White Paper

Model Complex Routing with Cisco MATE Design External Endpoints

What You Will Learn

Network planners, designers, and engineers increasingly need flexible, precise, and fast network modeling tools to model complex routing policies. Sometimes these complex policies are related to peering agreements of inter-autonomous systems AS[1] traffic and failover rules. Accurately modeling specific intra- autonomous systems AS routing failover policies is necessary to understand their impact. To model complex routing situations such as traffic distribution and failover policies, Cisco® MATE Design simulates potential traffic with demands that have user-defined external endpoints.

Modeling Complex Routing Policies

MATE Design enables you to simulate potential traffic in the network with demands. Each demand has a single source (node or external autonomous system AS, an egress destination (node, external autonomous system AS, or multicast destination) and all demands are treated the same by the network. Simulation in MATE Design constantly examines traffic demands, network topology, element configuration, and state. It instantly updates the property tables and the Simulated Traffic view in the network plot.

An external endpoint is a named endpoint for a demand with defined endpoint members. Each endpoint member is defined by a priority and traffic balance option. The priority establishes a hierarchy for failover when a member fails. A traffic balance option can also be set to model the shortest path or split the demand by a defined rate among endpoint members of equal priority.

For complex networks, peering agreements and complex failover routing policies must be considered and accurately modeled. Common modeling situations include:

- Complex inter-AS egress demands and failover routing policies
- Complex inter-AS ingress demands and failover routing policies
- Data center demands and failover routing policies

MATE Design can model all these situations with external endpoints.

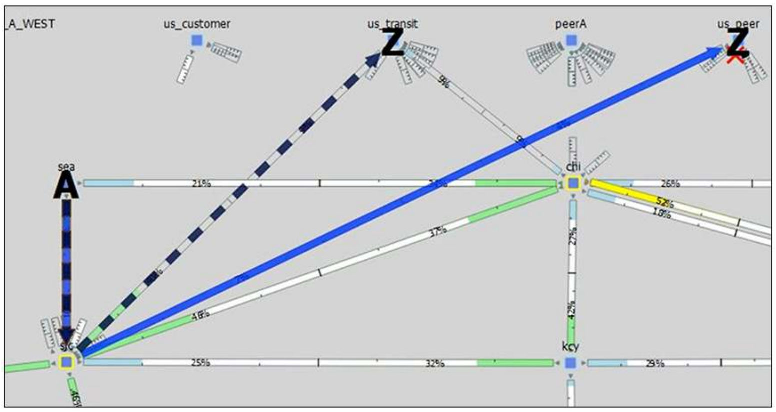
Modeling Inter-AS Egress Demands and Failover Routing Policies

Planning suitable egress traffic failover procedures or modeling existing egress traffic policies is necessary for planning and designing efficient and effective networks that meet customer requirements. For example, a cable operator has a connection to a peer network and a connection to a transit network at a site in San Jose, California. Demands are originating from the edge in Seattle, Washington with a destination beyond the external AS that the network is connected to. Ideally, traffic is sent to the peer network. If a circuit from the San Jose site to the external AS fails, or a failure occurs with an external endpoint member node, traffic is directed to the transit network.

[1] Inter-AS is a peer-to-peer type model that allows extension of VPNs through multiple provider or multi-domain networks.

MATE Design can address the failover between peers by modeling an external endpoint with two endpoint member nodes. The endpoint member node of the peer network has first priority, and the endpoint member node of the transit network has the second priority. When the first-priority endpoint member fails, MATE Design instantly simulates and displays the network impact on the network plot and updates the property tables. If you select the demand in the property tables, the network plot illustrates the demand's old route with a solid blue arrow and the new route with a dashed arrow, as shown in Figure 1.

Figure 1. External Endpoint Failure Between Peers

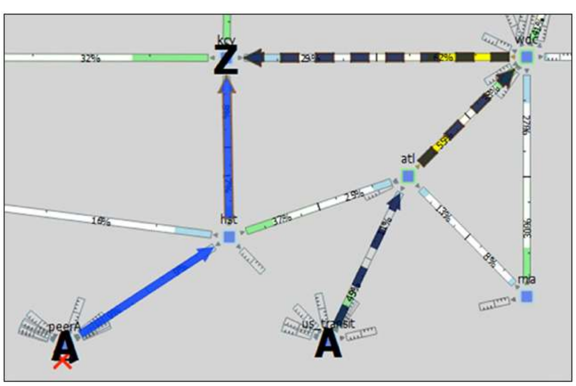


Modeling Inter-AS Ingress Demands and Failover Routing Policies

In this scenario, customer traffic is entering a cable provider network through a peer network and a transit provider network. A manual policy for each destination site determines the entry point from either of the two transit providers and which entry point is used for failover. For a site in Kansas City, Missouri, traffic enters Houston, Texas through a peer. In the event of failure, traffic enters Atlanta, Georgia through a transit provider.

