

Network Resiliency: Fault Tolerance for Your Critical Applications

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Outline

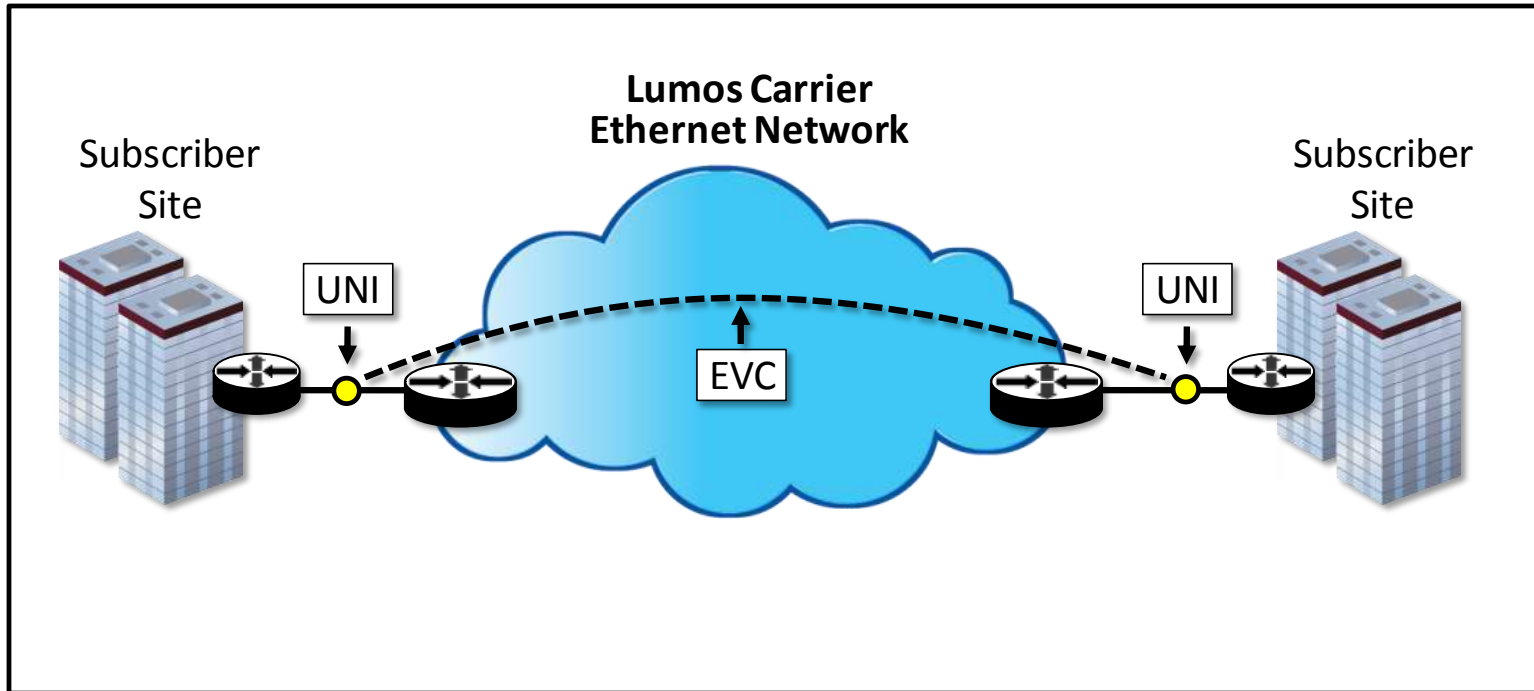
- What is network resiliency?
- Why it's important
- Examples of resiliency in telecomm services
 - Commercial Reserve E-Line
 - Local Ring Enhancement service
- Resiliency checklist



