Kirale Command-Line Shell

Reference Guide

Introduction

This document provides command documentation associated with Kirale Command-Line Shell (KSH) which is a human-friendly interface that allows to communicate with KiNOS through a USB port.

Disclaimer

INFORMATION IN THIS DOCUMENT IS SUBJECT TO CHANGE WITHOUT NOTICE AND DOES NOT REPRESENT A COMMITMENT ON THE PART OF KIRALE TECHNOLOGIES.

KIRALE TECHNOLOGIES PROVIDES THIS DOCUMENT “AS IS,” WITHOUT WARRANTY OF ANY KIND, EXPRESSED OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF FITNESS OR MERCHANTABILITY FOR A PARTICULAR PURPOSE. KIRALE MAY MAKE IMPROVEMENTS AND/OR CHANGES IN THIS MANUAL OR IN THE PRODUCT(S) AND/OR THE PROGRAM(S) DESCRIBED IN THIS MANUAL AT ANY TIME.

Trademarks and Copyright

© 2019 Copyright - Kirale Technologies S.L.

All Rights Reserved. No part of this document may be photocopied, reproduced, stored in a retrieval system, or transmitted, in any form or by any means whether, electronic, mechanical, or otherwise without the prior written permission of Kirale Technologies.

Kirale® and Kirale Technologies logos are registered trademarks of Kirale Technologies S.L. Other trademarks are the property of their respective owners.

Contact Information

Kirale Technologies S.L.
General Vara de Rey 9, 5B
26001 – Logroño (SPAIN)

+34 941 578 578
info@kirale.com
https://www.kirale.com

Contents

© Kirale Technologies

Revision History

Date	Revision	Changes
03/2018	1.0	Initial release.
06/2019	1.2	Full update with new KSH commands and descriptions.

© Kirale Technologies

1. KSH Command Syntax

1.1. Command syntax

KSH commands are intended to have human-friendly syntax to easy manual execution by a user from a PC. The command syntax is based in space separated ASCII words which specify either keywords or parameters. It is represented as:

kinos@local:~$ **command < arg > < key > < subkey >** [param 1] … [param N]

Where **command** is the name of the first level command to execute. It can have an **argument** to execute a lower-level command and can also have **keywords**, **sub-keywords** and parameters which are variable data required to a successful command execution.

ⓘ **Syntax of each command will be detailed in next sections of this guide.**

To display command list type **help** or **?** in the serial terminal and press enter:

```
kinos@local:~$ help
  Commands:
    clear       config      debug       exec        ifdown
    ifup        ping        reset       show
  Consult KSH Reference Guide for Command reference
```

To display the list of all available arguments for **show** command type:

show, **show ?** or **show help**

```
kinos@local:~$ show help
  Usage   : show <arg>
  Argument:
    childt      commcred    commsid     emac        eui64
    heui64      hwver       hwconfig    ipaddr      joincred
    joiners     joinport    maxchild    netconfig   parent
    pollrate    prefixt     provurl     rloc16      role
    routert     servicet    snum        stats       status
    swver       thinfo      thver       timeout     txpower
    uptime      vinfo       xpanfilt
  Consult KSH Reference Guide for Command reference
```

To display the list of all available arguments for **config** command type:

config, **config ?** or **config help**:

```
kinos@local:~$ config help
  Usage   : config <arg>
  Argument:
    actstamp    autojoin    bagent      brouter     channel
    comm        commcred    emac        hwmode      ipaddr
    joiner      joincred    joinport    led         lowpower
    maxchild    mkey        mlprefix    netname     outband
    panid       pollrate    prefix      provurl     role
    route       service     steering    timeout     txpower
    vdata       vmodel      vname       vswver      xpanid
    xpanfilt
  Consult KSH Reference Guide for Command reference
```

To display the list of all available arguments for **exec** command type:

exec, **exec ?** or **exec help**:

```
kinos@local:~$ exec help
  Usage   : exec <arg>
  Argument:
    activeget   activeset   commget     commset     panidqry
    pendget     pendset
  Consult KSH Reference Guide for Command reference
```

To display the list of all available arguments for **debug** command type:

debug, **debug ?** or **debug help**:

```
kinos@local:~$ debug help
  Usage   : debug <arg>
  Argument:
    level       module
  Consult KSH Reference Guide for Command reference
```

1.2. Parameter syntax

There are six possible parameter formats:

- **Hexadecimal**: represented in this guide as [hex].

  For some commands this kind of parameter is only valid within an allowed range. This range could be specified between two values (e.g. 0x0000 to 0xFFFE) or as a number of bytes (e.g. 2B – 2 bytes). The range of the parameters of each command is explained in the next section.

  The [hex] hexadecimal parameters must be entered in hexadecimal notation like “0xABCD” or “0xabcd” with “0x” prefix.

- **Decimal**: represented in this guide as [dec].

  For some commands this kind of parameter is only valid within an allowed range. This range could be specified between two values (e.g. 11 to 26) or as a number of bytes (e.g. 1B – 1 byte). The range of the parameters of each command is explained in next section.

  The [dec] decimal parameters must be entered in decimal notation like “64”.

- **String**: represented in this guide as [str].

  String parameters must be enclosed in double quotes (″) and could be limited in length. This length limit is specified as number of allowed characters (e.g. 6C to 32C – 6 to 32 characters).

- **IP Address**: represented in this guide as [addr].

  This parameter format is used to specify IPv6 addresses, routes or prefixes and it must be formatted as s specified in RFC 4291 section 2 (16 bytes):

1. The preferred form is x:x:x:x:x:x:x:x, where the 'x's are one to four hexadecimal digits of the eight 16-bit pieces of the address.

Examples:

```
ABCD:EF01:2345:6789:ABCD:EF01:2345:6789
2001:DB8:0:0:8:800:200C:417A
```

2. The compressed form, where the use of "::" indicates one or more groups of 16 bits of zeros. The "::" can only appear once in an address. The "::" can also be used to compress leading or trailing zeros in an address.

For example, the following addresses:

```
2001:DB8:0:0:8:800:200C:417A
FF01:0:0:0:0:0:0:101
```

may be represented as:

```
2001:DB8::8:800:200C:417A
FF01::101
```

3. An alternative form that is sometimes more convenient when dealing with a mixed environment of IPv4 and IPv6 nodes is x:x:x:x:x:d.d.d.d, where the 'x's are the hexadecimal values of the six high-order 16-bit pieces of the address, and the 'd's are the decimal values of the four low-order 8-bit pieces of the address (standard IPv4 representation).

Example:

```
0:0:0:0:0:0:13.1.68.3
```

- **MAC Address**: represented in this guide as [mac].

  This parameter format is used to specify 64-bit addresses

  (e.g. `84-04-d2-00-00-00-00-01`, 8 bytes).

- **Array**: represented in this guide as [arr].

  This parameter format is used to specify payloads that must be sent with no change. They are made up of an array of bytes in hexadecimal notation without “0x”prefix.

1.3. Returned messages

When a command is executed in Kirale Command-Line Shell, some errors could be reported in response to its execution:

- **Invalid syntax**

  Both command and argument has been recognized by system but some of the keywords or sub-keywords are wrong, or there are more parameters than expected for this command.

- **Command not found**

  The command or argument does not exist.

- **Bad parameter**

  Some of the parameters that have been typed is wrong or the value is out of range.

- **Command not allowed**

  The command cannot be executed at this time. It might require some specific device status or perhaps some other configuration is not allowing to be executed.

- **Configuration settings missing**

  The command cannot be executed because more settings are required before.

- **Processing – please wait**

  The device is executing some other priority process. Only show status command is allowed at this time. Any other command is not allowed until the priority process ends.

If there is not a returned message, only the prompt, it means that command was successfully processed.

