GarrettCom

Ethernet at Its Best™

Magnum DS80F & DS80C Personal Hubs

Installation and User Guide

Magnum™ DS80F & DS80C Personal Hub®

Installation and User Guide

Part #: 84-00064, (Rev D 12/01)

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Important: Magnum DS80F and DS80C Dual-Speed Hubs contains no user serviceable parts. Attempted service by unauthorized personnel shall render any and all warranties null and void. If problems are experienced with a Magnum DS80F or DS80C, consult Section 5, Troubleshooting, of this User Guide.

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Federal Communications Commission

Radio Frequency Interference Statement

This equipment generates, uses and can radiate frequency energy and if not installed and used properly, that is in strict accordance with the manufacturer's instructions, may cause interference to radio communication. It has been tested and found to comply with the limits for a Class A computing device in accordance with the specifications in Subpart J of Part 15 of FCC rules, which are designed to provide reasonable protection against such interference when operated in a commercial environment. Operation of this equipment in a residential area is likely to cause interference, in which case the user at his own expense will be required to take whatever measures may be required to correct the interference.

The Magnum Line

ETHERNET CONNECTIVITY PRODUCTS

"DESIGNED AND MANUFACTURED IN THE USA"

OVERVIEW

GarrettCom, Inc.offers the premium-quality Magnum™ line of Ethernet LAN connectivity products with industry-standard functionality and built-in fiber configurability. Magnum products are designed for use in demanding Carrier Class, Industrial Grade and OEM applications where reliability is a primary consideration.

4K-Series Switches, 100 & 10Mbps, copper ports with optional fiber port, with auto-negotiating full switching performance.

Quad-Series Fiber Switches, 100 & 10Mbps, fiber and copper ports, mixed-speed and mixed-media types, full switching performance.

"Outdoor" Ethernet Switch, for temperature uncontrolled locations

6 10/100 and 2 100Mb fiber ports, can be connected in strings

Mixed-Media Fiber Hub, 16-port Stackable, 10/100 auto-sensing

Dual Speed 8-port and 16-port Stackables, 10/100 auto-sensing

Stackable Hubs, SNMP Optional

10Mb series and 100Mb series, both w/ optional port modules

Personal Switches, 10/100Mb

8 port dual speed, Auto-negotiable with fiber option

Personal Hubs, 100Mb or 10/100Mb

8-port, with two switched ports (1 fiber built in)

Personal Hubs, 10Mb series

8-port + AUI, stackable to 5 high, + optional BNC of fiber port
8 or 9-port and 4 or 5-Port Personal Hubs, w/ man. up-link sw.

Media Converters, 10Mb and 100Mb series

All media combinations, incl. fiber ST, SC, mm., single mode

The "X-line" of configurable MiXed Media products:

Stackable Concentrators, SNMP optional, 13-Ports
Mini-Concentrators, 7 Ports, **Repeaters**, 2-Ports
Repeater Port Modules (RPMs), 6 types for Ethernet media
Bridge Port Modules (BPMs), 4 types, for segment isolation

Fan-Outs, 10Mb series

2, 4 and 8 Port Model

Transceivers, 10Mb and 100Mb series 10Mb Mini-Transceivers and Coax Models, All Types -

Dec, 01

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Revisions

Rev D 12/01 : Updated the Manual switch F-H and FF-A support to SW1 and SW2

Rev C 09/01 : Change the company name to GarrettCom, Inc. (Formerly it was Garrett Communications). There are no changes to the content of the material at this time

Rev B 04/00: Added long reach (40km) fiber connector information.

Rev A 10/99 : This revision is the initial release of the 4K8 Switches user manual.

1.0 SPECIFICATIONS

1.1 Technical Specifications

Performance of Dual-Speed Ports

When a port is operating at 100Mbps:
Data Rate: 100Mbps
When a port is operating at 10Mbps:
Data Rate: 10Mbps
Partitioning: Enforced after 63 consecutive collisions
Auto-reconnect: Occurs after one packet of error-free reception

Network Standards

100Mb: Ethernet IEEE 802.3u, 100BASE-TX, 100BASE-FX
10Mb: Ethernet IEEE 802.3, 10BASE-T
Auto-sensing for speed: IEEE 802.3u

Packet-Processing Between Domains

Filtering and Forwarding Rate from 100Mbps ports: 148,800 pps max
Filtering and Forwarding Rate from 10Mbps ports: 14,880 pps max.
Processing type: Store and Forward
Auto-learning: 8K address table, shared for all traffic domains
Packet buffers: 512KB, dynamically shared on all domains
Latency (not including packet time): 100 to 10Mbps: 5µs
10 to 100Mbps: 5µs

Path Delay Value: 50 BT on all ports

Maximum Ethernet Segment (or Domain) Lengths

10BASE-T (Unshielded twisted pair)	- 100 m (328 ft)
100BASE-TX (CAT 5 UTP)	- 100 m (328 ft)
100BASE-FX, half-duplex: (multi-mode)	- 412 m (1350 ft)
100BASE-FX, full-duplex: (multi-mode)	- 2.0 km (6,562 ft)
100BASE-FX, half-duplex: (single-mode)	- 412 m (1350 ft)
100BASE-FX, full-duplex: (single-mode)	- 20.0 km (65,620 ft)
100BASE-FX, full-duplex: (single-mode, long)	- 40.0 km (131,240 ft)

Operating Environment

Ambient Temperature:	32°F to 104°F (0°C to 40°C)
Storage Temperature:	-5°C to 160°F (-20°C to 70°C)
Ambient Relative Humidity:	10% to 95% (non-condensing)

Power Supply (External)

Input: 95-125 vac at 60Hz for "-d" Models
200-250 vac at 50Hz for "-i" Models, which have IEC power cable connector in the external power unit.
Output: 5VDC, 2Amps
Polarity: center positive, shell negative
Power Consumption: 8 watts typical, 10 watts max.

External -48VDC Power Supply (Optional)

Power Input Voltage: 36 to 70 VDC (auto ranging), "-, GND, +"
Power Consumption: 8 watts typical, 10 watts max.

