

NOVASwitch

FNSW-1600

FNSW-2400

10/100Base-TX

Fast Ethernet Switch

Trademarks

Copyright © PLANET Technology Corp. 1999.
Contents subject to revision without prior notice.
PLANET is a registered trademark of PLANET Technology Corp. All other trademarks belong to their respective owners.

FCC Warning

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the Instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

Before Starting

In this User's Manual "NOVASwitch" is used for any/all of the PLANET NOVASwitch models of Ethernet Switches listed on the title page. Important differences between models will be specified.

Reversion

**PLANET NOVASwitch User's Manual
FOR MODELS: FNSW-1600, FNSW-2400**

Part No.: EMFNSW16V2

TABLE OF CONTENTS

1.UNPACKING INFORMATION.....	1
2.PRODUCT INTRODUCTION	3
2.1 KEY FEATURES	3
2.2 FRONT PANEL	3
2.2.1 Ports Speed	3
2.2.2 Cabling.....	4
2.2.3 MDI Switch	4
2.2.4 Status LEDs.....	4
2.3 THE REAR PANEL	5
2.3.1 Extension Slot.....	5
2.3.2 Power Connector	5
2.3.3 Fan.....	5
3. INSTALLATION	6
3.1 RACK-MOUNT INSTALLATION	6
3.2 DESKTOP INSTALLATION	6
3.3 CONNECTING THE HUB TO AC POWER	6
POWER FAILURE.....	6
4. OPTIMIZING CONFIGURATION	7
4.1 PRIOR TO INSTALLATION	7
4.2 HALF- AND FULL-DUPLEX	7
4.3 FAST ETHERNET.....	7
4.4 AUTO-NEGOTIATION	8
4.5 MAC ADDRESS TABLE	8
4.6 SAMPLE APPLICATION	9
5. TROUBLESHOOTING.....	10
6. PRODUCT SPECIFICATIONS	11
7. RJ-45 PIN ASSIGNMENT	12
7.1 STRAIGHT-THROUGH/CROSSOVER CABLE	12

1.UNPACKING INFORMATION

Thank you for purchasing a PLANET NOVASwitch series Ethernet Switches. Before continuing, please check the contents of the product package. This product package should contain the following items:

- One NOVASwitch Ethernet Switch
- One Power Cord
- Two Rack-Mounting Brackets with Attachment Screws
- This User's Guide

Please inform your local dealer/supplier immediately if any item is found to be defective, damaged or missing. Retain the original packaging (carton), including the packing materials, and use them to re-pack the product in the unlikely event there is a need to return it to us for repair.

2.PRODUCT INTRODUCTION

NOVASwitch Ethernet Switches are multi-speed, versatile network devices combining both standard and "Big-Pipe" ports under the same hood.

2.1 Key Features

- Compliant with IEEE802.3 and 802.3u standards for 100Base-TX/FX.
- 16/24-port Fast Ethernet Switch, pure 10/100Base-TX
- Wire-speed "Store-and-Forward" filtering/forwarding eliminates bad data packets with minimal delay
- 100Base-TX ports automatically sense and set optimal line speed from 10/20, 100/200Mbps, All 100Base-TX port support MII Auto-Negotiation function
- Optional Fiber-optic module for 100Base-FX, shared with port#9, #13. DIP switch for Half/Full-Duplex selection
- Shared buffer memory and up to 1K-entry MAC source address table make for fast handling of data packets
- Flow control to eliminate packets loss
- Internal, full-range power supply suitable for worldwide use

2.2 Front Panel



Figure 1: Front View of the FNSW-1600/2400

2.2.1 Ports Speed

■ 100Base-TX

All 100Base-TX ports come with auto-negotiation capability. They automatically support 100Base-TX and 10Base-T networks. Users only need to plug a working network device into one of the 100Base-TX ports, then turn on the hub. The port will automatically runs in 10Mbps, 20Mbps, 100Mbps or 200Mbps after the negotiation with the connected device.

