

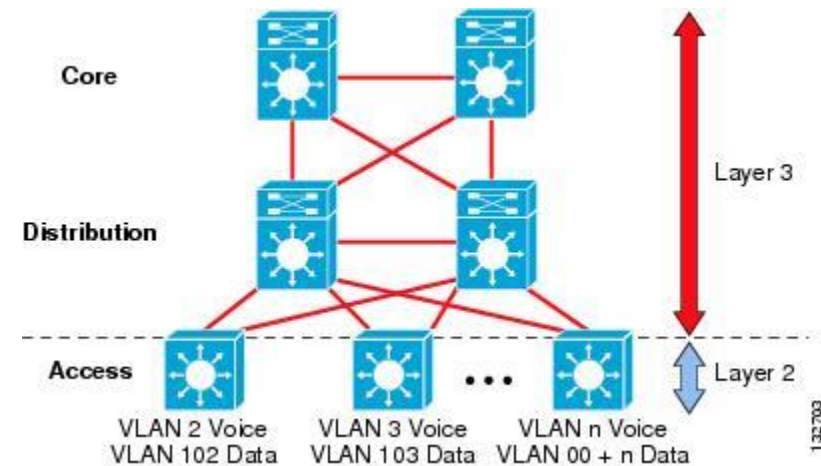
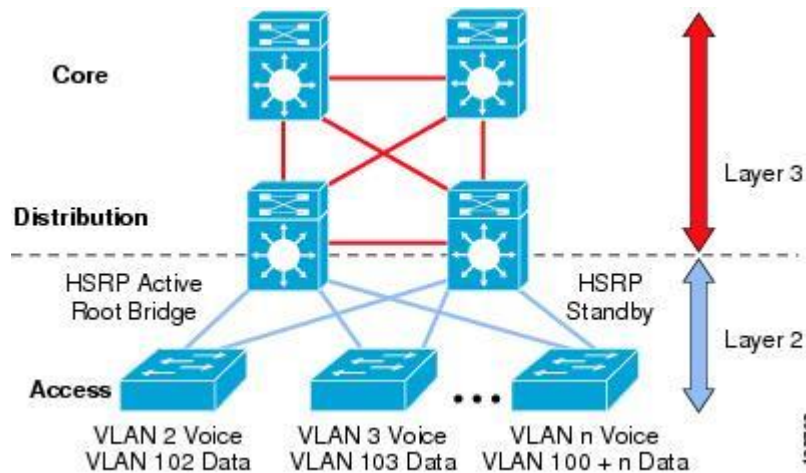
Routed Access

Routing in the Campus

- High availability
 - Deterministic convergence times for any link or node failure in an equal-cost path
Layer 3 design of less than 200 msec
 - No potential for Layer 2 Spanning Tree loops
- Scalability and flexibility
 - Dynamic traffic load balancing with optimal path selection
 - Structured routing permits for use of modular design and ease of growth
- Simplified management and troubleshooting
 - Simplified routing design eases operational support
 - Removal of the need to troubleshoot L2/L3 interactions in the core

