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Ethernet/FDDI Switching Module Installation Guide

For the LANplex® 6000 System

About This Guide

This guide includes:

- An inventory of items shipped with your LANplex® 6000 module
- An overview of the Ethernet/FDDI Switching Module (EFSM)
- Instructions for installing and replacing EFSMs
- A description of the EFSM's components, including media options and diagnostic LEDs
- Pin-out information

Information on installing modules is also included in the *LANplex 6000 Getting Started* guide.

NOTE: *The EFSM module with TP-DDI connectors requires LANplex system software revision 8.0 or later. LANplex system software revision 5.0.0 or later requires the LANplex Management Module Plus (LMM+).*

NOTE: *EFSM modules with 10BASE-2 (BNC), 10BASE-T (RJ-45), 10BASE-FL (FOIRL), or FDDI SAS (MIC) connectors require LANplex system software revision 4.3.0 or later. These system software revisions can be downloaded from the 3Com BBS, the Internet FTP site (ftp.3Com.com), 3ComForum on CompuServe, or 3Com's Web site: http://infodeli.3com.com/infodeli/swlib/switch_files.htm*

Audience *This guide is intended for trained technical personnel only.*

Taking Inventory

Your package should contain the following items:

- 1 LANplex 6000 Ethernet/FDDI Switching Module (EFSM)
- 1 *LANplex 6000 Software Release Notes*
- 1 disposable electrostatic discharge (ESD) wrist strap
- 2 cable locking posts (for 10BASE-T, RJ-21 modules only)
- Contact the 3Com Customer Service Organization at 1-800-876-3266, option 2, if any item is missing.

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The LANplex 6000 EFSM switches traffic among sixteen Ethernet segments and two FDDI segments. The EFSM combines Ethernet switching, FDDI switching, and Ethernet-to-FDDI translation bridging on a single module. The sixteen Ethernet segments of the EFSM connect externally through the front panel. The FDDI segments can connect either internally to two of the three backplane FDDI paths or externally through the front panel.

The EFSM offers a variety of media options for both Ethernet and FDDI segments. Some of the media options require two slots of the LANplex 6000 chassis to provide adequate front panel space to accommodate the connectors for the Ethernet segments. All EFSMs with external FDDI segment connections require two slots of the LANplex 6000 chassis.

EFSMs with two FDDI backplane segments are referred to as Type 1 EFSMs. EFSMs with one backplane attachment and one external FDDI are referred to as Type 2 EFSMs. All Type 2 EFSMs require two slots.

Both types of EFSM use 3Com's new custom ISE (Intelligent Switching Engine) ASIC technology, which brings high performance and reliability to your network. This technology provides full wire speed bridging throughput for all packet sizes across all ports without exception.

The EFSM provides the following intelligent switching functionality:

- 802.1d Spanning Tree Protocol or Express Switching modes
- User-defined packet filtering
- Virtual LAN support
- Routing (LANplex Extended Switching software only)
- Supports up to 8K (8,192) MAC addresses across its eighteen ports.

EFSM Configurable Modes

The EFSM can operate in either IEEE 802.1d Bridging mode or Express Switching mode. The default is Bridging mode.

To configure the Bridging mode, see Chapter 11: *Administering the Bridge* in the *LANplex 6000 Administration Console User Guide*. For more information about EFSM operation, see Part II: *Bridging* in the *LANplex 6000 Operation Guide*.

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IEEE 802.1d Bridging

The EFSM fully complies with the IEEE 802.1d bridging standard. This standard specifies that the module:

- Learns source addresses from packets transmitted by stations on LANs attached to EFSM ports
- Ages addresses of stations on attached LANs that have been inactive for a prolonged time (default agingTime = *300 seconds*)
- Stores and forwards packets from one attached LAN to another based on the destination address of the packet
- Uses the Spanning Tree protocol for loop detection and elimination

The EFSM automatically "learns" the MAC-layer addresses of the stations on its attached networks and forwards packets to their appropriate destinations. Packet forwarding is based on matching the Destination Address (DA) of a received packet with a learned or statically configured MAC address. Packets addressed to stations whose addresses have not been learned are flooded to locate the host station. The EFSM can learn up to 8K (8,192) addresses. All statically configured addresses are stored in nonvolatile RAM so they will survive a power loss or system initialization.

