# Migration Scenarios

This chapter describes migration scenarios for TN3270 Server. Each scenario describes the purpose of the new configuration, considerations for implementing the new configuration, and the configuration steps involved. This chapter contains the following scenarios:

- Scenario 1: TN3270 Server with Static LUs
- Scenario 2: TN3270 Server with Dynamic LUs
- Scenario 3: TN3270 Server Using LU Nailing
- Scenario 4: TN3270 Server Using LU Nailing with Static LUs
- Scenario 5: TN3270 Server Using Nailing for Printer LUs
- Scenario 6: Using a Remote TN3270 Server
- Scenario 7: TN3270 Server with LocalDirector
- Scenario 8: TN3270 Server Using DistributedDirector
- Scenario 9: TN3270 Server Using a Direct PU and INCLUD0E
- Scenario 10: TN3270 Server with Session Switching

## PU and LU Definitions

The definitions of PUs and LUs have not changed from the SNA 3270 definition mechanism. A VTAM XCA node definition is used for channel connectivity and then single or multiple switched major nodes are used to define the PU and LU. If you are migrating from an existing network that already uses switched major nodes, no change is required in the PU and LU definitions.

## XCA Major Node

The common configuration parameters for defining the XCA major node are shown in the following example. This configuration is standard and does not change throughout the scenarios.

```
CBXCA38  VBUILD TYPE=XCA
CBPRT38  PORT  ADAPNO=0,CUADDR=3800,SAPADDR=04,MEDIUM=RING,TIMER=60
CBGRP38  GROUP ANSWER=ON,
               AUTOGEN=(10,L,P),
               CALL=INOUT,
               DIAL=YES,
               ISTATUS=ACTIVE
```

## LUGROUP Major Node

As explained in Chapter 2, TN3270 Server Implementation, some devices (such as TN3270E clients) can request a specific LU by name. For those devices that do not request an LU by name, VTAM allocates LUs from a pool. You must define an LUGROUP that instructs VTAM how to allocate the LUs.

Look at the definitions for the LUGROUP and see how they are defined. Figure 4-1 shows the common configuration parameters for defining the LUGROUP. This configuration is standard and does not change throughout the scenarios.

Figure 4-1 LUGROUP Major Node Definition

```
CBDDDLU  VBUILD TYPE=LUGROUP
*********************************************************************
*     LUGROUP MAJOR NODE FOR TN3270S TESTING                        *
*********************************************************************
*   MM/DD/YY - WHO - WHAT                                           *
*********************************************************************
DDDMVSLU LUGROUP
327@@2   LU    DLOGMOD=D4A32782,
                MODETAB=ISTINCLM,
                USSTAB=USSSNA,
                SSCPFM=USSSCS
327@@3   LU    DLOGMOD=D4A32783,
                MODETAB=ISTINCLM,
                USSTAB=USSSNA,
                SSCPFM=USSSCS
327@@4   LU    DLOGMOD=D4A32784,
                MODETAB=ISTINCLM,
                USSTAB=USSSNA,
                SSCPFM=USSSCS
327@@5   LU    DLOGMOD=D4A32785,
                MMODETAB=ISTINCLM,
                USSTAB=USSSNA,
                SSCPFM=USSSCS
327@@2E  LU    DLOGMOD=SNX32702,
                MODETAB=ISTINCLM,
                USSTAB=USSSNA,
                SSCPFM=USSSCS
327@@3E  LU    DLOGMOD=SNX32703,
                MODETAB=ISTINCLM,
                USSTAB=USSSNA,
                SSCPFM=USSSCS
```

```
327@@4E  LU    DLOGMOD=SNX32704,
               MODETAB=ISTINCLM,
               USSTAB=USSSNA,
               SSCPFM=USSSCS
327@@5E  LU    DLOGMOD=SNX32705,
               MODETAB=ISTINCLM,
               USSTAB=USSSNA,
               SSCPFM=USSSCS
@        LU    DLOGMOD=BADMOD,
               MODETAB=ISTINCLM,
               USSTAB=USSSNA,
               SSCPFM=USSSCS
```

At the top of the file is the name of this major node, CBDDDLU. The name of an LUGROUP is DDDMVSLU. This is the name that the LUGROUP parameter in the PU definition maps to.

Below the LU group name is a list of mapping instructions for VTAM. In the left column are terms like 3@7@@2, which correspond with terminal types. The @ sign is used as a wildcard.

The fifth character in the model string that TN3270 Server sends indicates whether a client is TN3270 or TN3270E. You can use a 0 for standard TN3270 clients and an S for TN3270E (SCS) clients.

To accommodate both types of clients, you would need LU model entries like the following:

```
327802  LU   MODETAB=..,
                  DLOGMOD=..,
                  SSCPFM=USS3270,
                  USSTAB=(label of USSTAB with a USS10 in 3270DS)
3278S2  LU   MODETAB=..,
                  DLOGMOD=..,
                  SSCPFM=USSSCS,
                  USSTAB=(label of USSTAB with a USS10 in SCS)
```

Alternatively, you can do as we have in our example and make all clients work with SCS (using the translation feature in the TN3270 Server) by using a wildcard in the fifth position of the character model string as shown below:

```
3278@2  LU   MODETAB=..,
                  DLOGMOD=..,
                  SSCPFM=USSSCS,
                  USSTAB=(label of USSTAB with a USS10 in SCS)
```

If the client is using a 3270 data stream and the mainframe is expecting an SCS data stream, the TN3270 Server translates the 3270 data stream from the client into an SCS data stream for the mainframe and then translates the response into a 3270 data stream. The TN3270 Server cannot translate an SCS data stream from the client into a 3270 data stream for the mainframe. You can specify an SSCPFM of USSSCS for all clients regardless of the type of client.

In the following situations, you might prefer to specify an SSCPFM of USS3270:

- If you currently have all LUs configured for the 3270 data stream and do not want to create a new USSTAB. This situation is relevant only if none of the TN3270 clients uses SCS.
- If you want to use the 3270 data stream to make use of the highlighting and multiple-field screens in the USS10. This situation results in a different look for the two kinds of clients.
- If you are using login scripts. In a 3270 data stream, there must be a blank on the screen to the left of the input field (or in column 80 of the preceding line). The translation algorithm of the TN3270 Server inserts this blank as necessary and shifts the input field one column to the right. The results can confuse login scripts.

**Note:** This works only for TN3270 clients or TN3270E clients that do not negotiate the Bind image and, therefore, do not require the SCS-formatted SSCP-LU dialog.

If you use SCS for TN3270E clients and 3270DS for non-E clients, create separate LU group entries as follows:

- 327@S2 (old model 2)—specify an SSCPFM of USSSCS
- 327@02 (old model 2)—specify an SSCPFM of 3270DS
- 327@S2E (model 2, extended data stream)—specify an SSCPFM of USSSCS
- 327@02E (model 2, extended data stream)—specify an SSCPFM of 3270DS

### Parameters in the LUGROUP Major Node

The lines following the terminal types define the characteristics of the client to VTAM, including screen size. These lines instruct VTAM how to format the character stream that is sent to the client and identify what to expect from the client. If this mapping is incorrect, the data displayed at the client could be corrupted or the connection might fail to work. In addition, these lines tell VTAM what functions are supported. The parameters in this file are as follows:

- DLOGMOD (default logon mode table entry name)—Defines which logon mode is used in the table specified by the MOETAB entry. If this parameter is not specified, the first entry in the table is used.
- MODETAB (logon mode table)—Defines the list of rules that are in effect at logon. This table defines parameters, such as response unit (RU) size, encryption, character set, and type of bind. The MODETAB contains different rules for different logon modes. The default is MODETAB=ISTINCLM.
- USSTAB (unformatted system services tables)—Defines operator messages and certain commands. There are two types of USS tables. The session-level USS table defines the messages and commands for a dependent logical unit (DLU). The default session level is USSTAB=ISTINCDT. The operation-level USS table contains commands and messages that are sent to and received from the VTAM operator. The default operation level is USSTAB=ISTINCNO.
- SSCPFM (system services control point format)—Defines which RU types are used by the LU. Specifying USS3270 causes the USSMSG10 (USS message number 10) to flow to the LU at logon time. This is the logon panel that is displayed when a connection is established (such as the VM/ESA logo).

  There are only two valid combinations of these parameters.
  – For a SCS data stream, use the following:
    SSCPFM=USSSCS
    In this case, the USSTAB is the name of a USS table that contains a USS10 message coded in SCS data stream.
  – For a 3270 data stream(3270DS), use the following:
    SSCPFM=USS3270
    In this case, the USSTAB is the name of a USS table that contains a USS10 message coded in 3270 data stream.

When a client establishes a connection, it tells the server its device type. VTAM matches the device type to one of the entries in the LUGROUP and assigns the parameters.

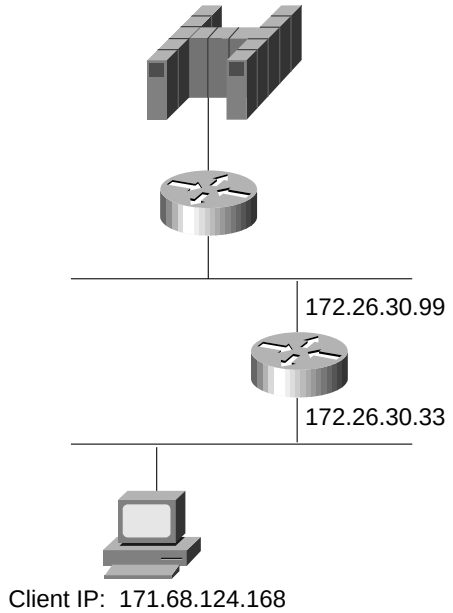
VTAM also allows default mapping for clients when they specify a device type that is not mapped. This situation is covered by the @ LU entry. Anything that does not map to a specific device type in the list is treated as if it has the characteristics mapped to the @ entry. This wildcard entry is used to accept all other clients. It can also be used to reject all other clients and isolate all non-standard terminals.

## Scenario 1: TN3270 Server with Static LUs

In this scenario, we are starting with a legacy SNA network that contains 3174 controllers connected to 3278 type terminals. It is a pure SNA network. We are implementing IP in the network and so we have replaced all our 3278 type terminals with PCs. The network restrictions require the clients to use the same LU names that were defined in the SNA network, so we are going to use static LUs. Static LUs are predefined LUs in the switched PU VTAM definition. Static LUs must be used if extended clients are going to request specific LU names. This configuration is useful for printers, for applications that have terminal-based security, or other situations where the network administrator must control which LU a user is assigned.

We can use the existing switched major node and PU and LU definitions. Because we are using static LUs, either the client software must support TN3270E capabilities or the client nailing parameter must be configured on the TN3270 Server. We have chosen the first option because it reduces the maintenance of the TN3270 Server definitions.

Figure 4-2 TN3270 Server with Static LUs




### Design Considerations

When implementing static LUs with the TN3270 Server, keep in mind the following guidelines:

- If you use only static LUs without LU nailing, as in this scenario, then only TN3270E clients that present an LU name to the channel-attached router are able to connect. TN3270 clients are rejected because they do not request a specific LU name unless you configure LU nailing.

- If the client requests an LU name that VTAM knows, but the channel-attached router does not know this LU name, the request will fail. On the other hand, if the client requests an LU name and the channel-attached router knows this LU name, the activation occurs, even if VTAM knows this LOCADDR is a different LU name.
- If a client requests an LU that is inactive in VTAM, the client is rejected because the channel-attached router does not know the names of inactive LUs. That LOCADDR shows up as a blank name with a status of inactive.
- In most cases it is preferable for the LU name in VTAM to match the LU name in the channel-attached router for static LUs. This way, if a TN3270 client requests an LU name then the channel-attached router knows the correct LU name. Some organizations do not name their LUs based on the LU-seed naming standard. This makes network management difficult because the client and the channel-attached router know one LU name while VTAM knows another LU name. This design is achieved by the PU naming standards. For more information, see "Determining How LUs Will Be Named" in the TN3270 Server Implementation chapter.
- Specific logmodes must be defined for each LU in the switched major node depending on what type of model is going to connect. This increases the management burden because the client cannot change the device type it requests without a corresponding change in the VTAM definitions (unless it also requests a different LU to go with that model).

## Router Configuration

To implement IP in our network, we installed a CIP/CPA in our Cisco 7000 series router with Cisco IOS Release 11.3. We configured CSNA and are ready to implement our TN3270 Server. In this scenario, we need to:

- Initiate the TN3270 Server
- Define the LUs
- Verify the Configuration

It is a good idea to use separate adapters for the TN3270 Server and the CSNA. If the same adapter is used and the External Communications Adapter (XCA) goes down, the adapter will still answer logical link control (LLC) test polls, which will mislead SNA clients that the host connection is still up.

**Note:** The TN3270 Server can also access the host through a Multi-Path Channel (MPC) device.

### Initiate the TN3270 Server

To initiate the TN3270 Server on the router, issue the following commands:

```
! enter interface configuration mode for the virtual interface in slot 1
router(config)#int channel 1/2
! create TN3270 Server entity
router(config-if)#tn3270-server
router(config-if)#lan token 0
router(cfg-lan-Token 0)#adapter 0 4000.4000.0001
router(config-if)#lan token 31
router(cfg-lan-Token 0)#adapter 31 4000.4000.4444
! set server-wide defaults for PU parameters
router(cfg-tn3270)#unbind-action keep
router(cfg-tn3270)#generic-pool permit
```

### Define the LUs

To define the static LUs, issue the following commands:

```
router(cfg-tn3270)#pu puxcpa 0CBCB001 172.26.20.33 tok 31 10 rmac 4000.4000.0001
router(tn3270-pu)#pu puxcpb 0CBCB002 172.26.20.33 tok 31 12 rmac 4000.4000.0001
```

**Note:** Defining the PUs to an adapter other than adapter 0 (we have used adapter 31) means that error messages will not be sent to the adapter that connects to the XCA major node. This is optional. Many sites use a single adapter for both the XCA and PU connections.

### Verify the Configuration

To verify the configuration, use the Cisco IOS show commands. You can view the general TN3270 Server configuration as well as configuration information about the specific PUs and LUs.

#### Viewing the Current Router Configuration

To display the current router configuration, enter the following command:

```
router#show run
Building configuration...

< information deleted >

interface Channel1/2
 ip address 172.26.20.34 255.255.255.240
 no keepalive
 lan TokenRing 0
adapter 31 4000.4000.4444
 TN3270-server
  unbind-action keep
  PU PUXCPA01  0CBCB001 172.26.20.33    token-adapter 31 10 rmac 4000.4000.0001
  PU PUXCPB01  0CBCB002 172.26.20.33    token-adapter 31 12 rmac 4000.4000.0001
```

#### Viewing the Status of PUs

To display the current server configuration parameters and the status of the PUs defined in the server, enter the following command:

```
router#show extended channel 1/2 TN3270-server
                 <current stats < connection stats   <response time(ms)
server-ip:tcp        LU in-use   connect disconn fail   host     tcp
172.26.20.33:23      20     0        0        0     0      0      0
total                20     0
configured max_LU 2100
idle-time    0           keepalive 0      unbind-action keep
ip-preced-screen 0 ip-preced-printer 0 ip-tos-screen  0 ip-tos-printer  0
tcp-port   23            generic-pool permit no timing-mark

name(index)    ip:tcp              xid   state     link   destination   r-lsap
PUXCPA01(9)  172.26.20.33:23     0CBCB001 ACTIVE    tok 31 4000.4000.0001 04 10
PUXCPB01(10) 172.26.20.33:23     0CBCB002 ACTIVE    tok 31 4000.4000.0001 04 12
```

### Viewing a List of LUs

To display the PU configuration parameters, statistics, and all the LUs currently attached to the PU, enter the following command:

```
router#show extended channel 1/2 TN3270-server PU puxcpa01
name(index)    ip:tcp              xid   state     link   destination   r-lsap
PUXCPA01(9)  172.26.20.33:23     0CBCB001 ACTIVE    tok 31 4000.4000.0001 04 10

idle-time    0      keepalive 0      unbind-act keep     generic-pool perm
ip-preced-screen 0 ip-preced-printer 0 ip-tos-screen  0 ip-tos-printer  0
bytes 250 in, 141 out; frames 10 in, 11 out; NegRsp 0 in, 0 out
actLUs 10, dactLUs 0, binds 0
Note: if state is ACT/NA then the client is disconnected

LU    name   client-ip:tcp       nail state    model   frames in out   idle for
2   PUXCPA02 171.68.124.168:1196   N   P-BIND   3278S4E  4       3       0:1:12
3   PUXCPA03 never connected       N   ACT/NA           1       1       0:4:16
4   PUXCPA04 never connected       N   ACT/NA           1       1       0:4:16
5   PUXCPA05 never connected       N   ACT/NA           1       1       0:4:16
6   PUXCPA06 never connected       N   ACT/NA           1       1       0:4:16
7   PUXCPA07 never connected       N   ACT/NA           1       1       0:4:16
8   PUXCPA08 never connected       N   ACT/NA           1       1       0:4:16
9   PUXCPA09 never connected       N   ACT/NA           1       1       0:4:16
10  PUXCPA0A never connected       N   ACT/NA           1       1       0:4:16
11  PUXCPA0B never connected       N   ACT/NA           1       1       0:4:16
```

### Viewing the Status of an LU

To display the status of an LU, enter the following command:

```
router#show extended channel 1/2 TN3270-server PU puxcpa01 LU 02
LU    name   client-ip:tcp       nail state    model   frames in out   idle for
2   PUXCPA02 171.68.124.168:1196   N   P-BIND   3278S4E  4       3       0:1:12

PU is PUXCPA01, LU is STATIC unbound, negotiated TN3270E
bytes 155 in, 1531 out; RuSize 256 in, 256 out; NegRsp 0 in, 0 out
pacing window 0 in, 0 out; credits 0 in, queue-size 0 in, 0 out
```

### Viewing Historical Data for an LU

To display the trace history of an LU, enter the following command:

```
router#show extended channel 1/2 TN3270-server PU puxcpa01 LU 02 history
LU    name   client-ip:tcp       nail state    model   frames in out   idle for
2   PUXCPA02 171.68.124.168:1196   N   P-BIND   3278S4E  4       3       0:1:20

PU is PUXCPA01, LU is STATIC unbound, negotiated TN3270E
bytes 155 in, 1531 out; RuSize 256 in, 256 out; NegRsp 0 in, 0 out
pacing window 0 in, 0 out; credits 0 in, queue-size 0 in, 0 out
traces:
         actLU req
         Client connect req
         Reply PSID neg rsp
         notify resp
OUT len=12   2Dxxxxxxxx426B80000D0201
IN  len=25   xxxxxxxxxx42EB80000D0201000000
IN  len=101  xxxxxxxxxx110B820041038D000000
OUT len=16   2Cxxxxxxxx118F92001003000041
IN  len=20   xxxxxxxxxx010B80008106200C0603
OUT len=12   2Cxxxxxxxx018B8000810620
OUT len=1507 2Cxxxxxxxx01038000C3C9E2C3D6
IN  len=9    2C0000020001838000
```

## Host Configuration

The router configuration does not specify whether a TN3270 Server PU uses static LUs, dynamic LUs, or both. This type of LU is specified only in the VTAM switched major node. All LUs that are predefined in the switched major node are static.

