SmartMesh WirelessHART Manager CLI Guide

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1 About This Guide

1.1 Related Documents

The following documents are available for the SmartMesh WirelessHART network:

Getting Started with a Starter Kit

- SmartMesh WirelessHART Easy Start Guide - walks you through basic installation and a few tests to make sure your network is working
- SmartMesh WirelessHART Tools Guide - the Installation section contains instructions for the installing the serial drivers and example programs used in the Easy Start Guide and other tutorials.

User Guide

- SmartMesh WirelessHART User's Guide - describes network concepts, and discusses how to drive mote and manager APIs to perform specific tasks, e.g. to send data or collect statistics. This document provides context for the API guides.

Interfaces for Interaction with a Device

- SmartMesh WirelessHART Manager CLI Guide - used for human interaction with a Manager (e.g. during development of a client, or for troubleshooting). This document covers connecting to the CLI and its command set.
- SmartMesh WirelessHART Manager API Guide - used for programmatic interaction with a manager. This document covers connecting to the API and its command set.
- SmartMesh WirelessHART Mote CLI Guide - used for human interaction with a mote (e.g. during development of a sensor applicaition, or for troubleshooting). This document covers connecting to the CLI and its command set.
- SmartMesh WirelessHART Mote API Guide - used for programmatic interaction with a mote. This document covers connecting to the API and its command set.

Software Development Tools

- SmartMesh WirelessHART Tools Guide - describes the various evaluation and development support tools included in the SmartMesh SDK including tools for exercising mote and manager APIs and visualizing the network.

Application Notes

- SmartMesh WirelessHART Application Notes - app notes covering a wide range of topics specific to SmartMesh WirelessHART networks and topics that apply to SmartMesh networks in general.

Documents Useful When Starting a New Design

- The Datasheet for the LTC5800-WHM SoC, or one of the castellated modules based on it, or the backwards compatible LTP5900 22-pin module.
- The Datasheet for the LTP5903-WHR embedded manager.
- A Hardware Integration Guide for the mote SoC or castellated module, or the 22-pin module - this discusses best practices for integrating the SoC or module into your design.
- A Hardware Integration Guide for the embedded manager - this discusses best practices for integrating the embedded manager into your design.
- A Board Specific Integration Guide - For SoC motes and Managers. Discusses how to set default IO configuration and crystal calibration information via a "fuse table".
- Hardware Integration Application Notes - contains an SoC design checklist, antenna selection guide, etc.
- The ESP Programmer Guide - a guide to the DC9010 Programmer Board and ESP software used to program firmware on a device.
- ESP software - used to program firmware images onto a mote or module.
- Fuse Table software - used to construct the fuse table as discussed in the Board Specific Integration Guide.

Other Useful Documents

- A glossary of wireless networking terms used in SmartMesh documentation can be found in the SmartMesh WirelessHART User's Guide.
- A list of Frequently Asked Questions

1.2 Conventions Used

The following conventions are used in this document:

`Computer type` indicates information that you enter, such as specifying a URL.

Bold type indicates buttons, fields, menu commands, and device states and modes.

Italic type is used to introduce a new term, and to refer to APIs and their parameters.

Tips provide useful information about the product.

Informational text provides additional information for background and context

Notes provide more detailed information about concepts.

Warning! Warnings advise you about actions that may cause loss of data, physical harm to the hardware or your person.

```
code blocks display examples of code
```

The CLI commands are described using the following notations and terminology:

|	Indicates alternatives for a field. For example, *<moteId> | #<MAC>* indicates that you can specify a mote by its mote ID or MAC address.
< >	Indicates a required field.
{ }	Indicates a group of fields.
[ ]	Indicates an optional field.
MAC address	When specifying a MAC address, do not use spaces. You may omit leading zeros and hyphens. In cases where the command syntax allows either the MAC address or mote ID to be specified, the MAC address must be preceded by the # symbol. The following examples are all valid: 22CA 00000000000022CA 00-00-00-00-00-00-22-CA

1.3 Revision History

Revision	Date	Description
1	07/16/2012	Initial Release
2	03/18/2013	Numerous small changes
3	10/22/2013	Added exec reset system, exec sendResponse command; Other minor corrections
4	04/04/2014	Documented exec commands: setNumParents, failover, promoteToOperational;
5	10/28/2014	Clarified maxMotes description; Clarified decommissionDevice command; Added get commands: redundancy and sourceroute
6	04/22/2015	Updated get and set network descriptions; Updated blacklisting requirements
7	12/03/2015	Minor corrections

2 Introduction

This guide describes the commands used to communicate with the LTP5903CEN-WHR SmartMesh WirelessHART manager through its command line interface (CLI). The CLI is available by connecting a serial terminal program to the Manager. The CLI is intended for human interaction with a manager, e.g. during development, or for interactive troubleshooting. Most commands are atomic - a command and its arguments are typed into the CLI, and a response is returned. For example, the `help` command returns a list of possible commands. Traces are not atomic - once started, they generate output asynchronously until cancelled.

For a machine-to-machine communications (e.g. a host program talking to the manager), the SmartMesh WirelessHART Manager API Guide is used. See the API guide for details on that interface.

2.1 CLI Access

Two types of CLI commands can be sent to the manager. The commands are accessed through separate CLI utilities:

- ***Manager CLI Commands*** allow you to view information about the network and perform administrative tasks, such as upgrading software on the motes and configuring a mote. These commands are available through the manager CLI utility.
- ***Radio Test CLI Commands*** are used for testing the manager’s radio transmission and reception for certification purposes. These commands are available through the radio test utility.

You can log on to either CLI serially using a serial terminal program (such as HyperTerminal) or a secure shell (SSH) session via Ethernet. Refer to the user guide for the program you have chosen. The manager has several interfaces that provide access to the command line:

- ***Serial 2***—The serial interface can be used to access a CLI using a serial terminal program. The **Serial 2** port is a standard 9-pin D-SUB RS232 port. For hardware specifications and connection details, refer to the SmartMesh WirelessHART User's Guide or the product datasheet. The default serial port settings are as follows: 115200 baud, 8 data bits, No parity, 1 stop bit, no flow control.

- ***10Base-T Ethernet***—Use this interface to log on to a CLI using SSH. The connection details will vary depending upon how you have connected the manager to your LAN.

3 Manager CLI Commands

This section describes how to use the CLI commands for the SmartMesh WirelessHART Manager.

3.1 Logging on to the Manager CLI

The manager CLI is a separate shell that is run from the Linux command line. The manager CLI supports a maximum of three concurrent sessions. Attempting to launch any additional sessions will result in an error message stating that the maximum number of sessions are currently running. The root user is always permitted to log in to the manager CLI, if the maximum number of sessions has already been reached, then whichever session is oldest will be logged out to allow for the root user to log in.

To log on to the manager CLI:

At the prompt within the terminal program or SSH session, access the Linux logon prompt by entering the following username and password:

Username: `dust`
Password: `dust`

This will bring you to the Linux prompt. At the Linux prompt ($):

1. Enter: `nwconsole`
2. Enter the manager CLI user name and password. The default user name and password is:
   Username: `admin`
   Password: `admin`

⚠ The default username and password can be changed using the `set` command. For instructions, see Managing Users and Passwords .

Alternatively, you can access `nwconsole` directly from the terminal program or SSH session prompt in Step 1 by entering the following username and password:

Username: `dustcli`
Password: `dustcli`

To log out of the Manager CLI:

To log out of the manager CLI and return to the Linux prompt, enter the `logout` command. If the SSH connection is dropped, the manager CLI session is logged out.

3.1.1 CLI Timeouts

Manager CLI sessions are logged out if they have been inactive for too long. The CLI timeout is specified in the *System* element with the *cliTimeout* field. The default timeout value is 120 minutes. If *cliTimeout* is set to 0, CLI sessions will never timeout.

3.2 delete

Description

Use this command to delete a mote from the Access Control List (ACL) or the network, or delete a username from the access list for the manager XML API.

Syntax

```
delete { acl #<mac> | mote {<id> | #<mac>} | user <userName>
```

Parameters

Parameter	Description
acl #<mac>	Deletes a mote (identified by its MAC address) from the access control list. If the security mode is set to *acceptACL*, deleting a mote from the ACL prevents the mote from joining the network, or rejoining if the mote is already in the network; it does not force a mote to leave the network.
mote <id>|#<mac>	Deletes a mote (identified by its Mote ID or MAC address) from the network. Note that you can only delete a mote from the network if the mote is in the **Lost** or **Idle** state.
user <username>	Removes a user (identified by the username) from the access list for manager's XML API. Deleting a user prohibits that user from accessing the manager XML API.

Example

To delete the mote with MAC address *00-00-00-00-00-00-62-4C* from the ACL, enter:

```
delete acl #00-00-00-00-00-00-62-4C
```

To delete the mote with MAC address *00-00-00-00-00-00-62-4C* from the network, enter:

```
delete mote #00-00-00-00-00-00-62-4C
```

To delete the username `YuriZ` from the list of users who may access manager, enter:

```
delete user YuriZ
```

3.3 deleteSessions

Description

Use this command to close all control and notification sessions established by a client (identified by the client IP address). To verify that the sessions have been deleted, use the `show sessions` and `show cli-sessions` commands.

Syntax

```
deleteSessions <ip>
```

Parameters

Parameter	Description
ip	The client IP address for which control and notification sessions are to be closed.

Example

3.4 exec

The exec command allows you to execute the API commands described in this section.

3.4.1 exec activateAdv

Description
Use this command to trigger manager to turn on advertising for all motes in the network.

Syntax

```
exec activateAdv <mac> <timeout>
```

Parameters

Parameter	Description
mac	MAC address must be set to ff-ff-ff-ff-ff-ff-ff-ff (turns advertising on for all motes)
timeout	The number of minutes (from 0 to 255) that advertising should remain on. After this period, advertising is turned off. Specifying `0` turns off advertising.

Example
To activate advertising for a 60 minute advertising period, enter:

```
> exec activateAdv FF-FF-FF-FF-FF-FF-FF-FF 60
activateAdvertising command has been accepted.
```

3.4.2 exec activateFastPipe

Description

Use this command to activate a pipe between the manager and a mote. A pipe is a high-bandwidth frame that allows for faster data transfer between the manager/gateway and the mote. Only one pipe may be active in the network at a time. To see the pipe status for a specific mote, use the `get mote` command.

You may want to activate a pipe if you are planning a large file transfer to a mote, or will be performing a series of request and response maintenance commands to a single mote.

Syntax

```
exec activateFastPipe <mac> <pipeDirection>
```

Parameters

Parameter	Description
mac	MAC address of mote for which pipe is being activated
pipeDirection	Sets the direction of the pipe: 0 = Activates an upstream pipe (mote to manager) 1 = Activates a downstream pipe (manager to mote) 2 = Activates a pipe in both upstream and downstream directions

Example

To activate a bidirectional pipe between manager and a mote with MAC address of *00-00-00-00-00-00-40-C9*, enter:

```
> exec activateFastPipe 00-00-00-00-00-00-40-C9 2

activateFastPipe command has been accepted
```

3.4.3 exec cancelOtap

Description

Cancels an OTAP in progress.

Use this command to cancel a software update (OTAP). If the OTAP has already reached the *commit* stage, the new software is being activated on the motes and an error message informs you that the OTAP cannot be cancelled. Before issuing the `exec cancelOtap` command, you may want to view the status of the OTAP by issuing the `otap status` command.

Syntax

```
exec cancelOtap
```

Parameters

Parameter	Description

Example

To cancel an OTAP, enter:

```
exec cancelOtap
```

3.4.4 exec deactivateFastPipe

Description

Use this command to deactivate a pipe between the manager and a mote. Only one pipe may be active in the network at a time. To see the pipe status for a specific mote, use the `get mote` command.

Deactivate a pipe when it is no longer needed in order to conserve energy.

Syntax

```
exec deactivateFastPipe <mac>
```

Parameters

Parameter	Description
mac	MAC address of mote for which pipe is being deactivated

Example

To deactivate a pipe between manager and a mote with MAC address of *00-00-00-00-00-00-40-C9*, enter:

```
> exec deactivateFastPipe 00-00-00-00-00-00-40-C9
deactivateFastPipe command has been accepted.
```

3.4.5 exec decommissionDevice

Description

The *exec decommissionDevice* command causes the manager to prepare a mote (identified by its MAC address) for safe removal from the network. The target mote's children are moved to other parents, and the node is designated as non-routing (it does not forward any other mote's traffic). This makes it safe to remove the target mote from the network without disrupting other network traffic. The mote enters the *disconnected* state, which can be used to inform a user that it is safe to power down the mote and physically remove it from the network. Note that the *decommissionDevice* command can be used on any mote unlike the *delete* command, which can only be used to remove an inactive mote.

Syntax

```
exec decommissionDevice <MAC>
```

Parameters

Parameter	Description
MAC	The MAC address of the device to be decommissioned

Example

To decommission the mote with MAC address *00-00-00-00-00-00-62-4C,* enter:

```
exec decommissionDevice 00-00-00-00-00-00-62-4C
```

3.4.6 exec exchangeJoinKey

Description

Use this command to initiate the replacement of the common join key for security reasons. The process may take several minutes to complete, depending on network size. The join key is used by motes when they first join the network or communicate with a new mote.

The `exchangeJoinKey` command is only valid if the network security mode is set to accept the common join key. If the security mode is set to accept the Access Control List (ACL), each mote is assigned a separate join key and the common join key is not used. To see the current security mode, use the `get security` command.

Syntax

```
exec exchangeJoinKey <key>
```

Parameters

Parameter	Description
key	The new 16-byte join key. Each byte is entered as a pair of hexadecimal digits

Example

To change the join key to *3987A553544E4B4F4B4A5152544E434F*, enter:

```
exec exchangeJoinKey 3987A553544E4B4F4B4A5152544E434F
```

3.4.7 exec exchangeMoteJoinKey

Description

Use the `exec exchangeMoteJoinKey` command to initiate the replacement of the join key for a mote on the Access Control List (ACL). Note that you must use the same join key that you have specified for the mote in the ACL. Depending on the network size, it may take several minutes to complete the process of exchanging the join key on the mote.

