Option (NTO)
  - Non-SNA Interconnection (NSI)
  - MERVA extended connectivity
- **Since EP and PEP are not supported by the CCL, the following EP/PEP native network attachments are not supported either:**
  - non-SNA BSC resources (includes both 3270 and RJE over BSC)
  - Start/Stop resources
- **The CCL environment does not address functions currently executing in the Multi Access Enclosure (MAE) feature or the Network Node Processor (NNP) in the IBM 3746:**
  - Consider using Communications Server for Linux on zSeries to migrate functions from the MAE and NNP to a zSeries platform.

Please see "*IBM Communication Controller Migration Guide*", SG24-6298 for alternative technologies.

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Notes:

- It is important to emphasize that the CCL supports an NCP, not an Emulation Program (EP) and not a Partitioned Emulation Program (PEP).
- There is no support for EP/BTAM connectivity through the CCL.
- Also, please note that SNA BSC lines are not supported by the CCL environment. BSC lines may in a traditional IBM 3745/46 environment be owned by the NCP (BSC resources are considered SNA network resources and known to the NCP and VTAM). BSC lines may also be owned by the EP component (BSC resources are unknown to the SNA network). BSC resources that are owned by the EP component requires Basic Terminal Access Method (BTAM) on the mainframe operating system. In the context of CCL, neither two types of BSC lines are supported – SNA BSC lines are not supported because of lack of DLSw support in the aggregation layer router environment, and EP BSC lines are not supported because of lack of EP support by CCL itself.
- An NCP in a CCL environment supports the same APPN functions as an NCP in an IBM 3745. An NCP can in combination with VTAM constitute an APPN Network Node – also known as a Composite Network Node (CNN).
- An NCP can act as a router in an HPR SNA network infrastructure – it can perform the Automated Network Routing (ANR) functions of HPR. It cannot be a Rapid Transport Protocol (RTP) end point.
- If an existing IBM 3745/46 environment uses any of the software technologies listed on this chart, it is not currently possible to replace such an IBM 3745/46 with a CCL implementation.

CCL Usage, Summary, and Contacts

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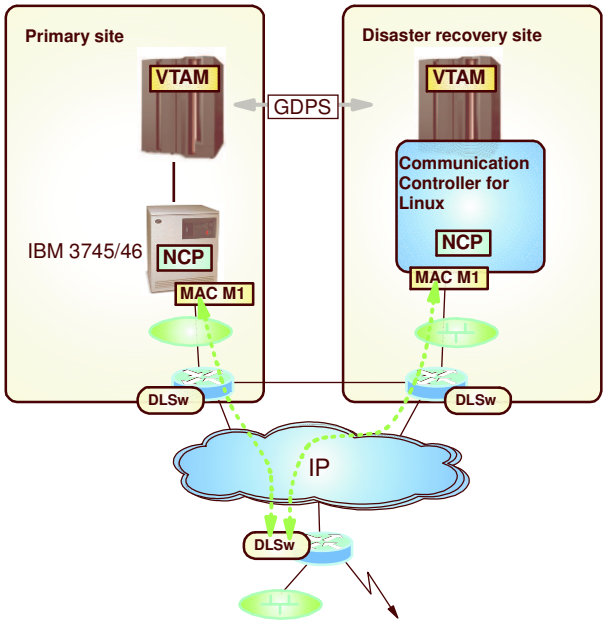
Notes:

Disaster Recovery Site Scenario



- For installations currently investing in DR sites, IBM 3745/46 redundancy poses some challenges.
- An alternative in many cases to installing spare IBM 3745/46 hardware will be to use Communication Controller for Linux running the DR NCP in the DR site.
- For LAN-attached connections, a switch to the DR site can be done using duplicate MAC addresses and layer-2 bridging of SNA flows, or using DLSw to redirect the traffic to the DR site.
- If physical serial lines are attached to the IBM 3745/46, they need as usual to be manually switched to the DR site where they then can be terminated in a DLSw router.
- The CCL environment is able to reload and restart an NCP faster than a real IBM 3745/46, reducing recovery time of a failed NCP.

