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L44

Communications Server for Linux (CSL) on System z:
What is it and how to get it up and running

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Agenda

1. CS Linux overview

2. Installing CS Linux

3. SNA connectivity

4. TN3270 server and TN redirector

5. Remote API

6. Problem determination

This session focuses on the practical steps to bring a CS Linux on System z environment up and running.

CS Linux Overview

IBM Communications Server family of distributed products

➤ **Distributed Communications Server family**

- ▸ Distributed Communications Servers implement an SNA protocol stack, SNA APIs, and a selected set of SNA/IP integration applications on various distributed operating system platforms
  - – Distributed Communications Servers do not implement or modify the distributed operating systems' TCP/IP protocol stacks

- ▸ There are three products in the distributed Communications Server family:
  - – IBM Communications Server for Linux (CS Linux)
  - – IBM Communications Server for AIX (CS/AIX)
  - – IBM Communications Server for Windows (CS/Windows)

- ▸ CS Linux is really two products
  - – Communications Server for Linux - supports Intel and pSeries P5 Linux platforms
  - – Communications Server for Linux on System z V6.2.2
    - ● Renamed from "CS Linux on zSeries" V6.2, V6.2.1
    - ● Supports zSeries and System z9 (G5/G6, z800, z890, z900, z990, z9)

- ▸ CS Linux and CS/AIX share the same code base
  - – GUI, Command Line, and configurations are 99% the same
  - – A Remote API Client provided with either product will work with either type of server (Linux or AIX)
    - ● Note: Remote API Client does not connect to CS/Windows. CS/Windows ships its own client, generally referred to as the "SNA API" client

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IBM Communications Server for Linux Version 6.2.2

➤**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
- ▸ Supports connection networks

➤**High Performance Routing (HPR) including Enterprise Extender (EE, also known as 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)
- ▸ Primary LU 0 support for the LUA APIs
- ▸ Remote SNA client/server APIs using sna-cs service (port 1553) or HTTPS via Webservices on WebSphere
  - ● Client support on Windows, AIX (32 and 64 bit), Linux (Intel i686 and x86_64, Power ppc64, zSeries s390 and s390x)
- ▸ APPC application suite (AFTP, APING, AREXEC, ATELL, ACOPY, 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 (GUI interface)
- ▸ Network Operator Facility (NOF) APIs - programmed administration
- ▸ Internationalization
- ▸ 31-bit and 64-bit support
- ▸ Runs on both Red Hat and SuSE (both 2.4 and 2.6 kernel levels)

➤**Network attachments for SNA**
- ▸ Enterprise Extender (HPR over IP)
- ▸ (V)CTC using MPC channel protocols (Linux as a PUT2.1 - APPN/ISR routing)
- ▸ Native SNA (SNA LLC2) over shared LAN (Ethernet or token-ring)
- ▸ SDLC and QLLC over vendor supported WAN cards (Intel only!)

CS Linux server is offered for the following hardware platforms and Linux distributions:

Architecture	Platform	SLES 8 (2.4 kernel)	RHEL 3 (2.4 kernel)	SLES 9 (2.6 kernel)	RHEL 4 (2.6 kernel)	SLES 10 (2.6 kernel)
i686	Intel, 32-bit	✔	✔	✔	✔	✔
x86_64	AMD64, EMT64			✔	✔	✔
ppc64	OpenPower or Power 5, 64-bit			✔	✔	✔
s390	zSeries, 31-bit	✔	✔	✔	✔	
s390x	zSeries, 64-bit	✔	✔	✔	✔	

IBM Communications Server for Linux on System z - overview

Linux onSystem z

QDIO LCS

SNA

CTC or HiperSockets

LSA

CS Linux on System z
✓ **TN3270 gateway - optionally with WebSphere Application Server with HATS**
✓ **Enterprise Extender gateway**
✓ **SNA application gateway**
✓ **Remote SNA API server**

SNA

✓ **z/OS**
✓ **VSE/ESA**
✓ **z/VM**

OSA-E
QDIO

Ethernet-based IP infrastructure

✓ IP to the mainframe
✓ SNA network infrastructure simplification

SNA Network

IP Network

Enterprise Extender APPN Network

SNA devices

Can be used to replace most of the functions in an IBM 3746 MAE or NNP

IP Network

IP Network

TN3270 or Web clients

SNA Remote API clients on AIX, Windows or Linux

CS Linux on System z offers SNA/IP integration technologies on System z, but with no or minimal changes to the traditional mainframe OS environment.
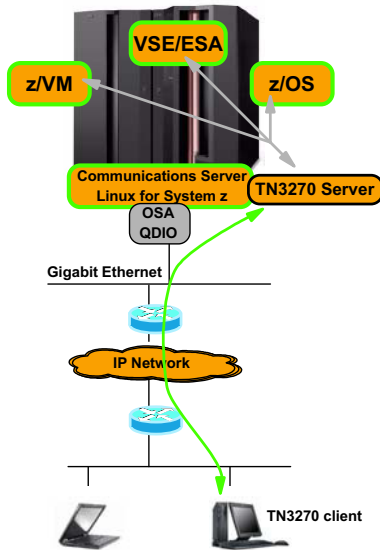
1. Enterprise Extender same-NETID gateway functions
   - Using APPN/ISR routing to/from VTAM and EE downstream
   - EE gateway to z/OS, VSE/ESA, or z/VM VTAM

2. TN3270 server on System z
   - Supports TN3270 access to z/OS, VSE/ESA, and z/VM
   - Can be combined with WebSphere Application Server and Host Access Transformation Services
   - IP all the way to System z
   - No or minimal change to VTAM definitions if consolidating existing distributed TN3270 servers

3. TN3270 SSL offload - using the TN3270 redirector

4. APPN Network Node or Branch Extender node in an APPN network infrastructure
   - Replacing IBM 3746 MAE or NNP
   - Consolidate downstream HPR pipes
   - Does not support EBN functions

5. SNA gateway for consolidation of multiple downstream SNA PUs

6. SNA application platform for Web-based access to SNA applications

7. Remote API services for secure remote SNA application access without having SNA protocol stacks on distributed AIX, Windows and Linux (xSeries, System p and System z) nodes

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SNA connectivity options to CS Linux on System z

z/VSE   OSA/LSA

2

CTC/MPC

z/VM   OSA/LSA

3

SNA Network

z/OS   OSA/LSA

1   IP   EE

Communications Server Linux for System z

OSA/LCS or OSA-E

OSA QDIO   OSA QDIO-L2   OSA LCS

IP Network

SNA Network

IP devices

SNA devices
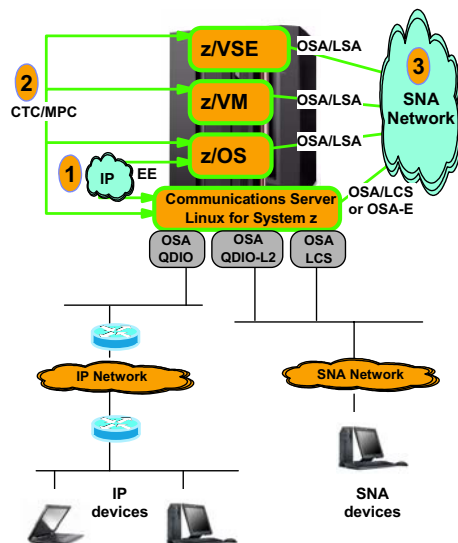
➢ **Enterprise Extender (to z/OS or downstream).**
  ▸ z/OS needs to be EE-enabled in order for this option to work.
  ▸ Physical connectivity to z/OS may be via HiperSockets
  ▸ z/OS is the only mainframe operating system that supports EE (besides Linux). z/VM, z/VSE, and TPF do not support EE connectivity.
  ▸ Downstream can be any EE-capable node