Network Resiliency

- What is
- Why it's important

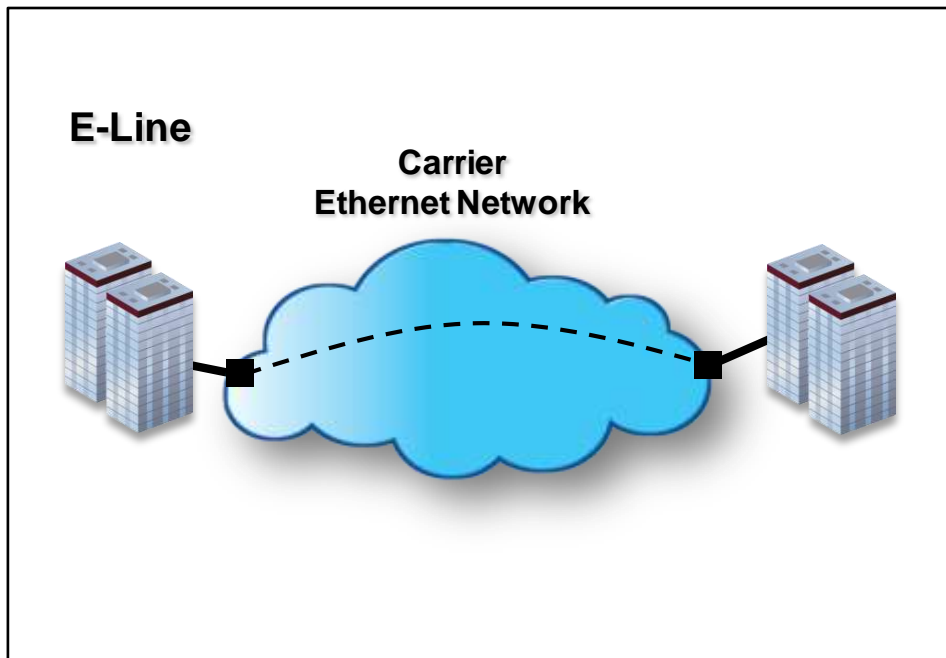
RESILIENCY EXAMPLE: COMMERCIAL RESERVE E-LINE SERVICE



- **User Network Interface (UNI)**
 - Demarcation point between service provider and customer responsibility
 - Speed-specific, standard Ethernet interfaces (1 Gbps, 10 Gbps)
 - Two (2) per E-Line Service, one at each end location
- **Ethernet Virtual Connection (EVC)**
 - Association of two UNIs; traffic passes only between UNIs associated with the same EVC
 - Speed- and grade of service- specific; pay for speed, pay for performance
 - One (1) per each E-Line service

Type I Ethernet service with:

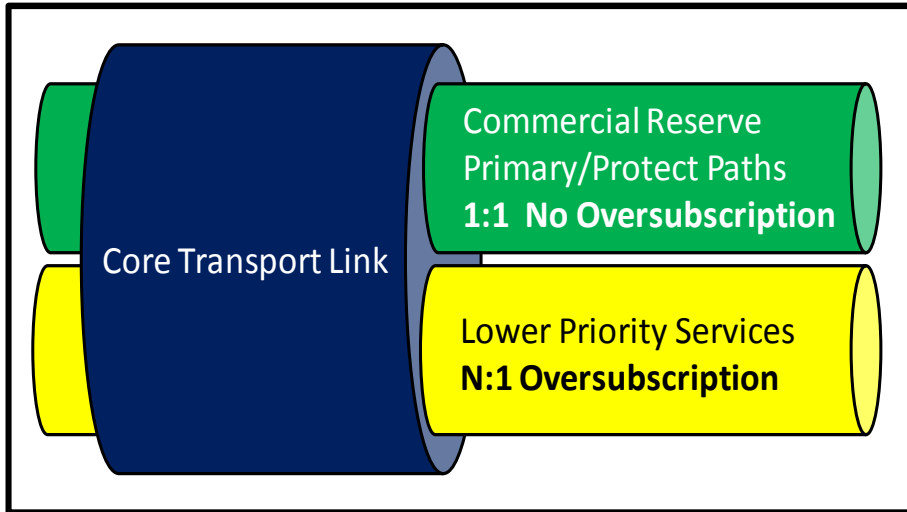
- E-Line (point-to-point) topology
- Specific design requirements to enhance reliability
- Failover and traffic prioritization mechanisms
- Inherent scalability and cost/price customer advantages



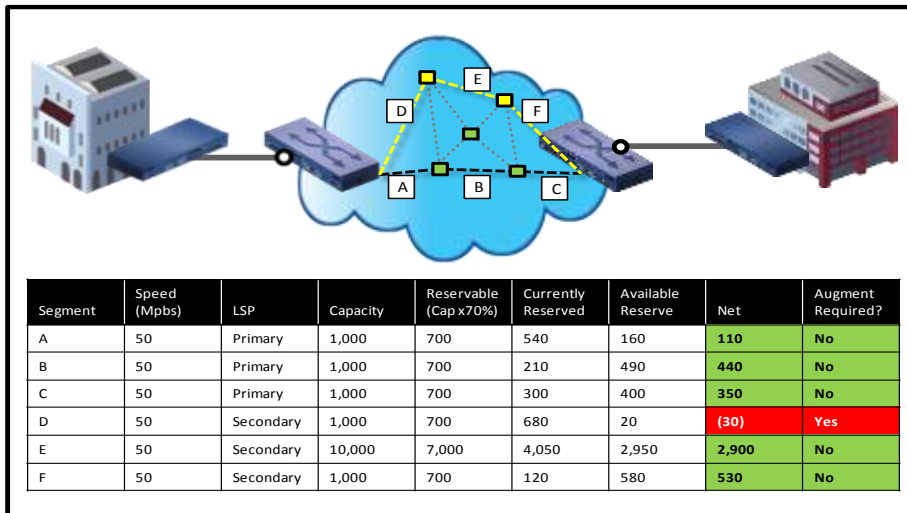
What attributes distinguish
“Commercial Reserve”?

