

Enabling Broadband On-Demand Services

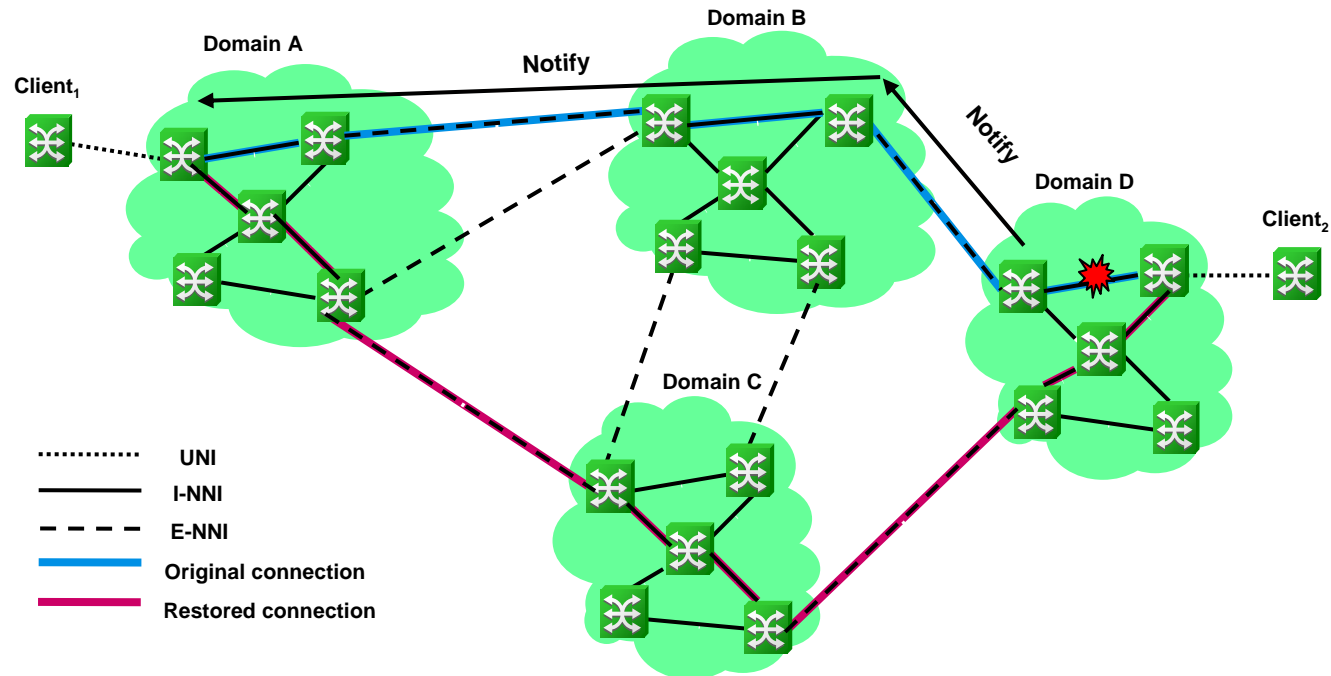
Control Plane-based service restoration



Inter-Domain Service Restoration

- ◆ Restoration techniques in today's transport networks typically utilize I-NNI protocols within a given control domain.
- ◆ Restoration mechanism allows to replace a connection by re-routing the connection away from data plane failures.
- ◆ Why restoration is an interesting feature for transport networks?
 - **It allows to share the resources used for recovery**
 - Carriers' internal studies show that the introduction of dynamic restoration at L1 leads to a gain of 20 to 25 % of the overall CapEx.
 - **It is resilient to multiple failures**
 - allows a gain in availability rate (up to 99.9999% - 6 nines)
 - could relax the critical impact on field intervention for repairing the first outage, as a second failure would not render the service unusable
 - **can be combined with protection mechanism**
 - to provide extremely high availability services with sub-50 ms switching time
 - **relies on the same principle than administrative re-routing**
 - provides operators with the ability for planned maintenance activity