Routed Access

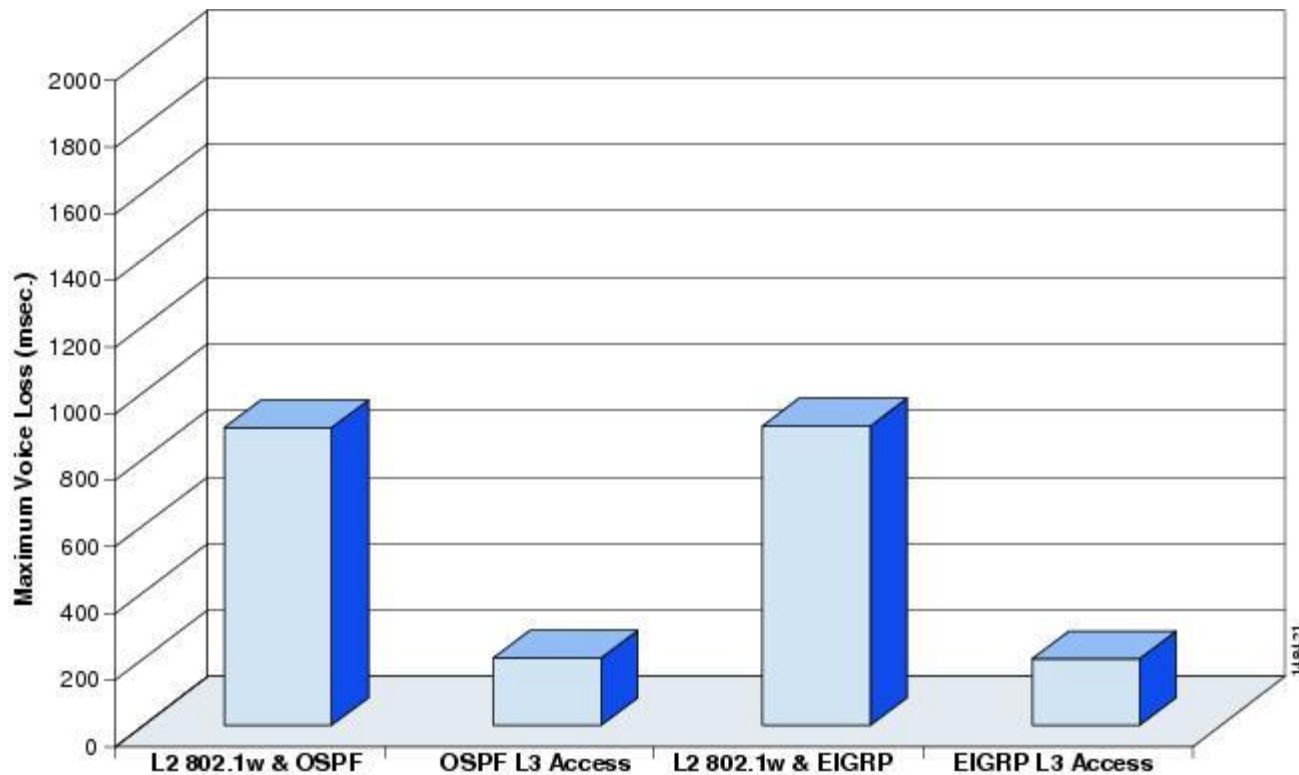
Migrating L2/L3 to the access layer



Routed Access

L2/L3 comparison

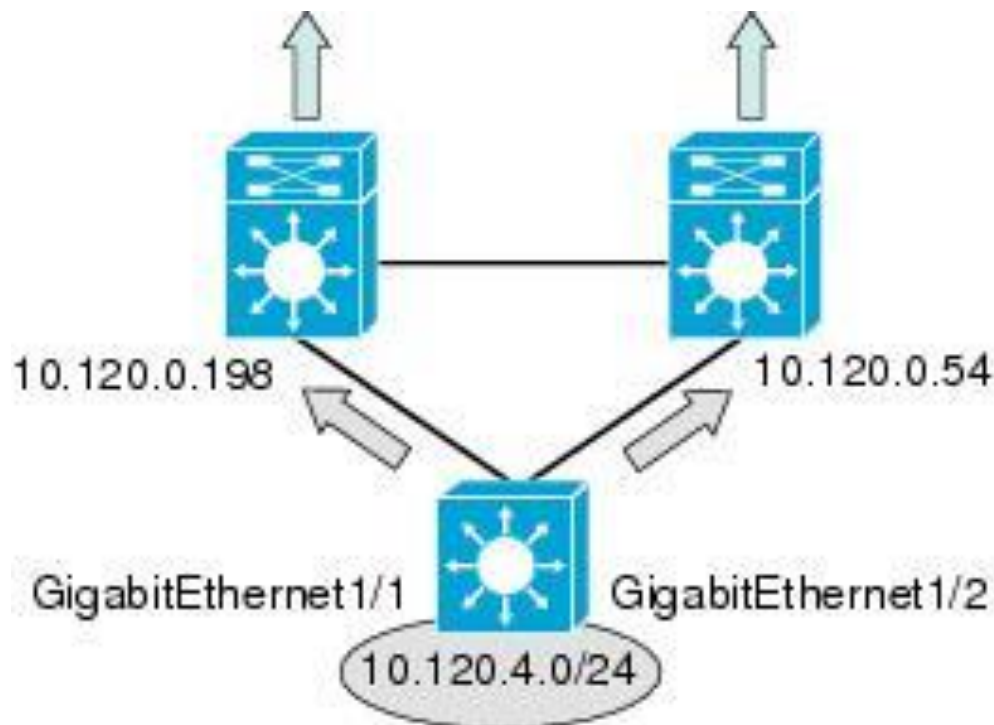
- Gets well below the subsecond boundry
- Sub-200msec