© Kirale Technologies

2. Command Quick Reference Table

COMMAND	ARG	KEY	SUBKEY	PARAM 1	PARAM 2	PARAM 3	SYNTAX	PARAM. RANGE	DEFAULT	NV
clear							**clear**			-
reset							**reset**			-
ifup							**ifup**			-
ifdown							**ifdown**			-
ping				[IPv6 address]	*[payload size]*		**ping** [addr] *[dec]*	16B; ≤ 1232	- ; zero-length payload	-
				[host-name]	*[payload size]*		**ping** [str] *[dec]*	≤ 31C; ≤ 1232	- ; zero-length payload	-
debug	level	none					**debug level** <key>		**none**	Y
		all								
		info								
		log								
		error								
	module	none					**debug module** <key> *<subkey>*		**none**	Y
		all								
		ether								
		serial								
		radio	data							
			command							
			beacon							
		ipv6	icmp							
			udp							
		app	mle							
			dtls							
			coap							
			dhcp							
config	panid			[pan ID]			**config panid** [hex]	≤ 0xFFFE	not set	Y
	channel			[channel]			**config channel** [dec]	11 to 26	not set	Y
	role	leader					**config role** <key>		not set	Y
		reed								

© Kirale Technologies

		fed								
		med								
		sed								
	emac			[EUI-64 MAC address]			**config emac** [mac]	8B	randomly generated	Y
	joinport			[joiner port]			**config joinport** [dec]	2B	49786	N
	joincred			[joiner credential]			**config joincred** [str]	6C to 32C	EUI-64 from Serial Num.	N
	joiner	add		[EUI-64 MAC address]	[joiner credential]		**config joiner add** [mac] [str]	8B; 6C to 32C		N
		remove		[EUI-64 MAC address]			**config joiner remove** [mac]	8B		
		remove	all				**config joiner remove all**			
	commcred			[commissioner credential]			**config commcred** [str]	6C to 255C	"THREAD"	Y
	comm	on					**config comm** <key>		**off**	N
		off								
	timeout			[timeout]			**config timeout** [dec]	2 to 4147199	240	Y
	pollrate			[polling rate]			**config pollrate** [dec]	1 to 4147199	239	Y
	ipaddr	add		[IPv6 address]			**config ipaddr add** [addr]	16B		N
		remove		[IPv6 address]			**config ipaddr remove** [addr]	16B		
	maxchild			[number of children]			**config maxchild** [dec]	10 to 64	10	Y
	steering	open					**config steering** <key>		**open**	N
		close								
		on								
	xpanfilt	add		[extended pan ID]			**config xpanfilt add** [hex]	8B		N
		remove	all				**config xpanfilt remove all**			
	bagent	on					**config bagent** <key>		**off**	Y
		off								
	brouter	on					**config brouter** <key>		**off**	Y
		off								
	outband						**config outband**		no	Y
	xpanid			[extended pan ID]			**config xpanid** [hex]	8B	not set	Y
	netname			[network name]			**config netname** [str]	1C to 16C	not set	Y
	mlprefix			[mesh-local prefix]			**config mlprefix** [addr]	8B	not set	Y
	mkey			[master key]			**config mkey** [hex]	16B	not set	Y

config (cont.)

© Kirale Technologies

config (cont.)	lowpower	on					**config lowpower** <key>		**off**	Y
		off								
	txpower			[transmission power level]			**config txpower** [dec]	0 to 15	7	Y
	hwmode			[hw configuration mode]			**config hwmode** [dec]	1 to 4	1	Y
	autojoin	on					**config autojoin** <key>		**off**	Y
		off								
	led	on					**config led** <key>		**on**	Y
		off								
	actstamp			[active timestamp]			**config actstamp** [hex]	8B	0x0000000000010000	Y
	vswver			[vendor sw version]			**config vswver** [str]	≤ 16C	"KiNOS v1.2"	Y
	vname			[vendor name]			**config vname** [str]	≤ 32C	"Kirale Technologies"	Y
	vdata			[vendor data]			**config vdata** [str]	≤ 64C	not set	Y
	vmodel			[vendor model]			**config vmodel** [str]	≤ 32C	"KTWM102 Module"	Y
	prefix	add		[prefix]	[prefix length]	[prefix flags]	**config prefix add** [addr] [dec] [hex]	16B; 1B; 2B		N
		remove		[prefix]	[prefix length]		**config prefix remove** [addr] dec]	16B; 1B		
	route	add		[route]	[prefix length]	[prefix flags]	**config route add** [addr] [dec] [hex]	16B; 1B; 2B		N
		remove		[route]	[prefix length]		**config route remove** [addr] [dec]	16B; 1B		
	provurl			[provisioning url]			**config provurl** [str]	≤ 64C	not set	Y
	service	add		[enterprise number]	[service data]	[server data]	**config service add** [dec] [arr] [arr]	4B; ≤ 249B		N
		remove		[enterprise number]	[service data]		**config service remove** [dec] [arr]	4B; ≤ 249B		
show	netconfig						**show netconfig**			
	hwconfig						**show hwconfig**			
	thinfo						**show thinfo**			
	vinfo						**show vinfo**			
	snum						**show snum**			
	swver						**show swver**			
	hwver						**show hwver**			
	eui64						**show eui64**			
	heui64						**show heui64**			
	emac						**show emac**			
	txpower						**show txpower**			

© Kirale Technologies

show (cont.)	uptime						**show uptime**			
	status						**show status**			
	role						**show role**			
	rloc16						**show rloc16**			
	joiners						**show joiners**			
	maxchild						**show maxchild**			
	ipaddr						**show ipaddr**			
	xpanfilt						**show xpanfilt**			
	joinport						**show joinport**			
	joincred						**show joincred**			
	commcred						**show commcred**			
	timeout						**show timeout**			
	pollrate						**show pollrate**			
	parent						**show parent**			
	stats						**show stats**			
	childt						**show childt**			
	routert						**show routert**			
	prefixt						**show prefixt**			
	servicet						**show servicet**			
	commsid						**show commsid**			
	thver						**show thver**			
exec	activeget			[IPv6 address]	*[requested TLVs]*		**exec activeget** [addr] *[arr]*	16B; *< 292B*		
	activeset			[IPv6 address]	[requested TLVs]		**exec activeset** [addr] [arr]	16B; < 292B		
	commget			[IPv6 address]	*[requested TLVs]*		**exec commget** [addr] *[arr]*	16B; *< 292B*		
	commset			[IPv6 address]	[requested TLVs]		**exec commset** [addr] [arr]	16B; < 292B		
	panidqry			[IPv6 address]	[channel mask]	[pan ID]	**exec panidqry** [addr] [hex] [hex]	16B; 4B; 2B		
	pendget			[IPv6 address]	*[requested TLVs]*		**exec pendget** [addr] *[arr]*	16B; *< 292B*		
	pendset			[IPv6 address]	[requested TLVs]		**exec pendset** [addr] [arr]	16B; < 292B		

© Kirale Technologies

3. Detailed Command Description

debug level

To activate or deactivate the visualization in real-time of KiNOS system information on the user terminal through log messages concerning to KiNOS itself, network traffic or Thread events. Each log message has an associated log level that gives a rough guide to the nature of the message.

debug level <{ none | all | info | log | error }>

Syntax description

none	To deactivate all log messages.
all	To activate all log messages.
info	To enable informational messages that might make sense to end users and system administrators, and highlight the progress of the application.
log	To enable relatively detailed tracing used by application developers and system integrators.
error	To activate error events of considerable importance in addition to network error notifications.

Command default

Default value is **none**.

Command mode

Execution is always allowed.

Usage guidelines

You might want to increase the logging level to diagnose or debug a problem.

Examples

How to enable both log and error level messages.

```
kinos@local:~$ debug level log
kinos@local:~$ debug level error
```

debug module

To activate or deactivate the visualization in real-time of KiNOS system information on the user terminal through log messages concerning to different layers within KiNOS stack. Each log message has an associated module or layer that gives a rough guide to the nature of the message.

debug module <{ none | all | ether | serial | radio | ipv6 | app }>
debug module radio <{ data | command | beacon }>
debug module ipv6 <{ icmp | udp }>
debug module app <{ mle | dtls | coap | dhcp }>

Syntax description

none	To deactivate all messages.
all	To activate messages from all layers.
ether	To enable messages associated to Ethernet interface.
serial	To turn on messages concerning Serial interface.
radio	To activate messages regarding MAC layer. Optionally you can specify the sort of frames which you are interested in (**data**, **command** or **beacon**).

ipv6	To get messages originating from IP layer. It is possible to discern from two kind of IP packets (**icmp** or **udp**).
app	To enable messages that have their origin in the Application Layer. Debug function is able to differentiate between four application protocols (**mle**, **dtls**, **coap** or **dhcp**) if more granularity is needed.

Command default

Default value is **none**.

Command mode

Execution is always allowed.

Usage guidelines

You might want to increase the logging level to diagnose or debug a problem.

Examples

How to enable messages concerning MAC and IP layer.

```
kinos@local:~$ debug module radio
kinos@local:~$ debug module ipv6
```

config panid

To configure PAN ID for the IEEE 802.15.4 network.

config panid [pan ID]

Syntax description

pan ID	Each network is defined with a unique PAN identifier (PAN ID). This identifier is common among all devices of the same network. Thread devices are either preconfigured with a PAN ID to join, or they can discovery nearby networks and select a PAN ID to join. Parameter of two bytes hexadecimal.

Command default

No default value.

Command mode

Execution is only allowed when device is not connected to network and there is not a previous valid configuration loaded.

