

2009 OIF Worldwide Interoperability Demo Enabling Broadband On-Demand Services



Collaboration and Innovation. At Light Speed.

OIF Worldwide Interoperability Demonstration

- ◆ End-to-end provisioning of dynamic switched Ethernet Virtual Private Line (EVPL) services – application of OIF UNI2.0 to new Layer 2 transport technologies
- ◆ Data plane interoperability testing of EVPL over multiple transport technologies
- ◆ End-to-end service restoration using E-NNI
- ◆ Supported by (7) major Carriers and (10) leading equipment vendors from Asia, Europe and the USA
- ◆ Testing underway in Carrier labs March to June 2009
- ◆ Builds on OIF WW Interop Demos of 2004, 2005 and 2007

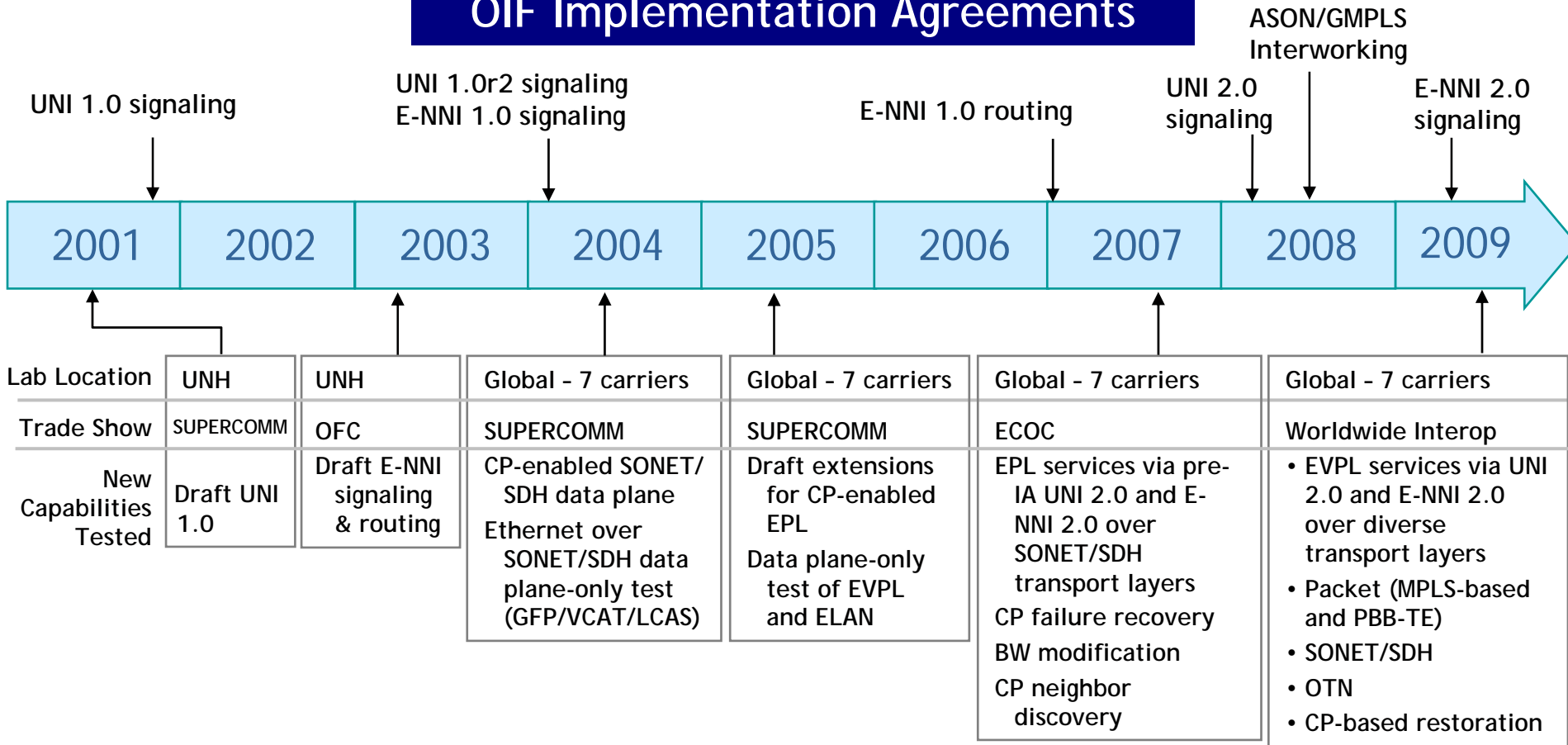


