SIGNAMAX
CONNECTIVITY SYSTEMS

Signamax Connectivity Systems
MediaRack Modular
Switch System Model 065-7520

USER'S GUIDE

Signamax Connectivity Systems

MediaRack Modular Switch System
Model 065-7520

User's Guide

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 this user' s guide, 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.

CE Mark Warning

This is a Class A product. In a domestic environment, this product may cause radio interference in which case the user may be required to take adequate measures.

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- Ethernet is a trademark of Xerox Corporation.
- Microsoft Windows is a trademark of Microsoft Corporation.
- VT100 is a trademark of Digital Equipment Corporation.
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ABOUT THIS GUIDE

This manual describes the installation and usage of Signamax Connectivity Systems' MediaRack Modular Switch System. The flexibility of this unique device allows several combinations of fiber-optic and copper-based connections in a single box. This modular design enhances flexibility and lowers the cost through the reduction of manufacturing and warehousing expenses.

In this manual, you will find:

- Benefits of Ethernet switches
- MediaRack Modular Switch System and its features
- LED functions and illustrations
- Installation instructions
- Configuration instructions for VLAN and port speed
- Networking examples
- Specifications
- Ethernet technology, LAN, and VLAN tutorial information
- Definitions of terms used in this manual
- **MediaRack Modular Switch System** line of networking products

To get the most out of this manual, you should have an understanding of Ethernet networking concepts. Refer to the appendices and glossary definitions for expanded information.

1

INTRODUCTION

Benefits of Switching

Ethernet switching technology has dramatically boosted the total bandwidth of a network. It puts configuration flexibility and bandwidth adaptability into the local workgroups where the majority of work is generated.

It further eliminates congestion problems inherent to the CSMA/CD protocol and improves predictable response time under heavy network loads. Expensive routing equipment was used in the past to reduce the congestion under heavy loads.

The new wave of object-oriented client and server applications demands higher bandwidth and tighter integration of client workstations with servers. The old shared-access (hub/repeater) Ethernet technology provides neither enough bandwidth nor predictable response time for this new wave of workgroup computing.

Fast Ethernet switching not only satisfies both technical and business requirements, but also preserves the user's existing investment in the huge 10BaseT Ethernet installed Base.

This compatibility ensures a path for users to add, change, and migrate to Fast Ethernet as demands emerge. It also provides a low cost and flexible bandwidth solution directly to local workgroups where the majority of work is generated, reducing the need for expensive network equipment.

MediaRack Modular Switch System

The modular design of the MediaRack Modular Switch System was dictated by the needs of the consumer for a networking device that is flexible enough to accommodate a large variety of connections with both fiber-optic and copper-based cabling. This modular design not only enhances flexibility, but also lowers the price to the consumer because of reduced manufacturing and warehousing costs.

The MediaRack Modular Switch chassis houses the modules in a durable case with an internal power supply. Modules are available with fiber-optic ports accommodating SC, ST, or the newest small-form-factor MT-RJ and VF-45, and TX ports accommodating twisted-pair copper RJ-45 connections.

Port-based VLAN on the MediaRack Modular Switch System enables secure domains while eliminating unnecessary cross traffic through the segmentation of users. Configuration for fixed speed and duplex settings ensures compatibility with legacy equipment, making this a versatile Fast Ethernet switch.

The MediaRack Modular Switch System fully complies with IEEE 802.3u for 100BaseTX, IEEE 802.3 for 10BaseT and IEEE802.3x for flow control. It operates using a store-and-forward architecture.

Once the selected modules are properly installed, the MediaRack Modular Switch System is fully functional. With TX ports that auto-negotiate 10 to 100Mbps, no outside conversion devices are required.

This unique networking system neatly satisfies the demand for Fast Ethernet speed transmission over longer distances, combined with the flexibility and affordability of a modular switch.

Product Features

The MediaRack Modular Switch System provides the following features:

- Choice of ST, SC, MT-RJ or VF-45 connectors on FX modules
- RJ-45 connectors on all TX ports
- Uplink port on full four-port TX modules
- Auto-negotiation for speed and duplex on TX ports
- IEEE 802.3 compliant
- Port-based VLAN
- Configuration for fixed speed and duplex modes through console port
- Store-and-forward mechanism
- Back pressure and IEEE 802.3x compliant flow control
- True non-blocking switch architecture
- Full wire speed forwarding
- Supports 2K MAC addresses
- Optional 11K MAC addresses
- Front panel status LEDs
- Front panel reset switch
- Standard 19" rackmountable size

Packing List

When you unpack the MediaRack Modular Switch System, you should find the items listed below. Please inspect the contents, and report any apparent damage or missing items immediately to your authorized reseller.

MediaRack Modular Switch System chassis
User's manual
AC power cord
Rackmount brackets with screws
Serial cable

Port modules are shipped separately from the switch chassis. They arrive boxed and enclosed in a static-free envelope, accompanied by a set of screws to secure them to the chassis.

MediaRack Modular Switch System Chassis
For ordering purposes only, the basic chassis is part number model FO-065-7520.

