Release Note

Software Version 3.2.1
For AT-9924Ts, x900-24XT and x900-24XS Switches

Connecting The (IP) World

Allied Telesis

Introduction

Allied Telesis announces the release of Software Version 3.2.1 on the AT-9924Ts, x900-24XT and x900-24XS switches.

This Release Note should be read in conjunction with the Installation and Safety Guide or Quick Install Guide, Hardware Reference, and Software Reference for your switch. These documents can be found on the Documentation and Tools CD-ROM packaged with your switch, or:

www.alliedtelesis.com/support/software

This Release Note has the following structure:

■ **Upgrading to Software Version 3.2.1**

This section lists the names of the files that may be downloaded from the web site.

■ **Descriptions of New Features**

These sections describe how to configure each new feature. The features described in this release note are available on all switches running 3.2.1.

Caution: Information in this document is subject to change without notice and does not represent a commitment on the part of Allied Telesis Inc. While every effort has been made to ensure that the information contained within this document and the features and changes described are accurate, Allied Telesis Inc. can not accept any type of liability for errors in, or omissions arising from, the use of this information.

Upgrading to Software Version 3.2.1

Software Version 3.2.1 is available as a flash release that can be downloaded directly from the Software/Documentation area of the Allied Telesis website:

www.alliedtelesis.com/support/software

The following table lists the file names for Software Version 3.2.1.

Product name	Release file	GUI resource file	CLI help file
AT-9924Ts	9924s_321-00.pkg	-	99s-321a.hlp
x900-24XT	x900-24XT_321-00.pkg	-	99s-321a.hlp
x900-24XS	x900-24XS_321-00.pkg	-	99s-321a.hlp

Switches manufactured at the end of 2006 will have release licences valid for all releases. This means you can upgrade these devices without entering the **enable basepackage** command.

If you already have an AT-9924Ts, x900-24XT or x900-24XS, contact your Allied Telesis representative for information about licencing. If you are not sure whether your device licence is valid for all releases, use the following command:

```
show system licence
```

If your switch does not have the following output, contact your Allied Telesis representative to request a licence.

```
Base Package            Licence            Period
---------------------------------------------------
any                     full               -
---------------------------------------------------
```

A new release licence is not required when you are updating to a minor or maintenance release. This change affects release licences only, and not special feature licences.

Backwards Compatibility Issues when Upgrading

There are no known backwards compatilibity issues with this Software Version.

System Enhancements

This Software Version includes the following enhancements to the System:

■   **Enhanced Protection for Filenames**

■   **Increased Module Support by Show Debug Active**

This section describes the enhancements. The new and modified commands to implement them are described in **Command Reference Updates**.

Enhanced Protection for Filenames

This Software Version protects the preferred software release and current boot configuration files from being renamed.

Previously, you could rename the current boot configuration file using the command **rename**. This stopped the switch from running that configuration on boot-up, so if the switch restarted after the user had renamed the current boot configuration file, it started up with no configuration.

Command Changes

This enhancement does not affect any commands.

Increased Module Support by Show Debug Active

This Software Version increases the number of modules supported by the **show debug active** and **disable debug active** commands. See "Supported Modules" on page 5 for the list of newly supported modules.

To display the debugging options that are active on the switch for the supported modules, use the command:

    show debug active={all|*module*}

To disable debugging on the supported modules, use the command:

    disable debug active={all|*module*}

Command Changes

The following table summarises the modified commands:

Command	Change
disable debug active	New module options for **active** parameter
show debug active	New module options for **active** parameter

Command Reference Updates

This section describes the changed portions of modified commands.

disable debug active

Syntax   `DISable DEBug ACTive={ALL|module}`

where *module* is the predefined name of a module

Description   This command disables currently enabled debugging, either for a specific module or for all modules. This command now supports additional modules. See "Supported Modules" on page 5 for a list of additional modules.

show debug active

Syntax   `SHow DEBug ACTive={ALL|module}`

where *module* is the predefined name of a module

Description   This command displays information about module-specific debugging currently enabled on the switch. The following table lists the new modules supported by this command and their related debug commands.

Supported Modules

Module	Related Debugging Commands
BOOTp	disable bootp relay option82 debug
	enable bootp relay option82 debug
DHCP	disable dhcp debug
	enable dhcp debug
DHCP6	disable dhcp6 debug
	enable dhcp6 debug
DVMrp	disable dvmrp debug
	enable dvmrp debug
ENCO	disable enco debugging
	enable enco debugging
GARP	disable garp debug
	enable garp debug
	show garp debug
HTTP	disable http debug
	enable http debug
	show http debug
IPV6	disable ipv6 debug
	disable ipv6 mld debug
	disable mldsnooping debug
	enable ipv6 debug
	enable ipv6 mld debug
	enable mldsnooping debug
	show ipv6 mld debug

Module	Related Debugging Commands
LDAP	disable ldap debug enable ldap debug
LLDP	disable lldp cdp debug enable lldp cdp debug
MAIL	disable mail debug enable mail debug
PIM6	disable pim6 debug enable pim6 debug show pim6 debug
PING	disable ping poll debug enable ping poll debug
PKI	disable pki debug enable pki debug
PORTAuth	disable portauth debug enable portauth debug
QOS	disable qos debug enable qos debug
RSVP	disable rsvp debug enable rsvp debug
SSH	disable ssh debug enable ssh debug
SSL	disable ssl debug enable ssl debug
STAck	disable stack debug enable stack debug
TCP	enable tcp debug disable tcp debug
VLAN	disable vlan debug enable vlan debug show vlan debug

Internet Protocol (IP) Enhancements

This Software Version includes the following enhancements to IP:

■ **Preventing MAC Address Resolution Between Hosts Within a Subnet**

■ **IP Debug Timeout**

■ **Show IP Interface Command Displays Gratuitous ARP Status**

This section describes the enhancements. The modified commands to implement them are described in **Command Reference Updates**.

Preventing MAC Address Resolution Between Hosts Within a Subnet

A new feature lets you stop MAC address resolution between hosts within an interface's subnet. Local proxy ARP ensures that devices within a subnet cannot send traffic that bypasses the switch. This lets you monitor, filter, and control traffic between devices in the same subnet.

Local proxy ARP extends proxy ARP by intercepting and responding to ARP requests between hosts within a subnet. It responds to the ARP requests with the switch's own MAC address details instead of those from the destination host. This stops hosts from learning the MAC address of other hosts within its subnet.

When local proxy ARP is operating on an interface, the switch does not generate or forward any ICMP-Redirect messages on that interface.

To create an interface that uses local proxy ARP, use the command:

```
add ip interface=interface ipaddress={ipadd|dhcp}
    proxyarp=local [other-options]
```

To change an interface to use local proxy ARP, use the command:

```
set ip interface=interface ipaddress={ipadd|dhcp}
    proxyarp=local [other-options]
```

Command Changes

The following table summarises the modified commands:

Command	Change
add ip interface	New **local** option for **proxyarp** parameter
set ip interface	New **local** option for **proxyarp** parameter
show ip interface	Existing **proxyarp** field displays the setting of the **local** option

IP Debug Timeout

This enhancement makes it possible to specify a timeout value when enabling IP debugging. After the timeout expires, IP debugging is automatically disabled. This helps to prevent problems from too much IP debugging clogging up the display.

To specify the timeout, use the new optional **timeout** parameter in the command:

```
enable ip debug={all|arp|packet|advertise|upnp}
    [timeout={none|1..2400}]
```

The **timeout** units are seconds.

For example, to enable ARP debugging and display the debugging information onscreen for the next 25 seconds, use the command:

```
enable ip debug=arp timeout=25
```

To see the current timeout value, use the **show debug active[=ip]** command. The current timeout is shown above the types of IP debugging that are currently enabled ().

Command Changes

The following table summarises the modified commands:

Command	Change
enable ip debug	New **timeout** parameter
show debug active	New **IP Debug Timeout** field

Show IP Interface Command Displays Gratuitous ARP Status

This Software Version includes an additional field in the output in the **show ip interface** command. This displays whether the interface accepts or rejects gratuitous ARPs.

Gratuitous ARP packets are ARP messages that are not required for the functioning of ARP (RFC 826). However, they are often sent by devices to aid with early detection of IP conflicts and to keep ARP tables in other switches up to date. To configure whether an interface accepts or rejects these messages, use the command:

```
set ip interface[=interface] gratuitousarp={off|on}
```

To see which interfaces on the switch accept gratuitous ARP request or reply messages, use the command:

```
show ip interface[=interface]
```

Command Changes

The following table summarises the modified command:

Command	Change
show ip interface	New **GArp** field in output

Command Reference Updates

This section describes the changed portions of modified commands and output screens. The new parameters, options, and fields are shown in bold.

add ip interface

Syntax
```
ADD IP INTerface=interface IPaddress={ipadd|DHCP}
    [ADVertise={YES|NO}] [BROadcast={0|1}]
    [DIRectedbroadcast={False|NO|OFF|ON|True|YES}]
    [FILter={0..999|NONE}] [FRAgment={NO|OFF|ON|YES}]
    [GRAtuitousarp={ON|OFF}] [GRE={0..100|NONE}]
    [IGMPProxy={OFF|UPstream|DOWNstream}]
    [INVersearp={ON|OFF}] [MASK=ipadd] [METric=1..16]
    [MULticast={BOTH|NO|OFF|ON|RECeive|SENd|YES}]
    [OSPFmetric=1..65534] [POLicyfilter={0..999|NONE}]
    [PREferencelevel={-2147483648..2147483647|NOTDEFAULT}]
    [PRIorityfilter={0..999|NONE}]
    [PROxyarp={DEFRoute|False|LOCal|NO|OFF|ON|STrict|True|
    YES}] [RIPMetric=1..16] [SAMode={Block|Passthrough}]
    [VJC={False|NO|OFF|ON|True|YES}]
    [VLANPRiority={0..7|None}] [VLantag={1..4094|None}]
```

Description
The new **local** option for **proxyarp** increases the range of ARP Requests that the switch responds to. When you specify **yes**, **on**, **true** or **strict**, the switch only responds to ARP Requests with a specific route if it exists, and ignores all others. When you specify **local**, the switch responds for routes it has a specific route to, and routes within its local subnet that would normally be IGMP redirected. By intercepting and responding to these local ARP requests, the switch prevents hosts within the subnet from successfully using MAC address resolution to communicate directly with one another. Instead, traffic between hosts is forwarded through the switch.

enable ip debug

Syntax
```
ENAble IP DEBug={ARP|PACket|ADVertise|UPNP|ALL}
[TIMEOut={NONE|1..2400}]
```

Description
The new **timeout** parameter specifies the time period, in seconds, for which IP debugging is enabled. Setting a timeout reduces the risk of overloading the switch and the display with too much debugging information. The value set by the **timeout** parameter overrides any previous IP debugging timeout values, even if they were specified for other debugging options. The default is the timeout value used the last time that this command was run, or **none**.

To change the current timeout value, re-enter the command **enable ip debug={arp | packet | advertise | upnp | all} timeout={none|1..2400}**. A value of **none** turns the timeout off.

Note that you can also enter the command **enable ip debug** without specifying an option on the **debug** parameter. This starts a different debugging mode, in which IP stores the header and the reason for rejection of the 40 most recent incorrectly formatted IP packets. You can then display the stored information by using the **show ip debug** command. The new **timeout** parameter has no effect when debugging is in this mode.