Network Cable Connectors - for eight RJ-45 shielded female ports and 1 fiber port

100Mbps: Category 5 UTP/STP, fiber (50/125, 62.5/125, 9/125 micron)

10Mbps: Category 3, 4, 5 UTP (Note: auto-sensing does not sense cable type)

Maximum Load per port: 60 mA

Up-Link, Port # 1 SW

Port 1SW (switched RJ-45) has a manual crossover (MDIX up-link) switch for connection to a central switch or to another DS80F, DS80C (or equal) unit.

Manual Switch

DS80C: "FF" or "A" switch

Port 2SW (a switched port) has a "FF-A" manual switch. In the "FF" position, it fixes port 2 at Full 100Mb. In the "A" position, port 2 is set at auto-negotiation

DS80F: "F" or "H" switch

Ports 1SW and 2SW (the switched ports) have a common "F-H" manual switch. In the "F" position, it causes full-duplex mode to be advertised for the standard 802.3u auto-negotiation session on port 1SW. For fiber, it forces full-duplex mode at 100Mb. In the "H" position, it causes half-duplex mode to be advertised for auto-negotiation, and for fiber it forces half-duplex mode.

See Section 4.3 for details.

Packaging

Enclosure: Rugged high-strength sheet metal. Metal mounting clips included. Suitable for wiring closet shelf, wall or desktop mounting.
Dimensions: 1.25 in H x 6.75 in W x 5.0 in D (3.2 cm x 17.1 cm x 12.7 cm)
Weight (of hub unit): 1.0 lb. (455 g.)
Weight (of power supply unit): 1.0 lb. (455 g.)
Cooling method: Convection

LED Indicators

PWR: Steady On when power applied
ERROR: Self-test at power up failed
SPEED (with LINK ON): ON = 100Mbps; OFF = 10Mbps
LINK/ACT: Steady On for LINK with no traffic, blinking indicates port is transmitting / receiving.
F/H (for port 1SW and 2SW only): ON = full-duplex, OFF = half-duplex

Agency Approvals

UL Listed (UL 1950), cUL, CE
Emissions: meets FCC Part 15, Class A

Warranty: Three years, return to factory Made in USA

1.2 Ordering Information

Magnum DS80F -10/100 Dual-Speed Personal Hubs with a 100Mb Fiber Port

Magnum DS80F-MSC-d, or -i: 8-port Dual-Speed Personal Hub with one full-duplex 100Mbps switched fiber port (multi-mode SC-type connector), one "N-way" switched RJ-45 port, and six half-duplex 10/100 auto-negotiating ports. Includes store-and-forward switching that filters and forwards data moving between the two switched ports, among the 10/100 user ports. The internal switch has 8K nodes address table and 512KB packet buffers. External 115vac 60Hz power supply.

Magnum DS80F-MST-d, or -i: Same as DS80F but with multi-mode ST- type fiber connector.

Magnum DS80F-SSC-d, or -i: Same as DS80F but with single-mode SC-type fiber connector.

Magnum DS80F-MTRJ-d, or -i: Same as DS80F but with multi-mode MTRJ-type fiber connector.

Magnum DS80C -10/100 Dual-Speed Personal Hubs with all copper ports

Magnum DS80C-d, or -i: Dual Speed 10/100 8-port "copper" office hub with two 10/100 N-way switched ports and six half-duplex 10/100 auto-negotiating ports. Includes store-and-forward switching that filters and forwards data moving between the two switched ports, and among the 10/100 user ports. The internal switch has 8K node addresses and 512KB packet buffers. External power supply.

Use "-d" suffix for external power supply at 115vac 60Hz; use "-i" suffix for external at 230vac 50Hz.

GarrettCom, Inc. reserves the right to change specifications, performance characteristics and / or model offerings without notice.

2.0 INTRODUCTION

2.1 Inspecting the Package and Product

Examine the shipping container for obvious damage prior to installing this product; notify the carrier of any damage that you believe occurred during shipment or delivery. Inspect the contents of this package for any signs of damage and ensure that the items listed below are included.

This package should contain:

1 Magnum DS80F Dual-Speed Hub with a Fiber Port or DS80C with all copper ports.

1 External Power Supply, 5VDC from either 115v 60Hz or 230v 50Hz

1 Set of metal clips and screws for secure shelf or wall-mounting

1 Installation and User Guide

1 Product Registration Card

Remove the Magnum DS80F or DS80C Dual-Speed Hub from the shipping container. Be sure to keep the shipping container should you need to ship the unit at a later date. To validate the product warranty, please complete and return the enclosed Product Registration Card to Garrett Communications as soon as possible.

In the event there are items missing or damaged, contact your supplier. If you need to return the unit, use the original shipping container. Refer to Chapter 5, Troubleshooting, for specific return procedures.

2.2 Product Description - General

The DS80F Dual-Speed Personal Hubs with a Fiber Port, and the DS80C model with all copper ports, offer the flexibility of 100Mbps switched fiber link upstream with the convenience of dual-speed 10/100 copper ports for workplace LAN connections.

Magnum D80F "Fiber" models have been designed with one full-duplex 100Mbps switched fiber port, one "N-way" switched RJ-45 and six half-duplex 10/100 auto-negotiating RJ-45 ports. The DS80C "Copper" model has been designed with all eight RJ45 ports, two switched ports with "N-way" capability and six half duplex 10/100 auto-negotiating ports. For half- or full duplex selection on the two switched ports, see sections 4.3 and 4.4.

Ports #3 to 8 can independently identify (via IEEE 802.3u auto-sensing) and accept either 100Mbps or 10Mbps Ethernet signals, adapting to match the highest speed of the connected device. While the switched fiber port is typically for a backbone connection (note – no media converter is required), the switched RJ-45 port can be used at 100Mb. FDX for

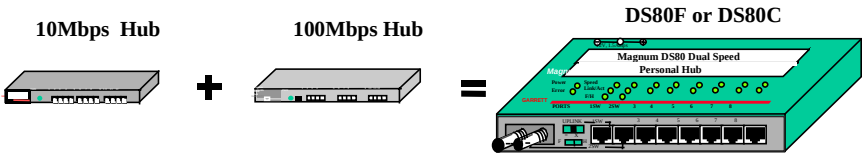
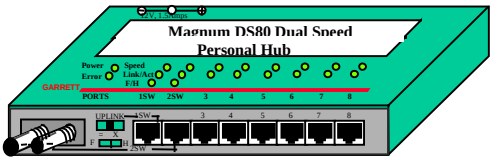


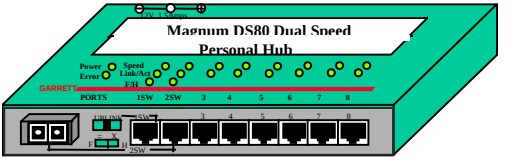
Figure 2.2.1: DS80F & DS80C is functionally both a 10Mbps and a 100Mbps hub in one

high-performance workplace servers or to cascade to another DS80-series for expansion. There are separate internal traffic domains in Magnum DS80F & DS80C hubs, one for the 100Mbps traffic and one for the 10Mbps traffic.

