



ETHERNET SWITCHING MODULE INSTALLATION GUIDE

For the LANplex 6000

About This Guide

This guide includes:

- An overview of the Ethernet Switching Module (ESM)
- Instructions for installing and replacing ESM's
- A description of the ESM's components, including diagnostic LEDs and the five media options
- Port pin-out information

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

Audience This guide is intended for trained technical personnel only.

Taking Inventory

Your package should contain the following items:

- 1 LANplex 6000 ESM
- 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 3Com Customer Service Organization at 1-800-876-3266, option 2, if any item is missing.

ESM Description

The ESM provides high-speed intelligent switching, IEEE 802.1d bridging, and routing among up to eight Ethernet LANs and FDDI. It can be situated in any open slot in your LANplex system. A LANplex 6012 system accepts up to eleven ESMs, supporting 88 separate Ethernets.

The ESM optimizes LAN-to-LAN interconnections where the user population on the eight Ethernet segments is large. With each ESM you add to the LANplex system, you increase processing power with the additional switched ports.

Each ESM contains an AMD 29K™ RISC-based high-speed switching engine that forwards data packets and performs translation between Ethernet and FDDI. IP fragmentation is performed on IP FDDI packets larger than 1518 bytes that are destined for a station on an Ethernet port.

Packets received on one Ethernet port that are destined for another Ethernet port on the same ESM are “u-turned” without crossing the LANplex switching hub’s backplane. A packet destined for an uncontested port incurs a maximum latency of 25 micro seconds (measured for 64 byte frames). A packet destined for a busy port is momentarily queued and transmitted when the channel is no longer busy.

Additional ESM features include user-defined packet filtering and multicast/broadcast storm suppression.

ESM Configurable Modes

The ESM 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 ESM operation, see Part III: *Bridging* in the *LANplex 6000 Operation Guide*.

IEEE 802.1d Bridging

The ESM fully complies with the IEEE 802.1d bridging standard, which means that the ESM:

- Learns source addresses from packets transmitted by stations on LANs attached to ESM ports
- Ages addresses of stations on attached LANs that have not transmitted a packet for a prolonged time
- Stores and forwards packets from one attached LAN to another
- Participates in the Spanning Tree protocol used for loop detection

The ESM automatically “learns” the MAC-layer addresses of the stations on its attached networks, and then forwards packets to their appropriate destinations. Packet forwarding is based on learned or statically configured MAC addresses. The ESM can learn up 8K addresses. All addresses are stored in nonvolatile RAM so they will survive a power loss or system initialization.

Express Switching

The ESM can also operate in Express switching mode. Express switching optimizes LAN throughput in flat segmentation topologies in which a smaller number of high-performance Ethernet end-stations are connected directly to an FDDI backbone. In Express switching mode, the ESM learns the source addresses of only the Ethernet attached stations.

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 stations that have been aged. The result is enhanced performance by eliminating flooding of packets and preventing slowdowns in packet forwarding due to aged addresses.

Routing The EFSM also supports routing, which allows the introduction of Ethernet switching into existing subnetted environments. Traffic traveling between subnets is routed using the Routing Information Protocol (RIP). Combining routed and switched EFSM ports can be used to add segmentation to existing subnets to increase performance.

The configuration in Figure 1 shows how multiple switch 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. Traffic traveling to different subnets is routed using IP routing. Additional ESM ports can be used to expand existing subnets.