Figure 1: Front Panel of Modular Switch Chassis

1. **Power**
   Indicates that there is power to the switch.

2. **Reset Button**
   Push to reset the switch if it becomes unresponsive.

MediaCard 4-Port Modules for the MediaRack Modular Switch

The following is a list of model numbers for the various modules. All TX ports use RJ-45 connectors.

Table 1: Module Model Number

Model	Ports	FX Connector
FO-065-75203TX1SC	3TX, 1FX	SC
FO-065-75203TX1MT	3TX, 1FX	MT-RJ
FO-065-75203TX1ST	3TX, 1FX	ST
FO-065-75203TX1VF	3TX, 1FX	VF-45
FO-065-75202TX2SC	2TX, 2FX	SC
FO-065-75202TX2MT	2TX, 2FX	MT-RJ
FO-065-75202TX2ST	2TX, 2FX	ST
FO-065-75202TX2VF	2TX, 2FX	VF-45
FO-065-75204SC	4FX	SC
FO-065-75204MT	4FX	MT-RJ
FO-065-75204ST	4FX	ST
FO-065-75204VF	4FX	VF-45
FO-065-75204TX	4TX	

LED Indicator

Figure 3: Illustration of FX LEDs represented by FO-065-75204VF

3. **LNK/ACT** Link/Activity
   When light is *steady*: indicates a proper link to another working device
   When light is *flashing*: indicates activity between links

4. **FDX/COL** Full-duplex/Collision
   When light is *steady*: indicates presence of full-duplex operation
   When light is *flashing*: indicates a collision on that port

Table 2: FX Port LEDs

LED	State	Indication
LNK/ACT	Steady	The port has established a valid network connection
	Flashing	The port is transmitting data
FDX/COL	Steady	The connection is in full duplex mode
	Flashing	The port is receiving data

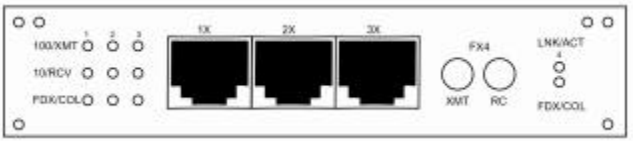

Figure 4: Illustration of TX LEDs represented by FO-065-75203TX1ST

5. **100/XMT**100Mbps/Transmit
   When light is *steady*: indicates presence of 100Mbps fast Ethernet
   When light is *flashing*: indicates traffic transmission

6. **10/RCV** 10Mbps/Receive
   When light is *steady*: indicates presence of 10Mbps Ethernet
   When light is *flashing*: indicates traffic receipt

7. **FDX/COL** Full-duplex/Collision
   When light is *steady*: indicates presence of full-duplex operation
   When light is *flashing*: indicates a collision on the port with another transmission

(Refer to Table 3)

Table 3: TX Port LEDs

LED	State	Indication
100/XMT	Steady	The port has established a valid 100M network connection
	Flashing	The port is transmitting Data
10/RCV	Steady	The port has established a valid 10M network connection
	Flashing	The port is receiving Data
FDX/COL	**Steady**	The connection is in full duplex mode
	Flashing	Collision occurred in the 10/100 domain
	Off	The connection is in half duplex mode

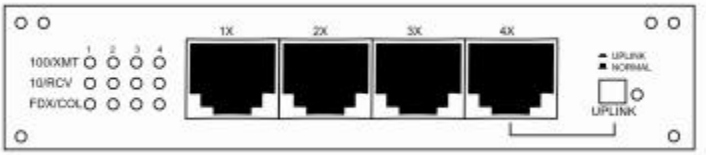

Figure 5: Illustration of Uplink function, only necessary on FO-065-75204TX

8. **Uplink Button**: Depress for uplink function

9. **Uplink:** LED indicator lights steady when the uplink function is activated

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INSTALLATION

This chapter presents step-by-step installation instructions for the Signamax Connectivity Systems 065-7520 MediaRack Modular Switch System.

Selecting a Site for the Switch

As with any electronic device, you should place the Signamax 065-7520 MediaRack Switch where it will not be subjected to extreme temperatures, humidity, or electromagnetic interference. Specifically, the site you select should meet the following requirements:

- The room temperature should be between 32 and 104 degrees Fahrenheit (0 to 40 degrees Celsius).
- The relative humidity should be less than 90 percent, non-condensing.
- Surrounding electrical devices should not exceed the electromagnetic field (RFC) standards for IEC 801-3, Level 2 (3V/M) field strength.

- Make sure that the switch receives adequate ventilation. Do not block the ventilation holes on the side of the switch or the fan exhaust port on the rear of the switch.
- The power outlet should be within 1.8Meters (6 feet) of the switch.

Connecting to AC Power

Connect the supplied AC power cord to the receptacle on the back of the switch, and then plug the cord into a standard AC outlet with a voltage range from 100 to 240 VAC.
Turn the MediaRack Modular Switch on by flipping the ON/OFF switch on the rear of the unit to the **I** (ON) position. The **O** position is OFF.

Connecting to Your Network

First, *turn off the power.* Always ensure that there is no power before installing or removing modules from the MediaRack Modular Switch. It is unsafe to install or remove modules with the power on; and, additionally, the equipment could be damaged.

