APNIC 34

Open Source Software for Routing

A look at the status of Open Source Software for Routing

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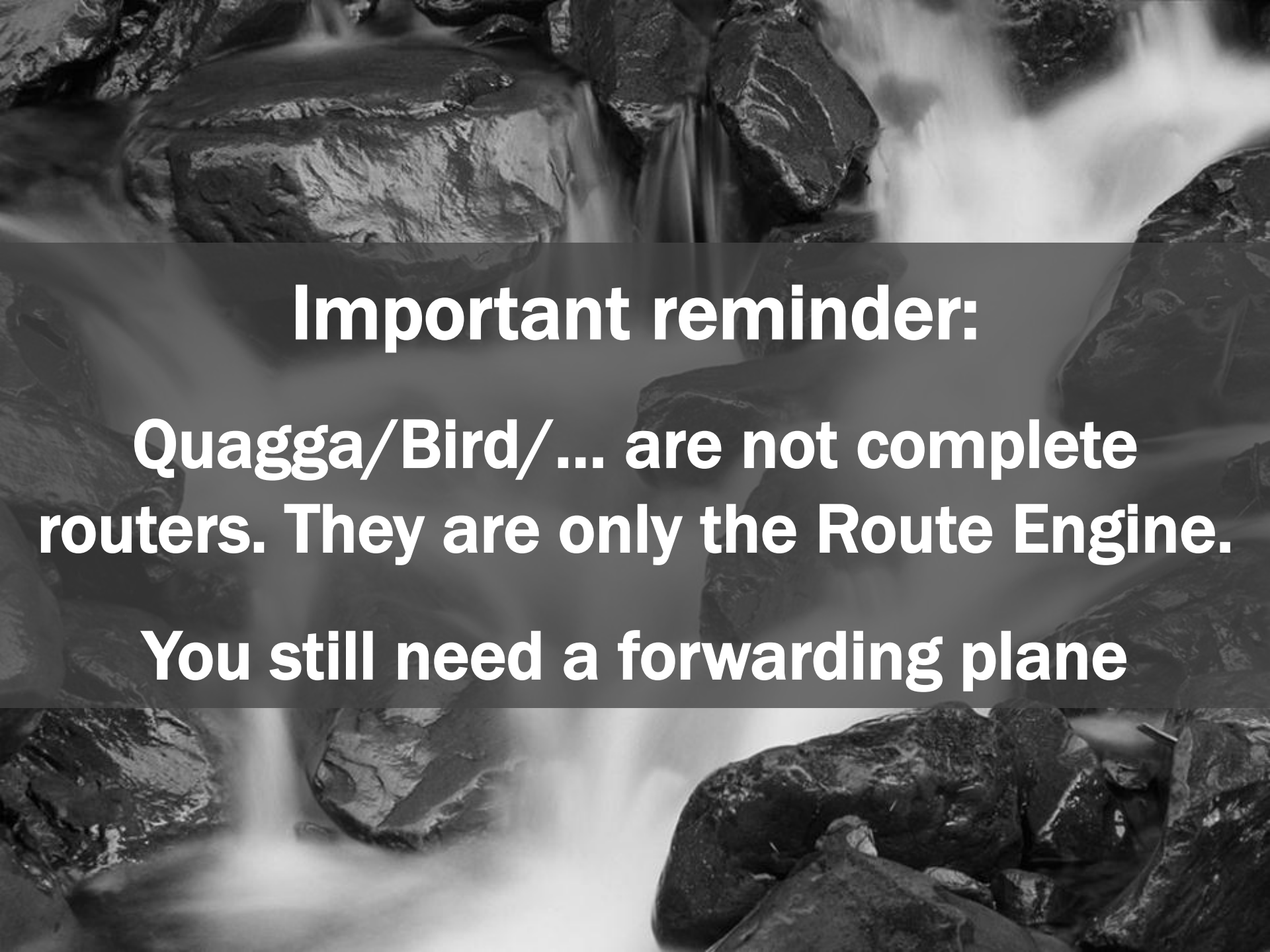
OpenSourceRouting.org

Who is OpenSourceRouting

Quick Overview of what we do and who we are

www.opensourcerouting.org

- **Started late summer 2011**
- **Focus on improving Quagga**
- **Funded by Companies who like an Open Source Alternative**
- **Non-Profit Organization**
  - Part of ISC (Internet System Consortium)


Important reminder:
Quagga/Bird/... are not complete routers. They are only the Route Engine.
You still need a forwarding plane

Why look at Open Source for routing, Why now? 1

Reasons for Open Source Software in Routing

Popular Open Source Software 2

Overview of Bird, Quagga, OpenBGPd, Xorp

Current Status of Quagga 3

Details on where to consider Quagga, where to avoid it

What Open Source Routing is doing 4

What we (OpenSourceRouting.org) do on Quagga

How you can help 5

Open Source needs your help. And it will help you.

