Chapter 12

Interfaces

Introduction

This chapter describes how to configure, control and monitor interfaces, and the encapsulations supported on each interface. The chapter also describes the format of the Ethernet frame, and the naming conventions that are available for different interface types.

Some interface and port types mentioned in this chapter may not be supported on your switch. The interface and port types that are available vary depending on your product model and whether an expansion unit is installed, such as a PIC, NSM, or expansion module. For more information, see the Hardware Reference for the switch.

The interface described is:

- asynchronous

Other interfaces are described in:

- Chapter 8, Switching (Ethernet switch ports and VLANs).

The term *interface* refers to one of the physical ports on the switch. The physical ports connect the switch to a network, and all data enters and leaves the switch via the interface.

Asynchronous ports can be used to connect terminals and terminal ports on host computers. See Chapter 39, Terminal Server for information about using asynchronous ports for terminal serving.Each frame of data includes a header that informs a receiving switch about the protocol carried in the frame. This header is specified by a set of rules referred to as an *encapsulation*. Some interface types can be used with more than one encapsulation. It is important to know about encapsulations for two reasons. Firstly, the information can be useful in debugging network problems, if traces of the packets being transmitted or received on a particular interface can be obtained. Secondly, information about encapsulations can be used to determine whether the switch can interoperate with other vendors' switches, since this depends on both switches supporting the same encapsulation(s) for a particular protocol.

Naming Interfaces

Commands that configure an interface or configure a routing protocol to use an interface must specify the interface by name. Typically, commands use the **interface=*interface*** or **over=*interface*** parameter to specify an interface.

Create interface names by concatenating the interface type with the interface instance. The interface type is an abbreviation of the full name of the interface. The interface instance is a non-negative number that uniquely identifies the interface among interfaces of that type.

For physical interfaces, the instance number is the physical port number, which the system determines. Physical ports are numbered from left to right as viewed, starting at 0.

For logical interfaces, the instance number is the module instance number specified in the **add** or **create** command for that module. Instance numbers may be chosen arbitrarily but common practice is to assign them sequentially, starting with 0.

The following table describes names for different types of interface.

Interface Type	Description
Physical interfaces	
ASYN	Asynchronous interface
Logical interfaces	
VLAN	Virtual LAN interface
PPP	Point-to-Point Protocol interface

Permanent interfaces are numbered first, followed by removable interfaces.

The following table shows examples of valid names for interfaces.

Interface name	Description
asyn4	Asynchronous port 4
ppp1	Point-to-Point Protocol instance 1
vlan1	Virtual LAN 1

Ethernet

Ethernet encapsulation is used on *switch ports* on the switch. For more information about switch ports and VLAN tagging in Ethernet frames, see Chapter 8, Switching.

Ethernet is a term that describes a particular family of interface types and encapsulations. Other common terms are *802.3* and *CSMA/CD*. Various physical media can carry Ethernet, including thin and thick coaxial cable, twisted pair wires, and optical fibre.

All these forms of Ethernet are characterised by these common features:

- A single medium carries all incoming and outgoing traffic.
- A number of stations may use the same medium for communicating with all other stations on the medium. All stations can see all the traffic on the medium.
- Stations wait for the medium to become free before attempting to send data on it. If more than one station attempts to send data simultaneously a collision results and the data being sent becomes invalid.
- Stations can be connected to or disconnected from the medium without disturbing the other stations on the medium.
- The order in which stations are attached to the physical medium is not important.

Ethernet runs at speeds of 10 Mbps, 100 Mbps, 1 Gbps, or 10 Gbps.

Ethernet is used primarily to provide local area networking rather than wide area networking. The installation of Ethernet media within premises is normally the responsibility of the user of the premises rather than the telecommunications provider.

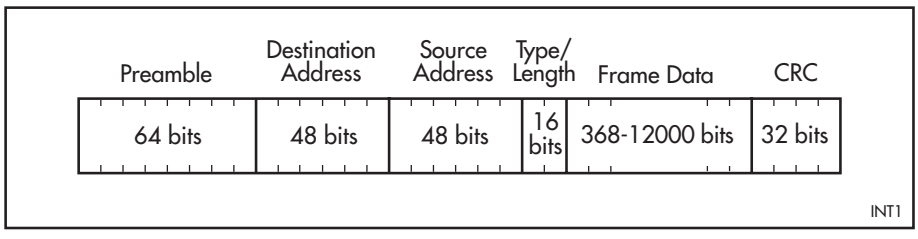
Ethernet was first defined in 1982. The original definition is generally referred to as Type 1 Ethernet and although it differs slightly from the modern standard, it is not very common today. Subsequent standards defined Type 2 Ethernet, which was largely ratified unchanged by the IEEE as IEEE 802.3.

Ethernet interfaces on the switch are specified by the IEEE Standard 802.3 or ISO 8802-3 standards. This is the standard used by most implementations. The switch physically supports all three versions of Ethernet, and is supplied with Type 2/ 802.3 selected.

Encapsulations

Since Ethernet is a single wire used by many stations at once and with many different protocols, encapsulation of protocol types is used to distinguish the protocols. Ethernet has been developed over a period of time, and the efforts of the Standards bodies following on from the vendors that developed Ethernet have led to different encapsulation types for Ethernet.

The following figure shows an Ethernet frame, which consists of a preamble followed by the data, and terminated with a CRC



The data begins with the station addresses of the receiver and sender of the frame. These address fields are both 6 octets long. Following the addresses is a 2-octet field, referred to here as the type/length field, that contains either a type field or a length.

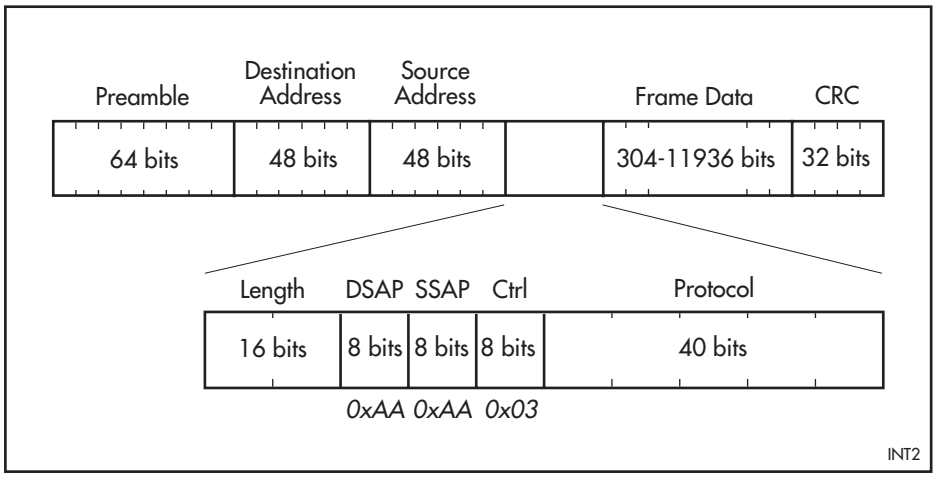
The type/length field was introduced by the vendors that developed Ethernet and was used to contain a protocol type. Different values in the type field distinguished different protocols. The values that are contained in this field are administered by Xerox Corporation and vendors of network equipment may apply to reserve a type field to define vendor-specific protocols.

The original vendor specifications were extended by the IEEE. This body developed standards in local area networking, including Ethernet. The Ethernet addresses and type/length field appear in the IEEE standards as part of the Ethernet-specific standard, IEEE Standard 802.3. Another standard, IEEE Standard 802.2, specifies the format of the frame after the type/length field. Since IEEE Standard 802.2 applies to other LAN media, such as Token Ring and FDDI, the frame after the type/length field cannot contain anything specific to Ethernet. For this reason the type/length field is used to specify a length, and is, in fact, the length of the rest of the frame.

Although there may appear to be a conflict between the use of the type/length field for both a frame type and a length, in practice there is no conflict. The maximum length of an Ethernet frame (including the preamble, addresses and the type/length field) is 1514 octets, so the maximum value of the type/length field as a length is 1500 octets. Ethernet types are assigned values greater than 1500. In the early days of Ethernet, some protocol types were assigned values below 1500, but these have since become obsolete.

When the IEEE introduced the standard that replaced the type field with a length field, parts of the networking community still wanted a way to specify that a particular Ethernet frame was a certain protocol type, without having to implement all of the IEEE Standard 802.2.

