SOHOware™ SuperFlex

8/16-port 10/100Mbps Autosensing Dual-Speed Hub
plus One/Three Switch Ports

Installation Guide

FCC ID : IOUNDS108S01

Rev: A1
January 1999

NDC Communications, Inc.
265 Santa Ana Court, Sunnyvale
CA 94086, USA
Tel: +1 (408) 730-0888
Fax: +1 (408) 730-0889

Technical Support
E-mail: support@ndclan.com
Toll-Free (US only): 800-632-1118
Europe and Asia Pacific
E-mail: techsupt@ndc.com.tw

NDC Web Site
www.sohoware.com
www.ndclan.com

TRADEMARKS

NDC and SOHOware are trademarks of NDC Communications, Inc. All other names mentioned in this document are trademarks/registered trademarks of their respective owners. NDC provides this document "as is," without warranty of any kind, neither expressed nor implied, including, but not limited to, the particular purpose. NDC may make improvements and/or changes in this manual or in the product(s) and/or the program(s) described in this manual at any time. This document could include technical inaccuracies or typographical errors.

FCC WARNING

This equipment has been tested and found to comply with the limits for a Class B Digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna
- Increase the separation between the equipment and receiver
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected
- Consult the dealer or an experienced radio/TV technician for help

You are cautioned that changes or modifications not expressly approved by the party responsible for compliance could void your authority to operate the equipment.
This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions:

1. This device may not cause harmful interference, and
2. This device must accept any interference received, including interference that may cause undesired operation

Federal Communications Commission (FCC) Statement

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

-- Reorient or relocate the receiving antenna.

-- Increase the separation between the equipment and receiver.

-- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.

-- Consult the dealer or an experienced radio/TV technician for help.

Warning: A shielded-type power cord is required in order to meet FCC emission limits and also to prevent interference to the nearby radio and television reception. It is essential that only the supplied power cord be used.

Use only shielded cables to connect I/O devices to this equipment.

You are cautioned that changes or modifications not expressly approved by the party responsible for compliance could void your authority to operate the equipment.

Table of Contents

INTRODUCTION 1

SOHOWARE™ SUPERFLEX 1
FEATURES 1
WHAT YOU GET 3
GETTING TO KNOW YOUR SUPERFLEX 10/100 HUB 4
NDS108 Front View *4*
NDS108 Rear View *5*
NDS316 Front View *5*
NDS316 Rear View *6*

GETTING STARTED 7

PLACING CONSIDERATIONS 7
INSTALLING YOUR SUPERFLEX HUB 7
CONNECTING DEVICES TO YOUR SUPERFLEX HUB 7
EXAMPLES 8
A. Connecting a Server to a SuperFlex Hub *8*
B. Connecting a Hub to a SuperFlex Hub *8*
C. Connecting a SuperFlex Hub to a Switch *9*

APPLICATION SCENARIOS 10

SCENARIO I: INTEGRATING 10MBPS AND 100MBPS 10
SCENARIO II: CONNECTING SERVERS AND HUBS 10
SCENARIO III: MULTIPLE MIXED NETWORKS 11

LED INDICATORS 12

NDS108 13
NDS316 I

TROUBLESHOOTING 17

GENERAL PROBLEMS 17
SUPPORT FROM YOUR NETWORK SUPPLIER 18

SUPPORT FROM NDC 19
TECHNICAL SPECIFICATIONS 20

List of Figures

FIGURE 1. NDS108 FRONT VIEW 4
FIGURE 2. NDS108 REAR VIEW I
FIGURE 3. NDS108 DIP SWITCH 5
FIGURE 4. NDS316 FRONT VIEW ..... 錯誤! 尚未定義書籤。
FIGURE 5. NDS316 REAR VIEW ..... 錯誤! 尚未定義書籤。
FIGURE 6. NDS316 DIP SWITCH ..... 錯誤! 尚未定義書籤。
FIGURE 7. NDS316 DIP SWITCH 6
FIGURE 8. 10MBPS AND 100MBPS INTEGRATION 錯誤! 尚未定義書籤。
FIGURE 9. SERVER AND HUB-HUB CONNECTION 錯誤! 尚未定義書籤。
FIGURE 10. MULTIPLE MIXED NETWORKS ..... 錯誤! 尚未定義書籤。
FIGURE 11. NDS108 LEDS 13
FIGURE 12. NDS316 LEDS 15

