



**COMSPHERE
3600 SERIES
DATA SERVICE UNITS
MODELS 3610 AND 3611**

**TIME DIVISION MULTIPLEXER,
MULTICHANNEL MULTIPOINT, AND
DIGITAL BRIDGE OPTIONS
APPLICATIONS GUIDE**

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March 1999

PARADYNE™

COMSPHERE 3600 Series Data Service Units

Models 3610 and 3611

Time Division Multiplexer, Multichannel Multipoint, and Digital Bridge Options
Applications Guide

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- Use caution when installing or modifying telephone lines.
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Preface

About this Guide

This applications guide is intended as a supplement to the operator's guide; it only contains installation and operation information that is specific to the Time Division Multiplexer (TDM), Multichannel Multipoint (MCMP), and digital bridge options for the COMSPHERE® 3600 Series Data Service Units (DSUs), Models 3610 and 3611.

Since a DBM-V, DBM-S, or DBM-D is only used in digital bridge configurations, information specific to these circuit cards is included in this applications guide, along with SNA Diagnostic Interface information as it applies to TDM or MCMP configurations. However, a DBM-V, DBM-S, or DBM-D operates like an internal Dial Backup Module (DBM), so if your application uses a DBM-V, DBM-S, or DBM-D, refer to the other applications guide.

Order the *COMSPHERE 3600 Series Data Service Units, Models 3610 and 3611, Operator's Guide* for the technical specifications for the DSU and all of its options, basic DSU installation and operation information, verification of network operation, all configuration options tables and worksheets, DCP messages for all options, and troubleshooting flowcharts. DATAPHONE® II and Diagnostic Microcomputer (DMC) Network Management System (NMS) references are also provided, along with a complete equipment list and glossary.

Order the *COMSPHERE 3600 Series Data Service Units, Models 3610 and 3611, Dial Backup Module and SNA Diagnostic Interface Options, Applications Guide* if your application uses these options as part of its configuration, or if your application uses DBM-Vs, DBM-Ss, or DBM-Ds. It also provides a NetView™ commands reference for your convenience.

How to Use this Guide

Chapter 1 gives a general overview of the features for the 3600 Series DSU and its TDM and MCMP options. Refer to this chapter for a summary of feature capability.

Chapter 2 explains how to install and set up a Model 3610 (standalone) DSU-TDM/Flex or DSU-MCMP/Flex, or if you have added a TDM/Flex or MCMP/Flex to your DSU. If you ordered a TDM/DSD or MCMP/DSD, refer to this chapter to change interface settings.

Chapter 3 explains how to install and set up a Model 3611 (carrier-mounted) DSU-TDM or DSU-MCMP, or to add a TDM or MCMP to your DSU.

Chapter 4 familiarizes you with the basic principles underlying TDM, MCMP, and digital bridge operation. It also explains how SNA Diagnostic Interface operation is affected when using these features.

Chapter 5 identifies and discusses how the DSU functions differently or has different selections available when the TDM or MCMP is installed, or when a DBM-V, DBM-S, or DBM-D is installed.

Appendix A provides a summary of the DSU's menu structure. Refer to the menu tree as you proceed through the menu via the DCP (or SDCP if you have a Model 3611 DSU).

Appendix B provides a summary of all of the configuration options in the form of Configuration Worksheets, along with a suggestion for how the worksheets can be used.

Appendix C provides pin assignments for TDM or MCMP interfaces and cables.

Appendix D shows typical system configurations utilizing TDM, MCMP, and digital bridging. These configurations also indicate the configuration options that should be set to duplicate these scenarios for your own applications.

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Related Documents

Basic DSU product documentation includes the following:

3610-A2-GB46	<i>COMSPHERE 3600 Series Data Service Units, Models 3610 and 3611, User's Guide</i>
3610-A2-GB48	<i>COMSPHERE 3600 Series Data Service Units, Models 3610 and 3611, Time Division Multiplexer, Multichannel Multipoint, and Digital Bridge Options, User's Guide Supplement</i>

Should more detail about how the DSU operates be required, the following additional documentation may be ordered:

3610-A2-GB91	<i>COMSPHERE 3600 Series Data Service Units, Models 3610 and 3611, Operator's Guide</i>
3610-A2-GN32	<i>COMSPHERE 3600 Series Data Service Units, Models 3610 and 3611, Dial Backup Module and SNA Diagnostic Interface Options, Applications Guide</i>

Other product documentation includes the following:

3000-A2-GA31	<i>COMSPHERE 3000 Series Carrier, Installation Manual</i>
3000-A2-GB41	<i>COMSPHERE –48 Vdc Central Office Power Unit, Installation Guide</i>
3610-A2-GB42	<i>COMSPHERE 3600 Series Data Services Units, Models 3610 and 3611, Secondary Channel Applications Supplement</i>
6700-A2-GB41	<i>COMSPHERE 6700 Series Network Management System, User's Guide, Security Manager Feature Supplement</i>
6700-A2-GY31	<i>COMSPHERE 6700 Series Network Management System, User's Guide</i>

6800-A2-GB31 *COMSPHERE 6800 Series Network Management System Communications Products Support Command Reference Manual*

999-100-1961S *DATAPHONE II 2600 Series Data Service Units, User's Manual*

Contact your sales representative for additional product documentation.

Paradyne documents are also available on the World Wide Web at www.paradyne.com. Select *Library* → *Technical Manuals*.

Reference Documents

- AT&T Technical Reference 41458.
- AT&T Technical Reference 61330.
- AT&T Technical Reference 62310 – 1987.
- Bell Canada DCTE Specifications.
- Bell Communications Research Technical Reference Publication 41028.
- CCITT V.35 (ISO 2593).
- EIA-232-D/V.24 (ISO 2110).
- Integrated Network Corporation Compatibility Bulletin CB-INC-101.
- Northern Telecom NIS S204-2© 1986.
- Pacific Bell PUB L-780035-PB/NB.
- Pacific Bell PUB L-780036-PB/NB.

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Overview

The COMSPHERE® 3600 Series Data Service Units (DSUs), Models 3610 and 3611, support communication between computers and other data processing devices by providing connections to digital transmission facilities. The 3600 Series DSUs can be optioned with hardware to support the following capabilities:

- Dial backup (point-to-point and multipoint).
- LPDA-2 (Link Problem Determination Aid, Release 2) interoperability.
- Time Division Multiplexing (TDM).
- Multichannel Multipoint (MCMP).
- Digital bridge.

The time division multiplexing, multichannel multipoint, digital bridge and multipoint backup capabilities are discussed in this applications guide. LPDA-2 interoperability, as it applies to applications requiring installation of the TDM or MCMP option, is also discussed in this guide.

The time division multiplexer (TDM) option, an additional circuit card, supports time division multiplexing and digital sharing for up to six ports. It can serve as a digital bridge for multipoint dial backup and multipoint local area data set (LADS) operation.

The multichannel multipoint (MCMP) option is a circuit card that provides multipoint TDM capability. The MCMP capability allows up to six independent application programs to share one 56 kbps multipoint circuit. Channel speeds can range from 1.2 to 48 kilobits per second (kbps) and the sum of the speeds must be less than or equal to 48 kbps.

The TDM can be software-defined to provide the TDM or digital bridge capability; the MCMP option can be software-defined to provide TDM, MCMP, or digital bridge capability. However, only one of these capabilities can be in effect at a time. The TDM cannot be upgraded to support MCMP capability.

LPDA-2 interoperability is provided by the systems network architecture (SNA) Diagnostic Interface option that is installed on the DSU circuit card. It supports DSU management from IBM's NetView™ host-based network management system (NMS), as well as management from a Paradyne NMS or the DSU's diagnostic control panel (DCP). This option also supports DBM (including the DBM-V, DBM-S, and DBM-D), TDM, MCMP, and digital bridge capability.

Standard Features

The 3600 Series DSU, without any options, offers the following features:

- Multispeed operation.
- Clear Channel capability.
- LADS operation.
- Asynchronous operation.
- Nondisruptive diagnostics.
- NMS control.
- Rate adaption.
- Aggregate switching.
- Diagnostic Control Panel control.
- Full tributary diagnostics.
- External dial backup.

Refer to the *COMSPHERE 3600 Series Data Service Units, Models 3610 and 3611, Operator's Guide*, which can be ordered, for a description of these features.

NOTE

This applications guide is designed to be used in conjunction with the *COMSPHERE 3600 Series Data Service Units, Models 3610 and 3611, Operator's Guide* and the *COMSPHERE 3600 Series Data Service Units, Models 3610 and 3611, Dial Backup Module and SNA Diagnostic Interface Options, Applications Guide*.

Optional Features

This manual discusses the 3600 Series DSU with the TDM or MCMP option; it also includes discussion of DBM-Vs, DBM-Ss, or DBM-Ds, which are used in digital bridging applications.

Most diagnostic tests and commands available to a 3600 Series DSU without the TDM or MCMP option are also available with the TDM or MCMP option. Control of a TDM/MCMP/digital bridge session can be performed from the DCP, from an Async (Asynchronous) Terminal, or from a COMSPHERE 6700 or 6800 Series NMS.

Options that provide point-to-point dial backup capability and LPDA-2 interoperability without the TDM or MCMP option are discussed in the *COMSPHERE 3600 Series Data Service Units, Models 3610 and 3611, Dial Backup Module and SNA Diagnostic Interface Options, Applications Guide*.

DSU with TDM Capability

TDM capability allows up to six independent ports to share one standard digital point-to-point facility. TDM capability provides the following features:

- **Port capacity.** The TDM option allows up to six independent ports. One port is provided on the DSU, and five EIA-232 ports are provided on the TDM circuit card. (For a Modular 3611 DSU, V.35 interface is at the top of the 6-port connector module.)

There are two versions of the Model 3610 TDM/Flex: the 2-port TDM/Flex and the 6-port TDM/Flex. With one of these features installed, *each port* can be set as either an EIA-232 or V.35 interface. When a port other than Port 1 is used for V.35 operation, a cable adapter is required (feature number 3000-F1-510).

When a Model 3610 TDM/DSD (digital sharing device) is ordered, Ports 2 through 6 are configured for EIA-232 operation. With these models, you can select either EIA-232 or V.35 operation for this port group.

- **Multiplexing.** The TDM option provides time division multiplexing for up to six independent ports over one standard DDS (digital data service) point-to-point facility.
- **Line speeds.** TDM capability operates at all line speeds supported by the 3600 Series DSU: 2.4, 4.8, 9.6, 19.2, 38.4, 56, and 64 kbps full-duplex.

- **Port speeds.** Speeds of the individual TDM ports (1 through 6) can be set to 1.2, 2, 2.4, 4, 4.4, 4.8, 7.2, 8.4, 9.2, 9.6, 12, 14.4, 16.8, 18, 18.8, 19.2, 28.8, 32, 38.4, 48, 56, or 64 kbps full-duplex. *The sum of the port speeds cannot exceed the line speed.*
- **Asynchronous operation.** Although the DSU provides synchronous transmission through the DDS network, any one or more of the six ports can be configured for asynchronous operation. The TDM capability provides the asynchronous-to-synchronous conversion on these ports. In addition to synchronous data rates, asynchronous data rates of 150, 300, 600, 1200, and 1800 bps are supported. The word size is 6 to 10 bits, and one or two stop bits can be specified.
- **Digital sharing.** Two groups of consecutive ports can be formed to share the same TDM channel. All ports in a digital-sharing group operate at the same speed and all receive the same data. When configured for DSD port contention, only one port at a time is allowed to send.
- **FEP port sharing.** FEP port sharing is a method of connecting a front-end processor (FEP) to multiple control DSUs/modems to broadcast the same message over the network and the shared port. Up to three separate FEP port-sharing groups can be selected. Each group consists of two adjacent ports (e.g., 1 and 2, 3 and 4, 5 and 6).

FEP data and control signal transmissions pass through the odd-numbered port for broadcast onto a TDM channel and the even-numbered port.
- **Elastic store per port.** The TDM capability provides a transmit elastic store buffer for each port to support extended circuits. Both digital and analog extensions are supported.
- **Switched-carrier emulation.** In TDM transmission, switched-carrier emulation for each port is optional for both the inbound (toward the control DSU) and outbound (from the tributary DSU) directions.
- **Digital bridge.** The TDM can be configured to perform a digital bridge function. The digital bridge capability can support many applications, including dedicated multipoint dial backup and multipoint LADS operation.
- **NMS control.** A 3600 Series DSU with TDM has the same diagnostic capabilities as a point-to-point 3600 Series DSU without the TDM option. Control of a TDM session can be performed from the DCP or from a 6700 or 6800 Series NMS.
- **Async Terminal control.** A Model 3610 DSU with TDM can be controlled from a VT100-compatible async terminal. When this feature is enabled, the DSU is operated from the async terminal's menu and keyboard.
- **Point-to-point backup.** A 3600 Series DSU with TDM can also have a DBM installed for point-to-point dial backup. If backup is at a different speed than the DSU's speed, TDM operation automatically changes to a second predetermined port speed to support dial backup operation at the lower speed.
- **Aggregate switching.** Aggregate switching provides an additional mode of point-to-point dial backup. When enabled, it provides an internal aggregate data stream that includes diagnostics and framing on the alternate EIA-232-D or V.35 interface of Port 1. The aggregate port can then be connected to a DBM or an *external* dial backup unit (DBU).
- **External dial backup.** An *external* DBU (e.g., a 3800 Series dial/lease modem) can provide backup for a point-to-point DSU. By monitoring the Data Terminal Ready (DTR) lead on the DTE port that supports the aggregate data path, the 3600 Series DSU can set up a backup session when the external DBU receives an incoming call. The DTR lead of the DSU's alternate DTE port then switches the data path. Using another method, the local 3600 Series DSU can initiate and terminate a backup call by controlling the DTR lead of the external DBU by controlling the Data Set Ready (DSR) lead.

DSU with MCMP Capability

The MCMP capability is an enhancement to TDM and allows up to six independent application programs to share one standard 56 kbps multipoint facility. Only an MCMP can be configured to provide MCMP capability and provides the following features:

- **Channel capacity.** The channel capacity is six channels, which can be assigned to any of the physical ports. One port is provided on the DSU, and one (2-port version) or five EIA-232 ports are provided on the MCMP circuit card. Up to six virtual multipoint circuits can exist over one standard DDS multipoint facility.

There are two versions of the Model 3610 MCMP/Flex: the 2-port MCMP/Flex and the 6-port MCMP/Flex. With one of these features installed, *each port* can be set as either EIA-232 or V.35 interface. When a port other than Port 1 is used for V.35 operation, a cable adapter is required (feature number 3000-F1-510).

When a Model 3610 MCMP/DSD (an MCMP that can operate as a digital sharing device) is ordered, Ports 2 through 6 are configured for EIA-232 operation. You can select either EIA-232 or V.35 operation for this port group.

- **Number of addressable devices.** The MCMP capability supports up to 40 tributary DSUs or 20 tributary DSUs with DBMs, each equipped with an MCMP circuit card.
- **Line speeds.** The MCMP capability operates at 56 kbps full-duplex. The total usable bandwidth for the port is an aggregate bit rate of up to 48 kbps.
- **Channel speeds.** Speeds of the individual channels can be arbitrarily set to 1.2, 2.4, 4.8, 7.2, 9.6, 12, 14.4, 16.8, 19.2, 38.4, or 48 kbps full-duplex. *The sum of the channel speeds cannot exceed 48 kbps.*
- **Asynchronous operation.** Although the DSU provides synchronous transmission through the DDS network, any of the channels (ports) can be configured for asynchronous operation. The MCMP capability provides the asynchronous-to-synchronous conversion on these channels.

The channel speed choices are the same as those for synchronous operation. The word size can range from 6 to 10 bits, and one or two stop bits can be specified. Asynchronous data rates of 150, 300, 600, 1200, and 1800 bps are also supported.

- **Digital sharing.** Up to three digital-sharing groups can be formed at each tributary site by assigning channels to more than one port. Since all ports in a digital-sharing group share the same channel, all ports operate at the same speed and all receive the same data.

With MCMP capability, digital sharing and multiplexing can be in effect simultaneously at any of the tributary sites.

- **FEP port sharing.** Up to three separate FEP port-sharing groups can be selected when using the MCMP option, each consisting of two adjacent ports (e.g., 1 and 2, 3 and 4, 5 and 6). FEP port-sharing is a method of connecting an FEP to multiple control DSUs/modems to broadcast the same message over the network and the shared port.

FEP data and control signal transmissions pass through the odd-numbered port for broadcast onto a TDM channel and the even-numbered port.

- **Elastic store per port.** The MCMP capability provides a transmit elastic store buffer on each port to support extended circuits. Both digital and analog extensions are supported.
- **Switched-carrier emulation.** In MCMP transmission, switched-carrier emulation for each channel is standard inbound (toward the control DSU) and optional outbound (from the tributary DSU).
- **Async Terminal control.** A Model 3610 DSU with MCMP can be controlled from an async terminal. When this feature is enabled, the DSU is operated from the async terminal's menu and keyboard.
- **Dial backup.** Dial backup using the aggregate switching and extended bridge capabilities allow for multipoint service restoration. When aggregate switching is enabled, the DSU provides an internal aggregate data stream that includes diagnostics and framing on the EIA-232-D and V.35 interfaces of Port 1. The aggregate port (the DTE port **not** selected under the General option set) can then be connected to an extended bridge so the data can be sent to multiple Switched 56 DBMs – either 2-wire or 4-wire.

DSU with Digital Bridge Capability

The digital bridge capability is dedicated to a single DSU, and the data terminal equipment (DTE) connected to that DSU is usually the controlling DTE of a multipoint network. Both TDM and MCMP can be configured to provide the digital bridge capability. The digital bridge capability can support many applications, including dedicated multipoint dial backup and multipoint LADS operation.

This capability is used primarily for dedicated multipoint dial backup. A digital data service multipoint network is backed up with public switched telephone network (PSTN) or switched 56 kbps calls between the central-site and remote-site DBMs that are tied together by the digital bridge.

The digital bridge capability, when used to support dedicated multipoint dial backup, provides the following features:

- **Number of tributaries.** Dedicated multipoint dial backup can back up as many as 20 tributary DSUs. To do this, four additional DSUs with TDM, each configured for extended bridge (EBrdg), are required.
- **Multispeed operation.** Multipoint dial backup using the V.32 DBM or DBM-V operates at a customer-specified rate of 2.4, 4.8, 9.6, 12, or 14.4 kbps full-duplex. Fallback (training at a lower rate) is not allowed. Using either the 2-wire or 4-wire Switched 56 DBM (DBM-D or DBM-S, respectively), the DBM operates at 56 kbps.
- **Partial and full backup.** Multipoint dial backup can provide both partial and full backup on DDS multipoint circuits. For partial backup, the DSU's rate must equal the DBM's rate. Full backup must be performed if the DSU's rate is not equal to the DBM's rate.
- **Security.** The V.32 DBM or DBM-V, the 4-wire Switched 56 DBM or DBM-S, or the 2-wire Switched 56 DBM or DBM-D provide four levels of call setup security: None, Password, Callback, and Alarm. *Alarm* allows the DBM, DBM-V, DBM-S, or DBM-D to answer only incoming calls when there is a Facility Alarm on the DDS line.
- **Restoration.** When the DSU rate equals the DBM rate, tributary DSUs can be configured to automatically drop the backup connection and switch back to the DDS facility when service has been restored to the DDS network. When the DSU rate is not equal to the DBM rate, restoration can only be accomplished remotely from an NMS or manually from the control DSU's DCP.
- **Setup.** A backup session can be set up automatically by the tributary DSUs (if the DSU's rate is equal to the DBM's rate), controlled remotely from an NMS, or initiated manually from a control DSU's shared diagnostic control panel (SDCP).

DSU with LPDA-2 Interoperability and TDM or MCMP

The SNA Diagnostic Interface firmware upgrade, using the Release 2 Link Problem Determination Aid (LPDA-2) protocol, is installed on the DSU circuit card. LPDA-2 interoperability provides the following features:

- **Link Problem Determination Aid.** This protocol emulates IBM 5822 DSUs that use the LPDA-2 protocol, allowing the 3600 Series DSU to be controlled from IBM's NetView network management program. With TDM or MCMP, this option is only supported on Port 1. For digital sharing, all ports are supported.
- **NMS control.** The 3600 Series DSUs operating with the LPDA-2 option can respond to commands from NetView, the NMS, the DSU's DCP, or all three.
- **Full option support.** With the LPDA-2 option installed, all other 3600 Series DSU options are accommodated: DBM, TDM, or MCMP.

Models

The 3600 Series DSUs are available in two models:

- Model 3610 is a standalone desktop unit.
- Model 3611 is a circuit card for installation in a COMSPHERE 3000 Series Carrier.

NOTE

Except where specifically noted, all features and capabilities of the 3600 Series DSUs with the TDM or MCMP option discussed in this applications guide apply equally to both models. However, the two models are not interchangeable.

Model 3610 with TDM or MCMP

The housing of the Model 3610 DSU with TDM or MCMP has an expanded base which is designed to accommodate both the DSU circuit card and the TDM or MCMP circuit card (Figure 1-1).

The TDM or MCMP circuit card provides up to five additional 25-pin EIA-232 interface connectors (ports) on the rear of the housing. These ports, together with the DSU's EIA-232-D/V.24 interface connector (Port 1), provide for 2-port or 6-port multiplexing or digital sharing.

A Model 3610 DSU with TDM/Flex or MCMP/Flex may be a 2- or 6-port version. You can configure *each port* independently to operate as either an EIA-232 or V.35 interface. Ports are configured via the DCP, an async terminal, or an NMS. When a port other than Port 1 is used for V.35 operation, a cable adapter is required (feature number 3000-F1-510).

When the TDM/DSD or MCMP/DSD (EIA-232/V.35) is installed, you can select either EIA-232 or V.35 interface compatibility for Ports 2 through 6 by changing the option card.

Model 3611 with TDM or MCMP

The Model 3611 DSU with TDM or MCMP consists of a Model 3611 circuit card and a TDM or MCMP circuit card that are physically connected (Figure 1-2). As a unit,

they fill two adjacent slots in the COMSPHERE 3000 Series Carrier.

There are two types of Model 3611 TDM or MCMP circuit cards: non-modular and modular.

The non-modular TDM or MCMP provides a single multiport interface connector mounted directly onto the rear of the TDM or MCMP circuit card. The EIA-232-D/V.24 or V.35 interface connector at the rear of the DSU is Port 1; the TDM or MCMP multiport interface connector provides five additional EIA-232 ports (2 through 6). A special multiport cable fans out from the single multiport interface connector to five individual EIA 25-pin DTE connectors. Together with the Port 1 interface connector, the multiport cable provides for 6-port multiplexing or digital sharing.

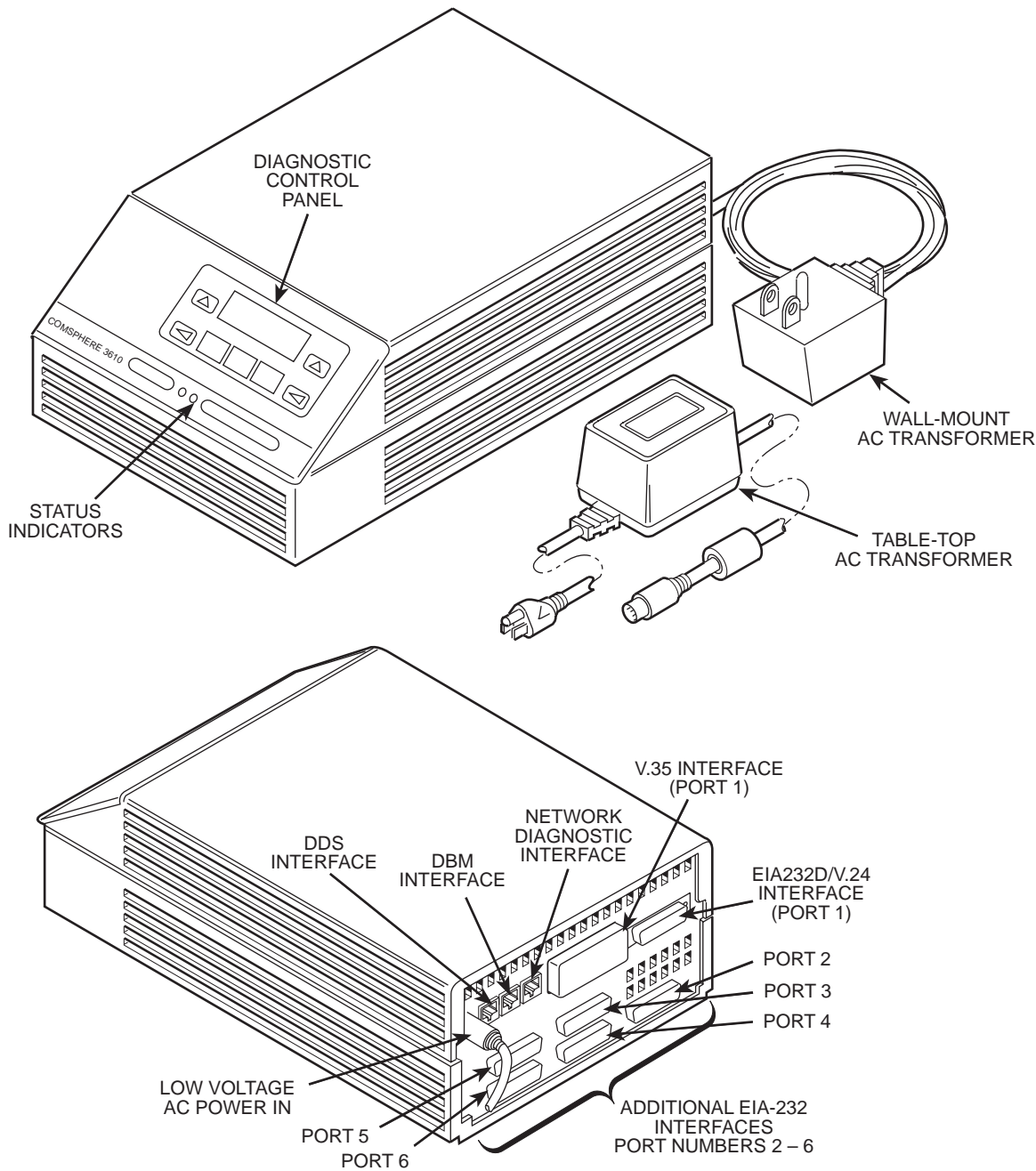
The modular TDM or MCMP contains "gold finger" contacts on the rear edge of the circuit card and is used with the 6-port connector module that contains six DB25 connectors. There is one connector for each port and a multiport cable is not needed. The 6-port connector module also provides a 26-pin high-density D-type connector for a V.35 interface for Port 1 and is located at the top of the module. This connector requires a 6-port V.35 Interconnect Cable that must be ordered separately.

The non-modular TDM or MCMP can be installed on a non-modular or modular DSU, while the modular TDM or MCMP can only be installed on a modular DSU. With the non-modular TDM or MCMP, the DTE cables must be removed before removing the DSU-TDM or DSU-MCMP unit from the carrier. However, with the modular TDM or MCMP, you can remove the DSU-TDM or DSU-MCMP unit from the front of the carrier without disconnecting the DTE cables from the rear of the carrier.

Low voltage ac power from the carrier's backplane is provided to the TDM or MCMP circuit card, and a power supply on the TDM or MCMP circuit card produces the regulated dc operating voltage.

Models 3610 and 3611 with SNA Diagnostic Interface

The Models 3610 and 3611 with the SNA Diagnostic Interface or LPDA-2 consist of a firmware upgrade that allows the DSU to be controlled by NetView. A 3600 Series DSU can be ordered from the factory with this option installed. This option can also be field installed by your Customer Support representative or upgraded by Factory Service.



496-13091-04

Figure 1-1. Model 3610 DSU with TDM or MCMP

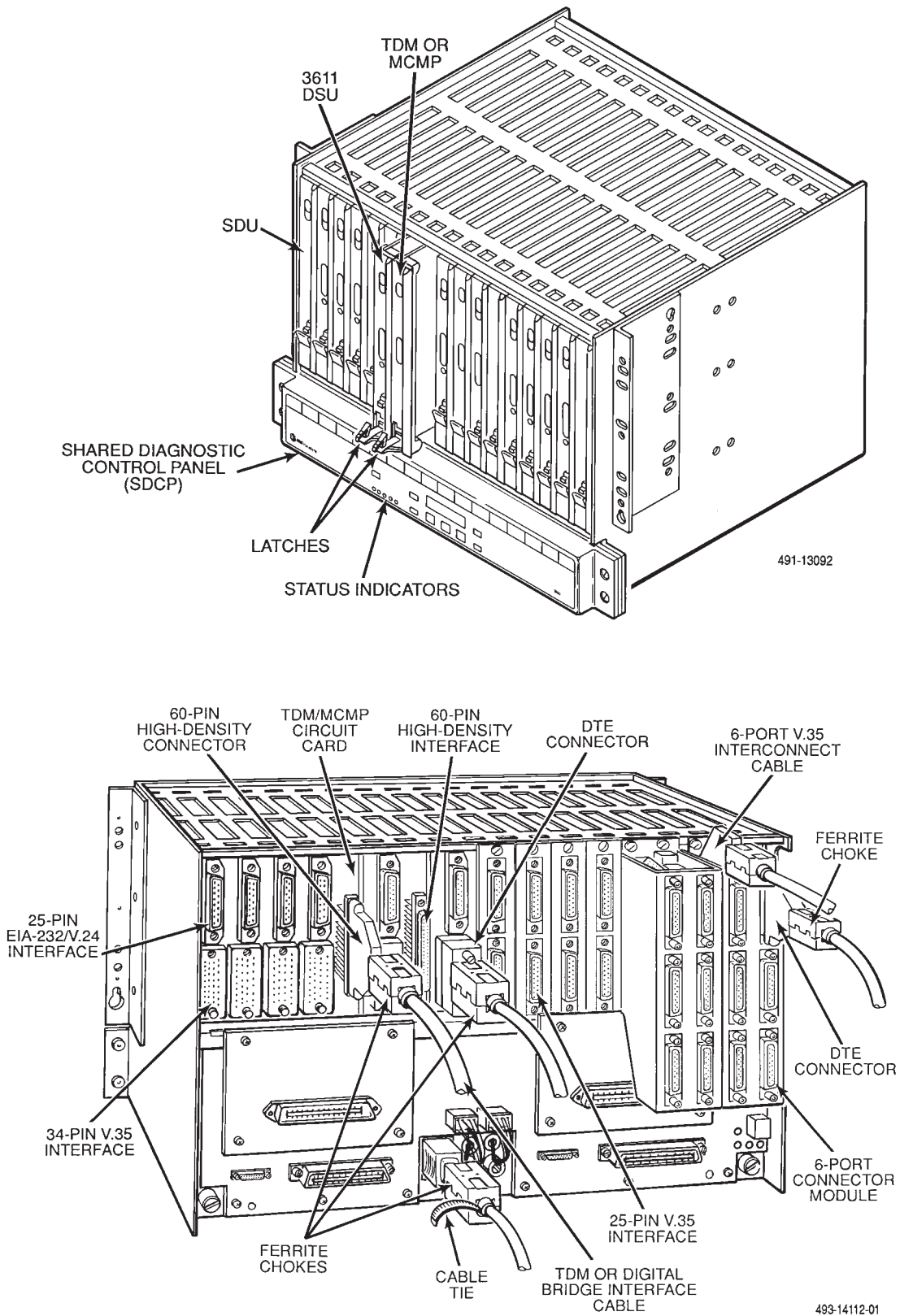


Figure 1-2. Model 3611 DSU with TDM or MCMP

DBM Types

Three dial backup modules (DBMs) are available. A DBM is optional and provides an alternate data path in case the digital connection fails. Each of the three DBM types listed below occupy one slot in the COMSPHERE 3000 Series Carrier.

DBM-V

A DBM-V is used for point-to-point dial backup and provides multipoint dial backup with a digital bridge. The DBM-V provides a carrier-mounted, 14.4 kbps V.32bis module that is compatible with the DBM associated with 3600 Series DSUs and with a COMSPHERE 6700 or 6800 Series NMS.

DBM-S

A DBM-S provides the capability to utilize the 4-wire switched 56 kbps digital service to back up a failed multipoint DDS circuit via a digital bridge. It is particularly useful in an MCMP backup environment. The DBM-S can be used on switching services that are compatible with AT&T, MCI®, and US SPRINT® using dedicated 4-wire access.

DBM-D

A DBM-D provides the capability to utilize the 2-wire switched 56 kbps digital service to back up a failed multipoint DDS circuit via a digital bridge. It is particularly useful in an MCMP backup environment. The DBM-D can be used on switching services that are compatible with Northern Telecom's DataPath™ service using dedicated 2-wire access.

NOTE

References to **DBM** operation in this guide also apply to a DBM-V, DBM-S, or DBM-D.

Government Requirements

For the Government Requirements and specific instructions pertaining to connection to the telephone network, refer to the *COMSPHERE 3600 Series Data Service Units, Models 3610 and 3611, User's Guide*.

Equipment Warranty and Support

For the Equipment Warranty and Support instructions, refer to the *COMSPHERE 3600 Series Data Service Units, Models 3610 and 3611, User's Guide*.

NOTE

If the DSU-TDM or DSU-MCMP was ordered as an integrated unit and needs repair, contact your service representative; *do not remove the TDM or MCMP from the DSU.*

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Overview

The Model 3610 DSU, designed for desktop operation, is delivered with default hardware strap settings and factory-installed software options, ready to connect to the network. The unit is configured as a tributary DSU for operation at 9.6 kbps on a point-to-point circuit, with diagnostic protocol set to ADp.

When a TDM or MCMP is installed, Port 1 of the DSU is configured to operate at 9.6 kbps with the TDM or MCMP capability enabled; all other ports are disabled.

For the Model 3610, the additional ports provided by the TDM or MCMP are 25-pin D-type connectors, which require an interface between each 25-pin D-type connector and V.35 connector. Order a V.35 adapter (feature number 3000-F1-510) for each TDM or MCMP port that you intend to operate as a V.35 interface. All ports are configured for EIA-232 operation before leaving the factory.

If you ordered a new Model 3610 DSU with a TDM/Flex or MCMP/Flex, it may be a 2- or 6-port version. You can configure *each port* independently to operate as either an EIA-232 or V.35 interface. Ports are

configured via the DCP, an async terminal, or an NMS through the Configuration (**Conf**) branch of the menu.

If you ordered a Model 3610 TDM/DSD or MCMP/DSD for digital-sharing device (DSD) applications, which only comes in a 6-port version, turn the *option card* on the TDM or MCMP so *all ports* can operate as either EIA-232 or V.35 interfaces.

If you ordered a TDM/Flex or MCMP/Flex field installation upgrade and have a DSU with a firmware version less than 6.3x, set the TDM or MCMP switch to change *all ports* from EIA-232 to V.35 operation; they cannot be set via the DCP. These ports should be set during the installation, but they can be changed as needed provided you have the required V.35 adapter or adapters. *Only the 6-port TDM/Flex or MCMP/Flex can be used with DSUs with firmware version (DSU SW ver:) less than 6.3x.* For further information regarding ordering equipment, see Appendix C, *Equipment List*, in the *COMSPHERE 3600 Series Data Service Units, Models 3610 and 3611, Time Division Multiplexer, Multichannel Multipoint, and Digital Bridge Option, User's Guide Supplement*.

This chapter contains only installation information that is specific to a TDM or MCMP, including the Flex and DSD options.

NOTE

Unless specifically noted, **TDM** refers to a TDM, TDM/Flex, or TDM/DSD, and **MCMP** refers to an MCMP, MCMP/Flex, or MCMP/DSD.

TDM or MCMP installation consists of the following procedures, which should be performed in the order listed.

- Physical installation of the TDM or MCMP.
- Change the S1 hardware strap (if necessary).
- Changing the switch position for the TDM/Flex or MCMP/Flex for a DSU having a firmware version *less than 6.3x*, or orientation of the TDM/DSD or MCMP/DSD option card (if necessary).
- Electrical connection.
- Network diagnostic connection.
- Software configuration.
- DDS network (or LADS) connection.
- PSTN or switched 56 kbps network connection (if the DBM is installed).
- DSU DTE connection.
- Operation verification.

Although the Model 3610 DSU is designed for desk- or table-top operation, an ACCULINK® 3100 Series CSU wall-mount adapter may be ordered to mount the DSU with TDM or MCMP on a wall, an equipment shelf, a 19-inch RS-310-C or 23-inch AT&T DATAPHONE® equipment cabinet. To order the adapter, refer to *Equipment Lists*, Appendix L, of the *COMSPHERE 3600 Series Data Service Units, Models 3610 and 3611, Operator's Guide*.

For DSU installation information, order the *COMSPHERE 3600 Series Data Service Units, Models 3610 and 3611, Operator's Guide*. For DBM and SNA Diagnostic Interface installation information, order the *COMSPHERE 3600 Series Data Units, Models 3610 and 3611, Dial Backup Module and SNA Diagnostic Interface Options, Applications Guide*.

Hardware Straps

HANDLING PRECAUTIONS FOR STATIC-SENSITIVE DEVICES

This product is designed to protect sensitive components from damage due to electrostatic discharge (ESD) during normal operation. When performing installation procedures, however, take proper static control precautions to prevent damage to equipment. If you are not sure of the proper static control precautions, contact your nearest sales or service representative.

The 6-port Model 3610 TDM/Flex or MCMP/Flex has two switches with hardware straps (refer to [Figure 2-1](#)).

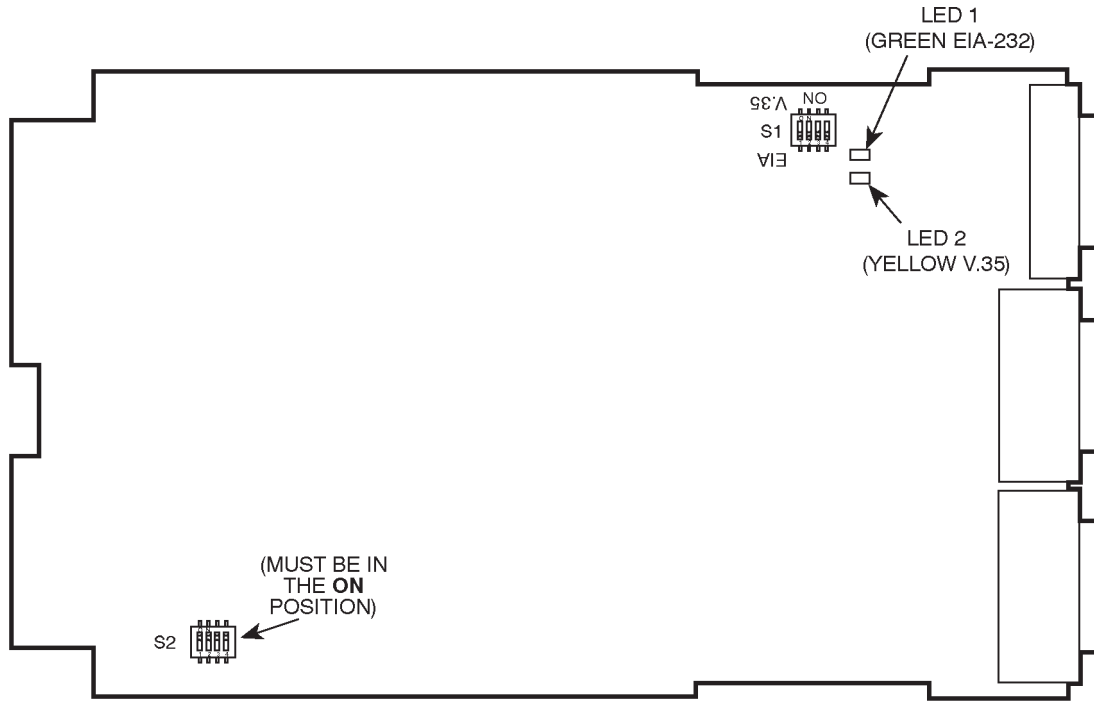
- *Switch S1* is for configuring a 6-port TDM/Flex or MCMP/Flex for EIA-232 or V.35 interface compatibility when the DSU's firmware version is less than 6.3x; all ports are configured for either EIA-232 or V.35 operation. *You can only use a 6-port TDM/Flex or MCMP/Flex with a DSU that has a firmware version of less than 6.3x.*

S1 is ignored if the DSU's firmware version is 6.3x or greater; the 2-port TDM/Flex or MCMP/Flex does not have S1.

- *Switch S2* is only located on an MCMP/Flex; these straps must not be changed.

For the TDM/DSD and MCMP/DSD with selectable V.35 or EIA-232 interface compatibility on all ports via an option card, there are two hardware straps or switches that are for factory testing only. **These two straps or switches must not be changed.** They should remain in the positions shown in [Figure 2-2](#).

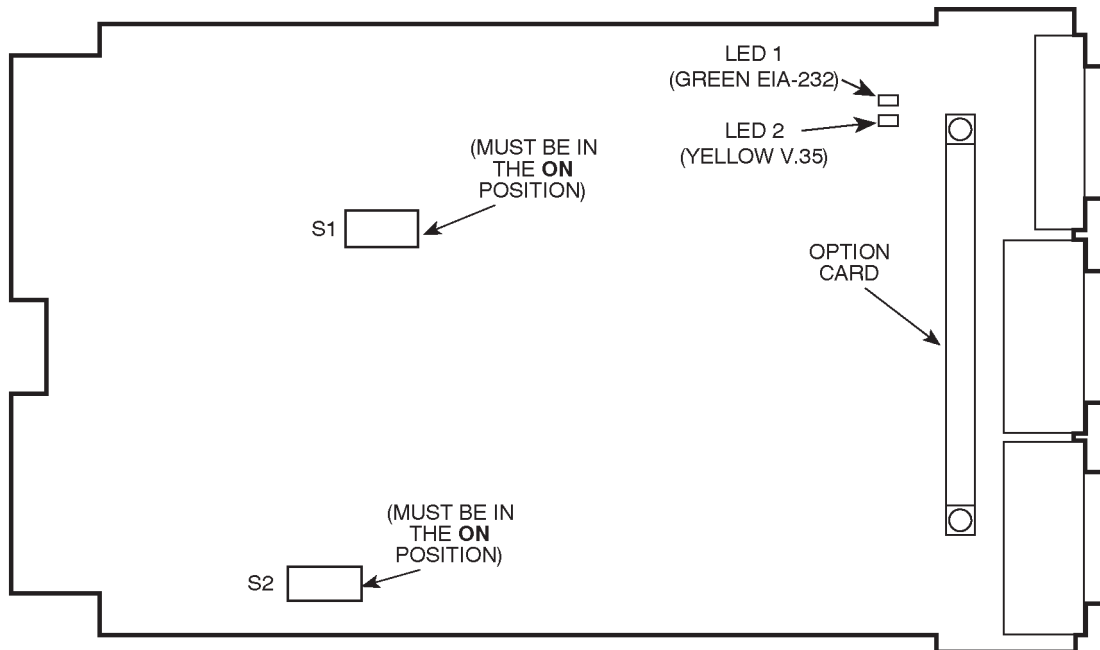
Most straps for the TDM or MCMP are set as configuration options. For additional DSU hardware strap information, refer to the *COMSPHERE 3600 Series Data Units, Models 3610 and 3611, User's Guide*.



SWITCH S1 ONLY APPEARS ON 6-PORT TDM FLEX OR MCMP FLEX CARDS.
SWITCH S2 ONLY APPEARS ON MCMP FLEX CIRCUIT CARDS.

494-14496

Figure 2-1. Model 3610 TDM/Flex or MCMP/Flex Switch Locations



SWITCH S2 ONLY APPEARS ON MCMP CIRCUIT CARDS.

494-13854-03

Figure 2-2. Model 3610 TDM/DSD or MCMP/DSD Circuit Card Switch Locations

Changing Hardware Settings

If you have a new TDM/Flex or MCMP/Flex or if you ordered a Flex field installation upgrade for a DSU having firmware version 6.3x or greater, you do not change hardware straps; you set each port to operate independently of the others via the DCP, an async terminal, or an NMS.

If you ordered the 6-port TDM/Flex or MCMP/Flex field installation upgrade for a DSU having a firmware version less than 6.3x, use the S1 switch to change the TDM or MCMP port interface operation – EIA-232 or V.35.

If you have a TDM/DSD or MCMP/DSD, use the option card to change the TDM or MCMP port interface operation – EIA-232 or V.35.

Follow this procedure to open the DSU and separate it from the TDM or MCMP (refer to Figures 2-3 and 2-4). Select the appropriate procedure based upon the type of

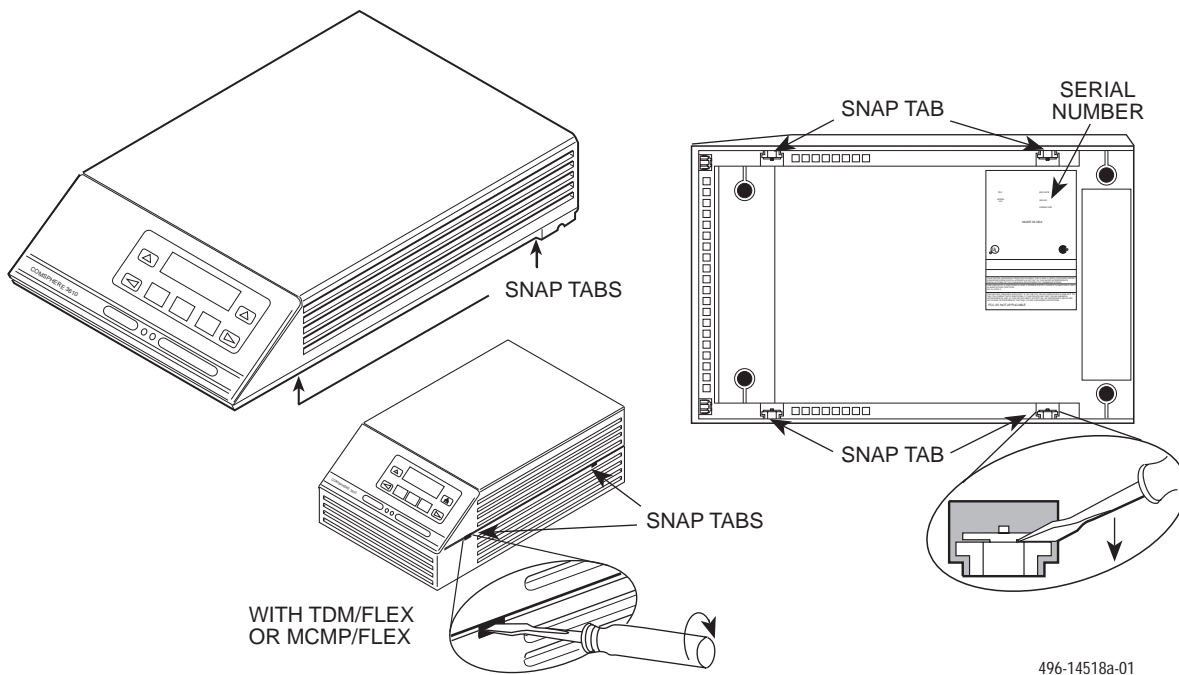
TDM or MCMP you have – either the switch (Flex) or option card (DSD).

NOTE

If the unit has already been installed, make sure that the unit is disconnected from its power source before changing the Flex interface switch position.

► Procedure

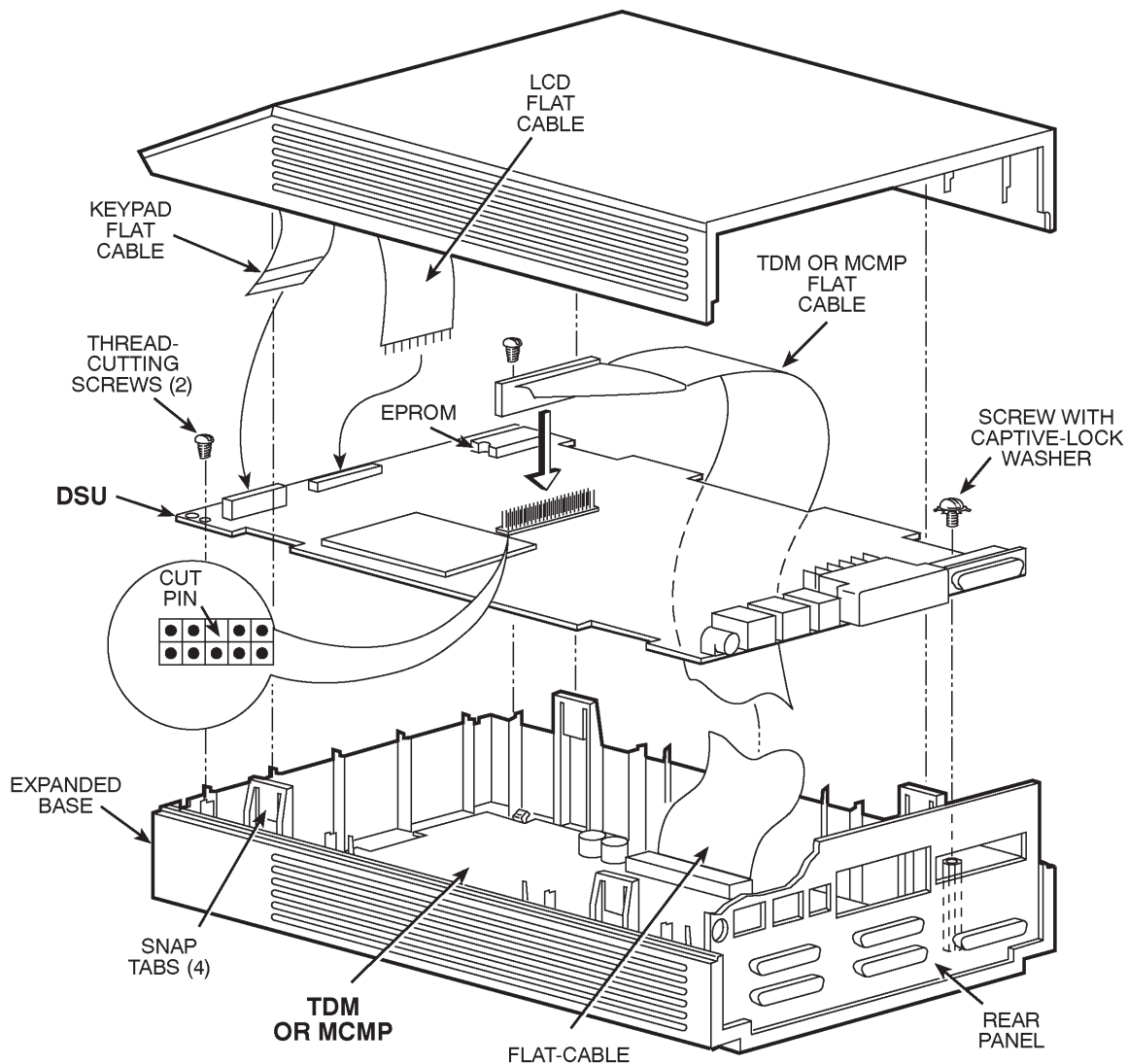
1. With the unit upside down, use a small flat-head screwdriver to release the four snap tabs holding the base in place (refer to Figure 2-3).
2. Turn the unit over while being careful not to allow any cable to be pulled free of the connectors.



496-14518a-01

Figure 2-3. Opening the DSU

3. Disconnect the keypad flat cable from the DSU circuit card by *squeezing the latches* on each side of the cable and gently pulling up (refer to Figure 2-4).
4. Disconnect the LCD flat cable by gently working the cable, **not the connector**, free of its connector. *Be careful not to bend any of the cable pins.*
5. Disconnect the TDM/MCMP flat cable.
6. Unscrew the three screws that hold the DSU circuit card in place.
7. Remove the DSU from the base. Carefully lift the DSU up until its connectors are free of the rear panel. Set the DSU on a clean ESD (anti-static) workpad.



494-13846b

Figure 2-4. Assembling/Disassembling the TDM or MCMP

Changing the Flex Interface Switch

The TDM or MCMP field installation upgrade is shipped from the factory with the switch position set to EIA-232. The following procedure tells you how to change this setting to V.35 or back to EIA-232.

► Procedure

1. Determine whether the port interfaces will be strapped for EIA-232 or V.35.
2. Locate interface Switch S1 on the TDM/Flex or MCMP/Flex circuit card (Figure 2-5).

If you have the 6-port version of the TDM/Flex or MCMP/Flex, Switch S1 has four straps, but only Strap 1 is used. (S1 is not installed on 2-port versions of the TDM/Flex or MCMP/Flex.)

3. Insert a small pointed tool into position 1 of Switch S1, and carefully flip the switch in the direction of the circuit card label identifying the setting. To select EIA, push switch to EIA (Off) direction. To select V.35, push switch to V.35 (ON) direction.
4. Reinstall the DSU circuit card, securing it to the base with the three screws (refer to Figure 2-4).
5. Reconnect the LCD, keypad, and TDM/MCMP flat cables.
6. Replace the cover over the expanded base, carefully aligning the rear panel and four snap tabs over their corresponding slots.
7. Press the cover and base together until all four tabs snap into place.

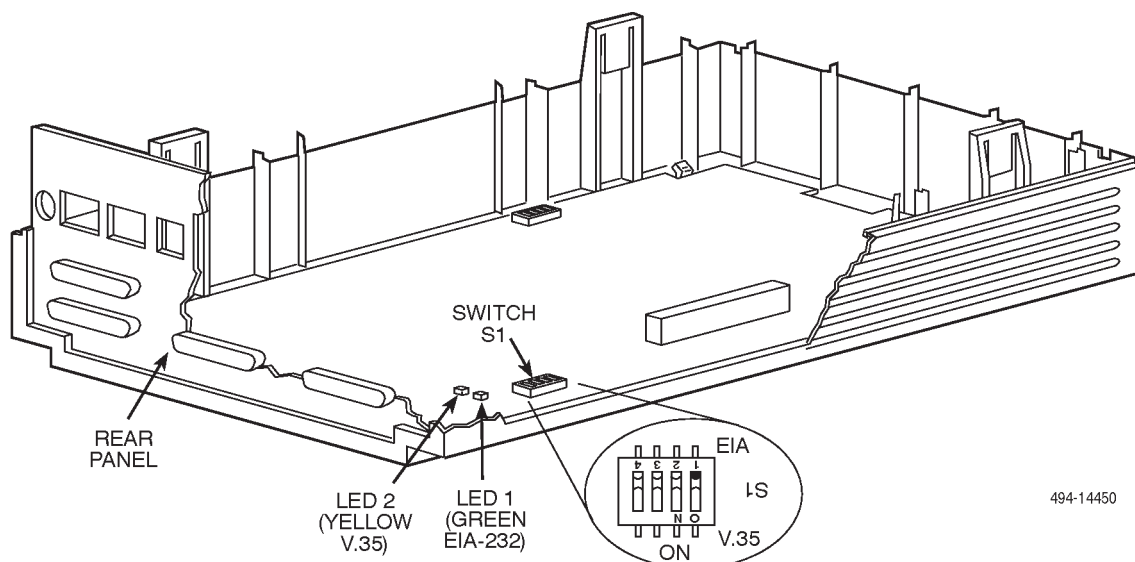


Figure 2-5. Changing TDM/Flex or MCMP/Flex Interface Compatibility

Changing the DSD Option Card

The TDM/DSD or MCMP/DSD is shipped from the factory with the option card set to EIA-232. The following procedure tells you how to change this setting to V.35 or back to EIA-232.

NOTE

If the unit has already been installed, make sure that the unit is disconnected from its power source before changing the option card.

2. Turn the card around, and re-insert the option card so that from the rear, the option card reads **THIS SIDE FACES REAR FOR V.35**.
3. Reinstall the DSU circuit card, securing it to the base with the three screws (refer to [Figure 2-4](#)).
4. Reconnect the LCD, keypad, and TDM/MCMP flat cables. For the TDM/MCMP flat cable, make sure the flat-cable ferrite choke is properly positioned on the edge between the DSU and the TDM/MCMP circuit card.
5. Replace the cover over the expanded base, carefully aligning the rear panel and four snap tabs over their corresponding slots.
6. Press the cover and base together until all four tabs snap into place.

► Procedure

1. Gently work the option card free of its connector (refer to [Figure 2-6](#)).

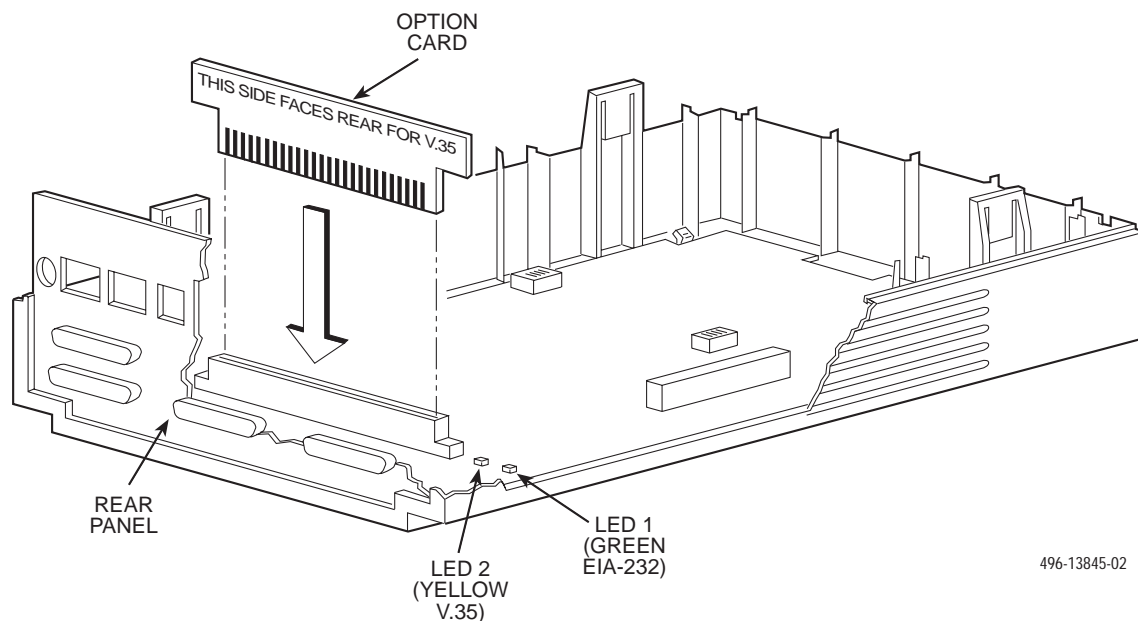


Figure 2-6. Changing TDM/DSD or MCMP/DSD Interface Compatibility

Electrical Connection

CAUTION

The power cord with ac transformer contains a 3-wire grounding-type plug which has a grounding pin. This is a safety feature. Grounding of the unit is vital to ensure safe operation. Do not defeat the purpose of the grounding plug by modifying it or by using an adapter.

Prior to installation, use an outlet tester or voltmeter to check the ac receptacle for earth ground. If the power source does not provide a ground connection, consult an electrician to determine another method of grounding the unit before proceeding with the installation.

CAUTION

Only use the power transformer designed for the Model 3610 DSU. Using other transformers may result in personal injury or damage to the equipment.

4. Reinstall the factory configuration options; use the FacT configuration for a tributary or FacC for a control.
5. Make any desired configuration changes in the DSU, Diag, DBM, Gen, Bckup, MUX, PrtSp, and LPDA-2 option sets.

For information on the TDM, MCMP, or digital bridge option sets, refer to the *Unit Configuration* section of this guide and the *COMSPHERE 3600 Series Data Service Units, Models 3610 and 3611, User's Guide* or the *COMSPHERE 3600 Series Data Service Units, Models 3610 and 3611, Operator's Guide*.

To power up the DSU:

► Procedure

1. Use a non-switched, 3-prong grounded ac wall outlet capable of supplying the specified voltage and current.
2. Label the circuit breaker that protects the wall outlet and be sure it is set to ON.
3. At the rear of the DSU (Figure 2-7), insert the small end of the power cable into the power receptacle.

If you have a table-top ac transformer, connect the 3-prong plug to the ac outlet. If you have a wall-mount ac transformer, connect the ac transformer to the ac outlet.

The unit performs a *power-up routine*.

Power-Up Routine

When power is applied, the DSU:

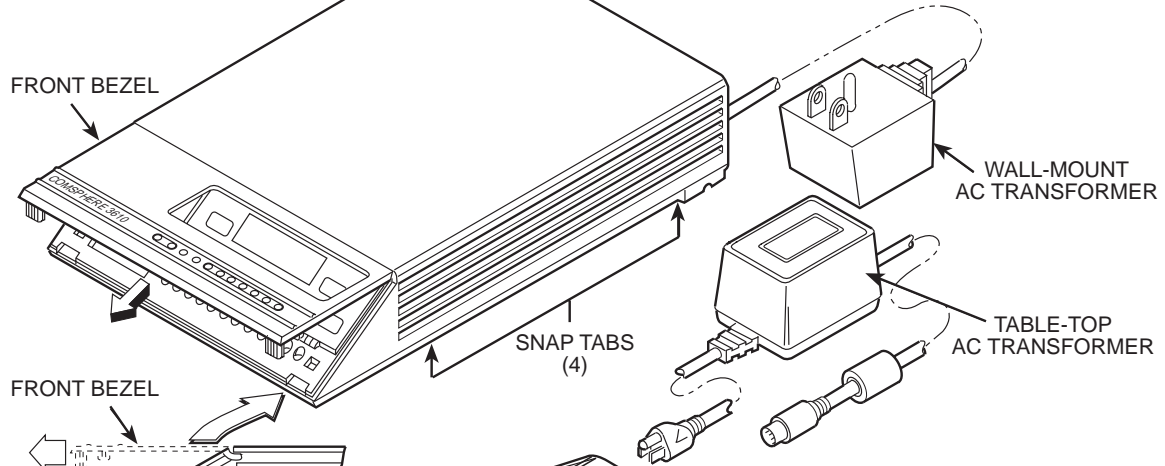
- Determines what options are installed (DBM or MUX – the TDM or MCMP).
- Runs a Device Test on the unit and each of the installed options.

During the tests, all indicators on the DCP light briefly and the message **Power-Up Tests** appears on the liquid crystal display (LCD).

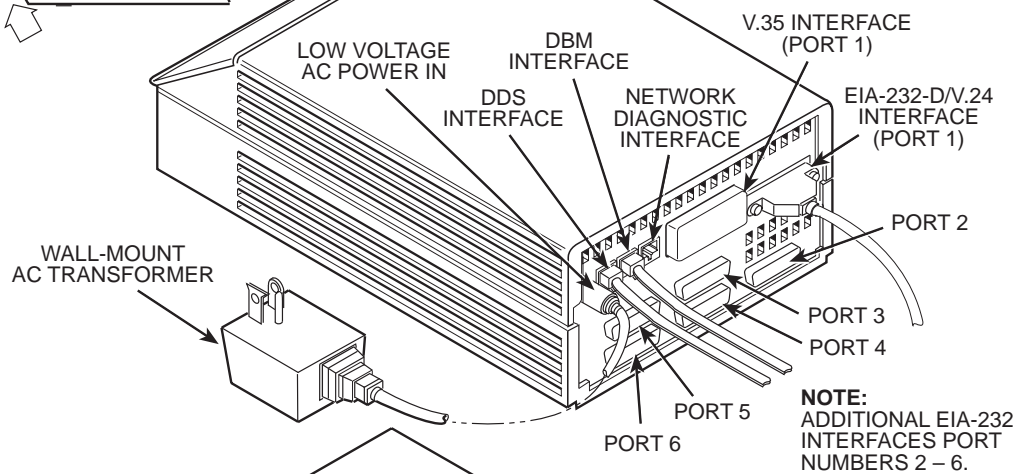
- Displays the results of each test momentarily as **Pass**, **Fail**, or **Abrt**. These tests take about 20 seconds to complete. **Abrt** indicates that the Device Test was aborted because a network loopback was in progress during the power-up procedure.

When a TDM or MCMP is installed, MUX is displayed as Pass or Fail.

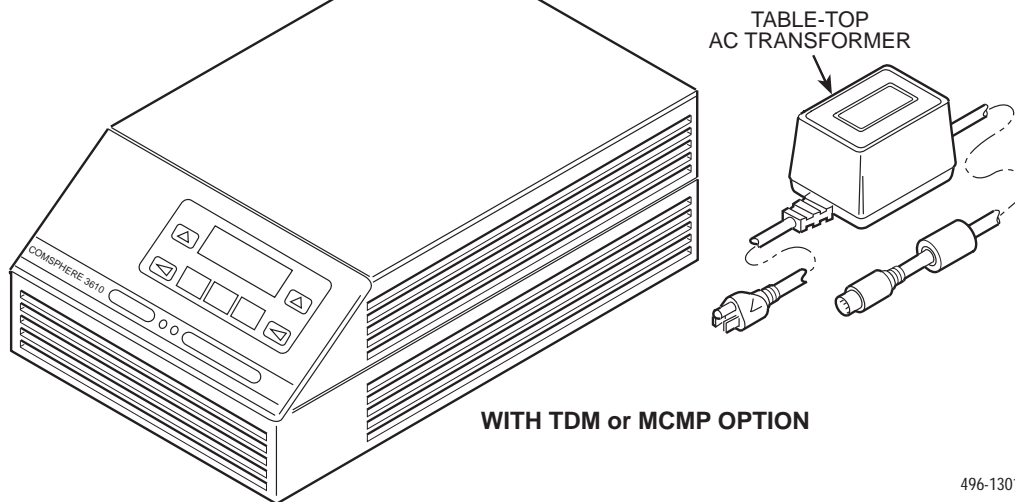
WITHOUT TDM or MCMP OPTION



WITH TDM or MCMP OPTION



WITH TDM or MCMP OPTION



496-13015-05

Figure 2-7. Model 3610 DSU with TDM or MCMP

If the DSU, DBM, TDM or MCMP (MUX) fails the power-up test:

► Procedure

1. Reinstall the factory configuration options; use the FacT configuration for a tributary or FacC for a control.
2. Confirm the installed hardware options (DBM, TDM, or MCMP).
3. Re-execute the Device Test. (Press the \triangle key to return to the top-level menu, then select **Local** → **Test** → **DSU** → **Devic**). If the test passes, continue with the installation.

Since the DSU is not connected to the network, the red **Alarm** indicator is lit, and the LCD displays **No Signal**, indicating a facility alarm. The LCD displays health and status information.

The red Alarm LED lights when there is no DDS signal.

NOTE

If the test fails again, call your service representative to return the DSU-TDM or DSU-MCMP unit; refer to Chapter 1 in the *COMSPHERE 3600 Series Data Service Units, Models 3610 and 3611, Time Division Multiplexer, Multichannel Multipoint, and Digital Bridge Options, User's Guide* or the *COMSPHERE 3600 Series Data Service Units, Models 3610 and 3611, Operator's Guide*.

Network Diagnostic Connection

The DSU may be set up for a diagnostic interface with the NMS using a 3600 Hubbing Device. For further information about installing a hubbing device or connecting to a router or async terminal, refer to the *COMSPHERE 3600 Series Data Service Units, Models 3610 and 3611, User's Guide*, or the *COMSPHERE 3600 Series Data Service Units, Models 3610 and 3611, Operator's Guide*.

Software Configuration

A default software configuration is loaded in the DSU at the factory. If the TDM is installed, the Model 3610 DSU is configured as a tributary with TDM mode enabled and Port 1 set to operate at 9.6 kbps. If the MCMP is installed, the DSU is configured as a tributary with MCMP mode enabled and Port 1 set to operate at 9.6 kbps.

Software configurations can be changed from the DCP, an async terminal, or from an NMS that supports this feature.

From the DCP and Async Terminal

To change configuration options from the DCP, use the selection sequence from the top-level menu. The Options (**Opts**) branch is used to change configuration options.

You can also change configuration options using an async terminal. Once an async terminal session is active, changing configuration options follows the same steps as as the DCP.

To change configuration options of the Model 3610 DSU from the DCP or the Model 3610 from an async terminal, select the Local branch, then the Configuration (Config) branch. (If not displayed, press the \triangleright key until Config is displayed, then press the function key below the selection.) Select Opts (for Configuration Options), then Load.

For additional information about changing configuration options from the DCP or async terminal or for a listing of messages received during installation, refer to the *COMSPHERE 3600 Series Data Service Units, Models 3610 and 3611, Time Division Multiplexer, Multichannel Multipoint, and Digital Bridge Options, User's Guide*, Chapter 3, or order the *COMSPHERE 3600 Series Data Service Units, Models 3610 and 3611, Operator's Guide* and refer to Chapter 6 and Appendix E.

From the NMS

Software configuration options for a Model 3610 with a TDM or MCMP can also be set from a 6800 Series NMS using the Change commands. These commands include the following:

- **cho** followed by the DSU's network address allows you to change the DSU, Diagnostic (DSU, DBM, and General), General, MUX Setup and Port, Port Speed, and LPDA configuration option sets.
- **cho** followed by the DBM's network address allows you to change the DBM, Backup, Diagnostic (DSU, DBM, and General), General, MUX Setup and Port, and Port Speed configuration option sets.
- **cha** followed by the DSU's serial number allows you to change the tributary DSU's network address.

For the 6700 Series NMS, configuration options are menu-driven. Select **Config**→**Network**→**Devices**→ the appropriate submenu selection.

Tributary 3610 DSUs with TDM or MCMP can be configured from an NMS provided the Position configuration option (Diagnostic General) is set to Trib from the DCP and the DSU is connected to a control DSU that is connected to the NMS.

The COMSPHERE 6700 or 6800 Series NMS, which uses the Advanced Diagnostic protocol (ADp), fully supports configuration of the DSUs with TDM and multipoint dial backup or MCMP. Refer to the NMS documentation as needed.

Configuration of the DSUs from an NMS using either the DPII or DMC protocol is subject to the same limitations identified in the *COMSPHERE 3600 Series Data Service Units, Models 3610 and 3611, User's Guide* or the *COMSPHERE 3600 Series Data Service Units, Models 3610 and 3611, Operator's Guide*.

Network and LADS Connections

For connection to the DDS, switched 56 kbps, and public switched telephone or dial networks, or to a local area data set (also called a limited-distance modem), refer to the *COMSPHERE 3600 Series Data Service Units, Models 3610 and 3611, User's Guide*, or the *COMSPHERE 3600 Series Data Service Units, Models 3610 and 3611, Operator's Guide*.

DSU DTE Connection

Make the DTE connection as described in the *COMSPHERE 3600 Series Data Service Units, Models 3610 and 3611, User's Guide*.

In a TDM or MCMP application, only DSU Port 1 is capable of interfacing to an EIA-232 connector or a V.35 connector. In a DSD application, an option card allows all ports to operate as either EIA-232 or V.35 interfaces. In a Flex application where the DSU firmware version is less than 6.3x, a Flex interface switch allows all ports to operate as either EIA-232 or an V.35 interface.

Ports 2 through 6 have only EIA-232 connectors. If speeds higher than 19.2 kbps are selected for these ports, an Paradyne special cable provides an interface between the TDM's or MCMP's D-type connector and the DTE cable's V.35 connector.

Verification Testing

Perform verification testing after any installation. After installing and configuring a network, including control and tributary DSUs, the DDS network and, if appropriate, DBMs and their dial connections, perform the following series of tests from the control DSU (using the DCP, an async terminal, or an NMS) to verify network operation.

► Procedure

1. Request a device Identity (*ID* from the Status branch) report from each tributary to ensure that the DSU is addressed properly.
2. Perform a Digital Test (on the DDS circuit) to ensure that the network is functioning. Refer to the *Digital Test* section of Chapter 5.

For a *DSU configured for TDM mode*, perform a Digital Test on each active port.

For a *DSU configured for MCMP mode*, perform a Digital Test on each tributary DSU on the aggregate channel.

For a *digital-sharing group*, perform a Digital Test on the lower-numbered port in the digital-sharing group only.

NOTE

A control DSU can originate a Digital Test in a point-to-point or multipoint network. A tributary DSU can originate a Digital Test in a point-to-point network only, provided the configuration option Respond to Remote Digital Loopback (**RespondRDL**) is enabled in the control.

For a DSU equipped with a DBM:

► Procedure

1. Select the **Dial** command from **Bckup** while in Idle Mode to establish a dial call to the tributary to test for dial tone, and verify that the DSU can initiate and receive calls.
2. Select the →**Dial** command to switch the data to the PSTN or switched 56 kbps circuit (enter Dial Backup mode) to ensure that both DSUs have been configured correctly.

3. Perform a Digital Test on both the DBM and the PSTN or switched 56 kbps circuit.

For a DSU equipped with both DBM and TDM or MCMP, perform a Digital Test on each of the TDM or MCMP ports in Dial Backup mode on the PSTN or switched 56 kbps circuit.

4. Drop the backup.

For a DSU equipped with MCMP:

► Procedure

1. *From the control DSU*, go to the Control (**Ctrl**) branch, select **LEDs**, and then select Aggregate (**Aggr**) to monitor the aggregate 56 kbps digital signal.
2. Go to the Configuration (**Conf**) branch and select Poll List (**PList**) from the menu.
3. Acquire the poll list (**Acq**). This command starts the initialization process.
4. Verify that each tributary DSU with MCMP has been acquired by displaying (**Displ**) the MCMP poll list.

If the DSU's address does not appear on the list, verify that the missing tributary DSU is equipped with the MCMP option and configured for MCMP mode.

After the poll list has been acquired, the LSD and RXD light-emitting diodes (LEDs) should be flashing without a pause at the control DSU's DCP. *Any pause indicates that a tributary on the poll list is not responding.*

5. *From the tributary DSU*, if a new drop is being added to an existing MCMP circuit, select **Add** from the Poll List menu. This places the tributary DSU on the control DSU's poll list.
6. After the tributary DSUs have been added to the control DSU's poll list, go back to the Control (**Ctrl**) branch, select **LEDs**, and reassign the LEDs from the aggregate data path (**Aggr**) to one of the DSU ports (Prt1, Prt2, Prt3, etc.).

MCMP capability is now functional, with all tributary DSUs on the control DSU's MCMP poll list. At this point, DSU ports can be assigned to MCMP channels through the Port Speed (**PrtSp**) selection from the Configuration Options (**Opts**) submenu.

Adding a TDM/Flex or MCMP/Flex to an Installed Model 3610 DSU

This section describes the procedure for adding a TDM/Flex or MCMP/Flex upgrade for the Model 3610 DSU.

The time division multiplexer (TDM/Flex) or multichannel multipoint (MCMP/Flex) upgrade for the Model 3610 (standalone) DSU includes a circuit card that rests in an expanded base with an expanded rear panel.

If this upgrade is to be *installed on a DSU with firmware version 6.3x or greater*, each port (Port 1 or Port 2 for the 2-port version, or Ports 1 through 6 for the 6-port version) can be configured independently to operate as an EIA-232 or V.35 interface via the DCP, an async terminal, or a 6700 or 6800 Series NMS.

If the upgrade is to be *installed on a DSU with firmware version less than 6.3x*, Switch S1 must be changed to switch *all ports* from EIA-232 to V.35 operation. *Only the 6-port TDM/Flex or MCMP/Flex can be used with DSUs with firmware version (DSU SW ver:) less than 6.3x; the 2-port TDM/Flex or MCMP/Flex is not supported.*

If installing a 6-port TDM/Flex or MCMP/Flex and your DSU has a wall-mount ac transformer, a table-top transformer must be ordered (part number 654-0099-0131).

If connecting a port to data communications equipment (DCE), a crossover cable is required (feature number 3211-178F for a V.35 Crossover Cable or feature number 4951-035F for an EIA-232 Crossover Cable). *If using V.35 operation, a V.35 adapter (feature number 3000-F1-510) is required for Ports 2 through 6; the V.35 connector on the DSU is used for Port 1.*

Before disconnecting the DSU:

► Procedure

1. Copy the applicable Configuration Worksheet from [Appendix B](#).
2. Access **Stat** (Status branch) and **ID** (Identity subbranch).
3. Record the unit's serial number at the top of Page 1 of the Configuration Worksheet.
4. Access **Config** (Configuration branch).
5. Record the configuration option settings for each option set (DSU, Diag, etc.).

If a DBM is installed, continue with:

1. Record all Backup Directory entries.
2. Record the unit's local telephone number (**Phone**).

For instructions and handling precautions for opening the DSU, refer to the [Hardware Straps](#) and [Changing the Hardware Settings](#) sections of this chapter.

Getting Started

As you follow these steps, refer to Figure 2-8.

► Procedure

1. Unplug the table-top ac transformer from the ac outlet, then disconnect the power cord from the DSU's rear panel (labeled POWER).
2. Disconnect the DDS interface cable (labeled LINE) from the DSU.
3. Disconnect the DBM and NMS interface cables (labeled BACKUP and CC/DC, respectively), if installed.
4. Disconnect the EIA-232-D/V.24 or V.35 interface cable from the DSU.
5. If a TDM or MCMP is being replaced, disconnect the additional port interface cable(s), as well.
6. With the unit upside down, use a small flat-head screwdriver to release the four snap tabs holding the base in place (refer to [Figure 2-3](#)).
7. Turn the unit over while being careful not to allow any cable to be pulled free of the connectors.

NOTE

If a TDM or MCMP is being replaced, the unit does not have to be turned upside down to open the case.

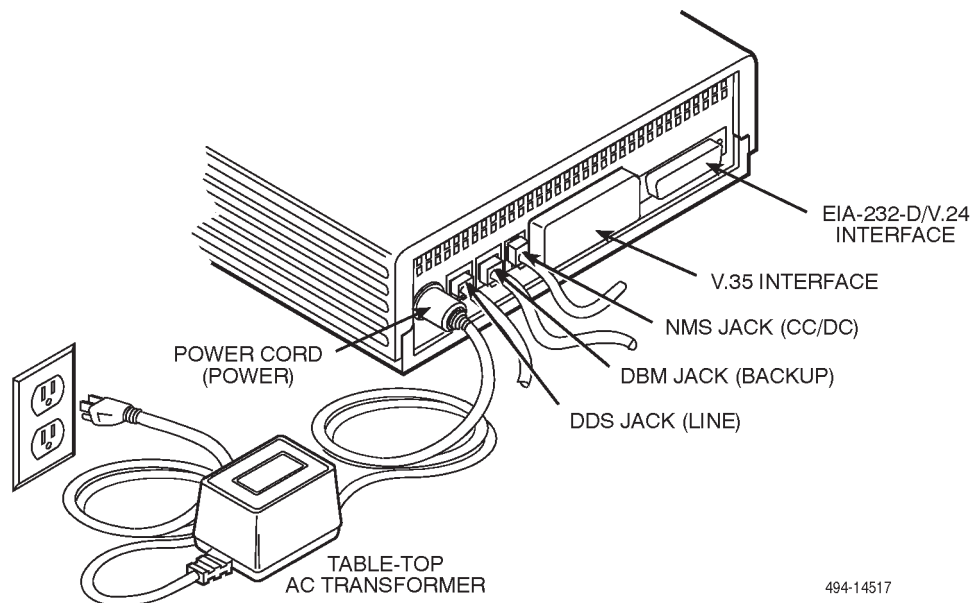


Figure 2-8. Disconnecting the DSU

Removing the DSU from Its Base

Refer to [Figure 2-4](#) as you follow these steps. If replacing a TDM or MCMP, refer to this figure as you remove the current TDM or MCMP.

► Procedure

1. Disconnect the keypad flat cable from the DSU by *squeezing the small black latches* on each side of the cable and carefully lifting the cable up and out of the connection.
2. Disconnect the LCD flat cable from the DSU circuit card. Gently work the cable (***not the connector***) out from the connector. *Be careful not to bend any of the cable pins.*
3. If a TDM or MCMP is being replaced, disconnect the TDM or MCMP flat cable's pre-folded 40-position header from the DSU, and fold the TDM or MCMP flat cable out over the side of the expanded base. Remove the two thread-cutting screws at the front corners and the screw with captive-lock washer at the rear corner of the DSU.
4. Remove the DSU from the existing base. Carefully lift the DSU up until its connectors are free of the rear panel. Set the DSU on a clean ESD (anti-static) workpad.
5. Write the serial number from the existing base onto the new TDM or MCMP expanded base using indelible ink (see [Figure 2-3](#)). Discard the existing base and rear panel.

Installing a TDM/Flex or MCMP/Flex

To change the Flex interface S1 switch, refer to the [Changing the Flex Interface Switch](#) section of this chapter. To complete the TDM/Flex or MCMP/Flex installation, refer to [Figure 2-4](#) while following this procedure.

► Procedure

1. Fold the TDM or MCMP flat cable out over the side of the new expanded base.
2. Position the DSU over the new expanded base.
3. Secure the DSU to the expanded base using the two #4 thread-cutting screws at the front corners, and the #4 screw with captive-lock washer at the rear corner (make sure this screw is tightened).
4. Connect the TDM or MCMP flat cable's pre-folded 40-position header to the DSU. *Make sure the pins are correctly aligned with the connector (one pin hole on the connector is blocked).*
5. Reconnect the keypad flat cable by inserting the cable into its connector as far as it will go. Then, push down on the tiny latching mechanism.
6. *Being careful not to bend the pins*, align the LCD flat cable to its connector. Then gently push the cable pins back into place.