DS80F & DS80C ports #3 to 8 can connect into either the 100 or the 10Mbps traffic domain, and can also change from one traffic domain to the other at any time without affecting the speed of other ports. The automatic per-port speed-sensing is always ready (it takes place at LINK enable, see Section 4.2 for details), allowing the connected devices to change speed at any time without impairing the operation of the other ports and connected devices.

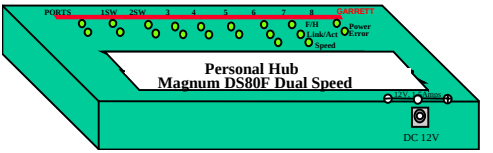
2.2.1 Magnum DS80F chassis with fiber ST or SC (mm or sgl. mode) connector





Fiber ST above, fiber SC at right

The Magnum DS80F chassis houses one main PC board. The power supply unit is external. The front side of the chassis has eight RJ-45 twisted-pair ports and one 100Mbps fiber port. Port #2SW always supports fiber ports only and the RJ-45 connector is inoperative at all times. LEDs to indicate operating status of all ports are mounted on the top. There are power (PWR) and ERROR (self-test at power up failed) indicators for the unit. For each port, there are Link and Activity (LINK/ACT) LEDs indicating traffic, and speed (ON for 100Mbps). Switched ports 1SW and 2SW have full-half (F-H) duplex indicators.

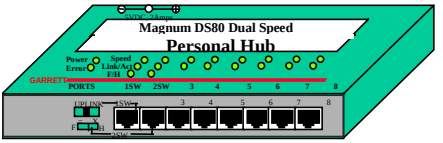


Rear View Magnum DS80-Series

The DC power plug connector or "jack" is in the left rear of the chassis.

The external power supply is 5VDC at either 95 - 125vac at 60 Hz for "-d" models or 120-250vac at 50Hz for "-i" models that have IEC power cable connector in the external power supply housing.

2.2.2 Magnum DS80C chassis with all RJ-45 Copper ports



The Magnum DS80C chassis houses one main PC board. The power supply unit is external. The front side of the chassis has eight RJ-45 twisted-pair ports. The 1SW and 2SW ports are switched ports with selectable Fullfixed- and Auto-negotiation (FF-A) capability. See section 4.4.

LEDs to indicate operating status of all ports are mounted on the top. There are power (PWR) and ERROR (self-test at power up failed) indicators for the unit. For each port, there are Link and Activity (LINK/ACT) LEDs indicating traffic, and speed (ON for 100Mbps). Switched ports 1SW and 2SW have full/half (F/H ON for full duplex) duplex indicators.

The DC power plug connector or "jack" is in the left rear of the chassis, like the DS80F. The external 5VDC power supply is for either 95 - 125vac at 60 Hz for "-d" models or 120-250vac at 50Hz for "-i" models that have IEC power cable connector in the external power supply housing.

2.2.3 10 / 100 Speed Auto-sensing

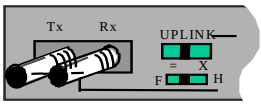
Ports #3 to 8, RJ-45 twisted pair HDX, support auto-sensing for speed independent of the other ports. Speed-sensing is performed by the DS80F and DS80C's electronics in accordance with the standards of the IEEE 802.3u auto-negotiation standard. If the connected device or node indicates that it is capable of 100Mbps speed, then operation on that port will be at 100Mbps. If the connected device does not positively indicate that it is capable of 100Mbps speed, then the operation on that DS80F and DS80C port will be at 10Mbps. Of course, the auto-negotiation technique, on ports #3 to 8, is only for 10/100 speed, and does not provide for any full-duplex operation.

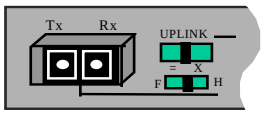
The per-port 10/100Mbps Link/Activity LEDs on the top panel indicate the result of auto-sensed speed detection, and the resulting connectivity to either a 10Mbps or 100Mbps device. The Speed LED will illuminate (GREEN) when 100Mbps signals are detected; the Speed LED will be OFF when 10Mbps signals (or no signals) are detected.

2.3 Up-link Port 1SW for Cascading

The unit has an up-link Port # 1SW, located on the left-front side of the hub. It enables the port's twisted pair cable to cascade to another shared hub, switching hub port or 10/100Mbps switch. (See Section 4.6 for more details about up-link). Unlike ports #3 to 8, port #1SW is capable of full- and half-duplex mode auto-sensing, based on the capability of the connected device. The up-link feature operates the same, whether Port # 1SW is connected to either 100Mbps or 10Mbps devices. When the up-link port is used to cascade two DS80F series hubs, the auto-sensing feature will cause the connecting link to operate at 100Mbps speed.

2.4 Fiber port for DS80F – Series





100Mbps Fiber port, ST-type mm or SC type(single-mode or multi-mode)

The Fast Ethernet fiber switched port on the Magnum DS80F is set to operate at fixed

100Mb speed for guaranteed high performance. The DS80F's fiber port is factory-built as either a multi-mode ST, multi-mode SC or single-mode SC connector. The 100Mb fiber port will run at 100Mbs speed at all times with manually selected full- and half-duplex capability. The 100Mbps fiber port is a switched port and performs as a domain, providing a high bandwidth backbone connection (no media converter is required!) and supporting long (up to 40km) fiber cable distances for installation versatility.

