



Fault and Performance Management for Carrier Ethernet Services

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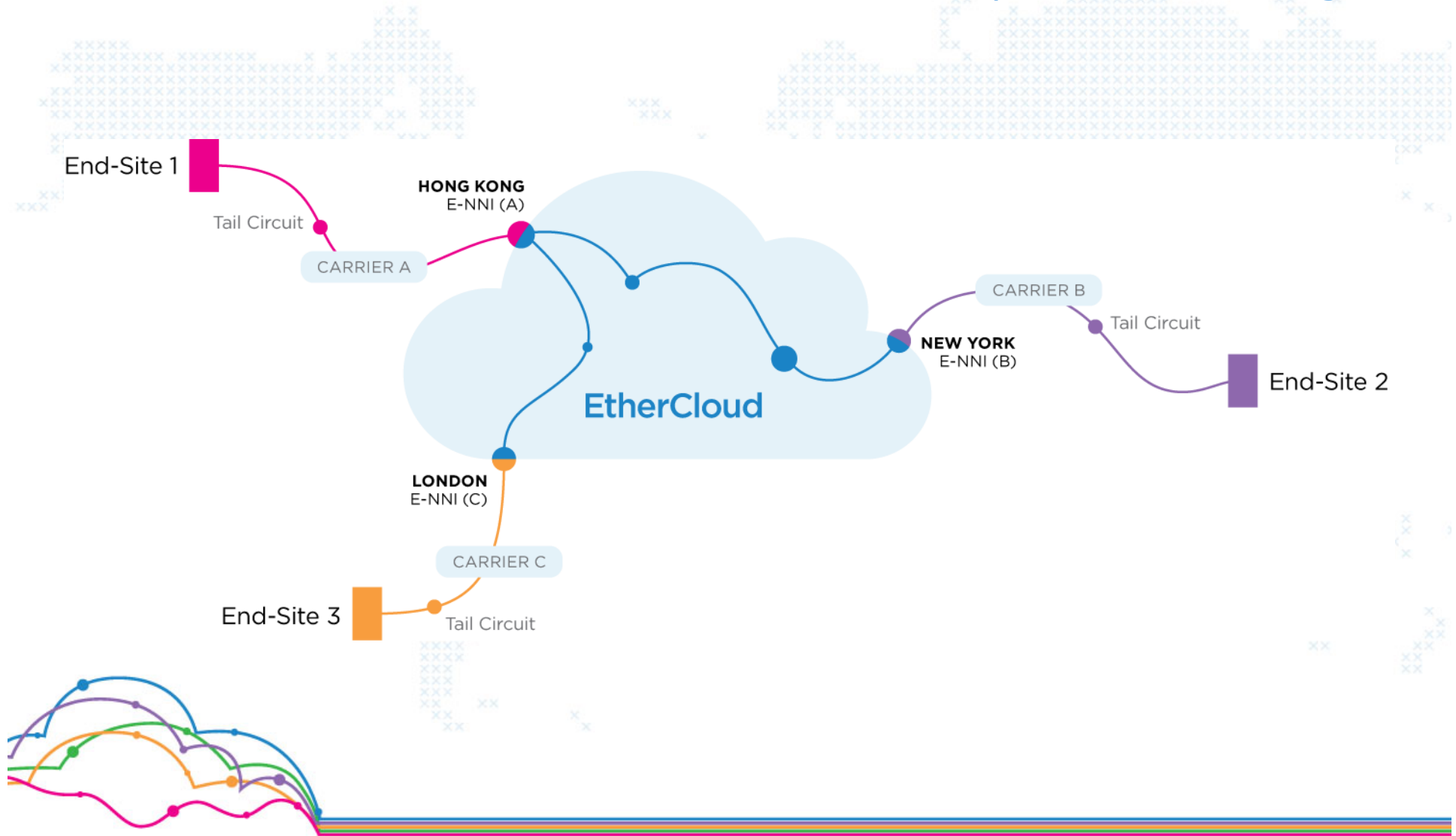


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Carrier Ethernet Overview & Operational Challenges





Operational Requirement & Solutions

- ✓ Real-time per-service Fault Management
- ✓ Real-time per-service Performance Management
- ✓ Active Fault Detection, Isolation, Diagnostics, and Verification
- ✓ Alerting for network failures
- ✓ End-to-end as well as per-segment SLA monitoring and verification