Examples   To display ARP debugging information onscreen for the next 25 seconds, use the command:

```
enable ip debug=arp timeout=25
```

To enable all debug options indefinitely, use the command:

```
enable ip debug=all timeout=none
```

set ip interface

Syntax
```
SET IP INTerface=interface [ADVertise={YES|NO}]
    [PREferencelevel={-2147483648..2147483647|NOTDEFAULT}]
    [BROadcast={0|1}]
    [DIRectedbroadcast={False|NO|OFF|ON|True|YES}]
    [FILter={0..999|NONE}] [FRAgment={NO|OFF|ON|YES}]
    [GRAtuitousarp={ON|OFF}] [GRE={0..100|NONE}]
    [IGMPProxy={OFF|UPstream|DOWNstream}]
    [INVersearp={ON|OFF}] [IPaddress=ipadd|DHCP]
    [MASK=ipadd] [METric=1..16]
    [MULticast={BOTH|OFF|ON|RECeive|SENd}]
    [OSPFmetric=1..65534|DEFAULT]
    [POLicyfilter={0..999|NONE}]
    [PRIorityfilter={0..999|NONE}]
    [PROxyarp={DEFRoute|False|LOCal|NO|OFF|ON|STrict|True|
    YES}] [RIPMetric=1..16] [SAMode={Block|Passthrough}]
    [VJC={False|NO|OFF|ON|True|YES}]
    [VLANPRiority={0..7|None}] [VLantag={1..4094|None}]
```

Description   The new **local** option for **proxyarp** increases the range of ARP Requests that the switch responds to. When you specify **yes**, **on**, **true** or **strict**, the switch only responds to ARP Requests with a specific route if it exists, and ignores all others. When you specify **local**, the switch responds for routes it has a specific route to, and routes within its local subnet that would normally be IGMP redirected. By intercepting and responding to these local ARP Requests, the switch prevents hosts within the subnet from successfully using MAC address resolution to communicate directly with one another. Instead, traffic between hosts is forwarded through the switch.

show debug active

Syntax   `SHow DEBug ACTIve={ALL|module}`

Description   For IP debugging, this command now displays the value of the IP debugging timeout (Figure 1).

Figure 1: Example output from the **show debug active=ip** command

```
IP
--------------------------------------------------------
IP Debug Timeout: 30 seconds
IP Debug Options Enabled:
    IP Packet
    IP ARP
```

show ip interface

Syntax SHow IP INTerface[=*interface*] [COUnter[=MULticast]]

Description This command displays interface configuration information for interfaces assigned to the IP module with the **add ip interface** command. The new **GArp** field displays whether or not the interface accepts gratuitous ARPs. The **PArp** field now displays **Loc** when local proxy ARP is enabled on the interface.

Figure 2: Example output of the **show ip interface** command

```
Interface      Type     IP Address        Bc Fr PArp  Filt RIP Met.
Pri. Filt      Pol.Filt Network Mask      MTU   VJC   GRE  OSPF Met.  DBcast  Mul.
GArp
-------------------------------------------------------------------------------
LOCAL          -        Not Set           -   n Def   --- -          -        ---
---            ----     -                 -     -     --- -          -        ---
On
Loopback       192.168.10.100            -   n -     --- -          -        ---
---            ---      -                 -     -     --- -          -        ---
On
vlan2          Static   192.168.1.1       1   n Loc   --- 01         Pass     No
---            ---      255.255.255.0     1500  -     --- 0000000001 No       Rec
On
vlan3#         Static   192.168.2.1       1   n Loc   --- 01         Pass     No
---            ---      255.255.255.0     1500  -     --- 0000000001 No       Rec
Off
-------------------------------------------------------------------------------
```

Table 1: New and modified parameters in the output of the **show ip interface** command

Parameter	Meaning
PArp	Whether this interface supports proxy ARP and if ARP responses will be generated if a default route exists; one of "On" (respond to ARP Requests only if a specific route exists), "Loc" (responds to ARP Requests if a specific route exists, including ARP requests for hosts within a subnet) "Off", or "Def" (respond to ARP Requests if a specific route or a default route exists).
GArp	Whether the interface accepts or rejects gratuitous ARP messages; one of "On" or "Off".

DHCP Enhancements

This Software Version includes the following enhancement to DHCP:

■   **DHCP Options**

This section describes the enhancement. The new and modified commands to implement it are described in **Command Reference Updates**.

DHCP Options

Software Version 3.2.1 introduces the ability to create user-defined DHCP options and apply them to policies.

DHCP allows the client to receive options from the DHCP server. Options describe the network configuration, and various services that are available on the network.

Previously, you could only add standard, pre-defined options to policies, using the **add dhcp policy** command. Now, you can also add user-defined options, using the new **add dhcp option** command.

Command Changes

The following table summarises the new and modified commands:

Command	Change
add dhcp option	New command
delete dhcp option	New command
set dhcp option	New command
show dhcp policy	New option values in display output

Command Reference Updates

This section describes each new command and the changed portions of modified commands and output screens. For modified commands and output, the new parameters, options, and fields are shown in bold.

add dhcp option

Syntax   ADD DHCP OPTion=*number* POLIcy=*name* [NAMe=*option-name*]
    TYpe={IP|SWItch|VALue|STRing|HexString|NONE}
    VALue=*value*

Description   This new command allows you to create a user-defined option for the specified policy. User-defined options are outside the standard range of pre-defined options that you can define using the **add dhcp policy** command.

It is possible to add a user-defined option with the same number as an existing pre-defined option. If this situation occurs, the user-defined option takes precedence - that is, it overrides but does not eliminate the pre-defined option.

Parameter	Description
OPTion	A number for the option. *number* is a decimal number between 1 and 254.
POLIcy	The name of the policy to add the option to. *name* is a character string 1 to 15 characters long. Any printable character is allowed. When you enter a *name* that contains spaces, you must surround it with double quotation marks.
NAMe	Use this optional parameter to define a name for the option. *option-name* is a character string 1 to 15 characters long. Any printable character is allowed. When you enter an *option-name* that contains spaces, you must surround it with double quotation marks.
TYpe	Use this optional parameter to specify a format in which to define the **value** parameter. Default: **none**

Option	Value format
IP	One or more IPV4 addresses in dotted decimal format, separated by commas.
SWItch	Any of: **on**, **off**, **yes**, **no**, **true**, **false**, **enabled**, **disabled**.
VALue	A decimal number between 0 and 4294967295.
STRing	A character string from 1 to 255 characters long. Any printable character is allowed. When you enter a string that contains spaces, you must surround the string with double quotation marks.
HexString	A string of 1 to 255 sets of hexadecimal character pairs; a maximum of 510 characters. The 510 character maximum includes any blank spaces or quotes used.
NONE	No value is required.

Parameter	Description
VALue	*value* is a user-defined value, which you must enter in the format specified with the **type** parameter - see above for details.

Examples To add option 151 to the "base" policy with the **name** "svpserver", and a **type** of **ip**, use the command:

```
add dhcp opt=151 poli=base nam=svpserver ty=ip
    val=192.168.3.3
```

To add option 114 to the "base" policy with no **name**, and a **type** of **string**, use the command:

```
add dhcp opt=114 poli=base ty=str
    val=http://allied-telesis.com
```

delete dhcp option

Syntax   DELete DHCP OPTion=*number* POLIcy=*name*

Description   This new command deletes a user-defined option from the specified policy. User-defined options are created with the **add dhcp option** command.

It is possible for the same option number to be specified for different options, one using **add dhcp option** and one using **add dhcp policy**. This command only deletes the option created with **add dhcp option**.

To completely delete the option number from the system, you must also delete the option with the same number that was created with **add dhcp policy**. You can do this using the **delete dhcp policy** command.

Once this option is deleted, any existing pre-defined option with the same option number becomes the active option.

Parameter	Description
OPTion	The number of the option to delete. This option must have been defined using **add dhcp option**. *number* is a decimal number between 1 and 254.
POLIcy	The name of the policy that the option is attached to. *name* is a character string 1 to 15 characters long. It may contain any printable character. When you enter a *name* that contains spaces, you must surround it with double quotation marks.

Example   To delete option 151 from the "base" policy, use the command:

```
del dhcp opt=151 poli=base
```

set dhcp option

Syntax   SET DHCP OPTion=*number* POLIcy=*name* [NAMe=*option-name*]
        [TYpe={IP|SWItch|VALue|STRing|HexString|NONE}]
        [VALue=*value*]

Description   This new command allows you to modify an existing user-defined option on the specified policy. User-defined options are created using **add dhcp option**.

You can modify the values set for the **name**, **type**, and **value** parameters. You cannot change the **policy** to which the option applies.

Parameter	Description
OPTion	The number of the user-defined option to modify. *number* is a decimal number between 1 and 254.
POLIcy	The policy to which the option applies. *name* is a character string 1 to 15 characters long. Any printable character is allowed. When you enter a *name* that contains spaces, you must surround it with double quotation marks.
NAMe	Use this optional parameter to set a new name for the option. *option-name* is a character string 1 to 15 characters long. Any printable character is allowed. When you enter an *option-name* that contains spaces, you must surround it with double quotation marks.
TYpe	Use this optional parameter to specify a format in which to define the **value** parameter. If you specify a **type**, the **value** parameter is mandatory. Default: **none**

Option	Value format
IP	One or more IPV4 addresses in dotted decimal format, separated by commas.
SWItch	Any of: **on**, **off**, **yes**, **no**, **true**, **false**, **enabled**, **disabled**.
VALue	A decimal number between 0 and 4294967295.
STRing	A character string from 1 to 255 characters long. Any printable character is allowed. When you enter a string that contains spaces, you must surround the string with double quotation marks.
HexString	A string of 1 to 255 sets of hexadecimal character pairs; a maximum of 510 characters. The 510 character maximum includes any blank spaces or quotes used.
NONE	No value is required.

Parameter	Description
VALue	*value* is a user-defined value, which you must enter in the format specified with the **type** parameter - see above for details. If you specify a **value**, the **type** parameter is mandatory.

Examples To set a new **name** of "server1" for option 151 on the "base" policy, use the command:

```
set dhcp opt=151 poli=base nam=server1
```

To change the IP address for the user-defined option 151 on the "base" policy to 192.168.3.2, use the command:

```
set dhcp opt=151 poli=base ty=ip value=192.168.3.2
```

show dhcp policy

Syntax   SHow DHCP POLIcy[=*name*]

Description   This command displays information about currently defined policies and the options configured for them. If you specify a policy *name*, then information about that policy is displayed only.

Figure 3: Example output from the **show dhcp policy** command

```
DHCP Policies

Name: pol1
  Base Policy: none
  01 subnetmask .... 255.255.255.0
  03 router ........ 202.36.163.21
  06 dnsserver ..... 192.168.100.50  192.168.100.33
  51 leasetime ..... 3600
*151 SVP server .... 192.168.88.20

Name: prnt
  Base Policy: pol1
  01 subnetmask .... (pol1) 255.255.255.0
  03 router ........ (pol1) 202.36.163.21
  06 dnsserver ..... (pol1) 192.168.100.50  192.168.100.33
  51 leasetime ..... (prnt) infinity
*151 SVP server .... (pol1) (none)
*161 ............... (prnt) 192.168.4.2 192.168.6.2
*172 privservernum...(prnt) 4
*253 optionpresent...(prnt) (none)
*254 privservernam15.(prnt) privateserver
```

Table 2: Modified parameters in the output of the **show dhcp policy** command

Parameter	Description
options...	A list of the options configured for the specified policy.
	Each entry includes the following information:
	The DHCP option identifier. This is the number that was assigned to the option.
	The number now has an asterisk (*) on its left if its option is a user-defined option, configured using the new **add dhcp option** command.
	The parameter keyword. This is now either:
	• the default assigned name for an option between the numbers of 1-68 that was configured using **add dhcp policy**, or
	• a name that was user-defined for the option using the new **add dhcp option** command.
	The current values of the option. If the option was configured using the new **add dhcp option** command then the option value is formatted based on the specified **type**.

Example   To display information about the "base" policy, use the command:

```
sh dhcp poli=base
```

IP Multicasting Enhancements

This Software Version includes the following enhancements to IP Multicasting:

■ **Query Solicitation**

This section describes the enhancements. The new and modified commands to implement them are described in **Command Reference Updates**.

Query Solicitation

This Software Version enhances IGMP snooping by providing the new query solicitation feature. Query solicitation minimises loss of multicast data after a topology change on networks that use EPSR or spanning tree (STP, RSTP, or MSTP) for loop protection.

When IGMP snooping is enabled and EPSR or Spanning Tree changes the underlying link layer topology, this can interrupt multicast data flow for a significant length of time. Query solicitation prevents this by monitoring for any topology changes. When it detects a change, it generates a special IGMP Leave message known as a Query Solicit, and floods the Query Solicit message to all ports in every VLAN that query solicitation is enabled on. When the IGMP Querier receives the message, it responds by sending a General Query, which all IGMP listeners respond to. This refreshes snooped group membership information in the network.

