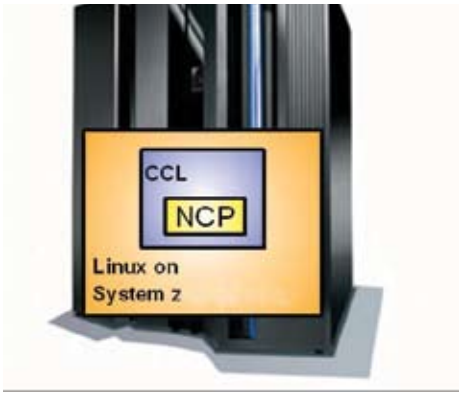
Migrate off of aging hardware while preserving software reliability

IBM Communication Controller for Linux on System z V1.3



Highlights

- **Provides migration path from IBM 37xx Communication Controller hardware while preserving investment in mission-critical SNA applications.**
- **Runs reliable NCP software, supporting many key functions including SNI, INN, and boundary function.**
- **Provides Data Link Switching (DLSw) support, allowing you to move the DLSw function onto the host and enabling an IP path for traffic between NCP and other network resources.**
- **Provides an enablement interface for NPSI X.25 connectivity.**
- **Provides enhanced connectivity including channel support through OSA for NCP (OSN) and 3746 TIC3 emulation.**
- **Supports SNA Modernization strategy by consolidating SNA function to the mainframe and sending SNA traffic over an IP network.**
- **Reduces CPU utilization requirements while increasing throughput.**
- **Runs on Linux operating system, either in native LPAR mode or in a z/VM LPAR on reliable System z hardware.**
- **Focuses on ease of migration, running existing NCP code with minimal network definition updates.**
- **Preserves strategic business-to-business connections, with no dependency on coordinated network updates by business partners.**
- **Requires no changes to network management products such as Tivoli® NetView® and NTuneMON.**

Companies are simplifying their networks and moving toward an on demand environment. They want to move off of older, slower networking hardware and be able to take advantage of newer technology. At the same time, they want to preserve their investment in their current application portfolio and continue to use solutions they have come to rely on. IBM's Communication Controller for Linux™ on System z™ is software that emulates IBM 3745 hardware and runs in the mainframe. Communication Controller for Linux (CCL) provides an attractive migration solution, integrating the latest networking hardware with mission-critical existing software.

New for V1.3

This release of IBM's Communication Controller for Linux on System z includes multiple enhancements to CCL's Data Link Switching (DLSw) component. Multiple DLSw console port support allows multiple users to be simultaneously logged in for monitoring and operation. A new filter for DLSw "show" command based on peer addresses allows for filtering of IP or MAC addresses using wildcards which reduces the amount of displayed

output for DLSw networks that contain many peers or connections. In addition to these usability improvements, CCL performance in DLSw configurations is also improved. Enhancements made to the DLSw component provide significant gains in transaction throughput and lower processor utilization. Significant reductions in processor utilization are made for idle peer connections.

This release also includes samples to automate CCL start and stop sequences. Through the use of "rc" scripts, CCL components (cclengine, ccldls and cclxot) can be automatically started or stopped during Linux kernel bootup and shutdown.

Other CCL improvements since release 2.1 include MultiLink Transmission Group (MLTG) support for IP Transmission Groups (IPTGs) which allows IPTGs to be a part of a transmission group with other link media for greater reliability. The support also allows for standby links. Multiple OSA/OSN CDLC IPL port support allows the CCL engine to be loaded from more than one CDLC-attached host. And CCU and adapter thread utilization is now reported to NPM, allowing the user to monitor the performance of CCL.

Alternative Hardware Option

The IBM 37xx Communication Controller hardware family was withdrawn from marketing in 2002. The IBM Communication Controller for Linux on System z was developed as a migration path from this hardware. CCL enables the Network Control Program (NCP) software that runs on IBM 37xx hardware to now run in Linux on System z hardware. The result is replacement of dependencies on older 37xx hardware with newer System z hardware and Linux software. And the mainframe Linux platform is a strategic environment for running many key software solutions along with CCL.

In the past, IBM 37xx NCPs were connected to your host via token-ring or ESCON® channel attachments. Many token-ring products are also being withdrawn from marketing and ESCON channel chips are no longer manufactured. In addition to moving the NCP into flexible System z Linux servers, running your NCP in Communication Controller for Linux also provides an Ethernet connection into the host, removing another non-strategic hardware dependency.