With the power off, remove the module from the anti-static sleeve and slowly side module into desired slot, following the internal guide rails. Then snap in the module to attain a firm connection. Fasten the screws on the cover plate to secure.

Prepare or obtain cables with the corresponding connectors for each type of port in use. Consult Table 4 below for cabling requirements based on connectors and speed. Once the connections are made, the switch is operational.

Table 4: Cable Specifications

Speed	Connector	Port Speed Half/Full Duplex	Cable	Maximum Range
100BaseTX	RJ-45	100/200 Mbps	Category 5 UTP	100 meters
10BaseT	RJ-45	10/20 Mbps	Category 3, 4, or 5 UTP	100 meters
100BaseFX	ST, SC, MT-RJ, & VF-45	200 Mbps Full Duplex	62.5/125 micron multi-mode fiber-optic cable	2,000 meters
100BaseFX	ST, SC, MT-RJ, & VF-45	100 Mbps Half Duplex	62.5/125 micron multi-mode fiber-optic cable	412 meters

3

SWITCH CONFIGURATION

This section explains the configuration of VLAN, flow control, port speed, and duplex mode setting.

Virtual Local Area Networking (VLAN) enables efficient traffic separation, provides better bandwidth utilization, and alleviates scaling issues by logically segmenting the physical LAN so that packets are switched only between ports within the same VLAN. This also creates secure segments within the existing network. Nodes residing in different VLAN segments cannot communicate with each other although they are connected to the same switch. The resulting security is yet another reason to use VLAN.
Auto-negotiation adjusts the speed and the duplex mode of each port, based on the capability of connected devices. Flow control (or back pressure) regulates transmission between two nodes running at different speeds or duplex modes. Auto-negotiation and flow-control may need to be disabled for some operations involving legacy equipment. Disabling the auto-negotiation is accomplished by fixing the speed or duplex mode of a port. Disabling of flow control is also performed on an individual port basis.

Setting up the Console Port Connection

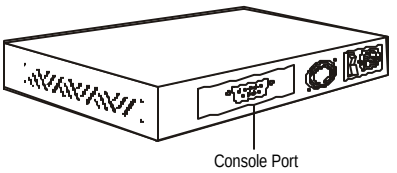
To configure these features through the console port, it is necessary to first configure a terminal emulation program in DOS or in Windows such as HyperTerminal.

Check the switch, cables, and computers for proper installation before configuration.

Attach a PC or any VT100 compatible terminal to the console port on the back of the switch (see figure 6) using the following settings:

Terminal type	VT100
Port type	(COM 1~4)
Communication Mode	8 data bits, 1 stop bit, no parity and 9600bps (for initial configuration)
Flow Control	None
Hardware Compression	NA

Figure 6. Console Port



Turn on the switch and press any key to view the main menu shown below:

```
SLOT    VLAN  Port List
--------  --------------------
A. 2004  V1     A1,A2,A3,A4,B1,B2,B3,B4,C1,C2,C3,C4
B. 2040  V2      <empty>
C. 2040  V3      <empty>
         V4     <empty>

Port    Type    Speed/Duplex Mode  Flow Control  VLAN List
------  ------  ---------------------------------------------
  A1     TX          Auto->100TX,Full   On          V1
  A2     TX          Auto->100TX,Full    On         V1
  A3     TX          Auto->100TX,Full    On         V1
  A4     TX          Auto->100TX,Full    On         V1
  B1     FX            100FX-Fullduplex   On        V1
  B2     FX            100FX-Fullduplex   On        V1
  B3     FX            100FX-Fullduplex    On       V1
  B4     FX            100FX-Fullduplex    On       V1
  C1     FX          100FX-Fullduplex     On          V1
  C2     FX          100FX-Fullduplex     On          V1
  C3     FX          100FX-Fullduplex     On          V1
  C4     FX          100FX-Fullduplex     On          V1
```

The following are the valid commands:

[V] Configure VLAN groups
[M] Select 10/100Mbps and half or full-duplex mode
[D] Restore the default settings
[ESC] Abort and return to the menu

By default, all TX ports are V1 (VLAN group 1), auto-negotiation and flow control ON.

The default setting for the FX ports is V1, 100FX full duplex, and flow control ON.

The menu will indicate what speed the port is currently running (i.e.: **auto->100TX full**) or if the port is not connected, the display reads **auto->No Link.**

Virtual LAN

Local area networks (LANs) are increasingly being divided into workgroups connected via common backbones to form Virtual LAN (VLAN) topologies. This enables efficient traffic separation, provides better bandwidth utilization, and alleviates scaling issues by logically segmenting the physical LAN into different segments so that packets are switched only between ports within the same VLAN. This switch supports four port-based VLAN domains; so that connected nodes on the network can be logically grouped into four separate virtual networks.

Configure VLAN Groups

The port numbers are designated alpha-numerically. The letters A, B, and C identify the module slots from left to right. Next to the letter, the model number further identifies the module slots. Consult Table 1, the model chart on page 7 for clarification.

