



Enterprise Networking Solutions

Chicago Area VM Enthusiasts - IBM Communications Server for Linux on zSeries

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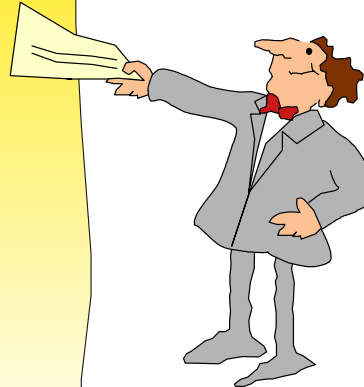
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Agenda



1. **Introduce the Communications Server family**
2. **Enterprise networking challenges and ways to address them using Communications Server (CS) Linux**
3. **CS Linux on zSeries introduction and base connectivity**
4. **CS Linux on zSeries solution overview**
 - ▶ Consolidated TN3270 servers
 - ▶ Application gateway
 - ▶ Enterprise Extender gateway
 - ▶ Remote SNA API server
5. **Summary and reference information**



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Enterprise Networking Solutions: Communications Server Product Family



- The communications server family of products managed from a development perspective by Enterprise Networking Solutions in Research Triangle Park, North Carolina are:

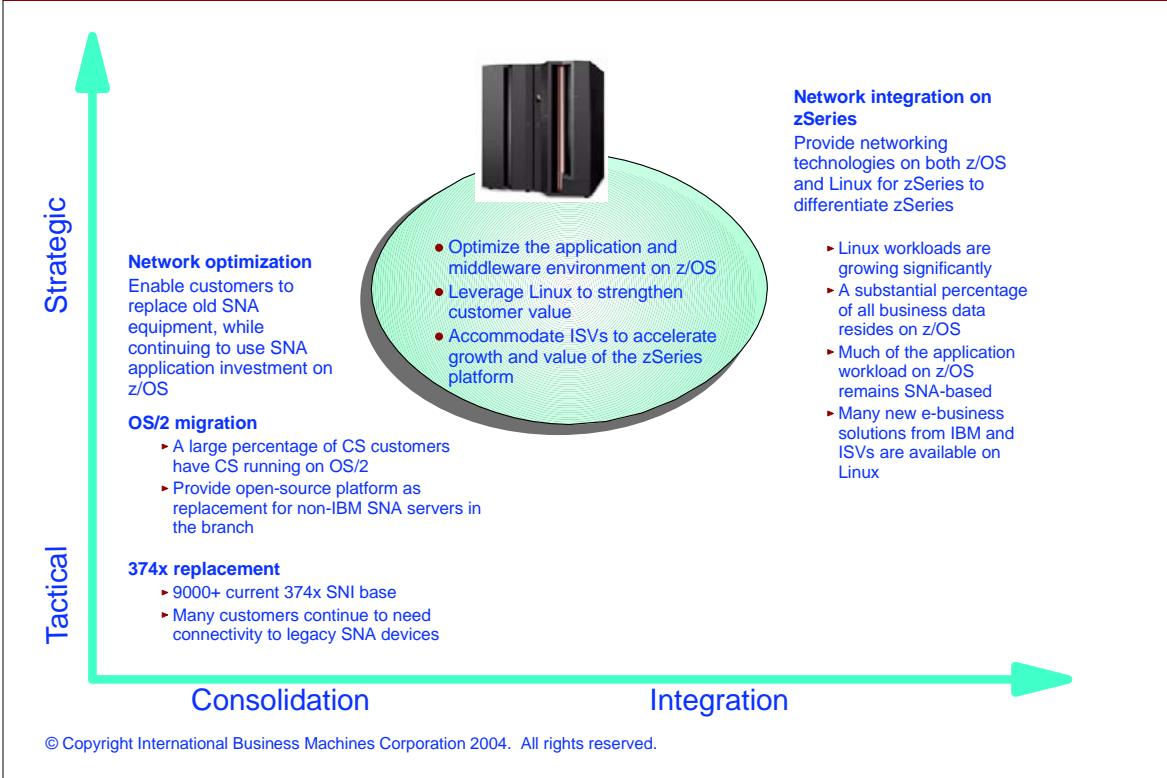
- ▶ **Communications Server for z/OS - SNA and TCP/IP**
- ▶ **Communications Server for AIX - SNA**
- ▶ **Communications Server for Windows - SNA**
- ▶ **Communications Server for Linux (on Intel) - SNA**
- ▶ **Communications Server for Linux on zSeries - SNA**



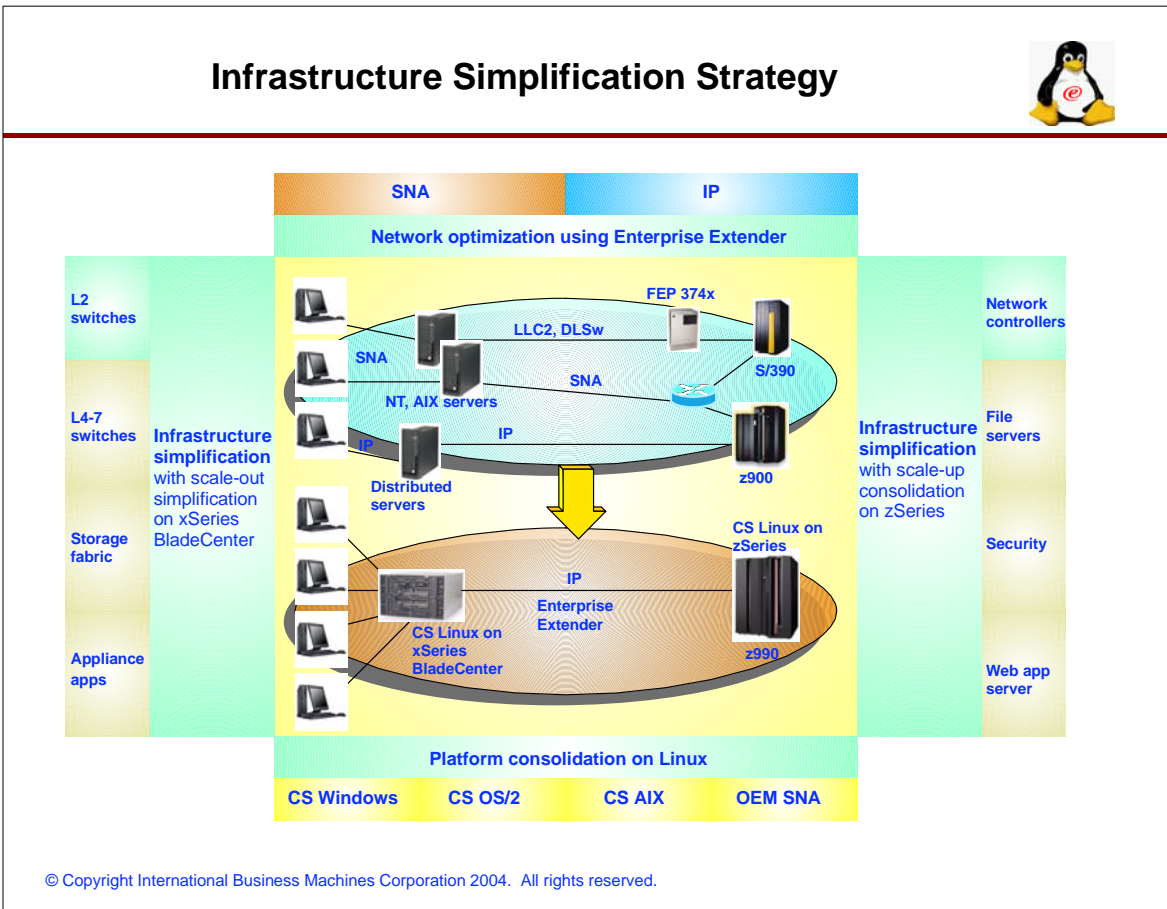
- Both the Communications Server for Linux (on Intel) and the Communications Server for Linux on zSeries have been available as PRPQs for a while, but shipped as program products May 2004.
 - ▶ Communications Server for Linux: 5724-I33
 - ▶ Communications Server for Linux on zSeries: 5724-I34
- Communications Server for Linux on zSeries share the same code base as the Communications Server on AIX, Windows, and Linux on Intel
 - ▶ Solid base to start from

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Enterprise Networking Solutions Communications Server Strategy



Infrastructure Simplification Strategy



Enterprise Networking Challenges and ways to address them using CS Linux

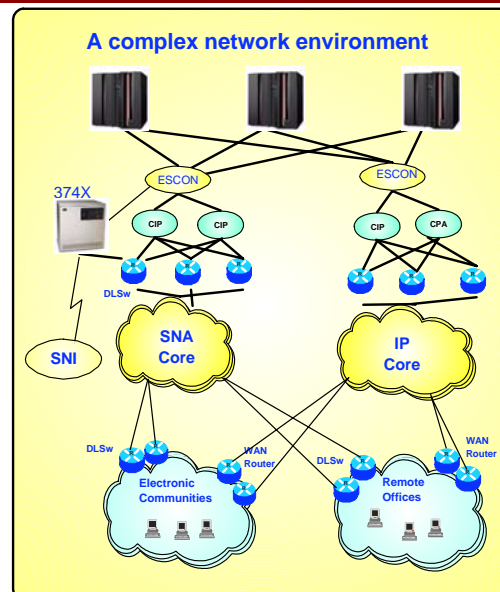
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Today's Enterprise Network: A mixed IP and SNA Network Infrastructure



