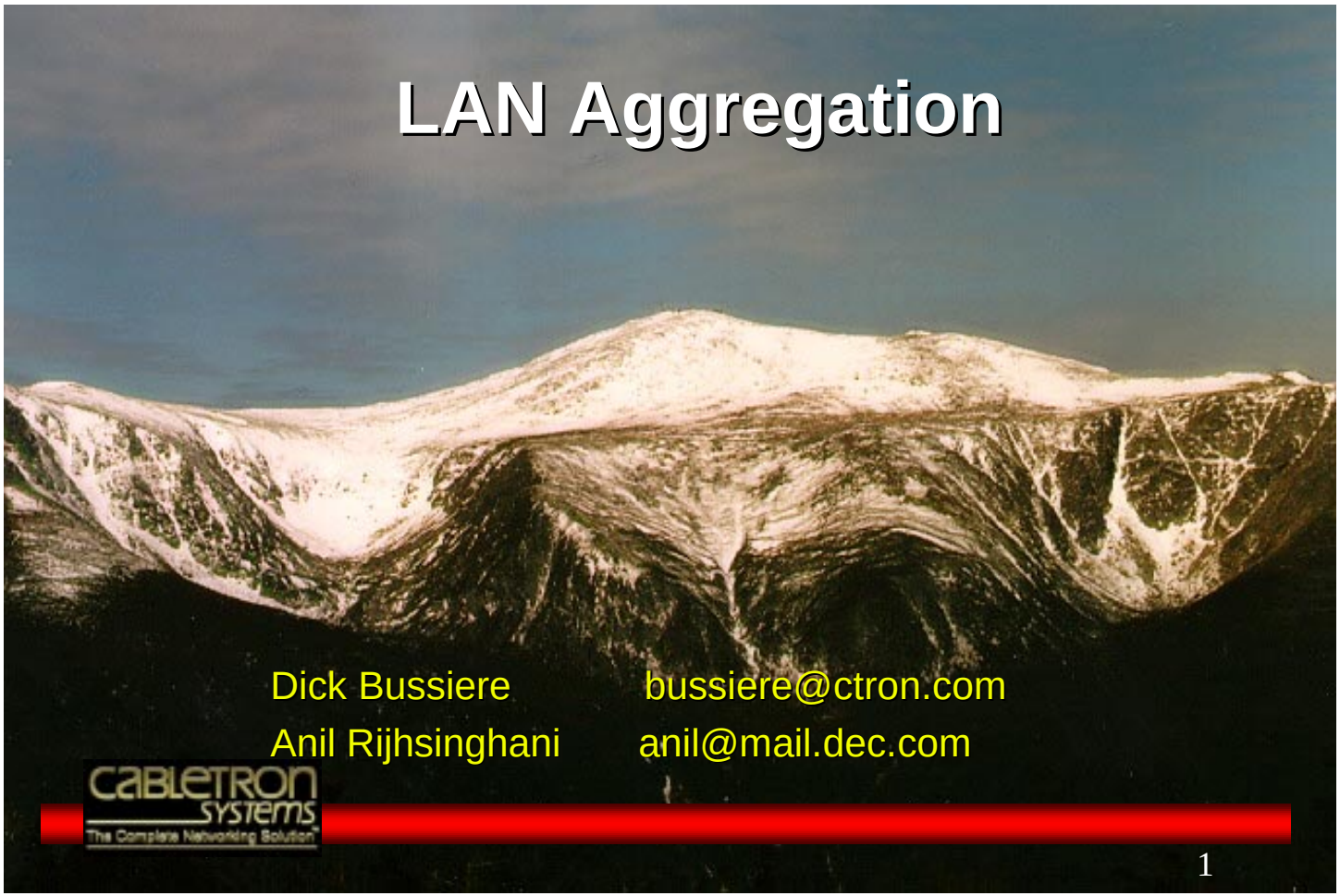
LAN Aggregation
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Objective of LAN Aggregation

- 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

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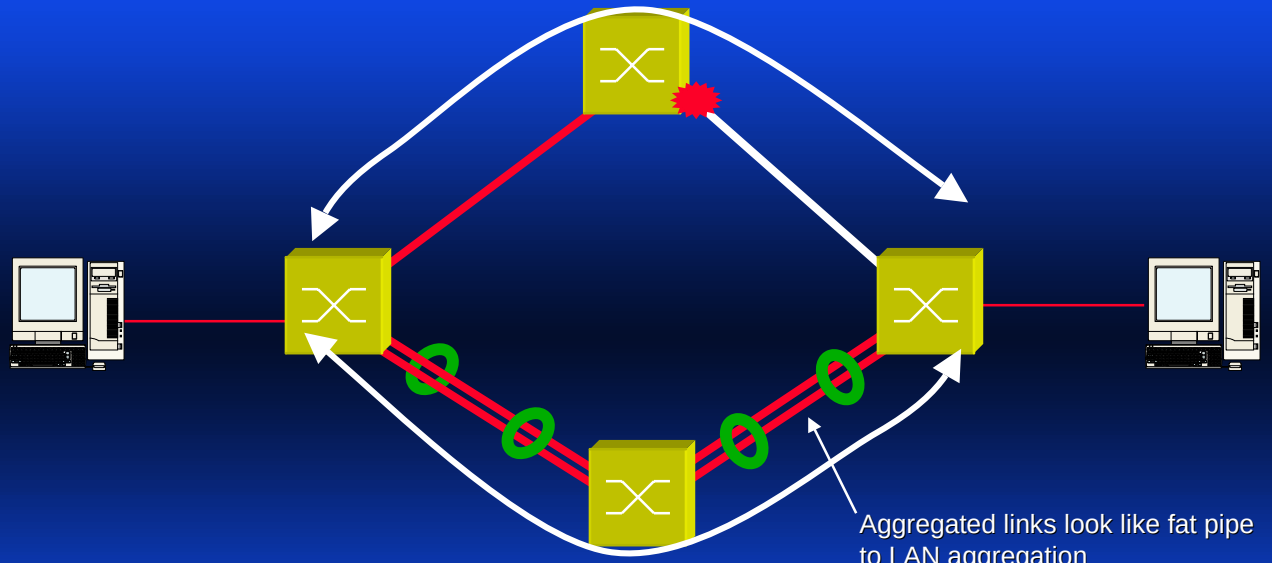
Works with Link Aggregation