Routed Access

Equal-Cost uplinks from the Access layer

- Twice the speed as normal 802.1w



Routed Access

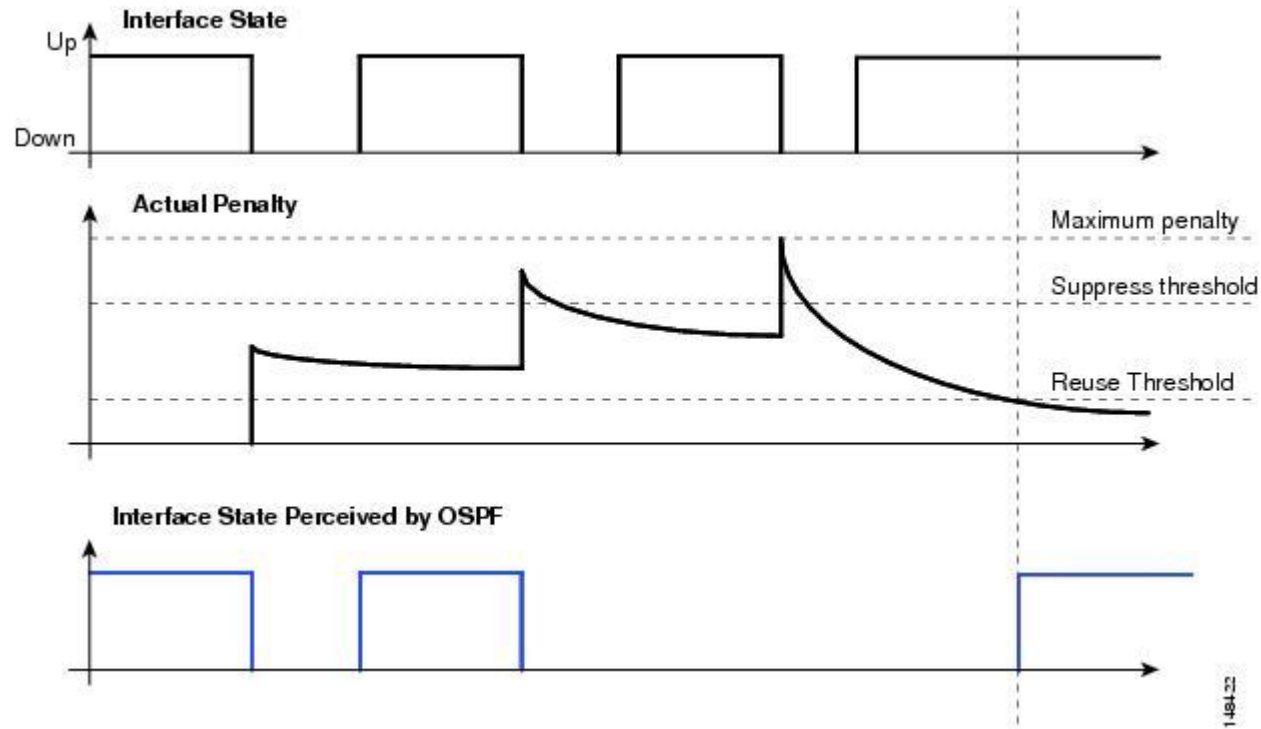
Interconnect Best practise

- **Use fiber optics instead of copper**
 - better electromagnetic and error protection
 - fewer distance limitations
 - higher capacity fiber links between switches
 - remote node and link loss detection is normally accomplished using the remote fault detection mechanism implemented as a part of the 802.3z and 802.3ae link negotiation protocols
- **Tune Debounce and Carrier delay**
 - Carrier-delay is used to delay the carrier detect/link up signal to the software
 - Configure Carrier-delay msec 0
 - Debounce is used to delay the link down signal to the software
 - Timers are hardware dependent.