Query solicitation functions by default (without you enabling it) on all VLANs on the root bridge in an STP instance and on all data VLANs on the master node in an EPSR instance. By default, the root bridge or master node always sends a Query Solicit message when the topology changes.

If you have multiple STP or EPSR instances, query solicitation only sends Query Solicit messages on VLANs in the instance that experienced a topology change.

In switches other than the STP root bridge or EPSR master node, query solicitation is disabled by default, but you can enable it by using the command:

```
set igmpsnooping vlan={vlan-name|1..4094|all}
    querysolicit={on|yes|true}
```

If you enable query solicitation on a switch other than the STP root bridge or EPSR master node, both that switch and the root or master send a Query Solicit message.

Once the Querier receives the Query Solicit message, it sends out a General Query and waits for responses, which update the snooping information throughout the network. If necessary, you can reduce the time this takes by tuning the IGMP timers, especially the **queryresponseinterval** parameter. For more information, see the "IGMP Timers and Counters" section of *How To Configure IGMP on Allied Telesyn Routers and Switches for Multicasting*. This How To Note is available in the Resource Center of the Documentation and Tools CDROM for Software Version 2.8.1, or from www.alliedtelesis.co.uk/en-gb/solutions/techdocs.asp?area=howto

Disabling Query Solicitation and Display Settings

On switches other than the STP root bridge or EPSR master node, you can disable query solicitation by using the command:

```
set igmpsnooping vlan={vlan-name|1..4094|all}
    querysolicit={off|no|false}
```

To see whether query solicitation is on or off, use the command:

```
show igmpsnooping
```

Check the new Query Solicitation field.

Changes to IGMP Snooping Fast Leave Command Syntax

The command syntax for the Fast Leave feature has also been changed, to make it more like the syntax for the query solicitation feature.

To enable Fast Leave on a specific VLAN, or all VLANs on the switch, the new syntax is:

```
set igmpsnooping vlan={vlan-name|1..4094|all}
    fastleave={on|yes|true}
```

To disable Fast Leave on a specific VLAN, or all VLANs on the switch, the new syntax is:

```
set igmpsnooping vlan={vlan-name|1..4094|all}
    fastleave={off|no|false}
```

The original syntax was:

```
set igmpsnooping fastleave={on|yes|true|off|no|false}
    [interface=vlan]
```

This original syntax is still valid, but we recommend using the new syntax instead.

Command Changes

The following table summarises the new and modified commands:

Command	Change
set igmpsnooping vlan	New command
show igmpsnooping	New **Query Solicitation** field

Command Reference Updates

This section describes each new command and the changed portions of modified commands and output screens. For modified commands and output, the new parameters, options, and fields are shown in bold.

set igmpsnooping vlan

Syntax
```
SET IGMPSNooping VLAN={vlan-name|1..4094|ALL}
    [Fastleave={ON|OFF|YES|NO|True|False}]
    [QUErysolicit={OFF|NO|False|ON|YES|True}]
```

where *vlan-name is* a unique name from 1 to 32 characters. Valid characters are uppercase and lowercase letters, digits, the underscore, and hyphen. The *vlan-name* cannot be a number or **all**.

Description
This command enables or disables Fast Leave processing and the new query solicitation feature for IGMP Snooping.

The **vlan** parameter specifies the VLAN on which the specified feature is to be enabled or disabled. The default is **all**.

The **fastleave** parameter specifies whether Fast Leave processing is enabled or disabled. If you specify **on**, **yes** or **true** then Fast Leave processing is enabled on the specified VLAN or all VLANs. If you specify **off**, **no** or **false** then Fast Leave processing is disabled on the specified VLAN or all VLANs. Note that Fast Leave should not be configured on a port that has multiple hosts attached because it may adversely affect multicast services to some hosts. The default is **off**.

This command deprecates the following command, which is still valid:
```
set igmpsnooping fastleave={on|yes|true|off|no|false}
    [interface=vlan]
```

The **querysolicit** parameter specifies whether query solicitation is enabled on the specified VLANs. Query solicitation minimises loss of multicast data after a topology change on networks that use EPSR or spanning tree (STP, RSTP, or MSTP) for loop protection. When an EPSR or STP topology change occurs, IGMP snooping sends a query solicit message out every VLAN that query solicitation is enabled on. When the IGMP Querier receives the message, it responds by sending a General Query, which all IGMP listeners respond to. This refreshes snooped group membership information in the network. The default is **on** for the root bridge in an STP topology and the master node in an EPSR topology and **off** for other switches.

Example
To enable IGMP Snooping Fast Leave processing on VLAN "vlan2", use the command:
```
set igmpsn vlan=vlan2 f=on
```

show igmpsnooping

Syntax   SHow IGMPSNooping [VLAN={*vlan-name*|1..4094}]

where *vlan-name* is a unique name for the VLAN 1 to 32 characters long. Valid characters are uppercase and lowercase letters, digits, the underscore, and the hyphen.

Description   This command displays information about IGMP snooping on a VLAN or VLANs (Figure 4, Table 3). This now includes the status of query solicitation.

Figure 4: Example output from the **show igmpsnooping** command

```
IGMP Snooping
----------------------------------------------------------
Status .......................... Enabled
Disabled All-groups ports ........ None

Vlan Name (vlan id) ..... default (1)
Fast Leave .............. On
Static Router Ports ..... None
Query Solicitation ...... Off
.
.
.
```

Table 3: New parameters in output of the **show igmpsnooping** command

Parameter	Meaning
Query Solicitation	Whether query solicitation is enabled on this VLAN.

OSPF Enhancements

This Software Version includes the following enhancement to OSPF:

■ **Neighbour Retransmission List Debugging**

This section describes the enhancement. The modified commands to implement it are described in **Command Reference Updates**.

Neighbour Retransmission List Debugging

A new **nrl** debugging option has been added to OSPF, to show additions to and deletions from the neighbour retransmission list. To enable NRL debugging, use the command:

```
enable ospf debug=nrl
```

Note that this option may generate large amounts of debugging output on a large OSPF network. Use it with care.

To disable NRL debugging, use the command:

```
disable ospf debug=nrl
```

Command Changes

The following table summarises the modified commands:

Command	Change
disable ospf debug	New **nrl** option for **debug** parameter
enable ospf debug	New **nrl** option for **debug** parameter

Command Reference Updates

This section describes the changed portions of modified commands. The new options are shown in bold.

disable ospf debug

Syntax `DISable OSPF DEBug={ALL|AUTOcost|IFSTate|LSU|NBRSTate|`
        `NSSA|PACket|`**`NRL`**`|REDistribute|SPF|STAte}`

Description The option **nrl** has been added to the **debug** parameter. If you specify **nrl**, neighbour retransmission list debugging is disabled.

enable ospf debug

Syntax `ENAble OSPF DEBug={ALL|AUTOcost|IFSTate|LSU|NBRSTate|`
        `NSSA|PACket|`**`NRL`**`|REDistribute|SPF|STAte}`
        `[TIMEOut={NONE|1..2400}]`

Description The option **nrl** has been added to the **debug** parameter. If you specify **nrl**, the switch displays changes to the neighbour retransmission list. Note that this option may generate large amounts of debugging output on a large OSPF network. Use it with care.

BGP Enhancements

This Software Version includes the following enhancements to BGP:

■ **Improved BGP Route Selection**

■ **Improved BGP Backoff Show Command Output**

This section describes the enhancements. The modified commands to implement them are described in **Command Reference Updates**.

Improved BGP Route Selection

This Software Version changes the preference order that BGP uses when selecting a route based on the "route type" rule. The order of "route type" preference is now:

1. routes imported into the BGP routing table from the router's RIB, using BGP import or network entries

2. routes learned through a BGP aggregate entry

3. routes learned from a foreign peer of any type, such as an EBGP, IBGP or confederation peer

Command Changes

This enhancement does not affect any commands.

Improved BGP Backoff Show Command Output

This Software Version includes the following improvements in the output of the **show bgp backoff** command:

■ The output now has a field called "command status", which displays "disabled" if the backoff feature has been manually disabled, or "enabled" at all other times.

■ The field "backOff state" now displays "peer disabled" if you have enabled BGP backoff but no peers yet exist.

Command Changes

The following table summarises the modified command:

Command	Change
show bgp backoff	New **command status** field
	Modified **backOff state** field

Command Reference Updates

This section describes the changed portions of modified output screens. The new fields are shown in bold.

show bgp backoff

Syntax   SHow BGP BACkoff

Description   This command displays BGP backoff details (Figure 5, Table 4).

Figure 5: Example output of the **show bgp backoff** command

```
BGP Backoff Stats:
 Stat                      Value
---------------------------------
command status            ENABLED
backOff state      PEER DISABLED
total hist backOffs          5
total backOffs               0
total backOff Limit          0
consecutive backOffs         0
consecutive backOffs limit   5
base Timeout                10
Timeout multiplier        100%
Timeout step                 1
Timeout length (sec)        10
Mem Upper Threshold Value   95%
Mem Upper Notify          TRUE
Mem Lower Threshold Value   90%
Mem Lower Notify         FALSE
Current Mem use             84%
---------------------------------
```

Table 4: New and modified parameters in the output of the **show bgp backoff** command

Parameter	Meaning
command status	Overall status of the BGP backoff; either ENABLED or DISABLED.
backOff state	The current status of BGP backoff. • NORMAL displays when BGP backoff is not active and BGP is processing normally. • BACKED OFF displays when system memory use has reached its upper threshold and BGP processing is halted. • PEER DISABLED displays when the consecutive or total backoff limits have been reached and the peers have been disabled. This also displays if BGP backoff is enabled, but no peer has yet been discovered. • DISABLED displays when the user has disabled backoff functionality.

IPv6 Enhancements

This Software Version includes the following enhancements to IPv6:

■ **Setting a Metric for RIPv6**

■ **Additional Show Command Filtering**

This section describes the enhancements. The modified commands to implement them are described in **Command Reference Updates**.

Setting a Metric for RIPv6

A new **metric** parameter lets you specify the cost to RIPv6 for crossing the logical interface. This parameter is allowed only on link-local interfaces. Therefore, setting this parameter also sets the metrics for all logical interfaces over the same IPv6 interface to the same value.

To specify the cost to RIPv6 for crossing the logical interface, use the new **metric** parameter in either of the commands:

```
create ipv6 interface=interface metric=1..16 [other-options]

set ipv6 interface=interface metric=1..16 [other-options]
```

For more information about RIPv6, see the *Internet Protocol version 6 (IPv6)* chapter of your Software Reference.

Command Changes

The following table summarises the modified commands:

Command	Change
create ipv6 interface	New **metric** parameter
set ipv6 interface	New **metric** parameter

Additional Show Command Filtering

This Software Version includes the new **full** parameter for the command:

```
show ipv6 route [full]
```

The **show ipv6 route full** command displays all the routes in the IPv6 route table. In previous software versions, the **show ipv6 route** command displayed this. The **show ipv6 route** command now displays a subset of the routing table.

Command Changes

The following table summarises the modified command:

Command	Change
show ipv6 route	New **full** parameter

Command Reference Updates

This section describes the changed portions of the modified commands. The new parameters are shown in bold.

create ipv6 interface

Syntax   CREate IPV6 INTerface=*interface* [DUPtrans=1..16]
    [METric=1..16] [RETRans=0..4294967295]

Description   This command creates an IPv6 Ethernet interface and uses stateless address autoconfiguration to assign it a link-local address.

The new **metric** parameter specifies the cost to RIPv6 for crossing the logical interface. This parameter is allowed only on link-local interfaces. Therefore, setting this parameter also sets metrics for all logical interfaces over the same IPv6 interface to the same value. The default is **1**.

set ipv6 interface

Syntax   SET IPV6 INTerface=*interface* [FILter=0..99]
    [IPaddress=*ipv6add/prefix-length*] **[METric=1..16]**
    [PREFerred=1..4294967295|INFinite]
    [PRIorityfilter=200..299]
    [PUBlish={YES|NO|ON|OFF|True|False}]
    [VALid=1..4294967295|INFinite]

Description   This command modifies values associated with an interface that was created by either the **create ipv6 interface** or **add ipv6 interface** command.