Express Switching

The EFSM can also operate in Express Switching mode. Express Switching optimizes LAN throughput in flat segmentation topologies in which a smaller number of high-performance end stations are connected directly to an FDDI backbone. In Express Switching mode, the EFSM only learns the addresses of stations attached to ports not designated as the backbone port. The result is that the number of hosts directly attached or bridged to the backbone is unlimited.

In Express Switching mode, the switch does not age the addresses. Because addresses are not aged, packets do not have to be flooded to learn the location of stations that have been aged. This mode enhances LAN performance because it eliminates packet flooding.

Routing

Using the LANplex Extended Switching software, the EFSM supports routing, which allows you to introduce Ethernet switching into existing subnetted environments. Traffic traveling between subnets is routed using

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the Routing Information Protocol (RIP). Combined routed and switched EFSM ports can add segmentation to existing subnets to increase performance.

NOTE: *Extended Switching Software (Part No. 3C96270) supports IP, IPX, and AppleTalk routing in the LANplex 6000. If you wish to purchase Extended Switching Software, contact your sales representative.*

The configuration in Figure 1 shows how multiple switched ports can be assigned to each subnet. Traffic between ports assigned to the same subnet is switched transparently using IEEE 802.1d bridging or Express Switching.

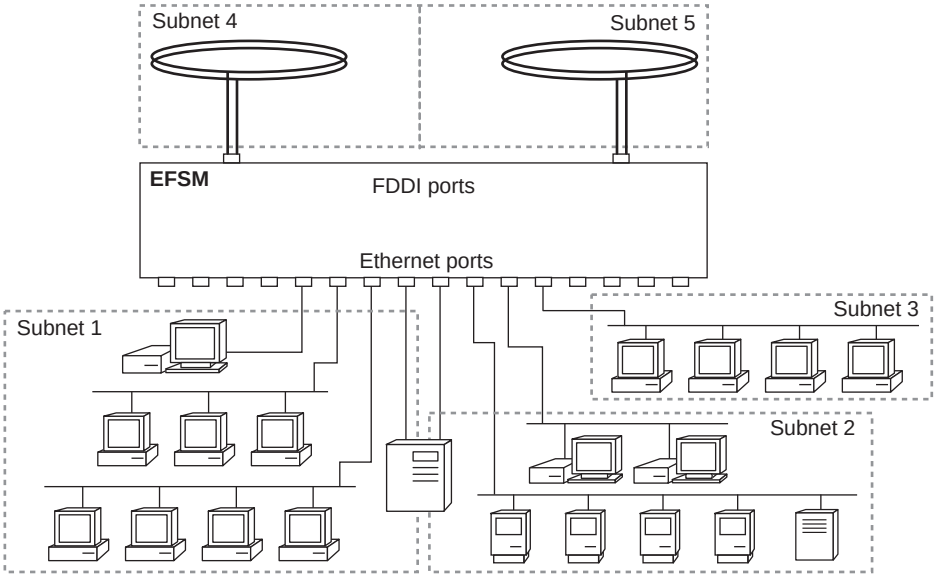


Figure 1 Multiple Ports per Subnet with the EFSM

See the *LANplex 6000 Extended Switching User Guide* for more information on the supported routing protocols.

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EFSM Installation

This section describes installation of the EFSM, including:

- Module safety information
- Set up and installation procedures
- LED activity during installation

Safety Information

Electrostatic discharge (ESD) can damage components on a module, causing complete or intermittent failures. ESD damage occurs when the module is improperly handled.

To prevent ESD-related damage, handle the module in the following manner:

- Always wear the ESD wrist strap provided with the module before and during handling. Be sure to follow the grounding instructions in step 1 of the installation.
- Keep the module in its antistatic, shielded bag until you are ready to install it.
- Always handle the module by its edges.
- Do not touch the components, pins, leads, or solder connections.

