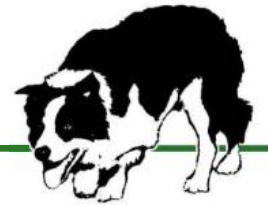


Recent Progress in Routing Standardization

An IETF update for UKNOF 23



Old Dog Consulting

Adrian Farrel

adrian@olddog.co.uk

afarrel@juniper.net

IETF Routing Area Director

Daniel King

daniel@olddog.co.uk

IETF Working Group Secretary
(CCAMP, L3VPN, PCE, ROLL)

What Is Interesting and New?

- Secure Inter-domain Routing (SIDR)
 - A long-standing effort making progress
- Network Virtualization Overlays (NVO3)
 - A new working group starting to focus
- Interface to the Routing System (IRS)
 - A new proposal with a meeting planned for IETF-85 in November

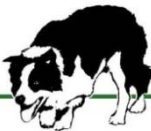


SIDR

- Inter-domain routing is fragile
 - “99% of mis-announcements are accidental originations of someone else’s prefix” – Google
 - It is possible some mis-announcements are malicious!
- SIDR aims to address
 - Is an AS authorized to originate an IP prefix?
 - Is the AS-Path represented in the route the same as the path through which the NLRI travelled?
 - Is the BGP protocol exchange secure?
- Non-goal is to prevent all malicious attacks

Resource Public Key Infrastructure (RPKI)

- Public *and* private key
 - Encrypt with one; decrypt with the other
- Public key issued by certifying authority
- X.509 certificates used
 - Tree of certification following address allocation
 - Address prefix is signed and announced with public key
- Route Origin Authorization
 - A signed prefix and AS number
 - Some support for aggregation
 - BGP advertisement checked against signed ROAs
- NB.Compute load much less than ACLs



SIDR Progress

- Completed frameworks for RPKI and ROAs
- Completed core infrastructure for RPKI/ROA
- Mature/completed
 - Protocol for exchanging information between RPKI and routers
 - Advertisement validation mechanism
- Work in progress
 - Security enhancements to BGP
 - Specifically secure the AS-PATH attribute



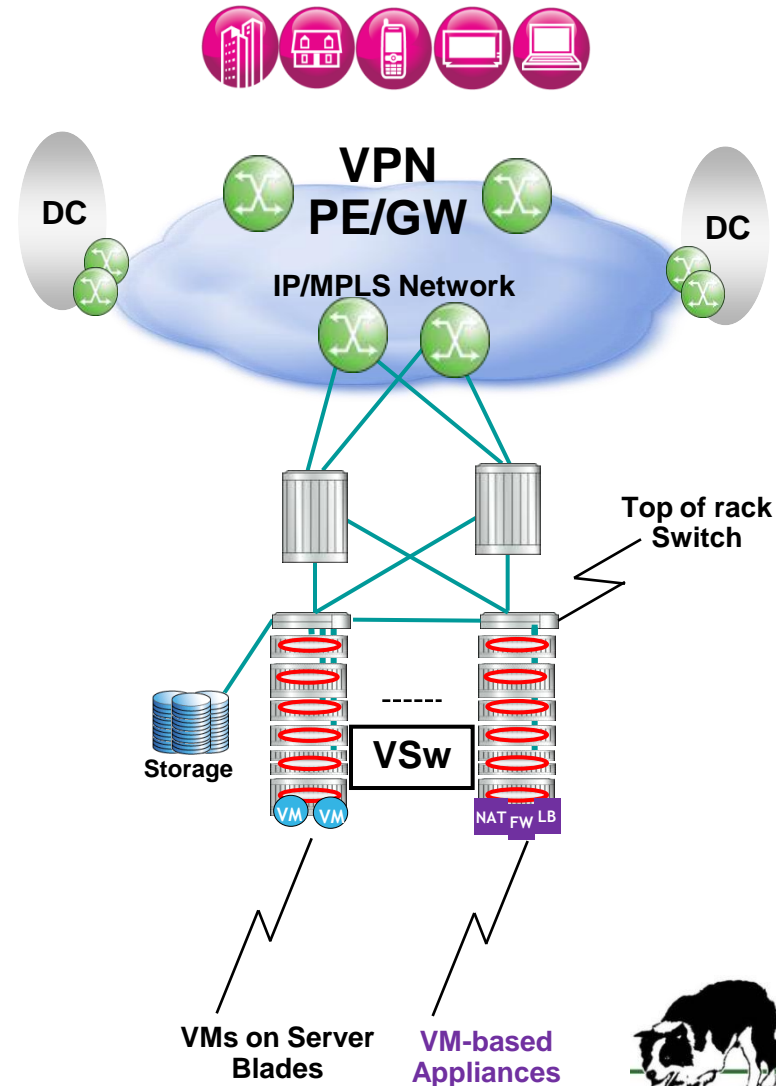
SIDR References

- SIDR Working Group
<http://datatracker.ietf.org/wg/sidr/charter/>
- RFC 6480
An Infrastructure to Support Secure Internet Routing
<http://datatracker.ietf.org/doc/rfc6480/>
- Endless presentations at nanog and ripe
 - <http://www.nanog.org/presentations/archive/index.php>
 - Search for SIDR
 - <https://ripe64.ripe.net/programme/meeting-plan/tutorials/>



Multi-tenant DC Networking

- Gateway to the outside world.
- DC Interconnect and connectivity to Internet and VPN customers.
- High capacity core node, usually a cost effective Ethernet switch; may support routing capabilities.
- Top of Rack (ToR) hardware-based Ethernet switch; may perform IP routing.
- Virtual Switch (VSw) software based Ethernet switch running inside the server blades.