The new **metric** parameter specifies the cost to RIPv6 for crossing the logical interface. This parameter is allowed only on link-local interfaces. Therefore, setting this parameter also sets the metrics for all logical interfaces over the same IPv6 interface to the same value. The default is **1**.

show ipv6 route

Syntax   SHow IPV6 ROUte **[FULL]**

Description   This command displays the contents of the IPv6 route table. The **full** parameter displays all the routes in the IPv6 route table. When the **full** parameter is not specified, then the command displays a subset of the routing table that includes:

■   all static routes

■   all interface routes

■   only the RIP routes that are alive and best

Link Layer Discovery Protocol

This Software Version adds support for the Link Layer Discovery Protocol (LLDP).

LLDP is a neighbour discovery protocol. Neighbour discovery protocols define standard methods for Ethernet network devices, such as switches and routers, to receive and transmit device-related information to other directly connected devices on the network, and to store the information that is learned about other devices in an LLDP defined MIB.

For more information and command syntax, see the *Link Layer Discovery Protocol* chapter at the end of this document.

Management Stacking Enhancements

This Software Version includes the following enhancement to Stacking:

■   **Changes to Local Commands**

This section describes the enhancement.

Changes to Local Commands

When several switches are managed as a stack, a few commands are local commands—they relate only to the switch on which you type them, and not to any other switch in the stack. The switch's handling of such commands has been improved in the following ways:

■   Local commands now cannot be host directed. If you try to enter a local command as a host directed command, the switch displays an error message.

■   The command **show config dynamic** is now a local command.

■   The command **disable stack** now cannot be run from a script.

Command Changes

This enhancement did not change any command syntax.

Link Layer Discovery Protocol (LLDP)

Introduction

This chapter describes the Link Layer Discovery Protocol (LLDP), how it is implemented on the switch, and how to configure the switch to use it.

LLDP is a neighbour discovery protocol. Neighbour discovery protocols define standard methods for Ethernet network devices, such as switches and routers, to receive and/or transmit device-related information to other nodes on the network, and to store the information that is learned about other devices.

Link Layer Discovery Protocol

Overview Link Layer Discovery Protocol (LLDP) is a Layer 2 protocol defined by the IEEE *S*tandard 802.1AB-2005. For a complete set of rules and information about LLDP, refer to this standard.

LLDP allows Ethernet network devices to advertise details about themselves, such as device configuration, capabilities and identification, to directly connected devices on the network that are also using LLDP.

LLDP is a "one hop" protocol; LLDP information can only be sent to and received by devices that are directly connected to each other by the same link. Devices that are directly connected to each other are called **neighbours**. Advertised information is not forwarded on to other devices on the network.

SNMP LLDP is designed to be managed with Simple Network Management Protocol (SNMP). We provide a command line interface to manage LLDP, however SNMP is the recommended interface as LLDP is designed to be automatically managed from Network Management Systems (NMS).

What LLDP does Advertisements are sent in packets called *LLDP Data Units* (LLDPDUs). The data sent and received via LLDPDUs is useful for many reasons. For example, the switch can discover which of the other devices on the network are each other's neighbours, and through which ports they connect to each other.

You can configure the switch to do the following:

■ transmit information about itself to neighbours

■ receive device information from neighbours

■ store and manage received information in an LLDP MIB

Each device that uses LLDP has its own LLDP agent, which is a software entity that implements LLDP. The LLDP agent is responsible for the reception, transmission, and management of LLDP.

LLDP defines the following:

■ A set of common advertisement messages (Type Length Values). For more information, see **Type Length Values**.

■ A protocol for transmitting and receiving advertisements. For more information, see **Transmission and Reception**.

■ A method for storing the information that is contained within received advertisements. For more information, see **Storing LLDP Information**.

Type Length Values

The LLDP agent transmits and receives information via LLDPDUs. A single LLDPDU contains multiple advertisement messages, each of which is communicated within a Type Length Value (TLV). TLVs are short information elements which communicate complex data, such as variable length strings, in an organized format. Each TLV advertises a single type of information that identifies the sending device, for example, its device ID, type, or the address or addresses.

The following table describes the fields in a TLV.

Field	Description
Type	Identifies the kind of information. It consists of a a 16-bit Type code.
Length	Identifies the length of the information. It consists of a 16-bit value that specifies the number of bytes of data in the Value field.
Value	Contains the actual value of the advertised information. This is a variable length data field.

Each LLDPDU contains at least four mandatory TLVs by default. You can also configure the switch to send up to five optional additional TLVs.

Mandatory TLVs Mandatory TLVs are sent by default in every LLDPDU. These advertise the device's MAC Service Access Point (MSAP) identifier, as well as the time period for which the device's information is valid. All LLDP information associated with a device is identified with the device's MSAP identifier.

The MSAP identifier is defined by the IEEE Standard 802.1AB-2005 as follows: "the concatenation of the chassis ID and the port ID is used by LLDP as an MSAP identifier, to identify the LLDP agent and physical port associated with an IEEE 802® LAN station" For more information, see the IEEE Standard 802.1AB-2005.

The following table describes mandatory TLVs.

Mandatory TLV	Description
Chassis ID	Identifies the device's chassis. It is the MAC address of the switch, or the MAC address of the port for Eth ports.
PortID	Identifies the port that transmitted the LLDPDU.
Time To Live (TTL)	Indicates the length of time in seconds for which the information received in the LLDPDU remains valid. If the value is greater than zero, the information is stored in the LLDP remote system MIB. If the value is zero, the information is no longer valid, and is removed from the MIB.
End of LLDPDU	Signals that there are no more TLVs in the LLDPDU.

Optional TLVs   You can configure the switch to send up to five optional TLVs alongside the mandatory TLVs in each LLDPDU. The the following table describes the optional TLVS from the LLDP-defined Basic Management TLV Set.

Optional TLV	Description
Port description	A description of the device's port in alpha-numeric format.
System name	The system's assigned name in alpha-numeric format.
System description	A description of the device in alpha-numeric format. This includes the system name, hardware versions, operating system, and the networking software supported in the device.
System capabilities	The device's router and bridge functions, and whether or not these functions are currently enabled.
Management address	The address of the local LLDP agent. This can be used to obtain information related to the local device.
	The **set lldp managementaddress** command lets you specify an IPv4 address to advertise in this TLV. Otherwise the switch's MAC address is used.

LLDPDU and TLV error handling   LLDPDUs and TLVs that contain detectable errors are discarded.

If a TLV is not recognized, but contains no basic format errors, the LLDP agent assumes that it is validated and stores it for possible later retrieval by network management.

Transmission and Reception

LLDP is a one-way protocol. That is, the information transmitted in LLDPDUs flows in one direction only, from one device to its neighbours, and the communication ends there. Transmitted LLDPDUs do not solicit responses, and received LLDPDUs do not solicit acknowledgement. LLDP agents cannot solicit any information from other devices.

By default, when you enable LLDP on a port, both the transmission and reception of LLDPDUs is enabled. However, you can separately enable and disable transmission and reception. The LLDP agent can operate in any one of the following user-defined modes:

- **Transmit-only mode**
  The agent can only transmit current information about the local system.

- **Receive-only mode**
  The agent can only receive current information about remote systems.

- **Transmit and receive mode**
  The agent can both transmit local information and receive remote information.

See "Configuring LLDP" on page 8 for information on how to configure these modes.

Transmission

When LLDP transmission is **enabled**, the LLDP agent advertises information about your switch to neighbours at regular, user-configured intervals.

Each transmitted LLDPDU contains the mandatory TLVs, and any optional TLVs that you have enabled. See "Type Length Values" on page 3 for more information about TLVs. Or, see "Configuring LLDP" on page 8 to find out how to configure the TLVs that are advertised on your switch.

When LLDP transmission is **disabled**, one of two scenarios occurs. If transmission is disabled:

■   because you have disabled a port using an LLDP command, then the LLDP agent transmits a single 'shutdown' LLDPDU with a Time-To-Live (TTL) TLV that has a value of "0". This tells any remote neighbouring devices to remove the information associated with your switch from their remote systems MIB.

■   for any other reason, for example you have disabled the port using **disable switch port**, then the LLDP agent does not send a shutdown LLDPDU.

Note that LLDP does not transmit LLDPDUs on switch ports that are untagged members of any VLAN other than the default VLAN (vlan1)

Transmission delay timer

Transmission cycles can be initiated by either of the following:

■   the expiration of a transmit countdown timing counter

■   a change to the status or value of one or more of the TLVs associated with your local system

A series of successive changes over a short period of time can trigger the agent to send a large number of LLDPDUs. To prevent this, there is a transmission delay timer. This establishes a minimum length of time that must elapse between successive LLDP transmissions. The default is two seconds, but you can configure this to suit your network. For more information, see the **set lldp txdelay** command on page 27.

Reception

When LLDP reception is **enabled** on a port, the LLDP agent receives advertised information from and about remote neighbouring devices, and stores this data in the remote systems MIB. For more information, see "LLDP Remote Systems MIB" on page 6.

When LLDP reception is **disabled** on a port, the LLDP agent does not receive any neighbour advertisements.

Storing LLDP Information

Whenever an LLDP device receives a valid and current LLDP advertisement from a neighbouring network device, it stores the information in an IEEE-defined Simple Network Management Protocol (SNMP) Management Information Base (MIB). For more information, see Section 12.2 of the IEEE Standard 802.1AB-2005.

LLDP Local System MIB

Information about your device is called local system information. The LLDP local system MIB maintains this information, which consists of device details, as well as any user-configured information that you have set up for your switch, for example a port description or a management address.

LLDP Remote Systems MIB

Information gained from neighbouring devices is called *remote system information*. The LLDP remote systems MIB maintains this information.

The length of time for which neighbour information remains in the LLDP remote systems MIB is determined by the Time-To-Live (TTL) value of received LLDPDUs:

■ When an LLDPDU first arrives from a neighbour, the LLDP agent initializes a timer.

■ As new LLDPDUs arrive from that neighbour, this refreshes the timer.

■ When the timer reaches the TTL value, the LLDP agent deletes the neighbour's information from the MIB.

This ensures that only valid LLDP information is stored.

Any remote, organization-specific TLV values are maintained in LLDP's organizationally-defined remote device LLDP MIB extensions. For more information, see Section 12 of the IEEE Standard 802.1AB-2005.

Remote tables change event Whenever a new neighbour is discovered, or an existing neighbour advertises a change, for example a new TLV or a change in the TTL, a remote tables change event is activated. At this time:

■ A trigger and log are activated. For information about LLDP triggers, see LLDP Triggers on page 10. For information about log messages, see Appendix A, Messages.

■ If you have notifications enabled, the notification **lldpRemTablesChange** is sent. For more information, see "LLDP MIB Notifications" in the IEEE Standard 802.1AB-2005.

Size limitations To prevent the remote systems MIB from using large amounts of memory and possibly affecting the operation of your switch, the following limitations are enforced:

■ The total size of the MIB can be a maximum of 5MB, or 5% of your available memory - whichever is the lesser amount.

■ There can be a maximum of five neighbours per port.

Once either of these limits is reached, the LLDP agent stops processing new neighbours. This condition is called **toomanyneighbours**. For more information, see Section 10.3.4 of the IEEE Standard 802.1AB-2005.

When the **toomanyneighbours** condition occurs, a trigger is sent, and a log is activated. For more information, see LLDP Triggers on page 10, and Appendix A, Messages.

Clearing data You can clear all the data stored in the LLDP remote systems MIB using the **purge lldp** command on page 24. This clears all current remote LLDP MIB data. LLDP reverts to its default configuration, which means that LLDP is disabled for all ports.

See also For information about configuring the LLDP MIB, see "Configuring LLDP" on page 8.

For other information about the LLDP MIB, see Appendix C, SNMP MIBs.

Configuring LLDP

LLDP is best configured and managed with SNMP, however you can also use the command line interface (CLI). This section contains an example of a basic LLDP configuration using the CLI.

Enabling and disabling LLDP

By default, LLDP is disabled. To enable LLDP on a port, list of ports, or all ports, use the command:

```
enable lldp port={all|port-list} [{tx|rx|txrx}]
```

To disable LLDP on a port, list of ports, or all ports, use the command:

```
disable lldp port={all|port-list} [{tx|rx|txrx}]
```

By default, when you enable a port for LLDP, both LLDP transmission and reception are enabled. To enable either LLDP transmission or reception only on the chosen ports, specify either **tx** or **rx**.