Reassembling the Unit

Refer to [Figure 2-4](#) as you close the unit and [Figure 2-8](#) to reconnect cables.

► Procedure

1. Align the cover over the expanded base and rear panel. Make sure the four snap tabs are over their corresponding slots (two in front and two in back).
2. Apply pressure at the four snap tab connecting points, pressing together until all four tabs snap securely into their slots.
3. Reconnect the power cord to the DSU (labeled POWER), referring back to [Figure 2-8](#).
4. Plug the 3-prong plug of the table-top ac transformer into the ac outlet. If installing a 6-port TDM/Flex or MCMP/Flex and the DSU has a wall-mount ac transformer, the wall-mount ac transformer must be replaced with a table-top ac transformer. If installing a 2-port TDM/Flex or MCMP/Flex on a unit having a wall-mount ac transformer, plug the ac transformer into the ac outlet.

On power-up, the DSU determines what options (TDM or MCMP) are installed. Refer to [Power-Up Routine](#) in this chapter.
5. Verify operation; refer to [Verification Testing](#) section in this chapter.
6. If the keypad and/or LCD functions fail, check the Keypad and LCD flat cables for proper installation. Perform the Device Test again.

If the Device Test fails again, call your service representative for assistance.

Model 3611 Installation 3

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Overview

The Model 3611 DSU-TDM or DSU-MCMP is designed for installation in a COMSPHERE 3000 Series Carrier, which supplies operating power and provides interfaces for connecting to the DDS and, if required, analog networks. Up to 16 DSUs can be installed in a COMSPHERE 3000 Series Carrier.

A Model 3611 DSU (modular or non-modular) is delivered with default strap settings and factory-installed software options. The DSU is ready to connect to the network and is configured as a control DSU for operation at 9.6 kbps on a point-to-point circuit, with diagnostic protocol set to ADp. When a TDM or MCMP is installed, Port 1 of the DSU is configured to operate at 9.6 kbps with the TDM or MCMP capability enabled; all other ports are disabled.

NOTE

In this guide, **Model 3611** refers to either the modular or the non-modular DSU-TDM or DSU-MCMP, unless otherwise specified.

A shared diagnostic control panel (SDCP), installed in the carrier, is required for installation and maintenance of the Model 3611 DSU-TDM or DSU-MCMP.

Installation of the DSU-TDM or DSU-MCMP and carrier-related equipment consists of the following procedures, which should be performed in the order listed.

- Changing hardware straps (if necessary)
- Physical installation of the DSU-TDM or DSU-MCMP
- Network diagnostic connection
- Software configuration
- DDS network (or LADS) connection
- PSTN or switched 56 kbps network connection (if a DBM is installed)
- DSU DTE connection
- Operation verification

This chapter tells you how to perform the procedures. For electrical connection, network diagnostic connection, PSTN and switched 56 kbps network connection, DDS network or LADS connection, and DSU DTE connection information, refer to the *COMSPHERE 3000 Series Carrier, Installation Manual*.

Non-Modular DSU with a TDM or MCMP

The *non-modular* Model 3611 DSU-TDM or DSU-MCMP has connectors mounted directly onto the circuit cards. With this type of unit, the DTE cables must be disconnected before the unit can be removed from the carrier.

A 60-pin high-density connector is mounted onto the TDM or MCMP circuit card. This connector requires either a TDM Interface Cable (feature number 3600-F2-500, part number 035-0101-0631) or a Digital Bridge Interface Cable (feature number 3600-F2-501, part number 035-0102-0631), depending upon the application. These cables must be ordered separately.

These cables provide fan-out cabling to five individual EIA-232 25-pin connectors. Each cable is six feet long and connected to the unit's dedicated DBM-Vs, DBM-Ss, or DBM-Ds. The fan-out section is one foot long.

Appendix C shows each cable and its pin assignments, as well as the TDM's or MCMP's 60-pin high-density connector. To order cables, refer to *Equipment Lists*, Appendix L, of the *COMSPHERE 3600 Series Data Service Units, Models 3610 and 3611, Operator's Guide*.

Modular DSU with a TDM or MCMP

The *modular* DSU-TDM or DSU-MCMP has "gold finger" contacts for connectors, which plug into a 6-port connector module (delivered with the unit) that is mounted onto the rear of the carrier. With this type of unit, the DTE cables do not have to be disconnected before removing the unit from the carrier.

Each port on the 6-port connector module is a 25-pin connector that provides the EIA-232 DTE interface. All port connectors are individual with this type of unit, and a separate crossover cable is required for each connector that is attached to a DBM-V, DBM-S, or DBM-D.

In addition to the six ports on the 6-port connector module, a 26-pin high-density D-type connector is located at the top of the connector module to provide a V.35 interface for either Port 1 or an aggregate data path. To use the V.35 interface, the 6-port V.35 Interconnect Cable (feature number 3600-F3-500, part number 035-0174-0031) is required. The cable provides an interface between the high-density D-type connector and a DTE cable's V.35 connector.

Appendix C shows the 6-port connector module and provides the port pin assignments. Cables must be ordered separately.

DBM-Vs/DBM-Ss/DBM-Ds

DBM-Vs, DBM-Ss, and DBM-Ds are dial backup units that are used for multipoint dial backup. Each DBM-V, DBM-S, or DBM-D occupies a slot in the COMSPHERE 3000 Series Carrier, and is connected to a TDM or MCMP circuit card through cables. Up to five DBM-Vs, DBM-Ss, or DBM-Ds can be connected to a DSU-TDM or DSU-MCMP. The TDM or MCMP option is configured to operate as a digital bridge; the digital bridge and its DBMs are dedicated to a single DSU within the carrier.

Typical configurations for various applications can be found in the *Digital Bridge/DBM-V/DBM-S/DBM-D Interface* section of Chapter 4. Various configurations for digital bridge and DBM-V, DBM-S, and DBM-D applications are shown in **Appendix D**. Installation procedures for connecting DBMs are included in the *Adding the TDM or MCMP Option to an Installed Model 3611 DSU* section in this chapter.

Hardware Straps

HANDLING PRECAUTIONS FOR STATIC-SENSITIVE DEVICES

This product is designed to protect sensitive components from damage due to electrostatic discharge (ESD) during normal operation. When performing installation procedures, however, take proper static control precautions to prevent damage to equipment. If you are not sure of the proper static control precautions, contact your nearest sales or service representative.

The Model 3611 DSU has one switch and one jumper on the circuit card that should be reset, if necessary, before the DSU is inserted into the carrier. Refer to the *COMSPHERE 3600 Series Data Service Units, Models 3610 and 3611, Operator's Guide*, which can be ordered, to change the straps.

When the Test Mode Indication jumper is enabled, the V.35 lead NN and Pin 25 on the EIA-232-D/V.24 interface go to ON (+EIA level) condition during a Test mode. This is the default setting on a DBM-V, DBM-S, or DBM-D. When disabled, the leads do not change to indicate a Test mode. The indicator lead for each interface can be enabled or disabled independently.

On the non-modular TDM or MCMP circuit card, there are hardware (jumper) straps that are for factory testing only (Figure 3-1). On the TDM circuit card, the jumpers labeled P1 and P2 are set; on the MCMP circuit card, jumpers labeled P1 through P5 are set. **These straps must not be changed.** They should remain in the positions shown in Figure 3-1.

The switches on the modular TDM or MCMP circuit cards are shown in Figure 3-2, but they should remain in the ON position. They are for factory test purposes only.

Most straps for the DSU-TDM or DSU-MCMP are set as configuration options.

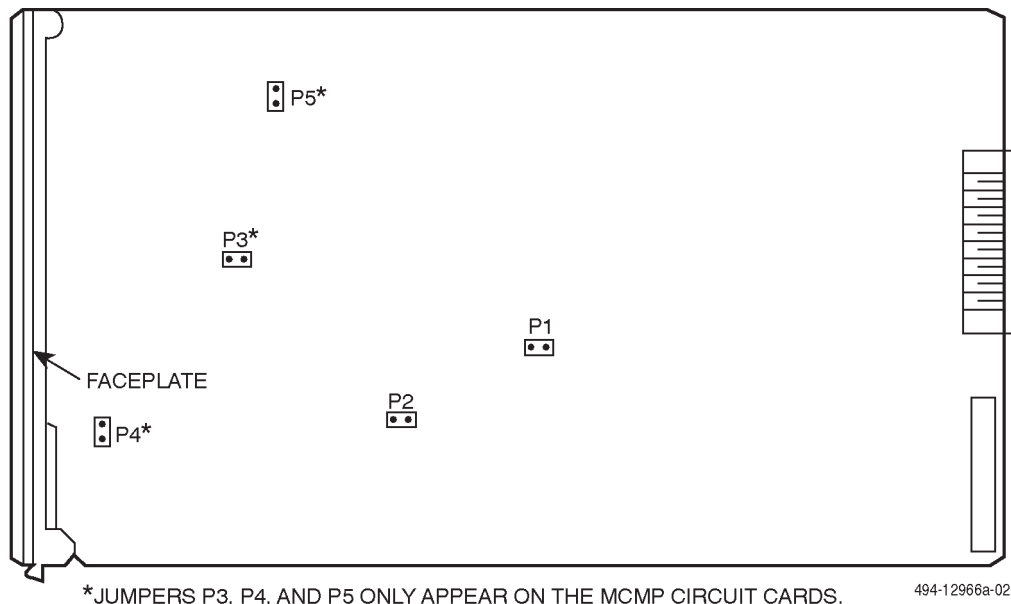


Figure 3-1. Non-Modular TDM/MCMP Circuit Card Switch Locations

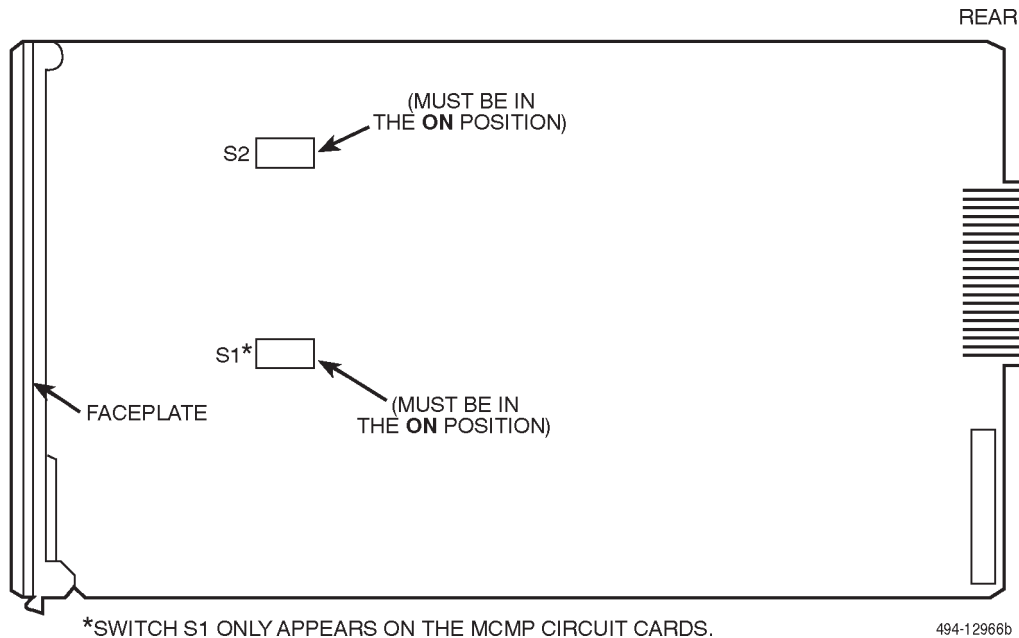


Figure 3-2. Modular TDM/MCMP Circuit Card Switch Locations

Software Configuration

A default software configuration is loaded in the DSU at the factory. If the TDM option is installed, the Model 3611 DSU is configured as a control with TDM mode enabled and Port 1 set to operate at 9.6 kbps. If the MCMP option is installed, the DSU is configured as a control with MCMP mode enabled and Port 1 set to operate at 9.6 kbps.

Software configurations can be changed from the SDCP or from an NMS that supports this feature.

From the SDCP

To change TDM, MCMP, or digital bridge configuration options from the SDCP, use the selection sequence from the top-level menu. The Options (**Opts**) branch is used to change configuration options.

For additional configuration option information, refer to *Unit Configuration*, Chapter 4, of the *COMSPHERE 3600 Series Data Service Units, Models 3610 and 3611, Time Division Multiplexer, Multichannel Multipoint, and Digital Bridge Options, User's Guide Supplement, or Configuration Options*, Chapter 6, of the *COMSPHERE 3600 Series Data Service Units, Models 3610 and 3611, Operator's Guide*.

For a listing of SDCP messages received when a TDM or MCMP is installed, refer to Appendix B of the *COMSPHERE 3600 Series Data Service Units, Models 3610 and 3611, Time Division Multiplexer, Multichannel Multipoint, and Digital Bridge Options, User's Guide Supplement*, or Appendix C of the *COMSPHERE 3600 Series Data Service Units, Models 3610 and 3611, Operator's Guide*.

From the NMS

Software configuration options for a Model 3611 with a TDM or MCMP can also be set from a 6800 Series NMS using the Change commands. These commands include the following:

- **cho** followed by the DSU's network address allows you to change the DSU, Diagnostic (DSU, DBM, and General), General, MUX Setup and Port, Port Speed, and LPDA configuration option sets.
- **cho** followed by the DBM's network address allows you to change the DBM, Backup, Diagnostic (DSU, DBM, and General), General, MUX Setup and Port, and Port Speed configuration option sets.
- **cha** followed by the DSU's serial number allows you to change the tributary DSU's network address.

For the 6700 Series NMS, configuration options are menu-driven. Select **Config**→**Network**→**Devices**→ the appropriate submenu selection.

Tributary 3610 DSUs with TDM or MCMP can be configured from an NMS provided the Position configuration option (Diagnostic General) is set to Trib from the SDCP and the DSU is connected to a control DSU that is connected to the NMS.

The COMSPHERE 6700 or 6800 Series NMS, which uses the Advanced Diagnostic protocol (ADp), fully supports configuration of the DSUs with TDM and multipoint dial backup or MCMP.

Configuration of the DSUs from an NMS using either the DPII or DMC protocol is subject to the same limitations identified in the *COMSPHERE 3600 Series Data Service Units, Models 3610 and 3611, User's Guide* or the *COMSPHERE 3600 Series Data Service Units, Models 3610 and 3611, Operator's Guide*.

For more information on the matrix-coded format and/or the NMS commands, refer to your NMS documentation.

Verification Testing

Perform verification testing after any installation. After installing and configuring a network, including control and tributary DSUs, the DDS network and, if appropriate, DBMs and their dial connections, perform the following series of tests from the control DSU (using the SDCP or an NMS) to verify network operation.

► Procedure

1. Request a device Identity (*ID* from the Status branch) report from each tributary to ensure that the DSU is addressed properly.
2. Perform a Digital Test (on the DDS circuit) to ensure that the network is functioning. Refer to the *Digital Test* section of chapter 5.

For a *DSU configured for TDM mode*, perform a Digital Test on each active port.

For a *DSU configured for MCMP mode*, perform a Digital Test on each tributary DSU on the aggregate channel.

For a *digital-sharing group*, perform a Digital Test on the lower-numbered port in the digital-sharing group only.

NOTE

A control DSU can originate a Digital Test in a point-to-point or multipoint network. A tributary DSU can originate a Digital Test in a point-to-point network only, provided the configuration option Respond to Remote Digital Loopback (**RespondRDL**) is enabled in the control.

For a DSU equipped with a DBM:

► Procedure

1. Select the **Dial** command to establish a dialed call to the tributary to test for dial tone and verify that the DSU can initiate and receive calls.
2. Select the →**Dial** command to switch the data to the PSTN or switched 56 kbps circuit (enter Dial Backup mode) to ensure that both DSUs have been configured correctly.
3. Perform a Digital Test on both the DBM and the PSTN or switched 56 kbps circuit.

For a DSU equipped with both DBM and TDM or MCMP, perform a Digital Test on each of the TDM or MCMP ports in Dial Backup mode on the PSTN or switched 56 kbps circuit.

4. Drop the backup.

For a DSU equipped with MCMP:

► Procedure

1. From the control DSU, go to the Control (**Ctrl**) branch, select **LEDs**, and then select Aggregate (**Aggr**) to monitor the aggregate 56 kbps digital signal.
2. Go to the Configuration (**Config**) branch and select Poll List (**PList**) from the menu.
3. Acquire the poll list (**Acq**). This command starts the initialization process.
4. Verify that each tributary DSU with MCMP has been acquired by displaying (**Displ**) the MCMP poll list.

If the DSU's address does not appear on the list, verify that the missing tributary DSU is equipped with the MCMP option and configured for MCMP mode.

After the poll list has been acquired, the LSD and RXD light-emitting diodes (LEDs) should be flashing without a pause at the control DSU's DCP. *Any pause indicates that a tributary on the poll list is not responding.*

5. From the tributary DSU, if a new drop is being added to an existing MCMP circuit, select **Add** from the Poll List menu. This places the tributary DSU on the control DSU's poll list.
6. After the tributary DSUs have been added to the control DSU's poll list, go back to the Control (**Ctrl**) branch, select **LEDs**, and reassign the LEDs from the aggregate data path (**Aggr**) to one of the DSU ports (Prt1, Prt2, Prt3, etc.).

MCMP capability is now functional, with all tributary DSUs on the control DSU's MCMP poll list. At this point, DSU ports can be assigned to MCMP channels through the Port Speed (**PrtSp**) selection from the Configuration Options (**Opts**) submenus.

Adding a TDM or MCMP to an Installed Model 3611 DSU

This section describes the installation procedure for adding the TDM or MCMP option onto the Model 3611 DSU, and then installing it in a COMSPHERE 3000 Series Carrier.

A non-modular TDM (feature number 3600-F3-206) or non-modular MCMP (feature number 3600-F3-207) may be added to a modular or non-modular DSU. A modular TDM (feature number 3600-F3-204) or modular MCMP (feature number 3600-F3-205) must be used with the Modular 3611 DSU.

The TDM or MCMP circuit card must be physically and electrically connected to the DSU, requiring two adjacent slots in the carrier.

The DSU hardware switches are not changed when the TDM or MCMP option is installed. The switches on the non-modular TDM or MCMP circuit card are shown in [Figure 3-1](#); the switches on the modular TDM or MCMP circuit card are shown in [Figure 3-2](#). These switches should not be changed (they are for factory test purposes only).

Refer to the appropriate section to install either the non-modular or modular TDM or MCMP.

Before installing the unit:

► Procedure

1. Copy the applicable Configuration Worksheet from [Appendix B](#).
2. Access **Stat** (Status branch) and **ID** (Identity subbranch).
3. Record the unit's serial number at the top of Page 1 of the Configuration Worksheet.
4. Access **Config** (Configuration branch).
5. Record the configuration option settings for each option set (DSU, Diag, etc.).

If a DBM is installed, continue with:

1. Record all Backup Directory entries.
2. Record the unit's local telephone number (**Phone**).

For instructions and handling precautions for opening the DSU, refer to the [Hardware Straps](#) and [Changing the Hardware Settings](#) sections of this chapter.

Installing a Non-Modular TDM or MCMP

This section describes the procedure for adding a non-modular TDM or MCMP circuit card onto a Model 3611 DSU and then into a COMSPHERE 3000 Series Carrier.

One of two special cables that attach to the multiport connector on the TDM or MCMP circuit card must be available when adding a non-modular TDM or MCMP: the TDM Interface Cable or the Digital Bridge Interface Cable. (Specify which cable is required at the time of purchase).

To install a TDM or MCMP onto a Model 3611 DSU:

► Procedure

1. Disconnect the DTE interface cable from the DSU. (It is not necessary to power down the carrier.)
2. Use a Phillips screwdriver to loosen the screw holding the circuit pack lock on the Model 3611 DSU, and rotate the lock to the open position (Figure 3-3).
3. Pull out and down on the latch at the bottom of the DSU's faceplate until the circuit card starts to come out of its slot in the carrier. Pull the circuit card free of the carrier and set the DSU on a clean, ESD (anti-static) workpad.
4. Insert the two plastic snaplock posts into their respective holes in the DSU circuit card (see Figure 3-3).
5. Insert the plastic slotted screw located near the top and rear of the DSU circuit card through its associated hole on the DSU and thread a standoff post onto the screw. Using a flat-blade screwdriver, tighten the plastic slotted screw until the standoff fits snugly against the circuit card; *do not overtighten*.
6. Attach the two remaining standoff posts to the DSU with the two Phillips-head screws and flat washers. Tighten the screws until the standoff posts fit snugly against the circuit card; *do not overtighten*.
7. Install the black-banded end of the double-ended pin header into its mating connector on the DSU. Make sure that the double-ended pin header is fully seated.

If the double-ended pin header and its mating connector do not fit, you have an older model DSU. Contact your service representative.

On a flat anti-static work surface, orient the DSU to its upright position, with the faceplate over the edge of the table (so the latches hang over) and pointing toward you (just as it would sit in the carrier). Orient the TDM or MCMP circuit card in the same manner, to the immediate right of the DSU circuit card.
8. Keeping the circuit cards perpendicular to the work surface, move the circuit cards closer to one another, ensuring that their bottom edges are flat against the work surface. Look between the circuit cards to guide the double-ended pin header into its mating connector on the TDM or MCMP circuit card. At the same time, ensure that the snaplock posts are aligned with their mating holes in the TDM or MCMP circuit card. Make sure that the double-ended pin headers are properly aligned. Then, snap the snaplock posts into the TDM or MCMP circuit card.
9. Use the remaining three Phillips-head screws and flat washers to secure the standoff posts to the TDM or MCMP circuit card.
10. At the front of the carrier, hold the DSU-TDM or DSU-MCMP circuit cards unit vertically, with the latches on the faceplates in the open position. Making sure that both the top and bottom edges of the DSU and TDM or MCMP circuit cards are correctly aligned in the respective circuit card guides, slide the DSU-TDM or DSU-MCMP unit into the slots until the power and network connectors seat firmly into the mating connectors on the backplane.

CAUTION

A plastic screw must be used on the far side of the DSU to avoid contact with the printed circuit wire path. Use care in handling the circuit card and screws to avoid cutting traces.

Press the latches to secure the DSU and TDM or MCMP circuit cards in the carrier to prevent the DSU-TDM or DSU-MCMP unit from being dislodged during installation of the DTE interfaces. Rotate the circuit pack lock on the DSU circuit card faceplate back into the closed position and tighten the screw.

Power-Up Routine

When power is applied, the DSU:

- Determines what options are installed (DBM or MUX – the TDM or MCMP).
- Runs a Device Test on the unit and each of the installed options.

During the tests, all indicators on the DCP light briefly and the message **Power-Up Tests** appears on the liquid crystal display (LCD).

- Displays the results of each test momentarily as **Pass**, **Fail**, or **Abrt**. These tests take about 20 seconds to complete. **Abrt** indicates that the Device Test was aborted because a network loopback was in progress during the power-up procedure.

If a TDM or MCMP is installed, MUX is displayed as Pass or Fail.

If the DSU, DBM, TDM or MCMP (MUX) fails the power-up test:

► Procedure

1. Reinstall the factory configuration options; use the FacT configuration for a tributary or FacC for a control.
2. Confirm the installed hardware options (DBM, TDM, or MCMP).
3. Re-execute the Device Test from the SDCP. (Press the $\hat{=}$ key to return to the top-level menu, then select **Local** → **Test** → **DSU** → **Devic**). If the test passes, continue with the installation.

Since the DSU is not connected to the network, the red **Alrm** indicator is lit, and the LCD displays **No Signal**, indicating a facility alarm. The LCD displays health and status information.

The red Alarm LED lights when there is no DDS signal.

NOTE

If the test fails again, contact your service representative to return the DSU-TDM or DSU-MCMP unit; refer to the *COMSPHERE 3600 Series Data Service Units, Models 3610 and 3611, User's Guide*.

To reconnect cables:

► Procedure

1. Reconnect the DTE interface cable to the DSU.
2. Connect the TDM or digital bridge interface cable to the TDM or MCMP, and to the appropriate DTEs, or DBM-V or DBM-S circuit cards. Also attach the ferrite chokes provided with the DTE cables ([Figure 3-4](#)).
3. Based upon the Configuration Worksheet completed prior to the installation, make any desired configuration option changes in the DSU, Diag (DSU, DBM, and Gen), DBM, Gen, Bckup, MUX (Setup and Prt1 through Prt6), PrtSp, and LPDA option sets. For information on these option sets, refer to the *Configuration Branch* section in Chapter 5.

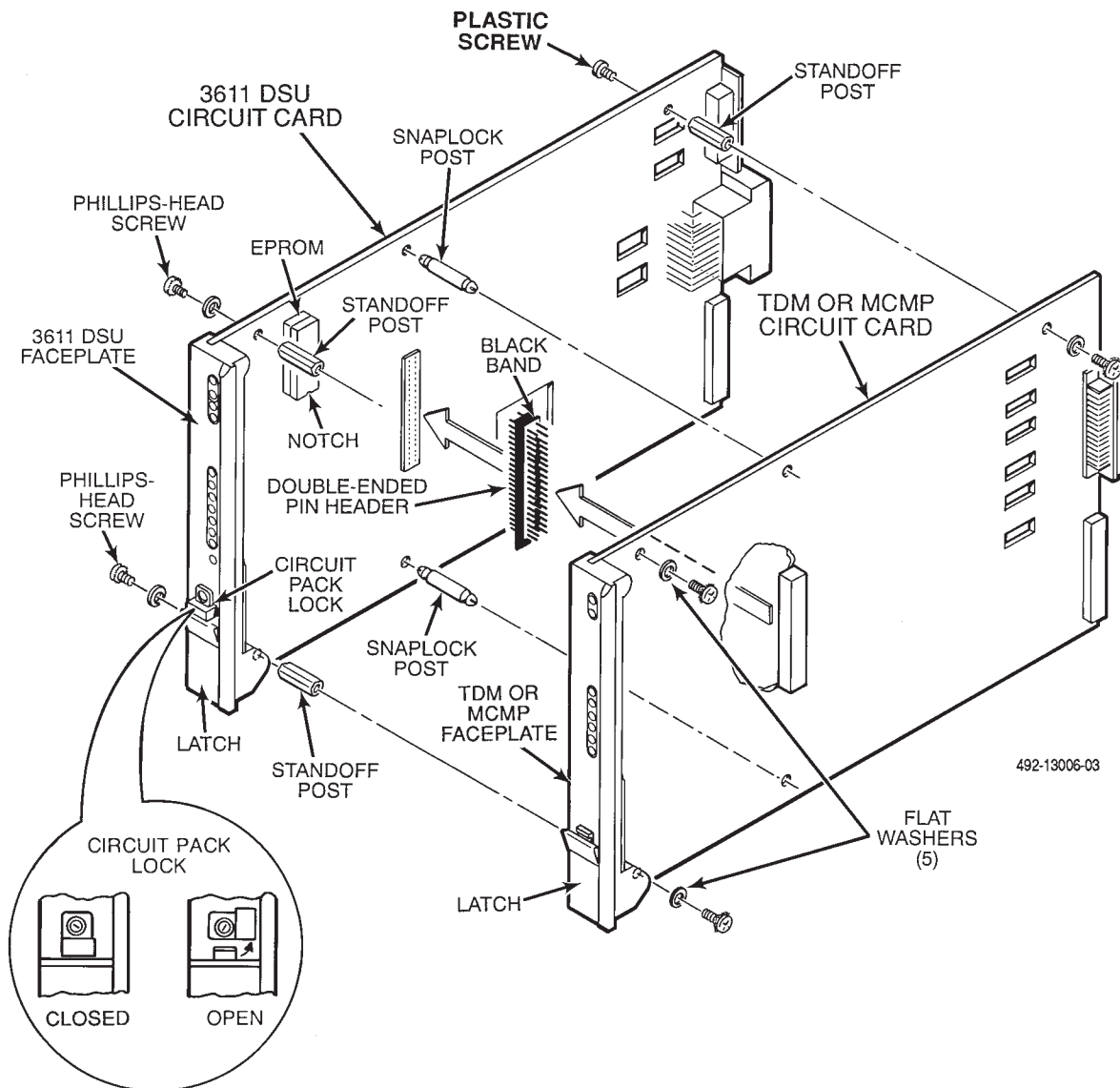


Figure 3-3. Non-Modular TDM or MCMP Installation

Installing a Modular TDM or MCMP

This section describes the procedure for adding a modular TDM or MCMP circuit card onto a Modular 3611 DSU and then into a COMSPHERE 3000 Series Carrier.

A connector module, which is supplied with each modular TDM or MCMP card, has six ports (labeled Port 1 through Port 6). The connector module is shown on the right in Figure 3-4. When the connector module is installed in a COMSPHERE 3000 Series Carrier, you can remove the modular DSU with a TDM or MCMP without disconnecting the DTE cables at the rear of the carrier.

Each port on the connector module is a DB25 connector which provides the EIA-232 DTE interface. In addition, a 26-pin high-density D-type connector is located at the top of the connector module which provides the V.35 interface for either Port 1 or an aggregate data path. This connector requires a 6-port V.35 Interconnect Cable which converts the 26-pin high-density D-type interface to the standard V.35 34-pin interface. The 6-port V.35 Interconnect Cable (part number 035-0174-0031) must be ordered separately.

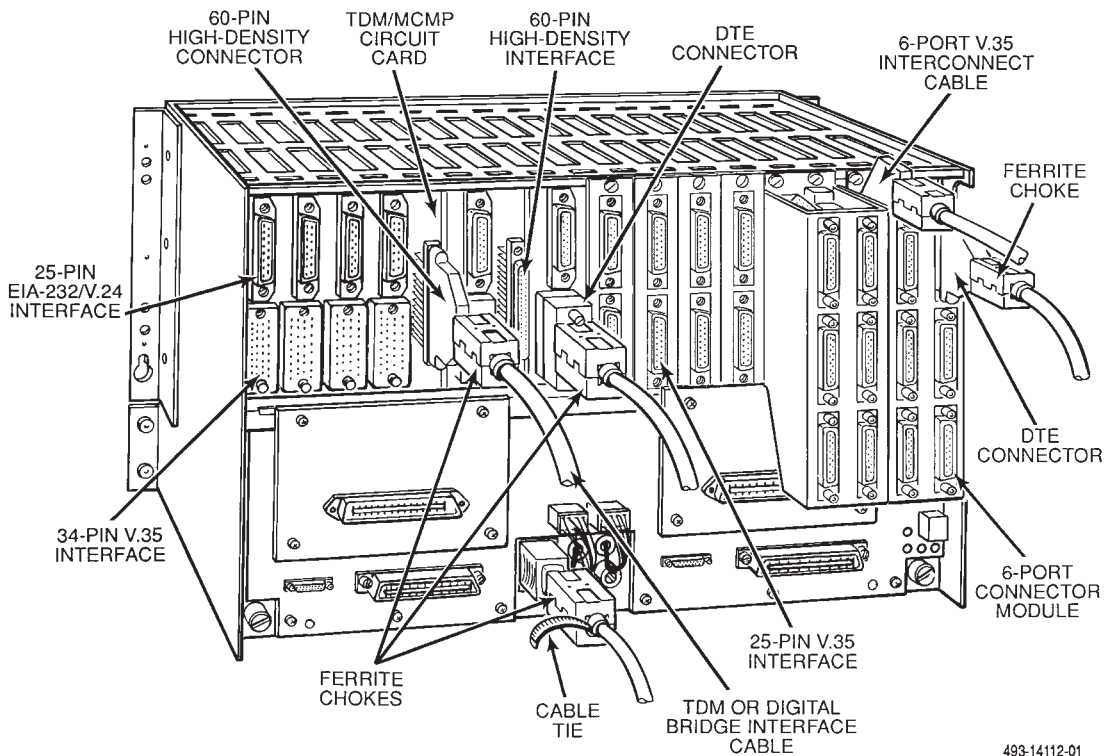


Figure 3-4. COMSPHERE 3000 Series Carrier (Rear)

To remove the installed Modular 3611 DSU:

► Procedure

1. Use a Phillips screwdriver to loosen the screw holding the circuit pack lock on the Modular 3611 DSU, and rotate the lock to the open position (Figure 3-5).
2. Pull out and down on the latch at the bottom of the modular DSU's faceplate until the circuit card starts to come out of its slot in the carrier. Pull the circuit card free of the carrier and set the DSU on a clean, ESD (anti-static) workpad.
3. At the rear of the carrier (Figure 3-4), disconnect the DTE interface cable from the rear connector plate; it is not necessary to power down the carrier.
4. Remove the rear connector plate.

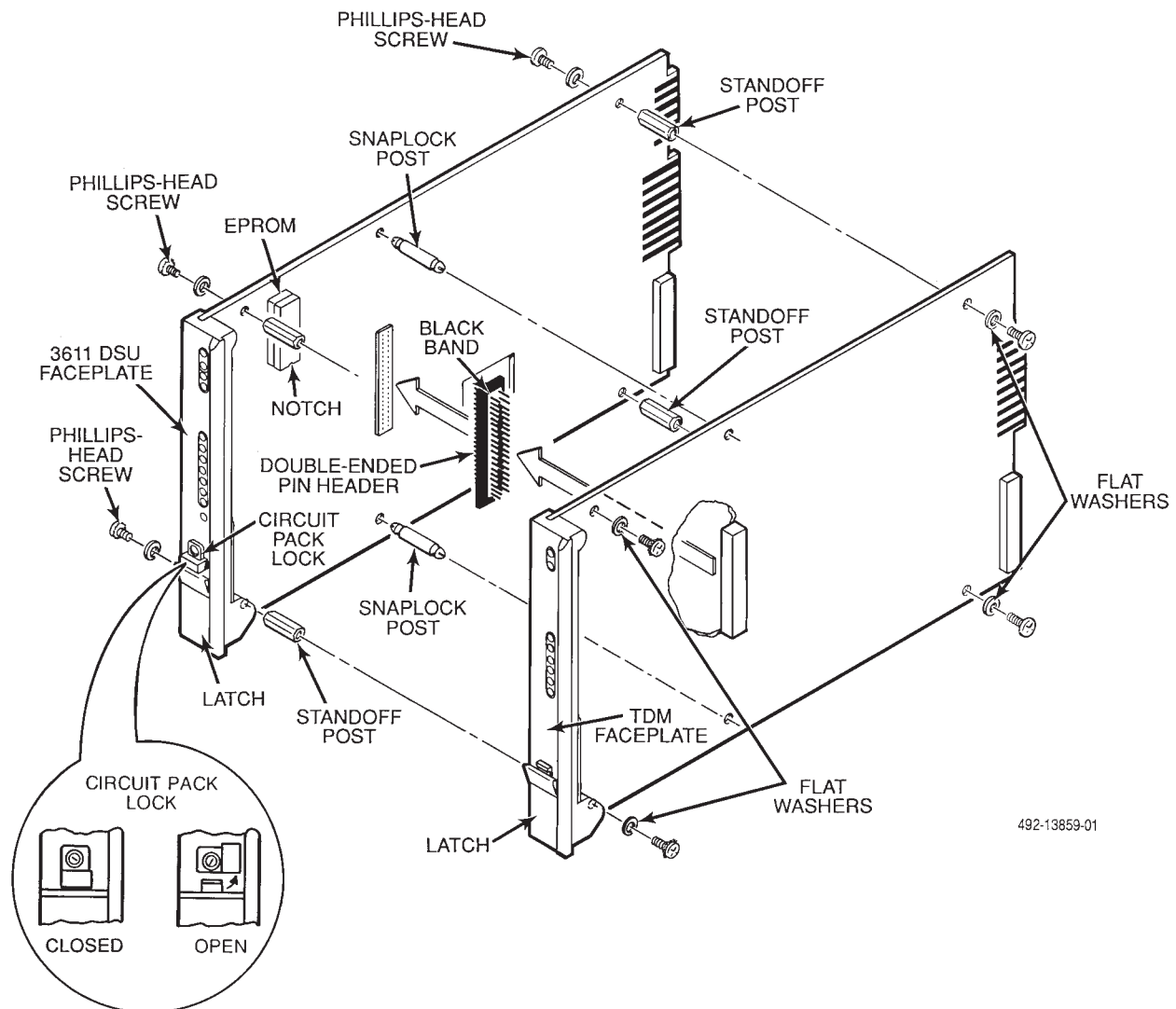


Figure 3-5. Modular TDM or MCMP Installation

To install the 6-port connector module and add the TDM or MCMP option to a Modular 3611 DSU:

► Procedure

1. At the rear of the carrier, set the tabs on the 6-port connector module into the slotted grooves on the carrier's backplane. (Note that the connector module occupies two slot positions.) Make sure the connector module uses the same slot positions intended for the modular DSU-TDM or DSU-MCMP circuit cards.
2. Loosely fasten the screws attached to the connector module, allowing for slight adjustment that may be needed when installing the modular DSU-TDM or DSU-MCMP circuit cards. The two screws on the connector module must be alternately fastened.
3. On the ESD workpad, insert the two plastic snaplock posts into their respective holes (See [Figure 3-5](#)).
4. Attach the four metal standoff posts to the DSU with the four Phillips-head screws and flat washers. Tighten the screws until the standoff posts fit snugly against the circuit card. *Do not overtighten.*
5. On the ESD workpad, orient the DSU to its upright position, with the faceplate over the edge of the table (so the latches hang over) and pointing toward you (just as it would sit in the carrier). Orient the modular TDM or MCMP circuit card in the same manner, to the immediate right of the modular DSU circuit card.

Keeping the modular circuit cards (DSU and TDM or MCMP) perpendicular to the work surface, move the circuit cards closer to one another, ensuring that their bottom edges are flat against the work surface.

Look between the circuit cards to guide the double-ended pin header with an integral ferrite choke into its mating connector on the modular TDM or MCMP. At the same time, ensure that the snaplock posts are aligned with their mating holes in the modular TDM or MCMP. Make sure that the double-ended pin headers are properly aligned. Then, snap the snaplock posts into the modular TDM or MCMP.
6. Use the remaining four Phillips-head screws and flat washers to secure the standoff posts to the modular TDM or MCMP.
7. At the front of the carrier, make sure that both the top and bottom edges of the modular DSU-TDM or DSU-MCMP circuit cards are correctly aligned in their respective circuit card guides. Then, slide the modular DSU-TDM or DSU-MCMP unit into the carrier and press the faceplate latches on both circuit card faceplates to secure the circuit cards into the connector module.
8. Rotate the circuit pack lock on the modular DSU circuit card faceplate back into the closed position and tighten the screw ([Figure 3-5](#)).
9. Install the black-banded end of the double-ended pin header with an integral ferrite choke into its mating connector on the DSU. Make sure that the double-ended pin header is fully seated.
10. Return to the rear of the carrier and tighten the screws on the connector module.
11. Connect the DTE interface cables ([Figure 3-4](#)). Install a ferrite choke (provided with the 6-port connector module) on each DTE cable, as close to the cable connector as possible. If your configuration requires a crossover cable (part number 4951-035F), see the documentation provided with the cables.
12. On power-up, the DSU determines what options are installed. Refer to the [Power-Up Routine](#) section of this chapter.
13. Based upon the Configuration Worksheet completed prior to the installation, make any desired configuration option changes in the DSU, Diag (DSU, DBM, and Gen), DBM, Gen, Bckup, MUX (Setup and Prt1 through Prt6), PrtSp, and LPDA option sets. For information on these option sets, refer to the [Configuration Branch](#) section in Chapter 5.
14. Verify operation; refer to the [Verification Testing](#) section of this chapter.

At this point, MCMP capability is functional, with all tributary DSUs on the MCMP poll list, and DSU ports can be assigned to MCMP channels.

Removing TDM or MCMP from an Installed Model 3611 DSU

To remove the TDM or MCMP circuit card:

► Procedure

1. For a non-modular DSU-TDM or DSU-MCMP unit, disconnect the DTE interface cable from the DSU, and disconnect the multiport cable from the TDM or MCMP. For a modular DSU-TDM or DSU-MCMP unit, this step is not necessary. (It is not necessary to power down the carrier.)
2. Use a Phillips screwdriver to loosen the screw holding the circuit pack lock on the DSU faceplate, and rotate the lock to the open position (Figure 3-5).
3. Pull out and down on the DSU-TDM or DSU-MCMP securing latches and start sliding the unit out of the carrier. Pull the DSU-TDM or DSU-MCMP unit free of the carrier and lay it on a clean ESD workpad.
4. On the TDM or MCMP side of the unit, remove the screws securing the standoff posts to the TDM or MCMP circuit card. For a non-modular unit, there are three screws and standoff posts (Figure 3-3); for a modular unit, there are four screws and standoff posts (Figure 3-5).
5. Carefully compress the heads of the two snaplock posts to disengage them from the TDM or MCMP circuit card. Then, carefully work the TDM or MCMP circuit card free from the snaplock posts and double-ended pin header.

If a TDM or MCMP is to be removed from service, contact your service representative to return the TDM or MCMP circuit as described in the *Equipment Warranty and Support* section of Chapter 1.

If you wish to install another TDM or MCMP circuit card, refer to the *COMSPHERE 3600 Series Data Service Units, Models 3610 and 3611, Operator's Guide*.

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Overview

A TDM can be configured to provide point-to-point time division multiplexing, digital sharing, or digital bridging capability. An MCMP can be configured to provide point-to-point time division multiplexing, multichannel multipoint multiplexing, or digital bridge capability.

Network Terminology

Data transmission between 3600 Series DSUs and compatible devices occurs in either of two ways: point-to-point or multipoint. The device at the host computer (or nearest to the host computer) end of a circuit is designated the **control**. The devices on the other end are designated **tributaries**.

Point-to-Point Transmission

In point-to-point transmission, there is one DSU at each end of the digital facility. The control DSU and the tributary may be 3600 Series DSUs or one of the other devices listed in the *DSU Compatibility* section of Chapter 1 of the *COMSPHERE 3600 Series Data Service Units, Models 3610 and 3611, Operator's Guide*.

A circuit employing point-to-point transmission is referred to as a point-to-point circuit.

Multipoint Transmission

In multipoint transmission (Figure 4-1), a control DSU is connected through the digital facility to multiple tributaries communicating at the same rate. Traditionally, a tributary site (often referred to as a *drop*) can transmit data only when it is polled by the front-end processor (FEP). The FEP, a communications computer associated with a host computer, is the data terminal equipment (DTE) at the control DSU.

A 3600 Series DSU can be configured as a control or as a tributary in multipoint transmission. A control 3610 or 3611 DSU provides diagnostic support for up to 40 addressable tributary devices using MCMP, multipoint nondisruptive, or mixed diagnostics. Without diagnostics and poll list, 254 addressable devices are supported.

A circuit employing multipoint transmission is referred to as a multipoint circuit.

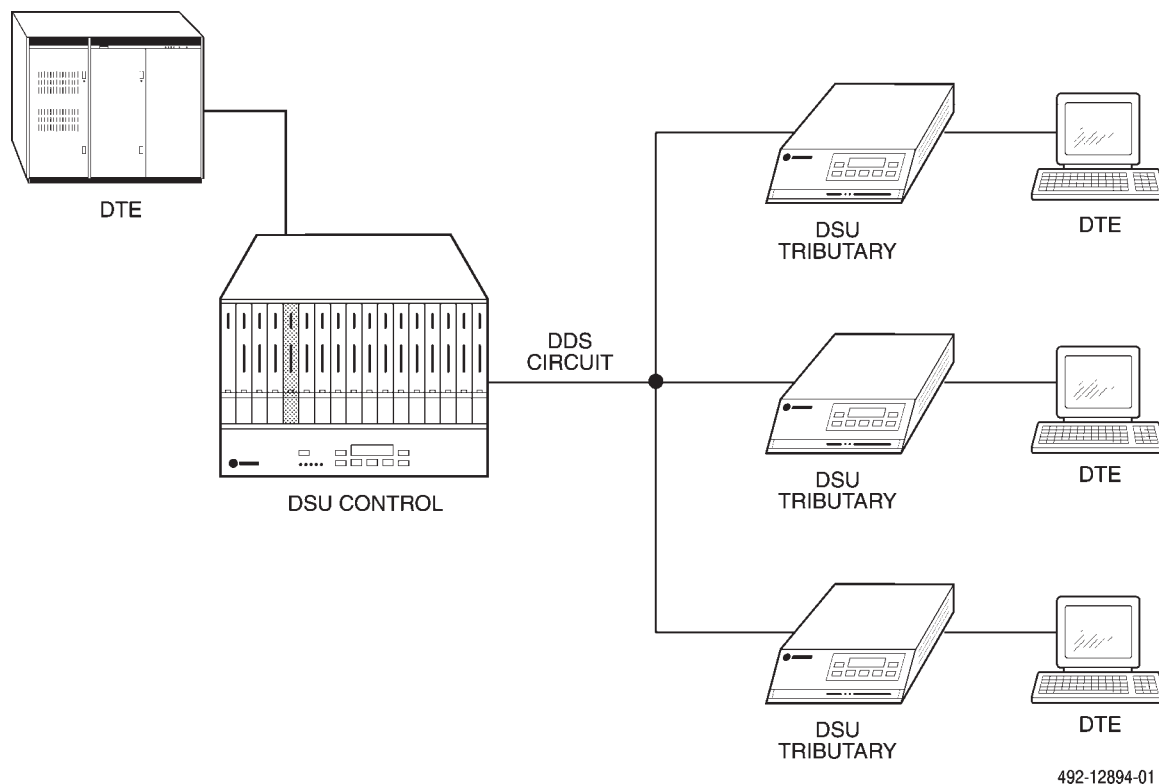


Figure 4-1. Multipoint Transmission

Modes Of Operation

A DSU with TDM or MCMP can operate in one of four modes: TDM mode (MUX Funct: TDM), MCMP mode (MUX Funct: MCMP), Bridge mode (MUX Funct: CBrdg or EBrdg), or Basic mode (MUX Funct: None). TDM and Bridge modes are available to a DSU with TDM; TDM, MCMP, and Bridge modes are available to a DSU with MCMP. The DSU operates in Basic mode when the TDM or MCMP circuit card is disabled.

MUX Funct (the TDM or MCMP circuit card's function) is the MUX Setup configuration option as it is displayed in the Configuration (Config) branch of the DCP menu. The functions available in this section are TDM, MCMP, CBrdg or EBrdg, or None (Basic). Each mode offers a unique set of configuration options.

Basic Mode

For a DSU with TDM or MCMP, disabling the TDM or MCMP capability (MUX Funct: None) places the DSU in Basic mode – just as if there were no TDM or MCMP circuit card attached to the DSU.

TDM Mode

In TDM mode, data paths are established between the DSU and TDM to increase the port capacity of the DSU to six ports. All six ports can be configured for multiplexing, digital sharing, or a combination of both.

A 3600 Series DSU with TDM can also be equipped with a dial backup module (DBM), either the V.32 DBM or a Switched 56 DBM, for point-to-point dial backup.

MCMP Mode

In MCMP mode, the same data paths are established as in the TDM mode of operation, plus the multichannel multipoint circuitry is activated on the MCMP circuit card.

Bridge Mode

In Bridge mode, all ports are assigned to one digital-sharing group. The data paths between the DSU and TDM or MCMP are also changed relative to the data paths in place during TDM or MCMP mode of operation.

When the TDM or MCMP is configured as a digital bridge, it can be used in conjunction with the control DSU to support multipoint LADS operation, dedicated multipoint dial backup, or expanded digital-sharing.

If a DBM is installed, it must be disabled or removed to operate in Bridge mode.

Time Division Multiplexing

Since transmission facilities are expensive, and frequently two or more low-speed point-to-point applications can share a high-speed digital facility, it is more efficient to share that capacity. This sharing is provided by 3600 Series DSUs equipped with a TDM (operating in TDM mode).

A pair of 3600 Series DSUs with TDM or MCMP operating in TDM mode can provide the equivalent of up

to six point-to-point circuits via a single DDS line (Figure 4-2). This single DDS line is able to carry six separate channels by interleaving the data on each channel into time slots of the high-speed aggregate data stream. The receiving TDM, with the aid of framing bits, separates (demultiplexes) the data according to channel and delivers the data to the appropriate output ports. Each pair of communicating DTEs must be operating at the same speed (data rate).

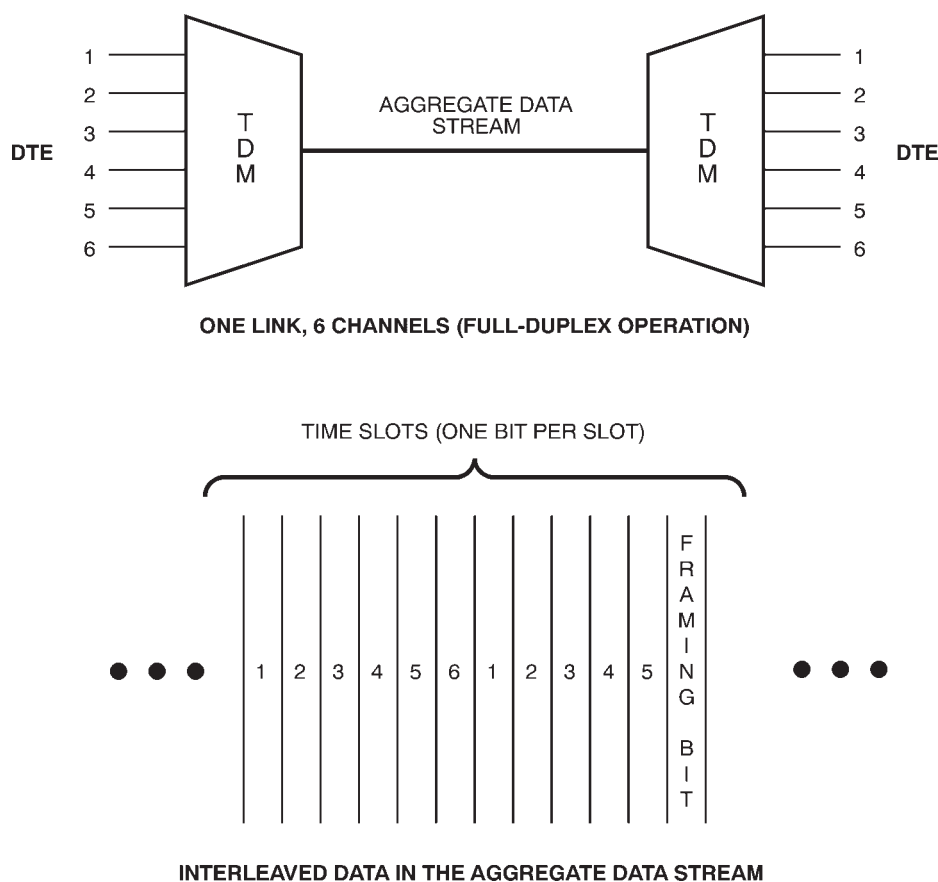


Figure 4-2. Functional Representation of Point-to-Point Multiplexing

Speed Characteristics

In time division multiplexing, the speed of the DDS line must equal or exceed the combined speeds of digital signals to be transmitted at each DTE interface. For example, if the multiplexer in [Figure 4-2](#) has five pairs of DTEs operating at 9.6 kbps and one pair of DTEs operating at 4.8 kbps for a combined speed of 52.8 kbps, a DDS line speed of 56 kbps could accommodate all six pairs. The portion of capacity dedicated to each pair of communicating DTEs constitutes a channel.

Asynchronous and Synchronous Sources

The 3600 Series DSU operating in TDM mode can accommodate both asynchronous and synchronous sources. Speeds of the two or six individual TDM ports (Ports 1 through 6) can be set to 1.2, 2, 2.4, 4, 4.4, 4.8, 7.2, 8.4, 9.2, 9.6, 12, 14.4, 16.8, 18, 18.8, 19.2, 28.8, 32, 38.4, 48, 56, and 64 kbps full-duplex.

Possible asynchronous rates include all rates available to synchronous operation (1.2 through 64 kbps, as stated above). Asynchronous rates of 150, 300 and 1200 bps are also supported, but they require the allocation of 1200 bps. The asynchronous speed of 600 and 1800 bps requires the allocation of 2400 bps.

When operating with the Async→Sync configuration option enabled, a single-port point-to-point circuit can operate using nondisruptive diagnostics. The control DSU's port speed and the tributary DTE port speeds must be set to the same rate with the tributary DSUs configured as a single port-sharing group.

Refer to the *COMSPHERE 3600 Series Data Service Units, Model 3610 and 3611, Operator's Guide* for the additional single-port async/sync information.

In-Band Framing and Underspeed Channel

For proper operation, the receiving TDM must be in synchronization with the transmitting TDM. To ensure synchronization, the transmitting TDM adds an extra bit to each TDM frame, called a *framing bit*, to create an identifiable pattern of bits over multiple frames. A *frame* is a block of data that is transmitted as a unit. Thus, to synchronize, the receiving TDM compares the incoming bit of each frame position to the expected pattern. If the pattern does not match, successive bit positions are searched until the pattern persists over multiple frames.

When two or more channels are required, a 3600 Series DSU operating in TDM mode uses a framing scheme called *in-band framing* (IBF). When the combined data rate of the communicating DTE is less than the data rate of the DDS line, the framing bits are inserted into the idle (unused) capacity.

When the combined data rate is equal to the rate of the DDS line, framing bits are implemented by reducing the data rate of one of the channels. This channel is called the *underspeed channel*. The underspeed channel runs 10 bits per second less than the channel's set speed. For example, a channel set to 9600 bps and running at underspeed operates at 9590 bps.

In-band framing cannot be taken from a channel supporting asynchronous communication. This restriction requires that if all ports are assigned to asynchronous operation, the sum of the port speeds must be less than the DDS line speed.

If nondisruptive diagnostics are enabled and the combined data rate is equal to the DDS line speed, then the underspeed port runs at the configured port speed minus the in-band secondary channel transport speed. For example, if a secondary channel speed is set to 400 bps, the port speed is set to 9600 bps, and the port is configured for Underspeed, the port speed will automatically run at 9200 bps. The framing bits are included as part of the secondary channel bandwidth.

TDM Architecture

Figure 4-3 shows a high-level view of the TDM architecture. Port 1 on the DSU is routed to the TDM or MCMP, where it is multiplexed with Ports 2 through 6. The aggregate data path of the multiplexer is routed back to the DDS core* by the data router.

The data router is a sophisticated circuit switch in the DSU that is capable of connecting several communication interfaces in a variety of ways. For example, if the DSU receives an out-of-service network code and is equipped with a DBM, the data router may be commanded to route the aggregate data stream from the TDM or MCMP circuit card to the V.32 core, to be transmitted over a dial backup connection to the DBM at the tributary site.

Port 1 provides either a physical EIA-232-D/V.24 or V.35 interface. Ports 2 through 6 comply with a subset of EIA-232 interface recommendations. The circuit leads supported on Ports 1 through 6 are discussed in [Appendix C](#).

NOTE

Throughout this document, **Port 1** refers to either the EIA-232-D/V.24 or V.35 physical interface connectors on the DSU.

For *non-modular Model 3611 DSUs* operating in TDM mode, a TDM interface (multiplexing) cable attaches to the multipoint connector on the TDM circuit card to provide fan-out cabling to five individual 25-pin EIA-232 connectors (Ports 2 through 6). The pin assignments for this cable are provided in [Appendix C](#). For *modular Model 3611 or Model 3610 DSUs* operating in TDM mode, all port connectors are individual and a separate crossover cable is required for each connector.

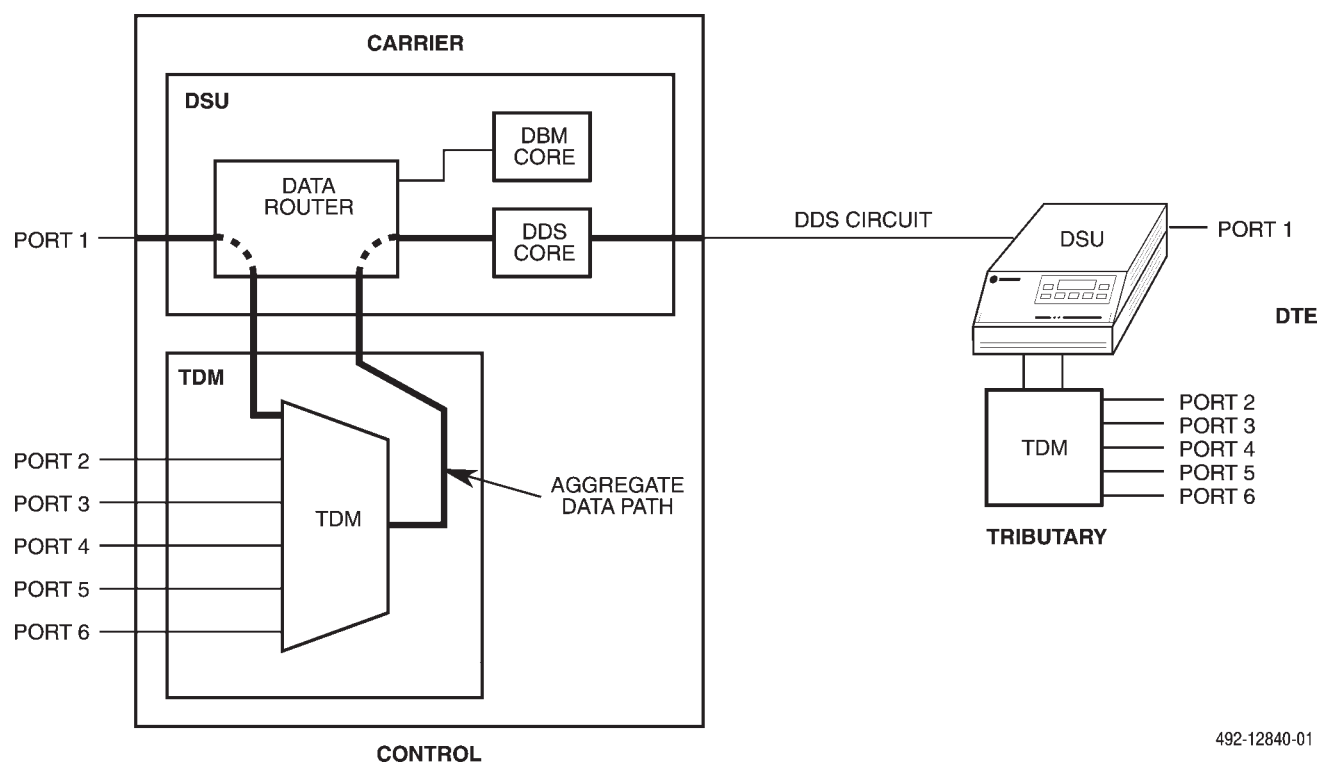


Figure 4-3. TDM Architecture and Signal Flow

* A *core* is any module that provides data transmission capabilities. The V.32 DBM has a V.32 core, which complies with the CCITT V.32 modem recommendation.

TDM Applications

The TDM capability can be used in a variety of configurations to enhance DDS service. Configurations discussed here include point-to-point multiplexing, a TDM backbone circuit with extensions, diagnostic extension, digital sharing, multiplexing and digital sharing, and FEP port-sharing.

Single-Port Async/Sync Support

When operating with the Async→Sync configuration option enabled, a single-port point-to-point or multipoint circuit can operate using nondisruptive diagnostics (Diag Type: NonD).

Point-to-Point Single-Port Async/Sync Capability

When operating with the Async→Sync configuration option enabled, a single-port point-to-point circuit can operate using nondisruptive diagnostics. The control DSU's port speed and the tributary DTE port speeds must be set to the same rate (see Figure 4-4). Note that the tributary DSUs are configured as a single port-sharing group (Share DevA: Enab).

Refer to Table 1-2 of the *COMSPHERE 3600 Series Data Service Units, Model 3610 and 3611, Operator's Guide* for the maximum diagnostic rate that can be run for various asynchronous-to-synchronous configurations. Note that in this table, **None** indicates that no excess bandwidth is available for nondisruptive diagnostics. When the DSU is configured for nondisruptive diagnostics and the Async→Sync configuration option is enabled, the DTE rate cannot operate underspeed for diagnostics since the DTE is now operating in synchronous mode. In addition, the maximum diagnostic rate available is 1600 bps, but the DSU's firmware overrides any selected rate with a speed up to 2400 bps if more bandwidth is required for diagnostics.

Asynchronous port speeds of 150, 300, 600, and 1800 bps may be obtained by *oversampling*; oversampling must be used to obtain these port rates. To oversample, the Async→Sync configuration option must be disabled and the synchronous port rate must be set to a rate greater than or equal to four times the asynchronous DTE rate. For example, select 1.2 kbps for the synchronous port speed if the asynchronous port speed is 150 or 300 bps, select 2.4 kbps if it is 600 bps, and 7.2 bps if it is 1800 bps. This ensures that oversampling will take place.

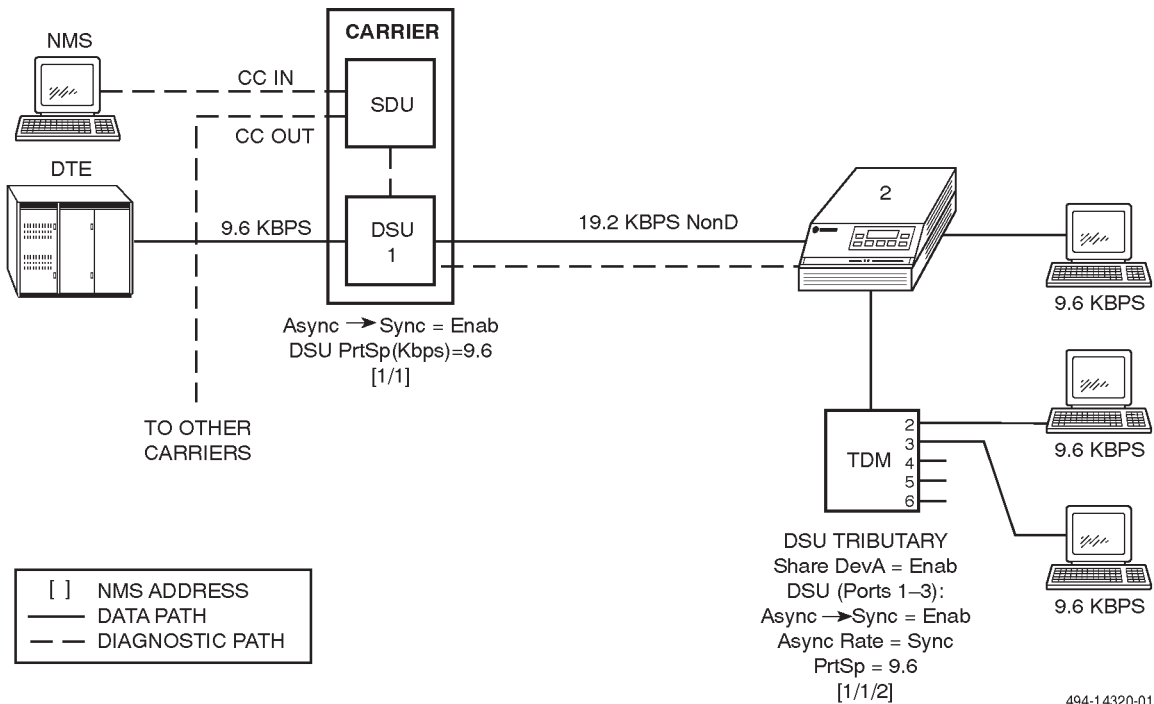


Figure 4-4. Single-Port Point-to-Point Circuit with Nondisruptive Diagnostics

Multipoint Async Compatibility

The control DSU with the Single-Port Async/Sync feature is compatible with earlier DSU releases that use a TDM with the ports configured as a single port-sharing group, as long as the control DSU's port speed and port-sharing group port speeds are the same. Earlier DSU releases from 4.xx to 5.xx can be accommodated as long as the control DSU's software version is 6.xx; otherwise, the units should be returned to the factory to be upgraded. (Contact your authorized service representative to arrange for your upgrade.) Figure 4-5 shows a compatible configuration. Access the Status (Stat) branch and select ID (Identity) to determine the DSU's firmware version (DSU SW ver).

NOTE

For asynchronous ports to operate at 1200 bps, individual asynchronous port speeds (Async Rate) for both the control and tributary DSUs must be set to =Sync when the port's Single-Port Async/Sync capability is enabled (Async→Sync: Enab).

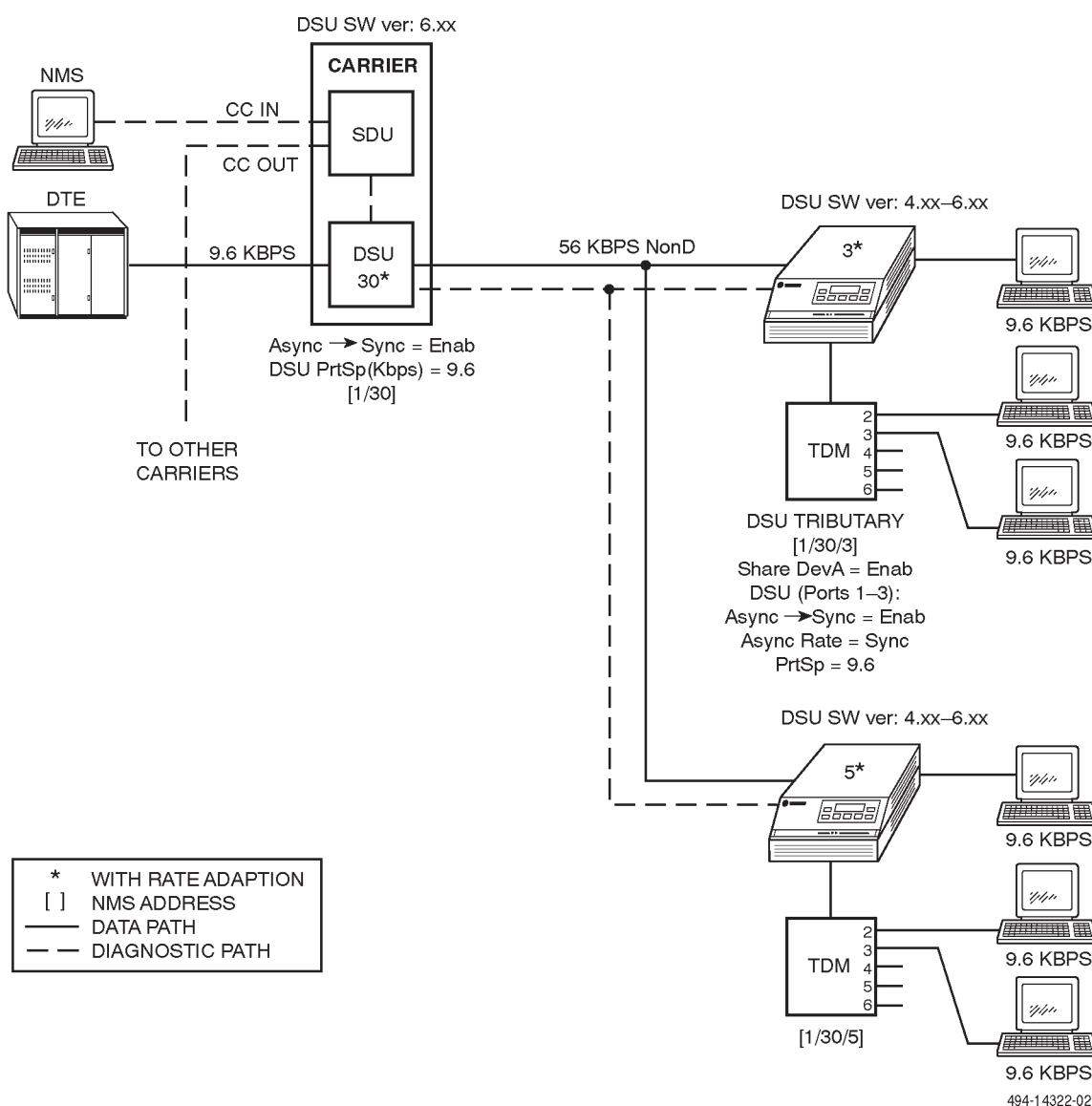


Figure 4-5. Multipoint Async-Compatible Network

Point-to-Point Multiplexing

The 3600 Series DSU operating in TDM mode can be used for point-to-point circuits at speeds of up to 64 kbps. Figure 4-6 shows a typical TDM application. In point-to-point multiplexing, the DTEs at Port 1

communicate with one another, the DTEs at Port 2 communicate with one another, and so on. The TDM point-to-point application provides the same functionality as six point-to-point circuits. The DDS circuit can be provided by a service provider or a metallic 4-wire LADS facility.

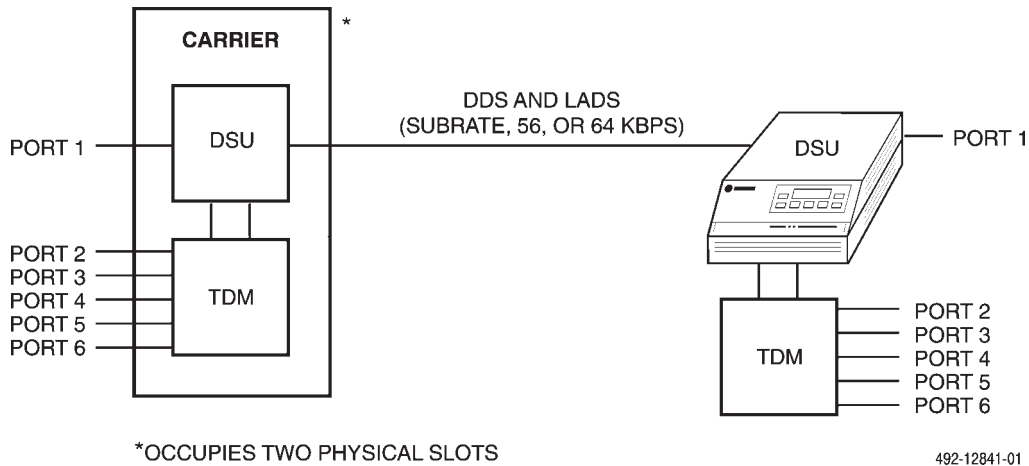


Figure 4-6. Point-to-Point Multiplexing

TDM Backbone Circuit with Extensions

Figure 4-7 shows a 3600 Series DSU with TDM as the DDS backbone with an analog private line (APL) extended circuit. In this example, Port 4, which is set to underspeed, cannot support an extended circuit because extended circuit equipment cannot accept off-speed clocks. Port 1 at 2400 bps can be extended via a crossover cable to the extended circuit (refer to [Appendix C](#)).

The extended circuit, if analog, takes timing from the DDS network; therefore, the extended control modem is configured for external timing from the local DSU and received timing at the extended tributary modem. The tributary DSU is configured for DDS timing and elastic store on Port 1. Elastic store compensates for phase differences between the DDS network timing and the received timing of the analog modem. (All configuration options, such as elastic store and external/DDS timing, are discussed in detail in [Chapter 5](#).)

Diagnostic Path Extension

Diagnostic control can be extended to other data communications equipment (DCE) beyond the tributary DSU. The diagnostic channel (DC) provides an external 1200 bps asynchronous transparent path for a network management system's control channel to extend diagnostic control to other Paradyne devices at the remote location.

Digital Sharing

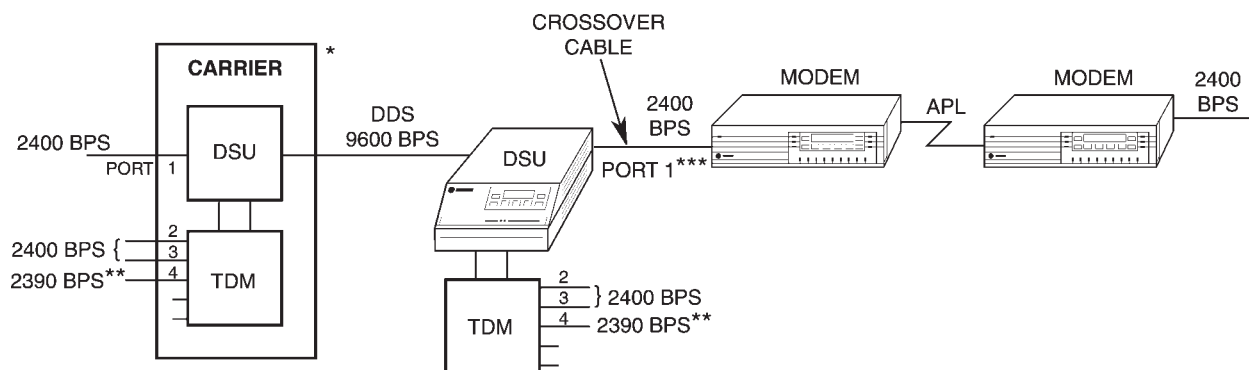
Digital sharing is a TDM or MCMP feature that allows up to six ports to share the same channel. Typically this is used for terminal-to-host connections that allow one host port to service several terminal ports.

Digital sharing can be used on either point-to-point or multidrop circuits, as shown in [Figure 4-8](#). This connection is used where multiple terminal devices are to be attached to a single communications channel. The terminal devices are typically addressed by the host computer; the protocol ensures that only one terminal device transmits at a time.

In single-port multipoint configurations, if nondisruptive diagnostics are enabled, the configuration option M-Pt SymPrt must also be enabled. This is because the TDM circuit card cannot support an asymmetrical port speed.

In this example, Ports 1 through 6 at each tributary DSU are in the digital-sharing group. If contention is not enabled, the DSU allows any DTE to send data whenever it raises RTS. If contention is enabled, CTS to a requesting port is not granted until the currently active port drops its RTS. If multiple RTS signals appear, the DSU gives CTS to the lower-numbered port.

Data received by a digital-sharing group is broadcast to all DTEs in the group. *Broadcast* is the delivery of a transmission to two or more communicating devices at the same time.



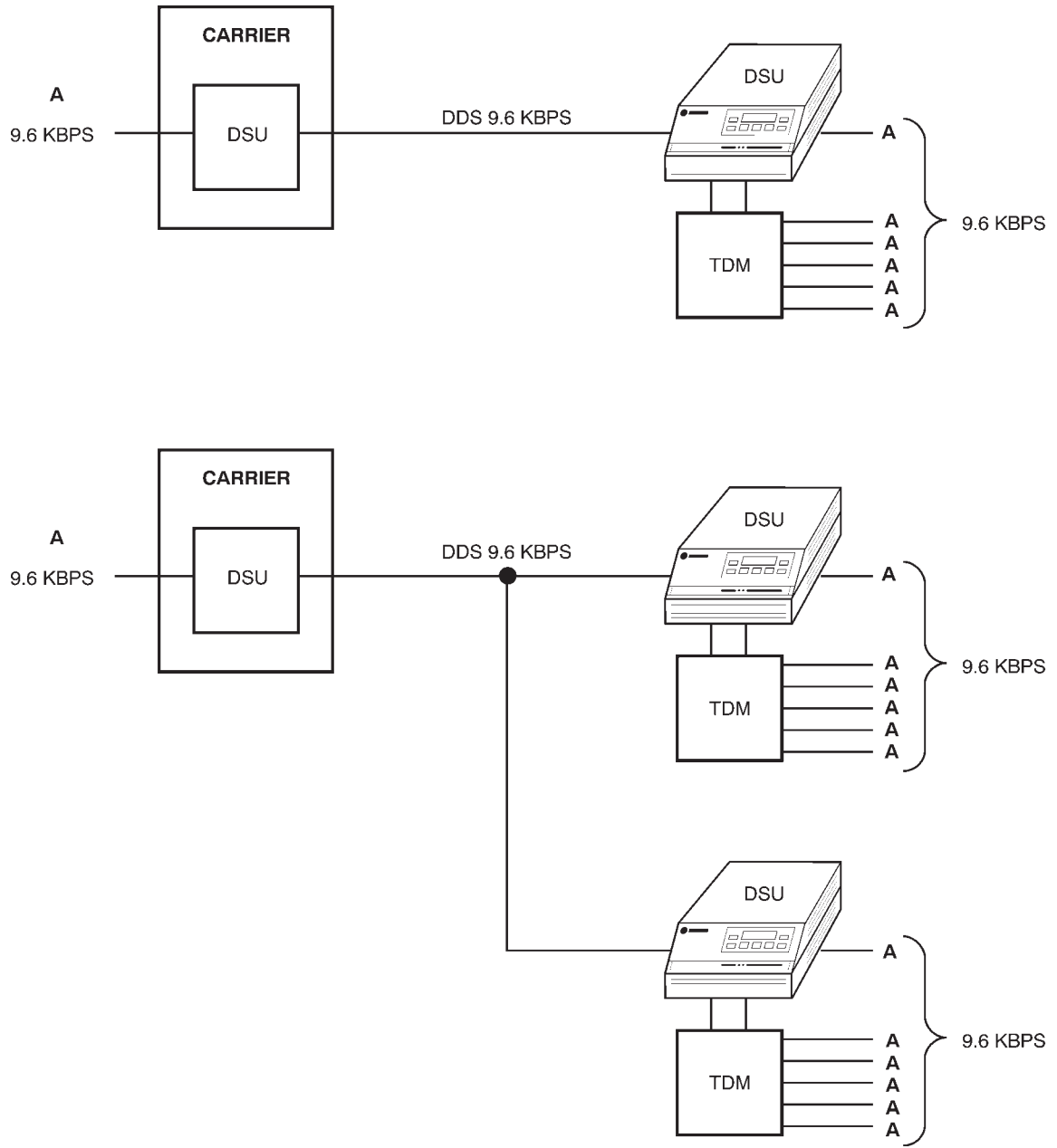
* OCCUPIES TWO PHYSICAL SLOTS.

** THIS PORT IS SET TO 2400 BPS BUT IS RUNNING UNDERSPEED.

*** CROSSOVER CABLE IS REQUIRED.

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Figure 4-7. TDM with Extended Circuit



491-12843

Figure 4-8. Digital Sharing

Multiplexing and Digital Sharing

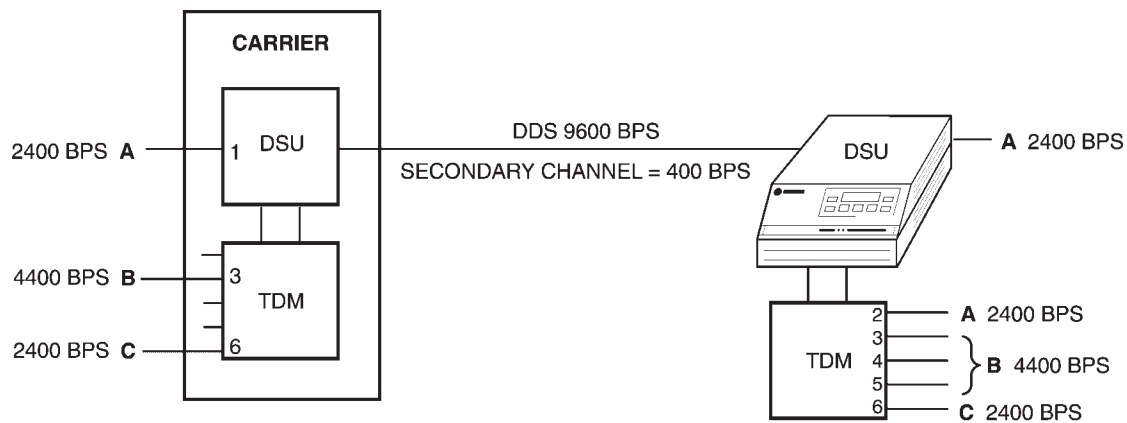
When digital sharing is combined with the TDM or MCMP multiplexing capability, in-band framing must be taken into account. The TDM circuit card can support up to two digital-sharing groups, while the MCMP circuit card can support up to three.

NOTE

Port Speed assignments should be the same at both the control and tributary DSUs.

Some of the ports can be configured for multiplexing (one port per channel) and others can be configured as a digital-sharing group. For example, two digital-sharing groups can be multiplexed with the remaining port forming three channels, as shown in Figure 4-9. The three channels are designated as A, B, and C in the example.

Framing and/or secondary channel bandwidth can be taken from any of the multiplexing ports or from the digital-sharing group. In this example, Port 6 is set to underspeed. If framing is taken from the digital-sharing group, every port in the shared group runs at underspeed. Keep in mind that extended circuits are not possible from an underspeed port or from any of the ports in a digital sharing group if the group is running underspeed.



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Figure 4-9. Multiplexing and Digital Sharing

FEP Port Sharing

FEP port sharing is a method of connecting a front-end processor (FEP) to multiple control DSUs/modems to broadcast the same message over different circuits, yet receive individual responses. A typical example can be found in the retail banking environment (Figure 4-10), where two high-speed applications (Channels A and B in the figure) service a branch of a retail bank, and the lower speed automated teller machine (ATM) application (Channel C in the figure) services an ATM at the retail branch as well as several remote ATMs. The ATM application is extended by a FEP port-sharing group (Ports 3 and 4) at the control DSU and by a dedicated multipoint circuit.

