Chapter 4

Configuring and Monitoring the System

Introduction

This chapter contains the following information.

Read about this topic...	In this section...
setting values that identify the router, and displaying a message at restart	**System Identification**
setting the time and date on the router	**Time and Date**
using the log facility, counters, and debug commands to check router and network functions	**Monitoring Router Operations**
checking the router's CPU utilisation and memory	**Monitoring Router Operations**
configuring the mail system so that the router emails log messages and other alerts	**Emailing Alerts from the Router**

System Identification

This section outlines how to set the system variables on the router and how to display them. Some of these variables help with accurate network monitoring, such as the router name. Others are required by certain protocols, such as the distinguished name that Public Key Infrastructure (PKI) uses.

Settings for identification

System name, location, and contact parameters help a remote network administrator identify individual routers.

To set the name of a router, use the command:

```
set system name=name
```

To set the location of a router, use the command:

```
set system location=location
```

To set information about the network administrator responsible for the router, use the command:

```
set system contact=contact
```

The name, location, and contact are strings 1 to 255 characters long containing any printable character. If the string includes spaces, it must be in double quotes.

Settings for protocols

The following system settings are in the chapters about the relevant protocol:

- Territory, used by ISDN to set appropriate defaults—see the **set system territory** command on page 11-120 of Chapter 11, Integrated Services Digital Network (ISDN)
- Country, used by ADSL to set appropriate defaults—see the **set system country** command on page 10-59 of Chapter 10, ATM over xDSL
- Distinguished name, used by Link Aggregation Control Protocol (LDAP) and Public Key Infrastructure (PKI) to identify the router—see the **set system distinguishedname** command on page 49-32 of Chapter 49, Public Key Infrastructure (PKI)

Displaying system information

To see a summary of the router hardware, software, and operating conditions, use the command:

```
show system
```

To see the router's serial number, use the command:

```
show system serialnumber
```

Customised system messages

Users with Manager level privilege or higher can set the system to display messages when users access the router through its CLI. The message displays before the login prompt when you login from Telnet or console connections. The following figure shows an example of a message (in bold).

```
TELNET session now in ESTABLISHED state

Warning: This equipment is for authorised persons only. Do not
log in unless you have proper clearance.


 login:
```

The message is in a file named *login.txt*, which is displayed if it exists in flash memory. Create a login.txt file by using the **edit** command or by loading an existing text file. The contents of the file must be in printable ASCII characters but with no control characters. When no login.txt file exists, the login prompt is displayed without a message.

For more information about creating a login.txt file, see the **edit** command on page 6-16 of Chapter 6, Managing the File System, and the **load** command on page 5-31 of Chapter 5, Managing Configuration Files and Software Versions.

Time and Date

To set the router's real-time clock to the current local time, use the command:

```
set time=hh:mm:ss
```

For example:

```
set time=14:50:00
```

You can also set the current date (dd-mmm-yy, or dd-mmm-yyyy), for example:

```
set date=29-JAN-05
```

```
set date=29-JAN-2005
```

The router's time is displayed on the Configuration > System > Time tab of the GUI, or by using the command:

```
show time
```

Log messages also include the time.

Using the GUI to set the time

Sometimes the time may not change even though you used the GUI to enter the correct time.

Remember that changing the time requires several small steps. First select Configuration > System > Time. Enter a time that is very shortly in the future (such as 20 seconds later than the current time), and then check **Set time**. Wait until the exact time you just entered, and then click **Apply**.

Timezone and UTC Offset

The router allows you to:

- set an internationally recognised timezone and set that timezone's UTC offset
- define and enable summer time settings, including the offset value that summer time uses alongside the UTC offset.

Setting a timezone

You can define a timezone for the router to use. Once defined, the system uses this timezone's time for operation.

To set a timezone, use the command:

```
set timezone[=time-zone-name]
   [utcoffset=std-utc-offset]
```

The **utcoffset** parameter defines the UTC offset for the timezone. For more information about defining a UTC offset, see "UTC offset" on page 4-6

Configuring summer time

Summer time is also known as Daylight Saving Time. When enabled, the system automatically sets the clock ahead when summer time begins, and sets the clock back when it ends.

You can enable summer time, specify when summer time starts and ends, and define a summer time offset value.

To enable summer time, use the command:

```
enable summertime
```

When summer time is enabled, but no summer time definition is set with the **set summertime** command, the router uses North American settings as the default. Therefore, in North America, summer time values do not need to be defined, just enabled.

To set the system's summer time definition, use the command:

```
set summertime[=summertime-zone-name]
   [{startdate=date|startmonth=month startweek=week
   startday=day]} [starttime=hh:mm] {[enddate=date|
   endmonth=month endweek=week endday=day]} [endtime=hh:mm]
   [offset=offset]
```

The **offset** parameter in the **set summertime** command is the amount by which the UTC offset changes when summer time begins and ends, and therefore the amount by which the local time changes. The default is 60 minutes.

To disable summer time, use the command:

```
disable summertime
```

You still need to set the local time using the command:

```
set time
```

If you set the time **before** you configure summer time settings, we suggest you set the time to standard time because the router automatically changes the time to summer time when applicable. If you set the time **after** configuring summer time, we suggest you set the time to the current local time—either summer time or standard time, whichever applies.

UTC offset

The UTC offset is the difference between local time and UTC (Coordinated Universal Time). The UTC offset value that the system uses is dependent on the router's configuration.

The UTC offset can be defined with the following commands:

```
set timezone
set ntp utcoffset in Chapter 57, Network Time Protocol (NTP)
```

If you set a time zone using the **set timezone** command, the timezone's **utcoffset** definition overrides the UTC offset that is defined for NTP. When you remove the timezone using the **clear timezone** command, the **utcoffset** value is set back to the default of 0.

If you enable a summer time setting using the **enable summertime** command, the following rules determine the UTC offset:

- **If a timezone is currently set up**
  The timezone **utcoffset** setting, plus the current summer time **offset** value applies.
- **If no timezone is currently set up**
  The **set ntp utcoffset** setting, plus the current summer time **offset** value applies.

If no timezone is currently set up, and you disable summer time using the **disable summertime** command, then the system once again uses the default of 0 for the UTC offset. It does not revert to the NTP UTC offset value, even if one has been defined.

Monitoring Router Operations

The following commands and features help you monitor router operations:

- **Event logging**
- **Counter commands**
- **Debug commands**
- **Redirecting output**
- **CPU utilisation**
- **Extended CPU monitoring**
- **Memory**
- **Restarts**

Event logging

The router responds to certain events by generating a log message about them. Each router maintains a local event log of the most recent log messages. To view the log, use the command:

```
show log
```

The Logging facility provides a powerful, flexible and easily configured tool for monitoring network activity and displaying results.User-defined output definitions can filter, prioritise, and output log messages to RAM, an asynchronous port, another router, a syslog server or an email address. See Chapter 60, Logging Facility for a detailed description of the Logging facility.

Counter commands

Most protocols and management features include **show <*protocol*> counter** commands, which count the number of items that the router has processed for that protocol. They generally include items that the protocol received and transmitted, and items with errors. Many **counter** commands list the different types of messages that the protocol sends and receives, and count the number of each type of message. Counter commands are described in the chapters for each protocol or feature.

Debug commands

Most protocols and management features include debugging commands that capture detailed information about what the router is processing and how. These types of commands generally come in sets of three—enable, disable, and show. The following table shows an example of a set of debug commands.

This command...	Does this...
enable <*protocol*> debug	sets the router to capture and display debug information. For example, **enable ip debug** sets the router to capture incorrectly formatted IP packets to a buffer for later diagnosis. Debugging information is displayed on the console for most protocols.
disable <*protocol*> debug	turns off debugging.
show <*protocol*> debug	displays the debugging settings that are enabled, and sometimes displays information gathered by debugging.

Some debug commands produce very large amounts of data and can degrade network performance. Debugging commands are described in the chapters for each protocol or feature.

Displaying and disabling active debugging

Protocol specific commands only provide information about the debugging that is enabled for that specific protocol. The following modules are supported for active debugging:

- BGPINTERFACE
- IP
- OSPF
- PIM
- RADIUS
- SWITCH
- TACACS
- TACPLUS
- VRRP

For more information on these modules, see "Module Identifiers and Names" on page B-2 of Appendix B, Reference Tables.

To display the debugging active for a specific module or all modules, use the command:

```
show debug active={module|all}
```

To disable debugging output for a specific module or all modules, use the command:

```
disable debug active={module|all}
```

Redirecting output

You can send output from a specific command or script to a text file when you next issue that command or script. This is especially useful when collecting debug output. Use one of these commands:

```
create file
add file
```

While output is being redirected, the text file cannot be edited, renamed, deleted, or uploaded.

To close one or all text files so that they no longer receive input from commands or scripts, use the command:

```
reset file permanentredirect
```

After the file closes, it can be uploaded or edited.

To display information about the redirected file, use the command:

```
show file permanentredirect
```

CPU utilisation

To display CPU utilisation over the last minute, five minutes, or since the router last restarted, use the command:

```
show cpu
```

Extended CPU monitoring

You can set the router to capture data about which specific functions the CPU is executing, and what level of instantaneous usage the CPU is experiencing. This allows you, in conjunction with your authorised distributor or reseller, to diagnose the causes of high rates of CPU utilisation on the router.