In addition, between installations, cover every empty slot with a blank faceplate to protect the system from dust or other foreign substances and to ensure proper system cooling.

Before You Install

Before installing your new module, follow the appropriate pre-installation instructions in this subsection.

If Installing in an Empty Slot

Your LANplex system is shipped with no modules installed and with protective faceplates covering the installation slots. Initial installation requires that you remove the protective faceplate covering the selected installation slot before you install the option module.



NOTE: *Only the LMM+ can be inserted in slot 1 of the LANplex system. The system will not operate if any other module is inserted into slot 1. Slot 1 of the LANplex 6004, as you face the system, is the bottom slot. Slot 1 of the*

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LANplex 6012, as you face the system, is the first slot on your left. See Figure 5 and Figure 6.

To remove the faceplate:

1 Unscrew the captive screws onthe protective faceplate. See

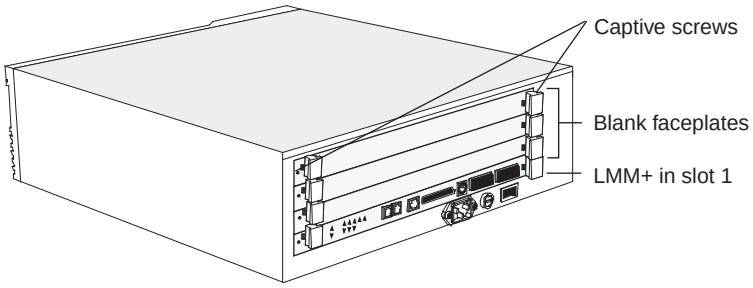


Figure 2 LLANplex 6004 with Blank Faceplates

2 Pull the blank faceplate away from the system. Store the faceplate for future use.

If Replacing an EFSM

You can replace a module while the system is powered on. You will need a small flat-blade screwdriver. Save the faceplate in case you need to cover an empty slot in the future.

To remove a module:

1 Follow the grounding instructions in step 1 of the installation.

CAUTION: *Replacing an EFSM with another module erases all information stored in NVRAM on the newly inserted module. Before removing the installed EFSM, save all nonvolatile data using the NV data save functionality on the system's Administration Console. Then you can restore this information using the NV restore functionality. See the LANplex 6000 Administration Console User Guide for information on saving, restoring, and resetting nonvolatile data. Inserting and extracting a module causes a warm system reboot.*

2 Disconnect the cables from the ports of the module you are removing.

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NOTE: *Be sure to make a record of where the cables are attached so that you can correctly re-connect them to the new module.*

3 Unscrew the captive screws on the module's faceplate. See Figure 2.

4 Grasp the inject/eject handles of the module and push them outward as shown in Figure 3.

NOTE: *The panel shown in Figure 3 is a single-slot panel. Some modules occupy two slots.*

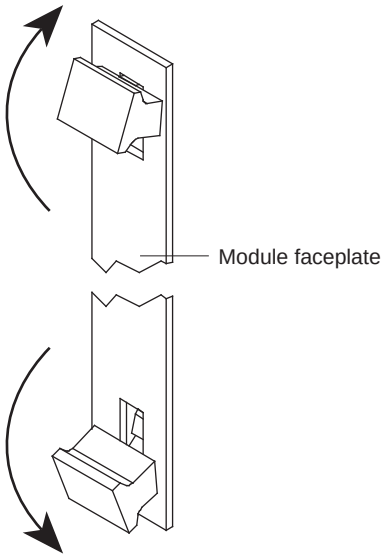


Figure 3 Handles in Outward (Eject) Position(

5 Pull the module out of the system.

6 Place the module in its antistatic bag.

Installing the EFSM

The installation procedure takes only a few minutes to complete. You need a small, flat-blade screwdriver.

