DEChub Network Modules

Repeater Reference

Part Number: EK-REPTR-HR. A01

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This manual describes the DIGITAL family of DECrepeater and PORTswitch modules.

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Preface

Overview

Introduction

This manual describes Digital's family of DECrepeater and PORTswitch modules.

Intended Audience

This manual is intended for:

- Pre-sales technical support — includes Digital's technical sales force and value-added resellers (VARs).
- Post-sales support — includes Digital's Multivendor Customer Service personnel and Digital's customers.

Structure of This Manual

This manual is structured as follows:

- Chapter 1 lists and describes the technical features and management functions of DECrepeater and PORTswitch modules.
- Chapter 2 provides a description of out-of-band and in-band management.
- Chapter 3 lists some of the more common management tasks required by network managers. Using sample clearVISN MultiChassis Manager window displays, this chapter explains how to perform the tasks. It also includes examples of associated management information bases (MIBs) for use by users who do not use clearVISN.
- Chapter 4 describes each module in the DEChub family of DECrepeater and PORTswitch modules.
- A glossary provides definitions of terms common to the DEChub 900 family of products.
- Index

Conventions

This book uses the following conventions.

Convention	Meaning
`Special type`	Indicates a literal example of system input.
`Bold special type`	In examples, indicates user input.
Italics	In examples, indicates a variable. In text, indicates either a variable or the title of a book.
<**Return**>	Indicates that you should press the Return key.
Bold	Indicates emphasis.

Additional Reference Documentation

Manuals

The following table provides titles and part numbers for additional reference documentation that is available:

Digital Equipment Corporation Manuals

Title	Part Number
DEChub Network Modules 900-Series Switch Reference	EK-SWTCH-HR
DEChub Network Modules 900-Series Concentrator Reference	EK-CONTR-HR
DEChub Network Products Problem Solving	EK-PRBSV-HR
DEChub Network Configuration	EK-CONFG-CG
DEChub 900 MultiSwitch Owner's Manual	EK-DH2MS-OM
DEChub 900 MultiSwitch Hub Manager Installation	EK-HUBMA-IN
DECagent 90 Installation and Configuration	EK-DENMA-IN
DECrepeater 90C Owner's Manual	EK-DECMR-OM
DECrepeater 90FA Owner's Manual	EK-DEFAR-OM
DECrepeater 90FL Owner's Manual	EK-DEFMR-OM
DECrepeater 90FL Installation	EK-DEFMR-IN
DECrepeater 90T-16 Installation	EK-DETMR-IN
DECrepeater 90FS Installation and Configuration	EK-DEFMI-IN
DECrepeater 90TS Installation and Configuration	EK-DETMI-IN
DECrepeater 900TM Installation and Configuration	EK-DETMM-IN
DECrepeater 900GM Installation and Configuration	EK-DETTM-IN
PORTswitch 900FP Installation and Configuration	EK-DEFMM-IN
PORTswitch 900TP Installation and Configuration	EK-DETPJ-IN
PORTswitch 900CP Installation and Configuration	EK-DECPM-IN
OPEN DECconnect Structured Wiring System Applications Guide	EC-G2570-42
Network Products Guide	EC-G4343-42
DEChub Firmware Updates	/pub/DEC/hub900/ firmware at ftp.digital.com

Standards and Specifications

The following list provides titles of additional references that are available:

Standards and Specifications
ISO/IEC 8802-3 - Information Processing Systems - Local Area Networks - Part 3, Carrier Sense Multiple Access with Collision Detection (CSMA/CD) Access Method and Physical Layer Specifications
IEEE Standard 802.3I - 1993, Twisted-pair Medium Attachment Unit (MAU) and Baseband Medium, Type 10BaseT
IEEE Standard 802.3j - 1993, Fiber-Optic Active and Passive Star-based Segments, Type 10BaseFL
Management Information Base for Network Management of TCP/IP-based Internets: MIB II, RFC 1213, K McCloghrie and M. Rose
Definitions of Managed Objects for the Ethernet-like Interface Types, RFC 1643, F. Kastenholz
Definitions of Managed Objects for IEEE 802.3 Repeater Devices, RFC 1516, D. McMaster and K. McCloghrie
Remote Network Monitoring Management Information Base, RFC 1271, S. Waldbusser
Digital Equipment Corporation's DEChub 900 Extensions to the Definitions of Managed Objects for IEEE 802.3 Repeater Devices, Version 1.1, Digital Equipment Corporation
Definition of Managed Objects for Common ONEhub Internal Objects, Version 1.1, Digital Equipment Corporation
DECagent 90 and DEChub 90 Vendor MIB Document for SNMP V1 Implementation, Digital Equipment Corporation

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Correspondence

Documentation Comments

If you have comments or suggestions about this document, send them to the Network Products Business Organization.

Attn: Documentation Project Manager
FAX: (508) 486-6093
E-MAIL: doc_feedback@lkg.mts.dec.com

Online Services

To locate product specific information, refer to the following online services:

BBS

To read the Bulletin Board System, set your modem to 8 bits, no parity, 1 stop bit and dial 508-486-5777 (U.S.)

WWW

The Digital Equipment Corporation Network Products Business Home Page on the World Wide Web is at the following addresses:

North America: http://www.networks.digital.com

Europe: http://www.networks.europe.digital.com

Australia http://www.digital.com.au/networks

Chapter 1

Features and Functionality

Overview

Introduction

This chapter describes the DECrepeater and PORTswitch modules, technical features and management functions. It serves as a primer for Ethernet repeater features and functionality.

In this Chapter

What is an Ethernet Repeater

Definitions

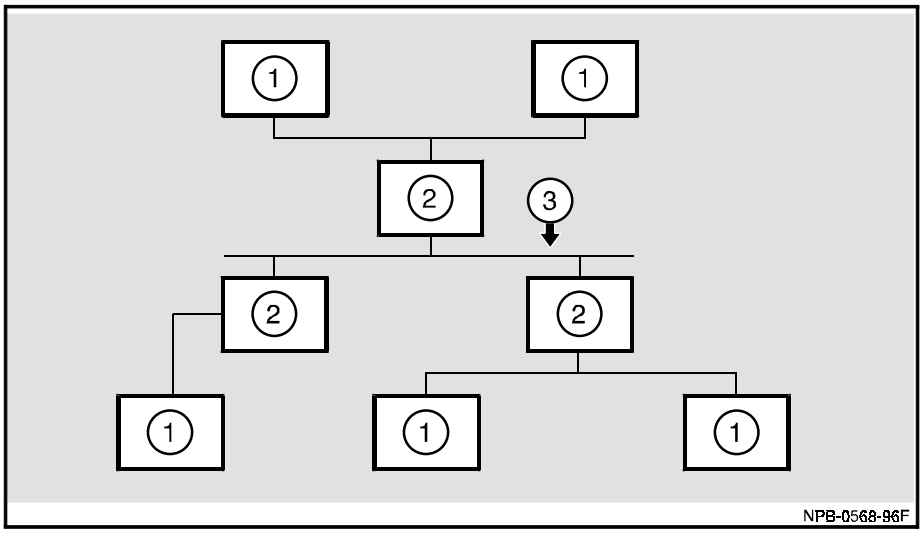
Ethernet is Digital's term for its product compatibility with the ISO 8802-3/ANSI/ IEEE 802.3 standards and the Ethernet standards for Carrier Sense Multiple Access with Collision Detection (CSMA/CD) local area networks (LANs).

A repeater is an Ethernet physical layer hardware device that restores signal amplitude, wave form, and timing of signals before transmission to other network segments. An Ethernet repeater interconnects media segments within an Ethernet network.

Purpose

The strength of a signal deteriorates with distance over any transmission medium. A received signal must have sufficient quality for the final receiver to detect and interpret it. Restoring the signalSignal restoration extends the physical distance of the LAN. The following figure shows an example of how a repeater is used to extend a LAN.

Figure 1-1: Extended LANExtended LAN



Item	Description
1	Station
2	Repeater
3	LAN segment

DEChub Ethernet Repeater Functions

DEChub Ethernet repeater modules perform the following primary physical layer functions in accordance with the IEEE 802.3/ISO 8802 standard:

- Interconnecting multiple media segments
- Restoring signal amplitude and timing
- Propagating collisions

Reference

Refer to *ISO/IEC 8802 Information Processing Systems - Local Area Networks* - Part 3: Carrier Sense Multiple Access with Collision Detection (CSMA/CD) Access Method and Physical Layer Specifications, Third Edition

Features

Data Forwarding

The DEChub family of Ethernet repeater modules handles all basic data repeating functions on a per-port basis.

The DECrepeater and PORTswitch modules also protect LANs from certain fault conditions that can halt all LAN communications. They do this by identifying malfunctioning ports and auto-partitioning (automatically disabling) these ports in order to bypass network disruptions.

Management

All DECrepeater and PORTswitch modules can be managed easily by Simple Network Management Protocol (SNMP) via an SNMP agent in the DEChub 900 MultiSwitch Hub Manager. Some can be managed directly through an SNMP agent on the module.

All DEChub network modules provide the following management features:

- In-band management capabilities
- Out-of-band management capabilities
- Remote Monitoring (RMON) alarms and events

clearVISN MultiChassis Manager Functionality

Through clearVISN MultiChassis Manager and StackManager, Digital's Network Management Station (NMS) applications, you can use a graphical user interface (GUI) to manage all DEChub network modules.

Refer to Chapter 3 for more information on clearVISN MultiChassis Manager.

Firmware Upgrades

You can easily make firmware upgrades to most DECrepeater and PORTswitch modules in one of three ways:

- Using the Flash Loader application that comes with clearVISN MultiChassis Manager
- Using any Trivial File Transfer Protocol (TFTP) server
- Triggering the Downline Upgrade option from the product's installation menu using the setup port and loading from a TFTP server

You do not need to replace or upgrade hardware, and there is minimum network disruption.

Operational Features

All Digital's Ethernet repeaters have the following operational features:

- Simple modular network design available as standalone, rack-and-stack, or chassis-based configurations
- Support for all IEEE 802.3 media types including 10Base2, 10BaseT, 10BaseFL/ FOIRL, or 10Base5
- Hot-swap capabilities for installation and configuration flexibility
- Automatic identification and isolation of faulty ports
- Automatic prevention of error propagation across the network
- Front panel LEDs that provide power indication, network activity, and port status at a glance
- Backplane connectivity for software controlled network configuration

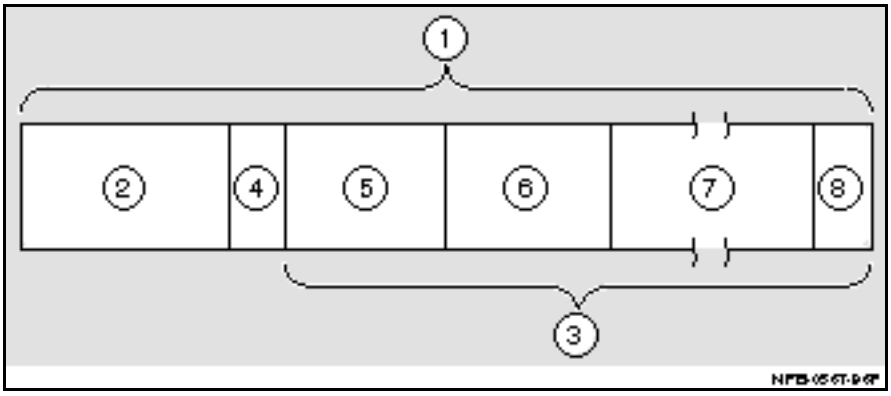
Data Forwarding

Introduction

The key purpose of a repeater is to restore signal amplitude, wave form, and timing as it forwards the data frame and restores the preamble in the packets.

The following illustration shows structure of an Ethernet 802.3 packetEthernet 802.3 packet.

Figure 1-2: Ethernet 802.3 Packet



Item	Description
1	Packet
2	Preamble
3	Media access control (MAC) frame
4	Start of frame delimiter (SFD)
5	Destination address
6	Source address
7	Data
8	Cyclic redundancy check (CRC)

How Does It Work?

When the repeater unit receives packets on any of its ports, it takes the following two actions:

Stage	Description
1)	Restores the correct signal amplitude and timing.
2)	Retransmits the restored packets to all its other ports, except the port from which it was received.

There are several conditions under which the repeater unit does not transmit a restored packet:

If...	Then, the repeater unit...
The repeater unit detects a collision condition between segments	Enforces a collision condition to all connected segments by transmitting a jam pattern[1].
The port on which the packet was received is disabled	Does not repeat the packet.
The port on which the packet was received is auto-partitioned	Does not repeat the packet

1.A jam pattern is an alternating sequence of logical ones and zeros that alaways begin with a logical one.

Preamble Regeneration

Introduction

Preamble regeneration is the complete restoration of the packet's preamble. A repeater unit restores preambles of packets with as few as 28 bits. A set preamble pattern is attached to the front of an Ethernet MAC frame, to perform the following functions:

- Initialize the physical layer.
- Provide a set pattern to enable a receiver's signal decoder to lock on the transmitter's signal.

How Does it Work?

To regenerate the preamble on each segment, the repeater unit transmits at least 56 bits of preamble plus an 8-bit start-of-frame delimiter. The repeater unit may send additional preamble if the received preamble is greater than 56 bits.

Collision Enforcement

How Does it Work?

As a normal part of Ethernet LAN operation, multiple stations may transmit at the same time. Then, the following events can occur:

When...	Then...
Multiple stations transmit at approximately the same time	A collision occurs
All transmitting stations are able to recognize this collision	They transmit a jam pattern following the complete preamble and SFD to all segments.
	They cease transmission for a random period of time.
	They retry transmission.

Minimum Collision Jam Length

The repeater unit transmits a jam signal for at least the minimum collision jam length of 32 bits to ensure that all stations on the LAN detect the event. A jam signal can begin transmitting only after the entire 56-bit preamble and 8-bit SFD are transmitted. Therefor, the smallest collision fragment is 96 bits.

References

Refer to Tables 4-2, 4-3, 4-5, and 4-6 for information on how each module implements this feature.

ISO/IEC 8802 Information Processing Systems

Digital CSMA/CD (Ethernet) Local Area Network Specifications

Digital Equipment Corporation's DEChub 900 Extensions to the Definitions of Managed Objects for IEEE 802.3 Repeater Devices.

Fragment Extension

To ensure that all stations on the LAN recognize the activity of a packet, the repeater guarantees that all collision fragments transmitted from any of its ports are a minimum of 96 bits. When transmitting to ports, the repeater extends all smaller fragments to 96 bits.

MAU Jabber Lock-up Protection

Introduction

MAU jabber lock-up protectionMAU jabber lock-up protection prevents received data that is beyond legal packet lengths from being continuously transmitted to all other repeater ports. If the MAU enables its protection circuitry, a network live lock or lockup could occur. The repeater's jabber locking protection ensures that the MAUs connected to the repeater ports do not enable their jabber protection circuitry.

How Does it Work?

The repeater's protection works in the following way:

Stage	Description
1)	If, due to an excessively long reception, the repeater unit has transmitted continuously for longer than 5 milliseconds (+50%, -20%), it interrupts its output on all ports.
2)	After 9.6 to 11.6 microseconds, the repeater unit re-enables transmission.

Auto-Partitioning

Introduction

Auto-partitioningAuto-partitioning protects the LAN from certain fault conditions that could halt all LAN communications. When a repeater detects certain faults on any of its ports, it isolates the faulty segment from the rest of the network. This isolation is referred to as auto-partitioning.

When a port is isolated, packets received on that port are not transmitted to other ports. Detected collisions are not enforced to other ports.

How Does it Work?

The following table describes the auto-partitioning process:

Stage	The Repeater...	Reason
1)	Detects a fault	One of the following reasons: • Media short • Media break (open) • Faulty connector • Faulty or missing media terminator • A station that incorrectly collides with each transmit attempt
2)	Auto-partitions the port, therefore, it does not repeat data received from that port to any other port.	To protect the LAN from conditions that could halt all LAN communications.
3)	Continues to transmit data to the auto-partitioned port.	To sense if the fault has been corrected.
4)	Reconnects the auto-partitioned port.	When the port successfully receives or transmits a complete frame without a collision. The following modules support a more stringent reconnection algorithm, reconnecting only when the port successfully transmits a complete frame without a collision: DECrepeater 900FP, DECrepeater 90FS, PORTswitch900FP, PORTswitch900CP, and PORTswitch 900TP.

Conditions

Every DEChub repeater auto-partitions a port on which it detects one of the following fault conditions:

Condition	Description	Conditions for Reconnection
Excessive length collision	A single collision event on that port that lasts for 1,300 bit times, or greater	Receives or transmits a complete frame without a collision.
Excessive number of consecutive collisions	Collisions on 32 consecutive receptions or transmissions	Receives or transmits a complete frame without a collision.
No receive activity during transmission (loopback error)	The port does not receive any data within 6 to 10 microseconds from the start of transmission. The receive activity may be transmitted data looped back from the MAU, or it may be a collision notification.	Varies depending on type of MAU associated with that port: • Default condition for those with embedded link-type MAUs (10BaseT and 10BaseFL) -- Reconnects when the port successfully receives or transmits a complete frame without a collision. • Optional additional condition for 10BaseT and 10BaseFL ports (default for other types of ports) - Successfully transmits a complete frame without a collision.
Excessive-length input (jabber)	The repeater has activated the MAU Jabber Lockup Protection function more than 64 times, and the excessively long activity continues.	When the port stops receiving the excessive length message, and the port transmits a complete frame without a collision.
Transmit carrier drops	A port stops receiving its own transmission during the transmission of a packet, but no collisions occurred.	Successfully receives its own transmission or detects a collision.

Additionally, through the MultiChassis Manager Repeater Summary window, you can disable a port to force partitioning of that port.

Reporting Auto-partitioned Ports

All repeaters can report if any port is auto-partitioned. Some are able to report the reason for the auto-partition.

References

Refer to Tables 4-2, 4-3, 4-5, and 4-6 for information on how each module implements this feature.

Definitions of Managed Objects for the Ethernet-like Interface Types, RFC 1643

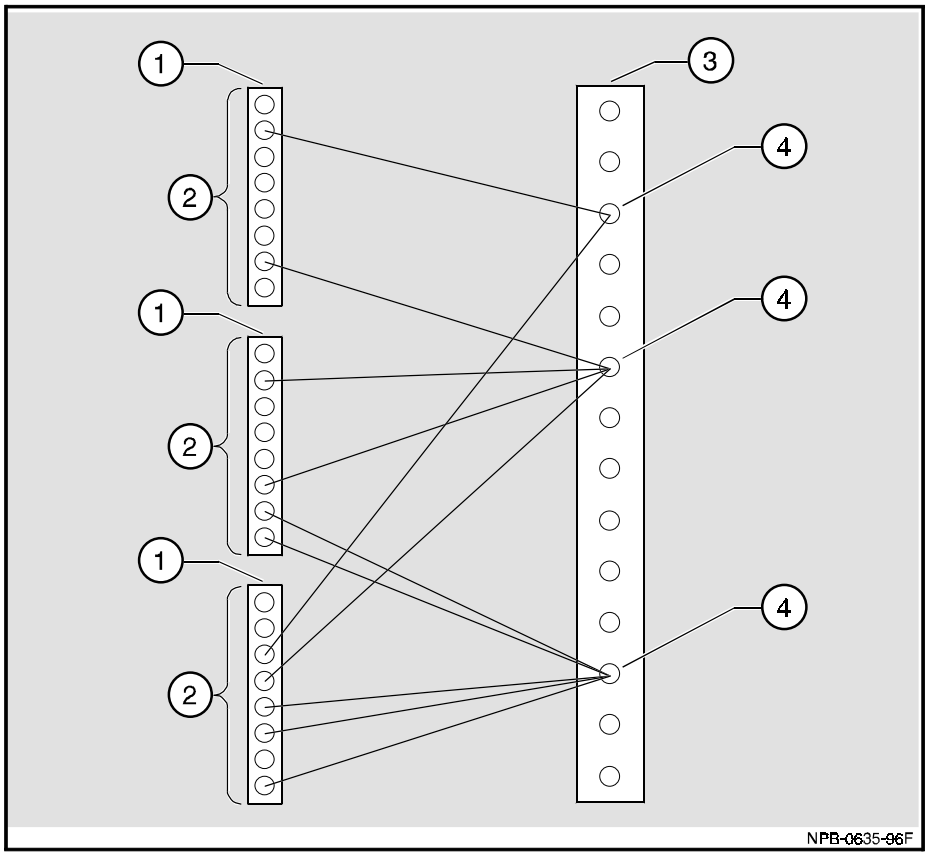
Management Domains

Introduction

The management domain is made up of all the ports on a single physical DECrepeater or PORTswitch module (box). All DECrepeater and PORTswitch modules are manageable as a single device, regardless of the configuration of their ports or port groups and regardless of the number of internal LANs (collision domains) within the module. One DECrepeater or PORTswitch module is always one management domain.

The following illustration shows the relationship between management domains and collision domains.

Figure 1-3: Management Domains and Collision



Item	Description
1)	PORTswitch module
2)	Management domain
3)	Backplane interconnect
4)	Collision domain (all attached ports)

Control and Status of Management Domains

Introduction

The purpose of control and status functions is to monitor the module's operational status and manage the module's configuration.

The SNMP agent always manages a module regardless of the two considerations:

- The number of collision domains in that module
- The specific collision domain in which a port resides

A DECrepeater or PORTswitch module can configure the operations and monitor the state of functions and features within the management domain regardless of the network configuration of the ports on that module.

Functions

The control and status functions perform the following tasks at the repeater, group, and port levels:

Table 1-1: Control and Status Function

Level	Functions at This Level
Repeater	Monitor and report overall repeater operational status
	Report overall group configuration
	Reset all repeater-unit state machines
	Select auto-partition and reconnection algorithms
	Select minimum collision jam extension lengths
Group	Monitor and report group operational status
	Report group types and port configurations
	Reset group repeater-unit state machines
Port	Manually enable and disable the port
	Monitor and report port partition and operational status
	Assign names to ports
	Report attached MAU configurations

Basic Repeater Counters

Basic repeater counters count module-level, group-level, and port-level events. The module-level and group-level counters compile the sums of the relevant port-level counters to obtain their data. These basic counters count events within the management domain. They do not count events occurring within the collision domain.

The following table lists the types of events counted in each level.

Table 1-2: Basic Repeater Counters

Level	Types of Events Counted Per Module, Group, or Port
Module	Total number of collisions per module
Group	Number of readable frames
	Number of readable bytes
	Number of collisions
	The total number of errors that is equal to the sum of following types of errors: • Frame check sequence (FCS) • Alignment • Frames too long • Short events • Late events • Data rate mismatches
Port	Number of readable frames
	Number of readable byte
	Number of runts
	Number of collisions
	The numbers of the following types of errors: • FCS • Alignment • Frames too long • Late, short, and very long (jabber) events • Data-rate mismatches

Management Agent Counters

Some DECrepeater and PORTswitch modules contain embedded SNMP management agents that maintain a separate set of management agent counters.

References

Management Information Base for Network Management of TCP/IP-based Internet: MIB II, RFC 1213 and *Definitions of Managed Objects for the Ethernet-like Interface Types* RFC 1643 formally define a complete list of counters, which the modules maintain. This list completely characterizes an agent's protocol processing performance.

Connected Stations Discovery

Introduction

DECrepeater and PORTswitch modules automatically discover stations connected to each manageable port.