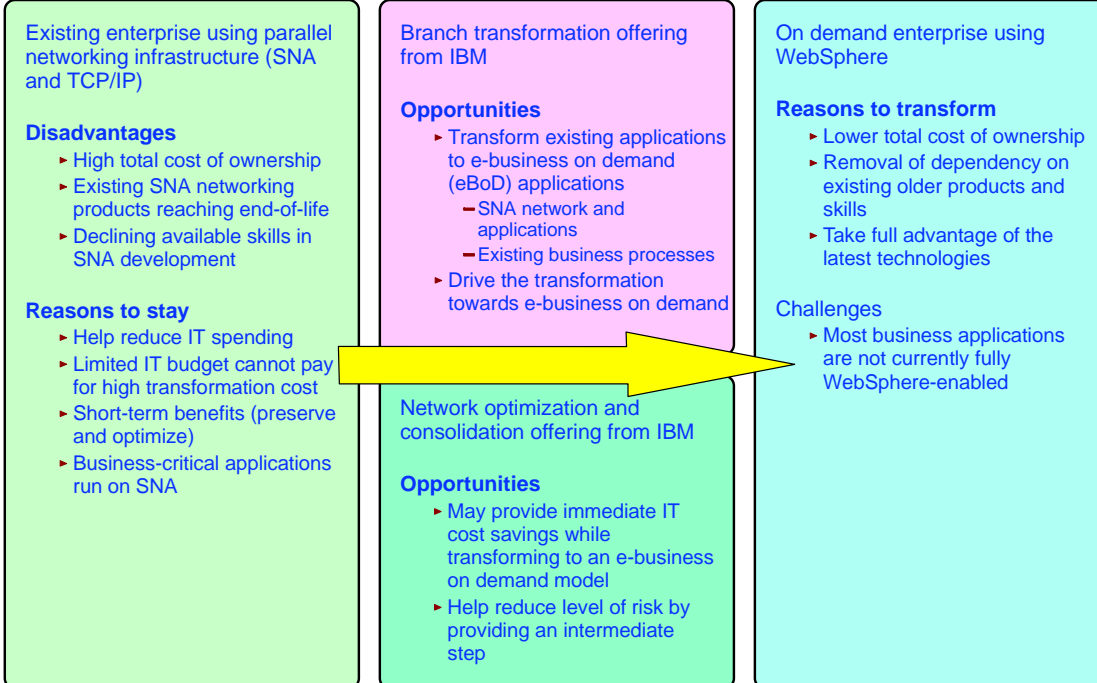
- In many cases, branch applications are a mix of SNA and IP applications residing on workstations, branch processors, regional processors, and the data center.
- SNA and IP traffic flows are often carried over separate networks using a complex set of infrastructure components and technologies, which all need to be managed and maintained.
- Some SNA network infrastructure components and technologies are nearing end-of-life:
 - ▶ 3745 including SNI to business partners
 - ▶ Cisco CIP ESCON channel attachments
 - ▶ Token-ring hardware components
 - ▶ AnyNet
- Maintaining parallel network infrastructures is expensive.
- Transforming all SNA applications to native IP applications is a long-term strategy and not cost efficient in some cases.
- **The challenge is to preserve the investment in the SNA applications, while at the same time remove the dependency on SNA network infrastructure technologies and disciplines - consolidating all SNA protocol stacks to the data center and all network flows to IP.**



- It is about much more than 3270 terminal access
- ▶ SNA program to program using LU0 protocols
 - ▶ SNA program to program using LU6.2 protocols
 - ▶ SNI communication to business partners
 - ▶ APPN network to network communication

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Branch Transformation - Network Optimization and Consolidation



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Branch Network Access Simplification using CS Linux for zSeries

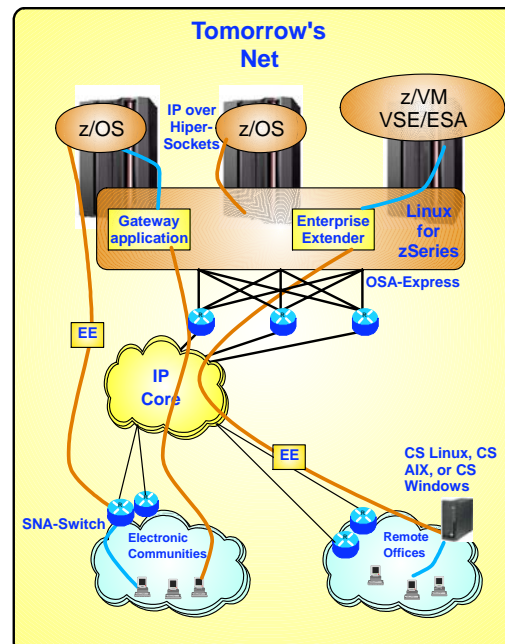


➤ Consolidation of branch SNA traffic

- ▶ Remove dependency on physical SNA wide area network to reduce network TCO.
- ▶ Consolidate/migrate gateway server applications onto Linux for zSeries using downstream IP communication, but retain upstream SNA communication with zSeries SNA applications
 - Business applications
 - Standard applications, such as distributed TN3270 servers
- ▶ Use Enterprise Extender and other SNA functions to transport native SNA over an IP network.
 - Use Linux for zSeries as an intranet same-NETID Enterprise Extender enabler for zSeries operating systems that do not natively support Enterprise Extender
 - VSE/VTAM
 - VM/VTAM

➤ Consolidate at a regional level using Linux for zSeries on a z890 or Linux for Intel

- ▶ Upstream can be Enterprise Extender

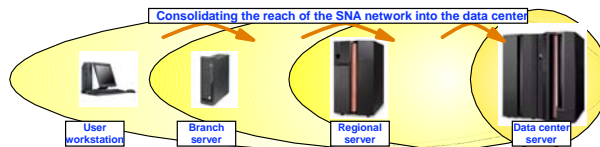


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SNA - IP Migration Strategy Communications Server is about having a choice



- Communications Server on Linux for zSeries is very much about having an extended choice when deciding how to architect and where to implement the points of intersection between IP and SNA network flows:
 - ▶ A choice of hardware platforms that can be vendor independent
 - Linux runs on just about any hardware platform
 - The Communications Server product runs on multiple hardware platforms (Intel, pSeries, zSeries)
 - ▶ A choice of operating systems that can be vendor independent
 - Linux is open source and is not proprietary
 - No ties to any specific operating system vendor, and that vendor's add-on solutions
 - The Communications Server product runs on multiple operating systems (AIX, Windows, Linux)
 - ▶ A choice of placement that is not permanent, but flexible
 - Intersection points can initially be deployed in branch locations and, as use of SNA diminishes, be consolidated into regional centers and ultimately into the data center on zSeries



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CS Linux on zSeries Introduction and Base Connectivity

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IBM Communications Server for Linux on zSeries

Program Product number 5724-I34

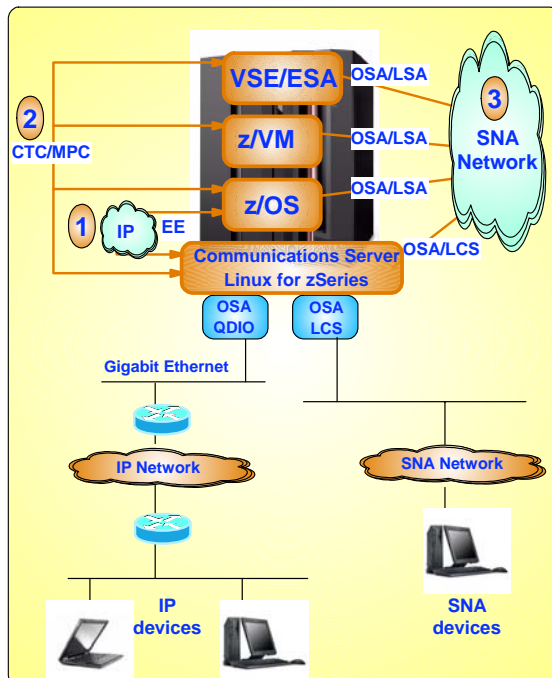


- **Advanced Peer-to-Peer Networking (APPN) support**
 - ▶ APPN End Node (EN) or APPN Network Node (NN) support
 - ▶ Uses Dependent LU Requester (DLUR) for dependent LU access over an APPN network
- **High Performance Routing (HPR) including Enterprise Extender (EE, a.k.a. HPR over IP)**
- **Branch Extender (BX) support**
 - ▶ Allows for APPN network topology simplification
- **SNA API support**
 - ▶ CPI-C and APPC APIs for both dependent and independent LU6.2 - including extensions for both Java and C
 - ▶ Java Host Access APIs
 - ▶ LUA APIs (Request Unit Interface (RUI) and Session Level Interface (SLI)) for dependent LU functions (LU types 0, 1, 2, and 3)
 - ▶ Remote SNA client/server APIs
 - ▶ APPC application suite (AFTP, APING, AREXEC, ATELL, ACOPI, and ANAME)
- **TN3270E server**
 - ▶ Including SSL with client authentication and Express Logon support
 - ▶ Telnet redirector - allows Telnet port mapping and/or Telnet passthru from SSL to non-SSL
- **Administration**
 - ▶ Motif-based administration
 - ▶ Network Operator Facility (NOF) APIs for programmed administration
 - ▶ Internationalization
 - ▶ 31-bit and 64-bit support
- **Network attachments for SNA**
 - ▶ Enterprise Extender (HPR over IP)
 - ▶ (V)CTC using MPC channel protocols (Linux as a PUT2.1)
 - ▶ Native SNA over shared LAN (Ethernet or Token-Ring)

5799-RXL PRPQ available since 12/2003 with limited functions as compared to the program product.