Open Source Routing

Reasons why the time is NOW

A few reasons to at least start thinking about Open Source

Money

Could be much cheaper. You don't need all the features and all the specialized hardware everywhere.

SDN, Cloud, ..

All the current buzzwords. And most of it started with Open Source – and is designed for it. Does your vendor provide you with the features for new requirements in time?

Your Features

Missing a feature? Need a special feature to distinguish from the competition? You have access to the source code.

Support

Not just one company is setting the schedule on what the fix and when you get the software fix. And you are independent on choosing hardware

Reasons to wait a bit longer

Maybe too early?

Early adoption

It’s not common (yet). The quality may not be at the same level and you have to do your own real testing.

Support

Limited choices for professional support if you depend on it

Missing features

You may be missing the features you need. Or you don’t have the required performance or interfaces

Risk

Your business may depend on it. (Testing may reduce the risk here!)

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Popular Open Source Software

Bird

http://bird.network.cz/

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http://bird.network.cz/

- **Project started 1999**
  - Alternative to Quagga
  - Started as seminar project at Charles University, Prague
  - Since 2008 maintained by CZ.NIC Labs
- **Started as alternative to Quagga/Zebra**
- **Fast, efficient**

Bird - Features

Based on Version 1.3.7

- **Protocols**
  - RIP, RIPv2, RIPng, OSPFv2, OSPFv3, BGPv4, BGPv6
- **Runs on Linux, FreeBSD, NetBSD, OpenBSD**
- **BGP ROA support (RPKI)**
- **IPv6 Router Advertisement**
- **Powerful configuration and filtering language (!)**
- **Multiple routing tables**
- **Missing / Limitations:**
  - IPv4 & IPv6 separate daemon
  - BGP multiprotocol
  - ISIS (IPv4 & IPv6)

Bird – Users

- **Bird is currently the most popular Open Source Solution for Route Servers**
  - Major use is for BGP processing and announcements
  - No (or very little) use in a router for forwarding or IGP

Popular Open Source Software

OpenBGPd

http://www.openbgpd.org/

OpenBGPd

http://www.openbgpd.org/

- **Project started as part of OpenBSD community**
  - BSD Licensed
  - Maintained by the BSD community
- **Focus on routing for OpenBSD systems**

Part of OpenBSD Project

OpenBGPd - Features

Based on Version 4.6

- **Protocols**
  - BGPv4, BGPv6 (OSPF available as part of OpenOSPFd)
- **Runs on OpenBSD, FreeBSD, OpenBSD, NetBSD, Linux**
- **BSD License**
- **Missing / Limitations:**
  - BGP only
  - Mostly BSD focused
  - Limited deployment (less active community)

Popular Open Source Software

Quagga

http://www.quagga.net/

Quagga

http://www.quagga.net/

- **Project started as fork of Zebra**
  - Open Source Community “owned”
  - Maintained by the community
  - OpenSourceRouting.org supports community with testing & development
- **Focus on full routing**

NO QUAGGA LOGO

But do you know what a Quagga is?

Quagga

Extinct relative of the Zebra

Quagga - Features

Based on Version 0.99.21

- **Protocols**
  - RIP, RIPv2, RIPng, OSPFv2, OSPFv3, ISIS (v4 only), BGPv4, BGPv6, Babel, SNMP
- **Runs on Linux, FreeBSD, NetBSD, OpenBSD, Solaris, and many more**
- **Cisco like CLI**
- **Missing / Limitations:**
  - BGP inefficient for Route Server / many full feeds
  - ISIS (IPv6) (and ISIS IPv4 is not yet useable)
  - Multiple branches of Quagga:
    - Quagga.net (official “Master” branch), Euro-IX, Quagga-RE and more

Quagga – Users

- Some Route Server (smaller ones)
- Used by OpenFlow, SDNs and small router appliances as route processor
- Smaller ISPs (Linux routers with OSPF & BGP)
- Many large Datacenters/CDNs use custom modified versions
- You?

