

Campus Networking Workshop

Core Network Design



UNIVERSITY OF OREGON



Routing Architectures

- If we start with the right topology it will make our network more stable
- Use a hierarchical approach that makes good use of your traffic patterns and IP address allocations

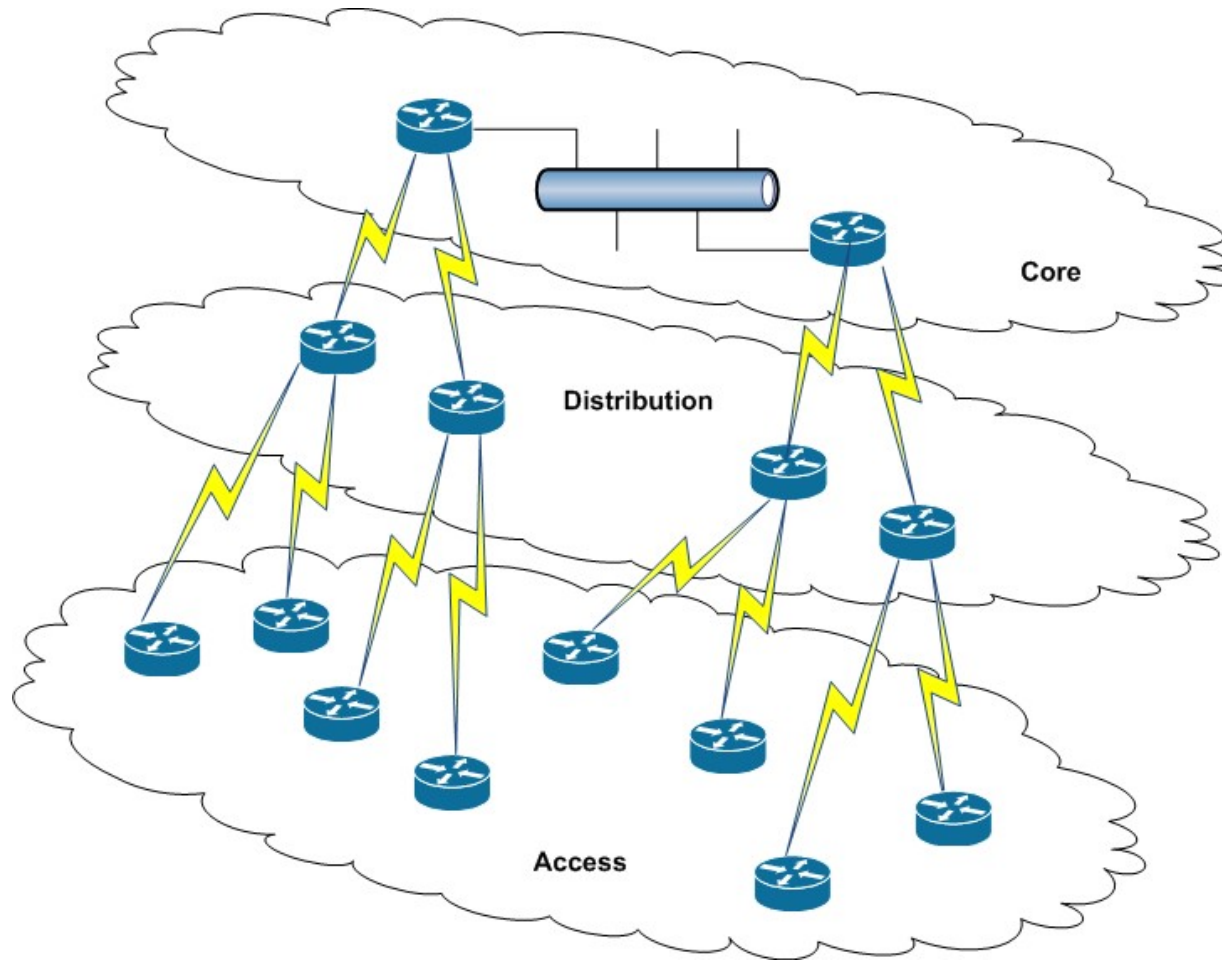


Routing Architectures

- What is the right topology?
- Continue to think of three layers
 - Access
 - Distribution
 - Core
- Thinking of layers helps reduce convergence time because of the scope of information to process



Routing Architectures



Routing Architectures

- Access Layer
 - Minimum routing information
 - Feeds traffic into the network
 - Link sizing
 - Provides network access control
 - No spoofing
 - No broadcast sources
 - No directed broadcasts
 - Provides other edge services
 - Tagging for QoS
 - Tunnel termination
 - Traffic metering and accounting
 - Policy-based routing