NOTE: *Only the LMM or LMM+ can be inserted in slot 1 of the LANplex system. The system will not operate if any other module is inserted into slot 1. Slot 1 of the LANplex 6004, as you face the system, is the bottom slot. Slot 1 of the LANplex 6012, as you face the system, is the first slot on your left.*

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To install the EFSM in an empty slot in the LANplex system, take these steps:

1 Discharge yourself of static electricity by placing the ESD wrist strap on your wrist and clipping the alligator clip securely to the mounting screw located next to the black ground symbol on the system's right mounting bracket. See Figure 4. If your system does not have mounting brackets, touch the system's rear panel.

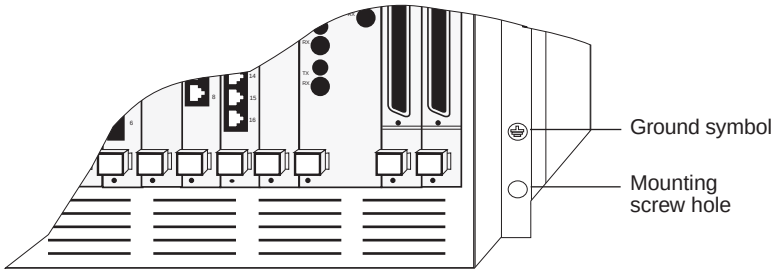


Figure 4 Ground Symbol for Static Discharge

2 Remove the EFSM from its antistatic bag. Observe the Safety Information on page 5.

3 Be sure that the inject handles are in the outward position. See Figure 3.

4 Orient the EFSM to insert it into the LANplex system. For a LANplex 6012 system, orient the module so that the EFSM handle label is at the top. For a LANplex 6004 system, orient the module so that the EFSM handle label is on your left as you face the system.

WARNING: *If the system is powered on when you are installing a module, do not insert any metal objects such as a screwdriver or a hand with a ring or bracelet in the open slot. It could cause burns or other bodily harm, as well as system damage.*

5 Direct the module into the chassis by placing it between the guides of the selected slot and carefully sliding the module in until it stops. The module stops sliding when the inject handles touch the front of the chassis.

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Figure 5 shows an EFSM being installed in a LANplex 6012 system.

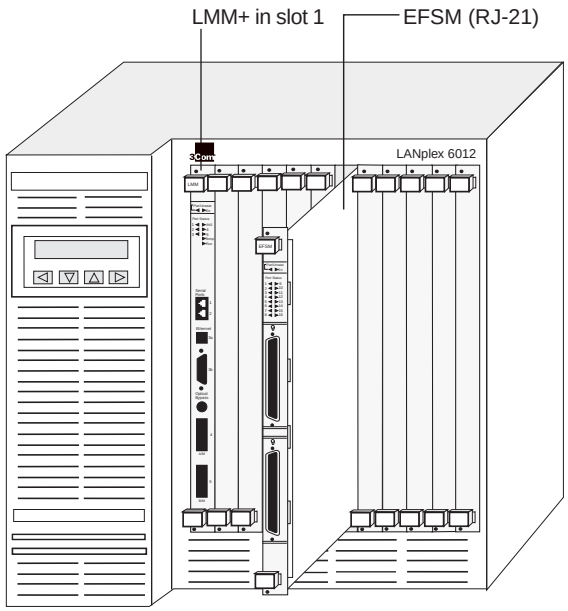


Figure 5 Guiding an EFSM into a LANplex 6012 System

NOTE: *The EFSMs (RJ-21) in Figure 5 and Figure 6 are shown for reference only. Some modules occupy two slots.*

Figure 6 shows an EFSM being installed in a LANplex 6004 system.

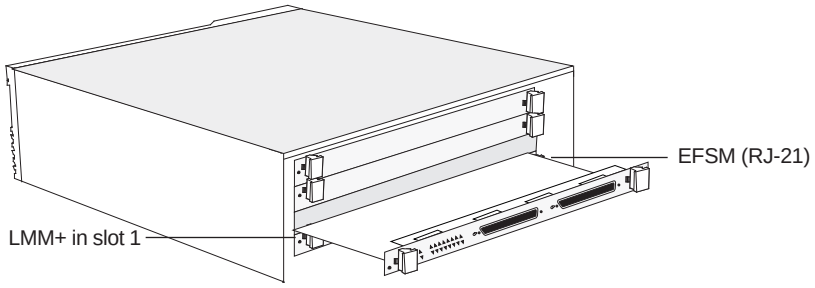


Figure 6 Guiding an EFSM into a LANplex 6004 System

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6 Insert the EFSM into the chassis.

