Global Crossing

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RPR Requirements

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Agenda

- Global Crossing Goals
- Metro Network architecture
- Global Ethernet Services
- SLA
- Implications on RPR
- Conclusion

Global Crossing Goals

- Data services in 50+ major metro cities worldwide
- A metro network that handles both legacy and data services
  - Basic legacy and data services
  - High margin value added services
- Maximize ROI
  - More customers per network
  - More services per customer

Metro Network Architecture

- Ring based architecture in metro networks
  - Max ring size ~100 km
  - Max distance between nodes up to ~40 km
  - Number of nodes < 15
  - High-speed rings (2.5Gbps and 10Gbps)
- SONET for TDM based services
- WDM for Lambda based services
- RPR for Ethernet based services
- Guiding Principles
  - Metro network remain layer 1 and 2 for simplicity

Global Ethernet Services

- Ethernet Services within a Metro Area or between Metro Areas on a global basis
  - High speed inter-connects for service providers
  - Ethernet services for large enterprises
- Transparent LAN service
  - Point to point virtual private line
- Multipoint VLAN service
  - 802.1q VLAN

Service Level Agreement

- An SLA defines a service
  - Reliability
  - Responsiveness
  - Performance
- SLA is enforced on a per customer basis
  - Pay penalties to customers if SLA is not met
  - A customer may have more than one service, each with its own SLA
  - Service level should be maintained regardless of network loading and other flows within the network

Service Level Agreement

- Performance parameter guarantees
  - Availability
    - Simple and fast restoration ~50 ms
  - Bandwidth
    - Committed information rate (in unit of Mbps)
  - Delay
    - Tight bound (<10 ms in a RPR)
    - Loose bound
    - No bound
  - Jitter
    - Need to be bound for high grade service level (<1ms)

Security Considerations

- Majority of data services are private lines or virtual circuit based
  - Customers are comfortable with logical segregation
- GX would like to offer customers traffic separation and security
  - Adopt Frame Relay PVC model (traffic segregated by DLCIs) as opposed to the IP VPN model (no logical flow separation)

FCAP Considerations

- For RPR to be successful, it needs to offer robust FCAP features
  - PM
    - CRC error
    - Packet dropped
  - Alarms
  - Threshold Crossing Alarms
  - SLA Monitoring

Enforcing SLA

- A philosophy is NOT to admit traffic not conforming to traffic contract
  - Traffic policing at ingress of network
  - Non-conforming traffic may be admitted but SLA applies only to conforming traffic
  - Non-conforming traffic may be discarded at ingress due to network conditions
  - Customers billed based on SLA and/or usage
    - SLA verification through monitoring and reporting
    - SLA violations by carrier have financial implications
    - Need some mechanism to clearly delineate individual customers

Implications for RPR

- High service availability
  - Fast service restoration (less than 50 ms) for platinum customer who pays for it
    - Per SLA protection
  - Simple and almost UPSR-like behavior
    - Source steering
- Bound latency and jitter
  - Latency < 10 ms & jitter < 1 ms within one RPR
    - Limit maximum frame size
    - High speed ring line rate preferably at 10 Gbps
- QoS per service per customer
  - Per flow QoS (based on SLA)
  - Performance monitoring for each customer's SLA
  - Need some sort of tagging to delineate individual customer

Implications for RPR

- Customer traffic separation
  - Some sort of tagging to identify a customer's traffic
- Guaranteed Bandwidth
  - CIR like guarantee
- Maximize ring utilization
  - Optimize bandwidth utilization of each link on the ring
- Layer 2 RPR for simplicity

Conclusion

- Global Crossing is looking for a cost effective RPR MAN technology that is optimized for data, and can be used to offer carrier-class Ethernet services as an alternative to Frame Relay service and maybe even private line service via circuit emulation in the future