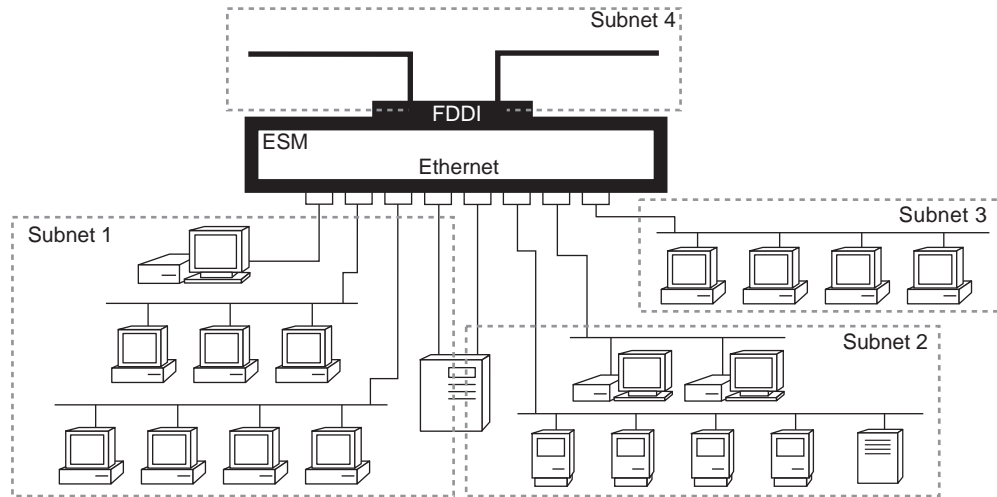


Figure 1 Multiple Ports per Subnets with the ESM

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



NOTE: *Extended Switching Software (Part No. 3C96250) supports IP, IPX, and AppleTalk routing in the LANplex 6000. If you wish to purchase Extended Switching Software, contact your sales representative.*

ESM Installation

This section describes the following:

- Module safety information
- Installation information
- LED activity during installation

Safety Information

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

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

- Always wear the ESD wrist strap provided with the module, ensuring that it makes good skin contact and that the alligator clip is connected to a suitable ground. See Figure 4 on page 8.
- Keep the module in its antistatic shielded bag until you are ready to install it.
- Do not touch the components, pins, leads, or solder connections.
- Always handle the module by its edges.

Additionally, you should cover every empty slot with a blank faceplate to protect the system from dust or other foreign substances, and to ensure proper system cooling.

Prior to Installation

Before you install your new module, follow the appropriate pre-installation instructions below:

Read 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 prior to installing the option module.

To remove the faceplate:

- 1 Unscrew the securing screws on the module's faceplate. See Figure 2.

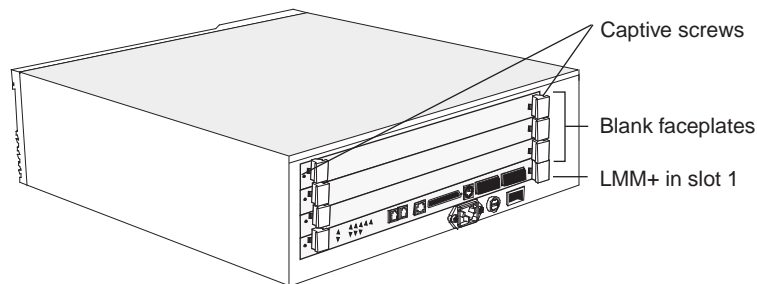


Figure 2 LANplex 6004 with Blank Faceplate

- 2 Pull the faceplate away from the system.

*Read if replacing
an ESM*

You can replace a module while the system is powered on. Replacing the module requires that you remove the attached cables from the module's ports prior to installing the new module.



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



CAUTION: *Inserting and extracting an ESM erases all information stored in NVRAM on the ESM. Before removing the installed ESM, save all nonvolatile data using the NV data save functionality on the system's Administration Console. This information can be restored 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.*

To remove a module:

- 1 Discharge yourself of static electricity by placing the ESD wrist strap on your wrist and clipping the alligator clip 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 rear panel.
- 2 Disconnect the cables from the module's ports.
- 3 Unscrew the securing 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.

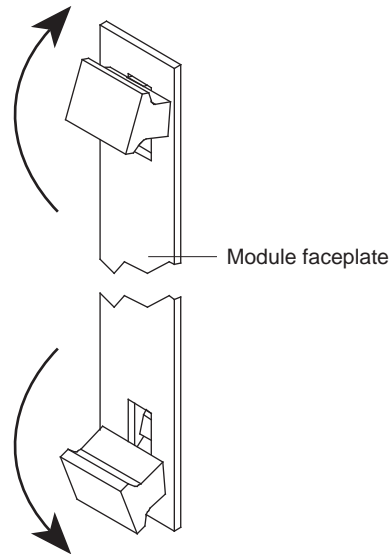


Figure 3 Handles in Outward Position

- 5 Remove the module from the system.
- 6 Place the module in its antistatic bag.