Routed Access

Routing Event Dampening

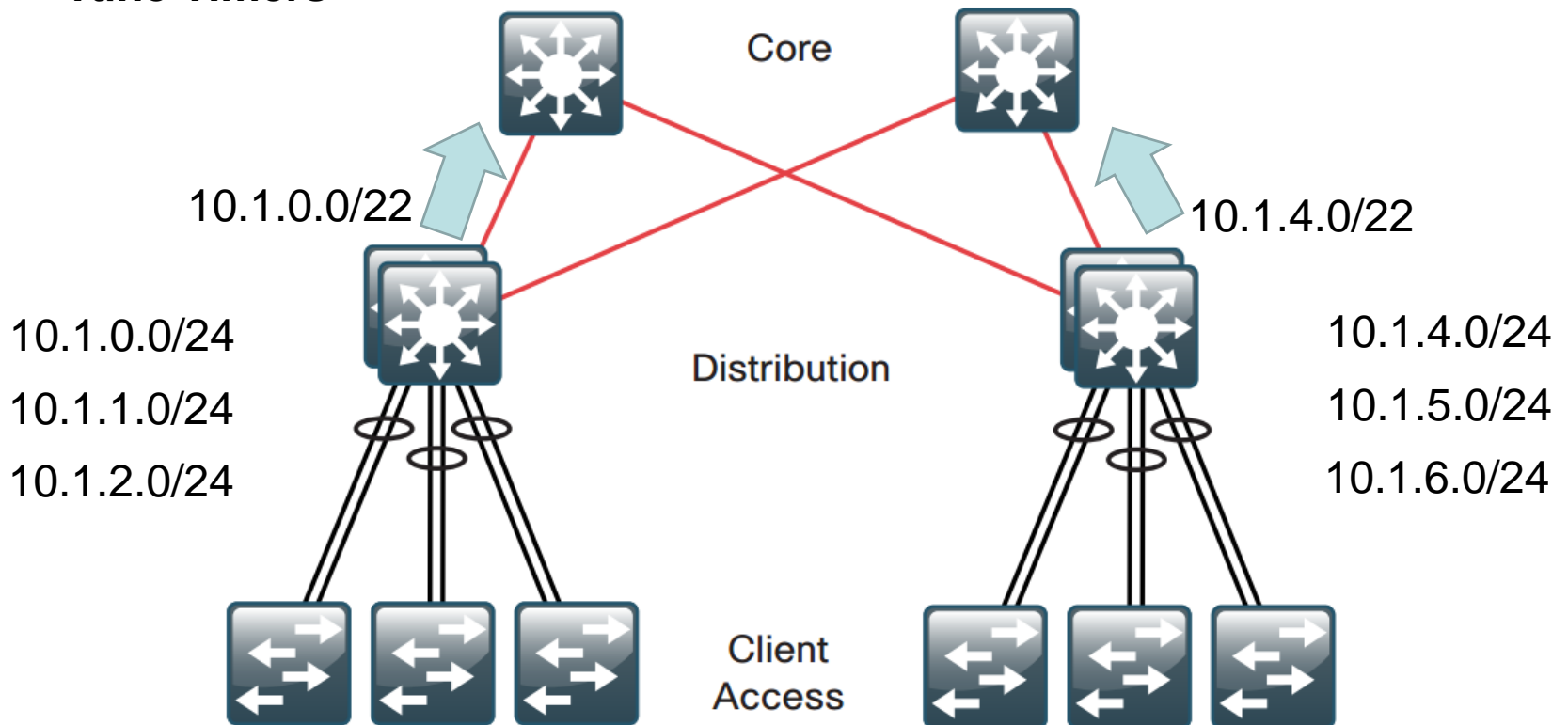
- IP event dampening provides a mechanism to control the rate at which interface state changes are propagated to the routing protocols.
- In the case of a link flapping the routing protocol will send routing updates and start the reconvergence process



