ALTO Network-Server and Server-Server APIs
draft-medved-alto-svr-apis

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Motivation and Scope

• Network and Cost Maps:
  – Must accurately reflect the actual network topology and utilization
  – Static configuration in ALTO Server not scalable, maps must be automatically generated
  – Data sources: network topology, geolocation, resource utilization...

• Well-defined APIs:
  – Network-to-Server API:
    • Get topology data from the network into the ALTO Server
  – Server-to-Server API:
    • Exchange topology data between ALTO Servers
1. CS: Client-Server API (ALTO Protocol, draft-ietf-alto-protocol)
2. SS: Server-Server API
3. SN: Server-Network API
4. NN: Network-Network API
Network-Server API Requirements

• ALTO Server operation with minimal human intervention
• Leverage existing sources of network topology data - no new (routing) protocols
  – Don’t force un-natural deployment of routing protocols within the ISP network
• Scalable mechanisms for (near real-time) network topology acquisition
• Centralized and/or distributed deployments of ALTO servers
• Network topology information:
  – Intra-AS
  – Inter-AS
  – From different intra-domain routing areas
• Automated ALTO server policy controls above and beyond mere routing metrics
• Origin security for network topology information
• Balance between frequency of updates and accuracy / timeliness of data
• Update throttling
ALTO Maps Topology Data Sources

• Network Maps:
  – BGP: prefixes required to generate Network Map PIDs

• Cost Maps:
  – Link-state IGPs: Intra-AS topology information
  – BGP: inter-AS topology information
Network-Server API: BGP w. TE Extensions

• BGP Speaker:
  – Learns a part or the entire intra-AS topology by participating in IGPs
  – Distributes the learned topology to other BGP Speakers in the AS.

• iBGP session: ALTO Server <-> BGP Speaker (RR)

• ALTO Server learns subnet/prefix data, Intra-AS topology, and inter-AS topology from a single source

• Draft-gredler-bgp-te-00

• Alternative: IGP peering
Transcoding TE Link Info into BGP NLRI

• Carried in the MP_REACH_NLRI and MP_UNREACH_NLRI attributes

• Each NLRI describes a single link anchored by at least a pair of router-IDs
  – Link may be anchored by more than one pair of Router-IDs

• Negotiated between BGP speakers using BGP Capability advertisement
Advantages

• Avoid peering with IGP routers
• Unified interface to the network (single protocol)
• Simplified handling of multi-area IGP topologies
• Peering with a BGP Route Reflector
• BGP policy and marking capabilities:
  – Prefix and connectivity information filtered / adjusted specifically for the ALTO Server’s use.
• BGP origin security
• BGP carries multicast for future enhancements (multicast maps) multicast maps
• In multi-area networks there only needs to be a single BGP Speaker in each area
Security Considerations

• Back-end ALTO Server interfaces potentially attractive to attackers:
  – Attackers might attempt to corrupt the ALTO DB

• The ALTO Server must peer with a known RR:
  – RR must be authenticated.

• Origin security mechanisms will also increase the assurance of the ALTO server.

• Integrity protection for the ALTO Svr <-> BGP Speaker channel required
  – Prevent malicious parties from inserting problem information
Conclusions

• Well-defined standard APIs needed for:
  – Inter-operation between ALTO Servers and different sources of information are required to generate maps.
  – Inter-operation between the ALTO Servers themselves
    • Multiple ALTO Servers in different administrative domains may be required to combine partial network maps / cost maps into a combined set of maps

• Altogether, having standardized APIs will facilitate interoperability between ALTO Servers from different vendors