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



NOTE: Only the LMM may be inserted in slot one of the LANplex system. The system will not operate if any other module is inserted into slot one. Slot one of the LANplex 6004 is the bottom slot, and slot one of the LANplex 6012 is the first slot on the left.

To install the ESM module in an empty slot in the LANplex system, perform the following steps:

- 1 Discharge yourself of static electricity by touching 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 rear panel.

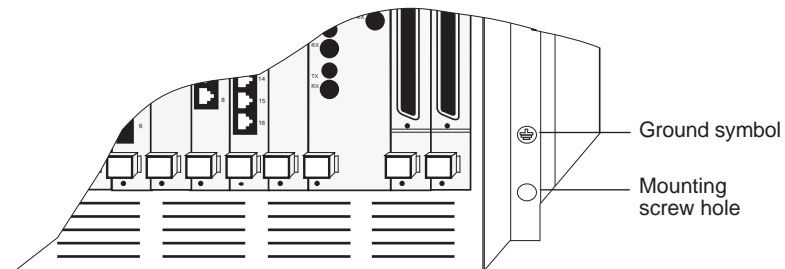


Figure 4 Ground Symbol for Static Discharge

- 2 Remove the ESM from its antistatic bag.
- 3 Ensure that the inject handles are in the outward position. See Figure 5.

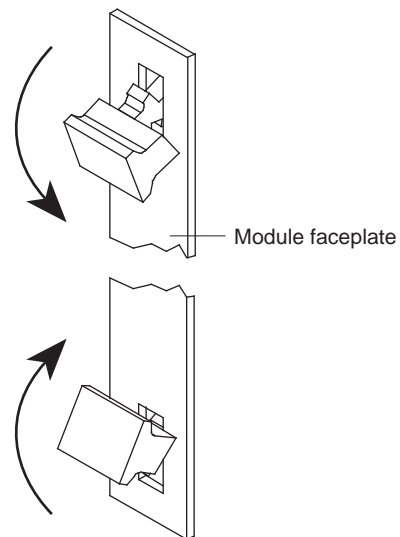


Figure 5 Handles in Outward Position

- 4 Orient the ESM to insert it into the LANplex system. For a LANplex 012 system, orient the module so that its labeling is upright. For a LANplex 6004 system, the module's labeling should be on your left.



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 finger with jewelry, in the open slot. This 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 sliding the module until it stops. The module stops sliding when the inject handles make contact with the front of the chassis.

Figure 6 shows an ESM being installed in a 012 system. Figure 7 shows an ESM being installed in a 6004 system.