➢ **An MPC (Multi Path Channel) CTC (Channel to Channel) channel driver supports APPN Node-to-Node Communication over a CTC (virtual, EMIF, or real channel-to-channel).**
  ▸ Use of this option requires both endpoints of the channel to be PU type 2.1 nodes, which means existing mainframe environments that have not enabled APPN support in VTAM will have to do some APPN enablement to communicate with CS Linux for System z using this option.
  ▸ Only meaningful for up-stream connectivity to VTAM

➢ **SNA LLC2 over shared LAN - via an OSA port operating in QDIO layer-2 mode or via an OSA port configured in LCS mode.**
  ▸ The QDIO layer-2 mode option depends on OSA-Express microcode upgrades (z800, z900: 3.50 - z990: 5.50). There are no plans to ship this support for pre-zSeries models.
  ▸ Works for OSA-2 as-is (in non-shared TCP/IP passthru mode, not in any shared mode). Works for pre-zSeries models also.
  ▸ Use of this option allows the mainframe operating system to view CS Linux as one of three SNA node types:
    - Peripheral node (a plain PU type 2.0)
    - LEN node (a PU type 2.1)
    - APPN node (a PU type 2.1)

Consolidating external TN3270 servers into Linux for System z

VSE/ESA

z/VM **z/OS**

Communications Server Linux for System z **TN3270 Server**

OSA QDIO

Gigabit Ethernet

IP Network

TN3270 client

➤ **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**

➤ **In CS Linux 6.2.2, added support to listen on ports for specific interfaces.**

➤ **Connectivity to System z is IP and can be via Gigabit Ethernet and QDIO**

➤ **SNA connectivity between Linux for System z and z/OS, z/VM, or z/VSE 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**
  ► Except for the peripheral node attachment option

➤ **No dependence on IBM 3745/46, CIP, CPA, or Token-ring hardware**

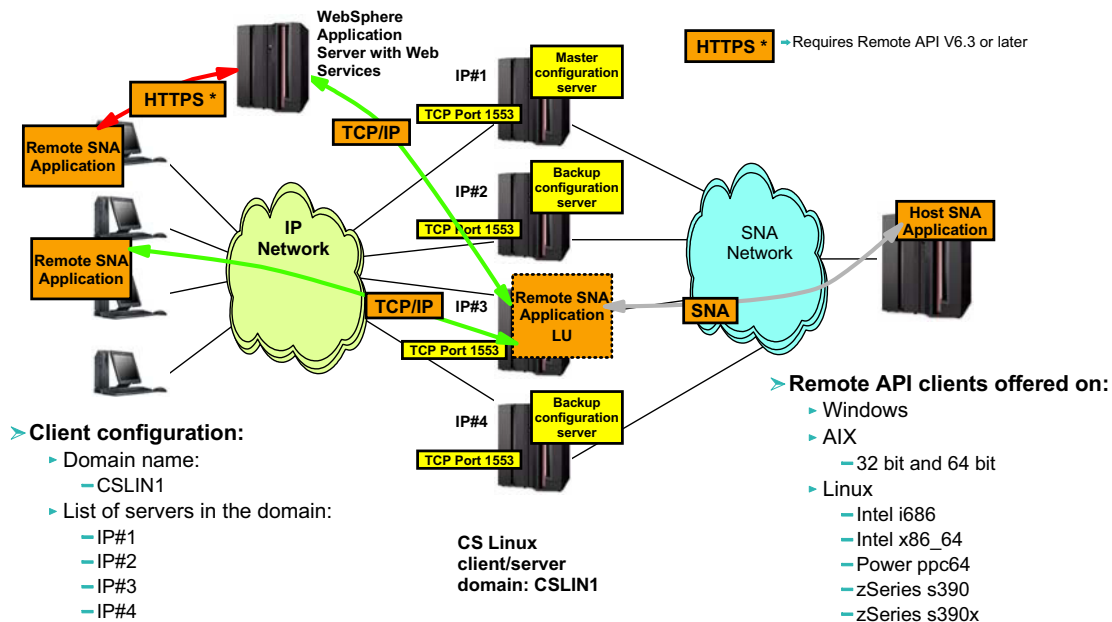➤ **TN3270 server MIPS executed on System z IFL processors**

TN3270 redirector on Linux for System z

z/OS

TN3270 server Port 23 **z/VSE**

TN Redirector Port 2024 **z/VM**

TN3270 client   **TN3270 redirector**   **TN3270 server**
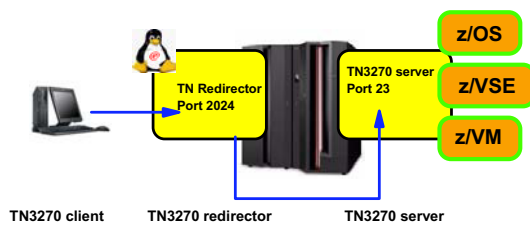
➤ **The TN3270 redirector acts as a TN3270 proxy server**
  ► Relays the connection and the TN3270 protocol between the real client and the real TN3270 server

➤ **CS Linux V6.2.2 allows a port to be listening on a specific interface**

➤ **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
      ● Note: looses capability to do client authentication on z/OS based on client cetificate

➤ **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, host name, or user ID derived from a client certificate

CS Linux Remote API clients with TCP/IP and HTTPS connections to server domain

WebSphere Application Server with Web Services

HTTPS * → Requires Remote API V6.3 or later

HTTPS *

Remote SNA Application

TCP/IP

IP#1
Master configuration server
TCP Port 1553

IP#2
Backup configuration server
TCP Port 1553

IP Network

Remote SNA Application

TCP/IP **IP#3**
Remote SNA Application LU

TCP Port 1553

SNA Network

SNA

Host SNA Application

IP#4
Backup configuration server
TCP Port 1553

➤ **Client configuration:**
  ► Domain name:
    ─ CSLIN1
  ► List of servers in the domain:
    ─ IP#1
    ─ IP#2
    ─ IP#3
    ─ IP#4

CS Linux client/server domain: CSLIN1

➤ **Remote API clients offered on:**
  ► Windows
  ► AIX
    ─ 32 bit and 64 bit
  ► Linux
    ─ Intel i686
    ─ Intel x86_64
    ─ Power ppc64
    ─ zSeries s390
    ─ zSeries s390x

IBM Communications Server for Linux - latest release updates

➤ **CS Linux and CS Linux on zSeries V6.2, released 2Q 2004, supported 2.4 Linux distributions**
  ► RHAS 2.1, RHEL 3, SLES 8

➤ **CS Linux and CS Linux on zSeries V6.2.1 released 3Q, 2005**
  ► Added support for 2.6 Linux distrinutions (RHEL 4, SLES 9)
  ► Added support for pSeries Linux
  ► Primary LU 0 support
  ► HPR tuning parameters

➤ **CS Linux and CS Linux on System z V6.2.2, released July 7, 2006**
  ► Name change to "on System z" indicates new supported z platforms
  ► Updated documentation
  ► SLES 10 support
  ► x86_64 client and server new platform support
  ► Windows 64-bit Remote API new client support
  ► Secure Remote API clients
    ─ HTTPS via Web services
    ─ Also shipped in CS/AIX V6.3
  ► TN3270 Server enhancement to listen on specific interfaces,
  ► New HPR timer parameters
  ► SDLC and QLLC adapter interfaces for WAN card support.
    ─ Intel platform only

Step 1

Installing CS Linux

The README file on the CD is there to be read!

> Before you start installing anything, take the time to locate the README file on the CD and read it to familiarize yourself with the install process before starting.