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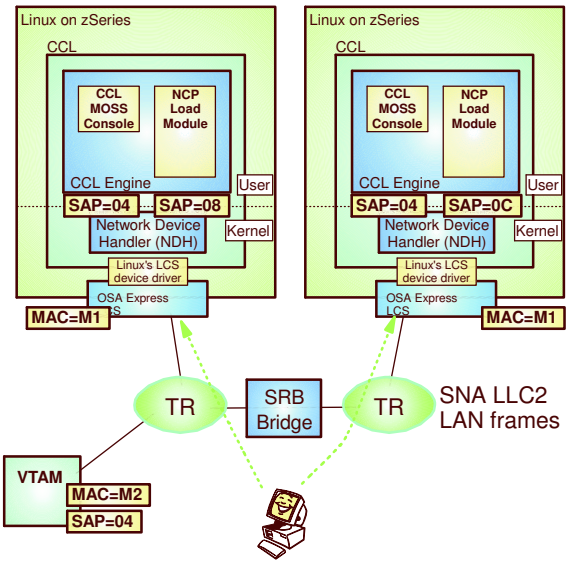
Notes:

- One area where CCL might be an initial consideration is for those who are in the process of implementing disaster recovery (DR) sites.
- Instead of purchasing a number of extra IBM 3745/46s for the DR site, CCL can be used in the DR site to provide the backup platform for the NCP functions.
- LAN connected SNA nodes can switch to the DR site based on use of duplicate MAC addressing.
- Serial line termination may use existing procedures to switch from the primary site to the DR site aggregation layer router infrastructure.

Duplicate Token-ring MAC Addresses

In two CCL NCPs for NCP availability and load balancing



- **Load balancing of remote SNA link station access when both CCL instances are up and running**
  - Each NCP needs unique SAP for VTAM links - VTAM needs to know them as separate NCPs (SAP 08 and 0C in this setup)
  - The two NCPs need the same SAP for downstream links (SAP 04 in this setup)
- **Availability**
  - If an LCS port, a Linux image, an NCP, or a CCL engine goes down, remote link stations can recover over the other CCL instance
    - As usual in an SNA network, such a switch is disruptive to SNA sessions (subarea and APPN)
    - SNA sessions over HPR will survive such a switch
  - Traditional availability aspects would direct one towards two Linux images on two different zSeries CECs in two different data centers for maximum availability

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Notes:

- VTAM availability
  - SSCP takeover functions will work as today
- Subsystem availability
  - Extended Recovery Facility (XRF) will work as today
- CCL/NCP availability
  - Redundant CCL/NCPs with duplicate TR MAC addresses
  - Similar layer-2 based availability can be implemented in an Ethernet environment, but needs to be combined with use of certain DLSw functions
- Duplicate MAC addresses in one CCL NCP for OSA port for availability and load balancing
  - NCP source for the TR line:
    - LINELAN LINE LOCADDR=M1,,,
  - Code only one LINE statement in this case.
    - Coding two could make the configuration ambiguous
  - When LINELAN is activated, CCL associates both LCS ports because they both have the same MAC address configured by OSA/SF:
    - SAP 04 for BNN traffic and SAP C8 for HPR (ANR) traffic are both also associated with these MAC addresses
  - When remote SNA link stations connect, CCL remembers which LCS port the connection arrived over and directs outbound SNA frames to that partner over the same LCS port
  - Load balancing
  - Availability
    - If one LCS port goes down, remote link stations can recover over the other
      - Disruptive to SNA sessions
- Duplicate Ethernet MAC addresses in two CCL NCPs for NCP availability and load balancing
  - Ethernet segments with duplicate MAC addresses cannot be bridged together
    - Ethernet bridging technology doesn't support that
  - Elements of the DLSw technology can instead be used to connect the Ethernet segments with duplicate MAC addresses together and with other LAN segments
    - DLSw may be split - having a DLSw router on each side of an intermediate IP network
    - DLSw may also be local
    - DLSw can be configured to use round-robin towards the two Ethernet segments with duplicate MAC addresses - allowing an even spread of SNA link station connections when both are available
  - Same considerations for VTAM links from the NCPs
    - Communication between the NCPs and VTAM also needs to use DLSw (typically local)
    - VLAN10 cannot be bridged to VLAN11 and VLAN12