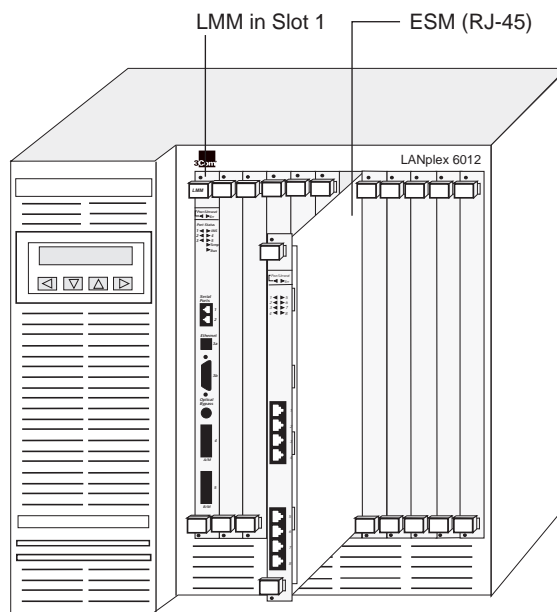


Figure 6 Installing an ESM Module into a LANplex 6012

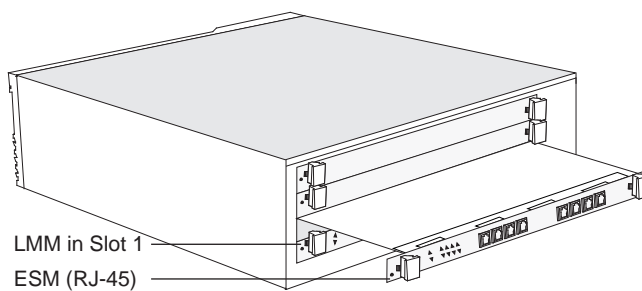


Figure 7 Installing an ESM Module into a LANplex 6004

- 6 Inject the ESM into the chassis.
 - If the system is powered on, when the **Unseat** LED on the panel's faceplate is yellow, inject the ESM into the chassis by grabbing both handles and simultaneously push them inward.
 - If the system is not powered on, once you feel a slight resistance, inject the ESM into the chassis.
- 7 Relocate the inject handles back to their center position by gently pushing them inward. See Figure 8.

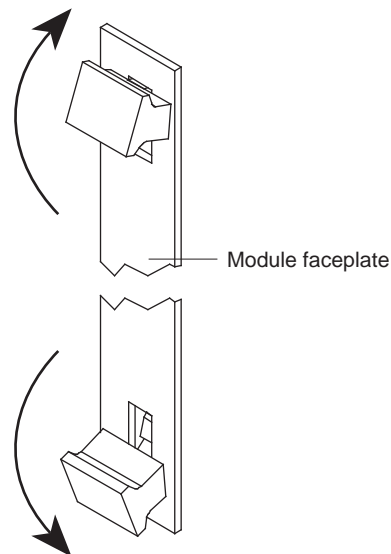


Figure 8 Handles in Inward (Inject) Position

This locks the ESM into the chassis. The **Power** LED lights green when the ESM is seated.

NOTE: *Do not push the handles outside the center position or you will eject the module. These handles act as "ejectors" when pushed outward and "injectors" when pushed inward.*

- 8 See the following section, "LED Activity", to verify that the ESM has been properly installed.
- 9 Tighten the ESM's securing screws using a flat-blade screwdriver.

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 below if LED activity is not normal:

Normal LED Activity

The following LED activity is normal during installation:

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

Once you have completed the installation procedure, only the green **Power/Unseat** LED should remain lit.

Troubleshooting

If LED activity is not normal, check the troubleshooting suggestions listed below:

- If the **Unseat** LED remains yellow, 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** 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 your LANplex 6000 Getting Started guide.

ESM Components

The main components of the ESM include module status LEDs, port status LEDs equivalent to the number of ports, and one to eight port connectors. These port configurations are shown in Figure 9. For possible ESM configurations, see the *LANplex 6000 Planning Your Site* guide.