- **If the system is powered on:** When the **Power/Unseat** LED on the module panel's faceplate is yellow, inject the EFSM into the chassis by grasping both ejector/injector handles and simultaneously pushing them inward. See Figure 7.
- **If the system is not powered on:** When you feel a slight resistance, inject the EFSM into the chassis by grasping both ejector/injector handles and simultaneously pushing them inward. See Figure 7.

NOTE: *The panel shown in Figure 7 is a single-slot panel. Some modules occupy two slots.*

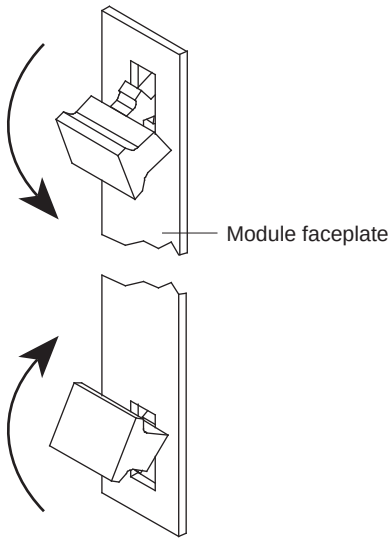


Figure 7 Handles in Inward (Inject) Position

7 Gently move the inject handles to their center position. See Figure 8.

NOTE: *Do not push the handles beyond the center position or you will eject the module.*

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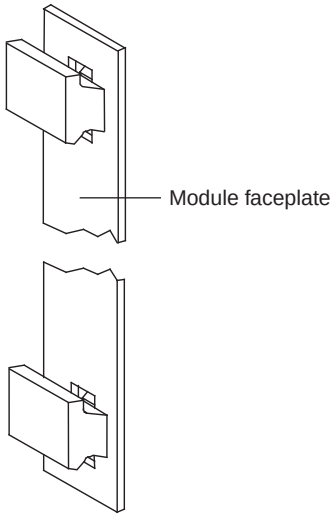


Figure 8 Handles in Center Position

This action locks the EFSM into the chassis. The **Power/Unseat** LED lights green when the EFSM is seated.

8 See the following section, "LED Activity," to verify that the EFSM has been properly installed.

9 When you are sure that the EFSM is properly installed, tighten the securing screws using the flat-blade screwdriver. Do not overtighten.

LED Activity

If the system is powered on, you can verify that your module is properly installed by observing its LEDs. Follow the troubleshooting suggestions if LED activity is not normal.

Normal LED Activity

The following LED activity is normal during installation:

- The **Power/Unseat** LED lights yellow briefly when the module is inserted far enough into the chassis to use the inject/eject handles.
- The **Err** LED lights yellow temporarily after insertion while the module runs diagnostics.

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- The **Power/Unseat** LED lights green, indicating that the module is powered on.

  When you have completed the installation procedure, only the green **Power/Unseat** LED remains lit.

Troubleshooting

If LED activity is not normal, check these troubleshooting suggestions:

- If the **Power/Unseat** LED remains yellow after insertion, the module is not fully seated in the chassis. Eject and re-insert the module as described in the installation procedure.
- If the **Err** LED remains yellow, contact 3Com Technical Support for additional assistance.
- If the **Power/Unseat** LED does not light green when the module is powered on, contact 3Com Technical Support for assistance.



NOTE: *For 3Com Technical Support information, see Appendix B: Technical Support in the* LANplex 6000 Getting Started *guide.*

EFSM Components

The main components of the EFSM include two module status LEDs and sixteen port status LEDs, described later in this section. Modules with external FDDI ports also include one FDDI port status LED.

Type 1 EFSM modules have eighteen switched segments, including sixteen Ethernet ports and two internal FDDI ports.