How Does it Work?

The module learns the MAC source address of valid frames it receives on each port. It stores the discovered information as follows:

- The module saves the most recent MAC address that it detects on each port.
- The module maintains a table of all addresses learned and the ports on which they were detected. The module stores up to 256 addresses in the table on a first-come first-serve basis.
- An address ages out from the table if the module does not detect a frame with that address on any port within two to eight minutes. This time period is not configurable.

References

Definitions of Managed Objects for IEEE 802.3 Repeater Devices, RFC 1516, and *Digital Equipment Corporation's DEChub 900 Extensions to the Definitions of Managed Objects for IEEE 802.3 Repeater Devices* formally define the manner in which modules report their connected station information.

Security

Introduction

Some DECrepeater and PORTswitch modules feature eavesdrop prevention and intrusion protection based on the Ethernet Media Access Control (MAC) addresses of attached stations. The module can enable and disable these features on a per-port basis.

Authorized Stations and Addresses

An authorized address is the Ethernet MAC address of a networked device that is authorized to be connected to a given repeater port. This address is included in the module's access control list which the module maintains. Through network management, a user can assign authorized addresses to DECrepeater and PORTswitch modules' ports.

Single Authorized Station Per Port

A single authorized station can have two authorized addresses (belonging to the same station) assigned to a repeater port. This feature accommodates DECnet nodes, which use their native hardware addresses (for example, 08-00-2B-11-22-33), then change to use their assigned DECnet addresses (for example, AA-00-04-44-55-66).

NOTE

Having two authorized addresses assigned to a repeater port does not allow two stations to co-exist on the same port.

Security Enforcement

Some DECrepeater and PORTswitch modules enforce security for a single authorized station, one port at a time. Others can enforce security for multiple, independent, authorized stations connected to a single port. This multiple-station configuration is referred to as a trusted work group.

Trusted Work Group Per Port

DECrepeater or PORTswitch modules that can enforce security for a trusted work group allow up to four authorized addresses to be assigned to a given port.

Authorized addresses assigned to one port can be the addresses of separate stations or a single station that is running DECnet.

Automatic Learning of Addresses

Automatic learning of addresses enables a DECrepeater or PORTswitch module's port to discover and remember source addresses of packets from the first *n* (a number) stations that transmit to it. These addressees can be used to enforce intrusion prevention or eavesdrop protection.

When	Then
The port receives a packet with a source address	The module remembers that source address.
The port has received packets from the maximum number of stations.	The module stops the learning process on that port. A network management application can automatically apply the addresses of the stations as authorized addresses to the ports on which they were discovered[1].
The network management application restarts or clears the learning process	The module restarts the learning process for that port.

1.This minimizes the need for a network manager to manually assign authorized addresses to every repeater port.

References

Refer to Tables 4-2, 4-3, 4-5, and 4-6 for information on how each module implements this feature.

Digital Equipment Corporation's DEChub 900 Extensions to the Definitions of Managed Objects for IEEE 802.3 Repeater Devices formally defines the manner in which modules manage their security functions.

Eavesdrop Prevention

Introduction

NOTE

This feature is available only in the following modules: DECrepeater 90FS, PORTswitch 900TP, PORTswitch 900CP, PORTswitch 900FP, and DECrepeater 900FP.

Eavesdrop prevention stops unauthorized stations from receiving all unicast packets.

NOTE

DECrepeater and PORTswitch modules enforce eavesdrop prevention on packets with unicast addresses only, not on packets with broadcast or multicast addresses.

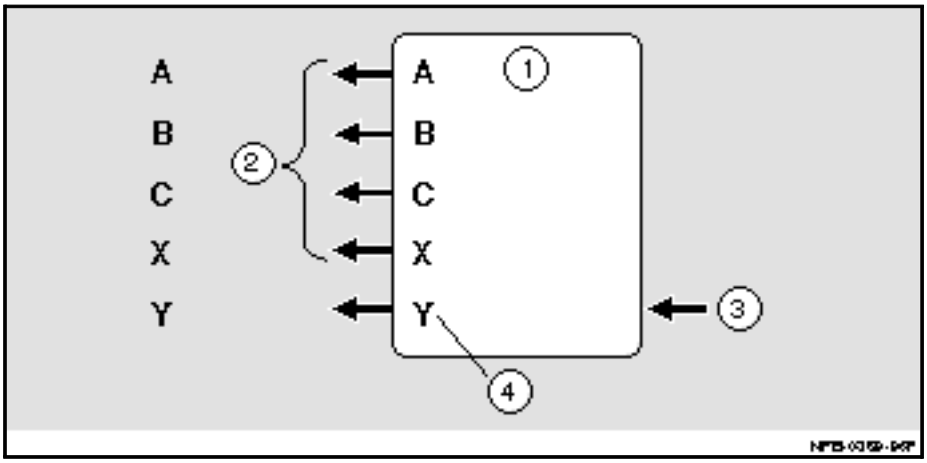
How Does It Work?

A port with eavesdrop prevention enabled takes the following actions (as shown in Figure 1-4):

Stage	Description
1)	Looks at the MAC destination address of all packets with unicast addresses tthat are transmitted into that port.
2)	Compares those addresses to the authorized addresses on the access control list assigned to that port.
3)	• When there is a match then the module transmits the packet. • When there is no match then the module overwrites the packet's data filed with a jam pattern (2) before transmitting it.

The following figure shows an example of eavesdrop prevention.

Figure 1-4: Eavesdrop Prevention



Item	Description
1)	Repeater
2)	Jam
3)	Packet destined for station Y
4)	Authorized address

If eavesdrop prevention is enabled on a port that has no authorized addresses assigned to it, the module uses the address of the connected station that last transmitted. The PORTswitch 900TP and PORTswitch 900CP use the last four addresses detected on a port if none is assigned.

Intrusion Protection

Introduction

NOTE

This feature is available only in the following modules: DECrepeater 90FS, PORTswitch 900TP, PORTswitch 900CP, PORTswitch 900FP, and DECrepeater 900FP

Intrusion protection prevents unauthorized stations from successfully transmitting data into a DECrepeater or PORTswitch port.

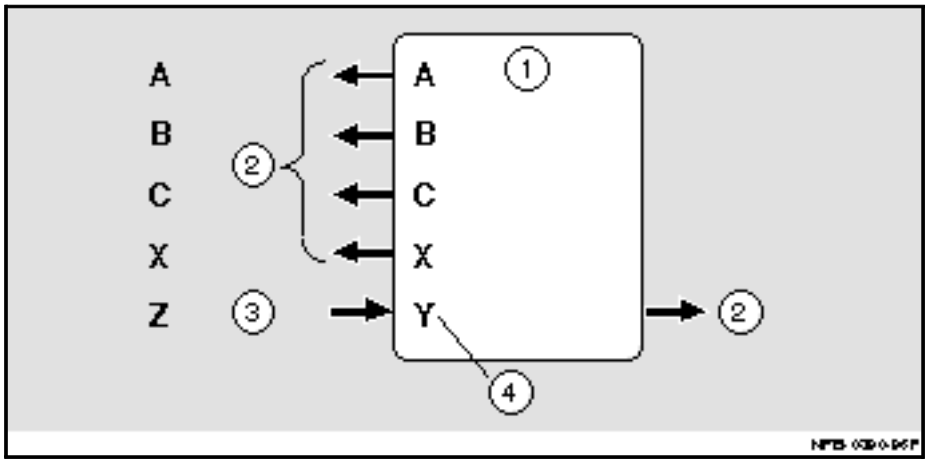
How Does it Work?

As illustrated in Figure 1-5, the module compares the MAC source address of a packet (3) received on a port (4) to the authorized addresses assigned to that port. If the repeater does not find a match, it performs the following tasks:

- Detects and logs an intrusion violation
- Records the following data:
  - The source address that caused the violation
  - The port on which the violation occurred (4)
  - The time of the violation
- All PORTswitch modules can also automatically disable the port that detected the violation (4).
- The PORTswitch 900TP and PORTswitch 900CP can overwrite the violating packet's data field with a jam pattern (2) before repeating it

The following figure shows an example of intrusion prevention.

Figure 1-5: Intrusion Protection



Item	Description
1)	Repeater
2)	Jam
3)	Packet from station Z
4)	Authorized address

Redundant-Link Configurations

Introduction

NOTE

This feature is available only in the following modules: DECrepeater 90FS, PORTswitch 900TP, PORTswitch 900FP, and DECrepeater 900FP

Some 10BaseT and 10BaseFL DECrepeater and PORTswitch modules may implement a dual-port redundancy function to provide fault-tolerant connections between repeaters. To achieve fault tolerance, primary and secondary point-to-point links must be configured between repeater modules

Other than their connection to different ports, the primary link is physically no different from the secondary link.

Reference

Refer to Tables 4-2, 4-3, 4-5, and 4-6 for information on how each module implements this feature.

Redundant-Link Components

Major Components

Redundant links consist of the following major components:

- Master port pair
- Responder ports
- Non-responder ports
- Master control algorithm
- Active link
- Standby link
- Primary link
- Secondary link

Master Port Pair

The master port pair is a pair of manageable ports that reside on the same module and contain the master control algorithm. Dual-port redundancy

Responder Ports

A responder port is a manageable port that can detect a failure on its receive link and signal the master port that there is a failure. A responder port also monitors and reports the state of its links and counts the number of link state changes.

Responder ports in a redundant-link configuration enable full fault detection.

Non-responder Ports

Non-responder ports are ports that cannot detect failures, and therefore, cannot signal the master port of a failure.

Master Control Algorithm

The master control algorithm (MCA) has the following functions:

- Controls the link-enable signal of each of the two ports of the master port pair. It enables only one port to be active at any time.
- Monitors and reports the state of both links
- Counts the number of link state transitions
- Enables fault detection
- Initiates failover to the standby link, if it detects a link failure

Active Link

The active link is the link that is currently transmitting data.

Standby Link

The standby link is the link that is currently inactive and not transmitting data

Primary Link

The primary link, assigned by the MCA, is active at initialization time and after a reset. If the MCA detects a fault on the primary link, the MCA automatically disables that link and enables the secondary link.

Secondary Link

The secondary link is inactive at initialization time. The secondary link becomes active if the MCA detects a failure in the primary link.

Dual-Port Redundancy Advantages

Introduction

The dual-port redundancy function protects against media breaks as well as against auto-partitioned ports.

Fault detection in the DEChub network modules provides dynamic failover to the standby link typically within 3 to 6 milliseconds (a maximum of 10 milliseconds).

Full Fault Detection

Full fault detection provides a robust redundant link between DECrepeater and PORTswitch modules. It provides fault detection for failures that occur at the transmit, receive, or both ends of the link by using responder ports in the configuration.

Partial Fault Detection

Partial fault detection provides a good level of fault detection for connecting DECrepeater and PORTswitch modules, or to other vendors' modules. It cannot detect failures in the master port's transmit link because it uses nonresponder ports in the configuration.

Redundant-Link Process

Introduction

The DECrepeater screen of clearVISN MultiChassis Manager enables you to configure the ports for dual-port redundancy. MultiChassis Manager prompts you to assign the master's primary and secondary ports as well as the responder ports.

The following table describes the redundant-link process:

Stage	Description
1	The module is initialized: The primary link becomes active and can carry data. The secondary link is inactive and is in stand-by mode
2	The master control algorithm (MCA) monitors the active link for failures.
3	If a link failure occurs, the MCA completes the following process: **a)** Disables the active link. **b)** Enables the secondary link within 10 milliseconds after it detects the error (if the secondary link is fault-free).

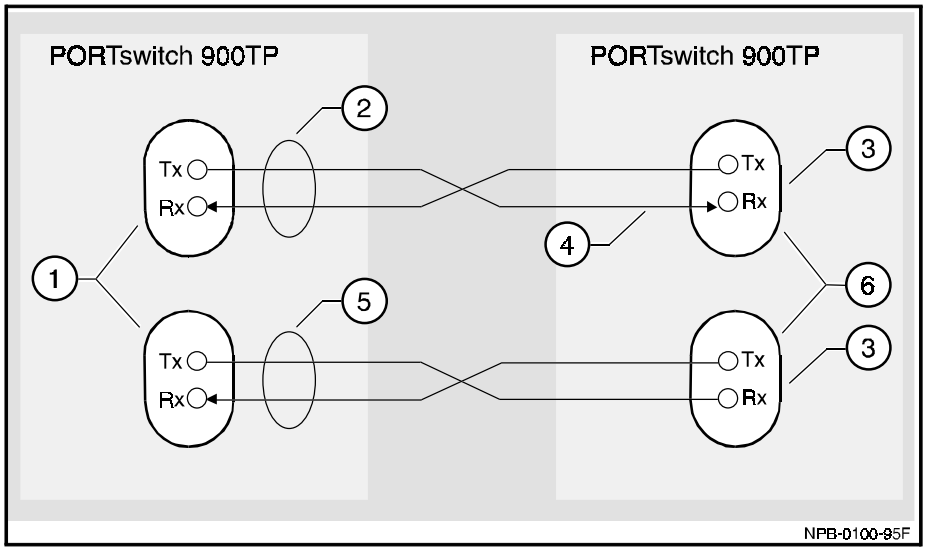
Full Fault Detection

Full fault detection is achieved by linking both master ports to responder ports. The MCA can detect failures that occur in either the transmit or receive link of the master port.

If a failure occurs in the master port's transmit link, the responder port signals the master port of the failure. It does this by inhibiting the transmission of both data and idle signals to the master port. This causes a receive-mode failure at the master port. This ensures that the master port detects both transmit and receive failures.

The following figure shows an example of full fault detection. Dual-port redundancy

Figure 1-6: Full Fault Detection

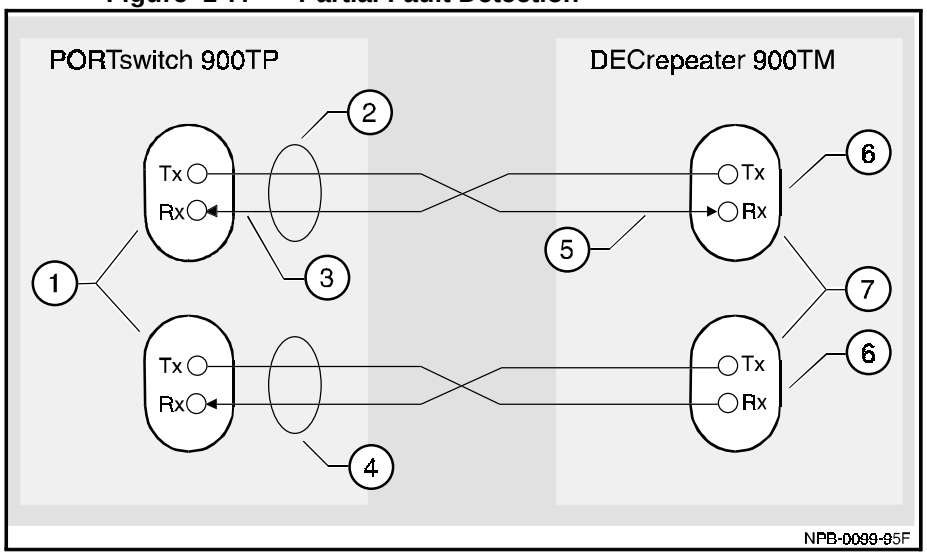


Item	Description
1)	Master port pair.
2)	Primary link (initially active).
3)	Single responder port (always enabled).
4)	The responder **can** signal the master that there is a failure in the responder's receive path.
5)	Secondary link (initially standby and disabled).
6)	These ports can be on the same module or on separate modules, but they are on the same LAN.

Partial Fault Detection

A redundant link provides partial fault detection when the primary and secondary master ports are linked to non-responder ports. The MCA can detect a receive failure at the master port. It cannot detect a transmit failure because the non-responder port cannot signal the master port that there is a failure. Dual-port redundancy

Figure 1-7: Partial Fault Detection

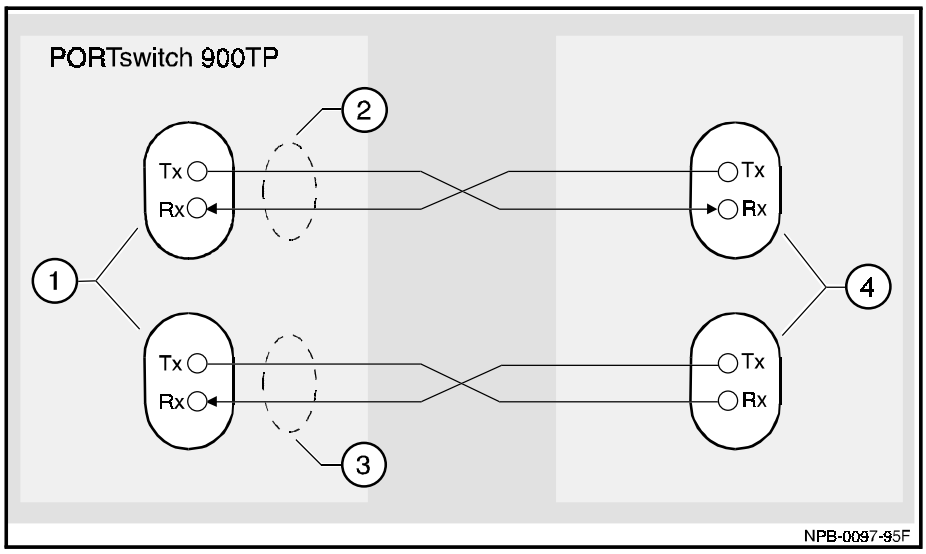


Item	Description
1)	Master port pair.
2)	Primary link (initially active).
3)	The master can detect a link failure here.
4)	Secondary link (initially standby and disabled).
5)	The responder **cannot** signal the master that there is a failure in the responder's receive path.
6)	Single non-responder port (always enabled).
7)	These ports may be on the same module or on separate modules, but should be on the same logical LAN.

Simple Redundant Links

Because the responder or non-responder ports in a simple redundant link reside on the same module, the simple redundant-link configuration provides fault coverage for the cable plant, but not for a module failure.

Figure 1-8: Simple Redundant-Link Configuration

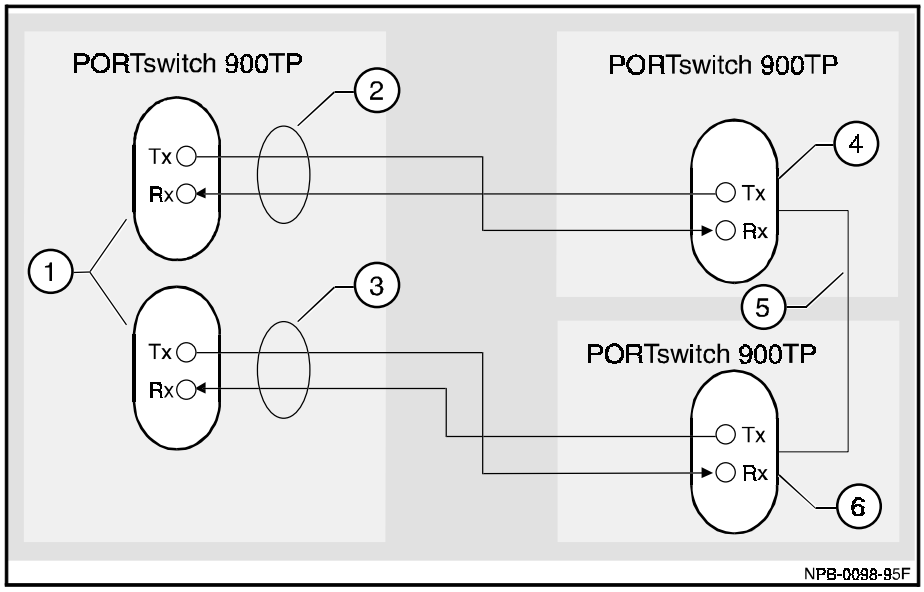


Item	Description
1)	Master port pair.
2)	Primary link.
3)	Secondary link.
4)	Single responder ports or nonresponder ports that reside on the same module.

Complex Redundant Links

A complex redundant link configuration offers recovery from a greater range of failures. The responder or non-responder ports reside on different modules. This allows recovery from a module failure as well as a cable plant failure, thereby providing fault tolerance for the entire backbone. The following figure shows an example of a complex redundant-link configuration. Dual-port redundancy

Figure 1-9: Complex Redundant-Link Configuration



Item	Description
1)	Master port pair.
2)	Primary link.
3)	Secondary link.
4)	Single responder port.
5)	LAN connection between these ports.
6)	Single responder port

Collision Domains

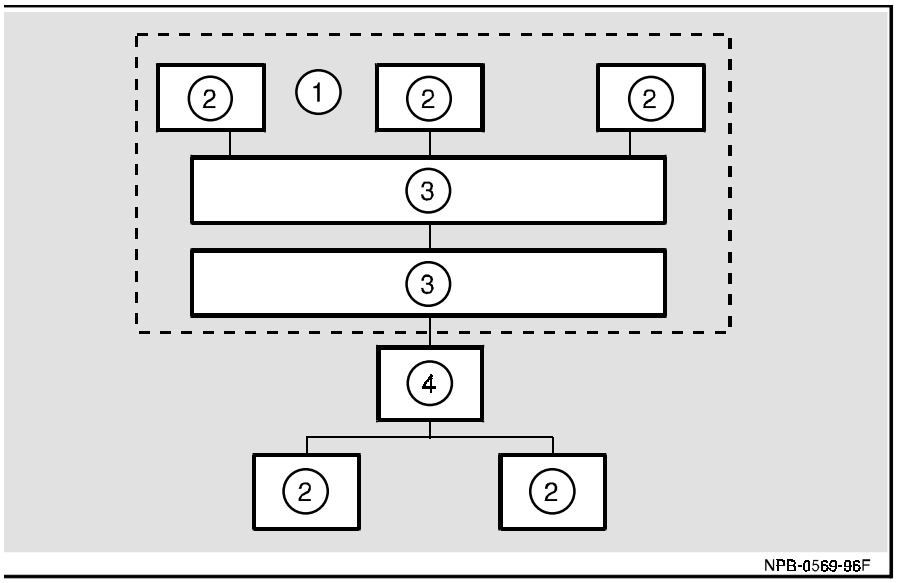
A collision domain consists of the interconnected ports that share the 10-mbps. bandwidth, and can therefore collide on an attempt to transmit to the network. The backplane interface and all the ports connected to it with their attached devices form a collision domain.

The front panel ports of DEChub PORTswitch modules can be grouped to form a collision domain. This collision domain can then be mapped to a DEChub backplane for interconnection to other ports on other modules. All the repeater ports that are mapped to the same backplane interface are part of the same collision domain.

A DECrepeater module may have only one collision domain. A PORTswitch module may have one or more collision domains.

The following illustration shows an example of a collision domain.