The `exchangeMoteJoinKey` command is only valid if the network security mode is set to accept an ACL. This mode allows individual motes to have their own join key, and only motes on the ACL will be accepted into the network. The join key is used by motes when they first join the network.

To see the current ACL, use the `get acls` command. To change the join key for a mote on the ACL, use the `set acl joinKey` command. To see the current security mode, use the `get security` command.

Syntax

```
exec exchangeMoteJoinKey <MAC> <key>
```

Parameters

Parameter	Description
MAC	MAC address of mote to receive the new join key
key	The new 16-byte join key. Each byte is entered as a pair of hexadecimal digits

Example

To change the join key to *1987A553544E4B4F4B4A5152544E434F* on a mote with MAC address *00-00-00-00-00-00-62-4C*, enter:

```
exec exchangeMoteJoinKey 00-00-00-00-00-00-62-4C 1987A553544E4B4F4B4A5152544E434F
```

3.4.8 exec exchangeNetworkId

Description

This command initiates the process of changing the Network ID on the manager and all its network motes. The process may take several minutes to complete, depending on network size. Allow time for the exchange to be completed before restarting the network.

If you want to operate two or more networks within range of each other, each network must have a different Network ID in order to preserve network integrity. The manager only allows motes to join the network if they share its Network ID and join key. The new Network ID takes effect the next time the network is restarted.

Syntax

```
exec exchangeNetworkId <network ID>
```

Parameters

Parameter	Description
network ID	Replaces the current Network ID with the specified Network ID. The Network ID can be any number between 1 and 65534

Example

To change the Network ID to *1668*, enter:

```
exec exchangeNetworkId 1668
```

3.4.9 exec exchangeMoteNetworkId

Description

This command initiates the process of changing the Network ID on a specified mote in the network. The new ID takes effect on next mote join.

Syntax

```
exec exchangeMoteNetworkId <mac> <network ID>
```

Parameters

Parameter	Description
network ID	Replaces the current Network ID with the specified Network ID. The Network ID can be any number between 1 and 65534
mac	MAC address of mote to receive the new Network ID

Example

```
exec exchangeMoteNetworkID 00-00-00-00-00-00-62-4C 100
```

3.4.10 exec exchangeNetworkKey

Description

Use this command to initiate the process of replacing the current network key with a new randomly generated key for security reasons. The process takes several minutes to complete. The network key is used for link layer authentication between devices.

Syntax

```
exec exchangeNetworkKey
```

Parameters

Parameter	Description

Example

```
exec exchangeNetworkKey
```

3.4.11 exec exchangeSessionKey

Description

Use this command to trigger manager to generate and distribute a new random session key for the session between the manager (or gateway) and a mote (or motes).

The session key is used to encrypt all messages exchanged between the manager (or gateway) and the mote(s).

Syntax

```
exec exchangeSessionKey <macA> <macB>
```

Parameters

Parameter	Description
macA	Identifies the MAC address of the manager (or gateway) for which the session key is to be generated. For the manager MAC address use: 00-1B-1E-F9-80-00-00-01 For the gateway address use: 00-1B-1E-F9-81-00-00-02
macB	Identifies the mote for which the session key is to be generated. The broadcast session key is distributed if you set ff-ff-ff-ff-ff-ff-ff-ff as the mote address.

Example

To change the session key for the session between a manager with MAC address *00-1B-1E-F9-80-00-00-01* and a mote with MAC address *00-00-00-00-00-00-40-C9* , enter:

```
exec exchangeSessionKey 00-1B-1E-F9-80-00-00-01 00-00-00-00-00-00-40-C9
```

3.4.12 exec failover

Description

The *exec failover* command initiates a redundancy failover. If the Manager is currently the master, it will become the slave, and vice versa. Added in Manager >= 4.1.

Syntax

```
exec failover
```

Parameters

Parameter	Description

Example

```
> exec failover
```

Description

The *exec failover* command initiates a redundancy failover. If the Manager is currently the master, it will become the slave, and vice versa. Added in Manager >= 4.1.

Syntax

```
exec failover
```

Parameters

Parameter	Description

Example

```
> exec failover
```

3.4.13 exec getLatency

Description

Use this command to return an estimate of the roundtrip latency to communicate with a specific mote.

Syntax

```
exec getLatency <mac>
```

Parameters

Parameter	Description
mac	MAC address of mote for which latency is being estimated

Example

```
> exec getLatency 00-17-0D-00-00-01-02-03
Upstream latency = 3.73 seconds
Downstream latency = 1.280 seconds
```

3.4.14 exec getLicense

Description

Use this command to retrieve the current license. The license is returned in the following format: 00-00-00-00-00-00-00-00-00-00-00-00-00.

Syntax

```
exec getLicense
```

Parameters

Parameter	Description

Example

```
> exec getLicense
license: 00-00-00-00-00-00-00-00-00-00-00-00-00
```

3.4.15 exec getTime

Description

Use this command to request the current time as Universal Time (UTC) and Absolute Slot Number (ASN). The return value for the UTC time is in <seconds>.<microseconds>, which is the number of seconds and microseconds since midnight January 1, 1970.

Syntax

```
exec getTime
```

Parameters

Parameter	Description

Example

```
> exec getTime
Current time (UTC) is:      1355509123.456297
Absolute Slot Number (ASN): 129723302
```

3.4.16 exec promoteToOperational

Description

The *exec promoteToOperational* command is used to move a mote from **Quarantine** state (in which it cannot send data) to the **Operational** state (in which it can). Available in manager >= 4.1

Syntax

```
exec promoteToOperational <MAC>
```

Parameters

Parameter	Description
MAC	MAC address of mote to promote

Example

```
exec promoteToOperational 00-00-00-00-00-12-34-56
```

Description

The *exec promoteToOperational* command is used to move a mote from **Quarantine** state (in which it cannot send data) to the **Operational** state (in which it can). Available in manager >= 4.1

Syntax

```
exec promoteToOperational <MAC>
```

Parameters

Parameter	Description
MAC	MAC address of mote to promote

Example

```
exec promoteToOperational 00-00-00-00-00-12-34-56
```

3.4.17 exec reset

Description

The `exec reset` command is used to manually reset a mote or the network, or clear statistics or the event log.

- `exec reset network`—Resets the manager's wireless connection. As a result, the entire network must reform.
- `exec reset system`—Resets the manager process (needed for certain persistent parameters to take effect) and its wireless connection. As a result, the entire network must reform.
- `exec reset stat`—Clears all statistics on the network motes and manager.
- `exec reset eventLog`—Clears all events from the network events log. Events include activities such as system connection, motes joining the network, creation or deletion of paths and links, and alarms.
- `exec reset mote`—Resetting a mote turns the mote hardware off and on again, temporarily removing the mote from the network and allowing it to rejoin again and re-establish links to other motes.

Syntax

```
exec reset <obj> [<moteId>|#<mac>]
```

Parameters

Parameter	Description
obj	Type of object to be reset: *network* = Resets manager's wireless connection *system* = Resets manager process and manager's wireless connection *stat* = Clears all statistics on the network motes and manager *eventLog* = Clears all events from the network events log *mote* = Causes a specific mote to reboot and rejoin the network
moteId #mac	Mote ID or MAC address of object to be reset

Example

To reset the network (without resetting the manager process), enter:

```
exec reset network
```

To reset mote ID 19, enter:

```
exec reset mote 19
```

3.4.18 exec sendRequest

Description

Sends a request packet to a mote (identified by its MAC address). The binary data is sent as a string in which each byte is represented by two ASCII digits (0-9 and A-F).

Syntax

```
exec sendRequest <mac> <app> <priority> [-r] [-g<grID> [-s<m1>:<m2>...]] <bytes>...
```

Parameters

Parameter	Description
mac	ReqParamDescr
app	Specifies the type of packet to be sent: *publish* = Data packets sent on a regular, periodic basis *event* = Packets (such as alarms) that are triggered by an event *maintenance* = A series of request/response packets used to manage the device *blockTransfer* = A group of packets sent over a period of time
priority	Specifies where the packet should be inserted in manager's queue and sets packet priority within the network: *low* = Use low priority *medium* = Use medium priority *high* = Use high priority
-r	Sends the specified series of bytes as a reliable packet. A reliable packet must be acknowledged by the mote. If this field is not specified, a best-effort packet is sent.
-g<grID>	Graph to use in sending the packet. If this field is not specified, the default graph is used.
[-s<m1>:<m2>...]	Source route to use in sending the packet. The source route can include up to eight motes (identified by mote IDs).
bytes	The series of bytes to be sent as a hex string (for example 4f1a0823b6).

Example

To send the hexadecimal string 4f1a0823b6 as a reliable, low priority, maintenance packet to a mote with MAC address *00-00-00-00-00-00-40-C9*, enter:

```
exec sendRequest 00-00-00-00-00-00-40-C9 maintenance low -r 4f1a0823b6
```

3.4.19 exec sendResponse

Description

Sends a response packet to a mote (identified by its MAC address). The binary data is sent as a string in which each byte is represented by two ASCII digits (0-9 and A-F).

Syntax

```
exec sendResponse <mac> <app> <priority> <callbackId> [-r] <bytes>
```

Parameters

Parameter	Description
mac	MAC address of mote to which response packet is to be sent
app	Specifies the application domain of packet to be sent: publish - Data packets to be sent on a regular, periodic basis event - Packets (such as alarms) that are triggered by an event maintenance - A series of request/response packets used to manage the device blockTranfer - A group of packets sent over a period of time
priority	Specifies where the packet should be inserted in manager's queue and sets packet priority within the network. Valid values are: low medium high
callbackId	The callback ID of the packet as given in the original request packet from the mote or a user generated one if the response is unsolicited (a publish)
-r	Sends the specified series of bytes as a reliable packet
bytes	The series of bytes to be sent, as a hex string

Example

```
exec sendResponse 00170D0000123456 maintenance high 1234 -r 0000FC121234
```

3.4.20 exec serviceGetNext

Description

Get the next service for mote. Given a valid service ID, command will return the next service ID in the list corresponding to the source and destination addresses. A service ID of 0 can be used to get the first valid service ID.

Syntax

```
serviceGetNext {<MACA>|gw} {<MACB>|gw} <srvId>
```

Parameters

Parameter	Description
MACA	The MAC address of the source mote or GW for which the service is associated
MACB	The MAC address of the destination mote or GW for which the service is associated
srvId	The starting ID for the search, or 0 to start a new search.

Example

```
> serviceGetNext F981000000000002 00170D0000001234 0
```

3.4.21 exec serviceRequest

Description

Creates a service between devices. The source of the service is given in the first MAC parameter, and the destination in the second. To establish a session to/from the Gateway, the gateway's well known address of 001B1EF981000002 is used.

Syntax

serviceRequest {<MACA>|gw} {<MACB>|gw} <srvId> <app> <period> [source|sink|intermittent]

Parameters

Parameter	Description
MACA	MAC address of the source mote or Gateway
MACB	MAC address of the destination mote or Gateway
servID	Unique identifier for this service to the destination mote.
app	The application domain for the service, one of: publish maintenance event block transfer
period	Interval between packets, in ms
type	The type of service, one of: source - the source address is generating packets sink - the source address is sinking packets intermittent - service period is to be used as a latency target for infrequent traffic such as process alarms

Example

```
> serviceRequest 001B1EF981000002 00170D0000001234 127 maintanance 5000
```

3.4.22 exec setLicense

Description

Use this command to enter the software license string. The license will take affect after a Manager reset. For settings that require a reset to take affect and depend upon a license, this means that two resets are required - one for the license change, and one for the settings change.

Syntax

```
exec setLicense <license>
```

Parameters

Parameter	Description
license	Software license string as 13-byte (26 character) hexadecimal string

Example

```
exec setLicense 00000000000000000000000000
```

3.4.23 exec setNumParents

Description

The *exec setNumParents* command changes the target number of steady-state parents for a node from the default value of 2. More parents increases the likelihood that a mote will stay in the network when there is poor path stability, at the cost of additional power for sending keepalives to additional parents. Added in Manager >4.1.

Syntax

```
exec setNumParents <numParents>
```

Parameters

Parameter	Description
numParents	The target number of parents for each node

Example

```
> exec setNumParents 3
```

Description

The *exec setNumParents* command changes the target number of steady-state parents for a node from the default value of 2. More parents increases the likelihood that a mote will stay in the network when there is poor path stability, at the cost of additional power for sending keepalives to additional parents. Added in Manager >4.1.

Syntax

```
exec setNumParents <numParents>
```

Parameters

Parameter	Description

numParents	The target number of parents for each node

Example

```
> exec setNumParents 3
```

3.4.24 exec startOtap

Description

Initiates the automatic OTAP (over-the-air-programming) process to update mote software. You can specify the number of times the manager retries the OTAP if the previous attempt fails.

Use `exec startOtap` to update software on the manager and network motes. Before using this command, you must first use the manager's Admin Toolset utility to copy the software update package to the manager. To use Admin Toolset for this task, refer to the "Software Upgrade" section in the Admin Toolset Guide.

Do not use `exec startOtap` without assistance from a Dust Networks support engineer. If used incorrectly, these commands can cause problems with the network or render it inoperable.

Syntax

```
exec startOtap [-n <numRetries>]
```

Parameters

Parameter	Description
-n numRetries	Number of times manager tries upgrading the software on the mote if the previous attempt fails.

Example

To start the OTAP process with 10 retries, enter:

```
exec startOtap -n 10
```

3.5 get

Use the `get` commands to display information about the network status and current configuration settings.

3.5.1 get acl

Description

Use the `get acl` command to find out whether a specified mote (identified by its MAC address) is on the Access Control List (ACL). Prints an error if the mote is not on the ACL.