Type 2 EFSM modules have eighteen switched segments, including sixteen Ethernet ports, one internal FDDI port, and one external FDDI port. All Type 2 module require two slots.

Type 1, single-slot media options:

- The 10BASE-T (RJ-21) module with two RJ-21 connectors and two internal FDDI ports
- The 10BASE-T (RJ-45) module with sixteen RJ-45 connectors and two internal FDDI ports

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Type 1, two-slot media options:

- 10BASE-FL configuration with sixteen ST connectors and two internal FDDI ports
- 10BASE-2 configuration with sixteen BNC connectors and two internal FDDI ports

Type 2, two-slot media options:

- The TP-DDI (RJ-45) module with sixteen Ethernet RJ-45 connectors, one internal FDDI port, and one external TP-DDI (RJ-45) port
- 10BASE-T (RJ-45) SAS module with sixteen Ethernet RJ-45 connectors, one internal FDDI port, and one external FDDI SAS (MIC) connector
- The 10BASE-FL SAS module with sixteen Ethernet ST connectors, one internal FDDI port, and one external FDDI SAS (MIC) connector

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Figure 9 shows the front panels of the Type 1 EFSMs.

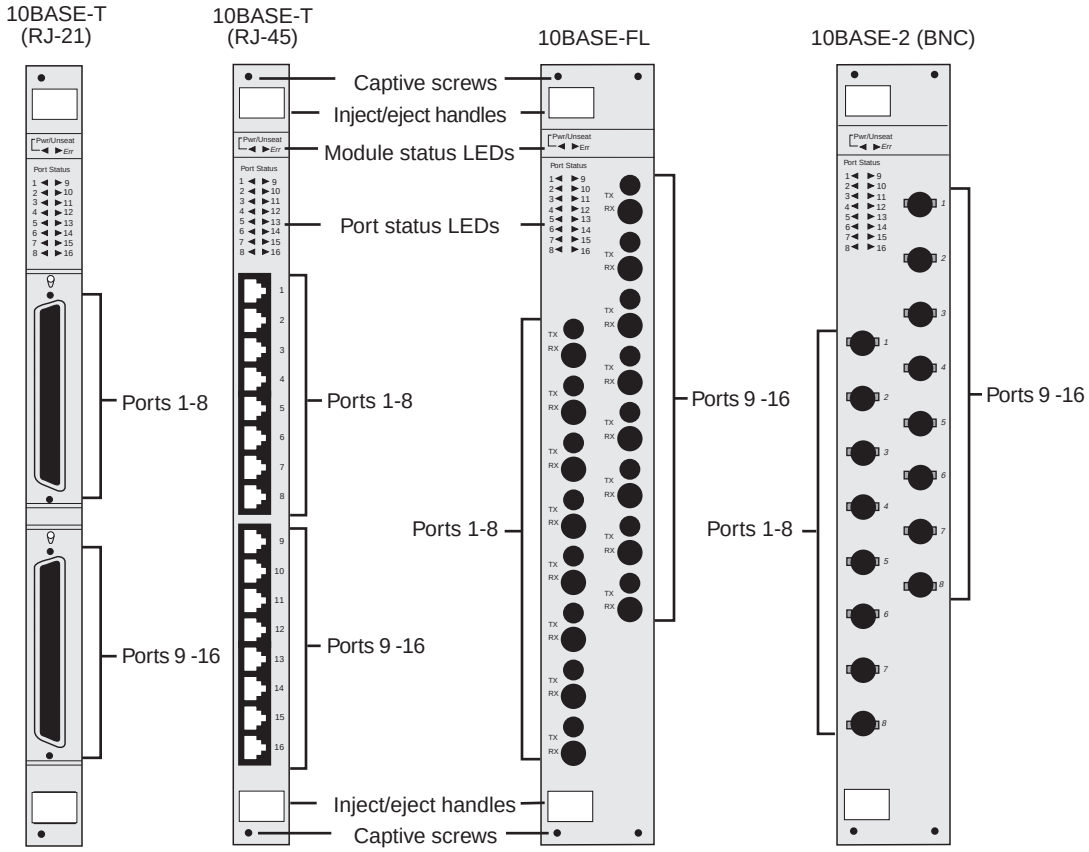


Figure 9 Type 1 EFSMs with Internal FDDI Ports

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Figure 10 shows the front panels of the Type 2 EFSMs.