- Bandwidth Reservation
- Path Protection
- Forwarding Priority

Bandwidth Reservation

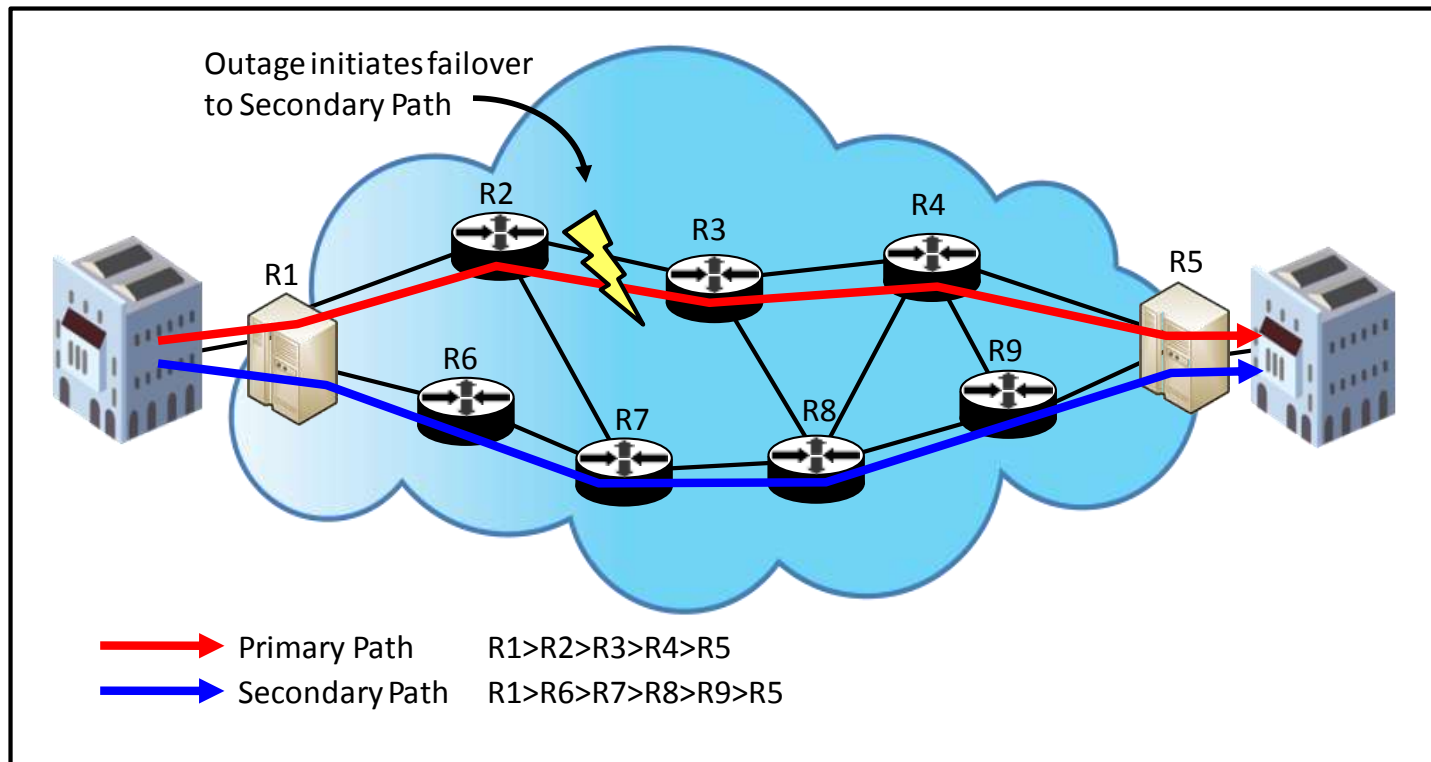


- Link capacity is allocated specifically for Commercial Reserve services
- Both Primary and Secondary Paths are non-oversubscribed, 1:1



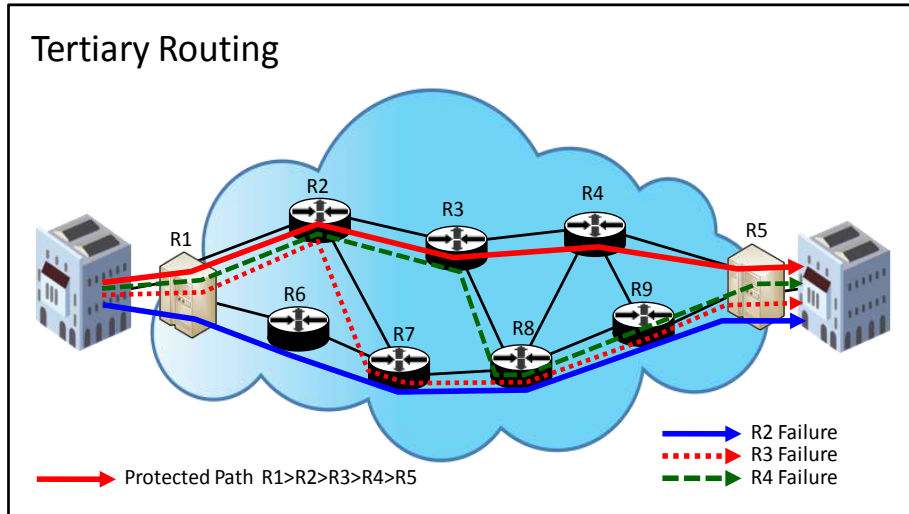
- Visibility into capacity inventory at point of design and provisioning
- Augments, if required, are completed before service is provisioned