Introduction

SOHOware™ SuperFlex

Congratulations on choosing a SOHOware™ SuperFlex 8/16-port 10/100Mbps Autosensing Dual-Speed Hub. The hubs are designed especially for small offices, corporate branch offices, small businesses and workgroups in large/medium enterprises that need to integrate 10Mbps Ethernet and 100Mbps Fast Ethernet networks and need dedicated connections to servers or other hubs/switches. The SOHOware SuperFlex 10/100 hubs feature eight or sixteen autosensing 10/100 hub ports with one (NDS108) or three (NDS316) 10/100 autosensing switch ports in a single box. They constitute a unique and completely flexible solution in the world of dual-speed hubs. All the ports are fully autosensing. Simply plug in the network cable and the SuperFlex hubs will automatically determine the maximum speed (10Mbps or 100Mbps) of the connection.

The built-in switch port(s) can be used as uplink/downlink connections or for connecting to servers and high-end workstations, thus improving overall network performance with no additional hardware investment. Switch performance, combined with a dual-speed hub's cost advantage, give SuperFlex 10/100 hubs the best performance-versus-cost ratio, making them the easy Fast Ethernet upgrade option for small and growing businesses.

Features

- Eight or sixteen dual-speed 10/100 autosensing ports with one (NDS108) or three (NDS316) half or full-duplex 10/100 autosensing switch ports
- Built-in internal switch; mix & match 10Mbps and 100Mbps
- Automatic setting of each port to the highest speed. No configuration changes/service interruptions migrating from 10Mbps to 100Mbps
- Plug-n-Play; makes Fast Ethernet migration a no-brainer

- Store-and forward switching between 10Mbps and 100Mbps networks; protects against data-error and enhances effective network traffic
- Front panel LED indicators; troubleshooting at a glance
- Automatic MAC address learning; maintains full data transfer performance within segments as well as to extended segments
- Complies with IEEE 802.3 10Base-T and 802.3u 100Base-TX standards

What You Get

1. One 8-port or 16-port SuperFlex 10/100 hub with one (NDS108) or three (NDS316) Switch ports
2. One AC power cord
3. This installation guide
4. One quick guide
5. Registration card
   (register to receive: Free
   - ✓ Warranty protection
   - ✓ Information on upcoming product releases and special product offers
   - ✓ Technical support

Getting to Know Your SuperFlex 10/100 Hub

NDS108 Front View

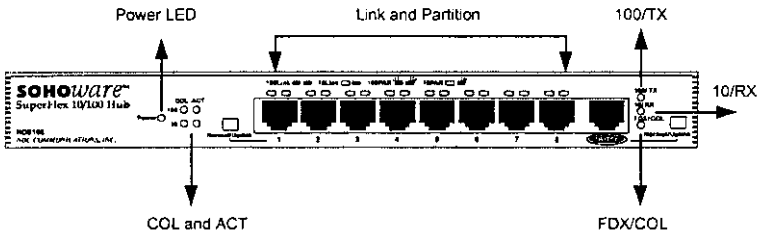


Figure 1. NDS108 Front View

✓ Eight hub ports, one Normal/Uplink slide-switch on the first port
✓ One switch port, one Normal/Uplink slide-switch on the port

Refer to "Connecting Devices to Your SuperFlex" on Page 7 for information on which ports to use in which situations, and Application Scenarios, page 10, for some examples.
See LED Indicators, page 12 for detailed information on the LEDs.

NDS108 Rear View

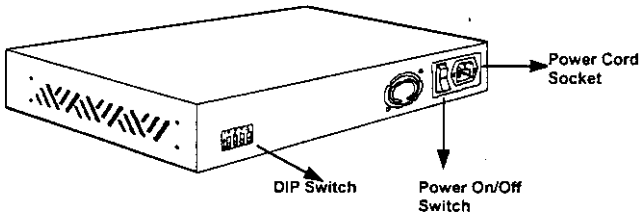


Figure 2. NDS108 Rear View

SuperFlex hubs are designed to auto negotiate the speed and duplex capability of the connected device. For various reasons a connected network device may sometimes fail to respond to the auto negotiation mechanism, therefore a DIP (Dual Inline Package) switch is provided to allow users to manually adjust the Tx/Rx speed.
The default setting is auto negotiation with four pins positioned as shown below:

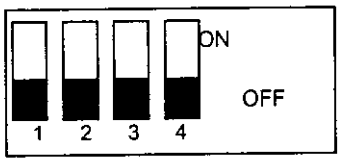


Figure 3. NDS108 DIP Switch

Each pin on the DIP switch manages the Tx/Rx speed of two hub ports concurrently. If pin 1 is toggled to the ON position, then hub ports 1 & 2 will be set at 100Mbps in half duplex mode. The following table summarizes the different settings between auto negotiation and 100Mbps forced modes.

