

# **NOVASWITCH**

**FNSW-1020**

**FNSW-1820**

**FNSW-2620**

**10/100Base-TX**

**Fast Ethernet Switching Hub**

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## 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 switching hubs listed on the title page. Important differences between models will be specified.

**PLANET NOVASwitch User's Manual  
FOR MODELS: FNSW-1020, FNSW-1021F,  
FNSW-1820, FNSW-1821F, FNSW2620, FNSW-  
2621F**

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# 1. UNPACKING INFORMATION

Thank you for buying a PLANET NOVASwitch switching hub. Before continuing, please check the contents of the product package. This NOVASwitch product package should contain:

- One NOVASwitch Switching Hub
- One Power Cord
- Four Rubber Feet (for desktop placement)
- Two Rack-Mounting Brackets with Attachment Screws
- This User's Manual

Please inform your 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. .



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## 2. NOVASWITCH INTRODUCTION

### 2.1 Models

NOVASwitch Fast Ethernet switching hubs are multi-speed, versatile network devices combining both standard and "Big-Pipe" ports under the same hood. The mix of 10Mbps Ethernet and 100Mbps Fast Ethernet interfaces lets these switching hubs unplug existing legacy LANs while providing a seamless path to high-speed networking.

The number and types of ports for NOVASwitch models are below.

MODEL	TOTAL	10BASE-T	100BASE-TX	100BASE-FX
FNSW-1020	10	#1-8	Ports P1 & P2	none
FNSW-1021F	10	#1-8	Port P1	Port P2
FNSW-1820	18	#1-16	Ports P1 & P2	none
FNSW-1821F	18	#1-16	Port P1	Port P2
FNSW-2620	26	#1-24	Ports P1 & P2	none
FNSW-2621F	26	#1-24	Port P1	Port P2

Table A: NOVASwitch Model/Port List

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### 2.2 Key Features

- Multi-speed rack-sized switching hubs combining Ethernet and Fast Ethernet ports
- 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 10-200Mbps, while all 10Base-T and 100Base-FX ports have selectable Half- or Full-Duplex operation
- 100Base-TX UpLink port for direct hub cascade

- Shared buffer memory for optimal data buffer control
- Shared MAC source address table make for fast handling of data packets

## 2.3 Front Panel

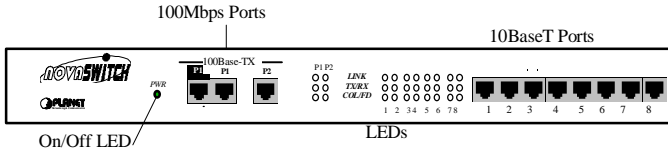


Fig. 1: Front View of the FNSW-1020

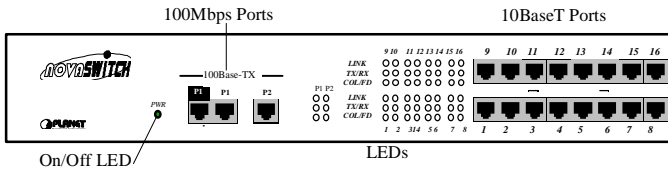


Fig. 2: Front View of the FNSW-1820

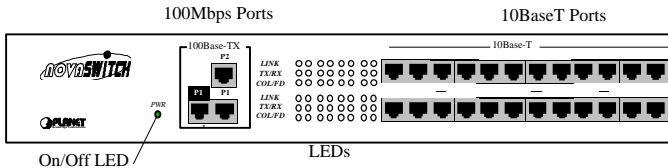


Fig. 3: Front View of the FNSW-2620



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### 2.3.1 10Base-T Ports

Each 10Base-T port delivers 10Mbps dedicated bandwidth to attached network devices in normal Half-Duplex mode or double that when in Full-Duplex mode. The mode is set via DIP switches on the rear panel (see Section 2.4.1, "DIP Switches").

RJ-45 sockets (similar to phone jacks) are used to attach the male RJ-45 plugs used on unshielded twisted-pair (UTP) cable. Two-pair Category 3, 4 or 5 UTP is recommended for 10Base-T LANs. To attach, plug one end of a UTP cable into a NOVASwitch 10Base-T port and the other end into a 10Base-T device, such as a workgroup hub or a file server.