Figure 1-10: Collision Domain



Item	Description
1)	Collision domain
2)	Station
3)	Repeater
4)	Switch, bridge, or router

Control of Collision Domains

Introduction

A DECrepeater or PORTswitch module can configure collision domains at three levels:

- Module level
- Group level
- Port level

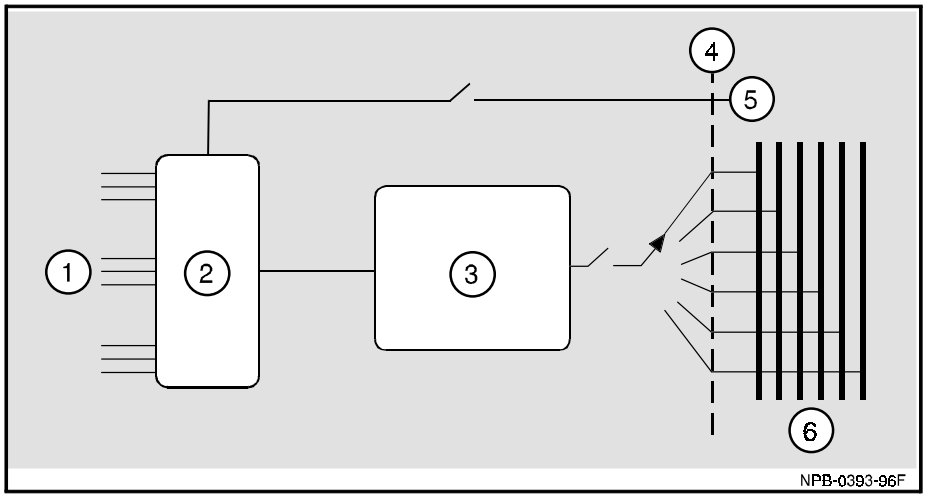
Module Level

A module-level collision domain maps all its ports into the same group. These modules contain a hard-wired single internal LAN segment. This single group can be mapped to one of several places on the backplane for interconnection to other ports, groups, or modules.

A DECrepeater or PORTswitch module is manageable as a single device (management domain), regardless of the configuration of the ports or port groups.

The following illustration shows a module-level configuration.

Figure 1-11: Module-Level Configuration



Item	Description
1)	Front panel ports
2)	Repeater engine
3)	Internal LAN engine
4)	Backplane interface
5)	Backplane ThinWire Port
6)	Flexible channels

Group Level

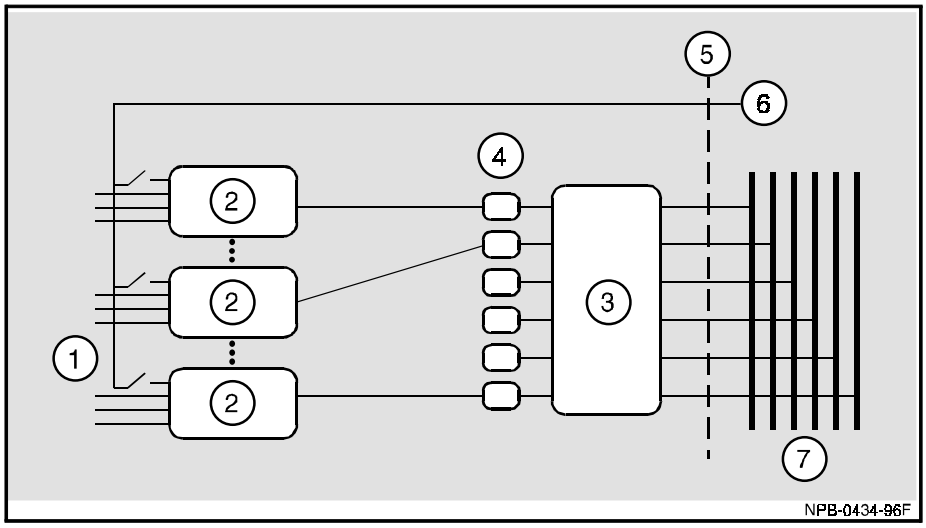
A group is a statically assigned, indivisible collection of ports that function as a single independent collision domain.

Groups (from the same module or different modules) that connect to the same DEChub 900 backplane LAN operate as a single independent collision domain or as part of a larger distributed collision domain.

The connection to the ThinWire segment is manageable and can be enabled or disabled.

The following illustration shows a group-level configuration.

Figure 1-12: Group-Level Configuration



Item	Description
1)	Front panel ports
2)	Repeater engine (fixed group)
3)	Crossbar multiplexor
4)	Six collision domains
5)	Backplane interface
6)	Backplane ThinWire port
7)	Flexible channels

Port Level

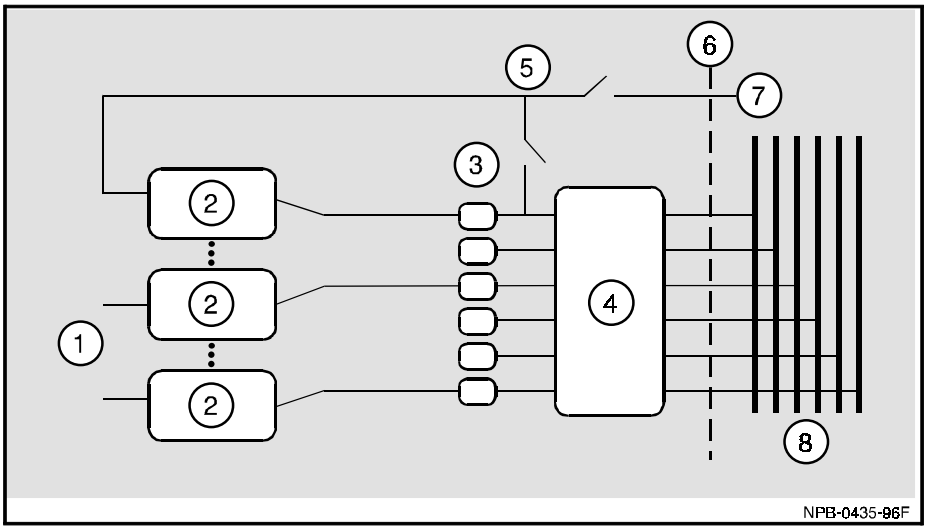
A port is any source of traffic into and out of the repeater. The DEChub 900 has internal ports: backplane, ThinWire, and local MAC units for management. The module's front panel ports are external ports.

Each front-panel port can be mapped individually or in groups to separate internal LANs. Those ports that are mapped to the same internal LAN function either as a single independent collision domain or as part of a larger distributed collision domain.

The connection to the ThinWire segment is manageable and can be enabled or disabled.

The following illustration shows a port-level configuration.

Figure 1-13: Port-Level Configuration



Item	Description
1)	Front panel ports
2)	Repeater engine
3)	Six internal LANs
4)	Crossbar multiplexor
5)	The ThinWire can be mapped to any of the collision domains
6)	Backplane Interface
7)	Backplane ThinWire port
8)	Flexible channels

LAN Hopping

Introduction

Ports on the DECrepeater and PORTswitch modules can be switched onto backplane segments at the module level, group level, or port level.

LAN Hopping via the DEChub 900 Backplane

LAN hopping is the ability, under software control, to reconfigure the port or group of ports in or between a collision domain or domains. DECrepeater and PORTswitch modules can connect to other DEChub Ethernet modules through the DEChub 900 flexible channels and through the DEChub 900 dedicated backplane Ethernet ThinWire channel.

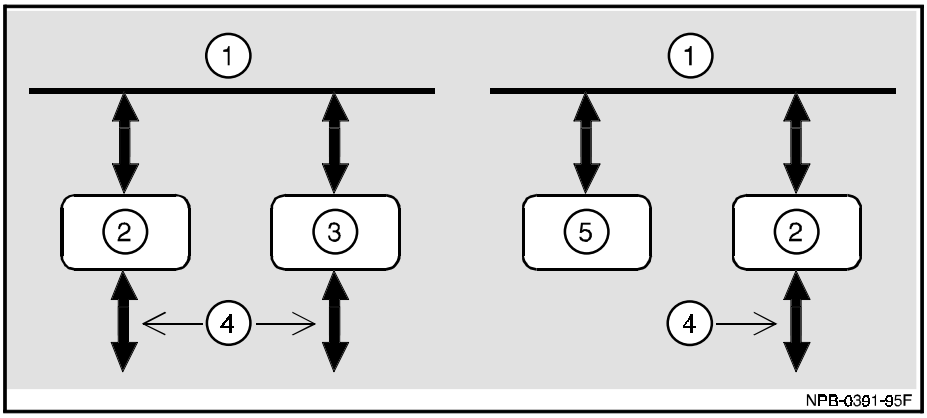
LAN Hopping via the Backplane Flexible Channels

A module can interconnect an internal LAN to one of the six single backplane flexible channels. This interconnection is manageable through clearVISN.

Repeater ports that connect through a flexible channel act as a single logical repeater. Traffic going to or from one of these ports on a flexible channel counts as one repeater hop.

The following illustration shows repeater hops on a flexible channel.

Figure 1-14: Repeater Hops on a Flexible Channel



Counts as one repeater hop and operates as one logical repeater.

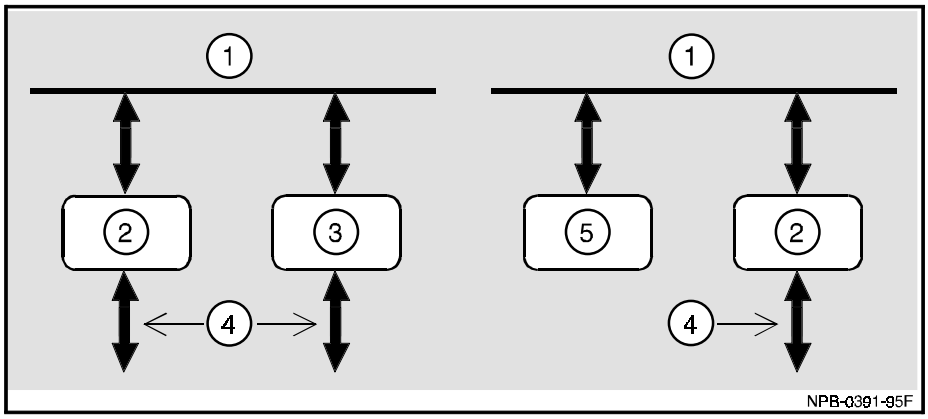
Counts as a direct MAU connection, not a repeater hop.

Item	Description
1)	Flexible channel
2)	Repeater A
3)	Repeater B
4)	Front panel ports
5)	Bridge or station

LAN Hopping via the Backplane ThinWire

Ports that connect through the dedicated backplane ThinWire segment act as two independent repeater units connected across the ThinWire link. Traffic on this segment counts as two repeater hops. The connection to the dedicated ThinWire segment is manageable, and can be enabled or disabled.

Figure 1-15: Repeater Hops on the ThinWire Port



Counts as two repeater hops connected across a ThinWire link **Counts as one repeater hop**

Item	Description
1)	ThinWire segment
2)	Repeater A
3)	Repeater B
4)	Front panel ports
5)	Bridge or station

Reference

Refer to Tables 4-2, 4-3, 4-5, and 4-6 for information on how each module implements this feature.

Enhanced Repeater Counters

Enhanced repeater counters count group-level, port-level, and management agent events occurring on manageable ports, internal LAN segments, and DEChub 900 flexible channels.

The following table lists the events counted in the group and port levels.

Table 1-3: Enhanced Repeater Counter

Level	Types of Events Counted Per Group or Port
Group	Number of multicast, broadcast, and total readable frames
	Number of readable bytes
	Number of collisions
	The number of the following types of errors: • Frame check sequence • Alignment • Frames too long • Late events
Port	Number of readable multicast frames
	Number of readable broadcast frames

References

Refer to Tables 4-2, 4-3, 4-5, and 4-6 for information on how each module implements this feature.

Digital Equipment Corporation's DEChub 900 Extensions to the Definitions of Managed Objects for IEEE 802.3 Repeater Devices formally defines the complete list of enhanced counters and gauges that the modules maintain to monitor overall network traffic.

Chapter 2

Managing DECrepeater and PORTswitch Modules In-Band and Out-of-Band

Overview

Introduction

This chapter provides information on how to manage DECrepeater and PORTswitch modules by using in-band management and out-of-band management.

In this Chapter

This chapter covers the following topics:

Two Management Methods

In-Band Management

In-band management is the network based method that transports management requests over the LAN. The network management station must be on the same LAN as the module being managed or have access to the module through interconnections within the platform.

Out-of-Band Management

Out-of-band management is a network independent method that uses a direct serial connection through the DEChub 900's, DEChub ONE's or (for some modules) the module's out-of-band management (OBM) port. The method allows local or remote access to the hub or using the Serial Line Internet Protocol (SLIP). SLIP transmits IP packets across serial lines.

NOTE

Typically, you manage the DEChub platforms and modules using the MultiChassis Manager network management application. You can however, use any network management product that supports native SNMP.

In-Band Management

Introduction

In-band management requires that the platform or module be assigned an in-band interface IP address as part of the configuration process. Communication with the network management station is then directed to this IP address. If the platform or module cannot be directly assigned an IP address or does not communicate in the appropriate protocol, then a proxy agent must be assigned.

Proxy Agent

A proxy agent is an IP addressable module that communicates using more than one protocol. It communicates with the network management station using SNMP. It communicates using other protocols to devices that cannot communicate directly with the network management station via SNMP. The device acts as the proxy or interpreter between the network management station and these modules.

Management Options

The following table lists the in-band management options:

Table 2-1: In-Band Management Options

Platform	Options
Digital MultiStack System	Install a proxy agent and use its in-band address to manage all types of modules installed in the Digital MultiStack System. If only repeaters are installed in the Digital MultiStack System, use a DECrepeater 90FS or DECrepeater 90TS as the proxy agent. Use the IP address assigned to an installed module.
DEChub 90	Install a proxy agent and use its in-band address to manage all types of modules installed in the platform. If only repeaters are installed in the platform, use a DECrepeater 90FS or DECrepeater 90TS as the proxy agent. Use the IP address assigned to an installed module
DEChub 900	Use the Hub Manager IP address and a module that provides IP services. Use the IP address assigned to an installed module.
DEChub ONE or DEChub ONE-MX	Use the module's IP address.
Standalone module	Use the module’s IP address, if it has an IP address. Use a proxy agent on the same network to manage the module.

Digital MultiStack System In-Band Management

To manage the Digital MultiStack System, install and designate a module as the stack manager (or proxy agent). Typically, the proxy agent is the DECagent 90. For a Digital MultiStack System containing all repeaters, you can use the DECrepeater 90TS or DECrepeater 90FS.

DEChub 90 In-Band Management

To manage a DEChub 90, install and designate a DECagent 90 (or a DECrepeater 90TS, or a DECrepeater 90FS for repeater only installations) to act as the proxy agent.

DEChub 900 In-Band Management

The DEChub 900 Hub Manager does not have its own connection to the backplane LANs. In order for the Hub Manger to communicate with the network, it requires a module that can receive and transmit messages over the DEChub 900 serial management bus. This module functionality is called IP services.

To manage the DEChub 900, install a module that provides IP services into the DEChub 900. Assign the in-band IP address for the Hub Manager to the slot location containing the IP services module.

The combination of the IP address and IP Service Module at that assigned slot location establishes the primary in-band management path. If you move the IP services module to another slot in the hub, you must redefine the location of the IP address.

You can also independently assign an IP address for the module if you want to manage that module directly.

Standalone In-Band Management

You can directly manage modules that have their own built-in SNMP agent. The full-height modules can be installed into a DEChub ONE or DEChub ONE-MX docking station. Some half-height modules can be installed standalone with an external power supply. Standalone installations without embedded SNMP agents require management by a proxy agent located somewhere on the LAN.

Out-of-Band Management

Introduction

Out-of-band (OBM) management enables you to run MultiChassis Manager, or any SNMP network management application that uses SLIP, directly at the platform or module without transport over the LAN.

Out-of-band management offers the same functionality as in-band management, except it operates at a lower speed. You must assign an out-of-band interface IP address and set the OBM port speed.

You can also manage the modules by establishing a connection from MultiChassis Manager to an access server that supports SLIP. If you have an access server in your hub, you can establish a SLIP connection between one of the access server ports and the OBM port.

OBM Port

You can use out-of-band management to manage modules installed in a platform that has a built-in OBM port. Additionally, some network modules, have their own OBM port. The OBM port is a serial interface port that can be connected to a terminal server, or a personal computer.

Management Options

The following options are available for out-of-band management:

- Using the platform's out-of-band IP address
- Using the module's out-of-band IP address

The following table lists the out-of-band management options:

Table 2-2: Out-of-Band Management Options

Platform	Options
Digital MultiStack System	Use the OBM port of the module that is acting as the stack manager.
DEChub 90	Use the OBM port on an installed module that has a management agent.
DEChub 900	Use the platform OBM port.
DEChub ONE or DEChub ONE-MX	Use the docking station OBM port.
Standalone DECrepeater 90TS module	Use the module's OBM port.

DEChub 900 Out-of-Band Management

To manage the DEChub 900, connect the Hub Manager’s OBM port to personal computer or terminal server.

This method is the same as in-band management, except that you assign an OBM IP address and an OBM port speed from the setup port DEChub 900 MultiSwitch Installation Menu. The port speeds at each end of the communications link must be identical.

Chapter 3

Managing DECrepeater and PORTswitch with clearVisn MultiChassis Manager

Overview

Introduction

This chapter shows how to use DECrepeater- and PORTswitch-specific MultiChassis Manager windows to perform common network management tasks. It provides an overview of the windows and lists each task as a separate heading. Each task description includes the appropriate SNMP MIB object (where applicable) that can be used by users who do not use clearVISN.

In this Chapter

Repeater-Specific clearVISN MultiChassis Manager Windows

Introduction

You can use the clearVISN MultiChassis Manager windows listed in the following table to manage the DECrepeater and PORTswitch modules. The following table describes the windows and their associated tasks.

Table 3-1: Window Tasks

Use this window...	To...
Hub Front Panel	Observe and interpret LEDs.
	Access a Port Summary window.
Repeater Summary (90-Series)	Interpret LEDs and port connector colors.
	Display port information.
	Assign the repeater description.
	Name the repeater ports.
	Reset the repeater module.
	Enable and disable the repeater.
	Enable and disable repeater ports.
	Access a port summary window.
	View jam bits settings.
	View auto-partition recovery settings.
	View an auto-partition algorithm setting.
Repeater Port Summary (90Series)	Name repeater ports.
	Enable and disable repeater ports.
	Access Port Details window
	Access the Repeater Security Summary window
	Access the Dual-Port Redundancy window

Repeater-Specific clearVISN MultiChassis Manager Windows

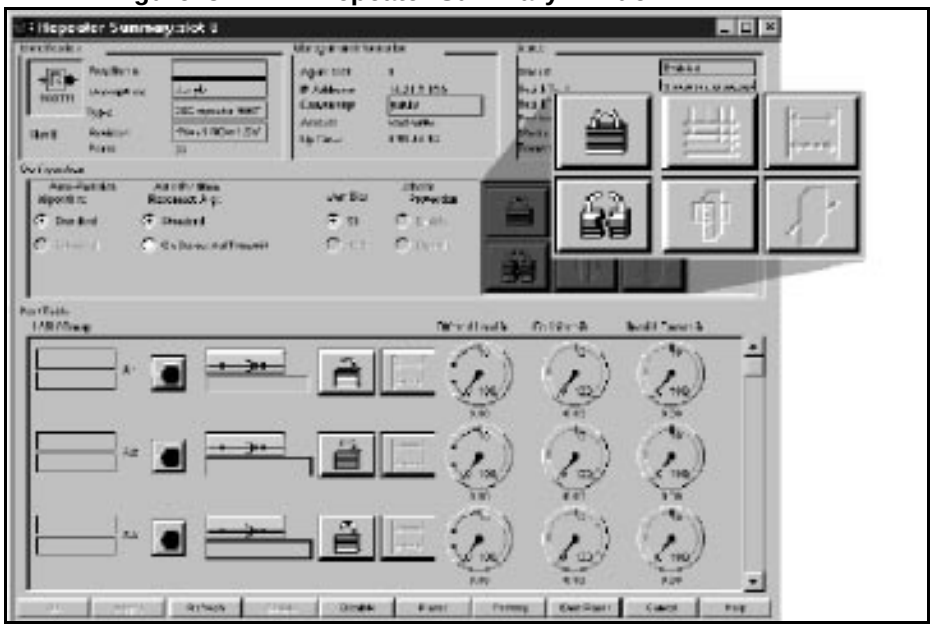
Use this window...	To...
Repeater Summary (900-Series)	Display port information.
	Assign the repeater's description.
	Name the repeater ports.
	Enable and disable the repeater module
	Enable and disable repeater ports.
	Reset the repeater module.
	Configure the repeater module.
	View jam bits settings.
	View auto-partition recovery settings.
	View an auto-partition algorithm setting.
	Access the Repeater Security Summary window
	Access the Dual-Port Redundancy window
	Access the Repeater Security Summary window
Repeater Port Summary (900-Series)	Display port information.
	Name the repeater port.
	Enable and disable the repeater port.
	Set up the repeater port performance monitors.
Repeater Port Details 900-Series)	Display port information.
	Enable and disable the repeater port.
	Set the repeater port link test administration status.
Repeater Security Summary (900-Series)	Display port information.
	Set up port security.
	Display port security.
	Enable and disable Address Learning.
	Add and remove authorized stations.
Repeater Security Intrusion Log (900-Series)	Display port information.
	Display security intrusions for the repeater.
Dual-Port Redundancy	Configure redundant ports.
Dual-Port Redundancy Add	Add a master pair of redundant ports.
	Add a redundant responder port.
	Delete a redundant responder port.

Accessing Other Windows

Introduction

The Repeater Summary window, shown in the following illustration, provides buttons that you can use to access other repeater management windows. The buttons are labeled with icons that represent various repeater functions.

Figure 3-1: Repeater Summary Window



Button	Description
	**Security —** Click on this button to open the Repeater Security Summary window.
	**Intrusion —** Click on this button to display the security intrusions log.

Opening Repeater Windows

The following table describes how to open any MultiChassis Manager repeater window:

To open this window...	Do this...
Repeater Summary	From the Hub Front Panel window, double-click on the repeater module.
Repeater Port Summary	From the Hub Front Panel window, double click on the repeater port. or From the Repeater Summary window, double click on a port connector icon in the port table.

Task List

The remainder of this chapter describes how to perform the network management tasks that are listed at the beginning of this chapter. The task descriptions include the associated SNMP MIB objects, for users who do not use clearVISN.

Enabling and Disabling LED Cycling

Overview

This task applies to 900-series repeaters only.

The enabling and disabling LED cycling feature allows you to enable and disable LED cycling on a particular repeater in order to display of groups (or bank) of ports.

Enabling and Disabling LED Cycling

To disable the cycling and display a particular group (or bank) of ports complete the following steps:

Step	Action
1	Click on the toggle button located below the bank indicator LEDs on the physical view of the Front Panel window.
2	To enable cycling, click on the toggle button.

Relevant SNMP Object

MIB Object	Where to get more information...
None	Not applicable.

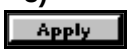
Assigning the Repeater Description

Overview

This feature allows you to assign the MultiChassis Manager local name for the repeater module. Descriptions must be strings of 1 to 80 characters. Valid characters are any printable characters including a space.

Assigning the Repeater Description

To assign or change the repeater description, complete the following steps:

Step	Action
1)	Open the Repeater Summary window
2)	In the Identification box, click on the Description box, delete the current description, and enter the new description.
3) 	To apply the new description and continue to make changes at the Repeater Summary window, click on the **Apply** button.
	or
	To apply the new description and close the window, click on the **OK** button.