You can set the router to capture data continuously, or only when the CPU experiences a specific level of instantaneous usage. The router holds up to 500 entries (10 seconds) of data about CPU utilisation.

To capture data when the CPU is experiencing a specific amount of instantaneous usage, set the start and start percentages with the command:

```
activate cpu extended start=1..100 [stop=1..100]
```

When a start percentage is set, the router automatically disables extended monitoring once it has 500 data entries.

To enable extended monitoring, use the command:

```
enable cpu extended
```

This command also lets you capture data immediately, without first setting start and stop percentages. This adds data entries continuously, until you stop it. Only the last 10 seconds of data entries are stored.

To stop capturing data, and reset the **start** and **stop** parameters if they are set, use the command:

```
disable cpu extended
```

To remove data entries and reset the **start** and **stop** parameters in the **activate cpu extended** command, use the command:

```
reset cpu utilisation
```

This command interrupts active data capturing for a specific event. However, monitoring remains enabled, and continues to collect data. This means you can capture data for a particular event without having to disable and re-enable this feature.

Memory

To examine how the router's memory is allocated, use the command:

```
show buffer
```

If the pool of free buffers drops below a critical threshold, the router progressively disables processes, resulting in a loss of functionality. This problem can potentially arise when a fast source sends enormous amounts of data to a slow destination or down a slow link. However, the cause is more likely to be a problem with the router itself. The problem can be corrected in the short term by restarting the router but also report it to your supplier.

To examine the contents of memory, use the command:

```
dump
```

To overwrite the contents of the router's memory, use the command:

```
modify
```

Caution These commands are provided as diagnostic tools and should not be used for normal operations. Inappropriate use of the **modify** command may cause a malfunction of the router, resulting in loss of network services.

Restarts

Some changes to configuration parameters require the router to be restarted for the changes to take affect. The router is restarted with the command:

```
restart {reboot|router} [config={filename|none}]
```

If the router encounters a fatal error condition from which it cannot recover, it automatically restarts. To determine the problem, examine the router's exception list, which you can generate with the command:

```
show exception
```

The conditions that the router encountered when it last restarted, such as the amount of RAM and the state of the battery-backed RAM, can be viewed with the command:

```
show startup
```

To display a snapshot of the state of the router prior to the last fatal condition, use the command:

```
show debug
```

Emailing Alerts from the Router

The router has a built-in email client and SMTP (Simple Mail Transfer Protocol) server to enable email messages to be sent from the router to remote mail systems using SMTP. The email client generates messages that comply with RFC 822, *Standard for the Format of ARPA Internet Text Messages*. The external SMTP server must be compliant with RFC 821, *Simple Mail Transfer Protocol*, for the transmission of mail messages. Note that Microsoft mail servers are not RFC 821 compliant.

The SMTP server transmits email messages only; it cannot accept emails from other mail systems.

A mail message is transmitted from the router's command line or from a script by using the command:

```
mail to=destination {file=filename|message=message}
    [subject=subject] [etrn=mail-domain]
```

Messages can also be transmitted automatically. For more information about automatic messages, see:

- Chapter 59, Trigger Facility
- Chapter 60, Logging Facility
- Chapter 46, Firewall

The body of the message may contain either a single character string or the contents of a file in the router's flash memory.

Up to 64 messages can be queued for transmission. Messages can be deleted from the queue by using the command:

```
delete mail=id
```

Mail messages are automatically deleted from the queue if the destination address cannot be resolved using DNS.

The current state of the mail subsystem and the messages queued for transmission can be displayed by using the command:

```
show mail
```

The progress of mail messages can be monitored using the mail subsystem's debugging option, which is enabled or disabled by using the commands:

```
enable mail debug
```

```
disable mail debug
```

Configuration Examples

The following procedures show how to configure a mail subsystem and transmit email messages. It assumes that IP has already been enabled and correctly configured on the router.

To configure the mail subsystem

1. **Configure a DNS Server.**

   Configure the IP address of the DNS server for the mail subsystem to use when resolving email addresses to IP addresses. The mail subsystem does not function without a DNS. Enter the command:

   ```
   set ip nameserver=192.168.5.3
   ```

2. **Configure the mail host name.**

   Configure the host name used by the mail subsystem when communicating with other mail systems. Normally this is the fully qualified domain name of the router. The mail subsystem needs a host name to function. Enter the command:

   ```
   set mail hostname=ho1.company.com
   ```

3. **Check the configuration.**

   Check that the mail subsystem is correctly configured and enabled by using the command:

   ```
   show mail
   ```

To send a file via email from the command prompt

1. **Send the file as the body of a mail message.**

   Text format files with .cfg, .scp, and .txt extensions can be transferred from the router to a remote user in the body of an email message. For example, configuration scripts can be sent to a central host for management and change control. In this example, the boot.cfg file is sent to the network administrator's email address *netman@company.com*:

   ```
   mail to=netman@company.com subject="boot script for
      ho1.company.com" file=boot.cfg
   ```

2. **Check the progress of the message.**

   The progress of the message as it is transmitted to the remote mail system can be monitored by using the command:

   ```
   show mail
   ```

To transmit messages automatically using the Trigger facility

1. **Create a script to generate a mail message.**

   Create a script called mailcpu.scp by using the router's built-in editor that sends a message to the network administrator:

   ```
   edit mailcpu.scp
   ```

   The script contains the following line:

   ```
   mail to=netman@company.com subject= WARNING: Load high"
      message="CPU utilisation exceeded 80%"
   ```

   It is not necessary to identify the router in the subject line or message because the mail system automatically inserts the router's host name in the From field of the message header.

2. Create a trigger to activate the script.

Enable the Trigger facility and create a trigger to activate the script when the router's CPU utilisation rises above 80%:

```
enable trigger
create trigger=1 cpu=80 direction=up script=mailcpu.scp
show trigger=1
```

Command Reference

This section describes the commands available on the router to support day-to-day operational and management activities.

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

activate cpu extended

Syntax `ACTivate CPU EXTended STARt={1..100} STOp={1..100}`

Description This command lets you set monitoring so that it captures data when the CPU experiences a specific amount of instantaneous usage.

The **start** parameter sets the percentage of utilisation the CPU must equal or exceed before it can begin capturing data. When CPU utilisation reaches the parameter, the router begins capturing data. It continues until utilisation falls below the **stop** parameter, or until it captures 500 entries (10 seconds worth).

The **stop** parameter sets the percentage of utilisation the CPU must reach to stop data capturing. If CPU utilisation falls below the **stop** percentage before the router has 500 data entries, then the router resumes data capturing the next time utilisation reaches the **start** percentage. When the router has 500 entries, it stops collecting data.

Examples To capture extended CPU utilisation data when CPU utilisation exceeds 70% and until it falls below 50%, use the command:

```
act cpu ext star=70 sto=50
```

Related Commands

disable cpu extended
enable cpu extended
reset cpu utilisation
show cpu

clear summertime

Syntax `CLear SUMMertime`

Description This command clears the existing summer time UTC offset and settings, and resets the default North American summer time definition.

Clearing summer time has an effect on the router's UTC offset value. For more information about how the system derives its UTC offset value, see "UTC offset" on page 4-6.

Before you can clear summer time, you must first disable it using the **disable summertime** command.

Examples The following command clears the existing summer time definition from the system:

```
cl summ
```

Related Commands

clear timezone
disable summertime
enable summertime
set ntp utcoffset in Chapter 57, Network Time Protocol (NTP)
set summertime
set time
set timezone
show ntp in Chapter 57, Network Time Protocol (NTP)
show summertime
show time
show timezone

clear timezone

Syntax `CLear TIMEZone`

Description This command clears the existing timezone definition from the system. The timezone definition sets a timezone for the router's clock, and defines a UTC offset value.

Clearing the timezone has an effect on the router's UTC offset value. For more information about how the system derives its UTC offset value, see "UTC offset" on page 4-6.

Examples The following command deletes the system time zone:

```
cl timez
```

Related Commands
clear summertime
disable summertime
enable summertime
set ntp utcoffset in Chapter 57, Network Time Protocol (NTP)
set summertime
set time
set timezone
show ntp in Chapter 57, Network Time Protocol (NTP)
show summertime
show time
show timezone

delete mail

Syntax `DELete MAIL=`*`id`*

where *id* is a hexadecimal number from 0x0 to 0xffff

Description This command deletes a specific mail message from the transmission queue. Up to 64 messages can be queued for transmission.

The **mail** parameter specifies the ID of the mail message to be deleted. The message ID can be determined from the output of the **show mail** command.

Examples To delete the mail message with a message id of 0x231b, use the command:

```
del mail=231b
```

Related Commands
mail
reset mail
show mail

disable cpu extended

Syntax `DISable CPU EXTended`

Description This command stops data capture of CPU utilisation, and resets parameters in the **activate cpu extended** command.