Usage guidelines

If no PAN ID is specified at the beginning and the node starts as End Device, a network discovery will be performed on every channel, if one has not been selected, without searching for a specific PAN ID. The connection process will be tried for every PAN ID found.

If no PAN ID is specified and the role is Leader, the device will generate a random one and will execute an active scan to verify that it is not already taken.

Examples

```
kinos@local:~$ config panid 0x1234
```

config channel

To perform channel selection for the IEEE 802.15.4 network.

config channel [channel]

Syntax description

channel	There are 16 channels available in the 2.4GHz ISM band whose range is from channel 11 to channel 26. Parameter of type decimal.

Command default

No default value.

Command mode

Execution is only allowed when device is not connected to network and there is not a previous valid configuration loaded.

Usage guidelines

If no channel is specified at the beginning and the node starts as End Device, a network discovery will be performed on every channel to find networks with a particular PAN ID if this latter has been defined.

If no channel is specified and the role is Leader, the device will perform an energy scan to select the quietest channel.

Examples

```
kinos@local:~$ config channel 11
```

config role

To configure Thread role that node is going to have in the network.

config role <{ leader | reed | fed | med | sed }>

Syntax description

leader	The Thread device responsible for managing router ID assignment. The single distinguished device in any Thread Network Partition that currently acts as a central arbiter and distributor of network configuration state.
reed	An FTD acting as an ED that may request to become a Router. A REED can have children and maintains links with neighboring Routers.
fed	An FTD acting as an FED that will always remain an ED. Unlike a REED, an FTD acting as an FED will never request to become a Router.
med	An MTD whose receiver is enabled all the time and that can communicate with its parent at any time.

© Kirale Technologies

sed	An MTD whose receiver is normally disabled and that wakes periodically to communicate with its parent.

Command default

No default value.

Command mode

Execution is allowed when device is not connected to network and there is not a previous valid configuration loaded. Also it is allowed when node is connected to network but following the next rules: if node was initially configured as a SED, its role can be changed to act as a MED or a FED; additionally, if node was configured as a MED at the beginning, its role can be changed to act as a FED.

Usage guidelines

A Thread Network may contain two different types of Thread devices and each device acts in a particular role. There are two types of Thread devices:

- Full Thread Device (FTD)
- Minimal Thread Device (MTD)

FTDs can communicate with each other and with their attached MTD Children. MTDs can only communicate with the FTD Parent they are attached to.

There are five selectable roles a Thread device can act as:

- Leader
- Active Router or Router-Eligible End Device (REED)
- Full End Device (FED)

- Minimal End Device (MED)
- Sleepy End Device (SED)

An FTD may act as a Leader, an Active Router, a REED, or a FED. An MTD may act as a MED or a SED. The radio of Routers, REEDs, FEDs and MEDs is always turned on when idle while, on the contrary, SEDs ones are turned off.

Examples

```
kinos@local:~$ config role leader
```

config joinport

To change the Joiner default port.

config joinport [joiner port]

Syntax description

joiner port	It is recommended to select it in dynamic/private UDP port range defined by IANA. Parameter of two bytes decimal.

Command default

Default value is 49786.

Command mode

Execution is only allowed when device is not connected to network.

Usage guidelines

The Joiner establishes an unsecured local-only link to the Joiner Router by configuring its MAC (Media Access Control) layer with the network parameters (Channel, PAN ID etc.) obtained during Joiner Discovery, and sending DTLS records to a known UDP port, called Joiner port, on this unsecured interface. This command is used for changing the default port used by Joiner Router which will be announced in the replies to Discovery messages.

Examples

`kinos@local:~$` **config joinport 49786**

config joincred

To configure the Joining Credential.

config joincred [joiner credential]

Syntax description

joiner credential	The Joining Credential consists of a string of 6 to 32 specific ASCII characters drawn from an alphabet of 32 numbers and letters. Must be encoded as uppercase characters (0-9, A-Y excluding I, O, Q). Parameter of type string.

Command default

Default value is the EUI-64 which appears in Serial Number of device.

Command mode

Execution is always allowed.

Usage guidelines

The Joining Credential is used to commission a Joiner onto the Thread network.

Examples

`kinos@local:~$` **config joincred "8404D20000000045"**

config joiner

To add a Joiner to the Commissioner's Joiner list.

config joiner add [EUI-64 MAC address] [joiner credential]
config joiner remove [EUI-64 MAC address]
config joiner remove all

Syntax description

add	To add a Joiner to Joiner list.
remove	To remove a Joiner from Joiner list. To use keyword **all** for clearing Joiner list out.
EUI-64 MAC address	Joiner's MAC address which is wished to add. Parameter of type MAC address.
joiner credential	The Joining Credential consists of a string of 6 to 32 specific ASCII characters drawn from an alphabet of 32 numbers and letters. Must be encoded as uppercase characters (0-9, A-Y excluding I, O, Q). Parameter of type string.

Command default

No default value.

Command mode

Execution is always allowed.

Usage guidelines

This setting is only distributed to the Leader (to upgrade the network data) if the node which this setting is being applied to is acting as the network Commissioner.

Examples

This example shows how to add a Joiner.

```
kinos@local:~$ config joiner add 84-04-D2-00-00-00-00-45 “8404D20000000045”
```

config commcred

To configure the Commissioner Credential, a passphrase that a Commissioner needs to connect to and authenticate with the Thread Network.

config commcred [commissioner credential]

Syntax description

commissioner credential	The Commissioner Credential consists of a string of 6 to 255 encoded in utf-8 format. Parameter of type string.

Command default

Default value is “THREAD”.

Command mode

Execution is always allowed.

Usage guidelines

A human-scaled passphrase for use in authenticating that a device may petition to become the Commissioner of the network. This credential can be thought of as the network administrator password for a Thread Network.

The first device in a network, typically the initial Leader, MUST be out-of-band commissioned to inject the correct user generated Commissioning Credential into the Thread Network, or provide a known default Commissioning Credential to be changed later.

Examples

`kinos@local:~$` **config commcred “THREAD”**

config comm

To activate or deactivate the function of on-mesh Commissioner in the device.

config comm <{ on | off }>

Syntax description

on	To activate on-mesh Commissioner.
off	To deactivate Commissioner.

Command default

Default value is **off**.

Command mode

Execution is only allowed when device is connected to network. Its role cannot be neither MED nor SED.

Usage guidelines

After enabling command, device will ask Leader to be the active Commissioner.

Examples

The following example shows how to enable on-mesh Commissioner function.

```
kinos@local:~$ config comm on
```

config timeout

To change the Timeout default value for an End Device.

config timeout [timeout]

Syntax description

timeout	Parameter of four bytes decimal.

Command default

Default value is 240 seconds.

Command mode

Execution is only allowed when device is not connected to network.

Usage guidelines

Time within which an End Device must check-in with its parent with a Keep Alive Request message. Otherwise the parent will consider that this child is out of the network and will remove it from its children table.

Examples

```
kinos@local:~$ config timeout 240
```

config pollrate

To configure the polling rate in seconds for a SED.

config pollrate [polling rate]

Syntax description

polling rate	Parameter of four bytes decimal.

Command default

Default value is 239 seconds.

Command mode

Execution is only allowed when device is not connected to network.

Usage guidelines

Time within which a SED sends a MAC Poll Request message to its Parent to check if this latter has some outstanding Data for SED.

Examples

```
kinos@local:~$ config pollrate 30
```

config ipaddr

To add or remove manually an IPv6 address to/from the device.

config ipaddr <{ **add** | **remove** }> [IPv6 address]

Syntax description

add	To add IPv6 address that is typed.
remove	To remove IPv6 address that is typed.
IPv6 address	Parameter of type IP address.

Command default

No default value.

Command mode

Execution is only allowed when device is connected to network.

Usage guidelines

You might need to add manually an IPv6 address to device. For instance, in case of you wanted to create a multicast group among some devices of the network.

Examples

How to add an IPv6 unicast address.

```
kinos@local:~$ config ipaddr add 2001::1
```

How to add an IPv6 multicast address.

```
kinos@local:~$ config ipaddr add ff53::1
```

config maxchild

To configure the maximum number of children that can be attached to this device.

config maxchild [number of children]

Syntax description

number of children	The range goes from 10 to 64 children. Parameter of one byte decimal.

Command default

Default value is 10.

Command mode

Execution is always allowed.

Usage guidelines

This command has only effect if the device behaves as a Router or Leader in the Thread network.

Examples

```
kinos@local:~$ config maxchild 25
```

config steering

To define steering data filter that indicates what Joiners are eligible to join the Thread Network.

config steering <{ open | close | on }>

Syntax description

open	All nodes are allowed in steering data.
close	All nodes are blocked in steering data.
on	To enable steering data filtering based on Joiner list.