3745 Twin CCU Configurations

- **Single CCU mode**
  - Only 1 CCU is installed in the controller
  - Each CCL instance operates as a single CCU modeled after the 3745 31A with 16M memory
- **Twin CCU in "dual mode"**
  - 2 CCUs installed in the controller
    - Channel and line adapters are dedicated to one CCU or the other
    - Bus switching between the 2 CCUs is not supported
  - Similar functionality is achieved by running two CCL instances
- **Twin CCU in "standby mode"**
  - 2 CCUs installed in the controller
    - All channel and line adapters are dedicated to only one CCU
    - The other CCU is down or idle ready to backup the first CCU
  - Similar function is implemented within CCL itself
    - CCL will attempt to restart a CCL Engine and load the same NCP load module as the failing CCL Engine
    - In some cases, the automatic restart of CCL will happen more rapidly than with a 3745 in twin CCU in "standby mode"
- **Twin CCU in "backup mode"**
  - 2 CCUs installed in the controller
    - Channel and line adapters are dedicated to one CCU or the other
    - Bus switching between the 2 CCUs is supported for certain types of failures (power supply, CCU failures)
  - Redundant hardware is provided by zSeries platform and is available to Linux operating system running CCL

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Notes:

- The Linux environment is much more flexible than the IBM 37xx hardware environment. Running multiple CCLs is not difficult and can provide capabilities similar to the twin-CCU environments.
- The NCP auto dump/load function is able to restart a failed CCL NCP as fast or in some cases faster than a real IBM 37xx.
- Some of the recovery scenarios twin-CCU configurations address, such as failure of a CCU or memory, are already handled by the zSeries hardware infrastructure itself and will in most cases never surface to the Linux operating system.

Monitoring CCL NCPs

- **NTuneMON**
  - Supported by CCL at the release level supported by the corresponding NCP without changes to NTuneMON
  - ATUSS panel displays a unique character string when it is used to monitor CCL NCPs
    - Under “3745 HARDWARE INFO”, the MICROCODE EC field will show the CCL version and release, such as CCLV1R1
    - Under “3745 HARDWARE INFO”, the FIX field will show the CCL package build date
  - CCL Engine will not provide CCU utilization so this will be reported as zero
- **NPM**
  - CCL Engine will not report CCU or TIC utilization
- **System Automation for z/OS V2R3**
  - SA's "Processor Operations" automation feature can automate any Linux on zSeries LPAR or guest under z/VM.
  - Startup, shutdown, and monitor Linux on zSeries itself
  - Startup, shutdown, and monitor CCL instances
  - The SA automation can handle any messages coming from Linux on zSeries and/or CCL as well as proactively monitor CCL itself by issuing CCL commands and having SA parse the results.

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Notes:

- Remember that it is the real NCP we're loading into the CCL. All the usual management and monitoring functions of NCPs and NCP resources work as they always did.
- This includes NetView operation and automation, NtuneMON, and NPM. Some metrics such as CCU utilization are reported as zero - they don't make sense in some of the environments a CCL will run.
- Linux on zSeries as a production platform may be new and some amount of management processes and probably tools need to be established around that environment - if not already in place. Processes to start/stop CCL, archive log files, and so forth are tasks that need to be considered.
- One technology to use for Linux management is System Automation that runs as part of NetView on z/OS – preserving a familiar interface for operators that now also need to include a Linux environment in the operations scope. See SA for z/OS V2R3 documentation for more details on those capabilities.

Terms and conditions

- **CCL pricing:**
  - Per processor pricing - in the US, the price is $40,000 per processor
  - CCL available via Passport Advantage
- **NCP tier structure and pricing for the CCL environment:**
  - Each NCP running on a CCL requires a Tier 2 NCP license ($620 per month)
    - Licensed to the zSeries serial number
- **Existing NCP terms and conditions also apply to the CCL environment:**
  - You need to maintain an NCP license for your IBM 3745/46 for as long as you continue to run an NCP on that hardware
  - A new NCP license may allow for a 60 day test period
  - New NCP media shipment is based on NCP V7R8.1
  - As usual you need an SSP license that matches the NCP level
- **Potential for NCP license reductions:**
  - As resources move to CCL NCPs, remaining NCP licenses may be reduced as the physical configurations of the IBM 3745/46s are being reduced
  - Opportunities exist to consolidate resources from more small NCPs into a larger CCL NCP and by doing so reduce the overall NCP license costs
    - A CCL NCP license is not tied to the size of the NCP. In the CCL environment, a Tier-2 NCP license per CCL is sufficient.