Routed Access

EIGRP

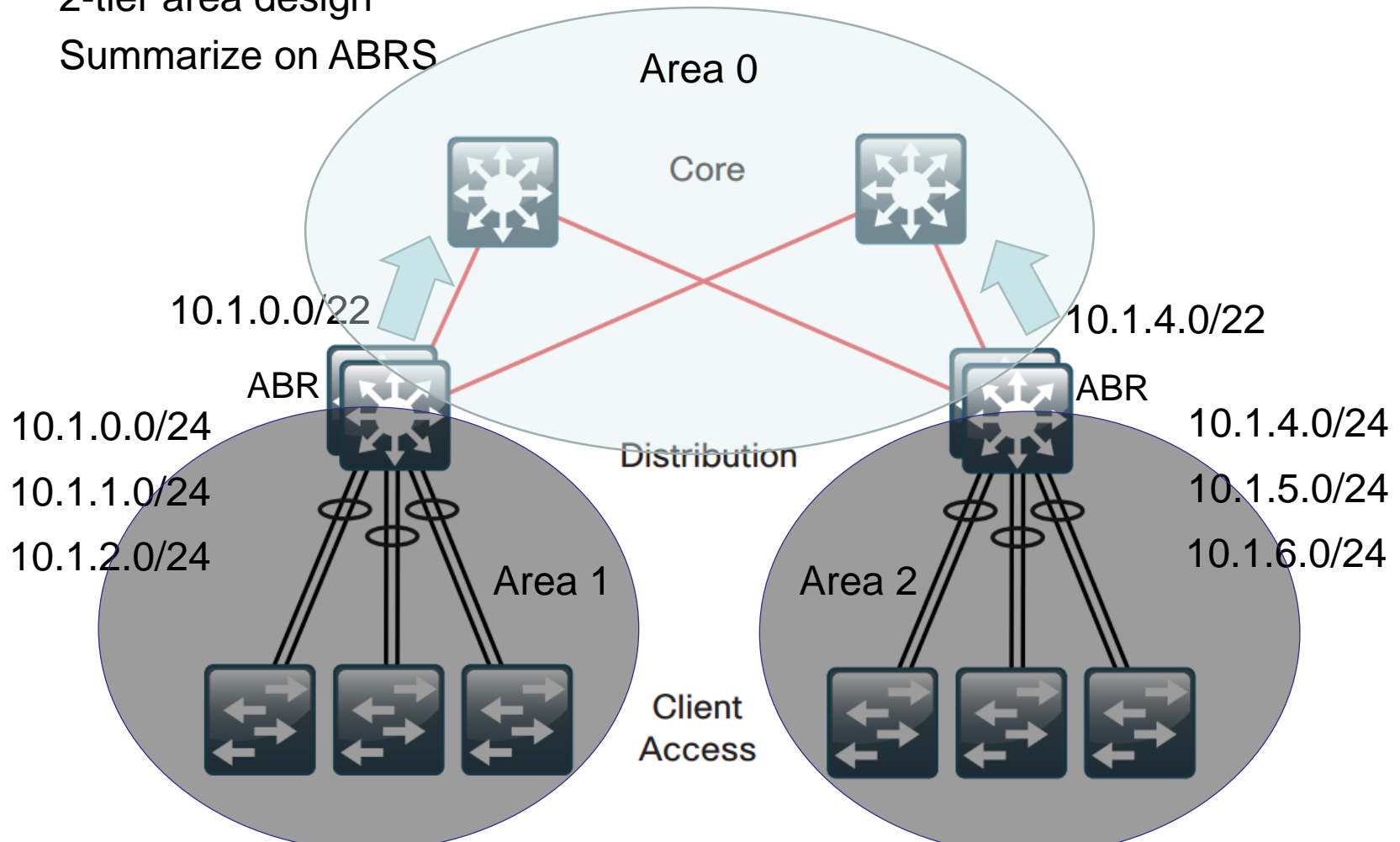
- Summarize out of the distribution layer
- Summarize out of the access layer
- Tune Timers