Command default

Default value is **open**.

Command mode

Execution is only allowed if the device is connected to the network and is the current active Commissioner.

Usage guidelines

These data are published in the network by the active Commissioner. It is possible to set a steering data with all joiners allowed, or with all joiners blocked or with specific joiners allowed (filter activated). Joiners may only attempt to join if they match the steering data filter.

Examples

This example shows how to allow all Joiners.

```
kinos@local:~$ config steering open
```

config xpanfilt

To add an element to the extended PAN ID filter list in order to specify known networks to which is not desired to be connected. This list is limited to a maximum of ten elements.

config xpanfilt add [extended pan ID]
config xpanfilt remove all

Syntax description

add	To add extended Pan ID that is typed.
remove all	To remove all elements from the list.
extended pan ID	Extended PAN Identifier that is used to identify the Thread Network. Parameter of eight bytes hexadecimal.

Command default

No default value.

Command mode

Execution is only allowed when device is not connected to network.

Usage guidelines

These Thread networks will be discarded during network discovery.

Examples

```
kinos@local:~$ config xpanfilt add 0x000db80000000001
```

config bagent

To configure device as Border Agent for an external or native Commissioner.

config bagent <{ on | off }>

Syntax description

on	To activate this function.
off	To disable this function.

Command default

Default value is **off**.

Command mode

Execution is only allowed when device is connected to network. Its role cannot be neither MED nor SED.

Usage guidelines

A Border Agent is any device capable of relaying MeshCoP messages between a Thread network and a Commissioner. The Commissioner may be reachable via either a non-Thread network (external) or a Thread network (native). The Border Agent requires a Thread Interface to operate and may be combined in any device with other Thread roles except the Joiner. In order to enable connectivity with an external network, therefore with an external Commissioner, the Ethernet interface must be activated (see config hwmode).

Examples

`kinos@local:~$` **config bagent on**

config brouter

To configure device as Border Router for its Thread network.

config brouter <{ on | off }>

Syntax description

on	To activate this function.
off	To disable this function.

Command default

Default value is **off**.

Command mode

Execution is only allowed when device is not connected to network. Ethernet interface must be activated (see config hwmode).

Usage guidelines

A Border Router is a specific type of Router that provides connectivity from the Thread network to adjacent networks. Border Routers provide services for devices within the network, including routing services for off-network operations. A Thread network typically contains one or more Border Routers. Multiple Border Routers of multiple Thread networks can be joined together to cooperate within a Thread Domain.

Examples

```
kinos@local:~$ config brouter on
```

config outband

To set out-of-band commissioning mode.

config outband

Syntax description

This command has no arguments or keywords.

Command default

No default value.

Command mode

Execution is only allowed when device is not connected to network and there is not a previous valid configuration loaded.

Usage guidelines

This mode allows the device to be commissioned by the user by configuring it with all the necessary parameters and credentials to join a specific network without following the in-band commissioning process.

If the out-of-band commissioning mode is set, a set of parameters have to be configured before attaching. So they are channel (i.e. config channel), PAN ID (i.e. config panid), network name (i.e. config netname), mesh local prefix (i.e. config mlprefix), master key (i.e. config mkey), extended PAN ID (i.e. config xpanid) and commissioning credential (i.e. config commcred).

Examples

`kinos@local:~$` **config outband**

config xpanid

To configure the extended PAN ID for Thread network.

config xpanid [extended pan ID]

Syntax description

extended pan ID	Extended PAN Identifier that is used to identify the Thread Network. Parameter of eight bytes hexadecimal.

Command default

No default value.

Command mode

Execution is only allowed when device is not connected to network, out-of-band commissioning has been selected and there is not a previous valid configuration loaded.

Usage guidelines

For in-band commissioning mode, this parameter will be randomly generated in case of device starts as Leader, or will be learnt during attaching process in the rest of roles.

Examples

`kinos@local:~$` **config xpanid 0x000db80000000000**

config netname

To configure the name of the Thread network.

config netname [network name]

Syntax description

network name	Human-readable identifier for the network that consists of a string of 1 to 16 ASCII characters. Parameter of type string.

Command default

No default value.

Command mode

Execution is only allowed when device is not connected to network and there is not a previous valid configuration loaded.

Usage guidelines

If a network name has not been defined and device starts as Leader, a new name will be randomly generated using the format kite_xxxx, where x means a random decimal number.

Examples

```
kinos@local:~$ config netname "kite_0000"
```

config mlprefix

To configure the mesh-local prefix of the Thread network.

config mlprefix [mesh-local prefix]

Syntax description

mesh-local prefix	The prefix used for realm-local traffic within the mesh. Parameter of type IP address.

Command default

No default value.

Command mode

Execution is only allowed when device is not connected to network, out-of-band commissioning has been selected and there is not a previous valid configuration loaded.

Usage guidelines

For in-band commissioning mode, this parameter will be randomly generated in case of device starts as Leader, or will be learnt during attaching process in the rest of roles.

Examples

`kinos@local:~$` **config mlprefix fd00:0db8:0000:0000::**

config mkey

To configure the Master Key of the Thread network.

config mkey [master key]

Syntax description

master key	Network-wide key used to derive security material for MAC layer (L2) and Mesh Link Establishment (MLE) protocol protection. Parameter of sixteen bytes hexadecimal.

Command default

No default value.

Command mode

Execution is only allowed when device is not connected to network, out-of-band commissioning has been selected and there is not a previous valid configuration loaded.

Usage guidelines

For in-band commissioning mode, this parameter will be randomly generated in case of device starts as Leader, or will be learnt during attaching process in the rest of roles.

Examples

`kinos@local:~$` **config mkey 0x00112233445566778899aabbccddeeff**

config lowpower

To activate or deactivate low-power mode in the device.

config lowpower <{ **on** | **off** }>

Syntax description

on	To activate this function.
off	To disable this function.

Command default

Default value is **off**.

Command mode

Execution is always allowed. The new configuration shall be effective on next software or hardware reset.

Usage guidelines

The low-power mode allows device to reduce its power consumption. When this mode is enabled, the device will reduce its transmission power to 0 dBm (except if a custom transmission power has been set before) and will go to sleep whenever microcontroller is idle if either its interface is down or its role is SED, and if it is connected through UART port (USB port disconnected).

Examples

```
kinos@local:~$ config lowpower on
```

config txpower

To set the transmission power level of device's radio.

config txpower [transmission power level]

Syntax description

transmission power level	The range goes from 0 to 15 (+4dBm to -17dBm). Parameter of type decimal.

Command default

Default value is 0 (+4dBm).

Command mode

Execution is always allowed.

Usage guidelines

The relation between level value and transmission power (in dBm) is represented in the following table.

Level	Tx pwr.	Level	Tx pwr.	Level	Tx pwr.	Level	Tx pwr.
0	+4	4	+2.5	8	-1	12	-6
1	+3.7	5	+2	9	-2	13	-8
2	+3.4	6	+1	10	-3	14	-12
3	+3	7	0	11	-4	15	-17

Examples

```
kinos@local:~$ config txpower 0
```

config hwmode

To select the communication interfaces that will be enabled in device.

config hwmode [hw configuration mode]

Syntax description

hw configuration mode	The range goes from 1 to 4. Parameter of type decimal.

Command default

Default value is 1 (both USB and UART port are enabled).

Command mode

Execution is always allowed except that mode 3 is not allowed to be set through KSH Shell and mode 2 and 4 are not allowed to be set via KBI. The new configuration shall be effective on next software or hardware reset.

Usage guidelines

The equivalence between hardware mode and ports is the following.

Hardware mode	Description
1	Both USB port and UART port are enabled (default mode).
2	Only USB port is enabled.
3	Only UART port is enabled.
4	Both USB port and emulated Ethernet port are enabled.

Examples

```
kinos@local:~$ config hwmode 1
```

config autojoin

To enable or disable the auto-join mode.

config autojoin <{ on | off }>

Syntax description

on	To activate auto-join functionality.
off	To deactivate auto-join functionality.

Command default

Default value is **off**.

Command mode

Execution is always allowed. The new configuration shall be effective on next software or hardware reset.

Usage guidelines

If auto-join mode is enabled and device has successfully connected to a Thread network (so then there is a valid configuration that has been stored in non-volatile memory), then device will automatically enable its Thread interface and will try to join to the same network after its normal power-up sequence has been completed.

Examples

```
kinos@local:~$ config autojoin off
```

config led

To turn on or turn off the port used by device to control a signaling led.

config led <{ on | off }>

Syntax description

on	To activate led function.
off	To deactivate led function.