Commercial Reserve Service is inherently redundant



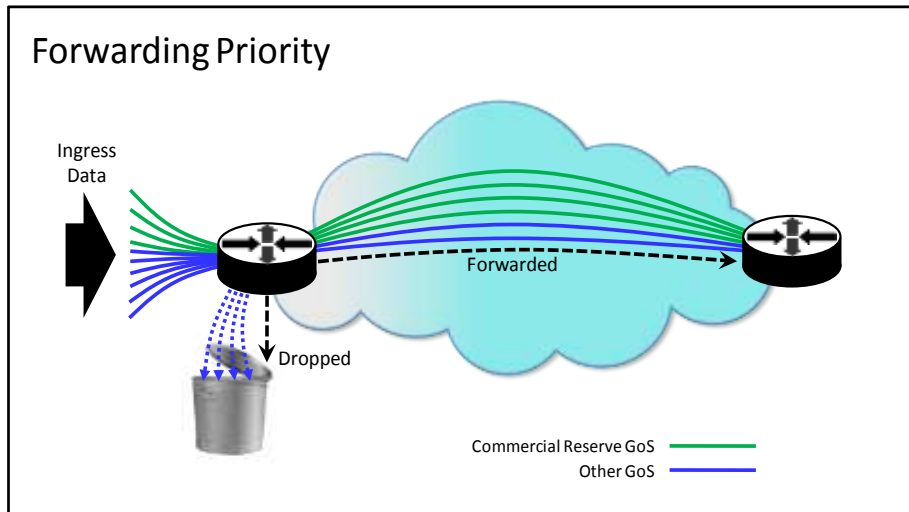
- Primary and Secondary paths are assigned through the MPLS core
- Paths are diverse from one another and non-oversubscribed
- If an outage occurs, failover to the secondary path is instant and automatic
- SONET-equivalent failover, ≤ 50 ms

Forwarding Priority



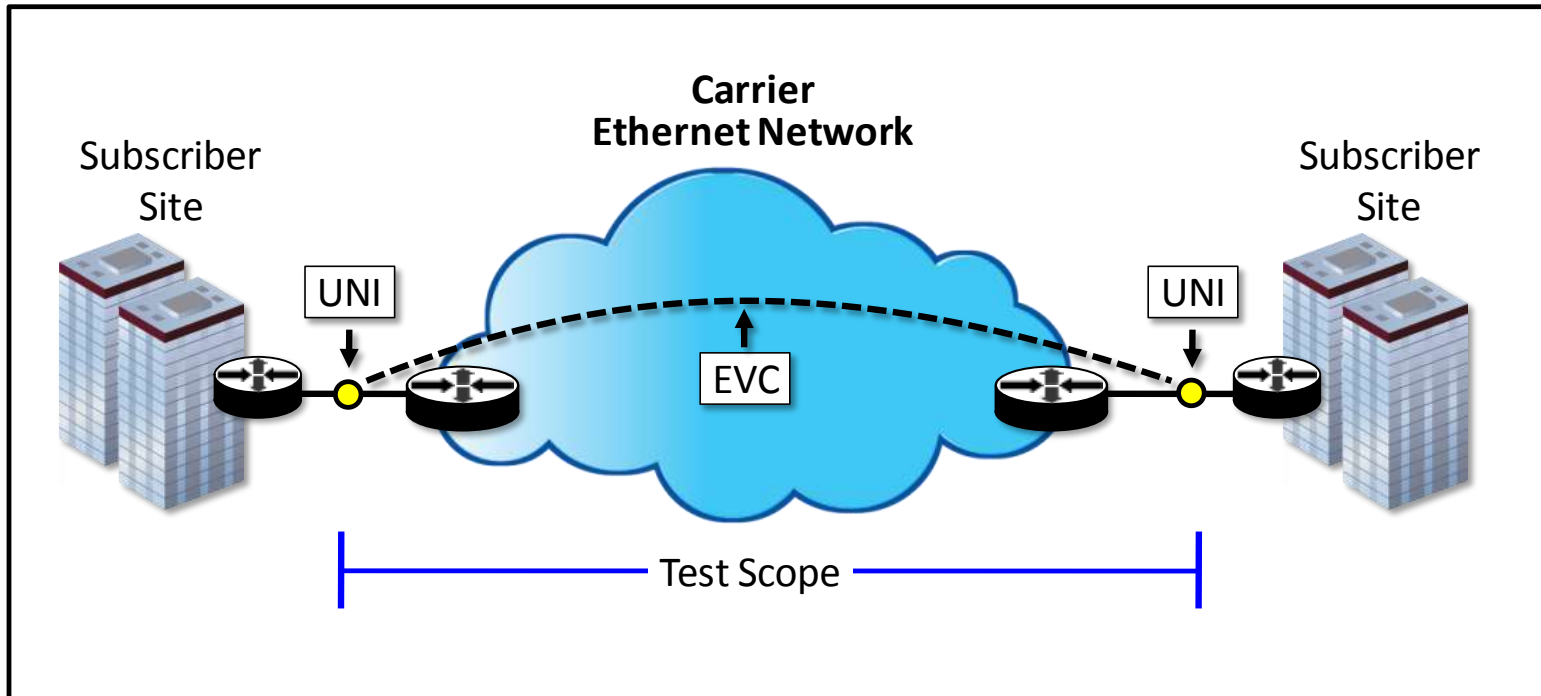
In the event of a failure on both the Primary and Secondary paths:

- Network leverages the best of any remaining shared network resources
- Traffic is routed over a tertiary path, determined dynamically, if available



If tertiary route(s) become congested:

- Commercial Reserve has exclusive forwarding priority
- Commercial Reserve traffic is preserved over all other traffic types
- Lower priority frames are dropped first

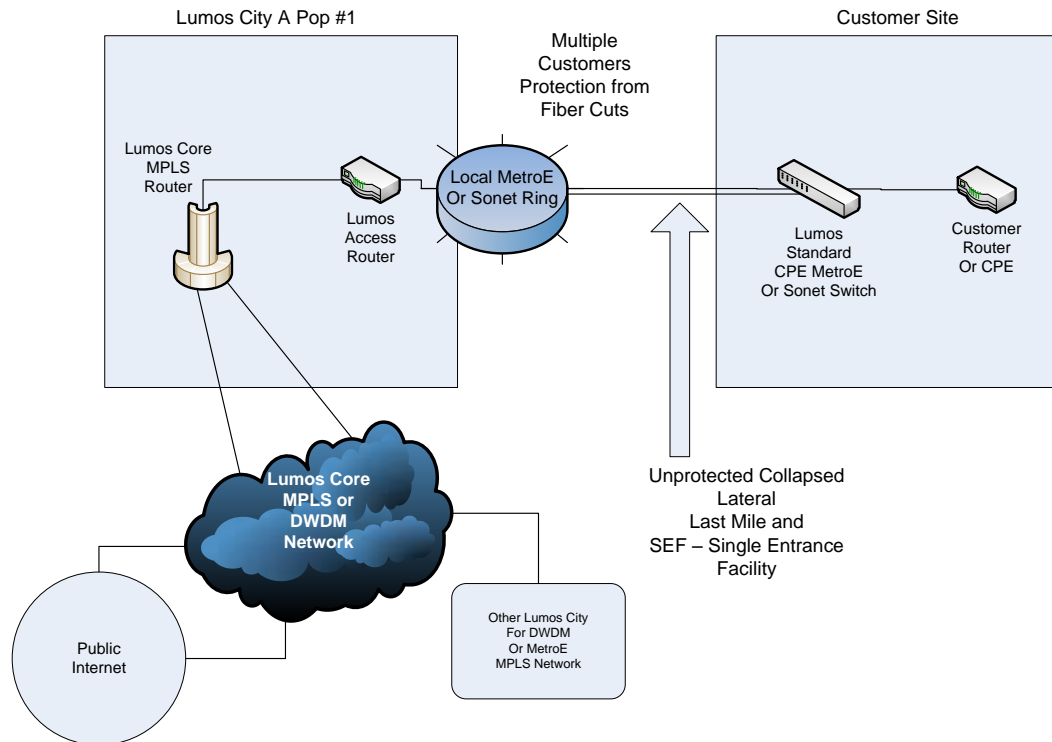


Initial testing – results delivered to customer:

- ITU-T Y.1564 test specification, industry-standard
- Measured from UNI to UNI, over the entire EVC
- Primary and Secondary paths tested individually
- Measures Frame Delay, Inter-Frame Delay Variation, and Frame Loss Ratio performance over a range of frame sizes and bit rates