Taking advantage of the CCL DLSw endpoint within the mainframe also provides an alternative to datacenter routers.

SNA Modernization

Communication Controller for Linux on System z supports consolidation of many of your SNA network components into the mainframe where VTAM® and the mainframe SNA applications reside. At the same time, it supports simplification of your network infrastructure to a single IP network. You can consolidate your traffic over IP all the way into System z. CCL's inboard Data Link Switching (DLSw) endpoint allows you to encapsulate the SNA communication over IP and CCL's x.25 over TCP/IP (XOT) interface, along with a server XOT endpoint,supports sending x.25 traffic over IP. The CCL IPTG function provides efficient IP connectivity between CCL NCPs.

Bringing NCP into the mainframe and consolidating your network infrastructure to IP can decrease complexity and skill requirements throughout the network. At the same time, CCL allows you to continue using the applications you count on today without requiring a rewrite to IP, simplifying migration and ensuring continued reliability.

Connectivity Options

The main difference between running NCP in an IBM 37xx and running it in the mainframe is in the area of network connectivity. Connectivity to Communication Controller on System z is through OSA adapters. Connectivity from VTAM to CCL may use channel datalink control (CDLC) through the OSA in NCP mode (OSN) feature available starting on the System z9®. If OSN is unavailable, or if CCL does not reside in the same CEC as VTAM,

connectivity to VTAM may also be through an OSA port running in LSA mode.

Network traffic to CCL may come in either over an SNA or an IP network. If CCL's inboard DLSw function is used, traffic can come into CCL over any IP OSA port. SNA connectivity from CCL to the network may be through an OSA port running in LCS mode or in QDIO mode. When using QDIO mode, CCL's exploitation of layer 2 support for OSA Express adapters has the advantage of supporting virtual MAC addresses, so that one physical port may be associated with multiple addresses and appear as many ports to the network. X.25 traffic would also come in over an IP network using XOT (X.25 over TCP/IP).

Efficient IP connectivity between two CCL NCPs is provided by CCL's IPTG function.

The CCL LAN connectivity through OSA may be either token ring or Ethernet. From an NCP perspective, NCP only supports SNA traffic over token ring LAN connections, so if Ethernet is used, CCL maps the Ethernet frames to token ring before sending them to NCP. IBM's 37xx hardware supports a variety of other non-LAN connectivity types, including x.25, SDLC, and frame relay. In order to migrate these connections from the older hardware to CCL, you have to terminate them at a WAN router and map them to CCL's LAN connection, either over an SNA or an IP network.

Ease of Migration

Because CCL was developed as a migration solution, simplifying migration was a key focus area. Existing NCP software, with no required code changes, runs in Linux on System z. CCL preserves your SNA subarea network topology and does not require APPN. Coordinated changes on the part of business partners are also not required. An NCP running in CCL can connect to another CCL NCP or to an NCP running in IBM 37xx, so migration can be staged. And CCL provides interfaces to load, operate, manage, and dump NCPs in a manner similar to operating NCP on an IBM 37xx.

If using NPSI, mainframe NPSI application and NPSI setup is as usual. And NCP management tools such as NTuneMON and Network Performance Monitor (NPM) continue to be supported.

NCP Functionality

Many key NCP functions now run in the Linux on System z platform using Communication Controller for Linux. SNA Network Interconnectivity (SNI) for business-to-business communication across networks is supported. As previously stated, migration on the part of the attached business partner is not required. Intermediate Network Node (INN) for communication between subareas within the same network is also supported.

In addition, selected boundary functions for Boundary Network Node (BNN) traffic are supported providing connectivity to SNA peripheral nodes. Continuing to connect these resources through NCP preserves the network topology. NCP boundary function support includes multiple availability functions. SSCP Takeover and Giveback and Extended Recovery Facility (XRF) will work as they do today. Redundant CCLs and NCPs can be defined using duplicate MAC addresses for load balancing and availability of NCPs and OSA ports. Functionality similar to IBM 3745 twin CCU configurations is available and CCL could also provide an alternative disaster recovery solution in place of a redundant 37xx installation.

CCL's native LAN support provides performance and configuration enhancements through 3746 TIC3 emulation. These enhancements move the Logical Link Control (LLC) function from NCP to CCL, helping to improve the performance of internal processing and enhancing usability by simplifying migration, allowing you to use the 3746 hardware addresses in a CCL environment.