Examples To stop capturing extended CPU utilisation data, use the command:

```
dis cpu ext
```

Examples use the command:

```
dis cpu ext
```

Related Commands
activate cpu extended
enable cpu extended
reset cpu utilisation
show cpu

disable debug active

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

Description This command disables currently enabled debugging, either for a specific module or for all modules supported by the **show debug active** command. See "Supported Modules" on page 4-42 for a list of the support modules.

The **active** parameter specifies which modules to disable. Specify **all** for all supported modules, or just a specific one. If no module is specified, active debugging is disabled on supported modules.

Examples To disable all active debugging, use one of the following commands:

```
dis deb act
dis deb act=all
```

To disable all active debugging for the OSPF module, use the command:

```
dis deb act=ospf
```

Related Commands **show debug active**
show debug

disable mail debug

Syntax `DISable MAIL DEBug`

Description This command disables the collection and display of mail information for debugging purposes. Debugging is disabled by default.

Examples To disable mail debugging, use the command:

```
dis mail deb
```

Related Commands **enable mail debug**
show mail

disable summertime

Syntax `DISable SUMMertime`

Description This command disables summer time on the router. When disabled, the router no longer automatically adjusts its clock when summer time begins and ends. By default, summer time is disabled.

Summer time is defined with the **set summertime** command, and enabled with the **enable summertime** command.

If you enter this command on a date that falls within the defined summer time period, this command immediately restores the system clock back to Standard Time.

Disabling summer time has an effect on the router's UTC offset value. For more information about how the system derives its UTC offset value, see "UTC offset" on page 4-6.

Summer time must be disabled before it can be cleared with the **clear summertime** command.

Examples The following command enables Daylight Saving Time.

```
dis summ
```

Related Commands
clear summertime
clear timezone
enable summertime
set ntp utcoffset in Chapter 57, Network Time Protocol (NTP)
set summertime
set time
set timezone
show ntp in Chapter 57, Network Time Protocol (NTP)
show summertime
show time
show timezone

dump

Syntax

```
DUMP [Address=address] [LENgth=length]
   [SIZE={BYTE|LONGword|WORD}] [SPace={SD|SP|UD|UP|UR}]
```

where:

- *address* is the first address (in hexadecimal) to be dumped.
- *length* is the number of bytes (in hexadecimal) to dump.

Description

This command displays the contents of the router's memory. It may interrupt operation of the router since it dumps I/O devices. This command is mainly a diagnostic tool, and should not be needed for normal operations. It requires a user with security officer privilege when the router is in security mode.

The block of memory to be displayed is specified by the **address**, **length**, and **space** parameters. The **space** parameter specifies the CPU address space to be dumped. If **space** is not specified, it defaults to **sd**. The following table describes available options for this parameter.

Option	CPU Address Space
SD	Supervisor Data
SP	Supervisor Program
UD	User Data
UP	User Program
UR	User Reserved

The **size** parameter specifies whether the data should be displayed grouped as **bytes**, **longword**, or **word**. Note that **len** is always in bytes, regardless of the value of **size**.

If the **length**, **size**, or **space** parameters are omitted, they default to the values from when the command was last used. If the **address** parameter is omitted, it increments to dump the block of memory immediately following the block dumped by the previous invocation. If the **address** parameter is entered without a value, then it dumps the block of memory previously dumped.

Examples

To dump 100 bytes of data at address 0 and grouped as words, use the command:

```
dump addr=0 len=100 size=word
```

Figure 4-1 on page 4-20 shows output from this command. The left-hand column shows the address of the data in each row. The next eight columns give the data starting at the address for the next 16 bytes. The right-most column is an ASCII representation of the data in the row, with non-printing characters represented by a dot.

Figure 4-1: Example output from the **dump** command.

```
00000000  0001 667c 0001 667c 0000 b424 0001 667c            ..f|..f|...$..f|
00000010  0001 667c 0001 667c 0001 667c 0001 667c            ..f|..f|..f|..f|
00000020  0001 667c 0001 667c 0001 667c 0001 667c            ..f|..f|..f|..f|
00000030  0001 667c 0001 667c 0001 667c 0001 667c            ..f|..f|..f|..f|
00000040  0001 667c 0001 667c 0001 667c 0001 667c            ..f|..f|..f|..f|
00000050  0001 667c 0001 667c 0001 667c 0001 667c            ..f|..f|..f|..f|
00000060  0001 66d4 0001 6b14 0001 667c 0001 667c            ..f|..f...k...f|
00000070  0001 667c 0001 1308 0001 6aa4 0001 66c8            ..f|......j...f.
00000080  0001 667c 0001 667c 0001 667c 0001 667c            ..f|..f|..f|..f|
00000090  0001 667c 0001 667c 0001 667c 0001 667c            ..f|..f|..f|..f|
000000a0  0001 667c 0001 667c 0001 667c 0001 667c            ..f|..f|..f|..f|
000000b0  0001 667c 0001 667c 0001 667c 0001 667c            ..f|..f|..f|..f|
000000c0  0001 667c 0001 667c 0001 667c 0001 667c            ..f|..f|..f|..f|
000000d0  0001 667c 0001 667c 0001 667c 0001 667c            ..f|..f|..f|..f|
000000e0  0001 667c 0001 667c 0001 667c 0001 667c            ..f|..f|..f|..f|
000000f0  0001 667c 0001 667c 0001 667c 0001 667c            ..f|..f|..f|..f|
```

Related Commands modify

enable cpu extended

Syntax `ENAble CPU EXTended`

Description This command lets you capture up to 500 data entries (10 seconds) of CPU utilisation data. Extended monitoring is disabled by default. This command takes effect when you enter it, or use the **activate cpu extended** command to collect data during specific usage levels.

Examples To begin capturing extended CPU utilisation data, use the command:

```
ena cpu ext
```

Related Commands **activate cpu extended**
disable cpu extended
reset cpu utilisation
show cpu

enable summertime

Syntax `ENAble SUMMertime`

Description This command enables summer time on the router. Summer time settings are defined with the **set summertime** command. When enabled, the router automatically adjusts its clock when summer time begins and ends. By default, summer time is disabled.

If you enter this command on a date that falls within the summer time period, this command immediately sets the system clock to summer time.

Enabling summer time has an effect on the router's UTC offset setting. For information about how the system derives the UTC offset value to use, see "UTC offset" on page 4-6.

Examples The following command enables Daylight Saving Time.

```
ena summ
```

Related Commands
clear summertime
clear timezone
disable summertime
set ntp utcoffset in Chapter 57, Network Time Protocol (NTP)
set summertime
set time
set timezone
show ntp in Chapter 57, Network Time Protocol (NTP)
show summertime
show time
show timezone

enable mail debug

Syntax `ENAble MAIL DEBug`

Description This command enables the collection and display of mail information for debugging. When debugging is enabled, messages recording the progress of email messages are displayed to the terminal from which the command was entered. Debugging is disabled by default.

Examples To enable mail debugging, use the command:

```
ena mail deb
```

Related Commands
disable mail debug
show mail

mail

Syntax

```
MAIL TO=destination {FIle=filename|MESSage=message}
   [SUBject=subject] [ETRN=mail-domain]
```

where:

- *destination* is a character string 3 to 131 characters long. Valid characters are uppercase and lowercase letters, digits, and the underscore.
- *filename* is a filename in the format [*device:*]filename.ext. Invalid characters are * + = " | \ [ ] ; : ? / , < > and wildcards are not allowed. Valid characters are:
  - uppercase and lowercase letters
  - digits
  - ~ ' ! @ # $ % ^ & ( ) _ - { }

  Optionally, *device* specifies the physical memory device where the file is stored, which is flash. If *device* is specified, it must be separated from the filename by a colon. The file extension *.ext* is any valid file type that contains text such as CFG, SCP, and TXT.
- *message* is a character string 1 to 131 characters long. Valid characters are uppercase and lowercase letters, digits, a space, and the underscore. If *message* contains spaces, it must be in double quotes.
- *subject* is a character string 1 to 131 characters long. Valid characters are uppercase and lowercase letters, digits, a space, and the underscore. If *subject* contains spaces, it must be in double quotes.
- *mail-domain* is a character string 3 to 63 characters long. Valid characters are uppercase and lowercase letters, digits, and the underscore.

Description

This command sends an email message or the contents of a file to a specific email address. It requires a user with security officer privilege when the router is in security mode. Up to 64 mail messages can be queued for transmission.

The **to** parameter specifies the email address where the email is to be sent. This is normally in the format user@company.net. However on RFC 821-compliant mail servers, if only the IP address of the destination mail host is known, the IP address can be used by enclosing it in square brackets, for example, user@[202.49.73.5]. Note that Microsoft mail servers are not RFC 821 compliant.

The **file** parameter specifies the name of a file on the router to send in the body of the email. The file type must be text and it must exist on the system.

The **message** parameter specifies a single line of text to send in the body of the email. The **message** and **file** parameters are mutually exclusive.

The **subject** parameter specifies the subject line to appear in the email. This field is not required but should normally be present in an email.

The **etrn** parameter sends an ETRN request (as defined in RFC 1985) to the remote mail server to forward any queued mail messages for the specified mail domain or host name. This can be used to assist mail servers that are connected to the Internet via dial-up rather than permanent connections. A trigger can be created to send an ETRN message to the email service provider each time the router connects to the Internet. Some mail servers reject email messages from hosts without reverse DNS entries.