NVO3 Overview

- Multi-tenancy has become a core requirement of data centers
 - Including for Virtualized Machines (VMs) and VM multi-tenancy
- Three key requirements needed to support multi-tenancy are
 - Traffic isolation
 - Address independence
 - Fully flexible VM placement and migration
- NVO3 WG considers approaches to multi-tenancy that reside at the network layer rather than using traditional isolation (e.g., VLANs)
 - An overlay model to interconnect VMs distributed across a data center
- NVO3 WG will determine which types of connectivity services are needed by typical DC deployments (for example, IP and/or Ethernet)
- NVO3 WG **Will Not** develop service provider solutions for wide-area interconnect of data centers



NVO3 WG Progress

- NVO3 Working Group
 - First meeting IETF-84 July 2012
 - <http://datatracker.ietf.org/wg/nvo3/charter/>
- Problem Statement: Overlays for Network Virtualization
 - Describes issues associated with providing multi-tenancy that require an overlay-based network virtualization approach to addressing them
 - Adopted by working group September 2012
 - <http://tools.ietf.org/html/draft-ietf-nvo3-overlay-problem-statement>
- Framework for DC Network Virtualization
 - Provides a framework for NVO3. It defines a logical view of the main components with the intention of streamlining terminology and focusing the solution set
 - Adopted by working group September 2012
 - <http://tools.ietf.org/html/draft-ietf-nvo3-framework-00>



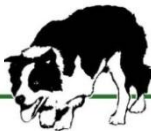
NVO3 has loads of buzz

- Internet-Drafts include:
 - Data and Control Plane Requirements
 - Framework
 - Overlay Architecture
 - Addressing
 - Use Cases
 - VPN Applicability
 - Mobility Issues
 - Operational Requirements
 - Security Framework

Related Active Documents (not working group documents):

(To see all nvo3-related documents, go to [nvo3-related drafts in the ID-archive](#))

🔍 draft-ashwood-nvo3-operational-requirement	-00	2012-06-14
🔍 draft-bitar-nvo3-vpn-applicability	-00	2012-08-30
🔍 draft-bl-nvo3-dataplane-requirements	-01	2012-06-26
🔍 draft-carpenter-nvo3-addressing	-00	2012-07-05
🔍 draft-drake-nvo3-evpn-control-plane	-00	2012-09-17
🔍 draft-dunbar-nvo3-overlay-mobility-issues	-00	2012-06-28
🔍 draft-gu-nvo3-overlay-cp-arch	-00	2012-07-09
🔍 draft-gu-nvo3-tes-nve-mechanism	-00	2012-07-06
🔍 draft-hy-nvo3-vpn-protocol-gap-analysis	-01	2012-09-10
🔍 draft-kj-nvo3-encapsulation-reqt	-00	2012-09-25
🔍 draft-kj-nvo3-pion-architecture	-00	2012-05-11
🔍 draft-kompella-nvo3-server2nve	-00	2012-07-09
🔍 draft-kreeger-nvo3-overlay-cp	-01	2012-07-16
🔍 draft-maino-nvo3-lisp-cp	-01	2012-09-20
🔍 draft-mity-nvo3-use-case	-03	2012-08-30
🔍 draft-rekhter-nvo3-vm-mobility-issues	-02	2012-09-27
🔍 draft-wei-nvo3-security-framework	-01	2012-07-16
🔍 draft-xu-nvo3-lan-extension-path-optimization	-00	2012-07-09