NPSI support via the use of an x.25 over TCP/IP (XOT) product is provided. NPSI running on CCL will continue to have the same x.25 capabilities. XOT will be used to transport the x.25 traffic. Since the x.25 traffic will need to come into the mainframe over an OSA port, the XOT endpoint has to be inside the box. CCL provides an open interface for XOT. IBM's X.25 over TCP/IP for Communication Controller for Linux product (IBM XOT) provides the server XOT endpoint.

CCL Components

The IBM Communication Controller for Linux on System z consists of three components, the Engine, the Network Device Handler, and the MOSS console. The CCL Engine allows NCP to run unchanged in Linux on System z. Each instance of the CCL Engine loads one NCP. Multiple CCL Engines can run in one Linux image. The Network Device Handler (NDH) provides the interface from the Linux device driver to the CCL Engine. If applicable, the NDH bridges the Ethernet frames to token-ring. The CCL MOSS console is a browser interface that provides functions similar to the IBM 37xx MOSS console.

Linux on System z Advantages

Not only does CCL reduce your dependency on aging hardware, running NCP in Linux on mainframe servers provides many other advantages. You can leverage the strengths of System z hardware, known for its reliability, security, scalability and business resiliency.

You can run Communication Controller for Linux on System z with Linux running in either native LPAR mode or as a z/VM® guest. You can also use IBM's Integrated Facility for Linux (IFL). Communication Controller for Linux on System z is an attractive migration alternative integrating the advantages of System z hardware, virtual servers, and the Linux operating system with the reliability of your existing NCP software and SNA applications.

For More Information

To learn more about the IBM Communication Controller for Linux on System z V1.3, visit: ibm.com/software/network/ccl

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IBM Communication Controller for Linux on System z at a glance

Component or related application:	Features:

NCP Support	• Runs existing NCP code
	• Supported NCP functions:
	  • SNI
	  • INN
	  • BNN
	  • XRF
	  • NRF
	  • SSCP Takeover and Giveback
	  • Duplicate MACs
	  • Load and dump over CDLC connections
	  • Native LAN emulation allowing use of 3746 TIC3 addresses

NPSI Support	• Support of X.25 Over TCP/IP (XOT) interface
DLSw Support	• Support for Data Link Switching (DLSw) as described by RFCs 1795 and 2166
Installation, Configuration, and Administrative Options	• Installation via CCL InstallShield • Can be automatically started during Linux boot • NCP load module is Linux file • VTAM operator commands and CCL MOSS console operation both supported • Samples to automate CCL start and stop sequences
Problem Determination and Systems Management	• Diagnostic traces of data flows to/from NCP, CCL components, VTAM, network • Support of NCP dumping and restarting functions with faster availability • CCL Engine dumps available • Continue use of network management products such as Tivoli NetView and NTuneMON

Requirements:	Features:
Hardware	• CCL runs on the following IBM servers, or equivalent: • IBM System z9, z10 • IBM eServer zSeries® z800, z890, z900, and z990 • IBM S/390® Parallel Enterprise Servers - Generation 5 (G5) and Generation 6 (G6) models Additional hardware requirements for the different connectivity options (Note: VTAM needs to connect to Communication Controller for Linux NCP over a LAN or CDLC connection): • CDLC requires Open Systems Adapter for NCP (OSN) support - System z9, z10 server with associated system software: - z/OS® V1.4, or higher, with APARs OA11238 and OA07875 (for OSN CHPID support in IOS and HCD) - If running CCL on a Linux guest under VM, z/VM V5.1, or higher, with APAR VM63722 for OSN CHPID support - OSA-Express2 features with OSN support: - 3364 OSA-Express2 LX Gigabit Ethernet - 3365 OSA-Express2 SX Gigabit Ethernet - 3366 OSA-Express2 1000Base-T Ethernet • LAN - LAN over Layer 2 - IBM System z 990 or 890 or later server with associated system software. If running CCL on a Linux guest under VM, you need z/VM V5.1 with Layer 2 support in PTF for APAR VM63538. Refer to the 2084/2086 PSP buckets for any additional required service