Relevant SNMP Object

MIB Object	Where to get more information...
sysname	RFC 1213,MIB II

Displaying Port Information

Overview

Displaying port information allows you to check information when troubleshooting repeater or LAN problems. The 900-Series Repeater Summary window displays the following port information:

Port Information	Description
Summary	Port state, port name, port status, administration status, security, and performance data.
Port Summary	Port status, performance data, security data, dual-port redundancy, data-link information, and connected stations. The following connected-stations information is displayed: • Number of stations connected • Last source address seen • The MAC address, and if available, the IP address, IP name, DECnet address, and DECnet name for the connected stations
Dual-Redundancy	Available on the Repeater Summary and Port Summary window. Indicates the port redundancy configurations.
Port Details	Port status, counters, MAU information, and link information.
Security Summary	Security information and authorized stations.
Security Intrusion Log	Intrusions for the repeater module.

Relevant SNMP Object

MIB Object	Where to get more information...
erptrSecurityPackage.	dechub900-erptr-mib-vx.x.txt[1]
pcomAdminStatus	dechub900-common-mib-vx.x[1].txt

1.where x.x is the current version

Naming Repeater Ports

Overview

You can modify the port name to reflect the repeater's position in the DEChub 900 chassis and the port number. For example, 900TM_2.3 is the suggested name for port 3 on the DECrepeater 900TM in slot 2.

How to Modify the Repeater Port Name

There are two ways to modify the port name: from the Repeater Summary window or from the Repeater Port Summary window.

Modifying the Port Name from the Repeater Summary Window

To modify the port name from the Repeater Summary window complete the following steps:

Step	Action
1)	In the Port table, click on the **Port Name** box.
2)	Delete the current name and enter a new port name.
3)	To apply the new name and continue to make changes in the Repeater Summary window, click on **Apply**. or To apply the new description and close the window, click on **OK**.

Apply Button

OK Button

Modifying the Port Name from the Repeater Port Summary Window

To modify the port name from the Repeater Port Summary window, complete the following steps:

Step	Action
1)	In the Identification box, click on the **Port Name** box.
2)	Delete the current name and enter a new port name.
3)	To apply the new name and continue to make changes at the Repeater Summary window, click on the **Apply** button. or To apply the new name and close the window, click on the **OK** button.

Apply Button

OK Button

Relevant SNMP Object

MIB Object	Where to get more information...
erptrPortName	dechub900-crptr-mib-vx.x.txt[1]

1.where x.x is the current version

Enabling and Disabling the Repeater Modules

Overview

This task applies to 900-series repeaters only. This feature allows you to enable and disable the repeater module. A disabled module cannot transmit or receive packets.

When...	Then...
The repeater module is disabled	All ports are made non-operational (disabled). Attempts to enable an individual repeater port do not take effect.
The repeater module is reenabled	The ports return to the last managed state. If the ports were enabled they return to an enabled state. If they were disabled, they return to a disabled state.

How to Enable and Disable Repeater Modules

To enable or disable the repeater module, complete the following steps:

Step	Action
1)	Open the Repeater Summary window
2)	Click on **Enable** or **Disable** to enable or disable the repeater module.
3)	To apply the change, click on the **Apply** button. or To apply the change and close the window, click on the **OK** button.

Enable and Disable Buttons

Apply Button

OK Button

Relevant SNMP Object

MIB Object	Where to get more information...
pcomAdminStatus	dechub900-common-mib-vx.x.txt[1]

1.where x.x is the current version

Enabling and Disabling Repeater Ports

Overview

This feature allows you to enable and disable ports. You do this by setting the state of a port. This state to which you set the port is called the Administration Status. The Administration Status is displayed in the Port Table in the Repeater Summary window.

How to Enable or Disable Repeater Ports

To enable or disable repeater ports, complete the following steps:

Step	Action
1)	In the Port table, click on a port's Administration Status button until the desired state icon appears.
2)	Repeat this operation for all the ports whose Administration Status you want to change.
3)	To apply the change click on the **Apply** button or To apply the change and close the window, click on the **OK** button

Administrative Status Button

Apply Button

OK Button

Relevant SNMP Object

MIB Object	Where to get more information...
rptrPortAdminStatus	RFC 1516,802.3 Repeater MIB

Resetting the Repeater

Overview

This task applies to 900-series repeaters only.

The Repeater Summary window provides three repeater reset options.

Option	Icon	Description
Reset		Resets repeater counters. This also causes an Enet reset.
Factory		Returns all set values to the factory default settings.
Enet reset		Resets partitioned ports after taking corrective active for faults.

How to Reset the Repeater

To reset the repeater module, complete the following steps:

Step	Action
1)	Open the Repeater Summary window.
2)	Click on **Reset**, **Factory**, or **Enet reset**. A confirmation window appears.
3)	Click on **Yes or Cancel.**
4)	To apply the change, click on the **Apply** button. or To apply the change and close the window, click on the **OK** button.

Reset, Factory Enet Reset Buttons

Apply Button

OK Button

Relevant SNMP Object

MIB Object	Where to get more information...
pcomAdminStatus (Reset and Factory)	dechub900-common-mib-vx.x.txt[1]
rptrReset (Enet Reset)	RFC 1516, 802.3 Repeater MIB

1.where x.x is the current version

Configuring the Repeater Module

Overview

This task applies only to some 900-series repeaters. See MIB for description.

How to Configure the Repeater Module

To configure the repeater module, complete the following steps:

Step	Action
1)	Open the Repeater Summary window.
2)	Click on either **Standard** or **Enhanced Auto-Partition** algorithm.
3)	Click on either **Standard** or **On successful transmit** Auto-Partition Reconnect Algorithm**.**
4)	Click on either **96** or **128** jam bits.
5)	To apply the change, click on the **Apply** button. or To apply the change and close the window, click on the **OK** button.

Apply Button

OK Button

Relevant SNMP Object

MIB Object	Where to get more information...
erptrAutoPartitionAlg	dechub900-erptr-mib-vx.x.txt[1]
erptrAutoPartitionReconnectAlg	dechub900-erptr-mib-vx.x.txt[1]
erptrJamBits	dechub900-erptr-mib-vx.x.txt[1]

1.where x.x is the current version

Setting Up the Repeater Port Performance Monitors

Overview

This task applies to DECrepeater 90FS, DECrepeater 90TS, and the 900-series repeaters only.

The Repeater Port Summary window includes four performance monitors in the Performance box:

- Octets per second/offered load
- Frames per second/valid frames percent
- Collisions per second/collisions percent
- Errors per second/invalid frames percent

Each monitor provides a speedometer-type readout that has three zones (background, yellow, and red) and a peak level indicator. The yellow and red zones are adjustable. Each monitor also has a **Reset Peak** button that clears the peak level indicator.

How to Set up the Repeater Port Performance Monitors

To set up the repeater port performance monitors, complete the following steps:

Step	Action
1)	Open the Repeater Port Summary window.
2)	In the Performance box, click on **Rate** or **Percent** to select the unit of measure to be displayed in the monitors. At the lower and upper limits of the yellow area in each performance monitor there is small box.
3)	Click on this small box and drag the mouse to reset the upper and lower limits of the yellow and red zones as desired. These limits remain in effect only until you exit from the MultiChassis Manager program unless you click on **Apply** or **OK**.
4)	To clear the peak level indicator, click on **Reset peak**.
5)	To apply the change and keep the window open, click on the **Apply** button. or To apply the change and close the window, click on the **OK** button.

Apply Button

OK Button

Relevant SNMP Object

MIB Object	Where to get more information...
rptrMonitorPortReadableFrames	RFC 1516, 802.3 Repeater MIB
rptrMonitorPortReadableOctets	RFC 1516, 802.3 Repeater MIB
rptrMonitorPortReadableRunts	RFC 1516, 802.3 Repeater MIB
rptrMonitorPortReadableCollisions	RFC 1516, 802.3 Repeater MIB
rptrMonitorPortReadableTotalErrors	RFC 1516, 802.3 Repeater MIB

Selecting Ports for Security

Overview

This task applies to 900-series repeaters and the DECrepeater 90FS and DECrepeater 90TS modules only.

You can apply security functions to a single selected port or to all the front panel ports.

There are three ways to select a port or all the front panel ports for security functions:

- From the Repeater Summary window's Configuration box
- From the Repeater Summary window's Port Table
- From the Repeater Port Summary window

NOTE

If you enter the Repeater Security Summary window from the Repeater Summary window's Port Table or from the Repeater Port Summary window, you cannot select a different port or ports.

How to Select Ports for Security

To select a port or all the front panel ports for security functions from either the Repeater Summary window's Configuration Box or Port Table, or the Repeater Port Summary window, complete the following steps:

Step	Action
1)	Click on the **Security** button. The Repeater Security Summary window appears. This window displays the current security settings for the ports in the Security Functions box.
2)	In the Select Ports box, do one of the following: • To select a single port, click on a port. • To select all the front panel ports, click on **All Front Panel Ports**. Note: When you select All Front Panel Ports, address learning and the application of security functions can take considerably longer than they do for a single port.

Security Button

If you select All Front Panel Ports, the following window items become inactive, since they apply to single ports only:

- Port Information box
- Security Functions box's Intrusions Count and Intrusions Log button
- Address Learning box's Learned Stations list, Learning Status field, Edit Mode button, and Authorized Stations list

Relevant SNMP Object

MIB Object	Where to get more information...
erptrSecurityPackage	dechub900-erptr-mib-vx.x.txt[1]

1.where x.x is the current version

Setting Up Port Security

Overview

You can set security on repeater ports for both outgoing (intrusion protection) and incoming (eavesdrop prevention) packet traffic. You can apply the security functions you select to a single port or to all the front panel ports.

When intrusion protection is enabled, it allows only the authorized stations to transmit traffic into the network on that port.

If you selected All Front Panel Ports on the Select Ports box, the selections you make on the Security Functions box apply to all ports.

NOTE

If you entered this window from the Repeater Summary window's Port Table or from the Repeater Port Summary window, you cannot select a different port or ports.

How to Set Up Port Security

To set up port security, complete the following steps:

Step	Action
1)	Open the Repeater Security Summary window.
2)	In the Select Ports box, do one of the following: • To select a single port, click on a port — The current security settings for the selected port appear in the Security Functions box. • To select all the front panel ports, click on **All Front Panel Ports**. — The default settings are shown initially. These settings can be changed and applied to all ports
3)	To restrict outgoing traffic on the port to the authorized stations (that is, stations listed in the Authorized Stations box on the Repeater Security Summary window), click on **Prevent Eavesdropping** in the Security Functions box. or Set the Intrusion mode.  Apply Button If stations are already connected and transmitting or receiving, click on the **Apply** button.
4)	Enter the authorized stations for the port.
5)	To apply the change, click on the **Apply** button or  Apply Button To apply the changes and close the window, click on the **OK** button.  OK Button

If you selected **All Front Panel Ports**, a dialogue box appears informing you that the selected security functions will be applied to all front panel ports on all repeater types. The message also informs you that, for repeaters supporting Address Learning, clicking on **OK** or **Apply** causes the authorized address list on each front panel port to be overwritten with the addresses currently in the port's learned address list.

Either click on **OK** to apply the changes, or click on **Cancel** to cancel the changes.

Relevant SNMP Object

MIB Object	Where to get more information...
erptrSecurityPackage	dechub900-erptr-mib-vx.x.txt[1]

1.where x.x is the current version

Displaying Repeater Port Security

Overview

This task applies to 900-series repeaters and the DECrepeater 90FS and DECrepeater 90TS modules only.

This function allows you to display the security set for individual ports.

How to Display Repeater Port Security

NOTE

If you enter this window from the Repeater Summary window's Port Table or from the Repeater Port Summary window, you cannot select a different port.

To display security for a single port, complete the following steps:

Step	Action
1)	Open the Repeater Security Summary window.
2)	In the **Select Port box**, click on the port for which you want to display security. The security settings for the selected port appear in the Security Functions box.

Relevant SNMP Object

MIB Object	Where to get more information...
erptrSecurityPackage	dechub900-erptr-mib-vx.x.txt[1]
erptrAddrLearnPackage	dechub900-erptr-mib-vx.x.txt[1]

1.where x.x is the current version

Enabling and Disabling Address Learning

Overview

This task applies to 900-series repeaters and the DECrepeater 90FS and DECrepeater 90TS modules only.

This function allows you to enable and disable Address Learning. This function is used in conjunction with Security.

Reference

Refer to the specific product's release notes for more information.

How to Enable and Disable Address Learning

NOTE

If you entered this window from the Repeater Summary window's Port Table or from the Repeater Port Summary window, you cannot select a different port or ports.

To enable or disable Address Learning, complete the following steps:

Step	Action
1	Open the Repeater Security Summary window.
2	In the **Select Port box**, do one of the following: • Click on the port for which you want to enable or disable Address Learning. Click on **All Front Panel Ports** to select all ports.
3	If you have made edits to the Authorized Stations list, and you want to write them to the repeater, click on **Apply** before you continue to the next step.

OK and Apply Buttons

	Step	Action
 Refresh Button	**4**	Click on **Refresh** to display the addresses learned in the Learned Stations list.
 Clear Button	**5**	If you want to delete the addresses in the repeater's learned address list, click on **Clear.** This function causes the repeater to clear its learned address database. It does not clear the addresses being displayed by the MultiChassis Manager window. If you click on **Clear** when Address Learning is disabled, the repeater's learned address database remains empty/cleared.
 Refresh Button	**6**	If you enable Address Learning for a single port, click on **Refresh** to update the Learned Stations list with the addresses learned since you last clicked on **Refresh**.

Relevant SNMP Object

MIB Object	Where to get more information...
erptrAddrLearnPortCtrlAdmin Status (disable, visible, clear)	dechub900-erptr-mib-vx.x.txt[1]
erptrAddrLearnPackage	dechub900-erptr-mib-vx.x.txt[1]

1.where x.x is the current version

Editing the Authorized Stations List

Overview

This task applies to 900-series repeaters and the DECrepeater 90FS and DECrepeater 90TS modules only.

On 900-series repeaters, each port is limited to two types of authorized station addresses: the physical Ethernet address of the station connected to the port and the station's DECnet physical address. These addresses identify the stations connected to the port.

If a connected station is not using DECnet software, the DECnet physical address is not applicable.

For repeaters with security enabled, either one or two stations can be connected to each port, depending on the repeater, as follows:

Repeaters whose ports can connect to...	You can enter...
Only one station	Two addresses for each port: • Physical Ethernet address of the connected station • Physical DECnet address of the connected station
Only two stations	Up to four address for each port

If you attempt to put more than the maximum number of addresses allowed by the repeater in the Authorized Stations list, MultiChassis Manager displays a message.

NOTE

If you edit the addresses in the Authorized Stations display but click on Refresh before you click on **OK** or **Apply**, your edits are replaced by the current contents of the repeater's authorized address list. To write your edits to the repeater, click on **Apply**, before you click on **Refresh**.

There are two ways to edit the Authorized Stations list:

- Using the **Overwrite** or **Append** buttons in the Address Learning box
- Using the **Add** or **Remove** buttons in the Address Authorization box

You can use both methods together.

NOTE

If you selected All Front Panel Ports, you cannot edit the Authorized Stations list. When you click on the **OK** or **Apply** buttons, MultiChassis Manager automatically creates the list for each port. The list contains the first addresses learned since the last enable or clear operation, up to the maximum number of addresses allowed on the repeater.

How to Edit the Authorized Stations List

Using the Overwrite or Append Buttons

To edit the Authorized Stations List using the **Overwrite** or **Append** buttons, complete the following steps:

Step	Action
1)	Open the Repeater Security Summary window.
2)	If you entered from the Repeater Summary window's Configuration box, select a port in the Select Port box.
3)	In the Learned Stations list, highlight the learned addresses you want to put in the Authorized Stations list.

Step	Action
4)	Click on the **Overwrite** button to replace the addresses displayed in the Authorized Stations list, or click on the **Append** button to add the selected addresses to the list.
5)	To apply the changes and continue to make changes at the Repeater Security Summary window, click on **Apply**. or To apply the changes and close the window, click on **OK**.

Overwrite and Append Button

Apply Button

OK Button

Using the Add or Remove Buttons

To edit using the **Add** or **Remove** buttons, complete the following steps:

Step	Action
1)	Open the Repeater Security Summary window.
2)	If you entered from the Repeater Summary window's Configuration box, select a port in the Select Port box.
3)	To add an address, click on the Address text box in the Address Authorization box, enter the desired address, and click on **Add**.
4)	To remove an address, click on the address in the text box in the Authorized Stations box or type in the address, and click on **Remove**.
5)	To apply the changes and continue to make changes at the Repeater Security Summary window, click on **Apply**. or To apply the changes and close the window, click on **OK.**

Add Button

Remove Button

Apply Button

OK Button

Relevant SNMP Object

MIB Object	Where to get more information..
erptrSecurityPortAddrTable	dechub900-erptr-mib-vx.x.txt[1]

1.where x.x is the current version

Displaying Security Intrusions

Overview

This task applies to 900-series repeaters and the DECrepeater 90FS and DECrepeater 90TS modules only.

This function displays a log of all security intrusions on all ports.

How to Display Security Intrusions

To display the log of security intrusions for all repeater ports, complete the following steps:

Step	Action
1)	Open the Repeater Summary window.
2)	In the Configuration box, click on **Security Intrusions.**
	The Repeater Security Intrusion Log window appears. This window displays a log of intrusions on all ports.
	Note: The Security Intrusion button is also available from the Security Summary window.

Security Intrusion Button

Relevant SNMP Object

MIB Object	Where to get more information...
erptrSecurityRptrLogTable	dechub900-erptr-mib-vx.x.txt[1]
erptrSecurityRptrLogCapacity	dechub900-erptr-mib-vx.x.txt[1]

1.where x.x is the current version

Setting the Port Link Test Administration Status

Overview

This task applies to 900-series repeaters and the DECrepeater 90FS and DECrepeater 90TS modules only.

Setting the Port Link Test Administration Status can be enabled or disabled. Enabling this object causes the medium access unit (MAU) to turn its link test function On. Disabling causes the MAU to turn its link test function Off.

Setting the Port Link Test Administration Status

To enable or disable this object, complete the following steps:

Step	Action
1)	Open the Repeater Port Details window.
2)	Click on either **Enable** or **Disable** in the lower portion of the window.
3)	To apply the changes and continue to make changes at the Repeater Security Summary window, click on **Apply**. or To apply the changes and close the window, click on **OK.**

Apply Button

OK Button

Relevant SNMP Object

MIB Object	Where to get more information...
erptrMauLinkTestAdminStatus	dechub900-erptr-mib-vx.x.txt[1]

1.where x.x is the current version

Configuring Redundant Repeater Ports

Overview

This task applies only to the DECrepeater 90FS, PORTswitch 900FP, and PORTswitch 900TP.

Redundant ports are usually configured between two or more repeaters to provide a standby link in case the active link fails. If the active link fails, the standby link automatically activates to handle traffic between the repeaters.

Configuration

The basic redundant configuration consists of a pair of master ports (the master pair) and two remote ports. The master control algorithm, in the module that contains the master ports, controls which of the two lines is active and which is in standby mode.

The master ports must be on the same repeater. The remote ports must be on the same LAN.

NOTE

This redundant configuration does not result in a repeater loop because only one of the links is active.

The remote ports can be responder ports, non-responder ports or a combination of the two types. A responder port provides full fault detection because it signals the master pair if it detects a receive-mode failure. A normal port provides only partial fault detection because it does not signal the master pair if a receive-mode failure occurs.

When configuring redundant links with responder ports, you must configure two types of ports: the master pair and the responder ports. You do not need to configure non-responder ports.

Master ports control the communication links and determine which port is active and which is standby.

Responder ports connect to a master port pair from a separate repeater module or modules. If two responder ports are connected to a master pair, the responder ports can both be physically located on the same repeater module or on separate modules, but they must be on the same LAN.

How to Configure Redundant Repeater Ports

To configure redundant ports, complete the following steps:

Step	Action
1)	Open the Dual-Port Redundancy Add window.
2)	Choose the type of redundant port you want to add: • Master pair • Responder pair

Adding a Master Pair of Redundant Portsr

To add a master pair of redundant ports, complete the following steps:

Step	Action
1)	Enter the port number in the **Primary Port** box. You can use either of the following methods: • Click on a port in the **Available Ports** box which pastes it into the **Primary Port** box. • Type the number of the port in the **Primary Port** box.
2)	Click on the **Secondary Port** box. The **Secondary Port** box is highlighted.
3)	Enter the port number in the **Secondary Port** box. You can use either of the following methods: • Click on a port in the **Available Ports** box which pastes it into the **Secondary Port** box. • Type the number of the port in the **Secondary Port** box.
4)	If you want to associate a name with the link, click on the **Link Name** box and enter the name you want to assign to this link. This name appears in the Dual-Port Redundancy window.
5)	To apply the changes and close the window, click on **OK.**

OK Button

Adding a Redundant Responder Ports

To add a redundant responder port, complete the following steps:

Step	Action
1)	Click on a port in the **Available Ports** box and paste it into the **Responder Port** box.
2)	If you want to associate a name with the link, click on the **Link Name** box and assign a name to this link. This name appears on the Dual-Port Redundancy window.
3)	To apply the changes and close the window, click on **OK**.

OK Button

NOTE

The MultiChassis Manager software displays a confirmation box that reminds you to check that the redundant ports are on the same LAN. To abort the configuration, click on **No**.

Relevant SNMP Object

MIB Object	Where to get more information...
erptrDprPackage	dechub900-erptr-mib-vx.x.txt[1]

1.where x.x is the current version

Deleting Redundant Ports

This function removes dual-redundancy from the selected port(s). The port(s) return to non-redundant function.

To delete redundant ports, complete the following steps:

Step	Action
1)	Open the Dual-Port Redundancy window.
2)	Click on **Select** for the redundant port that you want to delete.
	The selected row in the table is highlighted.
3)	Click on **Delete**. The redundant port or port pair is deleted.

NOTE

The MultiChassis Manager software displays a confirmation box that warns you that if you are deleting a master pair, you should check that at least one of the ports is disabled in order to avoid creating a repeater loop.

Relevant SNMP Object

MIB Object	Where to get more information...
erptrDprPackage, especially erptrDprLinkEntryStatus	dechub900-erptr-mib-vx.x.txt[1]

1. where x.x is the current version

Chapter 4

DECrepeater and PORTswitch Modules

Overview

This chapter lists the DEChub family of DECrepeater and PORTswitch modules and provides a list of features available with each product.

In This Chapter

Configuration Choices

Introduction

DEChub DECrepeater and PORTswitch modules let you change your configuration as your applications change without incurring new hardware, software, or training costs.

Connectivity Choices

The DEChub family of DECrepeater and PORTswitch modules provides network connectivity for any type of Ethernet device from a PC to a mainframe system. The product family supports the following cable types:

- Screened twisted-pair (ScTP) and unshielded twisted-pair (UTP)
- ThinWire coaxial
- Thick wire (attachment interface unit (AUI))
- Fiber-optic

Platform Choices

The following platform configuration choices are available:

- Installed into a DEChub 900 MultiSwitch hub
- Installed into a DEChub 90 hub
- Installed as standalone unit with the use of the DEChub ONE or DEChub ONE-MX docking stations
- Installed into Digital MultiStack System Stackable Hub

The following table lists the configuration choices for each DECrepeater and PORTswitch module.