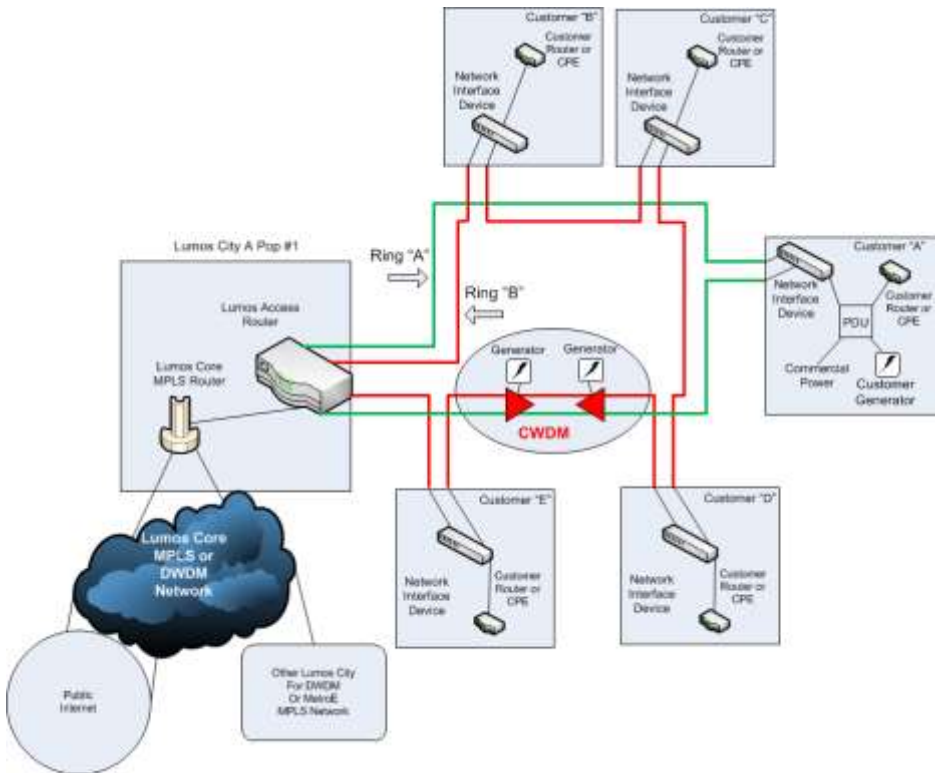
RESILIENCY EXAMPLE: LOCAL RING ENHANCEMENT SERVICE

❖ Standard Local Access Configuration

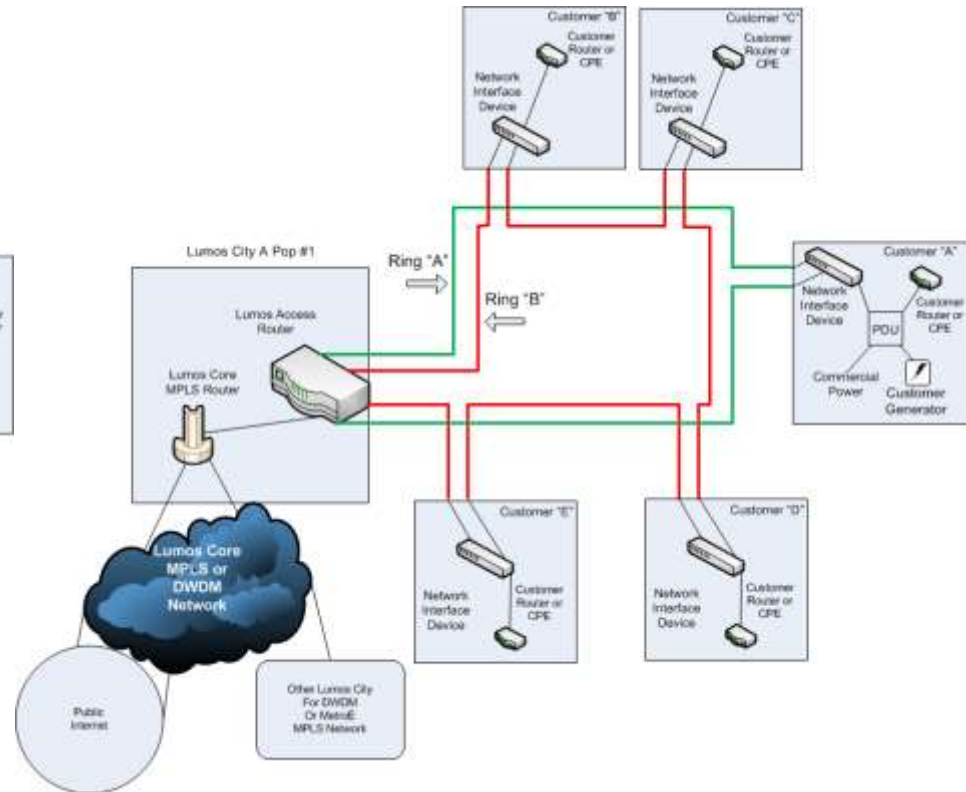


❖ Local Ring Options

Private Dedicated Virtual Ring

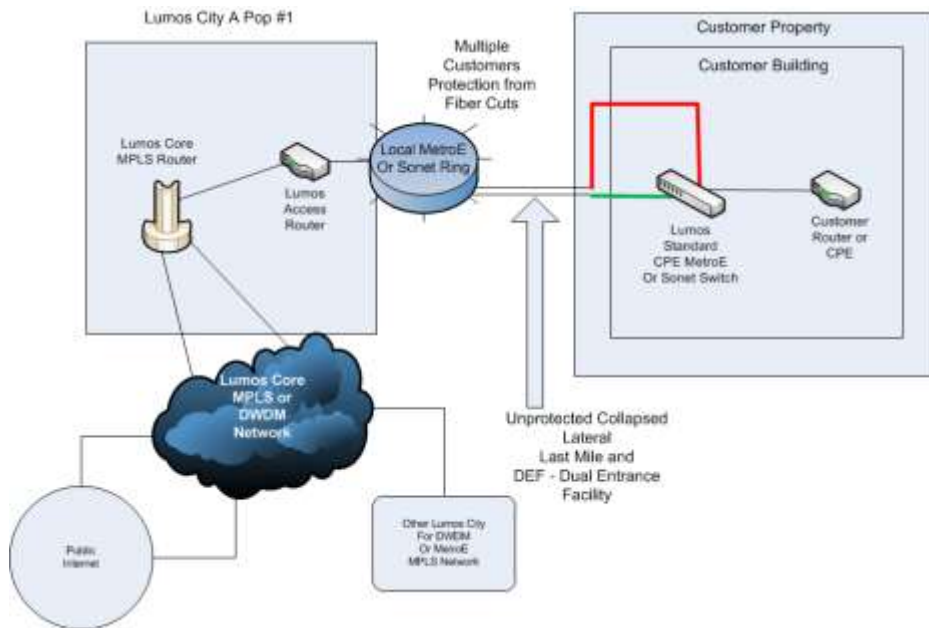


Private Dedicated Physical Ring