Command default

Default value is **on**.

Command mode

Execution is always allowed. The new configuration shall be effective on next software or hardware reset.

Usage guidelines

There are different types of signaling depending on device's state.

Blinking type	Description
Slow	Not connected to a network.
Normal	Connecting to a network.
Fast	Receiving firmware update package | Auto-join mode delay
Super fast	Bootloader running – during firmware update applying
Off (led on)	Connected to a network.

Examples

`kinos@local:~$` **config led on**

config actstamp

To set the Active Operational Dataset timestamp.

config actstamp [active timestamp]

Syntax description

active timestamp	Parameter of eight bytes hexadecimal.

Command default

Default value is 0x0000000000010000 (1 second).

Command mode

Execution is only allowed when device is not connected to network and there is not a previous valid configuration loaded.

Usage guidelines

This value is used for comparing the priority between different Active Operational Datasets.

Examples

```
kinos@local:~$ config actstamp 0x0000000000010000
```

config prefix

To add or remove manually an IPv6 prefix to/from the device.

config prefix add [prefix] [prefix length] [prefix flags]
config prefix remove [prefix] [prefix length]

Syntax description

add	To add an IPv6 prefix that is typed.
remove	To remove the IPv6 prefix that is typed.
prefix	Parameter of type IP address.
prefix length	Length of prefix. In Thread networks length usually is 64 bits. Parameter of type decimal.
prefix flags	Prefix flags are encoded the same way as in the Thread Border Router TLV, with the exception of the LSB which is used to mark it as stable when set, as shown below. Parameter of two bytes hexadecimal.

Command default

No default value.

Command mode

Execution is only allowed when device is connected to network. Its role cannot be neither MED nor SED.

Usage guidelines

Prefixes are mainly used to configure addresses within the Thread subnet. A prefix is on-mesh if packets with on-mesh destinations are routed within the Thread subnet; all other packets are forwarded to a Border Router. There are two methods of IPv6 address assignment: stateless (SLAAC) and stateful (DHCP).

Information encoded in [prefix flags] parameter in detail:

MSB															LSB
Prf	Prf	P	S	D	C	R	O	N	-	-	-	-	-	-	Stb

Examples

The following example shows how to add a stable IPv6 prefix 2001:db8:2:: with a length of 64 bits and address assignment using stateless auto-configuration, and on-mesh.

```
kinos@local:~$ config prefix add 2001:db8:2:: 64 0x3301
```

How to remove it.

```
kinos@local:~$ config prefix remove 2001:db8:2:: 64
```

config route

To add or remove manually a route for a particular IPv6 prefix to/from the device.

config route add [prefix] [prefix length] [route flags]
config route remove [prefix] [prefix length]

Syntax description

add	To add a route for an IPv6 prefix that is typed.
remove	To remove the route for an IPv6 prefix that is typed.
prefix	Parameter of type IP address.
prefix length	Length of prefix. In Thread networks length usually is 64 bits. Parameter of type decimal.
route flags	Route flags are encoded as shown below. Parameter of two bytes hexadecimal.

Command default

No default value.

Command mode

Execution is only allowed when device is connected to network. Its role cannot be neither MED nor SED.

Usage guidelines

Routes are defined to provide external routes off the Thread network to the devices, associated with a particular IPv6 prefix for which they will route.

Information encoded in [route flags] parameter in detail:

MSB															LSB
Prf	Prf	-	-	-	-	-	-	-	-	-	-	-	-	-	Stb

Examples

This example shows how to add a stable route for IPv6 prefix 2001:db8:2:: of 64 bits.

```
kinos@local:~$ config route add 2001:db8:2:: 64 0x0001
```

How to remove it.

```
kinos@local:~$ config route remove 2001:db8:2:: 64
```

config vswver

To configure vendor software version string of the Joiner device.

config vswver [vendor sw version]

Syntax description

vendor sw version	An utf-8 string of up to 16 bytes that specifies the product software version running on the Joiner device. Parameter of type string.

Command default

Default value is “KiNOS v1.2”.

Command mode

Execution is always allowed.

Usage guidelines

A string that is totally customizable and that serves to identify software version which is running on Joiner device.

Examples

```
kinos@local:~$ config vswver “KiNOS v1.2”
```

config vmodel

To configure vendor product model string of the Joiner device.

config vmodel [vendor model]

Syntax description

vendor model	A human-readable string of up to 32 bytes that specifies the product model of the Joiner device. Parameter of type string.

Command default

Default value is “KTWM102 Module”.

Command mode

Execution is always allowed.

Usage guidelines

A string that is fully customizable and that serves to identify product model of the Joiner device.

Examples

```
kinos@local:~$ config vmodel “KTWM102 Module”
```

config vname

To configure vendor name string of the Joiner device.

config vname [vendor name]

Syntax description

vendor name	A human-readable string of up to 32 bytes that specifies the vendor name of the Joiner device. Parameter of type string.

Command default

Default value is “Kirale Technologies”.

Command mode

Execution is always allowed.

Usage guidelines

A string that is completely customizable and that serves to identify vendor name of the Joiner device.

Examples

`kinos@local:~$` **config vname “Kirale Technologies”**

config vdata

To configure a product vendor-defined data structure to guide vendor-specific provisioning.

config vdata [vendor data]
config vdata remove

Syntax description

remove	To clear data out of non-volatile memory.
vendor data	A string of up to 64 bytes. Parameter of type string.

Command default

No default value.

Command mode

Execution is always allowed.

Usage guidelines

A string that serves to guide vendor-specific provisioning.

Examples

`kinos@local:~$` **config vdata "Kirale Vendor Data"**

config provurl

To configure a provisioning url to guide vendor-specific provisioning.

config provurl [provisioning url]
config provurl remove

Syntax description

remove	To clear data out of non-volatile memory.
provisioning url	A string of up to 64 bytes. Parameter of type string.

Command default

No default value.

Command mode

Execution is always allowed.

Usage guidelines

A string that serves to guide vendor-specific provisioning.

Examples

`kinos@local:~$` **config provurl "www.kirale.com"**

config service

To add or remove manually a service to/from the device.

config service add [enterprise number] [service data] [server data]
config service remove [enterprise number] [service data]

Syntax description

add	To add a service that is typed.
remove	To remove the service that is typed.
enterprise number	Private Enterprise Number assigned by IANA to the vendor that defined the type of the server. Standard Thread server types use 44970 for this value. Parameter of type decimal.
service data	Byte string specifying the type of service along with any associated data. Parameter of type array.
server data	Byte string containing server-specific information. Parameter of type array.

Command default

No default value.

Command mode

Execution is only allowed when device is connected to network.

Usage guidelines

Servers may either be of a standard Thread type or specific to a particular vendor.

Examples

How to add a service from vendor Kirale with enterprise number 49166.

```
kinos@local:~$ config service add 49166 01 aabbccdd
```

And how to remove it.

```
kinos@local:~$ config service remove 49166 01
```

show netconfig

To show a list of network settings configured in the device.

show netconfig

Syntax description

This command has no arguments or keywords.

Command default

No default value.

Command mode

Execution is always allowed.

Usage guidelines

This command shows the most parameters that are used in the Thread network.

Examples

Example 1. Node is not connected.

```
kinos@local:~$ show netconfig
+------------------------------------------------------------+
| Status                                                     |
+------------------------------------------------------------+
| Thread interface : down
| Auto joining     : off
| Node status      : none
+------------------------------------------------------------+
| MAC Layer                                                  |
+------------------------------------------------------------+
| PAN ID           : 0xffff
| Short Address    : 0xffff
| Extended Address : 96-0d-b0-59-bc-55-b8-01
| EUI-64 Address   : 84-04-d2-00-00-00-00-03
| MAC security     : on
+------------------------------------------------------------+
| IP Layer                                                   |
+------------------------------------------------------------+
| Ucast. Addressing: none
+------------------------------------------------------------+
| Ethernet Configuration                                     |
```

```
+-------------------------------------------------------------+
| MAC Address      : 86-04-d2-00-00-03
+-------------------------------------------------------------+
| Thread Configuration                                        |
+-------------------------------------------------------------+
| Config. mode     : Thread v2
| Role             : not configured
+-------------------------------------------------------------+
| Services                                                    |
+-------------------------------------------------------------+
| Commissioner     : off
| Border Router    : off
| DHCP client      : off
| DNS client       : off
| NTP client       : off
+-------------------------------------------------------------+
```