<table>
<tr><th>Requirements:</th><th>Features:</th></tr>
<tr><td>Hardware</td><td>
- OSA Express features with layer 2 routing support:
- 1364 OSA-Express LX Gigabit Ethernet
- 1365 OSA-Express SX Gigabit Ethernet
- 1366 OSA-Express 1000Base-T Ethernet
- 2364 OSA-Express LX Gigabit Ethernet
- 2365 OSA-Express SX Gigabit Ethernet
- 2366 OSA-Express Fast Ethernet
- 3364 OSA-Express2 LX Gigabit Ethernet
- 3365 OSA-Express2 SX Gigabit Ethernet
- 3366 OSA-Express2 1000Base-T Ethernet
- 3368 OSA-Express2 10 Gigabit Ethernet
- LAN over LCS Ethernet or token ring
- OSA copper LAN port(s) in LCS mode (OSA-2 or OSA-Express (at least MCL level 3.50 for z900 and z800, and 5.50 for z990 and z890))
<table>
<tr><th>Required Processor</th><th>Feature code</th><th>Ethernet</th><th>Feature code</th><th>Token-Ring card</th></tr>
<tr><td>G5/G6</td><td>2340</td><td>OSA-Express Fast Ethernet</td><td>5201</td><td>OSA2 ENTR</td></tr>
<tr><td>z800
z900</td><td>2366</td><td>OSA-Express Fast Ethernet</td><td>2367</td><td>OSA-Express</td></tr>
<tr><td>z890
z990</td><td>1366</td><td>OSA-Express (upgraded) 1000BaseT</td><td>2367</td><td>OSA-Express</td></tr>
</table>
</td></tr>
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Requirements:	Features:
Hardware	- OSA/SF to configure the OSA LAN connectivity, if applicable - Note: In addition to the above requirements for CCL, LAN connectivity between VTAM and a CCL NCP requires at least one LSA (copper) OSA port for the VTAM end of the LAN connection. • DLSw - One or more DLSw capable routers, and a TCP/IP connection to each • X.25 - One or more XOT capable router(s), and a TCP/IP connection to each • IPTG - TCP/IP connection to each partner Communication Controller for Linux

Software	• NCP V7R5 or later, and an environment (z/VM, VSE, z/OS) to generate NCP load modules
	• ACF/SSP V4R5, and later (5655-041, 5654-009, 5686-064)
	• If X.25 support is used:
	  - NPSI V3R8, or later (the release that corresponds to your NCP release)
	  - IBM's X.25 over TCP/IP for Communication Controller for Linux (IBM XOT)
	• One of the following Linux on System z distributions with recent maintenance:
	  - SUSE Linux Enterprise Server 9 (31-bit and 64-bit) for IBM System z and IBM S/390 (SLES9) + Service Pack 2 (SP2)
	  - SUSE Linux Enterprise Server 10 (31-bit and 64-bit) for IBM System z and IBM S/390 (SLES10)
	  - Red Hat Enterprise Linux V4 (31-bit and 64-bit) (RHEL4) + Update 1 (U1)
	  - Red Hat Enterprise Linux V5 (31-bit and 64-bit) (RHEL5)
	• CCL connections via CDLC and Layer 2 require kernel 2.6-based Linux distributions:
	  - SUSE Linux Enterprise Server 9 (31-bit and 64-bit) for IBM System z and IBM S/390 (SLES9) + Service Pack 3 (SP3)
	  - Red Hat Enterprise Linux V4 (31-bit and 64-bit) (RHEL4) + Update 3 (U3)
	
	For the latest information about Linux requirements, visit the Communication Controller for Linux Web site: www.**ibm.com**/software/network/ccl
	
	In order to support Communication Controller for Linux on System z, when not using CDLC, VTAM must support activation of CCL NCPs that are LAN attached to the activating VTAM through an XCA major node. The following VTAM APARs provide this function:
	
	• z/VM/VTAM V4R2 - APAR VM63677
	• VSE/VTAM V4R2 - APAR DY46311
	• OS/390® Communications Server V2R10 - APAR OA10425
	• z/OS Communications Server V1R2, V1R4, V1R5, and V1R6 - APAR OA10425

Memory and Storage	• 65 MB DASD for Communication Controller for Linux on System z and Java code • 80 MB to 100 MB DASD per Communication Controller for Linux on System z instance for traces, dumps, logs, and NCP load modules • 20 MB RAM per Communication Controller for Linux on System z instance Note: Additional DASD and memory is required for the base Linux operating system, and for other Linux packages (RPMs) that must be present on the system for CCL to function properly. For example, on some Linux distributions, the Linux Kernel Source package is required for installation of the Network Device Handler (NDH), and that package can take 300 MB of DASD. Refer to the CCL README for the complete list of required packages.