On-Demand Ethernet Services across Global Networks

Putting the Pieces Together

OIF Implementation Agreements and Interoperability Demos

OIF Implementation Agreements

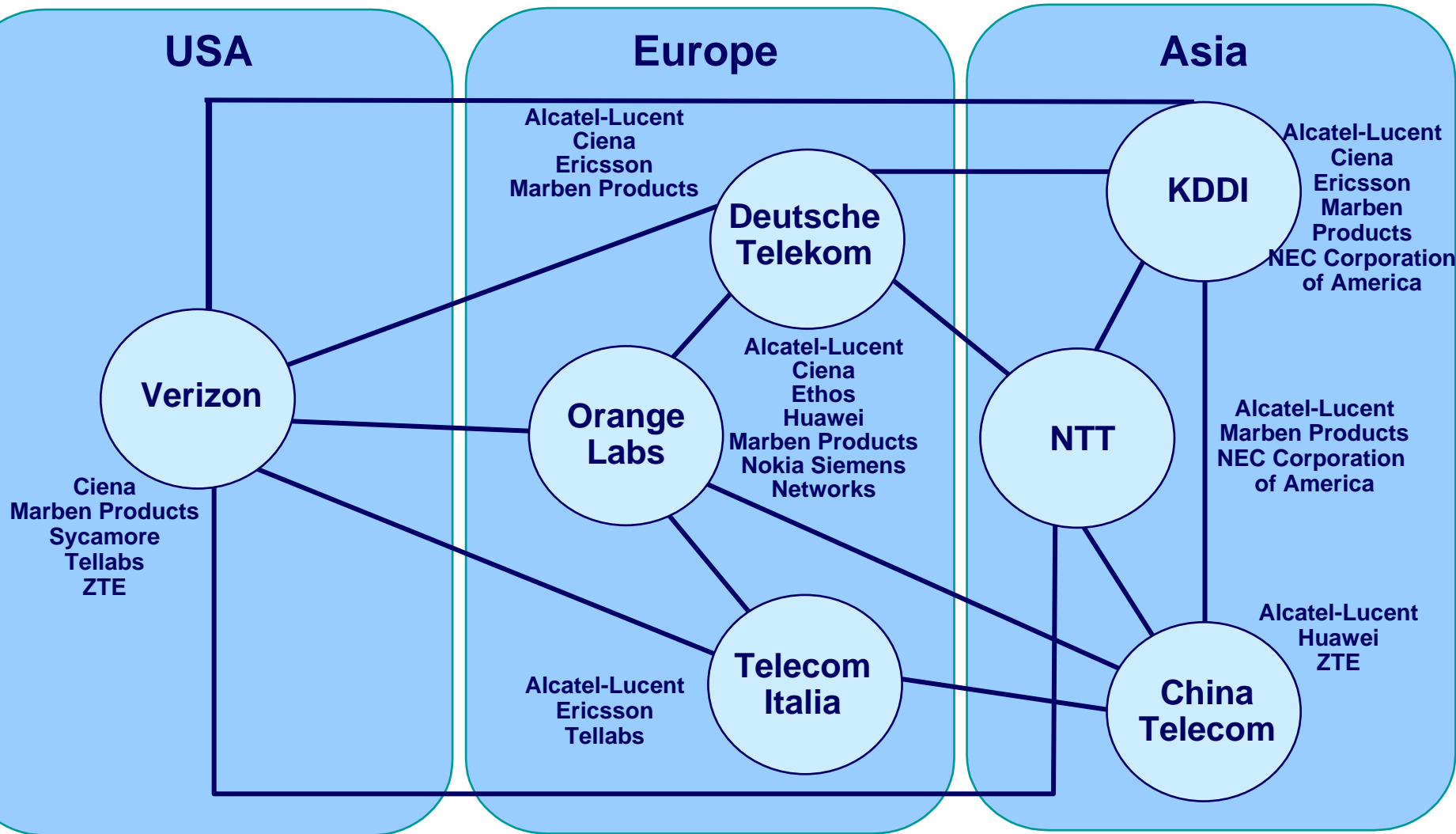


OIF Networking Interoperability Demonstrations

Worldwide Interoperability Practical Test Cases

- ◆ **Network Environment**
 - Heterogeneous multi-vendor and multi-domain networks with ASON/GMPLS-enabled nodes and domains
 - Interconnected via an OIF control plane with inter-domain links and supported by a global SCN
- ◆ **Technical Features in Worldwide Demonstration**
 - UNI 2.0 and E-NNI 2.0 testing for EVPL services over SONET/SDH
 - Including embedded SONET/SDH over OTN