Popular Open Source Software

XORP

http://www.xorp.org/

XORP

http://www.xorp.org/

- **Started as "Open Platform for Network Research"**
  - Answer of Juniper fans to Quagga
- **Goal to be Extensible Open Source Routing Platform**
- **Focus on good Documentation & clean code**

e**X**tensible
Open
Routing
Platform

XORP - Features

Based on Version 1.8.5

- **Protocols**
  - RIP, RIPv2, RIPng, OSPFv2, OSPFv3, BGPv4, BGPv6, IGMP, MLD, PIM-SM, OLSR
- **Runs on Linux, FreeBSD, OpenBSD, NetBSD, DragonFlyBSD, Windows**
- **Juniper like CLI**
- **Written in C++**
- **Forwarding Engine Abstraction (FEA)**
- **Missing / Limitations:**
  - No ISIS
  - Performance not yet evaluated

XORP – Users

- **Pica8 commercial stack based on XORP**
  - Code is closed but it's announced to be opened up in the future
- **CandelaTech's testing equipment products are based on XORP**
  - http://www.candelatech.com
- **Maine School and Library Network is completely served by Xorp based routers**
  - http://networkmaine.net/msln/
- **AI3/SOI IPv6 multicast network for long distance learning project is based on Xorp routers**
  - http://www.soi.asia
- **YOU?**

Highlights Open Source Solutions

My (personally) favorite feature on each solution

BIRD

Currently preferred solution for RouteServers

BSD License (no GPL limitations)

Quagga

Preferred solution for full routing (OSPF & BGP)

XORP

Clean C++ Source with good developer documentation

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Quagga Routing Protocols

BGP IPv4 & IPv6	Performance bad for large multiple tables • Euro-IX Branch tries to fix it with threads (work in progress) • OpenSourceRouting.org trying a few data structure improvements
OSPFv2	Reported as robust by many users Some OSR found open issues with large OSPF network topology changes
OSPFv3	Separate (partially cloned from OSPFv2), but behind on fixes as many OSPFv2 bugs never made it to it.

Quagga Routing Protocols

ISIS	Implemented, but not yet usable (too buggy) • ISIS for IPv4 should be ok in 1..2 releases • ISIS for IPv6 missing (expected to be done after IPv4 implementation is working)
RIPv1, RIPv2, RIPng	Working with no issues

See www.opensourcerouting.org/wiki/Testing+Efforts

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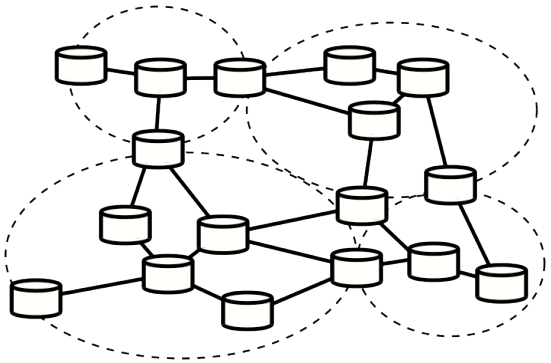
Open Source Routing

Our (current) main focus

OpenSourceRouting.org's main current work (in addition to community)

ISIS / OSPF

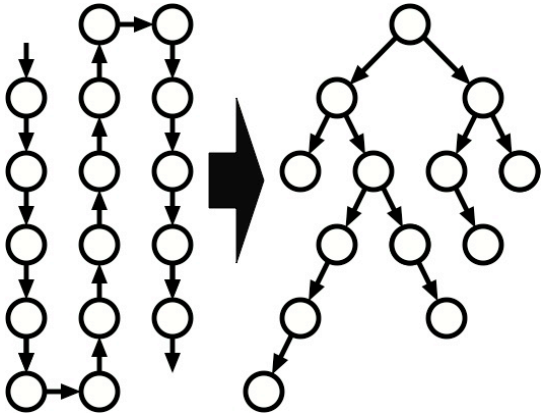


Fixing ISIS (IPv4) to get it to a useable state

OSPF unnumbered interfaces

IGP Stability fixes

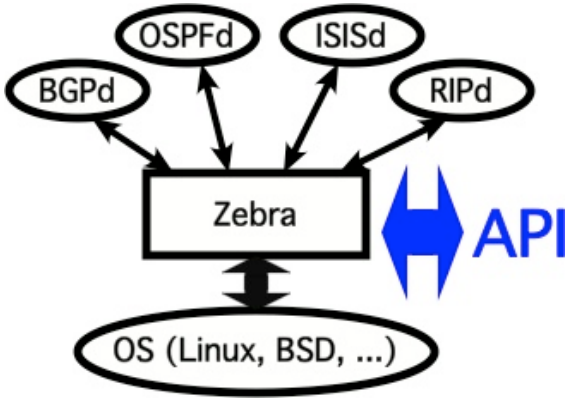
Data structure changes



Trying to improve internal RIB structures

(Cleanup and Performance Changes)