Ports 1SW and 2SW (the switched ports) have a common "F - H" user-selectable manual switch. When set in the "F" position, it causes full-duplex mode to be advertised for the standard 802.3u auto-negotiation session on RJ-45 ports, and for the fiber port, it forces full-duplex mode at 100Mb. When set in the "H" position, it causes half-duplex mode to be advertised for RJ-45 auto-negotiation, and for fiber it forces half-duplex mode.

On Magnum DS80F units, there are three LED's for the switched ports. One (LK/ACT) is steady ON to indicate LINK, blinking indicates the port is transmitting and receiving. The SPEED LED is ON for 100Mbps and OFF for 10Mbps (when LINK is made). The F/H indicates full-duplex when ON, when it is OFF, operation is half-duplex.

A fiber cable must be connected to the 100Mb port and a proper link (LK lit) must be made with the device at the other end of the cable in order for these LEDs to provide valid indications of operating conditions.

2.5 Features and Benefits

- **Supports 10 or 100Mbps network connections on RJ-45 ports # 3 to 8**

Magnum DS80F & DS80C Dual-Speed 10/100 hubs combine two logical hubs -- one at 10Mbps and one at 100Mbps -- in one physical box. Half-duplex ports #3 to 8 operate at either 10 or 100Mbps, independently of the other ports. Any mix of 10Mbps and 100Mbps users can be connected to the ports. Speed-sensing occurs at LINK enable and complies with IEEE 802.3u, providing interoperability with other products.

- **Internal switches connects all of the ports and users**

DS80F's and DS80C's have internal switches for filtering/forwarding traffic among the two switched ports (#1SW and #2SW) and the half-duplex 10/100 ports (#3 to 8), allowing all connected devices to communicate to each other. High performance switching provides full bandwidth in each domain, unaffected by local traffic on other domains.

- **DS80F's switched fiber-built-in 100Mb port #2, for "backbone" connectivity**

The F/H selectable 100Mbps fiber port(2SW) connects to a "future-proof" fiber cable from the local users upstream to the rest of the network. This is ideal in office buildings and classrooms where fiber is built into the infrastructure. No media converter is required. Different fiber connector types and modes are supported by different models, including 100Mb multi-mode, single-mode, and single-mode long.

- **Switched RJ-45 N-way port #1 for a high speed "copper" connection**

The (1SW) 10/100 switched RJ-45 port #1 can support a local server, a power user, another hub cascaded, or a switched "stack" connection to another DS80F, DS80C for expansion. An up-link switch is built in for port #1SW.

- **Installation is "Plug and Play", operation is transparent to software**

The Magnum DS80F & DS80C operates as a hardware switch, only forwarding those packets from each domain that are needed on the other domains. Internal address tables are self-learning, enabling users to change port connections or 10/100 domains without affecting operations.

- **Small enclosure enables use in offices, labs and classrooms**

The compact packaging of Magnum DS80F & DS80C's allows them to be installed in offices and labs, or virtually any workspace location within reach of a standard AC wall outlet. They come in a durable metal enclosure for table-top or wall-mount. There is a choice of external power supplies, for either 115vac or 230vac.

2.6 Applications

The DS80F & DS80C are designed to bring future-proof fiber connectivity and highly used copper connectivity to small user groups in offices, classrooms and labs.

Example 1. Magnum DS80F In this example, a Magnum DS80F Personal Hub serves a small office with multi-server and mixed-speed requirements. Some users operate at 100Mbps, and some users and utility devices (such as print servers) run at 10Mbps. High performance users need a high bandwidth backbone for access to a central LAN and central file servers. A Magnum DS80F Personal Hub serves this requirement economically. The two 1SW and 2SW full-duplex switched ports capability makes the required setup simple. Any attached node can change speed at any time without affecting network operation or impacting other users.

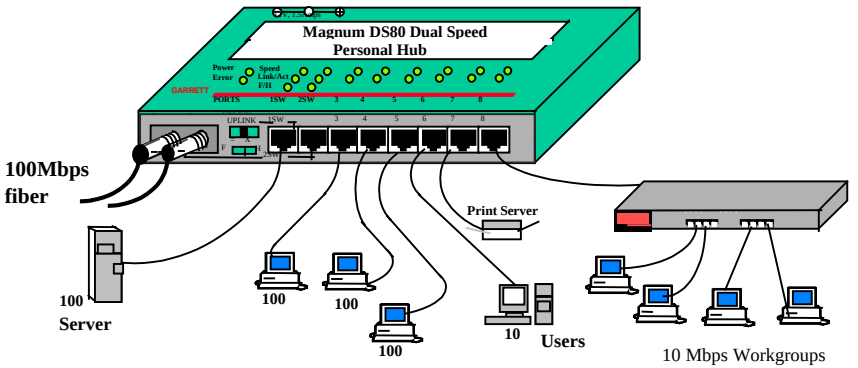


Figure 2.6.1: A DS80F connects combinations of 10Mbps and100Mbps network devices and provides a Fast Ethernet fiber backbone for access to the central LAN.

Where there is existing 10Mbps hubs and users, they can easily be cascaded into any port of the DS80F. This allows a simple plug-and-play addition of 100Mbps ports to an existing 10Mbps network without having to change it. Nodes that are capable of 100Mbps speed can be moved to a DS80F dual-speed port, and will automatically operate at the higher speed.

The 1SW full duplex 100Mbps switched port can support a local server for Fast Ethernet users. The 100Mb fiber port on the DS80F can be used for accommodating high performance data transfers, and provides fiber connectivity built-in rather than needing an auxiliary media converter unit. The 100Mbps traffic does not use the bandwidth of the 10Mbps domain, so overall performance of the network is sustained at the highest possible level.

Example 2. Magnum DS80C

The Magnum DS80C fits very well with small business seeing a growth in users volume and are forced to scale network quickly and cost effectively. Due to its 1SW and 2SW Full duplex switching capability, the DS80C provides a very economical high Bandwidth solution at copper port. The Dual-Speed functions supports a mixed environment of 10Mbps and 100Mbps users and the switching full duplex capability on 1SW and 2SW provides a high bandwidth uplink solution for expansion. The "FF-A" manual switch options for port 2SW allow this Hub to connect at Full duplex to any non-Auto-negotiating Switch using the "FF" mode.