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Linux for zSeries - Overview over Options for SNA Attachment to z/OS, VM, and VSE



- SNA between Linux for zSeries and other zSeries operating systems:
- 1 - **Enterprise Extender (HPR over IP)**
 - For upstream to z/OS only
 - Dependent LUs: Linux DLUR - z/OS DLUS
 - Can use any IP-based connectivity between Linux and z/OS - including HiperSockets
 - 2 - **APPN Host to Host (AHHC/ANNC over MPC)**
 - Connectivity: CTC MPC channel
 - For upstream to z/OS, z/VM, and VSE/ESA
 - Both endpoints must be defined as PU Type 2.1 nodes - may mean APPN-enabling z/OS, z/VM, and VSE/ESA, if not already done (z/VM and VSE/ESA as APPN NNs)
 - Dependent LUs: Linux DLUR - z/OS, z/VM, and VSE/ESA DLUS
 - 3 - **SNA LLC2 over shared LAN (APPN, LEN, or sub-area)**
 - Connectivity: Linux OSA LCS via shared LAN to OSA LSA
 - For upstream to z/OS, z/VM, and VSE/ESA
 - Linux attachment via LCS device driver and enhanced OSA Express microcode (zSeries only)
 - z/OS, z/VM, and VSE/ESA attachment via standard OSA LSA device driver
 - PUs may be PU Type 2.0 or 2.1

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Installation prerequisites overview



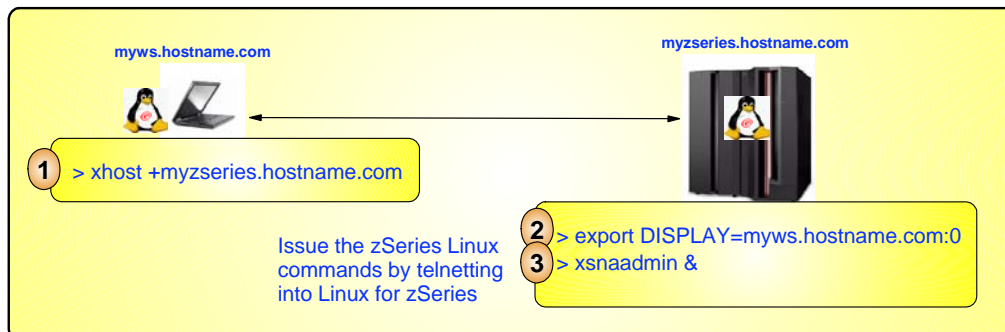
- Linux distributions that CS Linux on zSeries has been tested with:
 - ▶ RedHat Enterprise Linux 3 for S/390 (uname -m -> s390)
 - ▶ RedHat Enterprise Linux 3 for zSeries (uname -m -> s390x)
 - ▶ SuSE Linux Enterprise Server 8 for IBM Mainframes (SLES8) (uname -m -> s390 or s390x)
- For each supported Linux distribution, you may need to install one or more optional RPMs (see the README file for details - located in /opt/ibm/sna after an install - or on the CDROM before install)
- CS Linux uses a component called "Linux Streams" (LiS). LiS must be at a specific level and must be retrieved separately (for legal reasons):
 - ▶ Obtain LiS from the following URL:
 - ftp://ftp.gcom.com/pub/linux/src/LiS/LiS-2.16.19.tgz
 - ▶ The patch file is supplied with CS Linux for zSeries
 - ▶ Follow the detailed instructions in the release notes file for preparing and installing LiS
- OpenMOTIF is required by the GUI administration functions
 - ▶ You must install the optional XF86 or XFree86 packages and the openmotif-2.2.2 package
- Java JDK is needed for the Java CPI-C APIs. The latest Java 1.4.1 SDK is recommended.
 - ▶ For RedHat Enterprise Linux 3, you must install the optional IBMJava2-SDK-1.4.1-9.s390.rpm RPM
 - ▶ For the other distributions, you can download the SDK from <http://www.ibm.com/developerworks/java/jdk>
- If you plan to use SSL (with the TN3270 server), you will need to install some optional RPMs
 - ▶ compat-libstdc++-?? (level depends on distribution)
- When all prerequisites are resolved, you can then install CS Linux for zSeries

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Customization

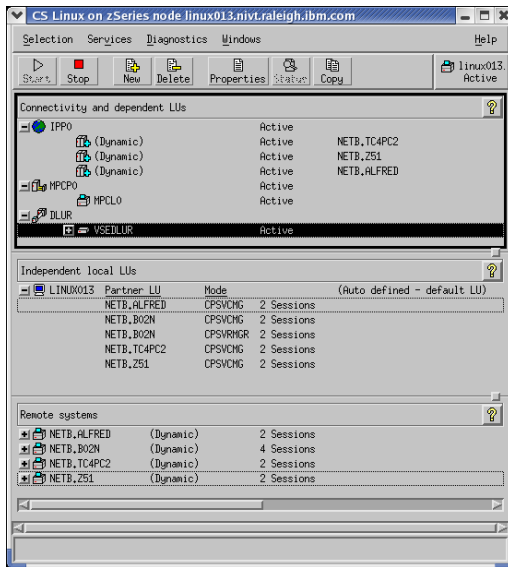


- Initially, you should use the GUI configuration tool - later you may exploit some of the many line mode commands to display and/or modify the configuration.
- The GUI tool is an X-Windows application and is started via the **xsnaadmin** command.
- You must have an X server somewhere in order to use xsnaadmin
 - ▶ We recommend that you use a Linux, AIX, or UNIX X-server
 - ▶ X-server software does exist for Windows, but we have seen problems with it so we can't recommend it at this point in time



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GUI SNA Administration Tool



➤ When xsnaadmin begins, a window will pop up on your workstation (where your X-server is running) and you are presented with an initial overview panel like the one you see on this page.

➤ The very first time you start xsnaadmin, the window will be quite empty.

➤ Later it will include information about the current configuration and status of individual components in that configuration.

➤ The panel is subdivided into three sub-panels:

- a. Connectivity and dependent LUs
- b. Independent local LUs
- c. Remote systems

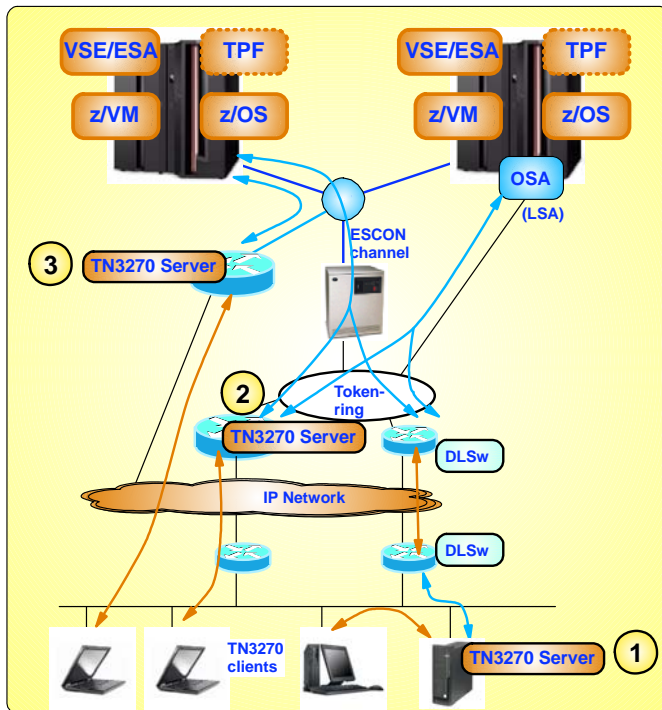
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CS Linux on zSeries Solution Overview

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Typical distributed TN3270 Server scenarios in an SNA sub-area network environment today



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> TN3270 servers are seen as PU type 2 nodes with dependent LU type 1, 2, or 3 devices.

- ▶ Defined in VTAM via a switched major node or an XCA major node

> Connectivity to VTAM is

- ▶ via an ESCON channel

- 37xx NCP (element addresses out of NCP's sub-area)
- Channel-attached router such as Cisco 7500 CIP (element addresses out of VTAM's low address pool)

- ▶ via an OSA adapter operating in LSA mode

- Token-ring or Ethernet (element addresses out of VTAM's low address pool)

1 TN3270 servers in branches

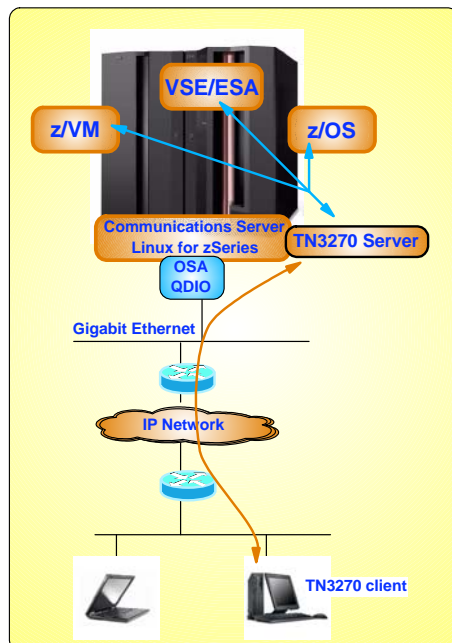
- ▶ Typically transports SNA LLCs over wide-area IP network via Data Link Switching
- ▶ SNA boundary functions done by NCP (37xx) or VTAM (OSA-LSA)

2 TN3270 servers in regional or central data center

- ▶ Token-ring attached to NCP (37xx) or VTAM (OSA-LSA)

3 TN3270 servers in channel-attached gateways

Consolidating TN3270 Servers into Linux for zSeries



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> Minimal or no changes to VTAM definitions of TN3270 server PUs and LUs

- ▶ Continue to look like a PU type 2.1 (or 2.0) with dependent LUs of type 1, 2, and 3

- ▶ USS table handling continues to be performed by the VTAM SSCP

- ▶ Default application logon continues to be handled via existing VTAM definitions

> Configuration concepts for TN3270 servers remains similar to how they were for the distributed TN3270 servers

> Connectivity to zSeries via Gigabit Ethernet and QDIO

> SNA connectivity between Linux for zSeries and z/OS, z/VM, or VSE/ESA via HiperSockets (EE to z/OS only), MPC Channel-to-Channel, or a shared LAN

