QUAGGA

OPENSOURCE ROUTING SOFTWARE

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Agenda

- Overview
- Installation
- Commands

Routing Daemons

- **Zebra** ***http://www.zebra.org***

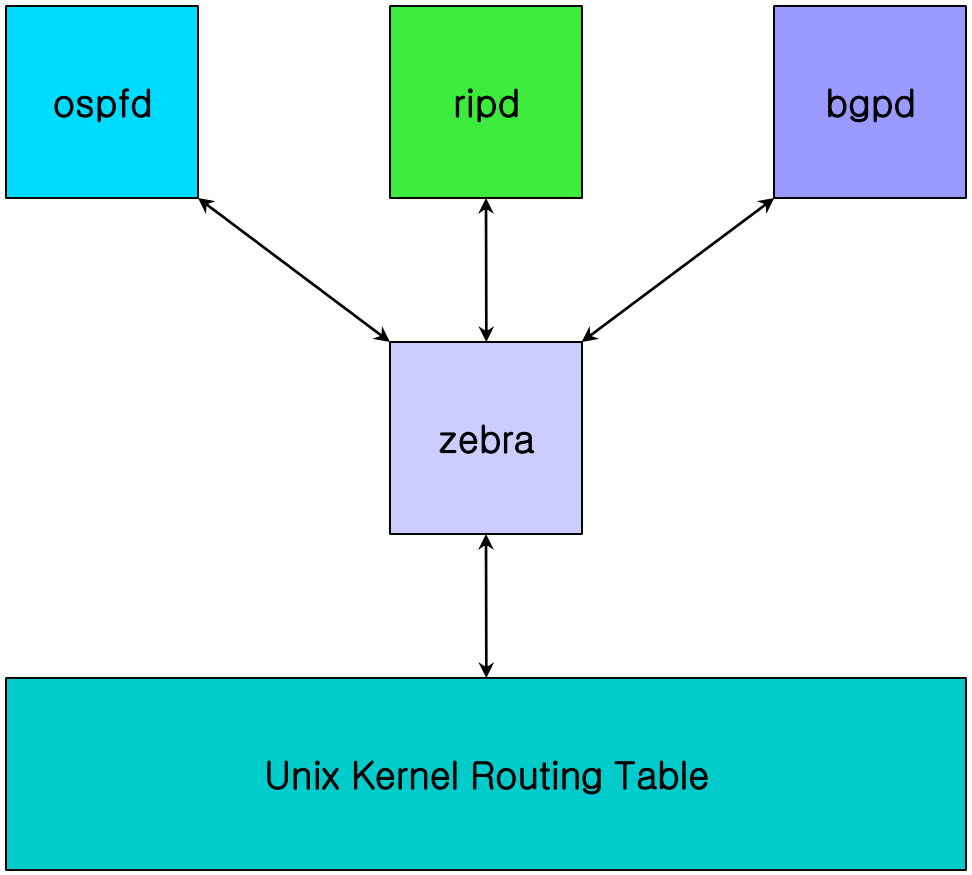
- ✓ First daemon
- ✓ Wide support: RIP,OSPF,BGP
- ✓ Certain Vulnerabilities

- **Quagga** ***http://www.quagga.net***
  - ✓ Based on Zebra
  - ✓ Wide support: RIP,OSPF,BGP,ISIS
  - ✓ Development libraries

Overview

- Distributed under the GNU General Public License
- Zebra is a routing software package that provides TCP/IP based routing services with routing protocols support such as RIPv1, RIPv2, RIPng, OSPFv2, OSPFv3, BGP-4, and BGP-4+
- Support BGP Route Reflectors and Route server behavior
- IPv6 Routing protocols
- Zebra has interactive user interface for each routing protocol and supports common client commands.

Quagga Architecture Diagram



How Zebra/Quagga works

- Collection of several daemons that work together to build the routing table. (protocol specific routing daemons: *ripd, ospfd, bgpd* + kernel routing manager: *zebrad*)
- Zebra daemon is an IP routing manager. It provides kernel routing table updates, interface lookups, and redistribution of routes between different routing protocols.
- Each daemon has its own configuration file
  - For example, Static route – in *zebrad* configuration file
  - BGP – in *bgpd* configuration file

Supported Platform

- Linux 2.2.x and higher
- FreeBSD 4.x and higher
- NetBSD 1.6 and higher
- OpenBSD 2.5 and higher
- Solaris 2.6 and higher

Install the Software

- default working directory: /usr/local/bin and /usr/local/etc
- Zebra daemons have their own terminal interface or VTY. After installation, we have to setup each beast's port number to connect to them. Please add the following entries to'/etc/services'.

```
zebrasrv 2600/tcp # zebra service
zebra 2601/tcp # zebra vty
ripd 2602/tcp # RIPd vty
ripngd 2603/tcp # RIPngd vty
ospfd 2604/tcp # OSPFd vty
bgpd 2605/tcp # BGPd vty
ospf6d 2606/tcp # OSPF6d vty

Additionally for Quagga
ospfapi 2607/tcp # ospfapi
isisd 2608/tcp # ISISd vty
```