 - Multi domain end-to-end restoration of SONET/SDH connections
 - Data plane testing for EVPL services over OTN
 - UNI 2.0 and data plane testing for EVPL services over MPLS-based packet transport
 - Data plane testing for EVPL services over PBB-TE packet transport

OIF Global Network Topology 2009



EVPLoMPLS Connection Table

- ◆ EVPLs are established by intra-lab and inter-lab UNI signaling.
 - MPLS-based LSPs are statically configured.
 - Clients initiate service request using UNI 2.0 signaling
 - UNI-N devices create Ethernet pseudowires over the existing MPLS LSPs

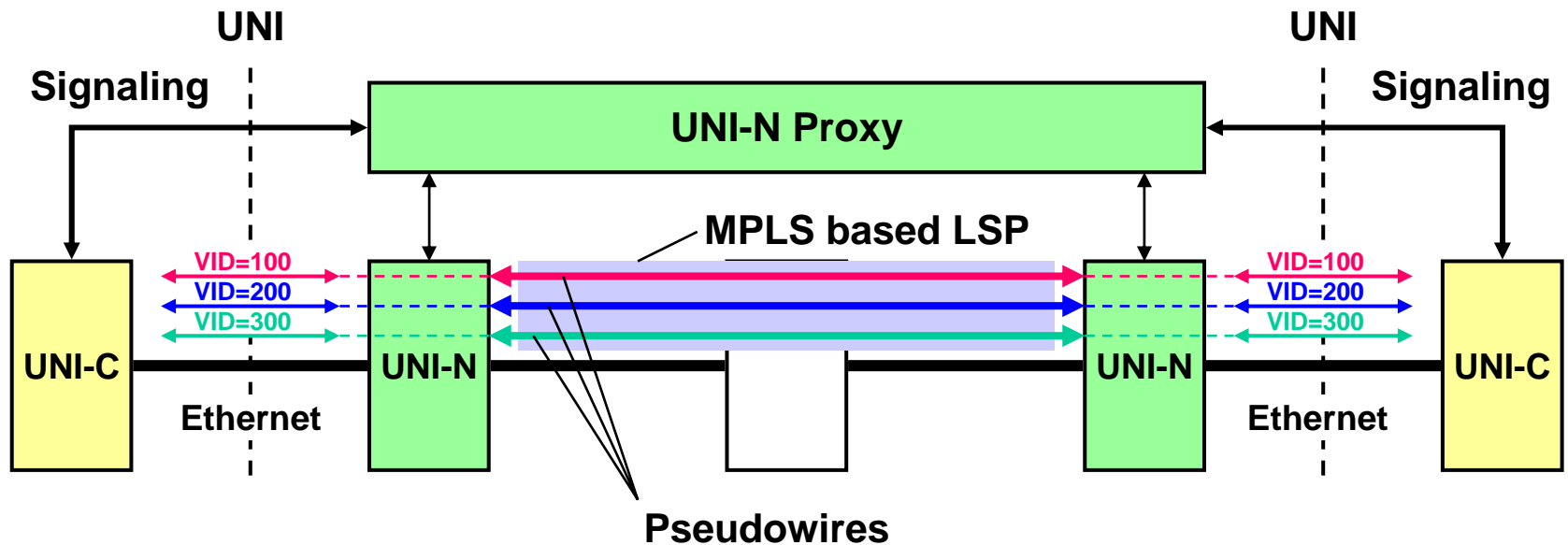
- ◆ Single connection setup with single VLAN ID
 - 1) Marben1(NTT)-NEC1(KDDI)-NEC3(KDDI)-Marben2(KDDI)
 - VLAN ID = 3, Tunnel ID =1