**Note:** Although a LOCADDR of 1 is valid (unlike traditional SNA controllers), we did not use it in this sample. The LOACADDR starts with 2, the first LU name starts with 01. Also, because the LU-seed is not used on the channel-attached router, the LU names on the channel-attached router are different from the ones in VTAM. For example, the VTAM name LUXCPA01 corresponds to the TN3270 Server name PUXCPA02. For more information, see "Determining How LUs Will Be Named" in the TN3270 Server Implementation chapter.

Figure 4-3 shows the configuration of the switched major node for this scenario.

Figure 4-3 Scenario 1: Switched Major Node

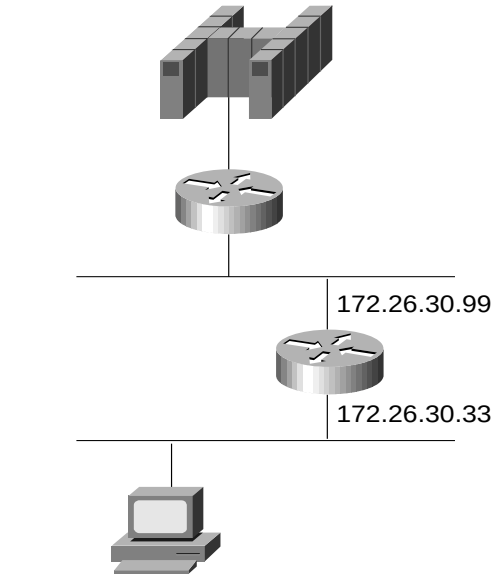
```
*********************************************************************
*    SWITCHED MAJOR NODE                                            *
*********************************************************************
CBSWN1 VBUILD TYPE=SWNET,MAXGRP=10,MAXNO=10
PUXCPA01 PU    ADDR=01,
               PUTYPE=2,ANS=CONT,
               IDBLK=0CB,IDNUM=CB001,
               USSTAB=USSSNA,DLOGMOD=SX32702S,MODETAB=ALAMODE
LUXCPA02 LU    LOCADDR=2
LUXCPA03 LU    LOCADDR=3
LUXCPA04 LU    LOCADDR=4
LUXCPA05 LU    LOCADDR=5
LUXCPA06 LU    LOCADDR=6
LUXCPA07 LU    LOCADDR=7
LUXCPA08 LU    LOCADDR=8
LUXCPA09 LU    LOCADDR=9
LUXCPA10 LU    LOCADDR=10
LUXCPA11 LU    LOCADDR=11
*
PUXCPB01 PU    ADDR=01,
               PUTYPE=2,ANS=CONT,
               IDBLK=0CB,IDNUM=CB002,
               USSTAB=USSSNA,DLOGMOD=SX32702S,MODETAB=ALAMODE
LUXCPB02 LU    LOCADDR=2
LUXCPB03 LU    LOCADDR=3
LUXCPB04 LU    LOCADDR=4
LUXCPB05 LU    LOCADDR=5
LUXCPB06 LU    LOCADDR=6
LUXCPB07 LU    LOCADDR=7
LUXCPB08 LU    LOCADDR=8
LUXCPB09 LU    LOCADDR=9
LUXCPB10 LU    LOCADDR=10
LUXCPB11 LU    LOCADDR=11
```

## Scenario 2: TN3270 Server with Dynamic LUs

In this scenario, we started with our legacy SNA network and have introduced IP and replaced our 3278 type terminals with PCs. This time the design requirement is to minimize the number of LU definitions in VTAM. Using the DDDLU feature of VTAM, we can define several switched PUs, which use dynamic LUs. As clients request a 3270 connection, the channel-attached router requests an LU and VTAM dynamically provides one. Each client receives an LU based on the model and type that it specifies. This process reduces the setup and maintenance cycle for VTAM LUs.

This process also provides greater flexibility to service client requirements without providing an individual LU for every client. For example, this is useful if you have 10,000 clients but only 5,000 log on at the same time. Using static LUs, you must define 10,000 LUs and assign each client a unique LU name. Using DDDLU, however, you can define a pool of 5,000 LUs without creating the static definitions. Each client is assigned an LU name from the pool when they request a connection. With DDDLU, the TN3270 Server can support standard TN3270 clients as well as TN3270E clients.

Figure 4-4 TN3270 Server with Dynamic LUs




## Design Considerations

When implementing dynamic LUs with the TN3270 Server, keep in mind the following guidelines:

- If DDDLU is used and static LUs are not defined, then TN3270E clients that request a specific LU name are rejected.
- Define each dynamic PU with a unique LU-seed parameter in the VTAM switched definition. Otherwise, VTAM attempts to define two LUs with the same name and the second request fails. The TN3270 client shows connected, but the channel-attached router is waiting for the ACTLU to flow.

- The LUGROUP in the switched major node must match the name of LUGROUP in the LU group major node.
- LUs marked as ACT/NA are reused by clients requesting the same model type. Clients requesting a different model type are assigned a new LU from VTAM.

## Router Configuration

The router configuration in this scenario is the similar to the configuration in Scenario 1. To implement IP in our network, we installed a CIP/CPA in our Cisco 7000 series router with Cisco IOS Release 11.3. We configured CSNA and are ready to implement our TN3270 Server. In this scenario, we need to:

- Initiate the TN3270 Server
- Define the LUs
- Verify the Configuration

### Initiate the TN3270 Server

To initiate the TN3270 Server on the router, enter the following commands:

```
! enter interface configuration mode for the virtual interface in slot 1
router(config)#int channel 1/2
! create TN3270 Server entity
router(config-if)#tn3270-server
router(config-if)#lan token 0
router(cfg-lan-Token 0)#adapter 0 4000.4000.0001
router(config-if)#lan token 31
router(cfg-lan-Token 0)#adapter 31 4000.4000.4444
! set server-wide defaults for PU parameters
router(cfg-tn3270)#unbind-action keep
router(cfg-tn3270)#generic-pool permit
```

### Define the LUs

To define the static LUs, enter the following commands:

```
router(cfg-tn3270)#pu puxcpa 05d00001 172.26.20.33 tok 31 10 rmac 4000.4000.0001
router(tn3270-pu)#pu puxcpb 05d00002 172.26.20.34 tok 31 12 rmac 4000.4000.0001
  lu-seed pub##
router(tn3270-pu)#pu puxcpc 05d00003 172.26.20.35 tok 31 14 rmac 4000.4000.0001
  lu-seed pu3###
```

### Verify the Configuration

To verify the configuration, use the Cisco IOS show commands. You can view the general TN3270 Server configuration as well as configuration information about the specific PUs and LUs.

### Viewing the Current Router Configuration

To display the current router configuration, enter the following command:

```
router#show run
Building configuration...

<deleted information>

interface Channel1/2
 ip address 172.26.20.33 255.255.255.240
 no keepalive
 lan TokenRing 0
  adapter 0 4000.4000.0001
  adapter 31 4000.4000.4444
 TN3270-server
  unbind-action keep
  PU PUXCPA01 0CBCB001 172.26.20.34    token-adapter 31 10 rmac 4000.4000.0001
  PU PUXCPB01 0CBCB002 172.26.20.34    token-adapter 31 12 rmac 4000.4000.0001 LU-seed
  PUB##
  PU PUXCPC01 0CBCB003 172.26.20.35    token-adapter 31 14 rmac 4000.4000.0001 LU-seed
  PU3###
```

### Viewing the Status of PUs

To display the current server configuration parameters and the status of the PUs defined in the server, enter the following command:

```
router#show extended channel 1/2 TN3270-server
                 <current stats < connection stats   <response time(ms)
server-ip:tcp        LU in-use   connect disconn fail   host     tcp
172.26.20.34:23     510     1        2        1     0      0      0
172.26.20.35:23     255     1        1        0     0      0      0
total               765     2
configured max_LU 2100
idle-time    0           keepalive 1800      unbind-action keep
ip-preced-screen 0 ip-preced-printer 0 ip-tos-screen  0 ip-tos-printer  0
tcp-port   23            generic-pool permit no timing-mark

name(index)    ip:tcp              xid   state     link   destination   r-lsap
PUXCPA01(15) 172.26.20.34:23     0CBCB001 ACTIVE    tok 31 4000.4000.0001 04 10
PUXCPB01(16) 172.26.20.34:23     0CBCB002 ACTIVE    tok 31 4000.4000.0001 04 12
PUXCPC01(14) 172.26.20.35:23     0CBCB003 ACTIVE    tok 31 4000.4000.0001 04 14
```

### Viewing a List of LUs

To display the PU configuration parameters, statistics, and all the LUs currently attached to each PU, enter the following commands:

```
router#show extended channel 1/2 TN3270-server PU puxcpa01
name(index)    ip:tcp              xid   state     link   destination   r-lsap
PUXCPA01(15) 172.26.20.34:23     0CBCB001 ACTIVE    tok 31 4000.4000.0001 04 10

idle-time    0      keepalive 1800      unbind-act keep     generic-pool perm
ip-preced-screen 0 ip-preced-printer 0 ip-tos-screen  0 ip-tos-printer  0
bytes 0 in, 21 out; frames 0 in, 1 out; NegRsp 0 in, 0 out
actLUs 0, dactLUs 0, binds 0
LU    name   client-ip:tcp       nail state    model   frames in out   idle for
```

To view the PU with static LUs, enter the following command:

```
router#show extended channel 1/2 TN3270-server PU puxcpb01
name(index)    ip:tcp               xid   state     link   destination   r-lsap
PUXCPB01(16) 172.26.20.34:23     0CBCB002 ACTIVE    tok 31 4000.4000.0001 04 12

LU-seed PUB##
idle-time    0      keepalive 1800      unbind-act keep     generic-pool perm
ip-preced-screen 0 ip-preced-printer 0 ip-tos-screen  0 ip-tos-printer  0
bytes 582 in, 2281 out; frames 26 in, 27 out; NegRsp 0 in, 0 out
actLUs 2, dactLUs 0, binds 1
LU    name   client-ip:tcp       nail state    model   frames in out   idle for
1   PUB01    171.68.124.165:1065   N   ACT/NA   VT400    5       3       0:8:2
2   PUB02    171.68.124.168:1215   N   ACT/SESS 327904E  21      20      0:3:33


router#show extended channel 1/2 TN3270-server PU puxcpc01
name(index)    ip:tcp               xid   state     link   destination   r-lsap
PUXCPC01(14) 172.26.20.35:23     0CBCB003 ACTIVE    tok 31 4000.4000.0001 04 14

LU-seed PU3###
idle-time    0      keepalive 1800      unbind-act keep     generic-pool perm
ip-preced-screen 0 ip-preced-printer 0 ip-tos-screen  0 ip-tos-printer  0
bytes 1420 in, 4141 out; frames 21 in, 22 out; NegRsp 0 in, 0 out
actLUs 2, dactLUs 0, binds 1
Note: If state is ACT/NA then the client is disconnected
LU    name   client-ip:tcp       nail state    model   frames in out   idle for
2   PU3002   never connected       N   ACT/NA            1       1       0:10:54
3   PU3003   171.68.124.168:1213   N   ACT/SESS 3278S4E  20      19      0:3:31
```

### Viewing the Status of an LU

To display the status of the LUs, enter the following commands for each LU:

```
router#show extended channel 1/2 TN3270-server PU puxcpb01 LU 02
Note: If state is ACT/NA then the client is disconnected
LU    name   client-ip:tcp       nail state    model   frames in out   idle for
2   PUB02    171.68.124.168:1215   N   ACT/SESS 327904E  21      20      0:4:4

PU is PUXCPB01, LU is DYNAMIC type 2, negotiated TN3270
bytes 326 in, 689 out; RuSize 1024 in, 3840 out; NegRsp 0 in, 6 out
pacing window 0 in, 1 out; credits 0 in, queue-size 0 in, 0 out

router#show extended channel 1/2 TN3270-server PU puxcpc01 LU 03
Note: If state is ACT/NA then the client is disconnected
LU    name   client-ip:tcp       nail state    model   frames in out   idle for
3   PU3003   171.68.124.168:1213   N   ACT/SESS 3278S4E  20      19      0:4:16

PU is PUXCPC01, LU is STATIC type 2, negotiated TN3270E
bytes 1395 in, 4096 out; RuSize 1024 in, 3840 out; NegRsp 0 in, 5 out
pacing window 0 in, 1 out; credits 0 in, queue-size 0 in, 0 out
```

In the examples above, we see that LU 02 is a dynamic LU and LU 03 is static.

### Viewing LUs Associated with an IP Address

To display information about LUs defined under an IP address, enter the following command:

```
router#sh ext ch 1/2 tn client-ip-address 171.68.124.168
Note: If state is ACT/NA then the client is disconnected
LU    name   client-ip:tcp       nail state    model   frames in out   idle for
3   PU3003   171.68.124.168:1213   N   ACT/SESS 3278S4E  20      19      0:4:47

PU is PUXCPC01, LU is STATIC type 2, negotiated TN3270E
bytes 1395 in, 4096 out; RuSize 1024 in, 3840 out; NegRsp 0 in, 5 out
pacing window 0 in, 1 out; credits 0 in, queue-size 0 in, 0 out
Note: if state is ACT/NA then the client is disconnected

LU    name   client-ip:tcp       nail state    model   frames in out   idle for
2   PUB02    171.68.124.168:1215   N   ACT/SESS 327904E  21      20      0:4:55

PU is PUXCPB01, LU is DYNAMIC type 2, negotiated TN3270
bytes 326 in, 689 out; RuSize 1024 in, 3840 out; NegRsp 0 in, 6 out
pacing window 0 in, 1 out; credits 0 in, queue-size 0 in, 0 out
Total 2 clients found using 171.68.124.168
```

## Host Configuration

The router configuration does not specify whether a TN3270 server PU uses static LUs, dynamic LUs, or both. The type of LU is specified only in the VTAM switched major node. Any LOCADDRs not defined in the switched major node (potential LOCADDRs are between 1 and 255) are used as dynamic LUs.

Figure 4-5 shows the configuration of the switched major node for this scenario.

Figure 4-5 Scenario 2: Switched Major Node

```
*********************************************************************
*    SWITCHED MAJOR NODE                                            *
*********************************************************************
CBSWN1 VBUILD TYPE=SWNET,MAXGRP=10,MAXNO=10
*
PUXCPA01 PU    ADDR=01,
               PUTYPE=2,ANS=CONT,
               LUGROUP=DDDMVSLU,
               IDBLK=0CB,IDNUM=CB001,
               USSTAB=USSSNA,DLOGMOD=SX32702S,MODETAB=ALAMODE
*
PUXCPB01 PU    ADDR=01,
               PUTYPE=2,INCLUD0E=YES,ANS=CONT,
               LUGROUP=DDDMVSLU,LUSEED=PUB##,
               IDBLK=0CB,IDNUM=CB002,
               USSTAB=USSSNA,DLOGMOD=SX32702S,MODETAB=ALAMODE
*
PUXCPC01 PU    ADDR=01,
               PUTYPE=2,INCLUD0E=YES,ANS=CONT,
               LUGROUP=DDDMVSLU,LUSEED=PU3###,
               IDBLK=0CB,IDNUM=CB003,
               USSTAB=USSSNA,DLOGMOD=SX32702S,MODETAB=ALAMODE
LUXCPC01 LU    LOCADDR=1
LUXCPC02 LU    LOCADDR=2
```

### Verify the VTAM Configuration

To display the status of the switched major node, enter the following command:

```
D NET,ID=CBSWN1,E
IST097I DISPLAY ACCEPTED
IST075I NAME = CBSWN2, TYPE = SW SNA MAJ NODE 572
IST486I STATUS= ACTIV, DESIRED STATE= ACTIV
IST1656I VTAMTOPO = REPORT, NODE REPORTED - YES
IST084I NETWORK RESOURCES:
IST089I PUXCPA01 TYPE = PU_T2.1          , ACTIV
IST089I PUXCPB01 TYPE = PU_T2.1          , ACTIV
IST089I PUB02    TYPE = LOGICAL UNIT     , ACTIV---X-
IST089I PUB01    TYPE = LOGICAL UNIT     , ACTIV---X-
IST089I PUXCPC01 TYPE = PU_T2.1          , ACTIV
IST089I PU3001   TYPE = LOGICAL UNIT     , ACTIV---X-
IST089I LUXCPC01 TYPE = LOGICAL UNIT     , ACTIV
IST089I LUXCPC02 TYPE = LOGICAL UNIT     , ACTIV
IST314I END
```

**Note:** The LUs that are dynamically created using DDDLU are shown with a status of ACTIV---X-. The 'X' means dynamically created.