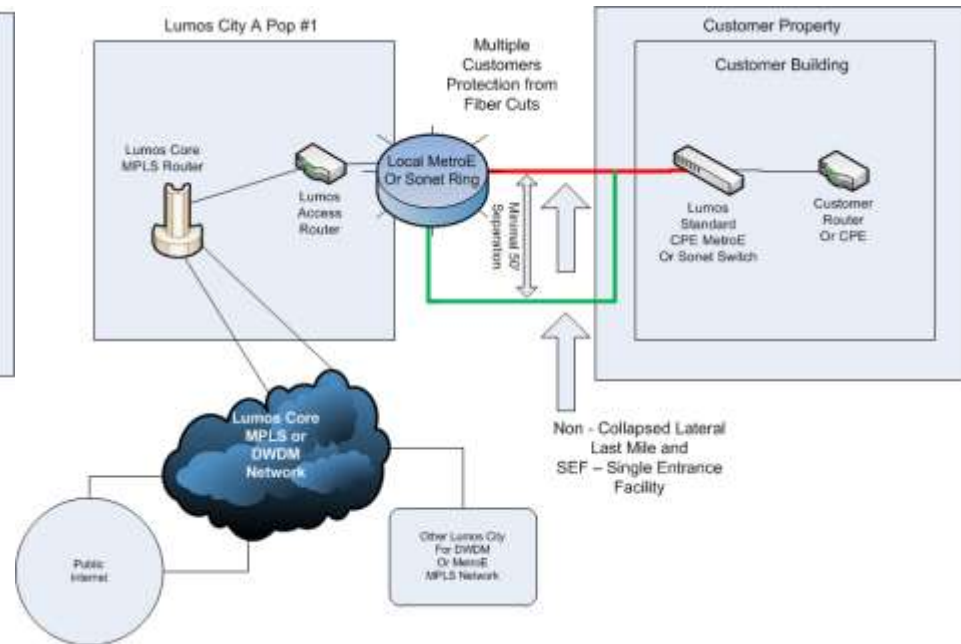


❖ Lateral / Building Entry Options

Dual Entrance Facility into Customer Premise

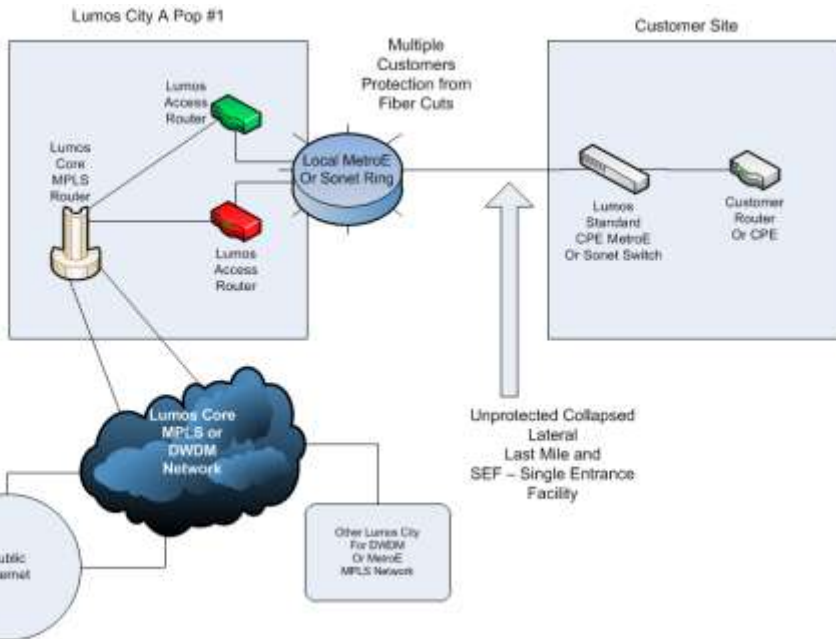


Non Collapsed Lateral Last Mile

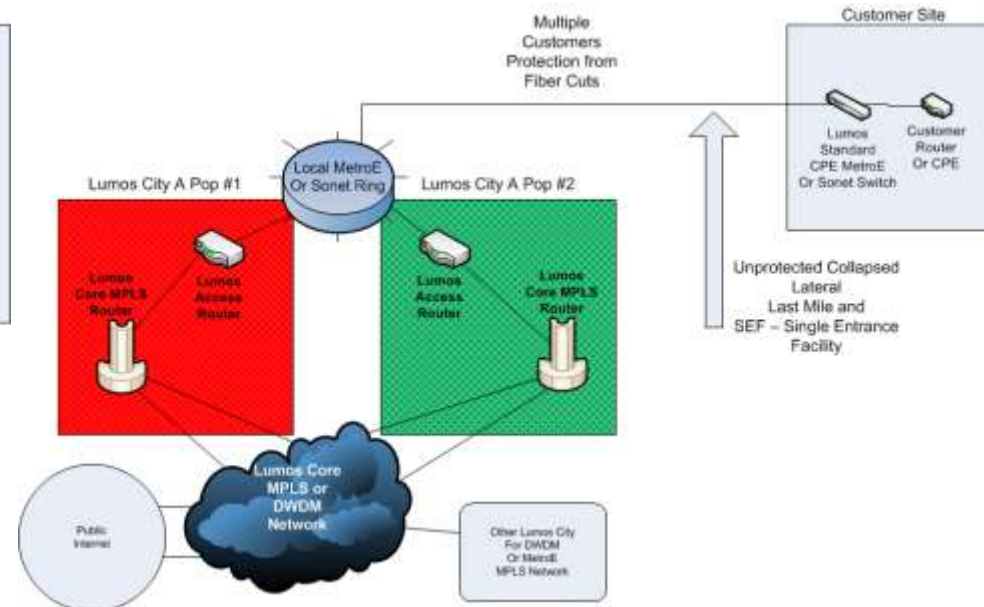


❖ POP Diversity Options

Lumos Router in POP Diversity (if available)