Examples To send an email message to user@testcom.com, use the command:

```
mail to=user@testcom.com SUBJ="Test Message" mess="Greetings
    from router 192.168.14.1"
```

To send an ETRN request to the mail server mserver1.isp.com to forward mail queued for users in the email domain “company.com”, use the command:

```
mail to=postman@mserver1.isp.com etrn=company.com
```

Related Commands

delete mail
reset mail
set mail
show mail

modify

Syntax

```
MODify ADDRess=address Size={Byte|Long|Word}
   VALue=value-list [SPace={SD|SP|UD|UP|UR}]
```

where:

- *address* is the base address of the block of memory to modify.
- *value-list* is either a list of up to five numbers (in hexadecimal) separated by commas, or a text string of up to twenty characters surrounded by double quotes.

Description

This command modifies (overwrites) the contents of the router's memory. You can modify any memory or I/O device but this may interrupt the operation of the router. This command is mainly a diagnostic tool, and should not be needed for normal operations. It requires a user with security officer privilege when the router is in security mode.

The values to be written to memory are specified by the **value** parameter and are written to contiguous memory locations starting at the memory address specified by the **address** parameter. The **size** parameter specifies how the values are written: **byte**, **long**(word), **word**.

The **space** parameter specifies the CPU address space to be dumped. If **space** is not specified, it defaults to **sd**. The following table describes available options for this parameter.

Option	CPU Address Space
SD	Supervisor Data
SP	Supervisor Program
UD	User Data
UP	User Program
UR	User Reserved

Examples

This example modifies the first two words of memory starting at memory location 0x00000000:

```
mod addr=0 s=word val=5,6AA4
```

Related Commands

dump

reset cpu utilisation

Syntax `RESET CPU UTIlisation`

Description This command resets all CPU utilisation percentages, and resets any start and stop percentages set with the **activate cpu extended** command. It also removes any data captured during extended utilisation monitoring, and clears this output from the **show cpu** command.

Examples To reset the CPU utilisation, use the command:

```
reset cpu util
```

Related Commands
activate cpu extended
disable cpu extended
enable cpu extended
show cpu

reset mail

Syntax `RESet MAIL`

Description This command deletes all mail messages from the transmission queue.

Examples To reset the mail and delete all messages, use the command:

```
res mail
```

Related Commands
delete mail
mail
show mail

set mail

Syntax `SET MAIL HOSTname=`*`hostname`* `[SMTPserver=`*`ipadd`*`]`

where:

- *hostname* is from 1 to 63 characters long. Any characters are valid **except** the following:
  - spaces
  - control characters (ASCII 0–31 and 127)
  - " ( ) < > @ , ; : \ [ ]
- *ipadd* is the IP address in dotted decimal notation

Description This command defines the name that the mail system uses when communicating with other mail systems. The mail system is not enabled until a host name is specified.

The **hostname** parameter is typically the fully specified domain name of the router, for example, router1.myorg.com. The host name appears in the *From* field of the message header when the remote mail system receives the message.

The **smtpserver** parameter specifies the IP address of the mail server where the mail from the router is to be sent. When set, the address pre-empts the use of a DNS lookup for the domain name of the destination email address specified in the **mail** command.

Examples To set the mail host name to router1.myorg.com, use the command:

```
set mail host=router1.myorg.com
```

To set the mail destination SMTP server to 192.168.6.100 for admin.myorg.com, use the command:

```
set mail host=admin.myorg.com smtp=192.168.6.100
```

Related Commands **show mail**
mail

set summertime

Syntax

```
SET SUMMertime[=summertime-zone-name] STARTDAte=date
   ENDDAte=date [STARTTime=hh:mm] [ENDTime=hh:mm]
   [Offset=offset]

SET SUMMertime[=summertime-zone-name] STARTMonth=month
   STARTWeek=week  STARTDay=day  ENDMonth=month
   ENDWeek=week ENDDay=day [STARTTime=hh:mm]
   [ENDTime=hh:mm] [Offset=offset]
```

Description

This command defines the start and end of summer time, and specifies summer time's offset value to Standard Time. The router uses North American settings as the default. Therefore, in North America, summer time values do not need to be defined, just enabled using **enable summertime**.

If no summer time is defined with the **set summertime** command, the router uses Standard Time as its local time.

Two formats can define the beginning and end of summer time, and only one may be used at a time.

For this format...	Then...
non-recurring fixed dates using the **startdate** and **enddate** parameter.	these dates apply only once on the dates given, and you must set new dates for the following year.
a recurring rule specifying the month, numbered week of the month, and day of the week	it stays in effect until it is either changed or reset. The date when summer time starts and ends is automatically recalculated each year.

Regardless of the format you use, you must use the same one to define both the beginning and end of summer time. That is, if a non-recurring fixed date is defined for **startdate**, then a non-recurring fixed date must be defined for **enddate**. If a recurring rule is used to define the start date of summer time, then a recurring rule must be used to define its end date.

Parameter	Description
SUMMertime	The abbreviation used to represent summer time for this time zone, for example, **nzdt**. Default: **dst**
STARTDAte	The absolute summer time start date. *Date* is in the d-mmm-yyyy, dd-mmm-yy, or dd-mmm-yyyy format. *month* is the first three letters of the month, for example, **apr**. If you specify a **startdate**, you must specify an **enddate**.
STARTMonth	The start month for a recurring rule. *month* is the first three letters of the month, for example, **jan**. Default: **apr**
STARTWeek	The start week for a recurring rule. *week* is the number of the week within its month, a number between 1 and 5. The value 5 always means the last week in the month and can be used in any month. Default: **1**

Parameter	Description
STARTDay	The start day for a recurring rule. *day* is the name of a day of the week using the first three letters of the day only, for example **mon**, **tue**, **wed**. Default: **sun**
STARTTIme	The start time. *time* is the time in hh:mm:ss format, where **hh**=0-23 **mm**=0-59, and **ss**=0-59. If **hh** is specified then **mm** is optional. If **mm** is specified then **ss** is optional. Default: **02:00** (2:00am)
ENDDate	The absolute summer time end date. *Date* is in the d-mmm-yyyy, dd-mmm-yy, or dd-mmm-yyyy format. *month* is the first three letters of the month, for example, **jun**. If you specify an **enddate**, you must specify a **startdate**.
ENDMonth	The end month for a recurring rule. *name* is the first three letters of the month, for example **jun**. Default: **jun**
ENDWeek	The end week for a recurring rule. *week* is the number of the week within its month, a number between 1 and 5. Default: **5**
ENDDay	The end day for a recurring rule. *day* is the name of a day of the week using the first three letters of the day only, for example **mon**, **tue**, **wed**. Default: **sun**
ENDTime	The end time. *time* is the time in hh:mm:ss format, where **hh**=0-23 **mm**=0-59, and **ss**=0-59. If **hh** is specified then **mm** is optional. If **mm** is specified then **ss** is optional. Default: **02:00** (2:00am)
Offset	The offset value, from 0 to 120 minutes. The value entered in this parameter is the amount of time by which Standard Time changes when summer time begins and ends. Default: **60**

Example

The following command sets a summer time definition for New Zealand using NZST (UTC+12:00) as the standard time, and NZDT (UTC+13:00) as summer time. In this example, summer time is set to start on the 1st Sunday in October, and end on the 3rd Sunday in March. It accepts the default settings for **starttime** and **endtime** (02:00) and for **offset** (60 minutes).

```
set summ=nzdt startm=oct startw=1 startd=sun endm=mar endw=3
   endd=sun
```

Related Commands

clear summertime
clear timezone
disable summertime
enable summertime
set ntp utcoffset in Chapter 57, Network Time Protocol (NTP)
set time
set timezone
show ntp in Chapter 57, Network Time Protocol (NTP)
show summertime
show time
show timezone

set system contact

Syntax `SET SYStem CONtact={`*`contact-name`*`|NONE}`

Description This command sets the contact name for the router. The contact name is:

- displayed in the output of the **show system** command
- stored in the MIB object sysContact

Parameter	Description	
CONtact	Contact name. Default: **none**	
	contact-name	Contact name that consists of: • a string 1 to 255 characters long • any printable character If *contact-name* contains spaces it must be enclosed in double quotes.
	NONE, empty string, no value	No contact name. Any existing contact name is cleared.

Examples To set the contact name for this router to "IT Support, 555-9834", use the command:

```
set sys con="IT Support, 555-9834"
```

To clear the contact name, use one of the commands:

```
set sys con=none
set sys con=""
set sys con=
set sys con
```

Related Commands

set system location
set system name
set system territory
show system

set system location

Syntax `SET SYStem LOCation={`*`location`*`|NONE}`

Description This command sets the location of the router. The location is:

- displayed in the output of the **show system** command
- stored in the MIB object sysLocation

Parameter	Description	
LOCation	Location. Default: **none**	
	location	Location that consists of: • a string 1 to 255 characters long • any printable character If *location* contains spaces it must be enclosed in double quotes.
	NONE, empty string, no value	No location. Any existing location is cleared.