> *This is not an SMP/E install process!*

IBM Communications Server v6.2.2.0 for Linux on System z (s390, s390x)
INSTALLATION AND RELEASE NOTES 5724-I34

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Documentation that is shipped with CS Linux on System z

```
   Publication name                    Book number   PDF filename
   ----------------------------------  ------------  ------------
   Quick Beginnings                    GC31-6768-01   czx00101.pdf
   Quick Beginnings on System z        GC31-6769-01   czx00201.pdf
   Administration Command Reference    SC31-6770-01   czx00301.pdf
   Administration Guide                SC31-6771-01   czx00401.pdf
   APPC Application Suite User's Guide  SC31-6772-01   czx00501.pdf
   APPC Programmer's Guide             SC31-6773-01   czx00601.pdf
   CPI-C Programmer's Guide            SC31-6774-01   czx00701.pdf
   CSV Programmer's Guide              SC31-6775-01   czx00801.pdf
   LUA Programmer's Guide              SC31-6776-01   czx00901.pdf
   MS Programmer's Guide               SC31-6777-01   czx01101.pdf
   NOF Programmer's Guide              SC31-6778-01   czx01201.pdf
   Diagnostics Guide                   GC31-6779-01   czx01301.pdf
   Glossary                            GC31-6780-01   czx01401.pdf
```

It is strongly recommended that you read the Quick Beginnings on zSeries book before attempting to install CS Linux on zSeries.

➤ The above files are shipped on the CD in the docs subdirectory.
  ▸ Includes an index file for cross-book searching - follow instructions in the README file if you want to install to your Windows workstation

➤ The documentation is also available on:
  ▸ http://www.ibm.com/software/network/commserver/library

➤ Before starting, it is recommend that you at a minimum familiarize yourself with the Quick Beginnings on System z book and the Administration Guide.

Installation prerequisites

➤ Linux distributions that CS Linux has been tested with:
  ● RedHat Enterprise Linux 3, 4 for System z
  ● RedHat Enterprise Linux 3, 4 for System z
  ▸ SuSE Linux Enterprise Server 8, 9 and 10 (SLES8,9, and 10)

➤ 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-2.18.0.tgz
  ● The patch file is supplied with CS Linux server CD and the CS Linux on System z tar image under /patches
  ● Follow the detailed instructions in the README 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 1.4.2 SDK is recommended.
  ● For RedHat Enterprise Linux 3, you must install the IBMJava2-142-...-SDK-1.4.2.3.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

Install overview - (see the README file for the details)

1. Copy or FTP the ibm-commserver-6.2.2.0-s390.tgz file from the CD-ROM to the Linux zSeries system. Make sure to use binary mode for the tgz file.

2. Log into the Linux for System z system as root.

3. Uncompress and unpack the tar file into an empty temporary directory:
   ```
   mkdir /tmp/ibmcs
   cd /tmp/ibmcs
   tar -xzf ibm-commserver-6.2.2.0-s390.tgz
   ```

   Do NOT try to install Communications Server with the rpm -i command!

4. Run the installibmcs shell script
   ```
   ./installibmcs
   ```

5. The installibmcs shell script will test for certain prerequisites and issue warning messages if they are not met. You will be prompted to read and accept the license agreement.

6. Add the CS Linux binary directories to your PATH. You also need to set some environment variables. You may wish to change your profile to do this automatically (/etc/profile)
   ```
   export PATH="$PATH:/opt/ibm/sna/bin:/opt/ibm/sna/bin/X11"
   export LD_LIBRARY_PATH=/usr/lib:/opt/ibm/sna/lib
   export LD_RUN_PATH=/usr/lib:/opt/ibm/sna/lib
   export CLASSPATH=$CLASSPATH:/opt/ibm/sna/java/cpic.jar
   ```

7. Start CS Linux. After installation this will happen automatically when the system is rebooted.
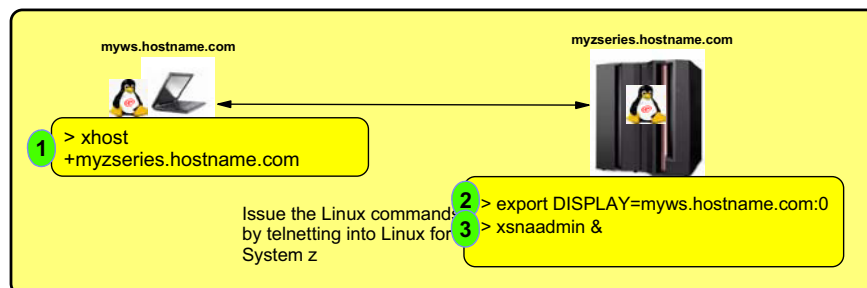   ```
   cd /
   sna start
   ```

---

# CS Linux 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.**
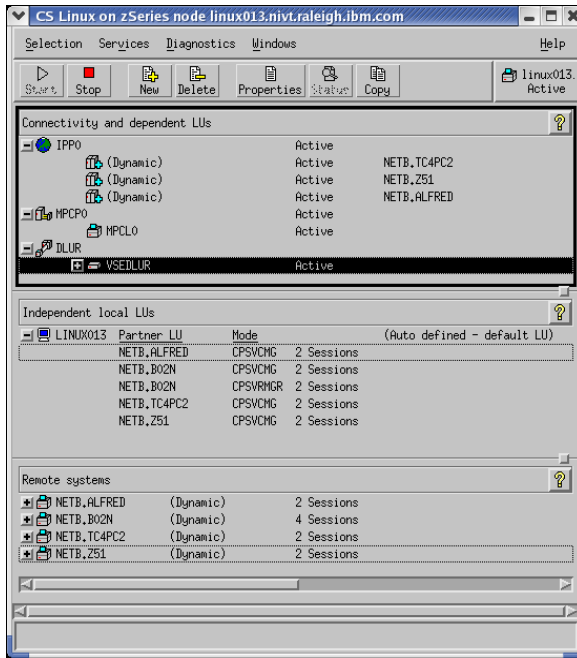
➤ **The GUI tool is an X-Windows application and is started via the xsnaadmin command.**

➤ **You must have an X server somewhere in order to use xsnaadmin**
  ▸ We recommend that you use a Linux, AIX, or UNIX X-server
  ▸ You can experiment with various X Server software packages (free or for-fee) for Windows.
    – Some of them have problems with certain non-US codepages



myws.hostname.com

myzseries.hostname.com

**1** > xhost +myzseries.hostname.com

Issue the Linux commands by telnetting into Linux for System z

**2** > export DISPLAY=myws.hostname.com:0
**3** > xsnaadmin &

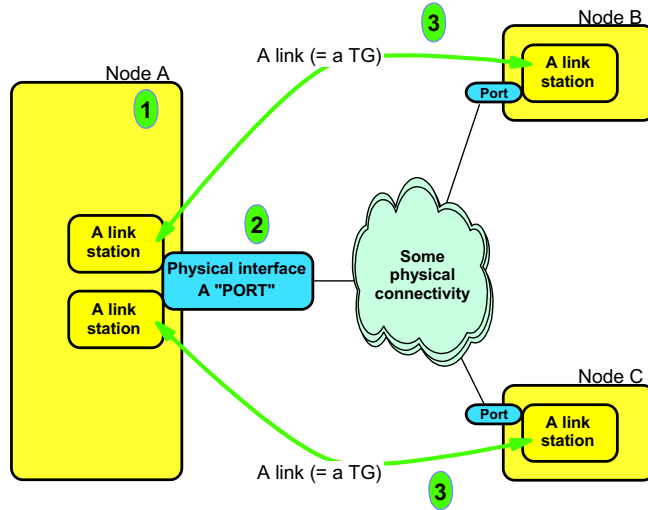# Motif-based configuration and monitoring interface to CS Linux



➤ **The configuration and monitoring tool (xsnaadmin) uses X-Windows to interface with the administrator**

➤ **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 subpanels:**

  ▸ Connectivity and dependent LUs
  ▸ Independent local LUs
  ▸ Remote systems

---

**Step 2**

SNA connectivity
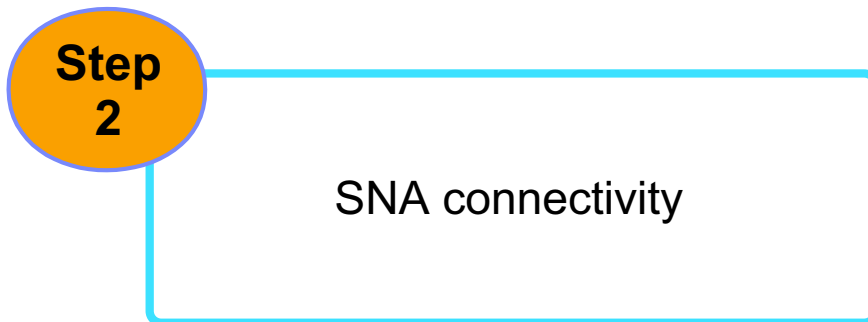
## SNA node, port, link station, and link

1. Define node: Some local node characteristics are in reality link station characteristics and not overall SNA node characteristics
   1. CS Linux may be an APPN network node, but still have a LEN link or a subarea (peripheral node) link to z/OS

2. Define port: If the port connects to a network technology to which many nodes can be attached, many link stations may be defined using that port

3. Define link stations: Partner link stations are identified based on the network technology:
   1. LAN - MAC and SAP address
   2. Point-to-point - implicit
   3. IP network (EE) - IP address

Node A

**1**

**A link station**

**2**

**Physical interface A "PORT"**

**A link station**

Some physical connectivity

A link (= a TG)

**3**

Node B

**Port**

**A link station**

Node C

**Port**

**A link station**

A link (= a TG)

**3**

Note: CS Linux does support SNA connection networks (Virtual Routing Nodes)

---

## CS Linux local node definitions

**Node parameters**

APPN support          Network node

SNA addressing

Control point name    NETB  .  LINUX127

Control point alias   linux127

Node ID               071  00000

Description  CS Linux on zSeries - linux127

OK    Advanced...    Cancel    Help

**Node advanced parameters**

■ Allow sessions to undefined partner LUs

■ Return generic security failure codes

Limited resource timeout  20  seconds

Control Point LU
☐ Support Syncpoint
☐ Disable Password Substitution

OK    Cancel    Help

➢ **The local SNA node can be configured as**
  - ► an APPN Network Node
  - ► an APPN End Node
  - ► a LEN node
  - ► an APPN Branch Network Node (Branch Extender node)

➢ **In this sample network, the NETID is NETB and we chose a node name that matched the Linux system's host name: linux127**
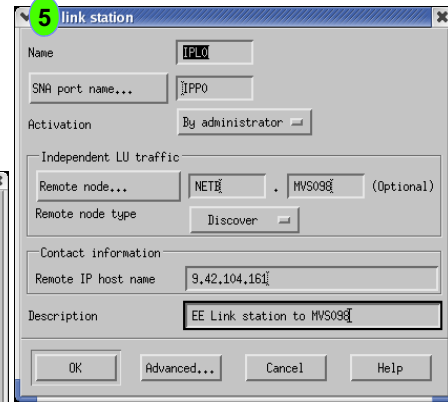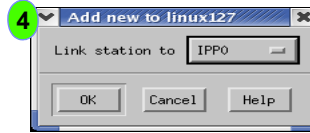
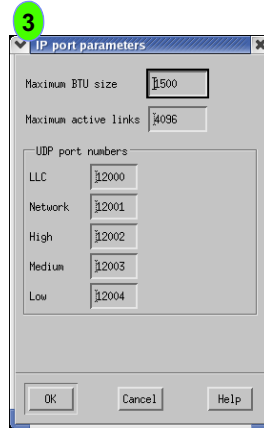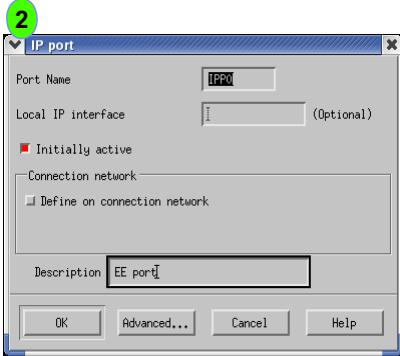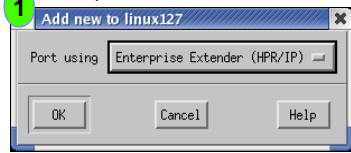➢ **The matching definitions in VTAMLST on the z/OS system are:**