Note:

1. Prices are current as of February 1, 2005, exclude applicable taxes, and are subject to change by IBM without notice.
2. Suggested retail price, dealer prices may vary.

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Notes:

- Provides migration path from IBM 37xx Communication Controller hardware
- Removes dependencies on other non-strategic or nearing end-of-life hardware (token-ring, ESCON)
- Runs reliable NCP software, supporting many key functions including SNI and boundary function
- Runs in existing zSeries hardware, taking advantage of its security, virtualization, scalability, and business resiliency features
- Runs on Linux operating system, either in native LPAR mode or in a z/VM LPAR
- Preserves investment in mission-critical SNA applications
- Focuses on ease of migration, requiring minimal network definition updates and no coordinated changes by business partners
- CCL itself is a per-processor price model. The US price is $40,000 per processor. This price is not dependent on number of CCLs or NCPs sharing a processor.
- An NCP license is needed per NCP running in a CCL - just as per NCP running in real IBM 37xx hardware. The NCP price is fixed at a Tier-2 level – independent of the size of the NCP.
- If any NCPs are left running on IBM 37xx hardware, the NCP Tier pricing for those NCP licenses should be reviewed at some point in time, since a reduction might be possible based on removal of hardware from the IBM 37xx as their use decrease.

Summary

- CCL provides a migration path for SNA functions from the IBM 37xx hardware - allowing the NCP to be moved from a hardware communication controller, such as an IBM 3725, an IBM 3720, or an IBM 3745/46, to a Linux operating system environment on zSeries.

- This migration can be done with no or minimal impact to:
  - The SNA network topology
    - Retain subarea topology as it is today
    - Retain SNA path definitions as they are today
    - Retain SNI topology and connectivity as it is today
  - VTAM definitions
    - One new keyword on the XCA PU to allow VTAM to activate and own an NCP over a LAN interface
  - Operation
    - NCP generation and maintenance process is unchanged
    - Load and activation of the NCP might be slightly different from the way an installation has chosen to do it today, but the procedures are not new - they also work with an NCP that runs in an IBM 3745/46 environment
    - VTAM commands to manage the NCP and the resources owned by the NCP are unchanged
  - Management of the NCP
    - Same management interfaces as today.
    - NetView for z/OS, NPM, and NTuneMON can be used as today.

  And all of this is transparent to our SNA applications. No SNA application rewrite is needed to take advantage of this technology.

- If this is the first time an installation begins to use Linux on zSeries for production workload, some amount of management processes need to be established for Linux on zSeries.
  - System Automation (SA) for z/OS V2R3 can be used to manage Linux on zSeries

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Notes:

- CCL provides an evolutionary step forward for the IBM Communication Controller family of products. It allows an NCP to be moved forward from a hardware Communication Controller to a software Communication Controller supporting SNI/INN connectivity and selected boundary functions.
- The transition from hardware IBM 37xx to software CCL can in many cases be done with no or minimal changes to the SNA network topology, VTAM definitions, NCP definitions, NCP generation and maintenance processes, and management processes.
- During a migration period, one may want to have both the old NCP running in a real IBM 37xx and the new NCP running in CCL. If both are active at the same time in such a migration period, they obviously cannot use the same SNA subarea number and some topology changes may need to be planned for during a migration period.
- Most importantly - this can be done transparently to our SNA applications and our business partners who are connected to us based on SNI connectivity.
- SNA is by no means dead - it is still very much alive - especially from an application end-point perspective. CCL allows us to move the SNA subarea environment forward wherever that environment continues to be of value to our business.
- Key messages about the Communication Controller for Linux on zSeries product:
  1. Provides migration path from IBM 37xx Communication Controller hardware
  2. Removes dependencies on other non-strategic or nearing end-of-life hardware (tokenring, ESCON)
  3. Runs reliable NCP software, supporting many key functions including SNI and boundary function
  4. Runs in existing zSeries hardware, taking advantage of its security, virtualization, scalability, and business resiliency features
  5. Runs on Linux operating system, either in native LPAR mode or in a z/VM LPAR
  6. Preserves investment in mission-critical SNA applications
  7. Focuses on ease of migration, requiring minimal network definition updates and no coordinated changes by business partners

Washington Systems Center (WSC)