- ◆ Multiple connection setup with different VLAN ID to different destination
 - 3-1) Marben1(NTT)-NEC1(NTT)-NEC3(NTT)-Marben1(VZ)
 - VLAN ID=30, Tunnel ID =2
 - 3-2) Marben1(NTT)-NEC1(NTT)-NEC3(NTT)-Marben1(DT)
 - VLAN ID =40, Tunnel ID = 3

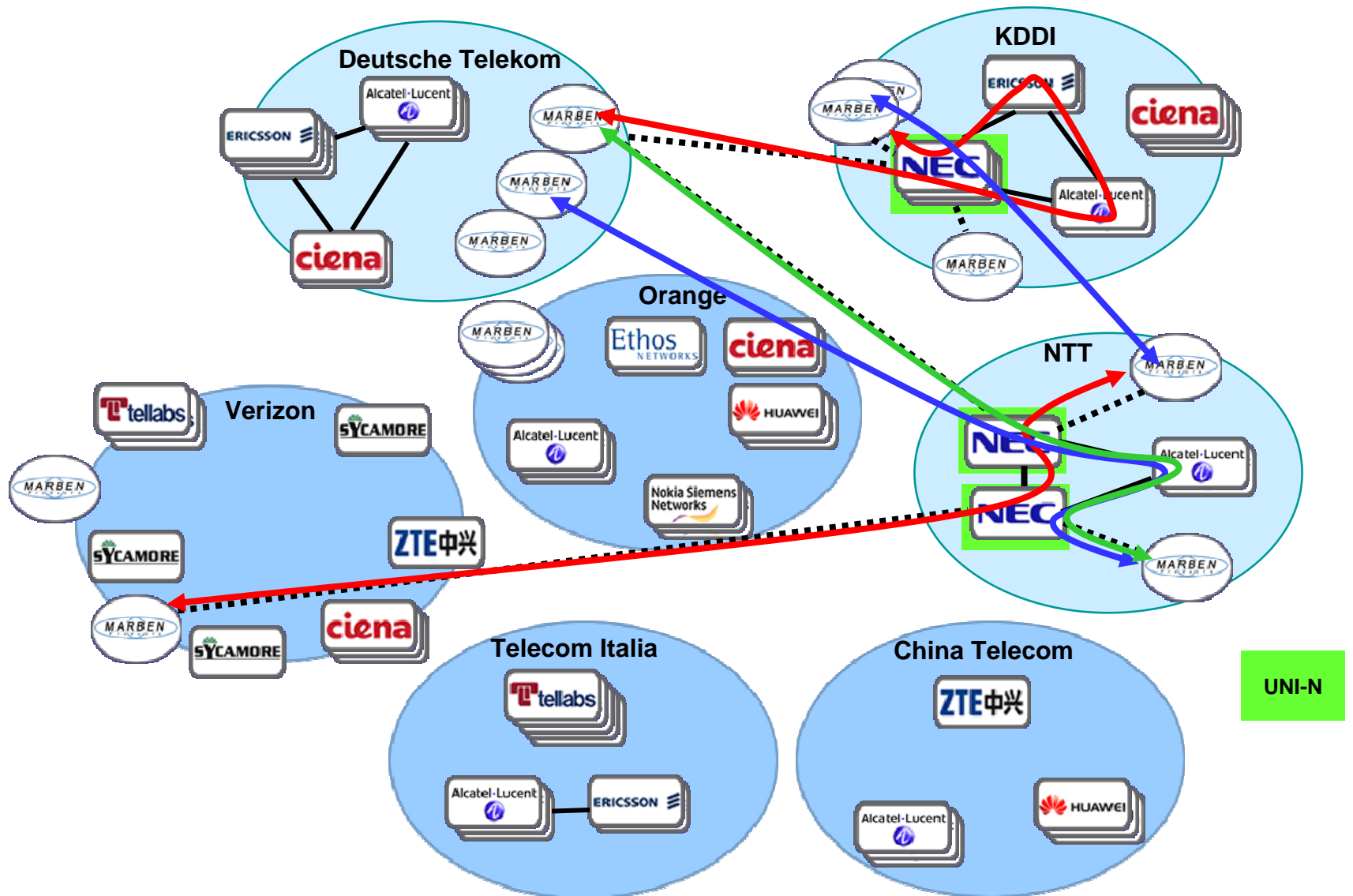
- ◆ Connection set up from Overseas UNI site
 - 4-1) Marben2(DT)-NEC1(NTT)-NEC2(NTT)-Marben2(NTT)
 - VLAN ID =4, Tunnel ID =1
 - 4-2) Marben1(DT)-NEC1(KDDI)-NEC2(KDDI)-Marben2(KDDI)
 - VLAN ID =2, Tunnel ID =1