Syntax

```
get acl #<MAC>
```

Parameters

Parameter	Description
MAC	MAC address (EUI-64) of the mote

Example

To find out if the mote with MAC address 00-17-0d-00-00-01-02-03 is on the ACL, enter:

```
> get acl #00-17-0d-00-00-01-02-03
Error retrieving ACL device #00-17-0d-00-00-01-02-03: ?/.
```

If it is on the ACL the MAC address will be returned:

```
> get acl #00-17-0D-00-00-38-0C-AE
MAC: 00-17-0D-00-00-38-0C-AE
```

3.5.2 get acls

Description

The `get acls` command lists all motes on the Access Control List (ACL).

Syntax

```
get acls
```

Parameters

Parameter	Description

Example

```
> get acls


MAC: 00-17-0D-00-00-38-0C-AE
```

3.5.3 get alarms

Description

Use the `get alarms` command to show all alarms.

Syntax

```
get alarms
```

Parameters

Parameter	Description

Example

```
> get alarms
Couldn't find any alarms.
```

3.5.4 get blacklist

Description

Use the `get blacklist` command show all blacklisted channels.

Syntax

```
get blacklist
```

Parameters

Parameter	Description

Example

```
> get blacklist
frequency:              2480
```

3.5.5 get mote

Description

The `get mote` command shows information for a mote (identified by Mote ID or MAC address).

Syntax

```
mote <id> | #<MAC>
```

Parameters

Parameter	Description
id	Mote ID
MAC	Mote MAC address

Example

To show information for Mote ID 17, enter:

```
> get mote 17
moteId:                 17
macAddr:                00-17-0D-00-00-19-2D-B2
name:
powerSource:            Line
...
```

To show information for the mote whose MAC address is 00-17-0d-00-00-01-02-03, enter:

```
get mote #00-17-0d-00-00-01-02-03
moteId:                 14
macAddr:                00-17-0d-00-00-01-02-03
name:
powerSource:            Line
...
```

Additional Information

The `get mote` command displays the following mote information.

Field	Description

moteId	Unique identifier assigned to a mote when it joins the network. This identifier may change from join to join.
macAddr	The mote MAC address.
name	User-defined mote name.
powerSource	Indicates the mote's power source (battery, line/recharge/power scavenging).
dischargeCurrent dischargeTime recoveryTime	The discharge current, discharge time, and recovery time are collectively used to describe the current sourcing capabilities of the three possible types of power supply feeding the mote: *dischargeCurrent* = The discharge current in mA *dischargeTime* = The maximum time (in seconds) that the power supply can sustain the discharge current before experiencing a voltage drop *recoveryTime* = The time (in seconds) required by the power supply to recover from a power drain (for example, recharge its capacitors).
enableRouting	Indicates whether the mote may be configured for routing data from other motes
productName	Product name
hwModel	Hardware model number
hwRev	Hardware revision number
swRev	Software revision number
isAccessPoint	Indicates that this mote is an access point. An access point mote bridges the wireless mesh network to a larger data network (for example, an Ethernet or RS-485 network) and may physically reside in a gateway.
numJoins	Indicates the total number of times that the mote has joined the network since the last time the manager reset.
state	Indicates the mote state: *Idle* = Mote has not been part of the network since the manager started *Lost* = Mote is not currently part of the network *Negotiating1* = Mote is in the process of joining the network *Negotiating2* = Mote is in the process of joining the network *Connected* = Mote is connected to the network *Operational* = Mote is operational *Disconnected* = Mote may be physically removed from network without affecting network

reason	Reason for mote state: None Maximum number of motes has been reached Mote is unreachable Mote is not connected Mote has a configuration error
joinTime	Indicates the last time that the mote joined the manager. If the mote has not joined since the manager started, the joinTime will be zero.
voltage	A floating point value containing the reading from the last battery measurement
numNeighbors	The number of neighbors (potential and connected) that the mote has
allocatedPkPeriod	The currently allocated bandwidth (in msec/packet) from mote to gateway
allocatedPipePkPeriod	The currently allocated bandwidth (in msec/packet) for the pipe. The value 0x01 (action pending) means the manager is in the process of changing the state of the pipe from on to off (or vice-versa).
pipeStatus	Indicates the status of the pipe at the mote
advertisingStatus	Indicates the status of advertising at the mote
needNeighbor	Indicates whether a mote has only one parent and (or) has insufficient links. A well formed network should have only one mote (the “single-parent” mote in the first hop) with this flag on. If the flag is on for other motes, it indicates that an additional mote needs to be added near them.

3.5.6 get motes

Description

The `get motes` command shows information for all motes.

Syntax

```
get motes
```

Parameters

Parameter	Description

Example

```
> get motes
moteId:                  1
macAddr:                 00-17-0D-00-00-19-2D-B2
name:
powerSource:             Line
dischargeCurrent:        0
dischargeTime:           0
recoveryTime:            0
enableRouting:           true
productName:
hwModel:                 3
hwRev:                   37
swRev:                   3.0.2-0
isAccessPoint:           true
numJoins:                1
state:                   Operational
reason:
joinTime:                1354211891321
voltage:                 0.00
numNeighbors:            1
allocatedPkPeriod:       0
allocatedPipePkPeriod:   480
pipeStatus:              off
advertisingStatus:       off
needNeighbor:            false
apRdntMode:              master
goodNeighbors:           1
locationTag:             not supported

moteId:                  2
macAddr:                 00-17-0D-00-00-10-1F-08
name:
powerSource:             Line
...
```

Additional Information

The `get motes` command displays the following mote information.

Field	Description
moteId	Unique identifier assigned to a mote when it joins the network. This identifier may change from join to join.
macAddr	The mote MAC address.
name	User-defined mote name.
powerSource	Indicates the mote's power source (battery, line/recharge/power scavenging).

dischargeCurrent dischargeTime recoveryTime	The discharge current, discharge time, and recovery time are collectively used to describe the current sourcing capabilities of the three possible types of power supply feeding the mote: *dischargeCurrent* = The discharge current in mA *dischargeTime* = The maximum time (in seconds) that the power supply can sustain the discharge current before experiencing a voltage drop *recoveryTime* = The time (in seconds) required by the power supply to recover from a power drain (for example, recharge its capacitors).
enableRouting	Indicates whether the mote may be configured for routing data from other motes
productName	Product name
hwModel	Hardware model number
hwRev	Hardware revision number
swRev	Software revision number
isAccessPoint	Indicates that this mote is an access point. An access point mote bridges the wireless mesh network to a larger data network (for example, an Ethernet or RS-485 network) and may physically reside in a gateway.
numJoins	Indicates the total number of times that the mote has joined the network since the last time the manager reset.
state	Indicates the mote state: *Idle* = Mote has not been part of the network since the manager started *Lost* = Mote is not currently part of the network *Negotiating1* = Mote is in the process of joining the network *Negotiating2* = Mote is in the process of joining the network *Connected* = Mote is connected to the network *Operational* = Mote is operational *Disconnected* = Mote may be physically removed from network without affecting network
reason	Reason for mote state: None Maximum number of motes has been reached Mote is unreachable Mote is not connected Mote has a configuration error
joinTime	Indicates the last time that the mote joined the manager. If the mote has not joined since the manager started, the joinTime will be zero.
voltage	A floating point value containing the reading from the last battery measurement
numNeighbors	The number of neighbors (potential and connected) that the mote has

allocatedPkPeriod	The currently allocated bandwidth (in msec/packet) from mote to gateway
allocatedPipePkPeriod	The currently allocated bandwidth (in msec/packet) for the pipe. The value 0x01 (action pending) means the manager is in the process of changing the state of the pipe from on to off (or vice-versa).
pipeStatus	Indicates the status of the pipe at the mote
advertisingStatus	Indicates the status of advertising at the mote
needNeighbor	Indicates whether a mote has only one parent and (or) has insufficient links. A well formed network should have only one mote (the “single-parent” mote in the first hop) with this flag on. If the flag is on for other motes, it indicates that an additional mote needs to be added near them.

3.5.7 get network

Description

The `get network` command shows network information, such as network name and Network ID.

Syntax

```
get network
```

Parameters

Parameter	Description

Example

```
> get network
netName:                 myNet
networkId:               303
optimizationEnable:      true
maintStartTime:          0
maintEndTime:            0
maxMotes:                251
numMotes:                1
accessPointPA:           true
ccaEnabled:              false
requestedBasePkPeriod:   100000
minServicesPkPeriod:     400
minPipePkPeriod:         480
bandwidthProfile:        P1
manualUSFrameSize:       1024
manualDSFrameSize:       256
manualAdvFrameSize:      128
netQueueSize:            0
userQueueSize:           0
locationMode:            off
backboneEnabled:         false
backboneSize:            1
numParents:              2
fastAdvPeriod:           0
slowAdvPeriod:           0
```

Additional Information

The `get network` command displays the following information.

Field	Description
netName	Describes the specific network installation.
networkId	The Network ID binds motes to their network. This value must be the same for all motes in the network and for the manager.
optimizationEnable	Indicates whether algorithms are enabled on the manager to continuously optimize network links to improve network performance. Dust Networks strongly recommends that optimization remain on (enabled) at all times.
maintStartTime	Start of maintenance period. Statistics will be discarded during this period.
maintEndTime	End of maintenance period.
maxMotes	Maximum number of motes (including APs) allowed in network.
numMotes	The number of motes (excluding gateway motes) that are in the “Live” state

accessPointPA	Describes the RF output power setting of a mote or manager that has a power amplifier (the power amplifier is either on or off).
ccaEnabled	The clear channel access (CCA) value indicates whether network motes (including the access point mote) listen on a channel before they transmit.
requestedBasePkPeriod	Defines the base bandwidth that the manager should allocate for each mote. Note that requested base packet period does not include bandwidth requested through mote service requests and cannot be used to allocate bandwidth for services.
minServicesPkPeriod	Defines the maximum bandwidth that a single mote may be allocated for total non-pipe user requested bandwidth. This limits service requests from motes.
minPipePkPeriod	Limits bandwidth on all pipes (manager-API requested pipes and pipes requested in service requests).

bandwidthProfile	Determines the frame size (number of timeslots) for upstream, downstream , and advertising traffic. There are three profiles available:
	P1 = Normal profile
	P2 = Low-power profile
	Manual = Manual profile. The manual profile is an advanced mode to be used only as directed by an application noe. The manual profile lets you use the next three bytes to manually set the number of timeslots for upstream, downstream, and advertising traffic.

manualUSFrameSize manualDSFrameSize manualAdvFrameSize	The manual upstream frame size, manual downstream frame size, and manual advertising frame size message bytes manually indicate the frame size (number of timeslots) for upstream traffic, downstream traffic, and advertising. These parameters are only applicable if the bandwidth profile is set to “manual.”
netQueueSize	The number of messages in the manager’s network management queue.
userQueueSize	The number of messages in the manager’s user command queue.
locationMode	Deprecated - always off.
backboneEnabled	High speed backbone is on (note this will dramatically increase mote power consumption)
backboneSize	Backbone superframe size - one of 8, 16
numParents	Number of upstream parents. Defaults to 2. Can be increased in cases where path stability is known to be marginal.
fastAdvPeriod	Advertising period when the network is in "fast" mode (i.e. at startup, or when motes go lost)
slowAdvPeriod	Advertising period when the network is in "slow" mode (i.e. 1 hour after last mote join)

3.5.8 get otapfiles

Description

The `get otapfiles` command lists the files that are currently being updated via OTAP (over-the-air programming).

Syntax

```
get otapfiles
```

Parameters

Parameter	Description

Example

```
get otapfiles
```

3.5.9 get otapmotes

Description

The `get otapmotes` command lists the motes that are receiving an OTAP update, and the status for each mote.

Syntax

```
get otapmotes
```

Parameters

Parameter	Description

Example

```
get otapmotes
```

3.5.10 get otapstatus

Description

The `get otapstatus` command provides a summary of the OTAP status.

Syntax

```
get otapstatus
```

Parameters

Parameter	Description

Example

```
> get otapstatus
state:                    Idle
```

3.5.11 get paths

Description

The `get paths` command shows information about all network paths.

Syntax

```
get paths
```

Parameters

Parameter	Description

Example

```
> get paths
pathId:                 65514
moteAMac:               00-17-0D-00-00-19-2D-B2
moteBMac:               00-17-0D-00-00-38-0C-AE
numLinks:               6
pathDirection:          upstream
pathQuality:            82.90


pathId:                 65514
moteAMac:               00-17-0D-00-00-38-0C-AE
moteBMac:               00-17-0D-00-00-19-2D-B2
numLinks:               2
pathDirection:          downstream
pathQuality:            82.90

...
```

3.5.12 get path

Description

The `get path` command displays the path ID and number of links for a path (identified by the MAC addresses of the motes on either end of the path).

Syntax

```
path <MACA> <MACB>
```

Parameters

Parameter	Description
MACA	MAC address of mote at origin of path
MACB	MAC address of mote at end of path

Example

To display information for the path between mote 00-17-0d-00-00-01-02-03 and mote 00-17-0D-00-00-10-2E-F6, enter:

```
> path 00-17-0d-00-00-01-02-03 00-17-0D-00-00-10-2E-F6
pathId:                 65564
moteAMac:               00-17-0d-00-00-01-02-03
moteBMac:               00-17-0D-00-00-10-2E-F6
numLinks:               6
pathDirection:          downstream
pathQuality:            85.80
```

3.5.13 get redundancy

Description

The `get redundancy` command returns redundancy status of the Manager and the status and version of the peer (slave). Available in Manager version >= 4.1.3

Synatax

```
get redundancy
```

Parameters

Parameter	Description

Example

```
> get redundancy

localMode:              master

peerStatus:             unknown

peerControllerSwRev:    3.0.0.2
```

3.5.14 get security

Description

The `get security` command shows security information.