IEEE Standard 802.2 defines the two octets after the type/length field as *Service Access Points*, or SAPs, one for the source of the packet and one for the destination. A special SAP value (0xAA or 170 decimal) was defined to indicate that the packet containing this SAP value would use the *SubNetwork Access Protocol* (SNAP) mechanism. In IEEE Standard 802.2, the one or two octets after the SAPs are defined as the control field. For the SNAP format, this is defined as the single octet 0x03, used to indicate an “unnumbered information” frame. The SNAP format then defines the next 5 octets as a protocol type. Values in this field define the different protocols. The following figure shows the format of an Ethernet frame with SNAP encapsulation.



The switch supports the following encapsulation formats:

- Ethernet – type/length field used as a type
- 802.2 – use of IEEE Standard 802.2 with SAPs
- SNAP – use of the SNAP SAP

For the correct operation of a software module, Ethernet drivers must receive packets with the appropriate encapsulation and forward them to that module. The packets are specified by an encapsulation format and a discriminator. The following table lists discriminators for each encapsulation format.

Format	Discriminator	Length (octets)
Ethernet	Ethernet type	2
802.2	Destination SAP	1
SNAP	SNAP discriminator	5

Asynchronous Interfaces

All models of the switch have at least one asynchronous interface, or port. This is a standard RJ45, DB9 male or DB9 female connector wired as a DTE (*Data Terminating Equipment*) interface. The asynchronous ports are identified by number, and are numbered sequentially starting from 0. The first interface is called asyn0.

All asynchronous ports use the RS-232C standard. At least four modem control lines are provided with each interface, and these are normally used as DTR, RTS, CTS, and CD. More information about asynchronous ports is in the Hardware Reference for the switch.

Asynchronous ports are normally used to connect terminals or modems to the switch. The cable types required to do this are described in the Hardware Reference. In general, most VT100-compatible terminals require a *crossed* cable (DTE-to-DTE).

Important The term *crossed* refers to the fact that the data pins (TxD and RxD) on the connector at one end of the cable are connected to the opposite pins (RxD and TxD respectively) on the connector at the other end of the cable. This is necessary because both the terminal and the switch have DTE interfaces.

Asynchronous ports may also be used as network interfaces.

By default, no encapsulation is used on asynchronous ports. Data is transmitted and received as a clear character stream. This is appropriate for remote terminal or terminal emulation access and remote printing facilities.

Configuration

Each asynchronous port can be individually configured to suit a wide range of different terminal types. The characteristics of a port can be changed by using the command:

```
set asyn=asyn-number option
```

Options for each port are listed in the following table.

Asynchronous port options

Option	Description
Attention	Sets the attention character used to return from a virtual terminal session to the switch prompt.
Databits	Sets the number of data bits per character transmitted by the port.
Defaultservice	Configures the port to automatically connect to a service when a user types anything at the terminal or an attached modem asserts DCD.
Dtrcontrol	Controls the way the switch controls the state of the DTR output signal. If **dtrcontrol** is set to **connect** the switch asserts DTR for the duration of the connection. If **dtrcontrol** is set to **on** or **off**, the DTR line is driven to the designated state.
Echo	Enables or disables the echoing of each character entered at a terminal.
Flow	Sets the flow control mechanism used for the port in both the receive and transmit directions. If **flow** is set to **none** the switch ignores all incoming flow control characters and lead transitions. If **flow** is set to **character** the switch uses **xon/xoff** flow control. If **flow** is set to **hardware** the switch uses the **rts/cts** lines for flow control.
Inflow	Sets the flow control mechanism used for the port in the receive direction. If **flow** is set to **none**, the switch ignores all incoming flow control characters and lead transitions. If **flow** is set to **character**, the switch uses **xon/xoff** flow control. If **flow** is set to **hardware**, the switch uses the **rts/cts** lines for flow control.
History	Sets the number of commands saved for command line recall.
Idletimeout	Specifies a period of time, in seconds, for a terminal connection's dedicated TTY device idle timer. If the specified time period lapses since the last time the dedicated TTY device received data from the client, the connection is terminated, and the terminal screen displays the login prompt. If **0** or **off** are specified, the idle timer remains off, and the session must be explicitly terminated.
Login	Enables or disables the ability to log into the asynchronous port.
Maxoqlen	Sets the maximum number of character buffers that are permitted on the transmit queue for the port.
Name	Assigns a text string used to identify the port, such as the name of the person whose terminal is normally connected to the port, or where the terminal is located.
Outflow	Sets the flow control mechanism used for the port in the transmit direction. If **flow** is set to **none**, the switch ignores all incoming flow control characters and lead transitions. If **flow** is set to **character**, the switch uses **XON/XOFF** flow control. If **flow** is set to **hardware**, the switch uses the RTS/CTS lines for flow control.
Page	Sets the number of lines of output displayed on the terminal before the switch pauses and waits for the user to press a key to continue.
Parity	Sets the parity of each character transmitted by the port.

Asynchronous port options

Option	Description
Prompt	Sets the prompt to a string, the default prompt, or disables the prompt.
Secure	Controls whether a user must log in to the port before switch commands can be accepted. See Chapter 23, User Authentication for information about defining users and logging in to the switch.
Service	Allocates the port to be a host port for a named service.
Speed	Sets the speed of the port, from 75 bps to 115200 bps. The terminal and port must be set to the same speed. Autobauding is also available, provided the attention character used is set to [Break]. In this mode the port automatically adjusts to the speed of the terminal that is attached, up to 19200 bps.
Stopbits	Sets the number of stop bits per character transmitted by the port.
Tentimervalue	The period, in milliseconds, over which the port bundles characters, when the port is in ten mode.
Type	Sets the terminal type to **vt100** or **dumb**. A **dumb** terminal is used for printing or terminals that do not support VT100 escape sequences.

Asynchronous port defaults

Asynchronous ports are initially configured with default values listed in the following table.

Option	Default setting
Attention	break
Cdcontrol	ignore
Databits	8
Echo	on
Flow	none
History	30
Idletimeout	0
Inflow	hardware
Login	on
Maxoqlen	0 (Unrestricted)
Name	asyn #
Outflow	hardware
Page	22
Parity	none
Prompt	default (CMD>)
Secure	on
Service	none
Speed	9600
Stopbits	1
Tentimervalue	100
Type	vt100

To display the complete configuration for a particular asynchronous port, use the command:

```
show asyn=asyn-number
```

To display the complete configuration for all asynchronous ports, use the command:

```
show asyn=all
```

To display summary details for a particular asynchronous port, use the command:

```
show asyn=asyn-number summary
```

To display summary details for all asynchronous ports, use the command:

```
show asyn=all summary
```

The switch maintains a separate command history list for each asynchronous port, containing the last commands entered at the port. To display the history list, use the command:

```
show asyn=asyn-number history
```

Session Timeout

If you disable an asynchronous port, users can still log into the port but will be logged out if the session is idle for a configurable length of time. Users can log in to the disabled port by sending it a break signal. To configure this timeout functionality:

1. **Set the timeout period.**

   If you require a different timeout than the default of 60 seconds, use the command:

   ```
   set asyn [enable=break] timeout=1..65535
   ```

   The timeout only applies if **enable=break**, which is its default.

2. **Manually disable the port.**

   Use the command:

   ```
   disable asyn
   ```

   Note that if you are logged into an asynchronous port to manage the switch, you cannot disable that port by typing the disable command. You have to run the disable command from a script or from a different session, such as a telnet session.

To log into the asynchronous port:

- Connect as normal to the port through a terminal emulator or modem. Then send a break signal to get a log in prompt. The method of sending a break signal depends on the terminal application.
- To start a new session after the port has timed out, send a break signal. This enables the port, which will then provide you with a log in prompt.

Connecting a Modem to the Asynchronous Port

If a modem is connected, configure the switch to make and/or accept calls via the modem. To set the **cdcontrol** parameter to **connect** and the **flow** parameter to **hardware**, enter the command:

```
set asyn cdcontrol=connect flow=hardware
```

If the terminal or modem is used with communications settings other than the default settings, then configure the asynchronous port to match the terminal or modem settings by using the **set asyn** command.

A port connected to a modem should always be set to a fixed speed matching that of the modem.

MIB Counters

The switch maintains a number of counters for each asynchronous port. The counters are objects in two standard MIBs and the switch's enterprise MIB. Counters are grouped into categories depending on the MIB to which they belong. The following table lists the categories maintained for asynchronous ports.

Category	Group	MIB table	RFC
INTERFACE	Interfaces	Interfaces	1213
RS232	Transmission	Asynchronous port	1659
DIAGNOSTIC	Enterprise MIB	Asynchronous interface	-

For more information about SNMP and MIBs, see Chapter 32, Simple Network Management Protocol (SNMP).