EVPLoMPLS Implementation

- ◆ MPLS based LSPs are statically configured.
- ◆ UNI-C device requests Call setup by signaling to UNI-N Proxy.
- ◆ UNI-N Proxy establishes Ethernet Pseudowires by configuring UNI-N devices.



EVPLoMPLS Demonstration Topology

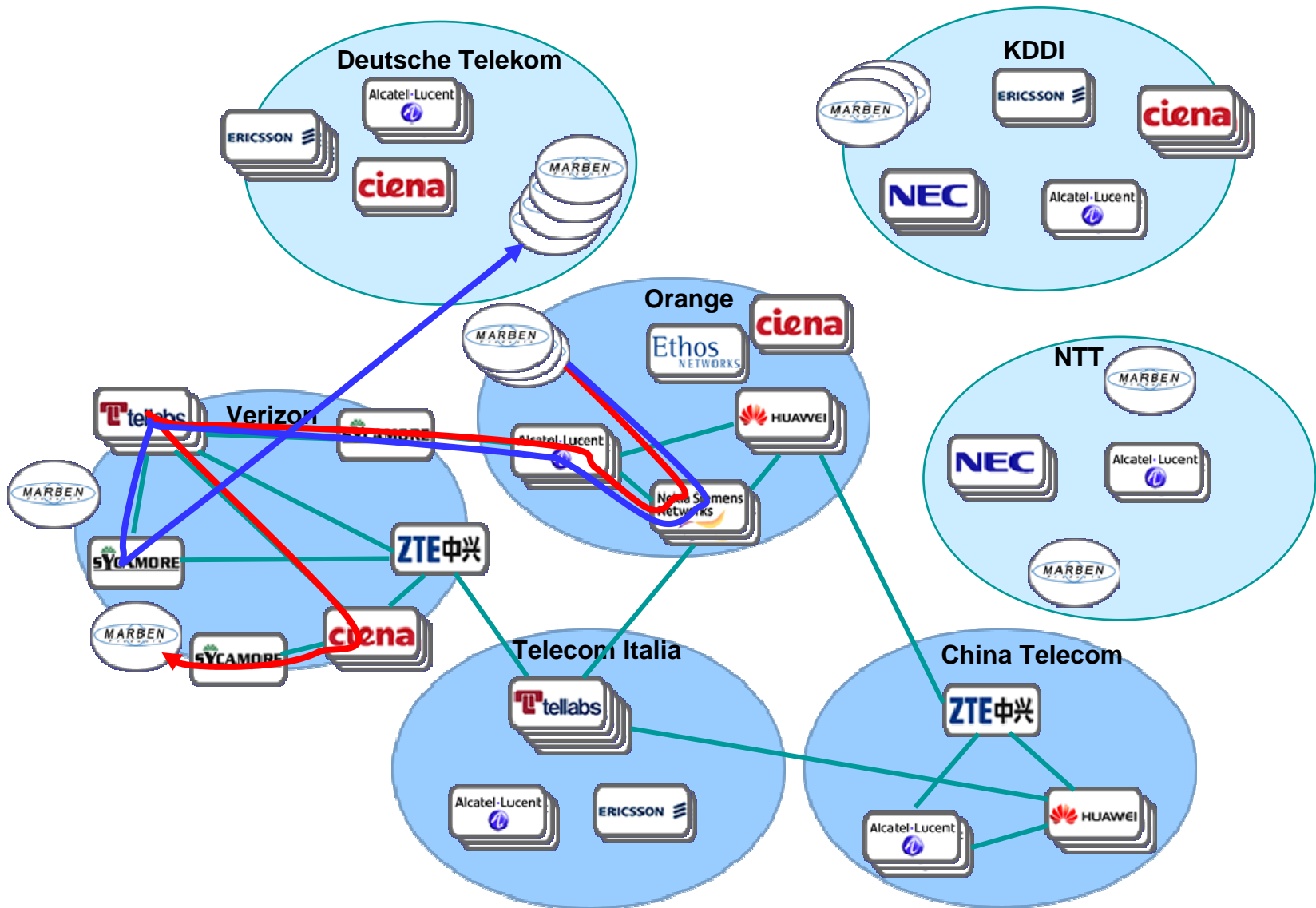


EVPLoS Connection Table

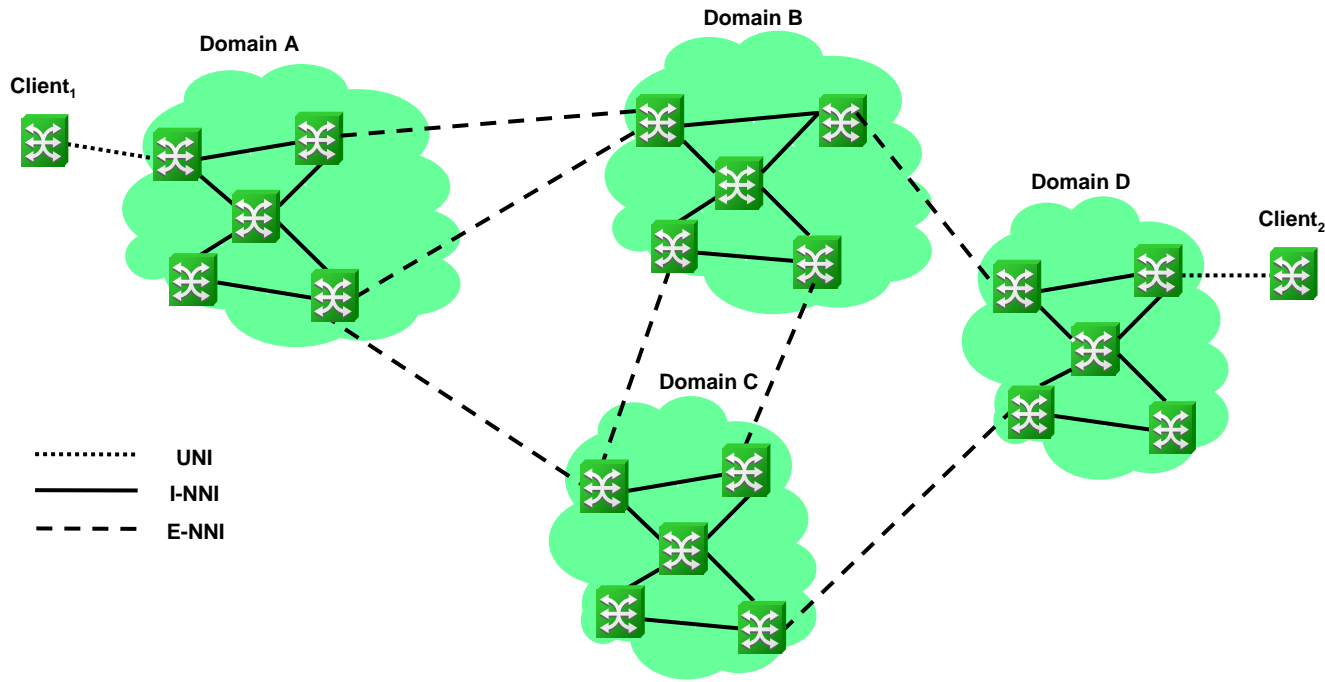
- ◆ Dynamically establish inter-lab EVPL connections:
 - 1) Mbn2(FT) -NSN(FT) -ALU(FT) -SCMR2(VZ) -TL(VZ) -Ciena(VZ) -SCMR1(VZ) -Mbn1(VZ)
 - 450 Mbps
 - 2) Mbn2(FT) -NSN(FT) -ALU(FT) -SCMR2(VZ) -TL(VZ) -SCMR3(VZ) -Mbn3(DT)
 - 150 Mbps
 - NOTE: both connections originate from the same UNI link but support different VLAN groups (EVPL) to different destinations