Example 1. Node is connected.

```
kinos@local:~$ show netconfig
+-------------------------------------------------------------+
| Status                                                      |
+-------------------------------------------------------------+
| Thread interface : up
| Auto joining     : off
| Node status      : joined
+-------------------------------------------------------------+
| MAC Layer                                                   |
+-------------------------------------------------------------+
| PAN ID           : 0x0791
| Short Address    : 0x2400
| Extended Address : 96-0d-b0-59-bc-55-b8-01
| EUI-64 Address   : 84-04-d2-00-00-00-00-03
| MAC security     : on
| Channel          : 25
+-------------------------------------------------------------+
| IP Layer                                                    |
+-------------------------------------------------------------+
| Ucast. Addressing:
| fe80::940d:b059:bc55:b801
| fdc5:200b:dbb:0:9ac:130c:dd24:7ba
| fdc5:200b:dbb::ff:fe00:2400
+-------------------------------------------------------------+
| Ethernet Configuration                                      |
+-------------------------------------------------------------+
| MAC Address      : 86-04-d2-00-00-03
+-------------------------------------------------------------+
| Thread Configuration                                        |
+-------------------------------------------------------------+
| Config. mode     : Thread v2
| Role             : leader
| Active Timestamp : 0x0000000000010000
| Network Name     : kite_0702
| Extended PAN ID  : 0x562d50755c0b58b1
| PSKc             : 0xa921f5fd2fb7c17539e0787bae388a6f
| Master Key       : 0x5f86e584e74a03346f1e211afb00bdf8
| Mesh-Local ULA   : fdc5:200b:dbb::/64
| Node Mesh IID    : 0x09ac130cdd2407ba
| Leader ID        : 9
```

```
| Partition ID     : 0xbce81e49
| Data Version     : 255
| Stable Version   : 186
| Prefixes/Routes  : 0
| 6lo Contexts     : 1
| Services         : 0
| Comm. Session ID : off
+------------------------------------------------------------+
| Services                                                   |
+------------------------------------------------------------+
| Commissioner     : off
| Border Router    : off
| DHCP client      : off
| DNS client       : off
| NTP client       : off
+------------------------------------------------------------+
```

show hwconfig

To show status of hardware interfaces configured in the device.

show hwconfig

Syntax description

This command has no arguments or keywords.

Command default

No default value.

Command mode

Execution is always allowed.

Usage guidelines

This command shows the status of the different available interfaces in the device in addition to signaling led.

Examples

```
kinos@local:~$ show hwconfig
USB Interface
  Serial       : on
  DFU          : on
  Ethernet     : on
UART Interface : off
Activity LED   : on
Low-Power Mode : off
```

show thinfo

To show information related to Thread configuration.

show thinfo

Syntax description

This command has no arguments or keywords.

Command default

No default value.

Command mode

Execution is always allowed.

Usage guidelines

This command shows relevant information about the Thread network to which this node belongs. It is a piece of data that are shown with show netconfig command.

Examples

```
kinos@local:~$ show thinfo
+-------------------------------------------------------------+
| Thread Configuration                                        |
+-------------------------------------------------------------+
| Config. mode     : Thread v2
| Role             : leader
| Active Timestamp : 0x0000000000010000
| Network Name     : kite_0702
| Extended PAN ID  : 0x562d50755c0b58b1
| PSKc             : 0xa921f5fd2fb7c17539e0787bae388a6f
| Master Key       : 0x5f86e584e74a03346f1e211afb00bdf8
| Mesh-Local ULA   : fdc5:200b:dbb::/64
| Node Mesh IID    : 0x09ac130cdd2407ba
| Leader ID        : 9
| Partition ID     : 0xbce81e49
| Data Version     : 255
| Stable Version   : 186
| Prefixes/Routes  : 0
| 6lo Contexts     : 1
| Services         : 0
| Comm. Session ID : off
+-------------------------------------------------------------+
```

show vinfo

To show vendor specific information.

show vinfo

Syntax description

This command has no arguments or keywords.

Command default

No default value.

Command mode

Execution is always allowed.

Usage guidelines

This command shows relevant information about the vendor.

Examples

```
kinos@local:~$ show vinfo
Vendor Name        : Kirale Technologies
Vendor Model       : KTWM102 Module
Vendor SW Version : KiNOS v1.2
```

show snum

To display the serial number of the device.

show snum

Syntax description

This command has no arguments or keywords.

Command default

No default value.

Command mode

Execution is always allowed.

Usage guidelines

It serves to have easy access to serial number of the device.

Examples

```
kinos@local:~$ show snum
KTWM102-11+201801+8404D20000000003
```

show swver

To display Bootloader and KiNOS software versions which are installed on the device.

show swver

Syntax description

This command has no arguments or keywords.

Command default

No default value.

Command mode

Execution is always allowed.

Usage guidelines

It serves to have easy access to software versions.

Examples

```
kinos@local:~$ show swver
Bootloader v1.1.6803.65369
KiNOS v1.2.7273.62432
```

show hwver

To show the hardware identifier (SKU).

show hwver

Syntax description

This command has no arguments or keywords.

Command default

No default value.

Command mode

Execution is always allowed.

Usage guidelines

It serves to have easy access to hardware identifier.

Examples

```
kinos@local:~$ show hwver
KTWM102-11
```

show eui64

To display universally administered IEEE EUI-64 address that has been factory assigned to the Thread interface.

show eui64

Syntax description

This command has no arguments or keywords.

Command default

No default value.

Command mode

Execution is always allowed.

Usage guidelines

It serves to have easy access to the factory assigned global IEEE EUI-64 address.

Examples

```
kinos@local:~$ show eui64
84-04-d2-00-00-00-00-03
```

show heui64

To display the result of computing SHA-256 over the universally administered IEEE EUI-64 address that has been factory assigned to the Thread interface.

show heui64

Syntax description

This command has no arguments or keywords.

Command default

No default value.

Command mode

Execution is always allowed.

Usage guidelines

When the Thread Device is configured to obtain Thread Network security credentials using Thread Commissioning, the specific value provided by the device to the MAC layer to represent the Extended Address prior to obtaining the network security credentials must be the first 64 bits of the result of computing SHA-256 over the universally administered IEEE EUI-64 value that has been factory assigned to the Thread Interface instead of the actual IEEE EUI-64 value.

Examples

```
kinos@local:~$ show heui64
eb-37-2b-77-8e-f7-f8-b2
```

show emac

To show the randomly generated IEEE 802.15.4 extended address assigned to the Thread interface.

show emac

Syntax description

This command has no arguments or keywords.

Command default

No default value.

Command mode

Execution is always allowed.

Usage guidelines

After the Thread Network security credentials have been successfully obtained, the specific value provided by the device to the MAC layer to represent the Extended Address will be a randomly generated value different from the universally administered IEEE EUI-64 address that has been factory assigned to the Thread.

Examples

```
kinos@local:~$ show emac
96-0d-b0-59-bc-55-b8-01
```

show txpower

To display the transmission power level configured in the device.

show txpower

Syntax description

This command has no arguments or keywords.

Command default

No default value.

Command mode

Execution is always allowed.

Usage guidelines

See the config txpower command for getting more information about this topic.

Examples

```
kinos@local:~$ show txpower
4.0dBm
```

show uptime

To get the time elapsed since last system boot, UTC time (only if there is a NTP server configured in the network) and the current microcontroller temperature.

show uptime

Syntax description

This command has no arguments or keywords.

Command default

No default value.

Command mode

Execution is always allowed.

Usage guidelines

It serves to know time elapsed since last system boot and MCU temperature.

Examples

```
kinos@local:~$ show uptime
Uptime           : 0 days, 1 hours, 46 minutes and 34 seconds
MCU Temperature  : 36°C
```

show status

To show status of the device.

show status

Syntax description

This command has no arguments or keywords.

Command default

No default value.

Command mode

Execution is always allowed.

Usage guidelines

The status of the device could be one of the following, depending on each particular situation.

Status	Description
none	Not connected - not configured
none - saved configuration	Not connected - configured
none - no network	Connection failed - network not found
none - commissioning failed	Connection failed - commissioning error
none - attaching failed	Connection failed - attaching error
booting	Booting KiNOS
discovering	Scanning for networks
commissioning	Authentication in progress
attaching	Trying to connect to a network
joined	Connected
rebooting	Rebooting
change partition	Migrating to another network
clearing	Clearing configuration

Examples

```
kinos@local:~$ show status
joined
```

show role

To display the role of the device.

show role

Syntax description

This command has no arguments or keywords.

Command default

No default value.

Command mode

Execution is always allowed.

Usage guidelines

See the config role command for getting more information about this topic.

Examples

```
kinos@local:~$ show role
leader
```

show rloc16

To show the RLOC16 acquired by device when it connected to the Thread network. RLOC16 is equal to IEEE 802.15.4 short address of the device.

show rloc16

Syntax description

This command has no arguments or keywords.

