X.25 Dual Serial Line Management

Feature History

Release	Modification
12.2(13)T	This feature was introduced.

This document describes the X.25 Dual Serial Line Management feature in Cisco IOS Release 12.2(13)T. It includes the following sections:

Finding Feature Information

Your software release may not support all the features documented in this module. For the latest caveats and feature information, see Bug Search Tool and the release notes for your platform and software release. To find information about the features documented in this module, and to see a list of the releases in which each feature is supported, see the feature information table at the end of this module.

Use Cisco Feature Navigator to find information about platform support and Cisco software image support. To access Cisco Feature Navigator, go to www.cisco.com/go/cfn. An account on Cisco.com is not required.

Feature Overview

Telco service providers use data communications networks (DCNs) to provide communications between network management applications (also called operations support systems or OSSs) and network elements.

The telco DCNs use the X.25 protocol (or a variation of X.25) to send network management information across the DCN.

The figure below shows a typical DCN that uses the BX.25 protocol developed by Bell Communications Research (now Telcordia Technologies). The Lucent 5ESS switch in this network uses the BX.25 protocol for monitoring, provisioning and collecting billing data.

Figure 1: Network Management Application Monitors Lucent 5ESS Switch over Datakit Network
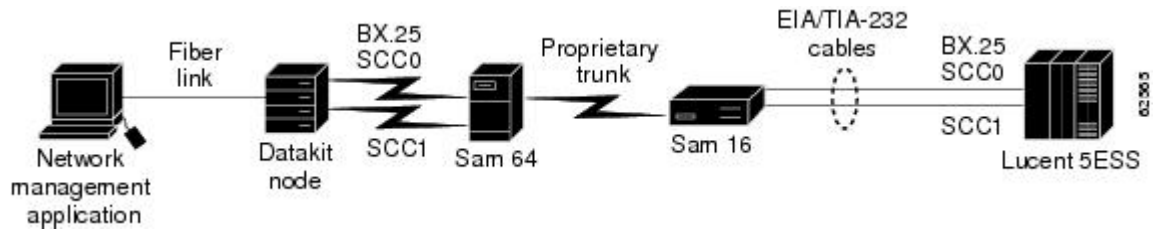

The Datakit node provides the communications front end to a network management application and provides two links, SCC0 and SCC1, for link redundancy. One link is active and passes data across the network; the other remains in standby mode.

The Datakit node acts as a transport, so that to the network management application and the Lucent 5ESS switch, the node looks like it has two individual circuits. The network management application host is supplying leads on both interfaces but ignoring Set Asynchronous Balanced Mode (SABM) messages on the standby interface. If communication is lost on the active interface, the network management application host responds to the SABM messages on the standby interface and it becomes the active interface.

In the past, incumbent local exchange carriers (ILECs) have built either Lucent Datakit or X.25 networks to carry the network management data. Large ILEC customers are currently replacing the Lucent Datakit portion of the networks with Cisco IP core routers in their DCN. The figure below shows a typical migration path using X.25 over TCP/IP (XOT) and the Cisco Serial Tunneling (STUN) features.

Figure 2: Network Management Application Monitors Lucent 5ESS Switch Using XOT and STUN
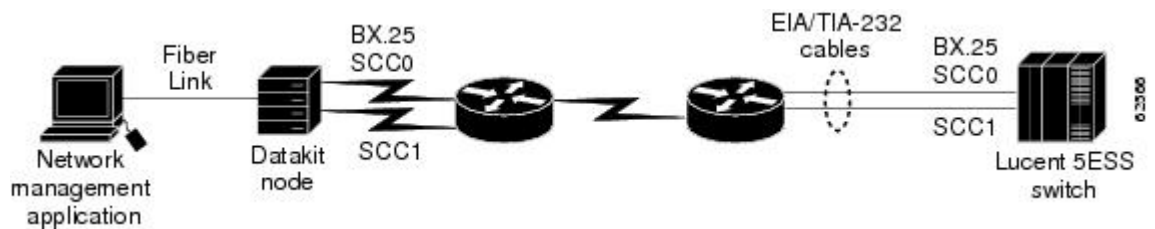

Although the solution shown in the figure above eliminates some of the Lucent Datakit network elements in ILEC networks, the network still requires a Lucent Datakit node as a front end to the network management application from the Lucent 5ESS switch.