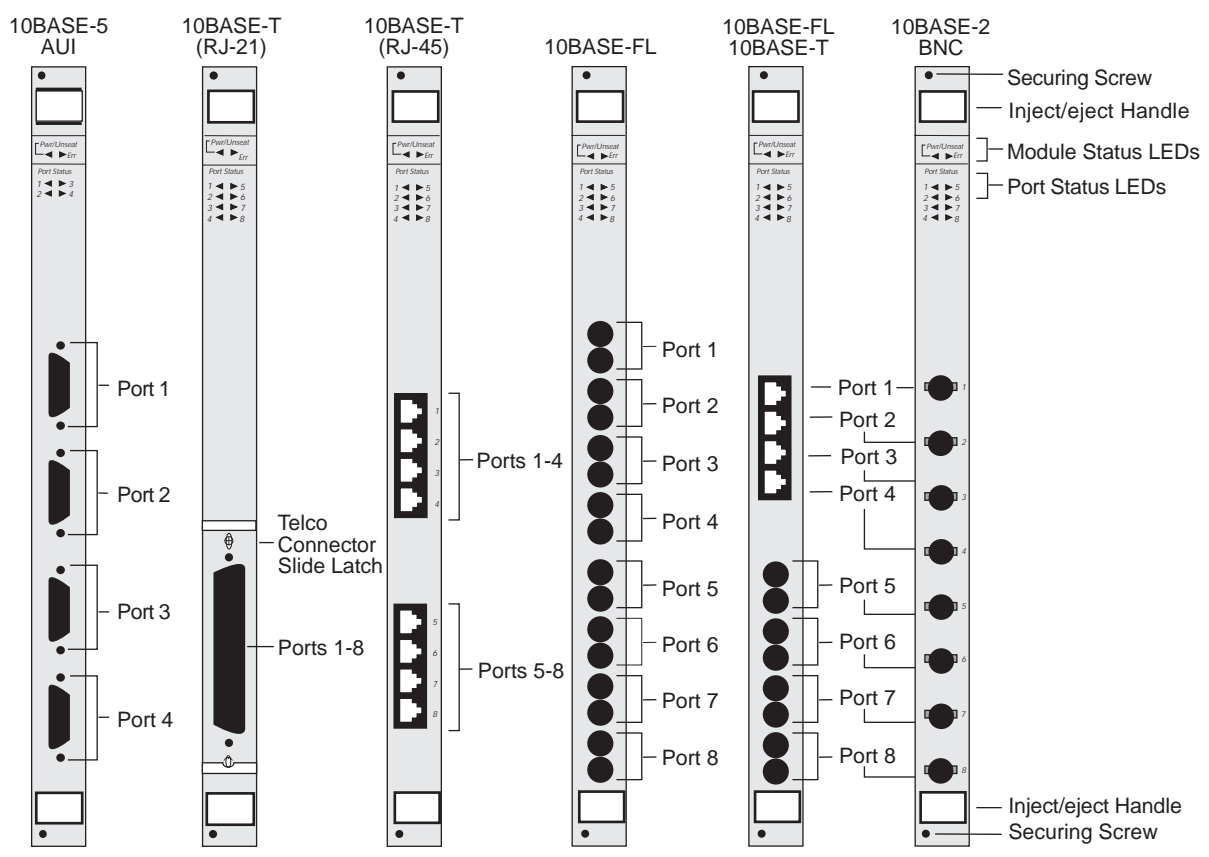


Figure 9 ESM Media Options

Status LEDs Each ESM contains two module status LEDs and a number of **Port Status** LEDs equivalent to the number of ports. Depending on the condition, each LED is either green (indicating active) or yellow (indicating error).

Figure 9 shows the location of the LEDs on the front panel of each media option. Table 1 describes these LEDs.

Table 1 Ethernet Switching Module LEDs

LEDs	Name	Color	Description
Module Status	Power/Unseat	Green	Indicates that the module is powered on
		Yellow	Indicates that the module is not fully plugged into the backplane
	Err (Error)	Yellow	Indicates that either an error has occurred or the module has failed a diagnostic procedure
Port Status	Port Status 1-4 (AUI)	Green	Indicates that the associated port is active
		Yellow	Indicates that an error condition has occurred with the associated port
	1-8 (RJ45, RJ21, 10BASE-FL, 10BASE-T/FL,BNC)		

Pin Assignments

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

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

Table 2 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_org	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	org_yellow	unused	34/5	red_brown	Receive +			

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

Table 3 ESM 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 10 shows the transmit and receive pins of the ESM's eight 10BASE-FL ports.

Figure 10 ESM 10BASE-FL Transmit and Receive

Documentation Comments

Your suggestions are very important to us and will help make LANplex documentation more useful to you. Please email comments on this guide to: sdtechpubs_comments@3Mail.3Com.com

Please include the following information when commenting:

- Document title
- Document part number (listed on back cover of document)
- Page number (if appropriate)

Example:

- *LANplex 6000 Planning Your Site*
- Part No. 801-00251-000
- Page 2-5 (chapter 2, page 5)