Technical Support from Washington Systems Center (WSC) - Advanced Technical Support in the US

WWQ&A and ATS Support through TECHEXPRESS -IBMers follow the following path:

1. Logon to URL http://d25dbw26.mkm.can.ibm.com/wwqa/wwqa.nsf/wwqalogon
2. Enter Country and Serial Number and select "GO".
3. Enter "Communications Server for Linux" in search field and "check" all applicable RETAIN Libraries.
    1. (You must conduct a search before you are permitted to submit a question.)
4. Browse "Q&A Usage Library" and "Q&A in Progress" for WWQ&A entries; browse other categories if desired.
5. Select "BACK" from Browser till you arrive at screen with "Search" bar on left-hand side.
6. In left-hand "Search" bar, select "Submit a Product Use Question (formerly QAAUTHOR)".
7. For "Product Search Words" enter "COMMUNICATIONS SERVER FOR LINUX".
8. Select "Communication Systems (CSYS - NA/ATS)-zSer TCP/IP VTAM NetView".
9. Select "LINUX".
10. Select appropriate LINUX on zSERIES product.
11. Enter Question "Abstract" and "TEXT" and select "SUBMIT".

For TechExpress requests for extended assistance (conference call with customer, assistance on a sale, etc.) - Submit a TECHEXPRESS request for zSeries Communications Server via the WEB at http://w3.ibm.com/support and select "Request Technical Sales Resources - Americas", or Gloria Grantman/Rochester/IBM can assist in opening a TechXpress. In either case, you will need the following information:

IBM Rep/Location for Notes

1. Customer Name/Geo
2. Brief Description of work/when
3. Platform/Op Sys/Application
4. Name of ATS Rep Performing
5. Other Info (CMT, OMSYS, PMR)
    OMSYS # ??????????????? - or - Contract # ????????????? - or - CRITSIT # ?????????????
6. Revenue Potential

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Notes:

- http://www.ibm.com/servers/eserver/zseries/zos/zos_sods.html#050726
    - On February 15, 2005, IBM announced IBM Communication Controller for Linux on zSeries V1.1. This product is intended to provide a migration path for customers using SNA applications to communicate with business partners. In the next release of Communication Controller for Linux on zSeries, IBM intends to provide enhancements in network connectivity such as channel data link control (CDLC) using OSA-Express2 OSN (OSA for NCP), data-link switching (DLSw), and an open interface for X.25 (NPSI). For more information on this product, refer to the Communication Controller for Linux on zSeries Web site.

Contact information

- CCL home page:
  - http://www.ibm.com/software/network/ccl
  - Click on Support to go to the CCL Support page
    - Useful links to manuals are located under "Learn"
- CCL Frequently Asked Questions page:
    - http://www.ibm.com/support/techdocs/atsmastr.nsf/WebIndex/FQ109582
- For more information, contact:
  - EMEA: Peter Redman - Peter_Redman@uk.ibm.com
  - Americas: Erika Lewis - erika@us.ibm.com
  - AP: Chuck Gardiner - cgardine@us.ibm.com
- For planning and installation services, contact:
  - April Singer in IBM Software Services for Websphere, Enterprise Transformation Services - singeraf@us.ibm.com

For further technical assistance:

US:

- Access installation and technical support information via the WWQA database
  - IBMers can access via the WWQA database via http://d25dbw26.mkm.can.ibm.com/wwqa/wwqa.nsf/wwqalogon via IBM intranet userid/password
  - Customers can access installation and technical support information from IBMLink/ServiceLink.
- Please research questions through all available resources before submitting a question to the Q&A database.

EMEA

- Techline and local Field Technical Support Specialists provide technical pre-sales assistance. Additional technical support is available through worldwide Question & Answer (WWQA), QASearch function on ViewBlue or EHONE. For some brands/products, authoring of questions is only available via Techline.

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Notes:

- IBM has defined service offerings to assist customers with planning for and migrating to the CCL environment.
- There is also a newsgroup available for discussing CCL-related topics: ibm.software.linux.ccl on news.software.ibm.com
- This presentation was originally created by Alfred Christensen. His recorded presentation is located under Learn on the CCL Support page http://www.ibm.com/support/docview.wss?rs=2192&context=SSRRLB&dc=DA480&uid=swg27005692&loc=en_US&cs=utf-8&lang=en