```
SWLNX   VBUILD TYPE=SWNET
*
PULNX127 PU   CPNAME=LINUX127,
               CPCP=YES,
               CONNTYPE=APPN,
               HPR=YES
*
         PATH IPADDR=9.42.105.53,
               GRPNM=XCAEEG
```
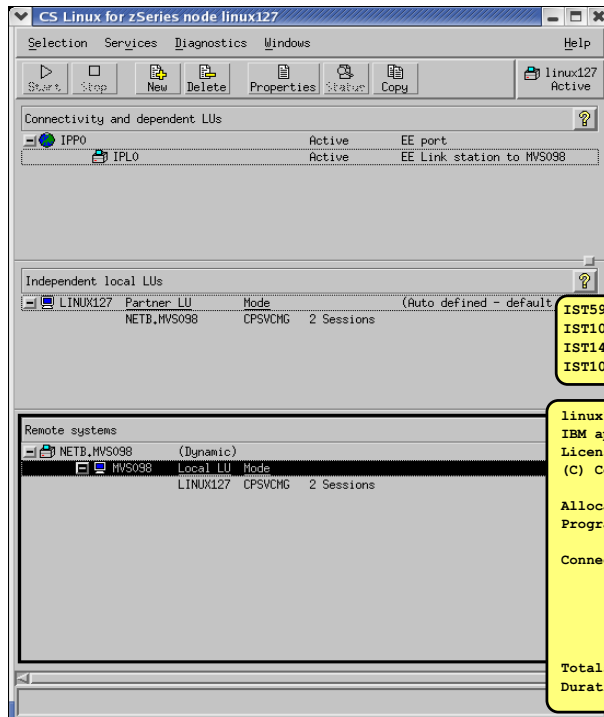
# CS Linux EE connectivity to z/OS

Define an IP port with the local EE port numbers.

**① Add new to linux127**

Port using [Enterprise Extender (HPR/IP)]

[OK]   [Cancel]   [Help]

**② IP port**

Port Name [IPP0]

Local IP interface [I] (Optional)

■ Initially active

Connection network
☐ Define on connection network

Description [EE port]

[OK]  [Advanced...]  [Cancel]  [Help]

**③ IP port parameters**

Maximum BTU size [1500]

Maximum active links [4096]

UDP port numbers
LLC     [12000]
Network [12001]
High    [12002]
Medium  [12003]
Low     [12004]

[OK]   [Cancel]   [Help]

**④ Add new to linux127**

Link station to [IPP0]

[OK]   [Cancel]   [Help]

**⑤ link station**

Name [IPL0]

SNA port name... [IPP0]

Activation [By administrator]

Independent LU traffic
Remote node... [NETB] . [MVS098] (Optional)
Remote node type [Discover]

Contact information
Remote IP host name [9.42.104.161]

Description [EE Link station to MVS098]

[OK]  [Advanced...]  [Cancel]  [Help]

Define an EE link to another EE node:
► a z/OS system called mvs098 on IP address 9.42.104.161

---

# Activate the EE port and the link to your z/OS system

**CS Linux for zSeries node linux127**

Selection  Services  Diagnostics  Windows                Help

Start  Stop  New  Delete  Properties  Status  Copy      linux127 Active

Connectivity and dependent LUs
IPP0                    Active      EE port
  IPL0                  Active      EE Link station to MVS098

Independent local LUs
LINUX127  Partner LU    Mode        (Auto defined - default
          NETB.MVS098   CPSVCMG  2 Sessions

Remote systems
NETB.MVS098   (Dynamic)
  MVS098   Local LU  Mode
           LINUX127  CPSVCMG  2 Sessions

Activating the EE port and the EE linkstation that connects Linux to your z/OS VTAM.

Activating the EE port brings the linkstation into "listening" state.

Starting the linkstation, connets it to the z/OS system.