To display the MIB counters for an asynchronous port, use the command:

```
show asyn[=n] counter[=category]
```

where *n* is the number of the asynchronous port and *category* is one of the three counter categories. If a category is not specified, all categories are displayed.

Objects from the general input and output signal tables (see RFC 1659) are displayed by the **show asyn** command.

To clear counters in each category, use the command:

```
reset asyn[=n] counter[=category]
```

where *n* is the number of the synchronous port and *category* is one of the three counter categories. If a category is not specified, all counters are cleared.

The **reset asyn counters** command does not actually clear the counters to zero. Instead, it saves a copy of the current counter values. Subsequent **show asyn counters** commands display the difference between the current counter values and the last copy saved, if any. This is useful when debugging as it makes it easier to see changes in counter values. SNMP get requests always return the true counter values.

To enable or disable each asynchronous port, use the commands:

```
enable asyn=n
disable asyn=n
```

where *n* is the number of the asynchronous port. When an asynchronous port is disabled it does not transmit or receive data. When the port is enabled, all configuration parameters are restored to the settings in effect prior to the port being disabled. The default state of an asynchronous port is enabled.

Important Data being received or transmitted when the asynchronous port is disabled or reset is lost.

To reset an asynchronous port, use the command:

```
reset asyn=n
```

where *n* is the number of the asynchronous port. Any current connections are disconnected and the configuration parameters are restored from nonvolatile storage.

To reset the command history, use the command:

```
reset asyn history
```

The specific commands to change the parameters of a particular asynchronous port are given in "Command Reference" on page 12-15. As an example, to change the name of port 6 to "**test**" and the speed to 9600 bps, use the command:

```
set asyn=6 name=test speed=9600
```

All port configuration parameters are held in non-volatile memory and are retained over a power cycle.

Autobauding

Asynchronous ports may be set to autobauding mode. In this mode the switch adjusts the speed of the port to match the speed of the terminal attached to the port, up to a maximum speed of 19200 bps. For autobauding to work, the user should always press the [Enter] or [Return] key on the terminal several times until the switch prompt appears on the screen. At this point the switch has set the speed of the port. If a key other than [Enter] or [Return] is pressed while the switch is setting the port speed, the speed may be incorrectly set. In this case, there is no response from the switch or "garbage" characters appear on the terminal screen. To fix this, press [Break] two or more times, followed by [Enter] or [Return] several times.

Some terminals require the [Break] key to be held down for about a second to properly send a [Break]. Additionally, some terminals require a brief pause between multiple [Break]s.

Once the speed is set on an autobauding port, the switch does not change it unless one of the following events occurs:

- The switch is turned off.
- [Break] is pressed twice, in which case the switch "forgets" the current speed and waits for [Enter] or [Return] to be pressed several times to set the speed again.
- The terminal is switched off. This sometimes has the effect of sending [Break]s to the switch.

Making Asynchronous Ports Respond More Quickly

When an asynchronous port is in *ten mode*, it bundles together the characters that it receives within a certain time period, instead of passing them one at a time to a higher protocol layer for processing. The time period over which characters are bundled is set by the *ten timer*.

Bundling reduces the load on the CPU by spreading the character processing overhead across several characters. If a remote terminal session is involved, bundling also reduces the number of packets on the network by sending more characters in each packet. However, bundling reduces terminal responsiveness.

A ten timer value of 100 milliseconds is generally a good compromise between responsiveness and processing overhead. If you need to increase the port's responsiveness, you can reduce the length of the ten timer, by using the command:

```
set asyn[=port-number] tentimervalue=20..100 [other optional
   parameters]
```

Unless you are logged in via the port you want to change, also specify the asynchronous port number.

The default **tentimervalue** is 100 milliseconds.

Testing Serial Data Circuits

Wide area data circuits are normally leased from the Telecom supplier. A point-to-point circuit has an NTU or modem at each end. These normally allow some limited testing of the circuit to be done. Unfortunately, there are a large number of different types of NTU and modem, so it is not possible to predict the exact functionality. The following gives an indication of the basic features common to most modems and NTUs.

In the remainder of this section, the term 'NTU' is used exclusively.

Carrier detect This signal is normally available at the data interface of the NTU as well as being shown on a front panel LED. It must be present for the NTU to operate correctly. If this fails, it usually means that the data circuit is faulty or the NTU at the other end is not functioning. In either case, the Telecom supplier should be called to fix the problem. Some other possible names for this signal include RLSD, 109, CD and EQG. If the circuit quality is poor, this signal may have frequent short transitions. This results in poor link throughput.

Loopback This feature is not normally present as an indicator, but rather as one or more front panel buttons, sometimes associated with an LED to show that the NTU is in a test mode. The loopback functionality available varies from NTU to NTU, depending on the type, and exactly what has been selected at installation time. Loopbacks allow the data circuit to be tested in stages, by progressively looping back first the local NTU and then the remote NTU. If for instance, the remote NTU loopback fails, but the local loopback is successful, it indicates a fault in either the data circuit or the remote NTU and the Telecom supplier should be notified. If the remote and local tests are successful, it indicates that the problem is either in the remote NTU or the network equipment at the remote end. The tests should be reversed from the remote end to eliminate the remote NTU.

Data indicators These are front panel mounted LEDs on the NTU and can be used to see that data is flowing in both directions.

Displaying Interfaces

The switch stores information about interfaces as objects in the Interfaces Table of MIB-II, defined in RFC 1213 *Management Information Base for Network Management of TCP/IP-based internets: MIB-II*. To display the contents of the Interfaces Table, use the command:

```
show interface
```

To display detailed information about a specific interface, use the command:

```
show interface={ifindex|interface}
```

where *ifIndex* is the index of the interface in the Interfaces Table and *interface* is the interface name.

To display counters for all the interfaces, use the command:

```
show interface counter
```

For a detailed description of the objects in the Interfaces Table of MIB-II, see Appendix C, SNMP MIBs.

Interface Link Traps

When an interface changes to or from the “Down” state, an SNMP trap can be sent to any SNMP manager stations (trap hosts) that have been defined.

The general operation of link traps is defined in RFC 1157, *Simple Network Management Protocol*. In the typical multi-layered interface environment, each protocol layer for which an interface entry exists in the interface table can generate link up/down traps.

Since interface state changes tend to propagate through the protocol layers, multiple traps may be generated as the result of a single link failure. RFC 1573, *Evolution of the Interfaces Group of MIB-II*, resolves this issue by providing a mechanism for enabling and disabling link trap generation on a specific interface. This allows stacked interfaces to be configured so that only one trap is sent for a link transition.

Link traps are disabled by default on the switch. Link traps can be enabled or disabled on a per-interface basis by using the commands:

```
enable interface linktrap
```

```
disable interface linktrap
```

To display current settings for link traps, use the command:

```
show interface
```

The potential exists in a large or busy network for a high volume of trap messages to be generated. To set the maximum number of link traps generated per minute for each static interface or for all dynamic interfaces, use the command:

```
set interface traplimit
```

Managing Interfaces with SNMP

Switch interfaces can be enabled or disabled via SNMP by setting the *ifAdminStatus* object in the *ifTable* of MIB-II MIB to 'Up(1)' or 'Down(2)' for the corresponding *ifIndex*. When it is not possible to change the status of a particular interface the switch returns an SNMP error message.

The switch's implementation of the *ifOperStatus* object in the *ifTable* of MIB-II MIB supports two additional values—"Unknown(4)" and "Dormant(5)" (e.g. an inactive dial-on-demand interface).

Important An unauthorised person with knowledge of the appropriate SNMP community name could bring an interface up or down. Community names act as passwords for the SNMP protocol. Care should be taken when creating an SNMP community with write access to select a secure community name and to ensure that this name is known only to authorised personnel.

Command Reference

This section describes the commands available on the switch to configure and manage the asynchronous interfaces on the switch.

Some commands require IP and SNMP to be enabled and configured. See Chapter 13, Internet Protocol (IP) for a detailed description of the commands required to enable and configure IP. See Chapter 32, Simple Network Management Protocol (SNMP) for a detailed description of the commands required to enable and configure SNMP.

The shortest valid command is denoted by capital letters in the Syntax section. See "Conventions" on page xxxviii of About this Software Reference in the front of this manual for details of the conventions used to describe command syntax. See Appendix A, Messages for a complete list of error messages and their meanings.

connect asyn

Syntax `Connect ASYn=0`

Description This command creates a new terminal session that connects a Telnet session directly to a physical asynchronous port. This lets you send commands directly to a device connected to the port. For example, this command can be used to access a modem connected to the port, to send modem commands directly to the modem to change its configuration.