Enabling and disabling LLDP TLVs

When LLDP is enabled on a port, the LLDP agent advertises all TLVs by default. However, you can separately enable or disable each optional TLV on the port, using the following commands:

TLV	Enable using...	Disable using...
Port Description	`enable lldp portdescription`	`disable lldp portdescription`
System Name	`enable lldp systemname`	`disable lldp systemname`
System Description	`enable lldp systemdescription`	`disable lldp systemdescription`
System Capabilities	`enable lldp systemcapabilities`	`disable lldp systemcapabilities`
Management Address	`enable lldp managementaddress`	`disable lldp managementaddress`

For more information about TLVs, see "Type Length Values" on page 3.

LLDP notifications

To enable LLDP notifications, use the command:

```
enable lldp notifications [other-options]
```

To disable LLDP notifications, use the command:

```
disable lldp notifications [other-options]
```

To set the amount of time between LLDP notifications, use the command:

```
set lldp notification interval [other-options]
```

Purging and re-setting LLDP

To clear your existing LLDP configuration information and all remote LLDP MIB data, use the command:

```
purge lldp [other-options]
```

To clear all remote LLDP MIB data, and start the LLDP re-initialization procedure, use the command:

```
reset lldp [other-options]
```

Monitoring LLDP

To display general LLDP information, use the command:

```
show lldp [other-options]
```

To display information about LLDP counters, use the command:

```
show lldp counters [other-options]
```

To display information about LLDP memory, use the command:

```
show lldp memory [other-options]
```

To display detailed information about LLDP neighbours, use the command:

```
show lldp neighbour [other-options]
```

LLDP Triggers

You can use the Trigger Facility to automatically run specific command scripts when particular triggers are activated. When a trigger is activated by an event, parameters specific to the event are passed to the script that is run. Triggers can be activated:

- when the LLDP remote systems MIB changes

- when LLDP too many neighbour events occur

For more information about the Trigger Facility, see Chapter 5, Trigger Facility.

Module   LLDP

Event   LLDPRemotetablechange
Description   The LLDP remote systems MIB changes.
Parameters   You cannot specify any command parameters in the **create trigger** command.
Script arguments   The trigger passes arguments in the following table to the script:

Argument	Description
%1	Value of LLDP MIB object lldpStatsRemTablesInserts
%2	Value of LLDP MIB object lldpStatsRemTablesDeletes
%3	Value of LLDP MIB object lldpStatsRemTablesDrops
%4	Value of LLDP MIB object lldpStatsRemTablesAgeouts

Example   To create trigger 1, which activates whenever the LLDP remote systems MIB changes, use the command:

```
create trigger=<number> module=lldp
    event=lldpremotetablechange
```

Module   LLDP

Event   LLDPToomanyneighbours
Description   There are too many active LLDP neighbours in the network.
Parameters   You cannot specify any command parameters in the **create trigger** command.
Script arguments   The trigger passes arguments in the following table to the script:

Argument	Description
%1	The system name of the neighbour that was refused
%2	The port description of the port on which the LLDPDU was received

Example   To create trigger 1, which activates whenever there are too many active LLDP neighbours in the network, use the command:

```
create trigger=<number> module=lldp
    event=lldptoomanyneighbours
```

Command Reference

This section describes the commands available on the switch to enable, configure, control and monitor LLDP.

The shortest valid command is denoted by capital letters in the Syntax section. See "Conventions" on page lxxxii 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 messages and their meanings.

disable lldp managementaddress

Syntax   DISable LLDP MANAgementaddress [POrt={ALL|*port-list*}]

Description This command stops the switch from advertising the management address TLV on the specified ports. The LLDP agent now sends LLDPDUs without management address information.

Unless an IPv4 management address has been set using the **set lldp managementaddress** command, the **managementaddress** is the MAC address of the switch.

Use the **port** parameter to define the ports for which to disable management address TLV advertisement, either a list of ports or all ports. *port-list* can be any/all of the following:

- a single switch port number. Port numbers start at 1 and end at *m*, where *m* is the highest numbered port.

- a range of switch port numbers (specified as *n-m*).

- a comma-separated list of switch port numbers and/or ranges.

- a single Ethernet interface (specified as eth*n*).

- a comma-separated list of Ethernet interfaces. Ethernet port numbers start at eth0 and end at eth*n*, where *n* is the highest numbered Ethernet port.

- the Ethernet interface eth0.

By default, LLDP management address advertisement is enabled for all ports.

Examples   To stop the switch from advertising the management address on ports 1 and 2, use the command:

```
dis lldp mana po=1,2
```

To stop the switch from advertising the management address on all ports, use one of the commands:

```
dis lldp mana
```

```
dis lldp mana po=all
```

See Also   disable lldp port
enable lldp managementaddress
set lldp managementaddress
show lldp

disable lldp notifications

Syntax   `DISable LLDP NOTIfications [POrt={ALL|port-list}]`

Description   This command stops the switch from sending LLDP SNMP notifications from the specified ports. Notifications are SNMP traps, triggers, and logs.

Use the **port** parameter to specify the ports for which to disable LLDP notifications, either a list of ports or all ports. *port-list* can be any/all of the following:

- a single switch port number. Port numbers start at 1 and end at *m*, where *m* is the highest numbered port.

- a range of switch port numbers (specified as *n-m*).

- a comma-separated list of switch port numbers and/or ranges.

- a single Ethernet interface (specified as eth*n*).

- a comma-separated list of Ethernet interfaces. Ethernet port numbers start at eth0 and end at eth*n*, where *n* is the highest numbered Ethernet port.

- the Ethernet interface eth0.

By default, LLDP notifications are disabled for all ports.

To set the amount of time between notifications, use **set lldp notification interval** command on page 26.

Examples   To stop the switch from sending LLDP notifications from ports 1 and 2, use the command:

```
dis lldp noti po=1,2
```

To stop the switch from sending LLDP notifications from all ports, use one of the commands:

```
dis lldp noti
dis lldp noti po=all
```

See Also   **disable lldp port**
enable lldp notifications
set lldp notification interval
show lldp

disable lldp port

Syntax   `DISable LLDP POrt={ALL|port-list} [{TX|RX|TXRX}]`

Description   This command disables the specified LLDP actions on the specified ports, either **tx** (transmission), **rx** (reception), or **txrx** (both). By default, all LLDP actions are disabled for all ports.

Parameter	Description
POrt	The ports for which to disable the specified LLDP actions, either a list of ports or all ports.
	port-list can be any/all of the following:
	• a single switch port number. Port numbers start at 1 and end at *m*, where *m* is the highest numbered port.
	• a range of switch port numbers (specified as *n-m*).
	• a comma-separated list of switch port numbers and/or ranges.
	• a single Ethernet interface (specified as ethn).
	• a comma-separated list of Ethernet interfaces. Ethernet port numbers start at eth0 and end at eth*n,* where *n* is the highest numbered Ethernet port.
	• the Ethernet interface eth0.
	Default: **all**

Parameter	Specify:	To:
TX|RX|TXRX	TX	Stop the LLDP agent from **transmitting** LLDPDUs on the specified ports.
	RX	Stop the LLDP agent from **receiving** LLDPDUs on the specified ports.
	TXRX	Stop the LLDP agent from both **transmitting and receiving** LLDPDUs on the specified ports.
	Default: **txrx**	

Examples   To stop the switch from transmitting LLDPDUs from all ports, use the command:

```
dis lldp po tx
```

To stop the switch from both transmitting and receiving LLDPDUs on ports 1 to 3, use one of the commands:

```
dis lldp po=1-3
dis lldp po=1-3 txrx
```

See Also   **enable lldp port**
purge lldp
reset lldp
show lldp

disable lldp portdescription

Syntax   `DISable LLDP PORTDescription [POrt={ALL|port-list}]`

Description   This command stops the switch from advertising the port description TLV on the specified ports. This is the IEEE 802 LAN station's port description that is associated with the local system. The LLDP agent now sends LLDPDUs without port description information.

Use the **port** parameter to specify the ports for which to disable port description TLV advertisement, either a list of ports or all ports. *port-list* can be any/all of the following:

- a single switch port number. Port numbers start at 1 and end at *m*, where *m* is the highest numbered port.

- a range of switch port numbers (specified as *n-m*).

- a comma-separated list of switch port numbers and/or ranges.

- a single Ethernet interface (specified as ethn).

- a comma-separated list of Ethernet interfaces. Ethernet port numbers start at eth0 and end at eth*n*, where *n* is the highest numbered Ethernet port.

- the Ethernet interface eth0.

By default, LLDP port description advertisement is enabled for all ports.

Examples   To stop the switch from advertising the port description on port 1 and 2, use the command:

```
dis lldp portd po=1,2
```

To stop the switch from advertising the port description on all ports, use one of the commands:

```
dis lldp portd
dis lldp portd po=all
```

See Also   disable lldp port
enable lldp portdescription
set switch port
show lldp

disable lldp systemcapabilities

Syntax   `DISable LLDP SYSTEMCapabilities [POrt={ALL|port-list}]`

Description   This command stops the switch from advertising the system capabilities TLV on the specified ports. System capabilities are the primary functions of your system, including bridge and/or switch.

The LLDP agent now sends LLDPDUs without system capabilities information.

Use the **port** parameter to specify the ports for which to disable system capability TLV advertisement, either a list of ports or all ports. *port-list* can be any/all of the following:

■ a single switch port number. Port numbers start at 1 and end at *m*, where *m* is the highest numbered port.

■ a range of switch port numbers (specified as *n-m*).

■ a comma-separated list of switch port numbers and/or ranges.

■ a single Ethernet interface (specified as ethn).

■ a comma-separated list of Ethernet interfaces. Ethernet port numbers start at eth0 and end at eth*n,* where *n* is the highest numbered Ethernet port.

■ the Ethernet interface eth0.

By default, LLDP system capabilities advertisement is enabled for all ports.

Examples   To stop the switch from advertising the system capabilities on ports 1 and 2, use the command:

```
dis lldp systemc po=1,2
```

To stop the switch from advertising the system capabilities on all ports, use one of the commands:

```
dis lldp systemc
dis lldp systemc po=all
```

See Also   disable lldp port
enable lldp systemcapabilities
show lldp

disable lldp systemdescription

Syntax   DISable LLDP SYSTEMDescription [POrt={ALL|*port-list*}]

Description   This command stops the switch from advertising the system description TLV on the specified ports. This is the description of the local system, and is displayed in output of the **show system** command.

The LLDP agent now sends LLDPDUs without system description information.

Use the **port** parameter to specify the ports for which to disable system description TLV advertisement, either a list of ports or all ports. *port-list* can be any/all of the following:

- a single switch port number. Port numbers start at 1 and end at *m*, where *m* is the highest numbered port.

- a range of switch port numbers (specified as *n-m*).

- a comma-separated list of switch port numbers and/or ranges.

- a single Ethernet interface (specified as ethn).

- a comma-separated list of Ethernet interfaces. Ethernet port numbers start at eth0 and end at eth*n,* where *n* is the highest numbered Ethernet port.

- the Ethernet interface eth0.

By default, LLDP system description advertisement is enabled for all ports.

Examples   To stop the switch from advertising the system description on port 1 and 2, use the command:

```
dis lldp systemd po=1,2
```

To stop the switch from advertising the system description on all ports, use one of the commands:

```
dis lldp systemd
dis lldp systemd po=all
```

See Also   disable lldp port
enable lldp systemdescription
show lldp

disable lldp systemname

Syntax   `DISable LLDP SYSTEMName [POrt={ALL|port-list}]`

Description This command stops the switch from advertising the system name TLV on the specified ports. The LLDP agent now excludes the local system name information from any LLDPDUs it sends.

Use the **port** parameter to specify the ports for which to disable system name TLV advertisement, either a list of ports or all ports. *port-list* can be any/all of the following:

- a single switch port number. Port numbers start at 1 and end at *m*, where *m* is the highest numbered port.

- a range of switch port numbers (specified as *n-m*).

- a comma-separated list of switch port numbers and/or ranges.

- a single Ethernet interface (specified as ethn).

- a comma-separated list of Ethernet interfaces. Ethernet port numbers start at eth0 and end at eth*n,* where *n* is the highest numbered Ethernet port.

- the Ethernet interface eth0.