Additionally, competitive local exchange carriers (CLECs) do not have DCNs or have very limited ones. Furthermore, the CLECs are not interested in purchasing the legacy Lucent Datakit solution shown in the first figure above, nor do they want to install a network management application with a Lucent Datakit front end as shown in the second figure above.

Both the CLECs and the ILECs want the DCN based on IP intranet technologies shown in the figure below.

Figure 3: Network Management Application Monitors Lucent 5ESS Switch over IP Network
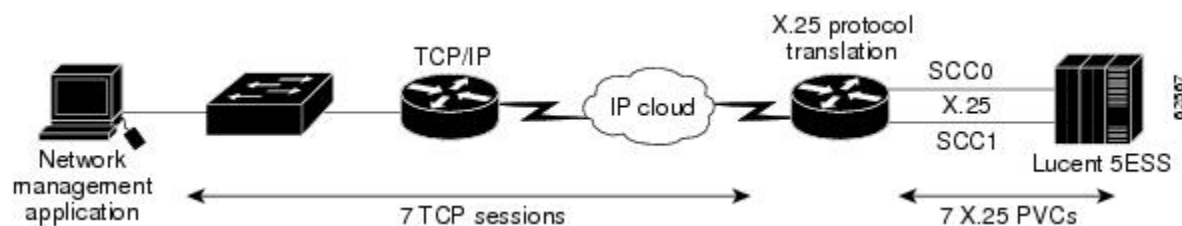
As the figure above shows, Cisco offers solutions that allow telco service providers to reduce operating costs, translate and migrate existing X.25-based DCNs to IP-based DCNs, and bridge traditional telephony operations to newer ones. The X.25 Dual Serial Line Management feature is a part of the Cisco IOS Telco Feature Set, a bundle of applications specific to the DCN environment. Specifically, this feature supports X.25-to-TCP protocol translation, and provides dual serial interfaces to preserve the redundancy and monitoring capability available from the SCC0 and SCC1 links on the Lucent 5ESS switch in the DCN network.

Benefits

The X.25 Dual Serial Line Management feature provides the following benefits:

- Preserves the redundancy and monitoring capability available from the SCC0 and SCC1 links on the Lucent 5ESS switch in the DCN network.

- Allows telco service providers to reduce operating costs by migrating existing X.25-based DCNs to IP-based DCNs.

Additionally, the Cisco IOS **translate tcp** command has been updated with the **dynamic** keyword for PVC options. The **dynamic** keyword provides a backup facility for PVC applications. Dynamic PVCs can be made part of an active backup configuration by using the dual serial line management feature.

Restrictions

The X.25 Dual Serial Line Management feature is used in DCN networks utilizing the Lucent 5ESS switch and running the X.25 protocol.

Related Documents

The chapter " Configuring X.25 and LAPB " in the *Cisco IOS Wide-Area Networking Configuration Guide* describes how to configure X.25.

The Cisco protocol translation feature is described in the Configuring Protocol Translation and Virtual Asynchronous Devices " chapter of the *Cisco IOS Terminal Services Configuration Guide*.

The **translate** command used for protocol translation is described in the *Cisco IOS Terminal Services Command Reference*.

The section "Switch Monitoring Networks: Cisco X.25 BAI OSS Connectivity Solution" in the *Cisco Network Solutions for the Telco DCN: Telephone Switch Environments* white paper provides tasks and examples for configuring a backup interface using dual serial lines in a telco DCN.

The " X.25 Record Boundary Preservation for Data Communications Networks " chapter of the *Wide-Area Networking Configuration Guide* provides related information about X.25 record boundary preservation.