Examples To connect to asynchronous port 0, use the command:

```
connect asy=0
```

Related Commands
connect
disconnect

disable asyn

Syntax `DISable ASYn=0`

Description This command disables a specific port that is currently enabled so that no data can be accepted or transmitted through it. By default, an asynchronous port is enabled.

If you are logged into an asynchronous port to manage the switch, you cannot disable that port by typing this command. You have to run the command from a script or from a different session, such as a telnet session.

Examples To disable asynchronous port 3, use the command:

```
dis asy=3
```

Related Commands
enable asyn
show interface
reset asyn
set asyn
show asyn

disable interface linktrap

Syntax `DISable INTerface={`*`ifIndex`*`|`*`interface`*`|DYnamic} LInktrap`

where:

- *ifIndex* is a decimal value specifying the entry in the interface MIB
- *interface* is a valid interface name

Description This command disables link up/down trap generation for the specified interface. Link up/down traps are disabled by default.

The **interface** parameter specifies the interface for which link traps are to be disabled.

The **dynamic** parameter handles the special case of dynamic interfaces that do not yet exist. If link traps are enabled for dynamic interfaces, a trap message is generated whenever a dynamic interface is created or destroyed. This is disabled by default. If **dynamic** is specified, link trap generation is disabled for the creation and destruction of dynamic interfaces. Valid interfaces are:

- VLAN (such as vlan1, vlan1-1)

To see a list of current interfaces, use the **show interface** command.

IP and SNMP must be enabled and correctly configured to generate traps. See Chapter 13, Internet Protocol (IP) for a detailed description of the commands required to enable and configure IP. See Chapter 32, Simple Network Management Protocol (SNMP) for a detailed description of the commands required to enable and configure SNMP.

Examples To disable link trap generation for interface vlan1, use the command:

```
dis int=vlan1 li
```

Related Commands

enable interface linktrap
set interface traplimit
show interface

enable asyn

Syntax `ENAble ASYn=0`

Description This command enables a specific asynchronous port. The port must currently be disabled. Data is accepted and/or transmitted via the specified port. By default, an asynchronous port is enabled.

Examples To enable asynchronous port 0, use the command:

```
ena asy=0
```

Related Commands

disable asyn
reset asyn
set asyn
show asyn
show interface

enable interface linktrap

Syntax `ENAble INTerface={`*`ifIndex`*`|`*`interface`*`|DYnamic} LInktrap`

where:

- *ifIndex* is a decimal value specifying the entry in the interface MIB
- *interface* is a valid interface

Description This command enables link up/down traps to be generated for an interface. Link up/down traps are disabled by default.

The **interface** parameter specifies the interface for which link traps are to be enabled.

The **dynamic** parameter handles the special case of dynamic interfaces that do not yet exist. If link traps are enabled for dynamic interfaces, a trap message is generated whenever a dynamic interface is created or destroyed. This is disabled by default. The **dynamic** parameter enables link trap generation for the creation and destruction of dynamic interfaces. Valid interfaces are:

- VLAN (such as vlan1, vlan1-1)

To see a list of current interfaces, use the **show interface** command.

IP and SNMP must be enabled and correctly configured to generate traps. See Chapter 13, Internet Protocol (IP), and Chapter 32, Simple Network Management Protocol (SNMP) for these commands.

Examples To enable link trap generation for the interface with an ifIndex of 1, use the command:

```
ena int=1 li
```

Related Commands

disable interface linktrap
set interface traplimit
show interface

purge asyn

Syntax `PURge ASYn={`*`asyn-number`*`|All}`

where *asyn-number* is the number of the port. Ports are numbered sequentially starting with 0.

Description This command resets a specific asynchronous port to the factory default configuration. If **all** is specified, all ports are reset and all port configurations are lost.

Examples To purge the configuration of all asynchronous ports, use the command:

```
pur asy=all
```

Related Commands
disable asyn
enable asyn
reset asyn
reset asyn counters
reset asyn history
set asyn
show asyn

reset asyn

Syntax `RESET ASYn=`*`asyn-number`*

where *asyn-number* is the number of the port. Ports are numbered sequentially starting with 0.

Description This command resets a specific asynchronous port. If a port number is not specified, then the command applies to the port from which it is issued. If a port number is specified, the command applies to the specified port. The port configuration is restored from nonvolatile storage. Any existing connections are terminated.

Examples To reset asynchronous port 3, use the command:

```
reset asy=3
```

Related Commands
disable asyn
enable asyn
reset asyn counters
reset asyn history
set asyn
show asyn

reset asyn counters

Syntax

```
RESET ASYn[=asyn-number] COUnters[={Diagnostic|Interface|
   Rs232}]
```

where *asyn-number* is the number of the port. Ports are numbered sequentially starting with 0.

Description

This command simulates a reset of the asynchronous counters to zero for the specified asynchronous port. The command saves a copy of the current counter values. Subsequent **show asyn counters** commands display the difference between the current counter values and the last saved copy, if any. This is useful when debugging as it makes it easier to see changes in counter values. SNMP get requests always return the true counter values.

The **asyn** parameter specifies the asynchronous port. If a port number is not specified, counters for the port from which you entered the command are reset. If a port number is specified, counters for the specified port are reset. If you enter this command from a Telnet session, you must specify a port number.

The **counters** parameter specifies the category of counters to reset. If a category is not specified, counters from all categories are reset. If **diagnostic** is specified, counters from the asynchronous interface table of the enterprise MIB are reset. If **interface** is specified, interface counters from the Interfaces MIB are reset. Interface MIB counters exist for ports used as network interfaces. If **rs232** is specified, counters from the asynchronous port table of the RS-232 like hardware devices MIB are reset.

Examples

To reset the interface counters for asynchronous port 3, use the command:

```
reset asy=3 cou=i
```

Related Commands

reset asyn
reset asyn history
show asyn counters

reset asyn history

Syntax `RESET ASYn=`*`asyn-number`* `History`

where *asyn-number* is the number of the port. Ports are numbered sequentially starting with 0.

Description This command clears all commands from the command history for the specified asynchronous port. If a port number is not specified then the command applies to the port or TTY device from which the command is issued. If a port number is specified, the command applies to the specified port.

Port history is automatically reset during the login and logoff processes.

Examples To reset the command history for the asynchronous port to which the terminal is connected, use the command:

```
reset asy h
```

To reset the command history for asynchronous port 3, use the command:

```
reset asy=3 h
```

Related Commands **reset asyn**
reset asyn counters
show asyn

reset interface counters

Syntax `RESET INTerface[={`*`ifIndex`*`|`*`interface`*`}] COUnters`

where:

- *ifIndex* is a decimal value specifying the entry in the interface MIB
- *interface* is a valid interface

Description This command simulates a reset of the interface counters to zero for the specified interface. The command saves a copy of the current counter values. Subsequent **show interface counters** commands display the difference between the current counter values and the last saved copy, if any. This is useful when debugging as it makes it easier to see changes in counter values. SNMP get requests always return the true counter values.

The **interface** parameter specifies the interface. If an interface is not specified, counters for all interfaces reset. If an interface is specified, counters for the specified interface are reset. To see a list of current interfaces, use the **show interface** command.

Examples To reset the vlan1 interface MIB counters, use the command:

```
reset int=vlan1 cou
```

Related Commands **show interface counters**

set asyn

Syntax

```
SET ASYn[=asyn-number] [ATtention={Break|alphabetical
   control char|^[|None}] [CDcontrol={Connect|Ignore|
   Online}] [DAtabits={5|6|7|8}] [DEFaultservice={ON|OFf|
   YES|NO|True|False}] [DTrcontrol={Connect|OFf|ON}]
   [Echo={ON|OFF|YES|NO|True|False}] [ENable={BREAK|NONE}]
   [Flow={Character|HArdware|None}] [History=0..99]
   [IDLEtimeout={10..4294967294|OFF|0}]
   [INFlow={Character|HAreware|None}] [LOGin={ON|OFf|YES|
   NO|True|False}] [MAXoqlen=0..4294967295] [MTu=40..1500]
   [NAme=name] [OUTFlow={Character|HArdware|None}]
   [PAGe={0..99|OFF}] [PARity={Even|Mark|None|Odd|SPace}]
   [PRompt={prompt|DEFault|OFf}] [SECure={ON|OFf|YES|NO|
   True|False}] [SERvice={service-name|None}]
   [SHellserver={ON|OFF}] [SPeed={AUTO}] [STopbits={1|2}]
   [TENtimervalue=20..100] [TIMeout=1..65535] [TYpe={Dumb|
   VT100}]
```

where:

- *asyn-number* is the number of the port. Ports are numbered sequentially starting with 0.
- *alphabetical control char* is the '^' character followed by any alphabetical character in upper or lower case such as ^A, ^b, ^z.
- *ipadd* is an IP address in dotted decimal notation.
- *network* is a valid Novell network number, expressed as a hexadecimal number. Leading zeros may be omitted.
- *name* is a character string 1 to 15 characters long. If the string contains spaces, it must be in double quotes. The string is not case-sensitive.
- *prompt* is a character string 1 to 15 characters long. If the string contains spaces, it must be in double quotes. The string is not case- sensitive.
- *service-name* is the name of a service 1 to 15 characters long, with no embedded spaces. The first character must be alphabetic (A–Z). The name is not case-sensitive.