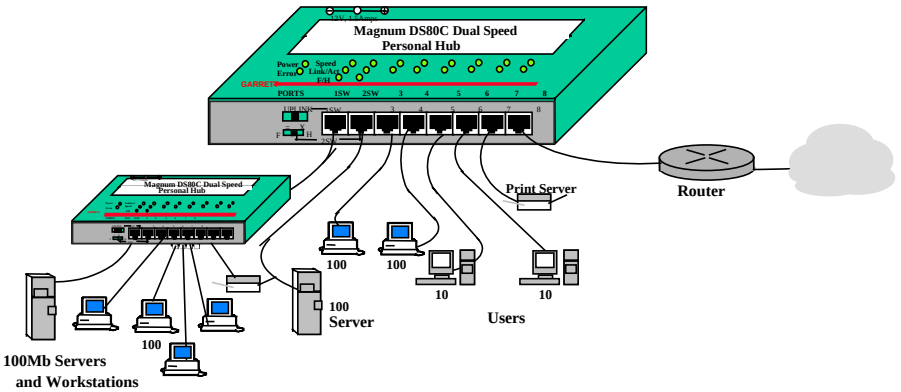


Figure 2.6.1: Two DS80C connects together to provide 10Mbps and100Mbps network with Fast Ethernet backbone.

In this example, two of the Magnum DS80C Personal Hub cascaded together to serve a small office with multi-server, print server, internet access and mixed-speed requirements. The users operate at 100Mb as well as at 10Mb and utility devices (such as print servers) run at 10Mbps. High performance users need a high bandwidth backbone for access to a central LAN and central file servers. Any attached node can change speed at any time without affecting network operation or impacting other users. The two DS80C cascaded together solve the requirement economically with reliability.

The Dual-Speed characteristic allows the DS80C to support the 10Mbps and 100Mbps traffic and always operates at the higher speed. The switching capability at 1SW and 2SW boosted the personal hub with its own switched 100Mbps or 10Mbps domain and provide a Fast ethernet backbone for expanding the network.

3.0 INSTALLATION

This chapter provides instructions for installing Magnum DS80F and DS80C hubs.

3.1 Locating Magnum DS80F & DS80C Dual-Speed Hubs

The location of a Magnum DS80F & DS80C Dual-Speed Personal Hub is dependent on the physical layout of the network. Typically the hub is located in a workplace site. The compact size of the unit allows it to be conveniently placed in an office, classroom or lab area, and it can also be either shelf- of wall-mounted (see mounting instructions in 3.1.2 below). Metal wall-mounting clips are included with the unit.

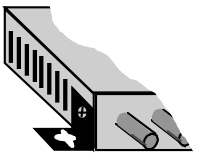
Locate an AC receptacle that is within six feet (2 meters) of the intended Magnum DS80F & DS80C site. The rugged metal case of the Magnum DS80F & DS80C will normally protect it from accidental damage in a lab or workplace setting. Maintain an open view of the top surface to visually monitor the status LEDs.

3.1.1 Table-Top or Shelf Mounting

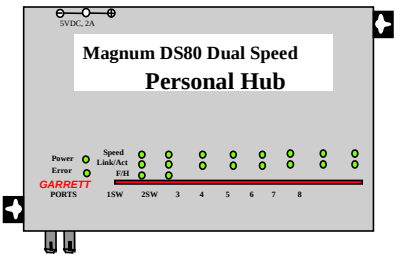
The Magnum DS80F & DS80C Dual-Speed Personal Hub can be easily mounted on a table-top or any suitable horizontal surface, and has four rubber feet to provide stability without scratching finished surfaces.

3.1.2 Wall (or vertical surface) mounting

Each Magnum DS80F and DS80C Personal Hub is shipped with two metal mounting brackets (and screws) to allow the unit to be mounted in nearly any desired orientation or position. The brackets are attached to the metal hub case using one of the metal screws for each bracket and attaching to the Magnum DS80F and DS80C through the round hole of the bracket. A user-supplied screw attaches the bracket to the mounting surface. It is recommended to use appropriate # 4 screws for attaching mounting bracket to wall (e.g wood screw, self-tapping screw, machine screw). It is also recommended that the brackets be attached to two opposite corners of the unit. When



Proper attachment of mounting bracket for wall mounting



Top view - Magnum DS80F with brackets attached for wall mounting

properly attached, the brackets will extend slightly below the base of the unit to allow clearance for the rubber feet.

3.2 Connecting Ethernet Media

The Magnum DS80C Dual-Speed Personal Hub can be connected to two media types i.e. 100BASE-TX and 10BASE-T, however, DS80F can be connected to the following three media types: 100BASE-TX, 10BASE-T and 100BASE-FX. CAT 5 cables should be used when making 100BASE-TX connections. When the ports are used as 10BASE-T ports, CAT 3 may be used. In either case, the maximum distance for unshielded twisted pair cabling is 100 meters (328 ft). For fiber port 100BASE-FX multi-mode, 50/125 or 62.5/125 microns cabling can be used, whereas for single-mode, 9/125 microns cabling should be used. Fiber cabling supports much longer cable distance and higher bandwidths as compared to copper wiring.

Media	IEEE Standard	Connector
Twisted Pair (CAT 3 or 5)	10BASE-T	RJ-45
Twisted Pair (CAT 5)	100BASE-TX	RJ-45
Fiber (Multi-mode)	100BASE-FX	ST
Fiber (Multi-mode)	100BASE-FX	SC
Fiber (Single-mode)	100BASE-FX	SC
Fiber (Multi-mode)	100BASE-FX	MTRJ

NOTE : *It is recommended that high quality CAT. 5 cables (which work for both 10Mbps and 100Mbps) be used whenever possible in order to provide flexibility in a mixed-speed network, since dual-speed ports are auto-sensing for either 10 and 100Mbps. Note that the auto-sensing function does not sense the cable type.*

3.2.1 Connecting Twisted Pair (RJ-45, CAT 3 or CAT 5, Unshielded or Shielded)

The following procedure describes how to connect a 10BASE-T or 100BASE-TX twisted pair segment to the RJ-45 port. The procedure is the same for both unshielded and shielded twisted pair cables.

