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.

draft-amante-irs-topology-use-cases-00

- 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

draft-keyupdate-irs-bgp-usecases-01

- 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'

draft-white-irs-use-case-00

- 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.

draft-medved-irs-topology-requirements-00

- 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 …

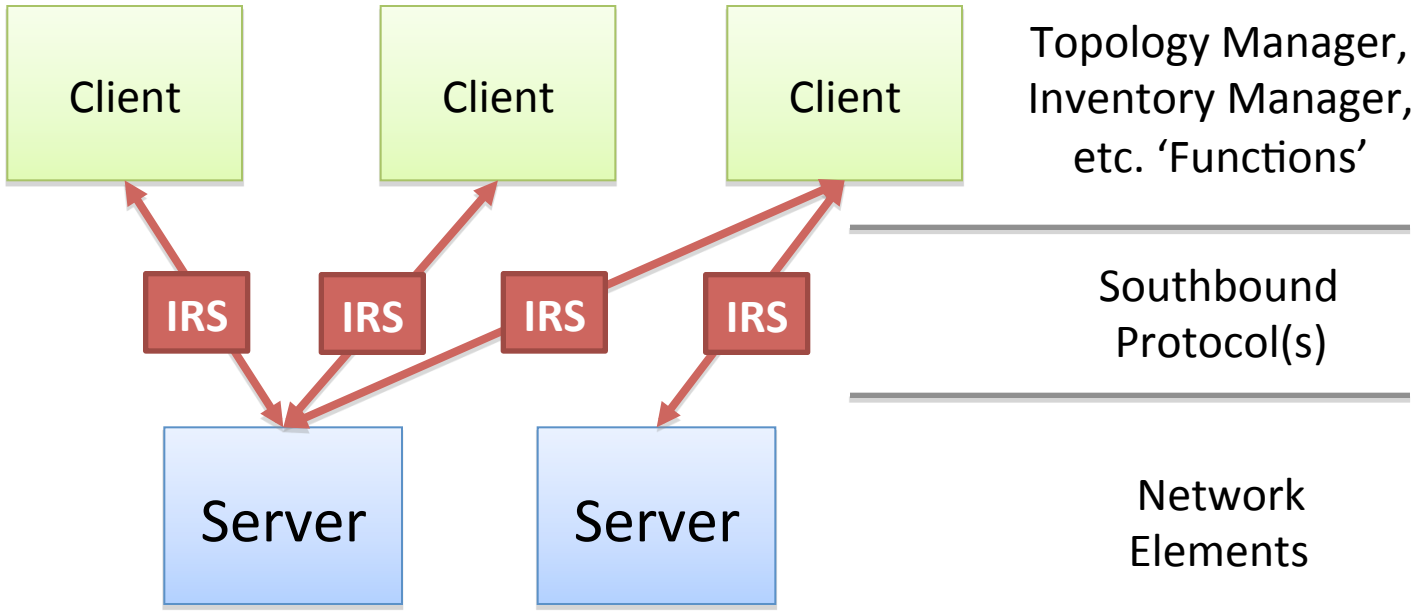
Requirements Summary

- 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


Client
Client
Client
Topology Manager,
Inventory Manager,
etc. 'Functions'
IRS
IRS
IRS
IRS
Southbound
Protocol(s)
Server
Server
Network
Elements