Access the Router

- Telnet to the port
  - telnet <ipaddress> 2601

    ports on zebra

    2601 # zebra vty
    2602p # RIPd vty
    2603 # RIPngd vty
    2604 # OSPFd vty
    2605 # BGPd vty
    2606 # OSPF6d vty

    Additionally *quagga* support:
    2607 # ospfapi
    2608 # ISISd vty

- Use VTY shell
  - To use vtysh, specify —enable-vtysh to configure script.
  - Username stored in vtysh.conf file.
    - username *testuser* nopassword

Config Commands

- Command common to all routing protocol
- Config command are generally found in /usr/local/etc/*.conf or path specified in --prefix option (eg. /home/quagga/*.conf)
- The daemon name + `.conf` is the default config file name (eg. /home/etc/quagga/zebra.conf)
- Config file can be specified using *-f* or *-config_file* options when stating the daemon (eg. /home/zebra/sbin/zebra -d -f /home/etc/quagga/zebratest.conf)

Basic Config Commands

- hostname *hostname* – Set hostname of the router.
- password *password* – Set password for vty interface. If there is no password, a vty won't accept connections.
- enable password *password* –Set enable password.
- log stdout – Set logging output to stdout.
- no log stdout –

Quagga Routing Configuration

- Command line interface similar to Cisco IOS

```
C4# conf t
C4(config)# interface eth2
C4(config-if)# description dummy interface
C4(config-if)# ip address 10.1.2.3/24
C4(config-if)# exit
C4(config)# exit
C4#

C4# conf t
C4(config)# router bgp 328
C4(config-router)# bgp router-id 10.1.1.10
C4(config-router)# network 10.1.1.0/24
C4(config-router)# redistribute static
C4(config-router)# neighbor 10.1.1.1 remote-as 999
C4(config-router)# exit
C4(config)# exit
C4#
```

Quagga Operation


```
# show ip route
Codes: K – kernel route, C – connected, S – static, O –OSPF
B – BGP, > – selected route, * FIB route
S>* 0.0.0.0/0 [10/0] via 128.100.96.194, disc0
B>* 6.1.0.0/16 [20/0] via 205.211.94.97, yk0, 01w4d03h
B>* 6.2.0.0/22 [20/0] via 205.211.94.97, yk0, 01w4d03h
B>* 6.3.0.0/18 [20/0] via 205.211.94.97, yk0, 01w4d03h
# show bgp neighbors
BGP neighbor is 205.211.94.97, remote AS 549, local AS 239, external link
BGP version 4, remote router ID 205.211.94.253
BGP state = Established, up for 01w4d22h
```

Comparisons

	RFC	QUAGGA 0.99.6	VYATTA VC 3.0	CISCO 2651	CISCO 3750 L3
Software type		IOS-Like	JunOS-Like	Cisco IOS	Cisco IOS
Opensource		YES	YES	NO	NO
Installation		YES	YES	NO	NO
Static Routing	-	YES	YES	YES	YES
RIPv2	2453	YES	YES	YES	YES
OSPFv2	2328	YES	YES	YES	YES
BGPv4	1771/4271	YES	YES	YES	YES
NAT	2766	NO/Linux	YES	YES	NO
VRRP	3768	NO/Linux	YES	YES	NO
Access lists		YES	YES	YES	YES
Route maps		YES	YES	YES	YES
VPN IPSec	4301	NO/Linux (1)	YES	YES	YES
VPN SSL		NO/Linux (2)	NO/Linux (2)	NO	NO
FTP client	959	NO/Linux	YES	YES	YES
TFTP client	1350	NO	YES	YES	YES
Telnet server	854	YES (3)	YES	YES	YES
ssh server	4251	NO/Linux	YES	YES/NO	YES/NO
HTTP server		NO	YES	YES	YES
DHCP server	2131	NO/Linux	YES	YES	YES
DHCP relay		NO/Linux	YES	YES	YES
NTP server	1305	NO/Linux	NO	YES/NO	NO
NTP client	1305	NO/Linux	YES	YES	YES
SNMP	3412/1157	YES (4)	YES	YES	YES
Ping		YES (5)	YES	YES	YES
traceroute		YES (5)	YES	YES	YES

Legend:

YES:	The protocol is supported.
YES/NO:	Available on specific Cisco IOSs only.
BUGGED:	There is a major bug on the protocol.
NO/Linux:	Not supported on the Quagga router but can be enabled at the Linux level.
(1)	Openswan can be used as an implementation of IPsec for Linux.
(2)	OpenVPN can be used to build SSL VPNs on Linux.
(3)	Each routing protocol daemon and the zebra kernel routing manager have to be telnetted separately.
(4)	Quagga must be compiled with the SNMP functionality.
(5)	Ping or traceroute must be installed at the Linux level to be used under Quagga.

Thank You

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