Select **[V]** from the Main Menu. Next, Select **[V1]**, **[V2]**, **[V3],** or **[V4].** Enter port numbers with a comma and no space between them. To enter an entire module, use just the letter A, B, or C. Only one VLAN group can be defined at a time. Repeat selecting VLAN groupings and assigning ports, and hit the **[ESC]** key when done. To return to the default settings, enter **[D]** from the

main menu. The [**D]** command will also change any communication mode modifications. A prompt verifies that you want to erase all current settings and reset to default. Though each VLAN grouping does not need to be utilized, each port must be assigned to at least one VLAN group.
Example:

- Enter **[V1]** (no enter)

```
The current V1 is A1,A2,A3,A4,B1,B2,B3,B4,C1,C2,C3,C4
Please enter the new port list ->
```

- Key A,B4

Proceed with the assignment of the remainder of the ports into any VLAN grouping. Until assigned, the menu will display **error** for each unassigned port. While any port is in the **error** status, the [**ESC**] key will not return to the main menu.

- Enter [**V2**]
- Key B1,B2,B3,C2
- Enter [**V3**]
- Key C1,C3,C4

View the results on the following illustration.

```
SLOT    VLAN       Port List
--------  --------------------
A. 2004     V1       A1,A2,A3,A4,B4
B. 2040     V2        B1,B2,B3,C2
C. 2040     V3        C1,C3,C4
            V4        <empty>

Port     Type     Speed/Duplex Mode  Flow Control  VLAN  List
------  ------ ------------------------------------------------
  A1     TX          Auto->100TX,Full   On          V1
  A2     TX          Auto->100TX,Full    On         V1
  A3     TX          Auto->100TX,Full    On         V1
  A4     TX          Auto->100TX,Full    On         V1
  B1     FX            100FX-Fullduplex     On      V2
  B2     FX            100FX-Fullduplex     On      V2
  B3     FX            100FX-Fullduplex     On      V2
  B4     FX            100FX-Fullduplex     On      V1
  C1     FX          100FX-Fullduplex     On          V3
  C2     FX          100FX-Fullduplex     On          V2
  C3     FX          100FX-Fullduplex     On          V3
  C4     FX          100FX-Fullduplex     On          V3

Please enter the VLAN# or ESC to Abort (V1-V4)->
```

Forced Modes

The MediaRack Modular Switch System negotiates either 10Mbps or 100Mbps automatically. Transmissions over the ports are two-way, or full duplex, and flow control automatically enables transmission from 100Mbps to 10Mbps nodes without loss of data. It may be preferable, especially when operating both nodes in legacy 10Mbps, to alter these automatic functions on individual ports.

Configure Port Settings

Enter **[M]** to change the communication mode of individual ports. Only one port can be changed at a time. Repeat selecting ports and communication settings (by entering the setting number) and hit the **[ESC]** key when done. To return to the default settings, enter **[D]**. The **[D]** command will also change any VLAN modifications. A prompt verifies that you want to erase all current settings and reset to default.

Change the speed/duplex mode setting:

- Enter **[M]** (no enter) on the main menu
- Select a port
- Select the communication mode

The communication mode options vary between TX and FX ports. Consult the following charts for a brief description:

Table 5: **TX Communication Settings**

#	**Communication Mode**	**Description**
0	Flow Control *	Toggles ON/OFF
1	Auto **	Auto-Negotiation
2	**100TX, full-duplex**	100Mbps at full-duplex mode
3	100TX, half-duplex	100Mbps at half-duplex mode
4	10TX, full-duplex	10Mbps at full-duplex
5	10TX, half-duplex	10Mbps at half-duplex

* Default setting is flow control ON

** Default setting is auto-negotiation

Table 6: **FX Communication Settings**

#	**Communication Mode**	**Description**
0	Flow Control *	Toggles ON/OFF
1	100FX, full-duplex **	100Mbps at full-duplex
2	100FX, half-duplex	100Mbps at half-duplex

*** Default setting is flow control ON**

**Default setting is 100FX, full-duplex

The following is an example:

- Type **[M] (**no [**enter**]**)**
- Select port A4
- Select communication mode 5

View the results on the following illustration.

```
SLOT    VLAN   Port List
--------  -------------------
A. 2004      V1      A1,A2,A3,A4,B4
B. 2040      V2      B1,B2,B3,C2
C. 2040      V3      C1,C3,C4
             V4      <empty>

Port    Type     Speed/Duplex Mode  Flow Control  VLAN  List
------  ------------------------------------------------------
  A1    TX       Auto->100TX,Full   On          V1
  A2    TX       Auto->100TX,Full    On         V1
  A3    TX       Auto->100TX,Full    On         V1
  A4    TX       10TX, halfduplex    On         V1
  B1    FX         100FX-Fullduplex    On       V2
  B2    FX         100FX-Fullduplex    On       V2
  B3    FX         100FX-Fullduplex    On       V2
  B4    FX         100FX-Fullduplex   On        V1
  C1    FX       100FX-Fullduplex     On          V3
  C2    FX       100FX-Fullduplex     On          V2
  C3    FX       100FX-Fullduplex     On          V3
  C4    FX       100FX-Fullduplex     On          V3

VLAN,Mode,Default  (V/M/D) ?
```

Networking Examples

This section supplies examples of how you could establish the MediaRack Modular Switch System in your network.