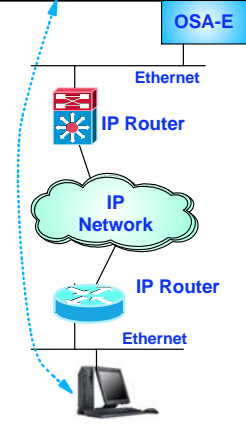
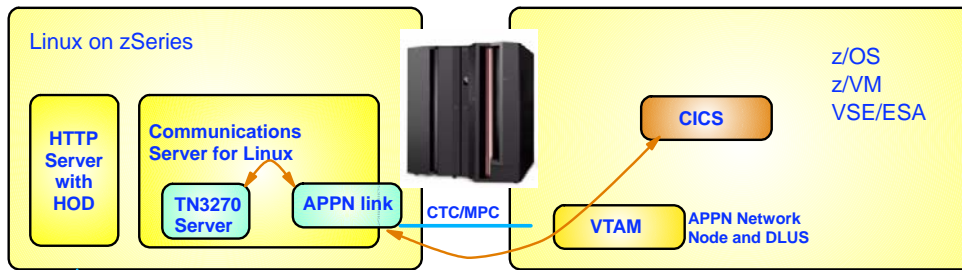
> SNA collapsed into the data center

> In most configurations, the LU element addresses will come out of VTAM's high-order address pool

> No dependency on 37xx, CIP, or Token-ring hardware

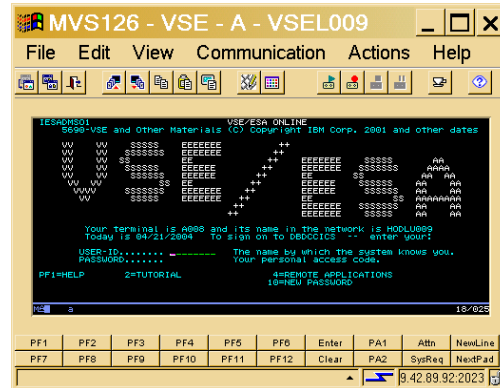
> TN3270 server MIPS executed on zSeries IFL processors

Combining CS Linux on zSeries with Host On Demand



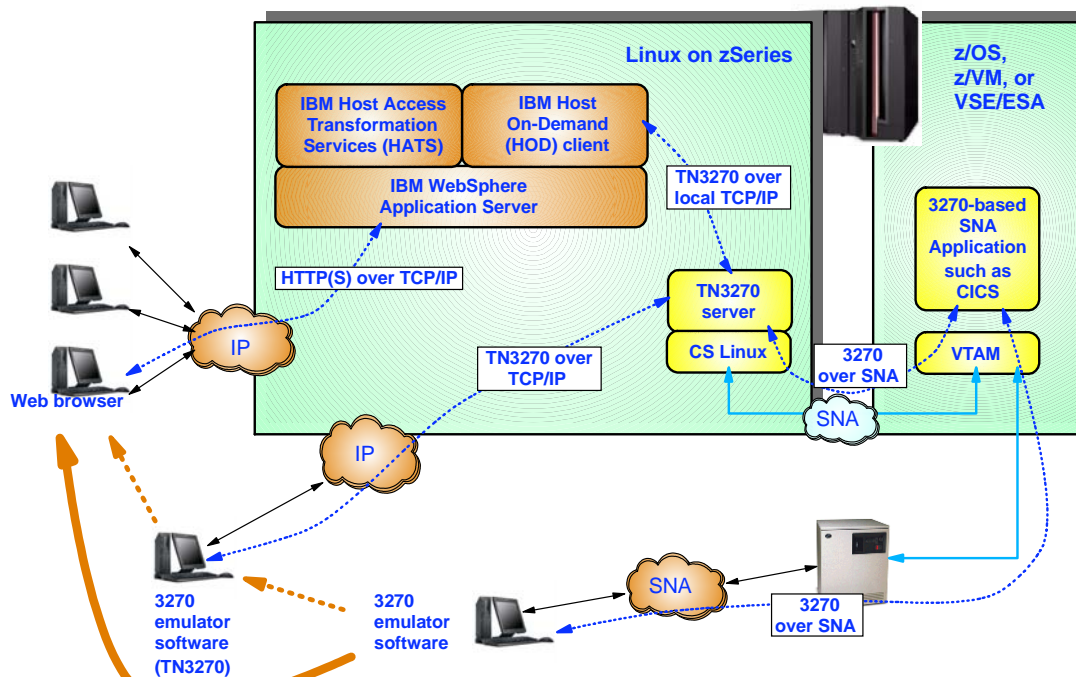
To avoid pre-installing 3270 emulator software on the workstation, an HTTP server serving a HOD client can be deployed on Linux and combined with the TN3270 server of CS Linux

- ▶ Web browser used to access a HOD client
- ▶ HOD client connects over TN3270/IP to TN3270 server in Linux
- ▶ TN3270 server in Linux uses DLUR to connect to DLUS in VTAM in z/OS, z/VM, or VSE/ESA



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3270: one step further - CS for Linux on zSeries and IBM's Host Access Transformation Services



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HATS transformation solution with Linux on zSeries



When migrating 3270-based workstation solutions off an SNA network infrastructure, one can today bypass the intermediate step with TN3270 emulation software on each workstation:

- ▶ Use a universal client on the user workstation (a Web browser)
 - No additional workstation software deployment or management
 - Workstation environments that support a Web browser are supported by this solution
 - Windows, Linux, Mac OS, etc.
- ▶ Use HTTP(S) protocols to communicate with a central WebSphere Application Server environment that hosts the IBM Host Access Transformation Server
 - HATS uses HTTP(S) downstream to users
 - Firewall traversal simplified
 - HATS uses Host On-Demand (TN3270 client) upstream communicating with existing 3270-based SNA applications on z/OS, z/VM, or VSE/ESA
 - No changes to existing SNA applications
- ▶ HATS transforms the outbound 3270 data stream to HTML, and the inbound HTML to a 3270 data stream
 - Simple out-of-the-box transformation with no or minimal customization
 - Opportunity to modernize user dialog without redesigning and redeveloping host applications
- ▶ The HATS transformation solution can be deployed on Linux on zSeries in combination with Communications Server for Linux on zSeries:
 - IP network infrastructure all the way into zSeries (high-speed IP network connectivity using zSeries OSA-Express technology)
 - No or minimal configuration changes to z/OS, z/VM, or VSE/ESA SNA definitions
 - zSeries availability, scalability, capacity, and performance characteristics

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Value of deploying HATS solution in combination with CS for Linux on zSeries



Network infrastructure simplification

- ▶ IP network access from end user to mainframe
- ▶ SNA network collapsed into zSeries
- ▶ Minimal or no change to the mainframe operating system's SNA configuration (z/OS, z/VM, or VSE/ESA)
- ▶ No change to the mainframe SNA applications
- ▶ No SNA 3270 or TN3270 emulator software on the desktop - a standard Web browser is all that is needed
- ▶ WebSphere Application Server/HATS Linux skills are more readily available than WebSphere Application Server/HATS skills on z/OS
- ▶ Solution has the simplification characteristics of a one-tier solution from a networking hardware point of view
- ▶ WebSphere Application Server and HATS use one and the same integrated development environment - one uniform set of development skills needed for both 3270 access transformation and development of e-business applications

Scalability

- ▶ Linux for zSeries can support a high number of users - vertical scaling through zSeries 64-bit storage support and powerful parallel CPU engines
- ▶ Multiple Linux on zSeries environments can be deployed using z/VM virtualization technology for nearly unlimited horizontal scaling on a single physical computer

Availability

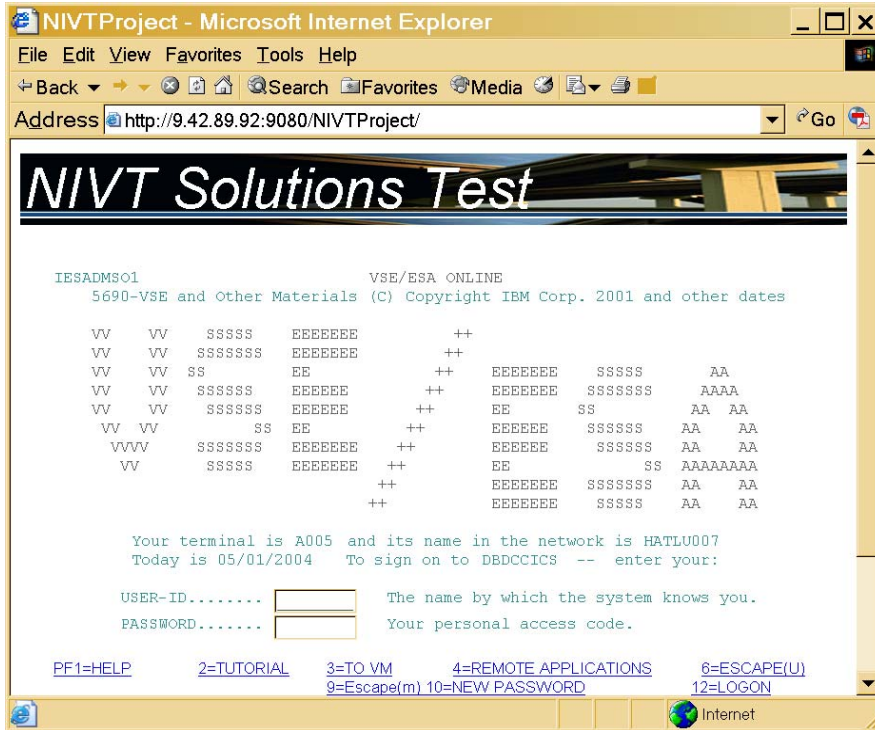
- ▶ zSeries hardware availability characteristics are renowned - based on such technologies as redundant components and non-disruptive component replacement capabilities
- ▶ Multiple parallel virtual environments can be deployed and front-ended by intelligent load balancing solutions for both increased performance and high availability

Security

- ▶ Security-rich internal network connectivity between Linux and the mainframe operating systems offer security-rich connectivity without additional encryption overhead
- ▶ Encryption/decryption of HTTPS connections done with zSeries IFL engines and hardware crypto support by WebSphere Application Server on Linux on zSeries