■ 100Base-FX

The port 9 (FNSW-1600) or port 13 (FNSW-2400) can be a 100Base-FX fiber-optic port as the extension module installed (rear) At the mean time, the RJ-45 port of #9/13 will being disabled. The Half-/Full-Duplex is selectable by the DIP-switch on the module. Please refer to the installation guide of the extension module for more.

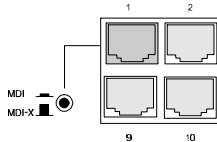
2.2.2 Cabling

NOVASwitch 100Base-TX ports use RJ-45 sockets -- similar to phone jacks -- for connection of unshielded twisted-pair cable (UTP). The IEEE 802.3u Fast Ethernet standard *requires* Category 5 UTP for 100Mbps 100Base-TX. 10Base-T networks can use Cat.3, 4, or 5 UTP (see table A)

Port Type	Cable Type	Connector
10Base-T	Cat 3, 4, 5	RJ-45
100Base-TX	Cat.5 UTP only	RJ-45
100Base-FX*	62.5/125µm multi-mode fiber	ST / SC

Table A: Supported port list

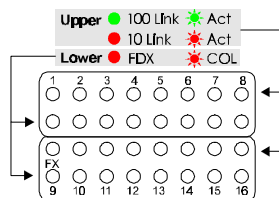
2.2.3 MDI Switch



Each numbered port of NovaSwitch FNSW-1600/FNSW-2400 are MDI-X port, you can direct use straight cable for the connection to your end nodes. However, port#1 is with one push button. To push the button to convert the port to MDI-II port for direct hub cascade. Please also refer to Section “7. RJ-45 Pin Assignment” for more.

2.2.4 Status LEDs

One green LED to show power On/Off is on the front panel. Also, each port has two status LED indicators, as shown below.



LABEL	STATUS / COLOR	MEANING	DESCRIPTION
UPPER ROW	Steady Green	100M Link	Lit to indicate that a valid <i>physical</i> UTP/STP connection exists on that port runs in 100Mbps
	Blink Green	100M Active	Blink to indicate the port is receiving in 100Mbps
	Steady Orange	10M Link	Lit to indicate that a valid <i>physical</i> UTP/STP connection exists on that port runs in 10Mbps

	Blink Orange	10M Active	Blink to indicate the port is receiving in 10Mbps
LOWER ROW	Steady Orange	Full-Duplex	Lit to indicate Full-Duplex mode detected on that port
	Blink Orange	Collision	Blinks if a collision is detected when the port is in Half-Duplex mode.

Table B: FNSW-1600/2400 Port-LED Functions

2.3 The Rear Panel

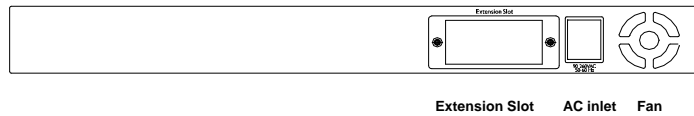


Figure 2: Rear View for both FNSW-1600/FNSW-2400

2.3.1 Extension Slot

NovaSwitch port #9 or #13 can be a 100Base-FX port switching port as the extension module installed. Please refer to the Installation Guide of the module for the detailed installation and settings.

NOTE: While powering on, NovaSwitch detects the DIP-switch status of the module, then shown on the front panel LED indicators

2.3.2 Power Connector

The Power Connector is designed to be used with the power cord included in the product package. Attach the female end of the cord to the power connector and the male end of the cord to a grounded power outlet. The accepted power range is from 90VAC to 260VAC, 50/60Hz.

2.3.3 Fan

All computing and communications devices work best when not overheated. Please keep the fan area clear so that the cooling function is not impaired.

3. INSTALLATION

The NOVASwitch do NOT require software configuration. Users can immediately use any of the features of this product simply by attaching the cables and turning on the power.