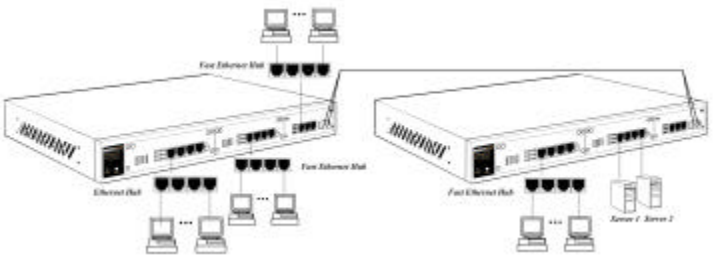


Figure 7: Establish collapsed backbone for workgroups.

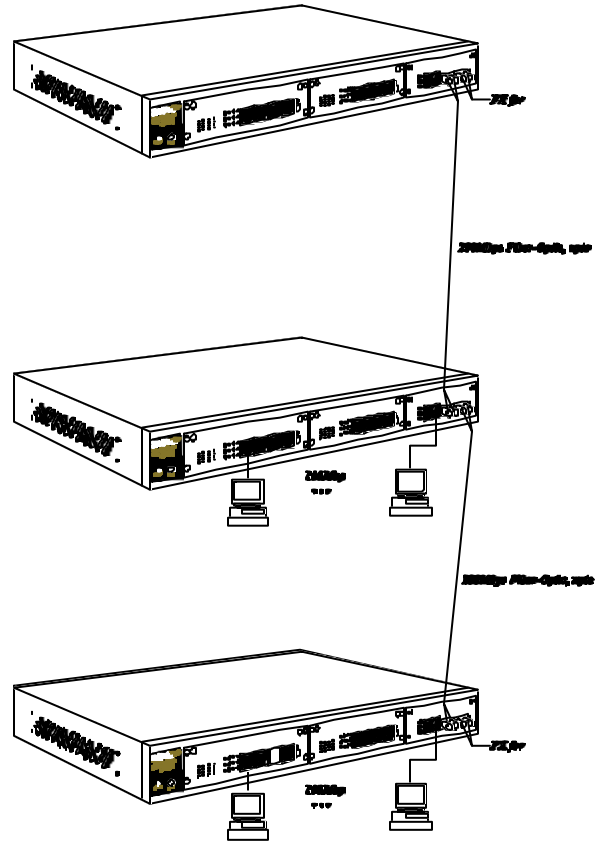


Figure 8: Cascade switches to network between buildings.

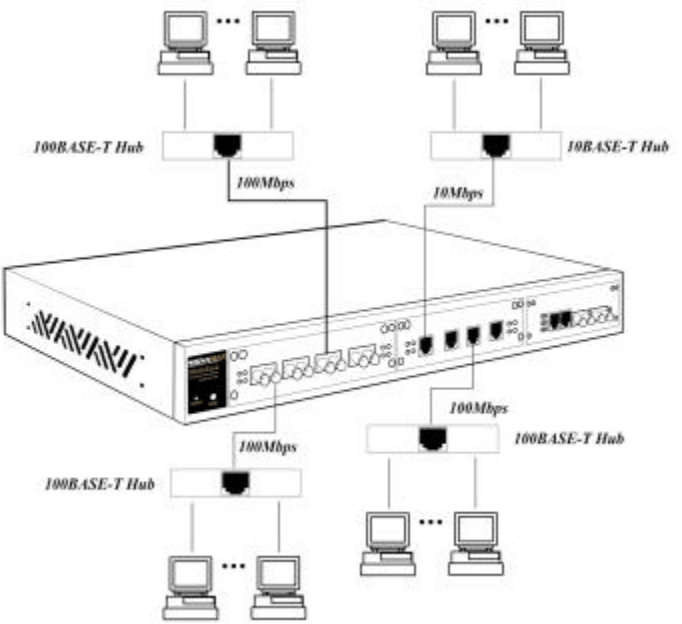


Figure 9: Bridge existing hub-based 100BaseTX and 10BaseT networks

4

SPECIFICATIONS

Applicable Standards	10BaseT, IEEE 802.3 100BaseTX, IEEE 802.3u
Speed	
100BaseFX:	200Mbps full-duplex 100Mbps half-duplex
100BaseTX:	200Mbps full-duplex 100Mbps half-duplex
10BaseTX:	20Mbps full-duplex 10mbps half-duplex
Performance	148,800 pps at 100Mbps 14,880 pps at 10Mbps
Chassis LED Indicators	Power
TX port LED Indicators	100Mbps/Transmit, 10Mbps/Receive, Full Duplex/Collision, Uplink (for full TX modules)
FX port LED Indicators	Link/Transmit, Full-duplex/Receive
VLAN	Port Based