Routed Access

OSPF

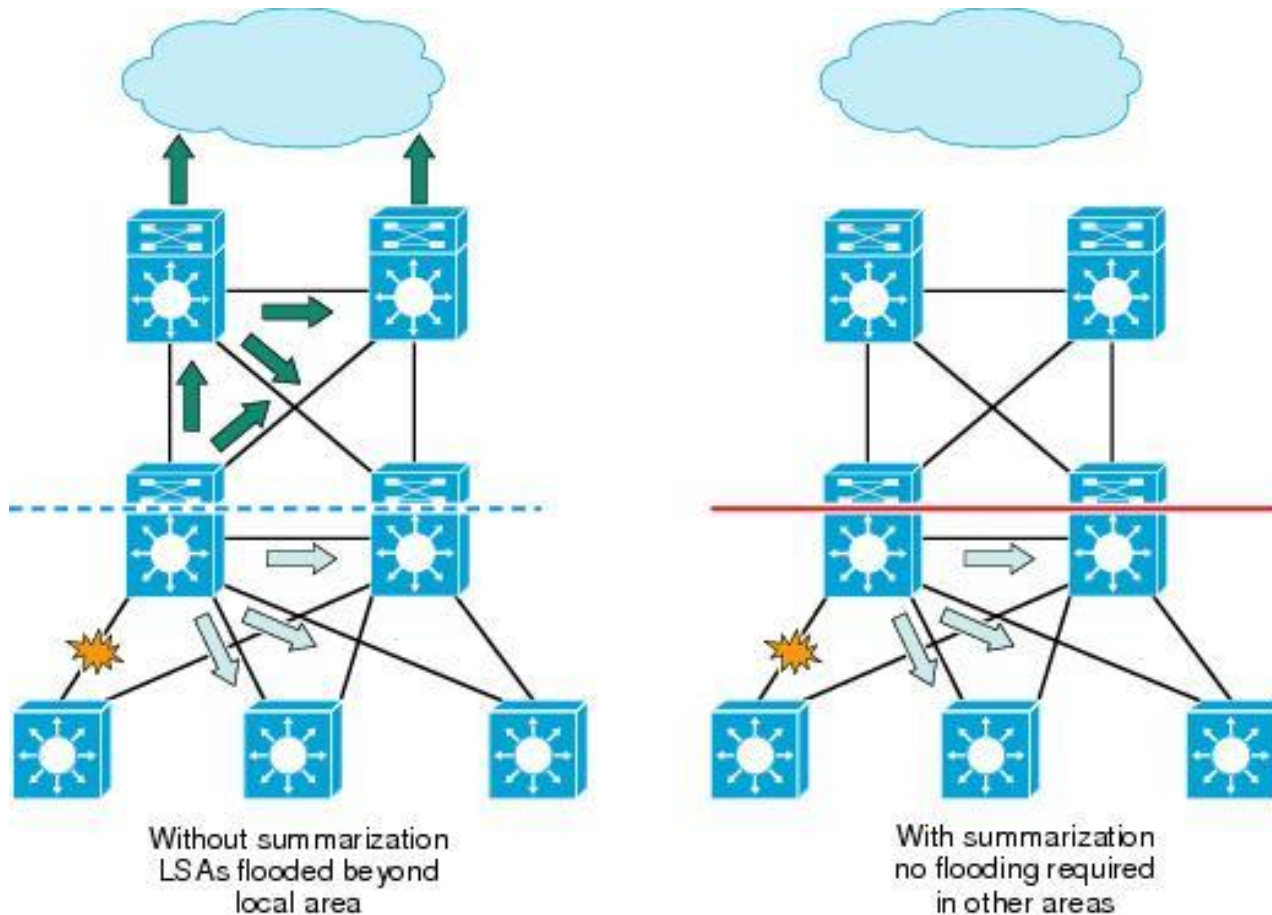
- 2-tier area design
- Summarize on ABRS