PIN	1	2	3	4
PORT	1, 2	3, 4	5, 6	7, 8
ON	100 Half	100 Half	100 Half	100 Half
OFF	Auto	Auto	Auto	Auto

NDS316 Front View

- ✓ Sixteen hub ports, one Normal/Uplink button on port 16
- ✓ Three switch ports, a separate SWITCH/Uplink port on the two front panel ports

Refer to "Connecting Devices to Your SuperFlex," on Page 7, for information on which ports to use in which situations, and Application Scenarios, page 10, for some examples.
See LED Indicators, page 12 for detailed information on the LEDs.

NDS316 Rear View

Power ON/OFF switch
Power cord socket
DIP Switch
Rear Switch port with three LEDs (same meanings as on the front panel SWITCH/Uplink port C)

SuperFlex hubs are designed to auto negotiate the speed and duplex capability of the connected device. For various reasons a connected network device may sometimes fail to respond to the auto negotiation mechanism, therefore a DIP (Dual Inline Package) switch is provided to allow users to manually adjust the Tx/Rx speed.
The default setting is auto negotiation with eight pins positioned as shown below:

Each pin on the DIP switch manages the Tx/Rx speed of four hub ports concurrently. If pin 1 is toggled to the ON position, then hub ports 1, 2, 5, and 6 will be set at 100Mbps in half duplex mode. The following table summarizes the different settings between auto negotiation and 100Mbps forced modes.

PIN	1	2	3	4
PORT	1, 2, 5, 6	3, 4, 7, 8	9, 10, 13, 14	11, 12, 15, 16
ON	100 Half	100 Half	100 Half	100 Half
OFF	Auto	Auto	Auto	Auto

Figure 4. NDS316 DIP Switch[JR7]

Getting Started

Placing Considerations

SuperFlex hubs should be placed where they will not be subjected to extreme temperatures, humidity, or excessive electromagnetic interference. Do not block the ventilation holes on the side, or the exhaust port on the rear of the SuperFlex.

Installing Your SuperFlex Hub

Installation couldn't be easier. Only three steps and you're in business:

1. ***Plug:*** Plug the cable of the connected device to the port of the SuperFlex
2. ***Plug:*** Plug one end of the AC power cord into the rear panel of the SuperFlex and the other into the wall socket
3. ***Play:*** Press the power switch to power on

Connecting Devices to Your SuperFlex Hub

This section will show you how to connect a server, a hub, or another switch to the SOHOware SuperFlex. Before you connect network devices to the SuperFlex, note that:

- ***Normal***: makes a normal twisted-pair connection
- ***Uplink***: uplinks to another hub or switch

What is the function of the Switch port?

The Switch port offers dedicated bandwidth and supports full-duplex mode to double data transmission speeds. It is designed especially for bandwidth-hungry applications such as file/printer servers, graphics, multi-media and client-server databases, etc.

When should you set the switch port to the Normal or Uplink position?

NDS108

✓ When the switch port is set to the UPLINK position, it is usually used to connect to a hub or to another switch that does not have UPLINK selected

✓ When the switch port is set to the Normal position, it can be used to connect to a server, a hub, or another switch that has UPLINK selected

NDS316

✓ When a device is connected to a switch UPLINK port it is usually used to connect to a hub or to another switch that does not have UPLINK selected

✓ When a device is connected to a SWITCH port it can be used to connect a server, a hub, or another switch that has Uplink selected

☞ **Note: One of the devices, either the connected hub/switch or SuperFlex, must be set in the UPLINK position**

The next section will give you a better idea of how to connect a server, hub, or switch.

Examples

A. Connecting a Server to a SuperFlex Hub

Usually a Server needs more bandwidth than regular workstations as it is accessed by many clients. You can connect it to the switch port(s) of the SuperFlex. Put the slide-switch in the Normal position for the NDS108 or connect it to a SWITCH port on the NDS316.

