ALTO Network-Server and Server-Server APIs

draft-medved-alto-svr-apis

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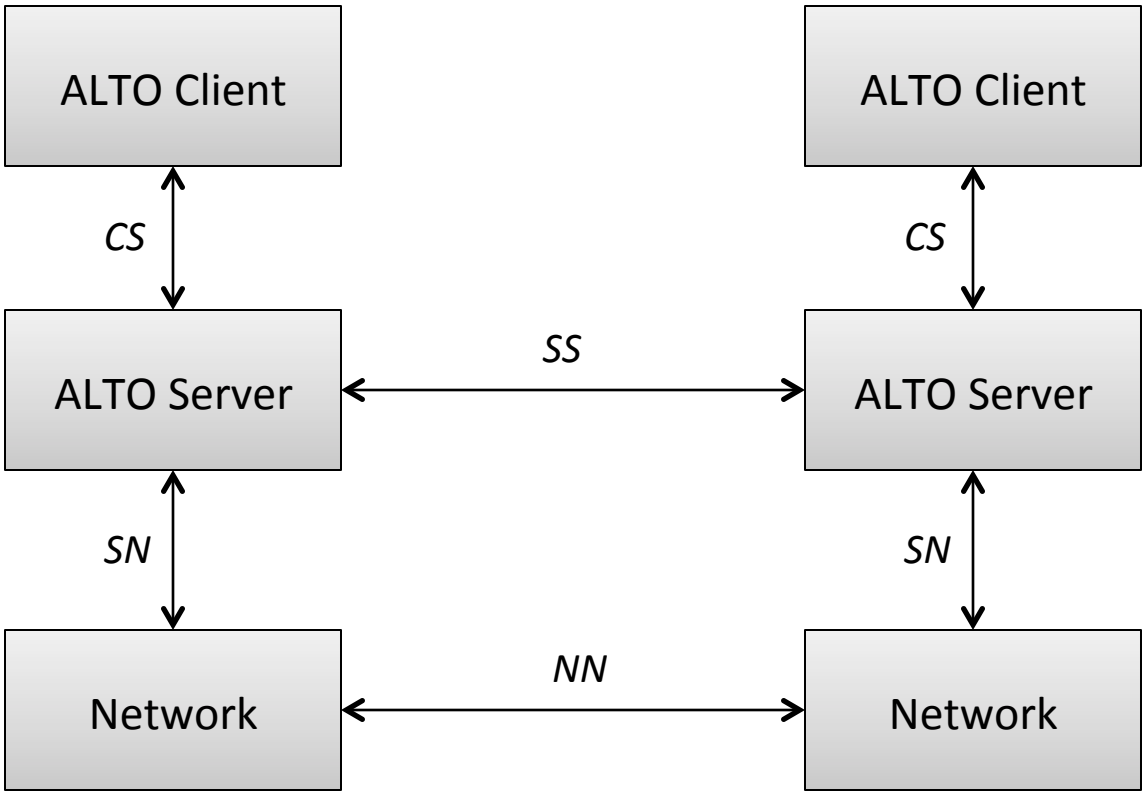
Motivation and Scope

- 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

ALTO Server API Reference



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