To get the best use of these NOVASwitch models, many things need to be considered first. See Section 4, *4. OPTIMIZING CONFIGURATION* for details.

3.1 Rack-Mount Installation

Most users prefer to attach the power cord to the hub before installation in a network rack. Do not plug the other end of the cord into a power outlet until after the hub is installed.

For mounting the NOVASwitch in a network rack, first attach the rack-mount brackets to the side of the hub with screws. (Both brackets and screws are included in the product package.) Slide the hub into the rack and align the holes in the bracket with the corresponding holes in the network rack. Attach the bracket to the rack with the enclosed screws.

3.2 Desktop Installation

To locate the NOVASwitch models on a desktop, first attach the four rubber feet to the bottom of the hub, one in each corner. Place the hub on a clean, flat desk or table-top close to a power outlet. Make sure there is no hindrance behind the fan of the hub

Plug in all network connections, then turn the switch on via plug in the power cord.

3.3 Connecting the Hub to AC Power

After making network connections as described in the preceding sections, you are ready to plug the hub in and turn it on.

The input voltage is from 90 to 250 volts AC and any frequency from 50 to 60 hertz. Adjustment to the power source is automatic; there is no switch to set.

Before plugging the hub in, make sure the power cord

- (1) is long enough to reach an AC wall outlet of an approved type,
- (2) has plugs that match both the hub's power inlet and the type of wall outlet you will use, and
- (3) Conforms to safety regulations in your area.

In most parts of the world you must use a three-conductor power cord with an integral three-prong grounding plug.

If the supplied power cord does not meet all three requirements given above, contact your computer equipment dealer and obtain one that does. Do not use an extension cord or multi-socket adapter; do not attempt to use a cord designed for any other kind of power inlet or wall outlet; do not use a cord that fails to meet safety standards in your part of the world.

Power Failure

To prevent costly equipment damage and downtime, please consider installing a surge suppression device or a UPS (un-interrupted power supply).

4. OPTIMIZING CONFIGURATION

4.1 Prior to Installation

Before installing the NOVASwitch models and connecting network devices, it is important to plan the new network layout. Consider:

- **Dedicated Bandwidth:** File servers and other high-traffic hardware can improve if they have their own direct connection with dedicated 10 or 100Mbps bandwidth.
- **Full-Duplex:** Determine which devices would benefit from a Full Duplex connection and check that they support it.
- **Fast Ethernet:** 100Base-TX and 100Base-FX have different rules for cable and distance. Make sure these are followed.
- **Auto-Negotiation:** Devices with different speeds may be easily swapped when the other end of the cable is fixed to a port with auto-negotiation.
- **Crossover Uplink:** Another hub can be attached to NovaSwitch models using UTP Crossover function.

4.2 Half- and Full-Duplex

The NOVASwitch support both Half- and Full-Duplex modes for 10Base-T, 100Base-TX, and 100Base-FX. Half-Duplex mode is the traditional data transfer mode: one station sends data while other devices wait for the first to finish.

Full-Duplex is the simultaneous transmission and receiving of data. It is only possible between two devices with a dedicated link (e.g., switch-to-switch, switch-to-PC). Both of the devices must be capable of, and set to, Full-Duplex

The 100Base-FX port set Half- or Full-Duplex mode through module's DIP-switch. 100Base-TX ports use auto-negotiation to detect and set the line's operating mode.

4.3 Fast Ethernet

100Base-TX and 100Base-FX are called "Fast Ethernet." This is because they use the Ethernet CSMA/CD access rules and data packet structure, but data travels ten times faster (100Mbps) than traditional 10Mbps Ethernet.

Below is a list of the cable types and connectors that supported by NovaSwitch models for 10Base-T, 100Base-TX, and 100Base-FX networks.

PORT TYPE	CABLES TYPE	CONNECTOR
100BASE-TX	Cat. 5 UTP only	RJ-45
10BASE-T	Cat.3, 4, 5 UTP	RJ-45

Table C: Cables & Connectors Supported by FNSW-16/2400

In many cases, 10Base-T LANs can quickly and easily upgrade to 100Base-TX networks. Also, 100Base-FX will become more popular due to its longer range. Table lists the maximum Fast Ethernet connection distances.