API to Zebra



Add API to decouple FIB updates from the OS below and allow forwarding engines to subscribe to direct updates from Zebra

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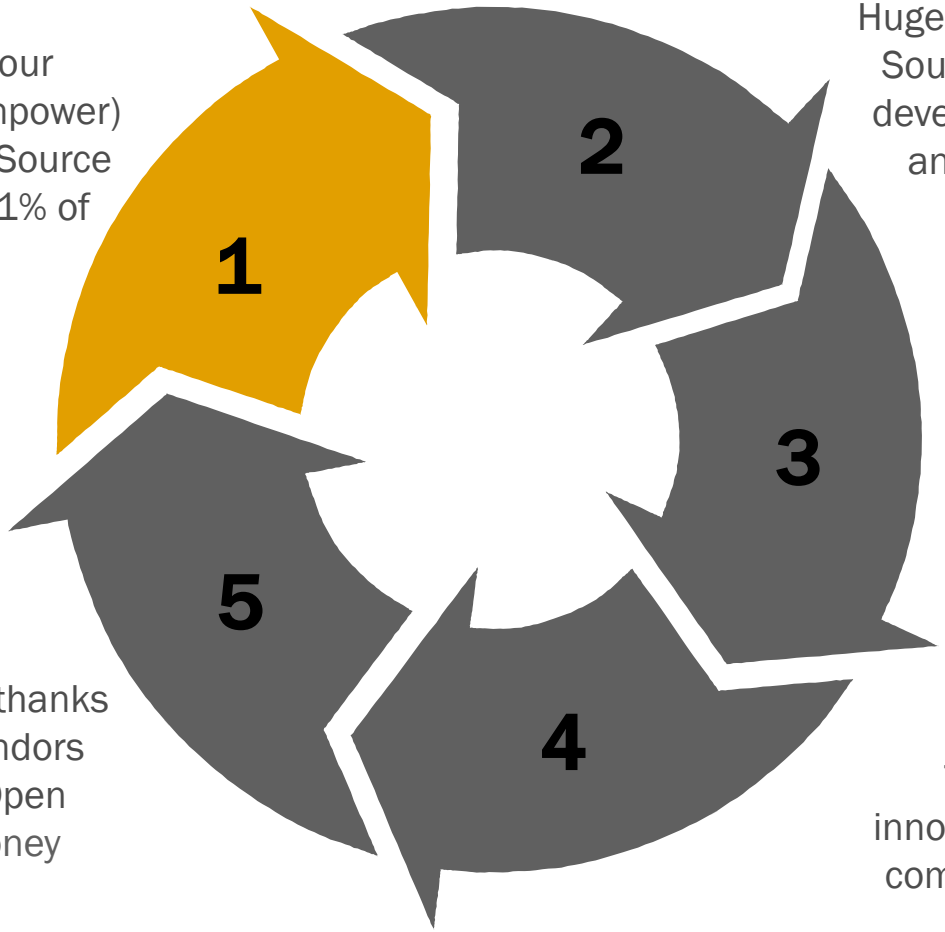
Allow Open Source to save you money

Please consider supporting the Open Source Routing Movement with time and/or money

Phase 1

Spend small amount of your resources (money or manpower) on helping out the Open Source Movement – maybe just 1% of your router budget



Phase 2

Huge Improvements in the Open Source Routing Space as more developers and testers will fix it and add the missing features

Phase 3

Open Source becomes a possibility in your network for many locations as it gets stable and has the needed features

Phase 4

Traditional vendors need to innovate or lower their prices to compete with the Open Source Movement

Phase 5

Lower Operational costs thanks to cheaper traditional vendors and savings from using Open Source Code → More money

Thank You - Discussion

The floor is open for discussion – Or contact me afterwards

- **Are you using Quagga or another Open Source Routing software?**
- **What is stopping you from using Open Source Routing Software?**
- **Experiences?**
- **Interested in helping out? ($$ and/or Work)**

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www.opensourcerouting.org

Open Source Routing

ISC