Description

This command sets characteristics of asynchronous ports. If a port is not specified, then the command applies to the port on which it is issued. If a port number is specified, the command applies to the specified asynchronous port. Multiple options may be specified in the same command.

If the **set asyn** command is issued from a port with User privileges, the port number and the options **ipaddress**, **mtu**, **service**, and **secure** cannot be specified.

For a Telnet connection only, the options **history**, **page**, **prompt**, **type,** and **idletimeout** may be used to alter the behaviour of the dedicated TTY device.

The **set asyn** command may be rejected if there is no hardware present in the switch for the specified port number, the port is currently assigned or a port-pair in a permanent assignment, or the port is a printer port and the printer is active.

The change takes place immediately and the new value is stored in nonvolatile memory.

The **attention** parameter specifies the character used to return from an active session (e.g. a Telnet connection) to the switch prompt. If "^" with an alphabetical character is specified then the attention character is the [Ctrl] key and the specified alphabetical character key held down simultaneously. Similarly, "^[" means the attention character is set to the [Ctrl] key with the "[" key. The default is **break** (the [Break] key) for asynchronous ports, and "^P" (the [Ctrl/P] key) for Telnet connections to the switch.

If autobauding is enabled, the attention character must be set to [Break] because this is the only character that can be detected before the baud rate is established

The **cdcontrol** parameter specifies how the switch interprets the state of the DCD input signal. If **cdcontrol** is set to **connect**, when DCD is deasserted, the switch terminates existing connections. This is useful when the port is accessed via a dialup modem. If **cdcontrol** is set to **online**, output is not sent to the port unless the DCD input signal is asserted. When the port is configured as a printer port, and the DTR line of the printer is connected to the DCD input of the switch, the switch determines if a printer is online and powered up. This ensures that print jobs are not sent to a printer that is offline or off. If **cdcontrol** is set to **ignore**, the switch ignores the state of the DCD input regardless of the way the port is used. The default is **ignore**.

The **databits** parameter sets the number of data bits per character transmitted by the port. This should match the terminal setting. The default is **8**.

The **defaultservice** parameter is used to configure a port to automatically connect to a service whenever a user types anything at a terminal connected to the port, or (in the case of a modem attached to the port) when the modem asserts DCD. This parameter is valid if a service is associated with the port, using the **service** parameter. A port configured for **defaultservice** can not be used to enter commands to the switch because the port connects to the default service whenever anything is typed at the switch prompt. The **defaultservice** parameter changes the meaning of the **service** parameter and the way the port operates. If **defaultservice** is set to **off** (the default) the port acts as an interactive service port for the service specified by the **service** parameter, and is used to connect the switch to the RS-232 port of a host. If **defaultservice** is set to **on**, the **service** parameter specifies the name of the service (interactive or Telnet) to which an automatic connection is to be made. In outputs of the **show asyn** command on page 12-28 for a **defaultservice** port, the service name is either prefixed by an asterisk or followed by the string "(default)".

The **dtrcontrol** parameter controls the way the switch controls the state of the DTR output signal. If **dtrcontrol** is set to **connect**, the DTR output of the switch is asserted for the duration of a valid connection. If **dtrcontrol** is set to **on** or **off**, the DTR line can be driven to the designated state. The default is **on**. This option is intended for ports that are directly connected to host asynchronous ports that require DTR output to be asserted for the duration of a valid connection.

The **echo** parameter sets the echo mode for the port. If **echo** is set to **on**, characters typed following the prompt are echoed to the terminal screen. If **echo** is set to **off**, characters are not echoed to the terminal screen but the switch still receives and processes them. This option has effect when the port is not assigned. When the port is assigned, echoing is controlled by the host. The default is **on**.

The **enable** parameter sets the behaviour of the asynchronous port after you have manually disabled the port by using the **disable asyn** command on page 12-15. If **enable=break** is specified, you can re-enable the port by sending

it a break signal. Further break signals will not affect the port's status. The port remains enabled until it is idle for the **timeout** period, or until you manually re-enter the **disable asyn** command. See "Session Timeout" on page 12-9 for more information about this functionality. If **enable=none** is specified, the port's status does not change even if it receives a break signal. The default is **break**.

The **flow** parameter sets the flow control mechanism used for the port in both the transmit and receive directions. If **flow** is set to **none**, the switch ignores all incoming flow control characters or lead transitions. The switch does not generate flow control characters and the state of the hardware lines do not change. Use **none** on AT-8624T/2M switches. If **flow** is set to **character**, the switch uses XON/XOFF flow control. If **flow** is set to **hardware**, the switch uses the RTS/CTS lines for flow control. For finer control, the **inflow** and **outflow** parameters can be used to set different flow control mechanisms for the port in the receive and transmit directions, respectively.

The **history** parameter defines the number of commands saved in the command history for future recall with the **show command history** command on page 2-17 of Chapter 2, Using the Command Line Interface (CLI). The minimum is 0 and the maximum is 99. Setting the history length to zero for a port does not clear all the commands from the history. To clear command history, use the **reset asyn history** command on page 12-21. The default history length for asynchronous ports and Telnet connections is 30.

The **idletimeout** parameter specifies a period of time, in seconds, for a terminal connection's dedicated TTY device idle timer. If the specified time period lapses since the last time the dedicated TTY device received data from the client, the connection or session is terminated and the terminal screen displays the login prompt. If **0** or **off** are specified, the idle timer remains off, and the session must be explicitly terminated. The default is 0.

If the dedicated TTY device's idle timeout period is modified while there is an established connection, the idle timer for that session is reset so that it uses the new timeout value. Any idle time accumulated by the connection prior to the issuing of the set command is lost.

The **login** parameter specifies whether a user can log into an asynchronous port and issue commands on the switch. If **on** is specified, users can log into the switch; if **off** is specified, they cannot. No command prompt is displayed, no characters are echoed by the port, and input received by the port is ignored. The default is **on**.

Caution If **login** is set to **off** from a terminal or terminal emulation session over the asynchronous port, it becomes impossible to enter any other commands into that session. In this situation, the switch can be reconfigured from a Telnet session when there is an interface with a valid IP address and appropriate routes. Alternatively, power cycling the switch removes the unsaved configuration.

The **maxoqlen** parameter sets the maximum number of character buffers permitted on the output queue for this port. Once the queue has reached this limit no further buffers are accepted for transmission from the higher layer. The default is **16**. A value of 0 means the length of the output queue is the default value.

The **mtu** parameter sets the Maximum Transmission Unit for the port. This is the maximum number of bytes in a packet transmitted over this port when it is

used as a network interface. The minimum MTU is 40 and the maximum is 1500. The default is **1500**.

The **name** parameter assigns a name to the port, as a convenient reference to identify ports. For example, it may be set to the name of the person who normally uses the terminal connected to the port, or the location of the terminal. The default name is “Port #” where “#” is the port number.

The **page** parameter sets the number of lines of command output displayed on the terminal screen before the switch pauses and waits for the user to press a key to continue. This number may range from 0 to 99. The default is **22** for both asynchronous ports and Telnet connections. If **page** is set to **off**, paging is disabled.

The **parity** parameter sets the parity of each character transmitted by the port. This should match the terminal setting. The default is **none**.

The **prompt** parameter sets the prompt for the port to the default string, such as CMD>, or a user-specified string, or it disables the prompt. It is often convenient to disable the prompt when the port is being used as a manager port or for debugging network problems because it reduces the clutter on the terminal screen. This option has effect when the port is not assigned. When the port is assigned, prompting is controlled by the host.

The **secure** parameter determines whether a user must log in to the port before switch commands are accepted. See Chapter 23, User Authentication for more information on logging in and defining users of the switch. The default is **on** for both asynchronous ports and Telnet connections.

