

XORP Command Line Interface User Guide

Part 1: Command Structure

Version 0.4

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1 Introduction

To interact with a XORP router using the command line interface (CLI), a user runs `xorpsh`. This allows configuration of the router and monitoring of the router state.

In this document we describe how to interact with `xorpsh`. This document does not provide specifics of how to configure BGP, PIM, SNMP and other processes - this will eventually be described in additional documents.

The user interface style is loosely modelled on that of a Juniper router. This manual and the `xorpsh` itself are works in progress, and so may change significantly in the future.

2 Running `xorpsh`

`xorpsh` provides an interactive command shell to a XORP user, similar in many ways to the role played by a Unix shell. In a production router, it is envisaged that `xorpsh` might be set up as a user's login shell - they would login to the router via `ssh` and be directly in the `xorpsh` environment. However, for research and development purposes, it makes more sense to login normally to the machine running the `rtrmgr` process, and to run `xorpsh` directly from the Unix command line.

`xorpsh` should normally be run as a regular user; it is neither necessary or desirable to run it as root. If the user is to be permitted to make changes to the running router configuration, they need to be in the Unix group `xorp`. The choice of GID for group `xorp` is not important.

`xorpsh` needs to be able to communicate with the `rtrmgr` using the local file system. If the `rtrmgr` cannot write files in `/tmp` that `xorpsh` can read, then `xorpsh` will not be able to authenticate the user to the `rtrmgr`.

Multiple users can run `xorpsh` simultaneously. There is some degree of configuration locking to prevent simultaneous changes to the router configuration, but currently this is fairly primitive.

3 Basic Commands

On starting xorps, you will be presented with a command line prompt:

```
Xorp>
```

You can exit xorps at any time by trying Control-d.

Typing “?” at the prompt will list the commands currently available to you:

```
Xorp> ?  
Possible completions:  
  configure  Switch to configuration mode  
  help       Provide help with commands  
  quit       Quit this command session  
  show       help
```

If you type the first letter or letters of a command, and hit <Tab>, then command completion will occur.

At any time you can type “?” again to see further command completions. For example:

```
Xorp> config?  
Possible completions:  
  configure  Switch to configuration mode  
Xorp> config
```

If the cursor is after the command, typing “?” will list the possible parameters for the command:

```
Xorp> configure ?  
Possible completions:  
  <[Enter]>  Execute this command  
  exclusive  Switch to configuration mode, locking out other users  
  |          Pipe through a command  
Xorp> configure
```

3.1 Command History and Command Line Editing

xorps supports emacs-style command history and editing of the text on the command line. The most important commands are:

- The **up-arrow** or **control-p** moves to the previous command in the history.
- The **down-arrow** or **control-n** moves to the next command in the history.
- The **left-arrow** or **control-b** moves back along the command line.
- The **right-arrow** or **control-f** move forward along the command line.
- **control-a** moves to the beginning of the command line.
- **control-e** moves to the end of the command line.

- **control-d** deletes the character directly under the cursor.
- **control-t** toggles (swaps) the character under the cursor with the character immediately preceding it.
- **control-space** marks the current cursor position.
- **control-w** deletes the text between the mark and the current cursor position, copying the deleted text to the cut buffer.
- **control-k** kills (deletes) from the cursor to the end of the command line, copying the deleted text to the cut buffer.
- **control-y** yanks (pastes) the text from the cut buffer, inserting it at the current cursor location.

4 Command Modes

xorpsh has two command modes:

Operational Mode, which allows interaction with the router to monitor its operation and status.

Configuration Mode, which allows the user to view the configuration of the router, to change that configuration, and to load and save configurations to file.

Generally speaking, operational mode is considered to give non-privileged access; there should be nothing a user can type that would seriously impact the operation of the router. In contrast, configuration mode allows all aspects of router operation to be modified.

In the long run, xorpsh and the rtrmgr will probably come to support fine-grained access control, so that some users can be given permission to change only subsets of the router configuration. At the present time though, there is no fine-grained access control.