To display the status of a VTAM PU, enter the following command:

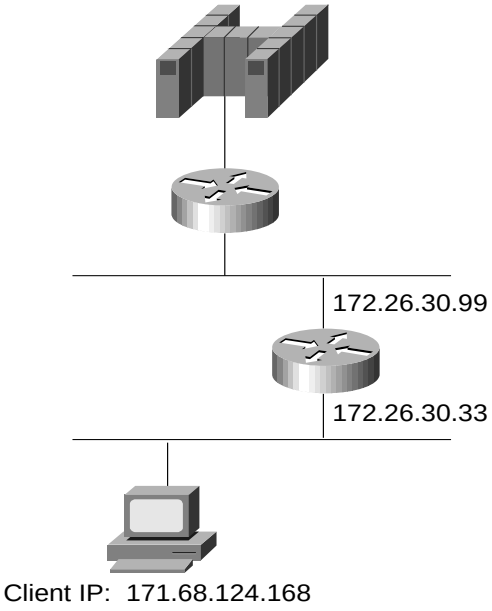
```
D NET,ID=PUXCPC01,E
IST097I DISPLAY ACCEPTED
IST075I NAME = PUXCPC01, TYPE = PU_T2.1 597
IST486I STATUS= ACTIV, DESIRED STATE= ACTIV
IST1058I MODEL LU GROUP = DDDMVSLU, LUSEED = PU3###
IST1043I CP NAME = PUXCPC01, CP NETID = NETA, DYNAMIC LU = YES
IST1589I XNETALS = YES
IST1105I RESOURCE STATUS TGN CP-CP TG CHARACTERISTICS
IST1106I PUXCPC01 AC/R     0 YES   907500000000000000000014C00808080
IST1482I HPR = RTP - OVERRIDE = N/A - CONNECTION = NO
IST136I SWITCHED SNA MAJOR NODE = CBSWN2
IST081I LINE NAME = L3800000, LINE GROUP = CBGRP38, MAJNOD = CBXCA38
IST654I I/O TRACE = OFF, BUFFER TRACE = OFF
IST1500I STATE TRACE = OFF
IST1656I VTAMTOPO = REPORT, NODE REPORTED - YES
IST1657I MAJOR NODE VTAMTOPO = REPORT
IST355I LOGICAL UNITS:
IST080I PU3001   ACTIV---X- LUXCPC01 ACTIV      LUXCPC02 ACTIV
IST314I END
```

**Note:** The VTAM says 'DYNAMIC LU = YES' for this PU. The ACTIV---X- is next to the dynamically created LUs. The statically defined LUs do not have the X.

## Scenario 3: TN3270 Server Using LU Nailing

In this scenario, we are going to use LU nailing to control the LU that is assigned to a particular IP address. In an SNA environment, there are often requirements to control the LUs that are assigned to particular clients, such as printers. This control is important for printers that need a predefined name and applications that use terminal-based security, such as IMS applications. There are two methods to address this requirement; the first option is to have the client use TN3270E and specify the LU name; the second option is to control the LU names allocated using LU nailing. Using LU nailing allows you to centrally control which clients can connect to certain LUs. It also allows standard TN3270 clients to access a specific LU or pool of LUs.

Figure 4-6 TN3270 Server Using LU Nailing




### Design Considerations

When implementing LU nailing with the TN3270 Server, keep in mind that new client statements are added to the end of the list for that particular PU (similar to configuring access lists).

**Note:** For more information on LU nailing, see "LU Nailing" in the TN3270 Server Implementation chapter.

### Router Configuration

The router configuration in this scenario is the similar to Scenario 2. In this scenario, we need to:

- Initiate the TN3270 Server
- Define the LUs
- Configure LU Nailing
- Limit the Number of TN3270 Sessions (Optional)
- Verify the Configuration

### Initiate the TN3270 Server

To initiate the TN3270 Server on the router, enter the following commands:

```
! enter interface configuration mode for the virtual interface in slot 1
router(config)#int channel 1/2
! create TN3270 Server entity
router(config-if)#tn3270-server
router(config-if)#lan token 0
router(cfg-lan-Token 0)#adapter 0 4000.4000.0001
router(config-if)#lan token 31
router(cfg-lan-Token 0)#adapter 31 4000.4000.4444
! set server-wide defaults for PU parameters
router(cfg-tn3270)#unbind-action keep
router(cfg-tn3270)#generic-pool permit
```

### Define the LUs

To define the static LUs, enter the following commands:

```
router(cfg-tn3270)#pu puxcpa 0CBCB001 172.26.20.34 tok 31 10 rmac 4000.4000.0001
  LU-seed LU1###
```

### Configure LU Nailing

To specify the LUs that are to be assigned to specific clients, enter the following commands:

```
router(cfg-tn3270)#pu puxcpa
router(tn3270-pu)#client ip 171.68.124.168 LU 1
router(tn3270-pu)#client ip 171.68.124.0 255.255.255.0 LU 3 50
router(tn3270-pu)#client ip 171.68.110.40 LU 51
router(tn3270-pu)#client ip 171.68.110.0 255.255.255.0 LU 52 100
```

### Limit the Number of TN3270 Sessions (Optional)

To limit the number of TN3270 sessions that can be established by a particular client, enter the following command:

```
router(cfg-tn3270)#client 172.1.1.1 LU maximum 2
```

In this case 172.1.1.1 is never allocated more than two LOCADDRs and can establish only up to two TN3270 sessions. This action is called LU capping.

### Verify the Configuration

To verify the configuration, use the Cisco IOS show commands. The show commands allow you to view the general TN3270 Server configuration and configuration information about the specific PUs and LUs.

#### Viewing the Current Router Configuration

To display the current router configuration, enter the following command:

```
router#show run
Building configuration...

<deleted information>

interface Channel1/2
 ip address 172.26.20.33 255.255.255.240
 no keepalive
 lan TokenRing 0
  adapter 0 4000.4000.0001
  adapter 31 4000.4000.4444
```

```
TN3270-server
 unbind-action keep
 PU PUXCPA01 0CBCB001 172.26.20.34   token-adapter 31 10 rmac 4000.4000.0001 LU-seed
 LU1###
  client ip 171.68.124.168 LU 1
  client ip 171.68.124.0 255.255.255.0 LU 3 50
  client ip 171.68.110.40 LU 51
  client ip 171.68.110.0 255.255.255.0 LU 52 100
```

### Viewing the Status of PUs

To display the current server configuration parameters and the status of the PUs defined in the server, enter the following command:

```
router#show extended channel 1/2 TN3270-server
                 <current stats < connection stats   <response time(ms)
server-ip:tcp        LU in-use   connect disconn fail   host     tcp
172.26.20.34:23     255     3       10        7     0      0      0
total               255     3
configured max_LU 2100
idle-time    0           keepalive 1800      unbind-action keep
ip-preced-screen 0 ip-preced-printer 0 ip-tos-screen  0 ip-tos-printer  0
tcp-port   23            generic-pool permit no timing-mark

name(index)    ip:tcp              xid   state     link   destination   r-lsap
PUXCPA01(18) 172.26.20.34:23     0CBCB001 ACTIVE    tok 31 4000.4000.0001 04 10
```

### Viewing a List of LUs

To display the PU configuration parameters, statistics, and all the LUs currently attached to each PU, enter the following command:

```
router#show extended channel 1/2 TN3270-server PU puxcpa01

name(index)    ip:tcp              xid   state     link   destination   r-lsap
PUXCPA01(18) 172.26.20.34:23     0CBCB001 ACTIVE    tok 31 4000.4000.0001 04 10

LU-seed LU1###
idle-time    0      keepalive 1800      unbind-act keep     generic-pool perm
ip-preced-screen 0 ip-preced-printer 0 ip-tos-screen  0 ip-tos-printer  0
bytes 2032 in, 6176 out; frames 40 in, 43 out; NegRsp 0 in, 0 out
actLUs 7, dactLUs 0, binds 0
Note: if state is ACT/NA then the client is disconnected

LU    name   client-ip:tcp       nail state    model   frames in out   idle for
1   LU1001   171.68.124.168:1448   Y   P-BIND   327904   3       2       0:19:59
3   LU1003   171.68.124.168:1444   Y   ACT/NA   327904   10      6       0:20:7
4   LU1004   171.68.124.165:2035   Y   ACT/NA   VT400    5       3       0:11:1
5   LU1005   171.68.124.165:2075   Y   ACT/NA   VT400    5       3       0:11:13
6   LU1006   171.68.124.165:2080   Y   ACT/NA   VT400    5       3       0:10:48
51  LU1051   171.68.110.40:36186   Y   P-BIND   327904E  8       5       0:8:12
52  LU1052   171.68.110.40:36187   Y   P-BIND   327904E  3       2       0:7:55

client ip        mask             nail-type   LU first  LU last
171.68.124.168                    screen      1
171.68.124.0     255.255.255.0    screen      3         50
171.68.110.40                     screen      51
171.68.110.0     255.255.255.0    screen      52        100
```

**Note:** This command also displays the specific nailed LUs.

### Viewing the Status of an LU

To display the status of the LUs, enter the following command for each LU:

```
router#show extended channel 1/2 tn3270-server PU puxcpa01 LU 01
Note: If state is ACT/NA then the client is disconnected
LU    name   client-ip:tcp       nail state    model   frames in out   idle for
1   LU1001   171.68.124.168:1448   Y   P-BIND   327904   3       2       0:20:20

PU is PUXCPA01, LU is DYNAMIC unbound, negotiated TN3270
bytes 135 in, 213 out; RuSize 256 in, 256 out; NegRsp 0 in, 0 out
pacing window 0 in, 0 out; credits 0 in, queue-size 0 in, 0 out
```

### Viewing Nailed LUs

To display mappings between a nailed client IP address and nailed LUs, enter the following command:

```
router#show extended channel 1/2 tn3270-server nailed-ip 171.68.124.168
  171.68.124.168                   LU PUXCPA01 LU 1
  171.68.124.0    255.255.255.0    LU PUXCPA01 LU 3   50
  171.68.110.40                    LU PUXCPA01 LU 51
  171.68.110.0    255.255.255.0    LU PUXCPA01 LU 52  100
```

**Note:** The output of this command is a subset of the show extended channel TN3270-Server PU command.

### Viewing LUs Associated with an IP Address

To display information about LUs defined under an IP address, enter the following command:

```
router#show extended channel 1/2 tn3270-server client-ip-address 171.68.124.168
Note: If state is ACT/NA then the client is disconnected
LU    name   client-ip:tcp       nail state    model   frames in out   idle for
3   LU1003   171.68.124.168:1444   Y   ACT/NA   327904   10      6       0:24:0

PU is PUXCPA01, LU is DYNAMIC unbound, negotiated TN3270
bytes 507 in, 450 out; RuSize 0 in, 0 out; NegRsp 0 in, 0 out
pacing window 0 in, 0 out; credits 0 in, queue-size 0 in, 0 out
Note: if state is ACT/NA then the client is disconnected

LU    name   client-ip:tcp       nail state    model   frames in out   idle for
1   LU1001   171.68.124.168:1448   Y   P-BIND   327904   3       2       0:23:52

PU is PUXCPA01, LU is DYNAMIC unbound, negotiated TN3270
bytes 135 in, 213 out; RuSize 256 in, 256 out; NegRsp 0 in, 0 out
pacing window 0 in, 0 out; credits 0 in, queue-size 0 in, 0 out
Total 2 clients found using 171.68.124.168
```

**Note:** The IP address shown has two LUs assigned.

## Host Configuration

Figure 4-7 shows the configuration of the switched major node for this scenario.

Figure 4-7 Scenario 3: Switched Major Node

```
*************************************************************************
*    SWITCHED MAJOR NODE                                                *
*************************************************************************
CBSWN5 VBUILD TYPE=SWNET,MAXGRP=10,MAXNO=10
*
PUXCPA01 PU    ADDR=01,                                                 X
               PUTYPE=2,ANS=CONT,                                       X
               LUGROUP=DDDMVSLU,LUSEED=LU1###,                          X
               IDBLK=0CB,IDNUM=CB001,                                   X
```

### Verify the VTAM Configuration

To display the status of the switched major node, enter the following command:

```
D NET,ID=CBSWN5,E
IST097I DISPLAY ACCEPTED
IST075I NAME = CBSWN5, TYPE = SW SNA MAJ NODE 537
IST486I STATUS= ACTIV, DESIRED STATE= ACTIV
IST1656I VTAMTOPO = REPORT, NODE REPORTED – YES
IST084I NETWORK RESOURCES:
IST089I PUXCPA01 TYPE = PU_T2.1          , ACTIV
IST089I LU1052   TYPE = LOGICAL UNIT     , ACTIV---X-
IST089I LU1051   TYPE = LOGICAL UNIT     , ACTIV---X-
IST089I LU1006   TYPE = LOGICAL UNIT     , ACTIV---X-
IST089I LU1005   TYPE = LOGICAL UNIT     , ACTIV---X-
IST089I LU1004   TYPE = LOGICAL UNIT     , ACTIV---X-
IST089I LU1001   TYPE = LOGICAL UNIT     , ACTIV---X-
IST089I LU1003   TYPE = LOGICAL UNIT     , ACTIV---X-
IST314I END
```

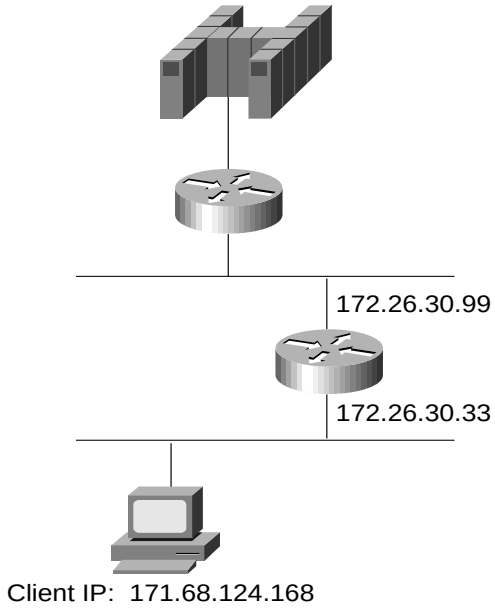
The ACTIV---X- indicates that these LUs were dynamically created.

**Note:** The LU names defined in the switched major node are different from the ones assigned at the TN3270 Server. For more information about LU names, see “Determining How LUs Will Be Named” in the TN3270 Server Implementation chapter.

## Scenario 4: TN3270 Server Using LU Nailing with Static LUs

In this scenario, we address the situation in which you have a group of statically defined LUs that are not available for use by a pool of LUs. The only clients that can request and use these static LUs must be TN3270E-capable clients. The Cisco solution for this is to configure the PU with client nailing to allow all IP addresses to request the group of static LUs. Configuring this parameter creates a pool of LUs, even though the LUs are static, and allow clients that are not TN3270E clients to access the static LUs.

Figure 4-8 TN3270 Server Using LU Nailing with Static LUs




### Router Configuration

We have configured CSNA and are now ready to implement our TN3270 Server. In this scenario, we need to:

- Initiate the TN3270 Server
- Define the LUs
- Configure LU Nailing
- Limit the Number of TN3270 Sessions (Optional)
- Verify the Configuration

### Initiate the TN3270 Server

To initiate the TN3270 Server on the router, enter the following commands:

```
! enter interface configuration mode for the virtual interface in slot 1
router(config)#int channel 1/2
! create TN3270 Server entity
router(config-if)#tn3270-server
router(config-if)#lan token 0
router(cfg-lan-Token 0)#adapter 0 4000.4000.0001
router(config-if)#lan token 31
router(cfg-lan-Token 0)#adapter 31 4000.4000.4444
! set server-wide defaults for PU parameters
router(cfg-tn3270)#unbind-action keep
router(cfg-tn3270)#generic-pool permit
```

### Define the LUs

To define the LU-seed used by the router, enter the following command:

```
router(cfg-tn3270)#pu puxcpa06 0CBCBA06 172.26.20.34 tok 31 10 rmac 4000.4000.0001
  LU-seed LUXCPA##
```

### Configure LU Nailing

To specify the LUs that are assigned to specific clients, enter the following commands:

```
router(cfg-tn3270)#pu puxcpa06
router(tn3270-pu)#client ip 171.68.124.165 LU 1 2
router(tn3270-pu)#client ip 171.68.124.0 255.255.255.0 LU 3 5
router(tn3270-pu)#client ip 171.68.110.0 255.255.255.0 LU 6 10
router(tn3270-pu)#client ip 171.68.120.0 255.255.255.0 LU 11 15
router(tn3270-pu)#client ip 171.68.130.0 255.255.255.0 LU 16 20
```

### Limit the Number of TN3270 Sessions (Optional)

To limit the number of TN3270 sessions that can be established by a particular client, enter the following command:

```
router(cfg-tn3270)#client 172.1.1.1 LU maximum 2
```

In this case 172.1.1.1 will never be allocated more than two LOCADDRs and can, therefore, only establish up to two TN3270 sessions. This is called LU capping.

### Verify the Configuration

To verify the configuration, use the Cisco IOS show commands. The show commands allow you to view the general TN3270 Server configuration and configuration information about the specific PUs and LUs.