FEP port sharing is accomplished with adjacent pairs of ports on the TDM or MCMP circuit card. Up to three separate groups can be selected, Ports 1 and 2, Ports 3 and 4, and/or Ports 5 and 6. FEP transmit data, receive data, and controls pass through the lower-numbered port of a FEP port-sharing group to be broadcast onto the aggregate data path and to the higher-numbered port. For example, data transmitted from the FEP on Port 3 is sent to the DSU connected to Port 4 and to Channel C of the TDM (Figure 4-10). Data received from Channel C or Port 4 is sent to the FEP on Port 3.

FEP port sharing is also used to back up an MCMP circuit with a set of point-to-point TDM circuits. The *MCMP Backup* section describes this in detail.

NOTE

When FEP port sharing is enabled, the corresponding port must operate in switched-carrier mode. V.13 Signaling may be used. *Set the tributary DSU's port RTS Cntrl configuration option to DTE and its TxCarrSel configuration option to Cntrl. Set the control DSU's port RxCarrSel configuration option to Cntrl.* In addition, at the control DSU, FEP port sharing can be combined with digital sharing at one or more tributary DSUs. In this case, V.13 Signaling *cannot* be used. Instead, the control DSU must have its RxCarrSel configuration option set to Mark.

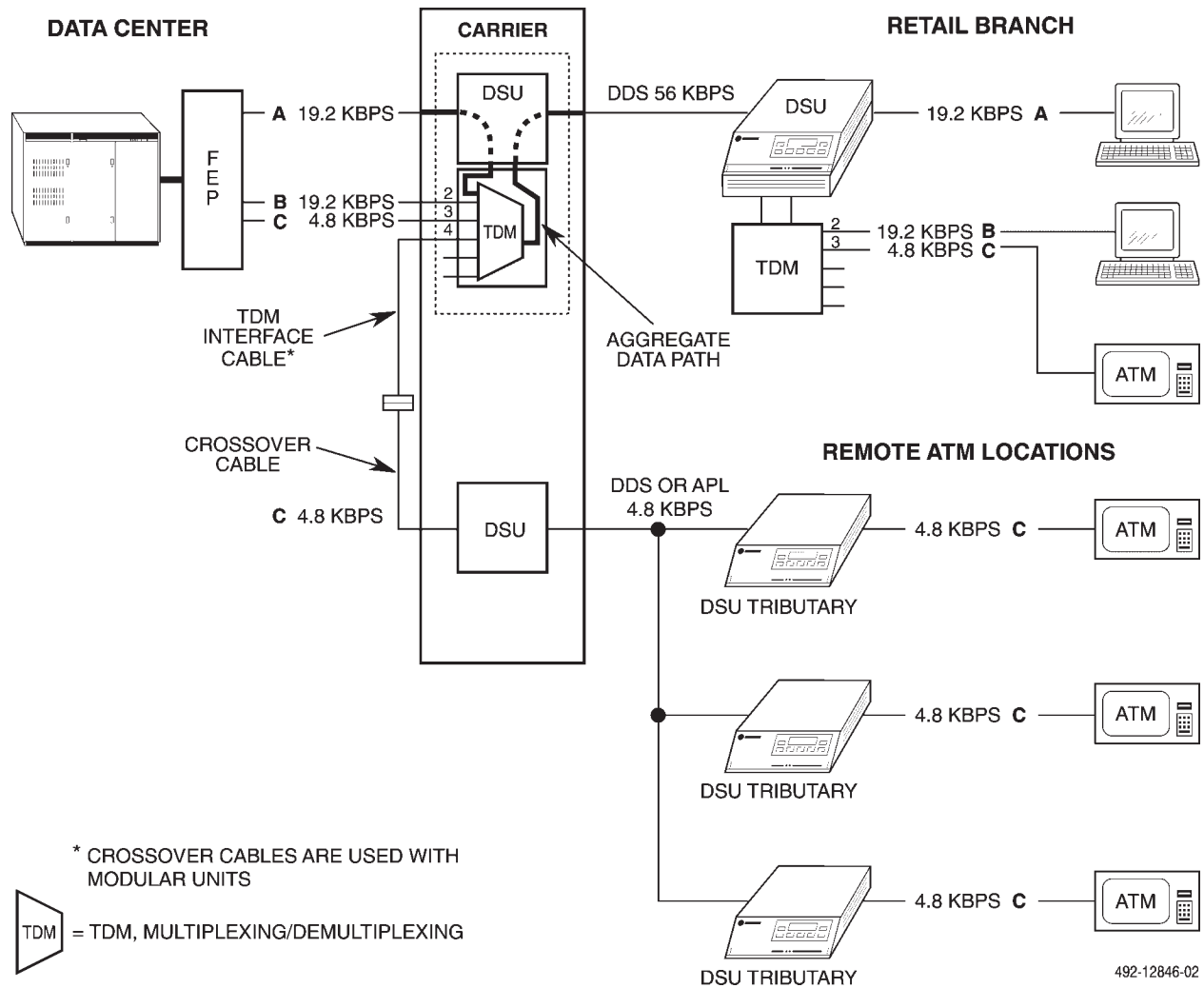


Figure 4-10. FEP Port Sharing

TDM Backup

A point-to-point multiplexing circuit can be backed up through the switched telephone network. There are five possible configurations:

- Case 1 – V.32 Backup for subrate DDS** (Figure 4-11). If the DDS network is out-of-service, the network management system can initiate dial backup or, if configured for automatic dial backup, the control or tributary DSU can initiate dial backup. Once the link is re-established, the TDM circuitry resynchronizes and data transmission resumes at the same rate as the DDS circuit. In the example below, the DSU-TDM is running disruptive diagnostics with four ports operating at 2400 bps.

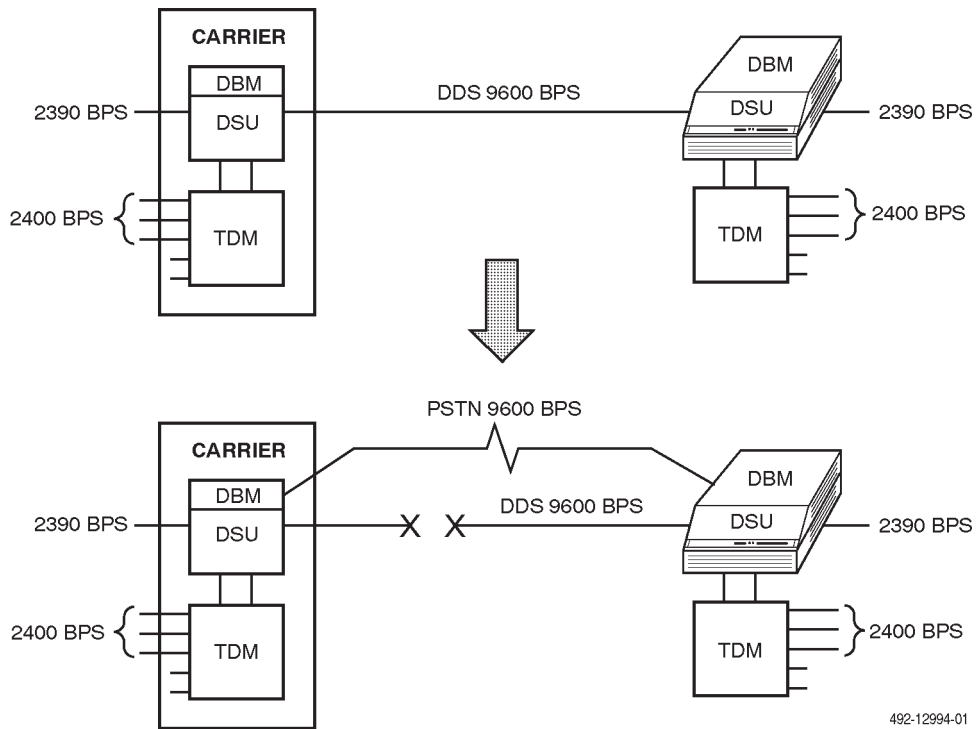


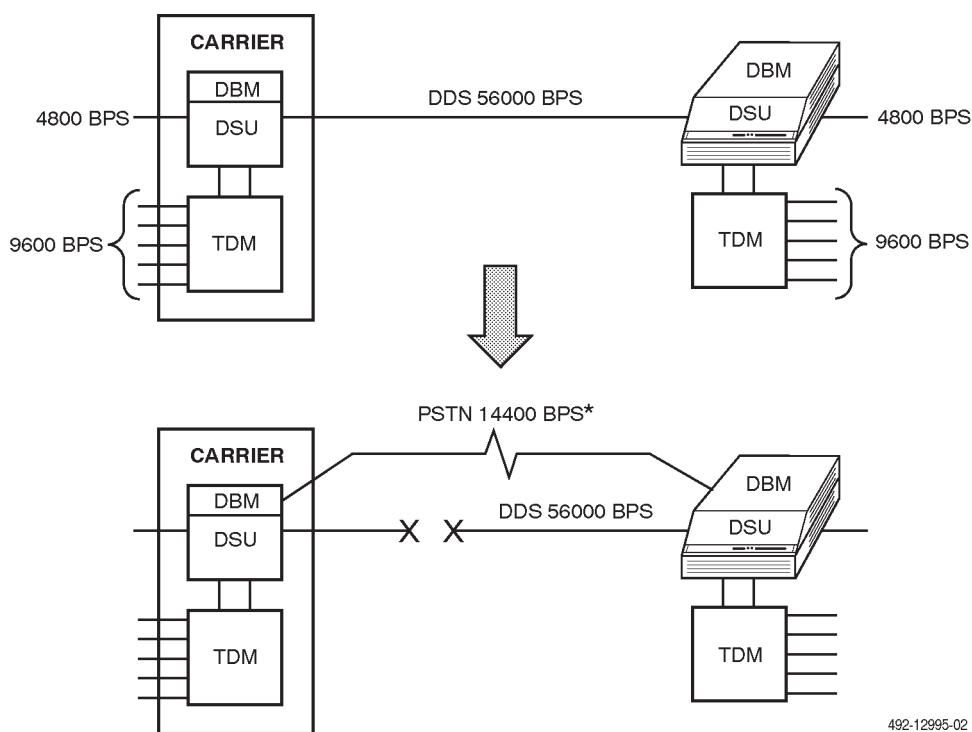
Figure 4-11. Case 1 – V.32 Backup for Subrate DDS

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- Case 2 – V.32 Backup for high-speed DSU** (Figure 4-12). The DBM port speeds must be reconfigured so that their sum is less than or equal to 14.4 kbps, the PSTN line speed. When the sum equals the line speed (now 14.4 kbps), one of the synchronous ports must be configured for underspeed.

One possible configuration is to allow one port to remain at 9600 bps, reconfigure one port to 4800 bps running at underspeed, and reconfigure all other ports to Off.

An alternate configuration that retains all ports is to configure two ports at 2400 bps and two ports at 4800 bps, with one of the ports set to Underspeed. The backup port speeds can be reallocated to match your circuit priorities.

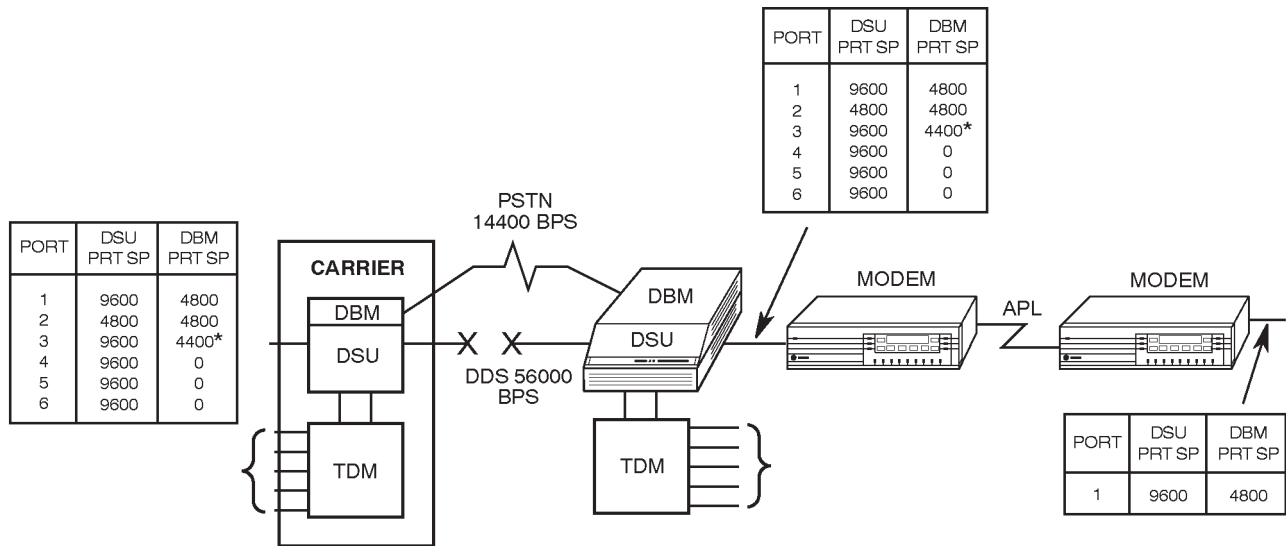


*SUM OF THE DBM PORT SPEEDS MUST BE NO GREATER THAN THE DIAL BACKUP SPEED (e.g., 14400 BPS)

Figure 4-12. Case 2 – V.32 Backup for High-Speed DSU

- **Case 3 – V.32 Backup for high-speed DSU with extended circuits** (Figure 4-13). When the backbone circuit is restored at 14.4 kbps, the port speeds at the tributary DSU may need to be reduced. If the port speed of the extended circuit must be reduced, then the speed of the extended modems must be reduced accordingly. The

speed-selection feature of the TDM circuit card will provide this function to modems (such as the COMSPHERE 3400 Series modems) that are capable of falling back in speed in response to an Off signal on their speed-select input lead. This requires a special crossover cable (feature number 3400-F1-501).



*NONDESCRIPTIVE DIAGNOSTICS (Diag Type: NonD)

494-12852a-03

Figure 4-13. Case 3 – V.32 Backup for DSU with Extended Circuits

- **Case 4 – Switched 56 Backup for DSU operating at 56 kbps or less** (Figure 4-14). The Switched 56 DBM provides full backup of point-to-point single

port and TDM circuits operating at 56 kbps. If the DDS circuit is operating at less than 56 kbps, rate adaption is used to match the DDS speed.

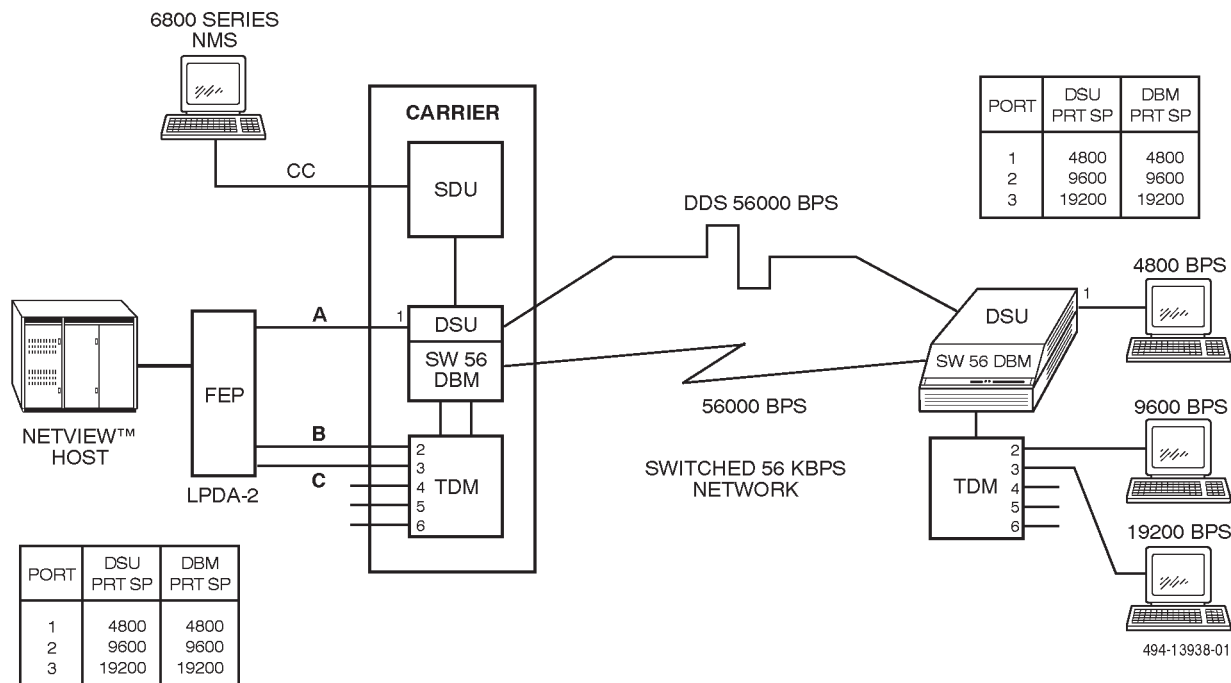


Figure 4-14. Case 4 – Switched 56 DBM Backup for DSU Operating at 56 kbps or Less

- **Case 5 – Aggregate Switched Backup for TDM Circuits** (Figure 4-15). A point-to-point TDM circuit can be backed up using the aggregate switch capability of the DSU. This may be useful if the DBMs are shared via an external switch.

In this example, the control DSU should be configured so that AggrSwitch (Aggregate Switch) is enabled and AgSw Timing (Aggregate Switch Timing) is set to Aggr. The DBM-S connected to the aggregate switch port must have Diag Type (Diagnostic Type) set to None or Disr.

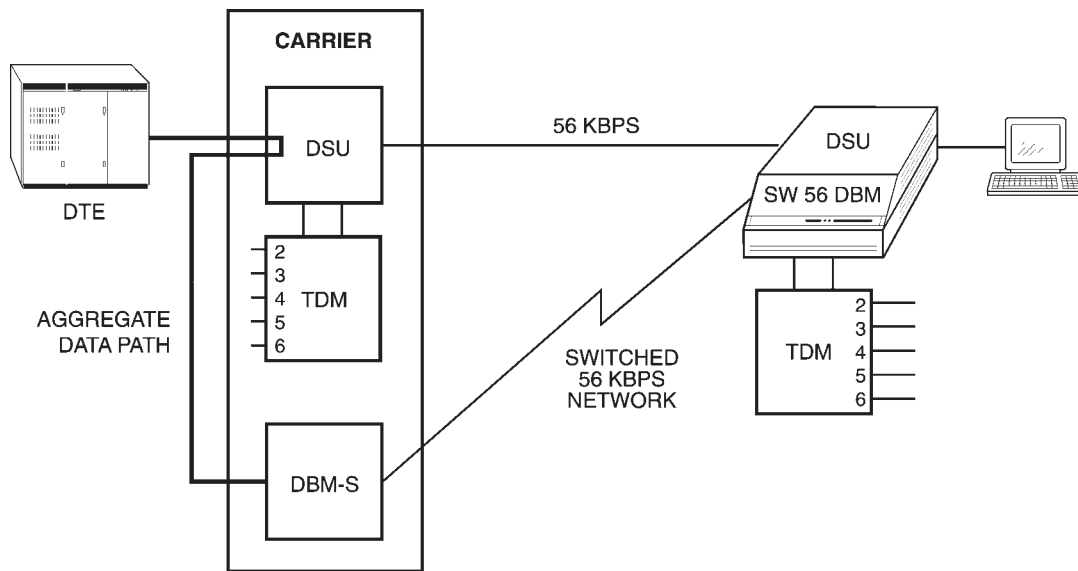
The DSU will take its timing from the Switched 56 DBM when in Dial Backup mode. The DBM-S should be commanded to dial the remote DBM using the Dial command, and to activate the data over the backup line using the switch to Dial (→Dial) command.

The DSU should then be commanded to switch data to the backup port using the Backup (Bkup)

command. When this is done, the DSU will transmit the aggregate data stream (including data, framing, and diagnostics) through the aggregate port. To terminate dial backup, send a DrBU command to the DBM-S and the DSU.

NOTE

During full backup switching (for aggregate versions only), diagnostic commands are routed over the aggregate port to the remote DSU or DBM. Only two tests are available to test the DDS facility: Digital Test (DT) and Bit Error Rate Test (BERT).



492-13933a

Figure 4-15. Case 5 – Aggregate Switched Backup for TDM Circuits Configuration

Multichannel Multipoint

The MCMP capability reduces the number of parallel multipoint digital private lines required by independent applications. Merging applications onto a single communications circuit reduces line, DCE, and maintenance costs (Figures 4-16 and 4-17). The 3600 Series DSUs with MCMP operating in MCMP mode can support up to six independent applications over a single 56 kbps standard multipoint digital facility.

The MCMP capability provides up to six user-selectable full-duplex channels, plus a channel for diagnostic transport. Any of the user-selectable channels can be assigned to any of the six ports (e.g., Channel A assigned to Port 3). By assigning channels to ports at both the control and tributary DSUs, an independent (virtual) multipoint circuit can be built for each channel.

Figure 4-16 shows three independent banking applications designated AA, BB, and CC that are operating over three parallel DDS multipoint circuits.

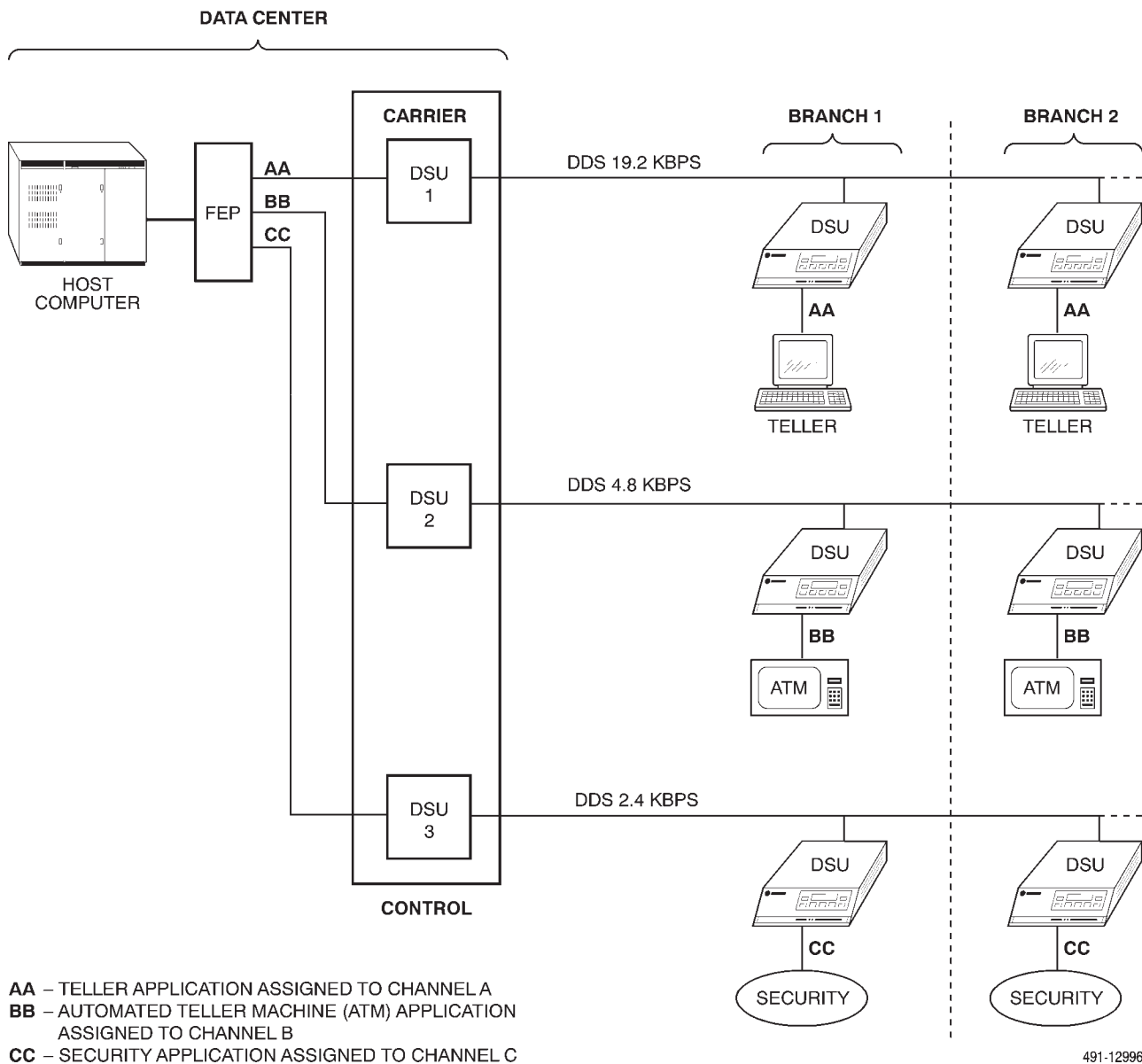


Figure 4-16. Typical Parallel Networks

At the control DSU, each application in Figure 4-16 is given its own channel (A, B, or C), and the channels are assigned to Ports 1 through 3. At each tributary (branch) location, Channel A is assigned to Port 1, allowing the teller workstations connected to this port to access application AA; Channel B is assigned to Port 2, allowing the ATMs connected to this port to access application BB; and Channel C is assigned to Port 3, allowing the security systems connected to this port to access application CC.

Figure 4-17 shows how the three independent applications can be combined via the MCMP capability to operate over one DDS 56 kbps multipoint circuit.

A simple channel-to-port assignment allows a teller workstation, an ATM, or an additional security system to be added at any one of the branch locations (e.g., assigning Channel A to any of the unused ports at Branch Site 1 allows an additional teller workstation to be added at that location), as shown in Figure 4-17.

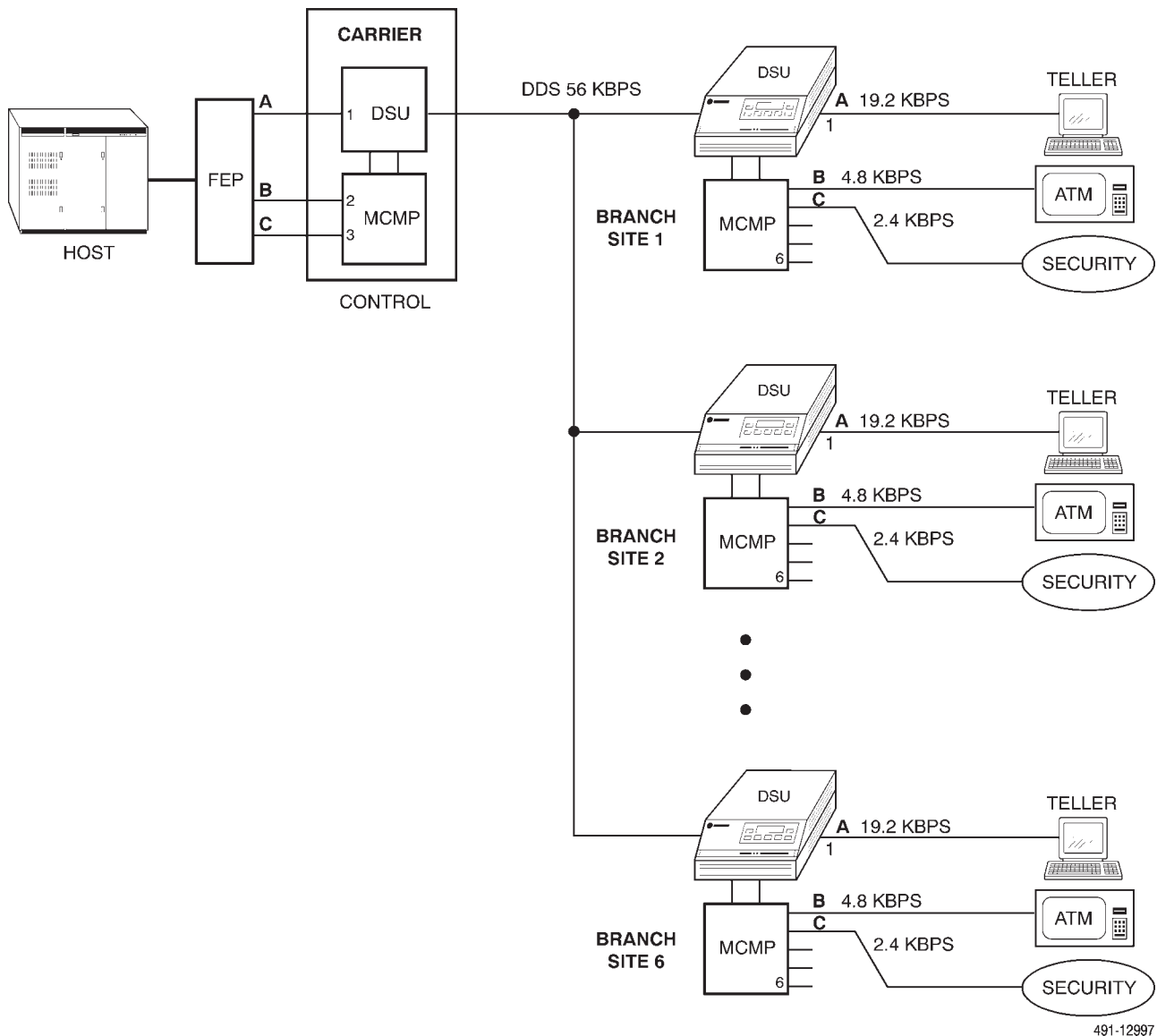


Figure 4-17. Applications Combined on One DDS Multipoint Circuit with MCMP

491-12997

Line and Channel Speeds

The MCMP capability operates only on a 56 kbps DDS multipoint circuit. Speeds of any channel can be set to the synchronous speed of 1.2, 2.4, 4.8, 7.2, 9.6, 12, 14.4, 16.8, 19.2, 38.4, or 48 kbps full-duplex.

A channel can be used either synchronously or asynchronously. Possible asynchronous rates include all rates available to synchronous operation (1.2 through 48 kbps). Asynchronous rates of 150, 300, and 1200 bps require the allocation of 1200 bps. The asynchronous speed of 600 and 1800 bps requires the allocation of 2400 bps.

The sum of the allocated channel speeds (aggregate bit rate) must not exceed 48 kbps.

MCMP Overhead Composition

Of the 56 kbps capacity (bandwidth) available to MCMP operation, 48 kbps is allocated to user-transmitted data and 8 kbps is overhead. The MCMP overhead consists of a management channel to control the proprietary MCMP framing process and a nondisruptive in-band secondary channel.

Management Channel

During MCMP operation, the control DSU is in constant communication with each tributary DSU via the management channel. Since the management channel is embedded in the MCMP overhead, it transmits information without disrupting user-transmitted data.

When the MCMP capability is activated for the first time, the control DSU with MCMP determines the roundtrip delay parameters that are critical to MCMP operation. MCMP sends these parameters to the tributaries in the network to synchronize their transmissions. Refer to *MCMP Operation* in this chapter.

After initialization, the control DSU continues to monitor these delay parameters. Upon detecting changes, the control DSU sends corrected roundtrip delay parameters to the tributaries.

The management channel is also used for *framing*, where selection of an underspeed channel is not required. This framing technique differs markedly from the in-band framing scheme used by the TDM capability, where framing bits may be implemented by reducing the data rate of one of the channels.

In-Band Secondary Channel Transport

The MCMP capability supports in-band secondary channel transport between the control and tributary DSUs that can transport diagnostics without disrupting user-transmitted data.

Some tests transmitted over the in-band secondary channel transport may result in primary channel disruptions when the test is executed (i.e., a Device Test to a tributary DSU). There is no routine health and status polling unless configured for nondisruptive diagnostics.

Number of Tributaries

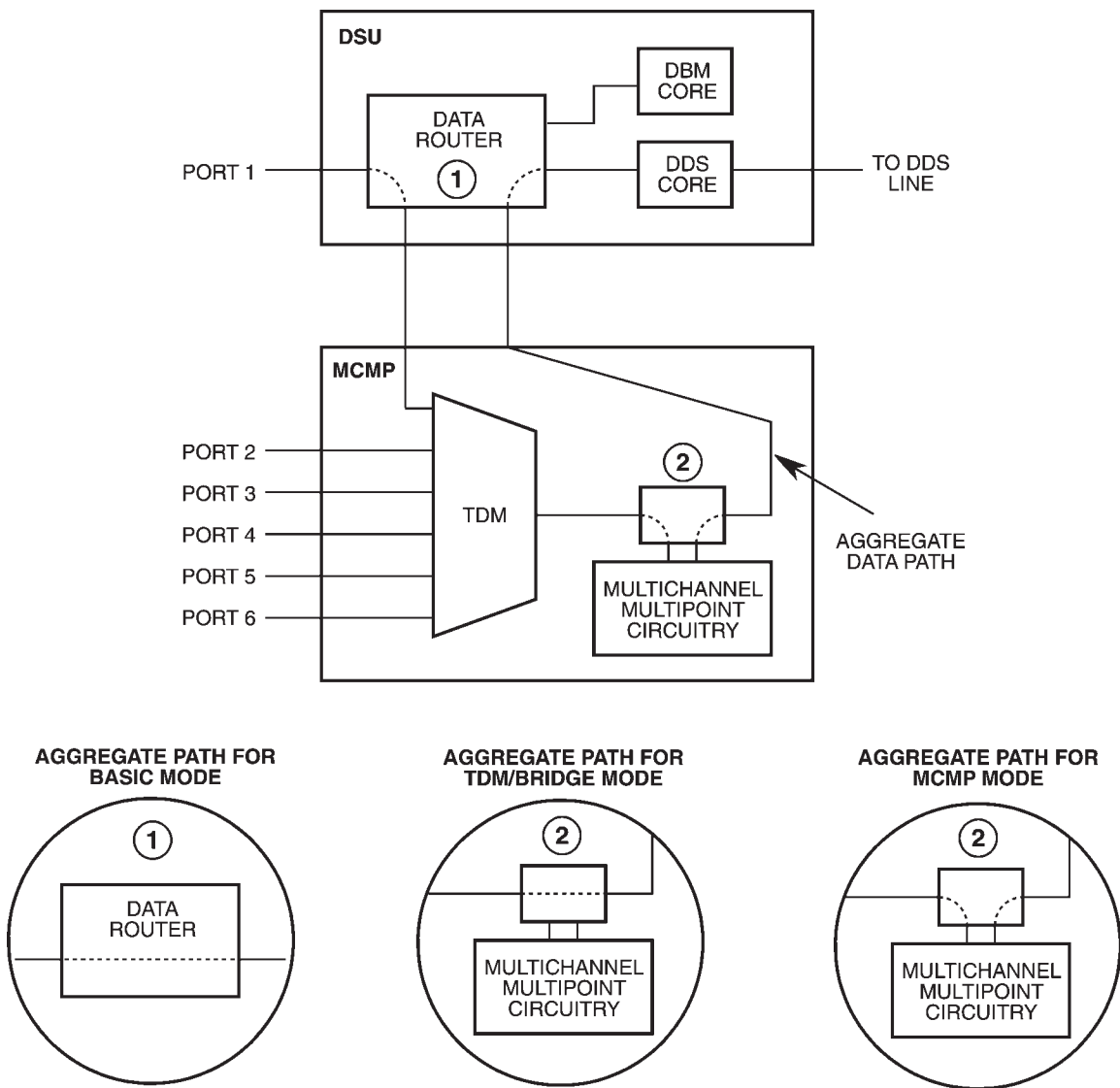
The MCMP capability can support up to 40 addressable tributary devices (40 DSUs or 20 DSUs with DBMs).

MCMP Architecture

Figure 4-18 shows a high-level view of the MCMP architecture. The data paths are established as in the TDM mode of operation via the data router. Additional multichannel multipoint circuitry is activated on the MCMP circuit card.

The port arrangement on the MCMP circuit card is identical to the port arrangement on the TDM circuit card. The first port of the MCMP circuit card is part of the communications interface between the MCMP and the DSU, and emerges as a physical interface (either EIA-232-D/V.24 or V.35) on the DSU.

The DTE cabling for the MCMP capability is the same cabling used for the TDM capability. For *non-modular Model 3611 DSUs* operating in MCMP mode, the TDM interface cable attaches to the multipoint connector on the MCMP circuit card to provide cabling to five individual EIA 25-pin connectors. This cable is six feet long, and each fan-out section is one foot long. (See [Appendix C](#) for pin assignments.) For *modular Model 3611 DSUs or Model 3610 DSUs* operating in MCMP mode, all port connectors are individual and a separate crossover cable is required for each connector.



492-12998-01

Figure 4-18. MCMP Architecture and Signal Flow

MCMP Operation

For proper MCMP operation, the network must be initialized, with the tributary DSUs added to the control DSU's poll list. Each newly installed circuit should be verified as a working single port multipoint circuit, per Technical Publication 62310 – 1987, prior to the MCMP capability being activated to ensure that the DSUs operate properly.

Initialization

The first time the MCMP capability is activated on the network or after the network has been reconfigured, the Acquire Poll List command must be issued from the control DSU's DCP or from NMS to start the initialization process. During the initialization process, the control DSU with MCMP performs the following tasks:

- Determines which tributaries are present on the network.
- Determines the roundtrip delay to each tributary.
- Loads the Channel Speed and Asynchronous configuration options into each tributary.

CAUTION

The initialization process is typically performed in less than 8 seconds, and is disruptive to customer data.

In response to the Acquire Poll List command, the control DSU with MCMP broadcasts a query message on the network asking what tributaries are to be on the poll list. All active tributary DSUs on the network respond by sending an affirmation message to the control DSU, and the control DSU adds those tributaries to the poll list.

The following configuration options are loaded into each tributary from the control DSU during initialization:

- Channel Speed
- Async/Sync
- Async Rate
- Async Bits/Character
- Stop Bits

During MCMP operation, the Channel Speed and Asynchronous configuration values at the control DSU are downloaded to the tributaries on the control DSU's poll list every 10 seconds. The downloading is accomplished via the management channel so there is no disruption to user-transmitted data.

Network Modification

When an additional tributary DSU is added to a multipoint circuit, the new DSU is not automatically included in the control DSU's poll list and the tributary DSU will not allow the DTE to respond to FEP polling. The tributary DSU must be added to the poll list.

A Change Poll List command must be issued from the control DSU's DCP or from NMS to the control DSU to update the poll list.

The Change Poll List command can also be used to delete a DSU from the poll list. When a tributary DSU is deleted from the list, associated DTE(s) no longer respond to FEP polling.

Switched-Carrier Emulation

In MCMP transmission, switched-carrier emulation for each channel is standard in the inbound direction (toward the control DSU). Transmission of signaling codes is not required; the control DSU toggles the Line Signal Detect (LSD) lead, based upon whether or not data is received for that channel.

MCMP Applications

There are five applications using MCMP capability included in this section. They include using MCMP capability for multichannel multipoint operation, digital sharing, extended diagnostics, FEP port sharing, and backup.

There is no need to set these configuration options at the tributary DSUs. Any values assigned to the configuration options prior to initialization are overwritten during initialization. (For configuration options, see *MUX Configuration Options* and *Port Speed Configuration Options* sections of Chapter 5.)

MCMP

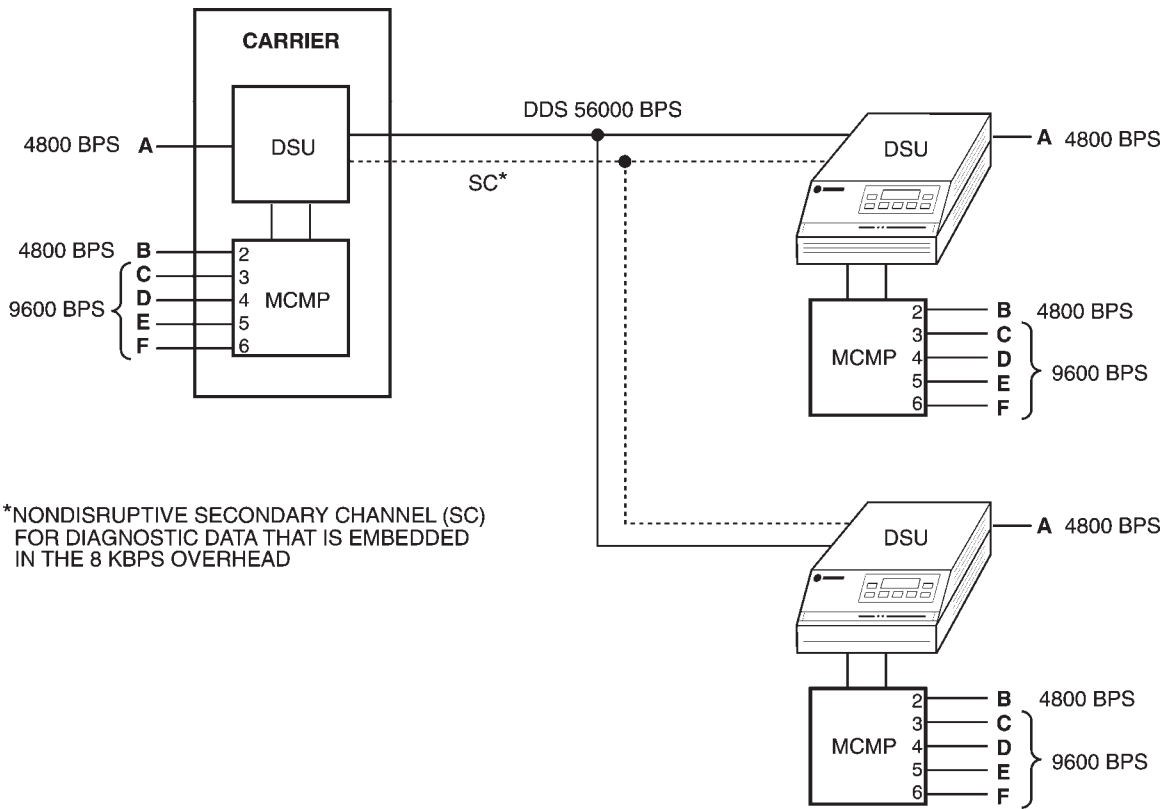
The MCMP capability provides multichannel multipoint operation over a 56 kbps DDS multipoint facility. Figure 4-19 shows an example of channel-to-port assignments and channel speed selections for MCMP operation: the 48 kbps user bandwidth supports four 9600 bps channels and two 4800 bps channels.

MCMP with Digital Sharing

The MCMP capability can be configured for multichannel multipoint and digital sharing at the same

time. Up to three digital-sharing groups can be formed at each tributary site.

A digital-sharing group is formed by assigning the same channel to each port in the group. All ports in the digital-sharing group operate at the same speed and all receive the same data. (The ports do not have to be adjacent to one another, which is a restriction when forming a digital-sharing group with the TDM capability). The host protocol must enforce the order of transmissions to avoid collisions; that is, the digital-sharing group is not configured for contention. Refer to the following note *if contention is required*.



*NONDISRUPTIVE SECONDARY CHANNEL (SC) FOR DIAGNOSTIC DATA THAT IS EMBEDDED IN THE 8 KBPS OVERHEAD

492-12999-01

Figure 4-19. MCMP with Independent Channels

NOTE

If the digital-sharing group consists of adjacent ports, the digital-sharing group can be created via an alternate method using the Sharing Device A (Share DevA) and Sharing Device B (Share DevB) configuration options. Refer to the *MUX Configuration Options* section of Chapter 5.

Figure 4-20 shows an MCMP application using three channels, where a digital-sharing group has been formed at each of the tributary locations. Notice that the digital-sharing groups can be different at each tributary DSU.

MCMP with FEP Port Sharing

Both MCMP capability and TDM capability provide the FEP port-sharing feature. Refer to the *Time Division Multiplexing* section of this chapter.

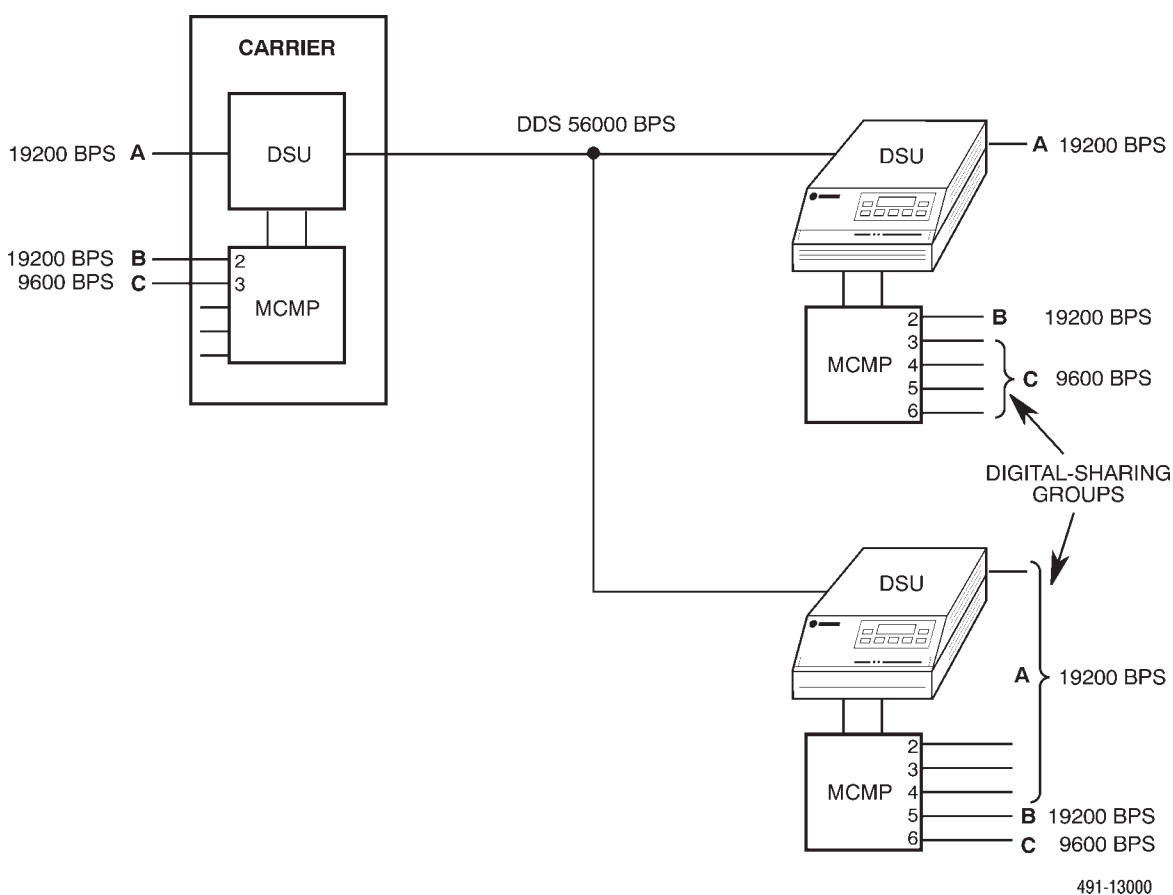
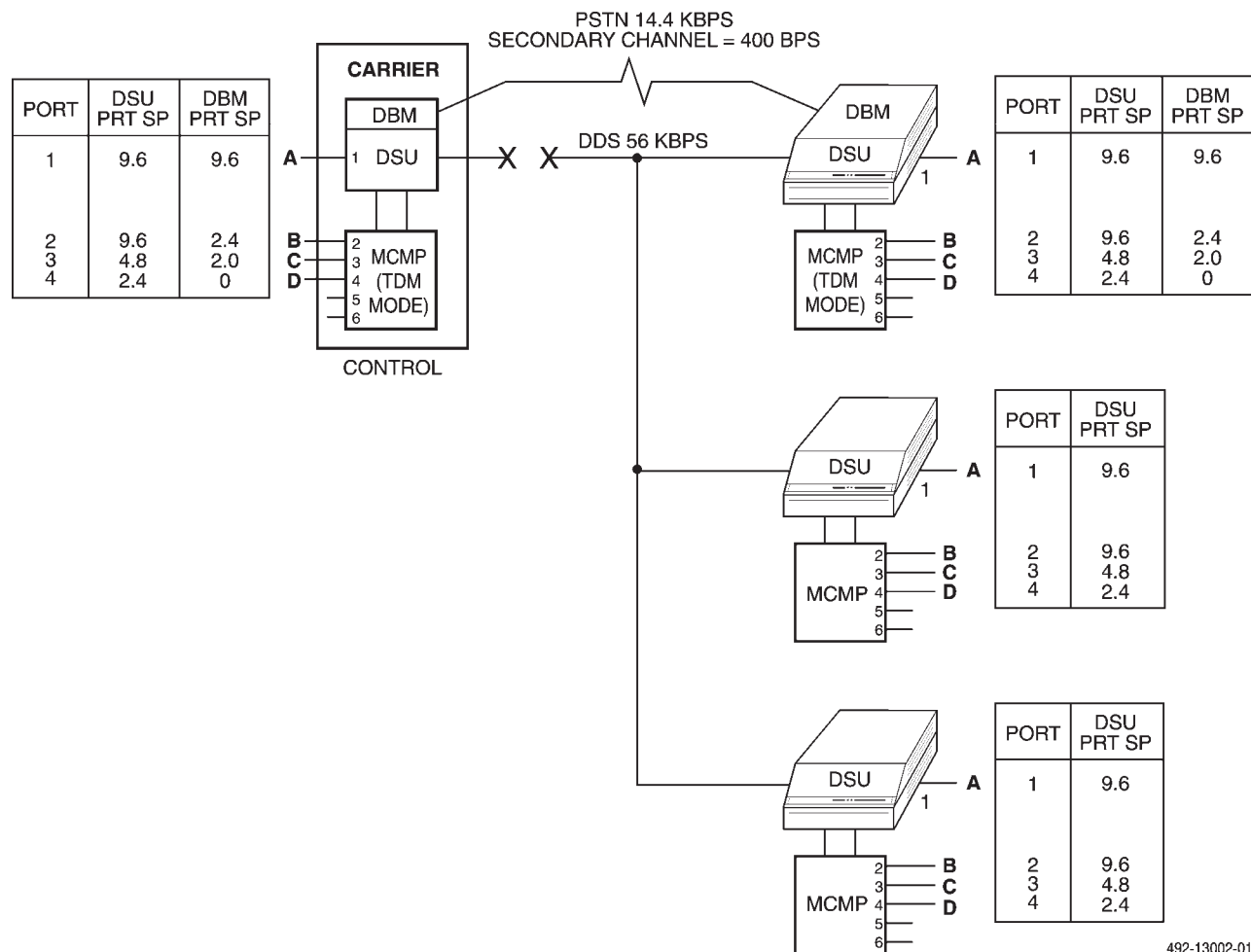


Figure 4-20. MCMP with Digital Sharing

- Case 2 – Backing up as many channels as possible to the one most important tributary location** (Figure 4-22). In this case, the control DSU and the one tributary DSU selected for dial backup must be equipped with a DBM configured with MCMP Backup set to TDM. Essentially, the backup becomes dial backup of a point-to-point TDM circuit.

Because the backup is performed in TDM mode, both TDM and MCMP configuration options must

be set. Therefore, Port 1 at the control DSU should be mapped to Port 1 at the tributary DSU. For Case 1, only two DSD groups can be supported (MCMP mode normally supports three DSD groups), and the inbound pseudo-carrier control configuration options (RxCarrSel and Tx CarrSel) need to be set for backup (Cntrl). All other tributary locations are not served until the alarm is fixed and the MCMP circuit is restored.

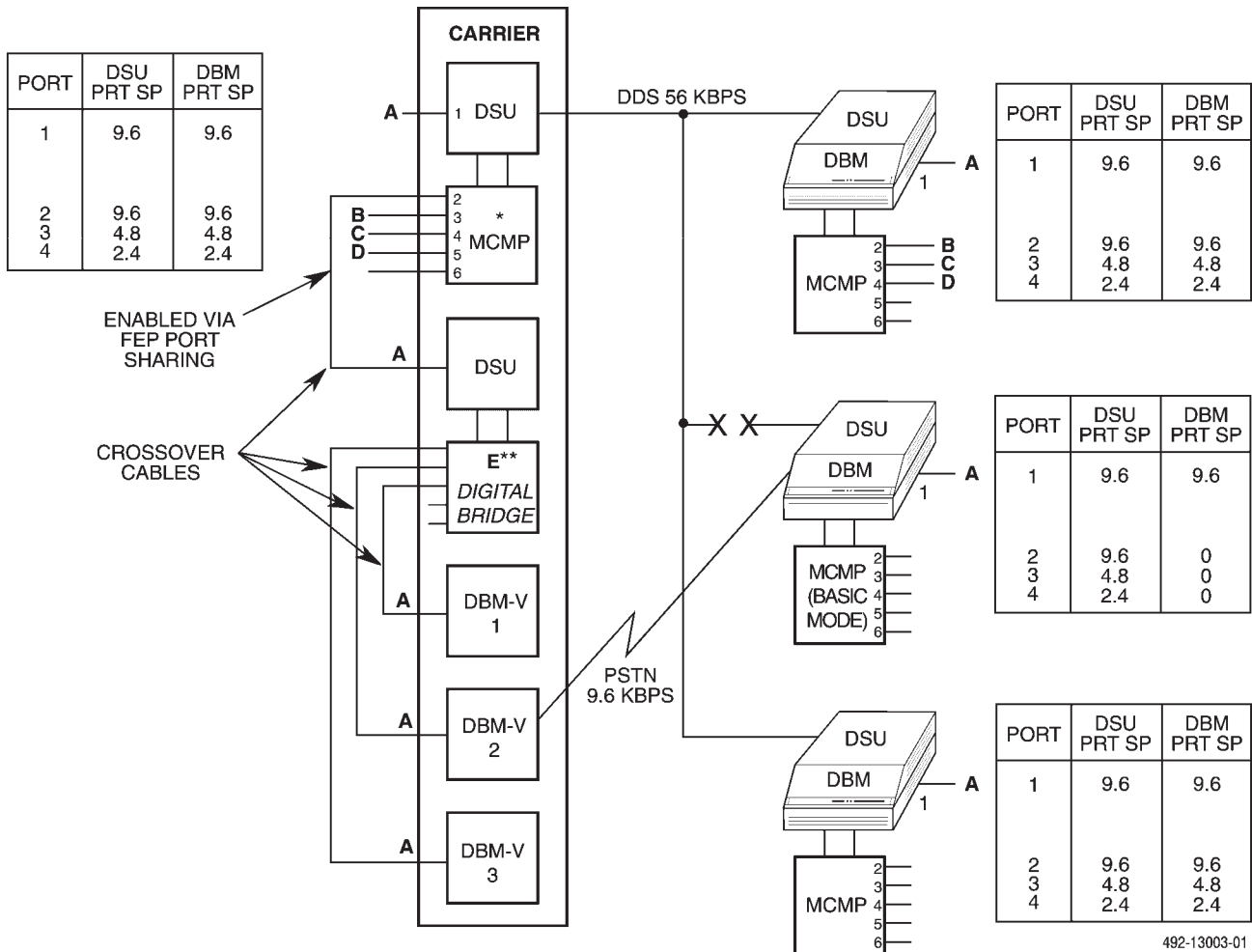


492-13002-01

Figure 4-22. Case 2 – Backing Up the Channels to the Most Important Tributary Location

- Case 3 – Backing up one complete channel (both partial and full backup)** (Figures 4-23 and 4-24). In this case, each tributary DSU in need of service restoration must be equipped with a DBM and the MCMP Backup configuration option must be set to TDM, with only one port assigned

bandwidth. At the central site, an extended bridge and a DBM-V for each tributary must be available. (Refer to the *Multipoint Dial Backup* section of this chapter.) Essentially, the backup becomes dial backup of a single multipoint circuit.



492-13003-01

* TDM AND DIGITAL BRIDGE INTERFACE CABLES ARE USED WITH NON-MODULAR UNITS

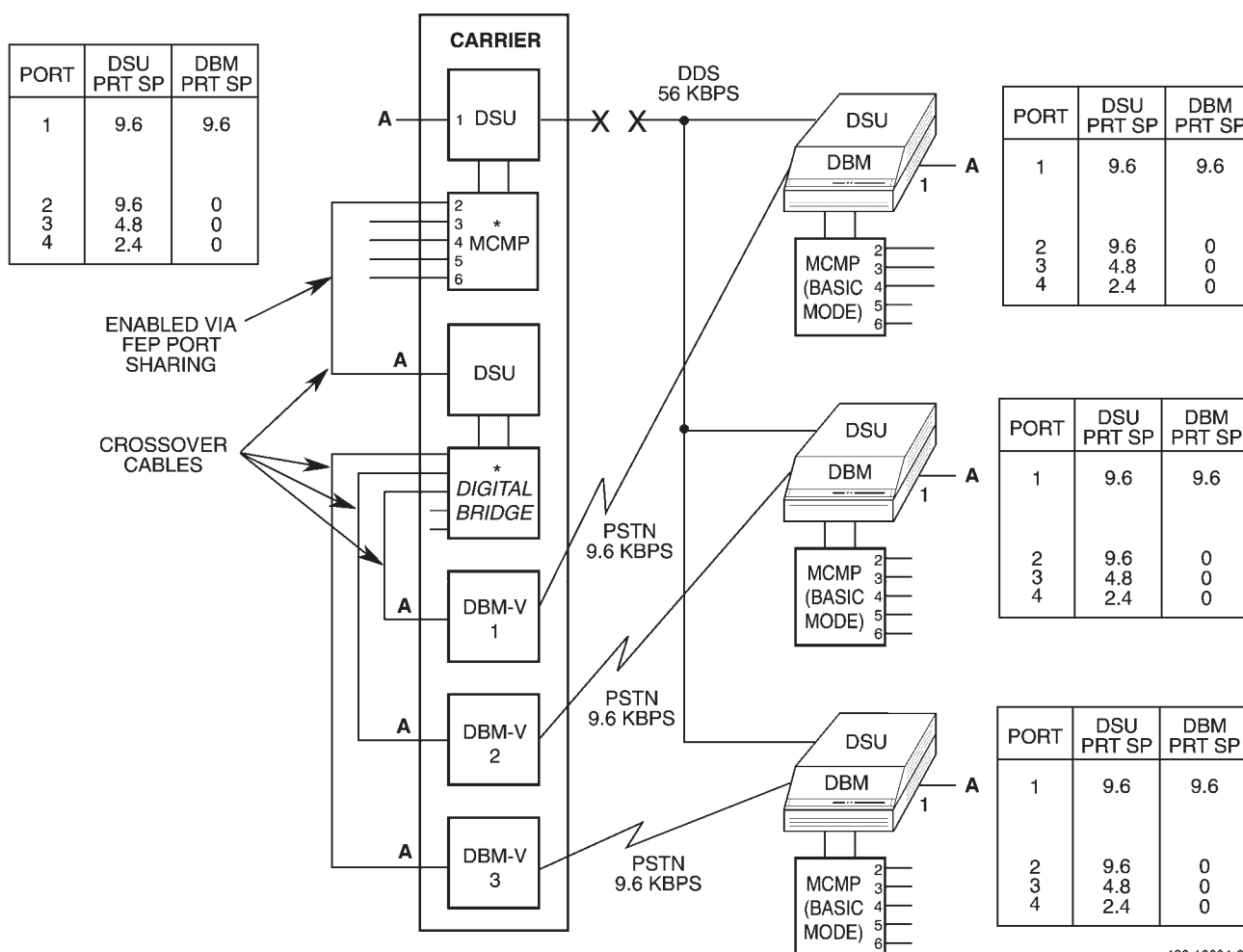
** EXTENDED BRIDGE (EBrdg)

Figure 4-23. Case 3 – Backing Up One Complete Channel (Partial Backup)

When backup is provided for one channel, the MCMP circuit can support a total of five application channels, and the control DSU must have the backup port and the next highest port configured as an FEP port-sharing group. The channel to be backed up must appear on Port 1, 3, or 5, and the port speed cannot exceed 14.4 kbps. Enabling FEP port-sharing group 1 and 2 (or 3 and 4, or 5 and 6) routes the application channel to the extended-bridge unit and DBM-Vs, where it is routed to the tributary DSU(s) via the PSTN connections. All other channels to the tributaries in backup are lost until the alarm is fixed and the MCMP circuit is restored.

The DBM-V should be configured for V.13 Signaling (V.13 Signl) enabled and for disruptive diagnostics (Diag Type). The tributary DSU should be configured for Transmit Carrier Select (TxCarrSel) set to Cntrl on the port that is to be backed up.

When the DBM-V has dialed the tributary DBM, a Change Options command should be sent to the tributary DSU changing the Diagnostic Type (Diag Type) configuration option to Disruptive (Disr).



492-13004-01

* TDM AND DIGITAL BRIDGE INTERFACE CABLES ARE USED WITH NON-MODULAR UNITS

Figure 4-24. Case 3 – Backing Up One Complete Channel (Full Backup)

- Case 4 – Backing up (up to) three channels at each tributary via the FEP port-sharing feature** (Figure 4-25). In this case, each tributary DSU to be backed up must be equipped with a DBM and the MCMP Backup configuration option should be set to TDM. At the central site, a DSU-DBM-TDM or DSU-DBM-MCMP unit operating in TDM mode must be available for each tributary to be backed up.

Using the FEP port-sharing feature, three channels from the control DSU-MCMP can be daisy chained to a set of DSU-DBM-TDM units to provide dial backup for each tributary DSU. To daisy chain these units, alternate TDM and digital bridge interface cables for non-modular devices, and use crossover cables with modular devices. Essentially, the backup becomes the dial backup of a set of point-to-point TDM circuits.

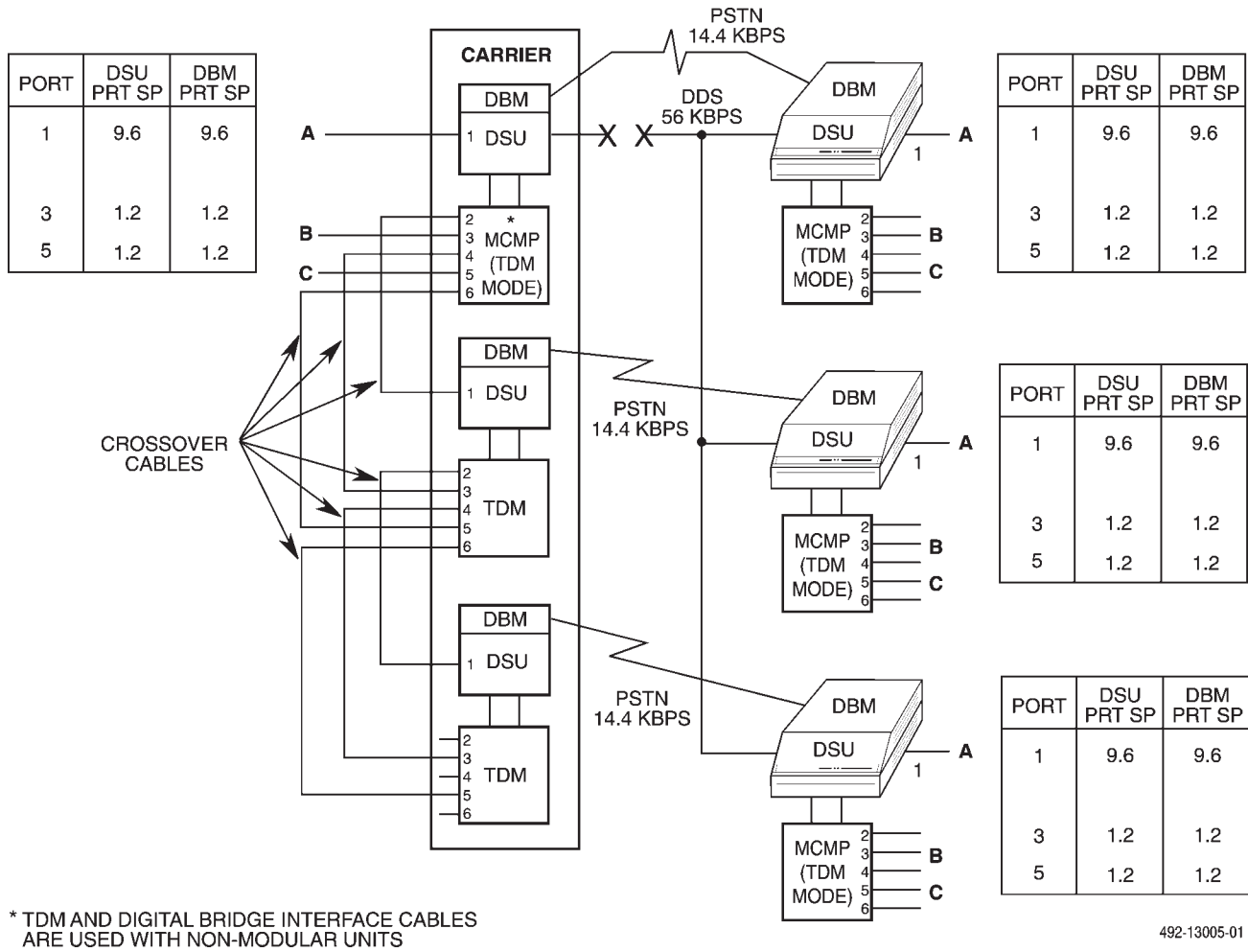


Figure 4-25. Case 4 – Backing Up (Up to) Three Channels via the FEP Port-Sharing Feature

There are several restrictions to implementation:

- There can be at most three DTE inputs (channels).
- The sum of the channel speeds should be less than the DBM speed.
- The ports that are connected using the FEP port-sharing feature should be set to the same port speed or disabled (Disab) in the Port Speed (PrtSp) configuration options for both the DSU and DBM.
- Pseudo-controlled carrier operation must be enabled in the tributary to control direction for all ports that are part of the FEP port-sharing connection. Set RTS Cntrl to DTE, TxCarrSel to Cntrl at the tributary, and RxCarrSel to Cntrl at the control.
- Since the dial backup operation is performed in TDM mode, the MCMP channel-to-port assignment capability is not available. Port 1 at the control DBM should map to Port 1 at the tributary DBM. In addition, only two DSD groups can be supported during the backup. If there is a DSD group at the tributary, the pseudo-carrier control configuration option should not be used for the port corresponding to the DSD group. Instead, set RxCarrSel to Mark at the control DBM and TxCarrSel to Const at the tributary DBM.

Figure 4-26 shows how the digital bridge interface cable completes the communication path between a digital bridge port and its associated DCE. With a non-modular DSU-MCMP, a digital bridge interface cable is required; with a modular DSU-MCMP, only crossover cables are required.

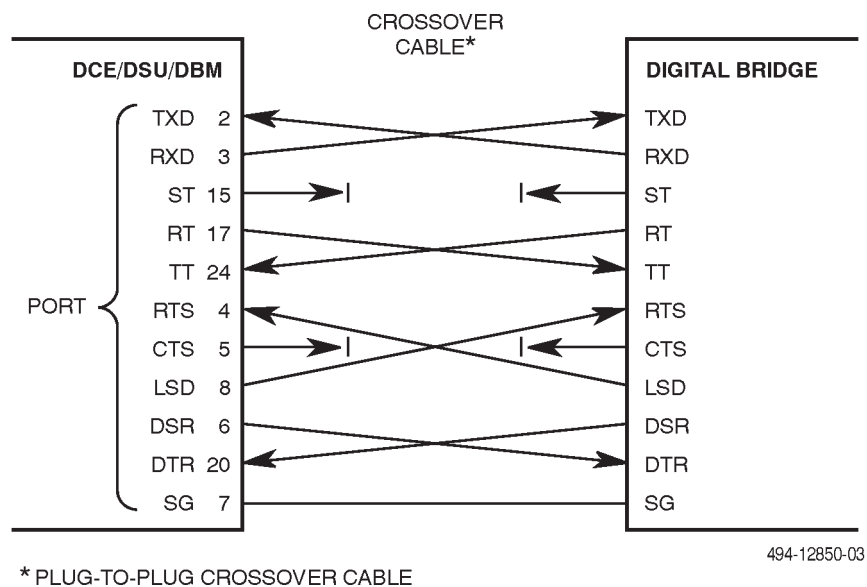


Figure 4-26. Digital Bridge/DCE Interface

- Case 5 – Aggregate switched backup for MCMP circuits.** An MCMP circuit can be backed up using the aggregate switch capability of the DSU. In Figure 4-27, the control DSU should be configured so that AggrSwitch (Aggregate Switch) is enabled and AgSw Timing (Aggregate Switch Timing) is set to the appropriate timing source to be used during dial backup. The Bridge is configured so Brdg Timing (Bridge Timing) is set to Ext for Port 1. The DBM-Ss are configured so that TxClkSource (Transmit Clock Source) is set to DDS. In addition, the DBM-S connected to the aggregate switch port must have Diag Type (Diagnostic Type) set to None or Disr.

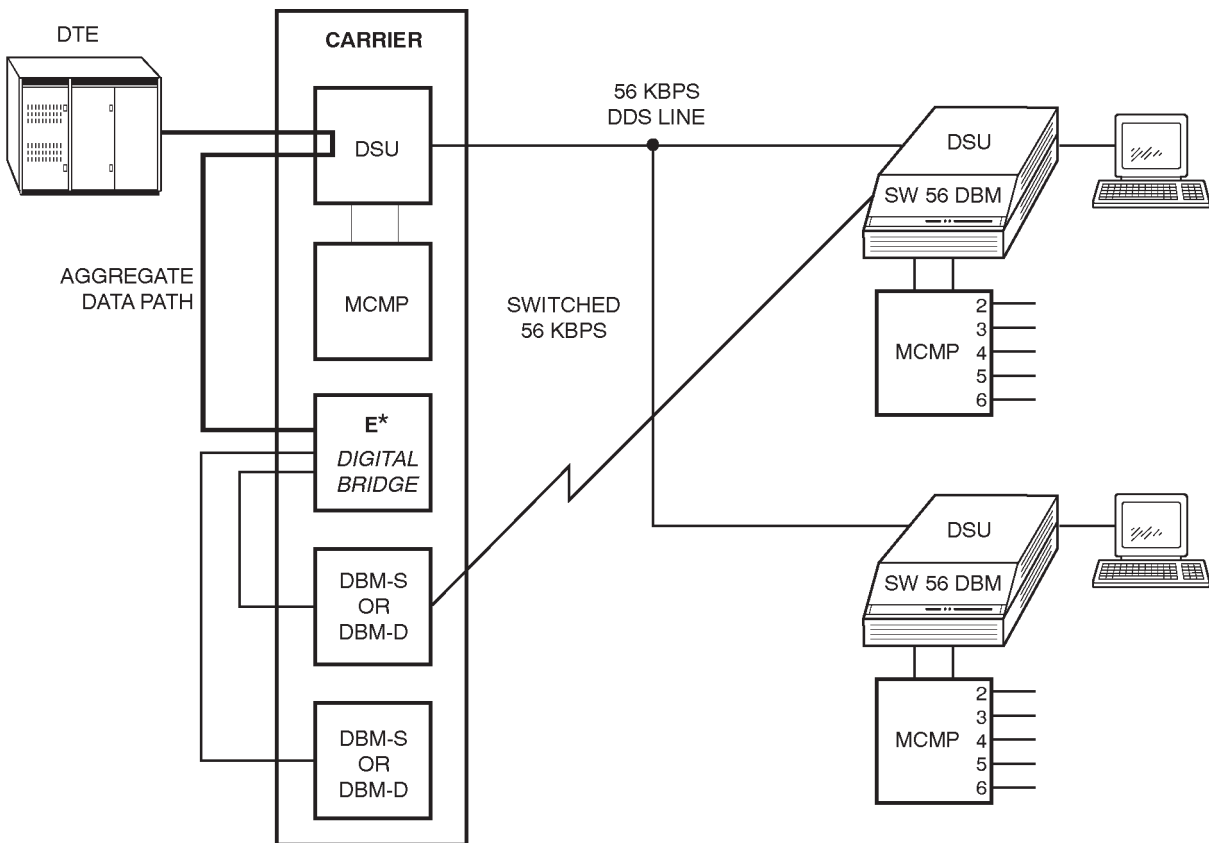
To establish a partial backup, command the control DBMs to call the remote DBMs using the Dial command, followed by the **sf** command from the 6800 Series NMS or →Dial command from the DCP. DSU timing is taken from the DDS network.

To establish a full backup, send an **sf** command from the 6800 Series NMS or →Dial command from the DCP to the control DSU. The DSU disconnects from the DDS line and derives its timing from the source specified in the AgSw Timing configuration option.

The 6700 Series NMS provides two choices from the Dial Standby status: Return to Lease or Return to Dial.

NOTE

During full backup switching (for aggregate versions only), commands are routed over the aggregate port to the remote DSU or DBM. Only two tests are available to test the DDS facility, Digital Test (DT) and Bit Error Rate Test (BERT).



*EXTENDED BRIDGE (EBrdg)

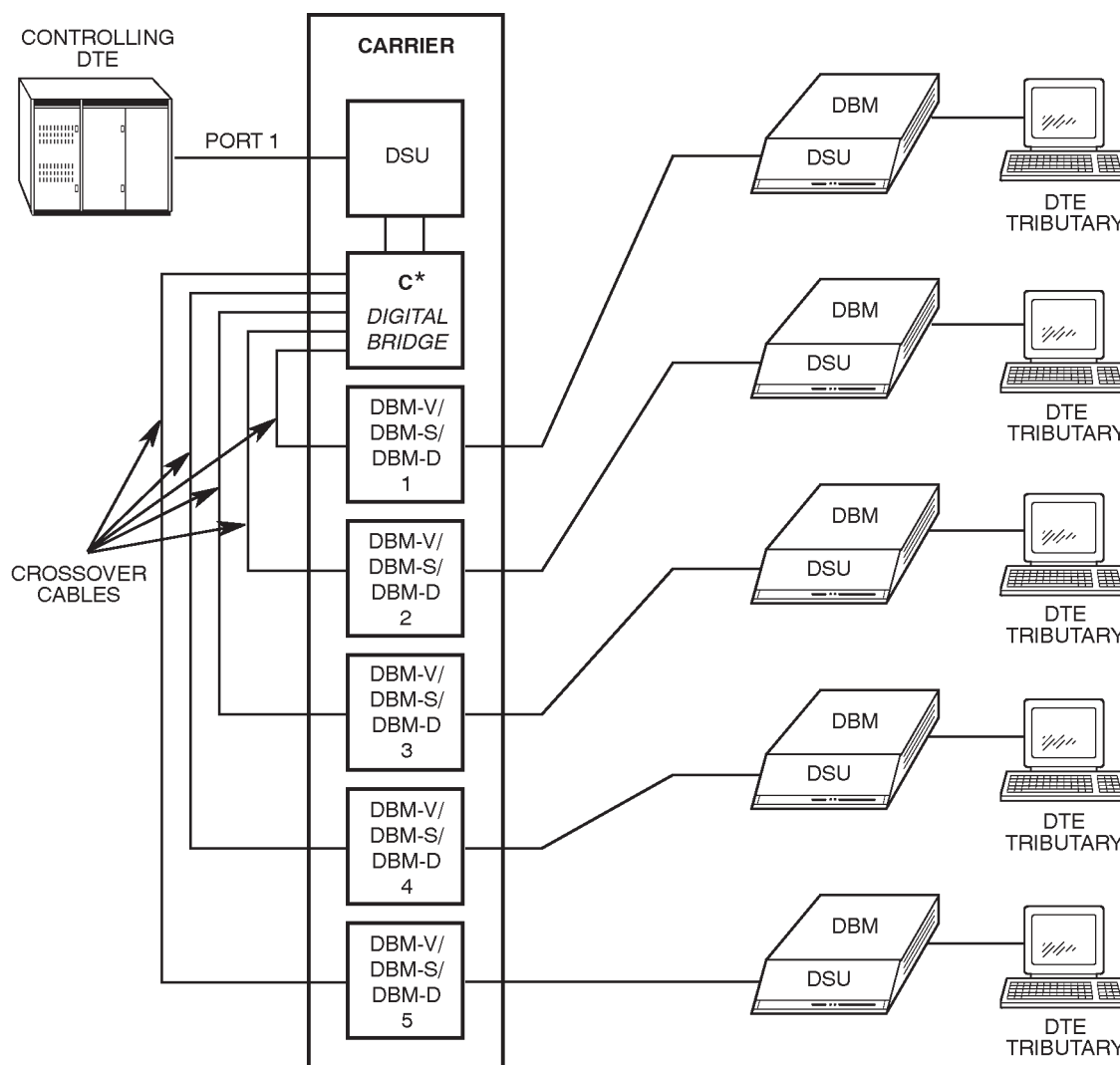
Figure 4-27. Aggregate Switched Backup for MCMP Circuit Configuration

Digital Bridge

A TDM or MCMP circuit card can be configured to perform digital bridge capability. This is a special case of digital sharing where all active ports on the bridge are configured to one digital-sharing group with or without contention. A digital bridge can be configured as a central-site bridge (CBrdg), or an extended bridge (EBrdg) when more bridging capability is needed.

The digital bridge capability allows for multipoint transmission from a local digital bridge (Figure 4-28), as opposed to network bridging. The DTE connected to the DSU having the digital bridge capability is the controlling DTE.

The digital bridge capability is used primarily in COMSPHERE 3000 Series Carrier applications, providing dedicated dial backup for multipoint DDS circuits. One TDM or MCMP circuit card configured as CBrdg provides bridging capability, depending upon the application.



*DIGITAL BRIDGE (CBrdg) – TDM CIRCUIT CARD OPERATING IN CENTRAL-SITE BRIDGE MODE

494-12847-04

Figure 4-28. Multipoint with Digital Bridging

If more bridging capability is needed, additional DSU-TDM or DSU-MCMP units configured as an extended bridge (EBrdg) can be connected to the central-site bridge, the controlling bridge. Up to four

extended bridges can be added to a central-site bridge to provide a total of 20 bridging ports, depending upon the application (Figure 4-29).

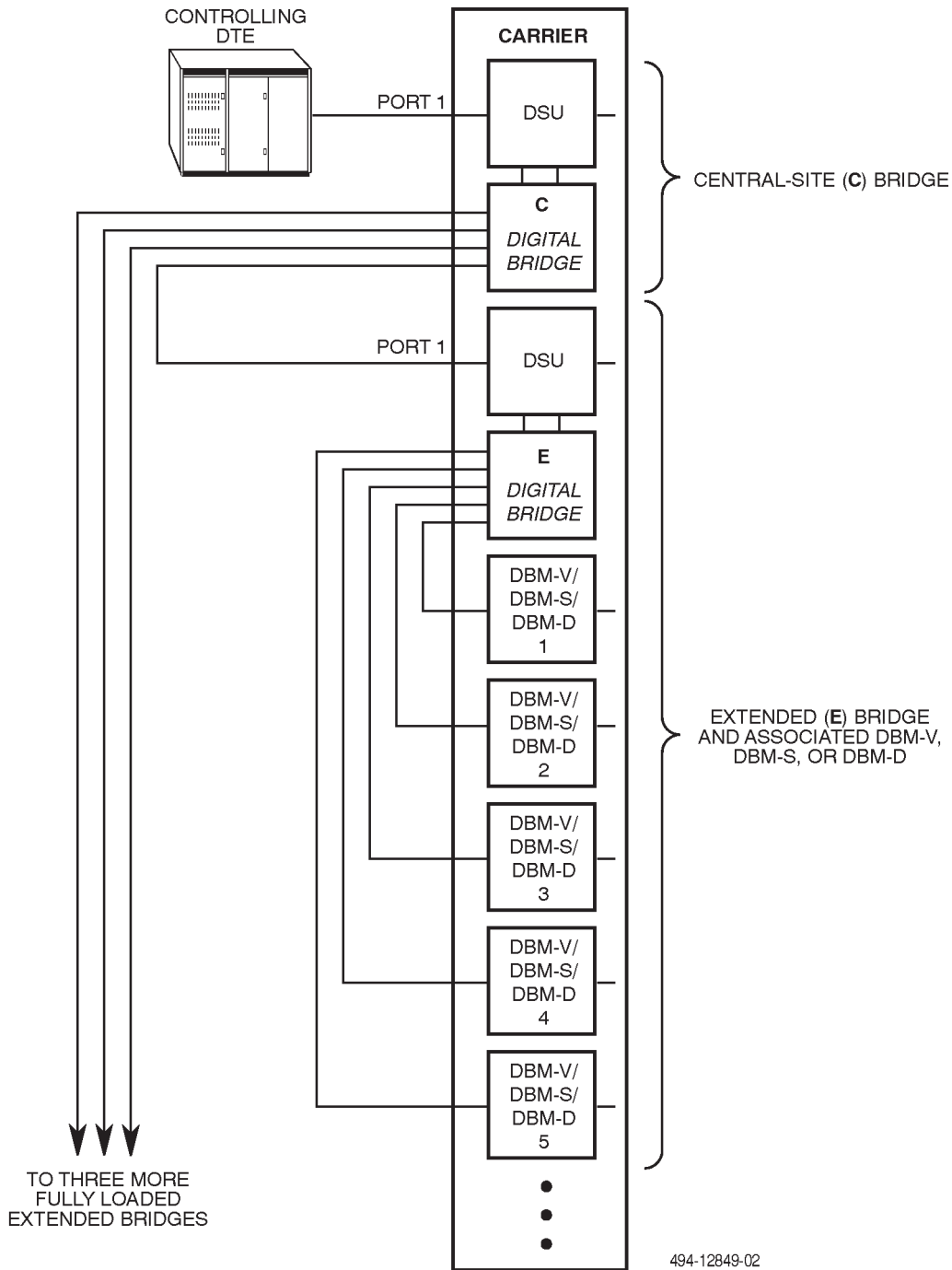


Figure 4-29. Maximum Bridging Capability – Up to 20 Bridging Ports

For *non-modular Model 3611 DSUs* with digital bridge capability, a digital bridge interface (crossover) cable attaches to the 60-pin high-density connector on the TDM or MCMP circuit card to provide fan-out cabling to five individual 25-pin EIA-232 connectors. Since a digital bridge port provides a DCE interface, and the digital bridge port connects to equipment that also provides a DCE interface, the crossover function is provided by the digital bridge interface cable, which must be provided between the two DCE interfaces to present the data and control leads on the proper pins. The pin assignments for this cable are provided in [Appendix C](#).