### 2.3.2 100Mbps Ports

#### 100Base-TX

**Port P1** on all NOVASwitch models is a 100Base-TX port, as is **Port P2** on the **FNSW-1020**, **FNSW-1820** and **FNSW-2620**. These ports also use RJ-45 sockets for UTP cable, however Cat. 5 is the only UTP cable type specified for 100Base-TX networks. The 100Base-TX ports on NOVASwitch models automatically set a line speed of 10, 20, 100, or 200Mbps with no user intervention (see section 4.4 "Auto-Negotiation").

#### Cascade port -Crossover Connector

**Port P1** on all NOVASwitch models includes a second RJ-45 socket which supports the UTP Crossover function. Crossover is used to connect to a standard port on another hub using normal UTP cable. **Use only one of the connectors on Port P1.** If devices are plugged into both connectors, neither will work properly.

#### 100Base-FX

Models **FNSW-1021F**, **FNSW-1821F** and **FNSW-2621F** come with an ST connector for attachment of multi-mode optical fiber cable. 100Base-FX is primarily used for network backbones. A DIP-switch sets the operating mode to Half-Duplex (default) or Full-Duplex.

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### **2.3.3 Status LEDs**

One green LED to show power On/Off is on the front panel.

Also, each port has three status LEDs, as shown below.

LABEL	STATUS	FUNCTION
LINK	Steady Green	Lit to indicate that a valid <i>physical</i> UTP/STP connection exists on that port.
TX/RX	Blinking Orange	Blinks when the port is sending or receiving data.
COL/FD	Blinking / Steady Amber	a) Blinks if a collision is detected when the port is in Half-Duplex mode (or Auto-Negotiation mode for 100Base-TX ports) b) Lit when port is set to Full-Duplex.

Table B: NOVASwitch Port-LED Functions

## 2.4 The Rear Panel

### 2.4.1 DIP Switches

On the left of the rear panel are DIP-switches to control each port's operating mode. Table D lists the ports' operating modes based on the DIP-switch position.

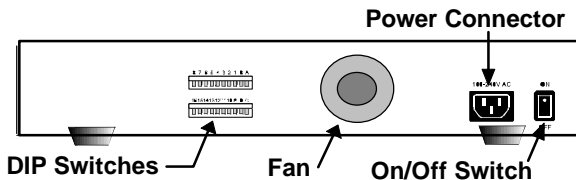


Fig. 3: FNSW-1820 Rear Panel

Half- or Full-Duplex mode is set by the numbered DIP switches for 10Base-T ports (all models), and by the "P2" switch for 100Base-FX (*FNSW-1021F*, *FNSW-1821F*, *FNSW-2621F*). When a switch is up (default), its port will function in Half-Duplex mode. Setting the DIP switch down puts the port in Full-Duplex mode.

SWITCH	1-8	9-16	17-24	P1-P2/TX	P2/FX
Up (default)	HD	HD	HD	A-N	HD
Down	FD	FD	FD	A-N	FD

FD= FULL-DUPLEX  
HD=HALF-DUPLEX

A-N=AUTO-NEGOTIATION  
n/a=NOT AVAILABLE

Table C: NOVASwitch DIP-Switch Position & Function

100Base-TX ports use auto-negotiation (see section 4.4) to set Half-or Full-Duplex mode, so setting DIP-switches for these ports ("P1" on all models and "P2" for **FNSW-1020**, **FNSW-1820**, **FNSW-2620**) has no affect on the ports' operating mode.

**NOTE:** *At power on, the NOVASwitch detects DIP switch status and sets its configuration. Changes to DIP switch settings when the hub is powered on are ignored. Turn off the NOVASwitch to reconfigure DIP switch settings.*

## 2.4.2 On/Off ("Reset") Switch

The power On/Off Switch is located on the far right of the rear panel next to the power connector. Turning the NOVASwitch off, then on resets it.

NOVASwitch must be reset under the circumstances below:

- 1.if the changes are made to DIP-switch settings or
2. when the MAC address table needs to be rebuilt.

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### **2.4.3 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.

### **2.4.4 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.

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## 3. INSTALLING THE NOVASWITCH

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

To get the best use of these NOVASwitch models, many things need to be considered first. See Section 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 on a desktop, first attach the four rubber feet included in the product package 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.

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

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## 4. OPTIMIZING CONFIGURATION

### 4.1 *Prior to Installation*

Before installing the NOVASwitch 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 **Port P1's** STP Cascade function.

### 4.2 *Half- and Full-Duplex*

NOVASwitch models support both Half- and Full-Duplex modes for 10Base-T and 100Base-TX. These use two pairs of twisted-pair wire: one pair receives (RX), the other transmits (TX).