1. Using standard twisted pair media, insert either end of the cable with a RJ-45 plug into the RJ-45 connector of the port. Note that, even though the connector is shielded, either unshielded or shielded cables and wiring may be used.
2. Connect the other end of the cable to the corresponding device.
3. Use the LINK LED to ensure proper connectivity by noting that the LED will be illuminated when the unit is powered and proper connection is established. If this does not help, ensure that the cable is connected properly and that the device on the other end is powered and is not defective.
4. For Port # 1SW, if the LINK LED is not illuminated, move the switch which has a cross-over or up-link for linking to another hub.

3.2.2 Connecting Fiber Optic ST-type, "twist-lock"

The following procedure applies to installations using ST-type fiber connectors. This procedure applies to ports using a multi-mode ST fiber connectors.

1. Before connecting the fiber optic cable, remove the protective dust caps from the tips of the fiber connectors. Save these dust caps for future use.
2. Wipe clean the ends of the dual connectors with a soft cloth or lint-free lens tissue dampened in alcohol. Make certain the connectors are clean before connecting.

   Note: ***One strand of the duplex fiber optic cable is coded using color bands at regular intervals; you must use the color-coded strand on the associated ports at each end of the fiber optic segment.***
3. Connect the Transmit (TX) port (light colored post) on the Magnum Fiber port to the Receive (RX) port of the remote device. Begin with the color-coded strand of the cable for this first TX-to-RX connection.
4. Connect the Receive (RX) port (dark colored post) to the Transmit (TX) port of the remote device. Use the non-color coded fiber strand for this.
5. The LINK LED on the front of the fiber connector will illuminate when a proper connection has been established at both ends (and when power is ON in the unit). If LINK is not lit after cable connection, the normal cause is improper cable polarity. Swap the fiber cables at the fiber connector to remedy this situation.

3.2.3 Connecting Fiber Optic SC-type, "Snap-In"

The following procedure applies to installations using SC-type fiber connectors, i.e., using multi-mode SC and SC single-mode.

When connecting fiber media to SC connectors, simply snap on the two square male connectors into the SC female jacks of the Fiber connector until it clicks and secures.

3.2.4 Connecting Single-Mode Fiber Optic

When using single-mode fiber cable, be sure to use single-mode fiber port connectors. Single-mode fiber cable has a smaller diameter than multi-mode fiber cable (9/125 microns for single-mode, 50/125 or 62.5/125 microns for multi-mode where xx/xx are the diameters of the core and the core plus the cladding respectively). Single-mode fiber allows full bandwidth at longer distances, about 20Km with the multi-mode SC.

The same procedures as for multi-mode fiber apply to single-mode fiber connectors. Follow the steps listed in Section 3.2.2 above.

3.2.5 Power Budget Calculations for DS80F Fiber Media

Receiver Sensitivity and Transmitter Power are the parameters necessary to compute the power budget. To calculate the power budget of different fiber media installations using Magnum products, the following equations should be used:

OPB (Optical Power Budget) = P_T(min) - P_R(min)

where P_T = Transmitter Output Power, and P_R = Receiver Sensitivity

Worst case OPB = OPB - 1dB(for LED aging) - 1dB(for insertion loss)

Worst case distance = {Worst case OPB, in dB} / [Cable Loss, in dB/Km]
where the "Cable Loss" for 62.5/125 and 50/125μm (m.m.) is 2.8 dB/km,
and the "Cable Loss" for 100/140 (Multi-mode) is 3.3 dB/km,
and the "Cable Loss" for 9/125 (Single-mode) is 0.5 dB/km

The following data has been collected from component manufacturer's (HP's and Siemens') web sites and catalogs to provide guidance to network designers and installers.

Fiber Port Module	Speed, Std.	Mode	Std. km fdx (hdx)	Wave-length nm	Cable Size μm	X'mitr Output P_T, dB	R'cvr Sens. P_R,dB	Worst OPB, dB	Worst* distance Km, fdx	typical OPB, dB	typical* distance Km, fdx
DS80F-MST, MSC	**100Mb FX**	Multi-mode	2 (0.4)	1300	62.5/125 50/125	-20 -23.5	-31 -31	9.0 5.5	2.5 2.0	14 12	5 4
DS80F-SSC	**100Mb FX**	Single-mode	20 (0.4)	1300	9/125	-15	-31	14	28	17.5	35
DDS80F-MTRJ	**100Mb FX**	Multi-mode	2 (0.4)	1300	62.5/125 50/125	-20 -23.5	-31 -31	9.0 5.5	3.0 2.0	15.8 12.2	5.5 4.0
Long Reach	**100Mb FX**	Single-mode	40 (0.4)	1300	9/125	-5	-34	29	58		

***Note**: The use of either multi-mode or single-mode fiber to operate at 100Mbps speed over long distances (i.e., over approx. 400 meters) can be achieved **only** if the following factors are both applied:*

- *The 100Mb fiber segment must operate in full-duplex (FDX) mode, and*
- *The worst-case OPB of the fiber link must be greater than the fiber cable's passive Attenuation.*

(Attenuation = Cable loss + LED aging loss + Insertion loss + safety factor)

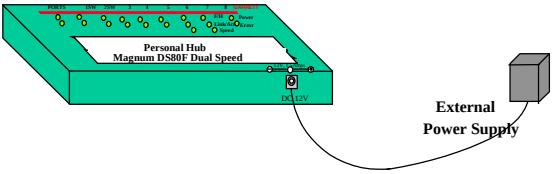
3.2.6 Connections to NICs which support Auto-Negotiation, RJ-45 ports

The copper ports of Magnum DS80F and DS80C Dual-Speed Hubs will function properly with NICs (Network Interface Cards) which support Auto-Negotiation, and the Fast Link Pulse (FLP) coding for the 100BASE-TX signaling system. When connecting a NIC to the DS80F or DS80C, it may be necessary to reload the NIC drivers on the user device if the NIC has been communicating with a protocol other than 100BASE-TX (such as 10BASE-T). When 100Mb operation is agreed and in use, the SPEED LED is illuminated steady ON. It is OFF if no traffic or if 10Mbps traffic.