Table 4-1: Configuration Choices

Module	DEChub 900	DEChub 90	Standalone	Digital MultiStack System
DECrepeater 90T-16	Yes	Yes		Yes
DECrepeater 90TS	Yes	Yes	Yes[1]	Yes
DECrepeater 900GM	Yes		Yes[2]	
DECrepeater 900TM	Yes		Yes[2]	
PORTswitch 900TP	Yes		Yes[2]	
DECrepeater 90FA[3]	Yes	Yes		Yes
DECrepeater 90FL	Yes	Yes		Yes
DECrepeater 90FS[3]	Yes	Yes		Yes
PORTswitch 900FP or DECrepeater 900FP	Yes		Yes[2]	
DECrepeater 90C	Yes	Yes		Yes
PORTswitch 900CP	Yes		Yes[2]	
DECrepeater 900FL	Yes		Yes[1]	

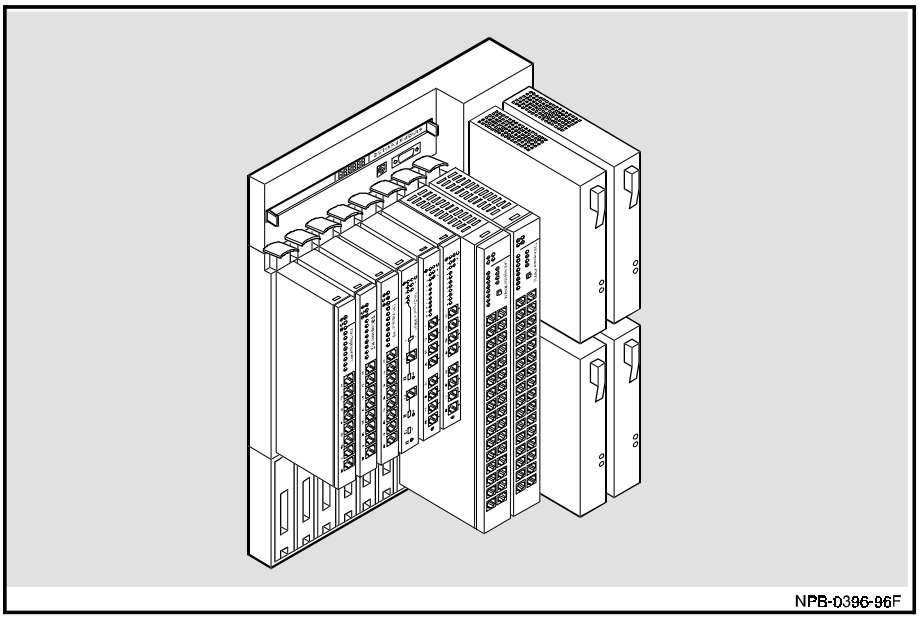
1.With back cover and power supply
2.Installed into a DEChub ONE
3.When installed into the DEChub 90, installed into slots 7 and 8 only.

The following pages show illustrations of the various configuration choices.

DEChub 900 MultiSwitch Configuration

The following figure shows a DEChub 900 MultiSwitch.

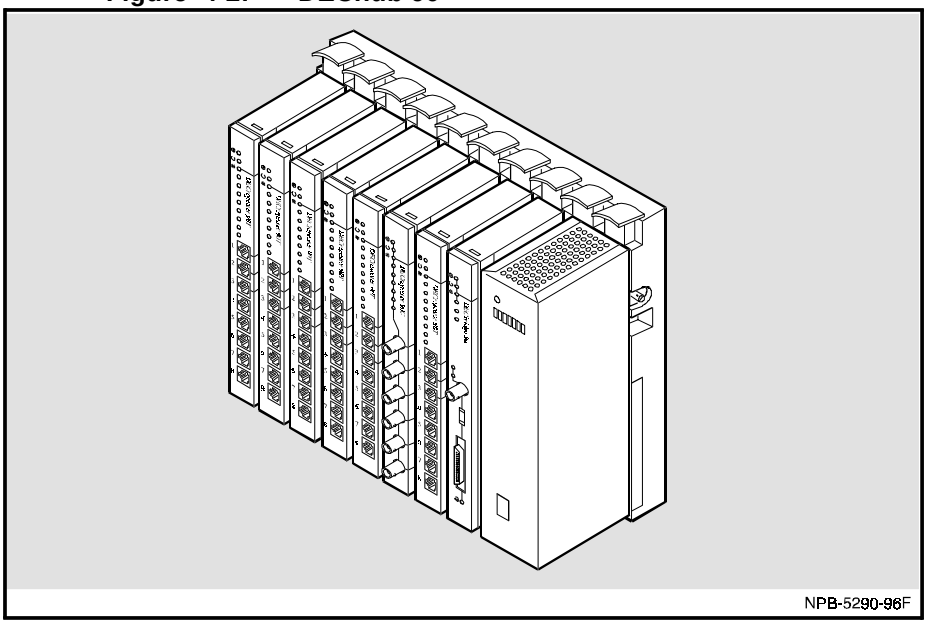
Figure 4-1: DEChub 900 MultiSwitch



DEChub 90 Configuration

The following figure shows a DEChub 90.

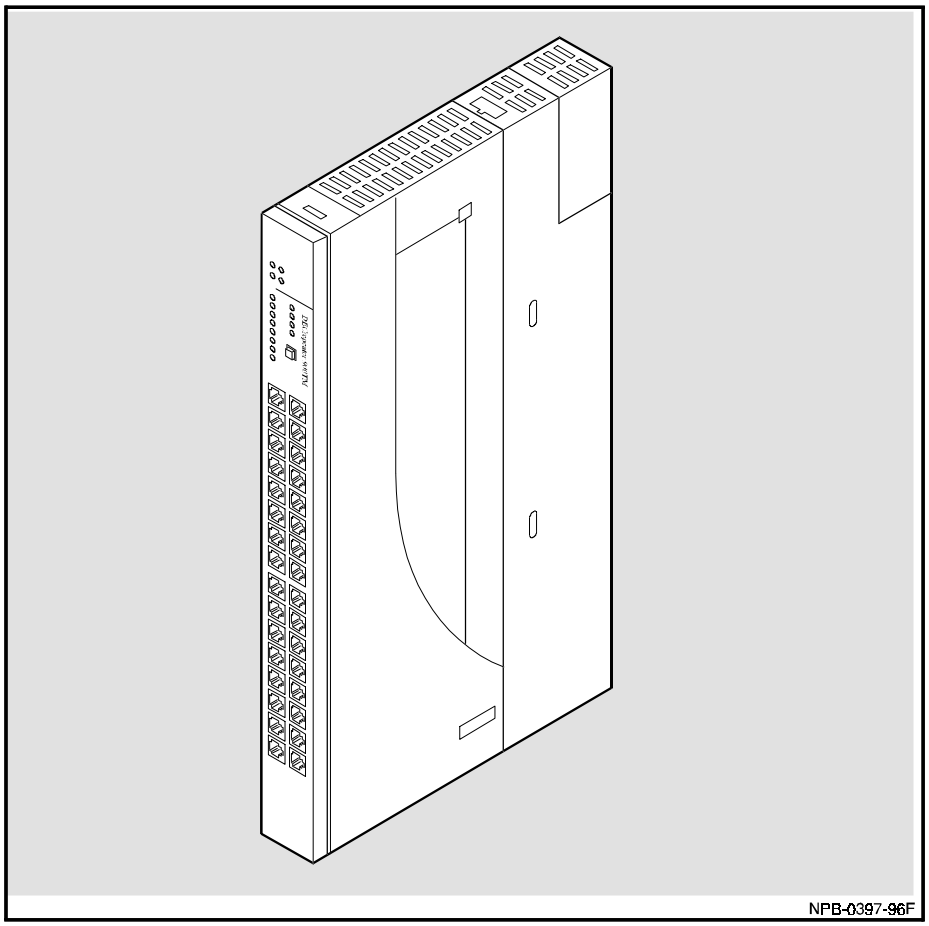
Figure 4-2: DEChub 90



Standalone Configuration with a DEChub ONE

The following figure shows a standalone configuration with the DEChub ONE docking station.

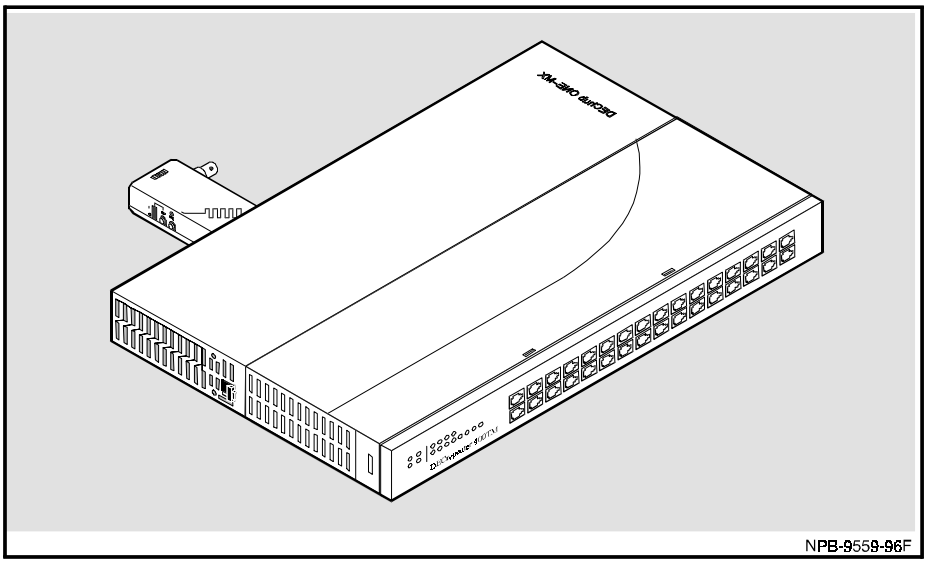
Figure 4-3: Standalone Configuration with a DEChub ONE



Standalone Configuration with a DEChub ONE-MX

The following figure shows a standalone configuration with the DEChub ONE-MX docking station.

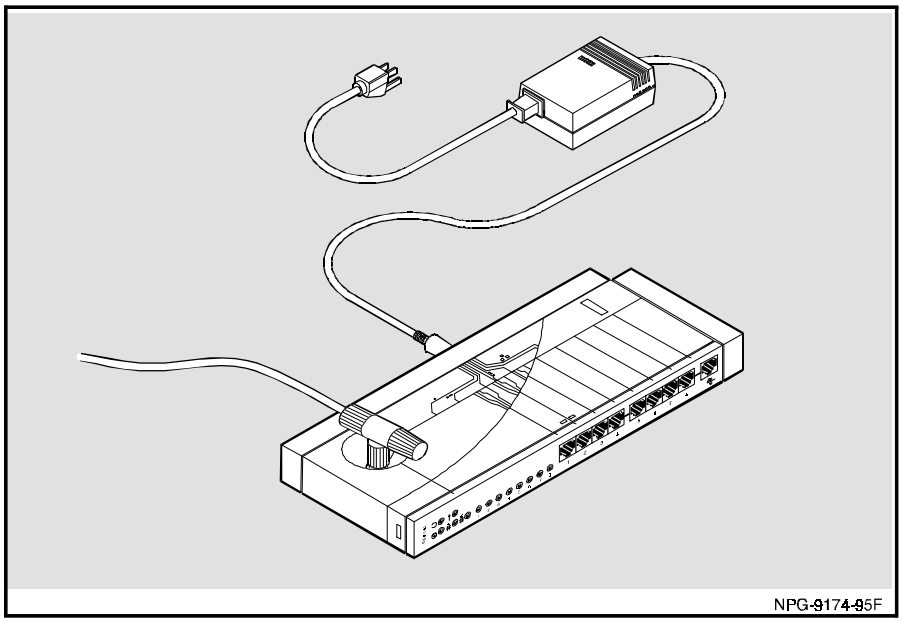
Figure 4-4: Standalone Configuration with a DEChub ONE-MX



Standalone Configuration for DECrepeater 90 Modules

The following figure shows the standalone configuration for DECrepeater 90 modules.

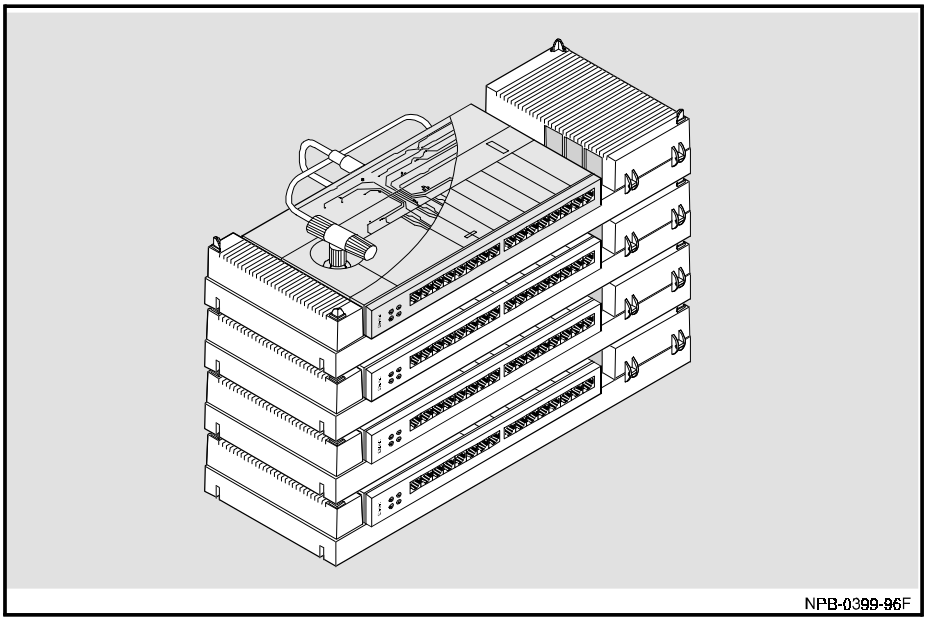
Figure 4-5: Standalone Configuration for DECrepeater 90TS Modules



Digital MultiStack System Stackable Hub Configuration

The following figure shows the Digital MultiStack System Stackable Hub configuration.

Figure 4-6: Digital MultiStack System Stackable Hub



Types of DECrepeater and PORTswitch Modules

Introduction

This section introduces the four types of DECrepeater and PORTswitch modules:

- Twisted-pair
- Fiber-optic
- ThinWire
- Token Ring backplane with fiber-optic front panel connectivity.

Twisted-Pair DECrepeater and PORTswitch Modules

Twisted-pair DECrepeater and PORTswitch modules provide 10BaseT ports that use 8-pin MJ connectors that support ScTP and UTP cable. The exception is the DECrepeater 900GM which features 24 10BaseT ports on two Telco connectors.

The following modules are twisted-pair repeaters:

- DECrepeater 90T-16
- DECrepeater 90TS
- DECrepeater 900GM
- DECrepeater 900TM
- PORTswitch 900TP

Fiber-Optic DECrepeater and PORTswitch Modules

Fiber-optic DECrepeater and PORTswitch modules provide 10BaseFL/FOIRL ports that use ST-type connectors that support fiber-optic cable.

The following modules are fiber-optic repeaters:

- DECrepeater 90FA
- DECrepeater 90FL
- DECrepeater 90FS
- PORTswitch 900FP
- DECrepeater 900FL (connects to the Token Ring channels on the DEChub 900 MultiSwitch backplane).

ThinWire DECrepeater and PORTswitch Modules

ThinWire DECrepeater and PORTswitch modules provide 10Base2 ports that use BNC connectors that support ThinWire coaxial cable.

The following modules are ThinWire repeaters:

- DECrepeater 90C
- PORTswitch 900CP

DECrepeater and PORTswitch Modules Product Comparisons

This section provides product comparison tables that identify the specific features and functions of each DECrepeater and PORTswitch module.

90-Series Twisted-Pair DECrepeater Module Features

The following table compares the 90-series twisted-pair DECrepeater modules.

Table 4-2: 90-Series Twisted-Pair DECrepeater Features

Features	DECrepeater 90TS	DECrepeater 90T-16
Port	8 10BaseT (8-pin MJ), 1 10Base2 or 1 AUI when standalone, 1 dual-function OBM/setup port	16 10BaseT (8-pin MJ) and 1 10Base2 when installed into a Digital MultiStack System
Management	Fully manageable in a DEChub 90, DEChub 900[1], Digital MultiStack System, or standalone via its own IP address. Embedded SNMP agent	Requires an SNMP management agent when installed into DEChub 90, DEChub 900, or Digital MultiStack System
IP services	Yes	No
Traffic counters	IEEE 802.3 counters (no internal LAN or flexible channel counters)	IEEE 802.3 counters (no internal LAN or flexible channel counters)
Backplane connectivity	ThinWire and one of six flexible channels	ThinWire
Port switching	Module level to backplane ThinWire or flexible channel, 1 internal LAN	Module level to backplane ThinWire, 1 internal LAN
Security	Intrusion— Log error and disable port and eavesdrop protection	No
Authorized address	Two addresses belonging to the same station per port	No
Dual-port redundancy	No	No

DECrepeater and PORTswitch Modules Product Comparisons

Features	DECrepeater 90TS	DECrepeater 90T-16
Auto-partition algorithm	Standard	Standard
Auto-partition reconnection algorithm	Standard or Tx	No
Minimum jam length	96 bits	96 bits
Address learning	2 addresses	2 addresses
MAC address database	256 on first-come/first-serve basis	256 on first-come/first-serve basis
Collision domain mapping	All ports are mapped to one collision domain	All ports are mapped to one collision domain

1.Manageable through its own IP address or the DEChub 900 Hub Manager's IP address.

900-Series Twisted-Pair DECrepeater and PORTswitch Module Features

The following table compares features of the 900-Series twisted-pair DECrepeater and PORTswitch modules.

Table 4-3: 900-Series Twisted-Pair DECrepeater and PORTswitch Modules Features

Feature	DECrepeater 900TM	DECrepeater 900GM	PORTswitch 900TP
Ports	32 10BaseT (8-pin MJ) and 1 AUI when standalone	24 10BaseT (Telco), 1 AUI and 1 additional AUI when standalone	32 10BaseT (8-pin MJ) and 1 AUI when standalone
Management	Fully manageable in a DEChub 900 or standalone[1] Embedded SNMP agent	Fully manageable in a DEChub 900 or standalone[1] Embedded SNMP agent	Fully manageable in a DEChub 900 or standalone[1] Embedded SNMP agent
IP services	Yes	Yes	Yes
Traffic counters	Standard repeater counters (no internal LAN or flexible channel counters)	Standard repeater counters (no internal LAN or flexible channel counters)	Standard repeater counters (no internal LAN or flexible channel counters)
Backplane connectivity	ThinWire and one of six flexible channels	ThinWire and one of six flexible channels	ThinWire and six flexible channels
Port switching	Module level to a back-plane flexible channel, 1 internal LAN	Module level to a back-plane flexible channel, 1 internal LAN	Port-level, 6 internal LANs
Security	Intrusion— Log error and disable port and Eavesdrop protection	Intrusion— Log error and disable port and Eavesdrop protection	Intrusion— Log error, disable port and jams unauthorized packets. Eavesdrop protection
Authorized address	Two addresses belonging to the same station per port	Two addresses belonging to the same station per port	Fixed allocation of 4 addresses per port
Dual-port redundancy	No	No	Yes
Auto-partition algorithm	Standard	Standard	Enhanced
Auto-partition reconnection algorithm	Standard or Tx	Standard or Tx	Standard or Tx

DECrepeater and PORTswitch Modules Product Comparisons

Feature	DECrepeater 900TM	DECrepeater 900GM	PORTswitch 900TP
Minimum jam length	96 bits	96 bits	96 bits
Address learning	2 addresses	2 addresses	4 addresses
MAC address database	256 addresses on irst-come/first-serve basis	256 addresses on first-come/first-serve basis	256 addresses on first-come/first-serve basis
Collision domain mapping	All ports are mapped to one collision domain	All ports are mapped to one collision domain	Ports can be mapped to 6 collision domains. The ThinWire may or may not be mapped to a collision domain

1. Manageable through its own IP address or the DEChub 900 Hub Manager's IP address

90-Series Fiber-Optic DECrepeater Module Features

The following table compares features of the fiber-optic DECrepeaters.

Table 4-4: 90-Series Fiber-Optic DECrepeater Module Features

Feature	DECrepeater 90FA	DECrepeater 90FL	DECrepeater 90FS
Ports	1 10BaseFL/ FOIRL, 1 AUI, 1 10Base2 when in a Digital MultiStack system	4 10BaseFL/ FOIRL, 1 10Base2 when in a Digital MultiStack system	2 10BaseFL/ FOIRL, 1 AUI, 1 10Base2 when in a Digital MultiStack System
Management	Requires an SNMP management agent when installed into DEChub 90, DEChub 900, or Digital MultiStack System	Requires an SNMP management agent when installed into DEChub 90, DEChub 900, or Digital MultiStack System	Embedded SNMP agent, fully manageable in a DEChub 900, DEChub 90, or Digital MultiStack System
IP services	No	No	Yes
Traffic counters services	No	No	Standard repeater counters (no internal LAN or flexible channel counters)
Backplane connectivity	ThinWire	ThinWire	ThinWire, and one flexible channel
Port switching	Module level to backplane ThinWire	Module level to backplane ThinWire	Module level to backplane ThinWire or flexible channel
Intrusion protection	No	No	Log error and disable port
Eavesdrop prevention	No	No	Yes
Authorized addresses	No	No	Two addresses belonging to the same station per port
Dual-port redundancy	No	No	Yes
Collision domain mapping	All ports are mapped to one collision domain	All ports are mapped to one collision domain	All ports are mapped to one collision domain

900-Series Fiber-Optic DECrepeater and PORTswitch Module Features

The following table compares features of the 900-series fiber-optic DECrepeater and PORTswitch modules.

Table 4-5: 900-Series Fiber-Optic DECrepeater and PORTswitch Module Features

Features	DECrepeater 900FL	PORTswitch 900FP and DECrepeater 900FP
Port	2 10BaseFL/ FOIRL using ST-type connectors that support fiber-optic cable and Token Ring on DEChub 900 backplane	12 10BaseFL/ FOIRL, 1 AUI when standalone
Management	Manageable through the DEChub 900 Hub Manager	Embedded SNMP agent fully manageable in a DEChub 900 or standalone
IP services	No	Yes
Traffic counters service	No	Standard repeater counters (no internal LAN or flexible channel counters)
Backplane connectivity	Token Ring	ThinWire and 6 flexible channels
Port switching	No	Group Level
Intrusion protection	No	Log error and disable port
Eavesdrop prevention	No	Yes
Authorized addresses	N/A	Two addresses belonging to the same station per port
Dual-port redundancy	No	Yes
Collision domain mapping	N/A	ThinWire must be mapped to one of the collision domains

ThinWire DECrepeater and PORTswitch Modules Features

The following table compares features of the ThinWire DECrepeater and PORTswitch modules.