#### Viewing the Current Router Configuration

To display the current router configuration, enter the following command:

```
router#show run
Building configuration...

<deleted information>

interface Channel1/2
 ip address 172.26.20.33 255.255.255.240
 no keepalive
 lan TokenRing 0
  adapter 0 4000.4000.0001
  adapter 31 4000.4000.4444
```

```
TN3270-server
 unbind-action keep
 PU PUXCPA06 0CBCBA06 172.26.20.34    token-adapter 31 10 rmac 4000.4000.0001 LU-seed
 LUXCPA##
  client ip 171.68.124.165 LU 1 2
  client ip 171.68.124.0 255.255.255.0 LU 3 5
  client ip 171.68.110.0 255.255.255.0 LU 6 10
  client ip 171.68.120.0 255.255.255.0 LU 11 15
  client ip 171.68.130.0 255.255.255.0 LU 16 20
```

### Viewing the Status of PUs

To display the current server configuration parameters and the status of the PUs defined in the server, enter the following command:

```
router#show extended channel 1/2 tn3270-server
                 <current stats < connection stats   <response time(ms)
server-ip:tcp        LU in-use   connect disconn fail   host     tcp
172.26.20.34:23      20     6        6        0     0      0      0
total                20     6
configured max_LU 2100
idle-time    0           keepalive 1800      unbind-action keep
ip-preced-screen 0 ip-preced-printer 0 ip-tos-screen  0 ip-tos-printer  0
tcp-port   23            generic-pool permit no timing-mark

name(index)    ip:tcp              xid   state     link   destination   r-lsap
PUXCPA06(22) 172.26.20.34:23     0CBCBA06 ACTIVE    tok 31 4000.4000.0001 04 10
```

### Viewing a List of LUs

To display the PU configuration parameters, statistics, and all the LUs currently attached to each PU, enter the following command:

```
router#show extended channel 1/2 tn3270-server PU puxcpa06
name(index)    ip:tcp              xid   state     link   destination   r-lsap
PUXCPA06(22) 172.26.20.34:23     0CBCBA06 ACTIVE    tok 31 4000.4000.0001 04 10

LU-seed LUXCPA##
idle-time    0      keepalive 1800      unbind-act keep     generic-pool perm
ip-preced-screen 0 ip-preced-printer 0 ip-tos-screen  0 ip-tos-printer  0
bytes 1280 in, 9471 out; frames 38 in, 39 out; NegRsp 0 in, 0 out
actLUs 20, dactLUs 0, binds 0
Note: If state is ACT/NA then the client is disconnected
LU    name   client-ip:tcp       nail state    model   frames in out   idle for
1   LUXCPA01 171.68.124.165:1364   Y   P-BIND   327802   4       3       0:1:27
2   LUXCPA02 171.68.124.165:1365   Y   P-BIND   327802   4       3       0:1:22
3   LUXCPA03 171.68.124.168:1617   Y   P-BIND   327904   4       3       0:1:29
4   LUXCPA04 171.68.124.165:1366   Y   P-BIND   327902E  4       3       0:1:16
5   LUXCPA05 never connected       Y   ACT/NA           1       1       0:1:57
6   LUXCPA06 171.68.110.40:36202   Y   P-BIND   327904E  4       3       0:0:57
7   LUXCPA07 171.68.110.40:36203   Y   P-BIND   327904E  4       3       0:0:48
8   LUXCPA08 never connected       Y   ACT/NA           1       1       0:1:57
9   LUXCPA09 never connected       Y   ACT/NA           1       1       0:1:57
10  LUXCPA0A never connected       Y   ACT/NA           1       1       0:1:57
11  LUXCPA0B never connected       Y   ACT/NA           1       1       0:1:57
12  LUXCPA0C never connected       Y   ACT/NA           1       1       0:1:57
13  LUXCPA0D never connected       Y   ACT/NA           1       1       0:1:57
14  LUXCPA0E never connected       Y   ACT/NA           1       1       0:1:58
15  LUXCPA0F never connected       Y   ACT/NA           1       1       0:1:58
16  LUXCPA10 never connected       Y   ACT/NA           1       1       0:1:58
17  LUXCPA11 never connected       Y   ACT/NA           1       1       0:1:58
18  LUXCPA12 never connected       Y   ACT/NA           1       1       0:1:58
```

```
19  LUXCPA13 never connected       Y   ACT/NA            1       1       0:1:58
20  LUXCPA14 never connected       Y   ACT/NA            1       1       0:1:58

client ip        mask            nail-type   LU first  LU last
171.68.124.165                   screen      1         2
171.68.124.0     255.255.255.0   screen      3         5
171.68.110.0     255.255.255.0   screen      6         10
171.68.120.0     255.255.255.0   screen      11        15

171.68.130.0     255.255.255.0   screen      16        20
```

### Viewing Nailed LUs

To display mappings between a nailed client IP address and nailed LUs, enter the following command:

```
router#show extended channel 1/2 tn nailed-ip 171.68.124.168
  171.68.124.165                  PU PUXCPA06 LU 1   2
  171.68.124.0    255.255.255.0   PU PUXCPA06 LU 3   5
  171.68.110.0    255.255.255.0   PU PUXCPA06 LU 6   10
  171.68.120.0    255.255.255.0   PU PUXCPA06 LU 11  15
  171.68.130.0    255.255.255.0   PU PUXCPA06 LU 16  20
```

### Viewing the Status of an LU

To display the status of the LUs, enter the following command for each LU:

```
router#show extended channel 1/2 tn3270-server PU puxcpa06 LU 06
Note: If state is ACT/NA then the client is disconnected
LU    name   client-ip:tcp       nail state    model   frames in out   idle for
6   LUXCPA06 171.68.110.40:36202   Y   P-BIND   327904E  4       3       0:3:10

PU is PUXCPA06, LU is STATIC unbound, negotiated TN3270
bytes 155 in, 1531 out; RuSize 256 in, 256 out; NegRsp 0 in, 0 out
pacing window 0 in, 0 out; credits 0 in, queue-size 0 in, 0 out
```

Although the client is a TN3270 non-E client, the LU assigned is a static LU.

## Host Configuration

Figure 4-9 shows the configuration of the switched major node for this scenario. The LUs are configured as static LUs.

Figure 4-9 Scenario 4: Switched Major Node

```
************************************************************************
*    SWITCHED MAJOR NODE                                               *
************************************************************************
CBSWN6 VBUILD TYPE=SWNET,MAXGRP=10,MAXNO=10
*
PUXCPA06 PU    ADDR=01,
               PUTYPE=2,ANS=CONT,
               IDBLK=0CB,IDNUM=CBA06,
               USSTAB=USSSNA,DLOGMOD=SX32702S,MODETAB=ALAMODE
LUXCPA01 LU    LOCADDR=1
LUXCPA02 LU    LOCADDR=2
LUXCPA03 LU    LOCADDR=3
LUXCPA04 LU    LOCADDR=4
LUXCPA05 LU    LOCADDR=5
LUXCPA06 LU    LOCADDR=6
LUXCPA07 LU    LOCADDR=7
LUXCPA08 LU    LOCADDR=8
LUXCPA09 LU    LOCADDR=9
LUXCPA0A LU    LOCADDR=10
```

```
LUXCPA0B LU    LOCADDR=11
LUXCPA0C LU    LOCADDR=12
LUXCPA0D LU    LOCADDR=13
LUXCPA0E LU    LOCADDR=14
LUXCPA0F LU    LOCADDR=15
LUXCPA10 LU    LOCADDR=16
LUXCPA11 LU    LOCADDR=17
LUXCPA12 LU    LOCADDR=18
LUXCPA13 LU    LOCADDR=19
LUXCPA14 LU    LOCADDR=20
LUXCPA15 LU    LOCADDR=21
```

### Verify the VTAM Configuration

To display the status of the switched major node, enter the following command:

```
D NET,ID=CBSWN6,E
IST097I DISPLAY ACCEPTED
IST075I NAME = CBSWN6, TYPE = SW SNA MAJ NODE 223
IST486I STATUS= ACTIV, DESIRED STATE= ACTIV
IST1656I VTAMTOPO = REPORT, NODE REPORTED - YES
IST084I NETWORK RESOURCES:
IST089I PUXCPA06 TYPE = PU_T2.1          , ACTIV
IST089I LUXCPA01 TYPE = LOGICAL UNIT     , ACTIV
IST089I LUXCPA02 TYPE = LOGICAL UNIT     , ACTIV
IST089I LUXCPA03 TYPE = LOGICAL UNIT     , ACTIV
IST089I LUXCPA04 TYPE = LOGICAL UNIT     , ACTIV
IST089I LUXCPA05 TYPE = LOGICAL UNIT     , ACTIV
IST089I LUXCPA06 TYPE = LOGICAL UNIT     , ACTIV
IST089I LUXCPA07 TYPE = LOGICAL UNIT     , ACTIV
IST089I LUXCPA08 TYPE = LOGICAL UNIT     , ACTIV
IST089I LUXCPA09 TYPE = LOGICAL UNIT     , ACTIV
IST089I LUXCPA0A TYPE = LOGICAL UNIT     , ACTIV
IST089I LUXCPA0B TYPE = LOGICAL UNIT     , ACTIV
IST089I LUXCPA0C TYPE = LOGICAL UNIT     , ACTIV
IST089I LUXCPA0D TYPE = LOGICAL UNIT     , ACTIV
IST089I LUXCPA0E TYPE = LOGICAL UNIT     , ACTIV
IST089I LUXCPA0F TYPE = LOGICAL UNIT     , ACTIV
IST089I LUXCPA10 TYPE = LOGICAL UNIT     , ACTIV
IST089I LUXCPA11 TYPE = LOGICAL UNIT     , ACTIV
IST089I LUXCPA12 TYPE = LOGICAL UNIT     , ACTIV
IST089I LUXCPA13 TYPE = LOGICAL UNIT     , ACTIV
IST089I LUXCPA14 TYPE = LOGICAL UNIT     , ACTIV
IST089I LUXCPA15 TYPE = LOGICAL UNIT     , ACTIV
```

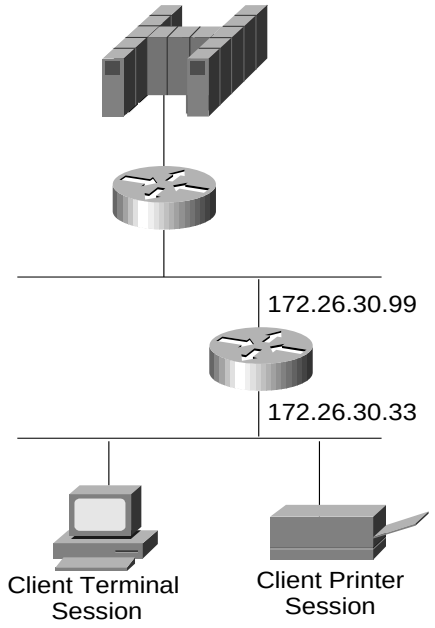
## Scenario 5: TN3270 Server Using Nailing for Printer LUs

In this scenario, we are using LU nailing to control the LU names associated with printers sessions. In many environments, it is important for printer sessions to be controlled so that only a particular print server can access the output being sent to an given LU.

With TN3270E clients, it is possible to request printer sessions from a workstation to the mainframe. For example, if you want to establish a TN3270E printer session to an NT server that is associated with one of the LAN printers designated for 3270 printing, you can create a logical connection between a VTAM 3287 printer definition and the LAN or local printer (RFC 2355, LU 1 or LU 3).

However, if you used your TN3270 client to established a session with Customer Information Control System (CICS) and then you want to print from CICS to your local PC printer, you must open another TN3270 client session with the channel-attached router and establish a connection as a printer LU. To do this, the print client must request a static printer LU name, which must be defined in the switched major node as an LU 1 or LU 3. Alternatively, you can use LU nailing to associate a specific printer LU with a print client in the channel-attached router configuration. This method is called passthrough printing and keeps the client from requesting an incorrect LU name.

Figure 4-10 TN3270 Server Using Nailing for Printer LUs




### Design Considerations

When implementing LU nailing for printer sessions, keep in mind the following guidelines:

- The easiest way to define printers is to use static LUs. If you define printers using dynamic LUs, you must note the LU name for printing. In this case, the LU name might change each time the client connects to its printer unless the print client is nailed to the DDDLU.

- At this time, printer LUs can be assigned only using a connect request. You cannot use an associate request (see RFC 2355). IOS 11.2(17)BC and above support associate requests. Associate request makes it possible to define a partner printer in the TN3270 Server for a given terminal LU pool or single terminal. The client does not need to know the LU name of the partner printer in advance. If the client requests a printer using associate request, it sends its terminal LU name with the request and receives the printer LU that is associated with its terminal LU from the TN3270 Server. If the client uses a connect request, it must specify a printer LU name for the request or a printer LU must be nailed to the client on the channel-attached router. In most cases, nailing printer LUs is more straightforward and easier to manage than an associate request.
- If the TN3270 Server contains a nail statement that assigns a specific printer LU to a client and this client specifies another LU name for its request, the client's session request is rejected.
- If the client requests a printer session with an LU name that is defined as a terminal in the switched major node, the request is rejected at the Bind.

## Router Configuration

We have configured CSNA and are ready to implement our TN3270 Server. In this scenario, we need to:

- Initiate the TN3270 Server
- Define the LUs
- Configure LU Nailing
- Verify the Configuration

### Initiate the TN3270 Server

To initiate the TN3270 Server on the router, enter the following commands:

```
! enter interface configuration mode for the virtual interface in slot 1
router(config)#int channel 1/2
! create TN3270 Server entity
router(config-if)#tn3270-server
router(config-if)#lan token 0
router(cfg-lan-Token 0)#adapter 0 4000.4000.0001
router(config-if)#lan token 31
router(cfg-lan-Token 0)#adapter 31 4000.4000.4444
! set server-wide defaults for PU parameters
router(cfg-tn3270)#unbind-action keep
router(cfg-tn3270)#generic-pool permit
```

### Define the LUs

To define the static LUs, enter the following command:

```
router(cfg-tn3270)#pu puxcpa07 0CBCB007 172.26.30.34 token-adapter 31 08 rmac
  4000.2222.0000 LU-seed LUXCP7##
```

### Configure LU Nailing

To specify the LUs that are assigned to specific clients, enter the following commands:

```
router(cfg-tn3270)#pu puxcpa07
router(tn3270-pu)#client ip 171.68.124.166 LU 1 2
router(tn3270-pu)#client printer ip 171.68.124.166 LU 7
```

Based on the configuration commands above, the client's terminal sessions will be nailed to LUXCP701 and LUXCP702. If the client requests a printer session, the TN3270 Server will assign the LU at LOCADDR 7.

## Verify the Configuration

To verify the configuration, use the Cisco IOS show commands. The show commands allow you to view the general TN3270 Server configuration and configuration information about the specific PUs and LUs.

### Viewing the Current Router Configuration

To display the current router configuration, enter the following command:

```
router#show run
Current configuration:

<deleted information>

interface Channel1/2
 ip address 172.26.30.33 255.255.255.240
 no keepalive
 lan TokenRing 0
  adapter 0 4000.2222.0000
  adapter 31 4000.2222.1111
 TN3270-server
  PU PUXCPA07 0CBCB007 172.26.30.34 token-adapter 31 08 rmac 4000.2222.0000 LU-seed
  LUXCP7##
   client ip 171.68.124.166 LU 1 2
   client printer ip 171.68.124.166 LU 7
```

### Viewing a List of LUs

To display the PU configuration parameters, statistics, and all the LUs currently attached to each PU, enter the following command:

```
router#show extended channel 1/2 tn3270-server PU puxcpa07

name(index)    ip:tcp              xid   state     link   destination   r-lsap
PUXCPA07(2)  172.26.30.34:23     0CBCB007 ACTIVE    tok 31 4000.2222.0000 04 08

LU-seed LUXCP7##
idle-time    0      keepalive 1800      unbind-act discon   generic-pool perm
ip-preced-screen 0 ip-preced-printer 0 ip-tos-screen  0 ip-tos-printer  0
bytes 3947 in, 19272 out; frames 97 in, 101 out; NegRsp 0 in, 0 out
actLUs 39, dactLUs 0, binds 0
Note: If state is ACT/NA then the client is disconnected
LU    name   client-ip:tcp       nail state    model   frames in out   idle for
1   LUXCP701 never connected       Y   ACT/NA            1       1       0:17:32
2   LUXCP702 never connected       Y   ACT/NA            1       1       0:17:32
3   LUXCP703 never connected       N   ACT/NA            1       1       0:17:32
4   LUXCP704 never connected       N   ACT/NA            1       1       0:17:32
5   LUXCP705 never connected       N   ACT/NA            1       1       0:17:32
6   LUXCP706 never connected       N   ACT/NA            1       1       0:17:32
7   LUXCP707 171.68.124.166:1133   Y   P-BIND   3287S1   6       4       0:16:33
8   LUXCP708 never connected       N   ACT/NA            1       1       0:17:32
9   LUXCP709 never connected       N   ACT/NA            1       1       0:17:32
10  LUXCP70A never connected       N   ACT/NA            1       1       0:17:32
client ip        mask            nail-type   LU first  LU last
171.68.124.166                   screen      1         2
171.68.124.166                   printer     7
```

## Host Configuration

Figure 4-11 shows the configuration of the switched major node for this scenario.