Traditional Half-Duplex devices use the RX pair to "listen" to the network to see if it is free. If so, the TX pair sends any data. Full-Duplex operation allows the reception and transmission activities to operate independently and simultaneously. This doubles the bandwidth available for use by compliant devices.

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**NOTE:** Full-Duplex operation is only possible when UTP cable is used and **both** nodes are set to Full-Duplex mode.

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### 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 supported by NOVASWITCH models for 10Base-T, 100Base-TX, and 100Base-FX networks.

	<b>CABLES TYPE</b>	<b>CONNECTOR</b>
<b>10BASE-T</b>	Cat. 3, 4, 5 UTP	RJ-45
<b>100BASE-TX</b>	Cat. 5 UTP only	RJ-45
<b>100BASE-FX</b>	62.5/125µm multi-mode fiber	ST

Table D: Cables & Connectors Supported by NOVASwitch

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 E lists the maximum Fast Ethernet connection distances.

<b>MAX. LINK DISTANCE</b>	<b>COPPER</b>	<b>COPPER+FIBER<sup>2</sup></b>	<b>FIBER</b>
DTE-DTE <sup>1</sup>	100m	n/a	412m
1 Class-I Repeater <sup>3</sup>	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 switching hub.

Table E: 100Base-TX/FX Topology Rules



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## 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 detecting the modes and speeds the second device is capable of. Both 10Base-T and 100Base-TX devices can connect with the 100Base-TX port in either Half- or Full-Duplex mode.

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

Table F: 100Base-TX Port Speeds in Auto-Negotiation

## 4.5 MAC Address Table

Each Ethernet device -- switch, repeater, adapter card, and so on -- has its own unique identifier. 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 store up to 8,192 MAC addresses. The MAC address table is volatile: it disappears when the switch is powered off or reset. Turn on the NOVASwitch to begin storing network node addresses.

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

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## 4.6 Sample Application

The optimal application for the NOVASwitch is as a "bridge" joining 100Mbps and 10Mbps network segments. The figure below illustrates one application.