Routed Access

OSPF

- Effect of summarization



Routed Access

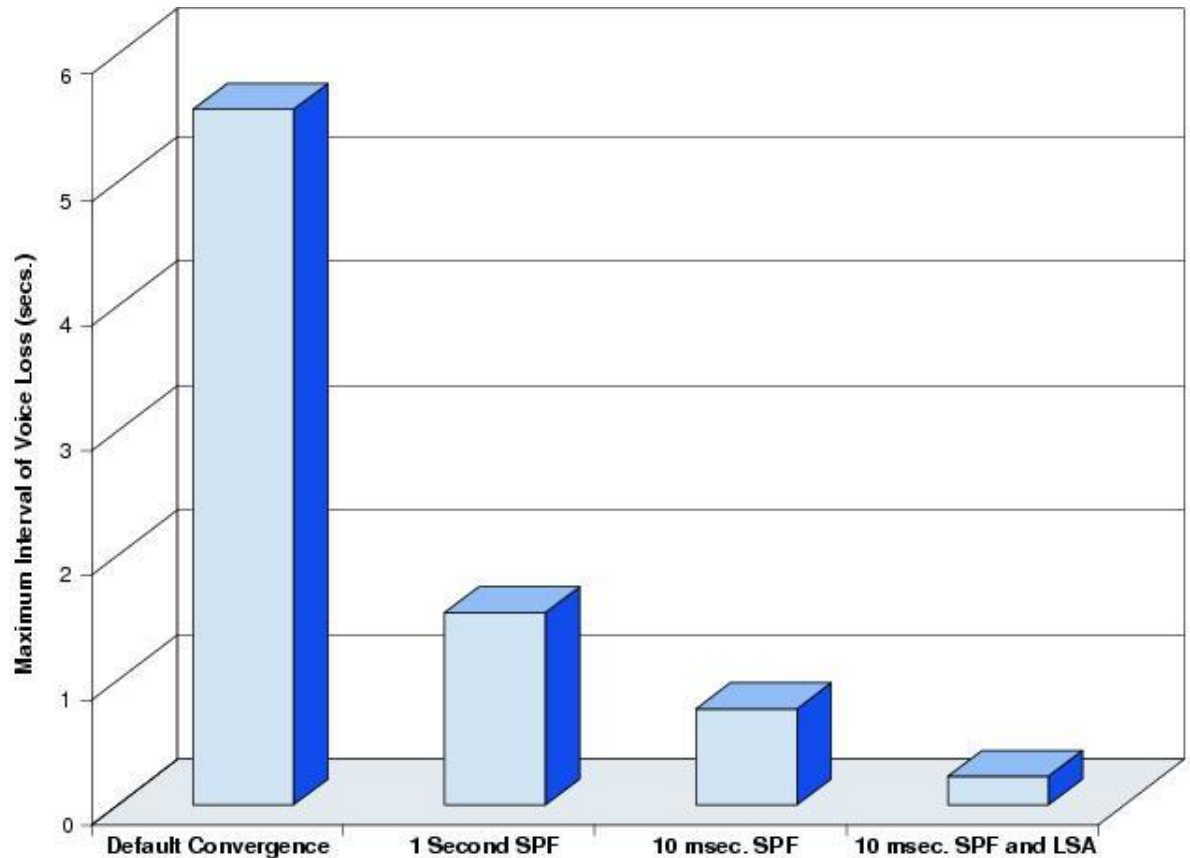
OSPF

- The Convergence timers can be influenced by the following factors
 - Time to detect the failure
 - Time to determine the new optimal path
 - Time to update the software and hardware forwarding tables
- The first and third bullet can be defined physical design and routing design. The second bullet relies on:
 - Number of LSAs
 - Number of nodes that need to receive the LSAs
 - Time required to transmit the LSAs
 - Time required run the SPF calculation
- So summarize to avoid LSA propagation