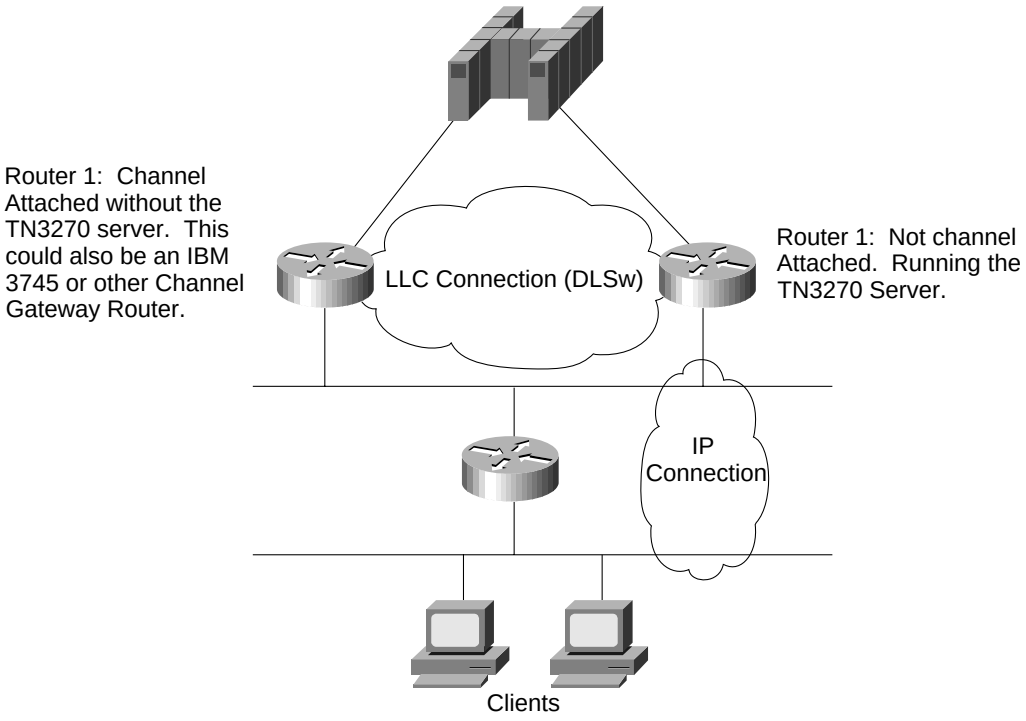
Figure 4-11 Scenario 5: Switched Major Node

```
*     SWITCHED MAJOR NODE
CBSWN7 VBUILD TYPE=SWNET,MAXGRP=10,MAXNO=10
PUXCPA07 PU    ADDR=01,
               PUTYPE=2,ANS=CONT,
               IDBLK=0CB,IDNUM=CB007,
               USSTAB=USSSNA,DLOGMOD=SX32702S,MODETAB=ALAMODE
LUXCP701 LU    LOCADDR=1
LUXCP702 LU    LOCADDR=2
LUXCP703 LU    LOCADDR=3
LUXCP704 LU    LOCADDR=4
LUXCP705 LU    LOCADDR=5
LUXCP706 LU    LOCADDR=6,DLOGMOD=SCS,MODETAB=ISTINCLM
LUXCP707 LU    LOCADDR=7,DLOGMOD=SCS,MODETAB=ISTINCLM
LUXCP708 LU    LOCADDR=8,DLOGMOD=DSC4K,MODETAB=ISTINCLM
LUXCP709 LU    LOCADDR=9,DLOGMOD=DSC4K,MODETAB=ISTINCLM
LUXCP70A LU    LOCADDR=10,DLOGMOD=DSC4K,MODETAB=ISTINCLM
```

## Scenario 6: Using a Remote TN3270 Server

Sometimes it is necessary to run a TN3270 Server in a remote location with no channel attachment to the mainframe. In this case it is possible to bridge the resulting SNA traffic from the TN3270 Server to a channel gateway via RSRB, DLSw+, SRB, or SR/TLB. In this scenario, we describe how to configure a remote TN3270 Server using a channel-attached Cisco 7500 series router as a channel gateway. You can also use an IBM 3745 or any other device that offers the necessary functionality.

Figure 4-12 Using a Remote TN3270 Server




## Design Considerations

When implementing a remote TN3270 Server, keep in mind the following guidelines:

- The TN3270 Server runs independently from the physical channel connection to the mainframe. The TN3270 Server no longer forwards the traffic from its internal virtual Token Ring adapter to another internal CSNA adapter. Instead, the traffic is now bridged from the TN3270 adapter in one of the CIP/CPA's internal virtual Token Rings to a remote adapter elsewhere. This remote adapter can be an external MAC address on a Token Ring (for example, an IBM 3745) or another virtual adapter on another virtual Token Ring (for example, a remote CIP/CPA). Performance can be affected by the network between the TN3270 Server and the channel gateway.
- This design requires you to configure an SRB connection between the channel-attached router internal LAN and the SRB ring group on the router. The traffic is then handled by DLSw or RSRB.

## Router Configuration

There are two routers in this scenario. Router 1 provides the channel connection to the mainframe. It does not contain a TN3270 Server. It is using DLSw to transport the traffic from the remote router with the TN3270 Server (Router 2) to the mainframe. Router 2 contains the TN3270 Server and is connected to Router 1. In this scenario, we need to:

- Configure DLSw on Router 1
- Configure DLSw on Router 2
- Initiate the TN3270 Server
- Define the LUs
- Configure the Virtual Interface to Participate in the Source-Bridge Group
- Verify the Configuration

### Configure DLSw on Router 1

This section discusses the steps required to configure Router 1.

#### Configuring the Source-Route Bridge and DLSw

To configure the source-route bridge and DLSw on Router 1, enter the following commands:

```
router1 (config)#source-bridge ring-group 1000
router1 (config)#dlsw local-peer peer-id 172.26.30.65
router1 (config)#dlsw remote-peer 0 tcp 172.26.30.81
```

### Configure DLSw on Router 2

This section discusses the steps required to configure Router 2.

#### Configuring the Source-Route Bridge and DLSw

To configure the source-route bridge and DLSw on Router 2, enter the following commands:

```
router2 (config)#source-bridge ring-group 1000
router2 (config)#dlsw local-peer peer-id 172.26.30.81
router2 (config)#dlsw remote-peer 0 tcp 172.26.30.65
```

### Initiate the TN3270 Server

To initiate the TN3270 Server on Router 2, enter the following commands:

```
! enter interface configuration mode for the virtual interface in slot 1
router(config)#int channel 1/2
! create TN3270 Server entity
router(config-if)#tn3270-server
router(config-if)#lan token 0
router(cfg-lan-Token 0)#adapter 0 4000.4000.0001
router(config-if)#lan token 31
router(cfg-lan-Token 0)#adapter 31 4000.4000.4444
! set server-wide defaults for PU parameters
router(cfg-tn3270)#unbind-action keep
router(cfg-tn3270)#generic-pool permit
```

### Define the LUs

To define the static LUs, enter the following command:

```
router2(cfg-tn3270)#pu puxcpa07 0CBCB007 172.26.30.50    token-adapter 31 12 rmac
  4000.2222.0000 lu-seed LUXCP7##
```

### Configure the Virtual Interface to Participate in the Source-Bridge Group

To configure the Token Ring virtual interface of the channel-attached router to participate in the source-bridge group, enter the following commands:

```
router2 (config)#int channel 1/2
router2(config-if)#lan tokenring 0
router2(config-if)#source-bridge 999 1 1000
```

### Verify the Configuration

To verify the configuration, use the Cisco IOS show commands. You need to verify the configuration on both routers. In the following command examples, the TN3270 Server on the virtual channel port of Router 1 is up and running. The real channel, however, is in shutdown state. The TN3270 Server PUs from Router 1 reach their destination XCA adapter via DLSW.

#### Viewing the Configuration of Router 1

To display the current configuration of Router 1, enter the following command:

```
router1#show run
Current configuration:

<deleted information>

source-bridge ring-group 1000
dlsw local-peer peer-id 172.26.30.65
dlsw remote-peer 0 tcp 172.26.30.81
!
interface Loopback0
 ip address 172.26.30.65 255.255.255.255
!
interface Ethernet0/0
 ip address 172.26.14.116 255.255.254.0
!
interface Channel1/0
 no ip address
 no keepalive
 shutdown
!
interface Channel1/1
 no ip address
 no keepalive
 csna 0120 00
!
interface Channel1/2
 no ip address
 no keepalive
 lan TokenRing 0
  source-bridge 999 1 1000
  adapter 0 4000.2222.0000
```

### Viewing the Configuration of Router 2

To display the current configuration of Router 2, enter the following command:

```
router1#show run
Current configuration:

<deleted information>

source-bridge ring-group 1000
dlsw local-peer peer-id 172.26.30.81
dlsw remote-peer 0 tcp 172.26.30.65
!
interface Loopback0
 ip address 172.26.30.81 255.255.255.255
!
interface Ethernet0/0
 ip address 172.26.14.114 255.255.254.0
!
interface Channel1/0
 no ip address
 no keepalive
 shutdown
!
interface Channel1/2
 ip address 172.26.30.49 255.255.255.240
 no keepalive
 lan TokenRing 0
  source-bridge 998 1 1000
  adapter 31 4000.4444.4444
 TN3270-server
  PU PUXCPA07 0CBCB007 172.26.30.50    token-adapter 31 12 rmac 4000.2222.0000 lu-seed
  LUXCP7##
```

### Verifying DLSw Reachability on Router 2

To display DLSw+ reachability information, enter the following command:

```
router2#show dlsw reachability
DLSw Local MAC address reachability cache list
Mac Addr        status     Loc.    port                rif
4000.4444.4444  FOUND      LOCAL   Channel1/2     06B0.3E61.3E80

DLSw Remote MAC address reachability cache list
Mac Addr        status     Loc.    peer
4000.2222.0000  FOUND      REMOTE  172.26.30.65(2065) max-lf(4472)
```

### Displaying Interface Status

To display the current status of the channel interface, enter the following command:

```
router2#show interface channel1/0
Channel1/0 is administratively down, line protocol is down
  Hardware is cyBus Channel Interface
  MTU 4096 bytes, BW 98304 Kbit, DLY 100 usec, rely 255/255, load 1/255
  Encapsulation CHANNEL, loopback not set
  ECA adapter card
```

### Viewing the Status of the TN3270 Server and Its PUs

To display the current server configuration parameters and the status of the PUs defined in the server, enter the following command:

```
router2#show extended channel1/2 tn3270-server
                 <current stats < connection stats   <response time(ms)
server-ip:tcp        LU in-use   connect disconn fail   host     tcp
172.26.30.50:23     255     0        1        1     0      0      0
total               255     0
configured max_LU 2100
idle-time    0           keepalive 1800      unbind-action disconnect
ip-preced-screen 0 ip-preced-printer 0 ip-tos-screen  0 ip-tos-printer  0
tcp-port   23            generic-pool permit no timing-mark

name(index)    ip:tcp              xid   state     link   destination   r-lsap
PUXCPA07(1)  172.26.30.50:23     0CBCB007 ACTIVE    tok 31 4000.2222.0000 04 12
```

## Host Configuration

Figure 4-13 shows the configuration of the switched major node for this scenario.

Figure 4-13 Scenario 6: Switched Major Node

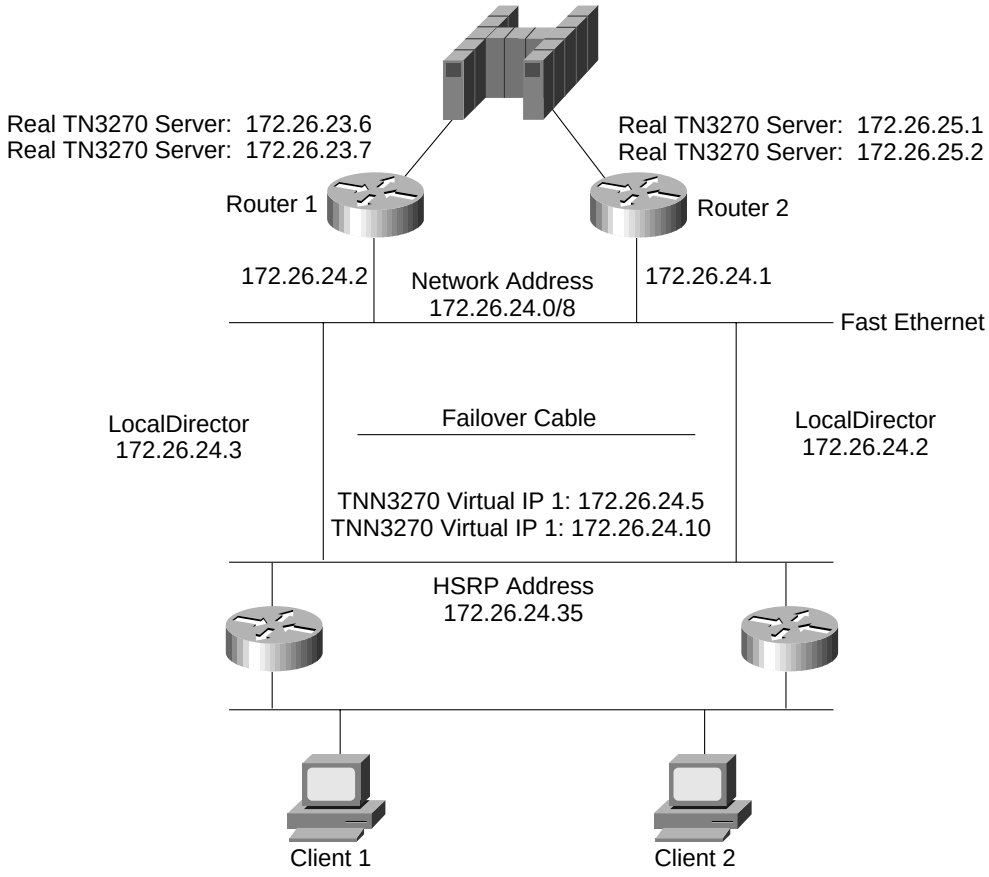
```
*    SWITCHED MAJOR NODE
CBSWN7 VBUILD TYPE=SWNET,MAXGRP=10,MAXNO=10
PUXCPA07 PU    ADDR=01,
               PUTYPE=2,ANS=CONT,
               IDBLK=0CB,IDNUM=CB007,
               USSTAB=USSSNA,DLOGMOD=SX32702S,MODETAB=ALAMODE
LUXCP701 LU    LOCADDR=1
LUXCP702 LU    LOCADDR=2
LUXCP703 LU    LOCADDR=3
LUXCP704 LU    LOCADDR=4
LUXCP705 LU    LOCADDR=5
LUXCP706 LU    LOCADDR=6,DLOGMOD=SCS,MODETAB=ISTINCLM
LUXCP707 LU    LOCADDR=7,DLOGMOD=SCS,MODETAB=ISTINCLM
LUXCP708 LU    LOCADDR=8,DLOGMOD=DSC4K,MODETAB=ISTINCLM
LUXCP709 LU    LOCADDR=9,DLOGMOD=DSC4K,MODETAB=ISTINCLM
LUXCP70A LU    LOCADDR=10,DLOGMOD=DSC4K,MODETAB=ISTINCLM
```

## Scenario 7: TN3270 Server with LocalDirector

One of the basic elements to any SNA network is network reliability through redundancy. Redundancy is also important when you implement a TN3270 Server. One way to get redundancy is to install a second TN3270 Server, but this does not solve the issue because the client still has to point to a single IP address. The solution is to provide a method of using multiple servers (for backup and load balancing) while providing the client a single IP address.

LocalDirector is used to achieve redundancy. LocalDirector is a device that dynamically load balances traffic between multiple servers to ensure timely access and response to requests. With LocalDirector, all traffic to the TN3270 Server passes through the LocalDirectors, which look like two PIX firewall machines connected with a failover cable. LocalDirector acts like a bridge, passing all packets from the client to the server after the connection is established. In this scenario, we describe how to implement a TN3270 Server with LocalDirector.

Figure 4-14 TN3270 Server with LocalDirector




## Design Considerations

When implementing LocalDirector with a TN3270 Server, keep in mind the following guidelines:

- The LocalDirector behaves like a transparent bridge to forward data packets between its interfaces. Because of its bridge capability, LocalDirector must not be installed on the network parallel to another bridge.
- When you use two LocalDirectors, one is active and the other operates in standby mode.

- The virtual IP addresses defined on the LocalDirector must be part of an existing IP subnetwork, which is routed. Otherwise, you will not be able to reach the virtual IP addresses even though you can ping the real IP addresses. Preferably, the addresses should be part of the subnet that contains the local LAN segment where the TN3270 Servers and the LocalDirectors are located. Because LocalDirector uses a method comparable to network address translation (NAT) for the virtual server addresses, the virtual server addresses are not required to be in the same IP subnet as the LocalDirector. However, to avoid confusion in this scenario, we are configuring our network this way.
- The route command in the LocalDirector specifies a default gateway. This gateway is necessary to allow the LocalDirector and the virtual servers that are configured on it to reach the outside world. Because the default gateway is a single point of failure, you should run HSRP on your gateway routers and the LocalDirector should use the HSRP address for its default gateway on the route command.
- Because this solution supports load balancing, static LU definitions are not supported. If you must support a combination of static and dynamic LUs, you should configure all the clients that require dynamic LUs to point to the IP address of the LocalDirector and all the clients that require static LUs to point directly to the required PU. To further avoid issues of load balancing to a PU that is also being directly referenced we recommend that static LUs are defined on a PU that is not put in the same pool as the dynamic LUs.
- DNS is not necessary to support this solution.
- Future versions of LocalDirector will provide non-disruptive session recovery in case of a LocalDirector failure.
- LocalDirector supports only Ethernet and Fast Ethernet. For Token Ring networks, you must use DistributedDirector or HSRP. DistributedDirector, which is discussed in Scenario 8: TN3270 Server Using DistributedDirector, sends the client the target IP address of a TN3270 Server at session initiation and then establishes an end-to-end-session between the client and the server.
- If the LocalDirector is used in a switched environment, you must define two VLANs for the LocalDirector segments. Otherwise, a bridging loop occurs because the LocalDirector does not participate in the spanning-tree algorithm.

## LocalDirector Configuration

After you have installed the LocalDirector, you must configure it for use with the TN3270 Servers.

### Assigning an IP Address

To assign the LocalDirector IP address and subnet mask, enter the following command:

```
LocalDirector1 (config)#ip address 172.26.24.3 255.255.255.0
```

### Defining the Virtual Servers

To define virtual servers and specify whether they are in or out of service, enter the following command:

```
LocalDirector1(config)#virtual 172.26.24.10:0:0 is
LocalDirector1(config)#virtual 172.26.24.5:0:0 is
```

This command specifies the virtual IP addresses of your TN3270 Servers. Normally, you will have only one, but to show a more complicated sample, we have defined two virtual server addresses in our scenario. Behind each of these virtual addresses is a cluster of several TN3270 Servers. The LocalDirector load balances the sessions between these servers and, if one TN3270 Server fails, the sessions can be reestablished at another server.