Syntax

```
get security
```

Parameters

Parameter	Description

Example

```
> get security
securityMode:           acceptCommonJoinKey
acceptHARTDevicesOnly:  false
```

3.5.15 get sla

Description

The `get sla` command shows the active network Service Level Agreement (SLA) settings (minimum network reliability, maximum network latency, and minimum path stability levels).

Syntax

```
get sla
```

Parameters

Parameter	Description

Example

```
> get sla
minNetReliability:      98.00
maxNetLatency:          12500
minNetPathStability:    50.00
apRdntCoverageThreshold:70.00
```

3.5.16 get sourceroute

Description

The `get sourceroute` command returns the current primary and secondary source routes to a mote. Available in Manager version >= 4.1.3

Synatax

```
get sourceroute #<MAC>
```

Parameters

Parameter	Description
MAC	MAC address of the target mote

Example

```
> get sourceroute #00-17-0D-00-00-3F-FC-FF

destMac:                00-17-0D-00-00-3F-FC-FF

primary route:

  1. macAddr: 00-17-0D-00-00-20-80-98

  2. macAddr: 00-17-0D-00-00-3F-FC-FF

secondary route:

  1. macAddr: 00-17-0D-00-00-20-80-98

  2. macAddr: 00-17-0D-00-00-10-17-F4

  3. macAddr: 00-17-0D-00-00-3F-FC-FF
```

3.5.17 get system

Description

The `get system` command shows information about the system, such as system name, location, and software/hardware revision.

Syntax

```
get system
```

Parameters

Parameter	Description

Example

```
> get system
systemName:             awesomeNet
location:               dust
swRev:                  4.0.1.33-1
hwModel:                PM2511
hwRev:                  006
serialNumber:           00170d80105b
time:                   1355451359091
startTime:              1354211881000
cliTimeout:             120
controllerSwRev:        4.0.2.51
```

3.5.18 get users

Description

The `get users` command shows the username and privilege information for each network user.

Syntax

```
get users
```

Parameters

Parameter	Description

Example

```
> get users
userName:                admin
privilege:               user
```

3.6 help

Description

Displays online help about a specified CLI command or all commands.

Syntax

```
help [<command> | -a ]
```

Parameters

Parameter	Description
-a	Displays help for all commands

Example

To display help about the `reset` command:

```
help reset
```

3.7 logout

Description

Closes the current CLI session.

Syntax

```
logout
```

Parameters

Parameter	Description

Example

```
logout
```

3.8 onechan

Description

The onechan command sets the network to run on a single specified channel. The network continues to run on one channel until onechannel is turned off. The onechan command may be used for radio frequency compliance testing. Note that this command resets the Access Point (AP) mote, causing the network to re-form.

Syntax

```
onechan {off | <channel-number> }
```

Parameters

Parameter	Description
off	Stops the network from running on one channel. The network returns to using all non-blacklisted channels.
channel-number	The channel (0–15) on which the network will run

Example

To run the network on channel 11, enter:

```
onechan 11
```

To stop the network from running on one channel and return to using all non-blacklisted channels, enter:

```
onechan off
```

3.9 otap

The Over-The-Air-Programming (OTAP) commands allow you to upgrade software on the motes and the gateway.

3.9.1 otap start

Description

The `otap start` command performs the same as function as `exec startOtap`. Refer to `exec startOtap` for a detailed description.

Syntax

```
otap start [-n <numrRetries>] [dir]
```

Parameters

Parameter	Description
-n <numRetries>	Number of times manager tries upgrading the software on the mote if the previous attempt fails
[dir]	The OTAP directory containing the software upgrade file. The default OTAP directory is `/root/otap`.

Example

```
otap start -n 10
```

3.9.2 otap status

Description

Use this command to display the status of an OTAP session in progress. The following status conditions may be found:

- *None* = The OTAP process has been cancelled
- *Initializing* = OTAP handshakes are being performed in preparation for uploading files to the motes
- *Upload* = OTAP files are being uploaded to the motes
- *Commit* = The upload is complete and motes are being reset in order to activate the new software; cancelling an OTAP at this stage will result in motes running different software versions
- *Completed* = OTAP is completed

Syntax

```
otap status
```

Parameters

Parameter	Description

Example

```
otap status
```

3.9.3 otap stop

Description

Use this command to pause an OTAP upload. To restart the OTAP upload, reissue the `otap start` or `exec startOtap` command.

Syntax

```
otap stop
```

Parameters

Parameter	Description

Example

```
otap stop
```

3.10 ping

Description

This command sends a packet to a mote (or all motes) requesting a response. The mote returns its voltage and temperature. You can choose to ping a mote via a specific route or graph. If no route or graph is specified, the manager pings the mote using the optimum route. The `ping` command can be used to verify that a mote is in the network.

Syntax

```
ping [-q] [-c<cnt>] [-i<int>] [-g<grId> [-r<mId:mId...>]] {<moteId>|#<MAC>}..
```

Parameters

Parameter	Description
-q	Show only the totals; do not show individual pings
-c <cnt>	Number of pings to send (there is no limit to the number you may send)
-i <int>	Interval (in seconds) between pings
-g <grId>	Graph to use for the pings
-r <mId:mId...>	Source route to use; the source route can include up to eight motes (identified by Mote IDs)
moteId	ID of the mote to ping
#<MAC>	MAC address of mote to ping

Example

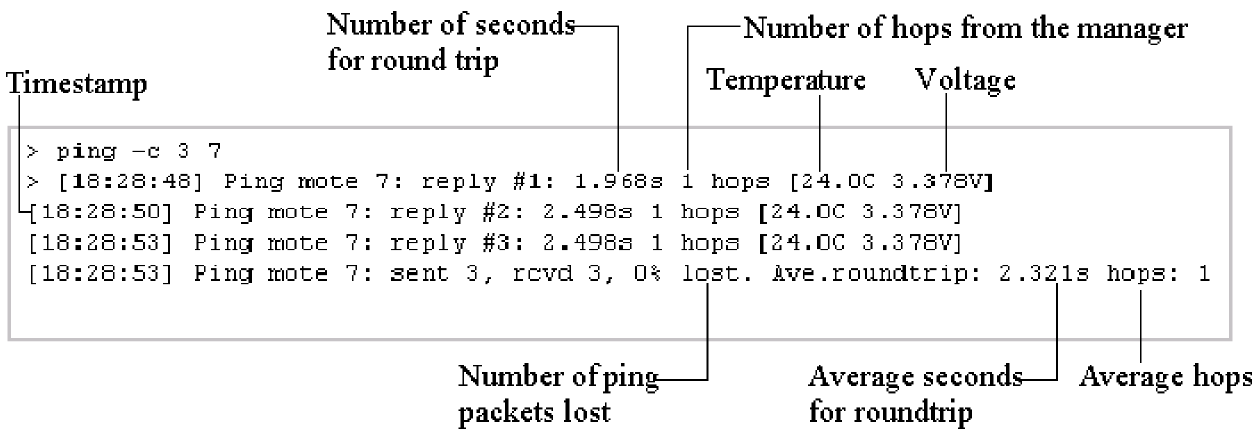
To ping Mote ID 20 ten times using the route through motes 7, 13 and 4, enter:

```
ping -c 10 -g 1 -r 7:13:4 20
```

To ping Mote ID 7 three times, enter:

```
ping -c 3 7
```

The following is an example of a ping result:


Number of seconds for round trip
Number of hops from the manager
Timestamp
Temperature
Voltage
Number of ping packets lost
Average seconds for roundtrip
Average hops

```
> ping -c 3 7
> [18:28:48] Ping mote 7: reply #1: 1.968s 1 hops [24.0C 3.378V]
[18:28:50] Ping mote 7: reply #2: 2.498s 1 hops [24.0C 3.378V]
[18:28:53] Ping mote 7: reply #3: 2.498s 1 hops [24.0C 3.378V]
[18:28:53] Ping mote 7: sent 3, rcvd 3, 0% lost. Ave.roundtrip: 2.321s hops: 1
```

3.10.1 ping show

Description

Shows the status of a ping command that is currently executing. If there is no ping pending, it will return "not found."

Syntax

```
ping show { all | { <moteId> | #<MAC> }... }
```

Parameters

Parameter	Description
all	Shows status of ping for all motes
moteId	Shows status of ping for a mote, identified by its ID
#<MAC>	Shows status of ping for a mote, identified by its MAC

Example

To check on the status of a ping command that was sent to Mote ID 20, enter:

```
ping show 20
```

3.10.2 ping stop

Description

Use this command to stop pinging all motes or a specific mote (identified by Mote ID or MAC address). Command will return the number of successful ping responses received.

Syntax

```
ping stop { all | { <moteId> | #<MAC> }... }
```

Parameters

Parameter	Description
all	Stop pinging all motes
moteId	ID of mote to stop pinging
#<MAC>	MAC address of the mote to stop pinging

Example

To stop pinging Mote ID 28, enter:

```
> ping stop 28
[18:13:54] Ping mote 28: sent 16, rcvd 15, 6% lost. Ave.roundtrip: 3.254s hops:1
```

3.11 set

Description

Use this command to configure the following objects:

- Mote
- Network
- System
- User (user access)
- Security (network security)
- Sla (network service level agreement)
- Blacklist (network channel blacklist)
- Acl (Access Control List)

3.11.1 set acl

Description

Use this command to configure the Access Control List (ACL).

Syntax

```
set acl {#<macAddr> <joinKey>=<val>}
```

Parameters

Parameter	Description
macAddr	MAC address (EUI-64) of mote to be added to the ACL
joinKey	Join key for the mote being added to the ACL

Example

```
> set acl #00:17:0D:00:00:01:02:03 joinKey=0123456789ABCDEF0123456789ABCDEF
macAddr:                00-17-0D-00-00-01-02-03
```

3.11.2 set blacklist

Description

Sets the channel blacklist, replacing any existing channel blacklist.

⚠ For compliant operation in North America, channel 16 (2480 MHz) must be blacklisted. Dust modules are certified as Frequency Hopping devices - if you operate any device in the network at above +10 dBm EIRP, you may not be able to use blacklisting in some jurisdictions.

Syntax

```
set blacklist {<parameter>=<value>...}
```

Parameters

Parameter	Description
frequency	The following frequency values may be specified: 2405 - 2480 in 5 MHz increments

Example

For example, to blacklist channels 2410, 2415, and 2445, enter:

```
> set blacklist frequency=2410 frequency=2415 frequency=2445


frequency:              2410
frequency:              2415
frequency:              2445
```

3.11.3 set mote

Description

The `set mote` command allows updating user-editable parameters of the mote. The mote must be identified with either its Mote ID or MAC address.

Syntax

```
set mote <moteId | #macAddr> <parameter>=<value>...
```

Parameters

Parameter	Description
name	User-defined mote name
enableRouting	Sets mote configurability for routing: *true* = Mote can be configured for routing *false* = Mote cannot be configured for routing

Example

To set the name and *enbaleRouting* flag using the Mote ID:

```
> set mote 11 name=My_Mote enableRouting=false
```

To set just the *enableRouting* flag using the MAC address:

```
> set mote #00-17-0d-00-00-01-02-03 enableRouting=true



moteId:                  11
macAddr:                 00-17-0d-00-00-01-02-03
name:                    My_Mote
powerSource:             Line
dischargeCurrent:        0
dischargeTime:           0
recoveryTime:            0
enableRouting:           false
isAccessPoint:           false
numJoins:                0
state:                   Idle
reason:
allocatedPkPeriod:       0
allocatedPipePkPeriod:   480
pipeStatus:              off
advertisingStatus:       off
needNeighbor:            false
goodNeighbors:           0
locationTag:             not supported
```

3.11.4 set network

Description

The `set network` command allows updating user-editable parameters of the network.

Syntax

```
set network {<parameter>=<value>...}
```

Parameters

Parameter	Description
networkId	Network ID - HART recommends that some network IDs be reserved for specific purposes- see HCF Spec 75, table 2. 0xFFFF is never a valid network ID.
netName	Network name
joinKey	Common join key; this key is used for all motes when the security mode is set to accept the common join key
optimizationEnable	Enables or disables network optimization: *true* = Enables optimization *false* = Disables optimization
maintStartTime	Reserved
maintEndTime	Reserved
maxMotes	Maximum number of motes (including APs) allowed in network
accessPointPA	Sets the power amplifier on a 2.4 GHz network mote or manager that has a power amplifier: *true* = Turns the power amplifier on *false* = Turns the power amplifier off
ccaEnabled	Sets clear channel access assessment (CCA): *true* = Enables CCA *false* = Disables CCA

bandwidthProfile	Chooses which predefined bandwidth profile is used: P1 (default): Upstream superframe = 1024 slots, Downstream = 256 slots P2: Upstream = 1024 slots, Downstream = 2048 slots (slow network build, lower power steady state)
requestedBasePkPeriod	Reserved
minServicesPkPeriod	Reserved
minPipePkPeriod	Reserved
manualUSFrameSize	Reserved
manualDSFrameSize	Reserved
manualAdvFrameSize	Reserved
netQueueSize	Reserved
userQueueSize	Reserved
locationMode	Deprecated - do not use
backboneEnabled	Turns high-speed backbone on/off: *true* = Enables backbone *false* = Disables backbone
backboneSize	Backbone superframe size - one of 8, 16
numParents	Defaults to 2. Range of 1-4.
fastAdvPeriod	Interval between advertisements in fast mode (ms)
slowAdvPeriod	Interval between advertisements in slow mode (ms)

Example
To set the maximum number of motes to 24 and enable network optimization, enter:

```
> set network maxMotes=24 optimizationEnable=true

netName:                 myNet
networkId:               303
optimizationEnable:      true
maxMotes:                24
numMotes:                1
accessPointPA:           true
ccaEnabled:              false
requestedBasePkPeriod:   100000
minServicesPkPeriod:     400
minPipePkPeriod:         480
bandwidthProfile:        P1
manualUSFrameSize:       1024
manualDSFrameSize:       256
manualAdvFrameSize:      128
netQueueSize:            0
userQueueSize:           0
locationMode:            off
```

3.11.5 set security

Description

Use the `set security` command to set the network security parameters.