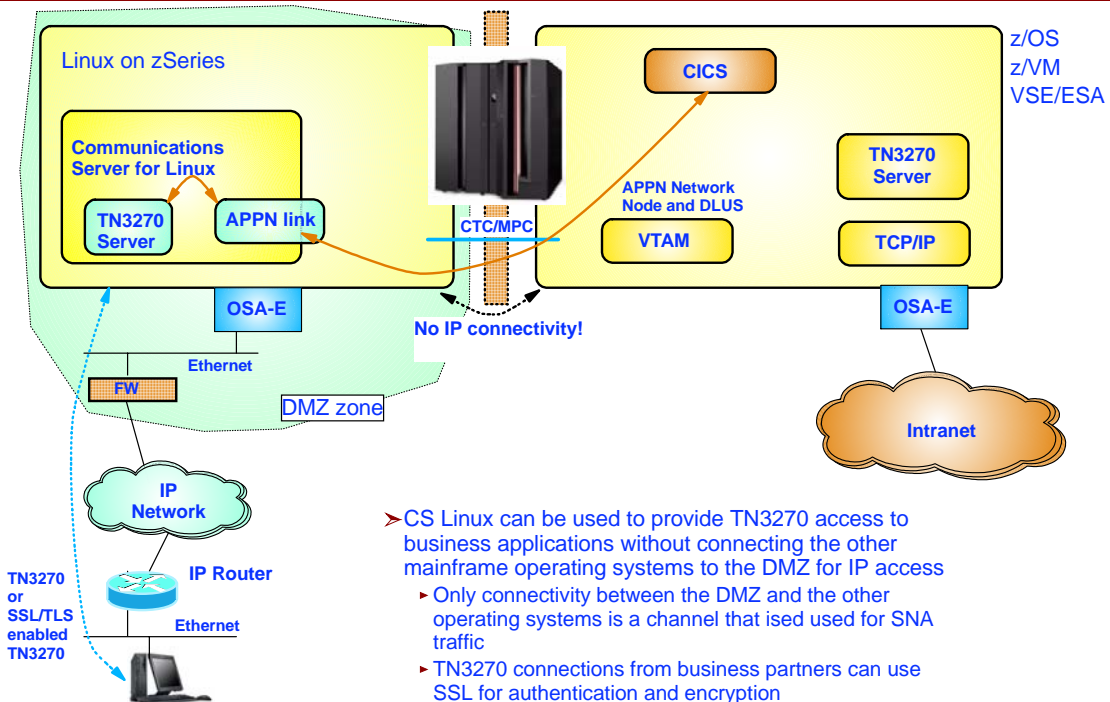
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Accessing VSE/ESA using CS Linux on zSeries and WebSphere Host Access Transformation Services



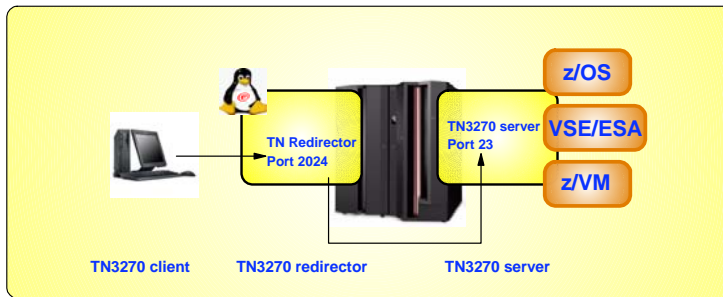
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Secure business partner TN3270 access via CS Linux



Business partner TN3270 access
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TN3270 Redirector on Linux for zSeries



The TN3270 redirector acts as a TN3270 proxy server

- Relays the connection and the TN3270 protocol between the real client and the real TN3270 server

The CS Linux TN3270 redirector support allows for:

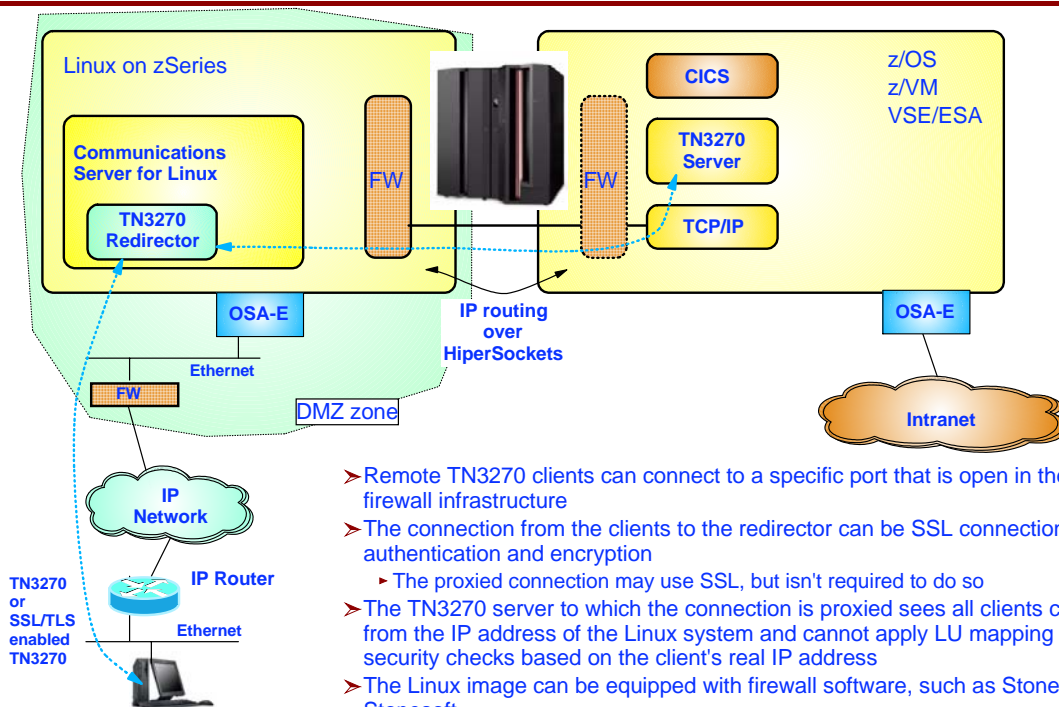
- Changing port number
 - Example: coming through firewalls with filtered port, then redirecting to real TN3270 server port
- Allowing for SSL termination outside the real TN3270 server
 - SSL connection from client to the CS Linux TN3270 redirector
 - Non-SSL connection from the CS Linux TN3270 redirector to real TN3270 server on z/OS, z/VM, or VSE/ESA

From a z/OS perspective, all clients come from the TN redirector host (all from same source IP address).

- LU name assignment in TN3270 server cannot be based on client source IP address or host name

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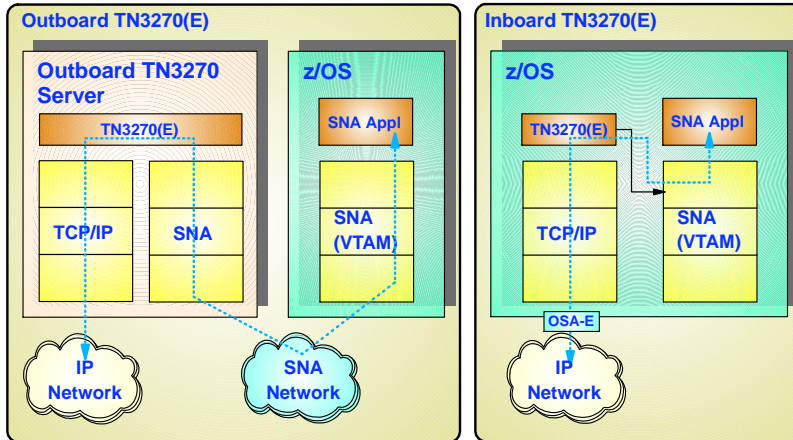
Secure business partner TN3270 access via the CS Linux TN3270 redirector function



- Remote TN3270 clients can connect to a specific port that is open in the firewall infrastructure
- The connection from the clients to the redirector can be SSL connections for authentication and encryption
 - The proxied connection may use SSL, but isn't required to do so
- The TN3270 server to which the connection is proxied sees all clients coming from the IP address of the Linux system and cannot apply LU mapping or security checks based on the client's real IP address
- The Linux image can be equipped with firewall software, such as Stonegate's Stonesoft

Business partner TN3270 access
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Does it really matter where I place my TN3270 server?



Application Workload Modeler (5655-J62) is an IBM product that can be used to perform in-house detailed benchmarks of both IP and SNA-based solutions. AWM provides an echo SNA application (awmecho) that can be used as the SNA application when doing TN3270 benchmarks.

➤ Application Workload Modeler can be used to simulate TN3270(E) client activity

- ▶ Capable of simulating a large number of TN3270(E) clients/activity
 - Used internally to benchmark 60,000 client sessions to a single z/OS TN3270 server
- ▶ Can be used to benchmark outboard vs. inboard TN3270(E) server solution
 - Determine cost/performance/scalability characteristics of each solution - incl. use of SSL/TLS
- ▶ Aids in decision making process for TN3270(E) server placement
 - Functions, availability characteristics, management capabilities

- ✓ Performance
- ✓ Scalability
- ✓ Functions
- ✓ Availability
- ✓ Manageability
- ✓ Cost
- ✓ Security

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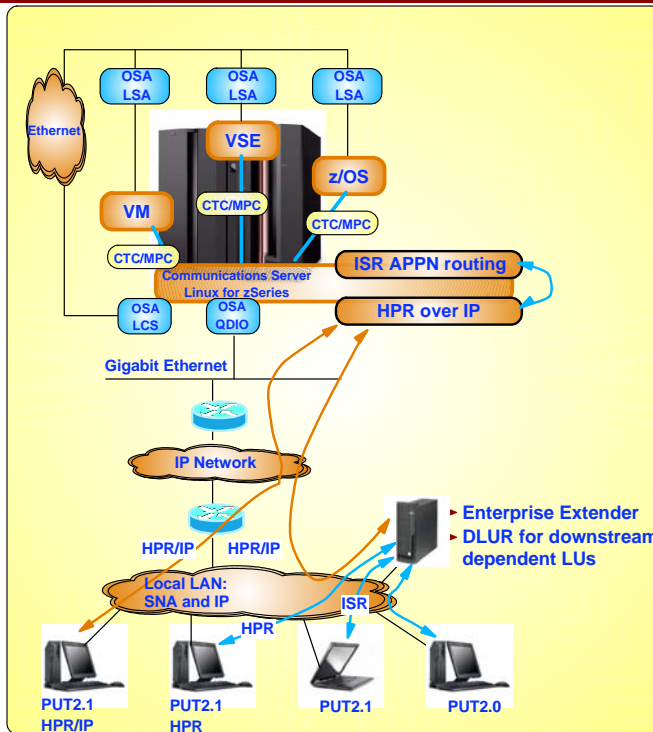
TN3270 Server on CS Linux for zSeries or z/OS