For *modular Model 3611 DSUs or Model 3610 DSUs* with the digital bridge capability, all port connectors are individual, requiring a separate crossover cable for each bridge port.

When the digital bridge is active, as shown in Figure 4-30, data from the controlling DTE flows to the

aggregate data path of the TDM or MCMP circuit card, where it is broadcast to all ports in the digital-sharing group. In the receive direction, when a tributary site is granted the channel, data flows from the tributary site through the aggregate data path to the controlling DTE.

In Figure 4-30, the Bridge Rate configuration option is set to =DSU. The bridge operates at the same speed as the DDS core. Configuration options are set via the DCP; the Bridge Rate configuration option is discussed in the [MUX Configuration Options](#) section of Chapter 5.

The DCE and transmission facilities needed to make the connection between the digital bridge and the tributary sites depends upon your use of the digital bridge. Many applications are possible. Three applications are discussed in the [Multichannel Multipoint](#), [Multipoint Dial Backup](#), and [LADS Operation](#) sections of this chapter.

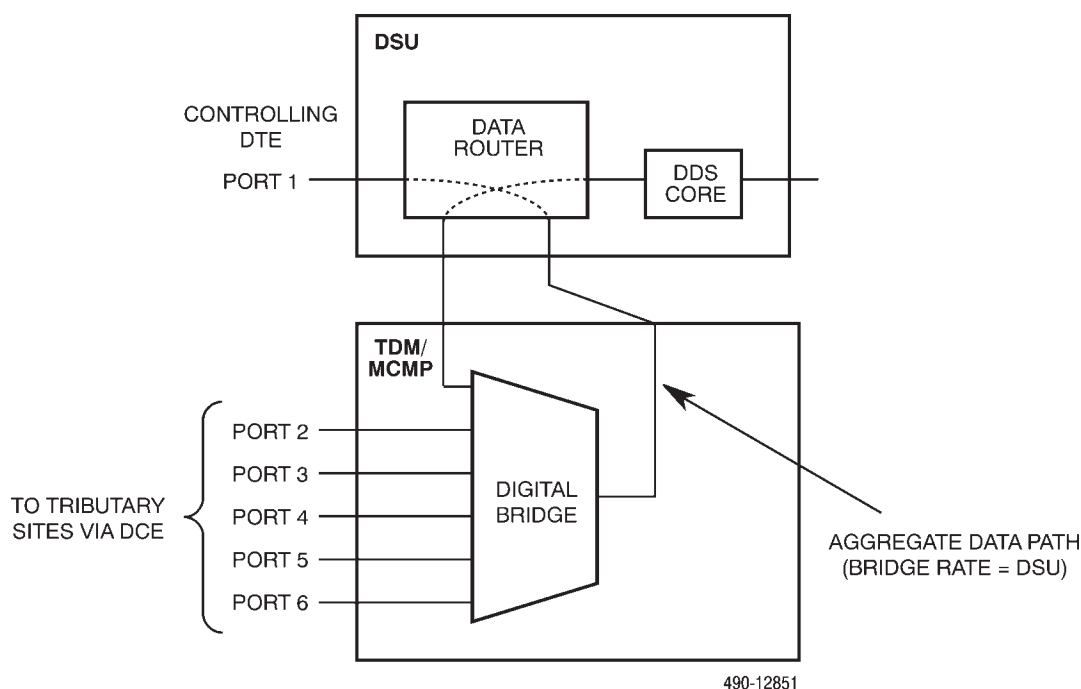


Figure 4-30. Broadcasting Data Through the Digital Bridge

Diagnostic Considerations

The digital bridge joins the aggregate data stream, including data, framing bits, and diagnostics. The diagnostic communication with tributary DSUs and DBMs is transparent to the digital bridge. Commands for a tributary DSU or DBM can be addressed via the control DSU, even when in backup. The central-site DBM-Vs, DBM-Ss, and DBM-Ds should be configured for disruptive diagnostics.

For a central-site bridge configuration, nondisruptive, mixed, and disruptive diagnostic types (3600e, Br56) are supported. Rate adaption is not supported. Therefore, the DSU port speed must equal the DSU rate and the bridge rate must equal the DBM rate. Also, the Multipoint Symmetrical (M-PtSymPrt) configuration option must be disabled.

NOTE

References to **DBM** in this guide also apply to a DBM-V, DBM-S, or DBM-D.

Multipoint Backup

The digital bridge capability of the TDM or MCMP option allows multipoint DDS circuits to have backup capability. At the central site, in addition to a TDM or MCMP, a DBM-V or DBM-S is required for each tributary DSU to be backed up (Figure 4-31).

Multipoint backup can provide dedicated dial backup on multipoint DDS circuits. Figure 4-28 shows the multipoint tributary DSUs as 3610 DSUs/DBMs, but tributaries can also be 3611 DSUs/DBMs. One dial backup call is required per failed drop.

Partial backup on multipoint DDS circuits is possible when not all drops are out-of-service, as long as the speed of the DDS line and the dial backup modules are matched and the digital bridge rate is set to =DSU. In partial backup, the tributaries not affected by the failure continue to communicate with the control DSU through the DDS facility, and each tributary affected by the failure communicates with the control DSU through a backup connection.

Full backup to each tributary on multipoint circuits is necessary when the speed of the DDS line and the dial backup modules cannot be matched or when the DDS facility (backbone) goes out-of-service. In full backup, the DDS facility is dropped and each tributary DSU communicates with the control DSU through a backup connection.

A partial backup application is shown in Figure 4-31. Each pair of communicating DBMs includes a central-site, carrier-mounted dial backup module (DBM-V, DBM-S, or DBM-D) and a remote-site childboard DBM. The DBM-V, DBM-S, or DBM-D is a dial backup module that fits into a COMSPHERE 3000 Series Carrier. The DBM can be addressed by an NMS, an async terminal, or the SDCP, can accept and forward diagnostic messages, and can carry out commands essential to multipoint dial backup operation.

The digital bridge and DBM-Vs, DBM-Ss, or DBM-Ds are dedicated to a single DSU. Digital bridging of the DTE input/output signals on Port 1 of the control DSU is performed by the TDM or MCMP circuit card. The circuit card broadcasts Port 1 DTE data to the central-site DBM-Vs, DBM-Ss, or DBM-Ds and accepts data from them when they are in dial backup.

Multipoint dial backup requires the following hardware when there are five or fewer drops:

- One Model 3611 DSU configured as a control.
- One TDM or MCMP circuit card configured as a digital bridge.
- One DBM-V, DBM-S, or DBM-D per drop at the central site. (The modules do not need to be adjacent to the TDM or MCMP circuit card or even in the same carrier as the TDM or MCMP.) A digital bridge interface or crossover cable between the digital bridge ports and the DBM-Vs, DBM-Ss, or DBM-Ds is required.
- One DBM in each tributary DSU.

One TDM or MCMP circuit card operating in Bridge mode can provide dial backup for up to five tributary DSUs. Bridges can be extended to provide dial backup for up to 20 tributary DSUs (see the *Digital Bridge* section of this chapter and Appendix D, *Configuration Scenarios*, for more information).

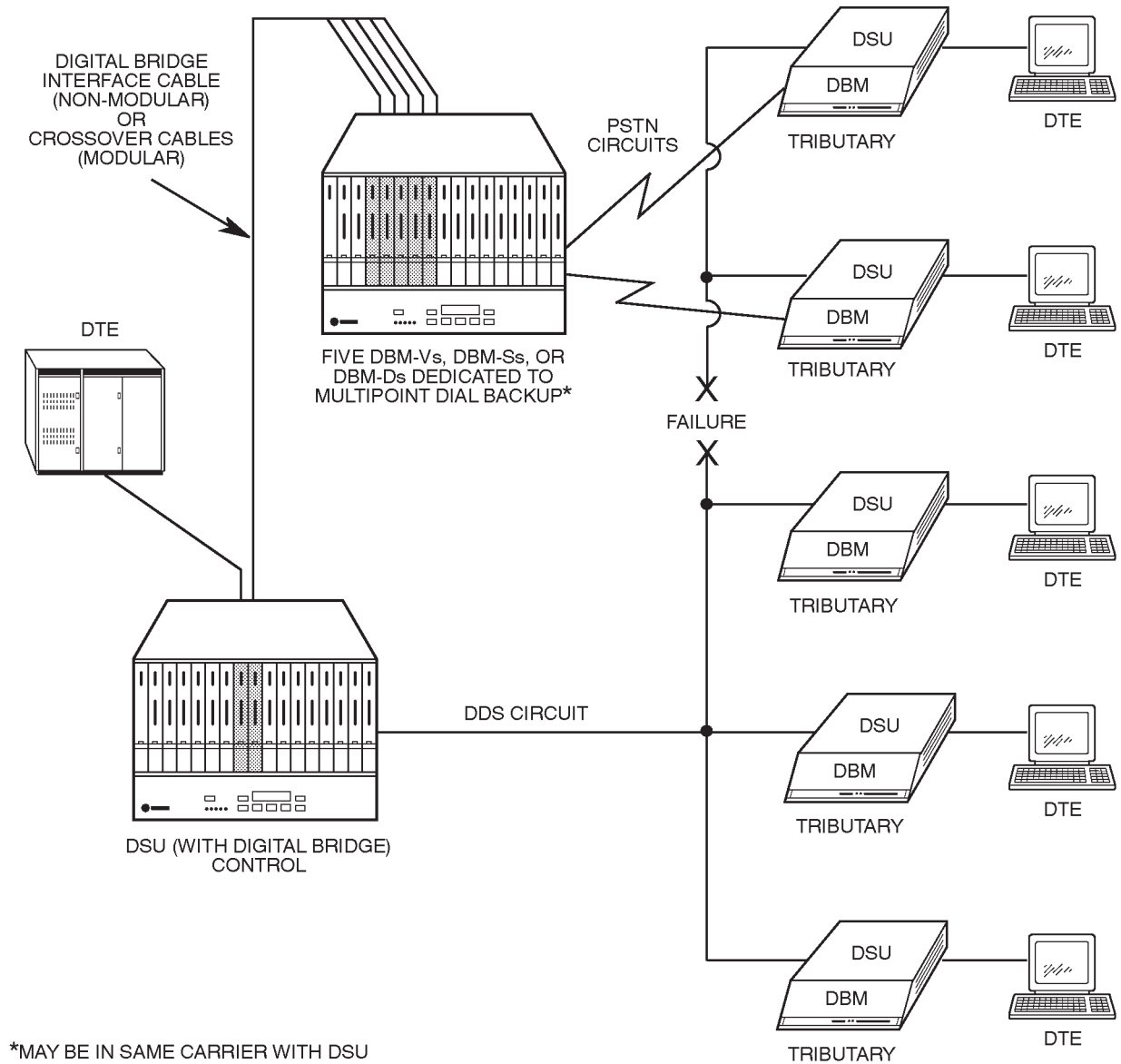


Figure 4-31. Multipoint DDS Circuit in Partial Backup

Multipoint Backup Addressing

For a central-site multipoint dial backup configuration, the digital bridge is controlled by the control DSU. Each central-site DBM-V, DBM-S, or DBM-D in the COMSPHERE 3000 Series Carrier has its own physical address, which is determined by the carrier number/slot number and used only for commands issued from the SDCP. In addition, each DBM-V, DBM-S, or DBM-D has a unique network address in the 1 to 255 range.

When not in dial backup, the tributary DBMs have network addresses under the control DSU and at the same level as the tributary DSU (Figure 4-32). The term *under*, as used here, means that the sequential address begins

with the control channel, followed by the slash delimiter and the DSU network address, followed by the slash delimiter and the tributary DBM network address; e.g., 1/1/4 in Figure 4-32. When in dial backup, the tributary DBMs retain the same address and are also addressable as tributaries of the central-site DBM-Vs, DBM-Ss, or DBM-Ds (Figure 4-33).

During dial backup, remote commands are routed through the digital bridge and the DBM-Vs, DBM-Ss, or DBM-Ds to the tributary DSUs or DBMs. The central-site bridge supports nondisruptive (NonD), mixed (Mixed), and disruptive (Disr) diagnostic types (Diag Type). The Disruptive Diagnostic Type (Disr Type) should be set to 3600e, or Br56 for switched 56 kbps dial backup.

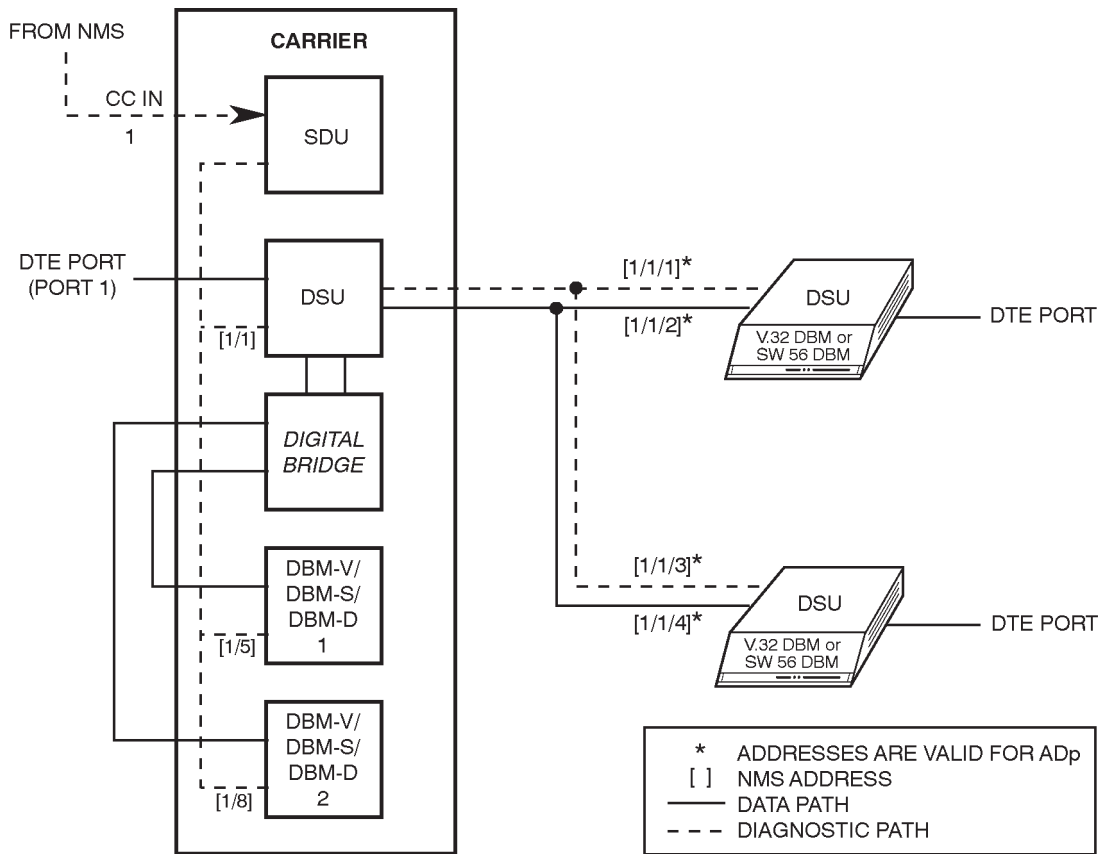
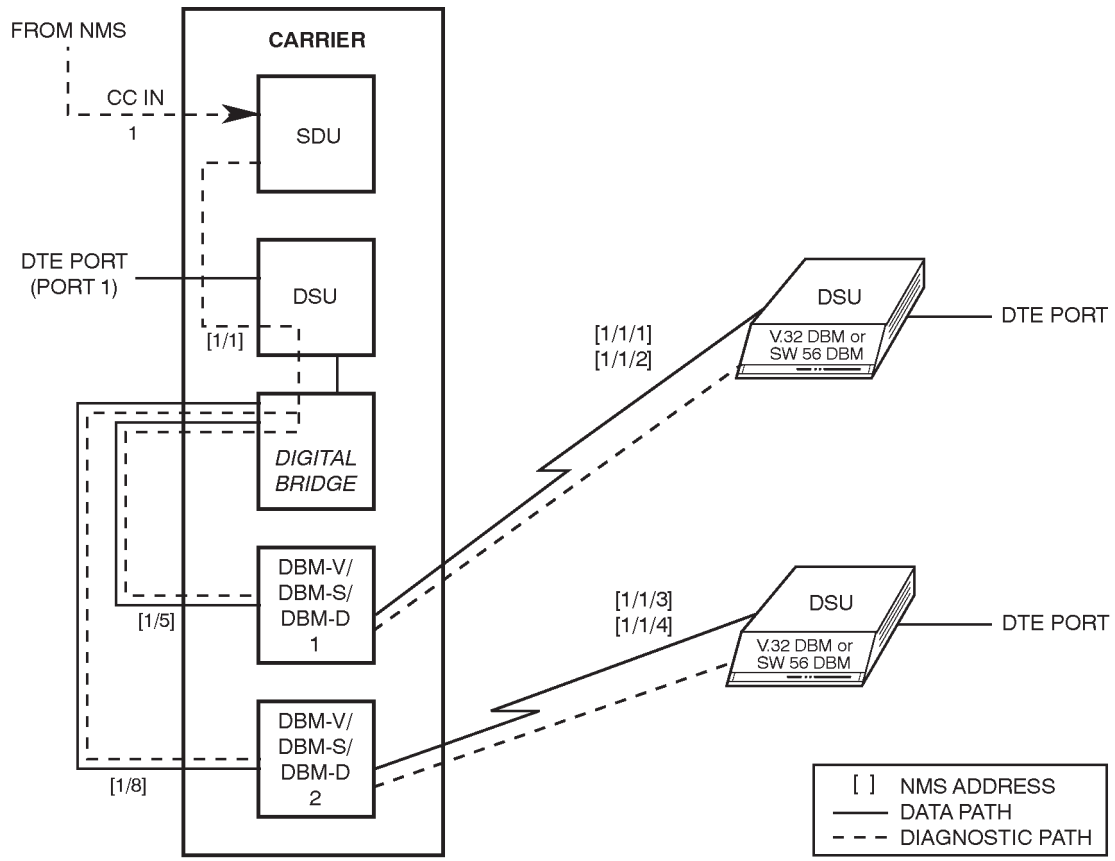


Figure 4-32. Tributary Addressing via DDS Connections



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Figure 4-33. Tributary Addressing via Backup Connections

Multipoint Backup Architecture

In a central-site multipoint dial backup configuration during partial backup (configuration option Bridge Rate is set to =DSU), the first port of the digital bridge is

included in the digital-sharing group. Under these conditions, the digital bridge is active during normal operation and valid backup calls are automatically put onto the digital bridge (Figure 4-34).

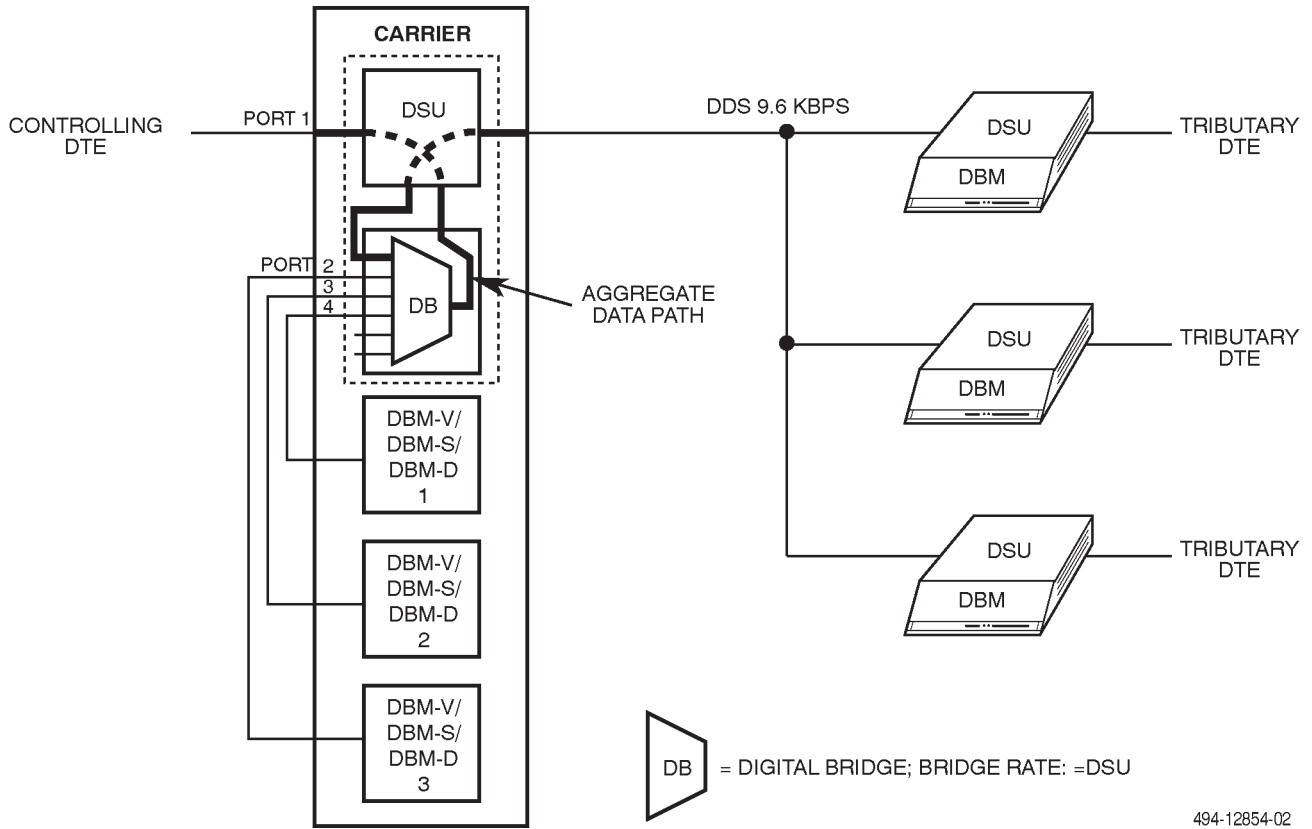


Figure 4-34. Central-Site Bridging Architecture (9.6 kbps) – Normal Operation with Partial Backup Possible

When full backup is in effect, there is no longer any data communication from the DDS line. All tributaries are communicating with the controlling DTE via the digital bridge capability.

In a central-site multipoint dial backup configuration, full backup is required if the DBM speed does not equal the DSU speed, or if the control DSU reports No Signal or Bipolar Violations. Under this condition, the bridge is inactive during normal operation. To go into full backup, the bridge may be activated by an 6800 Series NMS Standby Facility (**sf**) command, or from the DCP Backup

(**Bkup**) command. Figures 4-36 and 4-37 illustrate this. The 6700 Series NMS software uses a Device Management window to indicate device status.

For full backup, it is assumed that the control DSU is no longer receiving valid DDS timing. In this case, the control DSU must be commanded from the DCP or NMS to go into full backup. This action switches the connection from the DDS line to the bridge and causes the digital bridge to switch to the timing that is stored in the Brdg Timing configuration option.

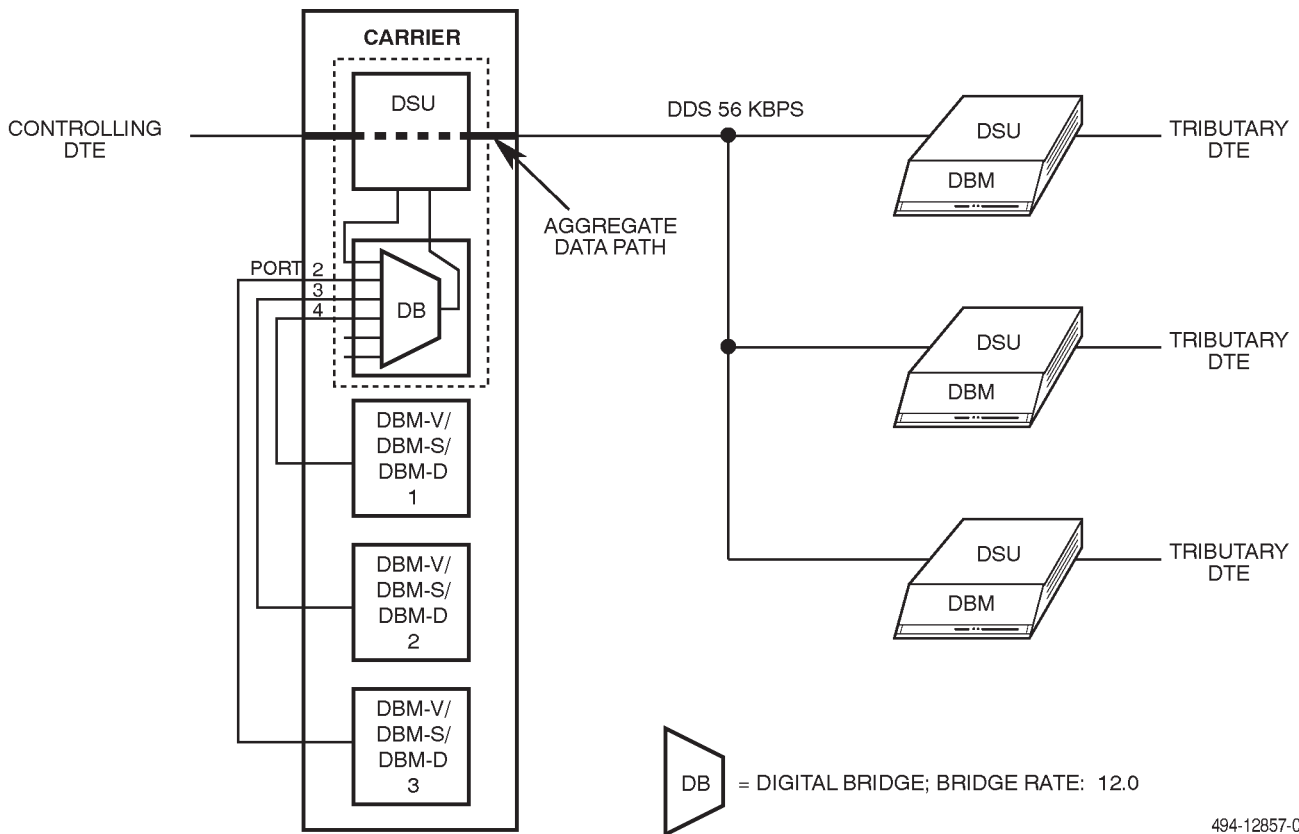
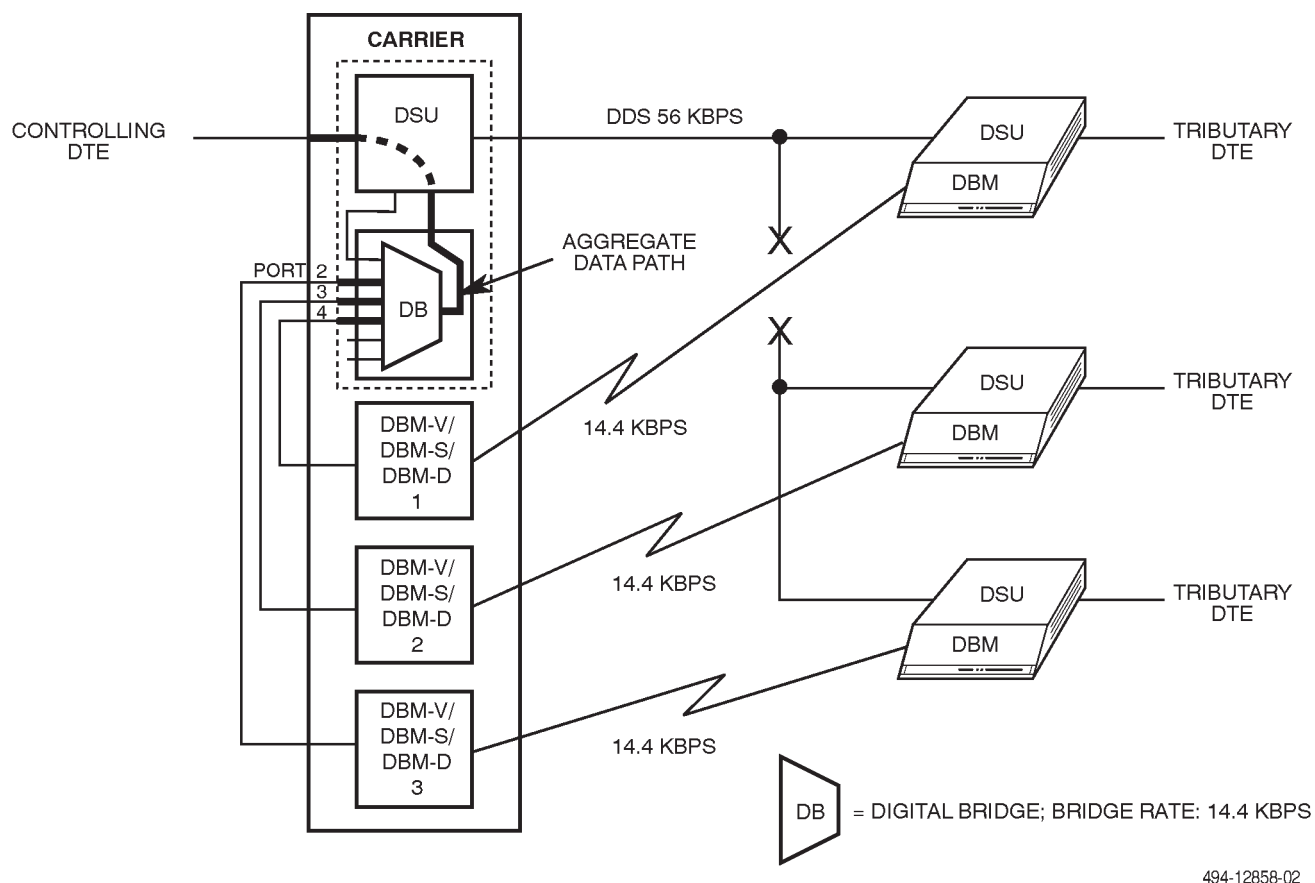


Figure 4-36. Central-Site Bridging Architecture (56 kbps) – Inactive Digital Bridge



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Figure 4-37. Central-Site Bridging Architecture (56 kbps) – Active Digital Bridge

Central-Site DBM-Vs/DBM-Ss/DBM-Ds

At the central site, a DBM is required for each drop to be backed up. A DBM-V may be used for V.32 backup. For switched 56 kbps backup, a DBM-S is used for 4-wire access and a DBM-D is used for 2-wire access to the switched 56 kbps digital service. These DBMs require one slot in the COMSPHERE 3000 Series Carrier. *As an alternative to using a DBM-V, DBM-S, or DBM-D, a DSU-DBM with its Primary Core configuration option enabled can be used for backup.*

The carrier is controlled by the same network management systems that control the Model 3611 DSU. DBMs have the same diagnostic capabilities and Call Setup security procedures as DBMs at the tributary location.

The DBM-V, DBM-S, or DBM-D is addressed just as a DBM is addressed via an NMS or the SDCP. Likewise, configuration options are set just as they are set for a DBM. (Refer to Chapter 5 of the *COMSPHERE 3600 Series Data Service Units, Models 3610 and 3611, Dial Backup Module and SNA Diagnostic Interface Options, Applications Guide* for in-depth instructions on how to set DBM configuration options and issue dial backup commands from the SDCP.)

Use DBM configuration option Single Rate set to Yes to configure the DBM-Vs so the call is not set at a lesser speed if line impairments are encountered. Each DBM pair cannot be independent. If one dial-back line is set up at a lower speed, its speed will not be the same as the other ports on the digital bridge, and it can no longer communicate. If the DBMs encounter line impairments, the DBMs drop the present call and attempt to place a new one.

DBM-V/DBM-S/DBM-D Dial on DTR Capability

When the central site loses access to its remote DSUs, the DBM-Vs, DBM-Ss, and DBM-Ds can initiate backup based upon the state of the DBM's DTR lead. To activate this capability, set the Primary Core configuration option to Yes and set the DTRCallCon configuration option to Orig. Then, the DBM-V/DBM-S/DBM-D originates a backup call when DTR is raised and drops the call when DTR goes low.

For additional information, refer to *Configuration Options*, Chapter 6, in the *COMSPHERE 3600 Series Data Service Units, Models 3610 and 3611, Operator's Guide*.

Digital Bridge/DBM-V/DBM-S/DBM-D Interface

Since both the digital bridge port and the DBM provide a DCE interface, a digital bridge interface or crossover cable is used to complete the communication path (refer back to [Figure 4-28](#)).

The digital bridge broadcasts data from the controlling DTE to all ports in the digital-sharing group, even if the DBMs connected to the ports are not in Dial Backup mode with an active call: the data is simply ignored by the DBMs.

When a call has been established between a central-site DBM and a remote DBM, the DBM-V, DBM-S, or DBM-D enters Dial Backup mode, accepts data from the digital bridge port, then transmits data over the backup line and through the remote DBM to its associated DTE.

Digital Bridge/DBM-V/DBM-S/DBM-D – Switched LSD Operation

Some DTEs require the LSD interface to be ON when data is present and Off when no data is present. In this case, the connected DBMs and associated tributary DBMs must be configured to enable the V.13 feature.

However, most DTEs that would be connected to Port 1 do not utilize the LSD interface lead. In this case, the connecting DBMs are not required to have the V.13 feature enabled.

Tributary DSU Considerations

In multipoint backup, the firmware version of the tributary DSU-DBM in a multipoint circuit determines the features available. It is recommended that all tributaries have Release 2.4 or greater firmware, which provides the following features:

- Multiple Call (MultiCall) configuration option. If the DBM is triggered by the DSU to attempt backup, the DBM calls the first number in its Backup Directory. If that number is busy after three attempts, the DBM places a call to the second number in the directory. The DBM steps through all 10 entries in the Backup Directory in an attempt to place the call, skipping all blank entries. This configuration option gives the tributaries more flexibility and a better success rate when calling the bridge.
- V.13 Signaling (V.13 Signl) configuration option for switched LSD emulation.
- Automatic restoration.
- All the DBM features available under the earlier release.

With the earlier release, multiple call and automatic restoration capabilities were not available. Release 4.25 is required for 14.4 kbps and 56 kbps backup speeds via 4-wire access, and release 6.18 is required for 56 kbps backup speeds via 2-wire access.

Setup – DSU Rate Equals DBM Rate

For a network where the DSU rate equals the DBM rate, partial or full backup can be accomplished automatically by the tributary DSU-DBM when they detect network failures.

Each tributary DSU should be configured for automatic backup, and the Backup Directory of its associated DBM should contain the telephone number of a central-site DBM associated with the digital bridge. The DBMs and DBM-Vs, DBM-Ss, or DBM-Ds need to be paired off and, in each DBM, a pointer set to the telephone number of the associated DBM-V, DBM-S, or DBM-D. Thus, each DBM will call a different central-site DBM. (Refer to the *Configuration Branch* section in Chapter 5 for further details regarding configuration options.)

Tributaries with Multiple Call capability should use this capability to increase their probability of connection to the bridge. The telephone numbers of all DBMs on the bridge should be entered into the tributary's directory.

The digital bridge must be configured for the appropriate number of ports (one port for each drop to be backed up) and the Bridge Rate configuration option must be set to =DSU. (The Bridge Rate configuration option is discussed in the *MUX Configuration Options* section of Chapter 5.) The DBMs associated with the digital bridge should have security options compatible with the tributary DBMs.

When a tributary DSU senses a DDS network failure condition, it places a call to one of the DBMs associated with the digital bridge. The call is answered by the control DBM-V, DBM-S, or DBM-D, the DBM raises DSR, which then turns on DTR at the digital bridge port. The EIA status command can be used to determine which ports are active by checking the DTR Lead status. Each tributary sensing a network failure will place a backup call.

Automatic DDS Restoration

When the DSU rate equals the DBM rate, the tributary DSUs can be configured to drop the backup call and switch back to the DDS network when they detect that the DDS network is restored for a customer-specified time. This feature automatically restores all control and tributary DSUs to the DDS network and drops all dial backup calls. There is no test of the DDS line during automatic restoration of multipoint tributary DSUs.

Setup – DBM Rate Less Than DSU Rate*

For a network running at DDS 19.2 kbps or greater with DBM-Vs (V.32 backup only), only full backup is possible, and it can only be accomplished manually: either from the SDCP or initiated by an NMS. In either case, commands are sent to the control DSU having the digital bridge capability and to the DBM-Vs, commanding the control DSU to activate the digital bridge and the DBM-Vs to call the DBMs at the tributary sites.

The DBM-Vs and tributaries need to be paired off and, in each DBM-V, a pointer must be set to the telephone number of the associated tributary DBM. Thus, each DBM-V will call a different DBM. Each DBM/DBM-V pair should have compatible security options.

If there is a failure in the backbone DDS network, the control DSU reports a Facility Alarm (FA) or Tributary Time-out Alarm (Time) to the NMS. The 6700 Series NMS software provides a Commands pull-down window to access Standby Facility.

When aware of the failure, the 6800 Series NMS commands the control DSU to activate the bridge. Enter **originate** in the *Standby Facility State* field and send the Standby Facility (**sf**) command to the control DSU. (Alternatively, the control DSU can be accessed by using a Bkup command to the DSU from the SDCP.) Upon receiving the command, the control DSU activates the digital bridge and switches to bridge timing (Brdg Timing) at the Bridge Rate fallback speed. (The Bridge Rate configuration option is discussed in the *MUX Configuration Options* section of Chapter 5.)

The 6800 Series NMS must send a **dial** command to each of the DBM-Vs associated with the digital bridge, causing each DBM-V to first place a call to its respective tributary DBM, then switch from Standby to Backup mode using the Dial Mode (**dm**) command. (Alternatively, the same function can be accomplished by the Bkup command to each DBM-V from the SDCP.) Each DBM-V establishes a call with a DBM, the pair of DBMs handshake and perform security checks (if so configured), and go into Dial Backup mode.

Manual DDS Restoration

For a full dial backup session, use the 6800 Series NMS to restore the control and tributary DSUs to the DDS network and drop all dial backup calls. Enter **release** in the *Standby Facility State* field and send the Standby Facility (**sf**) command to have the control DSU switch the data path from the bridge to the DSU. Use the **dial** command and enter **q** in the *Number to Dial* field to have each DBM-V associated with the digital bridge command the tributary DSU-DBM to switch back to DDS mode; both ends then disconnect. Alternatively, address the control DSU and each of the DBM-Vs via the SDCP; then issue a DrBU (Drop Backup) command.

Automatic restoration is not possible if the DSU rate does not equal the DBM rate, and the tributary DSU should not be configured to drop the backup call and switch back to the DDS network upon sensing that the DDS network has been restored because the control DSU will not automatically switch the data path from the bridge to the DSU.

* These procedures also apply when the bridge rate is configured for a value other than =DDS.

LADS Operation

The 3600 Series DSUs can be used as a local area data set (LADS) to provide a point-to-point link between two data devices having like protocols. The network facility is a direct 4-wire connection without using a digital service. Table 4-1 summarizes the distance limitations governing the use of the 3600 Series DSUs for LADS operation.

The 3600 Series DSUs with TDM or MCMP can be used as a LADS to provide either a multiplexed point-to-point link between two locations or the DSD capability at a remote location.

The 3600 Series DSUs with the digital bridge capability (TDM or MCMP circuit card operating in Bridge mode) can be used to support multipoint LADS operation.

Table 4-1
LADS Connection Distances

Data Rate (kbps)	Wire Gauge (AWG)			
	19	22	24	26
2.4	20.0 mi (32.2 km)	16.6 mi (26.7 km)	12.7 mi (20.5 km)	9.4 mi (15.1 km)
4.8	19.4 mi (31.2 km)	12.7 mi (20.5 km)	9.6 mi (15.4 km)	7.1 mi (11.5 km)
9.6	15.2 mi (24.5 km)	9.7 mi (15.6 km)	7.3 mi (11.7 km)	5.6 mi (9.0 km)
19.2 ¹	11.8 mi (19.0 km)	7.5 mi (12.1 km)	5.7 mi (9.2 km)	4.2 mi (6.8 km)
38.4	11.2 mi (18.0 km)	6.5 mi (10.5 km)	4.6 mi (7.4 km)	3.2 mi (5.1 km)
56	9.2 mi (14.8 km)	5.4 mi (8.7 km)	3.8 mi (6.2 km)	2.8 mi (4.5 km)
64	9.2 mi (14.8 km)	5.4 mi (8.7 km)	3.8 mi (6.2 km)	2.8 mi (4.5 km)

¹Power level is -10 dBm.

Point-to-Point LADS

Two 3600 Series DSUs that are connected by a 4-wire, nonloaded metallic pair can support point-to-point LADS operation. A typical scenario involves two data devices located in the same building or in a campus environment.

Either the control or the tributary DSU can provide the internal clock source, or timing can be taken from the external DTE.

Bridged LADS

A bridged LADS configuration can be used to provide a multipoint function. Bridged LADS operation at speeds from 2.4 kbps to 64 kbps is possible through the digital bridge, which is discussed in the *Digital Bridge* section of this chapter. The digital bridge capability is achieved through the TDM or MCMP circuit card operating in Bridge mode.

Bridged LADS operation requires the following hardware (two to six drops):

- One Model 3611 DSU configured as a control.
- One TDM or MCMP circuit card configured as a digital bridge.
- One Model 3611 DSU per drop at the digital bridge site. (The 3611 DSUs do not need to be adjacent to the TDM or MCMP circuit card or even in the same carrier as the TDM or MCMP.)

If the bridged LADS network is operating at a speed greater than 19.2 kbps, the distance between the DSUs and the digital bridge should not exceed one digital bridge interface cable.

- Digital bridge interface cabling between the digital bridge ports and the DSUs.

Up to six tributary DSUs can be supported via one central-site bridge (Figure 4-38). The extended bridges can be added to extend bridging capability, as explained in the *Digital Bridge* section of this chapter, to support up to 31 tributary DSUs.

The digital bridge and DSUs linked via the crossover cable to the bridge (Figure 4-38) are dedicated to a single control DSU. Digital bridging of the DTE input/output signals on Port 1 of the control DSU is performed by the TDM or MCMP circuit card, which broadcasts Port 1 DTE data to the central-site DSUs and accepts data from them.

For *non-modular Model 3611 DSUs* with the digital bridge capability, a digital bridge interface cable attaches to the multipoint connector on the TDM or MCMP circuit card to provide fan-out cabling to five individual 25-pin EIA-232 connectors. For *modular Model 3611 DSUs and Model 3610 DSUs* with the digital bridge capability, all port connectors are individual and a separate crossover cable is required for each connector. The *Digital Bridge/DSU Interface* section of this chapter describes how the crossover cable completes the communication path between a digital-bridge port and its associated DSU.

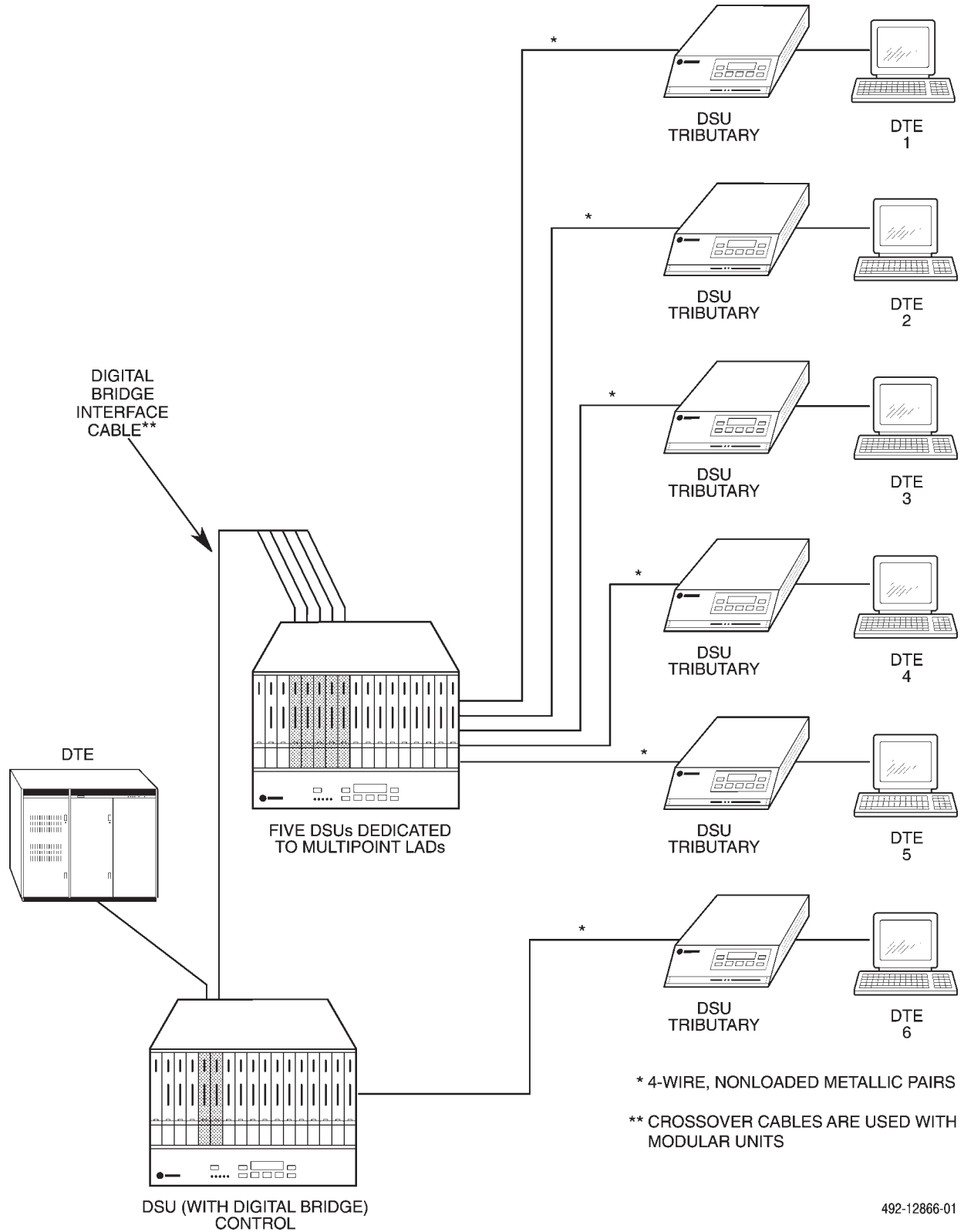


Figure 4-38. Bridged LADS Operation

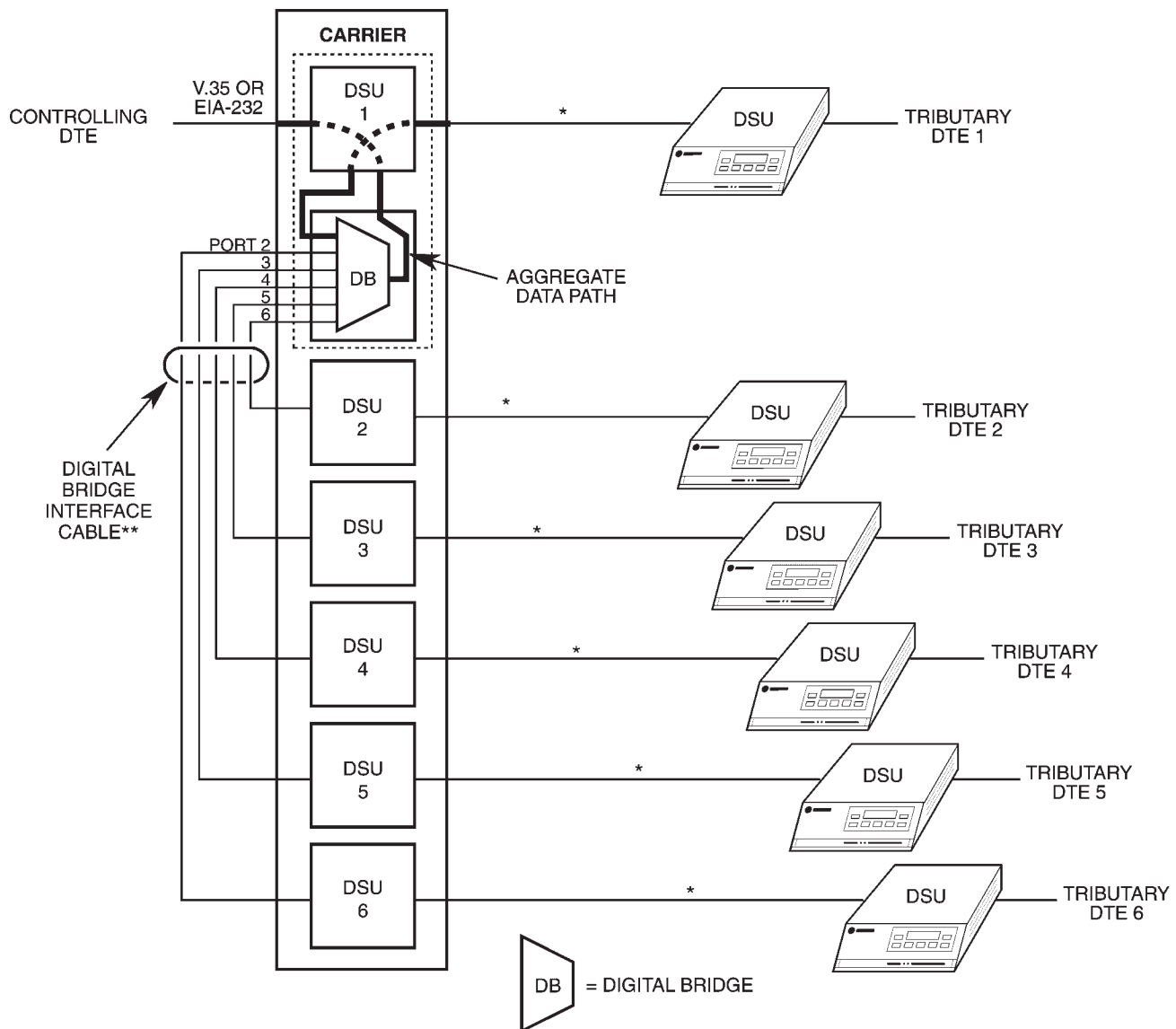
Bridged LADS Architecture

One TDM circuit card operating in Bridge mode can support up to six tributary DSUs (Figure 4-39). In the transmit direction, data from the controlling DTE is broadcast to all ports in the digital-sharing group. In the receive direction, data from a tributary site flows through the aggregate data path to the controlling DTE.

To establish the data paths shown in Figure 4-39, the Bridge Rate configuration option must be set to =DSU. (Configuration options are set via the DCP, as discussed in

Chapter 5; the Bridge Rate configuration option is discussed in the *MUX Configuration Options* section of Chapter 5.)

The control DSU is configured for internal timing unless the controlling DTE provides the timing source, in which case, the DSU is configured for external timing. Each tributary DSU on the LADS multipoint network is configured for received timing. The DSUs connected to the bridge are configured for external timing and should have their elastic stores enabled.



* 4-WIRE, NONLOADED METALLIC PAIRS

** CROSSOVER CABLES ARE USED WITH MODULAR UNITS

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Figure 4-39. Bridged LADS Architecture and Signal Flow

Digital Bridge/DSU Interface

Figure 4-40 shows the interconnections between a digital bridge port and a central-site 3600 Series DSU. Since both the digital bridge port and the DSU provide a DCE interface, a special crossover cable or digital bridge interface cable is used to complete the communication path.

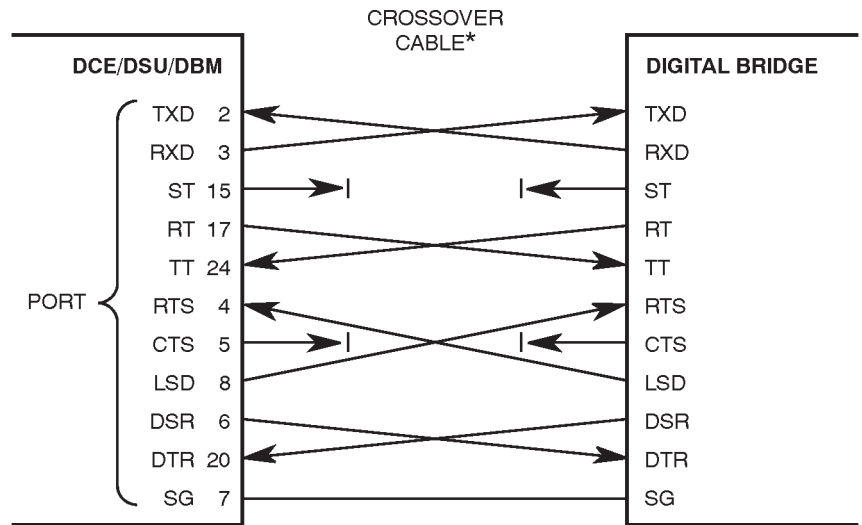
Data broadcast to a digital bridge port is accepted by the central-site DSU, and then transmitted over the 4-wire connection through the tributary DSU to its associated DTE. When a tributary DTE turns on RTS to transmit data, the tributary DSU begins sending data over the 4-wire transmission facility, causing the central-site DSU to turn on LSD. The cabling cross-couples LSD to RTS on the bridge port.

NMS Control

For a DSU with TDM or MCMP, the DATAPHONE II System Controller cannot configure the TDM ports or set port speeds. Only the COMSPHERE 6700 or 6800 Series NMS can fully support TDM, digital bridge, and MCMP capabilities.

Since NMS supports DSUs, DBM-Vs, DBM-Ss, and DBM-Ds, network management control of a multipoint dial backup session can be provided by sending tests and status commands to the individual DSU and backup devices. Additional network management-based features can be accomplished, such as determining which drops require backup, controlling the dial backup setup for the tributary locations, verifying that all drops have been backed up successfully, and filtering out redundant alarm information.

User-defined routines can automate network management-controlled backup for 3600 Series multipoint networks. These routines can be requested from the NMS console or can be linked to an event-driven routine and triggered by a Facility Alarm (FA) generated by a control DSU.



494-12850-03

* PLUG-TO-PLUG CROSSOVER CABLE

Figure 4-40. Digital Bridge/DSU Interface

SNA Diagnostic Interface

The SNA Diagnostic Interface option, which is compatible with IBM's LPDA-2 (Line Problem Determination Aid, Revision 2) protocol, enables management of 3600 Series DSUs from the DCP, a Paradyne NMS, IBM's NetView management system, or all three. All DSUs on the circuit must be 3600 Series DSUs.

This option is compatible with all other options available to the 3600 Series DSUs: DBM, TDM, and MCMP. However, the SNA Diagnostic Interface option is supported via Port 1 on a TDM or MCMP circuit card.

The 3600 Series DSUs operating with the SNA Diagnostic Interface option emulate IBM 5822 DSUs; although they are all data compatible, they are not diagnostically compatible with IBM 5822 DSUs. A mixture of 3600 Series and IBM 5822 DSUs will not support LPDA-2 diagnostics. The SNA Diagnostic Interface option must be installed in each control and tributary DSU.

The 3600 Series DSUs operating with the SNA Diagnostic Interface option can respond to commands from NetView or an NMS, or the DSU's DCP. The 3600 Series DSUs respond to commands from an NMS or NetView on a first-come, first-served basis. The NetView operator can monitor (read) DSU parameters and line status and can initiate tests from NetView, but cannot change DSU configuration options (a NetView constraint). An NMS operator has complete control of the network, and can change network configuration options as well as access sophisticated alarm-tracking reports.

The carrier-mounted Model 3611 DSU or the standalone Model 3610 DSU can receive the SNA Diagnostic Interface firmware. Either model may be configured as the control of a circuit that is to be managed by the NetView management system.

Refer to Chapter 6 of the *COMSPHERE 3600 Series Data Service Units, Models 3610 and 3611, Operator's*

Guide for configuration option information. Refer to the *COMSPHERE 3600 Series Data Service Units, Models 3610 and 3611, Dial Backup Module and SNA Diagnostic Interface Options, Applications Guide* for additional SNA Diagnostic Interface information.

LPDA-2 Addressing

The addressing scheme for LPDA-2 establishes a relationship between the link segments (primary circuit, extended circuit) and the remote DSUs populating the circuit. It allows you to target a link segment or a particular control-tributary DSU pair in the circuit for diagnostic testing. The LPDA-2 address is independent of the DSU network address associated with an NMS or DCP command, although you may choose to assign the same value to each.

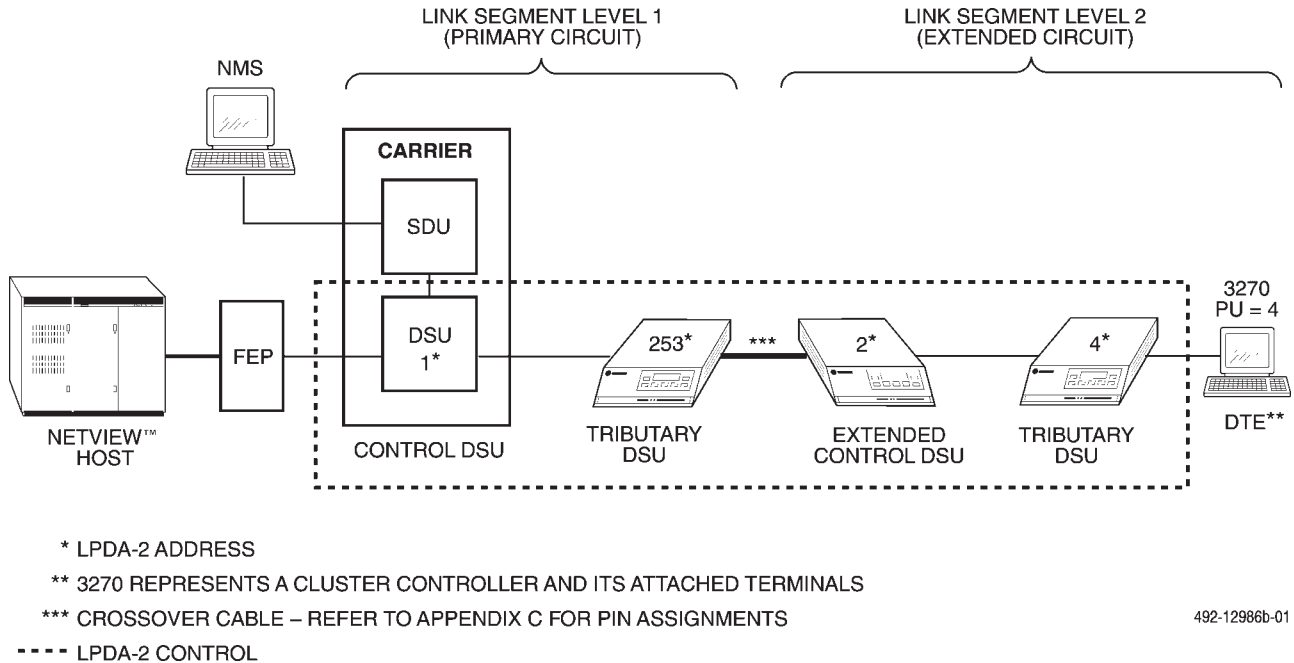
NOTE

In all of the illustrations, the LPDA-2 addresses are shown in decimal.

Assigning an Address to the Control DSU

The following rules apply to assigning the LPDA-2 address to control DSUs:

1. **Link Segment Level 1.** The control DSU closest to the NetView host is typically assigned the address 1 ([Figure 4-41](#)).
2. **Link Segment Level 2.** An extended control DSU, if present, is typically assigned the address 2 ([Figure 4-42](#)).
3. **Valid Addresses.** Valid addresses for control DSUs range from 1 to 255.



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Figure 4-41. Sample Configuration and LPDA-2 Addressing

Assigning an Address to the Tributary DSU

The following rules apply to assigning the LPDA-2 address for tributary DSUs:

1. **Valid Addresses.** Valid addresses for tributary DSUs range from 1 to 255.
2. **Single DTE.** The tributary DSU address is set to the Physical Unit (PU) address of the attached terminal device (Figures 4-41, 4-42, and 4-43). This constraint is imposed by NetView.
3. **Extended Circuit.** For configurations having extended circuits, the tributary DSU in the primary circuit is set to 253. Address 253 (FD hex) is the broadcast LPDA-2 address.
4. **TDM and MCMP.** Where multiple DTEs are attached to a DSU optioned with TDM or MCMP, the tributary DSU is set to the PU address of the attached terminal device at Port 1 (see Figures 4-44 and 4-45 in the *Multiplexing with TDM or MCMP* section). The SNA Diagnostic Interface option passes LPDA-2 commands via Port 1 of the TDM or MCMP.

NOTE

For MCMP, the channel assigned to Port 1 at the control DSU (control, tributary) must also be assigned to Port 1 at each tributary DSU.

5. **Digital Sharing and Multiple DTEs.** When LPDA-2 monitoring is used with digital sharing, a feature available with the TDM or MCMP option,* the DTE connected to the digital-sharing group must use consecutive PU addresses (see Figures 4-46 and 4-47 in the *Digital Sharing* section in this chapter). The digital-sharing group must start with Port 1 for the DSU to support LPDA-2 monitoring on each port of the digital-sharing group. The LPDA-2 address is set to the lowest PU address. The DTE with the lowest PU address is then connected to Port 1. The DTE with the next consecutive PU address is connected to Port 2 and so on. From the NetView operator's perspective, the digital-sharing feature appears as a unique DSU connected to each DTE.

* All ports in a digital-sharing group operate at the same speed and all receive the same data. The Sharing Device A (Share Dev A) configuration option is used to create the digital-sharing group.

When digital sharing is used on a multipoint circuit, make sure there is no overlap of LPDA-2 tributary addresses.

NetView-Initiated Dial Backup

The 3600 Series DSUs support NetView-initiated dial backup in a point-to-point configuration only (Figure 4-42). A DBM must be installed. The dial backup may be automated by the 3600 Series DSUs or initiated from NetView, NMS, or the DCP.

The 3600 Series DSUs continue to respond to and process the LPDA-2 commands as a DSU. By enabling the SNA Backup configuration option (discussed in the *LPDA-2 Configuration Options* section of Chapter 5), the DSU is allowed to respond to the LPDA Call Out and

Disconnect LPDA-2 commands. The Call Out command instructs the DSU to set up dial backup from the control site and switch to the PSTN line. The Disconnect command terminates (disconnects) the PSTN call at the control DSU and returns data to the DDS line.

For extended circuit configurations, the extended circuit link can also be configured to respond to NetView dial backup commands by turning on SNA Backup at the extended control DSU.

When in dial backup, the 3600 Series DSUs operating with the SNA Interface option continue to support the DSU/CSU and Line Status and Transmit/Receive Test commands. The DSU/CSU and Line Status test monitors both the PSTN and DDS facilities, and reports whether the circuit is in dial backup or communicating over the DDS line.

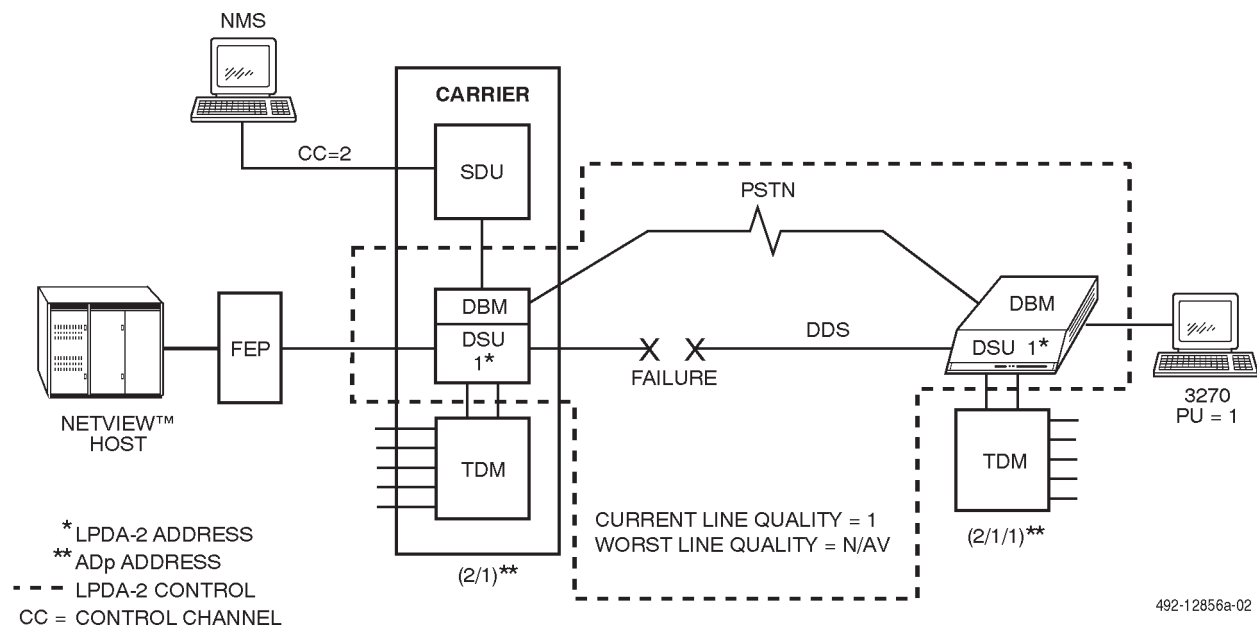


Figure 4-42. Dial Backup with LPDA-2 Configuration

Multipoint Dial Backup

The 3600 Series DSUs continue to support the DSU/CSU and Line Status command and the Transmit/Receive Test during a multipoint dial backup. The Call Out and Disconnect commands are not supported in multipoint dial backup. During a full or partial multipoint dial backup, LPDA-2 commands continue to operate between the control and tributary DSU-DBM, although the digital bridge and DBM-Vs are transparent to this operation.

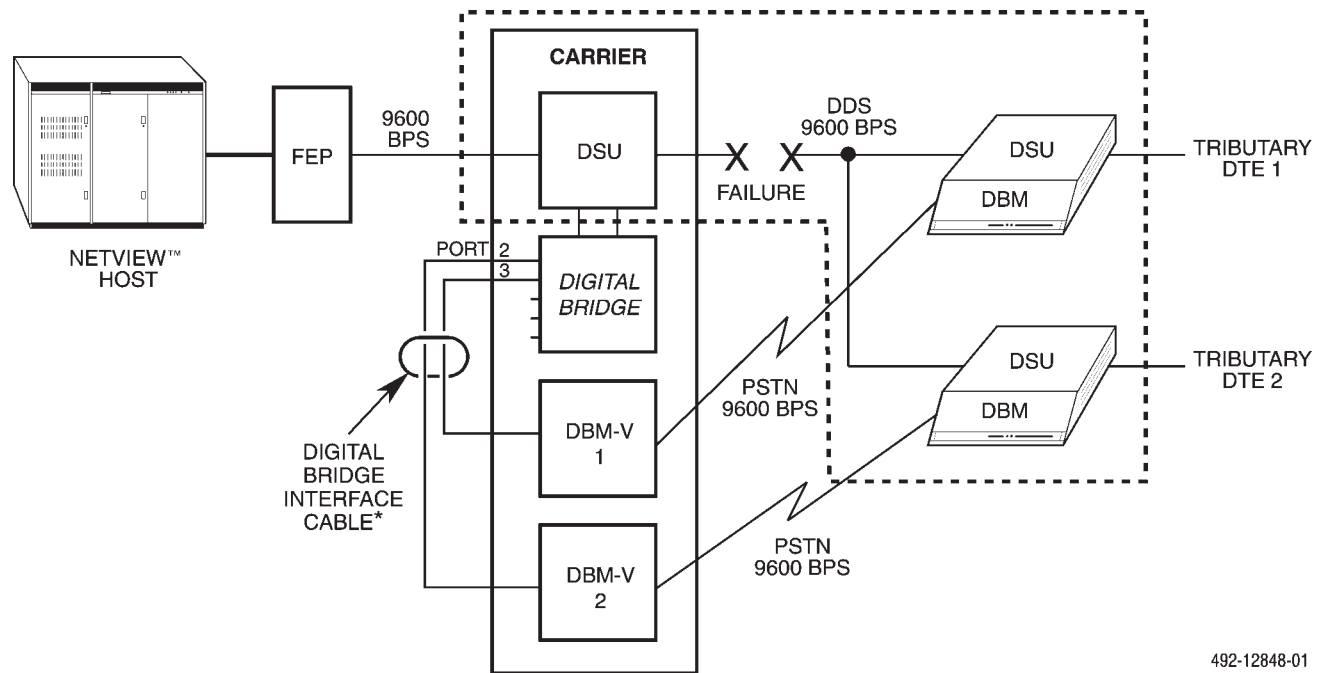
During backup, the control DSU reports only DDS line quality while the tributary DSUs report the DDS and PSTN line quality, just as in point-to-point backup (Figure 4-43).

Multiplexing with TDM or MCMP

The 3600 Series DSUs equipped with TDM or MCMP accommodate LPDA-2 monitoring on Port 1. NetView treats the TDM as a single point-to-point circuit and the MCMP as a single multipoint circuit.

For TDM, LPDA-2 commands issued from NetView only affect Port 1 when nondisruptive diagnostics are used; they affect all ports when disruptive diagnostics are used. For MCMP, commands issued from NetView only affect Port 1 of the control and tributary DSUs, unless Port 1 is in a digital-sharing group at the tributary DSU. Figure 4-44 shows a TDM circuit with LPDA-2 monitoring. The circuit extension to the controller having PU address = 1 is the standard application for TDM when an extended circuit is used. The cluster controllers connected to the remaining ports are not supported by LPDA-2 monitoring, although full support is provided from NMS.

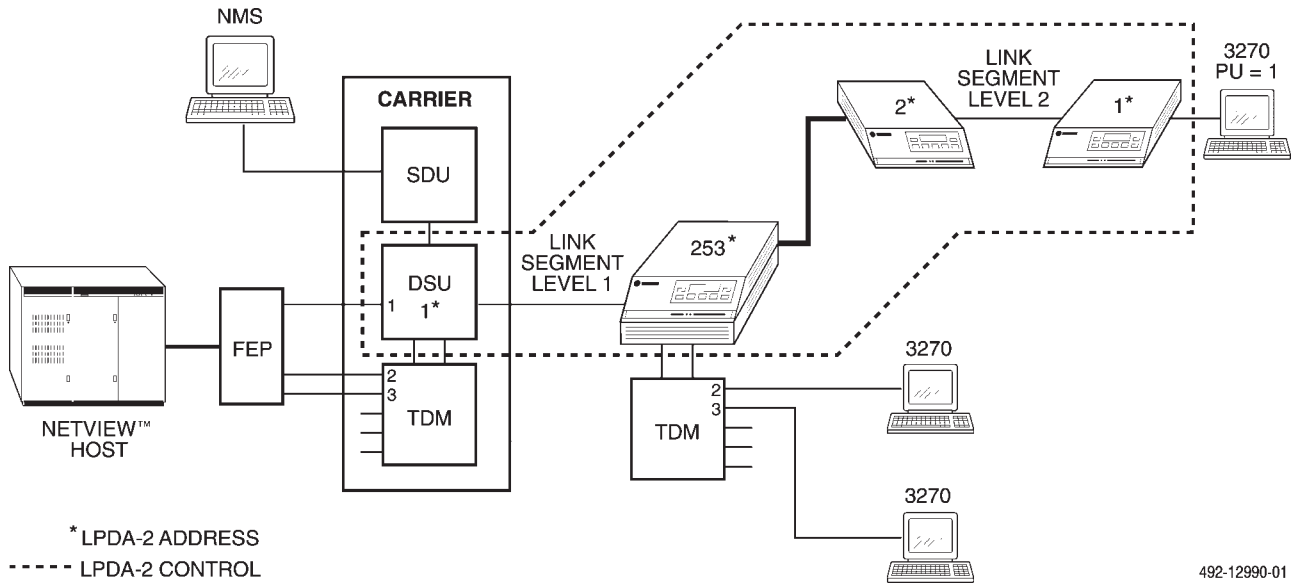
An example of an MCMP circuit with LPDA-2 monitoring is shown in Figure 4-45. MCMP is essentially the same as TDM for LPDA-2 monitoring.



* CROSSOVER CABLES ARE USED WITH MODULAR UNITS

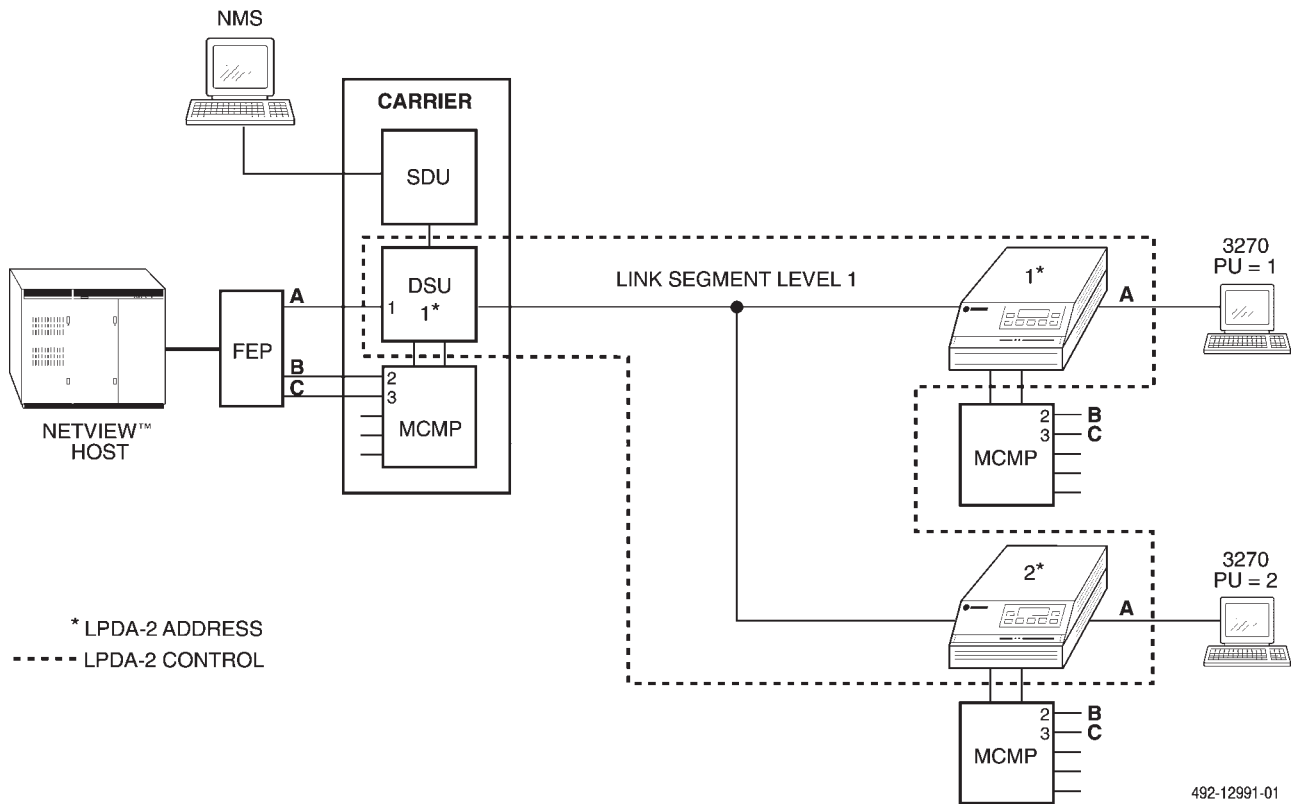
----- LPDA-2 CONTROL

Figure 4-43. Multipoint Dial Backup with LPDA-2



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Figure 4-44. Multiplexing with TDM (LPDA-2 Monitoring)



492-12991-01

Figure 4-45. Multiplexing with MCMP (LPDA-2 Monitoring)

Digital Sharing

Figures 4-46 and 4-47 show how digital sharing is used with LPDA-2 monitoring. When a digital-sharing group is configured on a tributary DSU, the DSU recognizes multiple LPDA-2 addresses instead of one. The number of addresses is equal to the number of ports comprising the digital-sharing group.

The tributary DSU answers to any LPDA-2 command containing one of the addresses. The DTE connected to the digital-sharing group must use consecutive PU addresses. The group must start with Port 1 for the DSU to support LPDA-2 monitoring on each port of the sharing group. (A digital-sharing group can be started on any other port, but it will be ignored by the LPDA-2 protocol.)

From the NetView operator's perspective, the digital-sharing feature appears as a unique DSU connected to each DTE. The LPDA-2 address is set to the lowest PU address. The DTE with the lowest PU address is then connected to Port 1. The DTE with the next consecutive PU address is connected to Port 2 and so on, as shown in Figures 4-46 through 4-49.

In Figures 4-46 and 4-48, directing a DSU/CSU and Line Status command to LPDA-2 Address 4 will report the DTE status of Port 3. In Figures 4-47 and 4-49, directing a DSU/CSU and Line Status command to LPDA-2 Address 4 will report the DTE status of Port 2 of the second tributary DSU.

NOTE

For MCMP, a digital-sharing group is created by assigning the same channel to each port in the group. However, for the SNA Diagnostic Interface option to recognize the digital-sharing group, the group must be specified by the Sharing Device A (Share DevA) configuration option.