Routed Access

OSPF

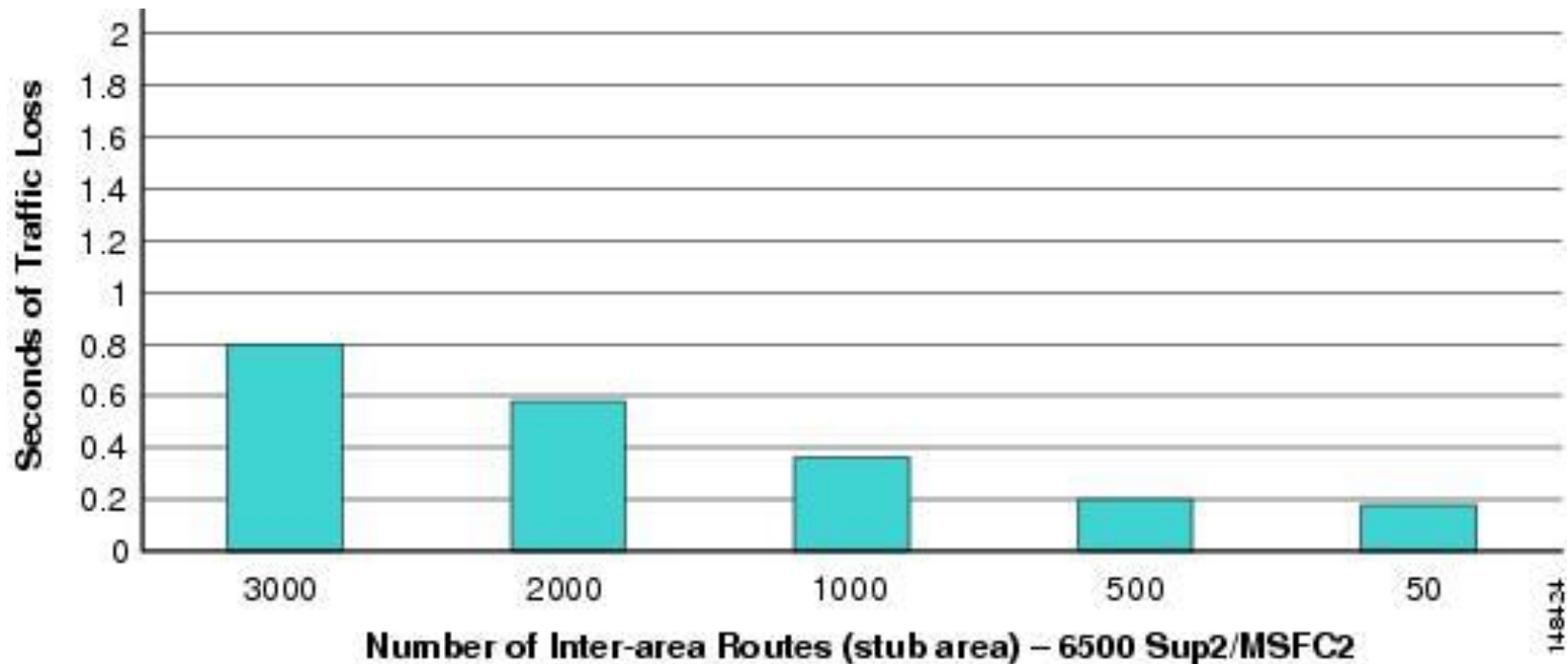
- The time it takes to calculate the SPF relies on tuning of timers
 - Default SPF delay is 5 sec



Routed Access

OSPF

- Performance on OSPF
- Minimize the number of routes on the router



Routed Access

OSPF

- Interface timers should be tuned to detect neighbour down messages faster
 - Default 5 sec Hello and 15 sec Dead timer
 - Configure for 250 msec and 1 sec

Routed Access

/31 subnetmasks on p2p links

- Instead of wasting 2 addresses on every p2p link devices support /31 subnets
- RFC3021
- ip address 10.120.0.197 255.255.255.252
- ip address 10.120.0.196 255.255.255.254

Routed Access

Management Interfaces

- Management SVI interfaces was used to access the L2 switches in the access layer, and to create security with Access-Lists and broadcast suppression from the end users.
- Loopback interfaces should be used instead with a fully routed /32 interface IP.

```
interface Loopback0
description Dedicated Switch Management
ip address 10.120.254.1 255.255.255.255
```

Routed Access



?