Examples To identify the location of this router as "Wiring Closet 3, First Floor, Head Office Building", use the command:

```
set sys loc="Wiring Closet 3, First Floor, Head Office
   Building"
```

To clear the location, use one of the commands:

```
set sys loc=none
set sys loc=""
set sys loc=
set sys loc
```

Related Commands

set system contact
set system name
set system territory
show system

set system name

Syntax `SET SYStem NAMe={`*name*`|NONE}`

Description This command sets the system name for the router. The system name is:

- displayed in the output of the **show system** command
- displayed in the CLI prompt so you know which router you are configuring
- stored in the MIB object sysName

This command requires a user with security officer privilege when the router is in security mode.

Parameter	Description	
NAMe	System name. Default: **none**	
	name	Name that consists of: • a string 1 to 255 characters long • any printable character If *name* contains spaces it must be enclosed in double quotes.
	NONE, empty string, no value	No system name. Any existing system name is cleared.

Examples To set the name for the router to "B2L3Admin", use the command:

```
set sys nam=B2L3Admin
```

To clear the system name, use one of the commands:

```
set sys nam=none
set sys nam=""
set sys nam=
set sys nam
```

Related Commands

set system contact
set system location
set system territory
show system

set time

Syntax `SET [TIme=hh:mm:ss] [DAte=date]`

Description This command sets the time and/or date on the router's system time (local time). This command also sets the Real Time Clock.

If Network Time Protocol (NTP) is enabled, then you cannot change the time or date using this command. NTP maintains the clock automatically using an external time source. If you wish to manually alter the time or date, you must first disable NTP with the **disable ntp** command on page 57-9 of Chapter 57, Network Time Protocol (NTP).

If you set the time **before** you configure summer time settings, we suggest you set the time to standard time even if summer time currently applies. When you configure summer time, the router automatically changes to summer time when applicable. If you set the time **after** configuring summer time, we suggest you set the time to current local time—either summer time or standard time, whichever applies.

Parameter	Description
TIme	Local time in 24-hour format. Default: local time
DAte	Date in d-mmm-yyyy, dd-mmm-yy, or dd-mmm-yyyy format. Dates before 1-Jan-1991 are not accepted. The month is the first three letters of the month (for example, APR). The day of the month can be one or two digits, and the year can be two or four digits. Default: no default

Examples The following command set the router's real-time clock to 10 p.m. on 27 January 2004:

```
set ti=22:00:00 da=29-JAN-04
```

Related Commands **show time**

set timezone

Syntax `SET TIMEZone[=time-zone-name] [UTCoffset=std-utc-offset]`

Description This command sets a timezone for the router's clock and defines a UTC offset value. For information about how the system derives the UTC offset to use, see "UTC offset" on page 4-6.

You can also use this command to redefine values for the current time zone.

Parameter	Description
TIMEzone	The timezone the router should use. *time-zone-name* is a character string from 1 to 7 characters representing the abbreviation for this timezone's Standard Time, for example NZST. Default: No default.
UTCoffset	The time difference between local time on the router's clock and UTC/GMT. The offset is used to calculate UTC time system-wide. *std-utc-offset* is a positive or negative number in the format hh[:mm], where hh=0-23 and mm=0-59. If hours are specified then mm is optional. Default: 0

Examples The following command sets the time zone to New Zealand Standard Time with an offset from UTC of +12 hours:

```
set timez=nzst utc=+12
```

The following command sets the timezone to Mountain Standard Time in North America, with a UTC offset of -7 hours:

```
set timez=mst utc=-7
```

Related Commands

clear summertime
clear timezone
disable summertime
enable summertime
set ntp utcoffset in Chapter 57, Network Time Protocol (NTP)
set summertime
set time
show ntp in Chapter 57, Network Time Protocol (NTP)
show summertime
show time
show timezone

show buffer

Syntax `SHow BUFfer [SCAn[=`*address*` [QUEuepointers]]]`

where *address* is a memory address expressed in hexadecimal

Description This command displays information about memory buffer usage. If no optional parameters are specified, a summary is displayed (Figure 4-2, Table 4-1 on page 4-36).

The **scan** and **queuepointers** parameters display low-level debugging information. Use them only when requested by technical support personnel.

The **scan** parameter displays detailed information about buffers usage. If an address is not specified, the memory addresses of sections of router code and the number of buffers in use by that section are displayed (Figure 4-3 on page 4-35, Table 4-1 on page 4-36). If an address is specified, the addresses of the buffers in use by that section of router code are displayed (Figure 4-4 on page 4-36, Table 4-1 on page 4-36). The value for **address** is obtained from the output of the **show buffer scan** command. Buffer violation information, such as buffers that are put twice, or buffers that are corrupted in the free buffer pool are also displayed by this command.

The **queuepointers** parameter displays additional information about the contents of the buffers used by the router code section at the specified address (Figure 4-5 on page 4-36, Table 4-1 on page 4-36), and is valid when the **scan** parameter is specified with a valid address.

Figure 4-2: Example output from the **show buffer** command

```
Memory ( DRAM ) .......... 16384 kB
Free Memory ............... 48 %
Free fast buffers ........ 1799
Total fast buffers ....... 1802
Free buffers .............. 4013
Total buffers ............. 4096
Buffer level 3 ........... 125   (don't process input frames)
Buffer level 2 ........... 250   (don't do monitor or command output)
Buffer level 1 ........... 500   (don't buffer up log messages)
Buffer level 0 ........... 1500  (warning via snmp trap)
```

Figure 4-3: Example output from the **show buffer scan** command

```
Scan of buffers in use

0005ab10      8     006ebccc     24     006ebd1c      3     006ebeac     34
00438b3c      1     0011de2c      1     0010ad8c      1     0010ae08      1
005b8688      1     006e76c4      4     005cf690     28     0041eeb8      1
006e760c      1     00409d70      1     00409da4      1     00409fcc      1
00080c24      1     00169a18      1     001b7d0c      4     001c9f10      1
006df230      1     006df258      6     005e8c4c      1     001aacf4      1
001aad00      1     001aa990     40     005f24a4      1     0019e9ec      1
0019e9f4      1     006e2fa8      1     0075b0dc      1     006e823c      1
006e81a8      3     005632e0      1     005632f0      1     00563300      1
00563284      1     0065ed3c      2     0065eee8      2     0050a1e4      1
006838a8      1     006f0cc8      3     006e7cf4      1     006fe514      1
006fe53c      1     00376aa4    286     00372110      1     00372000      1
006e81d0     14     0064afec      1     004e35cc      1     006fbb78      3
006bfac8      1     006bfad8      1     0012493c      1     0012472c      1
0012479c      1     0035b7ac      1     0035b998      1     006ebd64      4
00257980      1     002609ec      1     002609fc      1     00260a0c      1
00260a1c      1     00260a2c      1     006e753c      1     0008de50      1
000906f4      1     00090028      1     0069ca68      1     006b3fb8      1
006868e8      1     006b2f64      1     006b67c8      1     0051ccb4      1
006c9550      1     00519be8      1     003f0894      1     0019daa0     40
0010bd7c      1     002fe7f4      1     002f10e0      1     0031adf8      1
0040daa0      1     001c8a7c      1     002cd898      1     00680c28      3
002659d8      2     00266124     28     00265ae8      8     00265dc4    135
00265e0c     24     00265ef4      1     00265f34      1     002657fc      2
00265680     17     00265c14      6     00265c68      1

Total buffers in use - 805

 Entries - 99

Scan of fast buffers in use

001ac440      2     001acec8      1     0030126c      1     002de40c    572
007016e4      1     003560ac      1     001aebf8      1     001ad834      1
003014c0      1     0031d204      1     0031b354      1     002d3f38      1

Total fast buffers in use - 584

 Entries - 12

  Memory ( DRAM ) .......... 131072 kB
  Free Memory ............... 86 %
  Free fast buffers ........ 2186
  Total fast buffers ....... 2770
  Free buffers ............. 55625
  Total buffers ............ 56437
  Buffer level 3 ........... 125   (don't process input frames)
  Buffer level 2 ........... 250   (don't do monitor or command output)
  Buffer level 1 ........... 500   (don't buffer up log messages)
  Buffer level 0 ........... 1500  (warning via snmp trap)
```

Figure 4-4: Example output from the **show buffer scan** command for a specific address

```
002c93bc  002ce7bc  002d42bc  002d49bc  002d57bc  002d5ebc
002d65bc  002df8bc  002dffbc  002e0dbc  002e14bc  002eaebc
002eb5bc  002ec3bc  002ecabc


  Memory ( DRAM ) .......... 16384 kB
  Free Memory ............... 48 %
  Free fast buffers ........ 1799
  Total fast buffers ....... 1802
  Free buffers .............. 4013
  Total buffers ............. 4096
  Buffer level 3 ........... 125   (don't process input frames)
  Buffer level 2 ........... 250   (don't do monitor or command output)
  Buffer level 1 ........... 500   (don't buffer up log messages)
  Buffer level 0 ........... 1500  (warning via snmp trap)
```

