OPEX reduction through GMPLS/ASON - a business case study

Motivation
- ASON/GMPLS often promoted as a key technology to reduce OPEX and CAPEX
- Few studies on OPEX so far
- We quantify the cost reduction potential of ASON/GMPLS

Outline
- Defining OPEX
- Process-based OPEX modelling
  - Approach
  - Typical processes
  - ASON/GMPLS modified processes
- Quantitative results
  - Service provisioning
  - Overall OPEX
- Analysis and conclusions

Defining OPEX
- Total expenditures of a company
- Capital expenditures: CAPEX
  - Contribute to fixed company infrastructure
  - Depreciated over time
- Operational expenditures: OPEX
  - Cost to keep company operational
  - Do not contribute to infrastructure itself, not subject to depreciation

OPEX subparts
- Network operation
  - For a network which is up and running
  - Maintenance, service provisioning, etc.
- Equipment installation
  - First time installation costs
  - Up-front planning
- General OPEX
  - Non-tele specific infrastructure and administration

Outline
- Defining OPEX
- Process-based OPEX modelling
  - Approach
  - Typical processes
  - ASON/GMPLS modified processes
- Quantitative results
  - Service provisioning
  - Overall OPEX
- Analysis and conclusions
Approach

- Formal description of network operations
  - Identify generic processes
  - Modelling
- Changes expected with ASON/GMPLS
  - Qualitative and quantitative variation
- Relate to total OPEX
  - Network scenario
  - Relative weight of each OPEX category

Operational processes

- Continuous and recurring processes
  - Continuous cost of infrastructure
  - Routine operations, maintenance
  - Repairs
  - Operational network planning
  - Marketing
- Service management processes
  - Service offer
  - Service provisioning
  - Service cessation
  - Service move or change

Service management processes

- Service offer
  - The operator makes an offer at the customer's request
- Service provisioning
  - According to the terms of the contract, physical delivery of the service is carried out
- Service cessation
  - Contract update, coordination between new service setup and release of the previous service
- Service move or change
  - End of the contract, release of the connection and recovery of equipment

Service offer

- Customer
  - Customer Request
  - Service Offer
  - Contract
  - Order
  - Service Provisioning
  - Project Management
  - Project Implementation
  - Customer Acceptance
  - Close Out

Service provisioning

- Order
  - Network Design
  - Network Implementation
  - Test and Acceptance

Service cessation

- Customer
  - Customer Decommissioning
  - Physical Decommissioning
Service move or change
- Combination of services
  - Prepare offer for "new" service
  - Provisioning of new service
  - Cessation of previous service
- Requires additional coordination
  - Common resources

Outline
- Defining OPEX
- Process-based OPEX modelling
  - Approach
  - Typical processes
  - ASION/GMPLS modified processes
- Quantitative results
  - Service provisioning
  - Overall OPEX
- Analysis and conclusions

NMS: Current Limitations
- OTN currently operated by NMS
  - Administration & maintenance
  - Centralized provisioning
- NMS are widespread but
  - Manual configuration
  - Human communication
  - Limited to a domain
  - Lack of standardized interfaces

GMPLS/ASON: Expected improvements
- Compatibility between different domains
  - Standardized interfaces (UNI, NNI)
- Automatic configuration of connections
  - Call control, connection control
- Service Level Agreement (SLA)
  - Unified set of service classes

Automated service provisioning

Automated service cessation
Outline

- Defining OPEX
- Process-based OPEX modelling
  - Approach
  - Typical processes
  - ASON/GMPLS modified processes
- Quantitative results
  - Service provisioning
  - Overall OPEX
- Analysis and conclusions

Quantitative Results

- Focus on labour costs
- Assign duration (hours) to the boxes, and probabilities to the diamonds
- Estimate hourly wages for each employee category
- Sum up costs for all steps
  - Gives an upper bound estimate of a given process
- Figures obtained by means of surveys and interviews

First analysis

- Reveals two types of operators
  - Incumbent
    - More hours for sales, administration and management
    - And so called "new entrant"
    - Lower figures for these, the rest remaining in the same range
  - Due to
    - Smaller network to manage
    - Fewer types of services offered

Incumbent

- Service offer
  - Nearly as expensive as service delivery

- Service cessation
  - Less management and operations

- ASON processes
  - SLA negotiations more expensive
  - Consider offer+delivery

New Entrant

- Processes are cheaper
  - Less administration and management (smaller network)
  - Fewer types of services
  - Need for external supplier
  - Rental costs
  - Termite at international point

- ASON processes
  - Cheaper
  - In the same proportion
Overall OPEX

- Significant impact on OPEX related to service management
- How does it relate to other OPEX subparts?