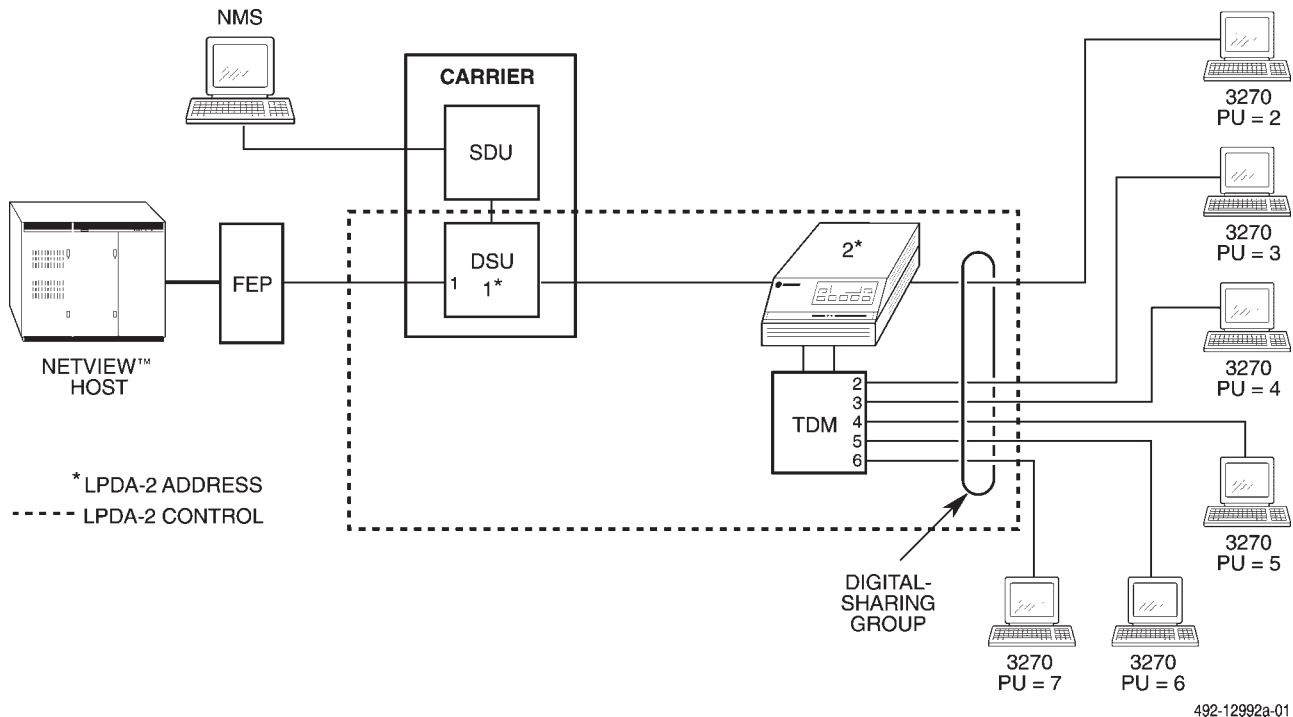


Figure 4-46. Digital Sharing in a Point-to-Point Circuit

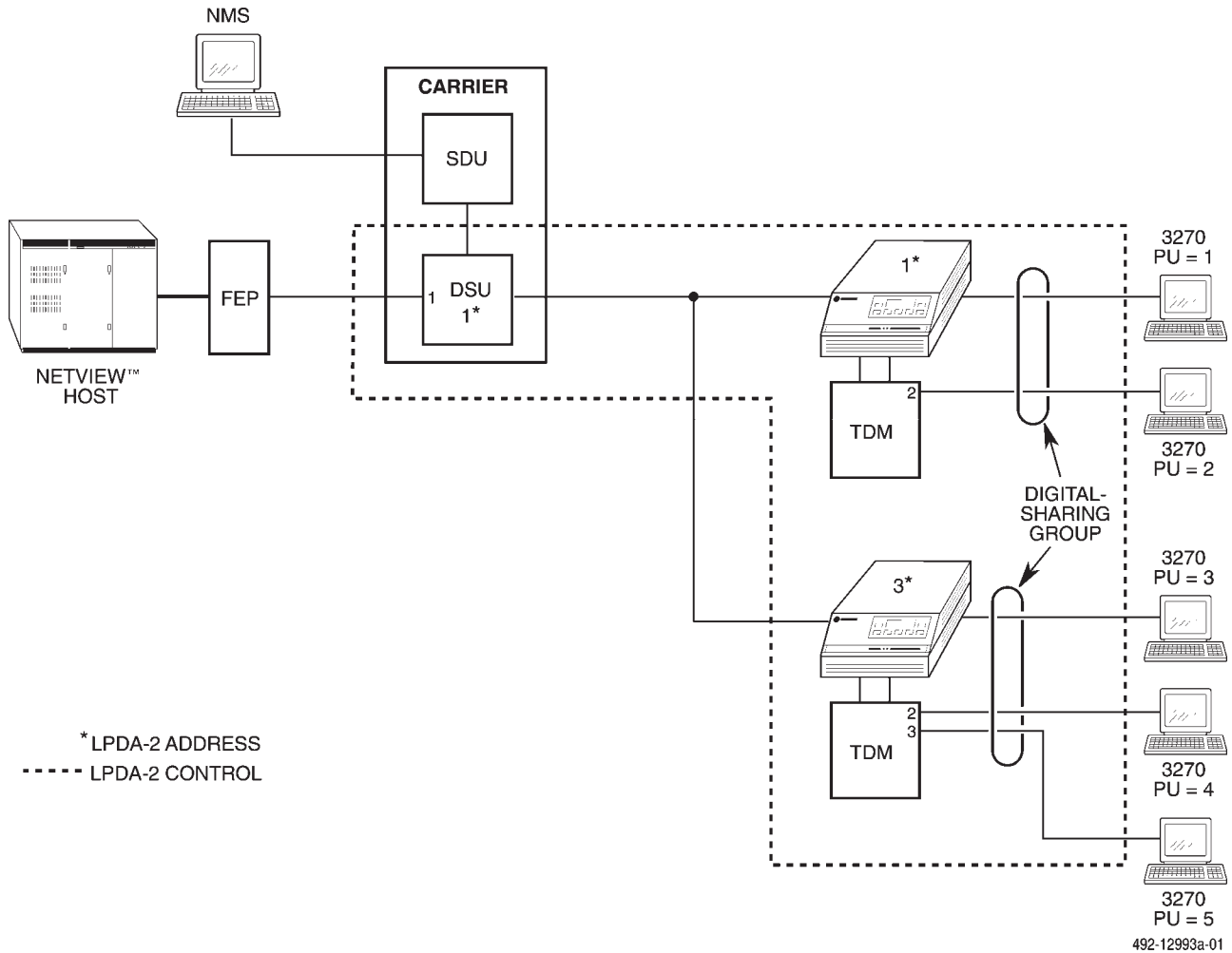


Figure 4-47. Digital Sharing in a Multipoint Circuit

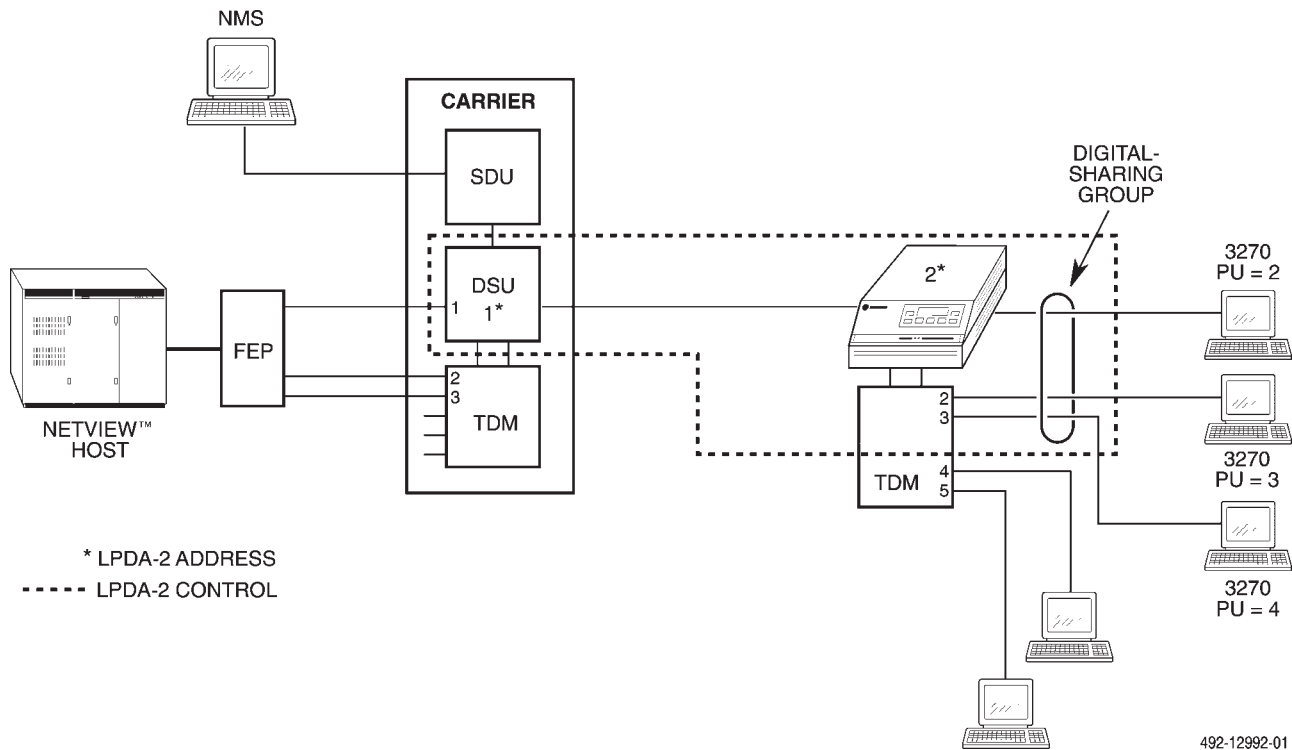
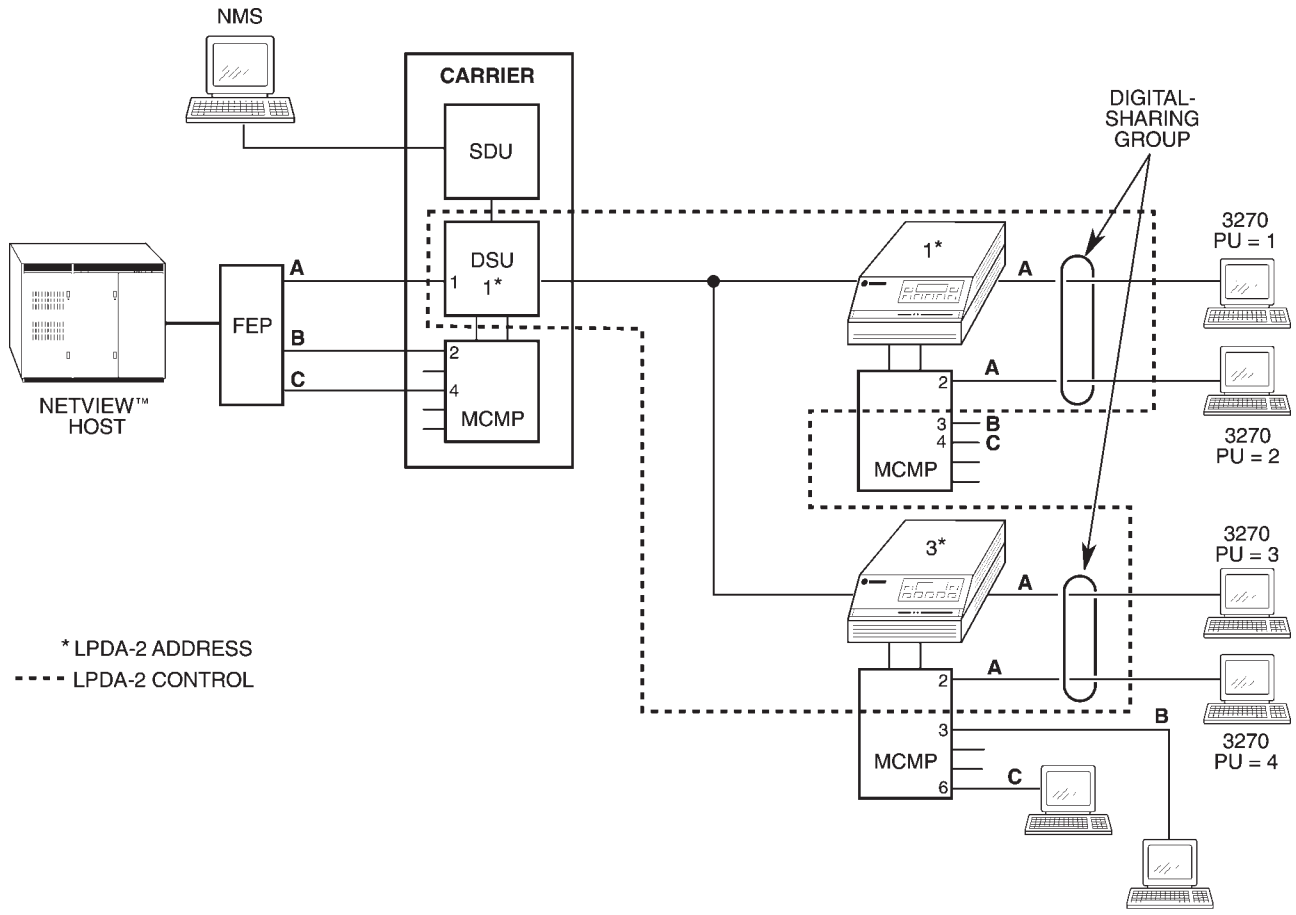


Figure 4-48. Digital Sharing in a TDM Circuit (LPDA-2 Monitoring)



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Figure 4-49. Digital Sharing in an MCMP Circuit (LPDA-2 Monitoring)

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Overview

This chapter identifies and discusses function and selection differences on the DSU when the TDM or MCMP optional feature is installed. It also discusses operation of DBM-Vs, DBM-Ss, and DBM-Ds, which are used in digital bridge applications.

As with the *COMSPHERE 3600 Series Data Service Units, Models 3610 and 3611, Operator's Guide*, this chapter follows the structure of the Menu Tree (Appendix A), discussing changes as they would appear as you operate the DSU from its diagnostic control panel (DCP or SDCP).

NOTE

Throughout this chapter, **shaded keys** indicate the key you should press to display the next screen in the example provided or the next screen in the procedure.

Refer to the *COMSPHERE 3600 Series Data Service Units, Models 3610 and 3611, Operator's Guide* to understand how the DSU operates without the TDM or MCMP and for more control panel, display, key, and menu function information.

Diagnostic Control Panels

Diagnostic control panel (DCP for the Model 3610 DSU), shared diagnostic control panel (SDCP for the Model 3611 DSU), or async terminal operation does not vary with the addition of DSU options (DBM, DBM-V, DBM-S, or DBM-D; TDM; MCMP; or SNA Diagnostic Interface). However, menu or selection displays may vary based upon the option that is installed.

NOTE

Except where a distinction is made, the term **DCP** refers to either type of diagnostic control panels, DCP or SDCP.

Status Indicators

The status indicators on the Model 3610 DSU's DCP and on the Model 3611 DSU's faceplate continuously provide information on the current operating condition of the DSU. All of the status indicators on the Model 3610 appear on its DCP, whereas the status indicators of the carrier-mounted Model 3611 DSU are spread across the following interfaces:

- SDCP
- Faceplate of the Model 3611 DSU (Figures 5-1 and 5-2)
- Faceplate of the TDM or MCMP circuit card (Figures 5-1 and 5-2)
- Faceplate of the DBM-V, DBM-S, or DBM-D, if installed (Figure 5-3)
- Faceplate of the shared diagnostic unit (SDU), if installed

Figures 5-1 and 5-2 show the faceplates of a Model 3611 DSU with the TDM option and a DSU with the MCMP option. The DSU faceplate provides network, DSU, and DTE interface status; the TDM or MCMP faceplate provides additional device status and port-selection information. Table 5-1 describes the function of the TDM and MCMP faceplate indicators.

The DBM-V, DBM-S, and DBM-D circuit cards are used with a digital bridge for multipoint dial backup. The status indicators on these circuit cards continuously provide information on the DBM-V's, DBM-S's, or DBM-D's current operating condition, functioning in a manner similar to the indicators on the DSU. Table 5-2 describes the function of the DBM-V, DBM-S, or DBM-D faceplate indicators.

SDCP and SDU status indicators are unchanged by the presence of a TDM or MCMP circuit card. To view SDCP and SDU status indicator tables, refer to the *COMSPHERE 3600 Series Data Service Units, Models 3610 and 3611, User's Guide* or the *COMSPHERE 3000 Series Carrier Installation Manual*.

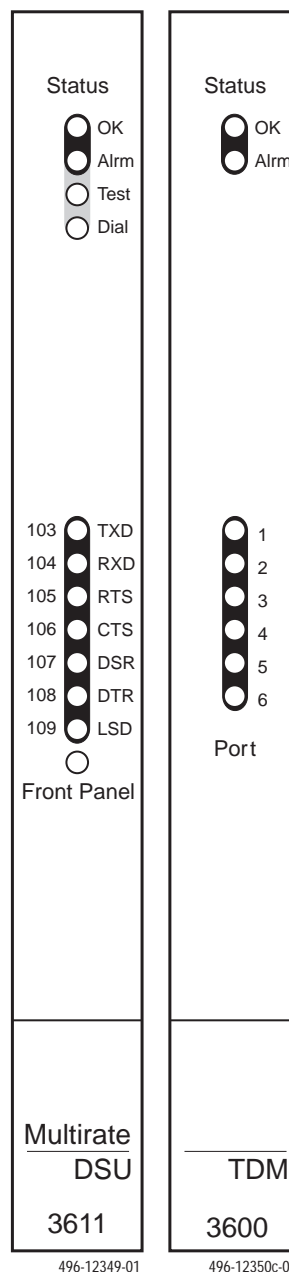


Figure 5-1. Model 3611 DSU and TDM Faceplates

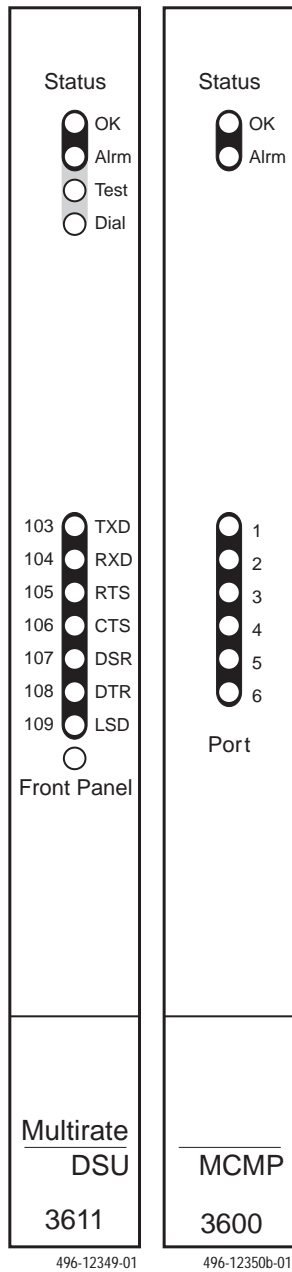


Figure 5-2. Model 3611 DSU and MCMP Faceplates

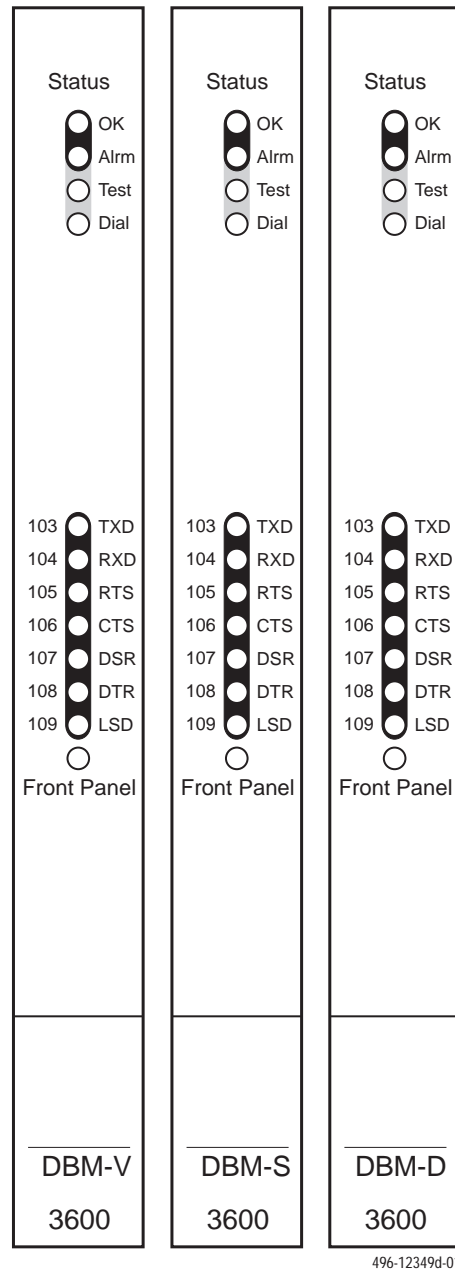


Figure 5-3. DBM-V, DBM-S, and DBM-D Faceplates

**Table 5-1
TDM and MCMP Status Indicators (Model 3611 Only)**

Label	Color	Description
OK	Green	<p>Health and status indicator. The TDM or MCMP hardware and software are operating normally.</p> <p>This indicator flashes two times per second if a message is present.</p>
Alrm	Red	<p>Health and status indicator. An alarm condition in the TDM or MCMP hardware, firmware, or configuration data is disrupting normal operation of the TDM or MCMP processor.</p> <p>Configuration alarms may be caused by a voltage spike on the input power line or momentary loss of power; the DSU automatically reloads the TDM or MCMP configuration options. When the reload procedure is completed, the Alrm LED goes Off and the TDM or MCMP OK LED comes ON.</p>
Port 1, 2, 3, 4, 5, or 6	Green	<p>In TDM or MCMP mode,¹ shows which port is being monitored (the status of the port's leads is displayed on the faceplate of the associated DSU).</p> <p>Any one of the six ports can be monitored at any given time; the port to be monitored is selected at the DCP (or SDCP). If the aggregate (Aggr) is monitored, all LEDs will be ON.</p> <p>In <i>Bridge mode</i>, the port LEDs perform a very different function. Each second, the LEDs indicate which ports had RTS ON during the last second. If the port is connected to a DCE device, the port RTS becomes the received LSD signal of the DCE device. Therefore, the LEDs indicate which ports had upstream activity during the last second.</p>
<p>¹ Only the MCMP circuit card can be configured for MCMP mode of operation.</p>		

Table 5-2
DSU with TDM or MCMP and DBM-V/DBM-S/DBM-D Status Indicators

Label	Color	Description
OK	Green	Health and status indicator. The device's operation is normal. (The device has not detected any of the alarms listed in the Alarm section below.) This indicator flashes two times per second if a message is present.
Alarm	Red	Health and status indicator for an alarm in the local or remote device. For the DSU with TDM or MCMP, ¹ the alarm may be in the communications path between the DSU and TDM or MCMP circuit card. The following alarms at the local or remote device cause the Alarm status indicator on the affected device to light: Configuration Corrupt, Device Alarm, Dial Tone Test Failure, DTE Alarm, Facility Alarm, MUX Failure, No Response, Redundant Power Alarm, Streaming Terminal, Subnetwork Alarm, and Out of Frame Threshold.
Test	Yellow	Active device (DSU or DBM-V/DBM-S/DBM-D) is either performing a test or other units are in Test mode. For a DSU with TDM or MCMP, test activity may be in the TDM or MCMP circuit card. ^{2,3,4}
Dial	Yellow	DBM-V/DBM-S/DBM-D is active: Rapid flashing: Call setup in progress Slow flashing: Call established but in Standby mode Steady ON: Backup call established and active
TXD, RXD, RTS, CTS, DSR, DTR, LSD ⁵	Green	Internal lead states at DSU-DBM-V/DBM-S/DBM-D-DTE interface (<i>circuit designations</i>): Control circuit active, <i>or</i> Data circuit SPACE(ing). For the DSU with TDM or MCMP, the circuit external lead states for any of the TDM or MCMP ports can be selected from the DCP via the Control branch. For a 3611 DSU with TDM or MCMP, the port LED illuminated on the TDM or MCMP faceplate indicates the monitored port. For Model 3610 DSUs, the monitored port is displayed on the DCP's LED display.
Front Panel (Model 3611 only)	Yellow	Device is currently selected by the SDCP (<i>the SDCP addresses one device at a time</i>). For a Model 3611 DSU with TDM or MCMP, the TDM or MCMP circuit card is also selected (<i>the TDM or MCMP circuit card has same address as its associated DSU</i>).

¹ Health and status for the TDM or MCMP is integrated into the Health and Status report for the device. For an alarm in the DSU with TDM or MCMP, this report indicates whether the TDM/MCMP or DSU is at alarm.
² Any test involving the TDM or MCMP also involves the DSU, and the test is integrated into the DSU's Health and Status report.
³ The device is automatically put into Test mode when a remote DSU or DBM is performing a disruptive test (e.g., a Local Loopback at the control DSU – select LL). A device in Test mode has its DTE interface turned Off.
⁴ With a DSU (unless it has an MCMP) or DBM-V/DBM-S/DBM-D running with disruptive diagnostics, this LED will flash each time a diagnostic poll or response is received.
⁵ When a TDM or MCMP is installed, DTR will always appear as ON for Port 1. Refer to the DTE Status display on the DCP to determine the state of the DTR lead.

Menu Structure

The menu tree is accessed via the DCP (SDCP for a DBM-V, DBM-S, or DBM-D) and is shown in [Appendix A](#). The menus that appear in the menu tree depend upon the DSU's function within the network (control or tributary), the hardware options that are installed (DBM, TDM or MCMP, LPDA*), and the DSU's mode of operation.

A Model 3610 DSU-TDM or DSU-MCMP comes from the factory configured as a tributary, while a Model 3611 DSU-TDM or DSU-MCMP comes configured as a control. In addition, a DSU-TDM comes configured for TDM mode, while a DSU-MCMP comes configured for MCMP mode. The mode of operation can be changed to disable the TDM or MCMP circuit card or to configure it to operate as a digital bridge.

Use the Configuration (**Conf**) branch of the menu tree to change these settings and customize the DSU-TDM's or DSU-MCMP's configuration.

Menus and Mode of Operation

A DSU *not* equipped with a TDM or MCMP is always operating in Basic mode, whereas a DSU equipped with a TDM or MCMP can operate in one of several modes. The mode of operation affects the menus that appear, as well as the selections that are available within the menus.

For a DSU-TDM, the following selections are available through the MUX path of the Configuration branch: TDM, CBrdg (central-site bridge), EBrdg (extended bridge), and None. For a DSU-MCMP, the following selections are available: TDM, MCMP, CBrdg, EBrdg, and None. Selecting None disables the TDM or MCMP circuit card; the unit operates as though there is no TDM or MCMP installed in the DSU.

When a TDM or MCMP is installed and enabled, the CBrdg and EBrdg selections permit the TDM or MCMP to operate in Bridge mode. For TDM, MCMP, or Bridge mode, a port number (Prt1 through Prt6) must be specified before issuing some commands. The results returned by the DSU may vary depending upon the operating mode (MUX Funct configuration option) and the port selected.

*The SNA Diagnostic Interface option (LPDA on the menu tree) for multipoint applications is discussed in this guide. Refer to the *COMSPHERE 3600 Series Data Service Units, Models 3610 and 3611, Dial Backup Module and SNA Diagnostic Interface Options, Applications Guide* for point-to-point applications and the configuration options unique to those SNA Diagnostic Interface (LPDA-2) applications.

Local/Remote Menu Subbranches

The Local branch menu has five subbranches and the Remote branch menu has four:

- The Status (**Stat**) branch reports the health and status of the DSU and its options, the DTE interface, the DSU's identification information, the status of the connected DTE's EIA-232 and V.35 interfaces, and, if there is a dialed PSTN connection, the quality of the PSTN circuit.
- The Backup (**Bckup**) branch controls the operation of the dial backup feature. Through this branch, the the digital bridge or aggregate switch is activated or deactivated. This branch can only be accessed from the Local branch.
- The **Test** branch provides extensive testing capabilities for the DSU, the DDS circuit, the DBM, and the backup circuit if there is a backup call in progress. This branch also provides test capability for TDM or MCMP circuitry and the additional ports.

NOTE

If the **Test** branch *does not* appear, the DSU is in Display mode; values can be read but not changed. Only authorized persons can change configuration option values for the DSU. Contact your System Administrator for further information.

- The Configuration (**Conf**) branch provides the ability to customize DSU and DBM software configuration options, to enter and change telephone numbers (if a DBM is installed), to change the DSU network address, and to specify the protocol used by a connected NMS. For a DSU-TDM or DSU-MCMP, the mode of operation (TDM, MCMP, Bridge, or Basic) is selected, and the TDM or MCMP port and port speed configuration options are also set using this branch.

- The Control (**Ctrl**) branch provides the ability to display and change external leads, enable or disable the DSU-DBM, and access and monitor the external leads for Ports 1 through 6. The circuit designation status indicators (TXD, RXD, etc.) reflect the status of the selected port.

NOTE

In most of the examples that follow, additional menu selections that do not fit onto the DSU's screen are shown beneath the DCP. To display those menu selections, press the \triangleleft or \triangleright key to scroll the selections into view.

Each selection leads to a functional subbranch of the menu tree. Five factors determine which selections or options are available.

- Whether the DSU is in Display mode and the DSU's mode of operation.
- Whether the DSU is a control or tributary.
- Whether your selections are from the Local or Remote branch (Local or Remote mode).
- Whether a DBM is installed.
- Whether a TDM or MCMP is installed.

Refer to the menu in [Appendix A](#). You will see *Port Select* under some of the menu selections, which means that a Port Number screen will appear when operating in TDM, MCMP, or Bridge mode. Use the F1 and F2 keys to display the port number of your choice; then press the F3 key to activate your choice.

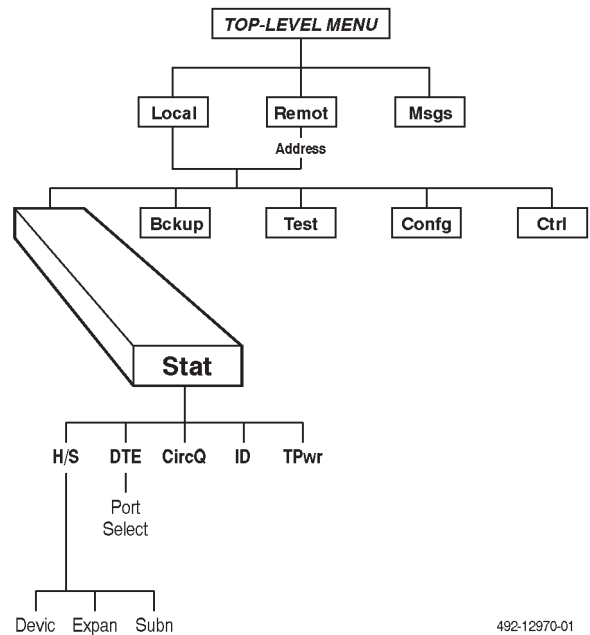
The following sections highlight only those areas of the DCP menu and operation that are unique to operating in TDM, MCMP, or Bridge mode.

For information on how to access menu branches and DCP operation (regardless of the options installed), refer to the *COMSPHERE 3600 Series Data Service Units, Models 3610 and 3611, Operator's Guide*.

Status Branch

The Status (**Stat**) branch reports on the health and status of the DSU and DBM, the DTE interface, the quality of the PSTN connection, the identity of the DSU (model number, serial number, etc.), and the terminal's power. (It checks the presence of voltage on the DTE's RTS lead on Port 1). For a DSU with TDM or MCMP, the health and status of the TDM or MCMP is integrated into the health and status of the DSU.

Of the five Status branch selections shown below, *CircQ (Circuit Quality) only appears when a V.32 DBM is installed*.



Health and Status

Health and Status (**H/S**) enables you to display the status of the DSU, as well as a DBM, TDM or MCMP, if installed. It automatically scans for DSU and line conditions that are not within normal limits.

There are three types of Health and Status reports:

- **Devic** (Device Health and Status) – displays the health and status for a local or remote DSU (and DBM and TDM or MCMP, if installed).
- **Expan** (Expanded Health and Status) – only appears during automatic dialing, retrieving the local DSU's health and status information when there is a failed dialing attempt or an unsolicited disconnect after a successful connection.
- **Subn** (Subnetwork Health and Status) – displays status information from a DSU's subnetwork (all DSUs and DBMs assigned to that DSU's active poll list). The downstream network addresses and current statuses are listed.

For a complete list of Health and Status messages, refer to Appendix C of the *COMSPHERE 3600 Series Data Service Units, Models 3610 and 3611, Operator's Guide*.

Device Health and Status

The Device Health and Status (**Devic**) selection reports health and status information for a selected DSU.

NOTE

If five minutes elapse without a key being pressed, the Device Health and Status screen is redisplayed.

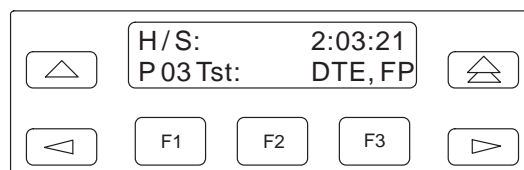
To access Device Health and Status from the top-level menu, make the following selections:

- Local (F1), or Remot (F2) and Address
- Stat
- H/S
- Devic

Results

When the digital circuit is the active link, the first line displays a running normal-operation timer (hhh:mm:ss). The second line displays the DSU's operating rate and can also display one or more of the test or alarm messages listed in Appendix C of the *COMSPHERE 3600 Series Data Service Units, Models 3610 and 3611, Operator's Guide*. An asterisk (*) appears at the far right to indicate NMS activity. A right arrow (→) appears just before the asterisk if there is more than one existing message.

For a DSU with TDM or MCMP, the Device Health and Status of the TDM or MCMP is incorporated into the health and status of the DSU, along with any test or alarm involving the TDM or MCMP. In the example below, Port 3 has been in DTE Loopback for 2 hours, 3 minutes, and 21 seconds. The DTE Loopback originated from the DCP (DTE, FP).



Expanded Health and Status

Expanded Health and Status (**Expan**) selection retrieves local DSU health and status information concerning a failed dialing attempt or an unsolicited disconnect after a successful connection.

To access the Expanded Health and Status from the top-level menu, make the following selections:

- Local (F1), or Remot (F2) and Address
- Stat
- H/S
- Expan

Results

The second line of the Expanded Health and Status report displays one or more of the test or alarm messages. Messages are listed in Appendix C of the *COMSPHERE 3600 Series Data Service Units, Models 3610 and 3611, Operator's Guide*.

Subnetwork Health and Status

Subnetwork Health and Status (**Subn**) provides status information from a DSU's subnetwork (all DSUs and DBMs assigned to that DSU's active poll list). The downstream network addresses and current statuses are listed. Use the F1 and F2 keys to page through the tributary addresses.

To access the Subnetwork Health and Status from the top-level menu, make the following selections:

- Local (F1), or Remot (F2) and Address
- Stat
- H/S
- Subn

Results

Status messages are updated periodically. If no downstream DSU's are being monitored, **No PList** is displayed instead of the address and status for an active poll list member. For a list of status messages and their meanings, see Appendix C of the *COMSPHERE 3600 Series Data Service Units, Models 3610 and 3611, Operator's Guide*.

DTE Status

The **DTE** Status displays a snapshot of the local or remote DSU-DBM's external DTE interface status. Ten different signal statuses are reported.

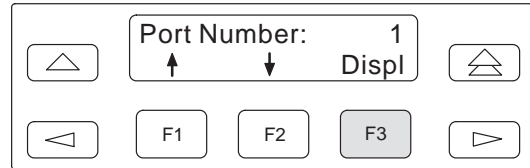
To access the DTE status report from the top-level menu, make the following selections:

- Local (F1), or Remot (F2) and Address
- Stat
- DTE

NOTE

If there is only one port, the DTE Status screen is displayed. If there is more than one port, the Port screen is displayed prior to the DTE Status screen. If using FEP port sharing, select the first port in the digital-sharing group to obtain DTE Status.

For TDM, MCMP, or Bridge mode, the following additional menu appears:

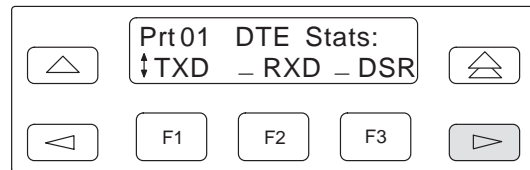


Use the F1 and F2 keys to display the port number of your choice, then press the F3 key to have your choice accepted.

Results

The DTE interface statuses are displayed in sets. Use the < or > key to scroll the next set of lead statuses into view. **Table 5-3** translates the status codes.

The following is displayed for the selected DSU-TDM's or DSU-MCMP's external DTE interface. The activity shown may be different from the states displayed by the DSU's LED indicators, which sometimes reflect the internal states of the interface circuits. In this example, Port 1 was designated.



If only one port is active, the DTE Status screen is displayed. If more than one port is active, the Port screen is displayed *prior* to the DTE Status screen.

Table 5-3
DTE Lead Status Codes

Code	Lead Status
☐	ON/SPACE (above text line)
☐	Off/MARK (below text line)
↕	At least one transition between Off/MARK and ON/SPACE has been detected during the monitoring window.

Circuit Quality

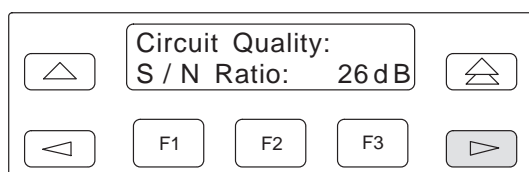
Circuit Quality (**CircQ**) only appears when a V.32 DBM is installed. The report shows the level and quality of the signal being received from the network by the V.32 DBM.

To access the Circuit Quality status report from the top-level menu, make the following selections:

- Local (F1), or Remot (F2) and Address
- Stat
- CircQ

Results

The following is displayed for the local or remote device selected:



When there is no dialed call, all values are reported as an x.

Table 5-4 lists the circuit quality measurements and the range of possible values. Press the \triangleright key to display additional measurements, one display at a time.

Terminal Power

Terminal Power (**TPwr**) shows the status of the connected DTE's EIA-232-D or V.35 interface. The DSU checks the state of the request-to-send (RTS) lead and reports the DTE powered ON if the voltage is approximately less than -3V or greater than +3V for both EIA-232 and V.35 interfaces.

To access the Terminal Power report from the top-level menu, make the following selections:

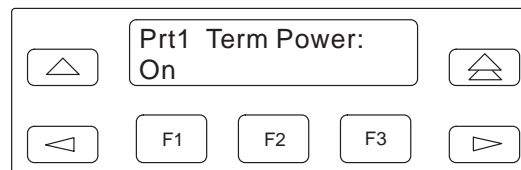
- Local (F1), or Remot (F2) and Address
- Stat
- TPwr

Results

NOTE

The Terminal Power report is only generated for the DTE connected to the DSU (Port 1) when a TDM or MCMP is installed.

The following report displays for the local or remote device selected. If power is detected on the RTS, the second line displays **On**. If no power is detected on the RTS lead, the second line displays **Off**.



**Table 5-4
Circuit Quality Measurements**

Measurements	Information Displayed	Range Of Possible Values
S/N ratio	Signal-to-noise ratio (dB)	9 dB to 27 dB
Sig Level	Signal level (dBm)	0 dBm to -50 dBm
BitErrR	Bit error rate (factor of 10, e.g.: <10 [^] to 06>)	<10 [^] — 00 to <10 — 7 ¹
RndTrip	Roundtrip delay (ms)	23 ms ² — 1700 ms

¹ 10[^] to 06 = 1 error in a million bits (10⁶).

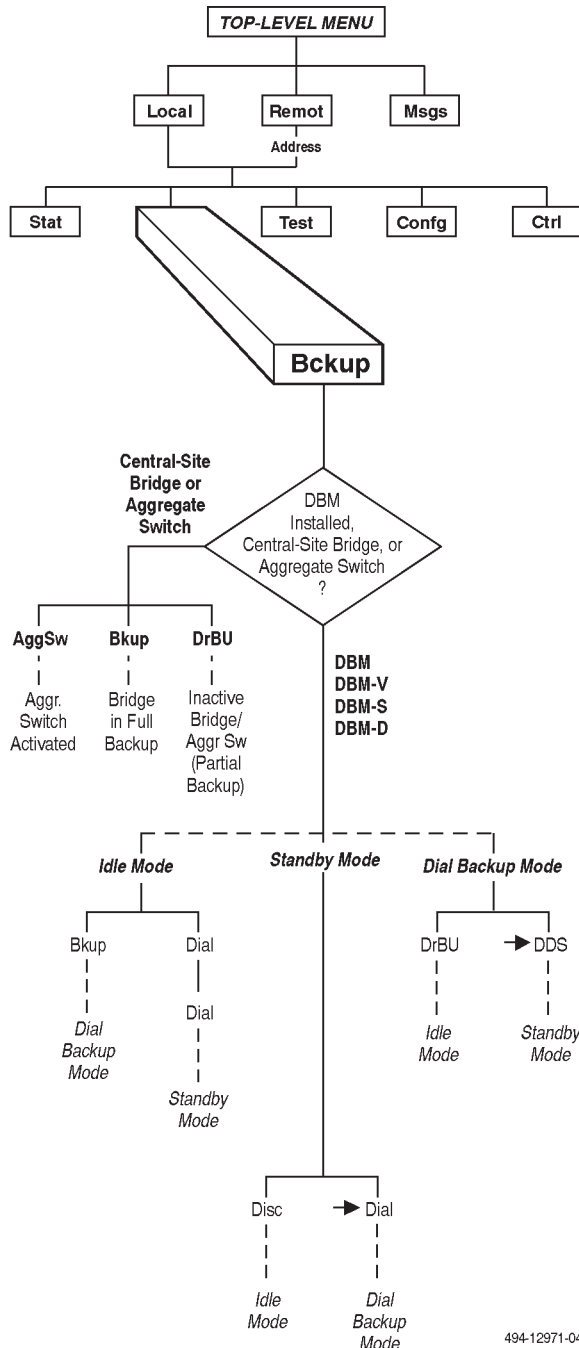
² A roundtrip delay of less than 23 ms is reported as 23 ms.

Backup Branch

The Backup (**Bckup**) branch controls operation of the point-to-point dial backup feature. The Bckup selection only appears when a DBM (V.32 DBM, 4-wire Switched 56 DBM, or 2-wire Switched 56 DBM) is installed, Central-Site Bridge (CBrdg) is enabled, or Aggregate Switch (AggrSwitch) is enabled.

The *DBM/DBM-V/DBM-S/DBM-D* section discusses the full set of available commands when a DBM is installed. Multipoint dial backup requires a TDM or MCMP to be installed, with the DSU-TDM or DSU-MCMP configured as a central-site bridge (MUX Funct: CBrdg), with an associated DBM-V, DBM-S, or DBM-D for each remote drop (refer to the *Bridge* section).

For additional DBM operation information, refer to the *COMSPHERE 3600 Series Data Service Units, Models 3610 and 3611, Dial Backup Module and SNA Diagnostic Interface Options, Applications Guide*.



DBM/DBM-V/DBM-S/DBM-D

This section discusses the full set of commands available in the Backup branch when a DBM is installed.

NOTE

References to **DBM** in this guide also apply to a DBM-V, DBM-S, or DBM-D.

The Backup branch menu items displayed depend on the DBM's current operating mode:

- **Idle mode** – The DBM has no call in progress, but may be either enabled or disabled. If the DBM is enabled, the DDS circuit is carrying data and diagnostics. If the DBM is disabled, no calls can be initiated or answered.
- **Standby mode** – The DBM has a dialed or switched 56 kbps connection to another DBM or compatible modem, but the DDS circuit is still active and carrying data. The dialed or Switched 56 kbps digital circuit carries diagnostic traffic addressed to either the tributary DSU or DBM. These diagnostics do not disrupt the DDS circuit.
- **Dial Backup mode** – A dialed connection is established and is the active link, carrying data and diagnostics.

Table 5-5 lists the current DBM modes, the available selections, and the mode in which the selection places the DBM.

Table 5-5
Backup Branch Menu Selections

Current DBM Mode	Menu Selection	Effect
Idle	Bkup	Dial out, establish, and switch to dialed link (Dial Backup mode).
	Dial	Dial out and establish dialed link (Standby mode). The data is routed over the DDS circuit.
Standby	Disc	Disconnect dialed link (Idle mode).
	→Dial	Switch data to dialed link (Dial Backup mode).
Dial Backup	DrBU	Disconnect dialed link and switch to DDS (Idle mode).
	→DDS	Switch data to DDS (Standby mode).

Aggregate Switch

When AggrSwitch (**Aggregate Switch**) is enabled, the backup commands have a different effect:

- **Bkup** is used to initiate a point-to-point backup or a full multipoint backup. The DSU disconnects from the DDS line and reverts to the timing source specified by the AgSw Timing (Aggregate Switch Timing) configuration option. *Do not initiate this command for a partial multipoint backup.*

For multipoint applications, data is automatically bridged to the aggregate port as well as the DDS line when the AggrSwitch configuration option is enabled,

- **DrBU** is used to terminate a point-to-point or full multipoint backup. The DSU resumes transmission on the DDS line. The DSU timing is specified by the DSU TxClkSource configuration option.

The DBM's mode determines the menu that appears when Bkup is selected.

With the addition of the TDM or MCMP circuit card, the DCP operation remains unchanged while in Idle mode for the following:

- Enabling, disabling, or placing the DBM in Dial Backup or Standby mode.
- Disconnecting the dial connection, switching data to the dial connection and switching to the DDS circuit.

To learn how to enable, disable, or place the DBM in Dial Backup or Standby mode while in Idle mode, as well as how to disconnect the dial connection, switch data to the dial connection, and switch to the DDS circuit, refer to the *COMSPHERE 3600 Series Data Service Units, Models 3610 and 3611, Dial Backup Module and SNA Diagnostic Interface Options, Applications Guide*.

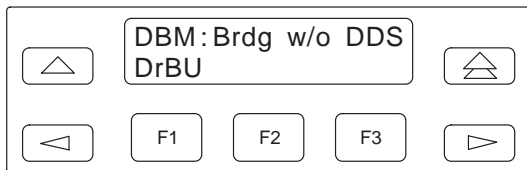
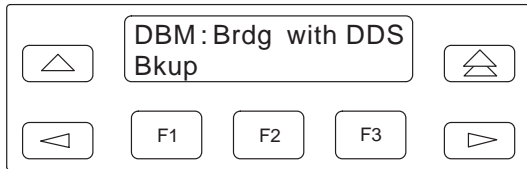
Bridge

When the DSU is configured as an extended bridge (EBrdg), the Bckup menu is displayed; however, the DSU-DBM or DSU-DBM-V is always in Dial Backup mode. If an attempt to drop backup (DrBU) is made, a **Conflict w/Envir** message is displayed.

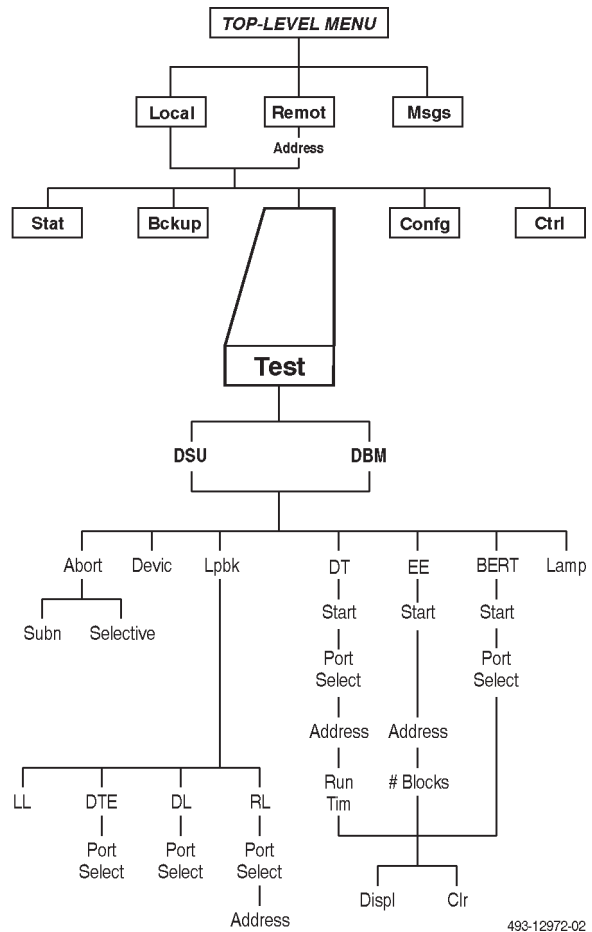
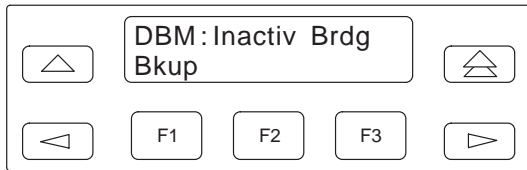
When a DSU is configured as a central-site bridge, a DBM circuit card can be installed, but the DBM must be disabled. When the TDM or MCMP circuit card is installed, only two sections are displayed: one turns the bridge ON (Bkup) and the other turns it Off (DrBU). Select **Bkup** to activate the bridge, disconnect the DDS line from the bridge, and switch to internal timing; select **DrBU** to deactivate the bridge; to connect the DDS line to the bridge and switch to DDS timing.

The digital bridge's mode determines the menu that is displayed when Bkup is selected.

For a DSU configured as a central-site bridge with configuration option Bridge Rate set to =DDS, one of the following two screens appears:



For a DSU configured as a central-site bridge with configuration option Bridge Rate set to =DSU, the following screen is displayed.



Test Branch

The **Test** branch provides extensive testing capabilities for the DSU, DDS circuit, DBM, and backup circuit.

For a DSU that is performing a multiplexing function such as rate adaption, nondisruptive diagnostics, TDM or MCMP, you can request tests on individual ports or on the aggregate data path. Local Loopback (LL) and End-to-End (EE) tests, however, can only be run on the aggregate data path.

Tests that are performed on the aggregate data stream test the entire bandwidth. Therefore, during aggregate tests, in-band secondary channel transport communication is lost. For tests such as aggregate Digital Loopback (DL), the control DSU reports a **No Response** or a **TribTimOut** alarm for downstream devices.

When a DSU receives a test request from the remote DSU, it aborts any locally-initiated test in progress. A point-to-point control or tributary DSU, or a multipoint control DSU, can run all of the tests on the Test menu. A multipoint tributary cannot run any remote tests or a BERT, Digital Test (DT), or EE test.

There are a number of tests that can be initiated, depending upon your configuration. To determine the appropriate test(s) to run for a DBM (or DBM-V, DBM-S, or DBM-D), see Table 5-3 of the *COMSPHERE 3600 Series Data Service Units, Models 3610 and 3611, Dial Backup Module and SNA Diagnostic Interface Options, Applications Guide*. To determine the appropriate test(s) to run for a DSU and for additional information, refer to the *COMSPHERE 3600 Series Data Service Units, Models 3610 and 3611, Operator's Guide*.

Abort

The Abort selection allows you to terminate a test that is running. When a test is running, the DBM is in Test mode and is not allowed to run any other test.

To access the Abort selection from the top-level menu, make the following selections:

- Local (F1), or Remot (F2) and Address
- Test
- DSU or DBM (select active core)
- Abort

There are two types of selections to abort a test:

- **Subn** (Subnetwork) terminates any test running at the control DSU or at a tributary DSU or DBM associated with the control.
- **Selective** terminates whatever test is in progress at the local DBM.

Results

After selecting either Subn or Selective, the test is terminated and the DCP displays the message **Command Complete**.

Device Test

The Device (**Devic**) Test uses a test pattern generator built into the DSU to perform a local loopback on both the DSU and the DBM (Figure 5-4). During the test, the TXD, RXD, and RTS indicators show internal activity, which may be different from the states of the same leads at the DTE interface.

NOTE

On power-up, the DSU sends out polls to determine whether the DBM and MUX circuit cards are installed (MUX indicates a TDM or MCMP). The DSU then initiates a Device Test on itself and each of the available circuit cards. The results of the Device Tests appear momentarily on the DCP's LCD.

The DBM must be in Idle mode or Disconnect mode, with no call in progress.

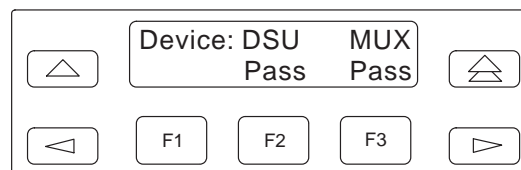
The Device Test is a 15- to 20-second test that does not require any connection *except* ac power to the DSU. For a DSU-TDM or DSU-MCMP, the Device Test checks both the DSU and the TDM or MCMP circuit cards.

To access the Device Test from the top-level menu, make the following selections:

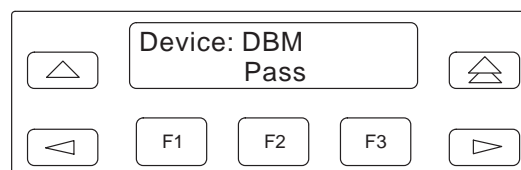
- Local (F1), or Remot (F2) and Address
- Test
- DSU or DBM (select active core)
- Devic

Results

For the DSU with TDM or MCMP, the following appears:



For the DBM, the following appears:



While the test is in progress, the second line displays **Abrt** so that the test can be aborted.

If a network loopback is in effect when a power-up Device Test is initiated, the test will not run and the second line on the DSU displays **Abrt**.

For a DBM, the Device Test is the only DBM test that does not require a dialed connection. *The DBM must be disabled or in Idle mode, with no call in progress.*

If the DSU, TDM or MCMP (MUX), or DBM fails the test, the second line displays **Fail** instead of Pass. Also, the Alarm (**Alrm**) status indicator lights and the failure is reported in the DSU's Health and Status. The Alarm indicator remains lit and the failure continues to be

reported until the Device Test ends with a **Pass** in all categories (DSU, MUX, DBM). Until then, you can proceed but be aware that the DSU may not function properly.

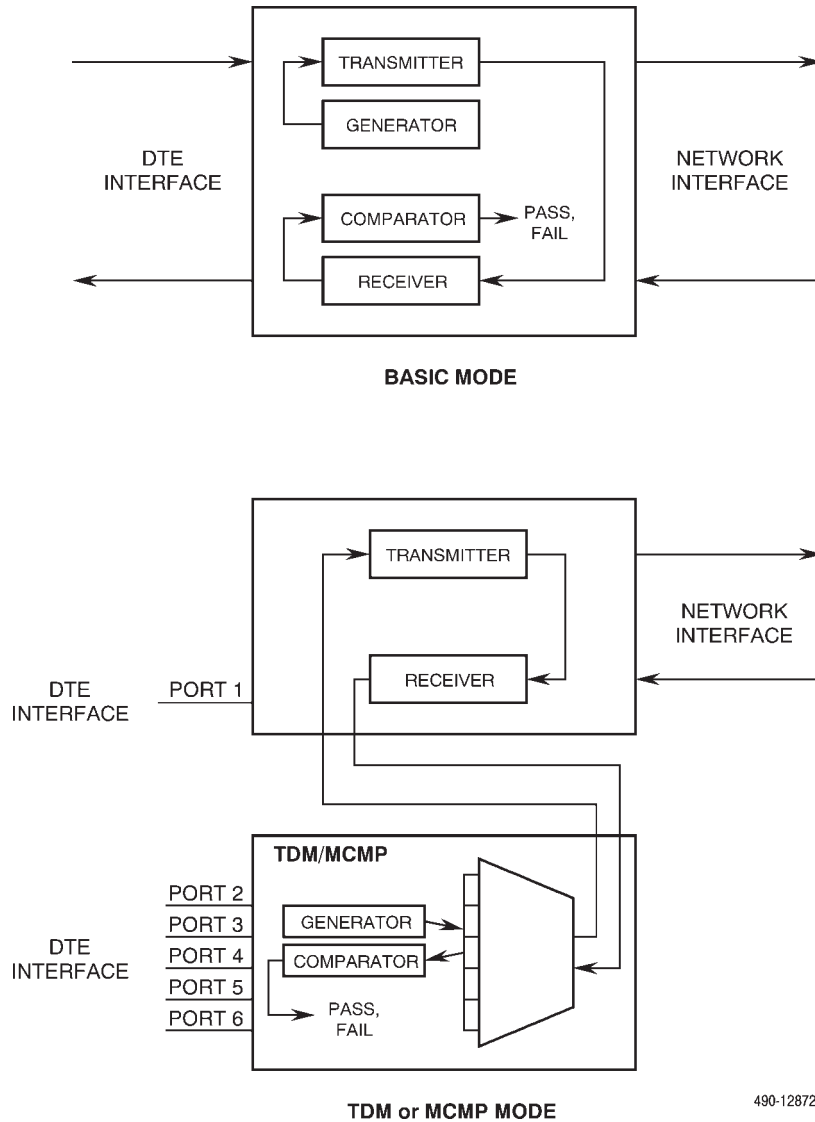


Figure 5-4. Device Test

Loopback

The Loopback (**Lpbk**) branch displays four loopbacks:

- Local Loopback (LL)
- DTE Loopback (DTE)
- Digital Loopback (DL)
- Remote Digital Loopback (RL)

For additional information concerning loopbacks, refer to the *COMSPHERE 3600 Series Data Service Units, Models 3610 and 3611, Operator's Guide*.

Local Loopback

Local Loopback (**LL**) is session-disruptive; performing the test will disrupt data. Local Loopback permits the DTE to run a test on the DTE connection to the DSU and verify that the DSU is functioning properly (Figure 5-5). *This test cannot be performed by the DBM.*

Local loopback is used with the DTE test after the DSU passes the Device Test.

If you issue a Local Loopback to a tributary DSU, the DSU must have a DBM installed or you will get a **Conflict w/ Environ** message. Use the DBM to abort the Local Loopback by calling the tributary DSU.

CAUTION

If a tributary DSU is in Local Loopback, the DBM *must* be in Standby or Idle mode if the NMS is to abort the loopback. If the DBM is in Dial Backup mode when the NMS issues the Abort command, the command will not be recognized and the loopback must be aborted from the DCP.

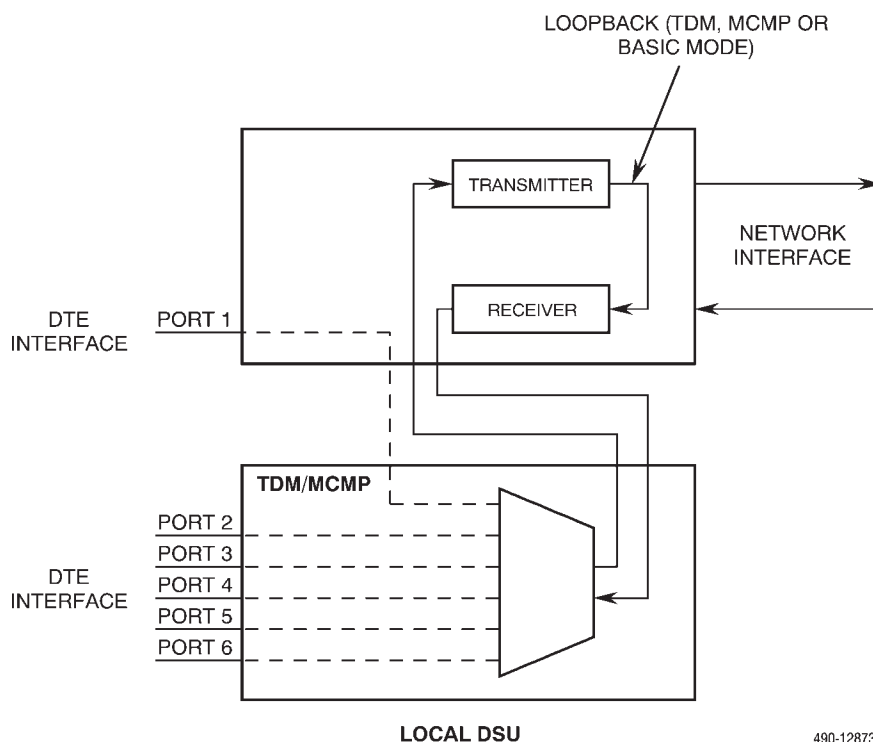


Figure 5-5. Local Loopback

While the DSU is in Local Loopback, any data transmission by the DTE is returned as received data. An operator can send a test pattern and verify correct reception of the test. The DSU does not monitor this testing.

When Local Loopback is requested of an inactive core, there is no effect since data from DTE ports is routed through the active core.

For TDM, MCMP, or Bridge mode, the entire data stream is looped back; therefore, all six ports are in Local Loopback. Use the DTE Loopback command to loop back only one port. **Command Complete** appears at the loopback conclusion.

NOTE

When Nondisruptive Diagnostics is enabled (Diag Type: NonD), Local Loopback disrupts secondary channel transport communications. For a control DSU, the DSU may report **No Response** or **Tributary Time-out** during the test.

To access Local Loopback from the top-level menu, make the following selections:

- Local (F1)
- Test
- DSU
- Lpbk
- LL

Local Loopback can also be initiated by the DTE attached to Port 1 by raising Pin 18 of the EIA-232-D/V.24 interface or Pin L of the V.35 interface, provided the Local Loopback by DTE configuration option is enabled.

Results

Data transmitted to the DSU is returned to the DTE.



NOTE

During Local Loopback, the DSU uses internal timing. This may be a problem for extended circuit applications. In this case, execute a DTE Loopback instead of a Local Loopback.

DTE Loopback

DTE Loopback (**DTE**) loops back the data path at the DTE/DCE interface on a per port basis without affecting the operation of the remaining ports (Figure 5-6). A message appears regarding successful loopback execution.

To access the DTE Loopback from the top-level menu, make the following selections:

- Local (F1)
- Test
- DSU or DBM (select active core)
- Lpbk
- DTE
- Port selection

Results

The test result is a message telling you whether or not the loopback executed successfully.

The DSU with TDM or MCMP only permits one test to be active at a time. Thus, if Port 1 is placed in loopback, another port cannot be placed in loopback. The only test selection available is Abort.

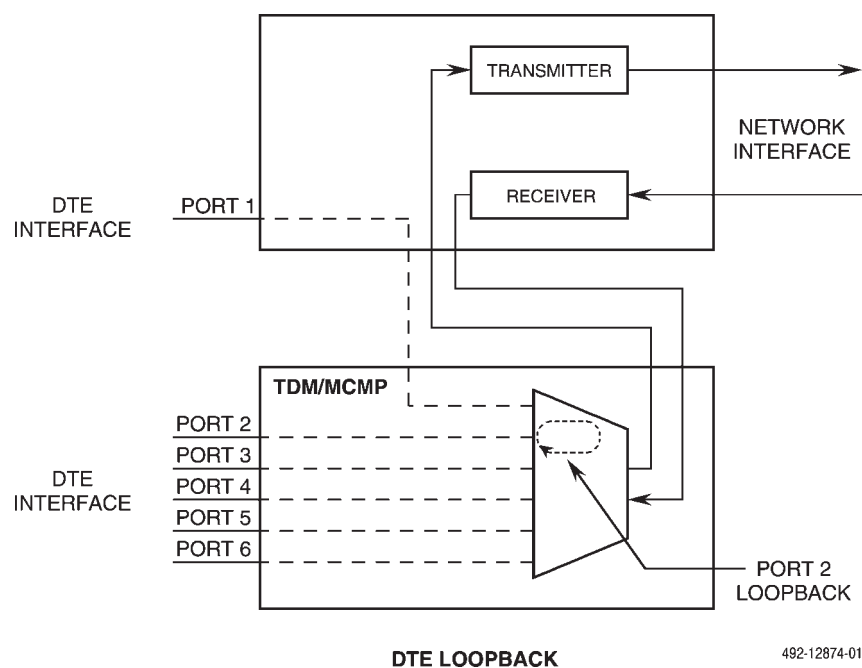


Figure 5-6. DTE Loopback on Port 2

Digital Loopback

Digital Loopback (**DL**) is used for manual testing of the remote end of the circuit. For example, a remote Digital Loopback may be required in order to complete an external Bit Error Rate Test (BERT) from the remote DSU. The local DSU receives test data, loops it back to the transmitter before the DTE interface, and returns it to the network (Figure 5-7).

For the DSU, the Digital Loopback command is session-disruptive *except* when a dial backup session is active. It is used to condition the DSU for testing to determine whether the DSU connection to the network is functioning properly. This test requires a DDS network circuit between two DSUs. DTE connections to the DSUs are not required.

For the DBM, Digital Loopback is used to determine whether the DBM connection to the dial network is functioning properly. Digital Loopback is session-disruptive when the DBM is in Dial Backup mode and is nondisruptive when it is in Standby mode. The test

requires a dialed connection to another DBM. DTE connections to the DBMs are not required.

Digital Loopback (DL) can be initiated by:

- Selecting DL from the Lpbk submenu in the Test branch menu.
- Receiving a V.54 loopback pattern. Enable configuration options V.54 Lpbk (V.54 Loopback) and RespondRDL (Respond to Remote Digital Loopback).

A Digital Loopback may not be initiated from a remote multipoint device.

NOTE

If the Bilat Lpbk (Bilateral Loopback) configuration option is enabled, requesting a Digital Loopback automatically initiates a DTE Loopback as well.

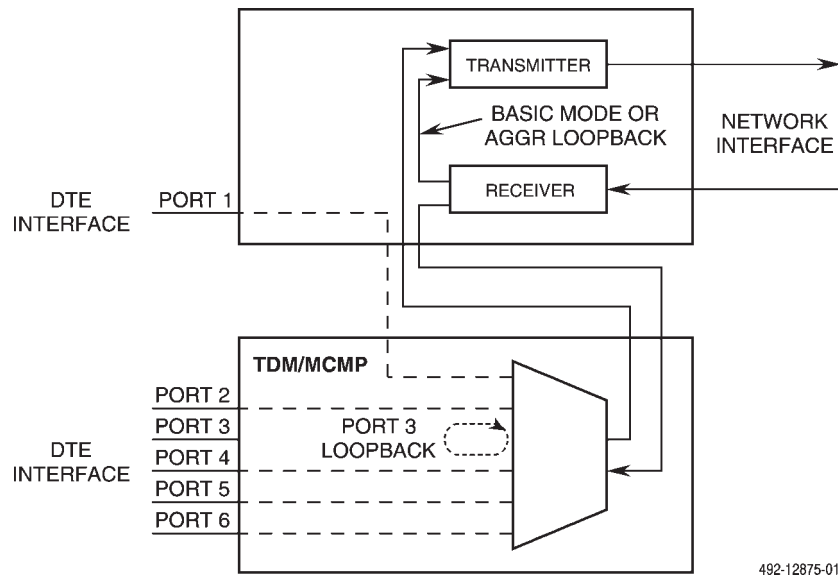


Figure 5-7. Digital Loopback

Selecting **Aggr** (Aggregate) loops back the user-transmitted data and the secondary channel transport data (if nondisruptive diagnostics are in effect). This disrupts secondary channel transport communications. Selecting **Prt1** (Port 1) causes the loopback to occur at a point where the secondary channel transport has already been extracted from the user-transmitted data, so only the user-transmitted data is looped back. Secondary channel communications are preserved.

To access Digital Loopback from the top-level menu, make the following selections:

- Local (F1), Remot (F2) and Address
- Test
- DSU or DBM (select active core)
- Lpbk
- DL
- Port Select (when not operating in single-port mode)

NOTE

When the local DSU initiates Digital Loopback to a remote DSU (via Remote mode), the remote DSU is placed in Test mode. The local DSU is not in Test mode, and another test, such as BERT, can be initiated at the local DSU.

For TDM or MCMP mode, the following additional menu appears:

▲	Port Number:			▲
	Prt1	Prt2	Prt3	
◀	F1	F2	F3	▶
Prt4 Prt5 Prt6 Aggr				

In Bridge mode, you are not asked to select a port; you are placed in the same loopback configuration as Basic mode. For MCMP mode, Digital Loopback using the Aggr selection is not a valid command.

Results

The TXD, RXD, and RTS LED indicators show the states of the leads at the DTE interface.

▲	DSU Digital Lpbk:			▲
	Command Complete			
◀	F1	F2	F3	▶

Remote Digital Loopback

Remote Digital Loopback (**RL**) is typically used to support testing by an external device, such as a protocol analyzer connected to the local DSU's DTE interface. A test message from the external device is looped back from the receiver to the transmitter in the remote DSU and returned to the local DSU (Figure 5-8).

In Remote Digital Loopback, the local DSU (control or tributary) or the 6700 or 6800 Series NMS places the remote DSU into Digital Loopback. A control DSU can originate Remote Digital Loopback in a point-to-point or multipoint network; a tributary DSU can only originate Remote Digital Loopback in a point-to-point network.

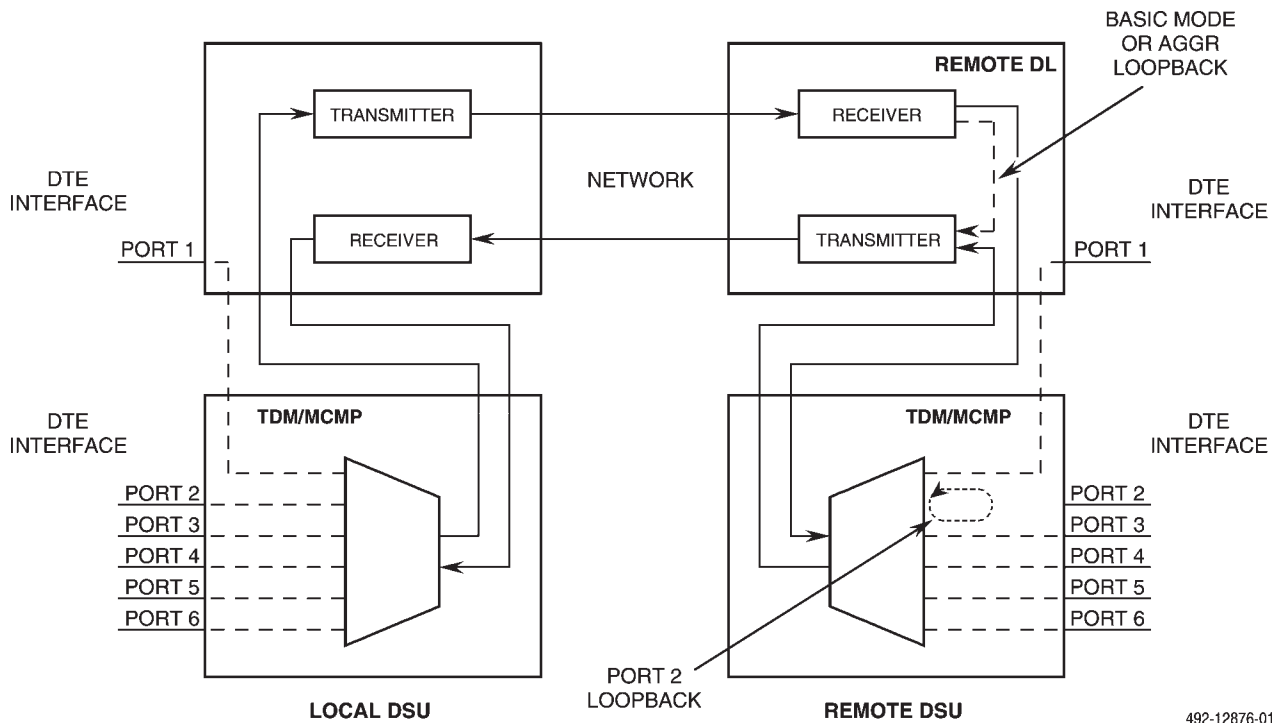
When a control or tributary DSU originates Remote Digital Loopback, both originating and targeted DSUs enter Test mode. On a multipoint circuit, all tributaries are placed in Test mode. No other test can be run at the originating DSU or the targeted DSU until the Remote Digital Loopback is aborted.

NOTE

To abort the Remote Digital Loopback, issue the Abort command to the control DSU-DBM, not the tributary.

For a DSU, Remote Digital Loopback is session-disruptive *except* when a dial backup session is active and used to determine whether a control DSU, a single tributary, and the network between them are functioning properly. This requires a network connection to both DSUs. However, a DTE connection to the remote DSU is not required.

For a DBM, Remote Digital Loopback is session-disruptive when the DBM is in Dial Backup mode and nondisruptive when in Standby mode. A DTE connection to the remote DBM is not required.



492-12876-01

Figure 5-8. Remote Digital Loopback

In a point-to-point network only, Remote Digital Loopback can also be initiated by the DTE by raising Pin 21 of the EIA-232-D/V.24 interface or Pin N of the V.35 interface, provided the Remote Digital Loopback by DTE (RL by DTE) configuration option is enabled. *When testing a DBM, the DBM must be in Dial Backup mode to realize this capability.*

The Remote Digital Loopback command is not available when the LPDA-2 configuration option is enabled.

NOTE

If the Bilat Lpbk (Bilateral Loopback) configuration option is enabled, requesting a Remote Digital Loopback on a port automatically initiates a DTE Loopback on the port as well. Requesting an aggregate Remote Digital Loopback automatically initiates a DTE Loopback on *all* of the ports.

To access Remote Digital Loopback from the top-level menu, make the following selections:

- Local (F1)
- Test
- DBM (select active core)
- Lpbk
- RL
- Port Select (when not operating in single-port mode)
- Trib Address (multipoint control DBM only)

For TDM or MCMP mode, the following additional menu appears:

▲	Port Number:			▲
	Prt1	Prt2	Prt3	
◀	F1	F2	F3	▶
Prt4 Prt5 Prt6 Aggr				

In TDM or MCMP mode, raising Pin 21 on Port 1 initiates an aggregate loopback. This loopback is performed on the DDS circuit unless a dial backup session is active.

When in MCMP mode, the port selected is not necessarily the port placed in loopback at the remote location. For example, if a channel assigned to Port 2 locally is assigned to Port 3 remotely, then selecting Port 2 places Port 3 at the remote location in loopback.

When a DSU (control or tributary) originates Remote Digital Loopback, both the originating DSU and the targeted DSU enter Test mode. *On a multipoint circuit*, all other tributaries are also placed in Test mode. No other test can be run at the originating DSU or the targeted DSU until the Remote Digital Loopback is aborted.

Results

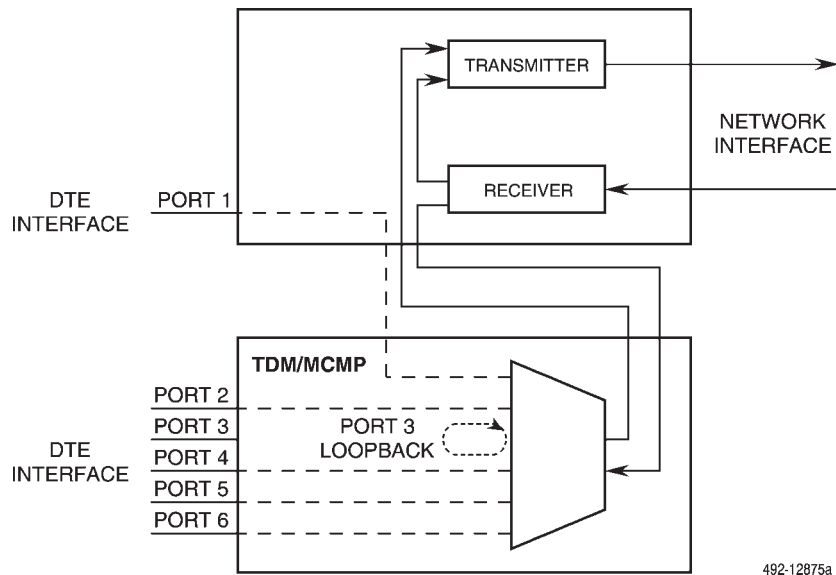
The DBM does not generate the test results.

Bilateral Loopback

Bilateral Loopback, shown in Figure 5-9, is a combination of DTE and Digital Loopbacks operating simultaneously in the same DSU. Bilateral Loopback or Digital Loopback is a customer-selectable configuration choice (see the General Configuration Option Table in Chapter 6 of the *COMSPHERE 3600 Series Data Service Units, Models 3610 and 3611, Operator's Guide*).

NOTE

If the Bilat Lpbk (Bilateral Loopback) configuration option is enabled, requesting a Remote Digital Loopback or Digital Test on a port also initiates a DTE Loopback on the port. Requesting an aggregate Remote Digital Loopback or Digital Loopback automatically initiates a DTE Loopback on all ports.



492-12875a

Figure 5-9. Bilateral Loopback

Digital Test

Digital Test (**DT**) is used to check the functionality of a pair of DSUs or DBMs and the data circuit between the pair.

The local DBM transmits the 511-bit test pattern over the network to the remote DBM for an operator-specified length of time (Figure 5-10). The remote DBM receives the test pattern and loops it back to its transmitter before the DTE interface, and returns it to the local DBM. The test pattern is then passed to the DSU's comparator to be checked for errors. At the conclusion of the test, the local DBM releases the remote DBM from Digital Loopback.

When a Digital Test is performed on a specific port, data transmission is not affected on the other ports. *When CBrdg or AggrSwitch is enabled*, the test is performed over the DDS link, not the dialed link.

NOTE

The Digital Test command is not available when the LPDA-2 configuration option is enabled.

For a DSU operating in single-port mode and having either nondisruptive diagnostics or rate adaption in effect, an additional selection for Aggr (Aggregate) or Prt1 (Port 1) appears.

Selecting **Aggr** allows only the test pattern data to propagate the looped data path. In-band secondary channel transport data is not allowed to avoid disrupting in-band secondary channel transport communications. Selecting **Prt1** allows both the test pattern and in-band secondary channel transport data to propagate the data path; in-band secondary channel transport communications are preserved.

NOTE

If the Bilat Lpbk (Bilateral Loopback) configuration option is enabled, requesting a Digital Test on a port automatically initiates a DTE Loopback on the port as well. Requesting an aggregate Remote Digital Loopback automatically initiates a DTE Loopback on *all* of the ports.

NOTE

A control DSU can originate a Digital Test in a point-to-point or multipoint network, whereas a tributary DSU can originate a Digital Test in a point-to-point network only.

A Digital Test can also be run on a DBM, over a backup connection, or to a remote DBM for point-to-point testing. On a DBM-V, DBM-S or DBM-D, a Digital Test can be run over a backup connection to a remote DBM for multipoint testing.

To access the Digital Test from the top-level menu, make the following selections:

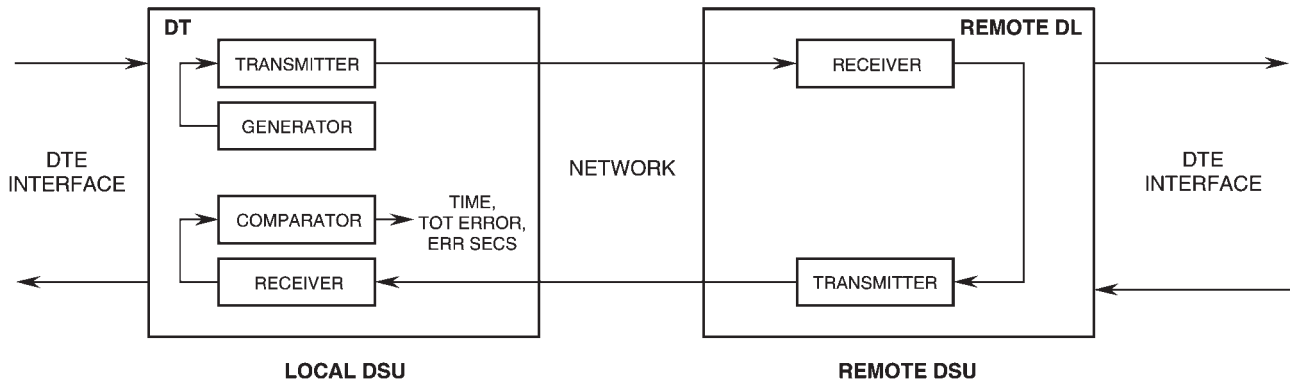
- Local (F1)
- Test
- DBM (select active core)
- DT
- Start
- Port Select (when not operating in single-port mode)
- Trib Address (multipoint control DBM only)
- Run Time (duration of the Digital Test)

For TDM or MCMP mode, the following additional menu appears:

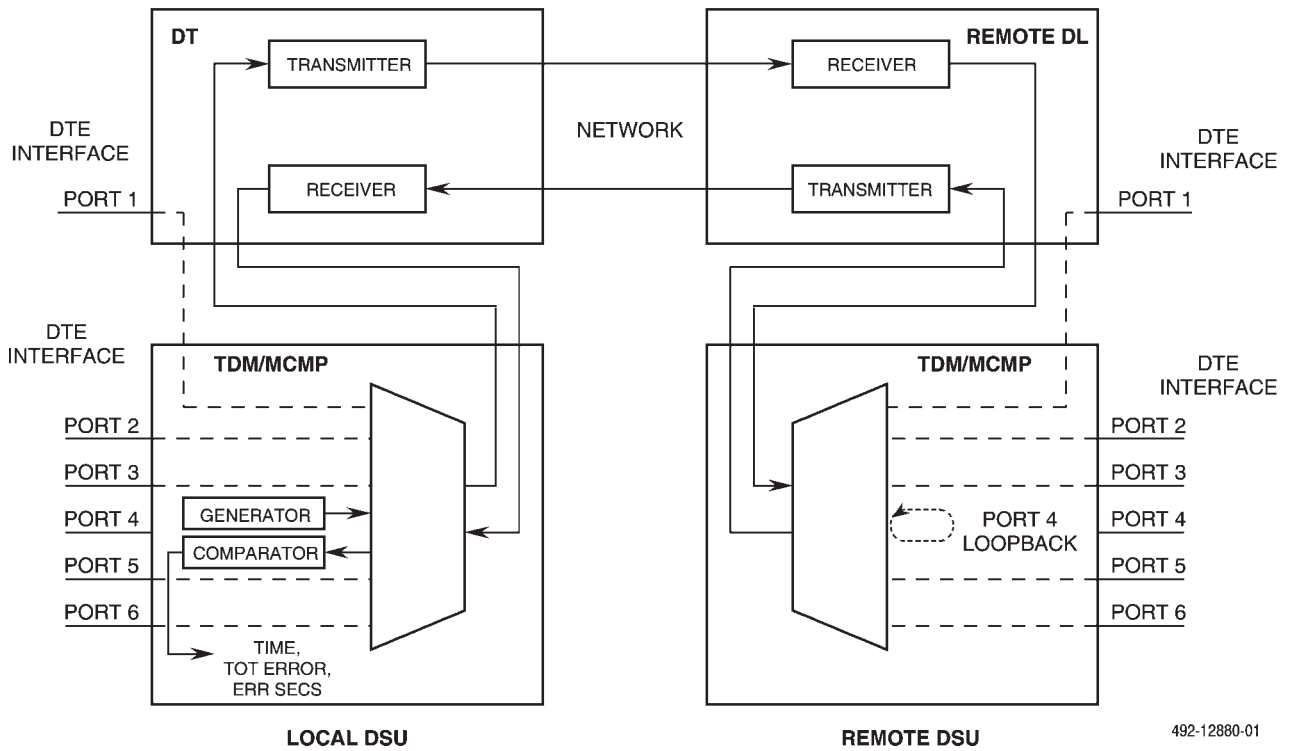
The screenshot shows a menu for selecting a port number. At the top, there is a label 'Port Number:' followed by three buttons labeled 'Prt1', 'Prt2', and 'Prt3'. Below these are three function keys labeled 'F1', 'F2', and 'F3'. At the bottom of the menu, there is a row of four options: 'Prt4', 'Prt5', 'Prt6', and 'Aggr'.