Figure 4-5: Example output from the **show buffer scan queuepointers** command

```
002c93bc  002df8bc  002d5ebc  002c9434    002ce7bc  002e0dbc  002dffbc  002ce834
002d42bc  002d49bc  002569f0  002d4334    002d49bc  002d57bc  002d42bc  002d4a34
002d57bc  002d5ebc  002d49bc  002d5834    002d5ebc  002c93bc  002d57bc  002d5f34
002d65bc  002ec3bc  002eb5bc  002d6634    002df8bc  002dffbc  002c93bc  002df934
002dffbc  002ce7bc  002df8bc  002e0034    002e0dbc  002e14bc  002ce7bc  002e0e34
002e14bc  002eaebc  002e0dbc  002e1534    002eaebc  002eb5bc  002e14bc  002eaf34
002eb5bc  002d65bc  002eaebc  002eb634    002ec3bc  002ecabc  002d65bc  002ec434
002ecabc  002569f0  002ec3bc  002ecb34


  Memory ( DRAM ) .......... 16384 kB
  Free Memory ............... 48 %
  Free fast buffers ........ 1799
  Total fast buffers ....... 1802
  Free buffers .............. 4013
  Total buffers ............. 4096
  Buffer level 3 ........... 125   (don't process input frames)
  Buffer level 2 ........... 250   (don't do monitor or command output)
  Buffer level 1 ........... 500   (don't buffer up log messages)
  Buffer level 0 ........... 1500  (warning via snmp trap)
```

Table 4-1: Parameters in output of the **show buffer** command

Parameter	Meaning
Scan of buffers in use	List of memory addresses and the number of buffers used by the code at that memory address.
Total buffers in use	Total number of buffers in use.
Entries	Number of memory addresses listed in buffer scan.
Scan of fast buffers in use	List of memory addresses and the number of fast buffers used by the code at that memory address.
Total fast buffers in use	Total number of fast buffers in use.
Entries	Number of memory addresses listed in fast buffer scan.
Buffers put twice violations	List of buffers erroneously returned to the free buffer pool more than once. This field is only displayed if there are any violations, and is intended for use by customer support engineers.

Table 4-1: Parameters in output of the **show buffer** command (cont)

Parameter	Meaning
Buffers corrupt in free buffer pool	List of buffers in the free buffer pool that were corrupted and have been repaired. This field is only displayed if there are any violations, and is intended for use by customer support engineers.
Memory (DRAM)	Total amount of DRAM installed in the router.
Free memory	Amount of free (unused) memory expressed as a percentage of total available memory.
Free fast buffers	The number of free (unused) fast memory buffers. Fast buffer memory is cached by the CPU and is available for program variable storage. It cannot be used for packet buffers.
Total fast buffers	The total number of fast memory buffers.
Free buffers	Number of free (unused) packet memory buffers.
Total buffers	Total number of memory buffers.
Buffer level n	When the "Free buffers" value drops below this level, the specified activity ceases and/or an SNMP trap is generated.

Examples To display memory buffer usage, use the the command:

```
sh buf
```

To display detailed information about buffer usage by the code at memory address 002de40c, use the command:

```
sh buf sca=002de40c
```

Related commands

show cpu
show debug

show cpu

Syntax `SHow CPU [EXTended]`

Description This command displays information about CPU utilisation router (Figure 4-6, Table 4-2). The **extended** parameter displays extended CPU information.

Figure 4-6: Example output from the **show cpu extended** command

```
CPU Utilisation ( as a percentage )
-----------------------------------
Maximum since router restarted ..... 80
Maximum over last 5 minutes ........ 80
Average since router restarted ..... 37
Average over last 5 minutes ........ 37
Average over last minute ........... 32
Average over last 10 seconds ....... 31
Average over last second ........... 32
-----------------------------------

Extended CPU Information
-------------------------------------------------------------
State ............... Enabled
Current Time ........ 21:44:49 (04aa9a34 / 2573941241)
Current Install ..... 54-281.rez (5012892)
Start percent ....... -
Stop percent ........ -

msSM      Timestamp Util   Caller  Return1  Return2  Return3
-------------------------------------------------------------
04aa9a34 2573927208  100 0021a384 00031c0c 00027e8c 0021a57c
04aa9a20 2573907218  100 0021a384 00031c0c 00027e8c 0021a57c
04aa9a0c 2573887230  100 0021a4b0 00031c0c 00027e8c 0021a57c
.
.
.
```

Table 4-2: Parameters in output of the **show cpu** command

Parameter	Meaning
Maximum since router restarted	Maximum CPU utilisation recorded since the router restarted.
Maximum over last 5 minutes	Maximum CPU utilisation achieved over the last five minutes.
Average since router restarted	Average CPU utilisation recorded since the router restarted, as a percentage of total CPU capacity.
Average over last 5 minutes	Average CPU utilisation over the last five minutes, as a percentage of total CPU capacity.
Average over last minute	Average CPU utilisation over the last minute, as a percentage of total CPU capacity.
Average over last 10 seconds	Average CPU utilisation over the last 10 seconds, as a percentage of total CPU capacity.
Average over last second	Average CPU utilisation over the last second, as a percentage of total CPU capacity.
State	Whether extended CPU utilisation is enabled.

Table 4-2: Parameters in output of the **show cpu** command (cont)

Parameter	Meaning
Current Time	Current time in hh:mm:ss format. The time in milliseconds since midnight, and the current timestamp are also in brackets.
Current Install	Current installed version, with the size of the version in brackets.
Start percent	Percentage of utilisation that the CPU must reach, if any, before the router can begin capturing extended CPU utilisation data. A "-" shows if no percentage is set.
Stop percent	Percentage of utilisation that the CPU must fall below before the router stops capturing extended CPU utilisation data.
msSM	Time when the router captured the CPU utilisation sample. The time format is milliseconds since midnight, in hexadecimal notation.
Timestamp	Time when the router captured the CPU utilisation sample. The time format is microseconds since the router last restarted. This figure wraps at 4 294 967 295 to return to 0.
Util	Percentage of instantaneous CPU utilisation.
Caller	Return address of the function that the CPU is executing.
Return 1, Return 2, Return 3	Return addresses for function calls on the CPU stack.

Examples To display the extended CPU utilisation data, use the command:

```
sh cpu ext
```

Related Commands

activate cpu extended
disable cpu extended
enable cpu extended
reset cpu utilisation
show buffer

show debug

Syntax `SHow DEBug [STAck|FULl|IPSec]`

Description This command executes a specific sequence of **show** commands to produce output useful for debugging.

The **stack** parameter limits output to a stack dump since the last power cycle, if one is available. Output depends on whether the last fatal condition was a software reboot or a hardware reset. After a software reboot, output is a stack dump (Figure 4-7 on page 4-41). After a hardware reset, no stack dump information is available and a message to this effect is displayed (Figure 4-8 on page 4-41). If the **stack** parameter is not specified, a stack dump is generated along with output from the **show** commands. The **full** parameter runs a longer list of commands. The **ipsec** parameter runs specific commands useful for debugging IPsec or ISAKMP problems.

Note that output depends on the router's mode and user privilege as well as parameter as indicated in the following table:

Commands for show debug	Commands for show debug full	Commands for show debug IPsec
‡ show system (with current config file)	‡ show system (with current config file)	‡ show system (with current config file)
show file	show file	show file
show install	show install	show install
‡ show feature	‡ show feature	‡ show feature
show release	show release	show release
‡ show config dynamic	‡ show config dynamic	‡ show config dynamic
show buffer scan	show interface	show buffer scan
show cpu	show ip interface	show cpu
show log	show ip arp	show log
show exception	show ip route full	show exception
show ffile check	show ip counter	show ipsec policy sabundle
	show switch	§ show ipsec sa=*sa*
	show switch counter	show ipsec sa counters
	‡ show switch fdb	show ipsec counters
	show startup	¶ show ipsec policy=*policy* counters
	show flash	show enco
	show switch port=all	show enco channel
	show switch port=all counter	† show enco channel=*channel*
	show buffer scan	† show enco channel=*channel* counters
	show cpu	show enco counters
	show log	show isakmp sa
	show exception	show isakmp exchange
	show ffile check	show isakmp exchange detail
		show isakmp sa detail
		show isakmp counters
		show ffile check

‡ When the router is in security mode, this command produces output only when the user has security officer privilege.

§ Selects all current IPsec SAs.

¶ Selects all IPsec policies configured with **action=ipsec**.

† Selects all ENCO channels in use.