By default, LLDP system name advertisement is enabled for all ports.

Examples   To stop the switch from advertising the system name on port 1 and 2, use the command:

```
dis lldp systemn po=1,2
```

To stop the switch from advertising the system name on all ports, use one of the commands:

```
dis lldp systemn
dis lldp systemn po=all
```

See Also   **disable lldp port**
enable lldp systemname
show lldp

enable lldp managementaddress

Syntax `ENAble LLDP MANAgementaddress [POrt={ALL|port-list}]`

Description This command enables management address TLV advertisement on the specified ports. The LLDP agent now includes management address information in any LLDPDUs it sends.

By default, the **managementaddress** is the MAC address of the switch. To advertise the IPv4 management address of the local LLDP agent instead, use the **set lldp managementaddress** command.

Use the **port** parameter to define the ports for which to enable management address TLV advertisement, either a list of ports or all ports. *port-list* can be any/all of the following:

- a single switch port number. Port numbers start at 1 and end at *m*, where *m* is the highest numbered port.
- a range of switch port numbers (specified as *n-m*).
- a comma-separated list of switch port numbers and/or ranges.
- a single Ethernet interface (specified as ethn).
- a comma-separated list of Ethernet interfaces. Ethernet port numbers start at eth0 and end at eth*n*, where *n* is the highest numbered Ethernet port.
- the Ethernet interface eth0.

By default, LLDP management address advertisement is enabled for all ports.

Examples To enable management address advertisement on ports 1 and 2, use the command:

```
ena lldp mana po=1,2
```

To enable management address advertisement on all ports, use one of the commands:

```
ena lldp mana
ena lldp mana po=all
```

See Also **disable lldp managementaddress**
enable lldp port
set lldp managementaddress
show lldp

enable lldp notifications

Syntax ENAble LLDP NOTIfications [POrt={ALL|*port-list*}]

Description This command enables the switch to send LLDP SNMP notifications from the specified ports. Notifications are SNMP traps, triggers, and logs.

Use the **port** parameter to specify the ports for which to enable LLDP notifications, either a list of ports or all ports. *port-list* can be any/all of the following:

- a single switch port number. Port numbers start at 1 and end at *m*, where *m* is the highest numbered port.
- a range of switch port numbers (specified as *n-m*).
- a comma-separated list of switch port numbers and/or ranges.
- a single Ethernet interface (specified as ethn).
- a comma-separated list of Ethernet interfaces. Ethernet port numbers start at eth0 and end at eth*n,* where *n* is the highest numbered Ethernet port.
- the Ethernet interface eth0.

By default, LLDP notifications are disabled for all ports.

To set the amount of time between notifications, use **set lldp notification interval** command on page 26.

Examples To enable LLDP notifications from ports 1 and 2, use the command:

    ena lldp noti po=1,2

To enable LLDP notifications from all ports, use one of the commands:

    ena lldp noti

    ena lldp noti po=all

See Also **disable lldp notifications**
enable lldp port
set lldp notification interval
show lldp

enable lldp port

Syntax   `ENAble LLDP POrt={ALL|port-list} [{TX|RX|TXRX}]`

Description   This command enables the specified LLDP actions on the specified ports, either **tx** (transmission), **rx** (reception), or **txrx** (both). By default, all LLDP actions are disabled for all ports.

Parameter	Description	
POrt	The ports for which to enable the specified LLDP actions, either a list of ports or all ports.	
	port-list can be any/all of the following:	
	• a single switch port number. Port numbers start at 1 and end at *m*, where *m* is the highest numbered port.	
	• a range of switch port numbers (specified as *n-m*).	
	• a comma-separated list of switch port numbers and/or ranges.	
	• a single Ethernet interface (specified as ethn).	
	• a comma-separated list of Ethernet interfaces. Ethernet port numbers start at eth0 and end at eth*n,* where *n* is the highest numbered Ethernet port.	
	• the Ethernet interface eth0.	
	Default: **all**.	
TX|RX|TXRX	Specify:	To:
	TX	Allow the LLDP agent to **transmit** LLDPDUs on the specified ports.
	RX	Allow the LLDP agent to **receive** LLDPDUs on the specified ports.
	TXRX	Allow the LLDP agent to both **transmit and receive** LLDPDUs on the specified ports.
	Default: **TXRX**	

Examples   To enable the transmission of LLDPDUs from all ports, use the command:

```
ena lldp po tx
```

To enable both the transmission and reception of LLDPDUs on ports 1 to 3, use one of the commands:

```
ena lldp po=1-3
```

```
ena lldp po=1-3 txrx
```

See Also   **disable lldp port**
purge lldp
reset lldp
show lldp

enable lldp portdescription

Syntax   ENAble LLDP PORTDescription [POrt={ALL|*port-list*}]

Description   This command enables port description TLV advertisement on the specified ports. The IEEE 802 LAN station's port description that is associated with the local system. You can set this using the **set switch port description** command. Note that you cannot set an Ethernet port's description, because Ethernet ports are static.

The LLDP agent now includes port description information in any LLDPDUs it sends.

Use the **port** parameter to specify the ports for which to enable port description TLV advertisement, either a list of ports or all ports. *port-list* can be any/all of the following:

- a single switch port number. Port numbers start at 1 and end at *m*, where *m* is the highest numbered port.

- a range of switch port numbers (specified as *n-m*).

- a comma-separated list of switch port numbers and/or ranges.

- a single Ethernet interface (specified as ethn).

- a comma-separated list of Ethernet interfaces. Ethernet port numbers start at eth0 and end at eth*n,* where *n* is the highest numbered Ethernet port.

- the Ethernet interface eth0.

By default, LLDP port description advertisement is enabled for all ports.

Examples   To enable port description advertisement on port 1 and 2, use the command:

```
ena lldp portd po=1,2
```

To enable port description advertisement on all ports, use one of the commands:

```
ena lldp portd
ena lldp portd po=all
```

See Also   disable lldp portdescription
enable lldp port
set switch port
show lldp

enable lldp systemcapabilities

Syntax   ENAble LLDP SYSTEMCapabilities [POrt={ALL|*port-list*}]

Description   This command enables system capabilities TLV advertisement on the specified ports. System capabilities are the primary functions of your system, including bridge and/or switch. The LLDP agent now includes system capabilities information in any LLDPDUs it sends.

Use the **port** parameter to specify the ports for which to enable system capability TLV advertisement, either a list of ports or all ports. *port-list* can be any/all of the following:

- a single switch port number. Port numbers start at 1 and end at *m*, where *m* is the highest numbered port.

- a range of switch port numbers (specified as *n-m*).

- a comma-separated list of switch port numbers and/or ranges.

- a single Ethernet interface (specified as ethn).

- a comma-separated list of Ethernet interfaces. Ethernet port numbers start at eth0 and end at eth*n*, where *n* is the highest numbered Ethernet port.

- the Ethernet interface eth0.

By default, LLDP system capabilities advertisement is enabled for all ports.

Examples   To enable system capabilities advertisement on ports 1 and 2, use the command:

```
ena lldp systemc po=1,2
```

To enable system capabilities advertisement on all ports, use one of the commands:

```
ena lldp systemc
ena lldp systemc po=all
```

See Also   **disable lldp systemcapabilities**
enable lldp port
show lldp

enable lldp systemdescription

Syntax　　ENAble LLDP SYSTEMDescription [POrt={ALL|*port-list*}]

Description　This command enables system description TLV advertisement on the specified ports. This is the description of the local system, and is displayed in output of the **show system** command.

The LLDP agent now includes system description information in any LLDPDUs it sends.

Use the **port** parameter to specify the ports for which to enable system description TLV advertisement, either a list of ports or all ports. *port-list* can be any/all of the following:

- a single switch port number. Port numbers start at 1 and end at *m*, where *m* is the highest numbered port.

- a range of switch port numbers (specified as *n-m*).

- a comma-separated list of switch port numbers and/or ranges.

- a single Ethernet interface (specified as ethn).

- a comma-separated list of Ethernet interfaces. Ethernet port numbers start at eth0 and end at eth*n,* where *n* is the highest numbered Ethernet port.

- the Ethernet interface eth0.

By default, LLDP system description advertisement is enabled for all ports.

Examples　To enable system description advertisement on port 1 and 2, use the command:

```
ena lldp systemd po=1,2
```

To enable system description advertisement on all ports, use one of the commands:

```
ena lldp systemd
ena lldp systemd po=all
```

See Also　**disable lldp systemdescription**
enable lldp port
show lldp

enable lldp systemname

Syntax   `ENAble LLDP SYSTEMName [POrt={ALL|port-list}]`

Description   This command enables system name TLV advertisement on the specified ports. The LLDP agent now includes local system name information in any LLDPDUs it sends.

Use the **port** parameter to specify the ports for which to enable system name TLV advertisement, either a list of ports or all ports. *port-list* can be any/all of the following:

- a single switch port number. Port numbers start at 1 and end at *m*, where *m* is the highest numbered port.

- a range of switch port numbers (specified as *n-m*).

- a comma-separated list of switch port numbers and/or ranges.

- a single Ethernet interface (specified as ethn).

- a comma-separated list of Ethernet interfaces. Ethernet port numbers start at eth0 and end at eth*n,* where *n* is the highest numbered Ethernet port.

- the Ethernet interface eth0.

By default, LLDP system name advertisement is enabled for all ports.

Examples   To enable system name advertisement on port 1 and 2, use the command:

```
ena lldp systemn po=1,2
```

To enable system name advertisement on all ports, use one of the commands:

```
ena lldp systemn
```

```
ena lldp systemn po=all
```

See Also   disable lldp systemname
enable lldp port
show lldp

purge lldp

Syntax   `PURge LLDP`

Description   This command clears your existing LLDP configuration information and all remote LLDP MIB data. LLDP reverts to its default configuration, which means that LLDP is disabled for all ports.

This command does not reset LLDP MIB counters because these counters cannot be reset.

Example   To purge your LLDP configuration and remote LLDP data, and restore the default values, use the command:

```
pur lldp
```

See Also   reset lldp
show lldp

reset lldp

Syntax　`RESET LLDP`

Description　This command clears all your remote LLDP MIB data, and starts the LLDP re-initialization procedure. LLDP reverts to the previous, user-defined configuration.

This command does not reset LLDP MIB counters because these counters cannot be reset.

Example　To clear your remote LLDP MIB data and reset your LLDP configuration, use the command:

```
reset lldp
```

See Also　**purge lldp**
show lldp

set lldp managementaddress

Syntax　`SET LLDP MANAgementaddress=ipadd`

Description　This command sets an IPv4 address value to advertise for your local LLDP agent's management address.

The **managementaddress** parameter specifies the IPv4 management address that is advertised for your local LLDP agent. If you do not set this parameter, the management address that is advertised is the MAC address of the switch. ipadd is an IP version 4 address in dotted decimal notation.

By default, LLDP management address advertisement is enabled for all ports. To disable it, use the **disable lldp managementaddress** command.

Examples　To set the management address to 192.168.0.1, use the command:

```
set lldp mana=192.168.0.1
```

See Also　**disable lldp managementaddress**
enable lldp managementaddress
show lldp

set lldp notification interval

Syntax   `SET LLDP NOTIFicationinterval=5..3600`

Description   This command sets the amount of time between LLDP notifications. Notifications include SNMP traps, log messages and triggers.

The **notificationinterval** parameter is the number of seconds to elapse between LLDP notifications.The notification interval prevents multiple notifications occurring within the given time. The default is 5.

By default, all LLDP notifications are disabled. To enable them, use the **enable lldp notifications** command.

Example   To set the LLDP notification interval to 10 seconds, use the command:

```
set lldp notif=10
```

See Also   **disable lldp notifications**
enable lldp notifications
set lldp reinitdelay
set lldp txdelay
set lldp txhold
set lldp txinterval
show lldp

set lldp reinitdelay

Syntax   `SET LLDP REINITdelay=1..10`

Description   This command sets the LLDP re-initialization delay.

The **reinitdelay** parameter specifies the number of seconds that the switch waits after a port's status becomes disabled before it begins the LLDP re-initialization process. The default is 2.