Dimensions	W444 mm X D235 mm X H44 mm W17.5 in. X D9.3 in. X H1.7 in.
Weight	3.5 kg (approx.) 7.7 lb. (approx.)
Power Input	100-240Vac 50-60Hz Universal Power Supply
Power Consumption	30W maximum for 3 FO-065-75204TX modules (differs with module type)
Heat Generated	85 BTU/hr (approx) for 3 FO-065-75204TX modules (differs with module type)
Operating Temperature	0°C to 40° C 32°F to 104°F
Storage Temperature	-25°C to 70°C -13°F to 158°F
Humidity	10%-90% non-condensing
Emissions	FCC part 15 class A CE Mark VCCI Class A
Safety	UL listed

A

CONNECTOR PINOUTS

Pin arrangement of RJ-45 connectors

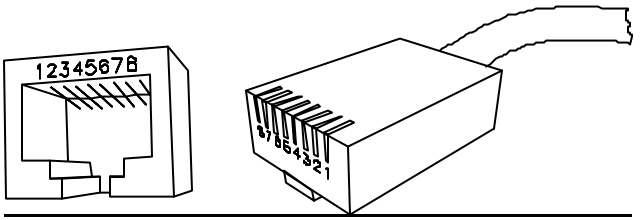


Figure 10: RJ-45 Connector and Cable Pins

The following table lists the pinouts of 10/100BaseT/TX ports:

Table 7: Connector Pin-Out

Pin	Regular Ports	Uplink port
1	Input Receive Data +	Output Transmit Data +
2	Input Receive Data -	Output Transmit Data -
3	Output Transmit Data +	Input Receive Data +
4	NC	NC
5	NC	NC
6	Output Transmit Data -	Input Receive Data -
7	NC	NC
8	NC	NC

B

INTRODUCTION TO LAN & ETHERNET TECHNOLOGIES

As communication and business applications become increasingly complex, computer networking has evolved as a very important part of the infrastructure.

Communication systems like Local Area Network (LAN) evolved into sophisticated, powerful, yet flexible technology. Among the different types of LAN technologies, Ethernet represents the best in speed, cost, ease of installation, and supportability.

LAN

Local Area Network (LAN) technology gave personal computers the power to share resources of hardware and software. LAN connects personal computers, file servers, printers, etc. together within a geographical area, usually a single building. Multiple, widely dispersed LAN systems are referred to as a wide area network (WAN).

Ethernet Technologies

More than 80 percent of all LANs utilize Ethernet technology. The Institute of Electrical and Electronic Engineers (IEEE) standardized Ethernet in IEEE 802.3, which provides for configuration rules, interaction requirements, types of media, and data rate.

Fast Ethernet

For networks that need higher transmission speeds, a faster speed was developed and IEEE next established IEEE 802.3u, raising the Ethernet speed from 10 Mbps to 100 Mbps. Thus, Fast Ethernet arose and users quickly began converting from 10Mbps to 100Mbps.

Gigabit Ethernet

The demand for even higher speed created Gigabit Ethernet at 1000Mbps (or 1Gbps). The newer IEEE standard for Gigabit Ethernet are IEEE 802.3z for a fiber-optic pair and IEEE 802.3ab for Category 5e or better twisted pair. Watch for 10 gig Ethernet.

Ethernet Products

Hub

One of the earlier connection solutions for Ethernet, a hub (also called a repeater) operates by broadcasting data to all ports simultaneously, only to repeat it when it is not received. The hub works through a "shared network" with all of the nodes in the network segment sharing the same collision domain. Switches and bridges emerged

because of a need to separate collision domains that are too large, therefore improving performance and network reliability.

Switch

A switch solves the collision problem by working as a single domain. A Switch maps the physical Ethernet addresses of the nodes residing on each network segment and then allows only the necessary traffic to pass through. Packets of data are transmitted along with the destination and source segment.

There are two basic architectures of LAN switches, cut-through and store-and-forward. Cut-through switches consider only the destination address before forwarding it on to its destination segment, but store-and-forward architecture accepts and then analyzes the entire packet before forwarding. This allows the switch to stop certain packet errors from propagating through the network. The store-and-forward switch eliminates redundant or corrupted packets, thus increasing the efficiency of the network transmission.

C

VLANs

Virtual local area network (VLAN) is a network configuration in which nodes are grouped into logical, rather than physical networks. Figure 13 & 14 below shows the difference between LAN and VLAN. The segmentation in VLAN creates secured areas where sensitive information is not shared and creates its own broadcast domain within the group to effectively reduce broadcast traffic, providing higher network efficiency and security.