### Setting the Load Balancing

To set the type of load balancing for each virtual server, use the following command:

**predictor** *virtual_id* **{fastest|roundrobin|leastconns|weighted} [roundrobin|none]**

### Defining a Route to the Default Gateway

To define the route to the default gateway for the LocalDirector, enter the following command:

```
LocalDirector1(config)#route 0.0.0.0 0.0.0.0 172.26.24.35 1
```

The route command should point to the HSRP address of the gateway routers.

### Defining the Backup Server

To identify the second, or backup, LocalDirector, enter the following commands:

```
LocalDirector1(config)#failover active
LocalDirector1(config)#failover ip address 172.26.24.4
```

### Defining the Real Servers

To define the addresses of the real TN3270 Servers and specify whether they are in or out of service, enter the following commands:

```
LocalDirector1(config)#real 172.26.25.1:0 is
LocalDirector1(config)#real 172.26.25.2:0 is
LocalDirector1(config)#real 172.26.23.7:0 is
LocalDirector1(config)#real 172.26.23.6:0 is
```

### Binding the Servers

To associate each virtual server to real servers, enter the following commands:

```
LocalDirector1(config)#bind 172.26.24.10:0:0 172.26.23.7:0
LocalDirector1(config)#bind 172.26.24.10:0:0 172.26.25.1:0
LocalDirector1(config)#bind 172.26.24.5:0:0 172.26.25.2:0
LocalDirector1(config)#bind 172.26.24.5:0:0 172.26.23.6:0
```

The clients use the virtual server IP address to establish a TN3270 session.

### Verifying the LocalDirector Configuration

To verify the configuration of the LocalDirector, enter the following command:

```
LocalDirector #show run
Building configuration...
: Saved
: LocalDirector 415 Version 2.1.0.127
syslog output 20.7
no syslog console
enable password dfeaf10390e560aea745ccba53e044 encrypted
hostname adelaide
interface ethernet 0 100full
interface ethernet 0
interface ethernet 1 100full
interface ethernet 1
mtu 0 1500
mtu 1 1500
no secure  0
no secure  1
ping-allow 0
ping-allow 1
ip address 172.26.24.3 255.255.255.0
route 0.0.0.0 0.0.0.0 172.26.24.35 1
no rip passive
failover
failover ip address 172.26.24.4
```

```
password cisco
telnet 172.26.0.0 255.255.0.0
no snmp-server contact
no snmp-server location
virtual          172.26.24.10:0:0 is
virtual           172.26.24.5:0:0 is
real         172.26.25.1:0 is
real         172.26.25.2:0 is
real         172.26.23.7:0 is
real         172.26.23.6:0 is
name 172.26.25.1 router232701
name 172.26.25.2 router232702
name 172.26.25.3 router232703
name 172.26.25.4 router232704
name 172.26.23.9 router132704
name 172.26.23.8 router132703
name 172.26.23.7 router132702
name 172.26.23.6 router132701
bind          172.26.24.10:0:0        172.26.23.7:0
bind          172.26.24.10:0:0        172.26.25.1:0
bind           172.26.24.5:0:0        172.26.25.2:0
bind           172.26.24.5:0:0        172.26.23.6:0
threshold       172.26.25.1:0 0
threshold       172.26.25.2:0 0
threshold       172.26.23.7:0 0
threshold       172.26.23.6:0 0
: end
```

To display information about all the real servers defined, enter the following command:

```
LocalDirector1#show real
Real Machines:
                                              No Answer TCP Reset DataIn
             Machine  Connect   State  Thresh Reassigns Reassigns  Conns
      router232701:0       0      IS       0         0         0      0
      router232702:0       3      IS       0         0         0      0
      router132702:0       0      IS       0         0         0      0
      router132701:0       2      IS       0         0         0      0
```

To display information about all the virtual servers defined, enter the following command:

```
LocalDirector1#show virtual

Virtual Machines:

                  Machine   State  Connect   Sticky    Predictor   Slowstart
         172.26.24.10:0:0     IS        0        0   leastconns roundrobin*
          172.26.24.5:0:0     IS        5        0   leastconns* roundrobin
```

To display information about all the bindings defined, enter the following command:

```
adelaide 3#show bind
               Virtual                      Real
         172.26.24.10:0:0(IS)
                                 maroubra32702:0(IS)
                                  sydney32701 :0(IS)
          172.26.24.5:0:0(IS)
                                   sydney32702:0(IS)
                                 maroubra32701:0(IS)
```

## Router Configuration

There are two routers in this scenario. Each provides a TN3270 Server. Both are channel attached to the mainframe and both have an Ethernet connection to the 172.26.24.0 network that contains the LocalDirectors. In this scenario, we need to:

- Configure Router 1
- Configure Router 2
- Verify the Configuration

### Configure Router 1

This section discusses the steps required to configure Router 1.

#### Initiating the TN3270 Server

To initiate the TN3270 Server, enter the following commands:

```
! enter interface configuration mode for the virtual interface in slot 1
router(config)#int channel 1/2
! create TN3270 Server entity
router(config-if)#tn3270-server
router(config-if)#lan token 0
router(cfg-lan-Token 0)#adapter 0 4000.4000.0001
router(config-if)#lan token 31
router(cfg-lan-Token 0)#adapter 31 4000.4000.4444
! set server-wide defaults for PU parameters
router(cfg-tn3270)#unbind-action keep
router(cfg-tn3270)#generic-pool permit
```

#### Defining the LUs

To define the LUs on Router 1, enter the following commands:

```
router1(cfg-tn3270)#pu puccc 12345674 172.26.23.6 token-adapter 2  04 rmac
  4000.7505.0006 lu-seed LUCCC##
router1(cfg-tn3270)#pu puddd 12345675 172.26.23.7 token-adapter 2  08 rmac
  4000.7505.0006 lu-seed LUDDD##
```

### Configure Router 2

This section discusses the steps required to configure Router 2.

#### Initiating the TN3270 Server

To initiate the TN3270 Server, enter the following commands:

```
! enter interface configuration mode for the virtual interface in slot 2
router(config)#int channel 2/2
! create TN3270 Server entity
router(config-if)#tn3270-server
router(config-if)#lan token 0
router(cfg-lan-Token 0)#adapter 0 4000.4000.0001
router(config-if)#lan token 31
router(cfg-lan-Token 0)#adapter 31 4000.4000.4444
! set server-wide defaults for PU parameters
router(cfg-tn3270)#unbind-action keep
router(cfg-tn3270)#generic-pool permit
```

### Defining the LUs

To define the LUs on Router 2, enter the following commands:

```
router1(cfg-tn3270)#pu puaaa 12345678 172.26.25.1 token-adapter 2  04 rmac
  4000.7505.0001 lu-seed LUAAA##
router1(cfg-tn3270)#pu pubbb 12345677 172.26.25.2 token-adapter 2  08 rmac
  4000.7505.0001 lu-seed LUBBB##
```

## Verify the Configuration

To verify the configuration, use the Cisco IOS show commands. Verify the configuration on both routers. In the following command examples, each router is running a TN3270 Server, both have channel connections to the mainframe, and both have Ethernet connections to the 176.26.24.0 network.

### Viewing the Configuration of Router 1

To display the current configuration of Router 1, enter the following command:

```
router1#show run
Current configuration:

<deleted information>

microcode CIP flash slot0:CIP25-7.exe
microcode reload
!
interface FastEthernet0/1/0
 ip address 172.26.24.2 255.255.255.0
 no ip redirects
 no keepalive
!
interface Channel1/0
 no ip address
 no keepalive
 csna 0110 00
!
interface Channel1/1
 no ip address
 no keepalive
 shutdown
!
interface Channel1/2
 ip address 172.26.23.11 255.255.255.0
 no keepalive
 lan TokenRing 0
  adapter 1 4000.7505.0006
  adapter 2 4000.7505.9999
 TN3270-server
  PU PUCCC    12345674 172.26.23.6     token-adapter 2  04 rmac 4000.7505.0006 lu-seed
  LUCCC##
  PU PUDDD    12345675 172.26.23.7     token-adapter 2  08 rmac 4000.7505.0006 lu-seed
  LUDDD##
```

### Viewing the Status of PUs on Router 1

To display the current server configuration parameters and the status of the PUs defined in the server, enter the following command:

```
router1#show extended channel1/2 tn3370-server
                <current stats < connection stats   <response time(ms)
server-ip:tcp        LU in-use   connect disconn fail   host     tcp
172.26.23.6:23      255     3      943      940     0      0      0
172.26.23.7:23      255     2        2        0     0      0      0
total               510     5
configured max_LU 2100
idle-time    0           keepalive 1800      unbind-action disconnect
ip-preced-screen 0 ip-preced-printer 0 ip-tos-screen  0 ip-tos-printer  0
tcp-port   23            generic-pool permit no timing-mark

name(index)    ip:tcp              xid   state     link   destination   r-lsap
PUCCC(9)     172.26.23.6:23      12345674 ACTIVE    tok 2  4000.7505.0006 04 04
PUDDD(11)    172.26.23.7:23      12345675 ACTIVE    tok 2  4000.7505.0006 04 08
```

### Viewing a List of LUs on Router 1

To display the PU configuration parameters, PU statistics, and all the LUs currently attached to each PU, enter the following command:

```
router1#show extended channel1/2 tn3270-server PU puccc

name(index)    ip:tcp              xid   state     link   destination   r-lsap
PUCCC(9)     172.26.23.6:23      12345674 ACTIVE    tok 2  4000.7505.0006 04 04

LU-seed LUCCC##
idle-time    0      keepalive 1800      unbind-act discon   generic-pool perm
ip-preced-screen 0 ip-preced-printer 0 ip-tos-screen  0 ip-tos-printer  0
bytes 656 in, 937 out; frames 14 in, 15 out; NegRsp 0 in, 0 out
actLUs 3, dactLUs 0, binds 0
Note: If state is ACT/NA then the client is disconnected
LU    name   client-ip:tcp       nail state    model   frames in out   idle for
1   LUCCC01  172.26.2.202:1163     N   P-BIND   327802E   3       2       1:16:18
2   LUCCC02  172.26.2.204:1301     N   P-BIND   327802    8       5       0:4:56
3   LUCCC03  172.26.2.203:1674     N   P-BIND   327902E   3       2       0:6:32
```

### Viewing the Configuration of Router 2

To display the current configuration of Router 2, enter the following command:

```
router2#show run
Current configuration:

<deleted information>

microcode CIP flash slot1:CIP25-7
microcode reload
!
interface Channel2/0
 no ip address
 no keepalive
 csna 0110 00
!
interface Channel2/1
 no ip address
 no keepalive
!
interface Channel2/2
 ip address 172.26.25.10 255.255.255.0
 no keepalive
 lan TokenRing 0
  adapter 0 4000.7505.0001
  adapter 2 4000.7505.8888
 TN3270-server
  PU PUAAA    12345678 172.26.25.1     token-adapter 2  04 rmac 4000.7505.0001 lu-seed
  LUAAA##
  PU PUBBB    12345677 172.26.25.2     token-adapter 2  08 rmac 4000.7505.0001 lu-seed
  LUBBB##
!
interface FastEthernet3/1/0
 ip address 172.26.24.1 255.255.255.0
 no ip redirects
```

### Viewing the Status of PUs on Router 2

To display the current server configuration parameters and the status of the PUs defined in the server, enter the following command:

```
router2#show extended channel2/2 tn3270-server
                 <current stats < connection stats   <response time(ms)
server-ip:tcp        LU in-use   connect disconn fail   host     tcp
172.26.25.1:23      255     8     1371     1363     0      0      0
172.26.25.2:23      255     3      168      165     0      0      0
total               510    11
configured max_LU 2100
idle-time    0           keepalive 1800      unbind-action disconnect
ip-preced-screen 0 ip-preced-printer 0 ip-tos-screen  0 ip-tos-printer  0
tcp-port   23            generic-pool permit no timing-mark

name(index)    ip:tcp              xid   state     link   destination   r-lsap
PUAAA(9)     172.26.25.1:23      12345678 ACTIVE    tok 2  4000.7505.0001 04 04
PUBBB(11)    172.26.25.2:23      12345677 ACTIVE    tok 2  4000.7505.0001 04 08
```

### Viewing a List of LUs on Router 2

To display the PU configuration parameters, PU statistics, and all the LUs currently attached to each PU, enter the following command:

```
router2#show extended channel2/2 tn3270-server PU puaaa

name(index)    ip:tcp              xid   state     link   destination   r-lsap
PUAAA(9)     172.26.25.1:23      12345678 ACTIVE    tok 2  4000.7505.0001 04 04

LU-seed LUAAA##
idle-time    0      keepalive 1800      unbind-act discon   generic-pool perm
ip-preced-screen 0 ip-preced-printer 0 ip-tos-screen  0 ip-tos-printer  0
bytes 9173 in, 40475 out; frames 222 in, 209 out; NegRsp 0 in, 0 out
actLUs 11, dactLUs 0, binds 4
Note: if state is ACT/NA then the client is disconnected

LU    name   client-ip:tcp       nail state    model   frames in out   idle for
1   LUAAA01  172.26.2.202:1160     N   P-BIND   327802E  14      11      1:15:2
2   LUAAA02  172.26.2.202:1232     N   P-BIND   327802E  14      11      0:39:8
3   LUAAA03  172.26.2.202:1133     N   ACT/NA   327802E  11      9       1:19:21
4   LUAAA04  172.26.2.202:1169     N   ACT/NA   327802E  44      30      0:39:17
5   LUAAA05  172.26.24.50:1036     N   ACT/NA   327802E  5       3       1:26:31
6   LUAAA06  172.26.2.202:1166     N   P-BIND   327802E  8       5       1:14:52
7   LUAAA07  172.26.24.50:1081     N   P-BIND   327802E  28      17      0:3:29
8   LUAAA08  172.26.24.50:1086     N   P-BIND   327802E  23      14      0:3:26
9   LUAAA09  172.26.24.50:1087     N   P-BIND   3278S2E  44      29      0:3:23
10  LUAAA0A  172.26.24.50:1084     N   P-BIND   3278S2E  23      14      0:3:28
11  LUAAA0B  172.26.2.204:1303     N   P-BIND   327802   8       5       0:2:53
```

## Host Configuration

Figure 4-15 shows the configuration of the switched major node for this scenario.

Figure 4-15 Scenario 7: Switched Major Node

```
LLBSMNA VBUILD TYPE=SWNET,MAXGRP=10,MAXNO=10
*
PUAAA    PU     ADDR=01,                                                  X
                PUTYPE=2,IDBLK=123,IDNUM=45678,ANS=CONT,                  X
                LUSEED=LUAAA##,LUGROUP=LLBDDD1
PUBBB    PU     ADDR=02,                                                  X
                PUTYPE=2,IDBLK=123,IDNUM=45677,ANS=CONT,                  X
                LUSEED=LUBBB##,LUGROUP=LLBDDD1
PUCCC    PU     ADDR=03,                                                  X
                PUTYPE=2,IDBLK=123,IDNUM=45674,ANS=CONT,                  X
                LUSEED=LUCCC##,LUGROUP=LLBDDD1
PUDDD    PU     ADDR=04,                                                  X
                PUTYPE=2,IDBLK=123,IDNUM=45675,ANS=CONT,                  X
                LUSEED=LUDDD##,LUGROUP=LLBDDD1
```

## Scenario 8: TN3270 Server Using DistributedDirector

As discussed in the previous scenario, the issue of redundancy is a high priority in the data center. There are several methods of load balancing the TN3270 Servers. The DistributedDirector is one of these methods.

The Cisco DistributedDirector is a device that efficiently distributes Internet services among topologically dispersed servers on the Internet or an intranet. It provides scalable, transparent, and network-intelligent traffic load distribution. Using the DRP, a simple User Datagram Protocol (UDP)-based application developed by Cisco, the DistributedDirector queries properly configured Cisco routers in the field for Exterior Gateway Protocol (EGP) and Internal Gateway Protocol (IGP) topological "distance" metrics. With this information and other configuration metrics, the DistributedDirector assigns an optimal distributed server to each client. As a result, users are transparently and automatically assigned a distributed server anywhere on the Internet.

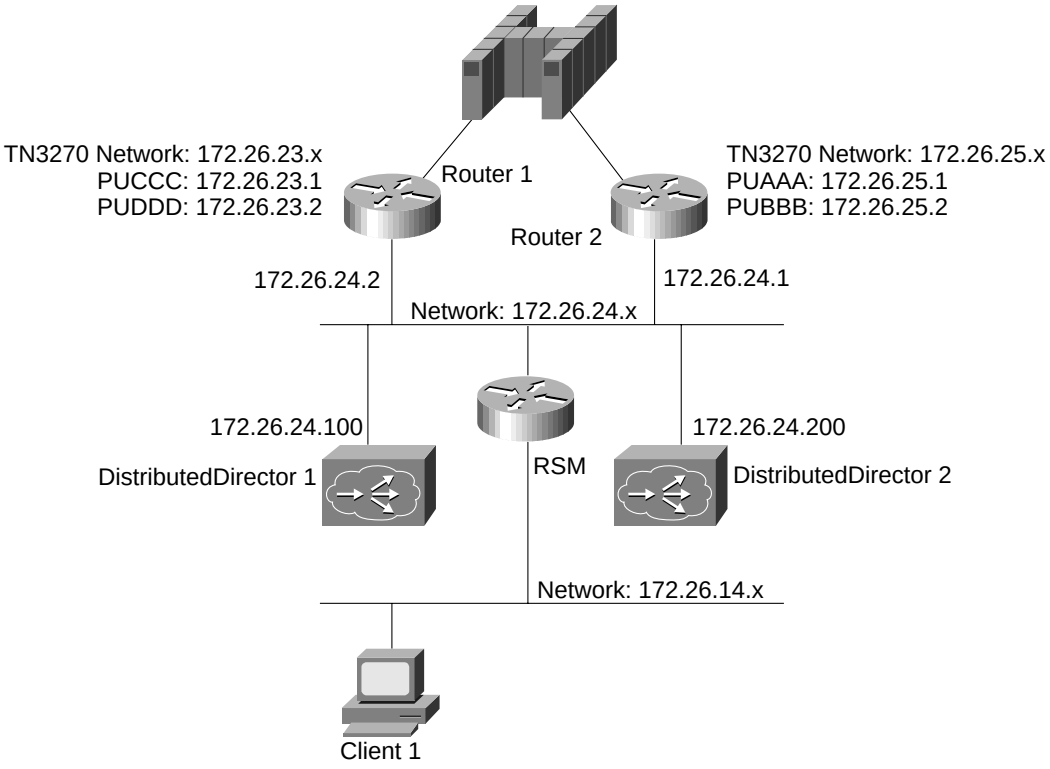
DistributedDirector requires a DNS server in the network. The DistributedDirector can be configured to act as a DNS. When you use DistributedDirector, you should configure your clients with a primary DNS IP address and a backup DNS IP address. The DistributedDirectors are known to the DNS. The primary DNS receives the request from the client and passes the request on to a DistributedDirector, which resolves the name to one of the servers. The method used to select the server depends on the configuration of the DistributedDirector. You can configure the DistributedDirector to use one of the following methods:

- Preference—The DistributedDirector always chooses a specific active server.
- Random—The DistributedDirector randomly chooses between the servers.
- Portion—You assign a relative portion metric to each server and each server gets that portion of the connections. For example, if server A is assigned a portion of 1 and server B is assigned a portion of 2, then server A receives one third of the connections and server B receives two-thirds of the connections.