```
IST590I CONNECTIN ESTABLISHED FOR PU PULNX127 ON LINE LNEE00F
IST1086I APPN CONNECTION FOR NETB.LINUX127 IS ACTIVE - TGN = 21
IST1488I ACTIVATION OF RTP CNR00025 AS PASSIVE TO NETB.LINUX127
IST1096I CP-CP SESSIONS WITH NETB.LINUX127 ACTIVATED
```

```
linux127:/opt/ibm/sna/bin # ./aping netb.mvs098
IBM aping version 2.44 APPC echo test with timings.
Licensed Materials - Property of IBM
(C) Copyright 1994,1995 by IBM Corp. All rights reserved.

Allocate duration:          0 ms
Program startup and Confirm duration:         10 ms

Connected to a partner running on: (UNKNOWN operating system)
         Duration      Data Sent      Data Rate      Data Rate
         (msec)        (bytes)        (KB/s)         (Mb/s)
         --------      ---------      ---------      ---------
            10           200            19.5           0.156
            10           200            19.5           0.156
Totals:     20           400            19.5           0.156
Duration statistics: Min = 10 Ave = 10 Max = 10
```

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Step 3

TN3270 Server and TN Redirector

Define a DLUR PU on CS Linux and a matching switched major node in VTAM

➤ **The TN3270 server needs LUs defined to map client devices to multiple or different upstream connections.**

➤ **The upstream PU may or may not use DLUR.**
  ▸ If upstream connectivity is APPN, use DLUR
  ▸ If the upstream link is a peripheral link, define the PU and LUs as part of the link station definitions on CS Linux

DLUR PU

PU name	DLUR127
DLUS name	NETI . MVS098
PU ID	071 00127

☐ Initially active
☐ Compression supported
☐ Retry contacting DLUS indefinitely

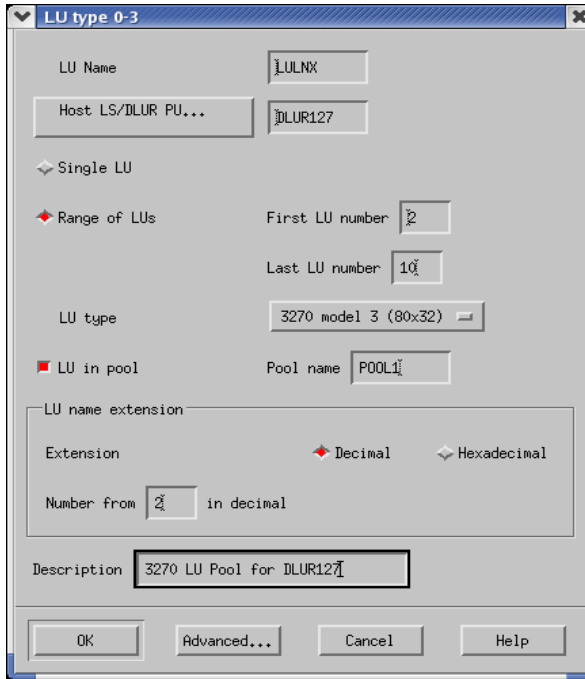Description: DLUR PU to MVS098 (DLUR127)

[OK]   [Cancel]   [Help]

```
SWPU      VBUILD TYPE=SWNET
PUDLU127 PU     ADDR=01,
                XNETALS=YES,
                PACING=0,
                VPACING=0,
                ANS=CONT,
                DLOGMOD=SNX32703,
                USSTAB=USSABCSC,
                IDBLK=071,
                IDNUM=00127
LULNX001 LU     LOCADDR=1
LULNX002 LU     LOCADDR=2
LULNX003 LU     LOCADDR=3
LULNX004 LU     LOCADDR=4
LULNX005 LU     LOCADDR=5
LULNX006 LU     LOCADDR=6
LULNX007 LU     LOCADDR=7
LULNX008 LU     LOCADDR=8
LULNX009 LU     LOCADDR=9
LULNX010 LU     LOCADDR=10
```
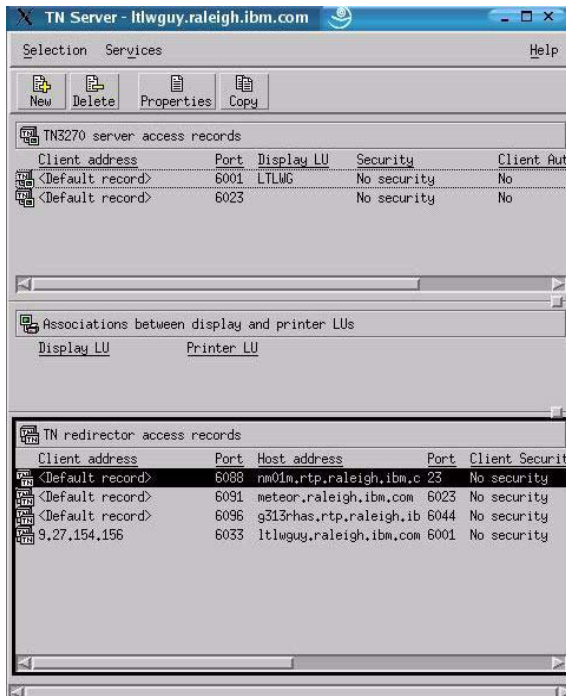
Define LUs and LU pool for use by the TN3270 Server

LU type 0-3

LU Name: LULNX

Host LS/DLUR PU... : DLUR127

Single LU

Range of LUs   First LU number: 2

Last LU number: 10

LU type   3270 model 3 (80x32)

LU in pool   Pool name: POOL1

LU name extension

Extension   ◆ Decimal   ◇ Hexadecimal

Number from 2 in decimal

Description: 3270 LU Pool for DLUR127

OK   Advanced...   Cancel   Help

➤ **The local placeholder LU names will become LULNX002 through LULNX010.**

➤ **The LUs are defined under DLUR PU DLUR127 (as defined on the previous page).**

➤ **The LUs are made part of a local LU pool called POOL1.**

CS Linux TN3270 Function Panel

TN Server - ltlwguy.raleigh.ibm.com

Selection   Services   Help

New   Delete   Properties   Copy

TN3270 server access records

Client address	Port	Display LU	Security	Client Aut
<Default record>	6001	LTLWG	No security	No
<Default record>	6023		No security	No

Associations between display and printer LUs

Display LU   Printer LU

TN redirector access records

Client address	Port	Host address	Port	Client Securit
<Default record>	6088	nm01m.rtp.raleigh.ibm.c	23	No security
<Default record>	6091	meteor.raleigh.ibm.com	6023	No security
<Default record>	6096	g313rhas.rtp.raleigh.ib	6044	No security
9.27.154.156	6033	ltlwguy.raleigh.ibm.com	6001	No security

➤ **This panel allows the selection of TN3270 Server, Associated Printer or TN Redirector configurations panels.**

➤ **Select the section you wish to configure by clicking the mouse on the panel of interest. Then select, New, Delete, Properties or Copy from the Menu list.**
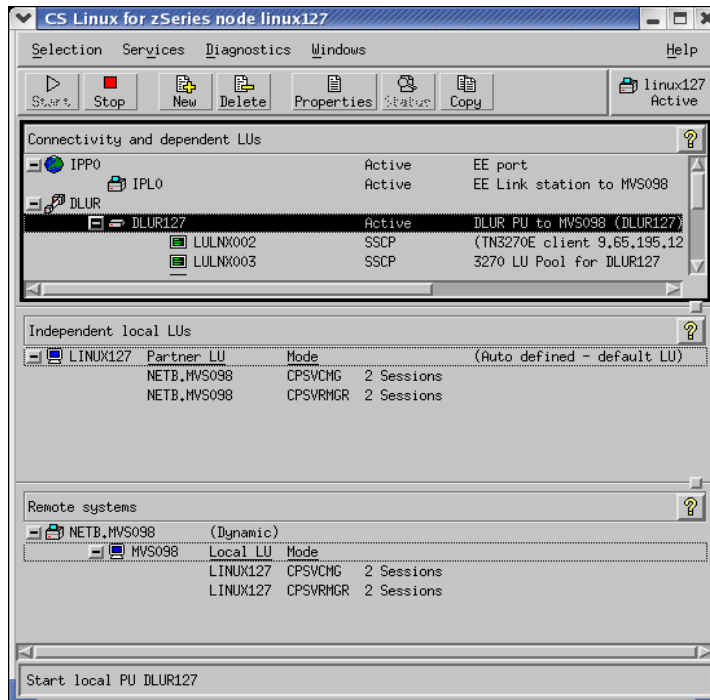
CS Linux TN3270 Server access setup
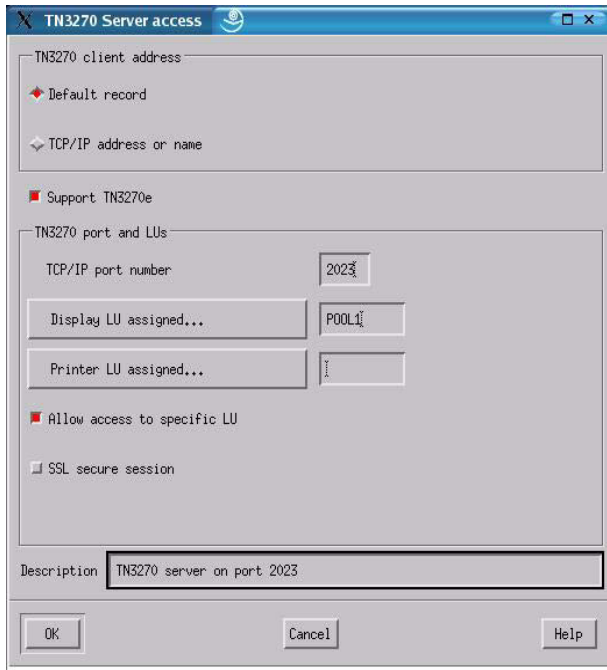
➢ **A TN3270 server access is defined on port 2023**
  ► Port 23 is used by the local Linux telnet daemon

➢ **Display LUs are assigned out of the LU pool we defined on the previous page**

Full TN3270 service environment up-and-running

Connecting a TN3270 client through the TN3270 server on CS Linux for System z

MVS098 via Linux

File Edit View Communication Actions Window Help