Syntax

```
set security <parameter>=<value>...
```

Parameters

Parameter	Description
securityMode	Sets the network security mode: *acceptACL* = Allows only the motes on the access control list to join the network *acceptCommonJoinKey* = Allows any mote that shares manager's network join key to join the network
commonJoinKey	Sets the common join key for the network

Example

To set the security mode to accept only motes that are on the ACL, enter:

```
> set security securityMode=acceptACL


securityMode:           acceptACL
acceptHARTDevicesOnly:  false
```

3.11.6 set sla

Description

Use the `set sla` command to configure the network Service Level Agreement (SLA).

Syntax

```
set sla <parameter>=<value>...
```

Parameters

Parameter	Description
minNetReliability	Sets the minimum allowable network reliability (as percent). The percentage value is the number of packets received at manager divided by the number of packets expected at manager.
maxNetLatency	Sets the minimum allowable average packet latency (in seconds).
minNetPathStability	Sets the minimum allowable path stability (as percent). This percentage value is the number of acknowledgments received divided by the number of acknowledgments expected.

Example

To set the SLA for minimum network reliablity to 98%, enter:

```
> set sla minNetReliability=98


minNetReliability:      98.00
maxNetLatency:          12500
minNetPathStability:    50.00
apRdntCoverageThreshold:70.00
```

3.11.7 set system

Description

The `set system` command allows updating user-editable parameters of the system.

Syntax

```
set system <parameter>=<value>...
```

Parameters

Parameter	Description
systemName	Name of system
location	Location of system
ctrlTcpPort	TCP port for the local plaintext control channel
ctrlSslPort	TCP port for the secure control channel
dataTcpPort	TCP port for local plaintext data
dataSslPort	TCP port for secure data
discoveryUdpPort	UPD port for manager discovery
sslEnabled	Enables security for the control and data channels. The sslEnable setting takes effect when the manager restarts. *true* = The ctrlTcpPort and dataTcpPort are only accessible from the localhost, and stunnel is used to provide encrypted access to ctrlSslPort and dataSslPort *false* =The ctrlTcpPort and dataTcpPort provide plaintext access for any client

Example

```
> set system systemName=awesomeNet

systemName:             awesomeNet
location:               dust
swRev:                  4.0.1.33-1
hwModel:                PM2511
hwRev:                  006
serialNumber:           00170d80105b
time:                   1355450339191
startTime:              1354211881000
cliTimeout:             120
controllerSwRev:        4.0.2.51
```

3.11.8 set user

Description

Use the `set user` command to configure network users. Note that the password returned is the password hash, not the actual password.

Syntax

```
set user <parameter>=<value>...
```

Parameters

Parameter	Description
userName	Username
password	User password
privilege	Controls user access to the network: *viewer* = Provides user access to a subset of CLI commands displaying manager information *user* = Provides user access to all CLI commands

Example

```
> set user username=JasonZ password=artZ2ba privilege=user


userName:               JasonZ
password:               pWx3Drxqdi89c
privilege:              user
```

3.12 show

3.12.1 show cli-sessions

Description

Shows CLI user names and login times.

Syntax

```
show cli-sessions
```

Parameters

Parameter	Description

Example

```
> show cli-sessions
admin       user        12/13/12 17:38:19
```

3.12.2 show events

Description

Shows events.

Syntax

```
show events <last> <num>
```

Parameters

Parameter	Description
<last>	Specifies the most recent event you want to see. If *<last>* is 0, shows the latest *<num>* events.
<num>	Specifies the number of events that you want to see which preceded the *<last>* event.

Example

To see 10 events with 3599 as the most recent event shown, enter:

```
> show events 3599 10
```

To see the latest 10 events, enter:

```
> show events 0 10
      1439 AlarmClose 12/11/12 10:30:00.507
      1430  PathDeact 12/10/12 17:03:46.074     65564  00-17-0D-00-00-19-2D-B2
      1431 PathDelete 12/10/12 17:03:46.076     65564  00-17-0D-00-00-19-2D-B2
      1432   MoteJoin 12/10/12 17:03:46.077     28  00-17-0D-00-00-38-0C-AE
      1433 AlarmClose 12/10/12 17:03:46.077        moteDown High  00-17-0D-00-0
      1434 PathCreate 12/10/12 17:03:46.078     65564  00-17-0D-00-00-19-2D-B2
      1435    PathAct 12/10/12 17:03:47.639     65564  00-17-0D-00-00-19-2D-B2
      1436   MoteLive 12/10/12 17:04:17.323     28  00-17-0D-00-00-38-0C-AE
      1437 SysDisconn 12/10/12 19:38:22.225    cli            admin         0.00
      1438  AlarmOpen 12/11/12 10:15:00.503    slaStability  Low
```

3.12.3 show frame

Description

Shows information for the specified superframe. If no superframe number is specified, shows all superframe information.

Syntax

```
show frame <frId>
```

Parameters

Parameter	Description
frId	Superframe identifier

Example

```
> show frame
FRAME: 0
  timeslots: 1024 (0-1023)
  channels: 12 (0-11)
FRAME: 1
  timeslots: 256 (0-255)
  channels: 12 (0-11)
FRAME: 2
  timeslots: 256 (0-255)
  channels: 1 (14-14)
  type: location
FRAME: 4
  timeslots: 16 (0-15)
  channels: 1 (13-13)
  type: input pipe
FRAME: 5
  timeslots: 16 (0-15)
  channels: 1 (13-13)
  type: output pipe
FRAME: 6
  timeslots: 128 (0-127)
  channels: 1 (12-12)
  type: advertisement
Advertisement timeout 20000 msec.
Pipe Status: Off
```

3.12.4 show ap

Description

Shows information for the access point.

Syntax

```
show ap [-a]
```

Parameters

Parameter	Description
-a	Includes information about unused paths

Example

To show information about the gateway and all unused paths, enter:

```
> show ap -a
00-17-0D-00-00-19-2D-B2     1     Oper SW: 3.0.2-0 HW: 37
   Location is not supported
   Number free TS: 838
   Upstream hops: 0, latency: 0.000, TTL: 127
   SourceRoute: Dist(Des):  0.0(1) Prim: 1 Sec:
   Power Source: line
   Advertisement Period: 20.000
   Bandwidth:
      Summary for AP:   0.0433
   Neighbors: 1. Links: 25. Norm/bitmap 21/4 (max norm: 63)
   Links per second: 11.914062 (unlimited)
   Frame: 0. Neighbors: 1. Parents: 0. Links rx:6, tx:1.
      Broadcast links
          0.  1. 0: rtdb
          0.609. 2:  rjb
      <- #28   Links 4/4/4 RSSI: -32 Q: 0.87
   Frame: 1. Neighbors: 0. Parents: 0. Links rx:0, tx:9.
      Broadcast links
          1. 24.10:   tb
          1. 51.11:   tb
          1. 83. 1:  tjb #28
          1.113. 7:   tb #28
          1.139. 5:   tb
          1.167. 7:   tb
          1.195.11:   tb
          1.225.10:   tb
          1.251. 8:   tb
      <- #28   Links 2/2/2 RSSI: -32 Q: 0.87
   Frame: 6. Neighbors: 0. Parents: 0. Links rx:2, tx:8.
      Broadcast links
          6.  0.12:   tb
          6. 16.12:   tb
          6. 32.12:   tb
          6. 48.12:   tb
          6. 62.12:  rjb
          6. 64.12:   tb
          6. 80.12:   tb
          6. 90.12:  rjb
          6. 96.12:   tb
          6.112.12:   tb
```

3.12.5 show linksmap

Description

Shows the list of links for each superframe and the corresponding end points for each link.

Syntax

```
show linksmap
```

Parameters

Parameter	Description

Example

```
> show linksmap
--- LinkMap for Frame#0 (timeslots: 0-1024) ---
ts=1 0:3
ts=242 2:2
ts=505 2:2
ts=609 2:1
ts=757 2:2
ts=932 9:1
ts=1020 2:2
--- LinkMap for Frame#1 (timeslots: 0-256) ---
ts=24 10:1
ts=51 11:1
ts=83 1:2
ts=112 9:1
ts=113 7:2
ts=139 5:1
ts=167 7:1
ts=195 11:1
ts=225 10:1
ts=251 8:1
--- LinkMap for Frame#2 (timeslots: 0-256) ---
ts=255
ts=255
ts=255
ts=255
...
```

3.12.6 show mote

Description

Shows information for a mote (identified by Mote ID or MAC address).

Syntax

```
show mote {<moteId>|#<MAC>} [-l] [-a]
```

Parameters

Parameter	Description
moteId	Mote ID
MAC	Mote MAC address
-l	Show links
-a	Includes information about unused motes

Example

To show information for all motes, enter:

```
show motes -a
```

A shortcut for this command is `sm -a`. For an example of how mote information displays, see the `sm` command.

To show information about a particular mote, enter:

```
> show mote 28
00-17-0D-00-00-38-0C-AE    28   9 Oper SW: 1.0.1-53 HW: 33 (*)
   Location is supported
   Upstream hops: 1, latency: 1.602, TTL: 127
   SourceRoute: Dist(Des):  1.2(0) Prim: 1,28 Sec:
   Power Source: battery
   Advertisement Period: 20.000
   Bandwidth:
      output planned / current       :   0.1333 /   0.1333
      global service / delta         :   0.0433 /   0.0000
      local service goal / current   :   0.0433 /   0.0433
      guaranteed for services / child:   0.0433 /   0.0000
      free                           :   0.0900
      Planned BW per parent: #1 -  0.0433
      Mote services BW:   0.0433
         Problem/Fix Motes 65535/65535 status 0 cur ID 0
         Default    BW:   0.0100
         ID: 0 Time: 30000 BW:   0.0333
   Neighbors: 1 (max 32). Links: 10 (max 200)
   Links per second: 2.539062 (limit: 21.329132)
   Frame: 0. Neighbors: 1. Parents: 1. Links rx:2, tx:5.
      Broadcast links
          0.  1. 0: rtdb
          0.932. 9:  rjb
      -> #1 T Links 4/4/4 RSSI: -33 Q: 0.88
   Frame: 1. Neighbors: 1. Parents: 1. Links rx:2, tx:1.
      Broadcast links
          1.112. 9:  tjb
      -> #1   Links 2/2/2 RSSI: -33 Q: 0.88
   Frame: 6. Neighbors: 0. Parents: 0. Links rx:0, tx:1.
      Broadcast links
          6. 94.12:   tb
```

Description of fields:

- Line 1: MAC address of mote, mote ID, time since last packet, state, software version, hardware type
- Line 3: Upstream hops, average upstream latency, average upstream TTL count
- Line 4: Source route average distance, list of primary source route addresses, list of secondary source route addresses (if one is calculated)
- Lines 6-16: Information about planned versus assigned bandwidth, in links/s needed to meet service and base bandwidth for that mote. The "limit" value is the peak packets/s reported by the mote at join.
- Line 17: Total neighbors and links, with device specific maximums
- Line 19+: Information about links, organized per frame. Contains frame, slot, offset, and flags, where r=receive, t=transmit, d=discovery, b=broadcast, j=join

3.12.7 show motes

Description

Shows information for all motes.

Syntax

```
show motes [-a]
```

Parameters

Parameter	Description
-a	Includes motes in unused state

Example

To show all motes, including motes in unused state, enter:

```
> show motes -a
Current time: 12/13/12 17:46:21 ASN: 123769104
Elapsed time: 14 days, 07:48:20
      MAC                 MoteID  Age Jn      UpTime   Fr Nbrs Links State
00-17-0D-00-00-19-2D-B2   ap  1         1   14-07:48:10  6    1    25 Oper
00-17-0D-00-00-10-0A-4D      21    -1  0       00:00:00  0    0     0 Idle
00-17-0D-00-00-10-0A-51      27    -1  0       00:00:00  0    0     0 Idle
00-17-0D-00-00-38-0C-AE      28    15  2    3-00:42:33  2    1    10 Oper
```

3.12.8 show msg

Description

Shows how many reliable messages the manager has transmitted and how many messages it re-sent. If the number of repeated commands is high, it can indicate a problem sending downstream. Repeated commands should be less than 10% of the total number of commands. More than 10% may indicate the network is not stable.

Syntax

```
show msg [-v]
```

Parameters

Parameter	Description
-v	Includes any messages currently contained in manager's transmit queue

Example

To show the number of reliable messages the manager has transmitted and re-sent, including messages contained in the transmit queue, enter:

```
> show msg -v
** Commands in topology (approximately): 0
** Prepared topology/user packets: 0
** All packets (prepared and requested): 0)
** Number of free buffers (max): 8 (8)
** Output Queue Size: 0 Mngr: 0 VGW: 0 Waiting: 0 User: 0
** Downstream stats: Reliable  : 30. Reliable Repeats: 1/2
** Downstream stats: Tx Data   : 0. Data rate (msgs/sec): 0. Avrg: 0. Max: 0
** Upstream stats: Rcvd Total  : 10789. Rcvd linkfeedback :24
** Upstream stats: Rcvd Data Q : 8791. Data rate (msgs/sec): 0. Avrg: 0. Max: 0
APD queue maximum       : 1
Input queue. Current     : 0 Total: 921 Max: 0 Avrg: 0
Input Data queue. Current: 0 Total: 8791 Max: 0 Avrg: 0 AbsMax: 0
Num Packets Input/Output: 0 / 0
** Waiting Queue:
** Manager Queue:
** Gateway Queue:
** User Queue:
```

3.12.9 show optimization

Description

Shows current optimization state.

Syntax

```
show optimization
```

Parameters

Parameter	Description

Example

```
> show optimization
Auto-recalculation:     On
```

3.12.10 show sessions

Description

Shows how many XML sessions are currently running.