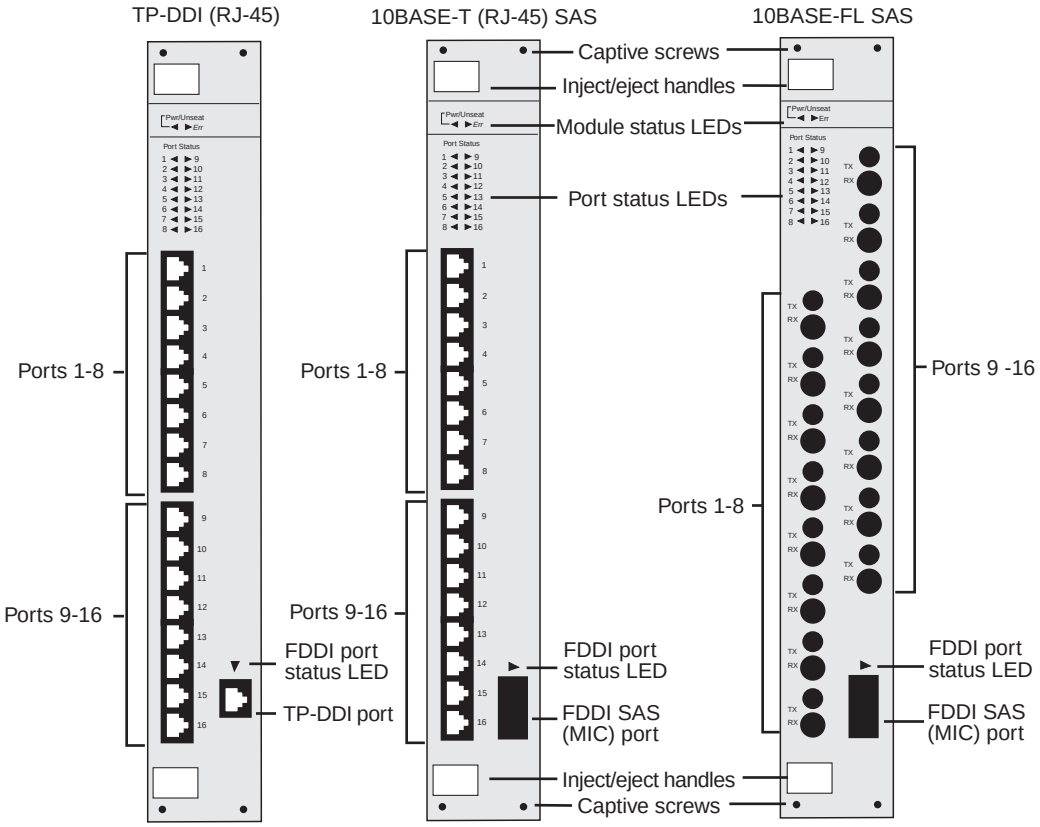


Figure 10 Type 2 EFSMs with Internal and External Connectors

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Status LEDs

Each EFSM contains two **Module Status** LEDs and as many **Port Status** LEDs as the number of ports. Depending on the condition, each LED is green (indicating active) or yellow (indicating error). Table 1 describes these LEDs.

Table 1 Ethernet/FDDI Switching Module LEDs

LEDs	Name	Color	Indicates...
Module Status	**Pwr/Unseat**	Green	That the module is powered on.
		Yellow	That the module is not fully seated into the backplane.
	Err (Error)	Yellow	That an error has occurred or the module has failed a diagnostic procedure.
Port Status	**Port Status** 1 - 16	Green*	That the associated port link status is active.
		Yellow	That an error has occurred with the associated port or that the port is not connected.

*Because there are no standards for testing port status for BNC, port status remú8Ñ active for these ports.