```
USSMSG10: Enter: LOGON APPLID() LOGMODE() DATA()
Date:   03/05/04
LU:     LULNX002
Time:   18:49:54
Sense: ***NA***

USSABCSC - This is VTAM on MVS098
Welcome to MVS098 - Enter either full LOGON command or:
one of the following short commands:

 TSOABC      - TSO as USER1
 TSO12-TSO18 - TSO as USER12 to USER18

 CICS        - DBDCCICS on mvs098


 _
```
```
MA                                                                18/002
```
Connected to remote server/host linux127.tcp.raleigh.ibm.com u

Remember:

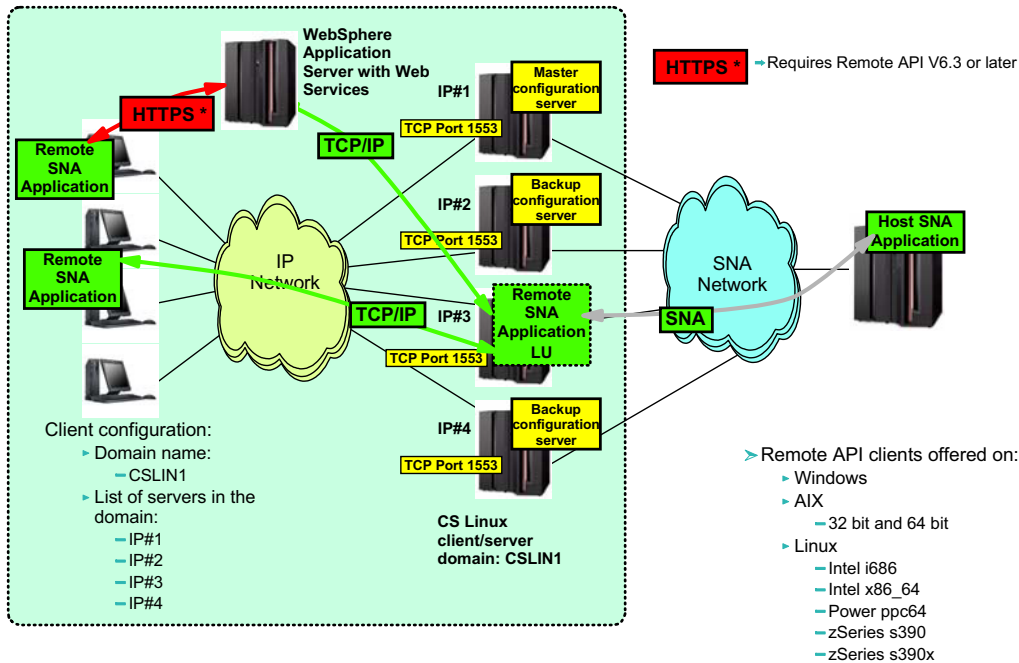The LU name that is assigned to the SNA session is the one assigned by VTAM.

The LU names used when configuring CS Linux on System z may be different (I prefer to refer to them as placeholders)

USS table processing is done by the SSCP on the z/OS host.
In this example we use an SCS formatted USS table.

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Step 4

Remote API

IBM Systems

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CS Linux Remote API clients with TCP/IP and HTTPS connections to server domain

WebSphere Application Server with Web Services

HTTPS *

Remote SNA Application

TCP/IP

IP#1 — **Master configuration server** — TCP Port 1553

IP#2 — **Backup configuration server** — TCP Port 1553

Remote SNA Application

IP#3 — **Remote SNA Application LU** — TCP Port 1553

TCP/IP

IP Network

IP#4 — **Backup configuration server** — TCP Port 1553

SNA Network

SNA

Host SNA Application

Client configuration:
- Domain name:
  - CSLIN1
- List of servers in the domain:
  - IP#1
  - IP#2
  - IP#3
  - IP#4

CS Linux client/server domain: CSLIN1

HTTPS * → Requires Remote API V6.3 or later

- Remote API clients offered on:
  - Windows
  - AIX
    - 32 bit and 64 bit
  - Linux
    - Intel i686
    - Intel x86_64
    - Power ppc64
    - zSeries s390
    - zSeries s390x

Installing remote API client on Windows - overview

- **To install the Win32 Client, complete the following steps.**

  - Copy the i_w32cli.exe file to your computer.
    - This file is on the Remote API Client CD in the ibm-commserver-clients/windows directory.
    - The copy must be done in binary mode.
      - For example, use "ftp" with the binary mode command.
      - Or insert the CD into your Windows workstation and copy the file to an install directory of your choice.
  - Run this file, it will prompt for a working directory (Default C:\IBMCS\w32cli), unzip the contents to the working directory, and proceed into install by starting the setup.exe program from the working directory

- **When setup has completed, you can delete the Win32 Client files from the working directory.**

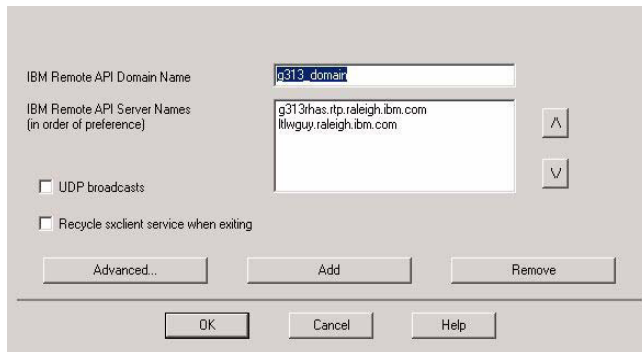- **You can un-install the remote API client via the standard windows "Add or Remove Programs" functions.**

- **Before you can un-install the client API, you need to ensure the CS Linux client monitor is stopped.**

  - Move the mouse pointer over the IBM CS Linux client monitor icon in the lower right corner of your screen, left click, and choose Close.

- **During un-install, the CS Linux client service will be stopped automatically.**

- **For HTTPS connectivity using the Remote API V6.3 or later, see the README file that is provided.**

Initial configuration of remote API client

IBM Remote API Domain Name: g313_domain

IBM Remote API Server Names (in order of preference):
g313rhas.rtp.raleigh.ibm.com
ltlwguy.raleigh.ibm.com

☐ UDP broadcasts
☐ Recycle sxclient service when exiting

Advanced...   Add   Remove

OK   Cancel   Help

Server Name: g313sles8.rtp.raleigh.ibm.com

OK   Cancel   Help

➤ This is the CS client configuration utility.

➤ You can launch this any time by selecting IBM CS Linux Client from the Windows Start Program list and then Configuration Utility

➤ If you enter the host names or IP addresses of your Remote API servers, you can disable the UDP broadcast option.

➤ Specify the hostname of the server to connect using the "cs-sna" service (port 1553). To connect using HTTPS protocol, specify the hostname of the WAS followed by a colon, ":", and then the hostname of the server. For example:
  ▸ meteor.raleigh.ibm.com:g313rhas.rtp.raleigh.ibm.com

➤ For availability and load balancing, you would typically have more remote API servers defined within a domain of such remote API servers.

➤ You can specify multiple WAS machines and servers. If you specify a WAS address (using HTTPS), then all the servers must be listed using HTTPS.

➤ Linux clients use a flat ASCII text file, /etc/opt/ibm/sna//sna_clnt.net. The file contains the domain name for the client/server, a list of servers and LAN accees parameters.

➤ AIX clients use the same file format, found in /etc/sna/sna_clnt.net.
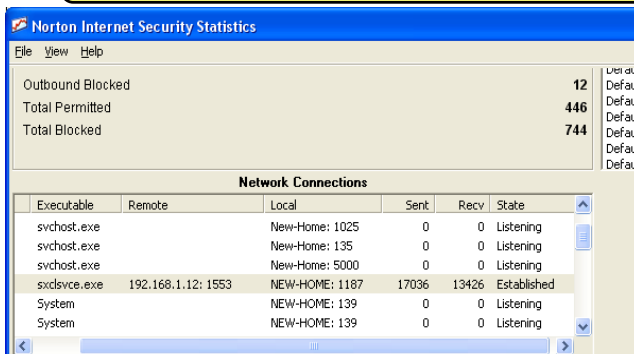
© 2006 IBM Corporation

Testing from Windows

