Session #4: Transport Network Control (ASON, GMPLS and Control plane management) Highlights & Conclusions

Presentation Title	Speaker	Organization
Business Drivers	Alan McGuire	BT
Management of ASON Capable Network and its control plane	H. Kam Lam	Lucent Technologies
Recent developments in signaling architecture and protocols	Stephen Shew	Nortel Networks
Introducing the Path Computation Element (PCE)	Adrian Farrel	Old Dog Consulting - IETF/ccamp
Routing in multi-layer networks	Jonathan Sadler	Tellabs

Stephen J. Trowbridge

Lucent Technologies

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Highlights from Presentation 1 "Business Drivers"

- The starting point is Service Management
- Radically Simplified Network - Mesh and Cross-Connect based rather than Ring Based - more effective utilization
- OPEX reduction (eliminate manual steps) and CAPEX reduction (more efficient utilization through shared restoration)
- Soft Permanent Connections are the primary driver today.
- Not ready for high penetration of Dynamic Switched Services (bandwidth on demand). From long holding times, Erlang theory indicates delay to set up service would be unacceptable when blocking occurs

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Highlights from Presentation 2
"Management of ASON Capable Network and its control plane"

- Management is Key to Control Plane deployment. Management of Control Plane as well as transport plane.
- Encompasses Configuration Management, Fault Management, Performance Management, Accounting Management, Security Management
- Framework and Requirements Recommendation approved. Information model and solution set are in progress and expected to finish soon.
- The management plane will still be the "captain" even with introduction of the control plane.
- Progress on control plane management has benefited from effective collaboration among SDOs (ITU-T, OIF, TMF, IETF).

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Highlights from Presentation 3
"Distributed Signalling and Multiple Transport Layers"

- Signaling architecture is composed of interrelated components developed by multiple standards organizations (IETF, OIF, ITU-T SG15). SDOs are cooperating to develop protocol pieces to support different architectures.
- An extensive signalling interoperability demonstration was undertaken involving 7 carriers and 13 equipment vendors.
- Recent signalling work is solving problems with inter-area (domain) signalling and multi-layer interworking (e.g., when a server layer connection must be established to support a client layer call)

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Highlights from Presentation 4 "Introduction to the Path Computation Element"

- Work is progressing rapidly to define essential protocol building blocks. The Path Computation Element (remote path query) is one such building block under development to deal with limited TE visibility.
- Virtual Link and Virtual Node abstractions both have drawbacks
- Can be employed in a variety of architectural models (co-located with connection controller, separate server, incorporated into NMS, or cooperating PCE servers across different domains.
- Applicable to ASON architecture - new Rec. G.7715.2 requirements and architecture for remote path query.

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Highlights from Presentation 5 "Routing in multi-layer transport networks"

- Convergence drives us to networks comprised of multiple technologies. Multi-Layer routing technologies being developed to support path computation in an environment made up of many different technologies in any layer that has switching flexibility.
- Need to represent server layer within client layer. Address cases where client layer link is to be established over established or potential server layer trails. Server layer can be represented as abstract node or topology shadow within client layer.
- Path Computation Element (PCE) can be employed as a bridge in multi-technology networks, e.g., for nodes that do not support multi-layer control plane.

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CONCLUSIONS

- Cooperation between SDOs (ITU-T, IETF, OIF, TMF, etc.) continues to be an essential part of control plane standards evolution.
- Primary application for carriers is soft permanent connection support for network simplification, OPEX/CAPEX reduction.
- Management is still the “captain of the ship”
- Current challenges being addressed in Signaling and Routing arise from networks comprised of multiple technologies (from convergence) (e.g., multi-layer networks), mutiple areas and domains.