The DistributedDirector determines whether a TN3270 Server is active by periodically checking it with Telnet. You configure the Telnet port and the timers that specify how often the DistributedDirector should Telnet to the server (or retry upon failure). If the TN3270 Server goes down, the DistributedDirector will discover this in one timer interval. In our scenario, we set this timer to 10 seconds. If the DistributedDirector is unable to reach the server, the DistributedDirector stops passing this server's IP address to clients and continues to attempt to Telnet to the server to determine if the server recovers. Upon recovery, the DistributedDirector starts passing the server's address to clients again.

In this scenario, we describe how to implement a TN3270 Server with DistributedDirector

Figure 4-16 TN3270 Server Using DistributedDirector




## Design Considerations

When configuring the DistributedDirector and TN3270 Server, keep in mind the following guidelines:

- Unlike LocalDirector, the DistributedDirector does not participate in the packet flow after a connection is established. DistributedDirector resolves DNS names for the client and then the client connects directly to the server.
- The DistributedDirector must fit into the existing DNS scheme. The DistributedDirector for the channel-attached router becomes a start of authority for certain domain names and the primary DNSs must know about the DistributedDirector and start of authority.
- If a primary DNS is used, you must give the authority of the TN3270 subdomain to the DistributedDirectors.
- The DistributedDirector DNS system is a modification of the normal DNS system and allows the DNS server to determine the best IP address for clients connecting to a server. The DNS caching name server mode is the appropriate DistributedDirector mode for use with TN3270 Servers.
- The DistributedDirector periodically Telnets to each TN3270 Server to determine whether the server is active. Therefore, you can expect to see more connects and disconnects when you display the TN3270 Server statistics.
- If the TN3270 client resides on a machine that contains other applications that need to consult the parent domain for addresses, the primary DNS needs to be configured to direct queries for the TN3270 Server subdomain to the DistributedDirector DNS.

- When using DistributedDirector as the DNS, all higher level DNS servers and all secondary DNS servers must be upgraded to Bind level 4.8.3 or higher. Versions of Bind prior to 4.8.3 contain a problem that causes the DNS server to hold information for up to 5 minutes even if the Time-To-Live (TTL) value is set to zero. If a previous version of Bind is running on any of the higher level DNS servers that clients might contact when translating the servers hostname and if these DNS servers decide to recursively ask the query themselves and cache the result (the normal case for Bind), then they cache only one of the many potential IP addresses for the hostname. This process defeats the purpose of the DistributedDirector system.

**Note:** In our scenario the DistributedDirectors are used as DNSs and each client is configured with the IP addresses of both DistributedDirectors. Therefore, when we bring down one DistributedDirector, the client tries the other and there is no perceptible downtime.

## DistributedDirector Configuration

Once you install and set up the DistributedDirector devices, you must configure the devices to receive DNS queries and to correlate them with the IP address of the desired server.

**Note:** The DistributedDirector documentation focuses on the use of the DistributedDirector with Web servers, which are likely to be located in different geographical locations. There are additional metrics and configuration parameters required in support of Web servers that are not necessary for the TN3270 Server scenario described in this configuration.

### Configure the Primary DNS

To configure the IP address of the primary DNS, enter the following command:

```
DistributedDirector1#ip name-server 172.26.24.100
```

### Configure the Virtual Host Name for the Servers

To define the virtual host name to be used for the set of TN3270 Servers, enter the following command:

```
DistributedDirector1#ip director host TN3270.xyz.com
```

### Associate Real Servers with the Virtual Host Name

To identify the IP addresses of the TN3270 Servers associated with the virtual host name, enter the following command:

```
DistributedDirector1#ip host TN3270.xyz.com 172.26.25.1 172.26.23.6 172.26.30.51
```

Up to 8 IP addresses per name can be specified.

### Configure Verification Parameters

DistributedDirector is designed to avoid returning the address of an inactive server by periodically checking whether a Telnet connection can be opened to each of them. To define the parameters for the connectivity check on the TN3270 Servers, enter the following command:

```
DistributedDirector1#ip director host TN3270.xyz connect 23 interval 10
```

This command indicates that the DistributedDirector should attempt to establish a connection using port 23 (Telnet) every 2 minutes. For the connection interval, a value of 1 or 2 is recommended. If you specify a larger value, there may be a delay between the time that a server goes down and the time that the DistributedDirector becomes aware of its status. As a result, users could be directed to a server that is not available.

### Configure the Selection Method

There are three methods of determining which IP address will be sent in response to the DNS request for the TN3270 server. In our scenario, we are configuring the DistributedDirector to select the IP address randomly. To set the default weights to use the random metric for sorting, so that a server IP address is randomly selected from among the servers that are considered active, enter the following command:

```
DistributedDirector1#ip director default-weights ran 1
```

### Designate the DistributedDirector as a Primary DNS

To configure the DistributedDirector as the primary DNS server for the new subdomain, enter the following command:

```
DistributedDirector1#ip dns primary TN3270.xyz.com soa distributeddirector1.xyz.com
  sysadmin.xyz.com 60 10 10 10
```

This command tells the DistributedDirector1 that it is the primary DNS server authoritative for the domain. It indicates that the DNS host name of the DistributedDirector is distributeddirecto1.xyz.com, and defines the administrative contact.

### Turn off Caching

If several client queries come from a single IP address, such as when the client software is used from terminals run on one machine, then you should disable DistributedDirector caching. To turn off caching, issue the following command:

```
DistributedDirector #no ip dir cache
```

If you do not enter this command, there is a timeout of 60 seconds in which the same server IP address is returned to requests from the same client IP address.

### Restrict the Names Sorted by the DistributedDirector

If the DistributedDirector is to be used to service queries for other names, then you should restrict sorting to the name or names designating TN3270 Servers. This example permits the sorting of names that start with "TN3270" and denies all other requests:

```
DistributedDirector1#ip director access-group 1
DistributedDirector1#ip director access-list 1 permit ^TN3270.*
DistributedDirector1#ip director access-list 1 deny .*
```

### Designate Authority for the Subdomain

To give authority for the TN3270 Server subdomain to the DistributedDirector DNS, you must modify the configuration of the DNS server. This modification is done by inserting the following lines in the DNS database:

```
TN3270.xyz.com. IN NS distributeddirector1.xyz.com
distributeddirector.xyz.com. IN A 172.26.24.100
```

**Note:** This step can be left out if the TN3270 clients will consult the DistributedDirector DNS directly.

If a backup DistributedDirector is used (to provide redundancy), you would add additional lines to the DNS configuration to allow for the backup DD.

### Configure the TN3270 Clients

Configure the TN3270 client to use the domain name "TN3270" to look up the IP address before connecting to TN3270 server.

The DNS used by the resolver on the client machine may be either the DistributedDirector DNS or the DNS for "xyz.com." It would typically be xyz.com if there were other applications running on the machine that needed to use other domain names. If the client resolver uses a default domain other than xyz.com, then specify the full domain name (in other words, TN3270.xyz.com) when configuring the TN3270 client.

## Verify the Configuration

To verify the configuration, use the Cisco IOS show commands. Verify the configuration on both DistributedDirectors.

### Viewing the Configuration of DistributedDirector 1

To display the current configuration of DistributedDirector 1, enter the following command:

```
DistributedDirector1#show run
Building configuration...

Current configuration:
!
version 11.1
service udp-small-servers
service tcp-small-servers
!
hostname distributeddirector1
!
boot system flash c4500-w3-mz_11-19_IA.bin
enable password cisco
!
!
interface Ethernet0
 ip address 172.26.24.100 255.255.255.0
 media-type 10BaseT
!
router eigrp 777
 network 172.26.0.0
!
ip default-gateway 172.26.24.100
ip host TN3270.xyz.com 172.26.25.1 172.26.23.6 172.26.30.51
ip name-server 172.26.24.100
no ip classless
ip dns primary TN3270.xyz.com soa distributeddirector1.xyz.com sysadmin.xyz.com 60 10
  10 10
no ip director cache
ip director server 172.26.25.1 23 portion 2
ip director server 172.26.23.6 23 portion 1
ip director server 172.26.30.51 23 portion 2
ip director hosts TN3270.xyz.com priority drp-s 1
ip director hosts TN3270.xyz.com connect 23 interval 10
ip director hosts TN3270.xyz.com port-service 23
logging buffered
snmp-server community public RO
snmp-server community private RW
snmp-server packetsize 4096
end
```

### Viewing the Configuration of DistributedDirector 2

To display the current configuration of DistributedDirector 2, enter the following command:

```
DistributedDirector2#show run
Building configuration...

Current configuration:
!
version 11.1
service udp-small-servers
service tcp-small-servers
!
hostname distributeddirector2
!
boot system flash c4500-w3-mz_11-19_IA.bin
enable password cisco
!
interface Ethernet0
 ip address 172.26.24.200 255.255.255.0
 no ip mroute-cache
 no ip route-cache
 media-type 10BaseT
!
router eigrp 777
 network 172.26.0.0
!
ip default-gateway 172.26.24.200
ip host TN3270.xyz.com 172.26.25.1 172.26.23.6
ip domain-name xyz.com
ip name-server 172.26.24.200
no ip classless
ip dns primary TN3270.xyz.com soa distributeddirector1.xyz.com sysadmin.xyz.com 60 10
  10 10
no ip director cache
ip director server 172.26.25.1 23 portion 2
ip director server 172.26.23.6 23 portion 1
ip director hosts TN3270.xyz.com priority por 1
ip director hosts TN3270.xyz.com connect 23 interval 10
ip director hosts TN3270.xyz.com port-service 23
logging buffered
!
end
```

## Configure Extra LUs

For the DistributedDirector system to work well with TN3270 Servers at times when most or all of the clients are active, and for redundancy when servers go down, there must be extra LUs available on each of the servers.

The DistributedDirector random metric is used to distribute the load among the servers. Although this randomness tends to distribute the sessions evenly over time, it also means that there are times when one server is advertised to clients more than others.

When the number of active clients approaches 100 percent of the total number of clients, some servers must cope with more than total-no-of-client/no-of-servers LUs. When the limit is reached on one server, clients retry the DNS name until they are sent to a server that is not full. The number of extra LUs you define here must be balanced against the likelihood of close to 100 percent client activation occurring in the particular network and the client dissatisfaction with the retry option.

For redundancy, extra LUs must configured on each server to allow the system to cope if one or more of the TN3270 Servers go down. The best case is to have each server capable of handling the full total-no-of-clients load.

To provide redundancy each channel-attached router needs maximum-LUs (the maximum number of simultaneously connected clients) configured for the worst case situation.

## Host Configuration

Figure 4-17 shows the switched major node for this scenario.

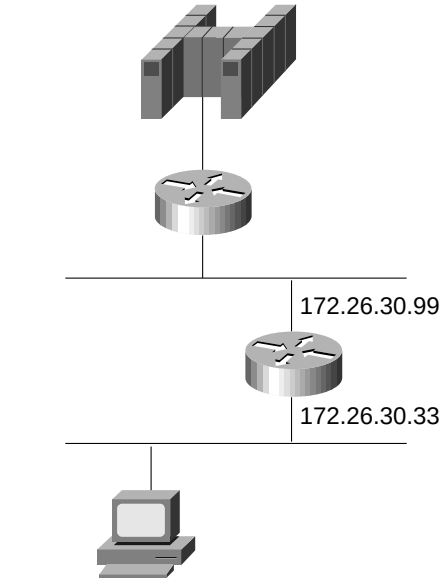
Figure 4-17 Scenario 8: Switched Major Node

```
LLBSMNA VBUILD TYPE=SWNET,MAXGRP=10,MAXNO=10
*
PUAAA   PU     ADDR=01,                                              X
               PUTYPE=2,IDBLK=123,IDNUM=45678,ANS=CONT,              X
               LUSEED=LUAAA##,LUGROUP=LLBDDD1
PUBBB   PU     ADDR=02,                                              X
               PUTYPE=2,IDBLK=123,IDNUM=45677,ANS=CONT,              X
               LUSEED=LUBBB##,LUGROUP=LLBDDD1
PUCCC   PU     ADDR=03,                                              X
               PUTYPE=2,IDBLK=123,IDNUM=45674,ANS=CONT,              X
               LUSEED=LUCCC##,LUGROUP=LLBDDD1
PUDDD   PU     ADDR=04,                                              X
               PUTYPE=2,IDBLK=123,IDNUM=45675,ANS=CONT,              X
               LUSEED=LUDDD##,LUGROUP=LLBDDD1
```

## Scenario 9: TN3270 Server Using a Direct PU and INCLUD0E

With direct PUs, there is a potential problem because the LU names in VTAM and LU names on the channel-attached router can be different. This happens for both static and dynamic LUs. When migrating to a network that uses both SNA and IP, some administrators may find that they are using an LU naming convention that results in names that the LU-seed parameter cannot generate. To solve this problem, use direct PUs and the INCLUD0E parameter. By coding INCLUD0E on the VTAM switched PU, VTAM sends each LU name in a 0E control vector of the ACTLU to the channel-attached router. The channel-attached router uses this name as the LU name rather than using the name produced by the LU-seed.

Figure 4-18 TN3270 Server Using a Direct PU and INCLUD0E




### Design Considerations

When using direct PUs and the INCLUD0E parameter with the TN3270 Server, keep in mind the following guidelines:

- You cannot use this solution if you are using the TN3270 Server as a remote server (that is, not connecting to the host via XCA, but connecting through an FEP). The current releases of NCP do not support the INCLUD0E parameter, and the 0E vector will stop at the FEP and will not pass through to the router.
- If you want the LU names on the channel-attached router to be different from the LU names on VTAM, do not use the INCLUD0E parameter on the switched PU.
- To use INCLUD0E, you must be using VTAM 4.4 and you must apply the PTFs for the following APARS:
  - APAR OW25501
  - APAR OW31436
  - APAR OW31805

- INCLUD0E is relevant only for direct PUs. For DLUR PUs, the LU name is always passed from VTAM to the channel-attached router at ACTLU time.
- If you want to use the INCLUD0E parameter and you are using an FEP, the FEP will require updates.

## Router Configuration

We have configured CSNA and are now ready to implement our TN3270 Server. In this scenario, we need to:

- Initiate the TN3270 Server
- Define the LUs
- Verify the Configuration

### Initiate the TN3270 Server

To initiate the TN3270 Server on the router, enter the following commands:

```
! enter interface configuration mode for the virtual interface in slot 1
router(config)#int channel 1/2
! create TN3270 Server entity
router(config-if)#tn3270-server
router(config-if)#lan token 0
router(cfg-lan-Token 0)#adapter 0 4000.4000.0001
router(config-if)#lan token 31
router(cfg-lan-Token 0)#adapter 31 4000.4000.4444
! set server-wide defaults for PU parameters
router(cfg-tn3270)#unbind-action keep
router(cfg-tn3270)#generic-pool permit
```

### Define the LUs

To define the static LUs, enter the following command:

```
router(cfg-tn3270)#pu pui0e 12345678 172.26.20.34 token-adapter 31 10 rmac
  4000.4000.1111 lu-seed LUI0E##
```

### Verify the Configuration

To verify the configuration, use the Cisco IOS show commands. The IOS show commands allow you to view the general TN3270 Server configuration as well as configuration information about the specific PUs and LUs.

#### Viewing the Current Router Configuration

To display the current router configuration, enter the following command:

```
router1 #show run
Building configuration...

<deleted information>

microcode CIP flash slot0:CIP25-7
microcode reload
source-bridge ring-group 400
!
interface Ethernet0/0
 ip address 172.26.14.112 255.255.254.0
 shutdown
!
interface Ethernet0/1
 ip address 172.26.20.97 255.255.255.240
!
```

```
interface Channel1/0
 ip address 172.26.20.18 255.255.255.240
 no keepalive
 csna 0110 01
 csna 0120 02
!
interface Channel1/2
 ip address 172.26.20.33 255.255.255.240
 no keepalive
 lan TokenRing 0
  source-bridge 401 1 400
  adapter 1 4000.4000.1111
  adapter 2 4000.4000.2222
  adapter 31 4000.4000.4444
 TN3270-server
  unbind-action keep
  PU PUI0E    12345678 172.26.20.34    token-adapter 31 10 rmac 4000.4000.1111 lu-seed
  LUI0E##
  timing-mark
!
interface TokenRing10/3
 ip address 10.100.100.1 255.255.255.0
 shutdown
 ring-speed 16
 source-bridge 500 1 400
 source-bridge spanning
```

Notice the LU-seed of LUI0E.