MAX. LINK DISTANCE	COPPER	COPPER+FIBER ²	FIBER
DTE-DTE ¹	100m	n/a	412m/2,000m ⁴
1 Class-I Repeater ³	200m	261m	272m
1 Class-II Repeater	200m	309m	318m
2 Class-II Repeaters	205m	216m	228m

- NOTES:** 1) "DTE" is an end-station such as a PC or switch port
2) Copper+Fiber assumes the max. Copper length is used
3) "Repeater" is a standard hub, NOT a Switch.
4) Half-/Full-Duplex. Fiber's distance depends on mode.

Table D: 100Base-TX/FX Topology Rules

4.4 Auto-Negotiation

The 100Base-TX ports on the NovaSwitch have built-in "Auto-Negotiation". This technology automatically sets the best possible bandwidth when a connection is established with another network device (usually at Power On or Reset). This is done by detect the mode and speed at the second device is capable of. The 100Base-TX devices can connect with the 100Base-TX port in either Half- or Full-Duplex mode.

If attached device is:	100Base-TX port will set to:
100Mbps, no auto-negotiation	100Mbps (100Base-TX, Half-Duplex)
100Mbps, with auto-negotiation	200Mbps (100Base-TX, Full-Duplex)
10Mbps, no auto-negotiation	10Mbps (10Base-T, Half-Duplex)
10Mbps, with auto-negotiation	20Mbps (10Base-T, Full-Duplex)

4.5 MAC Address Table

This 6-byte ID is called the MAC (Media Access Control) Address. Every Ethernet data packet includes both source and destination addresses.

These NOVASwitch models can automatically learn and store up to 1K MAC addresses. The MAC address table is volatile: it disappears when the switch is powered off or reset.

Note: *When the network needs reconfiguration, we recommend turning off the power first. After all nodes have been moved, power on the switch to rebuild the internal MAC address table.*

4.6 Sample Application

The optimal application for the NOVASwitch, no matter with the extension module or not, is as a "big pipe" backbone interconnecting file servers with bandwidth-hungry workgroups, departments, and offices.

In the figure, the first FNSW-1600 links to another hub's Uplink (MDI-II) port, some ports connect to 100Mbps Workstations, and attached to file servers at 200Mbps. This example highlight the extra distance provided by 100Base-FX fiber-optic, using the Port #9 of FNSW-1600 with the rear module installed.