For a single port DSU, Prt1 and Aggr are the only valid choices.

BASIC MODE



TDM or MCMP MODE (PORT 4 SELECTED)

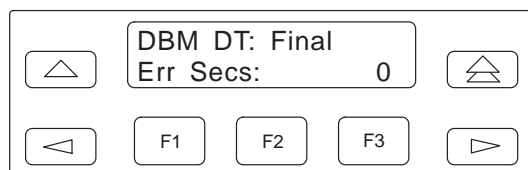


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Figure 5-10. Digital Test

Results

When the message **Command Complete** is displayed, any key *except* the \triangle key returns you to the Digital Test submenu, where the Dsply and Clr selections appear. If **Clr** is selected while the test is running, the test starts again.



If the test is still running, the top line displays **Active** instead of **Final**, and the results are updated in real time. Table 5-6 defines the information displayed after a Digital Test is completed.

Table 5-6
Digital Test Results

Results	Information Displayed
Time:	Running test timer. The Clr selection resets the timer to 0:00:00.
Tot Error:	Running count of bits in error; if the maximum error count of 64,000 is reached, max appears. The Clr selection resets the counter to 0.
Err Secs:	Running count of errored seconds. The Clr selection resets the counter to 0.
Run on: port nn	If this test was not run on an aggregate data path, the Digital Test was run on port <i>nn</i> .

For an example of Digital Test results, refer to the *COMSPHERE 3600 Series Data Service Units, Models 3610 and 3611, Dial Backup Module and SNA Diagnostic Interface Options, Applications Guide*.

End-to-End Test

The End-to-End (**EE**) test is used to analyze a control and tributary DSU or DBM and the network circuit between them in both directions independently (Figure 5-11). If an End-to-End test is performed, the in-band secondary channel transport communications are disrupted.

This test is a half-duplex test that runs in both DSUs and DBMs. Each DSU and DBM sends the same pattern to the other and checks the incoming pattern for errors. During the test, the TXD, RXD, and RTS indicators show internal activity (which may differ from the states of the same leads at the DTE interface).

A test between two DBMs requires a dial network connection between them. DTE connections to the modules are not required. The End-to-End test is performed on a DBM and is session-disruptive when a dial backup session is active and nondisruptive when it is not active.

To access the End-to-End test from the top-level menu, make the following selections:

- Local (F1)
- Test
- DSU or DBM (select active core)
- EE
- Start
- Trib Address (if a control)
- # Blocks

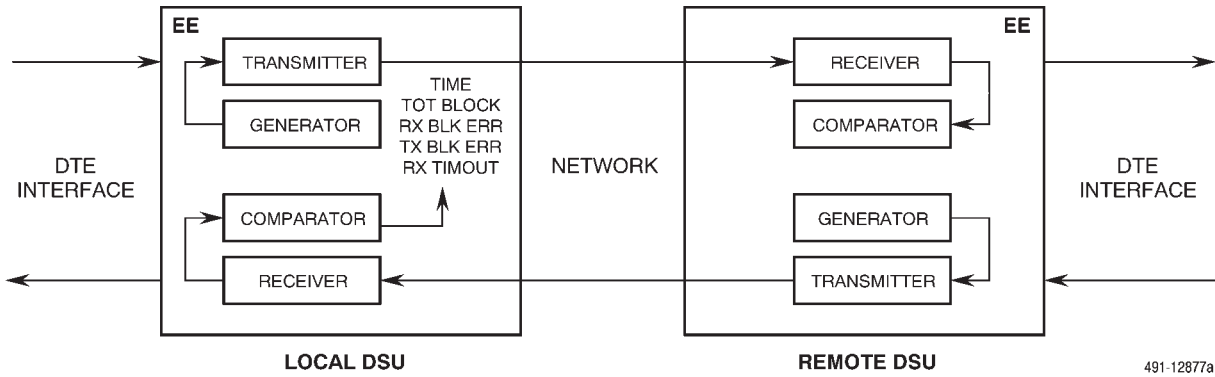


Figure 5-11. End-to-End Test

Results

When the message **Command Complete** is displayed, any key *except* the \triangle key returns you to the End-to-End Test submenu, where the **Displ** and **Clr** selections appear.

When the test is over, the top line displays **Final** instead of **Active**. Table 5-7 shows the information provided by an End-to-End Test.

Tests originating from an NMS operating with DPII protocol add the receive block errors to the receive time-outs and return the results to NMS as receive block errors.

For an example, refer to the *COMSPHERE 3600 Series Data Service Units, Models 3610 and 3611, Dial Backup Module and SNA Diagnostic Interface Options, Applications Guide*.

Table 5-7
End-to-End Test Results

Results	Reported By ¹	Information Displayed
Time:	Local and remote DBM	Running test timer. The Clr selection resets the timer to 0:00:00.
Tot Block:	Local and remote DBM	Number of blocks completed. The Clr selection resets the counter to 0.
Rx Blk err:	Local and remote DBM	Number of incoming blocks with errors detected, indicating a fault in the incoming transmission path. The Clr selection resets the counter to 0.
Tx Blk err:	Local and remote DBM	Number of blocks with errors detected at the remote DSU, indicating a fault in the outgoing transmission path. The Clr selection resets the counter to 0.
Rx TimOuts:	Local DBM only	Number of blocks that were not received or acknowledged by the remote DBM. The Clr selection resets the counter to 0.

¹ *Local* refers to the test initiator.

Bit Error Rate Test

The Bit Error Rate Test (**BERT**) is a session-disruptive test used to analyze the network circuit. This test requires network connection to the control and tributary DSUs or DBMs. A DTE connection to the remote DBM may be required. The originating DBM sends a continuous 511-bit test pattern from its test pattern generator (Figure 5-12) transmitting via the DDS circuit for the DSU test and via the dial circuit for the DBM test. The test monitors the results in one of the following ways:

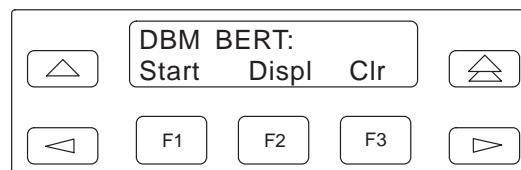
- Putting the remote DBM into Digital Loopback and checking the returned pattern for errors (Figure 5-12, part A).
- Simultaneously executing the BERT in the remote DSU (Figure 5-12, part B).

The test continues until aborted from the DCP or NMS. This test can be run on an aggregate or per-port basis. When run on an aggregate basis, in-band secondary channel transport communications are disrupted. A control DSU can initiate a Bit Error Rate Test in a point-to-point or a multipoint network. A tributary DSU can only initiate this test in a point-to-point network.

To access BERT from the top-level menu, make the following selections:

- Local (F1), or Remot (F2) and Address
- Test
- DSU or DBM (select active core)
- BERT
- Port Select (when not operating in single-port mode) or Aggr

Selecting **Aggr** (Aggregate) allows the test pattern data to propagate the data path. This is the same loopback configuration as Basic mode. If nondisruptive diagnostics are in effect, the in-band secondary channel transport communications are disrupted. *The Bit Error Rate Test is not available in Bridge mode.*



If the BERT is already in progress, **Start** will *not* be displayed.

To abort the Bit Error Rate Test, press the \triangle key *twice*. To display the results of the test, select **Displ**. To clear the results of the test and clear the counters to zero, select **Clr**.

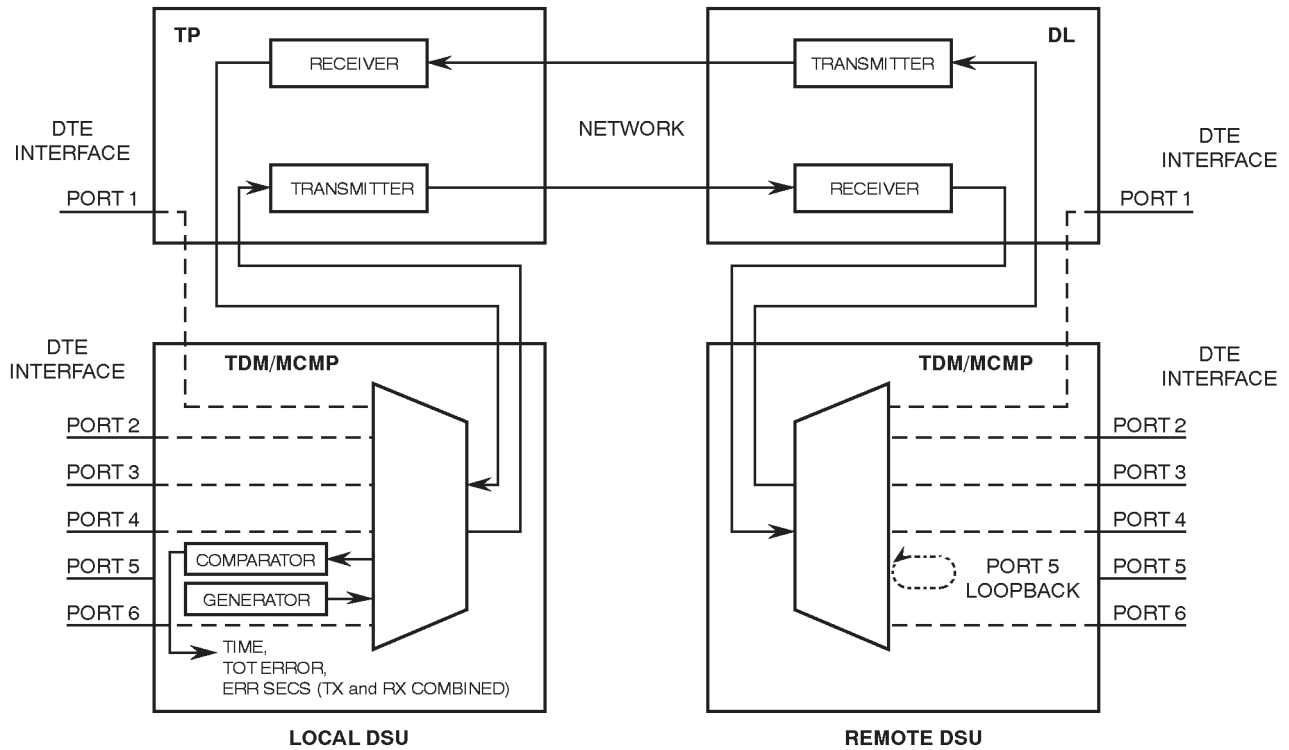
Results

When the message **Command Complete** is displayed, any key *except* the \triangle key returns you to the Bit Error Rate Test submenu. If the test is aborted, the top line of the display shows **Final** instead of **Active**. Table 5-8 defines the information displayed after a Bit Error Rate Test has been completed.

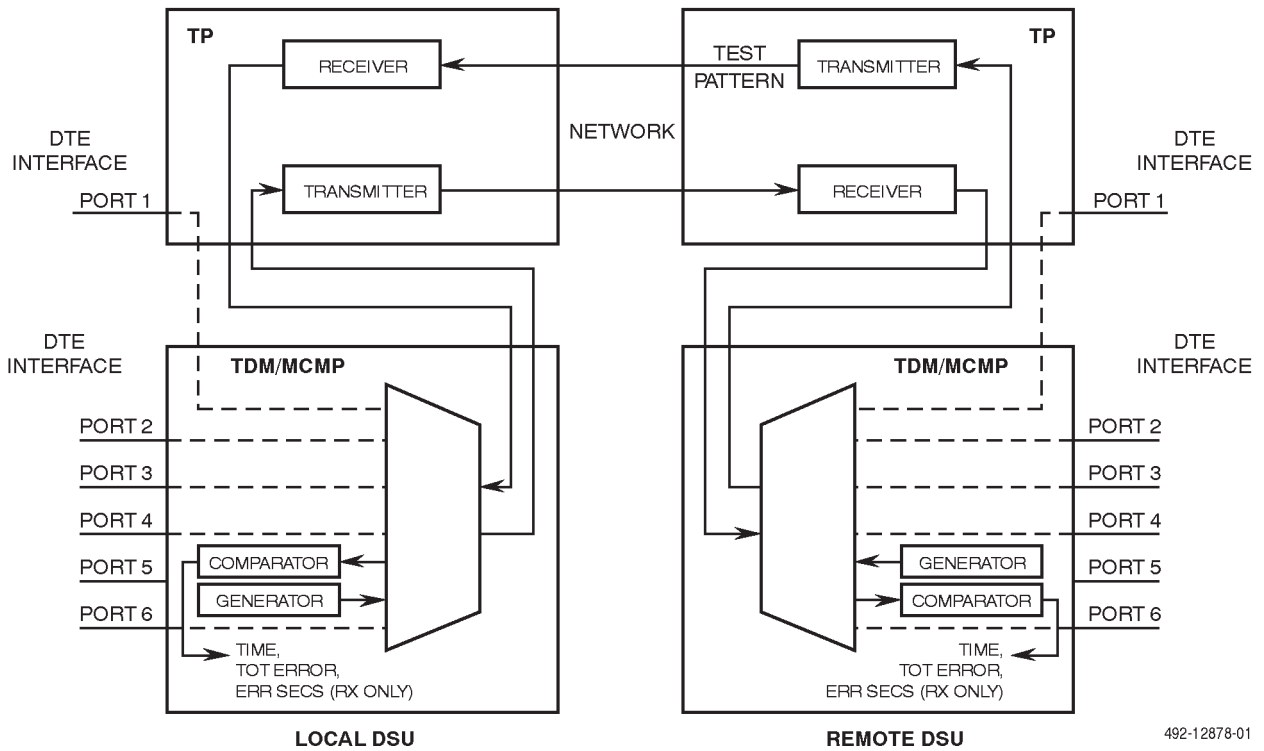
Table 5-8
Bit Error Rate Test Results

Results	Information Displayed
Time:	Running test timer. The Clr selection resets the timer to 0:00:00.
Tot Error:	Running count of bits in error; Max, if the maximum error count has been reached, which is 64000. The Clr selection resets the counter to 0.
Err Secs:	Running count of errored seconds. Errored second is when at least one error is detected during a 1-second time period. The Clr selection resets the counter to 0.
Run on: portnn	Port selected for testing.

A. BERT WITH REMOTE LOOPBACK



B. DUAL BERT



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Figure 5-12. Bit Error Rate Tests in TDM or MCMP Mode

Lamp Test

The **Lamp** test is a test of the status indicators (LEDs) on the DSU's DCP (both models), and the LCDs on the Model 3610 DCP and the SDCP. When the Lamp test is performed on the Model 3611, the alarm output is activated as well.

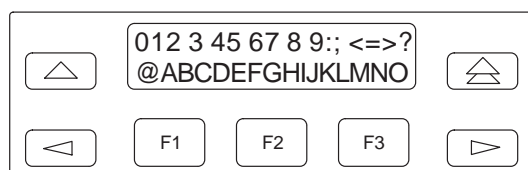
Any indicator that does *not* flash is not functional, unless the circuit card is a non-modular TDM or MCMP. In this case, the **Alrm** and **OK** LEDs do not flash.

To access the Lamp Test from the top-level menu, make the following selections:

- Local (F1)
- Test
- DSU or DBM (select active core)
- Lamp

Results

If all LEDs are functioning, all the indicators on the Model 3610 DSU's DCP or Model 3611 DSU's faceplate are flashing ON and Off steadily. In a COMSPHERE 3000 Series Carrier, the indicators on the SDCP, as well as the indicators on the Model 3611 DSU's faceplate, flash ON and Off steadily. (The **OK** and **Alrm** LEDs do not flash ON and Off on a nonmodular TDM or MCMP faceplate; one remains ON and one remains Off.) The LCD on the DCP flashes the following display until the test is aborted:



If any character indicator appears nonfunctional, the DCP should be replaced. If any of the LEDs do not work, the circuit card should be replaced.

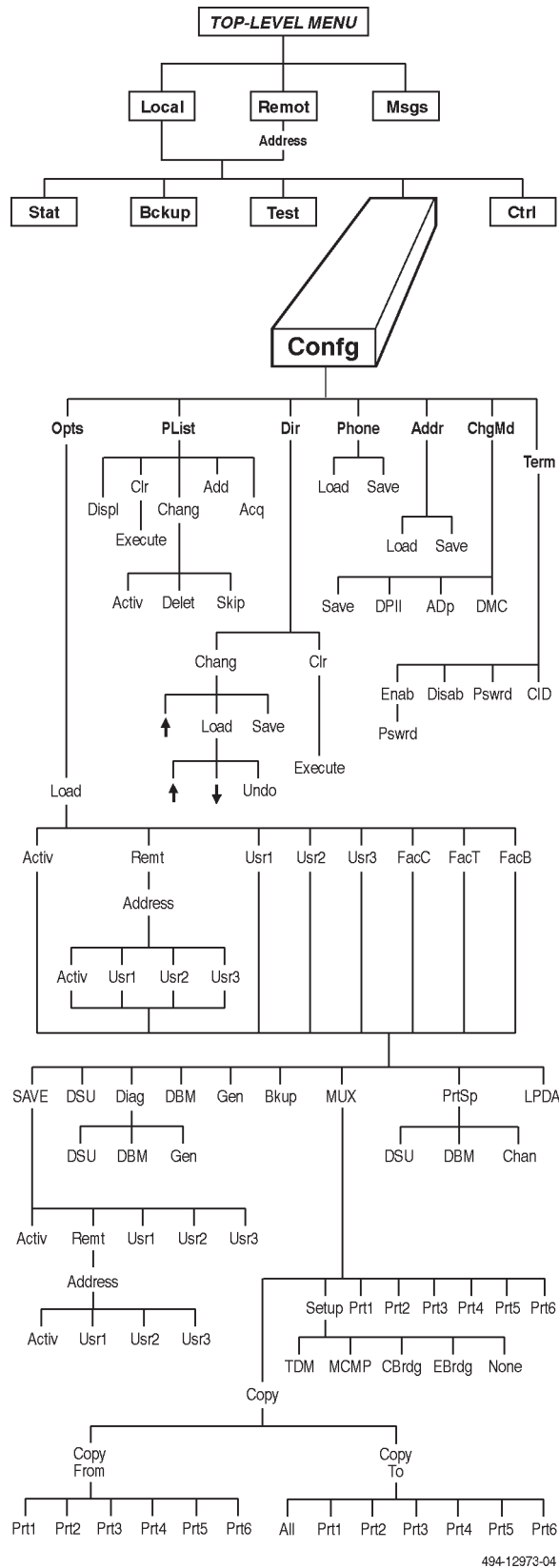
Pressing any key *except* the \triangle key will stop the LCD portion of the Lamp test and return you to the DSU or DBM Test menu to abort the test. Once the test has been aborted, the LCD and LEDs stop flashing. Press the \triangle key to return to the DSU or DBM Tests menu or press the \triangle key to return to the top-level menu.

Configuration Branch

The Configuration (**Config**) branch allows you to configure or customize the DSU and its options (DBM, TDM and MCMP) to fit site requirements, to enter and change telephone numbers when a DBM is installed, and to specify the protocol used by a connected NMS.

The Configuration branch menu varies with the options being configured. When changing configuration options, **always select the mode first** (MUX Funct: TDM, MCMP, CBrdg, EBrdg, or None in the MUX Setup option set).

When the TDM or MCMP option is installed, the MUX and PrtSp (Port Speed) option sets appear. When the DBM is installed, the Diag (Diagnostic) DBM, DBM, and Bkup (Backup) options sets appear. In addition, the Dir (Directory) subbranch appears when the DBM option is installed. It is through Dir that dial strings (telephone numbers) are entered, changed, and stored in the Backup Directory.



Options

The Options (**Opts**) submenu allows you to save, copy, and/or change configuration options.

A DBM-V, DBM-S, or DBM-D can initiate a backup call using one of the following setup methods: fully automatic backup, partially automatic backup, or manual backup. To configure the DSU-DBM for each of these setup methods using the DBM and Backup configuration option sets, refer to the *COMSPHERE 3600 Series Data Service Units, Models 3610 and 3611, Dial Backup Module and SNA Diagnostic Interface Options, Applications Guide*.

When any part of the configuration is corrupted, reset all configuration options using factory templates (FacC, FacT, or FacB), and reenter the network address. Check the protocol mode if there is an NMS connection, and verify the Backup Directory entries and the local telephone number.

Recall that Usr1 and Usr2 are storage areas for user-defined configuration option sets, and that *Usr3* is shipped from the factory loaded with the configuration option sets for a DBM-V, DBM-S, or DBM-D. *Usr3 can be overwritten*. Refer to **Appendix B** of this guide for the default configuration options for a DBM-V, DBM-S or DBM-D should Usr3 be overwritten.

To learn how to edit (change) and save configuration options, and for a complete description of all configuration options, refer to the *COMSPHERE 3600 Series Data Service Units, Models 3610 and 3611, Operator's Guide*.

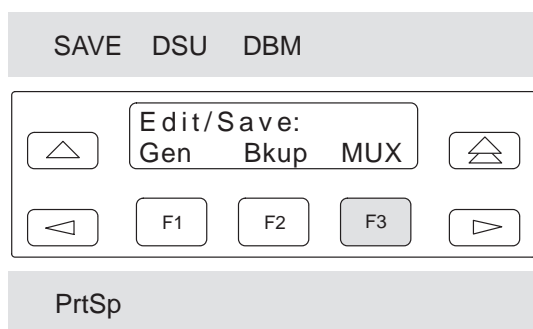
MUX Configuration Options

There are two submenus in the menu tree dedicated to configuring the TDM or MCMP: MUX and PrtSp. These submenus are used to select the mode of operation or function (TDM, MCMP, Bridge, or None), and to set the port options – port or channel speeds, an underspeed port (if needed), or channel assignment to ports.

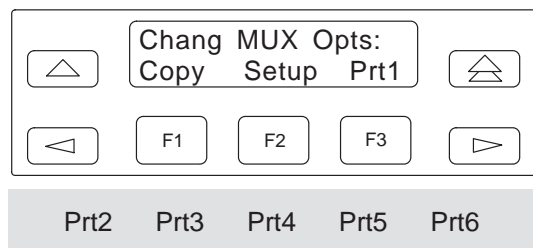
To access the MUX submenu from the top-level menu, make the following selections:

- Local (F1), or Remote (F2) and Address
- Config
- Opts
- Load from: Activ
- Press the \triangleright key to scroll the MUX selection into view

The **Load from** submenu displays the following selections:



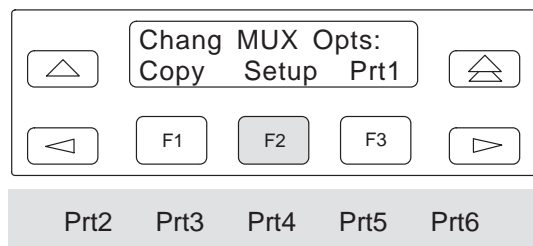
Press the \triangleleft key to scroll the SAVE, DSU, and DBM selections into view; press the \triangleright key to scroll the PrtSp selection into view. Select MUX and the following appears:



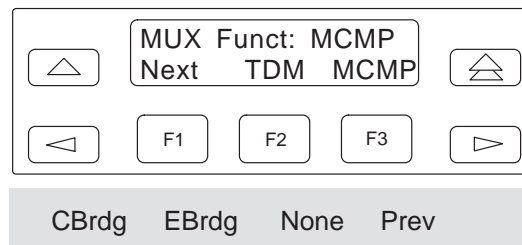
With the **Copy** selection, configuration options set for one port can be copied over to either a single port or to all other ports. The **Setup** selection allows the TDM or MCMP to be disabled (enabling Basic mode), or the TDM or MCMP to be enabled (enabling TDM or MCMP mode, or Bridge mode). Selections **Prt1** through **Prt6** allow configuration options to be set on a per-port basis.

MUX Setup Option Set

Press the F2 key to select the mode of operation and access the MUX Setup submenu.



The Setup selection displays the first configuration option in the Setup option set, MUX Funct, which is shown below and which selects the DSU-TDM's or DSU-MCMP's mode of operation.



Select the DSU-TDM's or DSU-MCMP's mode of operation by making one of the following selections:

- **TDM mode** – Set MUX Funct to TDM.
- **MCMP mode** – Set MUX Funct to MCMP. (This mode is only available to a DSU-MCMP.)
- **Bridge mode** – Set MUX Funct to *CBrdg* for the TDM or MCMP circuit card to operate as a central-site bridge, or to *EBrdg* for the TDM or MCMP circuit card to operate as an extended bridge.
- **Basic mode** – Set MUX Funct to None to disable the TDM or MCMP circuit card.

NOTE

Always select the mode (MUX Funct) first, then set the configuration options within the option set. The mode affects the configuration options that are available, as well as the values that are displayed for each.

Figure 5-13 maps mode of operation to the applicable Configuration Option Tables (refer to Chapter 6 of the *COMSPHERE 3600 Series Data Service Units, Models 3610 and 3611, Operator's Guide* for these tables). These tables are arranged by option set and presented in menu tree order. They describe the function or purpose of each configuration option in the set and describe each possible selection.

NOTE

Configuration Option Worksheets in Appendix B summarize the configuration options in each option set by mode of operation. You may want to record configuration option selections on one of these worksheets.

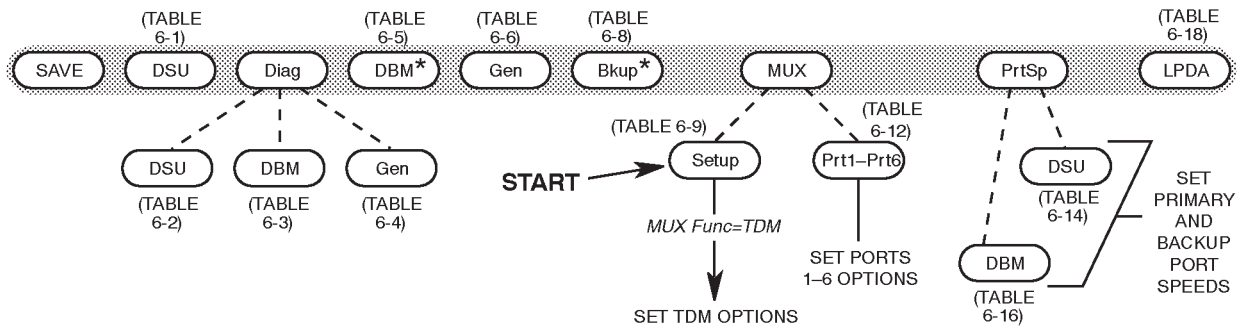
In TDM mode, the DSU performs several verification checks like verifying that the sum of the port speeds does not exceed the DDS or backup line speed (line speeds are set in the DSU and DBM submenus; primary and backup

port speeds are set in the PrtSp submenu). The DSU will not save configuration option selections if there is a mismatch in option settings. Refer to the *COMSPHERE 3600 Series Data Service Units, Models 3610 and 3611, Operator's Guide* for a list of TDM or MCMP error messages, what they mean, and how they can be corrected.

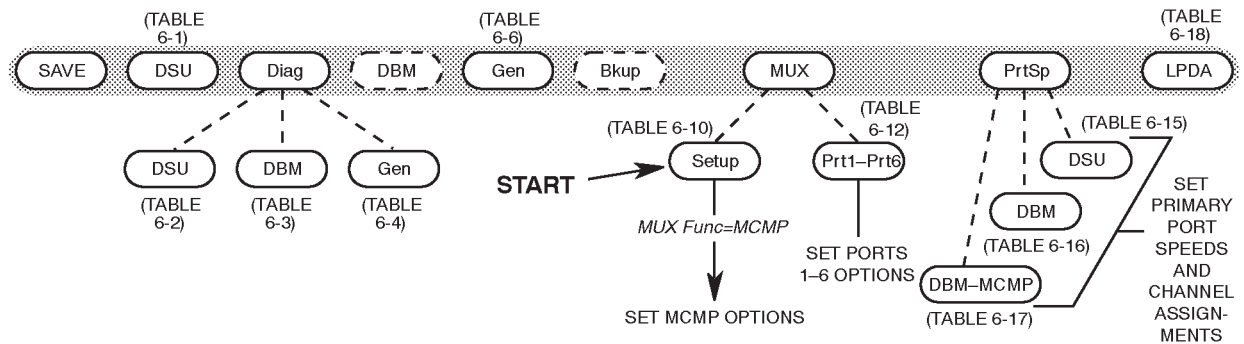
When choosing TDM, MCMP, or Bridge mode, you are presented with the configuration options listed in Table 5-9. In this table, the configuration options *with an X* for a particular mode are valid for the mode selected. A configuration option *without an X* either does not appear in that mode, is forced to a certain value, or has no meaning for that mode. For an option forced to a certain value, all of the values normally available to that option still appear, but changes made have no effect; the configuration option's value is not overwritten in software.

For a bridge configuration consisting of a central-site bridge and one or more extended bridges, digital bridge configuration options must be set for each DSU in the bridge. Address each of the DSUs through the DCP and set the configuration options.

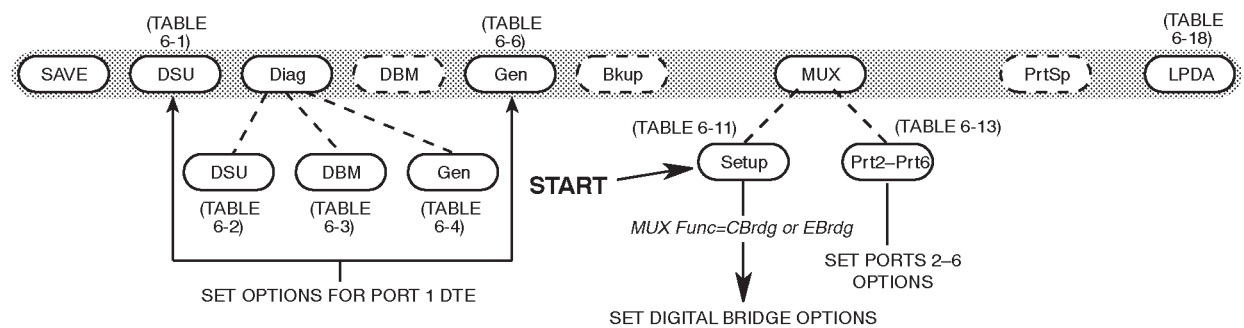
TDM MODE **



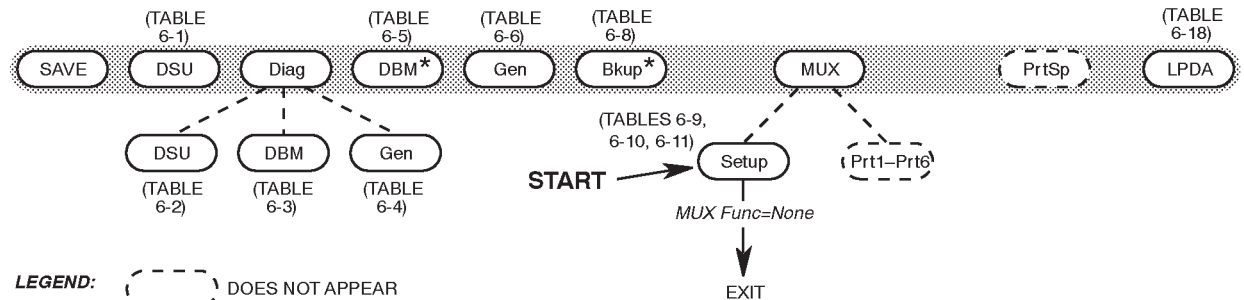
MCMP MODE **



BRIDGE MODE ***



BASIC MODE **



LEGEND: DOES NOT APPEAR

- * ONLY APPEARS WITH DBM OPTION.
- ** WHEN CHANGING FROM BRIDGE MODE TO ANY OTHER MODE, LOAD FROM FacC OR FacT.
- *** WHEN CHANGING FROM ANY OTHER MODE TO BRIDGE MODE, LOAD FROM FacB.

NOTE: TABLES 6-1 THROUGH 6-18 CAN BE FOUND IN THE COMSPHERE 3600 SERIES DATA SERVICE UNITS, MODELS 3610 AND 3611, OPERATOR'S GUIDE.

494-12833-04

Figure 5-13. Choosing Mode of Operation and Setting Configuration Options

Table 5-9
Complete List of MUX Setup Configuration Options

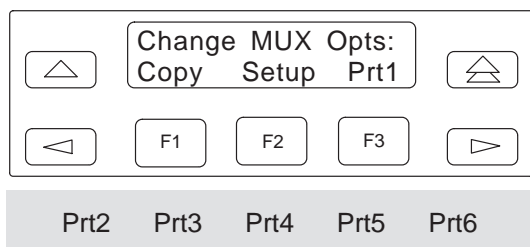
Option	Function	Mode of Operation		
		TDM	MCMP	Bridge
MUX Funct	Select mode of operation: TDM, MCMP, Bridge (CBrdg or EBrdg) or Basic (None).	X	X	X
Bridge Rate	Select bridge port speed; all active ports on the digital bridge are set to this speed.	Ignored	Ignored	X
Brdg Timing	Select where timing will be taken from during backup in Bridge mode.	Ignored	Ignored	X
Share DevA	Enable digital-sharing feature for one group.	X	X ¹	Must set to Enab
Lowest Port#	Select lowest port number in the first digital-sharing group.	X	X ¹	X
#Ports in Gp	Select number of ports to be in the first digital-sharing group.	X	X ¹	X
Port Cntrl	Configure the first digital-sharing group with or without contention.	X	X ¹	X
Share DevB	Enable digital-sharing feature for a second group.	X	X ¹	Must set to Disab
Lowest Port#	Select lowest port number in the second digital-sharing group.	X	X ¹	Ignored
#Ports in Gp	Select number of ports to be in the second digital-sharing group.	X	X ¹	Ignored
Port Cntrl	Configure the second digital-sharing group with or without contention.	X	X ¹	Ignored
P1/2 FEPSH	Enable FEP port-sharing group consisting of Ports 1 and 2.	X	X	Forced to Disab
P3/4 FEPSH	Enable FEP port-sharing group consisting of Ports 3 and 4.	X	X	Forced to Disab
P5/6 FEPSH	Enable FEP port-sharing group consisting of Ports 5 and 6.	X	X	Forced to Disab
MCMP Bckup	Enable backup in either TDM or MCMP mode.	Ignored	X	Ignored

¹ In MCMP mode, a digital-sharing group may also be formed by assigning the same channel to each port wanted in the group. The host protocol must enforce the order of transmissions to avoid collisions. If contention is desired and the digital-sharing group consists of adjacent ports, the digital-sharing group can be recreated via configuration options Share Dev, Lowest Port#, and # of Ports in Gp. The digital-sharing group can then be configured for contention via Port Cntrl.

Port Option Sets

The Prt1 through Prt6 selections allow configuration options to be set on a per-port basis for TDM, MCMP, or Bridge mode.

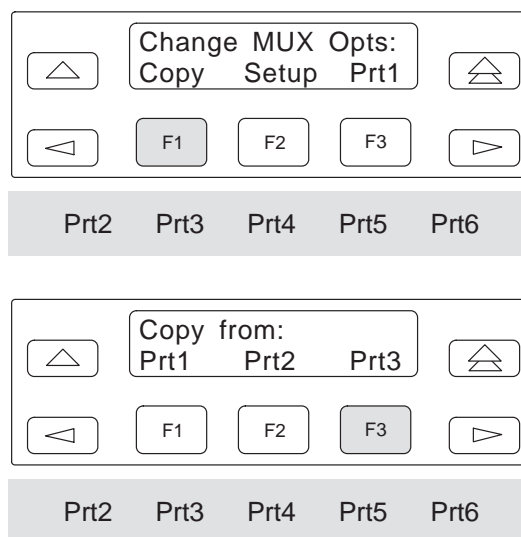
In TDM or MCMP mode, the Prt1 through Prt6 selections are available. In Bridge mode, the Prt2 through Prt6 selections are available; selections for **Prt1** are set via the DSU and Gen submenus (option sets).



In a port path, you are presented with the configuration options listed in [Table 5-10](#). In this table, the configuration options *with an X* for a particular mode are valid for the mode selected. A configuration option *without an X* either does not appear in that mode, is forced to a certain value, or has no meaning for that mode. For an option forced to a certain value, all of the values normally available to that option still appear, but changes made have no effect; the configuration option's value is not overwritten in software.

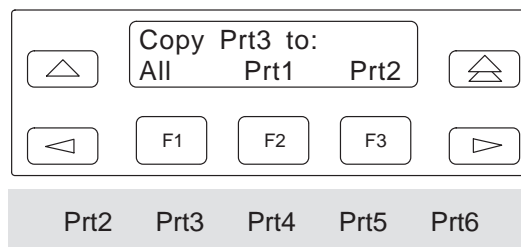
The **Copy** selection allows the set of configuration options that have been specified for a port to be copied into another port, or into all other ports. There are two menus associated with Copy: **Copy from** and **Copy to**.

To access the **Copy from** menu,



The **Prt1** selection in the **Copy from** menu appears in TDM or MCMP mode (shown above), but *not* in Bridge mode. Select a port (for this example, Port 3 is selected).

The **Copy to** menu appears.



If **All** is selected, a set of Prt3 configuration option values will be written to each port: Prt1 through Prt6 in TDM or MCMP mode, and Prt2 through Prt6 in Bridge mode. If a port is selected, the Prt3 configuration option values will only be written to the selected port.

Table 5-10
(1 of 2)
Complete List of MUX Port Configuration Options

Option	Function	Mode of Function		
		TDM	MCMP	Bridge
Async→Sync	Configure the port as asynchronous or synchronous.	X	X ¹	Forced to Disab
Async Rate	Select an asynchronous rate for the port.	X	X ¹	Ignored
AsyncBit/Char	Specify the length of the asynchronous character, including the parity bit but excluding the start and stop bits.	X	X ¹	Ignored
Stop Bits	Specify the number of stop bits in the asynchronous character.	X	X ¹	Ignored
Overspeed	Specify the overspeed percentage for the asynchronous DTE port.	X	X ¹	Ignored
RTS Cntrl	For the port, select whether RTS is to be Forced On or whether it is to follow the external RTS lead.	X	X	X
TxCarrSel	Enable the TDM or MCMP circuitry to simulate switched-carrier operation used by the V.13 protocol on an individual channel; this operation is also called pseudo-controlled carrier (PCC) mode.	X	X	Forced to Const
RxCarrSel	Enable the receiving DSU to look for V.13 codes on an individual channel that indicate transitions of RTS at the remote TDM or MCMP port; receiving DSU toggles LSD, as appropriate.	X	X	Forced to Const
PCC Buffer	Enable a buffer to intercept the PCC code on an individual channel so it is not received by the receiving DTE.	X	X	Ignored
Elast Stor	Enable the elastic store buffer (16-bit register) for the port.	X	X	X
RTS/CTS Del	For the port, select additional delay between the time RTS turns ON and CTS is turned ON.	X	X	X
DTR Alarm	Enable the DSU to report a major alarm for the port if the port's DTR lead goes Off.	X	X	X
AntiStream	Specify if the port is to be monitored for streaming terminal alarms.	X	X	X

¹ For MCMP mode, the values for configuration options Async→Sync, Async Rate, Async Bit/Char, and Stop Bits are set at the control DSU and loaded into each tributary DSU when the Acquire Poll List (Acq) command is issued from the control DSU's DCP. Refer to the *MCMP Operation* section of Chapter 4 and the *Poll List* section of this chapter.

Table 5-10
(2 of 2)
Complete List of MUX Port Configuration Options

Option	Function	Mode of Function		
DSR FrcOn	Enable port DSR lead to remain ON as long as the DSU is working, regardless of tests and network alarms.	X	X	X
DSR on Tst	Specify when the port DSR lead is turned ON or Off during testing.	X	X	Forced Off
Extend Chan	Specify whether an extended network has main channel connectivity during a test condition.	X	X	X
Upstrm Port	Specify the upstream port number when an extended control has main channel connectivity to its tributary.	X	X	X
DTE Port	Specify whether the port operates as an EIA-232 or V.35 interface.	X	X	X

Port Speed Configuration Options

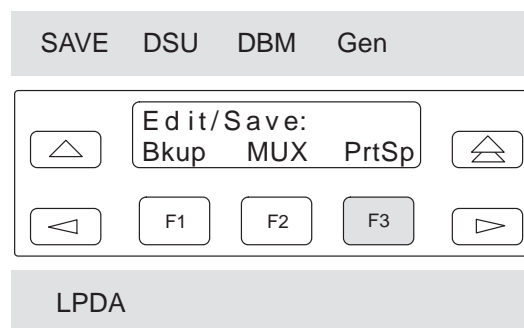
The Port Speed (**PrtSp**) submenu allows you to change the primary and backup port-speed configurations for TDM mode, and the primary port speed and channel-to-port assignment configurations for MCMP mode. For single-port operation, this option is available through the DSU submenu (option set).

Port speeds can be changed from either the NMS or from the DCP of the control DSU.

To access the PrtSp submenu from the top-level menu, make the following selections:

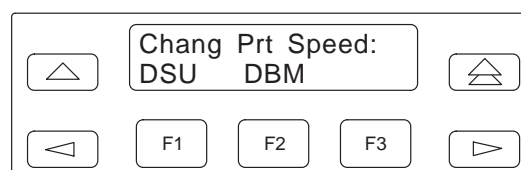
- Local (F1), or Remote (F2) and Address
- Config
- Opts
- Load from: Activ
- Press the \triangleright key to scroll the PrtSp selection into view

The Load from submenu displays the following selections:



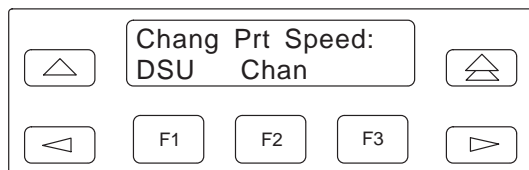
Select the PrtSp submenu.

If in TDM mode, the following is displayed:



Select the option set to be edited or changed. Selecting **DSU** allows you to change the primary port-speed configurations; selecting **DBM** allows you to change the backup port-speed configurations.

If in MCMP mode, the following is displayed:



Select the option set to be edited or changed. Selecting **DSU** allows you to change the primary port-speed configurations; selecting **Chan** allows you to change the channel-to-port assignment configurations.

Poll List

The Poll List (**PList**) submenu maintains or changes a DSU's poll list. A poll list identifies all DSUs or DBMs one level downstream in the network. A control DSU includes its tributary DSUs, or DSUs and DBMs in its poll list. A backbone tributary DSU includes any extended control DSUs, DBMs, or APL modems that are attached to the diagnostic channel (DC).

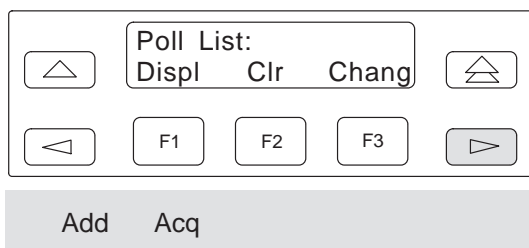
A poll list is available to any control DSU that is configured for nondisruptive or mixed diagnostics (Diag Type: NonD or Mixed), or a control DSU configured for MCMP mode and disruptive diagnostics (MUX Funct: MCMP and Diag Type: Disr). PList is also available for point-to-point tributary DSUs, or tributaries configured for MCMP mode and nondisruptive diagnostics in order to support extended diagnostic circuits.

PList is only available in the Local branch and only to a DSU configured with nondisruptive and mixed diagnostics.

To access PList from the top-level menu, make the following selections:

- Local (F1)
- Config
- PList

The following appears:



Press the \triangleright key to scroll other selections into view.

When PList is selected, four selections are displayed, unless the MCMP option is installed, in which case, there are five selections. Table 5-11 lists the PList selection options and their function.

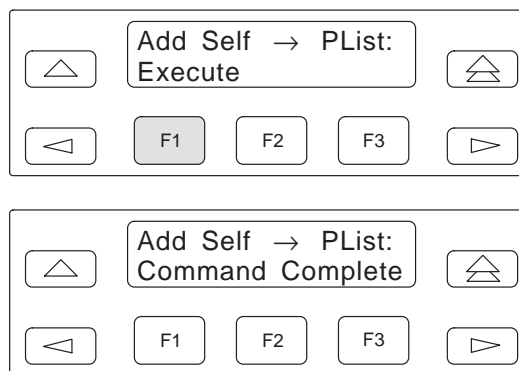
Table 5-11
Poll List Menu Options

Selections	Function
Displ	Displays each of the addresses in the poll list.
Clr	Clears (erases) all addresses from the poll list.
Chang	Selectively adds, deletes, or changes address in the poll list.
Add	Adds the tributary to the control DSU's poll list. For MCMP only, and only appears for a tributary DSU.
Acq	Polls all valid addresses and adds those addresses that respond to the poll list.

The following sections describe how a tributary DSU can add its network address to the control DSU's poll list, as well as how a control DSU acquires a poll list. Refer to *COMSPHERE 3600 Series Data Service Units, Models 3610 and 3611, Operator's Guide* for additional Poll List information.

Adding Self to Poll List

This PList selection is only available at a tributary DSU-MCMP unit operating in NonD diagnostics. The following menu displays after selecting PList, then **Add**:



The Add command is executed. A message is sent to the control DSU asking that the tributary be added to the polling list. The control DSU responds by acquiring the tributary DSU onto its polling list.

Acquiring the Poll List

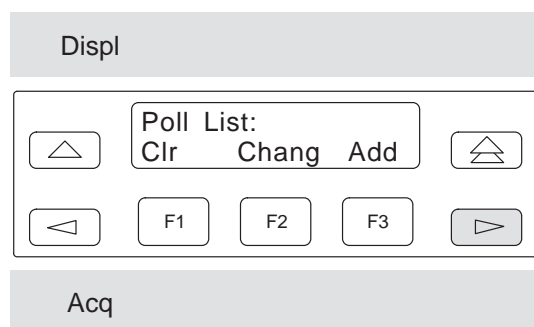
The first time the MCMP capability is activated on the network or after the network has been reconfigured, the Acquire Poll List (**Acq**) command must be issued from the control DSU's DCP to activate an initialization process. During the initialization process, the control DSU-MCMP performs the following tasks:

- Determines which tributaries are present on the network.
- Determines the roundtrip delay to each tributary.
- Loads whatever values have been assigned to the channel speed and asynchronous configuration options at the control DSU into each of the tributaries.

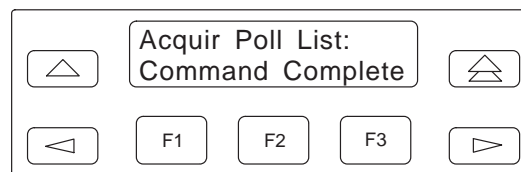
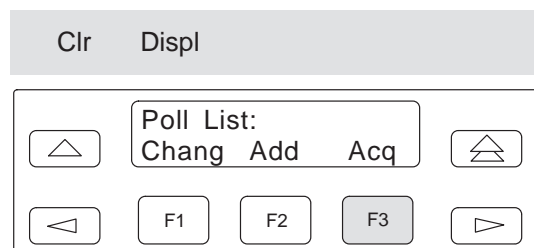
The initialization process typically takes less than 8 seconds to complete.

Once the control DSU determines the roundtrip delay for a tributary, it sends that information to the tributary. The tributary uses this information to determine when it should send data upon being polled by the FEP.

To acquire the Poll List, press the \triangleright key once.



Press the \triangleright key to display Acq.



All tributary addresses have been acquired.

Directory

The DSU's dial backup Directory (**Dir**) is available only if a DBM is installed, and only from the Local branch. It can store up to 10 dial strings so the DBM-V, DBM-S, or DBM-D can call other DBMs or modems. Each entry consists of a telephone number and may include other information, such as a callback directory pointer and a comment field.

A Backup Directory telephone number or dial string can contain any of the characters listed in [Table 5-12](#). Refer to *COMSPHERE 3600 Series Data Service Units, Models 3610 and 3611, Dial Backup Module, and SNA Diagnostic Options, Applications Guide* to learn how to access this subbranch, and for examples showing how to enter a dial string, to change it, to clear it, and to copy one directory entry into another.

Remember that a dial string can be up to 36 characters and cannot contain any separating characters or spaces (i.e., 555-1234 or 555 1234). Other valid characters can be interspersed: *, #, t, p, w, and comma (,). The **Undo** selection restores or erases the dial string. Entering an underscore (_) to the immediate right of the last character ends the field. After a directory entry has been entered or changed, save the entry.

CAUTION

Do not use Save until after you have loaded the directory entry displayed and, if necessary, edited the directory entry. Saving before a directory entry is loaded overwrites the current directory entry with random characters.

Table 5-12
Directory Entry and Password Characters

Character ¹	Use
0—9	Dialing digit (These are the only characters accepted by the Switched 56 DBM.)
*	Tone-dialing character *
#	Tone-dialing character #
t	Tone dial ²
p	Pulse dial ²
w	Wait for dial tone ²
	Delimiter, separating telephone number and callback directory pointer (for use with callback security).
, (comma)	In a dial string: Two-second pause; at the beginning of a password: suppress display of all following characters (invisible mode).
() (space)	Space (readability character) ³
_ (underscore)	Required character for end-of-string marker (Erase end-of-line)
¹ The colon (:) character should not be entered from the NMS. ² Not supported by Switched 56 DBMs. ³ Space is not used for directory entries.	

Phone

The local telephone number (**Phone**) feature is used to store the local DBM's telephone number. The DSU does not use this number in any of its operations; rather, the entry provides a convenient way to track the telephone number for future reference. The local telephone number is available in the Local branch *only* if a DBM (or DBM-V, DBM-S, or DBM-D) is installed. It is always available in the Remote branch, even though the remotely addressed DSU may not currently have a DBM installed; this allows the addition of a DBM to the DSU at a remote site.

A local telephone number can contain any of the characters listed in Table 5-12. Remember that the telephone number cannot contain any separating characters or spaces, although other valid characters can be interspersed: *, #, t, p, w, and comma (,). The **Undo** selection restores the number as it was originally displayed. After entering the number, save the local telephone number. (The **Save** selection would not be available if the DSU-DBM was operating in Remote mode, or if the DCP was locked.)

CAUTION

Do not use Save until after you have displayed and, if necessary, edited the local telephone number.

Refer to *COMSPHERE 3600 Series Data Service Units, Models 3610 and 3611, Dial Backup Module and SNA Diagnostic Interface Options, Applications Guide* to learn how to access this subbranch, and for an example of how to enter or change the this telephone number.

Async Terminal

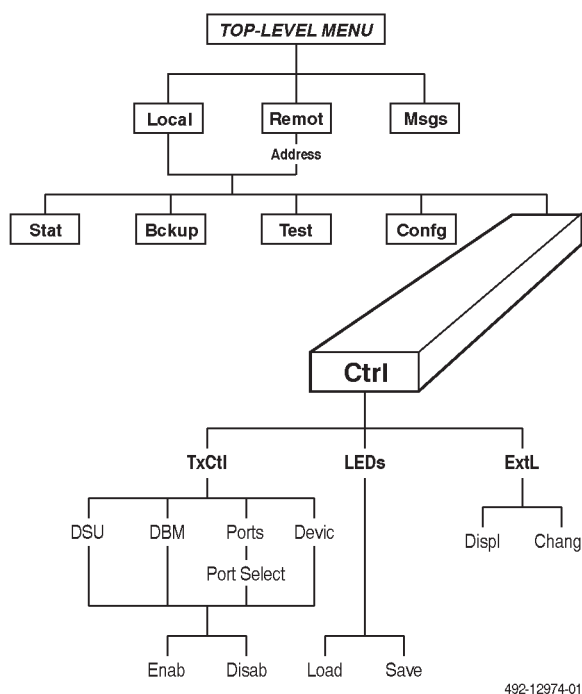
The Async Terminal (**Term**) feature allows you to manage the DSU through menus displayed using a VT100-compatible asynchronous terminal. This feature is available only for a Model 3610 standalone DSU with firmware version (DSU SW ver) 6.3x or greater.

This feature is enabled or disabled from this subbranch. Once enabled, the async terminal operates exactly as the DCP, but without the limitation of the 2-line, 16-character LCD. An entire menu (or submenu), test result, or range of configuration option selections appears on a single screen.

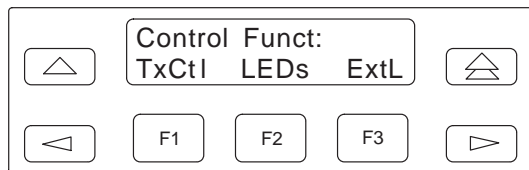
For additional information and examples, refer to the *COMSPHERE 3600 Series Data Service Units, Models 3610 and 3611, Operator's Guide*.

Control Branch

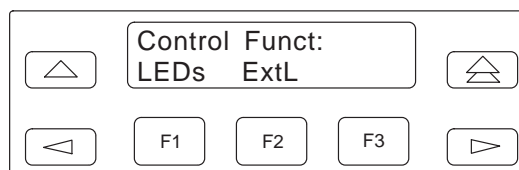
The Control (Ctrl) branch allows you to enable or disable the DSU's transmitter, as well as the DBM's, and to display/change the status of the general purpose external DTE leads.* For a DSU operating in TDM or MCMP mode, the Control branch allows the transmitter to be enabled or disabled on a per-port basis. It also allows you to choose which of the six ports is to have its circuit leads monitored.



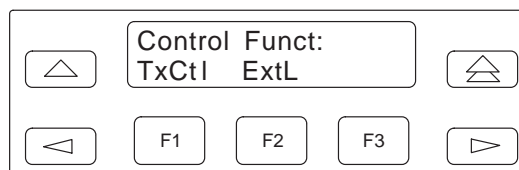
When in TDM or MCMP mode, the following selections appear:



When in Bridge mode, the following selections appear:



When in Basic mode, the following selections appear:



A DBM can be disabled if it is addressed from the Remote branch. The Control branch menu has three selections. Table 5-13 lists the selections on the Control branch menu.

Table 5-13
Control Branch Menu Options

Menu Selection	Purpose
TxCtl	Enables or disables the DSU's transmitter, or the DBM's call setup or answer capability.
LEDs	Selects whether the port or aggregate data stream is monitored on the faceplate LEDs. ¹
ExtL	Provides status and control of two external input leads and two output leads available for optional customer assignment.

¹ Only applies to TDM or MCMP applications, and only in Local mode.

Refer to the *COMSPHERE 3600 Series Data Service Units, Models 3610 and 3611, Operator's Guide* for additional information and examples.

*DSU and DBM subbranches are valid for Local mode only; Devic and Ports are displayed for Remote mode. Also, if General configuration option Ext Leads is set to ExtLd, Chang is not displayed.

Transmitter Control

Transmitter Control (**TxCtl**) allows you to enable or disable the DSU's transmitter (DDS core), the DBM's transmitter (the DBM's call setup and answering capability), or to enable or disable individual ports when operating in TDM or MCMP mode. You can also choose which of the six ports is to have its circuit leads monitored.

When the DSU transmitter is disabled, the following is possible:

- When a DSU is disabled, it responds to tests. Aborting a test clears the test but the unit remains disabled.
- A DSU in test clears the test when a disable (or enable) command is received.
- If an enable command is executed to a control from the NMS or the local DCP, all disabled tributaries are enabled; all tributaries in test are restored to Data mode.

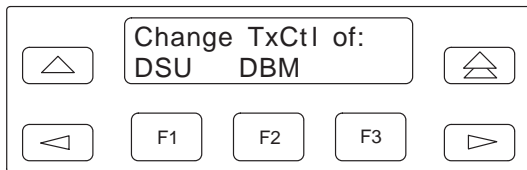
When the local DBM is disabled, the DBM does not originate or answer any calls until enabled.

To access the Transmitter selection from the top-level menu, make the following selections:

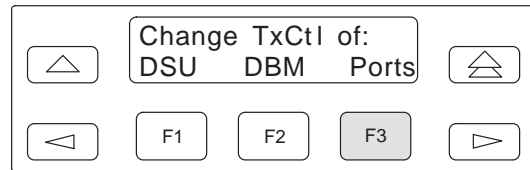
- Local (F1), or Remot (F2) and Address
- Ctrl
- TxCtl

The Transmitter Control submenu in Local mode differs from the one in Remote mode. Assume *Local mode* in the following discussion until directed otherwise.

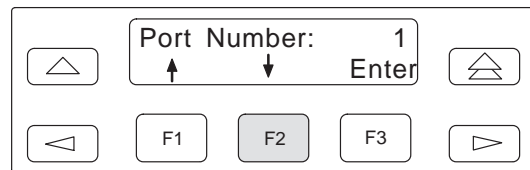
When in Basic mode, the following selections appear:



When in TDM or MCMP mode, the following selections appear:

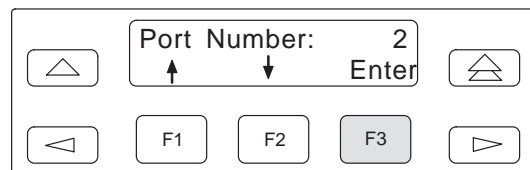
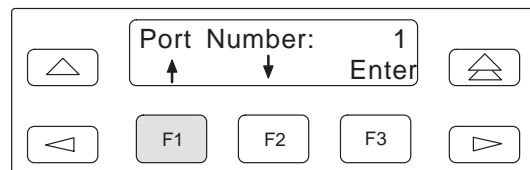


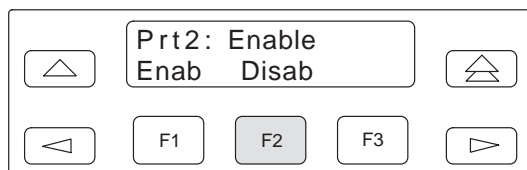
Select **DSU** for the DSU's transmitter (DDS core), select **DBM** for the DBM's transmitter (the DBM's call setup and answering capability, or DBM core), or select **Ports** for one (or more) of the TDM or MCMP circuit card's ports. For this example, select Ports. The following appears:



Use the F1 or F2 key to display the port number of your choice. Port number selections are 1, 2, 3, 4, 5, or 6. *If the Port Speed configuration option for a port is disabled, that port number will not display as a selection.* For example, if PrtSp for Port 3 is disabled, the port number selections would be 1, 2, 4, 5, or 6.

Change Port 1 to Port 2 and disable the port for this example.



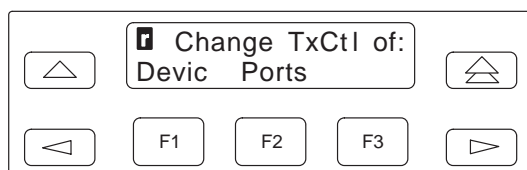
**NOTE**

If the DSU core is disabled, enabling all ports in TDM or MCMP mode *will not* enable the DSU core. You must specifically enable the DSU core.



The local DBM can be enabled or disabled in the same manner as for the ports.

In Remote mode, the following Transmitter Control submenu appears:



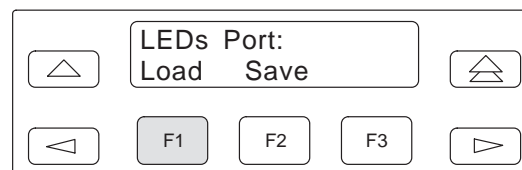
Select **Devic** (Device) to enable or disable the DSU or DBM. When selected, the address entered determines whether the DSU or DBM is enabled or disabled. Select **Ports** to enable or disable specific ports in Remote mode. Select a port as previously demonstrated.

LEDs

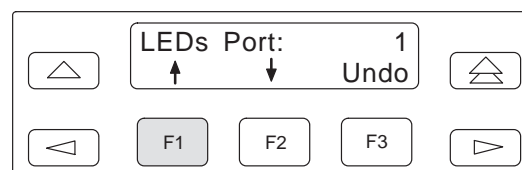
The **LEDs** selection is only available from the Local branch. This selection allows you to monitor any of the TDM or MCMP ports at any given time. When a port is selected, its lead activity is reflected in the DCP circuit designation status indicators (TXD, RXD, etc.). The LEDs on the TDM or MCMP circuit card show which ports are being monitored when the TDM or MCMP mode is in operation. You can also choose to monitor the aggregate data stream.

To access LEDs from the top-level menu, make the following selections:

- Local (F1)
- Ctrl
- LEDs



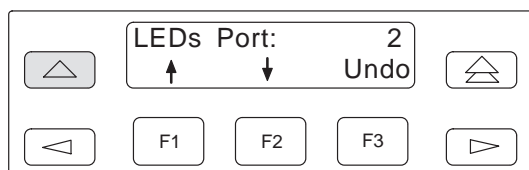
Press the F1 key to select Load. The following submenu appears:



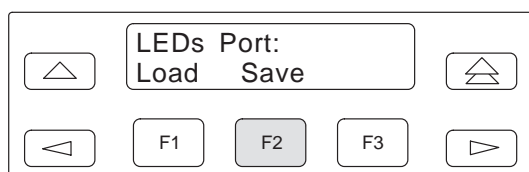
Use the F1 (\uparrow) or F2 (\downarrow) keys to display the port number of your choice. If you choose not to continue, press the F3 key (Undo) to restore the prior port value, then press the \triangle key to return to the top-level menu.

When in TDM or MCMP mode, the selections are 1, 2, 3, 4, 5, 6, or Aggr. **Aggr** is the communications interface between the aggregate data path (on the TDM or MCMP circuit card) and the DSU. *In Bridge mode*, the selections are 1, 2, 3, 4, 5, 6, or DCE. **DCE** is the communications interface between Port 1 (on the TDM or MCMP circuit card) and the DSU; Port 1 is the aggregate link to the DTE, while Ports 2 through 6 may be connected to DBM-Vs, DBM-Ss, or DBM-Ds.

Refer to the *TDM Architecture* and *Digital Bridge* sections of Chapter 4 for additional information.



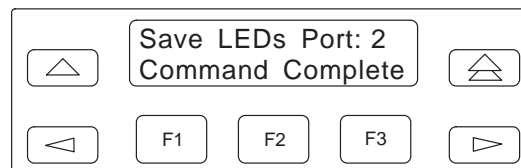
To continue with your change, press the \triangle key to return to the Load/Save menu selections.



Press the F2 (Save) key to change the monitored port to a new selection. *You must select Save to have the entry accepted.*

Results

The DSU displays the following, indicating that the command has been put into effect.

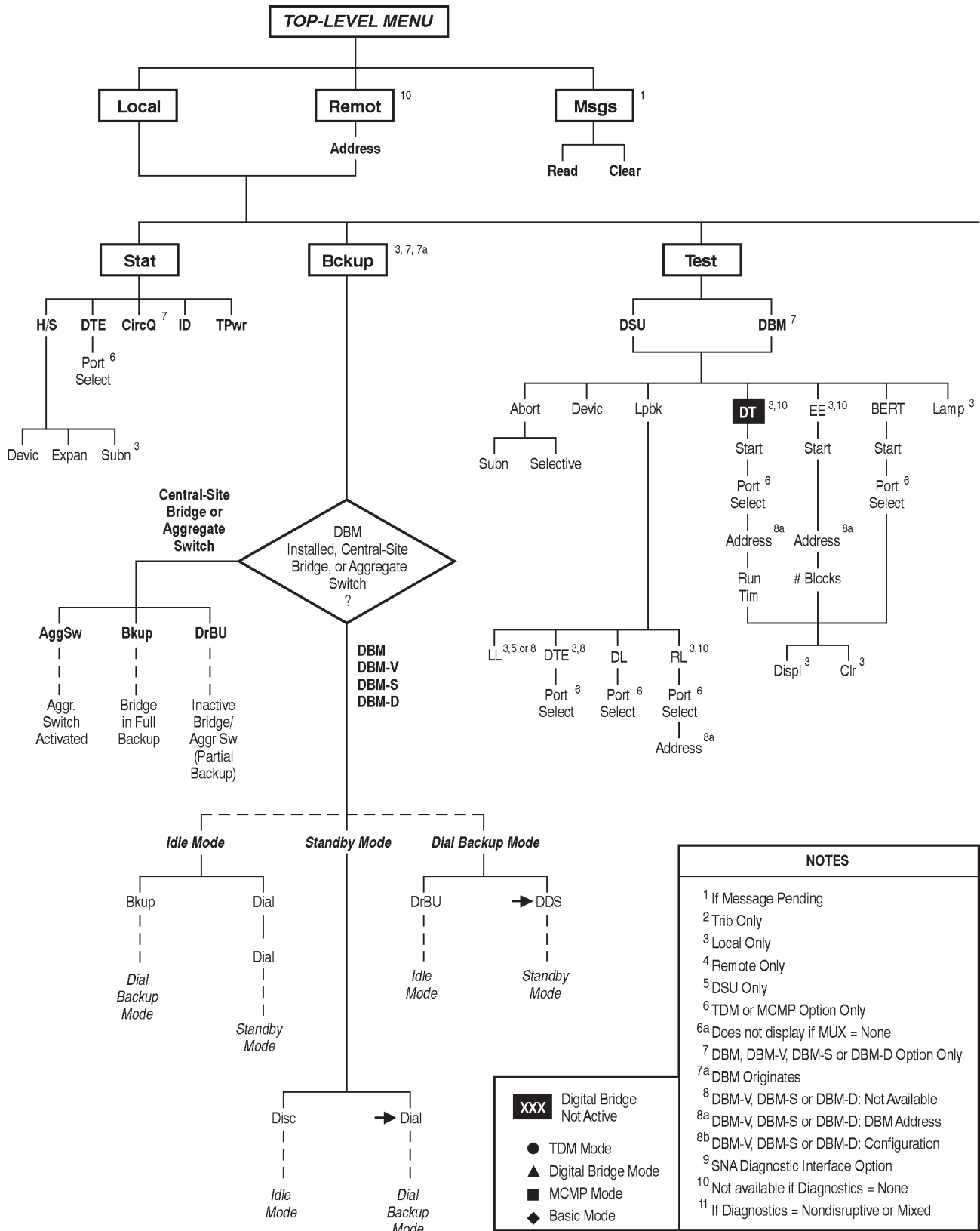


External Leads

Through the External Leads (**ExtL**) selection, you can display the state of four general-purpose leads on the EIA-232-D/V.24 Port 1 interface: Pins 12 and 13 for output (control leads) and Pins 19 and 23 for input (alarm leads). If the configuration option External Leads (Ext Leads) is set to ExtLd, you can change the state of the two output leads from the DCP or from a 6700 or 6800 Series NMS. If the DSU's diagnostic protocol is ADp and the CCN by External Leads (CCN by EL) configuration option has been enabled, a control DSU reports any changes to the four leads to the 6700 or 6800 Series NMS as part of its health and status poll response.

Refer to the *COMSPHERE 3600 Series Data Service Units, Models 3610 and 3611, Operator's Guide* for additional information and for examples.

Data Service Unit Menu **A**

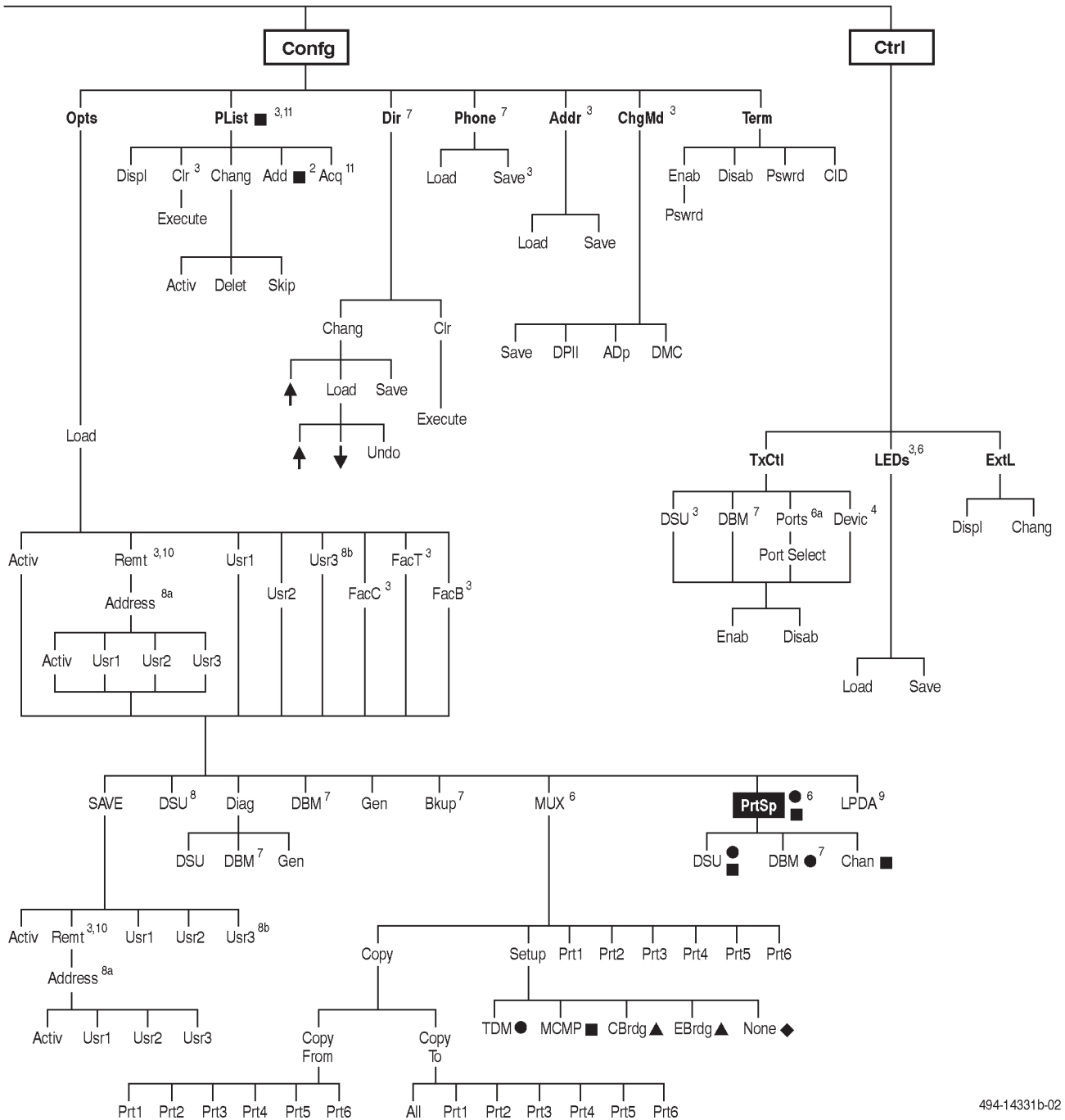


NOTES	
1	If Message Pending
2	Trib Only
3	Local Only
4	Remote Only
5	DSU Only
6	TDM or MCMP Option Only
6a	Does not display if MUX = None
7	DBM, DBM-V, DBM-S or DBM-D Option Only
7a	DBM Originates
8	DBM-V, DBM-S or DBM-D: Not Available
8a	DBM-V, DBM-S or DBM-D: DBM Address
8b	DBM-V, DBM-S or DBM-D: Configuration
9	SNA Diagnostic Interface Option
10	Not available if Diagnostics = None
11	If Diagnostics = Nondisruptive or Mixed

XXX Digital Bridge Not Active

- TDM Mode
- ▲ Digital Bridge Mode
- MCMP Mode
- ◆ Basic Mode

ABBREVIATIONS		Confg	Configure	DTE	DTE Loopback	Lpbk	Loopback
→ DDS	Switch to DDS Path	Ctrl	Control	EE	End-to-End Test	Msgs	Messages
→ Dial	Switch to DDD Path	Devic	Device Test	ExtL	External Leads	Opts	Configuration Options
Acq	Acquire	Diag	Diagnostic	FacB	Factory Bridge	PList	Poll List
AggSw	Aggregate Switch	Dir	Directory	FacC	Factory Control	PrtSp	Port Speed
Bckup	Backup	Disc	Disconnect	FacT	Factory Tributary	Remot	Remote Mode
BERT	Bit Error Rate Test	DL	Digital Loopback	H/S	Device Health/Status	RL	Remote Loopback
ChgMd	Change Mode	DrBU	Drop Backup	ID	Identity	Stat	Status
CircQ	Circuit Quality	Dspl	Display	LEDs	Monitor Port	TPwr	Terminal Power
Clr	Clear	DT	Digital Test	LL	Local Loopback	TxCtl	Transmitter Control



494-14331b-02

Configuration Worksheets **B**

Overview	B-1
Instructions	B-1

Overview

This appendix contains a complete set of Configuration Worksheets used for the 3600 Series DSU and its options. Each copy is specific to the DSU's mode of operation: TDM, MCMP, Bridge, and Basic mode. There is also a Configuration Worksheet that applies to the DBM-V, DBM-S, or DBM-D. These sets include the following:

- Configuration Worksheet for TDM Mode, which is used for the DSU with TDM. This worksheet includes the DBM and SNA Diagnostic Interface options, as well, so no other worksheet is required.
- Configuration Worksheet for MCMP Mode, which is used for the DSU with MCMP. This worksheet includes the DBM and SNA Diagnostic Interface options, as well, so no other worksheet is required.
- Configuration Worksheet for Bridge Mode, which is used for the DSU with TDM or MCMP. This worksheet includes the SNA Diagnostic Interface option, as well, so no other worksheet is required.
- Configuration Worksheet for Basic Mode, which is used when the TDM or MCMP circuit card is disabled, for the DSU without options, or the DSU with only the DBM and/or SNA Diagnostic Interface options.
- Configuration Worksheet for Basic (DBM-V, DBM-S, or DBM-D) Mode, which is used for the DBM-V, DBM-S, or DBM-D that is connected to the TDM or MCMP operating in Bridge mode.

A Configuration Worksheet summarizes the DSU-TDM's or DSU-MCMP's option sets, configuration options, and configuration option values. An explanation for each configuration option within each option set based upon the DSU's mode of operation is provided in the *Configuration Option Tables* section in Chapter 6 of the *COMSPHERE 3600 Series Units, Models 3610 and 3611, Operator's Guide*.

If more detailed configuration information is needed when configuring the unit, refer to *Configuration Options*, Chapter 6, of the *COMSPHERE 3600 Series Units, Models 3610 and 3611, Operator's Guide*.

Instructions

Configuration Worksheets can be used for reference, to record changes made to the DSU's configuration options, or to record the configurations saved to the Usr1, Usr2, or Usr3 areas of the DSU.

Make a copy of the appropriate Configuration Worksheets provided in this appendix. Complete the information at the top of each worksheet first. If you have a Model 3610 (standalone) DSU with TDM or MCMP, enter your site in the location field. If you have a Model 3611 (carrier-mounted) DSU with TDM or MCMP, enter the DSU's carrier and slot location. If recording Model 3611 DSU configurations, make a copy for each DSU-TDM or DSU-MCMP.

Record the configuration or changes by circling the appropriate configuration setting, either all of the configuration options or all those that change from their factory-loaded default values. Circle the appropriate hardware strap settings as well.