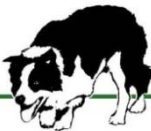
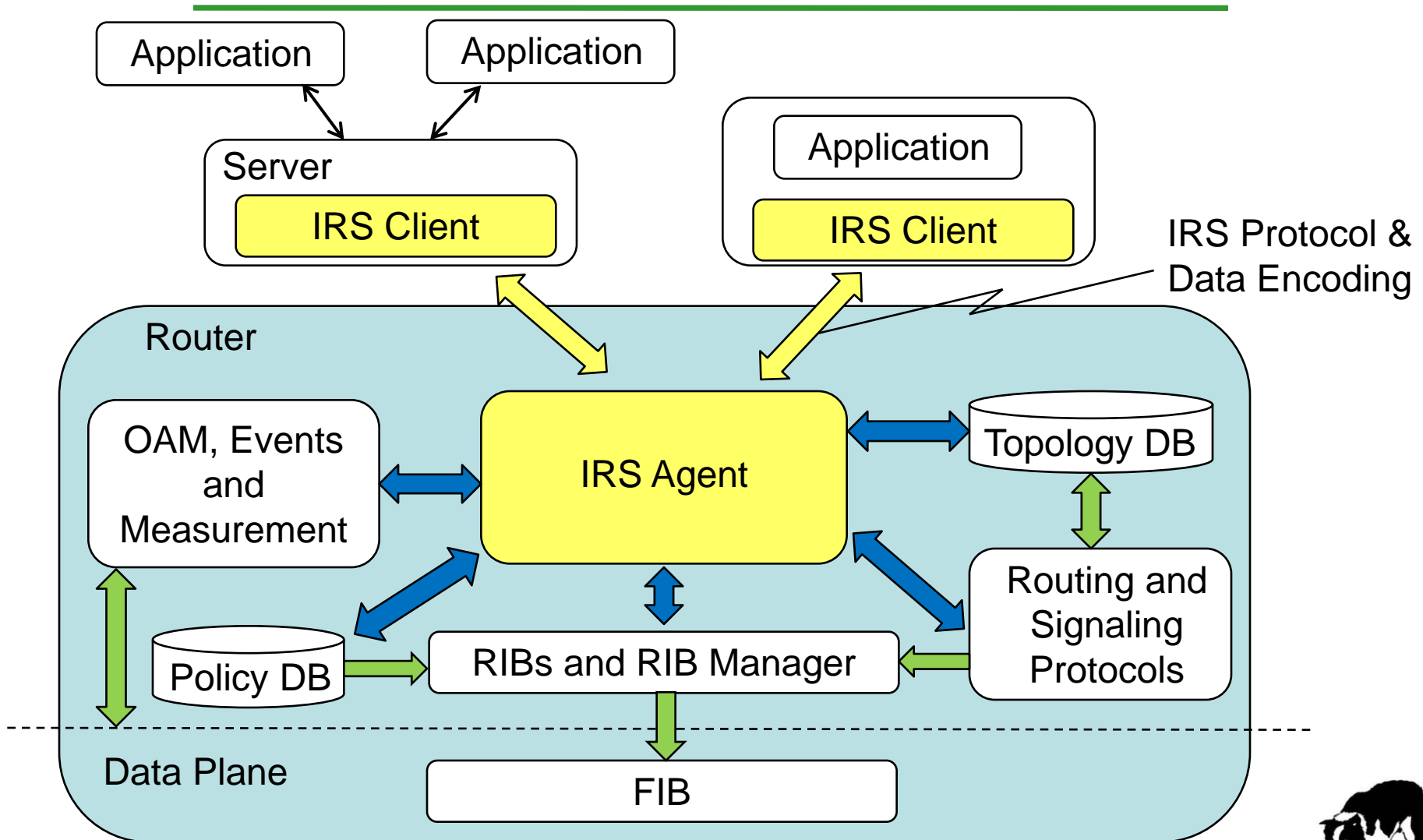


IRS

- Configuration access to routers tends to be
 - Non-dynamic
 - Granular
 - Non-standard
- Existing programmatic interfaces target
 - Data plane
 - FIB
- Need a way to provide high-level input to routing and to extract data
 - Make entries in RIBs
 - Control routing protocols
 - Set policies
 - For policy-based routing QoS, OAM, etc.
 - Security, firewalls, etc.
 - Route import/export
 - Read topology and routing information



IRS Framework



Questions to Be Answered

- What is an IRS Application?
- How does IRS interact with Configuration?
- Are there already existing protocols and encoding languages?
- How does this relate to OpenFlow?
- What's it all for?



IRS Use Cases

- Core routing system manipulation
 - Injection of static routes
 - Control of RIB-to-FIB policy
 - Extraction of RIBs and other data
- Topology manipulation
 - Extraction of topology and traffic engineering info
 - Creation of virtual links and tunnels
- BGP policy
 - Import and export policies
 - Route reflector control
 - Flowspec definition and configuration
- Firewalls
 - Injection of policies



IRS Plans

- Post some Internet-Drafts and discuss the idea
- BoF meeting IETF-85 in Atlanta (November)
 - Assess level of focus and support
- Maybe form a working group
 - Start with framework, use cases, requirements
 - Write **abstract** information models
 - Continue to evaluate existing protocols and encoding languages
 - Maybe develop new protocols/languages
 - Write data models



IRS References

- IETF-85 BoF Proposals
<http://trac.tools.ietf.org/bof/trac/>
- IRS discussion mailing list
<http://www.ietf.org/mailman/listinfo/irs-discuss>
- IRS Problem Statement
<http://datatracker.ietf.org/doc/draft-atlas-irs-problem-statement/>
- IRS Framework
<http://datatracker.ietf.org/doc/draft-ward-irs-framework/>