### Viewing a List of LUs

To display the PU configuration parameters, PU statistics, and all the LUs currently attached to each PU, enter the following command:

```
router#show extended channel1/2 tn3270-server PU pui0e

name(index)    ip:tcp              xid   state     link   destination   r-lsap
PUI0E(2)     172.26.20.34:23     12345678 ACTIVE    tok 31 4000.4000.1111 04 10

LU-seed LUI0E##
idle-time    0      keepalive 1800      unbind-act keep     generic-pool perm
ip-preced-screen 0 ip-preced-printer 0 ip-tos-screen  0 ip-tos-printer  0
bytes 2264 in, 2764 out; frames 47 in, 54 out; NegRsp 0 in, 0 out
actLUs 14, dactLUs 9, binds 0
Note: if state is ACT/NA then the client is disconnected

LU    name   client-ip:tcp       nail state    model   frames in out   idle for
1   LUNAME1  never connected       N   ACT/NA            1       1       0:9:2
2   LU2NAM1  never connected       N   ACT/NA            1       1       0:9:2
3   SOMENAM  never connected       N   ACT/NA            1       1       0:9:2
4   LUEEE04  172.26.2.199:1902     N   ACT/NA   327802E  5       3       0:6:39
5   LUEEE05  172.26.2.197:1741     N   P-BIND   327802   3       2       0:2:15
```

**Note:** The LU names on the channel-attached router and in VTAM are the same. The dynamic LUs that were created (LUEEE04 and LUEEE05) match VTAM's LUSEED naming convention instead of the naming convention used by the LU-seed on the channel-attached router.

## Host Configuration

Figure 4-19 shows the switched major node for this scenario.

Figure 4-19 Scenario 9: Switched Major Node

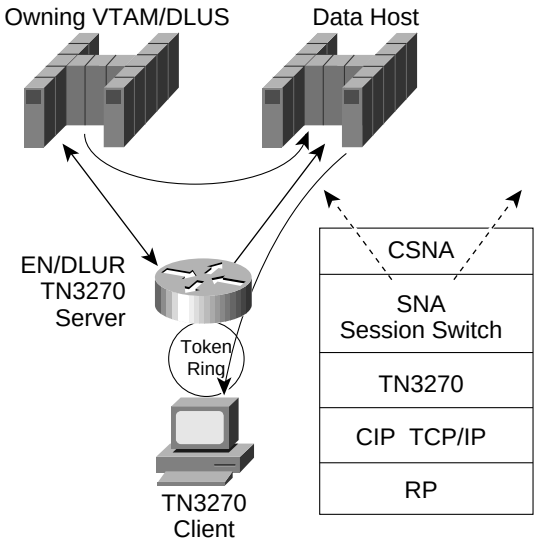
```
LLBSMNB VBUILD TYPE=SWNET,MAXGRP=10,MAXNO=10
PUI0E   PU     ADDR=01,
               PUTYPE=2,IDBLK=123,IDNUM=45678,ANS=CONT,
               LUSEED=LUEEE##,LUGROUP=DDDMVSLU,
               INCLUD0E=YES,
               USSTAB=USSSNA,DLOGMOD=SX32702S,MODETAB=ALAMODE
LUNAME1 LU     LOCADDR=1
LU2NAM1 LU     LOCADDR=2
SOMENAM LU     LOCADDR=3
```

**Note:** The static LUs have names that are not generated by the LU-seed parameter on the channel-attached router. LUSEED on the PU and LU-seed on the channel-attached router are different. Without INCLUD0E coded, static and dynamic LUs would have different names on the channel-attached router and in VTAM.

## Scenario 10: TN3270 Server with Session Switching

In a typical SNA environment, all sessions flow from the client to the owning VTAM and then across to the application. This flow means that every packet traverses the VTAM host even though the application is on another host. The way to avoid this problem is to implement session switching. Session switching routes the user directly to the application host and bypasses the VTAM host. In this scenario, we discuss how to implement session switching for a TN3270 Server.

Figure 4-20 TN3270 Server with Session Switching




### Design Considerations

When using session switching with the TN3270 Server, keep in mind the following guidelines:

- An LSAP statement is required for each adapter on which DLUR is to open an SAP. There must be at least one statement (one is usually sufficient). You may want more than one statement to provide a way to shut down a subset of the links using a configuration command.
- We recommend that you configure one LINK statement for each LPAR that can be reached directly (that is, without traversing an Intermediate Session Routing node). If this change requires a great deal of configuration or is difficult for you to maintain as the mainframe network changes, use a virtual routing node. A virtual routing node makes a LAN look like an APPN NN with a link to each node on the LAN. Each of those nodes is configured with the virtual routing node name of the LAN. At the mainframe, this name is configured in the XCA major node. When an APPN node selects a route through the network to carry a session, it may select a route via the VRN. For example, the route could go from the PLU node to node X then to the virtual routing node then to node Y and then to the SLU node. When the Bind arrives at node X, it notices that the next hop is to a VRN. Details in the route information provide the MAC and SAP address of node Y. Node X checks whether it now has a link to node Y and, if not, starts setting up a link. When the link comes up, it forwards the Bind over the new link.

When using virtual routing node, keep in mind the following guidelines:

– Virtual routing node is not a substitute for all link configurations. There must be enough statically defined links to allow the DLUR/EN to find a suitable NN server.

– All nodes must have the same name for the virtual routing node.

– There may be problems using virtual routing node in mixed APPN/subarea networks.

- It is not essential to configure any links under DLUR. The links can be configured at the mainframe using path statements. However, configuring the links from the DLUR end is recommended because retrying from the mainframe uses up mainframe cycles.
- There must be a base set of statically configured links between the DLUR and potential NN servers to provide a reasonable guarantee of connectivity. The static configuration of a link can be done from the DLUR end, from the mainframe, or both. Static configuration of the link from the DLUR end is recommended. Additional links will be generated as needed if virtual routing node is configured.
- Each LPAR to which DLUR may become adjacent (that is, with which it may have an LLC link) must be configured to accept such a connection. It should have either a switched major node entry for the DLUR CP or be configured with DYNADJCP=YES.

## Router Configuration

In this scenario, we have installed Cisco IOS Release 11.3 on the router and need to:

- Configure CSNA
- Initiate the TN3270 Server and Configure DLUR
- Verify the Current Configuration

### Configure CSNA

To configure CSNA to provide the XCA connection, enter the following commands:

```
router1 (config)#interface Channel3/0
router1 (config-if)#csna 0110 00
router1 (config-if)#csna 0120 08
```

### Initiate the TN3270 Server and Configure DLUR

To initiate the TN3270 Server and configure DLUR on the router, enter the following commands:

```
! enter interface configuration mode for the virtual interface in slot 1
router(config)#int channel 1/2
! create TN3270 Server entity
router(config-if)#tn3270-server
router(config-if)#lan token 1
router(cfg-lan-Token 0)#adapter 1 4000.cbcb.0001
router(config-if)#lan token 2
router(cfg-lan-Token 0)#adapter 2 4000.cbcb.0002
router(cfg-tn3270)#dlur NETA.COLORADO NETA.HDSMVS3
router(cfg-tn3270)#dlus-backup NETA.HDSMVS4
router(tn3270-dlur)#lsap token-adapter 1
router(tn3270-dlur-lsap)#link HDS1
router(tn3270-dlur)#lsap token-adapter 2
router(tn3270-dlur-lsap)#link HDS2
router(tn3270-dlur)#pu cbpu1 0cbcb001 172.26.56.2
```

### Verify the Current Configuration

To display the current router configuration, enter the following command:

```
router1 #show run
Building configuration...

<deleted information>

interface Channel3/2
 ip address 172.26.56.1 255.255.255.240
 load-interval 30
 no keepalive
 lan TokenRing 1
  adapter 1 4000.cbcb.0001
 lan TokenRing 2
  adapter 2 4000.cbcb.0002
 TN3270-server
  dlur NETA.COLORADO NETA.HDSMVS3
   dlus-backup NETA.HDSMVS4
   lsap token-adapter 1
    link HDS1
   lsap token-adapter 2
    link HDS2
   PU CBPU1    0CBCB001 172.26.56.2
```

## Host Configuration

On the host, we must configure LPAR1 and LPAR2.

### Configure LPAR1

For LPAR1, we must configure an XCA major node for each channel connection, a switched major node for the TN3270 Server, and an LUGROUP.

#### XCA Major Node for Each Channel Connection

The XCA major node definition is used to connect the channel device to the channel-attached router. Dynamic PU (DYNPU) and dynamic PU prefix (DYNPUPFX) are required for the path link. The path link is used for the adjacent CP between HDS1 and HDS2. Figure 4-21 shows the XCA major node for LPAR1.

Figure 4-21 Scenario 10: XCA Major Node

```
CBXCA41  VBUILD TYPE=XCA
CBPRT41  PORT  ADAPNO=1,CUADDR=4100,SAPADDR=04,MEDIUM=RING,TIMER=31
CBGRP41  GROUP ANSWER=ON,                                          X
               AUTOGEN=(100,L,P),                                  X
               CALL=INOUT,                                         X
               DIAL=YES,                                           X
               DYNPU=YES,DYNPUPFX=CB,                              X
               ISTATUS=ACTIVE
```

#### Switched Major Node for TN3270 Server

The switched major node defines the PUs for the TN3270 Server. Although not mandatory, it is recommended that the PU name in the switched major node match the PU name as defined in the TN3270 Server. This provides easier problem tracking and maintenance. Figure 4-22 shows the switched major node.

Figure 4-22 Scenario 10: Switched Major Node for TN3270 Server

```
CBSWN1   VBUILD TYPE=SWNET,MAXGRP=10,MAXNO=10
*
CBPU1    PU     ADDR=01,                                          X
                PUTYPE=2,ANS=CONT,                                X
                LUGROUP=DDDCB,LUSEED=CBPU1###,                   X
                IDBLK=0CB,IDNUM=CB001,ANS=CONT
```

### LU Group Member

The LU group member is a VTAM member that is required when LUSEED is used. Figure 4-23 shows part of the LUGROUP.

Figure 4-23 Scenario 10: LU Group Member

```
CBDDDLU  VBUILD TYPE=LUGROUP
*********************************************************************
*     LUGROUP MAJOR NODE FOR TN3270S TESTING                        *
*********************************************************************
*   MM/DD/YY - WHO - WHAT                                           *
*********************************************************************
DDDMVSLU LUGROUP
327@@2   LU     DLOGMOD=D4A32782,
                MODETAB=ISTINCLM,
                USSTAB=USSSNA,
                SSCPFM=USSSCS
327@@3   LU     DLOGMOD=D4A32783,
                MODETAB=ISTINCLM,
                USSTAB=USSSNA,
                SSCPFM=USSSCS
327@@4   LU     DLOGMOD=D4A32784,
                MODETAB=ISTINCLM,
                USSTAB=USSSNA,
                SSCPFM=USSSCS
327@@5   LU     DLOGMOD=D4A32785,
                MMODETAB=ISTINCLM,
                USSTAB=USSSNA,
                SSCPFM=USSSCS
327@@2E  LU     DLOGMOD=SNX32702,
                MODETAB=ISTINCLM,
                USSTAB=USSSNA,
                SSCPFM=USSSCS
327@@3E  LU     DLOGMOD=SNX32703,
                MODETAB=ISTINCLM,
                USSTAB=USSSNA,
                SSCPFM=USSSCS
327@@4E  LU     DLOGMOD=SNX32704,
                MODETAB=ISTINCLM,
                USSTAB=USSSNA,
                SSCPFM=USSSCS
327@@5E  LU     DLOGMOD=SNX32705,
                MODETAB=ISTINCLM,
                USSTAB=USSSNA,
                SSCPFM=USSSCS
@        LU     DLOGMOD=BADMOD,
                MODETAB=ISTINCLM,
                USSTAB=USSSNA,
                SSCPFM=USSSCS
```

### Switched Major Node for DLUR Links with the TN3270 Server

The PU definition is required to allow the link statement on the router to connect to VTAM. The CP name defined in the PU must match the CP name defined in the DLUR statement. Figure 4-24 shows the switched major node for the DLUR links.

Figure 4-24 Switched Major Node for DLUR Links

```
CBLINK1  PU    ADDR=01,PUTYPE=2,ANS=CONT,                              X
               CPCP=YES,NETID=NETA,                                    X
               CONNTYPE=APPN,CPNAME=COLORADO,                          X
               ISTATUS=ACTIVE
CBLINK2  PU    ADDR=01,PUTYPE=2,ANS=CONT,                              X
               CPCP=YES,NETID=NETA,                                    X
               CONNTYPE=APPN,CPNAME=COLORADO,                          X
               ISTATUS=ACTIVE
```

### Displaying VTAMLST Parameters

To display the VTAMLST parameters, enter the following command:

```
D NET,VTAMOPTS,FUNCTION=APPNCHAR
IST097I DISPLAY ACCEPTED
IST1188I ACF/VTAM V4R4 STARTED AT 21:12:45 ON 03/08/98 810
IST1349I COMPONENT ID IS 5695-11701-401
IST1348I VTAM STARTED AS INTERCHANGE NODE
IST1189I APPNCOS  = NONE                BN       = YES
IST1189I BNDYN    = FULL                BNORD    = PRIORITY
IST1189I CDSERVR  = YES                 CDSREFER = ***NA***
IST1189I CONNTYPE = APPN                CPCP     = YES
IST1189I DIRSIZE  = 0                   DIRTIME  = 691200S
IST1189I DYNADJCP = YES                 HPR      = (RTP,RTP)
IST1189I HPRNCPBF = NO                  HPRPST   = LOW          480S
IST1189I HPRPST   = MEDIUM       240S   HPRPST   = HIGH         120S
IST1189I HPRPST   = NETWRK        60S   INITDB   = NONE
IST1189I IOPURGE  = 300S                MAXLOCAT = 5000
IST1189I NODETYPE = NN                  NUMTREES = 200
IST1189I PSRETRY  = LOW            0S   PSRETRY  = MEDIUM         0S
IST1189I PSRETRY  = HIGH           0S   PSRETRY  = NETWRK         0S
IST1189I RESUSAGE = 100                 ROUTERES = 128
IST1189I SECLVLCP = ***NA***            SNVC     = 15
IST1189I SORDER   = APPN                SRCHRED  = OFF
IST1189I SRCOUNT  = 10                  SRTIMER  = 30S
IST1189I SSEARCH  = CACHE               VERIFYCP = NONE
IST1189I VFYRED   = YES                 VFYREDTI = OFF
IST1189I VRTG     = NO                  VRTGCPCP = YES
IST1189I XCFINIT  = ***NA***
IST314I END
```

## Configure LPAR2

For LPAR2, we must configure an XCA major node for each channel connection and a switched major node for the VTAM-to-VTAM CP-to-CP session.

### XCA Major Node for Each Channel Connection

Figure 4-25 shows the XCA major node for LPAR2.

Figure 4-25 Scenario 10: XCA Major Node

```
CBXCA418 VBUILD TYPE=XCA
CBPRT418 PORT   ADAPNO=2,CUADDR=4108,SAPADDR=04,MEDIUM=RING,TIMER=31
CBGRP418 GROUP  ANSWER=ON,                                          X
                AUTOGEN=(100,L,P),                                  X
                CALL=INOUT,                                         X
                DIAL=YES,                                           X
                ISTATUS=ACTIVE
```

### Switched Major Node for VTAM-VTAM CP-CP Session

Figure 4-26 shows the switched major node for the VTAM-to-VTAM CP-to-CP Session.

Figure 4-26 Scenario 10: Switched Major Node for the VTAM-VTAM CP-CP Session

```
CBLINK3  PU     ADDR=01,PUTYPE=2,MAXPATH=1,ANS=CONT,                X
                CPCP=YES,NETID=NETA,DWACT=YES,                      X
                CONNTYPE=APPN,CPNAME=HDSMVS3,                       X
                ISTATUS=ACTIVE
*
CBPATH1  PATH   DIALNO=1A044000CBCB0001,                            X
                GRPNM=CBGRP418
```

### Displaying VTAMLST Parameters

To display the VTAMLST parameters, enter the following command:

```
D NET,VTAMOPTS,FUNCTION=APPNCHAR
IST097I DISPLAY ACCEPTED
IST1188I ACF/VTAM V4R4 STARTED AT 21:08:06 ON 03/08/98 719
IST1349I COMPONENT ID IS 5695-11701-401
IST1348I VTAM STARTED AS INTERCHANGE NODE
IST1189I APPNCOS  = NONE                BN       = YES
IST1189I BNDYN    = FULL                BNORD    = PRIORITY
IST1189I CDSERVR  = YES                 CDSREFER = ***NA***
IST1189I CONNTYPE = APPN                CPCP     = YES
IST1189I DIRSIZE  = 0                   DIRTIME  = 691200S
IST1189I DYNADJCP = YES                 HPR      = (RTP,RTP)
IST1189I HPRNCPBF = NO                  HPRPST   = LOW          480S
IST1189I HPRPST   = MEDIUM       240S   HPRPST   = HIGH         120S
IST1189I HPRPST   = NETWRK        60S   INITDB   = NONE
IST1189I IOPURGE  = 300S                MAXLOCAT = 5000
IST1189I NODETYPE = NN                  NUMTREES = 200
IST1189I PSRETRY  = LOW            0S   PSRETRY  = MEDIUM         0S
IST1189I PSRETRY  = HIGH           0S   PSRETRY  = NETWRK         0S
IST1189I RESUSAGE = 100                 ROUTERES = 128
IST1189I SECLVLCP = ***NA***            SNVC     = 15
IST1189I SORDER   = APPN                SRCHRED  = OFF
IST1189I SRCOUNT  = 10                  SRTIMER  = 30S
IST1189I SSEARCH  = CACHE               VERIFYCP = NONE
IST1189I VFYRED   = YES                 VFYREDTI = OFF
IST1189I VRTG     = NO                  VRTGCPCP = YES
IST1189I XCFINIT  = ***NA***
IST314I END
```