A user can only enter configuration mode if they are in the `xorp` Unix group.

5 Operational Mode

```
Xorp> ?  
Possible completions:  
  configure  Switch to configuration mode  
  help       Provide help with commands  
  quit       Quit this command session  
  show       help
```

The main commands in operational mode are:

configure: switches from operational mode to configuration mode.

help: provides online help (not yet implemented)

quit: quit from xorpsh. (not yet implemented - use control-d instead).

show: displays many aspects of the running state of the router.

5.1 Show Command

```
Xorp> show ?  
Possible completions:  
  bgp         help  
  interface   help  
  vif         help  
Xorp> show
```

The show command is used to display many aspects of the running state of the router. We don't describe the sub-commands here, because they depend on the running state of the router. For example, only a router that is running BGP should provide `show bgp` commands.

As an example, we show the peers of a BGP router:

```
Xorp> show bgp peers detail
```

```
OK
```

```
Peer 1: local 192.150.187.108/179 remote 192.150.187.109/179
```

```
Peer ID: 192.150.187.109
```

```
Peer State: ESTABLISHED
```

```
Admin State: START
```

```
Negotiated BGP Version: 4
```

```
Peer AS Number: 65000
```

```
Updates Received: 5157, Updates Sent: 0
```

```
Messages Received: 5159, Messages Sent: 1
```

```
Time since last received update: 4 seconds
```

```
Number of transitions to ESTABLISHED: 1
```

```
Time since last entering ESTABLISHED state: 47 seconds
```

```
Retry Interval: 120 seconds
```

```
Hold Time: 90 seconds, Keep Alive Time: 30 seconds
```

```
Configured Hold Time: 90 seconds, Configured Keep Alive Time: 30 seconds
```

```
Minimum AS Origination Interval: 0 seconds
```

```
Minimum Route Advertisement Interval: 0 seconds
```

6 Configuration Mode

```
Xorp> configure
Entering configuration mode.
There are no other users in configuration mode.

[edit]
XORP>
```

When in configuration mode, the command prompt changes to be all capitals. The command prompt is also usually preceded by a line indicating which part of the configuration tree is currently being edited.

```
[edit]
XORP> ?
Possible completions:
  delete          Delete a configuration element
  edit            Edit a sub-element
  exit           Exit from this configuration level
  help           Provide help with commands
  interfaces     help
  load           Load configuration from a file
  protocols      help
  quit          Quit from this level
  run           Run an operational-mode command
  save          Save configuration to a file
  set           Set the value of a parameter
  show          Show the value of a parameter
  top           Exit to top level of configuration
  up            Exit one level of configuration
```

The router configuration has a tree form similar to the directory structure on a Unix filesystem. The current configuration or parts of the configuration can be shown with the show command:

```
[edit]
XORP> show interfaces
  interface r10 {
    description: "control interface"
    vif r10 {
      address 192.150.187.108 {
        prefix-length: 25
        broadcast: 192.150.187.255
      }
    }
  }
```

6.1 Moving around the Configuration Tree

You can change the current location in the configuration tree using the edit, up, top and exit commands.

- **edit** *<element name>*: Edit a sub-element
- **exit**: Exit from this configuration level, or if at top level, exit configuration mode.
- **quit**: Quit from this level
- **top**: Exit to top level of configuration
- **up**: Exit one level of configuration

For example:

```
[edit]
XORP> edit interfaces interface r10 vif r10

[edit interfaces interface r10 vif r10]
XORP> show
  address 192.150.187.108 {
    prefix-length: 25
    broadcast: 192.150.187.255
  }

[edit interfaces interface r10 vif r10]
XORP> up

[edit interfaces interface r10]
XORP> top

[edit]
XORP>
```

6.2 Loading and Saving Configurations

On startup, the rtrmgr will read a configuration file. It will then start up and configure the various router components as specified in the configuration file.