Figure 4-7: Sample output from the **show debug stack** command after a software reboot

```
This is a production version of code
-----------------------------------------------------

Router RESTART occurred
Check exception table for restart cause

STACK DUMP
-----------------------------------------------------

00012830: 00000001 00000001 00000001 00000001
00012840: 00010000 00000001 00000010 00000000
00012850: 0004c300 004c29f0 0001289c 0000e9a8
00012860: 0000e990 004bea9c 0001287c 00012004
00012870: 20040005 19c20084 00000000 000128d8
00012880: 00090c58 00000000 00090c2c 00000010
00012890: 0000e990 00000000 002aa284 004b0318
000128a0: 00000000 00000000 00000000 00000001
000128b0: 00000001 002b2660 0001294c 000128d4
000128c0: 004bea9c 0027c164 004bea9c 002b2850
000128d0: 000128d8 002b2850 004b030a 00000007
000128e0: 00000000 00000000 00000000 00000010
000128f0: 00000001 00000483 004b029c 00000000
00012900: 004bea9c 07400000 0009bcd6 004bea9c
00012910: 002b2660 0001294c 004b030a 0000003f
00012920: 00317567 00000fd5 00000023 00000014
00012930: 00000001 00000022 00317571 00000010
00012940: 00000000 00317572 004b030a 00287170
00012950: 0047c29c 0000030c 00000000 00000010
00012960: 00400100 00000006 00000000 000115a4
00012970: 000115a8 004b029c 0009bb78 00000010
00012980: 004b029c 00000000
```

Figure 4-8: Sample output from the **show debug stack** command after a hardware reset.

```
Router hardware reset occurred - no debug info
```

Related Commands

show exception
show log
show startup
show system

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 router (Figure 4-9 on page 4-45). The following table lists the supported modules and their related debug commands. For information about the debugging options available for each module, see the command description in the related command reference.

Supported Modules

Module	Related Debugging Commands
BGP	**disable bgp debug** **enable bgp debug**
BOOTp	**disable bootp relay option82** debug **enable bootp relay option82** debug
BRI (BRI driver)	**disable bri debug** **enable bri debug** **show bri 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**
FIREwall	**disable firewall policy debug** **enable firewall policy debug**
FRamerelay	**disable framerelay debug** **enable framerelay debug**
GRE	**disable gre debug** **enable gre debug**
HTTP	**disable http debug** **enable http debug** **show http debug**
INTerface	**disable interface debug** **enable interface debug**
IP	**disable ip debug** **enable ip debug** **show ip debug**
IPSec	**disable ipsec policy debug** **enable ipsec policy debug**
IPV6	**disable ipv6 debug** **disable ipv6 mld debug** **enable ipv6 debug** **enable ipv6 mld debug** **show ipv6 mld debug**

Module	Related Debugging Commands
ISAkmp	**disable isakmp debug** **enable isakmp debug**
LOADBalancer	**disable loadbalancer debug** **enable loadbalancer debug**
LDAP	**disable ldap debug** **enable ldap debug**
LLDP	**disable lldp cdp debug** **enable lldp cdp debug**
MAIL	**disable mail debug** **enable mail debug**
OSPF	**disable ospf debug** **enable ospf debug** **show ospf debug**
PIM6 (PIM for IPv6)	**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**
PPP	**disable ppp debug** **disable ppp template debug** **enable ppp debug** **enable ppp template debug**
PRI (PRI driver)	**disable pri debug** **enable pri debug**
SQOS (Software QOS)	**disable sqos debug** **enable sqos debug**
RADius	**disable radius debug** **enable radius debug** **show radius debug**
RSVP	**disable rsvp debug** **enable rsvp debug**
SHDsl	**disable shdsl debug** **enable shdsl debug**
SSH	**disable ssh debug** **enable ssh debug**
SSL	**disable ssl debug** **enable ssl debug**
STAR	**disable star debugging** **enable star debugging**
SWItch	**disable switch debug** **enable switch debug** **show switch debug**
TACACS	**disable tacacs debug** **enable tacacs debug** **show tacacs debug**

Module	Related Debugging Commands
TACPlus	**disable tacplus debug** **enable tacplus debug**
TCP	**enable tcp debug** **disable tcp debug**
TELnet	**disable rtelnet debug** **enable rtelnet debug**
VLAN	**disable vlan debug** **enable vlan debug** **show vlan debug**
VOIP	**disable voip debug** **enable voip debug**
VRRP	**disable vrrp debug** **enable vrrp debug**
WANLB	**disable wanlb debug** **enable wanlb debug**

The output shows only the modules that are listed in the previous table, and which have debugging enabled. It does **not** list modules:

- for which debugging is currently disabled
- that are not listed in the previous table even if debugging is enabled

The **active** parameter specifies which modules to display information about. Specify **all** for all supported modules, or just a specific one. If no module is specified, active debugging is disabled on supported modules.

Figure 4-9: Example output from the **show debug active** command

```
DHCP
 ----------------------------------------------------------
DHCP Debug Options Enabled:
      STATE+PKT

IP
 ----------------------------------------------------------
IP Debug Timeout: 30 seconds
IP Debug Options Enabled:
      IP Packet
      IP ARP
      IP UPNP
 ----------------------------------------------------------
IP Route Debug Options Enabled:
      route
      multicast
      rip
      ripraw
 ----------------------------------------------------------
IP NAT Debug Options Enabled:
      allow
      deny
      packet
      process
      checksum
      identproxy
      smtp
      proxy
      http

TACACS
 ----------------------------------------------------------
TACACS Debug Options:
      all
```

Figure 4-9: Example output from the **show debug active** command (cont)

```
OSPF
---------------------------------------------------------------
Debug Options Enabled       Detail
---------------------------------------------------------------
autocost                     n/a
if state                     n/a
nbr state                    n/a
nssa                         n/a
state                        n/a
packet                       lsa full
spf                          n/a
lsu                          n/a

RADIUS
---------------------------------------------------------------
RADIUS Debug Options:
      packet
      decode
      error

SWI
---------------------------------------------------------------
SWI Debug Modes:
       arl
       dma

BGP
---------------------------------------------------------------
Peer              BGP Debug Options
---------------------------------------------------------------
192.168.1.1       msg state trace update update_all rib

VRRP Debug
---------------------------------------------------------------
Virtual Routers with Debug Enabled
       Virtual Router Identifier ..................... 1
```

Examples To display all enabled debugging for the OSPF module, use the command:

```
sh deb act=ospf
```

Related commands **disable debug active**
show debug

show exception

Syntax `SHow EXception`

Description This command displays the router exception list (Figure 4-10 on page 4-47).

There may be up to ten entries in the list, ordered from most recent (event 01) to least recent (event 10). The explicit format of each entry depends on the exception type and hence what information was stored for that event.

The Spurious Interrupts field is the number of spurious interrupts handled by the router since startup. Under normal operating conditions this field should always be zero (0).

The fatal trap with error code of $001e is a CPU software trap that is invoked in response to the **restart** command on page 5-37 of Chapter 5, Managing Configuration Files and Software Versions and hence should not be considered an error.

Figure 4-10: Example output from the **show exception** command

```
Spurious interrupts = 0

Router exception list
--------------------------------------------------------------------------------
No: 01
  Offset/Type : $008/Bus error            Address    : $0019aaee
  Time        : 09:17:19 on 10-May-1997   Clock Log  : 09:16:42 on 10-May-1997
  SSW         : $0225                     Fault Addr : $0d0a0044

No: 02
  Offset/Type : $008/Bus error            Address    : $0019aaee
  Time        : 09:15:26 on 10-May-1997   Clock Log  : 09:14:29 on 10-May-1997
  SSW         : $0225                     Fault Addr : $0d0a0044

No: 03
  Offset/Type : $028/Line A emulator      Address    : $0009624c
  Time        : 10:42:59 on 01-May-1997   Clock Log  : 10:41:22 on 01-May-1997

No: 04
  Offset/Type : $028/Line A emulator      Address    : $0009624c
  Time        : 10:42:59 on 01-May-1997   Clock Log  : 10:41:22 on 01-May-1997

No: 05
  Offset/Type : $028/Line A emulator      Address    : $0009624c
  Time        : 10:42:59 on 01-May-1997   Clock Log  : 10:41:22 on 01-May-1997

No: 06
  Offset/Type : $028/Line A emulator      Address    : $0009624c
  Time        : 10:42:59 on 01-May-1997   Clock Log  : 10:41:22 on 01-May-1997
--------------------------------------------------------------------------------
```

show mail

Syntax `SHow MAIL`

Description This command displays the current configuration of the email system, and any email messages that are currently queued for transmission (Figure 4-11, Table 4-3).

Figure 4-11: Example output from the **show mail** command

```
MAIL
  Host Name ............ router2.company.com
  SMTP Server .......... 192.68.6.100
  State ................ alive
  Debug ................ disabled
  Mails Sent ........... 0

Date/Time   Id    To                    Subject             State      Retries
-------------------------------------------------------------------------------
29 15:00:05 0002  jb@it.company.com     Test Message        Initial    0
-------------------------------------------------------------------------------
```

Table 4-3: Parameters in output of the **show mail** command

Parameter	Meaning
Host Name	Host name that the mail system uses.
SMTP Server	IP address of the SMTP mail server where mail is sent.
State	Status of the mail system: Alive Dead - name server not set Dead - host name not set
Debug	Whether debugging is enabled for the mail system.
Mails Sent	Number of mail messages transmitted since the last router restart.
Date/Time	Date and time the message was queued for transmission.
Id	Unique message ID.
To	Email address where the message is to be sent.
Subject	Contents of the subject field in the message header.
State	Status of the transmission process: Initial Starting Get MX-IP Performing DNS lookup on MX record Get IP - Performing DNS lookup Connect TCP connection established S-hello Sending HELLO command S-from Sending MAIL FROM command S-rcpt Sending RCPT TO command S-data Sending DATA command S-header Sending headers S-file Sending file S-buffer Sending message text S-last Sending dot to terminate message S-done Sending message transmission S-quit Sending QUIT command

Table 4-3: Parameters in output of the **show mail** command (cont)

Parameter	Meaning
Retries	Number of times the mail system retransmitted the message because an acknowledgement was not received from the remote mail system.