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Configuration Worksheet for TDM Mode (1 of 3)

Date: _____

Location: _____

Local Phone Number: () _____

Device: _____

Local Address: _____

DBM Installed

Serial No.: _____

Tributary Network Address: _____

SNA Diagnostic Interface (LPDA-2) Installed

MUX Setup Options	Value Options
MUX Funct: (TDM)	TDM, MCMP*, CBrdg, EBrdg, None
Share DevA:	Enab, Disab
Lowest Port#:	1, 2, 3, 4, 5
#Ports in Gp:	2, 3, 4, 5, 6
Port Cntrl:	Host, DSD
Share DevB:	Enab, Disab
Lowest Port#:	1, 2, 3, 4, 5
#Ports in Gp:	2, 3, 4, 5, 6
Port Cntrl:	Host, DSD
P1/2 FEPSH:	Enab, Disab
P3/4 FEPSH:	Enab, Disab
P5/6 FEPSH:	Enab, Disab

* MCMP option only

** Available for TDM/Flex with DSU firmware version 6.3x or greater

Prt3 Options	Value
Async→Sync	Enab, Disab
Async Rate	=Sync, 1800, 1200, 600, 300, 150
AsyncBit/Char	6, 7, 8, 9, 10
Stop Bits	1, 2
Overspeed	1.25, 2.5
RTS Cntrl	FrcOn, DTE
TxCarrSel	Const, Cntrl
RxCarrSel	Const, Cntrl, Mark
PCC Buffer	Enab, Disab
Elast Stor	Enab, Disab
RTS/CTS Del (Chang)	0-1040 ms (8 ms increments)
DTR Alarm	Enab, Disab
Antistream (Chang)	Disab, 1-100 sec (async terminal = 0-100)
DSR FrcOn	Enab, Disab
DSR on Tst	Enab, Disab
Extend Chan	Yes, No
Upstrm Port	Prt1, Prt2, Prt3, Prt4, Prt5, Prt6
DTE Port**	EIA232, V.35

Prt1 Options	Value
Async→Sync	Enab, Disab
Async Rate	=Sync, 1800, 1200, 600, 300, 150
AsyncBit/Char	6, 7, 8, 9, 10
Stop Bits	1, 2
Overspeed	1.25, 2.5
RTS Cntrl	FrcOn, DTE
TxCarrSel	Const, Cntrl
RxCarrSel	Const, Cntrl, Mark
PCC Buffer	Enab, Disab
Elast Stor	Enab, Disab
RTS/CTS Del (Chang)	0-1040 ms (8 ms increments)
DTR Alarm	Enab, Disab
Antistream (Chang)	Disab, 1-100 sec (async terminal = 0-100)
DSR FrcOn	Enab, Disab
DSR on Tst	Enab, Disab
Extend Chan	Yes, No
Upstrm Port	Prt1, Prt2, Prt3, Prt4, Prt5, Prt6
DTE Port**	EIA232, V.35

Prt4 Options	Value
Async→Sync	Enab, Disab
Async Rate	=Sync, 1800, 1200, 600, 300, 150
AsyncBit/Char	6, 7, 8, 9, 10
Stop Bits	1, 2
Overspeed	1.25, 2.5
RTS Cntrl	FrcOn, DTE
TxCarrSel	Const, Cntrl
RxCarrSel	Const, Cntrl, Mark
PCC Buffer	Enab, Disab
Elast Stor	Enab, Disab
RTS/CTS Del (Chang)	0-1040 ms (8 ms increments)
DTR Alarm	Enab, Disab
Antistream (Chang)	Disab, 1-100 sec (async terminal = 0-100)
DSR FrcOn	Enab, Disab
DSR on Tst	Enab, Disab
Extend Chan	Yes, No
Upstrm Port	Prt1, Prt2, Prt3, Prt4, Prt5, Prt6
DTE Port**	EIA232, V.35

Prt2 Options	Value
Async→Sync	Enab, Disab
Async Rate	=Sync, 1800, 1200, 600, 300, 150
AsyncBit/Char	6, 7, 8, 9, 10
Stop Bits	1, 2
Overspeed	1.25, 2.5
RTS Cntrl	FrcOn, DTE
TxCarrSel	Const, Cntrl
RxCarrSel	Const, Cntrl, Mark
PCC Buffer	Enab, Disab
Elast Stor	Enab, Disab
RTS/CTS Del (Chang)	0-1040 ms (8 ms increments)
DTR Alarm	Enab, Disab
Antistream (Chang)	Disab, 1-100 sec (async terminal = 0-100)
DSR FrcOn	Enab, Disab
DSR on Tst	Enab, Disab
Extend Chan	Yes, No
Upstrm Port	Prt1, Prt2, Prt3, Prt4, Prt5, Prt6
DTE Port**	EIA232, V.35

Prt5 Options	Value
Async→Sync	Enab, Disab
Async Rate	=Sync, 1800, 1200, 600, 300, 150
AsyncBit/Char	6, 7, 8, 9, 10
Stop Bits	1, 2
Overspeed	1.25, 2.5
RTS Cntrl	FrcOn, DTE
TxCarrSel	Const, Cntrl
RxCarrSel	Const, Cntrl, Mark
PCC Buffer	Enab, Disab
Elast Stor	Enab, Disab
RTS/CTS Del (Chang)	0-1040 ms (8 ms increments)
DTR Alarm	Enab, Disab
Antistream (Chang)	Disab, 1-100 sec (async terminal = 0-100)
DSR FrcOn	Enab, Disab
DSR on Tst	Enab, Disab
Extend Chan	Yes, No
Upstrm Port	Prt1, Prt2, Prt3, Prt4, Prt5, Prt6
DTE Port**	EIA232, V.35

Configuration Worksheet for TDM Mode (2 of 3)

Prt6 Options	Value	
Async→Sync	Enab, Disab	
Async Rate	=Sync, 1800, 1200, 600, 300, 150	
AsyncBit/Char	6, 7, 8, 9, 10	
Stop Bits	1, 2	
Overspeed	1.25, 2.5	
RTS Cntrl	FrcOn, DTE	
TxCarrSel	Const, Cntrl	
RxCarrSel	Const, Cntrl, Mark	
PCC Buffer	Enab, Disab	
Elast Stor	Enab, Disab	
RTS/CTS Del <i>(Chang)</i>	0–1040 ms	(8 ms increments)
DTR Alarm	Enab, Disab	
Antistream <i>(Chang)</i>	Disab, 1–100 sec	(async terminal = 0–100)
DSR FrcOn	Enab, Disab	
DSR on Tst	Enab, Disab	
Extend Chan	Yes, No	
Upstrm Port	Prt1, Prt2, Prt3, Prt4, Prt5, Prt6	
DTE Port**	EIA232, V.35	

DSU Options	Value	
Rate (Kpbs)	64CC, 64L, 56, 38.4, 19.2 9.6, 4.8, 2.4	
TxCkSource	Int, RXC, DDS, Prt1, Prt2, Prt3, Prt4, Prt5, Prt6	
Msg Clamp	Enab, Disab	
TxElasStor	Enab, Disab	
RxElasStor	Enab, Disab	
19.2 PowrLvl	+6, 0, –10	
64KScrambling	On, Off	
64KLatchLpbk	On, Off	
AggrSwitch	Enab, Disab	
AgSw Timing	Int, Aggr, Prt1, Prt2, Prt3, Prt4, Prt5, Prt6	
V.54 Lpbk	Enab, Disab	

PrtSp Options (DBM)	Value	
Prt1 ()	56, 48, 38.4, 32, 28.8, 19.2, 18.0, 16.8, 14.4, 12.0, 9.6, 9.2, 8.4, 7.2, 4.8, 4.0, 2.4, 2.0, 1.2, Disab	
Prt2 ()	56, 48, 38.4, 32, 28.8, 19.2, 18.0, 16.8, 14.4, 12.0, 9.6, 9.2, 8.4, 7.2, 4.8, 4.0, 2.4, 2.0, 1.2, Disab	
Prt3 ()	56, 48, 38.4, 32, 28.8, 19.2, 18.0, 16.8, 14.4, 12.0, 9.6, 9.2, 8.4, 7.2, 4.8, 4.0, 2.4, 2.0, 1.2, Disab	
Prt4 ()	56, 48, 38.4, 32, 28.8, 19.2, 18.0, 16.8, 14.4, 12.0, 9.6, 9.2, 8.4, 7.2, 4.8, 4.0, 2.4, 2.0, 1.2, Disab	
Prt5 ()	56, 48, 38.4, 32, 28.8, 19.2, 18.0, 16.8, 14.4, 12.0, 9.6, 9.2, 8.4, 7.2, 4.8, 4.0, 2.4, 2.0, 1.2, Disab	
Prt6 ()	56, 48, 38.4, 32, 28.8, 19.2, 18.0, 16.8, 14.4, 12.0, 9.6, 9.2, 8.4, 7.2, 4.8, 4.0, 2.4, 2.0, 1.2, Disab	
Underspeed:	Disab, Prt1, Prt2, Prt3, Prt4, Prt5, Prt6	

Diagnostic DBM Options	Value
Diag Type	NonD, Disr, Mixed, None
2nd Ch(bps)	100, 400, 800, 1200, 1600
RemoteDiag	V.54, Enhan, 2500

Diagnostic DSU Options	Value
Diag Type	NonD, Disr, Mixed, None
2nd Ch(bps)	100, 400, 800, 1200, 1600
Disr Type	2500, 2500, 3600s, 3600e, Br56

**Available for TDM/Flex with DSU firmware version 6.3x or greater

PrtSp Options (DSU)	Value	
Prt1 ()	64, 56, 48, 38.4, 32, 28.8, 19.2, 18.8, 18.0, 16.8, 14.4, 12.0, 9.6, 9.2, 8.4, 7.2, 4.8, 4.4, 4.0, 2.4, 2.0, 1.2, Disab	
Prt2 ()	64, 56, 48, 38.4, 32, 28.8, 19.2, 18.8, 18.0, 16.8, 14.4, 12.0, 9.6, 9.2, 8.4, 7.2, 4.8, 4.4, 4.0, 2.4, 2.0, 1.2, Disab	
Prt3 ()	64, 56, 48, 38.4, 32, 28.8, 19.2, 18.8, 18.0, 16.8, 14.4, 12.0, 9.6, 9.2, 8.4, 7.2, 4.8, 4.4, 4.0, 2.4, 2.0, 1.2, Disab	
Prt4 ()	64, 56, 48, 38.4, 32, 28.8, 19.2, 18.8, 18.0, 16.8, 14.4, 12.0, 9.6, 9.2, 8.4, 7.2, 4.8, 4.4, 4.0, 2.4, 2.0, 1.2, Disab	
Prt5 ()	64, 56, 48, 38.4, 32, 28.8, 19.2, 18.8, 18.0, 16.8, 14.4, 12.0, 9.6, 9.2, 8.4, 7.2, 4.8, 4.4, 4.0, 2.4, 2.0, 1.2, Disab	
Prt6 ()	64, 56, 48, 38.4, 32, 28.8, 19.2, 18.8, 18.0, 16.8, 14.4, 12.0, 9.6, 9.2, 8.4, 7.2, 4.8, 4.4, 4.0, 2.4, 2.0, 1.2, Disab	
Underspeed:	Disab, Prt1, Prt2, Prt3, Prt4, Prt5, Prt6	

Diagnostic General Options	Value
Position	Cntrl, Trib, G2Trb
LinkConfig	Pt-Pt, M-Pt
Resp Period	1, 2, 10
Trib TimOut <i>(Chang)</i>	min and sec
Diag Conn	CC, DC
Link Delay	0s, 1s, 2s, 5s, 10s, 20s, 50s
Network Delay	0s, 1s, 2s, 5s, 10s, 20s, 50s
Packet Delay	0s, 1s, 2s, 5s
M-Pt SymPrt	Enab, Disab
Fast Sel	Enab, Disab

Configuration Worksheet for TDM Mode (3 of 3)

DBM Options	Value
Rate(Kbps) †	14.4, 12.0, 9.6, 4.8, 2.4
TxCkSource †	Int, RXC, DSU, Prt1, Prt2, Prt3, Prt4, Prt5, Prt6
CarrLossDisc †	Yes, No
Auto Retrain †	Yes, No
Single Rate †	Yes, No
AutoAnswer	Enab, Disab
TxElasStor	Enab, Disab
RxElasStor	Enab, Disab
Call Setup	None, Pswrd, Clbk, Alarm
RxPwd (Chang)	
TxPwd (Chang)	
V.13 Signl	Enab, Disab
Dial Test	Enab, Disab
Primary Core	Yes, No
DtrCallCon	Orig ††, Ansr, Disab
EchoCancel*	Enab, Disab
Remote DBM**	2-wire, 4-wire

Backup Options	Value
Auto Bckup	Enab, Disab
Backup Dir (Chang)	1-10
BckupOnCMI	Enab, Disab
AutoRestor	Enab, Disab
NtwkTimOut (Chang)	min and sec
RestorTimOut (Chang)	min
TriesTimeOut (Chang)	min
MultiCall	Enab, Disab

Backup Directory	Dial String
1	
3	
4	
5	
6	
7	
8	
9	
10	

Hardware Straps	Value
DDD Interface †	Permissive, Programmable
Frame Ground/ Signal Ground	Connected, Disconnected
Test Mode Indication	Enabled, Disabled

ChgMd Options	Value
Mode	DPII, ADp, DMC

General Options	Value
DTE Port***	EIA232, V.35
RTS Cntrl	FrcOn, DTE
CTS Cntrl	Std, =RTS
LSD Lead	STD, Delay, FrcOn
CTS Lead	STD, Delay, FrcOn
SystemStat	Enab, Disab
Circ Assur	Enab, Disab
Tst Pattern	AT&T, Std
RespondRDL	Enab, Disab
LL by DTE	Enab, Disab
RL by DTE	Enab, Disab
Bilat Lpbk	Enab, Disab
Ext Leads	ExtLd, Rate, RPower
CCN by EL	Enab, Disab
SW Vers	3.22, 4.41, Normal
AnswExtBU	Enab, Disab
RLSD in MCMP**	Yes, No

LPDA-2 Options	Value
LPDA-2	Enab, Disab
LPDA Address (Chang)	1-256
SNA Backup	Enab, Disab
Code 1 (Chang)	
Code 2 (Chang)	

- † Not available if a Switched 56 DBM
- †† Not available if Primary Core is No
- * Switched 56 DBM only
- ** 2-wire Switched 56 DBM only
- *** Appears when non-Flex TDM installed or 6-port Flex with DSU firmware version less than 6.3x

Configuration Worksheet for MCMP Mode (1 of 3)

Date: _____

Location: _____

Local Phone No.: () _____

Device: _____

Local Address: _____

DBM Installed

Serial No.: _____

Tributary Network Address: _____

SNA Diagnostic Interface (LPDA-2) Installed

MUX Setup	Value
MUX Funct: (MCMP)	TDM, MCMP, CBrdg, EBrdg, None
Share DevA:	Enab, Disab
Lowest Port#:	1, 2, 3, 4, 5
#Ports in Gp:	2, 3, 4, 5, 6
Port Cntrl:	Host, DSD
Share DevB:	Enab, Disab
Lowest Port#	1, 2, 3, 4, 5
#Ports in Gp:	2, 3, 4, 5, 6
Port Cntrl:	Host, DSD
P1/2 FEPSH:	Enab, Disab
P3/4 FEPSH:	Enab, Disab
P5/6 FEPSH:	Enab, Disab
MCMP Bckup*	MCMP, TDM

*Switched 56 DBM only

**Available for MCMP/Flex with DSU firmware version 6.3x or greater

Prt3 Options	Value
Async→Sync	Enab, Disab
Async Rate	=Sync, 1800, 1200, 600, 300, 150
AsyncBit/Char	6, 7, 8, 9, 10
Stop Bits	1, 2
Overspeed	1.25, 2.5
RTS Cntrl	FrcOn, DTE
TxCarrSel	Const, Cntrl
RxCarrSel	Const, Cntrl, Mark
PCC Buffer	Enab, Disab
Elast Stor	Enab, Disab
RTS/CTS Del (Chang)	0-1040 ms (8 ms increments)
DTR Alarm	Enab, Disab
Antistream (Chang)	Disab, 1-100 sec (async terminal = 0-100)
DSR FrcOn	Enab, Disab
DSR on Tst	Enab, Disab
Extend Chan	Yes, No
Upstrm Port	Prt1, Prt2, Prt3, Prt4, Prt5, Prt6
DTE Port**	EIA232, V.35

Prt1 Options	Value
Async→Sync	Enab, Disab
Async Rate	=Sync, 1800, 1200, 600, 300, 150
AsyncBit/Char	6, 7, 8, 9, 10
Stop Bits	1, 2
Overspeed	1.25, 2.5
RTS Cntrl	FrcOn, DTE
TxCarrSel	Const, Cntrl
RxCarrSel	Const, Cntrl, Mark
PCC Buffer	Enab, Disab
Elast Stor	Enab, Disab
RTS/CTS Del (Chang)	0-1040 ms (8 ms increments)
DTR Alarm	Enab, Disab
Antistream (Chang)	Disab, 1-100 sec (async terminal = 0-100)
DSR FrcOn	Enab, Disab
DSR on Tst	Enab, Disab
Extend Chan	Yes, No
Upstrm Port	Prt1, Prt2, Prt3, Prt4, Prt5, Prt6
DTE Port**	EIA232, V.35

Prt4 Options	Value
Async→Sync	Enab, Disab
Async Rate	=Sync, 1800, 1200, 600, 300, 150
AsyncBit/Char	6, 7, 8, 9, 10
Stop Bits	1, 2
Overspeed	1.25, 2.5
RTS Cntrl	FrcOn, DTE
TxCarrSel	Const, Cntrl
RxCarrSel	Const, Cntrl, Mark
PCC Buffer	Enab, Disab
Elast Stor	Enab, Disab
RTS/CTS Del (Chang)	0-1040 ms (8 ms increments)
DTR Alarm	Enab, Disab
Antistream (Chang)	Disab, 1-100 sec (async terminal = 0-100)
DSR FrcOn	Enab, Disab
DSR on Tst	Enab, Disab
Extend Chan	Yes, No
Upstrm Port	Prt1, Prt2, Prt3, Prt4, Prt5, Prt6
DTE Port**	EIA232, V.35

Prt2 Options	Value
Async→Sync	Enab, Disab
Async Rate	=Sync, 1800, 1200, 600, 300, 150
AsyncBit/Char	6, 7, 8, 9, 10
Stop Bits	1, 2
Overspeed	1.25, 2.5
RTS Cntrl	FrcOn, DTE
TxCarrSel	Const, Cntrl
RxCarrSel	Const, Cntrl, Mark
PCC Buffer	Enab, Disab
Elast Stor	Enab, Disab
RTS/CTS Del (Chang)	0-1040 ms (8 ms increments)
DTR Alarm	Enab, Disab
Antistream (Chang)	Disab, 1-100 sec (async terminal = 0-100)
DSR FrcOn	Enab, Disab
DSR on Tst	Enab, Disab
Extend Chan	Yes, No
Upstrm Port	Prt1, Prt2, Prt3, Prt4, Prt5, Prt6
DTE Port**	EIA232, V.35

Prt5 Options	Value
Async→Sync	Enab, Disab
Async Rate	=Sync, 1800, 1200, 600, 300, 150
AsyncBit/Char	6, 7, 8, 9, 10
Stop Bits	1, 2
Overspeed	1.25, 2.5
RTS Cntrl	FrcOn, DTE
TxCarrSel	Const, Cntrl
RxCarrSel	Const, Cntrl, Mark
PCC Buffer	Enab, Disab
Elast Stor	Enab, Disab
RTS/CTS Del (Chang)	0-1040 ms (8 ms increments)
DTR Alarm	Enab, Disab
Antistream (Chang)	Disab, 1-100 sec (async terminal = 0-100)
DSR FrcOn	Enab, Disab
DSR on Tst	Enab, Disab
Extend Chan	Yes, No
Upstrm Port	Prt1, Prt2, Prt3, Prt4, Prt5, Prt6
DTE Port**	EIA232, V.35

Configuration Worksheet for MCMP Mode (2 of 3)

Prt6 Options	Value	
Async→Sync	Enab, Disab	
Async Rate	=Sync, 1800, 1200, 600, 300, 150	
AsyncBit/Char	6, 7, 8, 9, 10	
Stop Bits	1, 2	
Overspeed	1.25, 2.5	
RTS Cntrl	FrcOn, DTE	
TxCarrSel	Const, Cntrl	
RxCarrSel	Const, Cntrl, Mark	
PCC Buffer	Enab, Disab	
Elast Stor	Enab, Disab	
RTS/CTS Del <i>(Chang)</i>	0–1040 ms	(8 ms increments)
DTR Alarm	Enab, Disab	
Antistream <i>(Chang)</i>	Disab, 1–100 sec	(async terminal = 0–100)
DSR FrcOn	Enab, Disab	
DSR on Tst	Enab, Disab	
Extend Chan	Yes, No	
Upstrm Port	Prt1, Prt2, Prt3, Prt4, Prt5, Prt6	
DTE Port**	EIA232, V.35	

PrtSP (Chanl)	Value	
AssgmtPrt1	A, B, C, D, E, F, G, H, None	
AssgmtPrt2	A, B, C, D, E, F, G, H, None	
AssgmtPrt3	A, B, C, D, E, F, G, H, None	
AssgmtPrt4	A, B, C, D, E, F, G, H, None	
AssgmtPrt5	A, B, C, D, E, F, G, H, None	
AssgmtPrt6	A, B, C, D, E, F, G, H, None	

DSU Options	Value	
Rate (Kpbs)	56	
TxCkSource	Int, RXC, DDS	
Msg Clamp	Enab, Disab	
TxElasStor	Enab, Disab	
RxElasStor	Enab, Disab	
19.2 PowrLvl	+6, 0, -10	
64KScrambling	On, Off	
64KLatchLpbk	On, Off	
AggrSwitch	Enab, Disab	
AgSw Timing	Int, Aggr	
V.54 Lpbk	Enab, Disab	

PrtSp Options (DSU)	Value	
Prt1 ()	48, 38.4, 19.2, 18.0, 16.8, 14.4, 12.0, 9.6, 7.2, 4.8, 2.4, 1.2, Disab	
Prt2 ()	48, 38.4, 19.2, 18.0, 16.8, 14.4, 12.0, 9.6, 7.2, 4.8, 2.4, 1.2, Disab	
Prt3 ()	48, 38.4, 19.2, 18.0, 16.8, 14.4, 12.0, 9.6, 7.2, 4.8, 2.4, 1.2, Disab	
Prt4 ()	48, 38.4, 19.2, 18.0, 16.8, 14.4, 12.0, 9.6, 7.2, 4.8, 2.4, 1.2, Disab	
Prt5 ()	48, 38.4, 19.2, 18.0, 16.8, 14.4, 12.0, 9.6, 7.2, 4.8, 2.4, 1.2, Disab	
Prt6 ()	48, 38.4, 19.2, 18.0, 16.8, 14.4, 12.0, 9.6, 7.2, 4.8, 2.4, 1.2, Disab	
Underspeed:	Disab, Prt1, Prt2, Prt3, Prt4, Prt5, Prt6	

PrtSp Options (DBM)**	Value	
Prt1 ()	56*, 48*, 38.4*, 32*, 28.8*, 19.2*, 18.0*, 16.8*, 14.4, 12.0, 9.6, 8.4, 7.2, 4.8, 4.0, 2.4, 2.0, 1.2, Disab	
Prt2 ()	56*, 48*, 38.4*, 32*, 28.8*, 19.2*, 18.0*, 16.8*, 14.4, 12.0, 9.6, 8.4, 7.2, 4.8, 4.0, 2.4, 2.0, 1.2, Disab	
Prt3 ()	56*, 48*, 38.4*, 32*, 28.8*, 19.2*, 18.0*, 16.8*, 14.4, 12.0, 9.6, 8.4, 7.2, 4.8, 4.0, 2.4, 2.0, 1.2, Disab	
Prt4 ()	56*, 48*, 38.4*, 32*, 28.8*, 19.2*, 18.0*, 16.8*, 14.4, 12.0, 9.6, 8.4, 7.2, 4.8, 4.0, 2.4, 2.0, 1.2, Disab	
Prt5 ()	56*, 48*, 38.4*, 32*, 28.8*, 19.2*, 18.0*, 16.8*, 14.4, 12.0, 9.6, 8.4, 7.2, 4.8, 4.0, 2.4, 2.0, 1.2, Disab	
Prt6 ()	56*, 48*, 38.4*, 32*, 28.8*, 19.2*, 18.0*, 16.8*, 14.4, 12.0, 9.6, 8.4, 7.2, 4.8, 4.0, 2.4, 2.0, 1.2, Disab	
Underspeed:	Disab, Prt1, Prt2, Prt3, Prt4, Prt5, Prt6	

Diagnostic DSU Options	Value	
Diag Type	NonD, Disr, Mixed, None	
2nd Ch(bps)	100, 400, 800, 1200, 1600	
Disr Type	2500, 2500, 3600s, 3600e, Br56	

* Switched 56 DBM only
 ** Available for MCMP/Flex with DSU firmware version 6.3x or greater
 *** TDM Backup only
 **** 2-wire Switched 56 DBM only
 † Not available if a Switched 56 DBM
 †† Not available if a Primary Core is No

Diagnostic DBM Options	Value	
Diag Type	NonD, Disr, Mixed, None	
2nd Ch(bps)	100, 400, 800, 1200, 1600	
RemoteDiag	V.54, Enhan, 2500	

Diagnostic General Options	Value	
Position	Cntrl, Trib	
LinkConfig	Pt-Pt, M-Pt	
Resp Period	1, 2, 10	
Trib TimOut <i>(Chang)</i>	sec to min	
Diag Conn	CC, DC	
Link Delay	0s, 1s, 2s, 5s, 10s, 20s, 50s	
Network Delay	0s, 1s, 2s, 5s, 10s, 20s, 50s	
Packet Delay	0s, 1s, 2s, 5s	
Fast Sel	Enab, Disab	

DBM Options	Value	
Rate(Kbps) †	14.4, 12.0, 9.6, 4.8, 2.4	
TxCkSource †	Int, RXC, DSU	
CarrLossDisc †	Yes, No	
Auto Retrain †	Yes, No	
Single Rate †	Yes, No	
AutoAnswer	Enab, Disab	
TxElasStor	Enab, Disab	
RxElasStor	Enab, Disab	
Call Setup	None, Pswrd, Cllbk, Alarm	
RxPwrd <i>(Chang)</i>		
TxPwrd <i>(Chang)</i>		
V.13 Signl	Enab, Disab	
Dial Test	Enab, Disab	
Primary Core	Yes, No	
DtrCallCon	Orig ††, Ansr, Disab	
EchoCancel*	Enab, Disab	
Remote DBM***	2-wire, 4-wire	

Configuration Worksheet for MCMP Mode (3 of 3)

General Options	Value
DTE Port*	EIA232, V.35
RTS Cntrl	FrcOn, DTE
CTS Cntrl	Std, =RTS
LSD Lead	STD, Delay, FrcOn
CTS Lead	STD, Delay, FrcOn
SystemStat	Enab, Disab
Circ Assur	Enab, Disab
Tst Pattern	AT&T, Std
RespondRDL	Enab, Disab
LL by DTE	Enab, Disab
RL by DTE	Enab, Disab
Bilat Lpbk	Enab, Disab
Ext Leads	ExtLd, Rate, RPower
CCN by EL	Enab, Disab
SW Vers	3.22, 4.41, Normal
AnswExtBU	Enab, Disab
RLSD in MCMP	Yes, No

Backup Options	Value
Auto Bckup	Enab, Disab
Backup Dir (Chang)	1-10
BckupOnCMI	Enab, Disab
AutoRestor	Enab, Disab
NtwkTimOut (Chang)	min and sec
RestorTimOut (Chang)	min
TriesTimeOut (Chang)	min
MultiCall	Enab, Disab

Hardware Straps	Value
DDD Interface†	Permissive, Programmable
Frame Ground/ Signal Ground	Connected, Disconnected
Test Mode Indication	Enable, Disable

ChgMd Options	Value
Mode	DPII, ADp, DMC

Backup Directory	Dial String
1	
3	
4	
5	
6	
7	
8	
9	
10	

LPDA-2	Value
LPDA-2	Enab, Disab
LPDA Address (Chang)	1-256
SNA Backup	Enab, Disab
Code 1 (Chang)	
Code 2 (Chang)	

† Not available if a Switched 56 DBM

* Appears when non-Flex MUX MCMP installed or DSU firmware version less than 6.3x

Configuration Worksheet for Bridge Mode (1 of 2)

Date: _____

Location: _____

Local Phone No.: () _____

Device: _____

Local Address: _____

DBM Installed

Serial No.: _____

Tributary Network Address: _____

SNA Diagnostic Interface (LPDA-2) Installed

MUX Setup Options	Value
MUX Funct: (CBrdg or EBrdg)	TDM, MCMP *, CBrdg, EBrdg, None
Brdge Rate	=DSU, 56, 19.2, 14.4, 12.0, 9.6, 4.8, 2.4
Brdg Timing	Int, Auto, Prt1, Prt2, Prt3, Prt4, Prt5, Prt6
Share DevA:	Enab
Lowest Port#	DCE, 2, 3, 4, 5
#Ports in Gp:	2, 3, 4, 5, 6
Port Cntrl:	Host, DSD
Share DevB:	Disab

Prt2 Options	Value
RTS Cntrl	FrcOn, DTE
TxCarrSel	Const, Cntrl
RxCarrSel	Const, Cntrl, Mark
PCC Buffer	Enab, Disab
Elast Stor	Enab, Disab
RTS/CTS Del (Chang)	0-1040 ms (8 ms increments)
DTR Alarm	Enab, Disab
Antistream (Chang)	Disab, 1-100 sec (async terminal = 0-100)
DSR FrcOn	Enab, Disab
DSR on Tst	Enab, Disab
Extend Chan	Yes, No
Upstrm Port	Prt1, Prt2, Prt3, Prt4, Prt5, Prt6
DTE Port	EIA232, V.35

Prt3 Options	Value
RTS Cntrl	FrcOn, DTE
TxCarrSel	Const, Cntrl
RxCarrSel	Const, Cntrl, Mark
PCC Buffer	Enab, Disab
Elast Stor	Enab, Disab
RTS/CTS Del (Chang)	0-1040 ms (8 ms increments)
DTR Alarm	Enab, Disab
Antistream (Chang)	Disab, 1-100 sec (async terminal = 0-100)
DSR FrcOn	Enab, Disab
DSR on Tst	Enab, Disab
Extend Chan	Yes, No
Upstrm Port	Prt1, Prt2, Prt3, Prt4, Prt5, Prt6
DTE Port	EIA232, V.35

*MCMP option only

Prt4 Options	Value
RTS Cntrl	FrcOn, DTE
TxCarrSel	Const, Cntrl
RxCarrSel	Const, Cntrl, Mark
PCC Buffer	Enab, Disab
Elast Stor	Enab, Disab
RTS/CTS Del (Chang)	0-1040 ms (8 ms increments)
DTR Alarm	Enab, Disab
Antistream (Chang)	Disab, 1-100 sec (async terminal = 0-100)
DSR FrcOn	Enab, Disab
DSR on Tst	Enab, Disab
Extend Chan	Yes, No
Upstrm Port	Prt1, Prt2, Prt3, Prt4, Prt5, Prt6
DTE Port	EIA232, V.35

Prt5 Options	Value
RTS Cntrl	FrcOn, DTE
TxCarrSel	Const, Cntrl
RxCarrSel	Const, Cntrl, Mark
PCC Buffer	Enab, Disab
Elast Stor	Enab, Disab
RTS/CTS Del (Chang)	0-1040 ms (8 ms increments)
DTR Alarm	Enab, Disab
Antistream (Chang)	Disab, 1-100 sec (async terminal = 0-100)
DSR FrcOn	Enab, Disab
DSR on Tst	Enab, Disab
Extend Chan	Yes, No
Upstrm Port	Prt1, Prt2, Prt3, Prt4, Prt5, Prt6
DTE Port	EIA232, V.35

Prt6 Options	Value
RTS Cntrl	FrcOn, DTE
TxCarrSel	Const, Cntrl
RxCarrSel	Const, Cntrl, Mark
PCC Buffer	Enab, Disab
Elast Stor	Enab, Disab
RTS/CTS Del (Chang)	0-1040 ms (8 ms increments)
DTR Alarm	Enab, Disab
Antistream (Chang)	Disab, 1-100 sec (async terminal = 0-100)
DSR FrcOn	Enab, Disab
DSR on Tst	Enab, Disab
Extend Chan	Yes, No
Upstrm Port	Prt1, Prt2, Prt3, Prt4, Prt5, Prt6
DTE Port	EIA232, V.35

Configuration Worksheet for Bridge Mode (2 of 2)

General Options	Value
DTE Port	EIA232, V.35
RTS Cntrl	FrcOn
CTS Cntrl	Std, =RTS
LSD Lead	STD, Delay, FrcOn
CTS Lead	STD, Delay, FrcOn
SystemStat	Enab, Disab
Circ Assur	Enab, Disab
Tst Pattern	AT&T, Std
RespondRDL	Enab, Disab
LL by DTE	Enab, Disab
RL by DTE	Enab, Disab
Bilat Lpbk	Enab, Disab
Ext Leads	ExtLd, Rate, RPower
CCN by EL	Enab, Disab
SW Vers	3.22, 4.41, Normal
AnswExtBU	Enab, Disab

DSU Options	Value
Rate (Kpbs)	64CC, 64L, 56, 38.4, 19.2, 9.6, 4.8, 2.4
TxCkSource	Int, RXC, DDS, Prt1
Msg Clamp	Enab, Disab
TxElastStor	Enab, Disab
RxElastStor	Enab, Disab
19.2 PowrLvl	+6, 0, -10
64KScrambling	On, Off
64KLatchLpbk	On, Off
AggrSwitch	Enab, Disab
AgSw Timing	Int, Aggr, Prt1, Prt2, Prt3, Prt4, Prt5, Prt6
V.54 Lpbk	Enab, Disab

LPDA-2 Options	Value
LPDA-2	Enab, Disab
LPDA Address <i>(Chang)</i>	1-256
SNA Backup	Enab, Disab
Code 1 <i>(Chang)</i>	
Code 2 <i>(Chang)</i>	

Hardware Straps	Value
DDD Interface †	Permissive, Programmable
Frame Ground/ Signal Ground	Connected, Disconnected
Test Mode Indication	Enable, Disable

ChgMd Options	Values
Mode	DPII ADP, DMC

Diagnostic DSU Options	Value
Diag Type	NonD, Disr, Mixed, None
2nd Ch(bps)	100, 400, 800, 1200, 1600
Disr Type	2500, 2600, 3600s, 3600e, Br56

Diagnostic General Options	Value
Position	Cntrl
LinkConfig	Pt-Pt
Resp Period	1, 2, 10
Trib TimOut <i>(Chang)</i>	sec to min
Diag Conn	CC, DC
Link Delay	0s, 1s, 2s, 5s, 10s, 20s, 50s
Network Delay	0s, 1s, 2s, 5s, 10s, 20s, 50s
Packet Delay	0s, 1s, 2s, 5s
M-PtSymPrt **	Enab, Disab
Fast Sel	Enab, Disab

** TDM option only

Configuration Worksheet for Basic Mode

Date: _____

Location: _____

Local Phone No.: () _____

Device: _____

Local Address: _____

DBM Installed

Serial No.: _____

Tributary Network Address: _____

SNA Diagnostic Interface (LPDA-2) Installed

DSU Options	Value
Rate(Kbps)	64CC, 64L, 56, 38.4, 19.2, 9.6, 4.8, 2.4
PrtSp(Kbps)	64, 56, 48, 38.4, 32, 28.8, 19.2, 18.8, 18.0, 16.8, 14.4, 12.0, 9.6, 9.2, 8.4, 7.2, 4.8, 4.4, 4.0, 2.4, 2.0, 1.2, Disab
TxCkSource	Int, RXC, Ext, DDS
Msg Clamp	Enab, Disab
TxElasStor	Enab, Disab
RxElasStor	Enab, Disab
19.2 PowrLvl	+6, 0, -10
64KScramblng	On, Off
64KLatchLpbk	On, Off
AggrSwitch	Enab, Disab
AgSw Timing	Int, Aggr, Prt1
V.54 Lpbk	Enab, Disab

Diagnostic DSU Options	Value
Diag Type	NonD, Disr, Mixed, None
2nd Ch(bps)	100, 400, 800, 1200, 1600
Disr Type	2500, 2600, 3600s, 3600e, Br56

DBM Options	Value
Rate(Kbps) †	14.4, 12.0, 9.6, 4.8, 2.4
PrtSp(Kbps)	56, 48, 38.4, 32, 28.8, 19.2, 18.8, 18.0, 16.8, 14.4, 12.0, 9.6, 9.2, 8.4, 7.2, 4.8, 4.4, 4.0, 2.4, 2.0, 1.2, Disab
TxCkSource †	Int, RXC, Ext, DSU
CarrLossDisc †	Yes, No
Auto Retrain †	Yes, No
Single Rate †	Yes, No
AutoAnswer	Enab, Disab
TxElasStor	Enab, Disab
RxElasStor	Enab, Disab
Call Setup	None, Pswrd, Cilbk, Alarm
RxPwd (Chang)	(up to 10 digits)
TxPwd (Chang)	(up to 10 digits)
V.13 Signl	Enab, Disab
Dial Test	Enab, Disab
Primary Core	Yes, No
DTRCallCon	Orig ††, Ansr, Disab
EchoCancel*	Enab, Disab
Remot DBM**	2-wire, 4-wire

General Options	Value
DTE Port	EIA232, V.35
RTS Cntrl	FrcOn, DTE
CTS Cntrl	Std, =RTS
AntiStream (Chang)	Disab, 1-100 sec
LSD Lead	Std, Delay, FrcOn
CTS Lead	Std, Delay, FrcOn
DSR FrcOn	Enab, Disab
SystemStat	Enab, Disab
DSR on Tst	Enab, Disab
Circ Assur	Enab, Disab
Tst Pattern	AT&T, Std
RespondRDL	Enab, Disab
LL by DTE	Enab, Disab
RL by DTE	Enab, Disab
Bilat Lpbk	Enab, Disab
Ext Leads	ExtLd, Rate, RPower
CCN by EL	Enab, Disab
DTR Alarm	Enab, Disab
SW Vers	3.22, 4.41, Normal
AnswExtBU	Enab, Disab
Async→Sync	Enab, Disab
AsyncBit/Char	6, 7, 8, 9, 10
Stop Bits	1, 2
Overspeed	1.0, 2.3

Diagnostic DBM Options	Value
Diag Type	NonD, Disr, Mixed, None
2nd Ch(bps)	100, 400, 800, 1200, 1600
RemoteDiag	V.54, Enhan, 2500

Diagnostic General Options	Value
Position	Cntrl, Trib, G2Trb
LinkConfg	Pt-Pt, M-Pt
Resp Period	1, 2, 10
TribTimOut (Chang)	sec to min (5 sec to 10 min)
Diag Conn	CC, DC
Link Delay	0s, 1s, 2s, 5s, 10s, 20s, 50s
Network Delay	0s, 1s, 2s, 5s, 10s, 20s, 50s
Packet Delay	0s, 1s, 2s, 5s
M-Pt SymPrt	Enab, Disab
Fast Sel	Enab, Disab

Backup Options	Value
Auto Bckup	Enab, Disab
Backup Dir (Chang)	(1-10)
BckupOnCMI	Enab, Disab
AutoRestor	Enab, Disab
NtwkTimOut (Chang)	min and sec (1 to 30 min)
RestorTimOut (Chang)	min and sec (1 to 60 min)
TriesTimeOut (Chang)	min and sec (1 to 60 min)
MultiCall	Enab, Disab

ChgMd Options	Value
Mode	DPII, ADp, DMC

Hardware Straps	Value
DDD Interface †	Permissive, Programmable
Frame Ground/Signal Ground	Connected, Disconnected
Test Mode Indication	Enabled, Disabled

† Not available if a Switched 56 DBM * Switched 56 DBM only
 †† Not available if Primary Core is No **2-wire Switched 56 DBM only

Backup Directory	Dial String
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	

LPDA-2 Options	Value
LPDA-2	Enab, Disab
LPDA Address (Chang)	(1 - 256)
SNA Backup	Enab, Disab
Code 1 (Chang)	
Code 2 (Chang)	

Configuration Worksheet for Basic (DBM-V, DBM-S, or DBM-D)

Date: _____

Device: _____

Serial No.: _____

Location: _____

Local Address: _____

Tributary Network Address: _____

Local Phone No.: () _____

DBM Installed

SNA Diagnostic Interface (LPDA-2) Installed

Diagnostic DBM Options	Value
Diag Type	NonD, [Disr] , Mixed, None
2nd Ch(bps)	100, [400] , 800, 1200, 1600
RemoteDiag	V.54, [Enhanc] , 2500

Diagnostic General Options	Value
Position	[Cntrl] , Trib, G2Trb
LinkConfig	[Pt-Pt] , M-Pt
Resp Period	[1] , 2, 10
Trib TimOut (Chang)	sec. to min [10 sec]
Diag Conn	[CC] , DC
Link Delay	[0s] , 1s, 2s, 5s, 10s, 20s, 50s
Network Delay	[0s] , 1s, 2s, 5s, 10s, 20s, 50s
Packet Delay	[0s] , 1s, 2s, 5s
M-Pt SymPrt	Enab, [Disab]
Fast Sel	[Enab] , Disab

ChMd Options	Value
Mode	DPII, ADp, DMC

Hardware Straps	Value
DDD Interface†	Permissive, Programmable
Frame Ground/ Signal Ground	Connected, Disconnected
Test Mode Indication	Enable, Disable

Note: Values shown in **[Bold]** are factory-set defaults.

† Not available if a DBM-S or DBM-D

†† Not available if a Primary Core is No

* DBM-S or DBM-D only

** DBM-D only

General Options	Value
DTE Port	[EIA232] , V.35
RTS Cntrl	[FrcOn] , DTE
CTS Cntrl	[Std] , =RTS
AnitStream (Chang)	[Disab] , 1–100 sec (async terminal = 1–100)
LSD Lead	[Std] , Delay, FrcOn
CTS Lead	[Std] , Delay, FrcOn
DSR FrcOn	Enab, [Disab]
SystemStat	[Enab] , Disab
DSR on Tst	[Enab] , Disab
Circ Assur	Enab, [Disab]
Tst Pattern	AT&T, [Std]
RespondRDL	Enab, [Disab]
LL by DTE	Enab, [Disab]
RL by DTE	Enab, [Disab]
Bilat Lpbk	Enab, [Disab]
Ext Leads	ExtLd, [Rate] , RPower
CCN by EL	Enab, [Disab]
DTR Alarm	Enab, [Disab]
SW Vers	3.22, 4.41, [Normal]
Async→Sync	Enab, [Disab]
AsyncBit/Char	6, 7, [8] , 9, 10
Stop Bits	[1] , 2
Overspeed	1.0, [2.3]

Backup Options	Value
Auto Bckup	Enab, [Disab]
Backup Dir (Chang)	1–10 [1]
BckupOnCMI	Enab, [Disab]
AutoRestor	Enab, [Disab]
NtwkTimOut (Chang)	min and sec [20 sec]
RestorTimOut (Chang)	min [5 min]
TriesTimeOut (Chang)	min [15 min]
MultiCall	Enab, [Disab]

DBM Options	Value
Rate(Kbps)	14.4, 12.0, [9.6] , 4.8, 2.4 or [56]
PrtSp(Kbps)	14.4, 12.0, [9.6] , 9.2, 8.4, 7.2, 4.8, 4.4, 4.0, 2.4, 2.0, 1.2, Disab or [56] , 48, 38.4, 32, 28.8, 19.2, 18.8, 18.0, 16.8, 14.4, 12.0, 9.6, 9.2, 8.4, 7.2, 4.8, 4.4, 4.0, 2.4, 2.0, 1.2, Disab
TxCkSource†	[Int] , RXC, DSU
CarrLossDisc†	[Yes] , No
Auto Retrain †	[Yes] , No
Single Rate †	[Yes] , No
AutoAnswer	[Enab] , Disab
TxElasStor	Enab, [Disab]
RxElasStor	Enab, [Disab]
Call Setup	[None] , Pswrd, Cllbk, Alarm
RxPwrd (Chang)	
TxPwrd (Chang)	
V.13 Signl	Enab, [Disab]
Dial Test	Enab, [Disab]
Primary Core	[Yes] , No
DtrCallCon	Orig††, Ansr, [Disab]
EchoCancel*	Enab, [Disab]
Remote DBM**	2-wire, [4-wire]

Backup Directory	Dial String
1	
3	
4	
5	
6	
7	
8	
9	
10	

Pin Assignments C

Overview C-1

Overview

The pin assignments for the 3600 Series TDM and MCMP connectors and interfaces are included in this appendix. Refer to them as needed.

- **Figure C-1** shows the TDM interface cable that is used for both TDM and MCMP non-modular applications; **Table C-1** provides its connector pin assignments.
- **Figure C-2** shows the digital bridge interface cable used for non-modular bridging applications; **Table C-2** provides its connector pin assignments.
- **Figure C-3** shows the pin locations on the 60-position high-density connector of the carrier-mounted non-modular TDM or MCMP circuit card; **Table C-3** provides its connector pin assignments.
- **Tables C-4** and **C-5** provide the EIA-232-D/V.24 and V.35 connector pin assignments for Port 1 for all DSU-TDMs and DSU-MCMPs.
- **Figure C-4** shows the V.35 adapter that is used with the standalone TDM/DSD, MCMP/DSD, TDM/Flex, or MCMP/Flex models. **Table C-6** provides its pin assignments.
- **Figure C-5** shows the 6-port connector module used with the modular TDM and MCMP circuit cards. **Table C-7** provides the EIA-232 TDM and MCMP connector pin assignments for Ports 2 through 6 for all standalone and modular DSU-TDMs and DSU-MCMPs.
- **Figure C-6** shows the V.35 interconnect cable used with the 6-port connector module for the modular TDM. **Table C-8** provides its pin assignments.

Refer to the *COMSPHERE 3600 Series Data Service Units, Models 3610 and 3611, Operator's Guide* and the *COMSPHERE 3600 Series Data Service Units, Models 3610 and 3611, Dial Backup Module and SNA Diagnostic Interface Options, Applications Guide* for additional pin assignments.

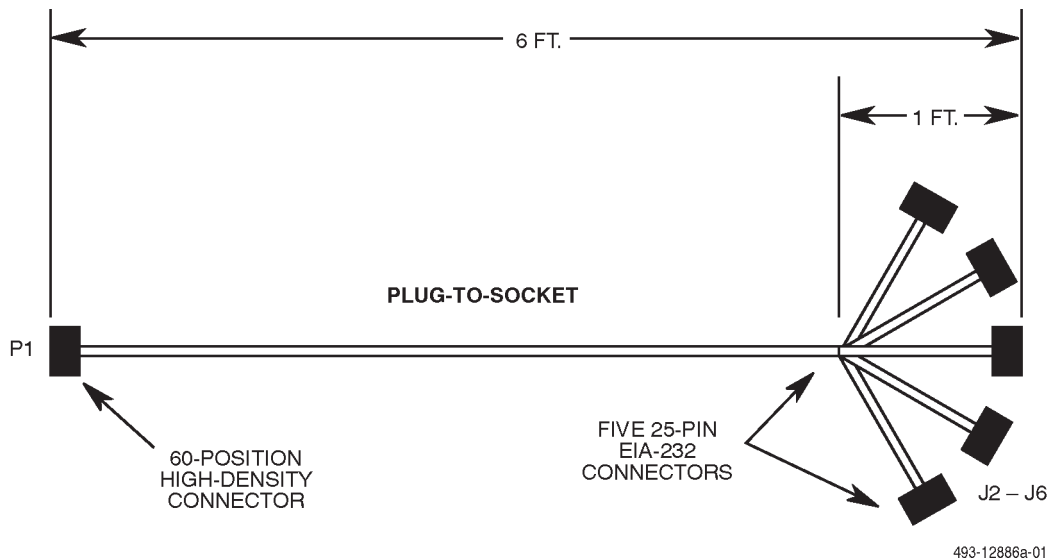


Figure C-1. TDM Interface Cable (Feature Number 3600-F2-500)

Table C-1
(1 of 3)
Time Division Multiplexer Connector Used with Non-Modular TDM

60-Position High-Density Connector	25-Position Socket D-Sub	
P1 Pin	Port ¹	Pin
01	J3	05
02	J3	17
03	J3	08
04	J3	06
05	J3	12
06	J3	24
07	J3	20
08	J2	07
09	J3	04
10	J4	08
11	J2	08
12	J5	07
13	J3	03
14	J2	02
15	J5	12

¹ J2 = Port 2
 J3 = Port 3
 J4 = Port 4
 J5 = Port 5
 J6 = Port 6

Table C-1
(2 of 3)
Time Division Multiplexer Connector Used with Non-Modular TDM

60-Position High-Density Connector	25-Position Socket D-Sub	
P1 Pin	Port ¹	Pin
16	J2	20
17	J2	24
18	J3	07
19	J2	04
20	J5	02
21	J5	08
22	J2	12
23	J5	04
24	J6	07
25	J6	08
26	J6	06
27	J6	17
28	J6	03
29	J6	12
30	J4	07
31	J4	17
32	J4	02
33	J4	04
34	J4	05
35	J4	03
36	J4	15
37	J4	12
38	J4	24
39	J4	20
40	J3	15
41	J3	02
42	J4	06
43	J5	03
44	J5	15
45	J5	15
¹ J2 = Port 2 J3 = Port 3 J4 = Port 4	J5 = Port 5 J6 = Port 6	

Table C-1
(3 of 3)
Time Division Multiplexer Connector Used with Non-Modular TDM

60-Position High-Density Connector	25-Position Socket D-Sub	
P1 Pin	Port ¹	Pin
46	J2	06
47	J2	17
48	J2	05
49	J2	03
50	J5	06
51	J5	05
52	J5	17
53	J5	24
54	J5	20
55	J6	15
56	J6	05
57	J6	02
58	J6	04
59	J6	20
60	J6	24
¹ J2 = Port 2 J3 = Port 3 J4 = Port 4	J5 = Port 5 J6 = Port 6	

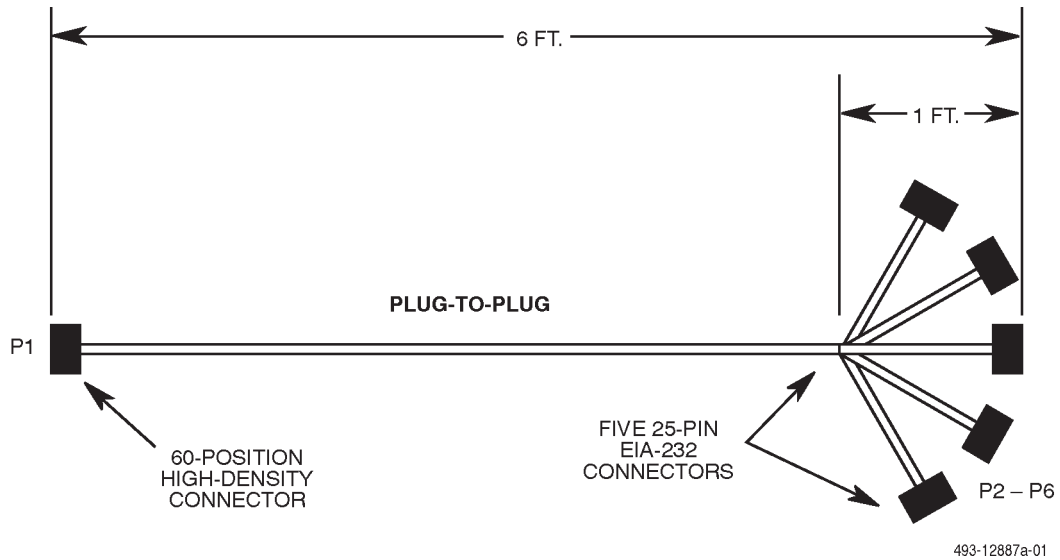


Figure C-2. Digital Bridge Interface Cable (Feature Number 3600-F2-501)

**Table C-2
(1 of 3)
Digital Bridge Connector Used with Non-Modular TDM/MCMP**

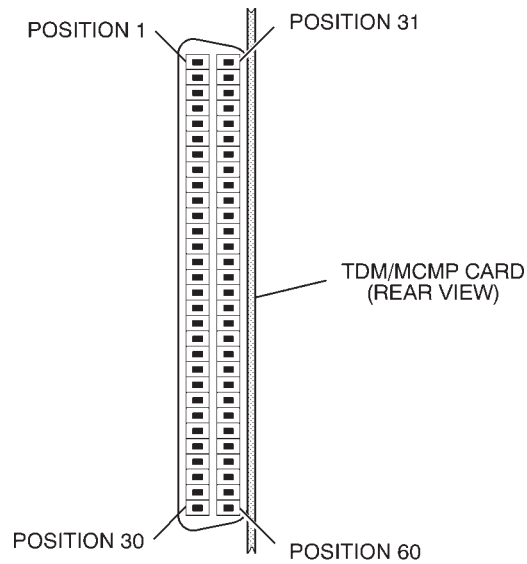
60-Position High-Density Connector	25-Position Plug D-Sub	
P1 Pin	Port ¹	Pin
01	NC ²	NC ²
02	P3	24
03	P3	04
04	P3	20
05	NC ²	NC ²
06	P3	17
07	P3	06
08	P2	07
09	P3	08
10	P4	04
11	P2	04
12	P5	07
13	P3	02
¹ J2 = Port 2 J3 = Port 3 J4 = Port 4 J5 = Port 5 J6 = Port 6 ² NC = No Connection		

**Table C-2
(2 of 3)
Digital Bridge Connector Used with Non-Modular TDM/MCMP**

60-Position High-Density Connector	25-Position Plug D-Sub	
P1 Pin	Port ¹	Pin
14	P2	03
15	NC ²	NC ²
16	P2	06
17	P2	17
18	P3	07
19	P2	08
20	P5	03
21	P5	04
22	NC ²	NC ²
23	P5	08
24	P6	07
25	P6	04
26	P6	20
27	P6	24
28	P6	02
29	NC ²	NC ²
30	P4	07
31	P4	24
32	P4	03
33	J4	08
34	NC ²	NC ²
35	P4	02
36	NC ²	NC ²
37	NC ²	NC ²
38	P4	17
39	P4	06
40	NC ²	NC ²
41	P3	03
42	P4	20
43	P5	02
44	NC ²	NC ²
¹ J2 = Port 2 J3 = Port 3 J4 = Port 4 ² NC = No Connection		
J5 = Port 5 J6 = Port 6		

Table C-2
(3 of 3)
Digital Bridge Connector Used with Non-Modular TDM/MCMP

60-Position High-Density Connector	25-Position Plug D-Sub	
P1 Pin	Port ¹	Pin
45	NC ²	NC ²
46	P2	20
47	P2	24
48	NC ²	NC ²
49	P2	02
50	P5	20
50	P5	20
51	NC ²	NC ²
52	P5	24
53	P5	17
54	P5	06
55	NC ²	NC ²
56	NC ²	NC ²
57	P6	03
58	P6	08
59	P6	06
60	P6	17
¹ J2 = Port 2 J3 = Port 3 J4 = Port 4 ² NC = No Connection		
J5 = Port 5 J6 = Port 6		



491-12884a

Figure C-3. Pin Locations on the 60-Position High-Density Connector of the Non-Modular Carrier-Mounted TDM/MCMP Circuit Card

Table C-3
60-Position High-Density Connector (TDM/MCMP Ports 2 through 6 for Model 3611 DSU)

Pin (Ports 2–6) ¹					Circuit Name		Function
2	3	4	5	6	EIA-232 ²	CCITT	
14	41	32	20	57	BA	103	Transmit Data (TXD)
49	13	35	43	28	BB	104	Received Data (RXD)
19	9	33	23	58	CA	105	Request-to-Send (RTS)
48	1	34	51	56	CB	106	Clear-to-Send (CTS)
46	4	42	50	26	CC	107	Data Set Ready (DSR)
8	18	30	12	24	AB	102	Signal Ground (SG)
11	3	10	21	25	CF	109	Received Line Signal Detect (LSD)
22 ³	5 ³	37 ³	15 ³	29 ³	CI	112	Data Signal Rate Selector I — DCE Source
45	40	36	44	55	DB	114	Transmitter Signal Element Timing — DCE Source
47	2	31	52	27	DD	115	Receiver Signal Element Timing — DCE Source
16	7	39	54	59	CD	108.2	Data Terminal Ready (DTR)
17	6	38	53	60	DA	113	Transmitter Signal Element Timing — DTE Source

¹ The 60-pin high-density connector provides five EIA-232 interfaces. (Connector pin locations are shown in [Figure C-3](#).)

² EIA-232 refers to EIA-232-D without the loopbacks and ring indicator.

³ In TDM mode, if External Lead is configured for Rate (Ext Leads: Rate), then this lead is used for speed selection on a port connecting to an analog private line (APL) extended circuit when the DDS backbone goes into backup. This pin signals the APL modem to fall back to the predetermined backup speed if the APL modem has fallback capability.

Table C-4
EIA-232-D/V.24 Connector (Port 1)

Pin	Circuit Name		Function
	EIA-232-D	CCITT/V.24	
2	BA	103	Transmit Data (TXD)
3	BB	104	Received Data (RXD)
4	CA	105	Request-to-Send (RTS)
5	CB	106	Clear-to-Send (CTS)
6	CC	107	Data Set Ready (DSR)
7	AB	102	Signal Ground (SG)
8	CF	109	Received Line Signal Detect (LSD)
9	—	—	Positive Test Voltage
10	—	—	Negative Test Voltage
12	CI	112	Data Signal Rate Selector I — DCE Source (alternate external control lead I)
13 ¹	—	—	Data Signal Rate Selector II — DCE Source (alternate external control lead II)
15	DB	114	Transmitter Signal Element Timing — DCE Source
17	DD	115	Receiver Signal Element Timing — DCE Source
18	LL	141	Local Loopback (LL)
19 ¹	—	—	Data Signal Rate Selector II — DTE Source (alternate external control alarm Lead II)
20	CD	108.2	Data Terminal Ready (DTR)
21	RL	140	Remote Digital Loopback (RL)
22	CE	125	Ring Indicator (RI) ²
23	CH	111	Data Signal Rate Selector I — DTE Source (alternate external control alarm Lead I)
24	DA	113	Transmitter Signal Element Timing — DTE Source
25	TM	142	Test Mode (TM)

¹ The Data Signal Rate Selector functions are not supported for leads 13, 19, and 23. These leads can be used for the external lead functions.

² Ring Indicator is only available on a DBM-V, DBM-S, or DBM-D at this time.

**Table C-5
V.35 Connector (Port 1)**

Pin(s)	Circuit Name		Function
	V.35	CCITT	
B	AB	102	Signal Ground (SG)
P, S	BA	103 a, b	Transmit Data (TXD)
R, T	BB	104 a, b	Received Data (RXD)
C	CA	105	Request-to-Send (RTS)
D	CB	106	Clear-to-Send (CTS)
E	CC	107	Data Set Ready (DSR)
F	CF	109	Received Line Signal Detect (LSD)
H	CD	108.2	Data Terminal Ready (DTR)
HH	—	—	Positive Test Voltage
KK	—	—	Negative Test Voltage
U, W	DA	113 a, b	Transmitter Signal Element Timing — DTE Source
Y, AA	DB	114 a, b	Transmitter Signal Element Timing — DCE Source
V, X	DD	115 a, b	Receiver Signal Element Timing — DCE Source
J	RI	125	Ring Indicator (RI) ¹
L	LL	141	Local Loopback (LL)
N	RL	140	Remote Digital Loopback (RL)
NN	TM	142	Test Mode (TM)

¹ Ring Indicator is only available on a DBM-V, DBM-S, or DBM-D at this time.

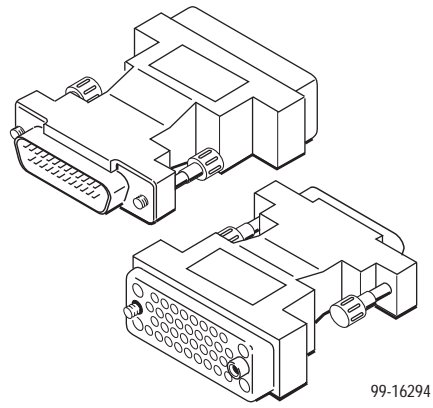


Figure C-4. Modular DSU V.35 Adapter (3000-F1-510)

Table C-6
Model 3610 (Ports 2 – 6) and Modular DSU 25-Pin V.35 Connector

25-Pin Connector (Model 3610 Ports 2 – 6)	34-Pin Connector (Modular DSU V.35 Adapter)	Circuit Name
Pin Number	Pin Number	
7	B	Signal Ground
4	C	Request-to-Send (RTS)
5	D	Clear-to-Send (CTS)
6	E	Data Set Ready (DSR)
8	F	Received Line Signal Detect (LSD)
20	H	Data Terminal Ready (DTR)
21	J	Ring Indicator (RI)
24, 11	P, S	Transmit Data (TXD)
23, 22	R, T	Received Data (RXD)
15, 2	U, W	Transmitter Signal Element Timing — DTE Source
16, 3	V, X	Receiver Signal Element Timing — DCE Source
14, 1	Y, AA	Transmitter Signal Element Timing — DCE Source
9	HH	Positive dc Test voltage
10	KK	Negative dc Test Voltage
25	NN	Test Mode (TM) Shell Shield

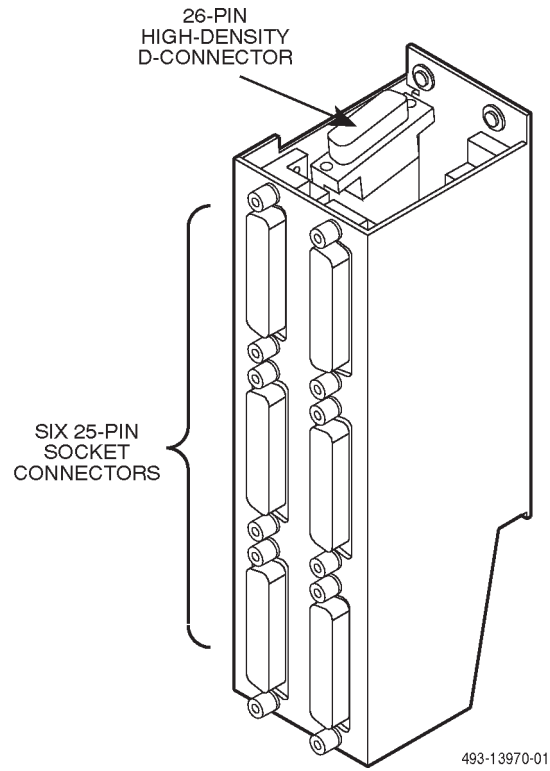


Figure C-5. 6-Port Connector Module (Part Number 870-1700-0011)

Table C-7
EIA-232/V.24 TDM/MCMP Connector (Modular and Standalone – Ports 2 through 6)

Pin	Circuit Name		Function
	EIA-232 ¹	CCITT/V.25	
2	BA	103	Transmit Data (TXD)
3	BB	104	Received Data (RXD)
4	CA	105	Request-to-Send (RTS)
5	CB	106	Clear-to-Send (CTS)
6	CC	107	Data Set Ready (DSR)
7	AB	102	Signal Ground (SG)
8	CF	109	Received Line Signal Detect (LSD)
9	—	—	Positive Test Voltage
12 ²	CI	112	Data Signal Rate Selector I — DCE Source
15	DB	114	Transmitter Signal Element Timing — DCE Source
17	DD	115	Receiver Signal Element Timing — DCE Source
20	CD	108.2	Data Terminal Ready (DTR)
24	DA	113	Transmitter Signal Element Timing — DTE Source

¹ EIA-232 refers to EIA-232-D without the loopbacks and ring indicator.

² During normal operation, Pin 12 is ON for Ports 2 through 6. During dial backup, Pin 12 is Off for Ports 2 through 6.

In TDM mode, if External Lead is configured for Rate (Ext Leads: Rate), then this lead is used for speed selection on a port connecting to an analog private line (APL) extended circuit when the DDS backbone goes into backup. This pin signals the APL modem to fall back to the predetermined backup speed if the APL modem has fallback capability.

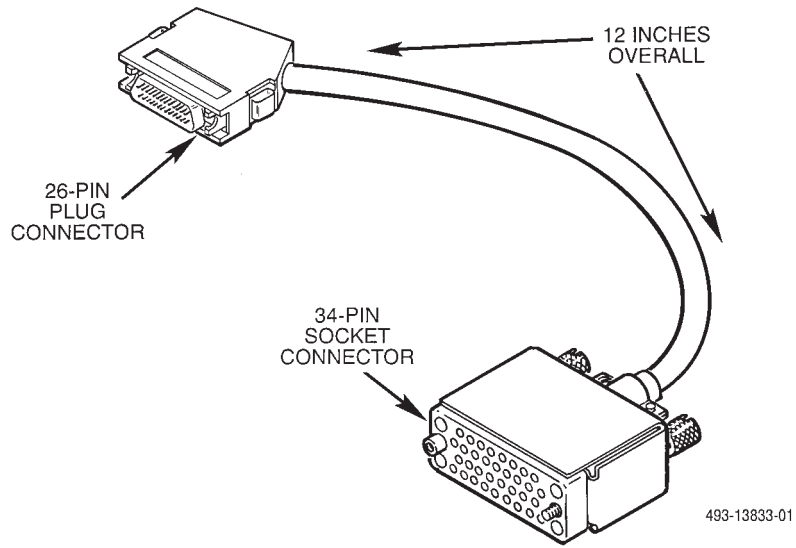


Figure C-6. 6-Port V.35 Interconnect Cable (Feature Number 3600-F3-500)

Table C-8
6-Port V.35 Interconnect Cable Connector

26-Pin Connector (Connector Module)	34-Pin Connector (6-port V.35 Interconnect Cable)	Circuit Name
Pin Number	Pin Number	
7	B	Signal Ground (SG)
4	C	Request-to-Send (RTS)
5	D	Clear-to-Send (CTS)
6	E	Data Set Ready (DSR)
8	F	Received Line Signal Detect (LSD)
20	H	Data Terminal Ready (DTR)
22	J	Ring Indicator (RI) ¹
18	L	Local Loopback (LL)
21	N	Remote Digital Loopback (RL)
2, 14	P, S	Transmit Data (TXD)
3, 16	R, T	Received Data (RXD)
15, 12	Y, AA	Transmitter Signal Element Timing — DCE Source (ST)
17, 9	V, X	Receiver Signal Element Timing — DCE Source (RT)
24, 11	U, W	Transmitter Signal Element Timing — DTE Source (TT)
25	NN	Test Mode (TM)
¹ Ring Indicator is only available on a DBM-D, DBM-S, or DBM-V at this time.		

Configuration Scenarios **D**

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Overview

This appendix presents a **subset** of various configuration scenarios for TDM, digital bridge, and MCMP applications; these examples are not inclusive of all possible configurations. Each scenario consists of an illustration, an explanation of the configuration shown, and the applicable configuration option settings needed to support that scenario. Refer to **Chapter 5** for additional configuration information.

When reviewing the configuration options, keep the following in mind:

- A set of configuration options is provided for each type of unit (e.g., a control or a central-site bridge) shown in an illustration.
- The Configuration Worksheet you would use to record the unit's configuration is identified.

- Configuration options are grouped by their *option set* (the set of configuration options that can be edited under the Opts submenu – DSU, Diag, DBM, etc.).
- Option sets, as well as the configuration options, are presented in the order you will see them (option sets are bulleted and in bold), with one exception – when the TDM or MCMP option is installed, the MUX and PrtSp option set settings are configured first. (Note: N/A means Not Applicable.)
- Only applicable configuration options are listed; unlisted configuration options are left at their default settings or are forced to a value based upon other configuration option settings.
- Individual configuration options are shown as they appear on the DCP, followed by a colon (:) and the value that should be set (selected).

NOTE

In this appendix, **full backup** indicates that in order to operate, *all* remote devices must switch data to backup lines when one or more tributaries require backup. **Partial backup** indicates that *only affected* remote devices will switch data to backup lines when the DDS line is lost to the tributary site; all other devices continue to operate over the DDS line.

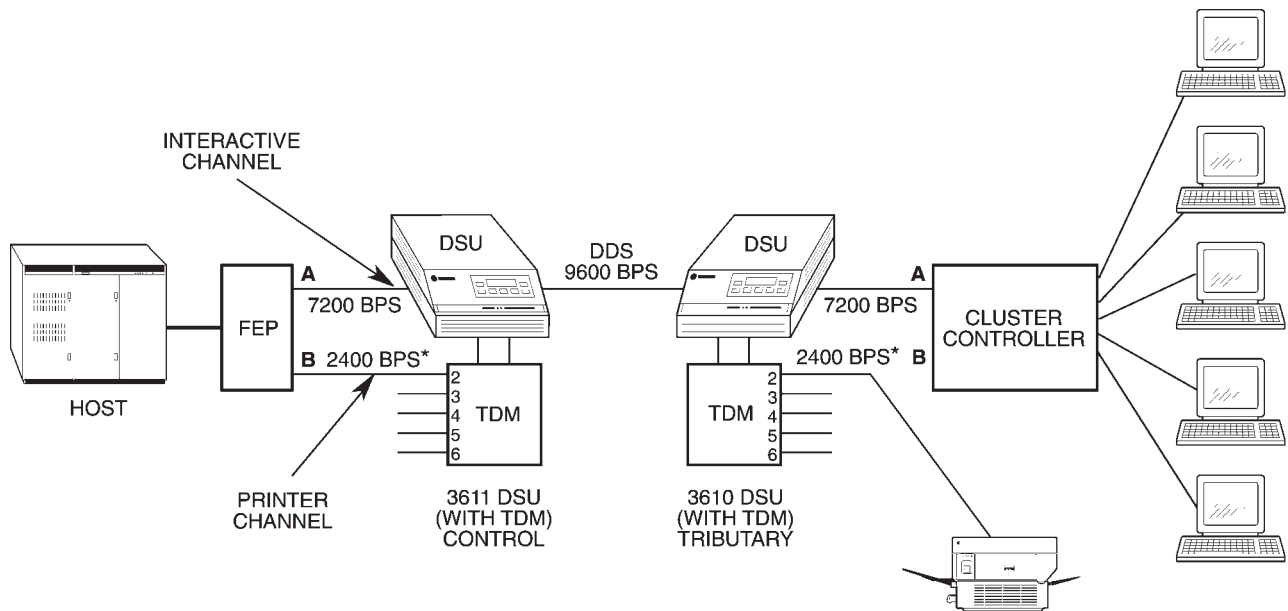
TDM Scenario 1 – Using Two Synchronous Channels

In this configuration, shown in Figure D-1, there are two synchronous channels. Channel A is the interactive channel between the host computer and the terminal users; Channel B is the printer channel carrying print jobs to the remote printers. The DSUs are configured for nondisruptive diagnostics and the secondary channel is running at 400 bps.

When a terminal user submits a file for printing, the file is transported over the interactive channel to the host computer, where it is directed to a text-formatting program. The resulting formatted file is transported to the remote printer.

TDM Configuration Scenarios

There are two TDM scenarios described in this section. In the first scenario, the network transports two channels of synchronous data between the host computer at the central site and the terminals and printer at the remote site. The second scenario shows full backup of TDM circuits using Switched 56 DBMs.



*CHANNEL B RUNS UNDERSPEED. ACTUAL RATE: 2000 BPS.

492-12888-01

Figure D-1. TDM Configuration: Scenario 1 – Two Synchronous Channels

Configuration Options

For TDM scenario 1, use the Configuration Worksheet for TDM Mode and set the configuration options that follow for *both* the control and tributary DSU-TDMs.

- **MUX – Setup**

MUX Funct: TDM
Share DevA: Disab
Share DevB: Disab
P1/2 FEPSH: Disab
P3/4 FEPSH: Disab
P5/6 FEPSH: Disab

- **Prt1 and Prt2** (Prt3 through Prt6 N/A)

Async→Sync: Disab
TxCarrSel: Const
RxCarrSel: Const
Elast Stor: Disab
RTS/CTS Del: 0
AntiStream: Disab

- **PrtSp – DSU**

Prt1: 7.2
Prt2: 2.4
Prt3 through Prt6: Disab
Underspeed: Prt2

- **DSU**

Rate(Kbps): 9.6
TxClkSource: DDS
Msg Clamp: Enab
AggrSwitch: Disab

- **Diag – DSU**

Diag Type: NonD
2nd Ch(bps): 400
Disr Type: 3600e

- **Diag – Gen**

Position: Cntrl for control; Trib for tributary
LinkConfig: Pt-Pt
Diag Conn: CC for control; N/A for tributary

- **Gen**

DTE Port: EIA232

TDM Scenario 2 – Using Switched 56 kbps Dial Backup

In this configuration, shown in Figure D-2, the Switched 56 DBMs provide the capability for full backup of a TDM circuit operating at 56 kbps. (If the DDS circuit operates at *less than* 56 kbps, the Switched 56 DBM uses rate adaption to match the DDS speed.)

For this scenario, the DSU supports three applications running at 4.8 kbps, 9.6 kbps, and 19.2 kbps. During dial backup, the ports can be set to the same speed since the DSU rate is the same as the DBM rate.

In this example, dial backup is configured for automatic dial backup and automatic restoration for both the control and the tributary, and LPDA-2 is enabled. Make sure that you enter at least 2 minutes difference between the control's Network Time-Out (NtwkTimOut) configuration option and the tributary's.

Configuration Options

For TDM scenario 2, use the Configuration Worksheet for TDM Mode and set the configuration options that follow for *both* the control and tributary DSUs.

- **MUX – Setup**

MUX Funct: TDM
 Share DevA: Disab
 Share DevB: Disab
 P1/2 FEPSh: Disab
 P3/4 FEPSh: Disab
 P5/6 FEPSh: Disab

- **Prt1, Prt2, and Prt3 (Prt4 through Prt6 N/A)**

Async→Sync: Disab
 TxCarrSel: Const
 Rx CarrSel: Const
 Elast Stor: Disab
 RTS/CTS Del: 0
 AntiStream: Disab

- **PrtSp – DSU**

Prt1: 4.8
 Prt2: 9.6
 Prt3: 19.2
 Prt4 through Prt6: Disab

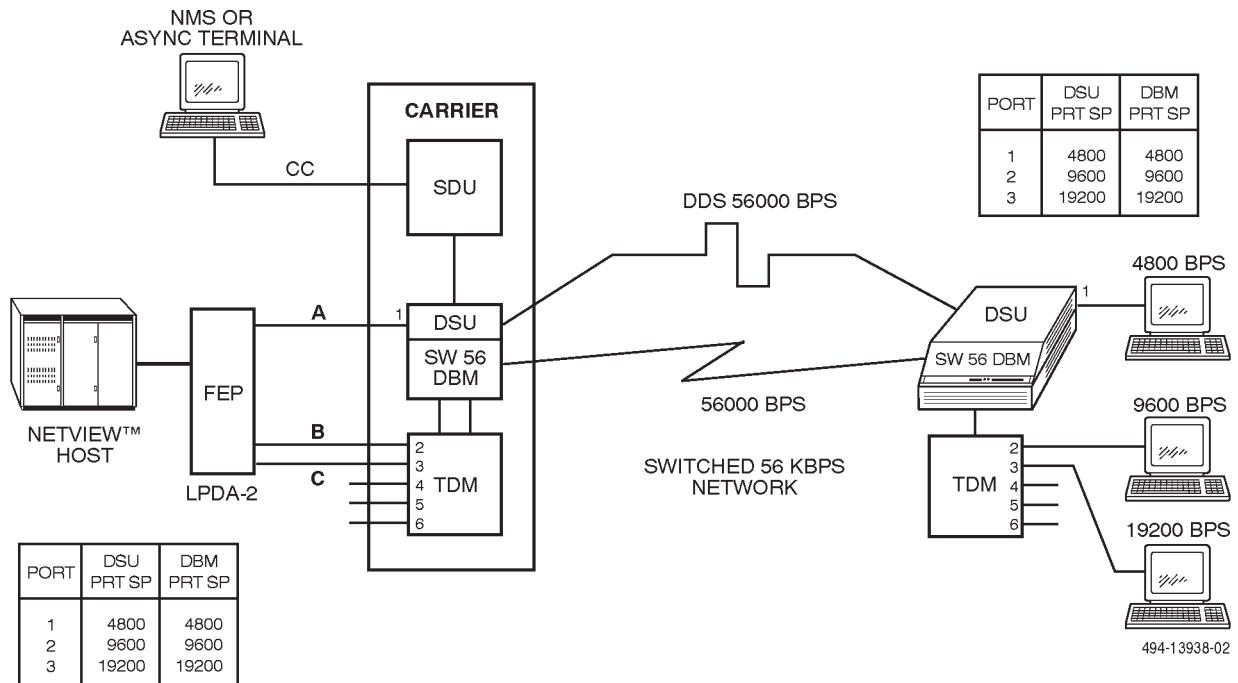


Figure D-2. TDM Configuration: Scenario 2 – Switched 56 kbps Dial Backup

- **PrtSp – DBM**

Prt1: 4.8
Prt2: 9.6
Prt3: 19.2
Prt4 through Prt6: Disab

- **DSU**

Rate(Kbps): 56
TxClkSource: DDS
Msg Clamp: Enab
AggrSwitch: Disab
V.54 Lpbk: Disab

- **Diag – DSU**

Diag Type: NonD
2nd Ch(bps): 400
Disr Type: 3600e

- **Diag – DBM**

Diag Type: NonD
2nd Ch(bps): 400
RemoteDiag: Enhan

- **Diag – Gen**

Position: Cntrl for control; Trib for tributary
LinkConfig: Pt-Pt
Diag Conn: CC for control; N/A for tributary

- **DBM**

AutoAnswer: Enab
Call Setup: Pswrd
RxPwd: enter received password
TxPwd: enter transmit password
V.13 Signl: Disab
Dial Test: Enab
Primary Core: No
DTRCallCon: Disab

- **Gen**

DTE Port: EIA232
SW Vers: Normal

- **Bkup**

Auto Bckup: Enab
Backup Dir: enter Dir number (1 to 10)
BckupOnCMI: Enab
AutoRestor: Enab
NtwkTimOut: enter amount of time
RestorTimOut: enter amount of time
TriesTimOut: enter amount of time
MultiCall: Disab

- **LPDA**

LPDA-2: Enab
LPDA Address: 1
SNA Backup: Disab

Digital Bridge Configuration Scenarios

The following scenarios describe *four* possible backup processes, which are used in typical customer networks: automatic partial backup, multipoint dial backup with tributary digital-sharing device, and network management controlled backup. Read these scenarios; each contains descriptions that are common to many applications.

Automatic Partial Backup

The assumed configuration for an automatic partial backup scenario (Figure D-3 shows when dial backup is not active, while Figure D-4 shows when dial backup is active) is as follows:

- Network is a 3-drop DDS multipoint network operating at 9600 bps.
- Customer wants automatic backup controlled by the tributary DSUs.
- Three central-site DBM-Vs are dedicated to the control DSU and are connected to its digital bridge.

- The control and tributary DSUs are configured for mixed diagnostics.
- Tributary DBMs are configured for 9.6 kbps operation, automatic backup, no fallback, backup on network fault, Network Time-out period of 1 minute, outgoing call setup with password security, and automatic restoration of DDS after 5 minutes.
- Central-site DBM-Vs are configured for 9.6 kbps operation, no fallback, and auto-answer with password security.
- Digital bridge is configured as a central-site bridge, has Bridge Rate set to =DSU, has Ports DCE (first port of the digital bridge) through Prt4 active and configured for Host contention, taking its timing from the DDS clock.
- When a failure occurs in the network serving two of the drops, the two affected DSUs display a network fault (**Alrm** LEDs light at the affected DSUs and begin DDS TimeOut for dial backup). The NMS and control DSU display a **Tributary Time-out** alarm for the two tributaries. Data transmission to the other drop is not affected.

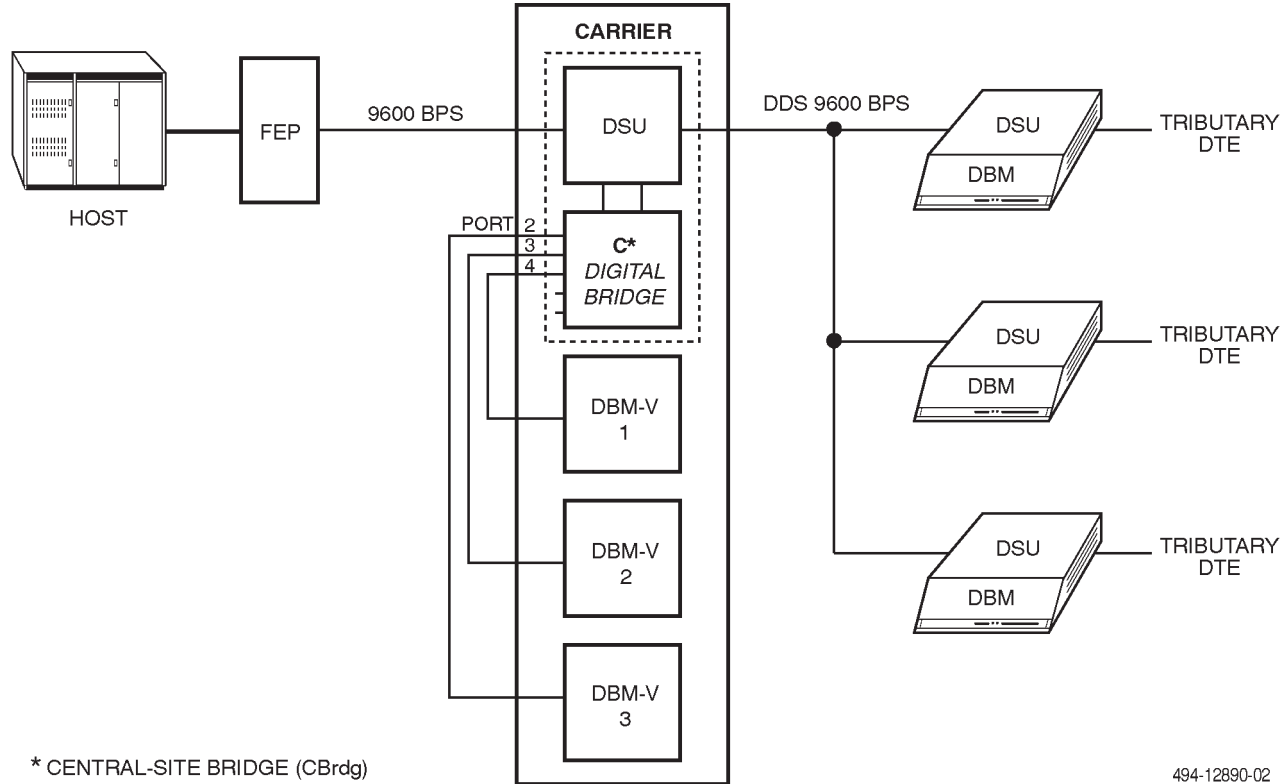


Figure D-3. Digital Bridge Configuration: Automatic Partial Backup – Dial Backup *Not* Active

When 1 minute elapses, the two tributary DSUs (Figure D-4) instruct their DBMs to place a call to their respective DBM-Vs at the central site. (Each tributary DSU-DBM has been paired with a DBM-V that is associated with the control DSU-digital bridge at the central site. The tributary's Backup Dir configuration option is a pointer to the telephone number stored in its Backup Directory for its associated DBM-V; each DBM calls a different DBM-V.) After the pairs of DBMs exchange passwords, the tributary DSU-DBMs enter Data mode (ready to send data).

After the tributary DSU-DBM has set up the call, each of the affected DSUs switches the DTE's data to its DBM. As each associated DBM-V enters Data mode, the data is passed from the DBM-V to the digital bridge. The digital bridge's timing is still provided by the DDS network, and elastic stores in the digital bridge buffer any timing differences between the DBMs and the DDS network. After all calls have been completed, full restoration is accomplished at 9600 bps.

It is not likely that backup can be accomplished before the network has timed out and the affected tributaries have been taken off the host's active list. However, if they are placed on an FEP's slow poll list, they will be placed back on the active list as soon as backup has been completed; they can then respond to polls once again. If dropped from the poll list completely, you will have to place the remote DTEs back onto the FEP's poll list.

During the backup session, each pair of communicating DBMs (the DBM-V and its tributary DBM) and the DDS network are active on the bridge. When the DDS network is restored, each tributary DSU drops its network alarm. After the 5-minute restoration interval has elapsed, the DSU switches back to the DDS network, and the remote DTE then receives polls from the host over the DDS network. Remote DTE responses are also sent back over the DDS network.

As each tributary disconnects its DBM, its DBM-V switches out of Data mode, becoming inactive on the bridge. Thus, restoration to the DDS network is automatic and generally nondisruptive. (Disruptions should only occur if the control and tributary are communicating when the switch occurs.)

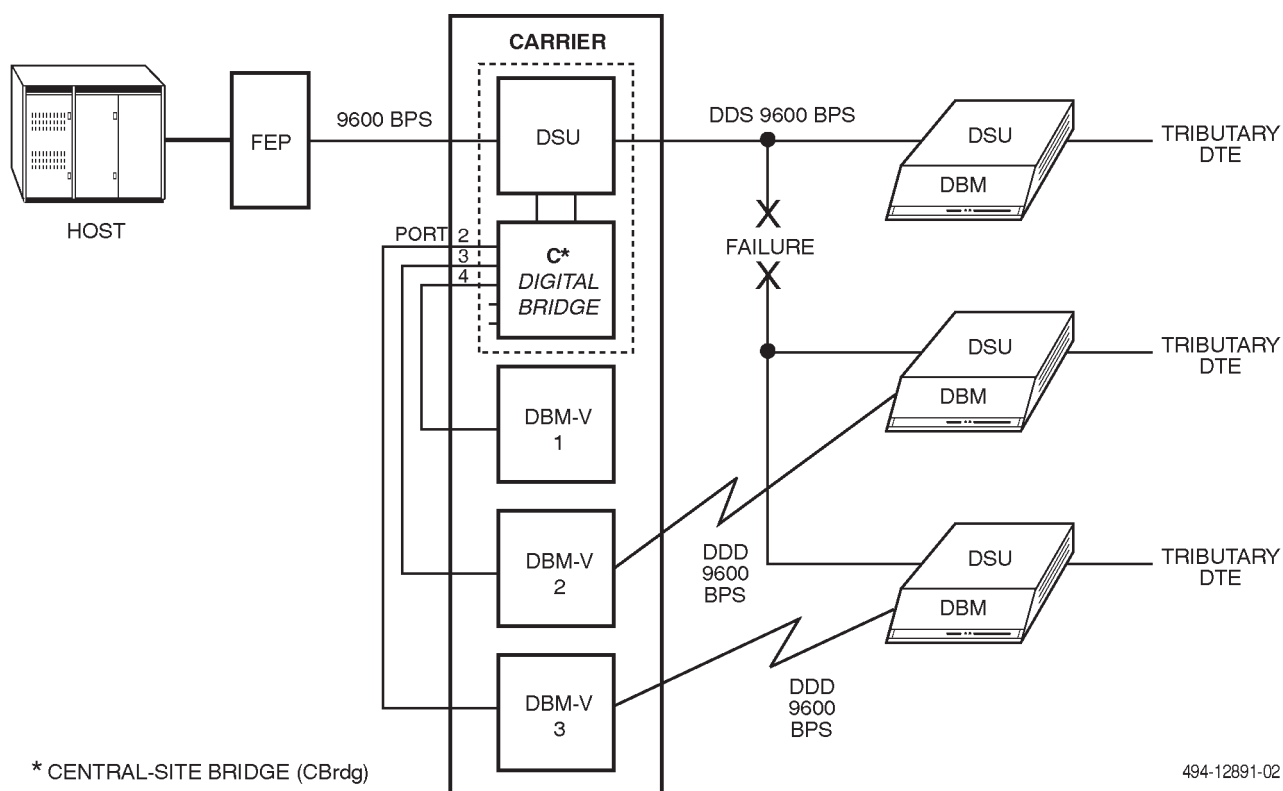


Figure D-4. Digital Bridge Configuration: Automatic Partial Backup – Dial Backup Active

Full Backup

If the fault is with the central-site bridge's local loop (a **No Signal** or a **Bipolar Violation** alarm is reported for the central-site bridge), the central-site bridge must be placed in Backup mode to eliminate problems with clock slippage (Figure D-5). This can be done from the SDCP by selecting **Bkup**, or from the NMS by issuing the Standby Facility (**sf**) command and entering **originate** in the *Standby Facility State* field. When the loop is restored, the central-site bridge's alarm disappears.