The configuration file can be created externally, using a normal text editor, or it can be saved from the running router configuration. A configuration file can also be loaded into a running router, causing the previous running configuration to be discarded. The commands for this are:

- **save** *<filename>*: save the current configuration in the specified file.
- **load** *<filename>*: load the specified file, discarding the currently running configuration.

6.3 Setting Configuration Values

- **set** *<path to config>* *<value>*: set the value of the specified configuration node.

The set command is used to set or change the value of a configuration option. The change does not actually take effect immediately - the commit command must be used to apply this and any other uncommitted changes.

In the example below, the prefix length (netmask) of address 192.150.187.108 on vif r10 is changed, but not yet committed. The “>” indicates parts of the configuration that have changed but not yet been committed.

```
[edit interfaces interface r10]
XORP> show
  description: "control interface"
  vif r10 {
    address 192.150.187.108 {
      prefix-length: 25
      broadcast: 192.150.187.255
    }
  }

[edit interfaces interface r10]
XORP> set vif r10 address 192.150.187.108 prefix-length 24
OK

[edit interfaces interface r10]
XORP> show
  description: "control interface"
  vif r10 {
    address 192.150.187.108 {
>   prefix-length: 24
      broadcast: 192.150.187.255
    }
  }
}
```

6.4 Adding New Configuration

New configuration can simply be typed at the command line while in configuration mode. The user interface for this is currently rather primitive and doesn't permit the more free-form configuration allowed in configuration files.

For example, to configure a second vif on interface r10:

```
[edit interfaces interface r10]
XORP> show
  description: "control interface"
  vif r10 {
    address 192.150.187.108 {
      prefix-length: 24
      broadcast: 192.150.187.255
    }
  }

[edit interfaces interface r10]
XORP> vif r10b {
  > address 10.0.0.1 {
  >   prefix-length 16
  >   broadcast 10.0.255.255
  > }
  > }

OK. Use "commit" to apply these changes.

[edit interfaces interface r10]
XORP> show
  description: "control interface"
  vif r10 {
    address 192.150.187.108 {
      prefix-length: 24
      broadcast: 192.150.187.255
    }
  }
  > vif r10b {
  >   address 10.0.0.1 {
  >     prefix-length: 16
  >     broadcast: 10.0.255.255
  >   }
  > }
```

6.5 Deleting Parts of the Configuration

The delete command can be used to delete subtrees from the configuration. The deletion will be visible in the results of the show command, but will not actually take place until the changes are committed.

```
XORP> show interfaces interface r10
  description: "control interface"
  vif r10 {
    address 192.150.187.108 {
      prefix-length: 24
      broadcast: 192.150.187.255
    }
  }
  vif r10b {
    address 10.0.0.1 {
      prefix-length: 16
      broadcast: 10.0.255.255
    }
  }
}

[edit]
XORP> delete interfaces interface r10 vif r10b
Deleting:
  address 10.0.0.1 {
    prefix-length: 16
    broadcast: 10.0.255.255
  }

OK

[edit]
XORP> show interfaces interface r10
  description: "control interface"
  vif r10 {
    address 192.150.187.108 {
      prefix-length: 24
      broadcast: 192.150.187.255
    }
  }
}
```

6.6 Committing Changes

```
[edit interfaces interface rl0]
XORP> commit
OK
```

The commit command commits all the current configuration changes. This can take a number of seconds before the response is given.

If xorpsd was built with debugging enabled, the response can be considerably more verbose than shown above!

If two or more users are logged in using configuration mode, and one of them changes the configuration, the others will receive a warning:

```
[edit]
XORP>
The configuration had been changed by user mjh
XORP>
```

6.7 Discarding Changes

The user can discard a batch of changes by editing them back to their original configuration, or by using the exit command to leave configuration mode:

```
[edit]
XORP> exit
Error: There are uncommitted changes
Use "commit" to commit the changes, or "exit discard" to discard them

XORP> exit discard
Xorp>
```