Routing Architectures

- Distribution Layer
 - Goals
 - Isolates topology changes
 - Controls the routing table size
 - Aggregates traffic
 - Strategies
 - Route summarization
 - Minimize the number of connections to the core



Routing Architectures

- Core Layer
 - Goal
 - Forwarding packets fast
 - Strategies
 - Clear of network policies
 - Every device has full reachability to every destination
 - Facilitates core redundancy
 - Reduces suboptimal routing
 - Prevents routing loops

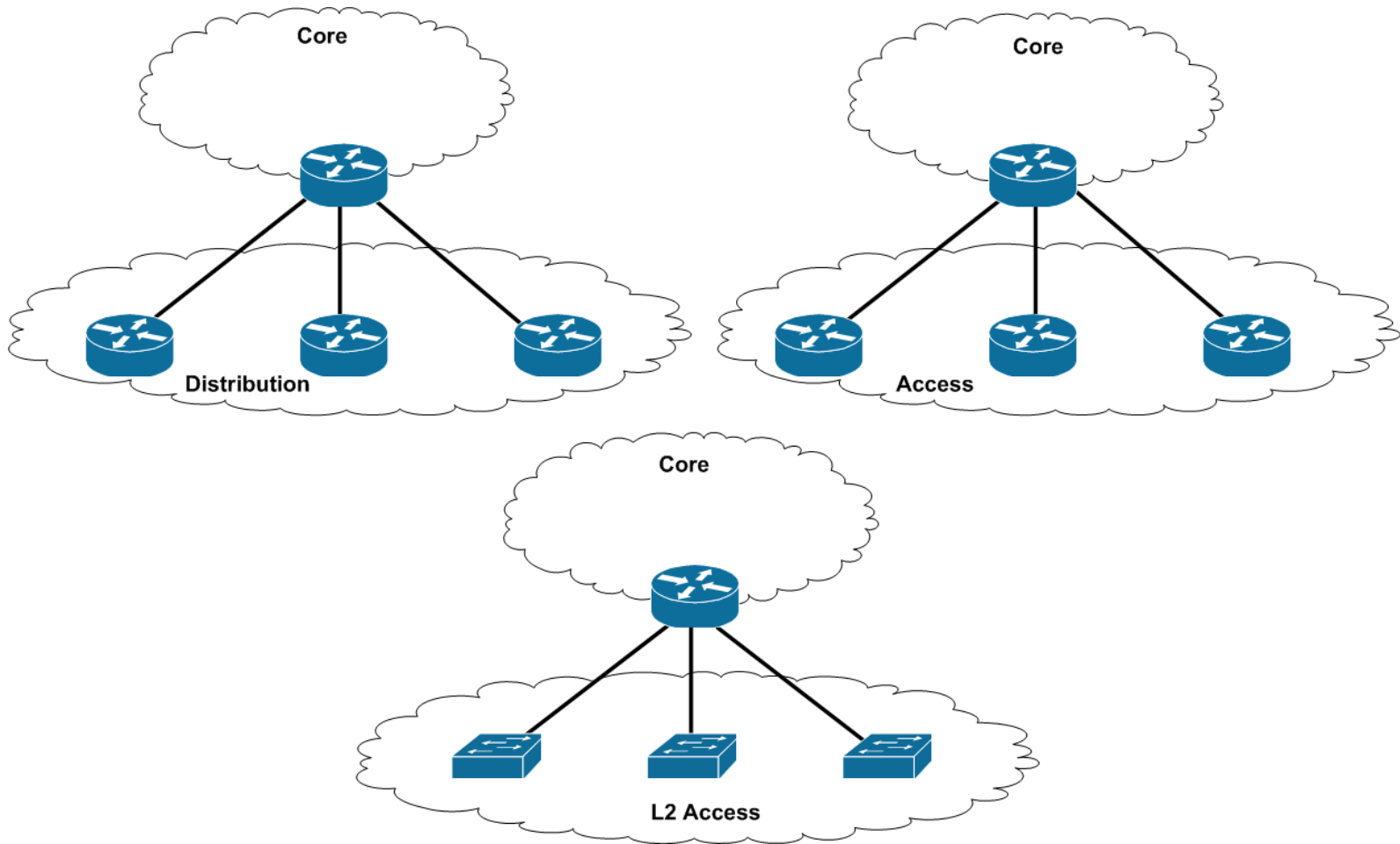


Routing Architectures

- Depending on how large your campus is you could use the typical hierarchical model or a subset
 - Collapsed core model
 1. Single router acts as the network core
 - All other routers in the access layer perform also distribution functions