Examples To show the state of the email system, use the command:

```
sh mail
```

Related Commands

delete mail
disable mail debug
enable mail debug
mail
reset mail
set mail
show mail

show startup

Syntax `SHow STARTup`

Description This command prints the state of the bits in the router Startup Status Flag (Figure 4-12). This command can be used to check the state of the router when it last started. When a bit signals an error, its message has an > added to the front of it.

This command is equivalent to the **show system startup** command on page 4-55.

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

```
Router Startup Status Flag is 00600040, which means:
-----------------------------------------------------
   4096k of RAM found
> Router CRASHED prior to this startup
  Battery backed RAM battery OK
  Battery backed RAM not corrupted
  Real time clock not corrupted
  Real time clock, time set
  Router software download OK
  Router vector download OK
-----------------------------------------------------
```

show summertime

Syntax `SHow SUMMertime`

Description This command displays information about the router's current summer time settings.

Figure 4-13: Example output from the **show summertime** command:

```
Summertime Configuration
------------------------------------------------------------
Enabled ..................... Yes
Summertime Name ............. NZDT
Start........................ Sunday 2-Oct-2005 02:00am
End.......................... Sunday 19-Mar-2005 02:00am
Offset....................... 60 minutes
Start rule................... non recurring fixed date
End rule..................... non recurring fixed date
```

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

Parameter	Meaning
Enabled	Whether summer time is currently enabled on the router.
Summertime Name	The abbreviated name of the timezone being used for the Real Time Clock.
Start	The day, date, year, and time on which summer time starts.
End	The day, date, year, and time on which summer time ends.
Offset	The summer time offset value. This is the amount of time by which the clock will advance when summer time begins.
Start rule	The rule that is set to define the start date of summer time; one of 'recurring', or 'non-recurring fixed date'. If recurring, then the rule details are displayed.
End rule	The rule that is set to define the end date of summer time; one of 'recurring', or 'non-recurring fixed date'. If recurring, then the rule details are displayed.

Example To display the router's current summer time settings, use the command:

```
sh summ
```

Related commands

clear summertime
clear timezone
disable summertime
enable summertime
set ntp utcoffset in Chapter 57, Network Time Protocol (NTP)
set summertime
set time
set timezone
show ntp in Chapter 57, Network Time Protocol (NTP)
show time
show timezone

show system

Syntax `SHow SYStem`

Description This command displays general system information about the router, including the hardware installed, memory, software versions loaded (Figure 4-14 on page 4-51, Table 4-5 on page 4-52). It also displays location and contact details when these have been set with the appropriate **set system** commands.

Figure 4-14: Example output from the **show system** command

```
Router System Status                              Time 05:48:16 Date 27-Dec-2006.
Board      ID Bay  Board Name                        Host Id Rev    Serial number
-------------------------------------------------------------------------------
Base      191      AT-AR440s                               0 M1-0   58045723
-------------------------------------------------------------------------------
Memory -   DRAM : 65536 kB    FLASH : 16384 kB
-------------------------------------------------------------------------------
SysDescription
Allied Telesis AT-AR440S version 2.9.1-00 15-Dec-2006
SysContact

SysLocation

SysName

SysDistName

SysUpTime
136030702 ( 12 days, 17:51:47 )
Boot Image      : unknown
Software Version: 2.9.1-00 15-Dec-2006
Release Version : 2.9.1-00 15-Dec-2006
Patch Installed : NONE
Territory       : usa
Country         : none
Help File       : 400-291a.hlp

Main Fan        : On

Configuration
Boot configuration file: boot.cfg (exists)
Current configuration: boot.cfg

Security Mode   : Disabled
```

Table 4-5: Parameters in output of the **show system** command

Parameter	Meaning
Board	One of the following board types: Base Expansion PAC PIC Uplink
ID	Identification number of the board.
Bay	Bay number where the expansion board is installed
Board Name	Descriptive name of the board.
Host Id	Host identification number for this router.
Rev	Revision number and hardware modification level of the board.
Serial number	Serial number of the board.
DRAM	Amount of DRAM memory installed.
FLASH	Amount of flash memory installed.
SysDescription	Description of the product and software version.
SysContact	Name or address of person to call about the router, set with the **set system contact** command on page 4-29.
SysLocation	Location of the router that is set with the **set system location** command on page 4-30.
SysName	Name of the router (usually the complete IP domain name) that is set with the **set system name** command on page 4-31.
SysDistName	Distinguished name of the router (used by PKI and ISAKMP) that is set with the **set system distinguishedname** command on page 49-32 of Chapter 49, Public Key Infrastructure (PKI).
SysUpTime	Elapsed time in 100ths of a second since the last router restart.
Boot Image	For devices that boot from flash, the flash boot image file name, size, and when it was loaded into the flash boot area,.
Software Version	Patch version running on the router.
Release Version	Software version running on the router.
Patch Installed	Description of the patch currently installed is any.
Territory	Territory where the router is used; either Australia, China, Europe, Japan, Korea, New Zealand, or USA. You can set this with the **set system territory** command on page 11-120 of Chapter 11, Integrated Services Digital Network (ISDN).
Country	Country where the router is being used, for ATM default values. You can set this with the **set system country** command on page 10-59 of Chapter 10, ATM over xDSL.
Help File	System help file used by the **help** for online help that is set with the **set help** command on page 2-15 of Chapter 2, Using the Command Line Interface (CLI).
Boot configuration file	Current boot configuration file set with the **set config** command and whether the file exists.
Current configuration	Source of the current router configuration This can be one of a number of items, including a configuration file name, no configuration, or configuration set by DIP switches.
Security Mode	Whether security mode is enabled.

Table 4-5: Parameters in output of the **show system** command (cont)

Parameter	Meaning
Patch files	Information about the patch files installed on the router, if any.
Name	Name of a patch file.
Device	Whether the patch file is stored in flash or NVS.
Size	Size of the patch file in bytes.
Version	Version number of the patch, which consists of the version number of the version to which the patch applies, followed by a hyphen, and the generation number of the patch itself.

Related Commands

disable system security_mode
enable system security_mode
set help in Chapter 2, Using the Command Line Interface (CLI)
set install
set system contact
set system location
set system name
set system territory

show system serialnumber

Syntax `SHow SYStem SErialnumber`

Description This command displays the serial number of the base unit (Figure 4-15 on page 4-54).

Figure 4-15: Example output from the **show system serialnumber** command

```
45AX4C00K
```

Examples To display the router's base hardware serial number, use the command:

```
sh sys se
```

Related Commands **show system**

show system startup

Syntax `SHow SYStem STARTup`

Description This command prints the state of the bits in the router Startup Status Flag (Figure 4-16). This command can be used to check the state of the router when it last started. When a bit signals an error, its message has an > added to the front of it.

This command is equivalent to the **show startup** command on page 4-49.

Figure 4-16: Example output from the **show startup** command

```
Router Startup Status Flag is 00600040, which means:
-----------------------------------------------------
   4096k of RAM found
> Router CRASHED prior to this startup
  Battery backed RAM battery OK
  Battery backed RAM not corrupted
  Real time clock not corrupted
  Real time clock, time set
  Router software download OK
  Router vector download OK
-----------------------------------------------------
```

show time

Syntax `SHow TIme [RTC]`

Description This command displays the router's currently configured local time and date.

Use the RTC parameter to display the time stored in the Real Time Clock.

Figure 4-17: Example output from the **show time rtc** command

```
System Real Time Clock is 14:18:05 on Wednesday 23-Jun-2005
```

Example To display the time the router is using, use the command:

```
sh ti
```

Related Commands
clear summertime
clear timezone
disable summertime
enable summertime
set ntp utcoffset in Chapter 57, Network Time Protocol (NTP)
set summertime
set time
set timezone
show ntp in Chapter 57, Network Time Protocol (NTP)
show summertime
show timezone

show timezone

Syntax `SHow TIMEZone`

Description This command displays information about the router's current timezone settings. If a timezone has not been specifically set, this command displays the system default values.

Figure 4-18: Example output from the **show timezone** command:

```
Timezone name is set to 'NZST', offset from UTC is +12:00
```

Table 4-6: Parameters in output of the **show timezone** command

Parameter	Meaning
Name	The abbreviated name for this time zone in Standard Time. If the timezone has been cleared, or has not yet been set, then 'not set' is shown.
offset from UTC	The offset from UTC time displayed as a positive (+) or negative (-) value, and the time displayed as hh:mm. If offset=0, then it is displayed as "+00:00"

Example To display the current timezone the router is using, use the command:

```
sh timez
```

Related Commands

clear summertime
clear timezone
disable summertime
enable summertime
set ntp utcoffset in Chapter 57, Network Time Protocol (NTP)
set summertime
set time
set timezone
show ntp in Chapter 57, Network Time Protocol (NTP)
show summertime
show time