LAN Aggregation

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Objective of LAN Aggregation

- Ability to use all blocked, redundant paths through L2 switched network
  - Different from link aggregation
    - Link aggregation is point to point between two switches
  - LAN aggregation allows for the use of different multiple hop paths simultaneously through the switch topology to the same endpoint
  - Allows traffic on paths other than spanning tree
Anticipated Benefits

- Allows multiple, otherwise unused interswitch links to be used, reducing congestion
- Allows even traffic distribution over multiple links
- Allows for quick failover in the event of network failure
- Allows for more optimal path between two endpoints to be selected
Works with Link Aggregation

• Point to point aggregated link can appear as a single “Aggregated Port” from LAN aggregation’s perspective
• A meshed topology can use the aggregated ports for even more bandwidth
• Topology scaling; multiple Link aggregated ports can be used concurrently
• Active Redundancy through multiple aggregated ports
Expressed Graphically...

Spanning tree shown in red

Aggregated links look like fat pipe to LAN aggregation

Expressed Graphically...
What we have now

• Spanning Tree for topology
  – the entire topology is viewed as a tree rooted at some arbitrary switch

• SA Learning for end-station path determination
  – each end node is “resolved” to a port on a switch, that port being on the Spanning Tree topology

• Learn function and actual path taken by traffic is constrained to unblocked topology ports
Benefits of present approach

- Spanning tree is elegant, lightweight proven technology
- Today’s switches are “Plug and Play”
- SA Learning is an inexpensive mechanism to determine end-station location
  - Automatically done as part of topology based flood scheme
Customers would like improvements...

- Faster convergence time
- Optimal selection of paths for fewer hops through physical topology
- Larger physical topology hop diameter
- Take advantage of blocked trunks
- Fewer “overloaded” devices because load is distributed over more devices
Logical Topology using STP

- Available Bandwidth limited to capacity of unblocked trunks
  - Traffic flows on unblocked trunks only
- Path Determination
  - Assume device on switch 1 talks to device on switch 2
  - Sub-optimal path used (in example, 6 switch hops are required)
  - Traffic unnecessarily traverses 3 devices
Optimal Approach using LAN Aggregation

- Available Bandwidth
  - 600Mbps simplex, 1200Mbps duplex in "core"
  - Traffic flows on all links, no links are blocked

- Path Determination
  - Assume device on switch 1 talks to device on switch 2
  - Optimal path used (in example, 3 switch hops are required)
Proposed LAN Aggregation Requirements and Goals

• Take advantage of multiple paths in a switched infrastructure

• Topology rules for LAN aggregation should be independent of 802.1 learn and forwarding rules
  – end-station to end-station path determination must have an alternative to Spanning tree

• Allow for dynamic resolution to one of N possible paths

• Plug and Play
  – Just like today’s switches
  – No changes can be required for legacy 802.1D/P/Q devices

• Quick failover
Conclusion

• New ways of topology and forwarding must be considered
• Spanning tree is required, but by itself is not enough
• Learn and topology must be separate to take advantage of multiple paths

User Benefit:

Traffic carrying capability of switched network is greatly improved, since all paths are available!