Routing Architectures

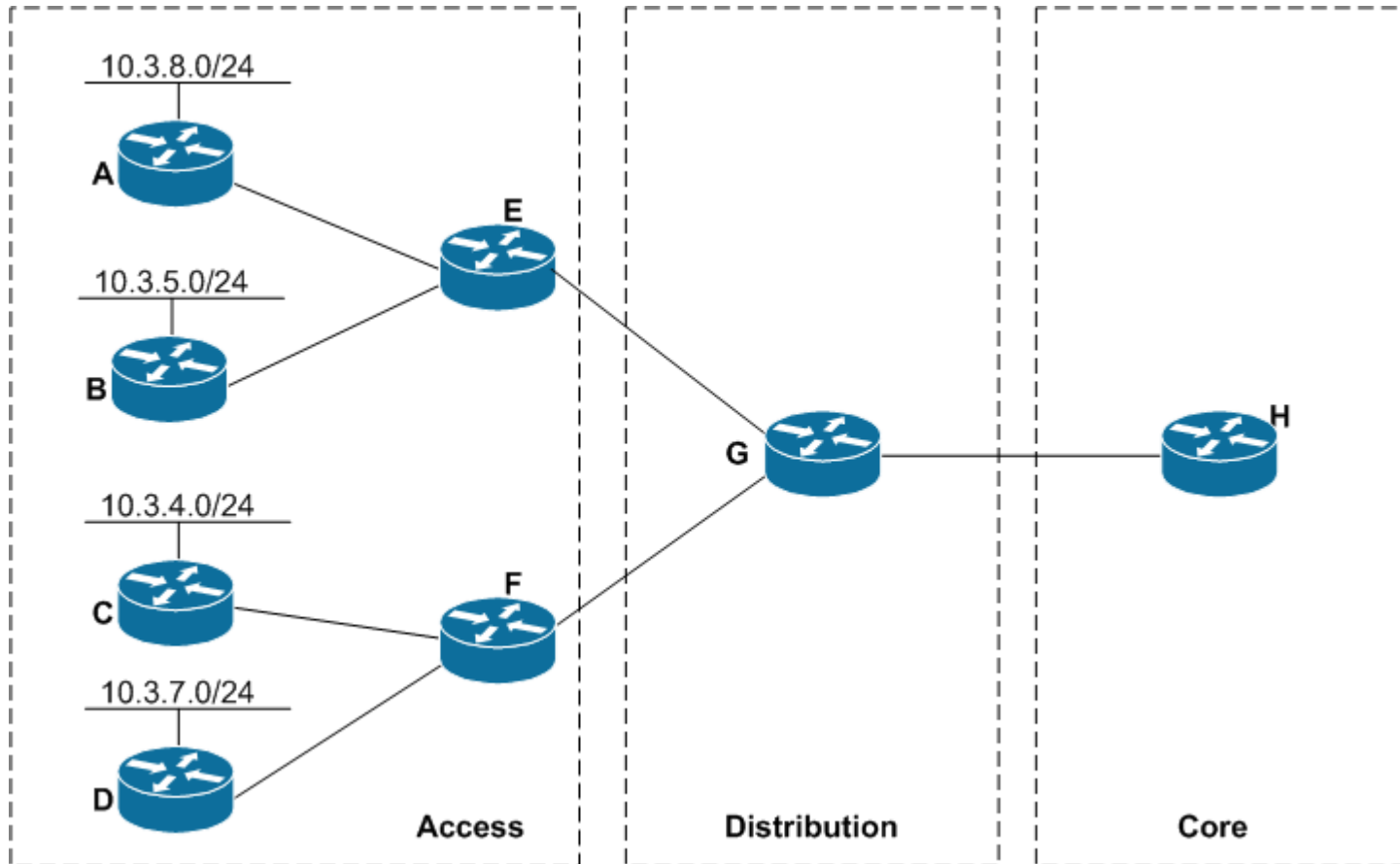


Routing Architectures

- What to do about your address space
 - Assign it from a single pool as you need it
WRONG!
 - Poor summarization has an impact on your network's stability
 - Very difficult to correct poor allocations
 - Spend some time thinking about how you will partition and assign address space
 - Routing stability is affected by the number of routes propagated through your network