Area of interest	TN3270 server in CS Linux for zSeries	TN3270 server in z/OS
Secure TN3270 support	Yes (SSL only) - including client authentication (signature verification)	Yes (SSL and TLS) - including client authentication (signature verification) with optional SAF authentication and port protection (SERVAUTH)
Express logon	Yes (TCP-SSL connection with a z/OS DCAS server)	Yes (direct SAF interaction)
zSeries hardware crypto exploitation	No	Yes
LU name assignment (LU name nailing)	Client IP address, client host name	Client IP address, client host name, MVS user ID, server IP address, server interface name
Real or placeholder LU name assigned	Placeholder LU name (the locally defined name)	The real LU name
Printer association support	Yes	Yes
Specific LU requests	Yes	Yes
USS table support	N/A (dependent LUs - done by the VTAM SSCP and controlled via VTAMLST definitions)	Yes - TN3270 server reuses VTAM USS table definitions (z/OS V1R6 adds support for SCS mode USS)
Selecting SNA application	N/A (dependent LUs - done by the VTAM SSCP and controlled via VTAMLST definitions)	Yes - LOGAPPL and QINIT support
Definitions	LU definitions on Linux and in VTAMLST (one PU per 255 LUs)	LU definitions in z/OS TN3270 server and VTAMLST (ACBs - cloning supported)
Capacity	Significant stress testing hasn't been completed	60,000 concurrent sessions tested - theoretical limit of 128,000 sessions
Load balancing	Traditional connection balancing	Traditional connection balancing. Sysplex Distributor value adds in terms of real-time LPAR capacity and server availability.

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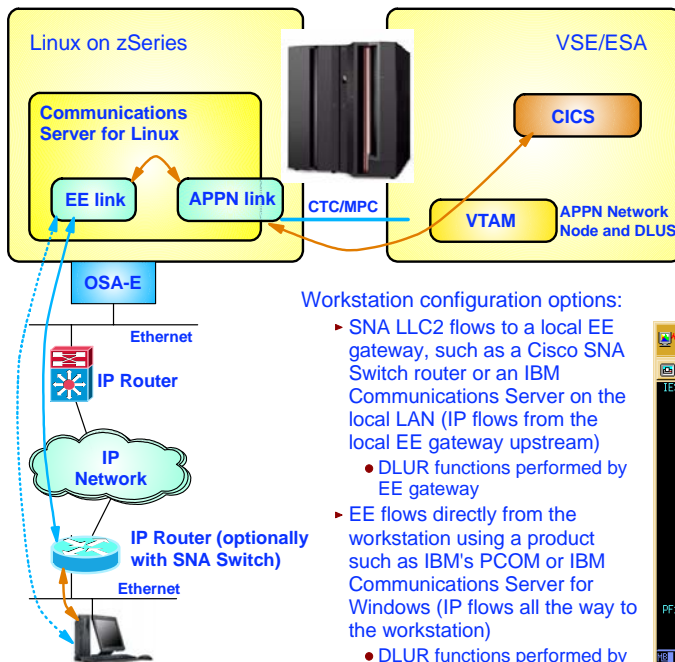
Linux for zSeries as same NETID Enterprise Extender gateway to z/OS, VM, and VSE



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- Linux for zSeries can act as an Enterprise Extender gateway to other zSeries operating systems that do not support, or are not configured for EE
 - SNA LLC traffic reduced to branch LAN and zSeries
 - ▶ No dependency on 37xx, CIP, or Token-ring hardware
 - ▶ Common WAN IP infrastructure
- Network connectivity to zSeries via Gigabit Ethernet and QDIO
- zSeries operating systems must be APPN enabled
 - ▶ ISR APPN routing over:
 - a CTC MPC link
 - OSA LCS via shared LAN to OSA LSA
 - ▶ HPR routing over IP (to z/OS only)
- All immediate downstream and upstream nodes must be within the same SNA NETID
 - ▶ CS Linux does not support APPN boundary functions or session services extensions

VSE/ESA or z/VM and Enterprise Extender gateway on Linux on zSeries



Workstation configuration options:

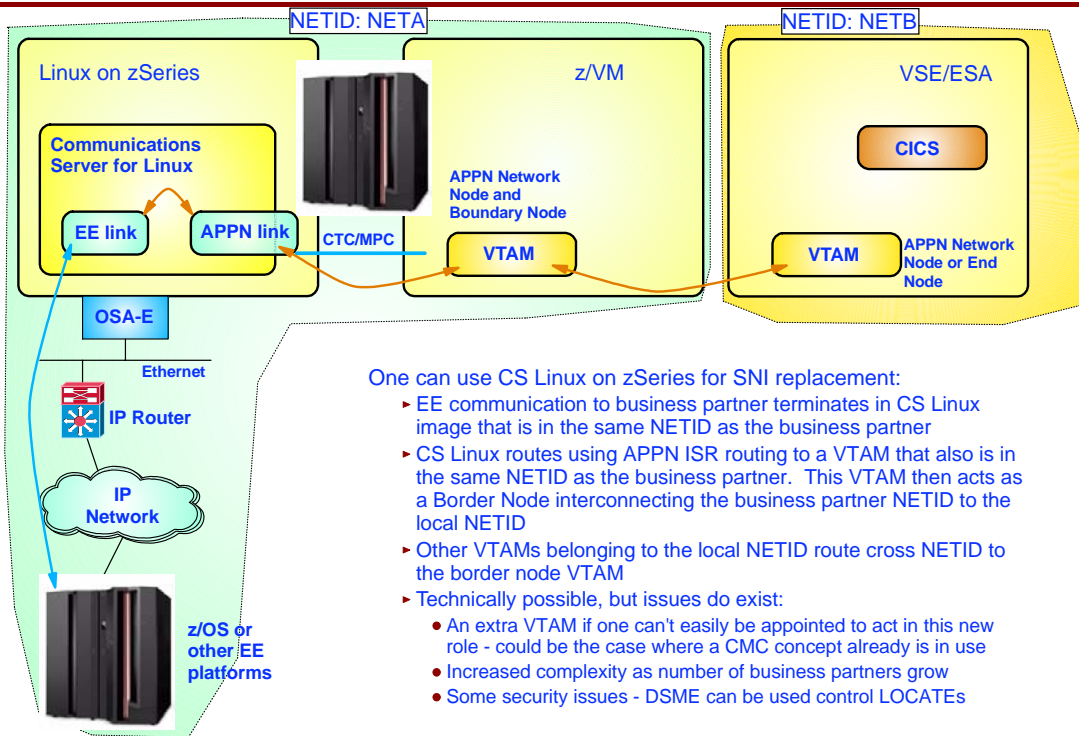
- ▶ SNA LLC2 flows to a local EE gateway, such as a Cisco SNA Switch router or an IBM Communications Server on the local LAN (IP flows from the local EE gateway upstream)
 - DLUR functions performed by EE gateway
- ▶ EE flows directly from the workstation using a product such as IBM's PCOM or IBM Communications Server for Windows (IP flows all the way to the workstation)
 - DLUR functions performed by local workstation

To use the CTC/MPC connectivity between Linux and VSE/ESA or z/VM, VSE/ESA or z/VM VTAM must be configured as an APPN Network Node



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Enterprise Extender gateway on Linux on zSeries as SNI replacement



One can use CS Linux on zSeries for SNI replacement:

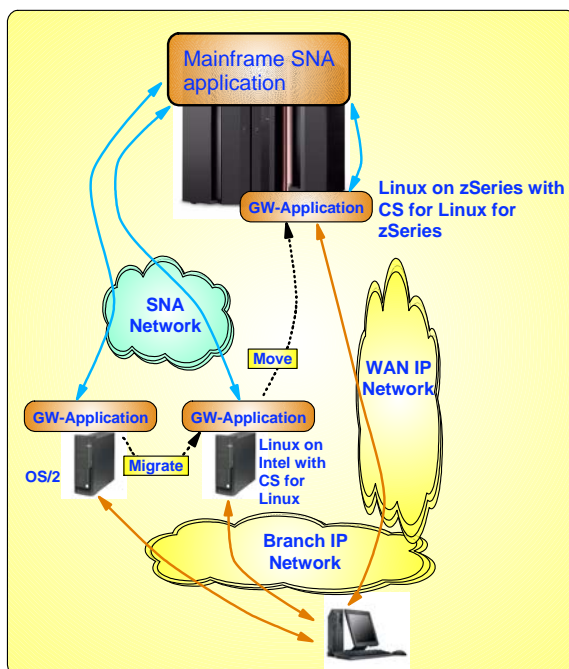
- ▶ EE communication to business partner terminates in CS Linux image that is in the same NETID as the business partner
- ▶ CS Linux routes using APPN ISR routing to a VTAM that also is in the same NETID as the business partner. This VTAM then acts as a Border Node interconnecting the business partner NETID to the local NETID
- ▶ Other VTAMs belonging to the local NETID route cross NETID to the border node VTAM
- ▶ Technically possible, but issues do exist:
 - An extra VTAM if one can't easily be appointed to act in this new role - could be the case where a CMC concept already is in use
 - Increased complexity as number of business partners grow
 - Some security issues - DSME can be used control LOCATES

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Customer-written SNA Application Gateway Programs on OS/2



➤ Customers migrating off OS/2 can take advantage of the CS Linux SNA API capabilities



Example:

A customer-specific application that runs on OS/2 and acts as a gateway between users in a branch and SNA applications on the mainframe:

- ▶ upstream: SNA LU0 or LU6.2
- ▶ downstream: TCP/IP

The first step is to rewrite the application to run on Linux instead of OS/2 - potentially deploying the gateway application initially on Linux for Intel in the branch. The SNA APIs provided by CS Linux are the same APIs as provided by CS OS/2.