Table 4-6: ThinWire DECrepeater and PORTswitch Modules Features

Feature	DECrepeater 90C	PORTswitch 900CP
Ports	6 10Base2 and 1 additional 10Base2 when in a Digital MultiStack System	16 10Base2 and 1 AUI when standalone
Management	Requires an SNMP management agent when installed into DEChub 90 or DEChub 900, or Digital MultiStack System	Embedded SNMP agent, fully manageable in a hub or standalone
IP services	No	Yes
Traffic counter services	No	Standard plus internal LAN and flexible channel counters
Backplane connectivity	ThinWire	ThinWire and 6 flexible channel Ethernet segments
Port switching	Module-level to backplane ThinWire, 1 internal LAN	Port-level, 6 internal LANs
Intrusion protection	No	Log error, disable port, and jam unauthorized packets
Eavesdrop prevention	No	Yes
Authorized addresses	No	Fixed allocation of 4 addresses per port
Dual-port redundancy	No	No
Auto-partition algorithm	Enhanced	Enhanced
Auto-partition reconnection algorithm	Standard	Standard or Tx
Minimum collision jam length	96 bits	96 bits
Collision domain mapping	All ports are mapped to one collision domain	Ports can be mapped to 6 collision domains. The ThinWire may or may not be mapped to a collision domain

DECrepeater 90T-16

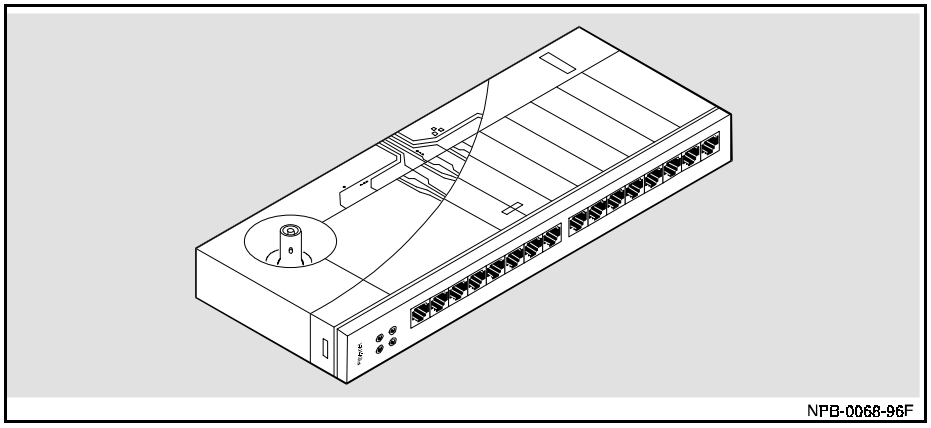
Introduction

The DECrepeater 90T-16 is a 16-port 10BaseT repeater that can be installed into a DEChub 900, DEChub 90, or a Digital MultiStack System.

Management

The module requires an SNMP management agent when installed into a DEChub 90 or into a Digital MultiStack System.

Figure 4-7: DECrepeater 90T-16



Ordering Information

Use the following order number to order the DECrepeater 90T-16 hub-based module: DETML-MA.

Operating Specifications

The following table provides DECrepeater 90T-16 module specifications.

Table 4-7: DECrepeater 90T-16 Specifications

Parameter	Hub-Based Module	Installed into a Digital MultiStack System
Height	27.9 cm (10.75 in)	27.9 cm (10.75 in)
Width	3.2 cm (1.25 in)	3.2 cm (1.25 in)
Depth	11.2 cm (4.4 in)	11.2 cm (4.4 in)
Weight	0.91 kg (2.0 lb.)	0.91 kg (2.0 lb.)
Operating Temperature[1]	5 °C to 50°C (41 °F to 122 °F)	5 °C to 50°C (41 °F to 122 °F)
Relative Humidity	10% to 95% non-condensing	10% to 95% non-condensing
Altitude:		
Operating	Sea level to 2400 m (8000 ft.)	Sea level to 2400 m (8000 ft.)
Non-operating	Sea level to 4900 m (16 000 ft.)	Sea level to 4900 m (16 000 ft.)
Power	6.0 W, total power 1.2 A, 5Vdc 0.0 A, 12Vdc 0.0 A, 15Vdc	6.0 W, total power 1.2 A, 5Vdc 0.0 A, 12Vdc 0.0 A, 15Vdc
Certification	CE, CSA, FCC, TUV, UL, VCCI	CE, CSA, FCC, TUV, UL, VCCI

1.For sites above 2400 m (8000 ft), decrease the operating temperature specification by 1.8°C for each 1000 m or 3.2°F for each 3200 ft.

Acoustical Specifications

The following table provides the DECrepeater 90T-16 acoustical specifications.

Table 4-8: DECrepeater 90T-16 Acoustical Specifications

Acoustics - Declared Values per ISO 9296 and ISO 7779[1]

Product	Sound Power Level L_{WAd},B	Sound Pressure Level L_{pAm},dBA (bystander positions)
	Idle/Operate	**Idle/Operate**
DETML	No acoustic noise	No acoustic noise
DETML - Stackable	No acoustic noise	No acoustic noise

1. Current values for specific configurations are available from Digital Equipment Corporation representatives. 1 B = 10 dBA.

Schallemissionswerte - Werteangaben nach ISO 9296 und ISO 7779/DIN EN27779[2]

Produkt	Schalleistungspegel L_{WAd},B	Schalldruckpegel L_{pAm},dBA (Zuschauerpositionen)
	Leerlauf/Betrieb	Leerlauf/Betrieb
DETML	keine meßbaren Schallemissionen	keine meßbaren Schallemissionen
DETML — Stackable	keine meßbaren Schallemissionen	keine meßbaren Schallemissionen

2Aktuelle Werte für spezielle Ausrüstungsstufen sind über die Digital Equipment Vertretungen erhältlich. 1 B = 10 dBA.

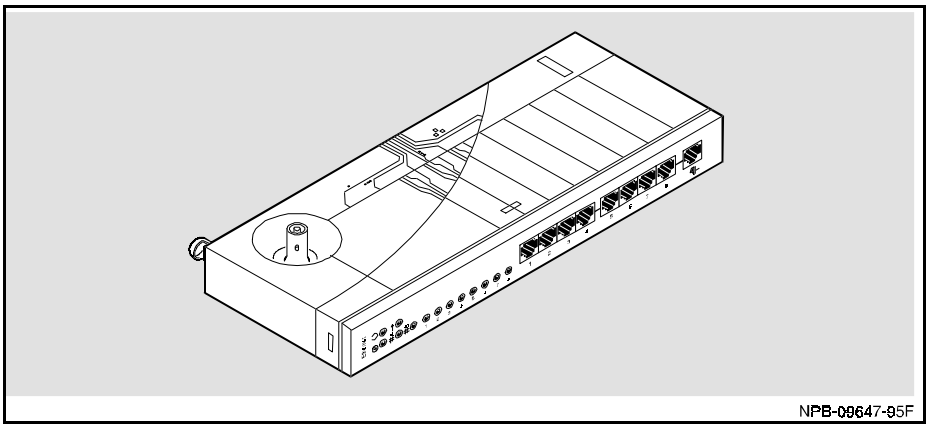
DECrepeater 90TS

Introduction

The DECrepeater 90TS is an 8-port 10BaseT repeater that can be installed into a DEChub 900, DEChub 90, Digital MultiStack System, or used as a standalone module. It features one 10Base2 port that can be used when the module is installed as a standalone repeater or as part of the Digital MultiStack System.

When installed standalone, the module includes a back cover with an AUI port. This AUI port connects internally to the same port as the ThinWire 10Base2 port on the module. Either the AUI or ThinWire port connection can be active (but not both) at any given time.

Figure 4-8: DECrepeater 90TS



Management

The DECrepeater 90TS provides a built-in SNMP management agent. It is fully manageable in any configuration. The module can serve as a stack manager when installed as part of a Digital MultiStack System. It can serve as an SNMP agent for other repeaters in a Digital MultiStack System or a DEChub 90.

The front panel serial port provides installation setup capabilities when the module is installed into a DEChub 90, standalone, or as part of a Digital MultiStack System. The setup menu provides an option to enable the front panel serial port for out-of-band management.

Ordering Information

The following table provides ordering information for the DECrepeater 90TS.

Table 4-9: DECrepeater 90TS Ordering Information

Description	Order Number
DECrepeater 90TS standalone with rear cover and power supply	DETMI-A#[1]
DECrepeater 90TS to be used as part of the Digital MultiStack System	DETMI-S#
DECrepeater 90TS hub-based module without power supply	DETMI-MA

1.# Country kit code. Order the following suffix as needed:
A = Unites States, Canada, and Japan; D = Denmark;
E = United Kingdom; I = Italy; K = Switzerland; T = Israel;
X = Central Europe; Z = Australia; J = India and South Africa

Operating Specifications

The following table provides DECrepeater 90TS module specifications.

Table 4-10: DECrepeater 90TS Specifications

Parameter	Hub-Based Module	Standalone Module	Installed into a Digital MultiStack System
Height	27.9 cm (10.75 in)	27.9 cm (10.75 in)	27.9 cm (10.75 in)
Width	3.2 cm (1.25 in)	3.2 cm (1.25 in)	3.2 cm (1.25 in)
Depth	11.2 cm (4.4 in)	13.5 cm (5.3 in)	13.5 cm (5.3 in)
Weight	0.82 kg (1.81 lb)	.09 kg (2.4 lb)	0.82 kg (1.81 lb)
Operating Temperature	5 °C to 50°C (41 ° F to 122 ° F)	5 ° C to 50° C (41 ° F to 122 ° F)	5 ° C to 50° C (41 ° F to 122 ° F)
Relative Humidity	10% to 95% non-condensing	10% to 95% non-condensing	10% to 95% non-condensing
Altitude[1]:			
Operating	Sea level to 2400 m (8000 ft.)	Sea level to 2400 m (8000 ft.)	Sea level to 2400 m (8000 ft.)
Non-operating	Sea level to 4900 m (16 000 ft.)	Sea level to 4900 m (16 000 ft.)	Sea level to 4900 m (16 000 ft.)
Power	6.0 W, total power 1.2 A, 5Vdc 0.0 A, 12Vdc 0.0 A, 15Vdc	12.0 W, total power 1.2 A, 5Vdc 1.2 A, 12Vdc (when connected to the network through AUI connector) 0.0 A, 15Vdc	6.0 W, total power 1.2 A, 5Vdc 0.0 A, 12Vdc 0.0 A, 15Vdc
Certification	CE, CSA, FCC, TUV, UL, VCCI	CE, CSA, FCC, TUV, UL, VCCI	CE, CSA, FCC, TUV, UL, VCCI

1.For sites above 2400 m (8000 ft), decrease the operating temperature specification by 1.8°C for each 1000 m or 3.2°F for each 3200 ft.

Acoustical Specifications

The following table provides the DECrepeater 90TS acoustical specifications.

Table 4-11: DECrepeater 90TS Acoustical Specifications

Acoustics - Declared Values per ISO 9296 and ISO 7779[1]

Product	Sound Power Level L_{WAd},B	Sound Pressure Level L_{pAm},dBA (bystander positions)
	Idle/Operate	**Idle/Operate**
DETMI	No acoustic noise	No acoustic noise
DETMI - Stackable	No acoustic noise	No acoustic noise
DETMI + H7827-BA	No acoustic noise	No acoustic noise

1. Current values for specific configurations are available from Digital Equipment Corporation representatives. 1 B = 10 dBA.

Schallemissionswerte - Werteangaben nach ISO 9296 und ISO 7779/DIN EN27779[2]

Produkt	Schalleistungspegel L_{WAd},B	Schalldruckpegel L_{pAm},dBA (Zuschauerpositionen)
	Leerlauf/Betrieb	**Leerlauf/Betrieb**
DETMI	keine meßbaren Schallemissionen	keine meßbaren Schallemissionen
DETMI — Stackable	keine meßbaren Schallemissionen	keine meßbaren Schallemissionen
DETMI + H7827-BA	keine meßbaren Schallemissionen	keine meßbaren Schallemissionen

2. Aktuelle Werte für spezielle Ausr üstungsstufen sind über die Digital Equipment Vertretungen erhältlich.1B=10dBA

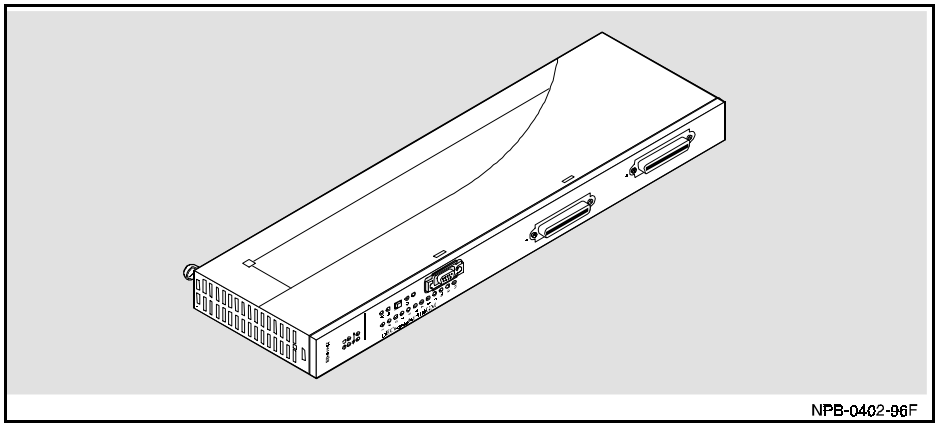
DECrepeater 900GM

Introduction

The DECrepeater 900GM is a 24-port 10BaseT repeater that can be installed into a DEChub 900 or standalone when installed into a DEChub ONE.

Using Telco connectors, the DECrepeater 900GM provides simplicity in wiring closets by allowing consolidation of 24 UTP cables into two 12-port connectors.

Figure 4-9: DECrepeater 900GM



Management

The DECrepeater 900GM has a built-in SNMP management agent. It is fully manageable in any configuration.

Ordering Information

The following table provides ordering information for the DECrepeater 900GM.

Table 4-12: DECrepeater 900GM Ordering Information

Description	Order Number
DECrepeater 900GM with DEChub ONE docking station	DETTM-MA and DEHUA-##[1]
DECrepeater 900GM hub-based module for use in a DEChub 900 MultiSwitch	DETTM-MA
DEChub ONE docking station (required with DETTM-MA for standalone use). Provides AUI network connector, power supply, setup port, and OBM port.	DEHUA-##[1]

1.## Country kit code. Order the following suffix as needed:
CA = Unites States, Canada, and Japan; CD = Denmark;
CE = United Kingdom; CI = Italy; CK = Switzerland; CT = Israel;
CX = Central Europe; CZ = Australia; DJ = India and South Africa

Operating Specifications

The following table provides DECrepeater 900GM module specifications.

Table 4-13: DECrepeater 900GM Specifications

Parameter	Hub-Based Module	Standalone Module
Height	44.45 cm (17.5 in)	44.45 cm (17.5 in)
Width	4.45 cm (1.75 in)	4.45 cm (1.75 in)
Depth	15.25 cm (6 in)	25.41 cm (10 in) with DEChub ONE 29.24 cm (11.9 in) with a DEChub ONE-MX
Weight	1.8 kg (3.97 lb)	3.4 kg (7.5 lb) with DEChub ONE; 3.9 kg (8.6 lb) with DEChub ONE-MX
Operating Temperature[1]	5 ^{o} C to 50^{o} C (41 ^{o} F to 122 ^{o} F)	5 ^{o} C to 50^{o} C (41 ^{o} F to 122 ^{o} F)
Relative Humidity	10% to 95% non-condensing	10% to 95% non-condensing
Altitude:		
Operating	Sea level to 2400 m (8000 ft.)	Sea level to 2400 m (8000 ft.)
Non-operating	Sea level to 4900 m (16 000 ft.)	Sea level to 4900 m (16 000 ft.)
Power	35.0 W, total power 4.0 A, 5Vdc 0.1 A, 12Vdc 1.0 A, 15Vdc	35.0 W, total power 4.0 A, 5Vdc 0.1 A, 12Vdc 1.0 A, 15Vdc
Certification	CE, CSA, FCC, TUV, UL, VCCI	CE, CSA, FCC, TUV, UL, VCCI

1.For sites above 2400 m (8000 ft), decrease the operating temperature specification by 1.8^{o}C for each 1000 m or 3.2^{o}F for each 3200 ft.

Acoustical Specifications

The following table provides the DECrepeater 900GM acoustical specifications.

Table 4-14: DECrepeater 900GM Acoustical Specifications

Acoustics - Declared Values per ISO 9296 and ISO 7779[1]

Product	Sound Power Level L_{WAd},B	Sound Pressure Level L_{pAm},dBA (bystander positions)
	Idle/Operate	**Idle/Operate**
DETTM	4.9	35
DETTM + DEHUA	5.3	39
DETTM + DEF1H	5.3	39

1. Current values for specific configurations are available from Digital Equipment Corporation representatives. 1 B = 10 dBA.

Schallemissionswerte - Werteangaben nach ISO 9296 und ISO 7779/DIN EN27779[2]

Produkt	Schalleistungspegel L_{WAd},B	Schalldruckpegel L_{pAm},dBA (Zuschauerpositionen)
	Leerlauf/Betrieb	**Leerlauf/Betrieb**
DETTM	4,9	35
DETTM + DEHUA	5,3	39
DETTM + DEF1H	5,3	39

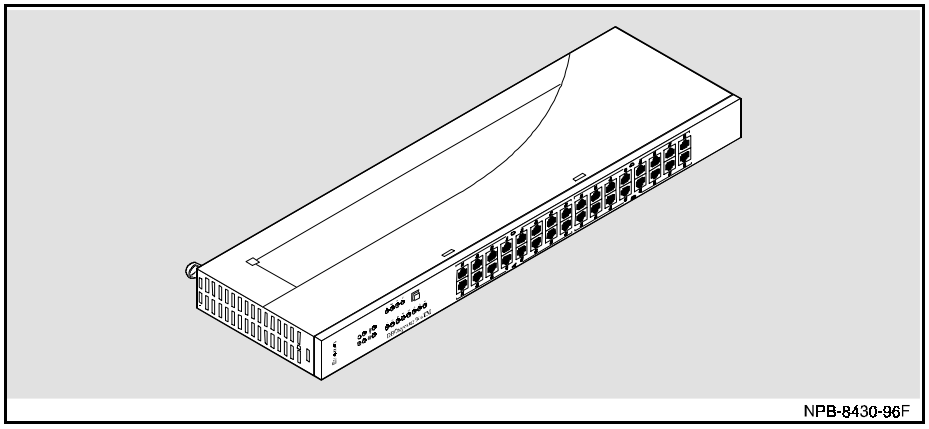
2. Aktuelle Werte für spezielle Ausrüstungsstufen sind über die Digital Equipment Vertretungen erhältlich. 1 B = 10 dBA.

DECrepeater 900TM

Introduction

The DECrepeater 900TM is a 32-port 10BaseT (8-pin MJ) repeater that can be installed into a DEChub 900 or standalone when installed into a DEChub ONE.

Figure 4-10: DECrepeater 900TM



Management

The DECrepeater 900TM has a built-in SNMP management agent. It is fully manageable in any configuration.

Ordering Information

The following table provides ordering information for the DECrepeater 900TM.

Table 4-15: DECrepeater 900TM Ordering Information

Description	Order Number
DECrepeater 900TM with DEChub ONE docking station	ETMM-MA and EHUA-##[1]
DECrepeater 900TM hub-based module for use in a DEChub 900 MultiSwitch	ETMM-MA
DEChub ONE docking station (required with DETTM-MA for standalone use). Provides AUI network connector, power supply, setup port, and OBM port.	EHUA-##[1]

1.## Country kit code. Order the following suffix as needed:
CA = Unites States, Canada, and Japan; CD = Denmark;
CE = United Kingdom; CI = Italy; CK = Switzerland; CT = Israel;
CX = Central Europe; CZ = Australia; DJ = India and South Africa

Operating Specifications

The following table provides DECrepeater 900TM module specifications.

Table 4-16: DECrepeater 900TM Specifications

Parameter	Hub-Based Module	Standalone Module
Height	44.45 cm (17.5 in)	44.45 cm (17.5 in)
Width	4.45 cm (1.75 in)	4.45 cm (1.75 in)
Depth	15.25 cm (6 in)	25.41 cm (10 in) with DEChub ONE 29.24 cm (11.9 in) with a DEChub ONE-MX
Weight	1.8 kg (3.97 lb)	3.4 kg (7.5 lb) with DEChub ONE; 3.9 kg (8.6 lb) with DEChub ONE-MX
Operating Temperature[1]	5 ^{o} C to 50^{o} C (41 ^{o} F to 122^{o} F)	5 ^{o} C to 50^{o} C (41 ^{o} F to 122 ^{o} F)
Relative Humidity	10% to 95% non-condensing	10% to 95% non-condensing
Altitude:		
Operating	Sea level to 2400 m (8000 ft.)	Sea level to 2400 m (8000 ft.)
Non-operating	Sea level to 4900 m (16 000 ft.)	Sea level to 4900 m1 (6 000 ft.)
Power	27.5 W, total power 4.0 A, 5Vdc 0.1 A, 12Vdc 0.5 A, 15Vdc	27.5 W, total power 4.0 A, 5Vdc 0.1 A, 12Vdc 0.5 A, 15Vdc
Certification	CE, CSA, FCC, TUV, UL, VCCI	CE, CSA, FCC, TUV, UL, VCCI

1.For sites above 2400 m (8000 ft), decrease the operating temperature specification by 1.8^{o}C for each 1000 m or 3.2^{o}F for each 3200 ft.

Acoustical Specifications

The following table provides the DECrepeater 900TM acoustical specifications.

Table 4-17: DECrepeater 900TM Acoustical Specifications

Acoustics - Declared Values per ISO 9296 and ISO 7779[1]

Product	Sound Power Level L_{WAd},B	Sound Pressure Level L_{pAm},dBA (bystander positions)
	Idle/Operate	**Idle/Operate**
DETMM	4.9	35
DETMM + DEHUA	5.3	39
DETMM + DEF1H	5.3	39

1. Current values for specific configurations are available from Digital Equipment Corporation representatives. 1 B = 10 dBA.

Schallemissionswerte - Werteangaben nach ISO 9296 und ISO 7779/DIN EN277792

Produkt	Schalleistungspegel L_{WAd},B	Schalldruckpegel L_{pAm},dBA (Zuschauerpositionen)
	Leerlauf/Betrieb	**Leerlauf/Betrieb**
DETMM	4,9	35
DETMM + DEHUA	5,3	39
DETMM + DEF1H	5,3	39

2. Aktuelle Werte für spezielle Ausrüstungsstufen sind über die Digital Equipment Vertretungen erhältlich. 1 B = 10 dBA.

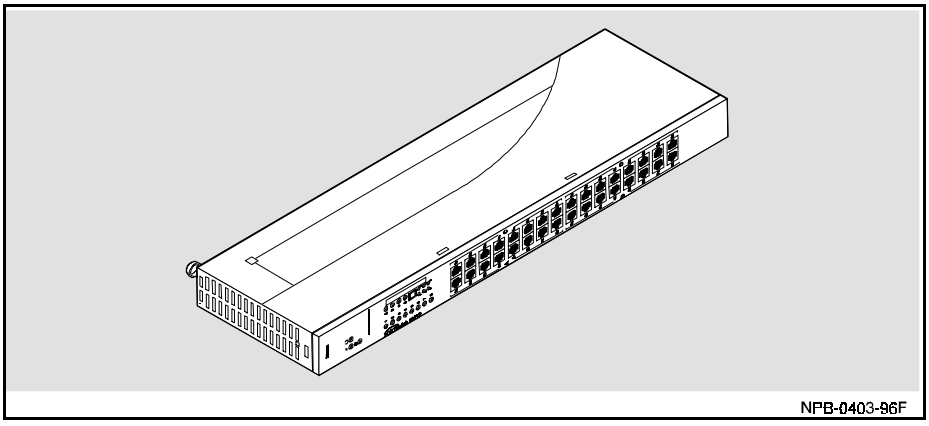
PORTswitch 900TP

Introduction

The PORTswitch 900TP is a 32-port 10BaseT (8-pin MJ) repeater that can be installed into a DEChub 900 or standalone when installed into a DEChub ONE.