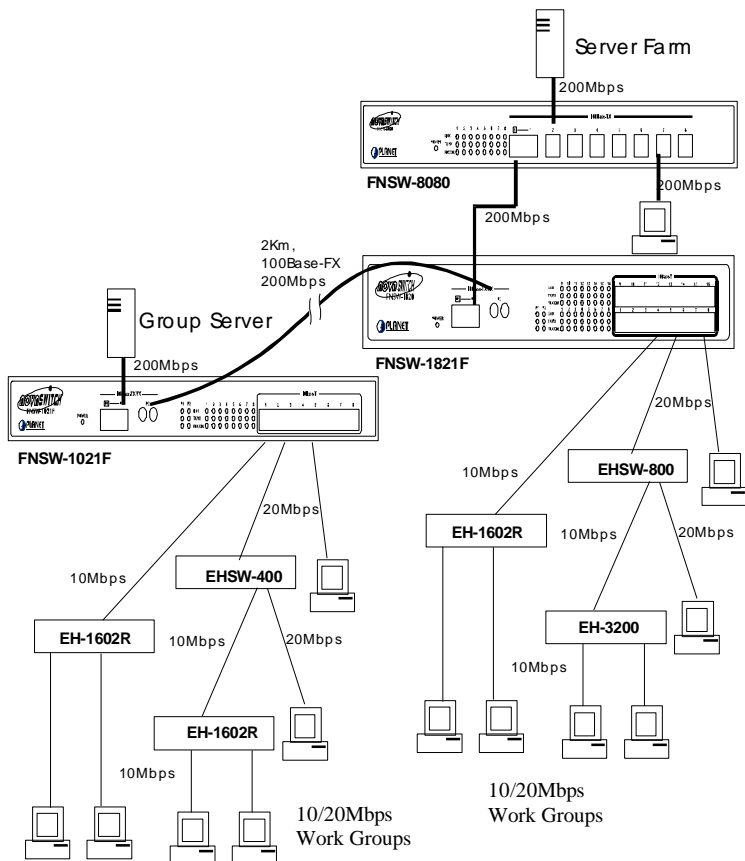


Fig. 4: Sample NOVASwitch Application

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## 5. TROUBLESHOOTING

- SYMPTOM** Cable plugged into 10Base-T port but LINK LED not lit.
- CHECKPOINT**
- ✓ Verify that the other end of the UTP cable is plugged into a device that is powered on and on-line.
  - ✓ Verify that the two devices are not both connected to “Crossover” ports.
- SYMPTOM** After changing 10Base-T port’s DIP switch, the attached device does not communicate normally with the port.
- CHECKPOINT**
- ✓ The attached network device **MUST** be set to operate in the same Duplex mode. Remember: for any change to DIP switch settings to take effect, the NOVASwitch must be turned off, then on
- SYMPTOM** 10Base-T port in Half-Duplex mode, LINK LED is lit, and Collision LED is blinking, but traffic is irregular
- CHECKPOINT**
- ✓ Attached device **MUST** also be 10Base-T & Half-Duplex.
- SYMPTOM** 10Base-T port in Full-Duplex mode and LINK LED is lit, but traffic is irregular.
- CHECKPOINT**
- ✓ Attached device **MUST** also be 10Base-T & Full-Duplex.
- SYMPTOM** 10Base-T port connected and LINK LED lit, but no data is being sent or received.
- CHECKPOINT**
- ✓ When the UTP cable detects a valid physical link, the LINK LED does light, whether or not the attached device is capable of communicating with the NOVASwitch. Check line speed and Duplex mode of both devices.

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- SYMPTOM** 100Base-TX auto-negotiation port LINK LED lit & Collision LED blinking, but traffic is irregular.
- CHECKPOINT** ✓ Check that the attached device is not set to dedicated Full-Duplex.

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

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## 6. PRODUCT SPECIFICATIONS

### 6.1 Specification for FNSW-1020, FNSW-1021F

MODEL	FNSW-1020	FNSW-1021F
<b>NETWORK PORTS</b>		
100BASE-TX	2	1
100BASE-FX	None	1
10BASE-T	8	8
BUFFER MEMORY	4 Mbyte	
MAC ADDRESSES	8,192 6-Byte entries max. self-learning	
DIMENSIONS	442 x 255 x 44 mm	

### 6.2 Specification for FNSW-1820, FNSW-1821F

MODEL	FNSW-1820	FNSW-1821F
<b>NETWORK PORTS</b>		
100BASE-TX	2	1
100BASE-FX	None	1
10BASE-T	16	16
BUFFER MEMORY	6 Mbyte	
MAC ADDRESSES	8,192 6-Byte entries max. self-learning	
DIMENSIONS	442 x 255 x 66 mm	

### 6.3 Specification for FNSW-2620, FNSW-2621F

MODEL	FNSW-2620	FNSW-2621F
<b>NETWORK PORTS</b>		
100BASE-TX	2	1
100BASE-FX	None	1
10BASE-T	24	24
BUFFER MEMORY	8 Mbyte	
MAC ADDRESSES	2,560 6-Byte entries max. self-learning	

<b>DIMENSIONS</b>	442 x 255 x 66 mm
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## 6.4 General Specification of NOVASwitch

<b>SPECIFICATION</b>	<b>ALL MODELS</b>
<b>MEDIA SUPPORT</b>	<b>100BASE-TX</b> : Cat. 5 UTP ( <i>All models</i> ) <b>100BASE-FX</b> : 62.5/125 $\mu$ m multi-mode optical fiber <i>(Models FNSW-1021F, FNSW-1821F &amp; FNSW-2621F)</i> <b>10BASE-T</b> : Cat. 3, 4, 5 UTP ( <i>All models</i> )
<b>BANDWIDTH</b>	<b>100BASE-TX</b> : 200/100/20/10Mbps set automatically <b>100BASE-FX</b> : 100Mbps default, 200Mbps Full-Duplex selectable <b>10BASE-T</b> : 10Mbps default, 20Mbps Full-Duplex selectable
<b>FILTER/ FORWARD RATE</b>	148,800 packets/second per port @ 100Mbps, max. 14,880 packets/second per port @ 10Mbps, max.
<b>LATENCY</b>	9 $\mu$ sec @ 100Mbps; 70 $\mu$ sec @ 10Mbps, min.
<b>SWITCHES</b>	1 for Power On/Off 1 per port for Half- or Full-Duplex mode
<b>LEDs</b>	1 for Power On/Off 1 per port for Transmit/Receive 1 per port for Link 1 per port for Collision/Full-Duplex
<b>POWER SUPPLY</b>	Internal, auto-switching. Input voltage: 100 ~ 240VAC
<b>ENVIRONMENT</b>	Operating Temp: 0 ~ 40°C (32 ~ 104°F) Storage Temp: -20 ~ 80°C (-4 ~ 176°F) Humidity: 0 ~ 90% non-condensing
<b>EMISSION</b>	FCC class A, CE

Table G: NOVASwitch Product Specifications



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**EMFNSW10/1820v3**