The **service** parameter allocates an asynchronous port to be a host port for the named service. This port must be an unallocated terminal port. The service must already have been defined with the **set service** command on page 39-18 of Chapter 39, Terminal Server and be of type **interactive**. If **service** is set to **none** the port is deallocated from the service.

The **shellserver** parameter specifies how to handle characters received on the asynchronous port. Use this parameter to prevent output from a device connected to the port being interpreted as commands. If you specify **on**, characters received on the port are sent to the CLI. If you specify **off**, characters received on the port are ignored. You can still use the **connect** command on page 39-12 of Chapter 39, Terminal Server to connect to a device attached to the asynchronous port. The default is **on**.

The **speed** parameter sets the speed (baud rate) of the port. This should match the terminal setting. The attention character must be set to [Break] if autobauding is selected. The port expects to see several [Enter] or [Return] characters to determine the terminal speed setting. If another character is entered initially after the port is reset or cleared, the autobauding feature may not select the correct speed. To restart autobauding in this situation, two consecutive [Break] characters should be entered, followed by two [Enter] or [Return] characters. The default is **auto**.

Autobauding does not work with baud rates exceeding 19200 baud, the maximum for many terminals. A port connected to a modem should not be set to autobauding.

Not all speeds are supported on every switch model. If an unsupported speed is specified, an error message is displayed and the command is ignored.

The **stopbits** parameter sets the number of stop bits per character transmitted by the port. This should match the terminal setting. The default is **1**.

The **tentimervalue** parameter sets the length of the ten timer, in milliseconds. Reducing the length of the ten timer increases the port's responsiveness (see "Making Asynchronous Ports Respond More Quickly" on page 12-12). Unless you are logged in via the port you want to change, also specify the asynchronous port number. The default **tentimervalue** is 100.

The **timeout** parameter specifies a length of time in seconds for which the asynchronous port can remain idle before it is disabled and the user is logged out. This parameter only takes effect on a port if you have already manually disabled the port using the **disable asyn** command on page 12-15. To re-enable the port, send it a break signal. See "Session Timeout" on page 12-9 for more information. The **timeout** parameter is only valid if the **enable** parameter is set to **break**. The default timeout is 60 seconds.

The **type** parameter specifies the type of terminal attached to the port. If **type** is set to **vt100**, the switch expects the terminal to support standard VT100 escape sequences and uses them. If **type** is set to **dumb**, the switch does not use VT100 escape sequences. The **dumb** option is usually required for ports connected to printers or very old terminals that do not support VT100 escape sequences. The default is **vt100** for both asynchronous ports and Telnet connections.

Examples

The following command configures asynchronous port 17:

```
set asy=17 da=7 par=odd sp=9600 st=1
```

Each parameter can also be set separately:

```
set asy=17 da=7
set asy=17 par=odd
set asy=17 sp=9600
set asy=17 st=1
```

Related Commands

disable asyn
enable asyn
reset asyn
set tty
show asyn
show command history
show service
show tty

set interface traplimit

Syntax `SET INTerface={`*`ifIndex`*`|`*`interface`*`|DYNamic} TRaplimit=1..60`

where:

- *ifIndex* is a decimal value specifying the entry in the interface MIB
- *interface* is a valid interface

Description This command sets the maximum number of link up/down traps generated in one minute for the specified interface. The default is 20 trap messages per minute. Valid interfaces are:

- VLAN (such as vlan1, vlan1-1)

To see a list of current interfaces, use the **show interface** command.

IP and SNMP must be enabled and correctly configured to generate traps. See Chapter 13, Internet Protocol (IP) for a detailed description of the commands required to enable and configure IP. See Chapter 32, Simple Network Management Protocol (SNMP) for a detailed description of the commands required to enable and configure SNMP.

Examples To set the trap limit for interface vlan2 to 40, use the command:

```
set int=vlan2 tr=40
```

Related Commands

disable interface linktrap
enable interface linktrap
show interface

show asyn

Syntax `SHow ASYn[={`*`port-number`*`|All}] [Summary]`

where *port-number* is the number of the port. Ports are numbered sequentially starting with 0.

Description This command displays configuration information for asynchronous ports.

The **asyn** parameter specifies the asynchronous port. If a port number is not specified, counters for the port from which you entered the command are displayed. If a port number is specified, counters for the specified port are displayed. If **all** is specified, counters for all asynchronous ports are displayed. You must have manager privilege to specify a port number.

The **summary** parameter displays a one-line summary for the specified ports (Figure 12-1 on page 12-28, Table 12-1 on page 12-28).

If no parameters are specified, then full configuration information for the specified ports is displayed (Figure 12-2 on page 12-29, Table 12-2 on page 12-30).

Figure 12-1: Example output from the **show asyn summary** command.

```
Port Name            Module Mode    Data Format Attn Secur Mgr Service
-------------------------------------------------------------------------------
000  Asyn 0          TSER   Ten     9600,N,8,1  brk  yes   yes -
-------------------------------------------------------------------------------
```

Table 12-1: Parameters in output of the **show asyn summary** command

Parameter	Meaning
Port	Number of the asynchronous port.
Name	Name assigned to the port.
Module	Module that owns the port.
Mode	Mode of operation for the port.
Data Format	Baud rate, parity, number of data bits and number of stop bits configured for the port.
Attn	Attention character for the port; either “-”, “brk”, or “chr”.
Secur	Whether the port is secure.
Mgr	Whether the port has Manager privilege.
Service	The name of the service to which the port is allocated, if any.

Figure 12-2: Example output from the **show asyn** command

```
ASYN 0 : 0000005625 seconds  Last change at: 0000005606 seconds

ASYN information
Name ..................... Asyn 0
Status ................... enabled
Mode ..................... Ten
Data rate ................ 38400
Parity ................... none
Data bits ................ 8
Stop bits ................ 1
Test mode ................ no
In flow state (mode) ..... on  (Hardware)
Out flow state (mode) ..... off (Hardware)
Autobaud mode ............ disabled
Max tx queue length ..... 16
TX queue length .......... 0
Transmit frame ........... none
RX queue length .......... 0
Ten timer value .......... 100
Enable Mode.................break
Enabled Status Time Left....59

Control signals
  DTR (out) ............... on  on      1
  RTS (out) ............... on  -       1
  CD  (in)  ............... n/a ignore  0
  CTS (in)  ............... off -       0
  RNG (in)  ............... off -       0

TTY information
Instance ................. 18
Login Name ...............
Description .............. Asyn 2
Secure ................... yes
Connections to ...........
Current connection ....... none
In flow state ............ on
Out flow state ........... on
Type ..................... VT100
Service .................. none
Prompt ................... login
Echo ..................... yes
Attention ................ break
Manager .................. no
Edit mode ................ insert
History length ........... 20
Page size ................ 22
Idle Timeout (seconds)..... 300
```

Table 12-2: Parameters in output of the **show asyn** command

Parameter	Meaning
Name	The name of the asynchronous port.
Status	Whether the port is enabled or disabled.
Mode	The mode of operation for the port. This is "Ten" for terminal server ports (characters bundled every tenth of a second).
Data rate	The baud rate for the port. The default is autobaud.
Parity	The parity setting for the port.
Data bits	The number of data bits in each transmitted character and the number expected in each received character.
Stop bits	The number of stop bits transmitted after each character and the number expected after each received character.
Test mode	Whether the interface is in a test mode.
In flow state (mode)	The flow control state and mode for the incoming data path. The flow control state may be "on" or "off", indicating whether the port is able to receive characters. The mode may be "none" (no flow control), "hardware" (RTS/CTS flow control), or "XON/XOFF" (XON/XOFF flow control).
Out flow state (mode)	The flow control state and mode for the outgoing data path. See "In flow state" for a description. The mode is the same for both directions.
Autobaud mode	Whether autobauding is enabled or disabled. When enabled, whether the autobauding process is searching (the port is trying to determine the baud rate of the terminal) or found (the baud rate has been set).
Max tx queue length	The maximum number of character buffers permitted on the transmit queue for the port. This parameter affects a port used as a network interface.
Tx queue length	The length of the queue of character buffers that are waiting to be transmitted to the port.
Transmit frame	The address of the current frame being transmitted by the port, or "none" if no frame is currently being transmitted.
Rx queue length	The length of the queue of character buffers that are waiting to be passed up from the port to higher layers.
Ten timer value	The length of the *ten timer*, in milliseconds. When an asynchronous port is in *ten mode*, it bundles together the characters that it receives within a certain time period, instead of passing them one at a time to a higher protocol layer for processing. The ten timer sets the time period over which characters are bundled.
Enable Mode	The behaviour of the switch when it receives a break signal. If "break" is displayed, a disabled asynchronous port is enabled when a break signal is received. If "none" is specified, the port's status does not change even if it receives a break signal.
Enable Status Time Left	The remaining length of time in seconds for which the asynchronous port can remain inactive before its status is set to disabled. If a timeout time was not specified in the **set asyn** command, this value is 0.

