Interface to The Internet Routing System (IRS)

Framework documents

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IETF 84 – Routing Area Open Meeting
Drafts included

draft-atlas-irs-problem-statement-00
draft-ward-irs-framework-00
draft-atlas-irs-policy-framework-00
draft-dimitri-irs-arch-frame-00

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IETF 84 – Routing Area Open Meeting
What’s the Problem?

• Applications Need To *Dynamically*
  – And Knowledgeably, based on:
    • Topology (active & potential)
    • Events
    • Traffic Measurements
    • Etc.
  – *Augment* Routing, based on:
    • Policy
    • Flow & Application Awareness
    • Time & External Changes
What’s Needed for the Routing System?

• Data Models for Routing & Signaling State
  – RIB Layer: unicast RIBs, mcast RIBs, LFIB, etc.
  – Protocols: ISIS, OSPF, BGP, RSVP-TE, LDP, PIM, mLDP, etc.
  – Related: Policy-Based Routing, QoS, OAM, etc.

• Framework of Integrating of External Data into Routing
  – Indirection, Policy, Loop-Detection

• Filtered Events for Triggers, Verification & Learning Changed Router State

• Data Models for State
  – Topology model, interface, Measurements, etc.

• Device-Level and Network-Level Interface & Protocol(s)
Main Concerns

1) Standard data-models
   - clear self-describing semantics
   - Sufficient coverage for use-cases needing feedback

2) Applications aren’t routers – so can’t need to implement a list of routing/signaling protocols

3) Good security, authorization, & identity mechanisms

4) Scaling and responsiveness:
   - Multiple applications
   - Many operations per second
   - Significant data to export, even when filtered
IRS Framework at IETF 84

- Application
- IRS Client
- IRS Protocol
- IRS Agent
- Router
- Policy Database
- Topology Database
- Subscription to Events and Configuration Templates for Measurement, Events, QoS, OAM, etc...
- Routing and Signaling Protocols
- RIB Manager
- FIB Manager and Data Plane
3 Key aspects - P.A.L.

• **Programmatic interface** – asynchronous and fast

• **Access to information** – IRS gives access to information and state that is not usually configured or modeled.

• **Learn additional filtered Events**
IRS Interface Key Aspects

- Multiple Simultaneous Asynchronous Operations
- Configuration - is not reprocessed
- Duplex Communication
  - Asynchronous, Filtered Events
  - Topologic Information (IGP, BGP, VPN, active/potential)
- High-Throughput
- Highly Responsive
- Multi-Channel (readers/writers)
- Capabilities Negotiation/Advertisement (self-describing)
What IRS is not

IRS is **NOT**:  

- the only configuration mechanism a router will ever need,  
- a direct replacement for existing routing/signaling protocols,  
- the only way to read topology and router data that will ever be needed,  
- solely limited to a single network device.
IRS: Focused Scope

• Start with a defined scope:
  – Small set of data-models (RIB layer) for control
  – Set of events to support related use-cases
  – Data-model for topology
  – Investigate protocol options for the interface
    • Consider application-friendly paradigms
    • Consider extensions as well as new definitions
  – Define set of motivating use-cases to drive this scope.
### Policy Definitions

- **Identity**
  - Not tied to a single channel
  - One per commissioner
  - One per agent
- **Role**
  - Each commission has a security role
- **Scope** - what I can read
- **Influence** – what I can write
- **Resources**
  - what agent can consume
  - Example: # of installs, # of events, # operations
- **Policy** – explicit and implicit
  - Explicit: what you configure
  - Implicit: What’s implied in protocols or “doing the right thing” in configuration

### Policy Actions

- **Connectivity**
  - No need for active connection
- **State**
  - Tied to Actions such as get this topology;
- **Priority**
  - Commissioner gives 3 tasks:
    - pull routes,
    - status on interface 2,
    - turn on interface 3
  - What’s the order
- **Precedence Decisions**
  1. Assume configured a route 192.165.2/24
  2. Multiple people use IR to move traffic for 192.165.2/24 short term
  - Who gets to install
  - what happens when they get done
  - What happens on a reboot
Q&A
Why Policy Framework

• Help to take Use cases → Data Models
  – What is the scope and influence policy specified for a data model?
  – How does implicit policy in associated routing system effect what IRS can do?
    • AKA - Don’t break implied policy
  – What explicit policy does model need?

• Why: KISS approach (Keep it simple stupid)
  – Best default – because complexity costs

• Some IRS may require
  – 3 phase commit or Time related commits