- ◆ Release connections

EVPLoS Demonstration Topology

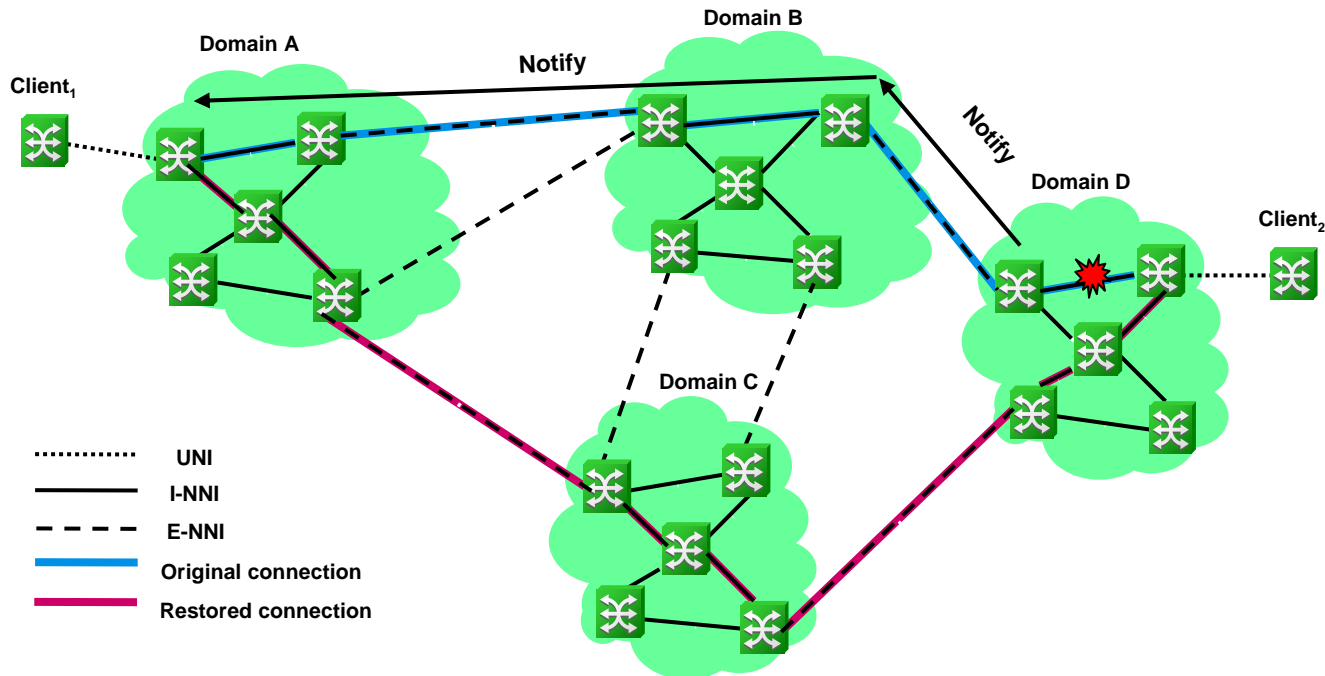


Inter-Domain Service Restoration



- ◆ Restoration techniques in today's networks typically utilize I-NNI protocols within a given control domain
- ◆ The 2009 OIF Worldwide Interoperability Demonstration uses E-NNI extensions to provide end-to-end restoration across multiple domains