Supported Standards and MIBs and RFCs

Standards

None

MIBs

None

To locate and download MIBs for selected platforms, Cisco IOS releases, and feature sets, use Cisco MIB Locator found at the following URL:

http://www.cisco.com/go/mibs

RFCs

None

Configuration Tasks

Configuring X.25 Dual Serial Line Management

To configure the X.25 Dual Serial Line Management feature, you must configure dual serial lines running the X.25 protocol, and activate a backup function on one of the interfaces. To enter these configurations, use the following commands beginning in global configuration mode:

SUMMARY STEPS

1. Router(config)# **interface serial** *x* / *y*
2. Router(config-if)# **backup active interface serial** *x* / *y*
3. Router(config-if)# **encapsulation x25 dce**
4. Router(config-if)# **x25 address** *address*

DETAILED STEPS

	Command or Action	Purpose
Step 1	Router(config)# **interface serial** *x / y*	Begins interface configuration on a serial interface (serial1/6, for example, which could be the primary interface).
Step 2	Router(config-if)# **backup active interface serial** *x / y*	Assigns a serial interface (serial 1/7, for example) as backup or standby, for the primary serial interface.
Step 3	Router(config-if)# **encapsulation x25 dce**	Specifies operation of a serial interface as an X.25 DCE device.
Step 4	Router(config-if)# **x25 address** *address*	(Optional) Sets the X.121 address on the interface.

What to Do Next

Refer to the documents listed in the Related Documents, on page 3 section for additional configuration information. The section X.25 Dual Serial Line Management Configuration Example, on page 7 also lists commands that you might enter to configure X.25 and X.25-to-TCP protocol translation.

Verifying X.25 Dual Serial Line Management

The verification process described in this section is based on the following configuration:

```
!
interface Serial0/0
 description connects to X.25 switch
 ip address 10.10.0.15 255.255.255.0
 encapsulation x25 dce
 backup active interface Serial0/1
 x25 ltc 10
 clockrate 64000
```
To verify correct operation of the X.25 Dual Serial Line Management feature, perform the following steps in EXEC mode:

SUMMARY STEPS

1. Use the **show backup** command to display which interface is the active backup:
2. Use the **show interfaces** command to monitor the serial interfaces. In the following display, serial interface 0/1 is up (active), and its backup interface is serial interface 0/0:

DETAILED STEPS

Step 1 Use the **show backup** command to display which interface is the active backup:

Example:

```
Router# show backup
Primary Interface   Secondary Interface   Status
```

```
                 ----------------   ------------------   ------
                 Serial0/0          Serial0/1            active backup
```

Step 2   Use the **show interfaces** command to monitor the serial interfaces. In the following display, serial interface 0/1 is up (active), and its backup interface is serial interface 0/0:

Example:

```
Router# show interfaces s0/1
Serial0/1 is up, line protocol is up
  Hardware is PowerQUICC Serial
  Description: connects to X.25 switch
  Internet address is 10.10.0.30/24
  Backup interface Serial0/0, failure delay 0 sec, secondary disable
delay 0 sec,
  kickin load not set, kickout load not set
  MTU 1500 bytes, BW 1544 Kbit, DLY 20000 usec,
     reliability 255/255, txload 1/255, rxload 1/255
  Encapsulation X25, loopback not set
  X.25 DCE, address 3034, state R1, modulo 8, timer 0
      Defaults: idle VC timeout 0
        cisco encapsulation
        input/output window sizes 2/2, packet sizes 128/128
      Timers: T10 60, T11 180, T12 60, T13 60
      Channels: Incoming-only none, Two-way 10-1024, Outgoing-only none
      RESTARTs 2/0 CALLs 4+0/2+0/0+0 DIAGs 0/0
  LAPB DCE, state CONNECT, modulo 8, k 7, N1 12056, N2 20
      T1 3000, T2 0, interface outage (partial T3) 0, T4 0
      VS 1, VR 1, tx NR 1, Remote VR 1, Retransmissions 0
      Queues: U/S frames 0, I frames 0, unack. 0, reTx 0
      IFRAMEs 130/130 RNRs 0/0 REJs 0/0 SABM/Es 2/1 FRMRs 0/0 DISCs 0/0
  Last input never, output 1w3d, output hang never
  Last clearing of "show interface" counters 2w2d
  Queueing strategy: fifo
  Output queue 0/40, 0 drops; input queue 0/75, 0 drops
  5 minute input rate 0 bits/sec, 0 packets/sec
  5 minute output rate 0 bits/sec, 0 packets/sec
     242 packets input, 4224 bytes, 0 no buffer
     Received 0 broadcasts, 0 runts, 0 giants, 0 throttles
     2 input errors, 0 CRC, 2 frame, 0 overrun, 0 ignored, 0 abort
     183 packets output, 1337 bytes, 0 underruns
     0 output errors, 0 collisions, 131 interface resets
     0 output buffer failures, 0 output buffers swapped out
     5 carrier transitions
     DCD=up  DSR=up  DTR=up  RTS=up  CTS=up
```