Routing Architectures

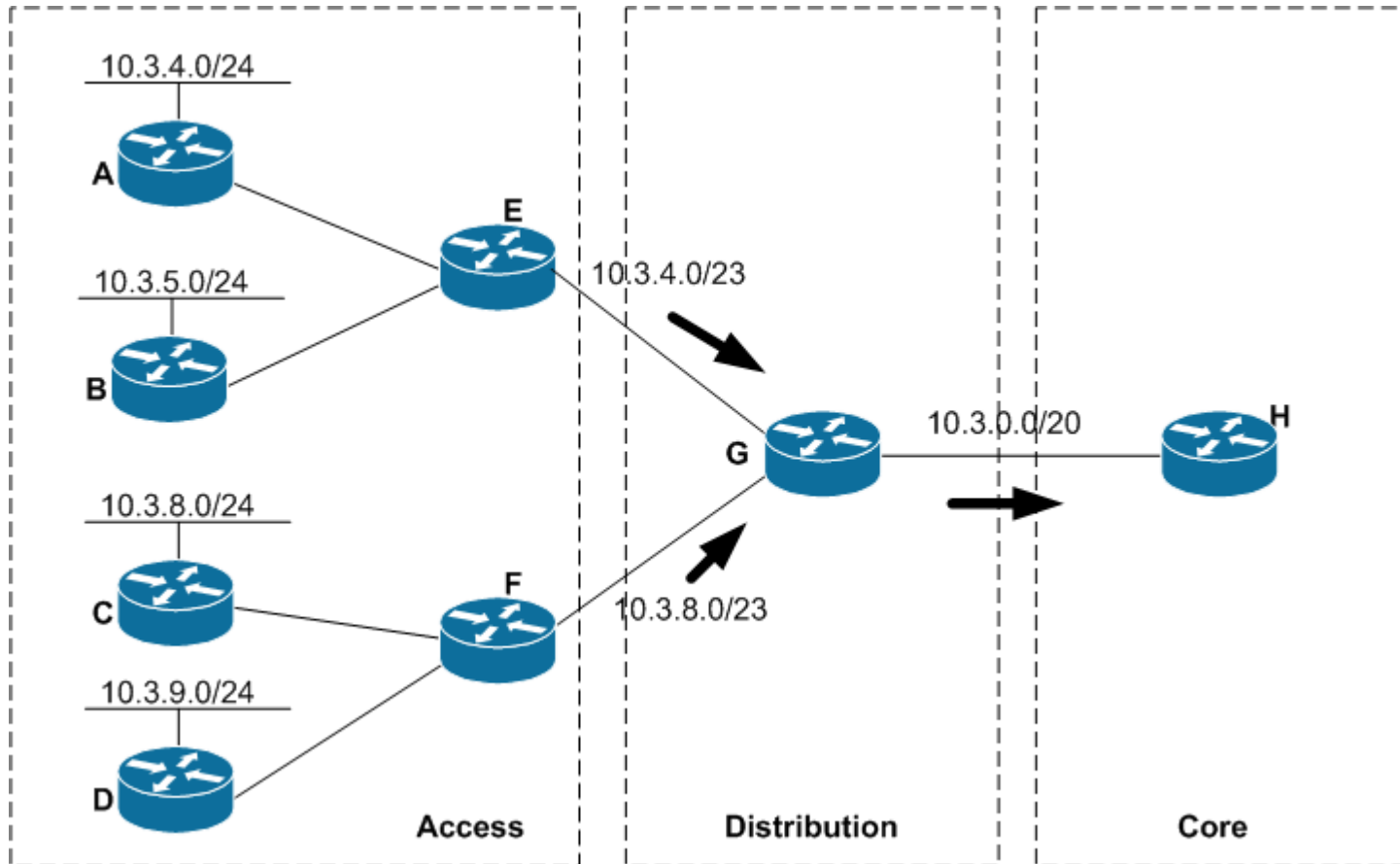


Routing Architectures

- What happens if the link to router D fails?
 - How are the other layers affected?
- What changes can I make to my address allocation and address summarization to minimize the impact of a link failure on convergence time and network stability?



Routing Architectures



Routing Architectures

- Where should you summarize?
 - Only provide full topology where it is needed
 - Core routers don't need to know about every single network
 - Access routers don't need to know how to get to every other network
 - They should only carry enough information to reach distribution routers
 - Summarize at the layer edges
 - Distribution layer to core
 - Access layer to distribution



Routing Architectures

- Addressing & Summarization
 - “Easy for you to say. I already have my network running and it looks nothing like what you show”
 - You are not alone
 - The principles still apply
 - Take it slowly. Define a goal and start working towards it. It can take years.
 - Maybe we can do the right thing with IPv6