Inter-Domain Service Restoration

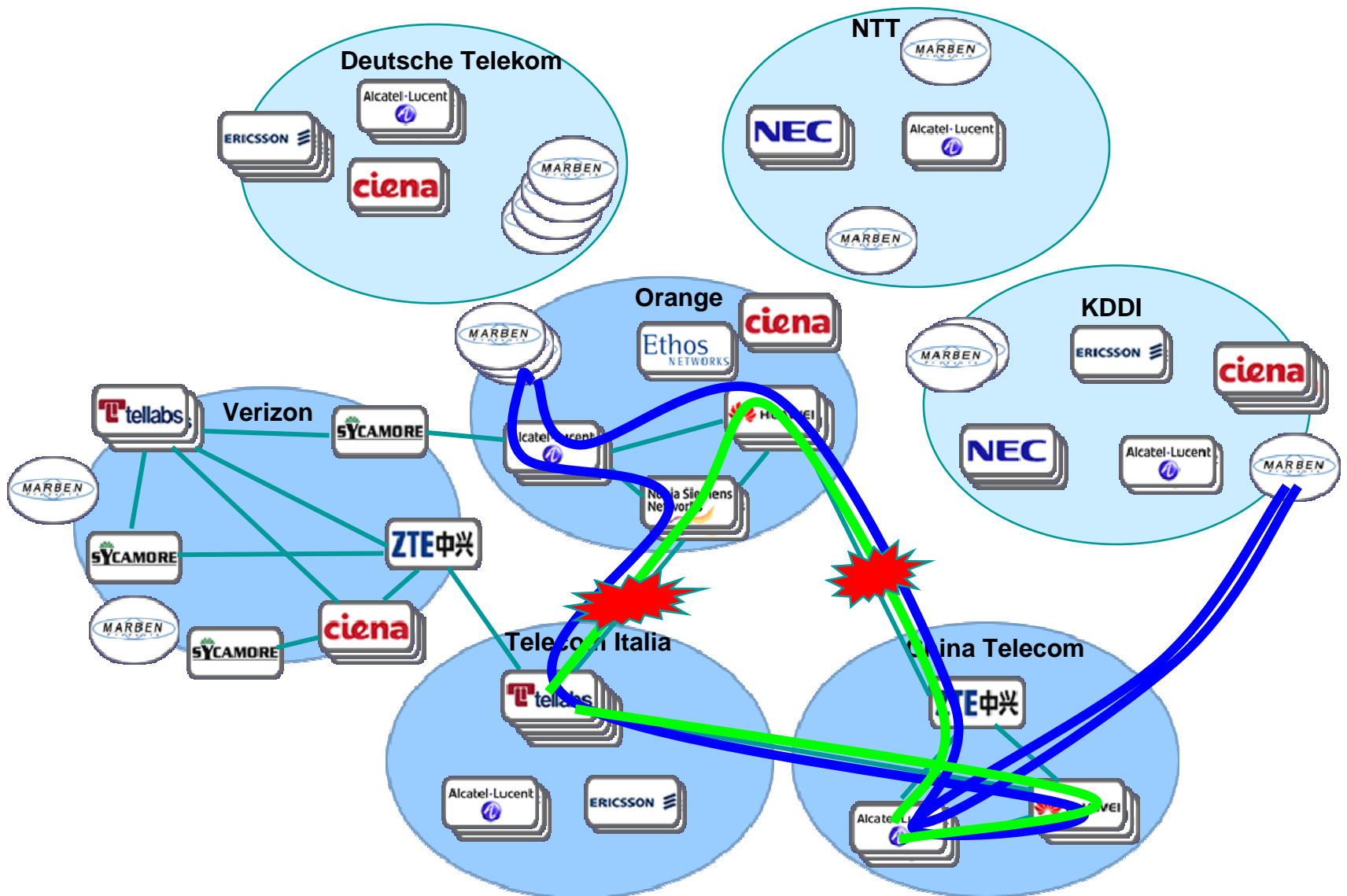


- ◆ **Features of inter-domain service restoration:**
 - Setup original connection with appropriate service level
 - When failure occurs, recover within the affected domain if possible
 - Otherwise, use E-NNI to notify the source node of the failure
 - Source node computes a restoration path, coordinates traffic switchover to restoration path and manages the original path (tear-down of failed path or reversion to it when failure is repaired)

Restoration Connection Table

- ◆ **Inter-lab restoration**
 - **Fail FT-TI link → all affected connections dynamically restored through TI-CT link**
 - **Bring up FT-TI link → no immediate change**
 - **Fail CT-FT link → all affected connections now dynamically restored through FT-TI link**

Restoration Demonstration Topology



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