Command default

No default value.

Command mode

Execution is always allowed.

Usage guidelines

The RLOC16 refers to the 16-bit encoding above that embeds the Router ID and Child ID. When an RLOC is assigned to a Thread interface, the MAC layer sets the IEEE 802.15.4 short address to the RLOC16.

Examples

```
kinos@local:~$ show rloc16
0x2400
```

show joiners

To show the content of Joiner list stored in the device.

show joiners

Syntax description

This command has no arguments or keywords.

Command default

No default value.

Command mode

Execution is always allowed.

Usage guidelines

See the config joiner command for getting more information about this topic.

Examples

```
kinos@local:~$ show joiners
84-04-d2-00-00-00-00-45
```

show ipaddr

To display the list of IPV6 addresses configured in the device and status of each one of them.

show ipaddr

Syntax description

This command has no arguments or keywords.

Command default

No default value.

Command mode

Execution is always allowed.

Usage guidelines

This command shows both IPv6 unicast and multicast addresses. Status could be one of the following: [T] Tentative, [R] Registered or [I] Invalid.

Examples

```
kinos@local:~$ show ipaddr
[R] fe80::940d:b059:bc55:b801
[R] fdc5:200b:dbb:0:9ac:130c:dd24:7ba
[R] fdc5:200b:dbb::ff:fe00:2400
[R] ff02::1
[R] ff03::1
[R] ff33:40:fdc5:200b:dbb::1
[R] ff32:40:fdc5:200b:dbb::1
[R] ff02::2
[R] ff03::2
[R] ff03::fc
```

show joincred

To show the Joining Credential configured in the device.

show joincred

Syntax description

This command has no arguments or keywords.

Command default

No default value.

Command mode

Execution is always allowed.

Usage guidelines

See the config joincred command for getting more information about this topic.

Examples

```
kinos@local:~$ show joincred
8404D20000000003
```

show joinport

To show the Joiner port configured in the device.

show joinport

Syntax description

This command has no arguments or keywords.

Command default

No default value.

Command mode

Execution is always allowed.

Usage guidelines

See the config joinport command for getting more information about this topic.

Examples

```
kinos@local:~$ show joinport
49786
```

show commcred

To show the Commissioner Credential configured in the device.

show commcred

Syntax description

This command has no arguments or keywords.

Command default

No default value.

Command mode

Execution is always allowed.

Usage guidelines

See the config commcred command for getting more information about this topic.

Examples

```
kinos@local:~$ show commcred
THREAD
```

show timeout

To show the Timeout value configured in the device.

show timeout

Syntax description

This command has no arguments or keywords.

Command default

No default value.

Command mode

Execution is always allowed.

Usage guidelines

See the config timeout command for getting more information about this topic.

Examples

```
kinos@local:~$ show timeout
240
```

show maxchild

To show the value of maximum number of children parameter that has been configured in the device.

show maxchild

Syntax description

This command has no arguments or keywords.

Command default

No default value.

Command mode

Execution is always allowed.

Usage guidelines

See the config maxchild command for getting more information about this topic.

Examples

```
kinos@local:~$ show maxchild
10
```

show pollrate

To show the value of polling rate parameter in seconds.

show pollrate

Syntax description

This command has no arguments or keywords.

Command default

No default value.

Command mode

Execution is always allowed.

Usage guidelines

See the config pollrate command for getting more information about this topic.

Examples

```
kinos@local:~$ show pollrate
239
```

show parent

To show information about Parent to which the device is attached.

show parent

Syntax description

This command has no arguments or keywords.

Command default

No default value.

Command mode

Execution is always allowed.

Usage guidelines

This command shows both IEEE 802.15.4 extended and short address of Router to which the End Device is connected.

Examples

```
kinos@local:~$ show parent
Extended MAC Address: 96-0d-b0-59-bc-55-b8-01
Short MAC Address   : 0x2400
```

show stats

To display frame counters and system events.

show stats

Syntax description

This command has no arguments or keywords.

Command default

No default value.

Command mode

Execution is always allowed.

Usage guidelines

This command is useful to detect any issue with the device.

Examples

```
kinos@local:~$ show stats
+--------------------------------------+
|         802.15.4 In Frames           |
+--------------------------------------+
| Unknown protocol  : 0
| Errors            : 0
| Unicast           : 10
| Broadcast         : 3
| Discard           : 0
+--------------------------------------+
|         802.15.4 Out Frames          |
+--------------------------------------+
| Errors            : 0
| Unicast           : 20
| Broadcast         : 34
| Discard           : 0
+--------------------------------------+
|            System Events             |
+--------------------------------------+
| DSA               : 0
| Queues            : 0
| USB serial port   : 0
| USB ethernet port : 0
| UART port         : 0
+--------------------------------------+
```

show childt

To list the children that are attached to the device.

show childt

Syntax description

This command has no arguments or keywords.

Command default

No default value.

Command mode

Execution is always allowed.

Usage guidelines

This command is useful to list the children that are attached to the device and to know some details about them.

Examples

```
kinos@local:~$ show stats
+-------------------------------------------------------------------------------------+
| Rloc16 |         EID          | Tout |  Age |  LM | Ver | Mode |     Extended Address    |
+--------+----------------------+------+------+-----+-----+------+-------------------------+
| 0x2401 | 0c21:d405:561e:eb55 |  240 |   54 |  82 | 244 |  R N | 4b-47-73-74-c4-14-8d-cf |
| 0x2402 | e170:3dcc:853a:a320 |  240 |   19 |  62 | 245 |  R N | 0e-59-b0-0d-e4-91-08-e5 |
+-------------------------------------------------------------------------------------+
```

show routert

To display the list of active routers in the network and the best route (next hop) to reach them with its respective cost.

show routert

Syntax description

This command has no arguments or keywords.

Command default

No default value.

Command mode

Execution is always allowed.

Usage guidelines

This command is useful to have a global sight of the network topology. When route cost is shown as 'loc.', it means that it is itself. The column called LM represents the link margin that the device has with each other.

Examples

```
kinos@local:~$ show routert
+-------------------------------------------------+
| Rloc16 | Router ID | NextHop ID | Cost |  LM  |
+--------+-----------+------------+------+------+
| 0x2400 |    09     |     09     | loc. |  00  |
| 0x7000 |    28     |     09     |  01  |  85  |
| 0x1c00 |    07     |     09     |  01  |  82  |
+-------------------------------------------------+
```

show prefixt

To list the network prefixes that are being announced in the Network Data by Leader.

show prefixt

Syntax description

This command has no arguments or keywords.

Command default

No default value.

Command mode

Execution is always allowed.

Usage guidelines

It serves to display, from Network Data that are stored in the device, the network prefixes that are being announced and their respective flags. See the config prefix and config route commands for getting more information about this topic.

Examples

```
kinos@local:~$ config prefix add 2001:: 64 0x3301
kinos@local:~$ config route add 2002:db8:2:: 64 0x0001

kinos@local:~$ show prefixt
+-------------------------------------+
|             Prefix table            |
+-------------------------------------+
| 2001::/64
| 0x2400 - BR 0 | S-RO-- | Stable
+-------------------------------------+
| 2002:db8:2::/64
| 0x2400 - HR 0 | ------ | Stable
+-------------------------------------+
```

show servicet

To list the service that are being announced in the Network Data by Leader.

show servicet

Syntax description

This command has no arguments or keywords.

Command default

No default value.

Command mode

Execution is always allowed.

Usage guidelines

It serves to display, from Network Data that are stored in the device, the services that are being announced in the Thread network. See the config service command for getting more information about this topic.

Examples

```
kinos@local:~$ config service add 49166 01 aabbccdd

kinos@local:~$ show servicet
+--------------------------------------+
|             Service table            |
+--------------------------------------+
| EN: 49166 SRCD: 0x01
| ->0x2400 SRVD: aabbccdd
+--------------------------------------+
```

show commsid

To show the Commissioner Session Identifier when the device acts as active Commissioner for the Thread network.

show commsid

Syntax description

This command has no arguments or keywords.

Command default

No default value.

Command mode

Execution is always allowed.

Usage guidelines

This command is useful to know the Commissioner Session ID.

Examples

```
kinos@local:~$ show commsid
0x0001
```

show thver

To show what Thread version is running in the device.

show thver

Syntax description

This command has no arguments or keywords.

Command default

No default value.

Command mode

Execution is always allowed.

Usage guidelines

This command serves to know the Thread version that is configured in the device. If node is executing Thread v1.1, Thread v2 will be shown. On the other hand, if device is running Thread v1.2, this command will show Thread v3.