- 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...



Aggregated links look like fat pipe to LAN aggregation

Spanning tree shown in red

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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

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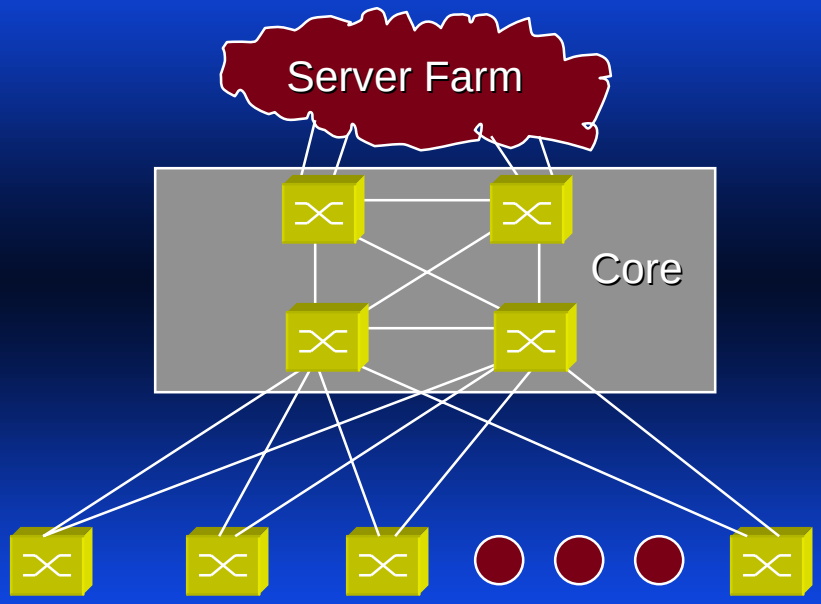
Benefits of present approach

- 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

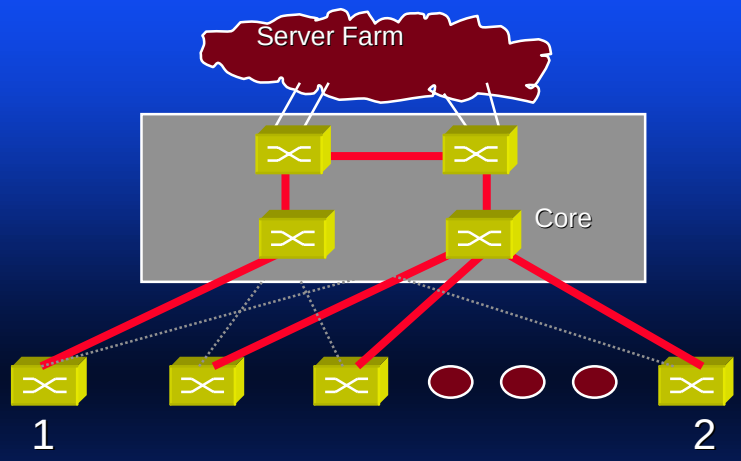
Customers would like improvements...

- 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

Example Physical Topology

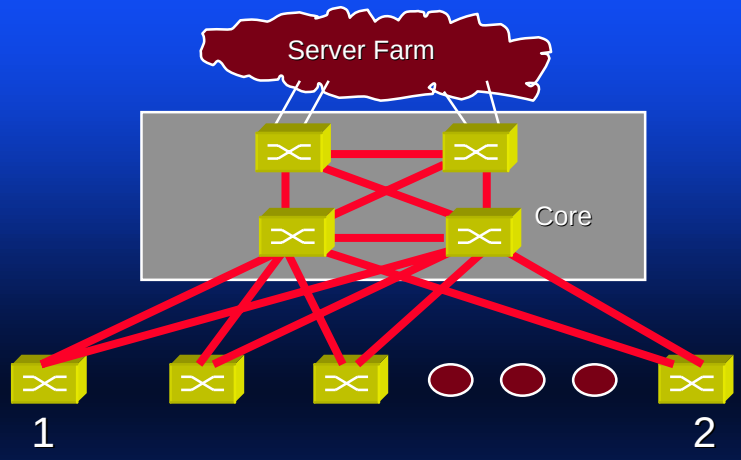


Logical Topology using STP



- 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 todays switches
  - No changes can be required for legacy 802.1D/P/Q devices
- Quick failover

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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!