The module provides flexibility to logically interconnect any combination of externally accessible ports on any of six internal LAN segments.

Figure 4-11: PORTswitch 900TP



Management

The PORTswitch 900TP has a built-in SNMP management agent. It is fully manageable in any configuration.

Ordering Information

The following table provides ordering information for the PORTswitch 900TP.

Table 4-18: PORTswitch 900TP Ordering Information

Description	Order Number
PORTswitch 900TP with DEChub ONE docking station	DETPJ-MA and DEHUA-##[1]
PORTswitch 900TP hub-based module for use in a DEChub 900 MultiSwitch	DETPJ-MA
DEChub ONE docking station (required with DETPJ-MA for standalone use). Provides AUI network connector, power supply, setup port, and OBM port.	DEHUA-##[1]

1.## Country kit code. Order the following suffix as needed:
CA = Unites States, Canada, and Japan; CD = Denmark;
CE = United Kingdom; CI = Italy; CK = Switzerland; CT = Israel;
CX = Central Europe; CZ = Australia; DJ = India and South Africa

Operating Specifications

The following table provides PORTswitch 900TP module specifications.

Table 4-19: PORTswitch 900TP Specifications

Parameter	Hub-Based Module	Standalone Module
Height	44.45 cm (17.5 in)	44.45 cm (17.5 in)
Width	4.45 cm (1.75 in)	4.45 cm (1.75 in)
Depth	15.25 cm (6 in)	25.41 cm (10 in) with DEChub ONE 29.24 cm (11.9 in) with DEChub ONE-MX
Weight	2.65 kg (5.85 lb)	4.24 kg (9.35 lb) with DEChub ONE; 4.75 kg (10.48 lb) with DEChub ONE-MX
Operating Temperature[1]	5 ^{o} C to 50^{o} C(41 ^{o} F to 122 ^{o} F)	5 ^{o} C to 50^{o} C (41 ^{o} F to 122 ^{o} F)
Relative Humidity	10% to 95% non-condensing	10% to 95% non-condensing
Altitude:		
Operating	Sea level to 2400 m (8000 ft.)	Sea level to 2400 m (8000 ft.)
Non-operating	Sea level to 4900 m (16 000 ft.)	Sea level to 4900 m (16 000 ft.)
Power	37.5 W, total power 6.0 A, 5Vdc 0.1 A, 12Vdc 0.5 A, 15Vdc	37.5 W, total power 6.0 A, 5Vdc 0.1 A, 12Vdc 0.5 A, 15Vdc
Certification	CE, CSA, FCC, TUV, UL, VCCI	CE, CSA, FCC, TUV, UL, VCCI

1.For sites above 2400 m (8000 ft), decrease the operating temperature specification by 1.8^{o}C for each 1000 m or 3.2^{o}F for each 3200 ft.

Acoustical Specifications

The following table provides the PORTswitch 900TP acoustical specifications.

Table 4-20: PORTswitch 900TP Acoustical Specifications

Acoustics - Declared Values per ISO 9296 and ISO 7779[1]

Product	Sound Power Level $L_{WAd,B}$	Sound Pressure Level $L_{pAm,dBA}$ (bystander positions)
	Idle/Operate	**Idle/Operate**
DETPJ	4.9	35
DETPJ + DEHUA	5.3	39
DETPJ + DEF1H	5.3	39

1. Current values for specific configurations are available from Digital Equipment Corporation representatives. 1 B = 10 dBA.

Schallemissionswerte - Werteangaben nach ISO 9296 und ISO 7779/DIN EN27779[2]

Produkt	Schalleistungspegel $L_{WAd,B}$	Schalldruckpegel $L_{pAm,dBA}$ (Zuschauerpositionen)
	Leerlauf/Betrieb	**Leerlauf/Betrieb**
DETPJ	4,9	35
DETPJ + DEHUA	5,3	39
DETPJ + DEF1H	5,3	39

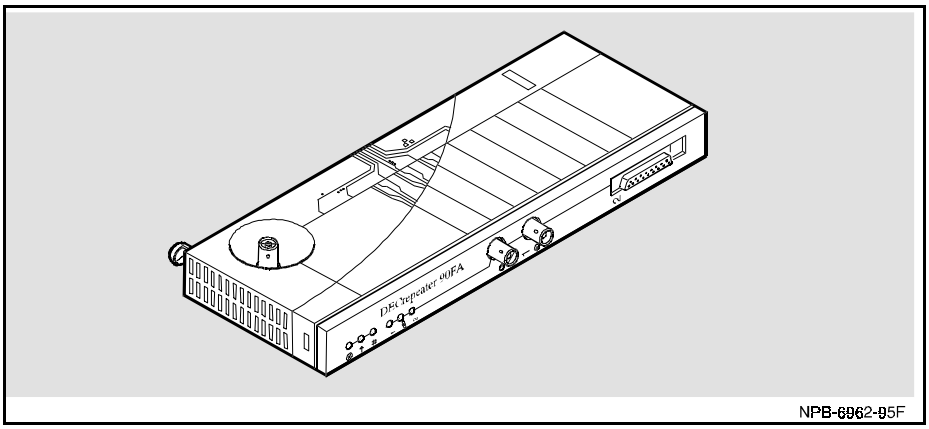
2. Aktuelle Werte für spezielle Ausrüstungsstufen sind über die Digital Equipment Vertretungen erhältlich. 1 B = 10 dBA.

DECrepeater 90FA

Introduction

The DECrepeater 90FA is a 3-port 10BaseFL/FOIRL repeater that can be installed into a DEChub 900, DEChub 90, or into a Digital MultiStack System. In addition to its one fiber-optic port (using ST-type connectors), it features an external AUI port. It also features one 10Base2 port that can be used when the module is installed into a Digital MultiStack System.

Figure 4-12: DECrepeater 90FA



Management

The module requires an SNMP management agent when installed into a DEChub 900, a DEChub 90, or a Digital MultiStack System.

Ordering Information

The following table provides ordering information for the DECrepeater 90FA.

Table 4-21: DECrepeater 90FA Ordering Information

Description	Order Number
DECrepeater 90FA in a Digital MultiStack System	DEFAR-##[1]
DECrepeater 90FA hub-based module without power supply	DEFAR-NA

1.## Country kit code. Order the following suffix as needed:
SA = Unites States, Canada, and Japan; SD = Denmark;
SE = United Kingdom; SI = Italy; SK = Switzerland; ST = Israel;
SX = Central Europe; SZ = Australia;
BJ = India and South Africa

Operating Specifications

The following table provides DECrepeater 90FA module specifications.

Table 4-22: DECrepeater 90FA Specifications

Parameter	Hub-Based Module	Installed into a Digital MultiStack System
Height	27.9 cm (10.75 in)	27.9 cm (10.75 in)
Width	3.2 cm (1.25 in)	3.2 cm (1.25 in)
Depth	11.2 cm (4.4 in)	11.2 cm (4.4 in)
Weight	0.77 k g (1.71 lb.)	0.77 k g (1.71 lb.)
Operating Temperature[1]	5 ^{o} C to 50^{o} C (41 ^{o} F to 122 ^{o} F)	5 ^{o} C to 50^{o} C (41 ^{o} F to 122 ^{o} F)
Relative Humidity	10% to 95% non-condensing	10% to 95% non-condensing
Altitude:		
Operating	Sea level to 2400 m(8000 ft.)	Sea level to 2400 m (8000 ft.)
Non-operating	Sea level to 4900 m (16 000 ft.)	Sea level to 4900 m (16 000 ft.)
Power	14.5 W, total power 1.4 A, 5Vdc 0.5 A, 12Vdc 0.0 A, 15Vdc	14.5 W, total power 1.4 A, 5Vdc 0.5 A, 12Vdc 0.0 A, 15Vdc
Certification	CE, CSA, FCC, TUV, UL, VCCI	CE, CSA, FCC, TUV, UL, VCCI

1.For sites above 2400 m (8000 ft), decrease the operating temperature specification by 1.8^{o}C for each 1000 m or 3.2^{o}F for each 3200 ft.

Acoustical Specifications

The following table provides the DECrepeater 90FA acoustical specifications.

Table 4-23: DECrepeater 90FA Acoustical Specifications

Acoustics - Declared Values per ISO 9296 and ISO 7779[1]

Product	Sound Power Level $L_{WAd,B}$	Sound Pressure Level $L_{pAm,dBA}$ (bystander positions)
	Idle/Operate	**Idle/Operate**
DETML	No acoustic noise	No acoustic noise
DETML - Stackable	No acoustic noise	No acoustic noise

1. Current values for specific configurations are available from Digital Equipment Corporation representatives. 1 B = 10 dBA.

Schallemissionswerte - Werteangaben nach ISO 9296 und ISO 7779/DIN EN27779[2]

Produkt	Schalleistungspegel $L_{WAd,B}$	Schalldruckpegel $L_{pAm,dBA}$ (Zuschauerpositionen)
	Leerlauf/Betrieb	**Leerlauf/Betrieb**
DETML	keine meßbaren Schallemissionen	keine meßbaren Schallemissionen
DETML — Stackable	keine meßbaren Schallemissionen	keine meßbaren Schallemissionen

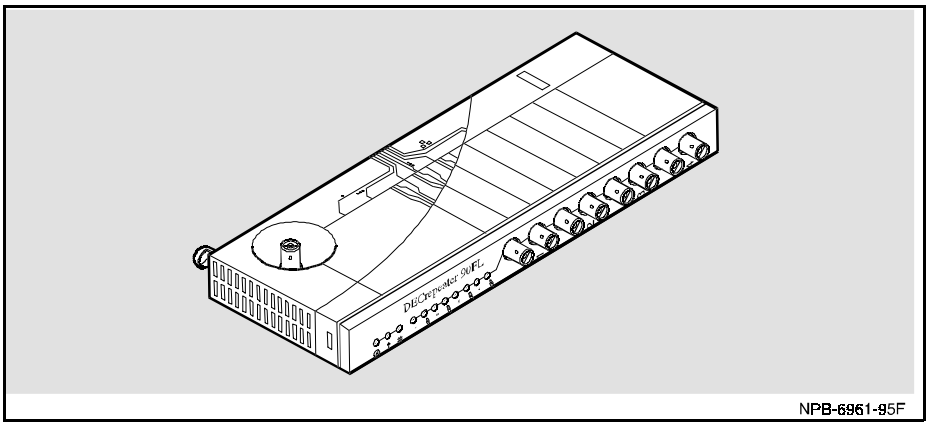
2. Aktuelle Werte für spezielle Ausrüstungsstufen sind über die Digital Equipment Vertretungen erhältlich. 1 B = 10 dBA.

DECrepeater 90FL

Introduction

The DECrepeater 90FL is a 5-port 10BaseFL/FOIRL repeater that can be installed into a DEChub 900, DEChub 90, or Digital MultiStack System. In addition to its four fiber-optic ports (using ST-type connectors), it features one 10Base2 port that can be used when the module is installed into a Digital MultiStack System.

Figure 4-13: DECrepeater 90FL



Management

The module requires an SNMP management agent when installed into a DEChub 900, a DEChub 90, or a Digital MultiStack System.

Ordering Information

The following table provides ordering information for the DECrepeater 90FL.

Table 4-24: DECrepeater 90FL Ordering Information

Description	Order Number
DECrepeater 90FL in a Digital MultiStack System	DEFMR-S#[1]
DECrepeater 90FL hub-based module without power supply	DEFMR-NA

1.# Country kit code. Order the following suffix as needed:
A = Unites States, Canada, and Japan; D = Denmark;
E = United Kingdom; I = Italy; K = Switzerland; T = Israel;
X = Central Europe; Z = Australia; J = India and South Africa

Operating Specifications

The following table provides DECrepeater 90FL module specifications.

Table 4-25: DECrepeater 90FL Specifications

Parameter	Hub-Based Module	In a Digital MultiStack System
Height	27.9 cm (10.75 in)	27.9 cm (10.75 in)
Width	3.2 cm (1.25 in)	3.2 cm (1.25 in)
Depth	11.2 cm (4.4 in)	13.5 cm (5.3 in)
Weight	0.82 kg (1.81 lb)	0.82 kg (1.81 lb)
Operating Temperature[1]	5 º C to 50º C (41 º F to 122 º F)	5 º C to 50º C (41 º F to 122 º F)
Relative Humidity	10% to 95% non-condensing	10% to 95% non-condensing
Altitude:		
Operating	Sea level to 2400 m(8000 ft.)	Sea level to 2400 m (8000 ft.)
Non-operating	Sea level to 4900 m (16 000 ft.)	Sea level to 4900 m (16 000 ft.)
Power	7.0 W, total power 1.4 A, 5Vdc 0.0 A, 12Vdc 0.0 A, 15Vdc	7.0 W, total power 1.4 A, 5Vdc 0.0 A, 12Vdc 0.0 A, 15Vdc
Certification	CE, CSA, FCC, TUV, UL, VCCI	CE, CSA, FCC, TUV, UL, VCCI

1.For sites above 2400 m (8000 ft), decrease the operating temperature specification by 1.8ºC for each 1000 m or 3.2ºF for each 3200 ft.

Acoustical Specifications

The following table provides the DECrepeater 90FL acoustical specifications.

Table 4-26: DECrepeater 90FL Acoustical Specifications

Acoustics - Declared Values per ISO 9296 and ISO 7779[1]

Product	Sound Power Level L_{WAd},B	Sound Pressure Level L_{pAm},dBA (bystander positions)
	Idle/Operate	**Idle/Operate**
DEFMR	No acoustic noise	No acoustic noise
DEFMR - Stackable	No acoustic noise	No acoustic noise

1. Current values for specific configurations are available from Digital Equipment Corporation representatives. 1 B = 10 dBA.

Schallemissionswerte - Werteangaben nach ISO 9296 und ISO 7779/DIN EN27779[2]

Produkt	Schalleistungspegel L_{WAd},B	Schalldruckpegel L_{pAm},dBA (Zuschauerpositionen)
	Leerlauf/Betrieb	**Leerlauf/Betrieb**
DEFMR	keine meßbaren Schallemissionen	keine meßbaren Schallemissionen
DEFMR — Stackable	keine meßbaren Schallemissionen	keine meßbaren Schallemissionen

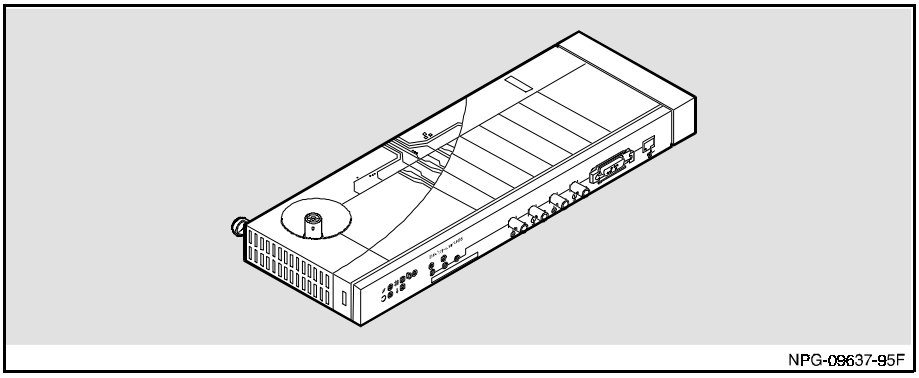
2. Aktuelle Werte für spezielle Ausrüstungsstufen sind über die Digital Equipment Vertretungen erhältlich. 1 B = 10 dBA.

DECrepeater 90FS

Introduction

The DECrepeater 90FS is a 4-port 10BaseFL/FOIRL repeater that can be installed into a DEChub 900, DEChub 90, or a Digital MultiStack System. In addition to its two fiber-optic ports (using ST-type connectors), it features one AUI port. It also features one 10Base2 port that can be used when the module is installed into a Digital MultiStack System.

Figure 4-14: DECrepeater 90FS



Management

The DECrepeater 90FS has a built-in SNMP management agent. It is fully manageable in any configuration. The module can serve as a stack manager when installed as part of a Digital MultiStack System. It can serve as an SNMP agent for other repeaters in a DEChub 90 or a Digital MultiStack System.

The front panel serial port provides installation setup capabilities when the module is installed into a DEChub 90, or as part of a Digital MultiStack System. The setup menu provides an option to enable the front panel serial port for out-of-band management.

Ordering Information

The following table provides ordering information for the DECrepeater 90FS.

Table 4-27: DECrepeater 90FS Ordering Information

Description	Order Number
DECrepeater 90FS with Digital MultiStack System	DEFMI-S#[1]
DECrepeater 90FS hub-based module without power supply	DEFMI-NA

1.# Country kit code. Order the following suffix as needed:
A = Unites States, Canada, and Japan; D = Denmark;
E = United Kingdom; I = Italy; K = Switzerland; T = Israel;
X = Central Europe; Z = Australia; J = India and South Africa

Operating Specifications

The following table provides DECrepeater 90FS module specifications.

Table 4-28: DECrepeater 90FS Specifications

Parameter	Hub-Based Module	In a Digital MultiStack System
Height	29.2 cm (11.5 in)	29.2 cm (11.5 in)
Width	3.2 cm (1.25 in)	3.2 cm (1.25 in)
Depth	11.2 cm (4.4 in)	13.5 cm (5.3 in)
Weight	0.82 kg (1.81 lb)	1.09 kg (2.0 lb)
Operating Temperature[1]	5 º C to 50º C (41 º F to 122 º F)	5 º C to 50º C (41 º F to 122 º F)
Relative Humidity	10% to 95% non-condensing	10% to 95% non-condensing
Altitude:		
Operating	Sea level to 2400 m (8000 ft.)	Sea level to 2400 m (8000 ft.)
Non-Operating	Sea level to 4900 m (16 000 ft.)	Sea level to 4900 m (16 000 ft.)
Power	15.0 W, total power 1.5 A, 5Vdc 0.5 A, 12Vdc 0.0 A, 15Vdc	15.0 W, total power 1.5 A, 5Vdc 0.5 A, 12Vdc 0.0 A, 15Vdc
Certification	CE, CSA, FCC, TUV, UL, VCCI	CE, CSA, FCC, TUV, UL, VCCI

1.For sites above 2400 m (8000 ft), decrease the operating temperature specification by 1.8ºC for each 1000 m or 3.2ºF for each 3200 ft.

Acoustical Specifications

The following table provides the DECrepeater 90FS acoustical specifications.

Table 4-29: DECrepeater 90FS Acoustical Specifications

Acoustics - Declared Values per ISO 9296 and ISO 7779[1]

Product	Sound Power Level $L_{WAd,B}$	Sound Pressure Level $L_{pAm,dBA}$ (bystander positions)
	Idle/Operate	**Idle/Operate**
DEFMI	4.5	31
DEFMI - Stackable	4.5	31

1. Current values for specific configurations are available from Digital Equipment Corporation representatives. 1 B = 10 dBA.

Schallemissionswerte - Werteangaben nach ISO 9296 und ISO 7779/DIN EN27779[2]

Produkt	Schalleistungspegel $L_{WAd,B}$	Schalldruckpegel $L_{pAm,dBA}$ (Zuschauerpositionen)
	Leerlauf/Betrieb	**Leerlauf/Betrieb**
DEFMI	4,5	31
DEFMI — Stackable	4,5	31

2. Aktuelle Werte für spezielle Ausrüstungsstufen sind über die Digital Equipment Vertretungen erhältlich. 1 B = 10 dBA.

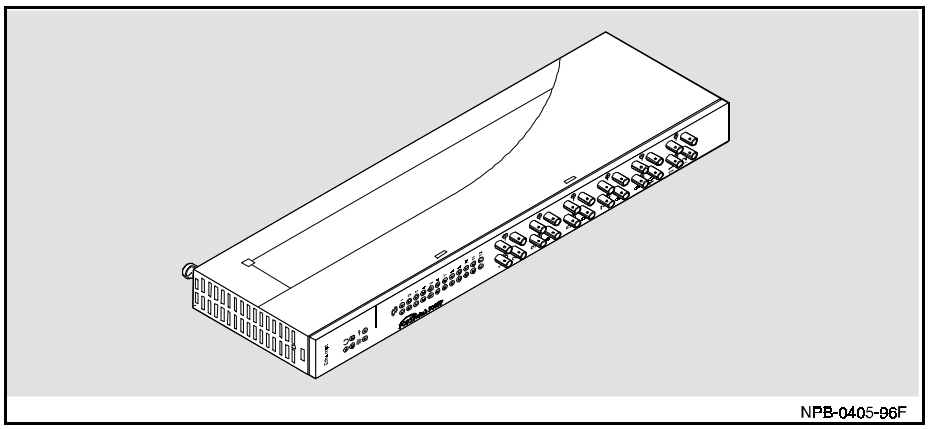
PORTswitch 900FP and DECrepeater 900FP

Introduction

The PORTswitch 900FP[1] and the DECrepeater 900FP are 12-port 10BaseFL/FOIRL repeaters that can be installed into a DEChub 900 or standalone when installed into a DEChub ONE.

The module provides flexibility to logically interconnect any combination of externally accessible port pairs on any of six internal LAN segments.

Figure 4-15: PORTswitch 900FP



[1] PORTswitch 900FP is the new product name for the module that was previously named DECrepeater 900FP. Except for the product name, the modules are identical.

Management

The PORTswitch 900FP and DECrepeater 900FP have a built-in SNMP management agent. It is fully manageable in any configuration.

Ordering Information

The following table provides ordering information for the PORTswitch 900FP.

Table 4-30: PORTswitch 900FP Ordering Information

Description	Order Number
PORTswitch 900FP with DEChub ONE docking station	DEFMM-MA and DEHUA-##[1]
PORTswitch 900FP hub-based module for use in a DEChub 900 MultiSwitch	DEFMM-MA
DEChub ONE docking station (required with DEFMM-MA for standalone use). Provides AUI network connector, power supply, setup port, and OBM port.	DEHUA-##[1]

1.## Country kit code. Order the following suffix as needed:
CA = Unites States, Canada, and Japan; CD = Denmark;
CE = United Kingdom; CI = Italy; CK = Switzerland; CT = Israel;
CX = Central Europe; CZ = Australia; DJ = India and South Africa

Operating Specifications

The following table provides PORTswitch 900FP and DECrepeater 900FP module specifications.

Table 4-31: PORTswitch 900FP and DECrepeater 900FP Specifications

Parameter	Hub-Based Module	Standalone Module
Height	44.45 cm (17.5 in)	44.45 cm (17.5 in)
Width	4.45 cm (1.75 in)	4.45 cm (1.75 in)
Depth	15.25 cm (6 in)	25.41 cm (10 in) with DEChub ONE 29.24 cm (11.9 in) with a DEChub ONE-MX
Weight	1.8 kg (3.96 lb)	3.4 kg (7.5 lb) with DEChub ONE; 3.9 kg (8.59 lb) with DEChub ONE-MX
Operating Temperature[1]	5 ^{o} C to 50^{o} C 41 ^{o} F to 122 ^{o} F)	5 ^{o} C to 50^{o} C (41 ^{o} F to 122 ^{o} F)
Relative Humidity	10% to 95% non-condensing	10% to 95% non-condensing
Altitude:		
Operating	Sea level to 2400 m (8000 ft.)	Sea level to 2400 m (8000 ft.)
Non-operating	Sea level to 4900 m (16 000 ft.)	Sea level to 4900 m (16 000 ft.)
Power	47.5 W, total power 8.0 A, 5Vdc 0.1 A, 12Vdc 0.5 A, 15Vdc	47.5 W, total power 8.0 A, 5Vdc 0.1 A, 12Vdc 0.5 A, 15Vdc

1.For sites above 2400 m (8000 ft), decrease the operating temperature specification by 1.8^{o}C for each 1000 m or 3.2^{o}F for each 3200 ft.