Syntax

```
show sessions
```

Parameters

Parameter	Description

Example

```
> show sessions
Control session limits:
max external sessions: 100
max cli sessions: 4
max serial sessions: 1
max datalog sessions: 5
max web_proxy sessions: 5
Control sessions:
1. user=admin           user      0.0.0.0         last use=12/13/12 17:38:19
Notification sessions:
```

3.12.11 show stat

Description

Displays statistics for motes, paths and the network.

Syntax

Use the following syntax to show statistics for a given interval:

```
show stat { cur | short <idx> | day <idx> | life }
```

Use the following syntax to show statistics for a given mote, path or network:

```
show stat { mote <moteId> | path <moteAId> <moteBId> | net }
```

Parameters

Parameter	Description
cur	Shows statistics for the current 15-minute interval for all motes, paths, and network
short <idx>	Shows 15-minute interval statistics for motes, paths, and network. <*idx*> specifies the interval you wish to view. The most recently completed 15-minute interval is 0. The oldest available interval is 95 (there are 96 15-minute intervals in a 24-hour period). For example, to view statistics for the most recently completed 15-minute interval, enter: show stat short 0
day <idx>	Shows 1-day interval statistics for all motes, paths, and the network. <*idx*> specifies the day you wish to view. The current day is 0. Yesterday is 1. For example, to view statistics for the day before yesterday, enter: `show stat day 2`
life	Shows lifetime statistics for all motes, paths, and network.
mote <moteId>	Shows all statistics for a specified mote (identified by its Mote ID). For example, to view statistics for mote 19, enter: `show stat mote 27`

path <moteAId> <moteBId>	Shows all statistics for the specified path. For example, to view statistics for the path between Mote ID 20 and Mote ID 27, enter: `show stat path 20 27`
net	Shows all statistics for the network

Example

To display all statistics for Mote ID 20, enter:

```
> show stat mote 28
LIFETIME
 Id Rx     Lost  Tx     Rx     Fwd    Drop  Dup   Ltncy Jn Hop avQ mxQ me ne Chg   T
 28  9651      0  9613     21      0      0   637  1.56  2   1   0   4  5  02501 25
DAY
 Id Rx     Lost  Tx     Rx     Fwd    Drop  Dup   Ltncy Jn Hop avQ mxQ me ne Chg   T
 28  2310      0  2310      0      0      0   243  1.63  0   1   0   4  1  02501 25
 28  3168      0  3168      0      0      0   202  1.59  0   1   0   4  3  01901 23
 28  3168      0  3168      0      0      0   160   1.5  0   1   0   4  1  01084 25
 28  1005      0   967     21      0      0    32  1.52  2   1   0   4  0  0 274 24
 28     0      0    --     --     --     --     0    --  0   -   -   -  -  -    -  -
 28     0      0    --     --     --     --     0    --  0   -   -   -  -  -    -  -
 28     0      0    --     --     --     --     0    --  0   -   -   -  -  -    -  -
SHORT
 Id Rx     Lost  Tx     Rx     Fwd    Drop  Dup   Ltncy Jn Hop avQ mxQ me ne Chg   T
index 0 .... start time 12/13/12 17:30:00
 28    33      0    33      0      0      0     2  1.42  0   1   0   4  0  02510 25
 28    33      0    33      0      0      0     2  1.41  0   1   0   4  0  02501 25
 28    33      0    33      0      0      0     3   1.6  0   1   0   4  0  02493 25
 28    33      0    33      0      0      0     3  1.42  0   1   0   4  0  02485 25
 28    33      0    33      0      0      0     4  1.48  0   1   0   4  0  02476 25
index 5 .... start time 12/13/12 16:15:00
 28    33      0    33      0      0      0     3  1.46  0   1   0   4  0  02468 26
 28    33      0    33      0      0      0     2  1.27  0   1   0   4  0  02459 25
 28    33      0    33      0      0      0     2   1.4  0   1   0   4  0  02451 26
 28    33      0    33      0      0      0     4  1.77  0   1   0   4  0  02442 26
 28    33      0    33      0      0      0     4  1.58  0   1   0   4  0  02434 26
...
```

To display statistics for motes, paths and the network during the most recently completed 15-minute interval, enter:

```
> show stat short 0
It is now .................. 12/13/12 17:50:22.
This interval started at ... 12/13/12 17:30:00.
There are 96 valid 15 minute intervals stored.
NOTE: you may be expecting packets that are still in transit!
--------------------------------NETWORK STATS--------------------------------
PkArr  PkLost  PkTx(Fail/ Mic/ Seq)  PkRx  Relia.  Latency   Stability
   33       0    37(   4/   0/   0)    39    100%   1.42s      89.19%
---------------------------------MOTE STATS----------------------------------
 Id Rx    Lost  Tx    Rx    Fwd    Drop  Dup    Ltncy Jn Hop avQ mxQ me ne Chg  T
 28    33     0    33     0     0     0     2  1.42  0   1   0   4  0  02510 25
---------------------------------PATH STATS----------------------------------
MoteA MoteB ABPower BAPower  ABTx(Fail)  ABRx  BATx(Fail)  BARx   Stab.
   1    28    -33     -30       0(   0)     3    37(   4)    36  89.19%
```

Additional Information

The following information may display in response to the manager CLI `show stat` command. To display larger numerical values in the fixed-width tables, the suffix "k" is used to denote 1,000 and the suffix "M" to denote 1,000,000. Despite the displayed values being rounded off in these cases, the Manager internally stores the exact counts.

Field	Description
ABPower	The average RSSI values for transmissions from mote A to mote B.
ABRx	Number of packets mote B received from mote A.
ABTx(Fail)	Number of packets transmitted by mote A to mote B, and the number of packets for which mote A failed to receive acknowledgement. Packets may fail for a number of reasons, including RF interference or bit errors.
avQ	Average number of packets in the mote's queue waiting to be transmitted.
BAPower	The average RSSI values for transmissions from mote B to mote A.
BARx	Number of packets mote A received from mote B.
BATx(Fail)	Number of packets transmitted by mote B to mote A, and the number of packets for which mote B failed to receive acknowledgement. (Not currently implemented. Acknowledgements are not sent for downstream data transmission.)
Chg	Charge consumption, in millicoulombs.
DnLat	Estimated latency for packets sent from the Manager to the mote. This value is based entirely on the hop depth of the mote and not on direct empirical measurement.
Hop	Average number of hops for this mote's data packets to arrive at manager.
Id	Mote ID number.

Jn	Number of times the mote joined since manager was last reset.
me	MAC-layer MIC (message integrity check) errors.
MoteA MoteB	Describes the path from mote A to mote B.
mxQ	Maximum number of packets in the mote's queue waiting to be transmitted.
ne	Network-layer MIC (message integrity check) errors.
PkDrp	Number of data packets dropped by the mote. Packets may be dropped because the mote's buffer was full and the mote was not able to generate a packet.
PkDup	Number of duplicate packets received. A duplicate packet is sent if no acknowledgement is received for any hop in the packet's journey to manager. When duplicate packets are high, it indicates problems with the mote-to-mote communication.
PkFwd	Number of data packets forwarded by the mote to a neighbor.
PkLst	Number of data packets that manager expected, but did not receive.
PkRx	Total number of packets received by network motes.
PkTerm	Number of data packets terminated by the mote.
PkTx(Fail)	Total number of packets transmitted by network motes, and total number of packets for which no acknowledgement was received.
Reliability	Mote or network reliability.
Stability	Path stability (for overall network or motes A and B). Path stability is the percentage of data packets that are successfully transmitted and received by the next mote on the path. If a transmitting mote does not receive an acknowledgement, it resends the packet. Manager calculates path stability for an interval by dividing the number of packets successfully transmitted by the sum of the number of packets successfully transmitted and the number of packets that failed to transmit. *Path stability = (Packets Successfully Transmitted)/(Packets Successfully Transmitted+Packets Failed) x 100%*
T	Temperature in Celsius
UpLat	Upstream data latency. The average time (in seconds) for a data packet to travel from the mote to manager. Manager calculates the data latency for each packet by subtracting the time the packet was received at manager from the packet timestamp, which indicates when the packet was generated by the mote. Manager averages the data latency of all packets from a mote to provide the values for network statistics.

Examples

The following is an example of the statistics provided in response to the `show stat life` command. For field descriptions, refer to the table above.

```
> show stat life
It is now .................. 04/08/13 09:29:03.
This interval started at ... 03/20/13 13:49:09.
--------------------------------NETWORK STATS----------------------------------
PkArr  PkLost  PkTx(Fail/ Mic/ Seq)  PkRx  Relia.  Latency   Stability
4709k       5   35M(5888k/   0/   0)   45M    100%   3.53s       83.3%
---------------------------------MOTE STATS-----------------------------------
 Id    Rx  Lost    Tx    Rx   Fwd  Drop   Dup  UpLat DnLat Jn Hop avQ mxQ me ne Chg  T
 23   17k     2   15k   22k   23k     3  2486  5.07     0  1   1   0   8  0  0 50k 27
 24   18k     0   16k  9204   86k    11  2685  3.29     0  1   1   0   9  0  1 51k 24
 25   18k     1   16k   22k   67k    31  2332  3.89     0  1   1   0   9  0  0 51k 23
 26   17k     2   15k   22k   28k     3  2734  4.76     0  1   1   0   9  0  0 59k 24
---------------------------------PATH STATS-----------------------------------
MoteA MoteB ABPower BAPower  ABTx(Fail)  ABRx  BATx(Fail)  BARx   Stab.
   1    23    -60     -60       0(   0)  8880   28k(8109)   23k  71.95%
   1    24    -65     -71       0(   0)   23k  110k( 42k)   75k  61.43%
   1    25    -70     -70       0(   0)   274  1856( 748)  479k   59.7%
   1    26    -65     -67       0(   0)   22k   92k( 33k)   66k  63.56%
```

The following example shows how statistics are provided in response to the `show stat net` command. *Lifetime* shows lifetime statistics for all motes and paths. *Day* shows statistics for each day, starting with the current day. *Short* shows statistics for each 15-minute interval (an interval begins on the quarter hour), starting with the most recently completed 15-minute interval. For column heading descriptions, refer to the table above.

```
> show stat net
LIFETIME
PkArr  PkLost  PkTx(Fail/ Mic/ Seq)  PkRx  Relia.  Latency   Stability
4709k      40   35M(5888k/   0/   0)   45M    100%   3.53s       83.3%
DAY
PkArr  PkLost  PkTx(Fail/ Mic/ Seq)  PkRx  Relia.  Latency   Stability
  94k       0  701k(116k/   0/   0)  899k    100%   3.36s      83.43%
 240k       0 1751k(259k/   0/   0) 2270k    100%   3.08s      85.19%
 250k       0 1814k(257k/   0/   0) 2395k    100%   3.01s      85.84%
 251k       0 1835k(278k/   0/   0) 2370k    100%   3.07s      84.85%
 250k       0 1879k(322k/   0/   0) 2366k    100%   3.23s      82.82%
 250k       0 1892k(335k/   0/   0) 2407k    100%    3.4s       82.3%
 250k       0 1880k(318k/   0/   0) 2380k    100%   3.48s      83.05%
SHORT
PkArr  PkLost  PkTx(Fail/ Mic/ Seq)  PkRx  Relia.  Latency   Stability
index 0 .... start time 04/08/13 09:00:00
 2598       0   19k(3320/   0/   0)   25k    100%   3.85s      83.15%
 2637       0   18k(2830/   0/   0)   24k    100%   3.29s         85%
 2607       0   19k(2826/   0/   0)   25k    100%   3.12s      85.27%
 2611       0   18k(2925/   0/   0)   24k    100%   3.17s      84.57%
 2606       0   19k(3343/   0/   0)   25k    100%   3.44s      82.82%
index 5 .... start time 04/08/13 07:45:00
 2644       0   19k(3011/   0/   0)   25k    100%    3.1s      84.49%
 2601       0   19k(3275/   0/   0)   25k    100%   3.46s      83.31%
 2613       0   20k(3428/   0/   0)   25k    100%   3.21s      82.92%
 2599       0   20k(3522/   0/   0)   25k    100%   3.41s       82.5%
```

3.12.12 show status

Description

Shows information about manager, including the IP address of each Ethernet interface, the number of motes and their status (live, connected).

Syntax

```
show status
```

Parameters

Parameter	Description

Example

```
> show status
Current time: 12/13/12 17:50:50 ASN: 123796005
Elapsed time: 14 days, 07:52:49
Manager:      4.0.2.51
Redundant State: Master w/o Slave
Netlayer Mode: Master
**** APD ***
Gateway:      3.0.2-0. Connected. Hardware reset is ON
IP (eth0):    10.70.48.124
TS time:      10 ms
Offsets:      15
Mode:         Steady State
AP Channel:     2
Location      is not enabled
Channel mode  is Regular
Max   motes:  251
 in network:  2
       live:  2
  connected:  0
no lost motes:2
# of motes:   27
# activating: 0
Hardware CTS: Ready
Remote log:   Log-service is off
UTC drift:    0.100
Usr/Tplg cmd ratio: 1/3
```

3.12.13 show time

Description

Shows the current time or translates the given ASN time to UTC.

Syntax

```
show time [<asn>]
```

Parameters

Parameter	Description
asn	Absolute Slot Number (must be an integer)

Example

```
> show time
Current time: 12/13/12 17:51:26 ASN: 123799632
Elapsed time: 14 days, 07:53:25

> show time 415
ASN: 415 Time: 11/29/12 09:58:14
```

3.12.14 show ver

Description

Shows manager build and motes by software and hardware version.

