IRS Use Case & Requirements

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(Speaking on behalf of several Use Case and Requirement I-D’s co-authors)
IRS Use Case & Reqmt’s Drafts

• Use Cases
  – *draft-amante-irs-topology-use-cases-00*
    • Shane Amante (Level 3), Jan Medved (Cisco), Tom Nadeau (Juniper)
  – *draft-keyupate-irs-bgp-usecases-01*
    • Keuyr Patel, Rex Fernando (Cisco), Hannes Gredler (Juniper), Shane Amante (Level 3)
  – *draft-white-irs-use-case-00*
    • Russ White (Verisign), Sue Hares (Huawei), Rex Fernando (Cisco)

• Requirements
  – *draft-medved-irs-topology-requirements*
    • Jan Medved, Stefano Previdi (Cisco), Hannes Gredler (Juniper), Shane Amante (Level 3)
  – *draft-rfernando-irs-framework-requirement-00*
    • Rex Fernando, Jan Medved, Dave Ward (Cisco), Alia Atlas, Bruno Rijsman (Juniper)
Caveat ...

• Going to quickly summarize contents of each draft to draw out commonalities and differences

• Encourage you to read all drafts, (if you have not already), for much more detail.
Framework for Topology, Policy & Orchestration ‘Manager’ Functions

Use Cases

– Capacity Planning & Traffic Engineering
  • Operate at different time scales, but critical requirement to incorporate information from multiple data sources: statistics & inventory data warehouses

– VPN Services Provisioning
– Rapid IP & ASN Renumbering
– Path Computation Element (PCE)
– ALTO Server
• Mass BGP Protocol & Policy Configuration Changes; Analysis and Troubleshooting of BGP Routing State across an entire network
• Side note: *BGP configuration is overwhelming majority of configuration on routers and modified the most frequently, by Service Providers*
• BGP Protocol Configuration
  – Dynamically change AFI/SAFI; ASN migration scenarios; RT (RD) changes, etc.
• BGP Policy Configuration: *Route filtering, Route summarization*
• Internal BGP Error Handling (?)
• BGP Route Manipulation
  – Customize Best Path Selection
  – Flowspec (react to DDoS attacks) – similar to draft-white-irs-use-case-00
  – Optimized Exit Control, a.k.a.: TE – similar to draft-white-irs-use-case-00
  – Change RT values on RR’s – similar to draft-white-irs-use-case-00
• BGP Events
  – Notify applications when changes occur to “important routes”
  – Troubleshooting Filtered BGP Routes
  – BGP Protocol Statistics – monitor & change ‘max-prefix limit’
• Fine-grained tuning of traffic flow(s) in an IP network
• Optimized Exit Control
  – Current dynamic routing protocols (BGP) do not provide the granularity to fine-tune exit paths in a network
• Reacting to DDoS attacks
  – Redirect some traffic through “traffic scrubbing” points in the network.
• Dynamically optimize traffic flows in a hub & spoke network
  – Instead of forwarding all traffic spoke-to-spoke traffic through hub-site; the hub site could dynamically program a spoke site to directly forward traffic to other spoke sites.
• Inside DataCenter Routing
  – Quickly modify routing based on topology changes and shifts in traffic patterns
• Between DataCenter Routing
  – “Bandwidth on Demand” across the WAN to move or replicate resources from one DC to a second DC.
• Reqmt’s for ‘Topology Manager’ function of draft-amante-irs-topology-use-cases
• Topology Manager (TM) constructs virtualized views of global network topology for consumption by Clients
• General:
  – Define standards-based data models with common vocabulary to describe various network components
• Data Model:
  – Layer-2 & higher Data Model Reqmt’s
  – MUST capture Visible & ‘Invisible’ Network Components
  – Hierarchical representation, composition and summarization of network components into real or virtual/abstract depictions of network topologies
• Northbound (Client) API
  – Efficient, flow-control-capable protocol for large data transfers between TM & Clients
  – MUST support publish/subscribe capability
  – MUST support ‘non-Routers’ as Clients, (up to now Clients needed to run a dynamic Routing Protocol to learn of network topology or events).
• Southbound (Network & Device) API – better reqmt’s in draft-rfernando-irs-framework-requirement-00 ... 😊
draft-rfernando-irs-framework-requirement-00

- IRS Framework Terminology and Requirements
  - In-depth requirements for protocol and (service) data models used between Clients & Servers in IRS
- One, p2p transport connection between a client and a server
- In order, reliable data delivery in both directions
  - Critical when client is adding, changing or deleting state on a server.
- Publish-Subscribe for Asynchronous Notifications of Events that occur on the Server
- Security Requirements: server needs to validate Identify of client, before allowing client read-only or read-write access to server state.
- Application Programmability Reqmt’s:
  - Apps should focus on functionality, they should not have to focus on mechanisms wrt communicating with Servers.
  - Apps should be re-usable across different environments
  - App “templates” (design patterns?) should be available in a common repository for re-use by other app developers …
Requirements Summary

• Need standard/common vocabulary to describe functional network components in the IP Routing System within standards-based data models.

• Need “application-friendly” mechanism(s) to allow non-Routers (Clients) to quickly exchange information with Routers/Switches (Servers) – and other infrastructure support systems – so as to query, add, modify or delete routing state in the network.
Overall Summary

• Critical need to make *globally optimized routing/forwarding and configuration changes* to the entire network.

• Can only be done by augmenting routing information (from the Devices *and* Control Plane) with network-wide traffic utilization patterns, routing and security policies.

• Only once this information is coalesced can operators make accurate, rapid (automated) changes to ‘forwarding patterns’ on the network.
BACKUP SLIDES
1/8/13

IRS
Use Cases & Requirements Drafts

Client

Server

Client

Server

Client

Server

Topology Manager, Inventory Manager, etc. ‘Functions’

Southbound Protocol(s)

Network Elements