✓ **OAM technologies**

✓ **Fault and Performance Management System**





Ethernet OAM Overview

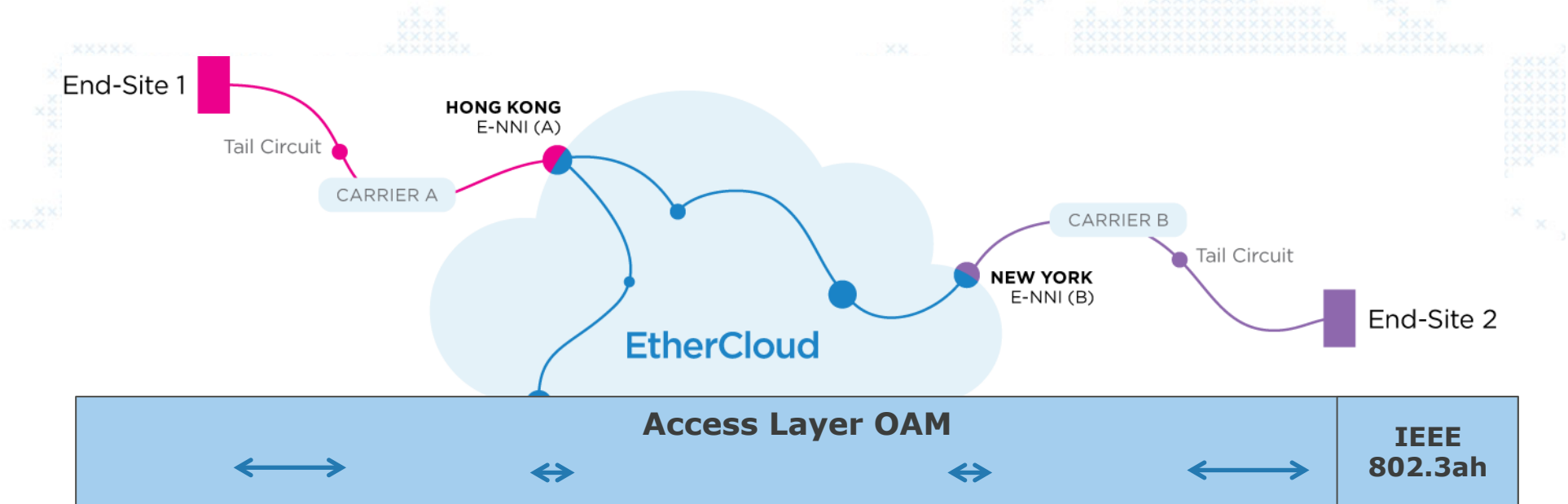


Service Layer OAM	ITU Y.1731
Connectivity Layer OAM	IEEE 802.1ag
Access Layer OAM	IEEE 802.3ah