Syntax

```
show ver
```

Parameters

Parameter	Description

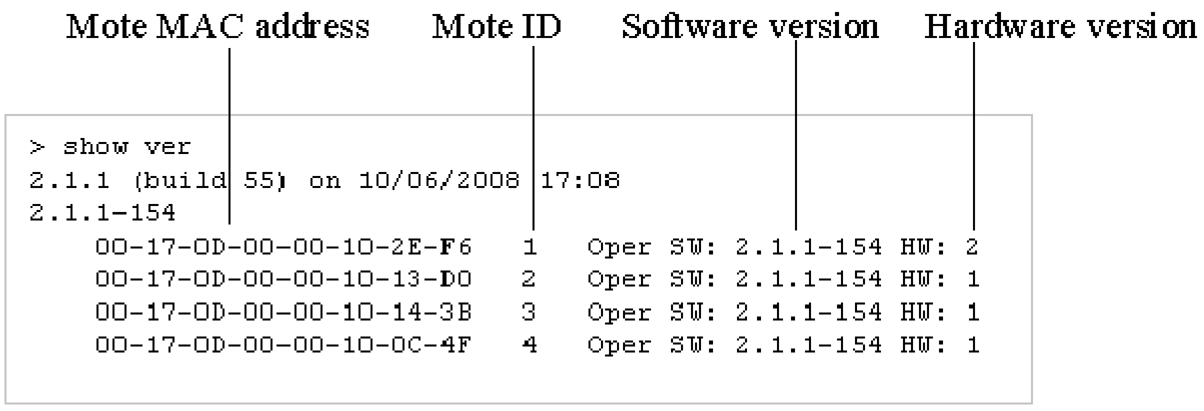
Example

To show version information, enter:

```
> show ver
4.0.2 (build 51) on 11/06/2012 14:12
1.0.1-53
    00-17-0D-00-00-38-0C-AE   28   Oper SW: 1.0.1-53 HW: 33 Stack: 1.0.1-1
3.0.2-0
    00-17-0D-00-00-19-2D-B2    1   Oper SW: 3.0.2-0 HW: 37
```

Additional Information

The following is an example of the information provided in response to the `show ver` command.



```
> show ver
2.1.1 (build 55) on 10/06/2008 17:08
2.1.1-154
     00-17-0D-00-00-10-2E-F6    1    Oper SW: 2.1.1-154 HW: 2
     00-17-0D-00-00-10-13-D0    2    Oper SW: 2.1.1-154 HW: 1
     00-17-0D-00-00-10-14-3B    3    Oper SW: 2.1.1-154 HW: 1
     00-17-0D-00-00-10-0C-4F    4    Oper SW: 2.1.1-154 HW: 1
```

3.13 sm

Description

This command shows information about all motes. It performs the same function as the show motes command described earlier in this guide.

Syntax

```
sm [-a]
```

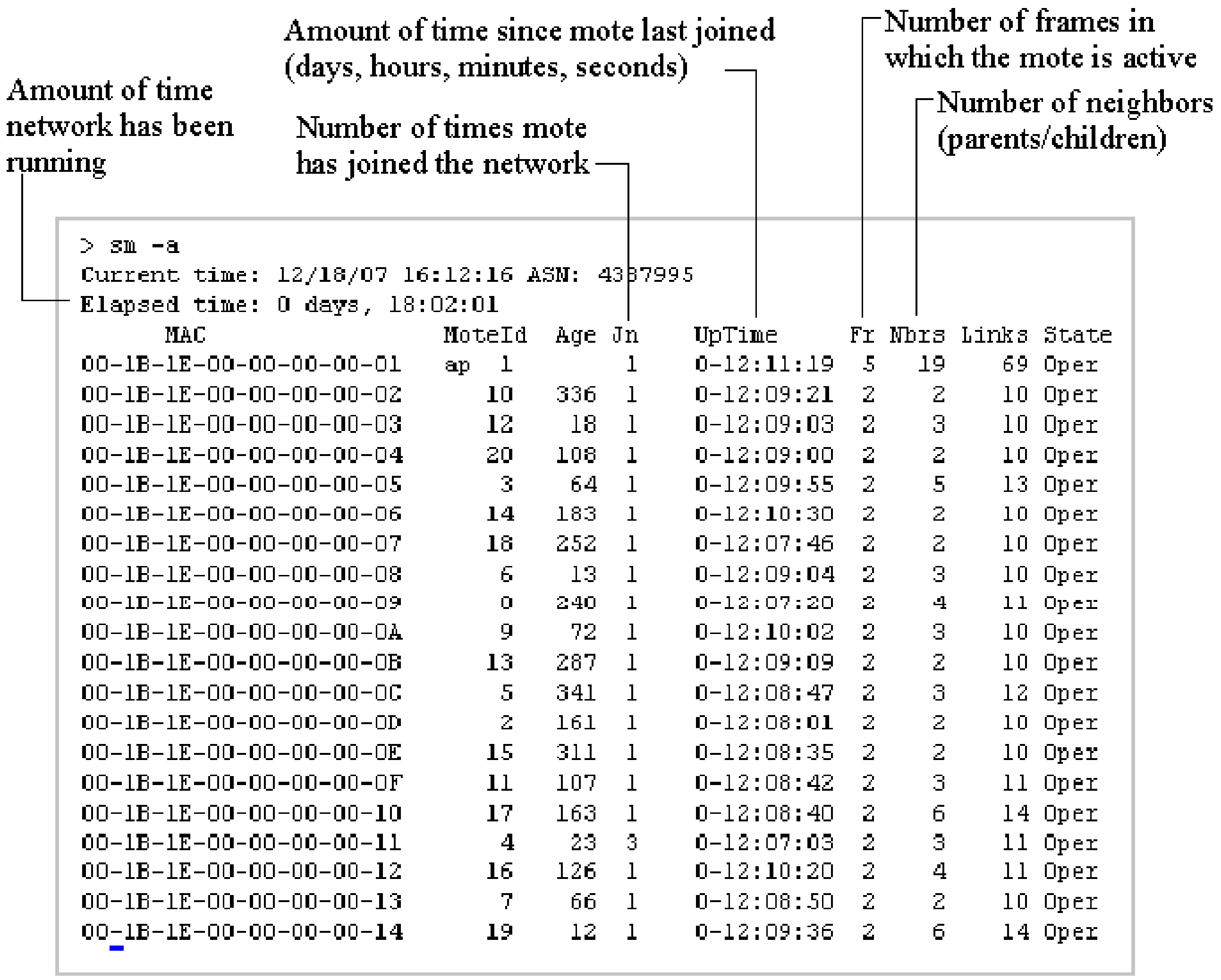
Parameters

Parameter	Description
-a	Includes motes in unused state

Example

```
> sm
Current time: 12/13/12 17:54:30 ASN: 123817979
Elapsed time: 14 days, 07:56:29
      MAC                 MoteID  Age Jn      UpTime   Fr Nbrs Links State
00-17-0D-00-00-19-2D-B2   ap  1         1   14-07:56:18  6    1    25 Oper
00-17-0D-00-00-38-0C-AE      28    25  2    3-00:50:42  2    1    10 Oper
```

The following screen shows how mote information displays.


Amount of time network has been running
Amount of time since mote last joined (days, hours, minutes, seconds)
Number of times mote has joined the network
Number of frames in which the mote is active
Number of neighbors (parents/children)

```
> sm -a
Current time: 12/18/07 16:12:16 ASN: 4387995
Elapsed time: 0 days, 18:02:01
       MAC                    MoteId  Age Jn    UpTime      Fr Nbrs Links State
00-1B-1E-00-00-00-00-01     ap   1         1    0-12:11:19   5   19    69 Oper
00-1B-1E-00-00-00-00-02         10   336   1    0-12:09:21   2    2    10 Oper
00-1B-1E-00-00-00-00-03         12    18   1    0-12:09:03   2    3    10 Oper
00-1B-1E-00-00-00-00-04         20   108   1    0-12:09:00   2    2    10 Oper
00-1B-1E-00-00-00-00-05          3    64   1    0-12:09:55   2    5    13 Oper
00-1B-1E-00-00-00-00-06         14   183   1    0-12:10:30   2    2    10 Oper
00-1B-1E-00-00-00-00-07         18   252   1    0-12:07:46   2    2    10 Oper
00-1B-1E-00-00-00-00-08          6    13   1    0-12:09:04   2    3    10 Oper
00-1B-1E-00-00-00-00-09          0   240   1    0-12:07:20   2    4    11 Oper
00-1B-1E-00-00-00-00-0A          9    72   1    0-12:10:02   2    3    10 Oper
00-1B-1E-00-00-00-00-0B         13   287   1    0-12:09:09   2    2    10 Oper
00-1B-1E-00-00-00-00-0C          5   341   1    0-12:08:47   2    3    12 Oper
00-1B-1E-00-00-00-00-0D          2   161   1    0-12:08:01   2    2    10 Oper
00-1B-1E-00-00-00-00-0E         15   311   1    0-12:08:35   2    2    10 Oper
00-1B-1E-00-00-00-00-0F         11   107   1    0-12:08:42   2    3    11 Oper
00-1B-1E-00-00-00-00-10         17   163   1    0-12:08:40   2    6    14 Oper
00-1B-1E-00-00-00-00-11          4    23   3    0-12:07:03   2    3    11 Oper
00-1B-1E-00-00-00-00-12         16   126   1    0-12:10:20   2    4    11 Oper
00-1B-1E-00-00-00-00-13          7    66   1    0-12:08:50   2    2    10 Oper
00-1B-1E-00-00-00-00-14         19    12   1    0-12:09:36   2    6    14 Oper
```

3.14 su

Description

This is a reserved command used for debugging

Syntax

su <string>

Parameters

Parameter	Description
string	Reserved string

Example

3.15 trace

Description

Use this command to display subsystem information as it is generated. The information continues to display until you turn the trace off. To turn a trace off, type the command even if information is streaming in so quickly that you cannot see the command prompt.

The commands `trace io`, `trace rawio`, `trace ioall`, and `trace notif` consume substantial resources on the manager and can cause performance degradation and network reset if they are left on. These commands should be used only for debugging purposes and turned off as soon as possible.

Syntax

```
trace <parameter> { on | off }
```

Parameters

Parameter	Description
alarm	Displays information about active alarms
cong	Displays information about downstream congestion
io	Displays compressed input-output packets (a short version of rawio)
apmio	Low level Access Point Mote (APM) traffic
apmnak	APM NACK trace (Available Manager >= 4.1)
latency	Displays data latency
login	Displays the IP address of users that are currently logged on to the CLI
logmsg	Displays log messages
motest	Displays mote state changes
notif	Displays notification connection information
rawio	Displays raw input-output packets
rpc	Displays information about the xmlrpc connection
secio	Raw security I/O data

stats	Displays statistics calculations
opt	Optimization scoring calculations (Available Manager >= 4.1)
syserr	Displays system errors
topology	Displays topology events
thread	Displays thread start/stop events
timeout	Displays latency and average latency for communications with mote
c2cio	Controller-to-controller, i.e. redundancy (c2c) driver IO (Available Manager >= 4.1)
c2crawio	Controller-to-controller driver raw IO (Available Manager >= 4.1)
redun	Redundancy state (Available Manager >= 4.1)
ioall	Displays all input and output information
info	Display standard information
bw	Bandwidth calculation (Available Manager >= 4.1)
path	Path deletion (Available Manager >= 4.1)
loc	Reserved (Deprecated in Manager >= 4.1)
all	Displays information on all of the trace parameters
status	Shows which traces are currently running

Example

To turn on a trace for input and output packets, enter:

```
trace io on
```

When you are ready to turn this trace off, enter:

```
trace io off
```

To display raw input and output packets, enter:

```
trace rawio on
```

When you are ready to turn this trace off, enter:

```
trace rawio off
```

To display all input and output packets, enter:

```
trace all on
```

When you are ready to turn this trace off, enter:

```
trace all off
```

4 Access Point CLI Commands

This chapter describes how to use the Access Point CLI commands. These commands are used to test the manager's radio transmission and reception. Use the following procedure to log on to the Access Point CLI.

4.1 Logging on to the Access Point CLI

Loging on to the Access Point CLI provides access to the radio test commands.

To log on to the Access Point CLI:

1. At the prompt within the terminal program or SSH session, access the Linux logon prompt by entering the username and password (the default is shown here).

Username: `dust`
Password: `dust`

2. At the Linux prompt ($), enter:

```
/opt/dust-manager/bin/apdconsole.py
```

3. You will be presented with a console message and a prompt (>):

```
Conect to 127.0.0.1:55551

>
```

To log out of the Access Point CLI and return to Linux:

1. Enter the `logout` command.
2. The CLI will print a message and exit:

```
apdconsole exit!
dust@manager:~$
```

4.2 radiotest start

Description

Use this command to disable normal operation of manager's access point mote in order to initiate radio testing using the `radiotest tx` and `radiotest rx` commands. Once in radiotest mode, only power cycling the manager or issuing `radiotest stop` will return the AP to normal operation.

Syntax

```
radiotest start
```

Parameters

Parameter	Description

Example

```
radiotest start
```

4.3 radiotest stop

Description

Use this command to return manager's access point mote to normal operation after radio testing is completed.