Table 12-2: Parameters in output of the **show asyn** command (Continued)

Parameter	Meaning
Control signals	The control signals present on the interface, their direction (output or input to the switch), their state and the number of transitions they have made since the switch was powered up or the counters reset. For the DTR and CD signal lines their mode of operation is also displayed.
Instance	The instance number for the TTY device dedicated to this port.
Login name	The login name of the user logged in to this port, if any.
Description	The name assigned to the port.
Secure	Whether the port is secure.
Connections to	A list of TTY devices (if any) to which this port TTY is linked for the purpose of providing multiple sessions.
Current connection	The instance number of the TTY that this port TTY is currently connected to, or "none" if there is no active connection.
In flow state	The input flow control state for the TTY dedicated to this port.
Out flow state	The output flow control state for the TTY dedicated to this port.
Attached module	The module that owns the port. By default this is terminal server.
Attached module instance	The instance of the module that owns the port.
Type	Whether the terminal type setting for the port is dumb or VT100.
Prompt	Type of prompt given on this port: default off login password confirm encapsulation a user-defined string
Echo	Whether the port echoes input characters.
Attention	The attention character for this port; either none, break, or char. For an asynchronous port the default attention character is "break".
Manager	Whether the port has Manager privilege.
Edit mode	The edit mode for the port; either "?", "insert", or "overstrike". The default is "insert".
History length	The maximum number of commands that are held in the command history for this port. The default is 30.
Page mode/length	The number of lines of command output the switch displays before pausing and waiting for the user to press a key, or "off" when page mode is disabled for this port. The default is 22.
Idle Timeout	Maximum period of time in seconds without data being received from a given client before the corresponding session is terminated.

Examples To show the configuration for asynchronous port 1, use the command:

```
sh asy=1
```

To obtain an abbreviated display for asynchronous port 1 enter:

```
sh asy=1 s
```

Related Commands

disable asyn
enable asyn
reset asyn
reset asyn counters
reset asyn history
set manager asyn
set asyn
set service
set tty
show asyn counters
show asyn history
show tty

show asyn counters

Syntax

```
SHow ASYn[={port-number|All}] COUnters[={Diagnostic|
   INTerface|Rs232}]
```

where *port-number* is the number of the port. Ports are numbered sequentially starting with 0.

Description

This command displays counters for asynchronous ports (Figure 12-3 on page 12-33, Table 12-3 on page 12-34). It requires a user with manager privilege.

If the counters have been reset with the **reset asyn counters** command on page 12-20, this command displays the difference between the current counter values and the last saved copy, if any. This is useful when debugging as it makes it easier to see changes in counter values. SNMP get requests always return the true counter values.

The **asyn** parameter specifies the asynchronous port. If a port number is not specified, counters for the port from which you entered the command are displayed. If a port number is specified, counters for the specified port are displayed. If **all** is specified, counters for all asynchronous ports are displayed. If you enter this command from a Telnet session, you must specify a port number or **all**.

The **counters** parameter specifies the category of counters to display. If a category is not specified, counters from all categories are displayed. If **diagnostic** is specified, counters from the asynchronous interface table of the enterprise MIB are displayed. If **interface** is specified, interface counters from the Interfaces MIB are displayed. Interface MIB counters exist for ports used as network interfaces. If **rs232** is specified, counters from the asynchronous port table of the RS-232 like hardware devices MIB are displayed.

Figure 12-3: Example output from the **show asyn counters** command

```
Asyn 1: 0000014132 seconds    Last change at: 0000000000 seconds

RS-232 MIB Counters
    Receive:
ParityErrs                0
FramingErrs               0
OverrunErrs               0

Diagnostic Counters
    Receive:                          Transmit:
inCharacters         690025    outCharacters         689828
inBuffers             13513    outBuffers             13526
fcsErrors                 0    droppedBuffers             0
                               lostInterrupts             0
slipErrors                0
    General:
disconnects               0
```

Table 12-3: Parameters in output of the **show asyn counters** command

Parameter	Meaning
ParityErrs	Number of characters received with a parity error.
FramingErrs	Number of characters received with a framing error.
OverrunErrs	Number of characters lost due to an overrun error.
inCharacters	Total number of characters received.
inBuffers	Number of character buffers transferred to a higher layer.
fcsErrors	Number frames received with a frame check sequence error.
outCharacters	Total number of characters transmitted.
outBuffers	Number of character buffers transmitted for a higher layer.
droppedBuffers	Number of character buffers discarded because the output queue had reached is maximum allowed length.
ifInOctets	Number of octets received on this interface.
ifInUcastPkts	Number of unicast packets delivered to a higher-layer protocol.
ifInNUcastPkts	Number of non-unicast packets delivered to a higher-layer protocol.
ifInDiscards	Number of inbound packets discarded though no errors had been detected to preventing them from being deliverable to higher-layer protocol.
ifInErrors	Number of inbound packets that contained errors preventing them from being deliverable to a higher-layer protocol.
ifInUnknownProtos	Number of packets discarded because they were for an unconfigured protocol.
ifOutOctets	Number of octets transmitted, including framing.
ifOutUcastPkts	Number of unicast packets transmitted or discarded.
ifOutNUcastPkts	Number of non-unicast packets transmitted or discarded.
ifOutDiscards	Number of packets discarded though no errors had been detected preventing their being transmitted.
ifOutErrors	Number of packets not transmitted because of errors.
ifOutQLen	Length of the output packet queue.

Examples

To display all the counters for asynchronous port 1, use the command:

```
sh asy=1 cou
```

Related Commands

disable asyn
enable asyn
reset asyn
reset asyn counters
set manager asyn
set asyn
set service
set tty
show asyn
show asyn history
show tty

show asyn history

Syntax `SHow ASYn[=`*`port-number`*`] History`

where *port-number* is the number of the port. Ports are numbered sequentially starting with 0.

Description This command displays the command history for an asynchronous port and prompts your for a command number from the list (Figure 12-4 on page 12-35). Enter a number and press the Enter or Return key to select a command, or just press Enter or Return to return to the prompt. If you enter a valid command number, the command is displayed at the prompt ready for editing and execution.

The **asyn** parameter specifies the asynchronous port. If a port number is not specified, the command history for the port from which you entered the command is displayed. If a port number is specified, the command history for the specified port is displayed. You must have manager privilege to specify a port number.

The command history can also be displayed with the **show command history** command on page 2-17 of Chapter 2, Using the Command Line Interface (CLI).

Figure 12-4: Example output from the **show asyn history** command

```
1  sh asyn cou
2  sh asyn sum
3  sh asyn hist
4  sh asyn cou
5  login manager
6  sh tty
7  sh asyn=1 cou
8  sh syn cou=int
9  sh asyn=1 cou

Enter command number>
```

Examples To see the command history for the asynchronous port to which the terminal is connected, use the command:

```
sh asy h
```

Related Commands

disable asyn
enable asyn
reset asyn
reset asyn history
set manager asyn
set asyn
set service
set tty
show command history in Chapter 2, Using the Command Line Interface (CLI)
show asyn
show asyn counters
show tty

show interface

Syntax `SHow INTerface[={`*`ifIndex`*`|`*`interface`*`}]`

where:

- *ifIndex* is a decimal value specifying the entry in the interface MIB
- *interface* is a valid interface name

Description This command displays the contents of the interface MIB. If an interface is not specified, summary information for all interfaces is displayed (Figure 12-5 on page 12-36, Table 12-4 on page 12-36). If an interface is specified, detailed information for the specified interface, including counters, is displayed (Figure 12-6 on page 12-37, Table 12-5 on page 12-37).