B. Connecting a Hub to a SuperFlex Hub

Either the connected hub or SuperFlex should be set to the UPLINK position, e.g. if your SuperFlex hub is set to the Normal position, use the connected hubs' Uplink port to connect to the SuperFlex.
If the connected hub needs higher bandwidth, connect it to a switch port. If not, connect it to Port #1 of the NDS108, or port # 16 of the NDS316.

C. Connecting a SuperFlex Hub to a Switch

NDS108

Either the connected switch or the SuperFlex must be set to the UPLINK position.

When you connect a SuperFlex hub to a Switch, for example a SOHOware™ Plug-n-Switch, set the Switch port of the NDS108 to the UPLINK position. If the connecting device supports full-duplex you will get guaranteed 200Mbps bandwidth for the Switch-to-Switch connection. The Switch port on the connecting device is left in the Normal position.

NDS316

Either the connected switch or the SuperFlex must be set to the UPLINK position.

When you connect a SuperFlex hub to a Switch, for example a SOHOware™ Plug-n-Switch, connect the device to the UPLINK port of the NDS316. If the connecting device supports full-duplex you will get guaranteed 200Mbps bandwidth for the Switch-to-Switch connection. The other Switch's port is left in the Normal position.

Application Scenarios

This section gives some examples of how to locate the SuperFlex hubs so as to achieve the maximum performance from your networking hardware.

Scenario I: Integrating 10Mbps and 100Mbps

When small offices are faced with network migration from 10Mbps Ethernet to 100Mbps Fast Ethernet, SOHOware™ SuperFlex lets legacy 10Mbps Ethernet equipment coexist and communicate with new, faster 100Mbps Fast Ethernet devices. Put the power users on 100Mbps Fast Ethernet while keeping legacy 10Mbps Ethernet equipment intact. Migrate users to Fast Ethernet on an as needed basis.

Scenario II: Connecting Servers and Hubs

In addition to the integration of 10Mbps and 100Mbps, a server-connection and a hub-to-hub connection are common in small businesses and corporate branch offices.

Dedicated 200Mbps high-speed access to local file and printer servers is available through the switch port(s) of the SuperFlex hubs. Heavily accessed servers are best placed directly on a connection to the switch port to guarantee the server-connection will not become a network bottleneck.

As the network grows you can accommodate more users by connecting another hub to a switch port(s) with no performance hit. SOHOware™ SuperFlex allows up to 100-meters (328 feet) between hubs via the switch port(s) without the extension distance restriction (5-meter max.) of regular dual-speed hubs.

Scenario III: Multiple Mixed Networks

Connect a combination of multiple SuperFlex hubs along with regular hubs and autosense switches to create a flexible "virtual non-blocking" switched workgroup LAN; at an implementation cost of only a small fraction of other competitive schemes. Regular client PCs connect to the SuperFlex hubs, enjoying "virtual non-blocking" switch performance due to the very low probability of collisions. Local servers and hubs are directly attached to the switched ports for maximum bandwidth allocation. Each device gets needed resources in the most cost-effective manner. No waiting and no waste!

LED Indicators

The LED indicators will help you monitor the status of each port and the connected segments.

The basic functions of the LED indicators are given below. More detailed explanations are on the following pages.

- **Power LED:** Indicates whether Power is on or off
- **COL and ACT LED for 10Mbps and 100Mbps segments (four):** Indicates data collisions or that the hub port is transmitting/receiving data on a 10Mbps or 100Mbps hub segment
- **Link/Partition LED (two per hub port):** Indicates that there is a device attached to the port or that the port is partitioned on a 10Mbps or 100Mbps domain
- **100/TX LED (one per Switch port):** Indicates that the port is on a 100Mbps connection and that the port is transmitting data
- **10/RX LED (one per Switch port):** Indicates that the port is on a 10Mbps connection and that the port is receiving data
- **FDX/COL (one per Switch port):** Indicates the port is in full-duplex mode or half-duplex mode and that data collisions are occurring

NDS108

There are four LED groups on the front panel of the NDS108 SuperFlex:

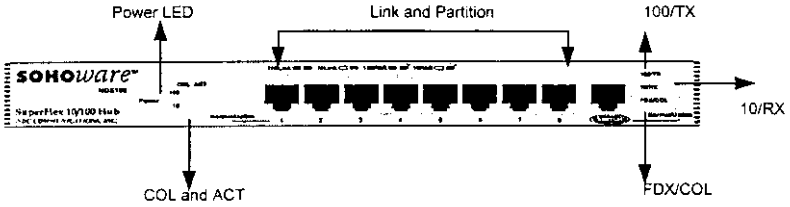
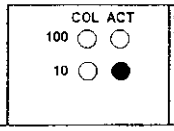