Syntax

```
radiotest stop
```

Parameters

Parameter	Description

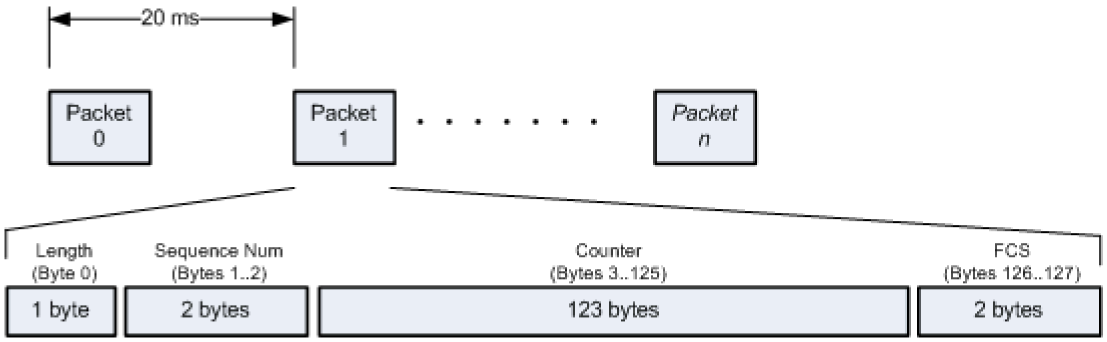
Example

```
radiotest stop
```

4.4 radiotest tx

Description

Use this command to initiate a series of 128-byte packet transmissions. As shown in the figure below, byte 0 contains the packet length (excluding the length parameter itself), which is 127 bytes. Bytes 1 and 2 contain the transmission sequence number. Bytes 3-125 contain a big-endian counter (from 0-122) that increments with every byte. The interpacket delay is 20 ms (see figure). Before using the `radiotest tx` command you need to issue the `radiotest start` command to place the manager's Access Point (AP) mote in test mode. After radio testing is completed, issue the `radiotest stop` command to return manager's access point mote to normal operation. If *numPkts* is set to 0, the AP generates an unmodulated test tone on the selected channel. The AP stops the tone with the `radiotest stop` command.



radiotest tx Packet Format

Channel numbering for this command is 0-15, corresponding to IEEE 2.4 GHz channels 11-26

Syntax

```
radiotest tx <channel> <numPkts>
```

Parameters

Parameter	Description
channel	RF channel (0 to 15) to use for the transmission test
numPkts	Number of packets to send. Specifying 0x00 sends an unmodulated test tone

Example

```
> radiotest tx 15 100

> TestRadioTx is responsed with RC=0
```

4.5 radiotest set txpower

Description

The `radiotest set txpower` command sets the conducted transmit power level on the Access Point.

Syntax

```
radiotest set txpower <txPowerLevel>
```

Parameters

Parameter	Description
txPowerLevel	Sets Tx power level. Valid values are -2 or 8.

Example

To turn power amplification on, enter:

```
> radiotest set txpower 8
> Set txPower RC=0
```

4.6 radiotest rx

Description

The `radiotest rx` command clears all previously collected statistics and initiates a test of radio reception for the specified channel and duration. During the test, the mote keeps statistics of the number of packets received (with and without error). The test results may be retrieved using the `radiotest getstats` command.

Before using the `radiotest rx` command you need to issue the `radiotest start` command to place manager's access point mote in test mode. After radio testing and radio statistics retrieval is completed, issue the `radiotest stop` command to return manager's access point mote to normal operation.

⚠ Channel numbering for this command is 0-15, corresponding to IEEE 2.4 GHz channels 11-26

Syntax

```
radiotest rx <channel> <numSecs>
```

Parameters

Parameter	Description
channel	RF channel (0 to 15) to use for the radio reception test
numSec	Duration or the radio reception test (in seconds)

Example

> radiotest rx 15 2
> TestRadioRx is responsed with RC=0

4.7 radiotest getstats

Description

The `radiotest getstats` command retrieves statistics for the latest radio reception test performed using the `radiotest rx` command. The statistics show the number of good and bad packets (CRC failures) received during the test.

After radio testing is completed, you need to issue the `radiotest stop` command to return manager's Access Point Mote to normal operation.

Syntax

```
radiotest getstats
```

Parameters

Parameter	Description

Example

```
> radiotest getstats
> rxTestStats: RC=0  rxOk=99 rxFail=1
```

4.8 show stats

Description

The `show stats` command displays statistics for the Access Point Driver (APD) and the Access Point Mote (APM).

Syntax

```
show stats
```

Parameters

Parameter	Description

Example

```
> show stats
> *********** apd statistics *************
  numDataTx          : 84
  numDataRetry       : 0
  numAckTx           : 15
  numNakTx           : 0
  numDataRx          : 15
  numDupDataRx       : 0
  numUnexpectedDataRx: 0
  numAckRx           : 84
  numNakRx           : 0
  maxAPMOutQSize     : 1
  averAPMOutQSize    : 0.133333
  averResponse       : 2.42857 ms
  averAPMToDCCDelay  : 2.67857 ms
  numAPMToDCCPkt     : 84
*********** apm statistics *************
  numDataTx          : 13
  numDataRetry       : 0
  numAckTx           : 85
  numNakTx           : 0
  numDataRx          : 85
  numDupDataRx       : 0
  numAckRx           : 13
  numNakRx           : 0
  maxAPDOutQSize     : 0
  averAPDOutQSize    : 0
  averResponse       : 19 ms
  averDCCToAPMDelay  : 25.8333 ms
  numDCCToAPMPkt     : 12
```

Additional Information

The following information may appear in response to the radio test CLI `show stats` command.

Field	Description
numDataTx	Number of packets transmitted
numDataRetry	Number of packets retransmitted
numAckTx	Number of acknowledgements transmitted
numNacTx	Number of packets for which no acknowledgement was transmitted
numDataRx	Number of packets receive
numDupDataRx	Number of duplicate packets received
NumUnexpectedDataRx	Number of unexpected packets received

numAckRx	Number of acknowledgements received.
numNacRx	Number of packets for which no acknowledgement was received
maxAPMOutQSize	Displays internal counters used by Dust Networks application engineering for system troubleshooting
maxAPDOutQSize	Displays internal counters used by Dust Networks application engineering for system troubleshooting
averAPMOutQSize	Displays internal counters used by Dust Networks application engineering for system troubleshooting
averAPDOutQSize	Displays internal counters used by Dust Networks application engineering for system troubleshooting
averResponse	Average response time (milliseconds)
averDCCToAPMDelay	Average delay from the manager to the APM
averAPMToDCCDelay	Average delay from the APM to the manager
numAPMToDCCPkt	Number of packets sent from the APM to the manager
numDCCToAPMPkt	Number of packets sent from the manager to the APM

4.9 show status

Description

The `show status` command returns the current state of the Access Point Mote (APM) - either radio test or normal, and whether the manager has received the AP's boot message.

Syntax

```
show status
```

Parameters

Parameter	Description

Example

```
> show status
 apm mode: radio test
 apm booted
```

5 Managing Users and Passwords

This section provides instructions for managing users and passwords for the SmartMesh WirelessHART Manager CLI and Linux console.

5.1 Managing Users and Passwords for the Manager CLI

You can create new users for the `nwconsole` application (Manager CLI). Two password options are available, which determine command access privileges for the CLI session. To create new users or change passwords or access privileges, you must log on with user privileges. Instructions are provided below.

Access Privileges	Default Password	Description
`user`	*admin*	Provides user access to all CLI commands.
`viewer`	*viewer*	Provides access to a subset of CLI commands displaying network information.

To create a new username and password:

1. Log on to the manager CLI with `user` privileges. For log on instructions, see Logging on to the Manager CLI.
2. To create a new username and password, enter:

```
set user userName=<new user name> password=<new password> privilege=<user/viewer>
```

To change a user password or access privileges:

1. Log on to the Manager CLI with user privileges. For log on instructions, see Logging on to the Manager CLI.
2. To change the password for an existing user, enter:

```
set user userName=<user name> password=<new password> privilege=<user/viewer>
```

5.2 Changing the Linux Login Password

You can change the default Linux login password (for the `dust` user). The new password must be 5 to 8 characters long, and should include a combination of upper and lower case letters and numbers.

To change the Linux login password:

1. At the prompt within the terminal program or SSH session, access the Linux login prompt by entering the current username and password (the default is shown here).
   Username:`dust`
   Password:`dust`
2. At the Linux prompt ($), enter:

   ```
   passwd
   ```

3. When prompted, enter the old password.
4. Enter the new password.
5. Re-enter the new password.

6 Linux Console Commands

The manager software runs on a Linux platform. There are a number of Linux console commands supplied along with the manager software for system administration of the device.

6.1 Logging into the Linux console

At the prompt within the terminal program or SSH session, access the Linux login prompt by entering the following username and password:

Username: `dust`
Password: `dust`

6.2 clear-motes

usage: clear-motes [--use-defaults]

The clear-motes command stops the Manager and removes persistent mote configuration, including mote names and mote ACL entries. By default, the common join key is preserved. If the `--use-defaults` option is passed to the scripts, it also removes the common join key.

6.3 config-login

usage: config-login [-p <port>] { enable | disable | status }

The `config-login` command is used to enable or disable the console (Linux command line) login on **Serial 1**. When console login is enabled, the **Serial 1** port provides a standard login prompt.

The `dust` user can invoke the `config-login` command using `sudo`.

```
dust@manager$ sudo config-login disable
```

6.4 config-ppp

```
usage: config-ppp [-p <port>] [-l <local IP>] [-r <remote IP>] [-w] [ enable | enable-windows |
disable | status ]
   port      - serial port (eg, ttyS1)
   local IP  - local IP address
   remote IP - remote IP address
   -w        - configure to run with a windows client
```

The `config-ppp` command is used to enable or disable the PPP server on Serial 1. When PPP is enabled, a PPP server listens for connections on the **Serial 1** port.

The `dust` user can invoke the `config-ppp` command using `sudo`.

```
dust@manager$ sudo config-ppp enable
```

6.5 create-network-snapshot

This allows the user to create a snapshot of the current Manager and network state. The command is invoked as:create-network-snapshot

By default, this script creates a directory `/tmp/snapshot`. The snapshot is created as a tarball named `snapshot.tar.gz` in this directory. If there is an older `snapshot.tar.gz` file, it is moved to `snapshot.tar.gz.old`.

6.6 dust-manager

The `dust-manager` script is the system-level init script for starting the Manager software. The `dust-manager` script can be invoked with `sudo` by the `dust` user. After performing its initialization, the `dust-manager` script calls the `mgrctl` script to perform the specified action.

```
dust@manager$ sudo /etc/init.d/dust-manager start
```

Standard actions:

`start` – Start the manager software.

`stop` – Stop the manager software.

`restart` – Restart the manager software.

On the LTP5903CEN-WHR, the `dust-manager` script is responsible for setting several environment variables used by the Manager.

Environment Variable	**Used by**
DUST_SERIAL_NUMBER	Used by the Manager software as the device id for licensing. Reported by the Manager API as part of the System element.
DUST_PRODUCT_NAME	Reported by the Manager API as part of the System element
DUST_HW_REVISION	Reported by the Manager API as part of the System element
DUST_DUSTMGR_REV	Reported by the Manager API as part of the System element

6.7 mgrctl

Startup and shutdown script for the Manager processes.

The `mgrctl` script is not the system-level init script provided on the device. The init script, `/etc/init.d/dust-manager`, performs additional operations such as setting required environment variables before calling the `mgrctl` script. It may require root privileges to run.

Standard actions:

`start` – Start the manager software.

`stop` – Stop the manager software.

`restart` – Restart the manager software.

`monitor` – Report whether the manager software is running.

`promote` - Promote a slave to master.

The mgrctl script is also used for starting the Manager under a redundancy manager, such as Linux-HA (though no HA system is provided in this release). The script conforms to the Linux-HA OCF spec required by resource agents.

6.8 Network Configuration

A couple of scripts are provided for changing the system's network configuration. These scripts can be run under `sudo` by the `dust` user. usage: ifswitch-to-dhcp

Switch the network configuration to use DHCP to obtain IP address and DNS configuration.

```
dust@manager$ sudo ifswitch-to-dhcp
```

usage: ifswitch-to-static <ip address> [gateway address] [netmask] [dns server]

Switch the network configuration to use a static IP address. If the additional parameters are not provided, the script assumes default values based on a `/24` subnet.

```
dust@manager$ sudo ifswitch-to-static 192.168.1.100
```

6.9 restore-dcc-conf

6.9.1 restore-dcc-conf

The `restore-dcc-conf` command stops the Manager and removes any persistent configuration, all ACL entries and log files, restoring the default shipping configuration.

```
dust@manager$ sudo restore-dcc-conf
Removing SMM log files...
Removing mote information...
Removing manager configuration...
Removing join configuration...
Removing user configuration...
Restoring /opt/dust-manager/conf/config/system.ini...
Restoring /opt/dust-manager/conf/settings/dcc.conf...
Restoring /opt/dust-manager/conf/settings/serial.conf...
Restoring /opt/dust-manager/conf/settings/xmlrpc.conf...
Restoring /opt/dust-manager/conf/settings/watchdog.conf...
Restoring /opt/dust-manager/conf/config/watchdog-client.conf...
```

6.10 restore-factory-conf

The `restore-factory-conf` command removes any persistent configuration of the device and restores the default shipping configuration, including user passwords for the Linux and Admin Toolset logins. The `restore-factory-conf` command also calls `restore-dcc-conf` to restore Manager configuration.

```
dust@manager$ sudo restore-factory-conf
```

Optionally, the restore-factory-conf command can be used to restore just the user passwords for both the Linux and Admin Toolset logins by passing the `--users` argument to the command. This command does not affect any other device configuration, nor the Manager configuration.

```
dust@manager$ sudo restore-factory-conf --users
Restoring default passwords
Restoring /etc/passwd...
Restoring /etc/shadow...
Restoring /opt/dust-manager/web/.htpasswd...
```

See Restoring Manager Factory Default Settings.

6.11 set-conf-param

6.11.1 set-conf-param

usage: `set-conf-param <file> <parameter> [value]`

Get or set a configuration parameter in a Manager ini file. This script only examines the existing configuration file. It does not know about default values compiled into the software. Therefore, if a file does not exist or a variable is not present in the configuration file, the script will not return a value.

For example:

```
dust@manager$ set-conf-param $SMARTMESH_HOME/conf/config/system.ini RDNCY_STANDALONE_MODE false
dust@manager$ set-conf-param $SMARTMESH_HOME/conf/config/system.ini RDNCY_STANDALONE_MODE true
```

6.12 set-time

usage: /usr/bin/set-time [-z <timeZone>] [{-t <time>} | {-s <server1> <server2> <server3>}] [-q]

Set the system clock time. If the time is set manually, NTP synchronization will be disabled. If NTP servers are specified, NTP will be used to update the system time.

- `timeZone` : name of timezone to use
- `time` : current time in the format `MMDDhhmm[[CC][YY][.ss]]`
- `server` : hostname or IP of ntp timeservers to use
- `-q` : instead of prompting interactively for unspecified values, use existing configuration