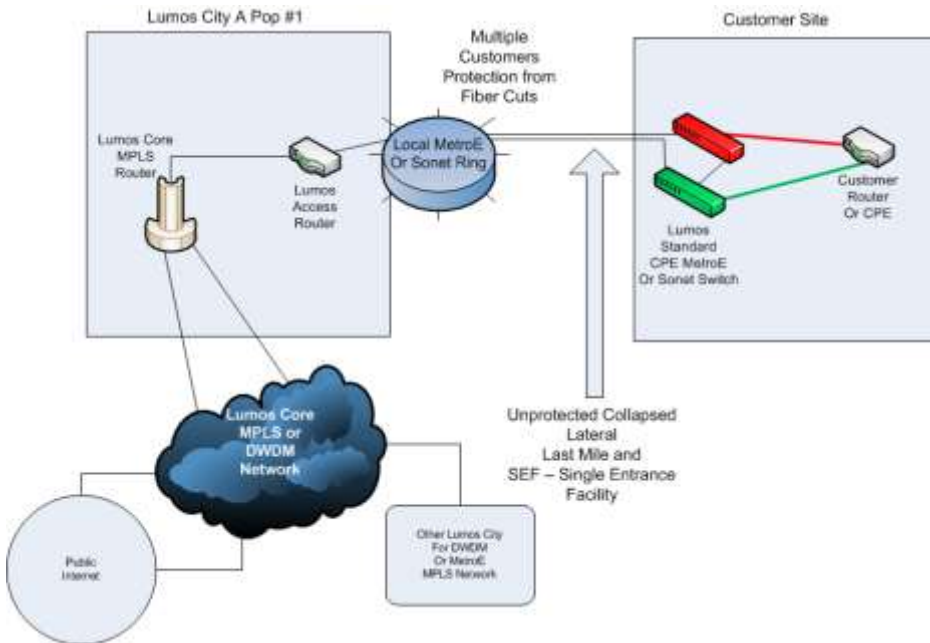


Lumos POP Diversity (in City and Cross City – if available)

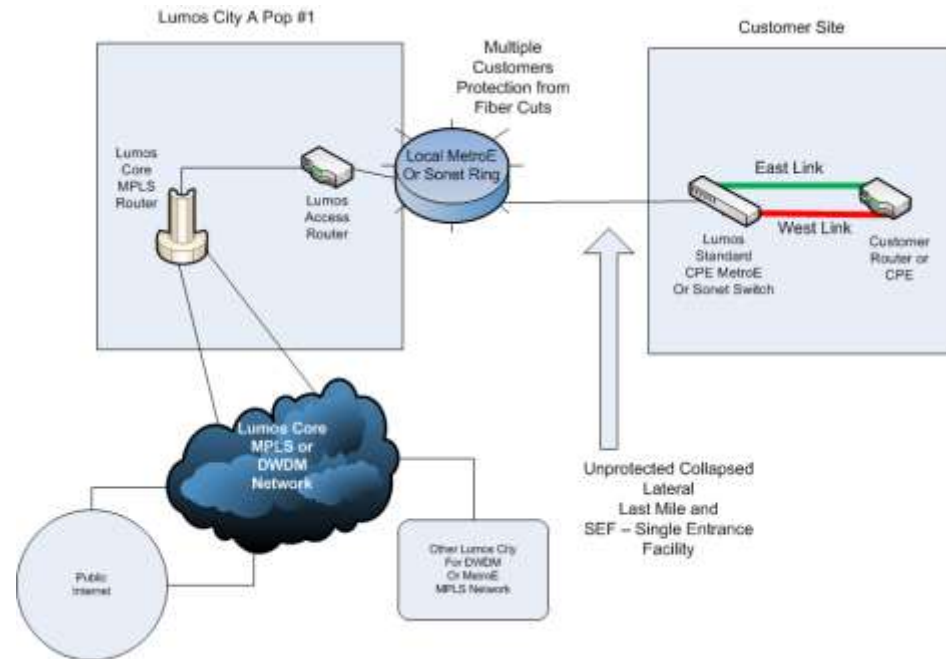


❖ Premises Equipment Options

Redundant Lumos Router/Switch at Customer premise



Redundant East/West Links from Lumos CPE to Customer's Network





Resiliency Checklist