Figure 5. NDS108 LEDs

- Power
- Collision and Activity (COL, ACT)
- Link/Partition for hub ports
- Link/Activity (100/TX, 10/RX, FDX/COL) for the switch port

LED Function	Status	Description
Power	Lit	Power On
	Unlit	Power Off
Collision & Activity	COL ACT 100 ● ○ 10 ○ ○	Collision detected on 100Mbps domain
	COL ACT 100 ○ ○ 10 ● ○	Collision detected on 10Mbps domain
	COL ACT 100 ○ ● 10 ○ ○	Flashes when hub ports are transmitting or receiving data in 100Mbps mode

		Flashes when hub ports are transmitting or receiving data in 10Mbps mode

Hub Port Status - Link/Partition

Left LED	Right LED	Indication
Green	Green	The port has established a valid 100Mbps network connection
Off	Green	The port has established a valid 10Mbps network connection
Flashing	Flashing	Partition on 100Mbps domain
Off	Flashing	Partition on 10Mbps domain
Off	Off	No link to the port

Switch Port Status - Link/Activity

100/TX	Green	The port has established a valid 100Mbps network connection
	Flashing	Transmitting data
10/TX	Green	The port has established a valid 10Mbps network connection
	Flashing	Receiving data
FDX/COL	Amber	The connection is in full-duplex mode
	Flashing	Collisions occurring
	Off	The connection is in half-duplex mode

NDS316

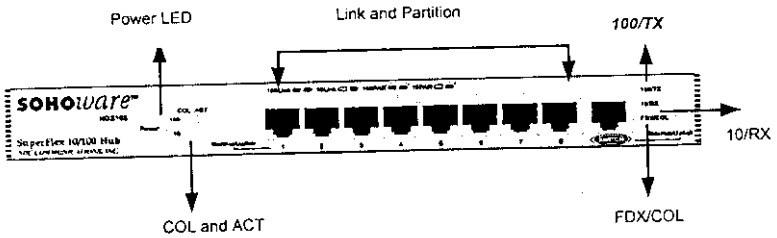
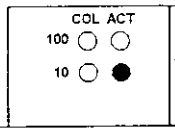


Figure 6. NDS316 LEDs

There are four LED groups on the front panel of the NDS316 SuperFlex:

- Power
- Collision and Activity (COL, ACT)
- Link/Partition for hub ports
- Link/Activity (100/TX, 10/RX, FDX/COL) for switch ports

LED Function	Status	Description
Power	Lit	Power On
	Unlit	Power Off
Collision & Activity (each port)	COL ACT 100 ● ○ 10 ○ ○	Collision detected on 100Mbps hub port segment
	COL ACT 100 ○ ○ 10 ● ○	Collision detected on 10Mbps hub port segment
	COL ACT 100 ○ ● 10 ○ ○	Flashes when hub ports are transmitting or receiving data 100Mbps mode

		Flashes when hub ports are transmitting or receiving data in 10Mbps mode

Hub Port Status - Link/Partition

Upper LED	Lower LED	Indication
Green	Green	The port has established a valid 100Mbps network connection
Off	Green	The port has established a valid 10Mbps network connection
Flashing	Flashing	Partition on 100Mbps domain
Off	Flashing	Partition on 10Mbps domain
Off	Off	No link to the port

Switch Port Status - Link/Activity

100/TX	Green	The port has established a valid 100Mbps network connection
	Flashing	Transmitting data
10/TX	Green	The port has established a valid 10Mbps network connection
	Flashing	Receiving data
FDX/COL	Amber	The connection is in full-duplex mode
	Flashing	Collisions occurring
	Off	The connection is in half-duplex mode

Troubleshooting

Should you experience a problem with a SuperFlex hub, the LEDs will help you determine the problem. Follow the steps below according to the status of the LEDs.