Example   To set the re-initialization delay to 5 seconds, use the command:

```
set lldp reinit=5
```

See Also   **set lldp txdelay**
set lldp txhold
set lldp txinterval
show lldp

set lldp txdelay

Syntax   `SET LLDP TXDelay=1..8192`

Description This command changes the default time delay between successive LLDP
transmissions initiated by value or status changes in the local LLDP MIB. For
more information, see Transmission delay timer on page 5.

This is the LLDP MIB object **lldpTxDelay.** For more information, see Section 12
of the IEEE Standard 802.1AB-2005.

The **txdelay** parameter is the number of seconds that the switch waits between
transmitting successive LLDPDUs, when those LLDPDUs are initiated by
value or status changes in the local LLDP MIB. The default is 2. Changing the
default can affect LLDP operation.

Example   To set the transmission delay to 10 seconds, use the command:

    set lldp txd=10

See Also   **set lldp reinitdelay**
set lldp txhold
set lldp txinterval
show lldp

set lldp txhold

Syntax   `SET LLDP TXHold=2..10`

Description   This command changes the default value of the LLDP MIB object
lldpMessageTxHoldMultiplier. For more information, see Section 12 of the
IEEE Standard 802.1AB-2005.

The **txhold** parameter specifies the multiplier on the **msgTxInterval** parameter
of the **set lldp txinterval** command. The default is 4. Changing the default can
affect LLDP operation.

Example   To set the txhold value to 8, use the command:

```
set lldp txh=8
```

See Also   set lldp reinitdelay
set lldp txdelay
set lldp txinterval
show lldp

set lldp txinterval

Syntax   `SET LLDP TXInterval=5..32768`

Description   This command sets the time interval between LLDP transmissions. This is the
LLDP MIB object **lldpMessageTxInterval.** For more information, see
Section 12 of the IEEE Standard 802.1AB-2005.

The **txinterval** parameter specifies the number of seconds that the switch
transmits LLDPDUs on behalf of the LLDP agent. The default is 30. Note that
changing the default can affect LLDP operation.

Example   To set the LLDP to transmit LLDPDUs every 100 seconds, use the command:

```
set lldp txi=100
```

See Also   set lldp reinitdelay
set lldp txdelay
set lldp txhold
show lldp

show lldp

Syntax	`SHow LLDP [LOCALData] [POrt={ALL|port-list}] [DETail]`
Description	This command displays information about your LLDP configuration. If no optional parameters are specified, the global LLDP configuration is displayed.

Parameter	Description
LOCALData	Displays additional LLDP local system data for the specified ports, or all ports if you do not specify the **port** parameter.
POrt	The ports for which to display LLDP information, either a list of ports or all ports.
	port-list can be any/all of the following:
	• a single switch port number. Port numbers start at 1 and end at *m*, where *m* is the highest numbered port.
	• a range of switch port numbers (specified as *n-m*).
	• a comma-separated list of switch port numbers and/or ranges.
	• a single Ethernet interface (specified as ethn).
	• a comma-separated list of Ethernet interfaces. Ethernet port numbers start at eth0 and end at eth*n,* where *n* is the highest numbered Ethernet port.
	• the Ethernet interface eth0.
	Default: **all**
DETail	Displays additional, detailed LLDP port configuration information about the specified ports (Figure 3, Table 1).

Figure 1: Example output from the **show lldp port** command

```
LLDP configuration

LLDP global configuration:
  msgTxInterval ........................ 30
  msgTxHold ............................ 4
  reinitDelay .......................... 2
  txDelay .............................. 2
  Notification interval ................ 5
  Management address ................... 00-09-41-4c-d0-18
  Total current neighbours ............. 0
  Too many neighbours events ........... 0
  System errors ........................ 0

LLDP port configuration:
Port       adminStatus    Notifications  LLDP TLVs
---------------------------------------------------------------
1          txOnly         enabled        PD SN SD SC MA
2          rxOnly         disabled       -  -  -  -  -
3          txAndRx        enabled        PD SN SD SC -
4          disabled       enabled        PD SN SD SC MA
5          txAndRx        disabled       PD SN SD SC MA
eth0       disabled       disabled       PD SN SD SC MA
eth1       disabled       disabled       PD SN SD SC MA

Key:
  PD ........ Port description
  SN ........ System name
  SD ........ System description
  SC ........ System capabilities
  MA ........ Management address
```

Figure 2: Example output from the **show lldp localdata port=1,2** command

```
LLDP configuration

LLDP global configuration:
  msgTxInterval ........................ 30
  msgTxHold ............................ 4
  reinitDelay .......................... 2
  txDelay .............................. 2
  Notification interval ................ 5
  Management address ................... 00-09-41-4c-d0-18
  Total current neighbours ............. 0
  Too many neighbours events ........... 0
  System errors ........................ 0

 LLDP local system data:
  lldpLocChassisIdSubtype .............. 4
  lldpLocChassisId ..................... 00-09-41-4c-d0-18
  lldpLocSysName ....................... AR450
  lldpLocSysDesc ....................... Allied Telesis AR450 version 2.9.1-00
                                         30-Dec-2006
  lldpLocSysCapSupported ............... Bridge, Router
  lldpLocSysCapEnabled ................. Bridge, Router

  lldpLocManAddrTable:
    lldpLocManAddrSubtype .............. 6
    lldpLocManAddr ..................... 00-09-41-4c-d0-18
    lldpLocManAddrLen .................. 7
    lldpLocManAddrIfSubtype ............ 1
    lldpLocManAddrOID .................. -

  lldpLocPortTable:
    Port 1:
      LLDP:
        lldpLocPortIdSubtype ........... 5
        lldpLocPortId .................. port1
        lldpLocPortDesc ................ port1

    Port 2:
      LLDP:
        lldpLocPortIdSubtype ........... 5
        lldpLocPortId .................. port2
        lldpLocPortDesc ................ port2

LLDP port configuration:
•
•
•
```

Figure 3: Example output from the **show lldp port=1,3 detail** command

```
LLDP configuration

LLDP global configuration:
  msgTxInterval ......................... 30
  msgTxHold ............................. 4
  reinitDelay ........................... 2
  txDelay ............................... 2
  Notification interval ................. 5
  Management address .................... 00-09-41-4c-d0-18
  Total current neighbours .............. 0
  Too many neighbours events ............ 0
  System errors ......................... 0

LLDP port configuration:
  Port 1:
    Admin status ........................ txOnly
    Notifications ....................... enabled
    LLDP optional TLVs:
      Port description .................. advertise
      System name ....................... advertise
      System description ................ advertise
      System capabilities ............... advertise
      Management address ................ advertise

  Port 2:
    Admin status ........................ rxOnly
    Notifications ....................... disabled
    LLDP optional TLVs:
      Port description .................. not advertise
      System name ....................... not advertise
      System description ................ not advertise
      System capabilities ............... not advertise
      Management address ................ not advertise
```

Table 1: Parameters in output of the **show lldp** command

Parameter	Meaning
LLDP global configuration	
msgTxInterval	The time interval in seconds between which the switch transmits LLDPDUs on behalf of the LLDP agent. You can set this using the **set lldp txinterval** command.
msgTxHold	The current multiplier on **msgTxInterval**. You can set this using the **set lldp txhold** command.
reinitDelay	The time in seconds that the switch waits after a port is disabled, before it begins the LLDP re-initialization process. You can set this using the **set lldp reinitdelay** command.
txDelay	The time in seconds, that the switch waits between transmitting successive LLDPDUs initiated by value or status changes in the local LLDP MIB. You can set this using the **set lldp txdelay** command.
Notification interval	The time in seconds that elapses between LLDP notifications. You can set this using the **set lldp notification interval** command.
Management address	The IPv4 management address the switch advertises for your local LLDP agent. You can set this using the **set lldp managementaddress** command.
Total current neighbours	The total number of active neighbours that are currently associated with your local system.
Too many neighbours events	The number of times the toomanyneighbours event has occurred since the last LLDP re-initialization.
System errors	Major LLDP system errors that could affect LLDP operation. If a number greater than 0 is displayed, contact your System Administrator.
LLDP port configuration	
Port	The port number.
adminStatus	The LLDP transmission and reception status of the port, one of: • **txOnly** Transmission is enabled only • **rxOnly** Reception is enabled only • **txAndrx** Both transmission and reception are enabled • **disabled** Both transmission and reception are disabled You can enable a value of **txOnly**, **rxOnly**, or **txAndrx** for the port using the **enable lldp port** command. You can disable **txOnly**, **rxOnly**, or **txAndrx for** the port using the **disable lldp port** command.
Notifications	The current notifications setting, either 'enabled' or 'disabled'. You can set this using the **disable lldp notifications** or **enable lldp notifications** commands.

Table 1: Parameters in output of the **show lldp** command (cont.)

Parameter	Meaning
LLDP TLVs	A list of the LLDP optional TLVs currently advertised on the listed ports, one or more of: • PD - Port Description • SN - System Name • SD - System Description • SC - System Capabilities • MA - Management Address
LLDP local system data	
This section is displayed only when you specify the **localdata** parameter.	
lldpLocChassisIdSubtype	The type of encoding used to identify the chassis associated with your local system.
lldpLocChassisId	The chassis ID associated with your local system. This is the MAC address.
lldpLocSysName	The system name of your local system.
lldpLocSysDesc	A textual description of your local system, including the full name and version identification of your system's hardware type, software operating system, and networking software.
lldpLocSysCapSupported	The system's currently supported primary functions.
lldpLocSysCapEnabled	The system's currently enabled primary functions.
lldpLocManAddrTable	
LLDP local management address MIB information. This is displayed only when you have both set and enabled an LLDP management address.	
lldpLocManAddrSubtype	The type of encoding used to identify the management address associated with your local system.
lldpLocManAddr	The IPv4 management address that is currently set for your local system. To set a management address, use the **set lldp managementaddress** command.
lldpLocManAddrLen	The total combined length of the management address subtype field, and the management address field in LLDPDUs transmitted by your local LLDP agent.
lldpLocManAddrIfSubtype	The interface numbering method used to define the interface number associated with your local system.
lldpLocManAddrOID	Currently unsupported.
lldpLocPortTable	
LLDP port information.	
LLDP	LLDP standard TLV configuration.
lldpLocPortIdSubtype	The type of encoding used to identify the port identifier associated with your local system.
lldpLocPortId	The port identification for the specified port in your local system.
lldpLocPortDesc	The IEEE 802 LAN station's port description associated with your local system.
LLDP port configuration	
This section is displayed only when you specify the **detail** parameter.	
Port	The port number.

Table 1: Parameters in output of the **show lldp** command (cont.)

Parameter	Meaning

adminStatus	The LLDP transmission and reception status of the port, one of:
	
	• **txOnly**
	  Transmission is enabled only
	
	• **rxOnly**
	  Reception is enabled only
	
	• **txAndrx**
	  Both transmission and reception are enabled
	
	• **disabled**
	  Both transmission and reception are disabled
	
	You can enable a value of **txOnly**, **rxOnly**, or **txAndrx** for the port using the **enable lldp port** command. You can disable **txOnly**, **rxOnly**, or **txAndrx for** the port using the **disable lldp port** command.

Notifications	The current notifications setting, either 'enabled' or 'disabled'. You can set this using the **disable lldp notifications** or **enable lldp notifications** commands.
LLDP optional TLVs	
Port description	The port description TLV advertisement status, either 'advertise' or 'not advertise'.You can set this using the **disable lldp portdescription** or **enable lldp portdescription** commands.
System name	The system name TLV advertisement status, either 'advertise' or 'not advertise'.You can set this using the **disable lldp systemname** or **enable lldp systemname** commands.
System description	The system description TLV advertisement status, either 'advertise' or 'not advertise'.You can set this using the **disable lldp systemdescription** or **enable lldp systemdescription** commands.
System capabilities	The system capabilities TLV advertisement status, either 'advertise' or 'not advertise'.You can set this using the **disable lldp systemcapabilities** and **enable lldp systemcapabilities** commands.
Management address	The management address TLV advertisement status, either 'advertise' or 'not advertise'.You can set this using the **disable lldp managementaddress** or **enable lldp managementaddress** commands.