Access Layer OAM / 802.3ah

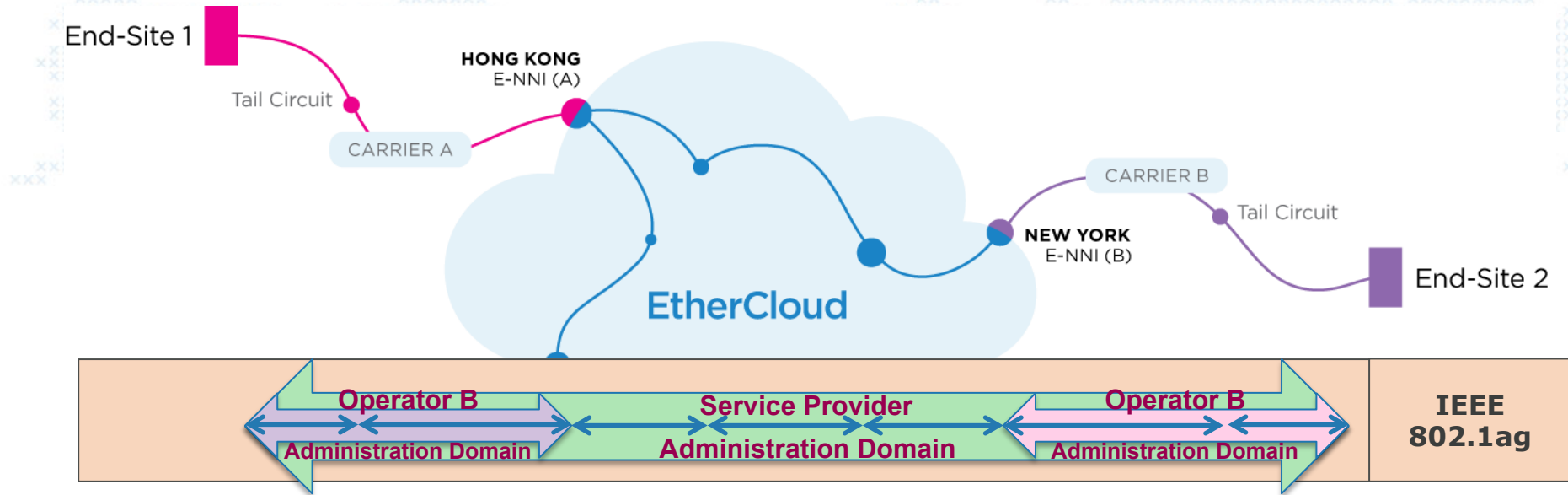


- ✓ Discovery
- ✓ Link Monitoring
- ✓ Remote Failure Indication
- ✓ Remote Loopback





Network Layer OAM / 802.1ag

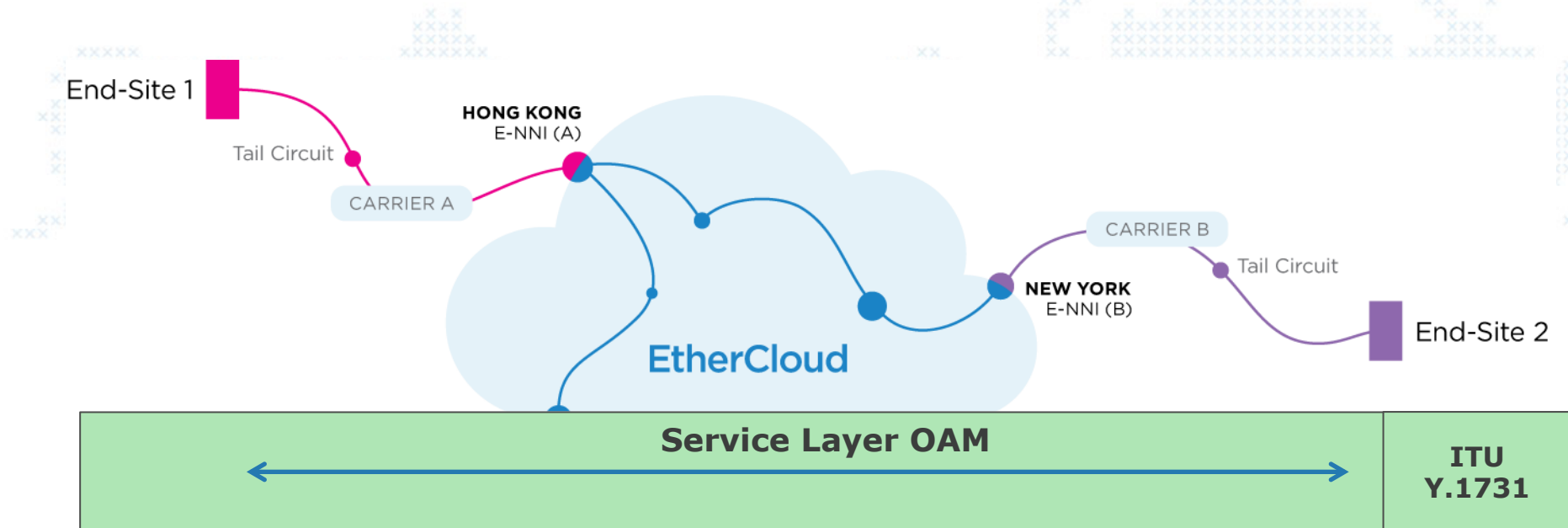


- ✓ Continuity Check Messages (CCM)
- ✓ Loopback Message (LBM)
- ✓ Link Trace Message (LTM)
- ✓ Alarm Indication Signal (AIS)