Troubleshooting Tips

To troubleshoot operation of the X.25 Dual Serial Line Management feature, use the **debug backup** privileged EXEC command.

Monitoring and Maintaining X.25 Dual Serial Line Management

To monitor and maintain the X.25 Dual Serial Line Management feature, use the commands and steps listed in the Verifying X.25 Dual Serial Line Management, on page 5 section.

X.25 Dual Serial Line Management Configuration Example

In the following example, dual serial lines (serial 1/6 and 1/7) are configured for the X.25 protocol. Serial interface 1/6 is configured as the primary interface, and serial interface 1/7 is configured as the backup interface. X.25-to-TCP protocol translation is also configured.

```
interface Serial1/6
 description SCC0
 backup active interface serial 1/7
 encapsulation x25 dce
 x25 address 66666666
 x25 ltc 8
 x25 ips 256
 x25 ops 256
 clockrate 9600
!
interface Serial1/7
 description SCC1
 encapsulation x25 dce
 x25 address 66666666
 x25 ltc 8
 x25 ips 256
 x25 ops 256
 clockrate 9600
!
x25 route ^66666666 interface Serial1/6
x25 route ^66666666 interface Serial1/7
!
translate tcp 172.20.21.188 port 1025 x25 66666666 pvc 1 dynamic max-users 1
translate tcp 172.20.21.188 port 1026 x25 66666666 pvc 2 dynamic max-users 1
translate tcp 172.20.21.188 port 1027 x25 66666666 pvc 3 dynamic max-users 1
translate tcp 172.20.21.188 port 1028 x25 66666666 pvc 4 dynamic max-users 1
translate tcp 172.20.21.188 port 1029 x25 66666666 pvc 5 dynamic max-users 1
translate tcp 172.20.21.188 port 1030 x25 66666666 pvc 6 dynamic max-users 1
translate tcp 172.20.21.188 port 1031 x25 66666666 pvc 7 dynamic max-users 1
```

Glossary

data communications network --See DCN.

DCN --data communications network. An out-of-band network that provides connectivity between network elements and their respective operations support system (OSS). Its primary function is enabling the surveillance and the status of a telco network, yet it also facilitates network operations and management functions such as provisioning, billing, planning, and service assurance.

CLEC --competitive local exchange carrier. Company that builds and operates communication networks in metropolitan areas and provides its customers with an alternative to the local telephone company.

competitive local exchange carrier --See CLEC.

ILEC -- incumbent local exchange carrier. The local telephone company that controls the cable that makes up the telephone network.

incumbent local exchange carrier --See ILEC.

Lucent 5ESS switch --A Class 5 local telephony switch that connects a local subscriber to a telephone network.

network element --A single piece of telecommunications equipment used to perform a function or service integral to the underlying network.

network management application --A application for managing elements in a service providers' network. For a Class 5 local telephony switch, the applications are used monitor the switch, provision the switch, collect call detail records, and collect traffic data. Examples of these applications include an OSS such as Lucent's Network Fault Management (NFM) application and Telcordia Technologies' Network Monitoring and Assurance (NMA) System.

operations support system --See OSS.

OSS --operations support system. DCN network management and operations applications.

SABM --Set Asynchronous Balanced Mode. Link Access Procedure, Balanced (LAPB) data link layer message that sets the operational mode of a link.

Set Asynchronous Balanced Mode --See SABM.

telco --Abbreviated form of the two words "telephone company."

X.25 protocol --ITU-T standard that defines how connections between data terminal equipment and data communications equipment are maintained for remote terminal access and computer communications in a network.