3.3 Powering the Magnum DS80F and DS80C

Each Magnum DS80F and DS80C Personal Hub is provided with an external power supply, and has a jack for the DC power cord in the rear. A lightweight DC power cord for

5V, 2.0 amps is supplied with each unit. The small DC power cord from the power supply plugs into the matching rear power jack of the DS80F and DS80C Personal Hubs. When the power is applied, the green PWR LED will illuminate.



Each Magnum DS80F and DS80C power supply supports standard AC installation environments and comes in two types; one version for AC input power of 115vac at 60Hz for "-d " models, and other version of 230vac at 50 Hz for "-i " models that have IEC power cable connector in the external power unit.

Examine the power supply to make sure the version you have is the right type for your AC power system. The 115vac version has a small transformer integral with a convenience power outlet plug, and a lightweight DC power cord to the applicable power jack on the hub. The 230vac version has a small transformer integral with an IEC-type power plug for a user-supplied AC power cord with a convenience power outlet plug.

4.0 OPERATION - the function and operation of the Magnum DS80F and DS80C hubs.

4.1 Dual-speed functionality, and switching

The Magnum DS80F and DS80C Personal Hubs provides two N-way switched ports (one of which may be 100Mb fiber) and six dual-speed half-duplex ports. The architecture supports a few users at 10/100Mbps, and a high speed up-link and/or server port typically at 100Mbps full-duplex.

The user ports #3 to 8 are half-duplex auto-sensing for speed. (See section 2.2). When the connected device is 10Mbps, the DS80F obeys all the rules of 10Mbps Ethernet configurations, (4 repeaters, 2Km fiber distance half-duplex etc.). The 10Mbps users share a 10Mbps traffic domain, and can "communicate with" 100Mbps users and the switched ports through a

switch to the 100Mbps domain. Similarly, the 100Mbps traffic on ports #3 to 8 obeys the rules of 100Mbps Ethernet, and shares a 100Mbps collision domain.

Magnum DS80F and DS80C units are plug-and-play devices. There is no software configuring to be done at installation or for maintenance. The only hardware configuration settings are user options for UP-LINK on RJ-45 port #1 SW. Half / Full duplex mode selection for the switched ports can be done through a switch accessed from the front of the unit. The internal functions of both are described below.

Switching, Filtering and Forwarding

Each time a packet arrives on one of the switched ports, the decision is taken to either filter or to forward the packet. Packets whose source and destination addresses on the same port segment will be filtered, constraining them to one port and relieving the rest of the network from processing them. A packet whose destination address is on another port segment will be forwarded to the appropriate port, and will not be sent to the other ports where it is not needed. Packets needed for maintaining the operation of the network (such as occasional multi-cast packets) are forwarded to all ports.

The Magnum DS80F and DS80C Personal Hubs operate in the store-and-forward switching mode, which eliminates bad packets and enables peak performance to be achieved when there is heavy traffic on the network.

Switching, Address Learning

The Magnum DS80F and DS80C units have address table capacity of 16K node

addresses, and is suitable for use in large networks. They are self-learning, so that as nodes are added or removed or moved from one segment to another, the DS80F and DS80C automatically keeps up with node locations.

An address-aging algorithm causes least-used addresses to fall out in favor of new frequently-used addresses. To reset the address buffer, cycle power down-and-up.

4.2 Auto-negotiation and speed-sensing

All eight RJ-45 ports independently support auto-negotiation for speed in 10BASE-T and 100BASE-TX modes. Operation is according to the IEEE 802.3u standard.

When a RJ-45 cable connection is made, and each time when a LINK is enabled, auto-negotiation takes place. The DS80F or DS80C advertises it capability for 10 or 100 Mbps speed, and the device at the other end of the cable should similarly advertise / respond and both sides will agree to the speed being used. Depending upon the device connected, this will result in agreement to operate at either 10Mbps or 100Mbps speed.

When the '**LINK/ACT'** LED is ON, steady ON indicates LINK with no traffic blinking ON indicates the port is transmitting / receiving. The port has auto-negotiated for operation. (If a DS80F or DS80C RJ-45port is connected to a non-negotiating device, it will default to 10Mbps speed and half-duplex mode, per the IEEE 802.3u standard).

4.3 Full or Half - Duplex, manual switch selection for DS80F Models

Ports 1SW and 2SW (the switched ports) have a common "F - H" manual switch mounted on the front-left of the DS80F personal hub. While in the "F" position, it causes full-duplex mode to be advertised for the standard 802.3u auto-negotiation session on RJ-45 ports 1SW. For fiber, it forces full-duplex mode at 100Mbps. In the "H" position, it causes half-duplex mode to be advertised for auto-negotiation on port 1SW, and for fiber it forces half-duplex mode.

4.4 Full Fixed or Auto-Negotiation, manual switch selection for DS80C Models

Port 2SW have a "FF - A" manual switch mounted on the front-left of the DS80C Personal Hub. While in the "FF" position, it causes full-duplex mode to be advertised for the standard 802.3u auto-negotiation session on RJ-45 port 1SW, but for switch 2SW, it causes 100Mbps fixed full duplex, only which can be useful for using Fast Ethernet media converter (like Magnum 15E).

While in "A" position, the switched port 2SW is set at 10/100 auto-negotiation, that allow this switched port to connect at 100Mb Full-duplex with any other auto-negotiating Switches.

4.5 LED's

PWR: Illuminates GREEN, steady on when power applied.

ERROR: Indicates the self-test at power up was not successful

SPEED: Per port, ON = 100Mbps; OFF = 10Mbps (when LINK is made)

LINK/ACT: Per port, steady ON for LINK with no traffic, blinking indicates port is transmitting and receiving.

F/H: (For full/half switched ports 1SW and 2SW only)
ON = Full-Duplex and Link, OFF = Half-Duplex and / or no Link.

4.6 Up-link Port

Magnum DS80F and DS80Cs have one manual crossover (MDIX up-link) switch, port 1SW, on the front of the Personal Hub. This port can operate either Full/Half duplex mode.