Examples   To display the LLDP configuration information about port 1 and 3 in detail, use the command:

```
sh lldp po=1,3 det
```

To display the LLDP configuration information with local system data about port 1 to 3 in summary, use the command:

```
sh lldp locald po=1,3
```

See Also   **disable lldp port**
enable lldp port
show lldp counters
show lldp neighbour

show lldp counters

Syntax   SHow LLDP COUnters [POrt={ALL|*port-list*}] [DETail]

Description   This command displays information about LLDP counters in your
configuration. If no optional parameters are specified, global LLDP counters
are displayed. For information about LLDP counters, see the IEEE Standard
802.1AB-2005.

Parameter	Description
POrt	The ports for which to display LLDP counter information, either a list of ports or all ports.
	port-list can be any/all of the following:
	• a single switch port number. Port numbers start at 1 and end at *m*, where *m* is the highest numbered port.
	• a range of switch port numbers (specified as *n-m*).
	• a comma-separated list of switch port numbers and/or ranges.
	• a single Ethernet interface (specified as ethn).
	• a comma-separated list of Ethernet interfaces. Ethernet port numbers start at eth0 and end at eth*n,* where *n* is the highest numbered Ethernet port.
	• the Ethernet interface eth0.
	Default: **all**
DETail	Specify **detail** to display additional, detailed LLDP counter information about the specified ports or all ports.

Figure 4: Example output from the **show lldp counters port=1,2** command

```
 LLDP counters information

 LLDP statistics group:
   Remote tables last change time .......... 00:10:33 (63350)
   Remote tables inserts ................... 1
   Remote tables deletes ................... 0
   Remote tables drops ..................... 0
   Remote tables ageouts ................... 0

 LLDP frame statistics summary:
 Port      Tx total        Rx total       Rx discards     Rx errors
 -------------------------------------------------------------
 1         120             0              0               0
 2         0               1              0               0
```

Figure 5: Example output from the **show lldp counters port=1,2 detail** command

```
LLDP counters information

LLDP statistics group:
  Remote tables last change time .......... 00:12:30 (75038)
  Remote tables inserts ................... 1
  Remote tables deletes ................... 0
  Remote tables drops ..................... 0
  Remote tables ageouts ................... 0

LLDP port statistics:
  Port 1:
    framesIn ..................... 0      framesOut ...... 120
    framesDiscarded .............. 0
    framesInErrors ............... 0
    ageouts ...................... 0
    TLVsDiscarded ................ 0
    TLVsUnrecognized ............. 0

  Port 2:
    framesIn ..................... 1      framesOut ....... 0
    framesDiscarded .............. 0
    framesInErrors ............... 0
    ageouts ...................... 0
    TLVsDiscarded ................ 0
    TLVsUnrecognized ............. 0
```

Table 2: Parameters in output of the **show lldp counters** command

Parameter	Meaning
LLDP statistics group	
A list of counters for remote MIB table information.	
Remote tables last change time	The time of the most recent change to the remote table, or when an entry was last created, modified, or deleted.
Remote tables inserts	The number of times that a complete set of information advertised by a neighbour has been inserted into the table.
Remote tables deletes	The number of times that a complete set of information advertised by a neighbour has been deleted from the table.
Remote tables drops	The number of times that a complete set of information advertised by a neighbour could not be inserted into the table.
Remote tables ageouts	The number of times that a complete set of information advertised by a neighbour has been removed from the table because its TTL has expired.
LLDP frame statistics summary	
A list of LLDP counters for each specified LLDP port.	
Port	The port number.
TX total	The total number of LLDPDUs transmitted through the port.
Rx total	The total number of LLDPDUs received by the port.
Rx discards	The total number of LLDPDUs received and subsequently discarded.
Rx errors	The total number of LLDPDUs received by the port with one or more detectable errors.

Table 2: Parameters in output of the **show lldp counters** command (cont.)

Parameter	Meaning
LLDP port statistics	
A list of LLDP frame counters for each specified LLDP port.	
framesIn	The total number of LLDP frames received by the port.
framesOut	The total number of LLDP frames transmitted from the port.
framesDiscarded	The total number of LLDP frames received and subsequently discarded.
framesInErrors	The total number of LLDP frames that were received by the port with one or more detectable errors.
ageouts	The total number of times that the switch deleted a neighbour's information from the LLDP remote systems MIB because that neighbour's time-to-live has expired.
TLVsDiscarded	The total number of TLVs that were received by the port and subsequently discarded.
TLVsUnrecognized	The total number of TLVs that the receiving LLDP local agent did not recognize.

Examples   To display counter information for ports 1 and 3 in a summary table, use the command:

```
sh lldp cou po=1,3
```

To display detailed counter information for port 1, use the command:

```
sh lldp cou po=1 det
```

See Also   disable lldp port
enable lldp port
show lldp
show lldp neighbour

show lldp memory

Syntax　　SHow LLDP MEMory

Description　　This command displays the available memory for LLDP, the total memory usage by LLDP as a whole, and the amount of memory used by the remote systems MIB. This information is displayed both in kbps and as a percentage.

To prevent the remote systems MIB from using large amounts of memory and possibly affecting the operation of your switch, the total size of the MIB is set to be a maximum of 5MB, or 5% of your available memory - whichever is the lesser amount.

Figure 6: Example output from the **show lldp memory** command

```
LLDP memory information

Total LLDP memory available ............. 5120 (KB)
Total LLDP memory usage ................. 4 (KB) (0%)
LLDP remote systems MIB usage ........... 0 (KB) (0%)
```

Table 3: Parameters in output of the **show lldp memory** command

Parameter	Meaning
Total LLDP memory available	The total memory space in Kbps that is currently available for LLDP.
Total LLDP memory usage	The total memory space in Kbps that LLDP is currently using, followed by its usage expressed as a percentage of the total LLDP memory.
LLDP remote systems MIB usage	The total memory space in Kbps that the LLDP remote systems MIB is currently using, followed by its usage expressed as a percentage of the total LLDP memory.
	If this counter shows that the maximum of 5% or 5MB is being reached often, consider deactivating LLDP reception on some ports.

Example　　To display information about LLDP memory, use the command:

```
sh lldp mem
```

See Also　　**purge lldp**
reset lldp
show lldp

show lldp neighbour

Syntax   SHow LLDP NEIghbour [POrt={ALL|*port-list*}] [DETail]

Description   This command displays information about neighbours discovered on the specified ports. If no optional parameters are specified, information about all LLDP neighbours is displayed.

Parameter	Description
POrt	The ports for which to display LLDP neighbour information, either a list of ports or all ports.
	port-list can be any/all of the following:
	• a single switch port number. Port numbers start at 1 and end at *m*, where *m* is the highest numbered port.
	• a range of switch port numbers (specified as *n-m*).
	• a comma-separated list of switch port numbers and/or ranges.
	• a single Ethernet interface (specified as eth*n*).
	• a comma-separated list of Ethernet interfaces. Ethernet port numbers start at eth0 and end at eth*n,* where *n* is the highest numbered Ethernet port.
	• the Ethernet interface eth0.
	Default: **all**.
DETail	Specify **detail** to display additional, detailed LLDP neighbour information about the specified ports or all ports.

Figure 7: Example output from the **show lldp neighbour port=1,2** command

```
LLDP neighbour information

Port 1:
There are no neighbours for this port.

Port 2:
remoteIndex    timeMark  chassisId                   sysName
-------------------------------------------------------------
1              89148     00-30-84-6e-ba-c2           switch1
```

Figure 8: Example output from the **show lldp neighbour port=1,2 detail** command

```
LLDP neighbour information

Neighbour information for port 1:
There are no neighbours for this port.


Neighbour information for port 2:

Remote index 1:
  lldpRemTable:
    lldpRemLocalPortNum ................. 2
    lldpRemIndex ........................ 1
    lldpRemTimeMark ..................... 89148
    lldpRemChassisIdSubtype ............. 4
    lldpRemChassisId .................... 00-30-84-6e-ba-c2
    lldpRemPortIdSubtype ................ 5
    lldpRemPortId ....................... port1
    lldpRemPortDesc ..................... port1
    lldpRemSysName ...................... switch1
   lldpRemSysDesc ...................... Allied telesis AR450
                                         version 2.9.1
                                         30-Oct-2005
    lldpRemSysCapSupported .............. Bridge, Router
    lldpRemSysCapEnabled ................ Bridge
    Time to live ........................ 120

  lldpRemManAddrTable:
    lldpRemManAddrSubtype ............... 1
    lldpRemManAddr ...................... 192.168.1.200
    lldpRemManAddrIfSubtype ............. 2
    lldpRemManAddrIfId .................. 1
    lldpRemManAddrOID ................... -

  lldpRemOrgDefInfoTable:
    lldpRemOrgDefInfoOUI ................ 00-80-C2
    lldpRemOrgDefInfoSubtype ............ 1
    lldpRemOrgDefInfoIndex .............. 1
    lldpRemOrgDefInfo ...................

    lldpRemOrgDefInfoOUI ................ 00-80-C2
    lldpRemOrgDefInfoSubtype ............ 2
    lldpRemOrgDefInfoIndex .............. 2
    lldpRemOrgDefInfo ................... 00

    lldpRemOrgDefInfoOUI ................ 00-80-C2
    lldpRemOrgDefInfoSubtype ............ 3
    lldpRemOrgDefInfoIndex .............. 3
    lldpRemOrgDefInfo ................... 000105766c61

    lldpRemOrgDefInfoOUI ................ 00-80-C2
    lldpRemOrgDefInfoSubtype ............ 4
    lldpRemOrgDefInfoIndex .............. 4
    lldpRemOrgDefInfo ................... 0354
```

Table 4: Parameters in output of the **show lldp neighbour** command

Parameter	Meaning
remoteIndex	A unique neighbour identity assigned to each neighbour added to the remote system MIBs.
timeMark	The number of centiseconds since this neighbour was added.
chassisId	The chassis identity of the neighbour.
sysName	The system name of the neighbour's system.
lldpRemTable	
This information is displayed when you enter the **detailed** parameter.	
lldpRemLocalPortNum	The number of the neighbour's port from which the LLDPDU was sent.
lldpRemIndex	A unique neighbour identity. This is assigned to each neighbour added to the remote system MIBs.
lldpRemTimeMark	The number of centiseconds since this neighbour was added.
lldpRemChassisIdSubtype	The type of encoding used to identify the neighbour's chassis.
lldpRemChassisId	The ID number of the neighbour's chassis.
lldpRemPortIdSubtype	The type of port identifier encoding used for the neighbour's port from which the LLDPDU was sent.
lldpRemPortId	The neighbour's port from which the LLDPDU was sent.
lldpRemPortDesc	A description of the neighbour's port from which the LLDPDU was sent.
lldpRemSysName	The system name of the neighbour's system.
lldpRemSysDesc	The system description of the neighbour's system.
lldpRemSysCapSupported	The system capabilities that are supported on the neighbour's system.
lldpRemSysCapEnabled	The system capabilities that are enabled on the neighbour's system.
Time to live	The number of seconds for which your LLDP agent will regard the neighbour's information as valid.
lldpRemManAddrTable	
lldpRemManAddrSubtype	The type of management address identifier encoding used for the neighbour's defined Management Address.
lldpRemManAddr	The neighbour's defined Management Address.
lldpRemManAddrIfSubtype	The interface numbering method used to define the interface name associated with the neighbour.
lldpRemManAddrIfId	The interface number for the management address component associated with the neighbour.
lldpRemManAddrOID	The type of hardware component or protocol entity associated with the neighbour's management address.
lldpRemOrgDefInfoTable	
lldpRemOrgDefInfoOUI	A globally unique assigned Organisationally Unique Identifier (OUI) number for the information received from the neighbour.

Table 4: Parameters in output of the **show lldp neighbour** command (cont.)

Parameter	Meaning
lldpRemOrgDefInfoSubtype	The subtype of the organisationally defined information received from the neighbour.
lldpRemOrgDefInfoIndex	An arbitrary local integer value used by your LLDP agent to identify a particular, unrecognized, organisationally defined information instance.
lldpRemOrgDefInfo	The organisationally defined information associated with the neighbour.

For more information about LLDP parameters, see the IEEE Standard 802.1AB-2005.

Examples To display the neighbour information for port 1 and 2 in detail, use the command:

```
sh lldp nei po=1,2 det
```

To display the neighbour information for all ports in summary, use one of the commands:

```
sh lldp nei
sh lldp nei port=all
```

See Also disable lldp port
enable lldp port
show lldp
show lldp counters