```
C:\IBMCS\w32cli>aping p390.p390sscp
IBM aping version 2.44 APPC echo test with timings.
Licensed Materials - Property of IBM
(C) Copyright 1994,1995 by IBM Corp. All rights reserved.

Allocate duration:       280 ms
Program startup and Confirm duration:       100 ms

Connected to a partner running on: (UNKNOWN operating system)
        Duration        Data Sent        Data Rate        Data Rate
        (msec)          (bytes)          (KB/s)           (Mb/s)
        --------        ---------        ---------        ---------
              60            200              3.3              0.026
              60            200              3.3              0.026
Totals:      120            400              3.3              0.026
Duration statistics: Min = 60 Ave = 60 Max = 60
```

aping is installed in the Remote API directory on Windows (C:\IBMCS\w32cli)

Norton Internet Security Statistics

File View Help

Outbound Blocked	12
Total Permitted	446
Total Blocked	744

Network Connections

Executable	Remote	Local	Sent	Recv	State
svchost.exe		New-Home: 1025	0	0	Listening
svchost.exe		New-Home: 135	0	0	Listening
svchost.exe		New-Home: 5000	0	0	Listening
sxclsvce.exe	192.168.1.12: 1553	NEW-HOME: 1187	17036	13426	Established
System		NEW-HOME: 139	0	0	Listening
System		NEW-HOME: 139	0	0	Listening

To verify that the remote API connection was actually used, I used my personal firewall software to display byte count information for active connections.

If you move the mouse pointer over the CS Linux client monitor icon, it will display if the client is connected to a server and which server that is.

IBM Remote API Client - g313rhas.rtp.raleigh.ibm.com

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What if SNA APIs already were installed on the workstation?

➤ **SNA APIs (APPC/CPIC, LUA) could have been provided by:**

- ▶ IBM Personal Communications (PCOMM)
- ▶ CS/AIX or its Remote API Client
- ▶ IBM CS/Linux or its Remote API Client
- ▶ IBM CS/Windows or its SNA API Client
- ▶ Microsoft SNA server or its Remote API Client

➤ **General approach is as follows:**

- ▶ De-install existing SNA API product including PCOMM
- ▶ Install Remote API Client from Communications Server for Linux
- ▶ Re-install existing product (will now pick up the CS Linux remote API DLLs)
  - ─ These other products such as PCOMM SNA 3270 will hereafter use the CS Linux remote API

➤ **For PCOMM users, after the Remote API has been detected, it will present a new option for "Interface" called "API Client", which will include the capability to request specific LU or LUPOOL from the CS Linux server domain**

- ▶ If the server the remote client is connected to doesn't support that LU, the servers in the domain will know which other server does support the LU and the client will be redirected to the proper server that supports the requested LU.

Configuring PCOMM for use with remote API server
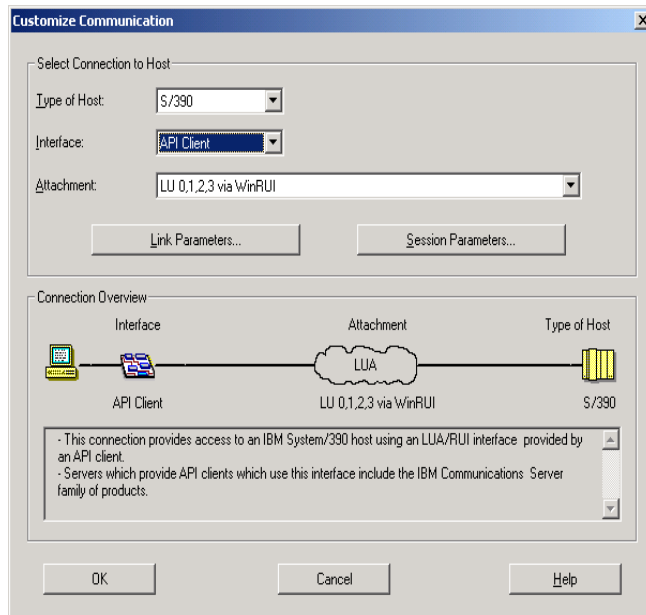
After installing the remote API client and re-installed PCOMM, the API Client interface choice is presented.

We have an LU Pool on the CS Linux server named GWPOOL, so we will request an LU in that pool.
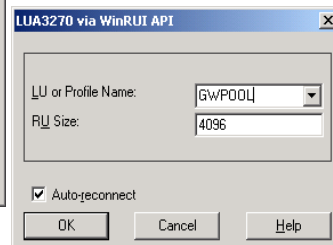
PCOMM 3270 using the remote API

```
Session A - [24 x 80]                                    _ □ X
File  Edit  View  Communication  Actions  Window  Help

USSMSG10: Enter: LOGON APPLID() LOGMODE() DATA()
Date:   30/08/04
LU:     GWLU002
Time:   16:13:12
Sense: ***NA***

USSABCSC - This is VTAM on Alfred's TP
Welcome to MVS on FLEX - Enter either full LOGON command or:
one of the following short commands:

 TSOABC      - TSO as ALFRED
 TSO12-TSO18 - TSO as USER12 to USER18

 CICS        - DBDCCICS




 _

MB a                                                      18/002
Connected to Host using LU GWPOOL.
```
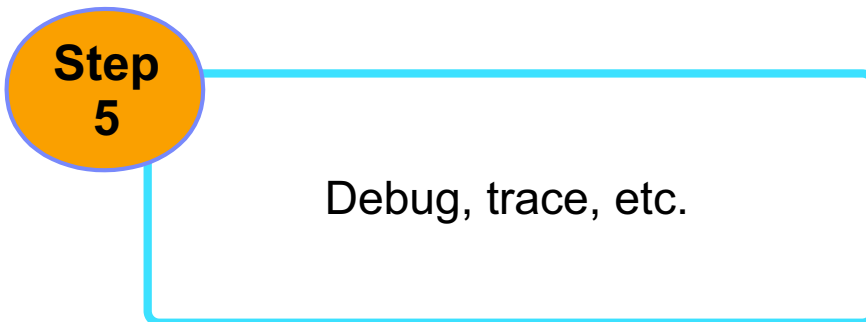
The 3270 session comes
active using the first
available LU in the
GWPOOL.

Step 5

Debug, trace, etc.

Something doesn't work - where do you start looking?

The on-line book to refer to is the **Diagnostics Guide** (GC31-6779-01, czx01301.pdf).
The directory to look into is: /var/opt/ibm/sna