The up-link (or cross-over) on the #1SW(N-way auto-negotiating switched port) allows its RJ-45 cable to connect for cascading to another hub or switch port. This allows repeater-to-repeater connections without a special cross-over cable. Port 1SW works the same as regular ports for 10Mbps or 100Mbps speed auto-sensing connections.

Cascaded connections may be operated at either 10 or 100Mbps speed. The DS80F even supports cascaded connections of both 10Mbps and 100Mbps at the same time on different ports. When attaching a 10Mbps hub, the Ethernet configuration rules (hop count limits, etc.) for 10Mbps domains are in effect. When the cascaded connection is operated at 100Mbps speed, because of its full duplex and switched port capability, does not need any PDV calculation for distances. Two DS80F and DS80Cs cascaded using RJ-45 ports will auto-negotiate to operate the connection at 100Mb/s.

4.7 Use with Media Converters

Where an additional fiber connection (beyond the built-in fiber port as on D80F) may be desired, a media converter may be used. For DS80F, the two switched ports can be set to FDX manually, making typical 100Mb media converters (which can be troublesome with auto-negotiating ports, defaulting to 100Mb half-duplex) usable in either HDX or FDX mode as set by the user.

Whereas for DS80C the switched port 2SW at "FF" position supports 100Mbps Full duplex fixed only which is useful for the fast ethernet media converter (e.g. Magnum 15E). If media converters are attached to ports 3 to 8, they will operate in HDX mode. It is best to use only 10Mb media converters on ports 3 to 8.

5.0 TROUBLESHOOTING

All Magnum Ethernet products are designed to provide reliability and consistently high performance in all network environments. The installation of a Magnum DS80F and DS80C Dual-Speed Hub is a simple procedure (see Section 3.0, INSTALLATION); operation is easy and is described in Section 4.0, OPERATION.

Should problems develop during installation or operation, this section should help to locate, identify and correct such problems. Please follow the suggestions listed below prior to contacting your supplier. However, if you are unsure of any procedure described in this section, or if the Magnum DS80F or DS80C hub is not operating as expected, do not attempt to repair or alter the unit. Contact your supplier or if unknown, contact GarrettCom Customer Support.

5.1 Before Calling for Assistance

1. If difficulty is encountered when installing or operating the unit, refer back to the Installation Section of the applicable chapter of this manual. Also check to make sure that the various components of the network are interoperable.
2. Check the cables and connectors to ensure that they have been properly connected and the cables/wires have not been crimped or in some way impaired during installation. (About 90% of network downtime can be attributed to wiring and connector problems.)
3. Make sure that an AC power cord is properly attached to each Magnum 4K-Series unit. Be certain that each AC power cord is plugged into a functioning electrical outlet. Use the PWR LEDs to verify each unit is receiving power.
4. If the problem is isolated to a network device other than the Magnum Magnum 4K-Series product, it is recommended that the problem device is replaced with a known good device. Verify whether or not the problem is corrected. If not, go to Step 5 below. If the problem is corrected, the Magnum 4K-Series and its associated cables are functioning properly.
5. If the problem continues after completing Step 4 above, contact your supplier of the Magnum 4K-Series unit or if unknown, contact GarrettCom, Inc. by fax, phone or email (*support@garrettcom.com*) for assistance.

5.2 When Calling for Assistance

Please be prepared to provide the following information.

1. A complete description of the problem, including the following points:
   a. The nature and duration of the problem;
   b. Situations when the problem occurs;
   c. The components involved in the problem;
   d. Any particular application that, when used, appears to create the problem;
2. An accurate list of GarrettCom product model(s)involved, with serial number(s). Include the date(s) that you purchased the products from your supplier.
3. It is useful to include other network equipment models and related hardware, including personal computers, workstations, terminals and printers; plus, the various network media types being used.
4. A record of changes that have been made to your network configuration prior to the occurrence of the problem. Any changes to system administration procedures should all be noted in this record.

5.3 Return Material Authorization (RMA) Procedure

All returns for repair must be accompanied by a Return Material Authorization (RMA) number. To obtain an RMA number, call GarrettCom Customer Service at (510) 438-9071 during business hours in California or email to *support@garrettcom.com*). When calling, please have the following information readily available:

Name and phone number of your contact person.
Name of your company / institution
Your shipping address
Product name
Serial Number (or Invoice Number)
Packing List Number (or Sales Order Number)
Date of installation
Failure symptoms, including a full description of the problem.

GarrettCom will carefully test and evaluate all returned products, will repair products that are under warranty at no charge, and will return the warranty-repaired units to the sender with shipping charges prepaid (see Warranty Information, Appendix A, for complete details). However, if the problem or condition causing the return cannot be duplicated by GarrettCom, the unit will be returned as:

No Problem Found.

GarrettCom reserves the right to charge for the testing of non-defective units under warranty. Testing and repair of product that is not under warranty will result in a customer (user) charge.

5.4 Shipping and Packaging Information

Should you need to ship the unit back to GarrettCom, please follow these instructions:

1. Package the unit carefully. It is recommended that you use the original container if available. Units should be wrapped in a "bubble-wrap" plastic sheet or bag for shipping protection. (You may retain all connectors and this Installation Guide.)

CAUTION: Do not pack the unit in Styrofoam "popcorn" type packing material. This material may cause electro-static shock damage to the unit.

2. Clearly mark the Return Material Authorization (RMA) number on the outside of the shipping container.
3. GarrettCom is not responsible for your return shipping charges.
4. Ship the package to:

GarrettCom, Inc.

213 Hammond Ave.

Fremont, CA 94539

Attn.: Customer Service

APPENDIX A: WARRANTY INFORMATION

GarrettCom, Inc. warrants its products to be free from defects in materials and workmanship for a period of three (3) years from the date of shipment by GarrettCom.

During this warranty period, GarrettCom will repair or, at its option, replace components in the products that prove to be defective at no charge other than shipping and handling, provided that the product is returned pre-paid to GarrettCom.

This warranty will not be effective if, in the opinion of GarrettCom, the product has been damaged by misuse, misapplication, or as a result of service or modification other than by GarrettCom.

GarrettCom reserves the right to make a charge for handling and inspecting any product returned for warranty repair which turns out not to be faulty.

Please complete the warranty card as this acts as a product registration, and mail it to GarrettCom within two weeks of your purchase.