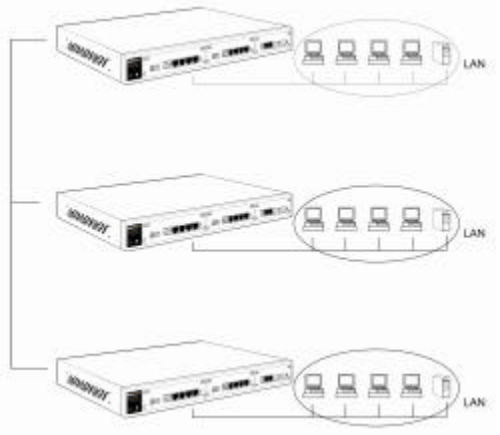


Figure 11: LAN Segmentation

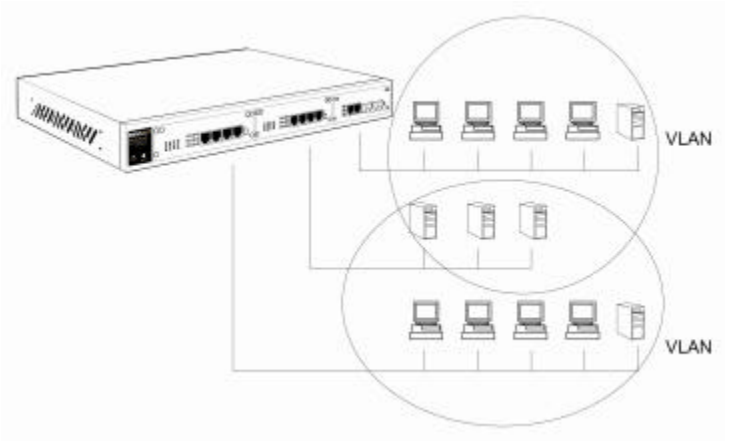


Figure 12: VLAN Segmentation

D

GLOSSARY

10BaseT	Networking standard for twisted-pair cabling capable of carrying data at 10Mbps; also called Twisted Pair Ethernet
100BaseT	Networking standard for twisted-pair cabling capable of carrying data at 100Mbps; also called Fast Ethernet
100BaseTX	Networking standard for two pairs of high-quality twisted-pair wires carrying data at 100Mbps
10BaseFL	Networking standard for fiber-optic cabling capable of carrying data at 10Mbps
100BaseFX	Networking standard for fiber-optic cabling capable of carrying data at 100Mbps
100BaseX	Networking standard for carrying data at 100Mbps

Adapter (Network)	Expansion card that enables a computer to attach to a network
ASIC	Application-specific integrated circuit; a chip designed for a particular application and built by connecting an existing arrangement of circuit building blocks in new ways; ASICs are commonly used in networking devices to maximize performance with minimum cost
ATM	Asynchronous transfer mode; network technology capable of transmitting data, voice, video, and frame-relay traffic in real time
Auto-discovery	Process by which a network device automatically searches through a range of network addresses and discovers all known types of devices present in that range
Auto-negotiation	Two-part process by which a network device automatically senses the speed and duplex capability of another device
Backbone	Interconnection within a LAN or WAN between subnetworks or workgroups within an enterprise
Backplane	Bus or switching matrix that

	resides within a switch or hub chassis; all traffic through such a device crosses the backplane at least once
Bandwidth	Amount of data that can be transmitted in a fixed amount of time; usually expressed in bits or bytes per second
Broadcast	Message forwarded to all destinations on a network
Bus	Connector or set of connectors that serve as the interconnection between related devices; common bus types in personal computers include Industry-Standard Architecture (ISA), Extended Industry-Standard Architecture (EISA), and Peripheral Component Interconnect (PCI)
Bus-type stack	Stack arrangement where the individual components are connected along a single shared cable
Category 5	Networking standard certifying that a copper wire cable can carry data at up to 100Mbps
Client/Server	Distributed computing model where desktop "clients" can access and share information resources from multiple "servers"
Collapsed backbone	LAN architecture in which the subnetwork interconnection is

	concentrated within a switching hub or router
Collision	Concurrent Ethernet transmissions from two or more devices on the same segment
Concentrator	Device used in a LAN to combine transmissions from a cluster of nodes; often called a hub
CRC	Cyclical redundancy check; a procedure used to check for errors in data transmission
DAS	Dual-attach station; a type of node that offers two connections, with each connection going to another node or concentrator
Desktop switch	A switching hub designed to support a single MAC address, or client on each port
EIFO	Ethernet in, FDDI out
Ethernet	Networking standard for transmitting data at 10Mbps
Fast Ethernet	Networking standard for transmitting data at 100Mbps
FDDI	Fiber distributed data interface; networking standard for 100Mbps fiber-optic LANs; widely used as a backbone technology to interconnect several Ethernet or Token Ring networks
Fiber-optic cable	Cable made of thin glass threads that carry data in the form of light

	pulses
Firmware	Software routines that are permanently written onto read-only memory
Full-duplex	Communications technique that allows two-way, simultaneous transmission between two devices on a single 10BaseT segment
Gigabit Ethernet	Networking standard for transmitting data at 1000Mbps
half-duplex	A communications technique in which one device on a segment transmits while the other receives, then the process is reversed
HTTP server	Software that serves HTML documents and associated files requested by clients such as Web browsers
Hub	A device providing a common connection among computers in a star-type network; all ports within a hub share the total bandwidth of the domain
IEEE 802	Set of Institute of Electrical and Electronic Engineers standards for defining methods of access and control on LANs
In-band	Transmission of control information within the bandwidth frequencies that transfer a network's data