Inter-Domain Service Restoration

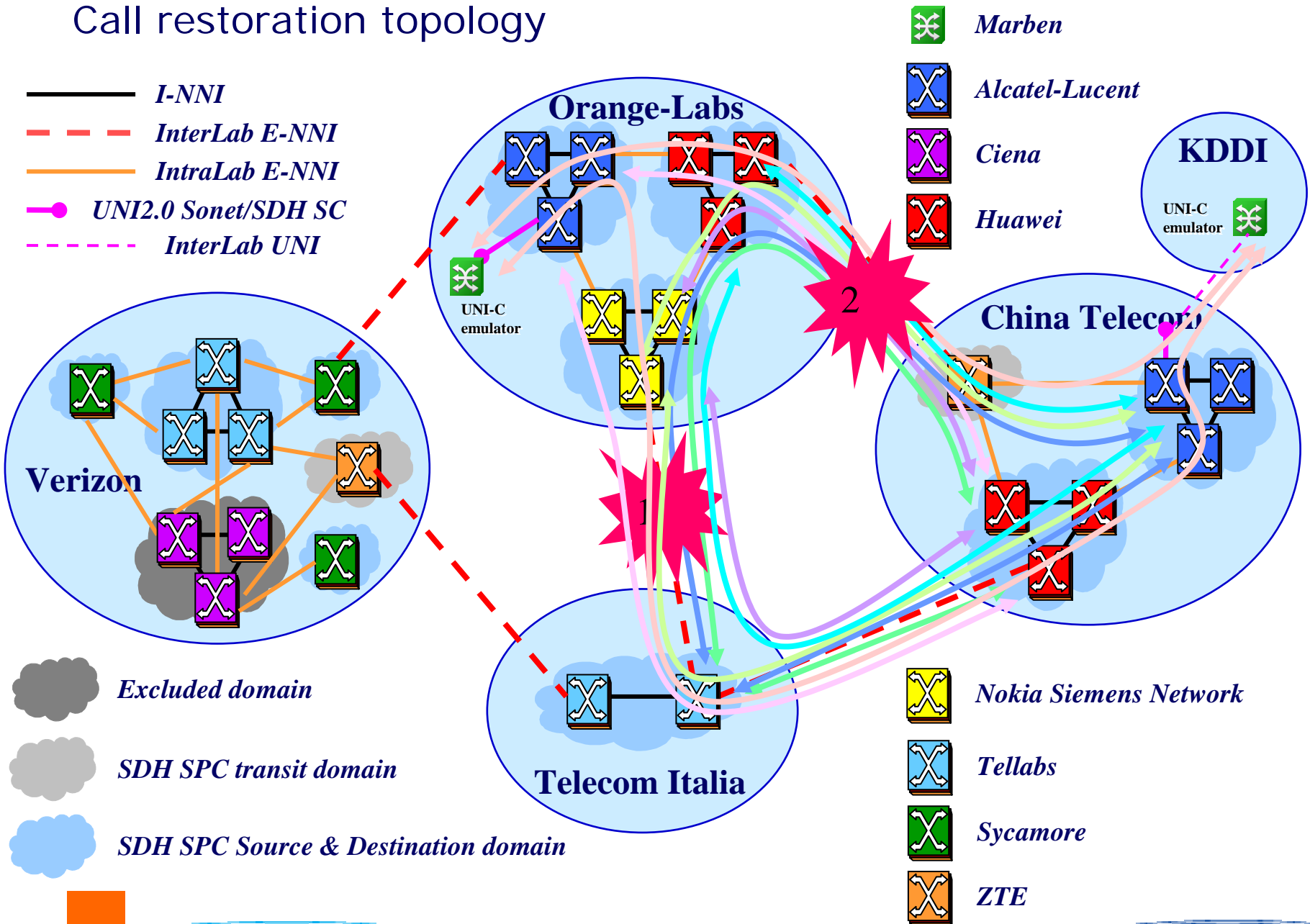


- ◆ **Features of inter-domain service restoration:**
 - Setup original connection with appropriate service level
 - When failure occurs, recover within the affected domain if possible
 - Otherwise, use E-NNI to notify the source node of the failure
 - Source node computes a restoration path, coordinates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

Inter-Domain Service Restoration

- ◆ The 2009 OIF Worldwide Interoperability Demonstration uses E-NNI extensions to provide end-to-end restoration across multiple domains
- ◆ OIF Worldwide Demonstration settings:
 - 25 Optical Cross Connects from 7 vendors
 - 13 I-NNI domains
 - More than 21 E-NNI links between the I-NNI domains
 - 4 carrier labs involved over 3 continents
 - A worldwide Signaling Communication Network
- ◆ Feature successfully tested:
 - with SC and SPCs
 - with 2 service levels (unprotected & restorable)
 - between each possible vendor pair
 - with some SPCs possibly using user-constrained routing at set-up

Call restoration topology



Live Demo replay

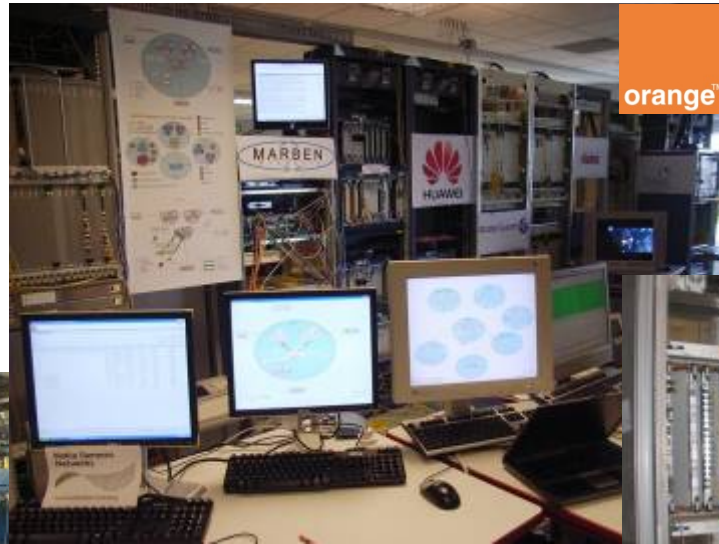


Conclusion

- ◆ The demonstration results should provide input to the ongoing OIF work towards an implementation agreement on this technology
- ◆ The implementation agreement will help vendors to propose in their products a common approach for end-to-end recovery mechanisms
- ◆ This will provide operators with
 - the ability to manage inter-domain end-to-end recovery/restoration of connections
 - the ability for end-to-end planned maintenance activity (E-NNI link/node maintenance)

Annex

Labs configuration



Collaboration and Innovation. At Light Speed.