```
suse:/var/opt/ibm/sna # ls -al
total 324
drwxrwxr-x    2 bin     sna        4096 Aug 28 05:44 .
drwxr-xr-x    3 root    root       4096 Aug 15 16:42 ..
-rw-rw-rw-    1 root    root         12 Aug 27 15:16 directry.dat
-rw-rw-rw-    1 root    root          8 Aug 27 11:54 heldalrt.dat
-rw-r--r--    1 root    root      71914 Aug 27 08:53 ksyms.bak.gz
-rw-r--r--    1 root    root      71912 Aug 28 05:44 ksyms.gz
-rw-rw-r--    1 root    sna        2569 Aug 28 05:44 sna.aud
-rw-rw-r--    1 root    sna       49507 Aug 28 05:44 sna.err
-rw-rw-r--    1 root    sna        5675 Aug 27 15:06 sna.usage
-rw-r--r--    1 root    root       3907 Aug 24 15:34 sna1.dmp
-rw-rw-r--    1 root    sna       53621 Aug 24 15:33 sna1.trc
-rw-r--r--    1 root    root        155 Aug 24 15:34 sna2.dmp
-rw-rw-r--    1 root    sna         145 Aug 24 15:33 sna2.trc
-rw-rw-r--    1 root    root       1455 Aug 27 14:34 snatnsv1.trc
-rw-rw-r--    1 root    root        215 Aug 27 14:12 snatnsv2.trc
-rw-r--r--    1 root    root        120 Aug 27 14:12 snatrcfiles
-rw-rw-rw-    1 root    root       2572 Aug 27 15:16 topology.dat
```
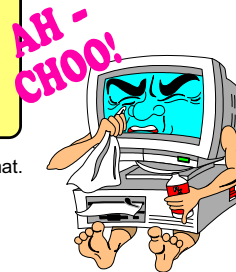
Start browsing the sna.err file - it is a log file where all error conditions are logged in text format.

If you enabled auditing, auditing messages are stored in the sna.aud log file.

Usage statistics will be written to the sna.usage file (always enabled, cannot be disabled)

Tracing

➢ **You enable tracing via xsnaadmin - Diagnostics, Node Tracing**
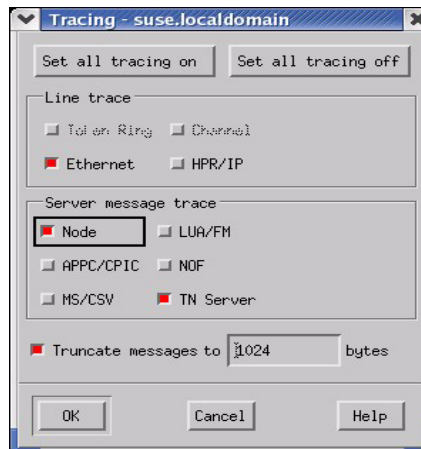
➢ **Binary trace data is written to:**

 ▸ /var/opt/ibm/sna/sna1.trc
  ▸ /var/opt/ibm/sna/sna2.trc

➢ **Format the binary trace files using the snatrcfmt command:**

 ▸ snatrcfmt -f sna1.trc -o sna1
  ▸ snatrcfmt -f sna2.trc -o sna2

Formatted output files are sna1.dmp and sna2.dmp

Ethereal - Linux built-in LAN "sniffer"

➢ **Ethereal is a software LAN sniffer that comes with Linux. It isn't installed by default, so depending on your install options you may have to install the optional Ethereal RPM (for SuSE SLES8 it is ethereal-0.9.6-32.s390.rpm).**

➢ **You can use Ethereal via the command line (tetherereal command), but I always use the GUI interface instead.**
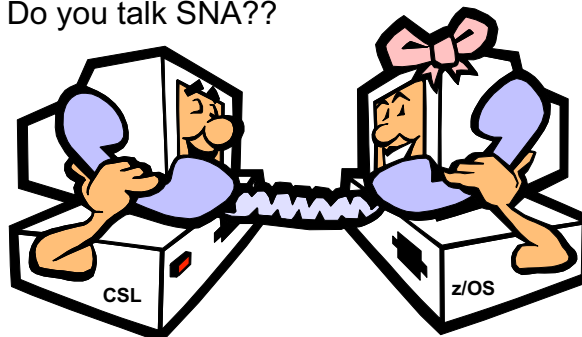 ▸ suse:/var/opt/ibm/sna # ethereal &
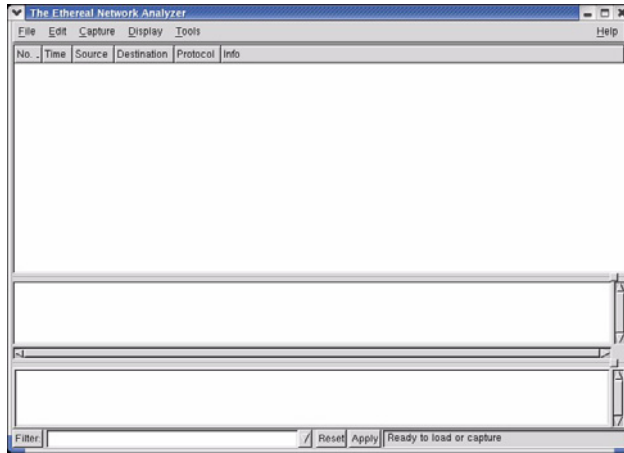
Select "Capture" and "Start"
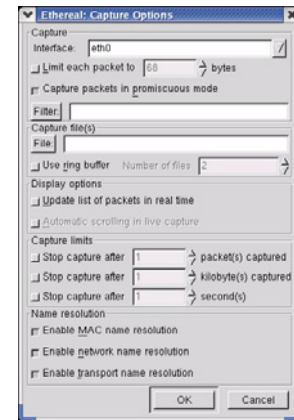
Useful links

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
- http://www.ibm.com/software/network/commserver/z_lin
- http://www.ibm.com/software/network/commserver/linux
- http://www.ibm.com/software/network/commserver/aix
- http://www14.software.ibm.com/webapp/download/search.jsp?go=y&rs=icstd

90-day trial free download

Do you talk SNA??

Step 6

CSL

z/OS

For more information....

URL	Content
http://www.ibm.com/servers/eserver/zseries	IBM eServer zSeries Mainframe Servers
http://www.ibm.com/servers/eserver/zseries/networking	Networking: IBM zSeries Servers
http://www.ibm.com/servers/eserver/zseries/networking/technology.html	IBM Enterprise Servers: Networking Technologies
http://www.ibm.com/software/network/commserver	Communications Server product overview
http://www.ibm.com/software/network/commserver/zos/	z/OS Communications Server
http://www.ibm.com/software/network/commserver/z_lin/	Communications Server for Linux on zSeries
http://www.ibm.com/software/network/ccl	Communication Controller for Linux on zSeries
http://www.ibm.com/software/network/commserver/library	Communications Server products - white papers, product documentation, etc.
http://www.redbooks.ibm.com	ITSO Redbooks
http://www.ibm.com/software/network/commserver/support	Communications Server technical Support
http://www.ibm.com/support/techdocs/	Technical support documentation (techdocs, flashes, presentations, white papers, etc.)
http://www.rfc-editor.org/rfcsearch.html	Request For Comments (RFC)

IBM Systems

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