General Problems

Power LED is off

- Check that one end of power cord is connected to the rear of the SuperFlex and the other end is connected to a wall power outlet
- Check that the On/Off switch on the rear of the device is switched to ***On***

The Power LED is on but the Link LEDs (100Link and10Link for the hub ports, 100/TX and 10/RX for the switch ports) are off

- Check that the connecting device is turned on
- Make sure the cables are wired correctly, and that you are using the correct cable type for 10Base-T or 100Base-TX
- Check that the cable connections are secure and undamaged

SWITCH/Normal or UPLINK Port Link LED (100Link and10Link for hub ports, 100/TX and 10/RX for switch ports) is off

- If the connected device is a hub or a switch, be sure that only one device is set to UPLINK
  - *Uplinking via the switch port of the SuperFlex*
    To set the Switch port of the SOHOware™ SuperFlex to UPLINK, just connect the cable to the UPLINK port of the NDS316, or set the slide-switch of the NDS108 to the Uplink position
  - *Uplinking via the Uplink hub port of the SuperFlex*
    To set the UPLINK port (port 1 for the NDS108 or port 16 for the

NDS316) of the SOHOware™ SuperFlex to UPLINK, use the slide-switch (NDS108) or button-switch (NDS316) beside the port

- With a SuperFlex port in UPLINK mode, another device connected to that port cannot be set to UPLINK
- If you set the connected hub or switch to UPLINK, use its Uplink port to connect to the SuperFlex and set the SuperFlex UPLINK or Switch port to Normal

■ Make sure that your SuperFlex is set to normal when a PC server is connected to the UPLINK or Switch port of the SuperFlex hub

LED indicates Partition (100PAR AND 10PAR) on some port(s) but not on others

■ If the partitioned port is connected to a Network Interface Card (NIC), the NIC may have failed. Replace with a working NIC

■ If the partitioned port is connected to a hub or switch, the connected port of the hub or switch may have failed. Try connecting to another device

Support From Your Network Supplier

If additional assistance is required, call your SuperFlex supplier for help. Have the following information ready before you make the call.

1. LED status
2. A list of the product hardware (including revision levels), and if possible, a brief description of the network structure
3. Details of recent configuration changes, if applicable

Support from NDC

If you are unable to receive support from your SuperFlex supplier, technical support is available from NDC. Contact your local NDC sales office.

USA:

Telephone: 1-408-7300888
Toll-Free (US only): 800-632-1118
FAX: 1-408-7300889
E-mail address: support@ndclan.com

Europe and Asia Pacific:

Telephone: 886-3-5783966
FAX: 886-3-5777989
E-mail address: techsupt@ndc.com.tw

Technical Specifications

- **Standards Compliance:**
  IEEE 802.3 (10Base-T)
  IEEE 802.3u (100Base-TX)
- **Network Interfaces:**
  NDS108: Eight 10/100Mbps auto-sensing hub ports
  One 10/100Mbps auto-negotiating/auto-sensing switch port
  NDS316: Sixteen 10/100Mbps auto-sensing hub ports
  Three 10/100Mbps auto-negotiating/auto-sensing switch ports
- **Data Transmission Speeds:**
  10/100 auto-sensing on every port
  Switch ports support half and full-duplex (20Mbps/200Mbps)
- **Packet Forwarding Mode:**
  Store-and-Forward
- **MAC Addresses:**
  NDS108: 8K
  NDS316: 8K
- **MAC Address Learning/Aging:** Automatic
- **Power Supply:** 47-63Hz Internal, Universal Power, 100-250V AC
- **Maximum Power Consumption:**
  NDS108: 11W max.
  NDS316: 30W max.
- **Cable Lengths**
  10Base-T: 100 meters (328 feet)
  100Base-TX: 100 meters (328 feet)
- **Cabling**
  10Base-T: Category 3 or category 5 UTP (Unshielded Twisted-Pair)
  100Base-TX: Category 5 UTP or STP (Shielded Twisted-Pair)
- **LEDs:**
  Per Unit: One power LED
  Per segment: Collision & Activity
  Per Hub Port: Link & Partition
  Per Switch Port: 10Mbps Link & Activity, 100Mbps Link & Activity, Full-duplex/Collision
- **Physical Dimensions:**
  NDS108
  Width – 10.0 inches (254 mm)

Height – 1.4 inches (35 mm)
Depth – 5.3 inches (135 mm)
Weight – 2.2 lb (1 kg)

NDS316

Width – 11.5 inches (295 mm)
Height – 1.8 inches (45 mm)
Depth – 8 inches (205 mm)
Weight – 5.5lb (2.5kg)

- **Operating Environment:**
  Temperature: 0°C to 40°C
  Non-condensing Humidity: 10% to 90%
- **Certification:**
  FCC Class B, CE Class B, VCCI Class B