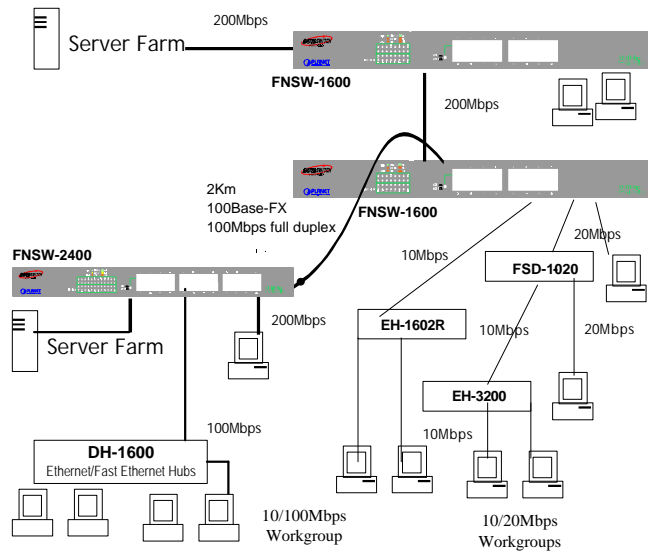


Figure 3: Sample Application for FNSW-1600/2400 Models

5. TROUBLESHOOTING

SYMPTOM	Link LED does not lit after cable is connected to the port..
CHECKPOINT	<ul style="list-style-type: none">✓ Verify that the other end of the cable is connected to a device that is powered on and on-line..✓ For UTP cable connection to another hub, verify that only one end of the cable is connected to a “MDI-II” Uplink port.
SYMPTOM	100Base-TX port Link LED is lit, Collision LED is blinking, but traffic is irregular.
CHECKPOINT	<ul style="list-style-type: none">✓ Check that the attached device is not set to dedicated full-duplex. (Some devices use a physical or software switch to change duplex modes. Auto-negotiation may not recognize this type of full-duplex setting.
SYMPTOM	After setting the DIP-switch of the 100Base-FX module, the attached device doesn't communicate normally with the port.
CHECKPOINT	<ul style="list-style-type: none">✓ The attached network device MUST be set to operate in the same duplex mode.

ALWAYS CHECK THAT THE CABLE, LINK DISTANCES, AND OVERALL NETWORK DIAMETER ARE WITHIN SPEC. FOR THE NETWORK TYPE.

6. PRODUCT SPECIFICATIONS

PRODUCT	FNSW-1600 / FNSW-2400
NETWORK PORTS	• 16/24 x 10/100Base-TX RJ-45 (MDI-X)
BUFFER MEMORY	1024K Byte
EXTENSION SLOT	Rear Extension slot shared with port 9/13 for optional module
MEDIA SUPPORT	<ul style="list-style-type: none"> • 100Base-TX Cat. 5 UTP, RJ-45 • 10Base-T Cat. 3, 4, 5 UTP RJ-45
BANDWIDTH	• 100Base-TX, 200/100/20/10Mbps, Auto-Negotiation
FILTER/ FORWARD RATE	<ul style="list-style-type: none"> • 148,800 packets/second per port @ 100Mbps, max. • 14,880 packets/second per port @ 10Mbps, max.
MAC ADDRESSES	Up to 1K 6-Byte full MAC address entries max. Self-learning
SWITCHES	• 1 for MDI-X / MDI-II selection for port#1
LEDs	<ul style="list-style-type: none"> • 1 for Power On/Off • 2 per port for 100Mbps, Full-Duplex, Act/Link, Collision
POWER SUPPLY	Auto-switching. Input voltage: 90~260 VAC, 50 ~ 60Hz
ENVIRONMENT	<ul style="list-style-type: none"> • <i>Operating Temp:</i> 0 ~ 50°C (32 ~ 122°F) • <i>Storage Temp:</i> -30 ~ 70°C (-22 ~ 158°F) • <i>Humidity</i> 0 ~ 90% non-condensing
DIMENSIONS	430 x 180 x 44 mm (16.9 x 7.1 x 1.73 in.)
EMISSION	FCC Class A, CE
SAFETY	UL, TUV/GS (EN60950)

Table E: FNSW-1600/2400 Product Specifications

7. RJ-45 PIN ASSIGNMENT

Pin	Numbered Ports (MDI-X port)	Uplink Port (MDI-II port)
1	Input Receive Data +	Output Transmit Data+
2	Input Receive Data -	Output Transmit Data-
3	Output Transmit Data+	Input Receive Data +
6	Output Transmit Data-	Input Receive Data -
4,5,7,8	Not used	Not used

Schematics for both straight and crossover twisted-pair cable are shown below. (Note that crossover cable is only required if you cascade hubs via the RJ-45 station ports; i.e. the Uplink port is not used.)

7.1 Straight-Through/Crossover Cable

The pin assignment of the cables both ends should be as below:

Straight-through		Crossover	
Hub (MDI-X)	Adapter(MDI-II)	Hub (MDI-X)	Hub (MDI-X)
Pin 1	Pin 1	Pin 1	Pin 3
Pin 2	Pin 2	Pin 2	Pin 6
Pin 3	Pin 3	Pin 3	Pin 1
Pin 6	Pin 6	Pin 6	Pin 2