Examples

```
kinos@local:~$ show thver
Thread v2
```

clear

To stop all running processes, clear the volatile memory and restore network configuration stored in non-volatile memory to factory settings.

clear

Syntax description

This command has no arguments or keywords.

Command default

No default value.

Command mode

Execution is always allowed except when device is still busy with a previous clearing process.

Usage guidelines

There are some settings stored in non-volatile memory (look at column NV of Command Reference Table to know which ones are) that are not factory restored by clear command execution and keep their current settings.

This command could have a delayed execution due to critical system processes that might be running at that moment. These processes cannot be stopped immediately and have to be completed before clear is applied. It is recommended to execute show status command to ensure that clear command has been applied. The response will be `none` when the command execution has finished successfully.

Examples

```
kinos@local:~$ clear
```

reset

To perform a software reset of the device. All unsaved configuration will be lost.

reset

Syntax description

This command has no arguments or keywords.

Command default

No default value.

Command mode

Execution is always allowed.

Usage guidelines

It is recommended to wait at least one second before sending other commands.

Examples

```
kinos@local:~$ reset
```

ifup

To start up Thread interface.

ifup

Syntax description

This command has no arguments or keywords.

Command default

No default value.

Command mode

Execution is only allowed when Thread interface is down and its status is `none`.

Usage guidelines

It serves to start the formation of a new Thread network or the joining process to an existing one, depending on the configured role apart from configuration parameters.

Role must be set before command execution, if not a `Configuration settings missing` error message will be responded. Channel, PAN ID, network name and commissioning credential are optional settings. Therefore if they are not specified, they will be automatically generated or selected.

If the out-of-band commissioning mode is set (i.e. config outband), command requires that a set of parameters are configured previously. So they are channel (i.e. config channel), PAN ID (i.e. config panid), network name (i.e. config netname), mesh local prefix (i.e. config mlprefix), master key (i.e. config mkey), extended PAN ID (i.e. config xpanid) and commissioning credential (i.e. config

commcred). In case of any of them is not correctly set an error message will be responded.

In order to know how joining or formation network process has ended up, you can type show status command to verify that the result of operation is `joined`. After a successful connection to Thread network, device will automatically save user configuration in non-volatile memory.

If you run this command and there is a valid network configuration stored in NV memory, then device resumes the connection with that configuration. No modification of this configuration is allowed therefore clear command needs to be executed in order to change those settings.

Examples

Example 1. How to start from scratch as REED in out-of-band commissioning mode.

```
kinos@local:~$ clear
kinos@local:~$ config outband
kinos@local:~$ config channel 11
kinos@local:~$ config panid 0x1234
kinos@local:~$ config xpanid 0x000db80000000000
kinos@local:~$ config netname "KIRALE"
kinos@local:~$ config mkey 0x00112233445566778899aabbccddeeff
kinos@local:~$ config mlprefix FD00:0DB8:0000:0000::
kinos@local:~$ config commcred "threadjpaketest"
kinos@local:~$ config role reed
kinos@local:~$ ifup
```

If you want to know the result from joining process, you can type show status command.

```
kinos@local:~$ show status
joined
```

Example 2. How to start from scratch as Leader of a new Thread network in channel 20.

```
kinos@local:~$ clear
kinos@local:~$ config channel 20
kinos@local:~$ config role leader
kinos@local:~$ ifup
```

In order to see the new network data, you can type show netconfig command.

```
kinos@local:~$ show netconfig
+-------------------------------------------------------------+
| Status                                                      |
+-------------------------------------------------------------+
| Thread interface : up
| Auto joining     : off
| Node status      : joined
+-------------------------------------------------------------+
| MAC Layer                                                   |
+-------------------------------------------------------------+
| PAN ID           : 0x2605
| Short Address    : 0x0000
| Extended Address : ae-09-f0-bd-84-41-48-95
| EUI-64 Address   : 84-04-d2-00-00-00-00-0c
| MAC security     : on
| Channel          : 20
+-------------------------------------------------------------+
| IP Layer                                                    |
+-------------------------------------------------------------+
| IPv6 Addresses   :
| fe80::ac09:f0bd:8441:4895
| fda9:c323:6a62:0:47fa:dd5a:d930:f190
| fda9:c323:6a62::ff:fe00:0
+-------------------------------------------------------------+
| Ethernet Configuration                                      |
+-------------------------------------------------------------+
| MAC Address      : 86-04-d2-00-00-0c
+-------------------------------------------------------------+
| Thread Configuration                                        |
+-------------------------------------------------------------+
| Config. mode     : Thread v2
| Role             : leader
| Active Timestamp : 0x0000000000010000
| Network Name     : kite_319c
| Extended PAN ID  : 0x2e9f7261e86d4229
| PSKc             : 0xe7103ee47f0b65e3ccc80b0ea83ee45c
| Master Key       : 0x434c4b98b5c63324275e17f63b40b9c4
| Mesh-Local ULA   : fda9:c323:6a62::/64
| Node Mesh IID    : 0x47fadd5ad930f190
| Leader ID        : 0
| Partition ID     : 0x181d4364
| Data Version     : 207
| Stable Version   : 150
| Prefixes/Routes  : 0
```

```
| 6lo Contexts     : 1
| Services         : 0
| Comm. Session ID : off
| PBBR Server      : off
+------------------------------------------------------------+
| Services                                                   |
+------------------------------------------------------------+
| Commissioner     : off
| Border Router    : off
| DHCP client      : off
| DNS client       : off
| NTP client       : off
+------------------------------------------------------------+
```

ifdown

To shut down the Thread interface. It wipes out data and configuration not stored in NV memory and stops all running processes.

ifdown

Syntax description

This command has no arguments or keywords.

Command default

No default value.

Command mode

Execution is always allowed even though only has effect when Thread interface is up.

Usage guidelines

It is recommended to wait at least one second before sending other commands.

Examples

```
kinos@local:~$ ifdown
```

You can type show status command to verify the result of command execution.

```
kinos@local:~$ show status
none - saved configuration
```

ping

To send a ping request to a specified IP address or domain name with a determined payload length in case of this latter has been defined.

ping [{ host-name | IPv6 address }] *[payload size]*

Syntax description

host-name	Hostname of the system to ping. Parameter of type string with up to 31 characters of length.
IPv6 address	Address of the system to ping. Parameter of type IP address.
payload size	(Optional) Length of payload. Default value is zero. Parameter of type decimal.

Command default

No default value.

Command mode

Execution is only allowed when device is connected to network.

Usage guidelines

The ping (packet internet groper) command tests the reachability of a remote device over a connectionless Open System Interconnection (OSI) network. The command sends an echo packet to an address and waits for a reply. Ping output can help you evaluate path-to-host

reliability, delays over the path, and whether the host can be reached or is functioning.

It is recommended to enable debug function in order to be able of seeing on screen the ping reply received.

Examples

This example shows how to previously configure debug function for getting logs concerning ICMP traffic before sending ping to destination:

```
kinos@local:~$ debug level log
kinos@local:~$ debug module ipv6 icmp

kinos@local:~$ ping fd00:db8::ff:fe00:0
#203 log: ipv6 tx icmp da=fd00:db8::ff:fe00:0 bs=8 id=53587 sn=26989 - echo.req
#203 log: ipv6 rx icmp sa=fd00:db8::ff:fe00:0 br=8 id=53587 sn=26989 - echo.rpl
```

exec <arg>

Network management commands allow nodes to read and set network attributes.

exec activeget [IPv6 address] *[requested TLVs]*
exec activeset [IPv6 address] [requested TLVs]
exec commget [IPv6 address] *[requested TLVs]*
exec commset [IPv6 address] [requested TLVs]
exec panidqry [IPv6 address] [channel mask] [pan ID]
exec pendget [IPv6 address] *[requested TLVs]*
exec pendset [IPv6 address] [requested TLVs]

Syntax description

IPv6 address	Address of the system to send this management command. Parameter of type IP address.
requested TLVs	(Optional for all commands of type GET). A list of TLVs encoded the same way as in Thread Specification. Parameter of type array.
channel mask	A bit mask that identifies the channels. Parameter of four bytes hexadecimal.
pan ID	Parameter of two bytes hexadecimal.

Command default

No default value.

Command mode

Execution is always allowed.

Usage guidelines

The main purpose of this family of commands is to give support for successfully overcoming Thread certification process when product in question is based on Thread stack from Kirale Technologies.

Examples

```
kinos@local:~$ exec pendget fdc5:200b:dbb::ff:fe00:2400 0d0101
kinos@local:~$ exec panidqry fdc5:200b:dbb:0:9ac:130c:dd24:7ba 0x001fffe0 0x0791
```

END OF THIS DOCUMENT