LAN	Local area network; a network where computers are connected in close proximity, such as in the same building or office park; a system of LANs connected at a distance is called a wide-area network (WAN)
MAC address	Media access control address; a hardware address that uniquely identifies each node of a network
MIB	Management information base; a database containing the names of all the information resources a management program might need
Master	Any device that controls another device; controlled devices are called slaves
Mbps	Millions of bits per second
MDA	Media-dependent adapter
OEM	Original equipment manufacturer; a manufacturer that typically purchases components from other manufacturers, integrates them into its own products, and sell the products to the public
Out-of-band	Transmission of control information outside the bandwidth frequencies that transfer a network's data
PCI	Peripherals component interface; a standard developed by Intel Corporation that defines

	a local bus system; most modern PCs include a PCI bus in addition to a more general ISA expansion bus
Port density	Number of ports, either physical or logical, per network device
Port mirroring	Advanced feature of switching hubs that allows one port's MAC layer data to be replicated to another port for monitoring by a network analyzer
Power-Link(tm)	Group of port connections between switches that allow traffic loads to be balanced among these connections to increase the total bandwidth of the interconnection; this term is trademarked by NPI
RMON	Remote monitoring; a network management protocol that allows network information to be gathered at a single workstation
Runt	Any frame that is shorter than the minimum valid size of 64 bytes; runt frames are usually caused by collisions or faulty network interface cards
Segment	Section of a network that is bounded by bridges, routers, hubs, or switches; dividing an Ethernet into multiple segments is a common way to increase bandwidth on a LAN
SAS	Single-attach station; a type of

	node that allows for a single cable connection to a concentrator
Slave	Any device that is controlled by another device; the controlling device is called a master
SNMP	Simple network management protocol; a standard for gathering statistical data about network traffic and the behavior of network components; SNMP uses management information bases (MIBs), which define what information is available from any manageable network device
Spanning-tree algorithm	A process used to eliminate redundant data routes and increase network efficiency
Stand-alone	Type of device that does not require support from another device to function
Star-type stack	Stack arrangement with the components connected to one another via a centralized hub
Store-and-forward	Switching feature where the receiving port receives the entire incoming frame and stores it in the buffers before forwarding it to the destination port; unlike cut-through switching, this method checks for runts and error frames and forwards only the good packets to the destination

Switch	Device that filters and forwards packets between LAN segments
Switch motherboard	Main board inside a switch where the switching circuitry is located
Switching fabric	A term used to specify the maximum bandwidth of a switch at the backplane
UTP	Unshielded twisted pair; cabling with wires that are twisted around each other; the individual wires are uninstalled
VAR	Value-added reseller; a company that buys hardware and software and resells it to the public with added services such as user support
VLAN	Virtual LAN; a process that defines network segment membership through the use of software; VLANs allow the network administrator to resegement the network without physically rearranging the devices or network connections
WAN	Wide-area network; a network that uses telecommunications technology to connect computers or networks over long distances
Wire speed	The ability to handle the fastest rate of traffic that a generator can deliver without dropping packets; on a 100Mbps

	connection, wire-speed traffic is 148,809 packets per second using 64 byte frames or 8,127 packets per second using 1,518 byte frames
Work - Group	Collection of computers that are grouped for sharing resources such as data and peripheral

E

CONTACT INFORMATION

SIGNAMAX CONNECTIVITY SYSTEMS
An AESP Company
1810 N.E. 144th Street.
North Miami, Florida 33181, U.S.A.
Phone: 305-944-7710 Fax: 305-652-8489
Sales: 800-446-2377 Tech. Support: 800-446-2377, ext. 201

Http:\\www.signamax.com
E-mail: info@signamax.com

EUROPE

AESP Ukraine. (UKRAINE)
2 Timiryazevskaya St. 47
252014 Kiev, Ukraine
Phone: +380 44 296.53.57
Fax: +380 44 294.88.60
Http:\\www.aesp.com.ua
E-mail: aesp@aesp.com.ua

AESP Sweden. (SWEDEN)
Grevegatan 19-21 SE-815
40 TIERP. SWEDEN
Phone:+46-(0)-293-228 88
Fax:+46-(0)-293-228 89
Phone:+49-81-35-9303-0
Http:\\www.aesp.se
E-mail: info@aesp.se

AESP Russia. (RUSSIA)
Kronshtadtsky Blv.
125499 Moscow, Russia
Phone:+7 095-456-0704
Phone:+7 095-456-0344
Fax:+7 095-454-3040
Http:\\www.aesp.ru
E-mail: aesp@aesp.ru

AESP Germany GmbH (GERMANY)
Weisserfelderstr.2 D-85551
Kircheim b. München,
Germany
Phone:+49-89-901-097-0
Fax:+49-89-901-097-22
E-mail: aesp.info@t-online.de

JOTEC AESP AS.
(NORWAY)
Telefon 23 14 17 00
Ordrefax 23 14 17 10
Karihaugveien 102
Postboks 50 Ellingsrudasen
1006 Oslo, Norway
Phone:+47-23-14-1700
Fax:+47-23-14-1710
Http:\\www.jotec.no
E-mail: jotec@jotec.no