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Pin Assignments

Table 2 provides punch-down block pin assignments for the EFSM's sixteen 10BASE-T (RJ-21) ports. The first color listed in a color code is the wire color; the second is the stripe color. For example, the color code blue_white refers to a blue wire with a white stripe.

3Com Corporation recommends that you use a Type 110 or Type 66 punch-down block for your Ethernet configurations.

Table 2 EFSM 10BASE-T (RJ-21) Pin Assignments

Pin/Port	Color Code	Signal	Pin/Port	Color Code	Signal	Pin/Port	Color Code	Signal
1/1	blue_white	Receive –	18	green_yellow	unused	35/5	red_gray	Receive +
2/1	orange_white	Transmit –	19	brown_yellow	unused	36/6	black_blue	Receive +
3/2	green_white	Receive –	20	gray_yellow	unused	37/6	black_orange	Receive +
4/2	brown_white	Transmit –	21	blue_violet	unused	38/7	black_green	Receive +
5/3	gray_white	Receive –	22	orange_violet	unused	39/7	black_brown	Receive +
6/3	blue_red	Transmit –	23	green_violet	unused	40/8	black_gray	Receive +
7/4	orange_red	Receive –	24	brown_violet	unused	41/8	yellow_blue	Receive +
8/4	green_red	Transmit –	25	gray_violet	unused	42	yellow_orange	unused
9/5	brown_red	Receive –	26/1	white_blue	Receive +	43	yellow_green	unused
10/5	gray_red	Transmit –	27/1	white_orange	Transmit +	44	yellow_brown	unused
11/6	blue_black	Receive –	28/2	white_green	Receive +	45	yellow_gray	unused
12/6	orange_black	Transmit –	29/2	white_brown	Transmit +	46	violet_blue	unused
13/7	green_black	Receive –	30/3	white_gray	Receive +	47	violet_orange	unused
14/7	brown_black	Transmit –	31/3	red_blue	Transmit +	48	violet_green	unused
15/8	gray_black	Receive –	32/4	red_orange	Receive +	49	violet_brown	unused
16/8	blue_yellow	Transmit –	33/4	red_green	Transmit +	50	violet_gray	unused
17	orange_yellow	unused	34/5	red_brown	Receive +			

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Table 3 provides the pin assignments for the EFSM's sixteen 10BASE-T (RJ-45) ports.

Table 3 EFSM 10BASE-T (RJ-45) Pin Assignments

Pin No.	Signal	Description
1	RX+	Receive +
2	RX –	Receive –
3	TX+	Transmit +
4	Not used	
5	Not used	
6	TX –	Transmit –
7	Not used	
8	Not used	

Figure 11 shows the transmit and receive pins of the EFSM's sixteen 10BASE-FL ports.

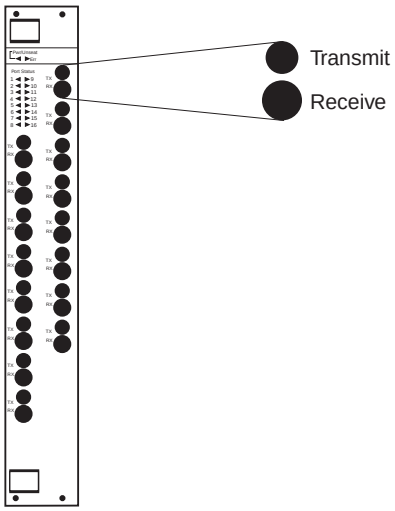


Figure 11 EFSM 10BASE-FL Transmit and Receive Pins

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Table 4 provides the pin assignments for the EFSM's TP-DDI (RJ-45) port. Standard TP-DDI port-to-station adapters require cross-over cable.

Table 4 EFSM TP-DDI (RJ-45) Pin Assignments

Pin No.	Signal	Description
1	TX +	Transmit +
2	TX –	Transmit –
3	Not used	—
4	Not used	—
5	Not used	—
6	Not used	—
7	RX+	Receive +
8	RX –	Receive –

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