Figure 12-5: Example output from the **show interface** command

```
Interfaces                                  sysUpTime:          03:45:33

DynamicLinkTraps.....Disabled
TrapLimit............20

Number of unencrypted PPP/FR links.....0

ifIndex Interface      ifAdminStatus   ifOperStatus     ifLastChange
--------------------------------------------------------------------------------
 1      port1          Up              Down                  00:00:16
 2      port2          Up              Down                  00:00:00
 3      port3          Up              Down                  00:00:00
 4      port4          Up              Down                  00:00:00
 5      port5          Up              Down                  00:00:00
 6      port6          Up              Down                  00:00:00
 7      port7          Up              Down                  00:00:00
 8      port8          Up              Down                  00:00:00
 9      port9          Up              Down                  00:00:00
 10     port10         Up              Down                  00:00:00
 11     port11         Up              Down                  00:00:00
 12     port12         Up              Down                  00:00:00
 13     port13         Up              Down                  00:00:00
 14     port14         Up              Down                  00:00:00
 15     port15         Up              Down                  00:00:00
 16     port16         Up              Down                  02:21:50
 17     vlan1          Up              Down                  02:21:50
--------------------------------------------------------------------------------
```

Table 12-4: Parameters in output of the **show interface** command

Parameter	Meaning
sysUpTime	Elapsed time since the last switch restart.
DynamicLinkTraps	Whether link traps are enabled for dynamic interfaces.
TrapLimit	Maximum number of link up/down traps for dynamic interfaces that is generated in one minute.
ifIndex	Index of the interface in the interface table.
Interface	Name of the interface.
ifAdminStatus	Whether the administratively-set (configured) state of the interface is Up, Down, or Testing.

Table 12-4: Parameters in output of the **show interface** command (Continued)

Parameter	Meaning
ifOperStatus	Whether the operational state of the interface is Up, Down, Testing, Unknown, or Dormant.
ifLastChange	Value of *sysUpTime* at the time the interface entered its current operational state.

Figure 12-6: Example output from the **show interface** command for a specific interface

```
Interface.................. vlan1
  ifIndex.................. 1
  ifMTU.................... 1500
  ifSpeed.................. 10000000
  ifAdminStatus............ Up
  ifOperStatus............. Up
  ifLinkUpDownTrapEnable... Disabled
  TrapLimit................ 20

Interface Counters (software only)

  ifInOctets .................. 21484       ifOutOctets ................. 13775
  ifInUcastPkts ................. 165       ifOutUcastPkts ............... 134
  ifInNUcastPkts ................ 19       ifOutNUcastPkts ................ 0
  ifInDiscards .................. 0       ifOutDiscards .................. 0
  ifInErrors .................... 0       ifOutErrors .................... 0
```

Table 12-5: Parameters in output of the **show interface** command for a specific interface

Parameter	Meaning
Interface	Name of the interface.
ifIndex	Index of the interface in the interface table.
ifMTU	Size in octets of the largest packet that can be transmitted on the interface.
ifSpeed	Estimate of the interface's current speed in bits per second, or 0 if the interface is down.
ifAdminStatus	Whether the administratively-set (configured) state of the interface is Up, Down, or Testing.
ifOperStatus	Whether the operational state of the interface is Up, Down, Testing, Unknown, or Dormant.
ifLinkUpDownTrapEnable	Whether link traps are enabled for the interface.
TrapLimit	Maximum number of link up/down traps for dynamic interfaces that is generated in one minute.
Interface Counters	Counters for the interface.
ifInOctets	Number of octets (bytes) received by the interface.
ifInUcastPkts	Number of unicast packets received by the interface.
ifInNUcastPkts	Number of multicast packets received by the interface.
ifInDiscards	Number of packets discarded by the interface. Not applicable for a port interface.
ifInErrors	Number of packets received with errors by the interface.
ifOutOctets	Number of bytes transmitted by the interface.

Table 12-5: Parameters in output of the **show interface** command for a specific interface (Continued)

Parameter	Meaning
ifOutUcastPkts	Number of unicast packets transmitted by the interface.
ifOutNUcastPkts	Number of multicasts transmitted by the interface.
ifOutDiscards	Number of output packets discarded by the interface. Not applicable for a port interface.
ifOutErrors	Number of packets that should have been transmitted but were not because of errors.

Examples

To display the general state of all interfaces, use the command:

```
sh int
```

Related Commands

disable interface linktrap
enable interface linktrap
reset interface counters
set interface traplimit
show interface counters

show interface counters

Syntax `SHow INTerface[={`*`ifIndex`*`|`*`interface`*`}] COUnters`

where:

- *ifIndex* is a decimal value specifying the entry in the interface MIB
- *interface* is a valid interface name

Description This command displays interface counters from the Interfaces MIB for the specified interface or all interfaces. If the counters have been reset with the **reset interface counters** command on page 12-21, this command displays the difference between the current counter values and the last saved copy, if any. This is useful when debugging as it makes it easier to see changes in counter values. SNMP get requests always return the true counter values.

The **interface** parameter specifies the interface. If an interface is not specified, interface counters for all interfaces are displayed (Figure 12-7 on page 12-39, Table 12-7 on page 12-40). If an interface is specified, interface counters for the specified interface are displayed (Figure 12-7 on page 12-39, Table 12-5 on page 12-37). When the interface is a VLAN, the command displays counters for packets switched by the CPU, not those switched in hardware at wire speed.

Figure 12-7: Example output from the **show interface counters** command

```
Interface Counters

Interface: vlan1 (software only)
  ifInOctets ................... 21484       ifOutOctets .................. 13775
  ifInUcastPkts ................. 165         ifOutUcastPkts ................ 134
  ifInNUcastPkts ................ 19          ifOutNUcastPkts ................ 0
  ifInDiscards ..................... 0        ifOutDiscards ................... 0
  ifInErrors ....................... 0        ifOutErrors ..................... 0
```

Table 12-6: Parameters in output of the **show interface counters** command

Parameter	Meaning
Interface	Name of the interface.
ifInOctets	Number of octets (bytes) received by the interface.
ifInUcastPkts	Number of unicast packets received by the interface.
ifInNUcastPkts	Number of multicast packets received by the interface.
ifInDiscards	Number of packets discarded by the interface. Not applicable for a port interface.
ifInErrors	Number of packets received with errors by the interface.
ifUnknownProtos	Number of packets received by the interface but discarded because their protocol is unsupported.
ifOutOctets	Number of bytes transmitted by the interface.
ifOutUcastPkts	Number of unicast packets transmitted by the interface.
ifOutNUcastPkts	Number of multicasts transmitted by the interface.
ifOutDiscards	Number of output packets discarded by the interface. Not applicable for a port interface.
ifOutErrors	Number of packets that should have been transmitted but were not because of errors.

Figure 12-8: Example output from the **show interface counters** command for a specific interface

```
Interface.................. vlan1
  ifIndex.................. 1
  ifMTU.................... 1500
  ifSpeed.................. 10000000
  ifAdminStatus............ Up
  ifOperStatus............. Up
  ifLinkUpDownTrapEnable... Disabled
  TrapLimit................ 20

Interface Counters (software only)

  ifInOctets .................. 21484       ifOutOctets ................. 13775
  ifInUcastPkts ................. 165       ifOutUcastPkts ............... 134
  ifInNUcastPkts ................ 19       ifOutNUcastPkts ................ 0
  ifInDiscards .................. 0       ifOutDiscards .................. 0
  ifInErrors .................... 0       ifOutErrors .................... 0
```

Table 12-7: Parameters in output of the **show interface counters** command for a specific interface

Parameter	Meaning
Interface	Name of the interface.
ifIndex	Index of the interface in the interface table.
ifMTU	Size in octets of the largest packet that can be transmitted on the interface.
ifSpeed	Estimate of the interface's current speed in bits per second, or 0 if the interface is down.
ifAdminStatus	Whether the administratively-set (configured) state of the interface is Up, Down, or Testing.
ifOperStatus	Whether the operational state of the interface is Up, Down, Testing, Unknown, or Dormant.
ifLinkUpDownTrapEnable	Whether link traps are enabled for the interface.
TrapLimit	Maximum number of link up/down traps for dynamic interfaces that is generated in one minute.
Interface Counters	Counters for the interface.
ifInOctets	Number of octets (bytes) received by the interface.
ifInUcastPkts	Number of unicast packets received by the interface.
ifInNUcastPkts	Number of multicast packets received by the interface.
ifInDiscards	Number of packets discarded by the interface. Not applicable for a port interface.
ifInErrors	Number of packets received with errors by the interface.
ifOutOctets	Number of bytes transmitted by the interface.
ifOutUcastPkts	Number of unicast packets transmitted by the interface.
ifOutNUcastPkts	Number of multicasts transmitted by the interface.
ifOutDiscards	Number of output packets discarded by the interface. Not applicable for a port interface.
ifOutErrors	Number of packets that should have been transmitted but were not because of errors.

Examples To display the interface counters for interface “vlan1”, use the command:

```
sh int=vlan1 cou
```

Related Commands

disable interface linktrap
enable interface linktrap
reset interface counters
set interface traplimit
show interface