The network can be tested by performing a Digital Test (DT). After the central-site bridge is taken out of Dial Backup mode (by selecting **DrBU** using the SDCP, or by issuing the **sf** command and entering **release** from the NMS), the tributary DSUs will automatically restore the DDS network when the minutes specified for the Restore Time Out (RestorTimOut) configuration option expire.

Pertinent configuration options for the central-site bridge, a DBM-V, and a tributary DSU-DBM that support the configuration scenario just described follow. Please note that all DBM-Vs here should be configured the same – only the passwords and telephone numbers should differ. The same holds true for the tributary DSU-DBMs.

NOTE

To place a call from the DBM-V to its tributary, at the tributary DSU-DBM, enable the tributary's DBM configuration option Auto Answer. Since both the DBM-V and DBM are configured for password security (Call Setup: PsWrd), the DBM-V's outgoing password (TxPwd) must be the same as the tributary DBM's incoming password (RxPwd).

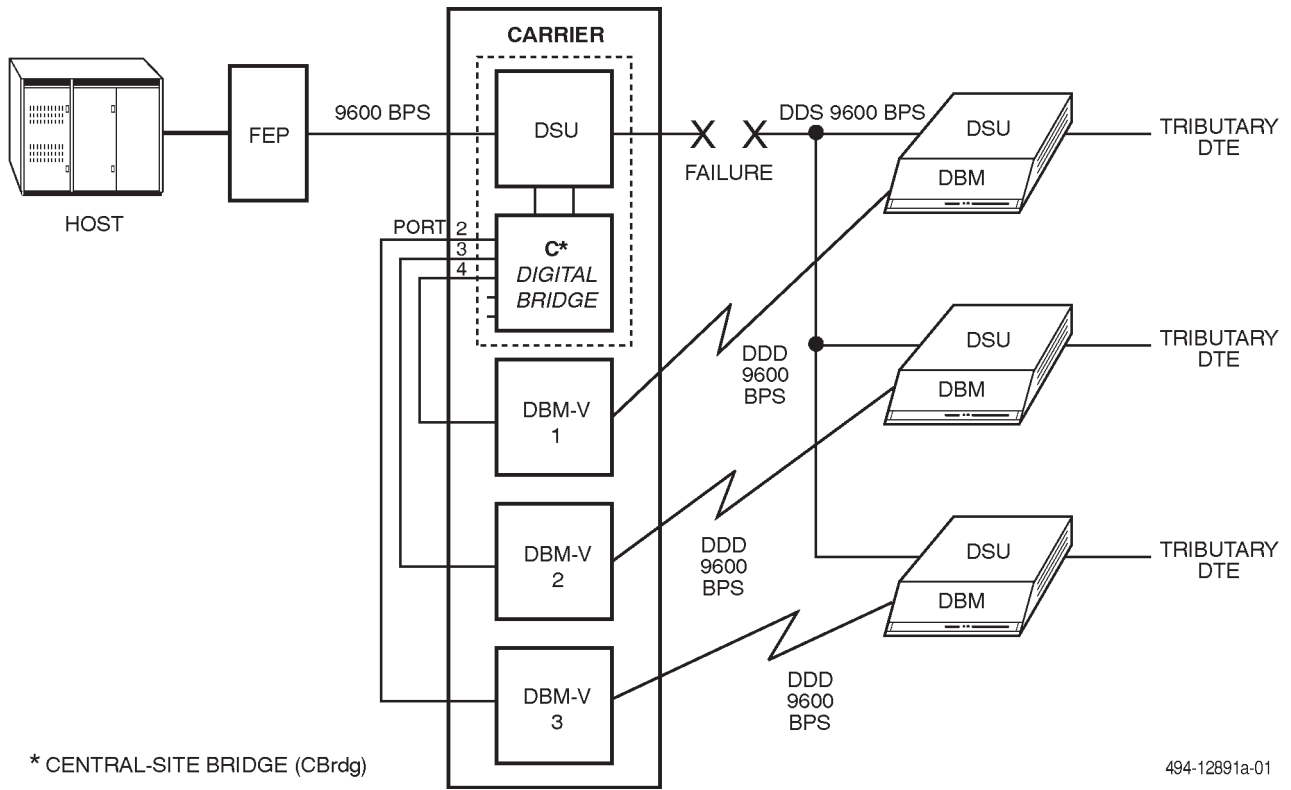


Figure D-5. Digital Bridge Configuration: Full Backup – Dial Backup Active

Configuration Options

Set the *central-site bridge* configuration options as follows (Configuration Worksheet for Bridge Mode)

- **MUX – Setup**

MUX Funct: CBrdg
 Bridge Rate: =DSU
 Brdg Timing: Int
 Share DevA: Enab
 Lowest Port#: DCE
 # Ports in Gp: 4
 Port Cntrl: Host
 Share DevB: Disab

- **Prt2 through Prt4** (Prt5 and Prt6 N/A)

RTS Cntrl: DTE
 Elast Stor: Enab
 RTS/CTS Del: 0
 DTR Alarm: Disab

- **DSU**

Rate(Kbps): 9.6
 TxClkSource: DDS
 Msg Clamp: Enab
 TxElastStor: Disab
 AggrSwitch: Disab

- **Diag – DSU**

Diag Type: Mixed
 Disr Type: 3600e

- **Diag – Gen**

Position: Cntrl
 LinkConfig: M-Pt
 Trib TimOut: enter amount of time

- **Gen**

DTE Port: EIA232

Set configuration options for automatic partial backup using the *DBM-V* as follows (Configuration Worksheet for Basic (DBM-V, DBM-S, or DBM-D) Mode):

- **Diag – DBM**

Diag Type: Disr
 RemoteDiag: Enhan

- **Diag – Gen**

Position: Cntrl
 LinkConfig: M-Pt
 M-Pt SymPrt: Disab

- **DBM**

Rate(Kbps): 9.6
 PrtSp(Kbps): 9.6
 TxClkSource: Ext
 CarrLossDisc: Yes
 Auto Retrain: Yes
 Single Rate: Yes
 AutoAnswer: Enab
 Call Setup: Pswrd
 RxPwd: enter received password
 TxPwd: enter transmit password
 V.13 Signl: Enab
 Primary Core: Yes
 DTRCallCon: Orig
 EchoCancel: Disab

- **Gen**

DTE Port: EIA232
 RTS Cntrl: FrcOn
 CTS Cntrl: Std
 AntiStream: Disab
 LSD Lead: Std
 CTS Lead: Std
 DSR FrcOn: Enab
 DSR on Tst: Enab
 Circ Assur: Disab
 LL by DTE: Disab
 RL by DTE: Disab
 DTR Alarm: Disab

- **Bkup**

Auto Bckup: Disab
 BckupOnCMI: Disab
 AutoRestor: Disab
 Backup Dir: enter
 Dir number (1 to 10)

Set the configuration options for automatic partial backup of the *tributary DSU* as follows (Configuration Worksheet for Basic Mode):

- **DSU**

Rate(Kbps): 9.6
 PrtSp(Kbps): 9.6
 TxClkSource: DDS
 AggrSwitch: Disab

- **Diag – DSU**

Diag Type: Mixed
 Disr Type: 3600e

- **Diag – DBM**

Diag Type: Mixed
 RemoteDiag: Enhan

- **Diag – Gen**

Position: Trib
 LinkConfig: M-Pt
 Resp Period: 1
 M-Pt SymPrt: Disab

- **DBM**

Rate(Kbps): 9.6
 PrtSp(Kbps): 9.6
 TxClkSource: RXC
 CarrLossDisc: Yes
 Auto Retrain: Yes
 Single Rate: Yes
 AutoAnswer: Enab
 TxElasStor: Disab
 RxElasStor: Disab
 Call Setup: Pswrd
 RxPwd: enter received password
 TxPwd: enter transmit password
 V.13 Signl: Enab
 Dial Test: Enab
 Primary Core: No
 DTRCallCon: Disab
 EchoCancel: Disab

- **Gen**

DTE Port: EIA232
 RTS Cntrl: DTE
 CTS Cntrl: Std

- **Bkup**

Auto Bkup: Enab
 Backup Dir: enter Dir number (1 to 10)
 BkupOnCMI: Enab
 AutoRestor: Enab
 NtwkTimOut: enter 1 minute
 RestorTimOut: enter 5 minutes
 TriesTimOut: enter 1 minute
 MultiCall: Disab

- **LPDA**

LPDA-2: Disab

Multipoint Full Dial Backup with Nondisruptive Diagnostics

The multipoint network in [Figure D-6](#) consists of a Model 3611 DSU with a digital bridge and two DBM-Ss, and two a Model 3610 DSUs with Switched 56 DBMs. Since the DSUs are configured for nondisruptive diagnostics (Diag Type: NonD), in-band framing is necessary, and all DSU/DTE interfaces operate at 55600 bps. In addition, it is assumed that the host polls for all data traffic.

In this scenario, the dial backup process will be initiated and controlled from the 6800 Series NMS (a 6700 Series NMS can also be used). All tributary DSUs should be listed in the control DSU's poll list.

NOTE

For this scenario, DBM-Ss are used; however, DBM-Ds can also be used.

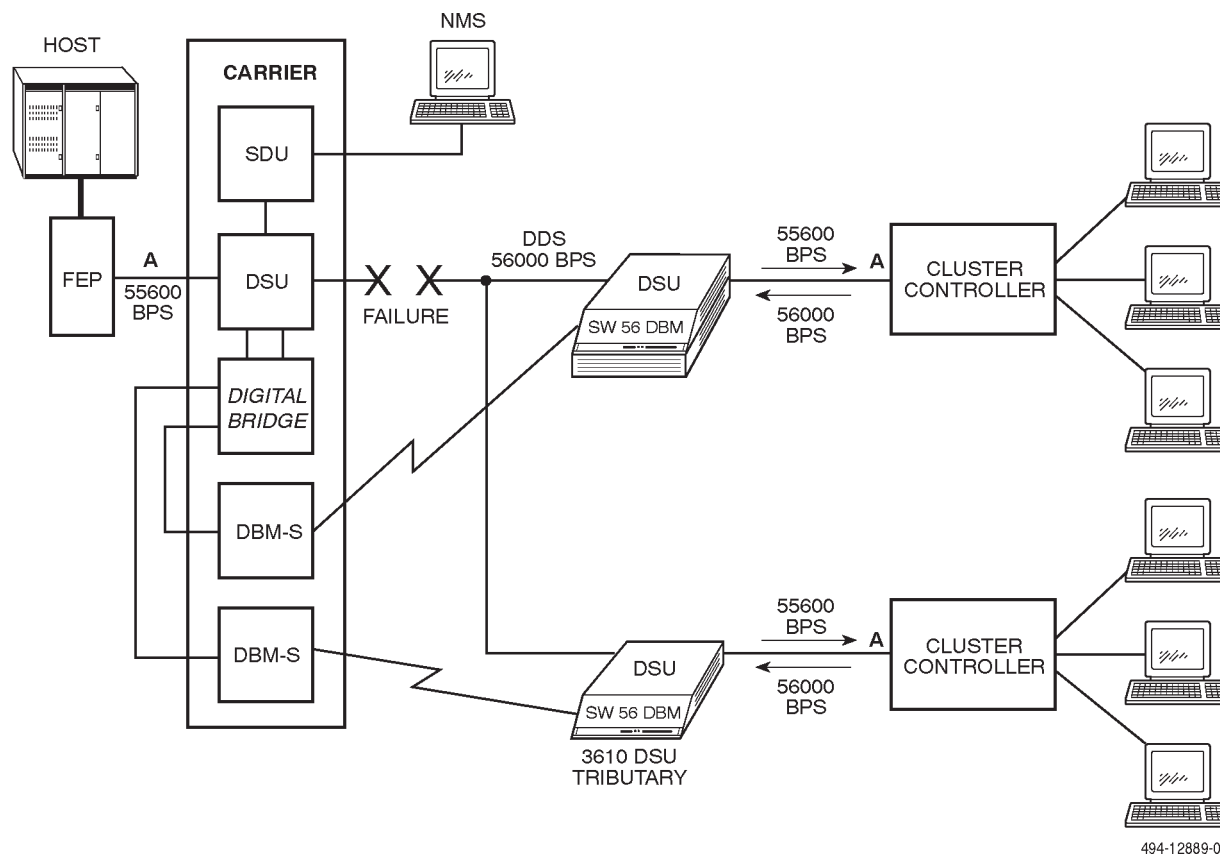


Figure D-6. Multipoint Full Dial Backup with Nondisruptive Diagnostics Configuration

If a network failure occurs so that the multipoint drops are lost, the 6800 Series NMS will display a **Tributary Time-out** alarm for the tributary DSUs, and a **Facility Alarm** for the control DSU. The operator then issues an **sf** command and **originate** in the *Standby Facility State* field to the control DSU, followed by a **dial** command, then the **sf** command and **originate** in the *Standby Facility State* field to each of the control DBM-Ss. (A routine command can be created to issue the command sequence automatically.) The control DSU reports by activating the digital bridge and switching to Bridge Timing (Brdg Timing: Auto).

Each DBM-S responds by dialing a tributary Switched 56 DBM. When connected, the pair of DBMs perform a handshake and exchange passwords, then enter Data mode (ready to send data).

After the tributary DSU-DBM has set up the call, each DSU switches the DTE's data to its DBM. After all calls are completed, full restoration is accomplished at 56 kbps.

The DBMs (the DBM-S and its tributary Switched 56 DBM) provide valid call setup messages to the NMS. If the NMS does not receive a valid call setup message from a DBM, the NMS operator issues another **dial** command, followed by the **sf** command and **originate** in the *Standby Facility State* field to the DBM. This completes the backup circuit and the host computer can restart the network polling; the FEP line may need to be restarted.

During backup, the DSU still reports the facility alarm to the NMS. When the failure is corrected and the DDS network is restored, the alarm is turned Off at the workstation's Alarm Monitor window. You can issue an aggregate Digital Test to one of the tributary DSUs to ensure that the DDS network is working correctly.

To end the backup session via the NMS, issue **disconnect** commands to the control DSU and all its DBM-Ss. (The NMS restores all control and tributary DSUs to the DDS network and drops all dial backup calls by issuing an **sf** command and **release** in the *Standby Facility State* field to the control DSU, and an **sf** command and **release** in the *Standby Facility State* field command followed by a **dial** and a **q** command in the *Number to Dial* field to each DBM associated with the digital bridge. To end the backup session via the SDCP, address the control DSU and each DBM by issuing the **DrBu** (drop backup) command.

Ending the backup session causes the control DSU to deactivate the bridge, and DSU timing (56 kbps) becomes the DDS clock source once again. Each DBM-S signals its tributary that it is dropping the call and hangs up. Each tributary then switches back to the DDS network, and the DDS network is again functional. (Between the time that the bridge is deactivated and the DDS network is reestablished, errors occur on those tributaries still in backup.)

Pertinent configuration options for the central-site bridge, a DBM-S, and tributary DSU-DBMs supporting the nondisruptive diagnostics configuration. Please note that all DBM-Ss here should be configured the same – only the passwords and telephone numbers should differ. The same holds true for the tributary DSU-DBMs.

Configuration Options

Set the *central-site bridge* configuration options that support the nondisruptive diagnostics configuration as follows (Configuration Worksheet for Bridge Mode):

- **MUX – Setup**

MUX Funct: CBrdg
 Bridge Rate: =DSU
 Brdg Timing: Auto
 Share DevA: Enab
 Lowest Port#: DCE
 # Ports in Gp: 3
 Port Cntrl: Host
 Share DevB: Disab

- **Prt2 and Prt3** (Prt4 through Prt6 N/A)

RTS Cntrl: DTE
 Elast Stor: Enab
 RTS/CTS Del: 0
 DTR Alarm: Disab

- **DSU**

Rate(Kbps): 56
 TxClkSource: DDS
 Msg Clamp: Enab
 TxElastStor: Disab
 AggrSwitch: Disab

- **Diag – DSU**

Diag Type: NonD
 2nd Ch(bps): 400
 Disr Type: Br56

- **Diag – Gen**

Position: Cntrl
 LinkConfig: M-Pt
 Trib TimOut: enter amount of time
 M-Pt SymPrt: Disab

- **Gen**

DTE Port: V.35

Set configuration options for DBM-Ss or DBM-Ds that support the nondisruptive diagnostics configuration as follows (Configuration Worksheet for Basic (DBM-V, DBM-S, or DBM-D) Mode):

- **Diag – DBM**

Diag Type: Disr
 RemoteDiag: Enhan

- **Diag – Gen**

Position: Cntrl
 LinkConfig: M-Pt

- **DBM**

PrtSp(Kbps): 56
 AutoAnswer: Disab
 Call Setup: Pswrd
 RxPwd: enter received password
 TxPwd: enter transmit password
 V.13 Signl: Enab
 Primary Core: Yes
 DTRCallCon: Orig
 EchoCancel: Disab

- **Gen**

DTE Port: EIA232
 RTS Cntrl: FrcOn
 CTS Cntrl: Std
 AntiStream: Disab
 LSD Lead: Std
 CTS Lead: Std
 DSR FrcOn: Disab

- **Bkup**

Auto Bckup: Disab
BckupOnCMI: Disab
AutoRestor: Disab

Set the configuration options for multipoint dial backup of a tributary DSU-DBM configuration as follows (Configuration Worksheet for Basic Mode):

- **DSU**

Rate(Kbps): 56
PrtSp(Kbps): 56
TxClkSource: DDS
AggrSwitch: Disab

- **Diag – DSU**

Diag Type: NonD
Disr Type: Br56

- **Diag – DBM**

Diag Type: NonD
RemoteDiag: Enhan

- **Diag – Gen**

Position: Trib
LinkConfig: M-Pt
Resp Period: 1
M-Pt SymPrt: Disab

- **DBM**

PrtSp(Kbps): 56
AutoAnswer: Enab
TxElasStor: Disab
RxElasStor: Disab
Call Setup: Pswrd
RxPwd: enter received password
TxPwd: enter transmit password
V.13 Signl: Enab
Primary Core: No

- **Gen**

DTE Port: V.35
RTS Cntrl: DTE
CTS Cntrl: Std

- **Bkup**

Auto Bckup: Disab
BckupOnCMI: Disab
AutoRestor: Disab

- **LPDA**

LPDA-2: Disab

Automatic Partial Backup Using an Extended Bridge

The assumed automatic partial backup configuration scenario, where there is an extended bridge, (Figure D-7 shows when dial backup is not active, Figure D-8 shows when dial backup is active on all drops, and Figure D-9 shows when dial backup is active on two drops) is as follows:

- Network is a 7-drop DDS multipoint network operating at 9600 bps.
- Customer wishes automatic backup controlled by the tributary DSUs.
- The control and tributary DSUs are configured for mixed diagnostics.
- Seven central-site DBM-Vs are dedicated to the control DSU and are connected to its digital bridge.
- Host requires a switched LSD signal.
- Tributary DBMs are configured for 9.6 kbps operation, LSD emulation (V.13 switched carrier emulation), automatic backup, no fallback, backup on network fault or LSD Off, time-out period of 1 minute, outgoing call setup with password security, and automatic restoration of DDS after 5 minutes.
- Central-site DBM-Vs are configured for 9.6 kbps operation, no fallback, LSD (V.13) emulation, and auto-answer with password security.
- Digital bridge consists of a central-site bridge and an extended bridge working in tandem. The *central-site bridge* has Bridge Rate set to =DSU, has Ports DCE (first port of the digital bridge) through Prt6 active and configured for contention, and takes its timing from the DDS system clock. The *extended bridge* has Bridge Rate set to 9.6, has Ports 2 through 4 active and configured for contention, and takes its timing from external timing on Prt1.
- When a failure in the backbone DDS network occurs, all DSUs recognize a network fault. The

NMS displays a **Facility Alarm** for the control DSU and a **Tributary Time-out** alarm for each tributary DSU and DBM.

- It is assumed that a failure in the DDS network is not between the control DSU and the central office. (The control DSU still receives valid DDS clock. If not receiving valid DDS clock, the central-site bridge would have to be put into Backup mode manually).

As a result of a failure in the backbone DDS network, the control DSU reports a **Facility Alarm** to the NMS. The tributary DSUs show an **Out-of-Service** message on their DCPs and the Network Timeout timer is started.

When 1 minute elapses, each of the seven tributary DBMs places a call to their respective DBM-Vs. (Each tributary DSU-DBM has been paired with a DBM-V that is associated with the control DSU-digital bridge at the central site. The tributary's Backup Dir configuration option is a pointer to the telephone number stored in its Backup Directory for its associated DBM-V; each DBM calls a different DBM-V.) After the pairs of DBMs exchange passwords, the tributary DSU-DBMs enter Data mode (ready to send data).

After the tributary DSU-DBM has set up the call, each DSU switches the DTE's data to its DBM. As each associated DBM-V enters Data mode, the data is passed from the DBM-V to the digital bridge. The digital bridge's timing is still provided by the DDS network, and elastic stores in the digital bridge buffer any timing differences between the DBMs and the DDS network. After all calls have been completed, full restoration is accomplished at 9600 bps.

It is not likely that backup can be accomplished before the network has timed out and the affected tributaries have been taken off the host's active list. However, if they are placed on an FEP's slow poll list, they will be placed back on the active list as soon as backup has been completed; they can then respond to polls once again. If dropped from the poll list completely, you will have to place the remote DTEs back onto the FEP's poll list.

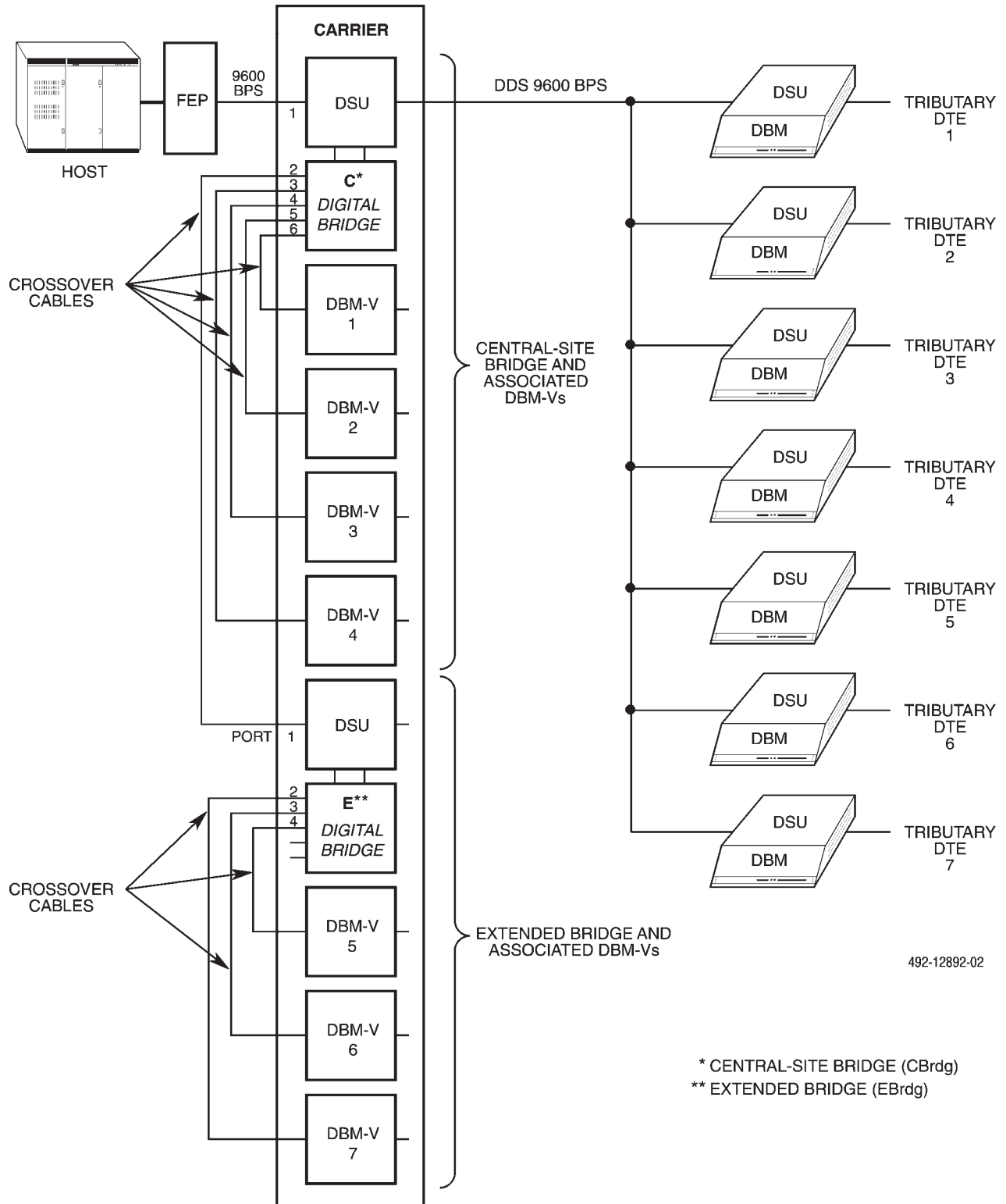


Figure D-7. Extended Bridge Configuration: Automatic Partial Backup – Dial Backup *Not* Active

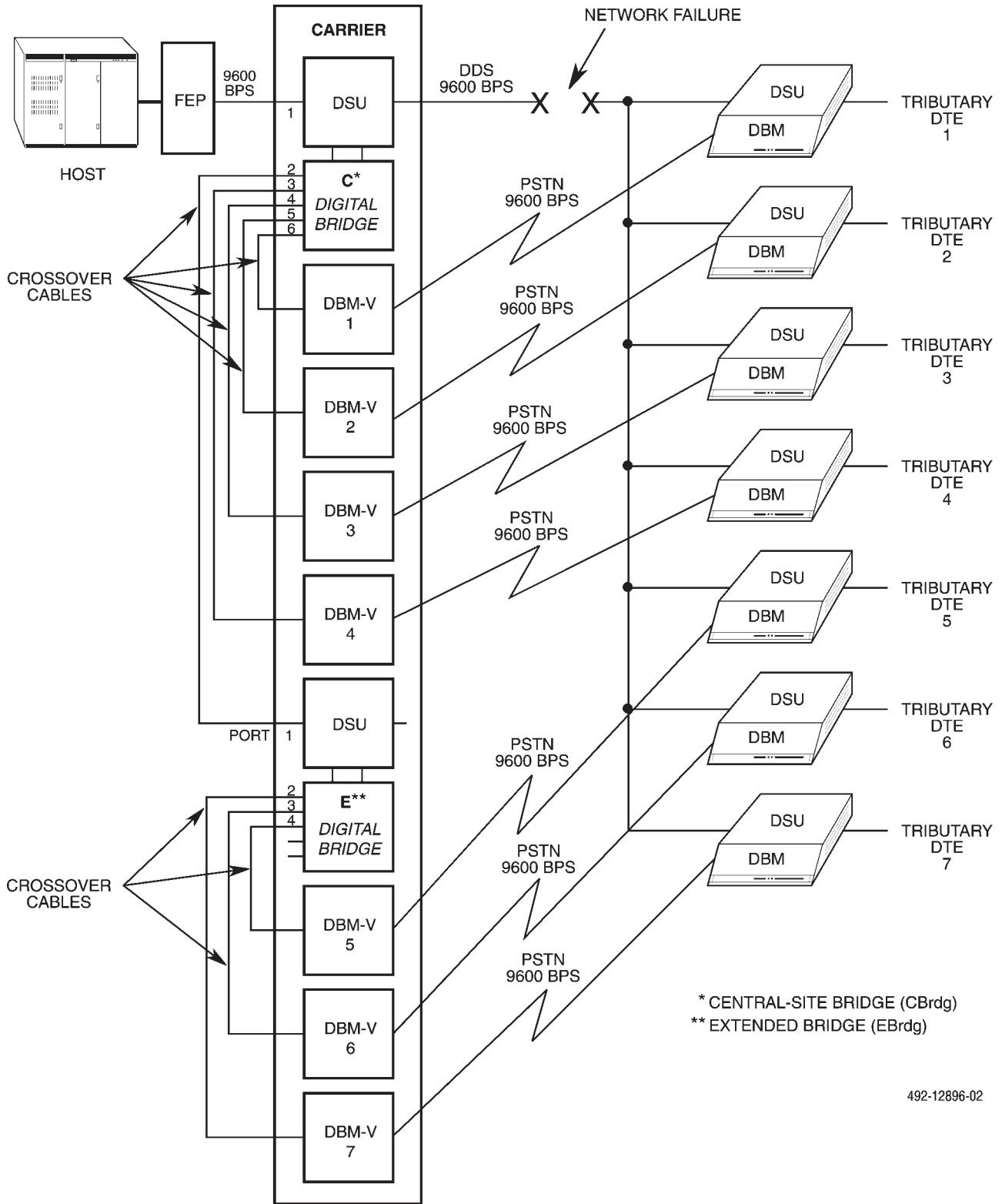


Figure D-8. Extended Bridge Configuration: Automatic Partial Backup Active – Dial Backup Active for All Drops

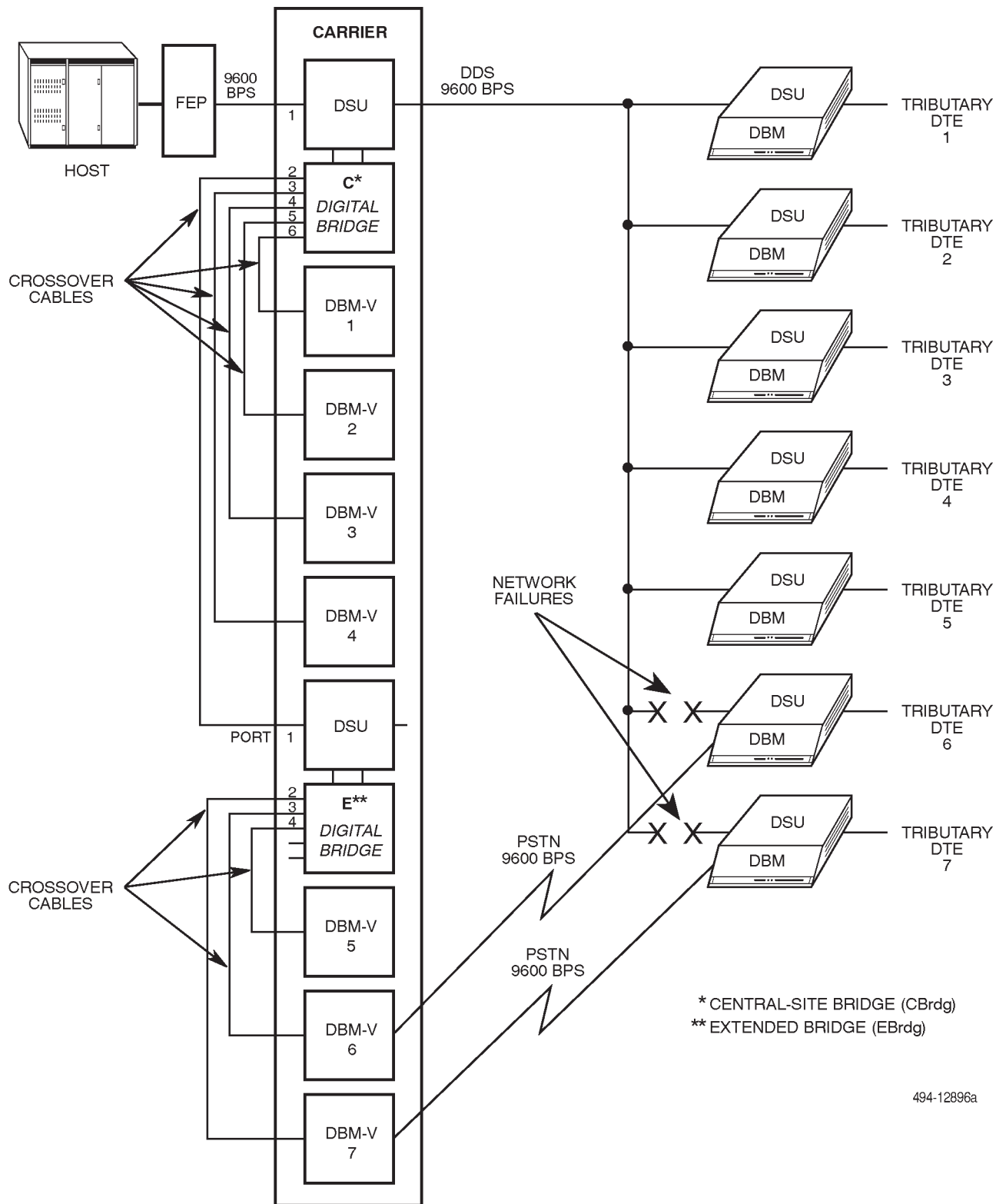


Figure D-9. Extended Bridge Configuration: Automatic Partial Backup Active – Dial Backup Active for Two Drops

During the backup session, each pair of communicating DBMs (the DBM-V and its tributary DBM) and the DDS network are active on the bridge. When the DDS network is restored, each tributary DSU drops its network alarm. After the 5-minute restoration interval has elapsed, the DSU switches back to the DDS network, and the remote DTE then receives its polls from the host over the DDS network. Remote DTE responses are also sent back over the DDS network; this causes the control DSU to raise LSD, transferring the data from the digital bridge, where it goes to the host (controlling DTE).

As each tributary disconnects its DBM, its DBM-V switches out of Data mode, becoming inactive on the bridge. Thus, restoration to the DDS network is automatic and generally nondisruptive. (Disruptions should only occur if the control and tributary are communicating when the switch occurs.)

Pertinent configuration options for the central-site bridge and the extended bridge that support the configuration scenario just described follow. The configuration options for a DBM-V and a tributary DSU-DBM are the same as those provided earlier in the *Automatic Partial Backup* section (related to **Figures D-3** and **D-4**). Please note that all DBM-Vs here should be configured the same – only the passwords and telephone numbers should differ. The same holds true for the tributary DSU-DBMs.

Configuration Options

Set the *central-site bridge* configuration options as follows (Configuration Worksheet for Bridge Mode).

- **MUX – Setup**

MUX Funct: CBrdg
 Bridge Rate: =DSU
 Brdg Timing: Int
 Share DevA: Enab
 Lowest Port#: DCE
 # Ports in Gp: 6
 Share DevB: Disab

- **Prt2 through Prt6**

RTS Cntrl: DTE
 Elast Stor: Enab
 RTS/CTS Del: 0
 DTR Alarm: Disab

- **DSU**

Rate(Kbps): 9.6
 TxClkSource: DDS
 Msg Clamp: Enab
 TxElastStor: Disab
 AggrSwitch: Disab

- **Diag – DSU**

Diag Type: Mixed
 2nd Ch(bps): 400
 Disr Type: 3600

- **Diag – Gen**

Position: Cntrl
 LinkConfig: M-Pt
 Trib TimOut: enter amount of time
 M-Pt SymPrt: Disab

- **Gen**

DTE Port: EIA232

Set the *extended bridge* configuration options as follows (Configuration Worksheet for Bridge Mode):

- **MUX – Setup**

MUX Funct: EBrdg
 Bridge Rate: 9.6
 Brdg Timing: Prt1
 Share DevA: Enab
 Lowest Port#: 2
 # Ports in Gp: 3
 Port Cntrl: Host
 Share DevB: Disab

- **Prt2 through Prt4** (Prt5 and Prt6 N/A)

RTS Cntrl: DTE
 Elast Stor: Enab
 RTS/CTS Del: 0
 DTR Alarm: Disab

- **DSU**

Rate(Kbps): 9.6
 TxClkSource: DDS
 Msg Clamp: Enab
 TxElastStor: Disab
 AggrSwitch: Disab

- **Diag – DSU**

Diag Type: Disr
 Disr Type: 3600e

- **Diag – Gen**

Position: Cntrl
 LinkConfig: M-Pt

- **Gen**

DTE Port: EIA232

Network Management-Controlled Full Backup Using an Extended Bridge

The assumed configuration for backup (Figure D-10 shows when dial backup is not active, while Figure D-11 shows when dial backup is active) that is controlled by an NMS, using an extended bridge, is as follows:

- Network is a 7-drop DDS multipoint network operating at 56 kbps.
- Full backup of all tributaries (with the digital bridge operating at 14.4 kbps) is required with outage of any tributary.
- The control and tributary DSUs are configured for nondisruptive diagnostics with a 400 bps in-band secondary channel transport speed.
- Seven central-site DBM-Vs are dedicated to the control DSU and are connected to its digital bridge.
- Tributary DBMs are configured for 14.4 kbps operation, LSD emulation (V.13 switched-carrier operation), no fallback, and auto-answer with password security.
- Central-site DBM-Vs are configured for 14.4 kbps operation, no fallback, and outgoing call setup with password security.
- Digital bridge consists of a central-site bridge and an extended bridge working in tandem; the *central-site bridge* has Bridge Rate set to 14.4 kbps, has Ports 2 through 6 active and configured for contention, and takes its timing from the DDS system clock; the *extended bridge* has Bridge Rate set to 14.4 kbps, has Ports 2 through 4 active and configured for contention, and takes its timing from the external timing on Prt1.
- The FEP can accept a change in speed from 56 kbps to 14.4 kbps.
- When a failure occurs in the backbone DDS network, all of the drops are affected. The control DSU reports a **Facility Alarm** and a **Tributary Time-out** alarm for each tributary DSU and DBM.
- You have either a System Controller, or a COMSPHERE 6700 or 6800 Series NMS workstation.

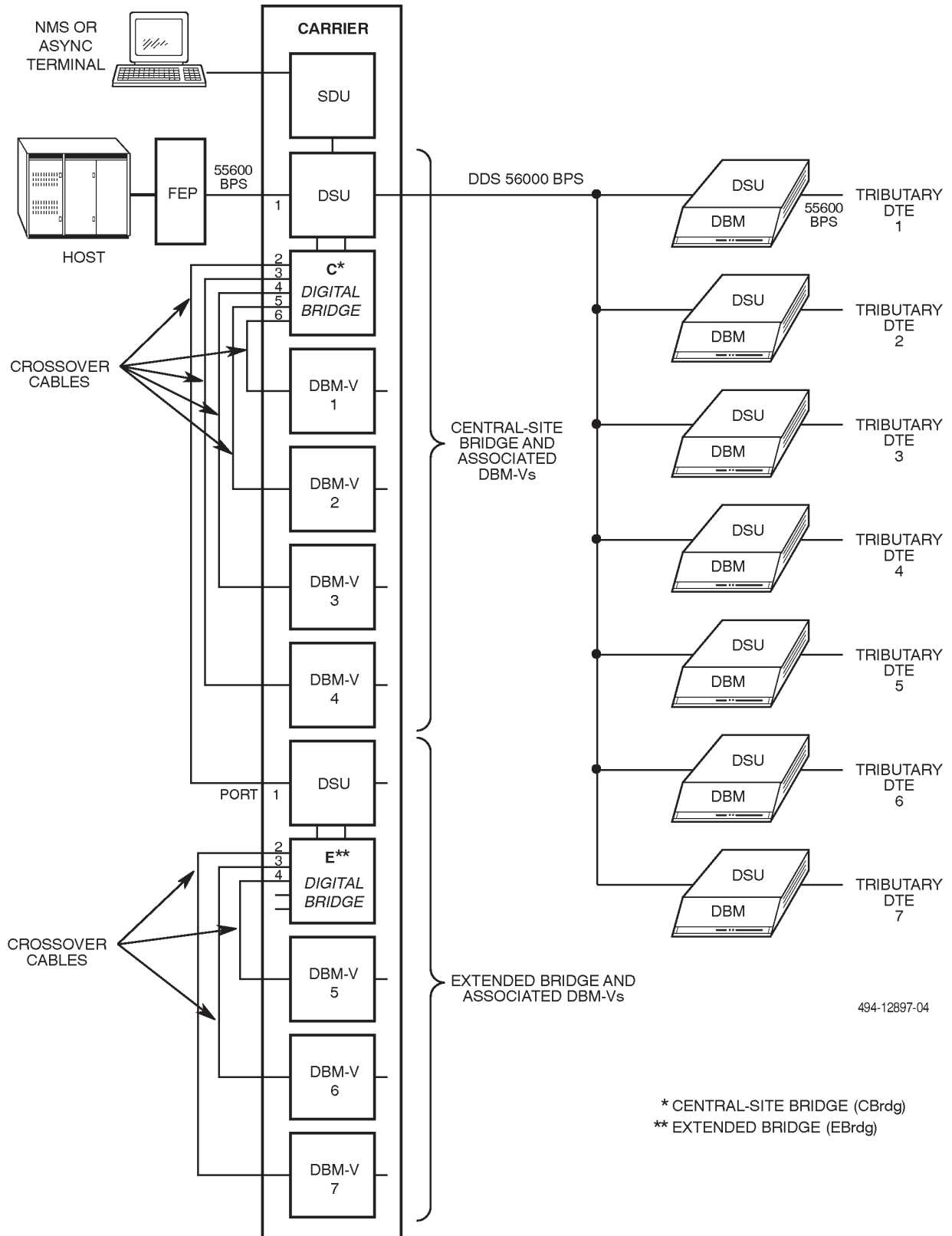


Figure D-10. NMS-Controlled Full Backup Configuration – Dial Backup *Not* Active

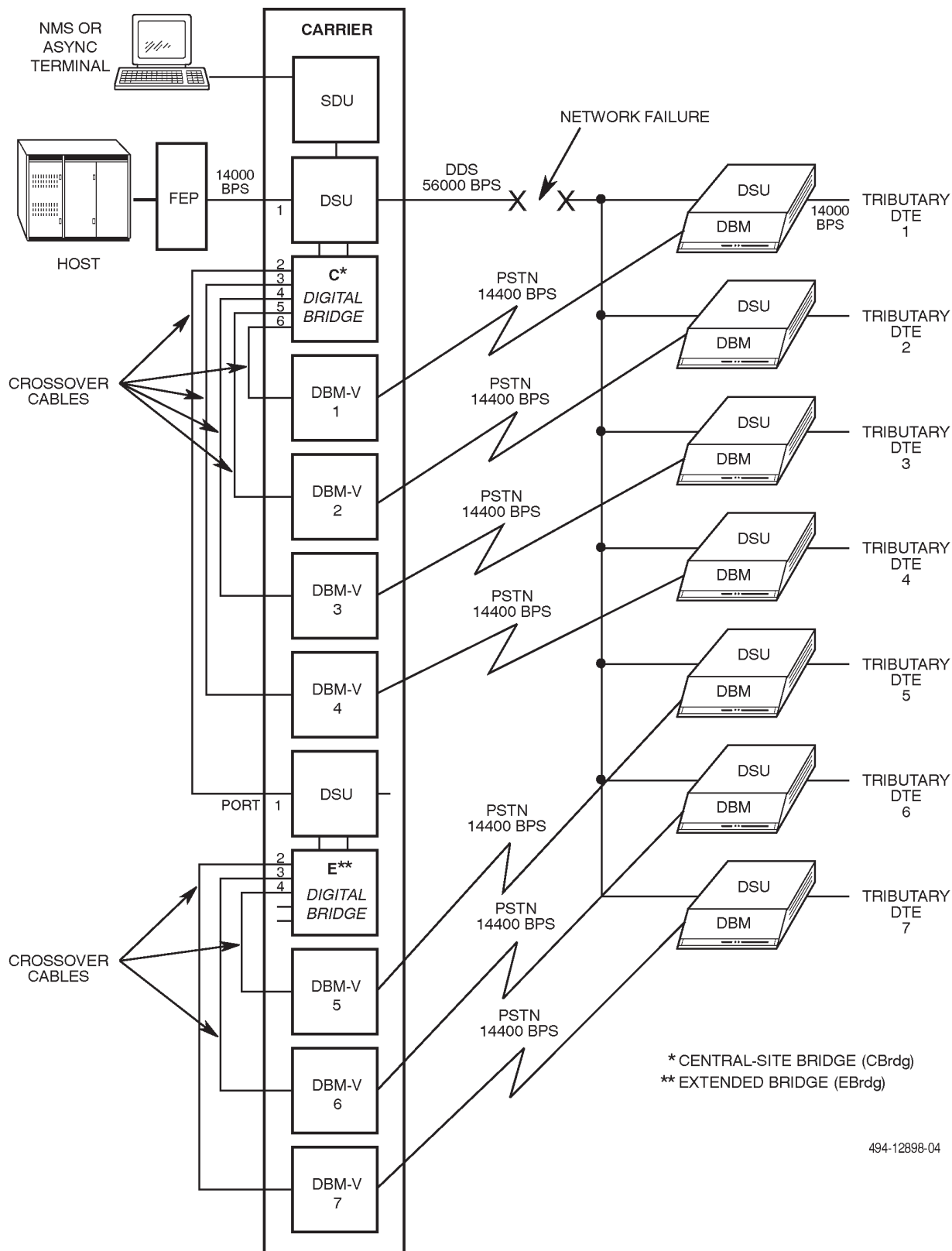


Figure D-11. NMS-Controlled Full Backup Configuration – Dial Backup Active

As a result of a network failure in the backbone DDS network, the control DSU reports a facility alarm to the NMS. The operator at the NMS workstation is alerted by the alarm, and examines the circuit's network map or circuit profile to see if backup is possible. Supplementary information about the network addresses of the DBM-Vs (that are dedicated to the bridge) and their remote DBM telephone numbers should also be in the circuit profile.

The operator then issues an **sf** command and enters **originate** in the *Standby Facility State* field to the control DSU; then a **dial** command followed by an **sf** command and **originate** in the *Standby Facility State* field to each of the DBM-Vs. (A routine command can be created to issue the command sequence automatically.) The control DSU reports by activating the digital bridge and switching to internal timing (Brdg Timing: Int) at the 14.4 kbps fallback rate. Each DBM-V responds by dialing a tributary DBM. When connected, the pair of DBMs (the DBM-V and its tributary DBM) perform a handshake and exchange passwords, and enter Data mode (ready to send data).

After the tributary DSU-DBM has answered the call, each DSU switches the DTE's data to its DBM. After all calls are completed, full restoration is accomplished at 14.4 kbps.

The DBM-Vs provide valid call setup messages to the NMS. If the NMS does not receive a valid call setup message from a DBM-V, the NMS operator issues another **dial** command followed by the **sf** command and **originate** in the *Standby Facility State* field to the DBM-V. This completes the backup circuit and the host computer can restart the network polling. When backup is completed, the FEP line may be restarted, if necessary.

During backup, the DSU still reports the facility alarm to the NMS. When the failure is corrected and the DDS network is restored, the alarm is turned Off at the workstation's Alarm Monitor window. You can request an aggregate Digital Test to one of the tributary DSUs to ensure that the DDS network is working correctly.

To end the backup session via the NMS, issue **disconnect** commands to the control DSU and all its DBM-Vs. (The NMS restores all control and tributary DSUs to the DDS network and drops all dial backup calls by issuing an **sf** command and **release** in the *Standby Facility State* field to the control DSU, and an **sf** command and **release** in the *Standby Facility State* field command, followed by a **dial** and a **q** command in the *Number to Dial* field to each DBM associated with the digital bridge. *To end the backup session via the SDCP*, address the control DSU and each DBM by issuing the **DrBu** (drop backup) command.

Ending the backup session causes the control DSU to deactivate the bridge, and DSU timing (56 kbps) becomes the DDS clock source once again. Each DBM-V signals its tributary that it is dropping the call and hangs up. Each tributary then switches back to the DDS network, and the DDS network is again functional. (Between the time that the bridge is deactivated and the DDS network is reestablished, errors occur on those tributaries still in backup.)

Pertinent configuration options for the central-site bridge, the extended bridge, a DBM-V, and a tributary DSU-DBM supporting this application follow. Please note that all DBM-Vs here should be configured the same – only the passwords and telephone numbers should differ. The same holds true for the tributary DSU-DBMs.

Configuration Options

Set the *central-site bridge* configuration options as follows (Configuration Worksheet for Bridge Mode):

- **MUX – Setup**

MUX Funct: CBrdg
 Bridge Rate: 14.4
 Brdg Timing: Int
 Share DevA: Enab
 Lowest Port#: DCE
 # Ports in Gp: 6
 Port Cntrl: Host
 Share DevB: Disab

- **Prt2 through Prt6**

RTS Cntrl: DTE
 Elast Stor: Enab
 RTS/CTS Del: 0
 DTR Alarm: Disab

- **DSU**

Rate(Kbps): 56
 TxClkSource: DDS
 AggrSwitch: Disab

- **Diag – DSU**

Diag Type: NonD
 2nd Ch(bps): 400
 Disr Type: 3600

- **Diag – Gen**

Position: Cntrl
 LinkConfig: M-Pt
 Trib TimOut: enter amount of time
 Diag Conn: CC
 M-Pt SymPrt: Disab

- **Gen**

DTE Port: V.35

Set the *extended bridge* configuration options as follows (Configuration Worksheet for Bridge Mode):

- **MUX – Setup**

MUX Funct: EBrdg
 Bridge Rate: 14.4
 Brdg Timing: Prt1
 Share DevA: Enab
 Lowest Port#: 2
 # Ports in Gp: 3
 Share DevB: Disab

- **Prt2 through Prt4** (Prt5 and Prt6 N/A)

RTS Cntrl: DTE
 Elast Stor: Enab
 RTS/CTS Del: 0
 DTR Alarm: Disab

- **DSU**

Rate(Kbps): 56
 TxClkSource: DDS
 Msg Clamp: Enab
 TxElastStor: Disab
 AggrSwitch: Disab

- **Diag – DSU**

Diag Type: Disr
 Disr Type: 3600e

- **Diag – Gen**

Position: Cntrl
 LinkConfig: M-Pt

- **Gen**

DTE Port: EIA232
 CTS Cntrl: Std

Set configuration options for multipoint full dial backup using the *DBM-V* as follows (Configuration Worksheet for Basic (DBM-V, DBM-S, or DBM-D) Mode):

- **Diag – DBM**
Diag Type: Disr
RemoteDiag: Enhan
- **Diag – Gen**
Position: Cntrl
LinkConfig: M-Pt
- **DBM**
Rate(Kbps): 14.4
PrtSp(Kbps): 14.4
TxClkSource: Ext
CarrLossDisc: Yes
Auto Retrain: Yes
Single Rate: Yes
AutoAnswer: Disab
Call Setup: Pswrd
RxPwd: enter received password
TxPwd: enter transmit password
V.13 Signl: Enab
Primary Core: Yes
DTRCallCon: Orig
- **Gen**
DTE Port: EIA232
RTS Cntrl: FrcOn
CTS Cntrl: Std
- **Bkup**
Auto Bckup: Disab
AutoRestor: Disab

Set the configuration options for multipoint full dial backup of a *tributary DSU* as follows (Configuration Worksheet for Basic Mode):

- **DSU**
Rate(Kbps): 56
PrtSp(Kbps): 56
TxClkSource: DDS
AggrSwitch: Disab
- **Diag – DSU**
Diag Type: NonD
2nd Ch(bps): 400
Disr Type: 3600e
- **Diag – DBM**
Diag Type: NonD
2nd Ch(bps): 400
RemoteDiag: Enhan
- **Diag – Gen**
Position: Trib
LinkConfig: M-Pt
Resp Period: 1
M-Pt SymPrt: Disab
- **DBM**
Rate(Kbps): 14.4
PrtSp(Kbps): 14.4
CarrLossDisc: Yes
Auto Retrain: Yes
Single Rate: Yes
AutoAnswer: Enab
TxElasStor: Disab
RxElasStor: Disab
Call Setup: Pswrd
RxPwd: enter received password
TxPwd: enter transmit password
V.13 Signl: Enab
Primary Core: No
- **Gen**
DTE Port: V.35
RTS Cntrl: DTE
- **Bkup**
Auto Bckup: Disab
AutoRestor: Disab

MCMP Configuration Scenarios

There are three different MCMP scenarios described in this section: one FEP port-sharing scenario and two dial backup scenarios.

MCMP Using FEP Port Sharing

The 3600 Series DSUs with MCMP capability are targeted towards financial services and information processing customers. These customers (banks, brokerages, and data processing houses) usually have two or more parallel multipoint analog private line (APL) circuits that terminate at a branch office. Each of these circuits is typically set for a different speed and response time, depending on application requirements. Using the MCMP capability, these multipoint circuits can be replaced by a single 56 kbps DDS multipoint circuit.

A typical example can be found in [Figure D-12](#), where two high-speed applications and a low-speed application service two branches of a retail bank. The high-speed applications (19.2 kbps) support teller workstations and platform terminals (Channels A and B, respectively), and the low-speed application (4.8 kbps) services automated teller machines (ATMs, Channel C). In addition, the low-speed application, extended via the FEP port-sharing feature of the control DSU and a dedicated multipoint circuit, services several additional remote ATMs.

In the configuration shown in [Figure D-12](#), the MCMP channels are assigned to different port numbers to illustrate channel assignment flexibility.

Pertinent configuration options for *both* the control DSU with MCMP and the Site 1 tributary DSU supporting this configuration scenario follow.

Configuration Options

Set the *FEP port sharing* configuration options for the control and tributary DSU-MCMPs as follows (Configuration Worksheet for MCMP Mode):

- **MUX – Setup**

MUX Funct: MCMP
Share DevA: Disab
Share DevB: Disab
P1/2 FEPSh: Disab
P3/4 FEPSh: Enab for control; Disab for tributary
P5/6 FEPSh: Disab

- **Prt1 through Prt4** (Prt5 and Prt6 N/A)

Async→Sync: Disab
TxCarrSel: Const
RxCarrSel: Const
Elast Stor: Enab (Prt4 only)

- **PrtSp – DSU**

Prt1: 19.2
Prt2: 19.2
Prt3: 4.8
Prt4: 4.8
Prt5 and Prt6: Disab

- **PrtSp – Chan**

Prt1: A
Prt2: B
Prt3: C
Prt4: C
Prt5 and Prt6: None

- **DSU**

Rate(Kbps): 56
TxClkSource: DDS
AggrSwitch: Disab

- **Diag – DSU**

Diag Type: NonD
2nd Ch(bps): 400
Disr Type: 3600e

- **Diag – Gen**

Position: Cntrl for control; Trib for tributary
LinkConfig: M-Pt

- **Gen**

DTE Port: EIA232
RTS Control: FrcOn

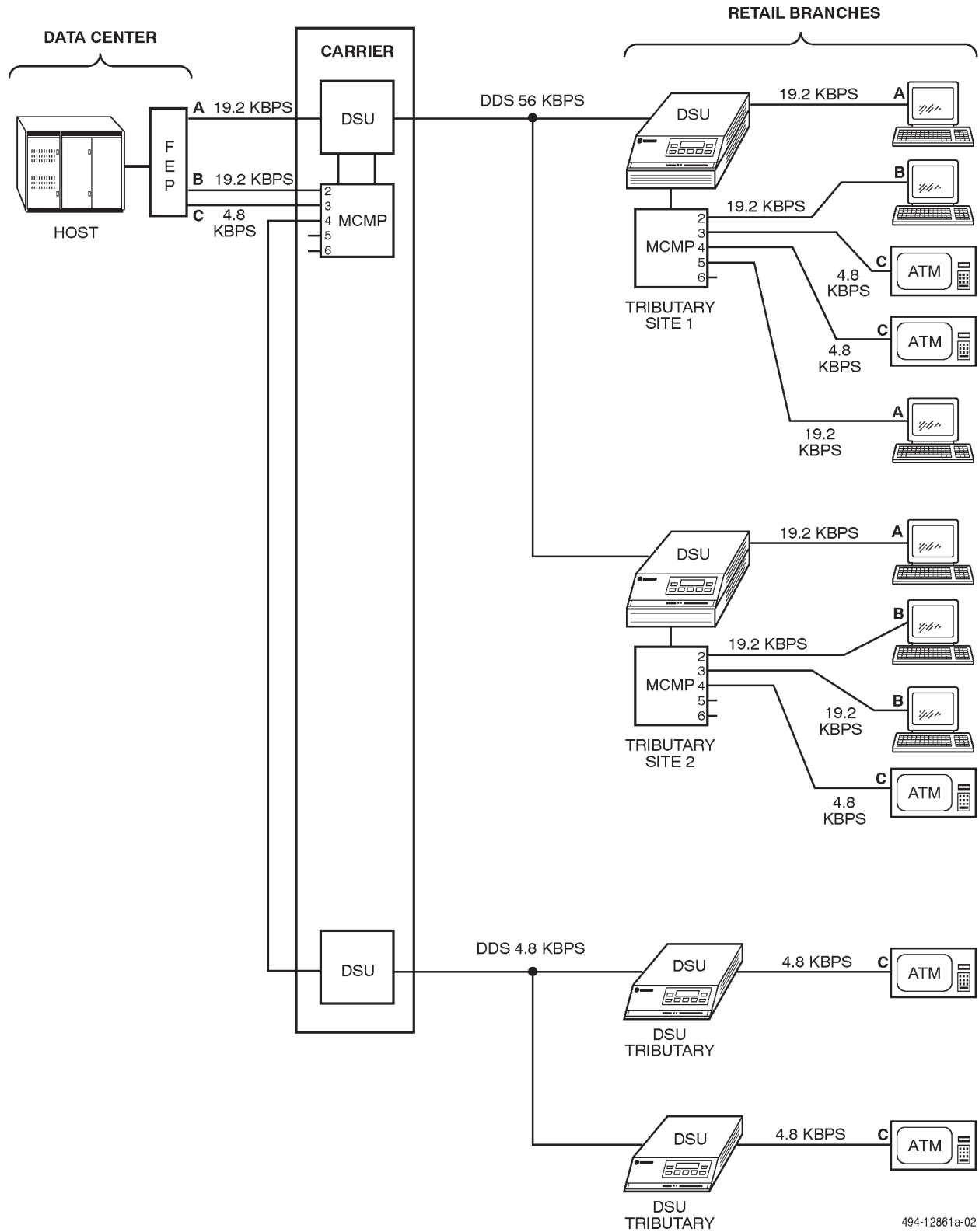


Figure D-12. MCMP using FEP Port-Sharing Configuration

Dedicated MCMP Backup with Switched 56 DBMs

This scenario describes the Switched 56 kbps dial backup of an MCMP circuit (Figure D-13). The assumed configuration for this scenario is as follows:

- Network is a 2-drop multipoint circuit operating at 56 kbps.
- Customer wishes dial backup to be initiated from and controlled by the NMS for this example; however, it could be done automatically.
- Two central-site DSUs equipped with DBM-Ss are dedicated to the control DSU-MCMP. A DSU with TDM is configured as an extended bridge, which is used to bridge the aggregate data stream to the Switched 56 DBMs.
- The control DSU-MCMP has its Aggregate Switch configuration option enabled (Aggr Sw: Enab) and the switch's timing set to Aggregate (AgSw Timing: Aggr). The aggregate data (data, framing and diagnostics) is routed from the spare Port 1 interface on the control DSU-MCMP to the extended bridge.
- The central-site DBM-Ss are configured for disruptive diagnostics (Diag Type: Disr).

- The extended bridge is configured to operate at 56 kbps, automatically taking its timing from any port, and configured for digital-sharing with two ports in the digital-sharing group, Prt2 being the lowest-numbered port. It is also configured for Host contention.

NOTE

For this scenario, DBM-Ss are used; however, DBM-Ds can also be used.

When a failure occurs, the control DSU reports a **No Response** alarm for the affected tributary DSU. The control DSU also reports a **Facility Alarm** if the control leg of the circuit is affected.

If all tributaries are affected by the failure and are to be backed up, send an **sf** command to the control DSU with MCMP and enter **originate** in the *Standby Facility State* field. This causes the DSU to disconnect the downstream DSU, and revert to aggregate switch timing (which, in this example, is taken from the aggregate port). *This step is not necessary for partial backup; that is, when not all tributaries were lost.*

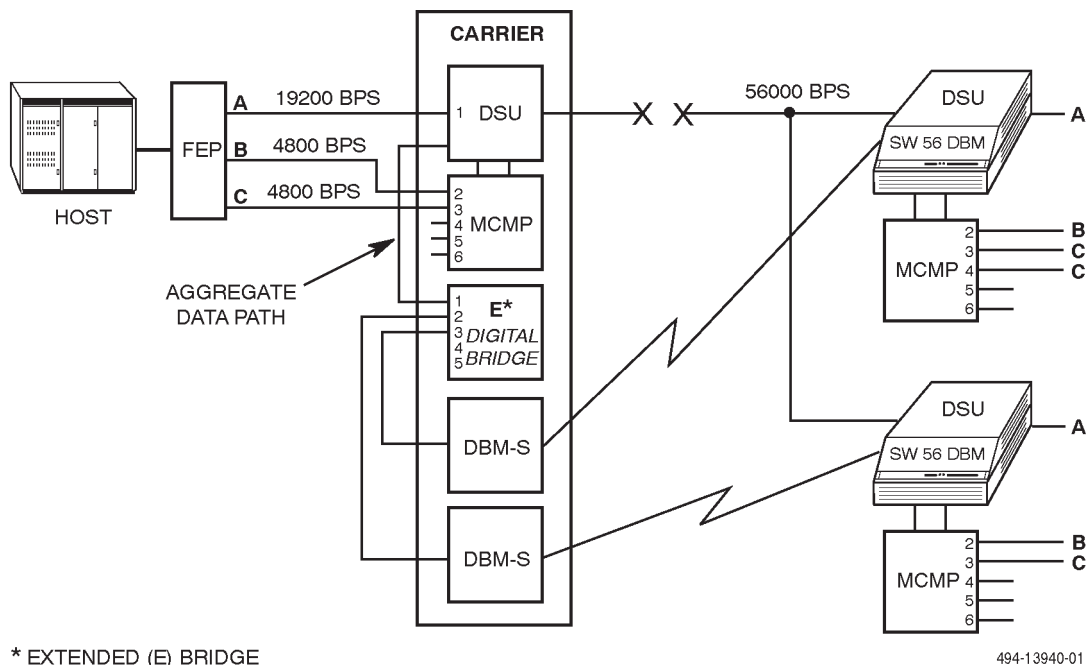


Figure D-13. Dedicated MCMP Backup Configuration with Switched 56 DBMs

Next, send a **dial** command, followed by a Dial Mode (**dm**) command to each of the DBM-Ss performing backup. (A routine command can be created to issue the command sequence automatically.) Each DBM-S responds by dialing a tributary Switched 56 DBM. When connected, the pair of DBMs handshake and exchange passwords, and enter Data mode (ready to send data).

After the tributary DSU-DBM has set up the call, each DSU switches the DTE's data to its DBM. After all calls are completed, full restoration is accomplished at 56 kbps.

The DBM-Ss provide valid call setup messages to the NMS. If the NMS does not receive a valid call setup message from a DBM-S, the NMS operator issues another **dial** command followed by a **dm** command to the DBM. This completes the backup circuit and the host computer can restart the network polling. When backup is completed, the FEP line may be restarted, if necessary.

During backup, the DSU still reports the facility alarm to the NMS. When the failure is corrected and the DDS network is restored, the alarm is turned Off at the workstation's Alarm Monitor window. You can request an aggregate Digital Test to one of the tributary DSUs to ensure that the DDS network is working correctly.

To end the backup session via the NMS, issue **disconnect** commands to the control DSU and all its DBM-Ss. (The NMS restores all control and tributary DSUs to the DDS network and drops all dial backup calls by issuing an **sf** command and entering **release** in the *Standby Facility State* field to the control DSU, and an **sf** command and entering **release** in the *Standby Facility State* field command, followed by a **dial** and a **q** command in the *Number to Dial* field to each DBM-S associated with the digital bridge). To end the backup session via the SDCP, address the control DSU and each DBM by issuing the **DrBU** (drop backup) command.

Ending the backup session causes the control DSU to deactivate the bridge, and DSU timing (56 kbps) becomes the DDS clock source once again. Each DBM-S signals its tributary that it is dropping the call and hangs up. Each tributary then switches back to the DDS network, and the DDS network is again functional. (Between the time that the bridge is deactivated and the DDS network is reestablished, errors occur on those tributaries still in backup.)

Pertinent configuration options for the central-site bridge, the extended bridge, a DBM-S, and a tributary DSU-DBM supporting this application follow. Please note that all DBM-Ss here should be configured the same – only the passwords and telephone numbers should differ. The same holds true for the tributary DSU-DBMs.

Configuration Options

Set the *control DSU-MCMP with Switched 56 DBM* configuration options as follows (Configuration Worksheet for MCMP Mode):

- **MUX – Setup**

MUX Funct: MCMP
Share DevA: Disab
Share DevB: Disab
P1/2 FEPSh: Disab
P3/4 FEPSh: Disab
P5/6 FEPSh: Disa
MCMP Bckup: MCMP for tributaries

- **Prt1 through Prt3** (Prt4 through Prt6 N/A)

Async→Sync: Disab
TxCarrSel: Const
RxCarrSel: Const

- **PrtSp – DSU**

Prt1: 19.2 for control; N/A for tributary
Prt2: 4.8 for control; N/A for tributary
Prt3: 4.8 for control; N/A for tributary
Prt4 through Prt6: Disab for control;
N/A for tributary

- **PrtSp – Chan**

Prt1: A
Prt2: B
Prt3: C
Prt4: None for control; C for top tributary,
None for bottom tributaries
Prt5 and Prt6: None

- **DSU**

Rate(Kbps): 56
TxClkSource: DDS
AggrSwitch: Enab
AgSw Timing: Aggr

- **Diag – DSU**

Diag Type: NonD
Disr Type: Br56

- **Diag – Gen**

Position: Cntrl for control; Trib for tributary
LinkConfig: M-Pt

- **Gen**

DTE Port: EIA232
RTS Control: FrcOn

- **Bkup**

Auto Bkup: N/A for control; Disab for tributary
AutoRestor: N/A for control; Disab for tributary

Set the *extended bridge* configuration options as follows (Configuration Worksheet for Bridge Mode):

- **MUX – Setup**

MUX Funct: EBrdg
Bridge Rate: 56
Brdg Timing: Auto
Lowest Port#: 2
Ports in Gp: 2
Port Cntrl: Host
Share DevB: Disab

- **Prt2 and Prt3** (Prt4 through Prt6 N/A)

RTS Cntrl: DTE
Elast Stor: Enab
RTS/CTS Del: 0
DTR Alarm: Disab

- **DSU**

TxElastStor: Enab
AggrSwitch: Disab

- **Diag – DSU**

Diag Type: Disr
Disr Type: 3600e

- **Diag – Gen**

Position: Cntrl
LinkConfig: M-Pt

- **Gen**

DTE Port: V.35

Set configuration options for automatic partial backup using the *tributary Switched 56 DBMs, DBM-Ss, or DBM-Ds* as follows (Configuration Worksheet for Basic (DBM-V, DBM-S, or DBM-D) Mode):

- **Diag – DBM**

Diag Type: Disr
RemoteDiag: Enhan

- **Diag – Gen**

Position: Cntrl
LinkConfig: M-Pt

- **DBM**

AutoAnswer: Enab
TxElasStor: Enab
RxElasStor: Disab
Call Setup: Pswrd
RxPwd: enter received password
TxPwd: enter transmit password
Primary Core: Yes (DBM-Ss or DBM-Ds only)
DTRCallCon: Orig

- **Gen**

DTE Port: EIA232
RTS Cntrl: FrcOn
CTS Cntrl: Std
AntiStream: Disab
LSD Lead: Std
CTS Lead: Std
DSR FrcOn: Disab

- **Bkup**

Auto Bkup: Disab
AutoRestor: Disab

MCMP Backup Using FEP Port Sharing

This configuration provides backup of two to three channels (Figure D-14). When the remote DBM dials into the control DBM-Vs, the remote DBM automatically reverts to TDM mode and adjusts its port speeds when the dial backup speed is less than the MCMP aggregate speed (Figure D-15). Port speeds are adjusted using the DBM port speed options.

The assumed configuration for this scenario is as follows:

- Network is a 2-drop DDS multipoint nondisruptive circuit operating at 56 kbps.
- Two control DBMs with TDM are dedicated to the control DSU.
- The MCMP is configured for three channels: one 7.2 kbps, one 4.8 kbps, and one 2.4 kbps.

- The DBM's are configured for 14.4 kbps. Excess bandwidth must be reserved on the backup configuration so that framing and diagnostic data does not reduce the port speeds. Therefore, the DBM port speeds are configured to support the 4.8 and 7.2 kbps applications. *The 2.4 kbps application is not supported during backup. DBM speeds must be the same or set to zero.*
- The tributary DBMs are configured for switched carrier operation on a per-port basis, no fallback, and password security.
- When the failure occurs, the control DSU reports a **Threshold exceeded** alarm, while tributaries are reported as having **No Response** alarms. These alarms will continue to be reported until the DDS facility is restored.
- There will be a subnetwork **No Response** alarm at the control MCMP for each tributary DSU that is out of service. That happens even when the tributary is in Backup mode.

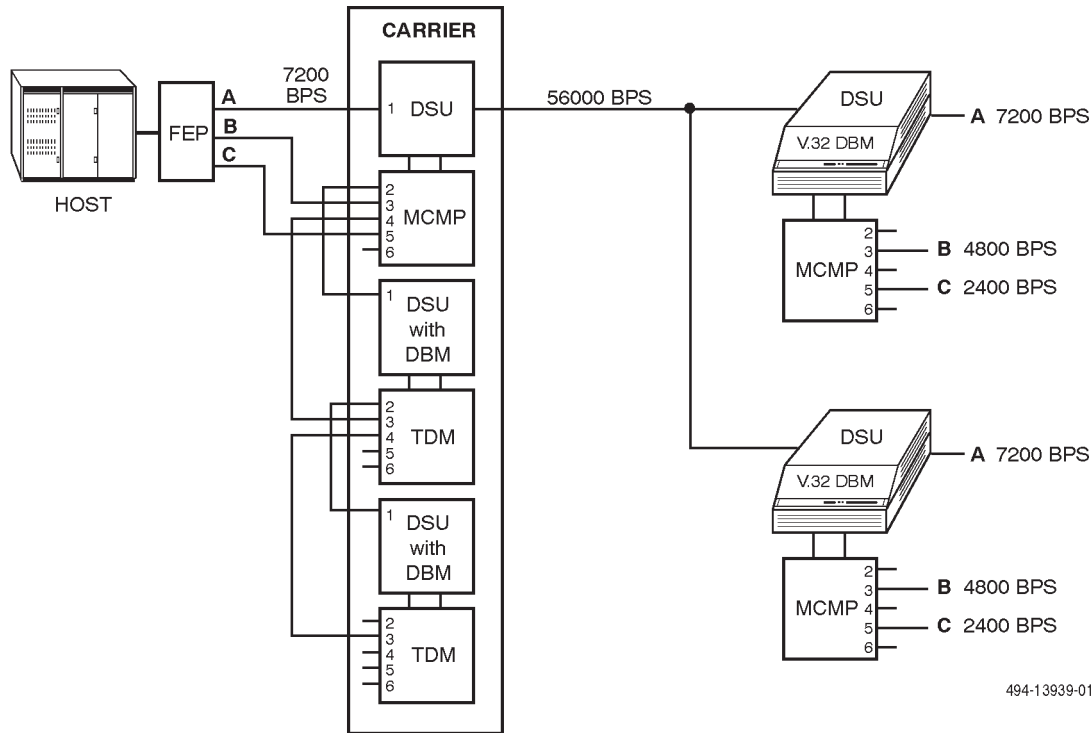


Figure D-14. MCMP FEP Port-Sharing Configuration – Dial Backup *Not* Active

- If all tributary DSUs are out of service, the control MCMP will have an **Out-of-Frame** alarm.
- If a tributary is in Backup mode and the network problem has been fixed, the only commands that can be sent to the tributary from the control MCMP are aggregate tests (e.g., the End-to-End test or Digital Test).
- While in backup, the tributary DSU can only be addressed via the control DSU-DBMs for diagnostics. Creating a poll list at the DSU-DBMs is acceptable, but *the poll list must be removed after the call is dropped* or unnecessary alarms will result.
- In configuring the tributary MCMPs, a combination of TDM and MCMP rules apply. There is a maximum of two port-sharing groups, with all ports in the group being contiguous (use the Sharing Device configuration options). Upstream switched-carrier configurations must be set: TxCarrSel set to Cntrl and RxCarrSel set to Cntrl or Mark in TDM mode (use the system default settings for MCMP mode).

Pertinent configuration options for the control and tributary DSU-MCMPs, and a DSU-DBM supporting this application are provided.

Configuration Options

Set the FEP port sharing configuration options for the control and tributary DSU-MCMPs as follows (Configuration Worksheet for MCMP Mode):

- **MUX – Setup**

MUX Funct: MCMP
 Share DevA: Disab
 Share DevB: Disab
 P1/2 FEPSh: Enab for control; Disab for tributary
 P3/4 FEPSh: Enab for control; Disab for tributary
 P5/6 FEPSh: Disab
 MCMP Bckup: TDM (for tributaries only)

- **Prt1, Prt3, and Prt5**

Async→Sync: Disab
 RTS Cntrl: N/A for control; DTE for tributary
 TxCarrSel: Const for control and tributary
 RxCarrSel: Const for control and tributary
 Elast Stor: Disab

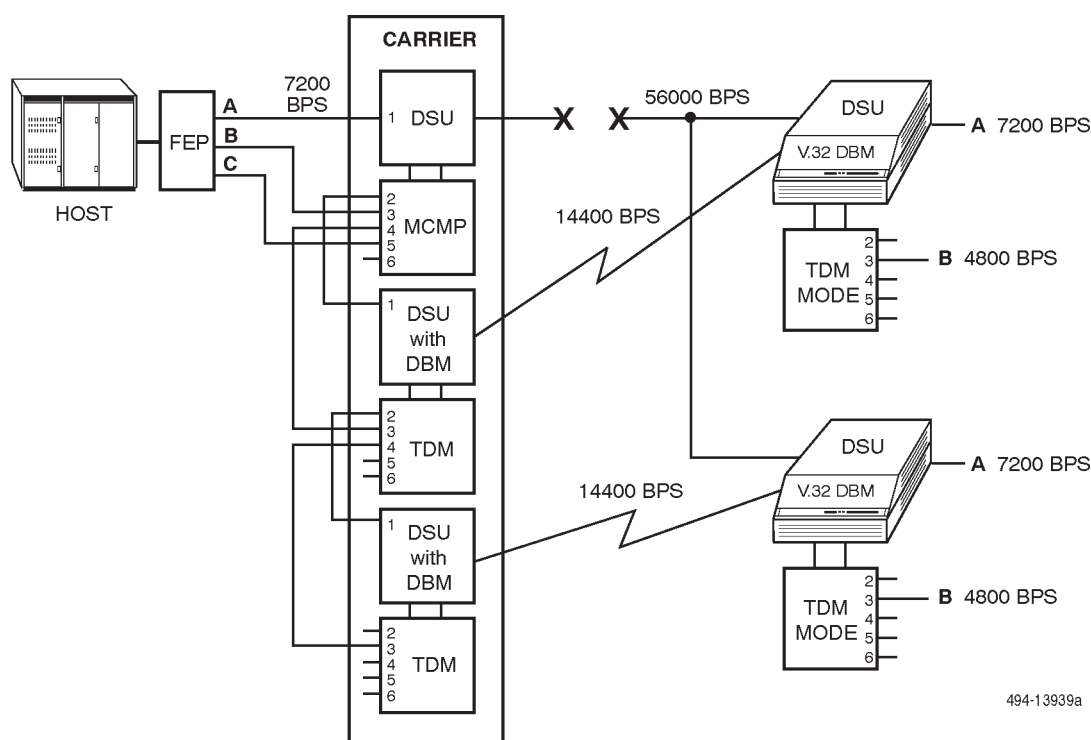


Figure D-15. MCMP FEP Port-Sharing Configuration – Dial Backup Active

- **Prt2 and Prt4** (Prt6 N/A)

Async→Sync: Disab for control;
N/A for tributary
TxCarrSel: Const for control; N/A for tributary
RxCarrSel: Const for control; N/A for tributary
Elast Stor: Disab for control; N/A for tributary

- **PrtSp – DBM**

Prt1: N/A for control; 7.2 for tributary
Prt2: N/A for control; Disab for tributary
Prt3: N/A for control; 4.8 for tributary
Prt4 through Prt6: N/A for control;
Disab for tributary

- **PrtSp – Chan**

Prt1: A
Prt2: A for control; None for tributary
Prt3: B Prt4: B for control; None for tributary
Prt5: C
Prt6: None

- **DSU**

Rate(Kbps): 56
TxClkSource: DDS
AggrSwitch: Disab

- **Diag – DSU**

Diag Type: NonD
2nd Ch(bps): 400 for control and tributary
Disr Type: 3600e

- **Diag – Gen**

Position: Cntrl for control; Trib for tributary
LinkConfig: M-Pt

- **DBM**

Rate(Kbps): N/A for control; 14.4 for tributary
TxClkSource: N/A for control; RXC for tributary
CarrLossDisc: N/A for control; Yes for tributary
Auto Retrain: N/A for control; Yes for tributary
Single Rate: N/A for control; Yes for tributary
AutoAnswer: Enab
Call Setup: Pswrd
RxPwd: enter received password
TxPwd: enter transmit password
Primary Core: No for control and tributary
DTRCallCon: N/A for control; Disab for tributary

- **Gen**

DTE Port: EIA232
RTS Control: FrcOn

- **Bkup**

Auto Bckup: N/A for control; Enab for tributary
Backup Dir: N/A for control;
enter Dir number (1 to 10) for tributary
BckupOnCMI: N/A for control;
Enab for tributary
AutoRestor: N/A for control; Enab for tributary
NtwkTimOut: N/A for control;
enter amount of time for tributary
RestorTimOut: N/A for control;
enter amount of time for tributary
TriesTimOut: N/A for control;
enter amount of time for tributary

Set configuration options for automatic partial backup using the DSU-DBM-TDM as follows (Configuration Worksheet for TDM Mode):

- **MUX – Setup**

MUX Funct: TDM
Share DevA: Disab
Share DevB: Disab
P1/2 FEPSh: Enab
P3/4 FEPSh: Enab
P5/6 FEPSh: Disab

- **Prt1 and Prt3** (Prt5 N/A)

Async→Sync: Disab
TxCarrSel: Const
RxCarrSel: Cntrl
PCC Buffer: Enab for control; Disab for tributary
Elast Stor: Enab
RTS/CTS Del: 0

- **Prt2 and Prt4** (Prt6 N/A)

Async→Sync: Disab
RTS Cntrl: DTE
TxCarrSel: Const
RxCarrSel: Const
RTS/CTS Del: 0
DTR Alarm: Disab
AntiStream: Disab

- **PrtSp – DSU**

Prt1: 7.2
Prt2: 7.2
Prt3: 4.8
Prt4: 4.8
Prt5 and Prt6: Disab

- **Diag – DSU**

Diag Type: NonD
2nd Ch(bps): 40
Disr Type: 3600e

- **Diag – Gen**

Position: Cntrl LinkConfig: Pt-Pt

- **DBM**

Rate(Kbps): N/A for control; 14.4 for tributary
TxClkSource: Ext for control; RXC for tributary
CarrLossDisc: N/A for control; Yes for tributary
Auto Retrain: N/A for control; Yes for tributary
Single Rate: N/A for control; Yes for tributary
AutoAnswer: Enab
Call Setup: Pswrd
RxPwd: enter received password
TxPwd: enter transmit password
Primary Core: Yes for control; No for tributary
DTRCallCon: N/A for control; Disab for tributary

- **Gen**

DTE Port: EIA232
RTS Cntrl: FrcOn

- **Bkup**

Auto Bckup: Disab
AutoRestor: Disab

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