Acoustical Specifications

The following table provides the PORTswitch 900FP amd DECrepeater 900FP acoustical specifications.

Table 4-32: PORTswitch 900FP and DECrepeater 900FP Acoustical Specifications

Acoustics - Declared Values per ISO 9296 and ISO 77791

Product	Sound Power Level L_{WAd},B	Sound Pressure Level L_{pAm},dBA (bystander positions)
	Idle/Operate	**Idle/Operate**
DEFMM	5.1	37
DEFMM + DEHUA	5.4	40
DEFMM + DEF1H	5.4	40

1. Current values for specific configurations are available from Digital Equipment Corporation representatives. 1 B = 10 dBA.

Schallemissionswerte - Werteangaben nach ISO 9296 und ISO 7779/DIN EN27779[2]

Produkt	Schalleistungspegel L_{WAd},B	Schalldruckpegel L_{pAm},dBA (Zuschauerpositionen)
	Leerlauf/Betrieb	**Leerlauf/Betrieb**
DEFMM	5,1	37
DEFMM + DEHUA	5,4	40
DEFMM + DEF1H	5,4	40

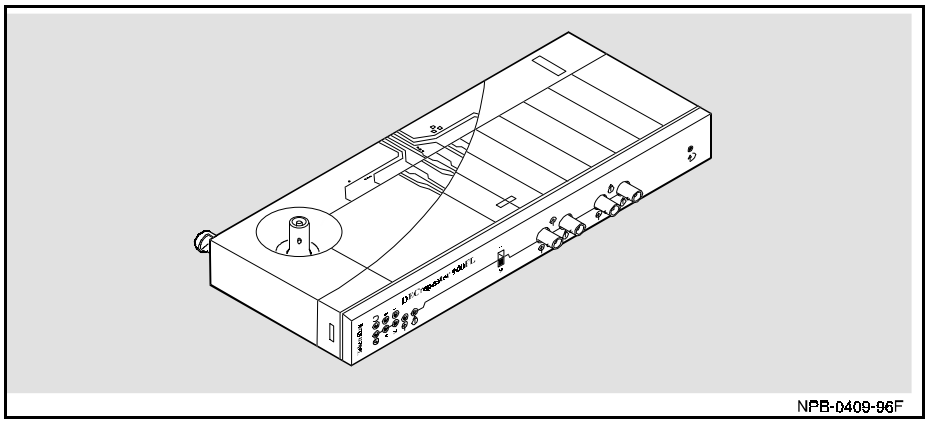
2. Aktuelle Werte für spezielle Ausrüstungsstufen sind über die Digital Equipment Vertretungen erhältlich. 1 B = 10 dBA.

DECrepeater 900FL

Introduction

The DECrepeater 900FL is a Token Ring, ring-in and ring-out, 10BaseFL/FOIRL, fiber-optic repeater that can be installed into a DEChub 900 or used as a standalone module. The module is fully compatible with the IEEE 802.5 standard and IBM Token Ring environments. It provides two fiber-optic ports that support ST-type connectors for fiber-optic cable.

Figure 4-16: DECrepeater 900FL



Ordering Information

The following table provides ordering information for the DECrepeater 900FL.

Table 4-33: DECrepeater 900FL Ordering Information

Description	Order Number
DECrepeater 900FL standalone unit with rear cover and power supply	DTFOR-##[1]
DECrepeater 900FL hub-based module without power supply	DTFOR-MA

1.## Country kit code. Order the following suffix as needed:
SA = Unites States, Canada, and Japan; SD = Denmark;
E = United Kingdom; SI = Italy; SK = Switzerland; ST = Israel;
SX = Central Europe; SZ = Australia; BJ = India and South Africa

Operating Specifications

The following table provides DECrepeater 900FL module specifications.

Table 4-34: DECrepeater 900FL Specifications

Parameter	Hub-Based Module	Standalone Module
Height	27.9 cm (10.75 in)	27.9 cm (10.75 in)
Width	3.2 cm (1.25 in)	3.2 cm (1.25 in)
Depth	11.2 cm (4.4 in)	17.0 cm (6.7 in)
Weight	0.56 kg (1.25 lb)	0.81 kg (1.8 lb)
Operating Temperature[1]	5 º C to 50º C (41 º F to 122 º F)	5 º C to 50º C (41 º F to 122 º F)
Relative Humidity	10% to 95% non-condensing	10% to 95% non-condensing
Altitude:		
Operating	Sea level to 2400 m (8000 ft.)	Sea level to 2400 m (8000 ft.)
Non-operating	Sea level to 4900 m (16 000 ft.)	Sea level to 4900 m (16 000 ft.)
Power	7.0 W, total power 1.4 A, 5Vdc 0.0 A, 12Vdc 0.0 A, 15Vdc	7.0 W, total power 1.4 A, 5Vdc 0.0 A, 12Vdc 0.0 A, 15Vdc
Certification	CE, CSA, FCC, TUV, UL, VCCI	CE, CSA, FCC, TUV, UL, VCCI

1.For sites above 2400 m (8000 ft), decrease the operating temperature specification by 1.8ºC for each 1000 m or 3.2ºF for each 3200 ft.

Acoustical Specifications

The following table provides the DECrepeater 900FL acoustical specifications.

Table 4-35: DECrepeater 900FL Acoustical Specifications

Acoustics - Declared Values per ISO 9296 and ISO 7779[1]

Product	Sound Power Level $L_{WAd,B}$	Sound Pressure Level $L_{pAm,dBA}$ (bystander positions)
	Idle/Operate	**Idle/Operate**
DEFOR	No acoustic noise	No acoustic noise
DEFOR + H7827-BA	No acoustic noise	No acoustic noise

1. Current values for specific configurations are available from Digital Equipment Corporation representatives. 1 B = 10 dBA.

Schallemissionswerte - Werteangaben nach ISO 9296 und ISO 7779/DIN EN27779[2]

Produkt	Schalleistungspegel $L_{WAd,B}$	Schalldruckpegel $L_{pAm,dBA}$ (Zuschauerpositionen)
	Leerlauf/Betrieb	**Leerlauf/Betrieb**
DEFOR	keine meßbaren Schallemissionen	keine meßbaren Schallemissionen
DEFOR + H7827-BA	keine meßbaren Schallemissionen	keine meßbaren Schallemissionen

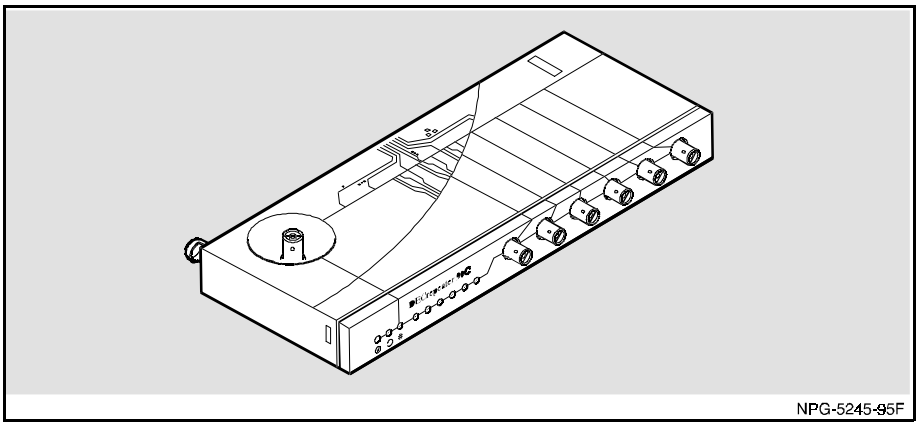
2 . Aktuelle Werte für spezielle Ausrüstungsstufen sind über die Digital Equipment Vertretungen erhältlich. 1B=10dBA.

DECrepeater 90C

Introduction

The DECrepeater 90C is a 7-port ThinWire 10Base2 repeater that can be installed into a DEChub 900, DEChub 90, or a Digital MultiStack System. In addition to its six 10Base2 ports (using BNC connectors) on the front panel, it features one 10Base2 port that can be used when the module is installed into a Digital MultiStack System.

Figure 4-17: DECrepeater 90C



Management

The module requires an SNMP management agent when installed into a DEChub 900, a DEChub 90, or a Digital MultiStack System.

Ordering Information

The following table provides ordering information for the DECrepeater 90C.

Table 4-36: DECrepeater 90C Ordering Information

Description	Order Number
DECrepeater 90C with a Digital MultiStack System	DECMR-##[1]
DECrepeater 90C hub-based module without power supply	DECMR-MA

1.## Country kit code. Order the following suffix as needed:
SA = Unites States, Canada, and Japan; SD = Denmark;
SE = United Kingdom; SI = Italy; SK = Switzerland;
ST = Israel; SX = Central Europe; SZ = Australia;
BJ = India and South Africa

Operating Specifications

The following table provides DECrepeater 90C module specifications.

Table 4-37: DECrepeater 90C Specifications

Parameter	Hub-Based Module	In a Digital MultiStack System
Height	27.9 cm (10.75 in)	27.9 cm (10.75 in)
Width	3.2 cm (1.25 in)	3.2 cm (1.25 in)
Depth	11.2 cm (4.4 in)	13.5 cm (5.3 in)
Weight	0.82 kg (1.5 lb	1.09 kg (2.0 lb)
Operating Temperature[1]	5 ^{o} C to 50^{o} C (41 ^{o} F to 122 ^{o} F)	5 ^{o} C to 50^{o} C (41 ^{o} F to 122 ^{o} F)
Relative Humidity	10% to 95% non-condensing	10% to 95% non-condensing
Altitude:		
Operating	Sea level to 2400 m (8000 ft.)	Sea level to 2400 m (8000 ft.)
Non-operating	Sea level to 4900 m (16 000 ft.)	Sea level to 4900 m (16 000 ft.)
Power	5.0 W, total power 1.0 A, 5Vdc 0.0 A, 12Vdc 0.0 A, 15Vdc	5.0 W, total power 1.0A, 5Vdc 0.0 A, 12Vdc 0.0 A, 15Vdc
Certification	CE, CSA, FCC, TUV, UL, VCCI	CE, CSA, FCC, TUV, UL, VCCI

1.For sites above 2400 m (8000 ft), decrease the operating temperature specification by 1.8^{o}C for each 1000 m or 3.2^{o}F for each 3200 ft.

Acoustical Specifications

The following table provides the DECrepeater 90C acoustical specifications.

Table 4-38: DECrepeater 90C Acoustical Specifications

Acoustics - Declared Values per ISO 9296 and ISO 7779[1]

Product	Sound Power Level $L_{WAd,B}$	Sound Pressure Level $L_{pAm,dBA}$ (bystander positions)
	Idle/Operate	**Idle/Operate**
DECMR	No acoustic noise	No acoustic noise
DECMR - Stackable	No acoustic noise	No acoustic noise

1. Current values for specific configurations are available from Digital Equipment Corporation representatives. 1 B = 10 dBA.

Schallemissionswerte - Werteangaben nach ISO 9296 und ISO 7779/DIN EN27779[2]

Produkt	Schalleistungspegel $L_{WAd,B}$	Schalldruckpegel $L_{pAm,dBA}$ (Zuschauerpositionen)
	Leerlauf/Betrieb	**Leerlauf/Betrieb**
DECMR	keine meßbaren Schallemissionen	keine meßbaren Schallemissionen
DECMR — Stackable	keine meßbaren Schallemissionen	keine meßbaren Schallemissionen

2 Aktuelle Werte für spezielle Ausrüstungsstufen sind über die Digital Equipment Vertretungen erhältlich. 1 B = 10 dBA.

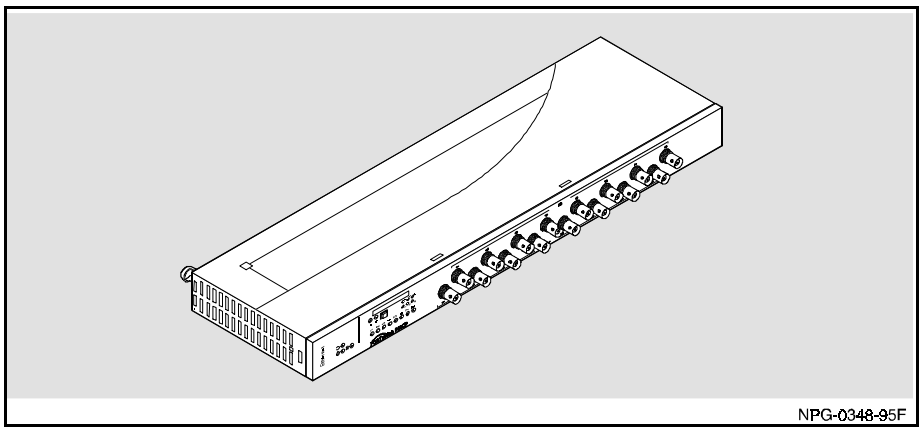
PORTswitch 900CP

Introduction

The PORTswitch 900CP is a 16-port, ThinWire, 10Base2, port-switchable repeater that can be installed into a DEChub 900 or standalone when installed into a DEChub ONE.

The module provides flexibility to logically interconnect any combination of externally accessible ports on any of six internal LAN segments.

Figure 4-18: PORswitch 900CP



Management

The PORTswitch 900CP has a built-in SNMP management agent. It is fully manageable in any configuration.

Ordering Information

The following table provides ordering information for the PORTswitch 900CP.

Table 4-39: PORTswitch 900CP Ordering Information

Description	Order Number
PORTswitch 900CP with DEChub ONE docking station	DECPM-MA and DEHUA-##[1]
PORTswitch 900CP hub-based module for use in a DEChub 900 MultiSwitch	DECPM-MA
DEChub ONE docking station (required with DECPM-MA for standalone use). Provides AUI network connector, power supply, setup port, and OBM port.	DEHUA-##[1]

1.## Country kit code. Order the following suffix as needed:
CA = Unites States, Canada, and Japan; CD = Denmark;
CE = United Kingdom; CI = Italy; CK = Switzerland; CT = Israel;
CX = Central Europe; CZ = Australia; DJ = India and South Africa

Operating Specifications

The following table provides PORTswitch 900CP module specifications.

Table 4-40: PORTswitch 900CP Specifications

Parameter	Hub-Based Module	Standalone Module
Height	44.45 cm (17.5 in)	44.45 cm (17.5 in)
Width	4.45 cm (1.75 in)	4.45 cm (1.75 in)
Depth	15.25 cm (6 in)	25.41 cm (10 in) with DEChub ONE 29.24 cm (11.9 in) with a DEChub ONE-MX
Weight	2.65 kg (5.85 lb)	4.24 kg (9.7 lb) with DEChub ONE; 4.75 kg (10.48 lb) with DEChub ONE-MX
Operating Temperature[1]	5 º C to 50º C (41 º F to 122 º F)	5 º C to 50º C (41 º F to 122 º F)
Relative Humidity	10% to 95% non-condensing	10% to 95% non-condensing
Altitude:		
Operating	Sea level to 2400 m (8000 ft.)	Sea level to 2400 m (8000 ft.)
Non-operating	Sea level to 4900 m (16 000 ft.)	Sea level to 4900 m (16 000 ft.)
Power	47.5 W, total power 8.0 A, 5Vdc 0.1 A, 12Vdc 0.5 A, 15Vdc	47.5 W, total power 8.0 A, 5Vdc 0.1 A, 12Vdc 0.5 A, 15Vdc
Certification	CE, CSA, FCC, TUV, UL, VCCI	CE, CSA, FCC, TUV, UL, VCCI

1.For sites above 2400 m (8000 ft), decrease the operating temperature specification by 1.8ºC for each 1000 m or 3.2ºF for each 3200 ft.

Acoustical Specifications

The following table provides the PORTswitch 900CP acoustical specifications.

Table 4-41: PORTswitch 900CP Acoustical Specifications

Acoustics - Declared Values per ISO 9296 and ISO 7779[1]

Product	Sound Power Level L_{WAd},B	Sound Pressure Level L_{pAm},dBA (bystander positions)
	Idle/Operate	**Idle/Operate**
DECPM	4.9	35
DECPM + DEHUA	5.3	39
DECPM + DEF1H	5.3	39

1. Current values for specific configurations are available from Digital Equipment Corporation representatives. 1 B = 10 dBA.

Schallemissionswerte - Werteangaben nach ISO 9296 und ISO 7779/DIN EN27779[2]

Produkt	Schalleistungspegel L_{WAd},B	Schalldruckpegel L_{pAm},dBA (Zuschauerpositionen)
	Leerlauf/Betrieb	**Leerlauf/Betrieb**
DECPM	4,9	35
DECPM + DEHUA	5,3	39
DECPM + DEF1H	5,3	39

2 Aktuelle Werte für spezielle Ausrüstungsstufen sind über die Digital Equipment Vertretungen erhältlich. 1 B = 10 dBA.

Glossary

This glossary is a comprehensive source of definitions for the DEChub repeater products.

agent

A task running on the object being managed. The agent responds to requests for information by the network management station (NMS). An SNMP agent is responsible for performing get and set operations, for generating the appropriate traps, and controlling access.

algorithm

A computational function that determines how values for a particular object are obtained.

attachment unit interface (AUI)

A 15-pin "D" Sub connector interface that allows stations to connect to the Ethernet/IEEE 802.3 network.

backbone

A core network (usually high speed) to which multiple local area networks (LANs) are often connected by means of switches or brouters, and over which traffic can pass.

bandwidth

A measure of the amount of traffic the media can handle at one time. In digital communications, bandwidth describes the amount of data, in bits per second, that can be transmitted over the line.

community

A set of attributes that are managed as a group. Community names are used in SNMP to control access. Each SNMP software request contains a community name that the agent uses as a password to verify that the requester is authorized to access the agent's management information base (MIB) or a subset of that MIB.

cyclic redundancy check (CRC)

A method of detecting errors in a frame by performing a mathematical calculation of the number of bits in the frame and appending the result to the end of the frame. The receiving station performs the same calculation on the frame and then checks that the result matches the CRC at the end of the frame.

destination address (DA)

The field in a frame that contains the address of the station to which the frame is being sent.

Ethernet

A network communications system developed and standardized by Digital, Intel, and Xerox, using baseband transmission, CSMA/CD access, and logical bus topology. This industry-standard protocol is specified by ISO 8802-3 ANSI/IEEE Standard 802.3.

Ethernet station

An addressable node on an Ethernet network capable of transmitting and receiving data.

frame

A group of digits (bits) transmitted as a unit, over which a coding procedure is applied for synchronization. Frames are transmitted in packets on Ethernet LANs.

Graphical User Interface (GUI)

A display format that enables the user to choose commands, start programs, and see lists of files and other options by pointing to icons and menu items on the screen. Choices can be generally activated either with the keyboard or with a mouse. The MultiChassis Manager application uses graphical user interfaces.

hub

A central device, usually in a star topology local area network (LAN), to which stations and other devices are connected.

icon

A pictorial representation on a user interface used to indicate an object, for example, a network module.

IEEE

Institute of Electrical and Electronics Engineers.

in-band management

Managing a device over a network.

Internet Protocol (IP)

The network protocol offering a connectionless-mode network service in the Internet suite of protocols.

Internet Protocol (IP) address

The IP address is a series of numbers that identifies a device's network address on the Internet.

Internet Protocol (IP) name

A unique alphanumeric string that identifies a device on the Internet.

jabber

Data that is beyond legal frame lengths

jam signal

An alternating sequence of logical ones and zeros that always begins with a logical one.

local area network (LAN)

A data communications network that spans a limited geographical area. The network provides high-bandwidth communication over coaxial cable, twisted-pair, fiber, or microwave media and is usually owned by the user.

LAN Segment

A portion of a LAN (of a single media type) that is organized in a bus, a ring, or a point-to-point configuration.

light-emitting diode (LED)

A semiconductor light source used as an indicator of status on a network module (or other device).

MAC address

A 48-bit binary number (usually represented as a 12-digit hexadecimal number) encoded in a device's circuitry to identify it on a local area network. Each MAC address is unique and is assigned by IEEE 802.

management agent

(See) Simple Network Management Protocol (SNMP) agent.

MAU (Ethernet)

When used in the context of network modules such as switches, this acronym stands for media access unit.

MAU (Token Ring)

When used in the context of token ring LANs and modules, this acronym stands for multistation access unit.

management information base (MIB)

A dynamic, virtual collection of data about a managed object. The managed object provides this data to the network management station (NMS) which gathers the values from the managed object and loads them into the MIB representing the object.

multicast address

A type of network addressing that enables a node to send messages or data packets to an address that represents a group of stations rather than a single station.

multiswitch backplane

A backplane that allows flexible allocation of its signals so that multiple local area network (LAN) segments can be managed. The DEChub 900 MultiSwitch has a multiswitch backplane.

network

A collection of computers, terminals, and other devices together with the hardware and software that enables them to exchange data and share resources over either short or long distances.

node

Any intelligent device that communicates with other devices in the network. A node is often referred to as a station.

out-of-band management (OBM)

Management of a network module or device (such as the DEChub 900 MultiSwitch backplane) over a telephone line or direct line to a dedicated management port rather than over the data network.

preamble

A sequence of bits at the beginning of a frame that is used for synchronization.

protocol

A formal set of rules governing the format, timing, sequencing, and error control of exchanged messages on a data network.

A protocol can also include facilities for managing a communications link or contention resolution.

A protocol can relate to data transfer over an interface, between two logical

units directly connected, or on an end-to-end basis between two end users over a large and complex network. There are hardware protocols and software protocols.

Serial Line Internet Protocol (SLIP)

Used for transmitting Internet Protocol (IP) packets across serial lines.

Simple Network Management Protocol (SNMP)

A high-level, standards-based protocol for network management.

Simple Network Management Protocol (SNMP) agent

An entity in a device that responds to SNMP requests.

source address (SA)

The address of the station that originated the data transmitted on a network.

standalone

A network module in a single configuration, such as a DEChub ONE.

Transmission Control Protocol (TCP)

The transport protocol offering a connection-oriented transport service in the Internet suite of protocols.

topology

The logical or physical arrangement of nodes on a network.

traps

Messages generated in Simple Network Management Protocol (SNMP) agents. The firmware monitors the device for faults and sends messages to monitoring software.

For the MultiChassis Manager application, the Alarms Poller software communicates with the SNMP agents in a hub or a community and arranges for specific traps to be sent to the network management station running the MultiChassis Manager application.

The trap table in the Alarms Definition file determines which traps to monitor. Cold start, warm start, and authentication failure are examples of traps monitored by the alarms software.

The Alarms Poller software uses Internet Protocol (IP) addresses and community names to communicate with specific SNMP agents, such as the DECagent 90, the Hub Manager, and modules with built-in SNMP agents.

window

A portion of the screen used for displaying information.

workgroup

An administrative grouping that consists of a relatively small number of devices attached to a LAN that is isolated from the extended LAN backbone by a bridge or a brouter.

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