To capture this, MATE Design models an external endpoint with two endpoint member nodes. The peer network's endpoint member node has the first priority, and the endpoint member node of the transit network has the second priority. When the first-priority endpoint member fails, MATE Design instantly simulates and displays the network impact on the network plot and updates the property tables. If you select the demand in the property tables, the network plot illustrates the demand's old route with a solid blue arrow and the new route with a dashed arrow, as shown in Figure 2.

Figure 2. External Endpoint Incoming Transit Routing Policies



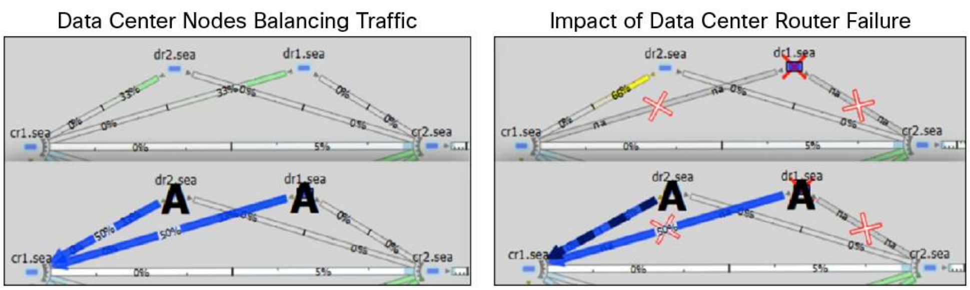
Modeling Data Center Demands and Failover Routing Policies

Accounting for redundancy is essential when modeling data centers. In this scenario, the outgoing traffic from a data center server cluster is distributed evenly between two data center routers connected to the backbone of the network. If one data center router fails, the server cluster behind the data center switches its traffic to the other data center router.

MATE Design models this data center example using an external endpoint with endpoint member edge nodes of the same priority and balancing traffic between them. When simulating the failure of one of the data center nodes with the demand selected, the network plot illustrates the demand's old route with a solid blue arrow and the new route with a dashed arrow, as shown in Figure 3.

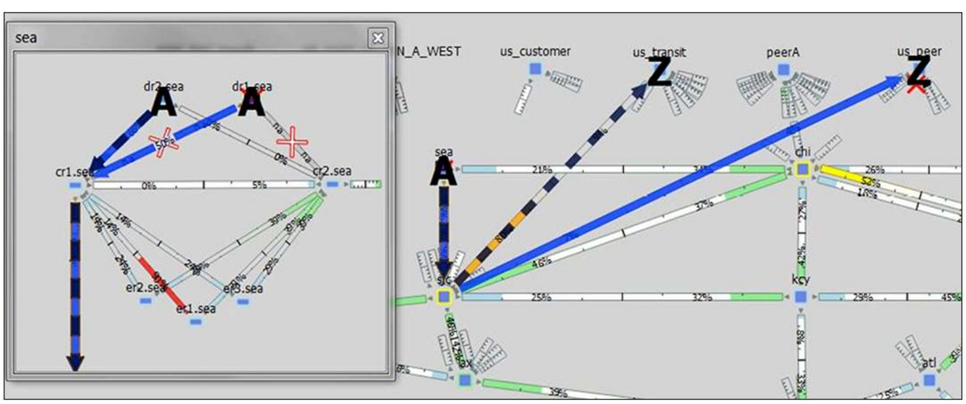
Note: This example is using the external endpoints to model a demand endpoint for the data center that is internal to the network.

Figure 3. External Endpoint Data Center Routing Policy



Demands can also be modeled from external endpoint to external endpoint. For example, a demand from the data center adheres to the routing policy on the left panel in Figure 4. A failure of each endpoint member is illustrated.

Figure 4. Failure of Source and Destination External Endpoints of a Demand



Conclusion

Cisco MATE Design models complex routing policies by creating demands with user-defined external endpoints. These endpoints can be used as a source or destination of a demand. Failure of an endpoint member instantly updates the simulation and the effects on the network are immediately apparent.

For More Information

For more information on Cisco MATE Design please visit http://www.cisco.com.

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