Service Layer OAM / Y.1731

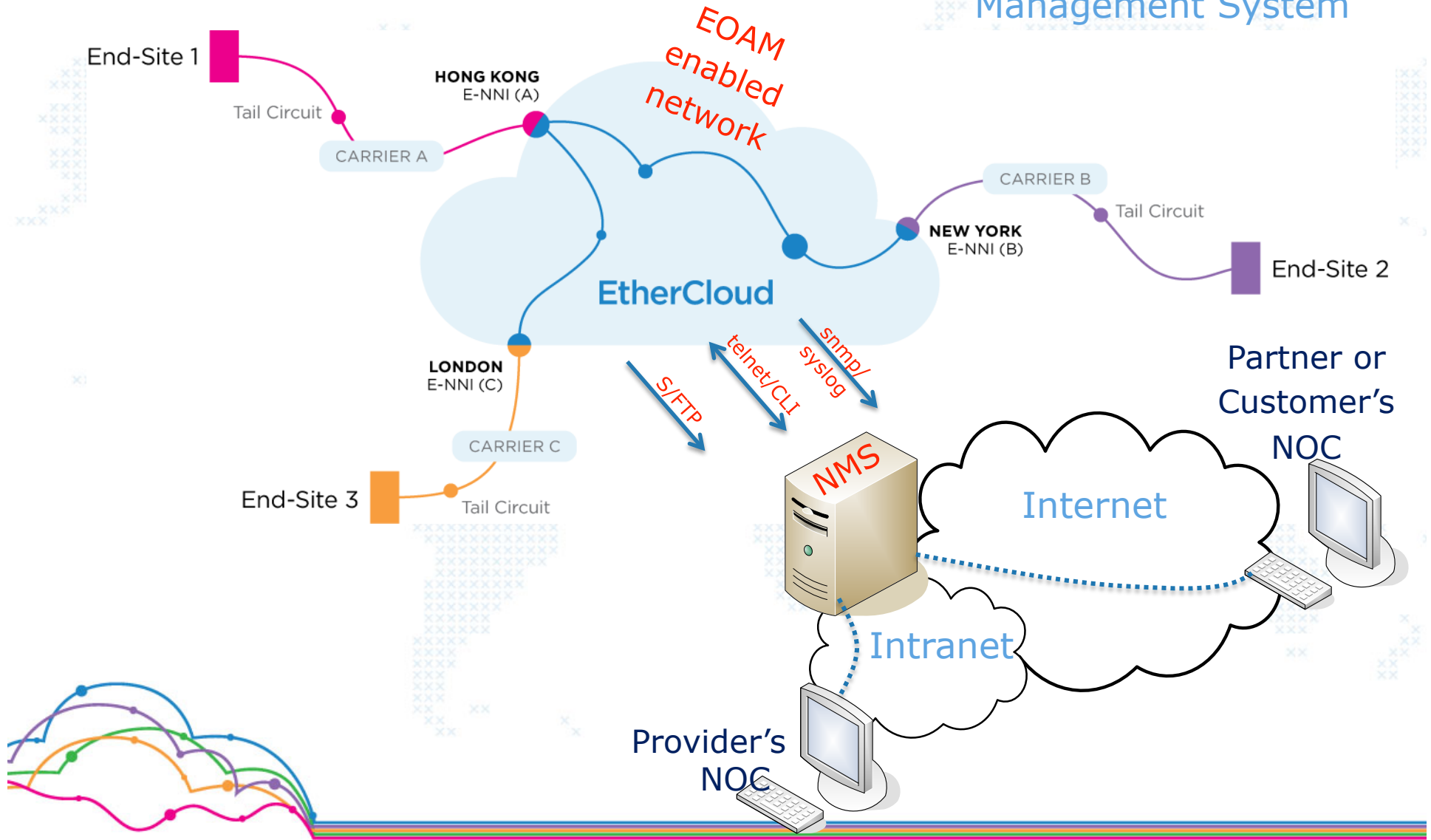


- ✓ Builds on 802.1ag
- ✓ Performance management for SLA verification
 - Frame loss ratio (FLR)
 - Frame delay (FD)
 - Frame delay variation (FDV)
 - Others (errored frame seconds, service status (up/down), frame throughput, etc.)





Fault and Performance Management System





Fault and Performance Management System

The image displays several key components of the ethercloud system:

- Network Overview:** A map showing global network connectivity with various nodes and links.
- Configuration Panel:** A window for configuring CFM (Connectivity Fault Management) loopback tests, showing local and remote IP addresses and a 'Start' button.
- Performance Monitoring:** Graphs showing network utilization and jitter over time, with labels like 'Utilization: NYCOR2 245 02VLF510000NTE' and 'Jitter: 1500R1 524 02VLF510000NTE'.
- Geographic Analysis:** A map of the United States with nodes (DEN, BOS, NYC, LSA) and annotations such as 'EtherVision backend Heartbeat indicator' and 'number of OVCs between NYC and DEN'.



Demo

This part is a demo on a live management system on how it utilize the EOAM to provide Active Fault Detection, Isolation, Diagnostics and Verification on Carrier Ethernet Services.





Challenges and conclusion

- ☑ Get the equipment vendor to support EOAM
- ☑ Get the partners and customers to enable and configure Ethernet OAM
.... and have them work with each other
- ☑ Get the system work well with equipment with different vendor, model, firmware versions.
- ☑ High availability system