- ▶ CS Linux provides multiple SNA programming interfaces, including:
 - CPI-C for LU6.2
 - APPC for LU6.2
 - LUA (for LU0, 1, 2, and 3)

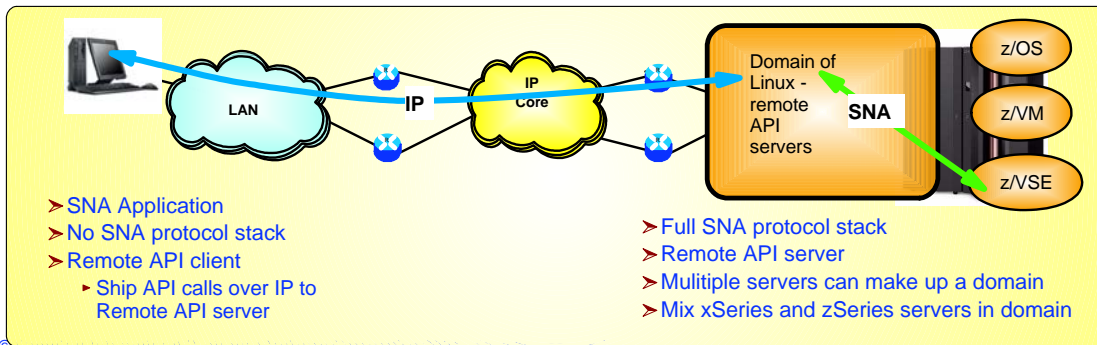
If initially deploying on Linux for Intel, a second step is to consolidate the gateway application into Linux on zSeries, collapsing the SNA network segment to be within the zSeries environment.

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Remote API Client/Server Technology



- > The remote SNA API support allows SNA application programs to reside on nodes that don't implement a full SNA protocol stack.
- > The SNA API calls are intercepted by a shim layer that ships the calls over a TCP connection to a Remote API server where the actual SNA API calls are executed.
- > This technology provides a solution for SNA application programs that must remain in remote locations - without requiring SNA protocol stacks on those remote nodes.
 - > Removing the need for SNA stack configuration skills, management, and operations procedures outside the data center where the remote SNA API servers may be collapsed
- > This technology also provides built-in availability and load-balancing to a pool (domain) of Remote API servers
 - > A Remote API client is not limited to use a single Remote API server
 - > Pools of LUs can be shared across servers on a Domain.
 - > Servers can be configured to back up each other
- > There is no charge for installing the Remote API client - usage is covered by per-user server charge
- > Support Windows XP, 2000, 2003 Server clients and Linux clients



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Remote API Client/Server example



> Domain Panel shows server in domain: "g313_domain"
 > One server can be on zSeries, other xSeries
 > LUs from different servers in one pool

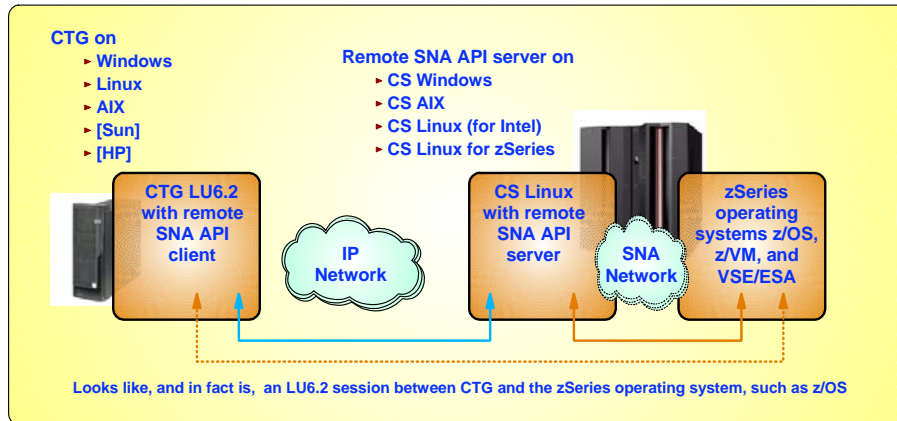
Pool	LU	Node	Status	Application
POOL1	RUIG011	g313rhas.raleigh	Inactive	No application
	RUIJ002	g313rhas.raleigh	SSCP	No application
	RUIJ003	g313rhas.raleigh	SSCP	No application
	RUIJ004	g313rhas.raleigh	SSCP	No application
	RUIJ005	g313rhas.raleigh	SSCP	No application
	RUIJ006	g313rhas.raleigh	SSCP	No application
	RUIJ007	g313rhas.raleigh	SSCP	No application
	RUIJ008	g313rhas.raleigh	SSCP	No application
	RUIJ009	g313rhas.raleigh	SSCP	No application
	RUIJ010	g313rhas.raleigh	SSCP	No application
POOL1	SL8LUE5	ltlwguy.raleigh.i	SSCP	No application
	SL8LUE6	ltlwguy.raleigh.i	SSCP	No application
	SL8LUE7	ltlwguy.raleigh.i	SSCP	No application
	SL8LUE8	ltlwguy.raleigh.i	SSCP	No application
	SL8LUE9	ltlwguy.raleigh.i	SSCP	No application
	SL8LUEA	ltlwguy.raleigh.i	SSCP	No application
	SL8LUEB	ltlwguy.raleigh.i	SSCP	No application

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Migrating off AnyNet Technology for SNA over IP



- z/OS V1R7 is the last release where z/OS will include the VTAM AnyNet component.
 - ▶ The strategic replacement for AnyNet is Enterprise Extender
- CICS Transaction Gateway today uses AnyNet
 - ▶ CTG ships with its own imbedded TCP62 (AnyNet) drivers for SNA APPC communication
 - ▶ An Enterprise Extender implementation, in some cases where CTG is used, may be seen as having a too-large footprint from a TCO perspective
 - ▶ Later this year, CTG plans to ship with the CS Linux remote API client software that will allow it to communicate over an IP network to a CS Linux remote API server – removing the dependency on Anynet



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Summary and Reference Information

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Summary



- Customer interest in SNA functions on Linux in general is high
- Simplifying the network infrastructure may have a direct impact on TCO
 - ▶ Reduced SNA software licenses
 - ▶ Reduced network hardware costs
 - ▶ Reduced line costs (no parallel networks)
 - ▶ Reduced cost of SNA management software
 - ▶ Reduced operations cost
 - ▶ Reduced total WAN capacity
 - ▶ Reduced overall complexity (consolidating onto Linux)
- SNA skills are on the decline – the less dependency on SNA in the wide area network, the better
 - ▶ Consolidating SNA skills into the data center
- Worries among many customers about 374x hardware spare part availability
 - ▶ The faster a migration off 374x technology can be done, the better
- Many mainframe applications remain SNA-based
 - ▶ Customers want a set of solutions that can help address the network infrastructure challenges they have today with existing SNA networks that doesn't require them to change the mainframe applications in coordination with changes to the SNA network.

Solutions are available today and more will become available during 2004! (*)







★ All statements regarding IBM's future direction and intent are subject to change or withdrawal without notice, and represent goals and objectives only.

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SNA - IP network Infrastructure Simplification and Optimization Strategy Elements



A multi-step approach that is designed to eventually confine SNA protocol stacks to the data center:

- ✓  CS Linux can help 1. Consolidate intranet **SNA 3270** traffic (LU1/SCS, LU2, LU3/DSC) into the data center using TN3270 client software (PCOM, HOD, OEM) connecting to TN3270 servers on zSeries, therefore removing native SNA 3270 traffic from the WAN and reducing dependency on Token-ring, 374x or other channel-attached SNA controller (CIP) technology.
- ✓  CS Linux can help 2. Move **middleware** communication off SNA where applicable. DB2 DRDA, MQ, etc. can be migrated to native IP communication without impact on database or messaging applications.
- ✓  CS Linux can help 3. For **native SNA applications** in the branches/remote locations (LU0, LU6.2), use Enterprise Extender to transport native SNA flows over an IP WAN network from the branch and into zSeries. This initially retains the SNA environment on the branch workstation and/or the branch server.
- ✓  CS Linux can help 4. Migrate OS/2-based SNA branch server applications to Linux. This initially retains them in the branch on a Linux Intel platform using Enterprise Extender for the upstream to zSeries SNA communication.
- ✓  CS Linux can help 5. Replace any workstation SNA protocol stack software with remote SNA API client software communicating with a remote SNA API server - optionally located on a Linux for Intel platform that uses Enterprise Extender for the upstream to zSeries SNA communication.
- ✓  CS Linux can help 6. Finally, consolidate the Linux for Intel environment onto Linux for zSeries optionally supporting a TN3270 server, any remaining branch SNA applications, and the remote SNA API services - removing all SNA protocol stacks outside the data center.

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From a zSeries perspective: CS Linux on zSeries adds choice and capabilities



From a z/OS operating system perspective:

- ▶ Alternatives to existing SNA - IP integration technologies on z/OS:
 - z/OS supports Enterprise Extender natively today and can transport SNA flows in/out of z/OS using Enterprise Extender IP flows - CS Linux on zSeries provides an alternative EE termination endpoint on zSeries
 - z/OS also supports an advanced TN3270 server implementation that provides native IP connectivity from TN3270 clients right into z/OS - CS Linux on zSeries provides an alternative placement of the TN3270 server function on zSeries
- ▶ New capabilities to z/OS environments:
 - Linux-based gateway applications consolidated onto zSeries for optimal performance
 - Linux-based remote SNA API server provides the capability to collapse SNA protocol stacks all the way into zSeries

From a z/VM operating system perspective:

- ▶ Alternatives to existing SNA - IP integration technologies on z/VM:
 - z/VM supports a TN3270 server - CS Linux on zSeries provides an alternative placement of the TN3270 server function on zSeries for z/VM
- ▶ New capabilities to z/VM environments:
 - CS Linux extends the Enterprise Extender technology values to z/VM
 - Linux-based gateway applications consolidated onto zSeries for optimal performance
 - Linux-based remote SNA API server provides the capability to collapse SNA protocol stacks all the way into zSeries

From a VSE/ESA operating system perspective:

- ▶ Alternatives to existing SNA - IP integration technologies on VSE/ESA:
 - VSE/ESA Version 1.5 today supports a TN3270 server - CS Linux on zSeries provides an alternative placement of the TN3270 server function on zSeries for VSE/ESA
- ▶ New capabilities to VSE/ESA environments:
 - CS Linux extends the values of the Enterprise Extender technology to VSE/ESA
 - Linux-based gateway applications consolidated onto zSeries for optimal performance
 - Linux-based remote SNA API server provides the capability to collapse SNA protocol stacks all the way into zSeries

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Consolidating Distributed TN3270 Servers onto Linux for zSeries



Consolidate from:

- ▶ Channel- or Token-ring attached TN3270 servers
- ▶ Microsoft SNA Servers or Host Integration Servers
- ▶ Various OEM distributed TN3270 server solutions
 - Apertus, OpenConnect, Attachmate, Novell, etc.
- ▶ CS AIX
- ▶ CS OS/2



Easy, high-value transition

Benefits of consolidation onto Linux for zSeries:

- ▶ Replace heterogeneous, proprietary solutions with Linux-based solution
- ▶ Centralize configuration and management
- ▶ Consolidate many distributed TN3270 server instances into fewer server instances on zSeries
- ▶ Minimal or no change to z/OS, z/VM, or VSE/ESA SNA definitions
- ▶ IP flows all the way into the data center and into zSeries
 - Wide area network infrastructure simplification (Reduced or no SNA skills needed in WAN)
 - Gigabit Ethernet (QDIO) capacity connectivity to zSeries
- ▶ Secure TN3270 all the way into zSeries (no passwords in the clear outside the data center or the zSeries)

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Same NETID Enterprise Extender gateway to z/VM and VSE/ESA



Added capability:

- ▶ Enterprise Extender is a highly efficient protocol to transport SNA flows over an IP network and is widely deployed by z/OS customers already
 - Based on High Performance Routing (HPR)
- ▶ z/VM and VSE/ESA do not support Enterprise Extender protocols, but rely entirely on SNA-based connectivity, which uses lower capacity interfaces than those supported by IP on zSeries

Benefits of adding Enterprise Extender gateway capability:

- ▶ IP-based network flows to the data center and zSeries for all types of SNA traffic, including SNA program-to-program flows (that are not covered by the TN3270 protocol):
 - LU type 0 (SLUTYPEP, NJE, etc.)
 - LU type 6.2 (APPC, CPI-C)
- ▶ Enterprise Extender technology allows SNA traffic to take advantage of the dynamic nature of IP routing, enabling dynamic recovery from IP network topology changes to be extended to SNA workload.
- ▶ Enables zSeries operating systems that don't support Enterprise Extender technology to use SNA flows over an IP backbone network all the way into the data center or zSeries:
 - Wide area network infrastructure simplification
 - Gigabit Ethernet capacity connectivity to zSeries
- ▶ Enterprise Extender technology is already deployed in large scale by many existing z/OS customers to simplify the backbone network infrastructure
- ▶ For zSeries operating systems that are already APPN enabled, use of Linux as an Enterprise Extender gateway will require minimal or no changes to existing configuration

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Consolidating SNA Application Gateway Programs to Linux for zSeries



Consolidate SNA application gateway programs from:

- ▶ OS/2
- ▶ Windows
- ▶ Various SNA implementations on Tandem, Stratus, SUN, HP, etc.
- ▶ AIX

Benefits of consolidation onto Linux for zSeries:

- ▶ Replace heterogeneous, proprietary solutions with Linux-based solution
- ▶ Centralize configuration and management
- ▶ Provide a migration path off OS/2 that will not tie the customer into yet another proprietary operating system platform
- ▶ Stepwise deployment possible - greater deployment flexibility:
 - Deploy the gateway application on CS Linux initially
 - Consolidate the gateway application onto CS Linux for zSeries
- ▶ IP flows all the way into the data center and into zSeries
 - Wide area network infrastructure simplification (Reduced or no SNA skills needed in wide area network)
 - Gigabit Ethernet (QDIO) capacity connectivity to zSeries

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Augment the Value of Linux for zSeries Installations



Some of the most widely used applications on Linux for zSeries are:

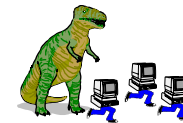
- ▶ WebSphere Application Server
- ▶ File and print sharing server (SAMBA)
- ▶ Database server

Communications Server for Linux on zSeries offers a new or increased value of zSeries installations:



- ▶ Consolidation of distributed TN3270 servers without modification to existing VTAM definitions
- ▶ A migration platform off OS/2 for SNA gateway applications
- ▶ A consolidation platform for SNA gateway applications in general
- ▶ Extension of the value of Enterprise Extender to the zSeries operating systems that do not currently support Enterprise Extender

- ▶ Existing zSeries installations are able to protect their investment in the current SNA-based application portfolio, but, at the same time, help reduce the overall cost of the networking infrastructure by making it a single-protocol network based on IP.



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Communications Server for Linux on zSeries – product features – part one



- **Advanced Peer-to-Peer Networking (APPN)**
 - ▶ Brings APPN network node and end node support, with the benefits of peer networking - including simplified configuration, high availability, dynamic routing, and easier maintenance
 - ▶ Branch extender to simplify APPN networks that contain a large number of branch end nodes
 - ▶ Offers a way for existing APPC and CPI-C applications to take advantage of peer networks
 - ▶ Allows 3270 applications to flow over APPN networks, with dependent LU requester (DLUR) enablement
- **High-performance Routing (HPR) and Enterprise Extender (EE)**
 - ▶ Increases data routing performance and reliability
 - ▶ Offers non-disruptive routing around network outages SNA gateway support
 - ▶ Allows many SNA clients to access multiple zSeries computers through one or more physical connections
 - ▶ Brings large computer resources to many users, while keeping adapter and line costs down
 - ▶ Extends the reach of SNA applications over IP networks and provides the level of reliability and performance enjoyed by SNA users
- **TN3270E server**
 - ▶ Allows TCP/IP users easy access to IBM 3270 applications and print services through TN3270E server
 - ▶ Supports Secure Sockets Layer (SSL) authentication and encryption, providing secure access across the TCP/IP network
- **Telnet Redirector**
 - ▶ Provides passthru TCP/IP host access to TN3270, TN3270E, TN5250 and VT clients
 - ▶ Allows you to use Secure Sockets Layer (SSL) security checking only where necessary (not on the entire user-to-host)

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Communications Server for Linux on zSeries – product features – part two



- **SSL data encryption scalability**
 - ▶ Can help enable the data flowing between the Telnet server and Telnet emulator client is protected
- **Client Authentication**
 - ▶ Helps enable communication with the intended server
 - ▶ More robust security for e-business
- **Application programming support**
 - ▶ Provides an excellent platform for programming and application integration
 - ▶ Extension of CPI-C to support Java applications, as well as standard C-language applications
 - ▶ Includes Host Access Class library (Host Access API) for Java that provides a core set of classes and methods, allowing the development of platform-independent applications that can access host information at the data stream level.
 - ▶ Provides LUA request unit interface (RUI) and session level interface (SLI) APIs, supporting dependent LU types 0, 1, 2, 3.
 - ▶ Provides CPI-C and APPC APIs, supporting both dependent and independent LU 6.2. This commonly used interface makes it easier to develop cross-platform applications.
 - ▶ Provides node operator facility (NOF) API, which allows custom applications to be written to perform system administration tasks.
 - ▶ Includes an APPC Application Suite. This is a set of applications that demonstrates the distributed processing capabilities of APPN networks, including AFTP, APING, AREXEC, ATELL, ACOPY, and ANAME.
 - ▶ Remote SNA API client/server technology

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Communications Server for Linux on zSeries – product features – part three



- **Advanced program-to-program communication (APPC)**
 - ▶ Delivers distributed processing capabilities by enabling different network nodes to share resources and tasks
 - ▶ Provides for peer-to-peer interaction and communication among various IBM and non-IBM systems
 - ▶ Supports multiple logical units and multiple concurrent links
 - ▶ Includes persistent verification to improve security
- **Common Programming Interface for Communications (CPI-C)**
 - ▶ Offers the function of APPC in a consistent form across multiple system platforms for CPI-C
 - ▶ Permits smooth movement of applications from one system platform to another (Example: A Linux platform to a Communication Server for Windows platform)
 - ▶ Supports CPI-C, Release 2
- **Configuration, installation, and administration options**
 - ▶ Easy to install and configure
 - ▶ Easy-to-use Motif-based Administrative interface
 - ▶ Internationalization
 - ▶ zSeries 64-bit support
- **Problem determination and systems management**
 - ▶ Offers quick access to integrated problem determination functions
 - ▶ Allows problem determination and systems management functions to be performed under program control through the use of the NOF API
 - ▶ Facilitates management of remote servers

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Documentation and Contact Information

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Links of interest:

- <http://www.ibm.com/software/network/commserver/>
- <http://www.ibm.com/software/network/commserver/os390>
- <http://www.ibm.com/software/network/commserver/windows>
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- <http://www.ibm.com/software/network/commserver/linux>
- <http://www.ibm.com/software/network/commserver/aix>

If you need assistance from CS for z/OS or Linux consultants who have experience designing and implementing network solutions for customers around the world, please contact April Singer at singeraf@us.ibm.com or 919-254-6762. April will work with you to provide a billable services offering specific to your needs, be it large or small.

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