Estimating yearly OPEX – input data

- Reference network
  - WDM network
  - 2.5 Gbps leased lines
- Traffic
  - Figures from reference network for 2004
  - Leads to a total of 1214 services in one year
  - 89% of services are standard
- Equipment
  - MTBF, life time
- Failure probabilities
  - Alarm types: preventive alarms, failure alarms
  - Failure types: external, hardware, misconfiguration/software, etc.

Estimated number of failures

Architecture
Topology
Traffic
Dimensioning
Repair process
Failure probabilities
Equipment MTBF
1171 failures
740 preventive alarms
Routine operation process

Yearly OPEX

Outline

- Defining OPEX
- Process-based OPEX modelling
  - Approach
  - Typical processes
  - ASON/GMPLS modified processes
- Quantitative results
  - Service provisioning
  - Overall OPEX
- Analysis and conclusions

Conclusion

- Most network operator's processes are similar and can be modelled quite generically
- When looking at typical effort
  - Major differences between incumbent and "new entrants"
  - Lighter business processes, but interactions with external suppliers
- OPEX effort and cost reduction in the order of 50% for both types
Thanks for your attention

Questions?

Andreas.iselt@siemens.com
The 7th Annual

Next Generation

Transport Network Strategies

Princesa Sofia Inter-Continental, Barcelona ■ 7th-11th November, 2005

EMEA’s Largest Forum for Transport Professionals from both Fixed and Mobile Operators

NG-WDM
Packet Evolution
Carrier Ethernet
Protection
Convergence
OTN
NG-SDH
ASTN
GMPLS

Including:
Transport Networks for Mobile Operators
Tuesday 8th November 2005
Adapting to Customer Requirements
Next Generation Core Architecture
Wednesday 9th November 2005
Next Generation Metro Architecture
Multiservice Transport Networking
Thursday 10th November 2005
Transport for Next Generation Services
Broadband Access
Friday 11th November 2005

Plus: A Pre-Conference Seminar
Scrutinising Carrier Ethernet Transport
Led by: SIEMENS
Monday 7th November 2005

Case Studies from:
Andy Sutton – 3 UK
Martin Kingston – Orange UK
Bob Hase – neo’s Networks
Michael Heuer – BT Global Services
Roberto Micai – Telecom Italia Lab
Nigel Stevens – THUS
Patrick George – Belgacom
International Carrier Services
Alan Corfield – Energis
Dr. Paul Gunning – BT
Paul LeBel – Bell Canada
Alex Bennett – ntl
Ovidio Michelangeli – Wind Telecomunicazioni
Dr. Kevin Smith – BT
Matthias Fricke – F-Com
Blandine Rousseau – France Telecom R&D
Glusseppe Abbatepaolo – Rai Way

Gold Sponsor

Silver Sponsors

Endorsed by:

SIEMENS

To Register Please Call: +44 (0) 20 7915 5055 Fax: +44 (0) 20 7915 5056
Email: registration@iir-conferences.com Web: www.optical-transmission.com/tns
About Next Generation Transport Network Strategies:
Major changes are taking place in the carrier service environment and new technologies are gaining traction in carrier networks - RPR, PW/3s, Carrier Ethernet, NG-SDH, MPLS. However well-informed you make yourself - by reading news-feeds and speaking with your own vendors - there is nothing to beat the benefit of spending time discussing key developments in your industry with 300 of your peers from network operators, vendors, associations and other interested organizations.

Transport Network Strategies is an internationally recognised forum at which you can gain a complete and detailed view of the key trends in markets, services and technologies. The 16 network operator case studies will provide you with important information that will enable you to update your expertise and benchmark your own transport approaches, service developments and network evolution projects against those of your competitors.

Main Themes:
Next Generation services and technologies are becoming today's major concern. Technologies that offer new service opportunities and important Capex and Opex savings. As bandwidth demands grow and carrier-class data services enter the mainstream, network operators must engage with Next Generation transport networking technologies and architectures. The IP/MPLS core based upon intelligent optical switching – OTN/GMPLS – and the Convergent Packet Access (CPA) architecture based upon Carrier Ethernet and MPLS are key elements for future competitiveness. Change is happening rapidly and both fixed and mobile networks need to adapt in fundamental ways to remain competitive. Operators are looking for cost-effective migration strategies for both networks and customers – this is the main business under discussion at Next Generation Transport Network Strategies.

Key Benefits of Attending:
- Hear case study presentations from 16 senior transport professionals from fixed and mobile service providers – gain insights into their transport strategies
- Network with 300 senior transport networking professionals from fixed and mobile network operators, vendors and consultants
- Tap into a wealth of technical and commercial intelligence – develop your understanding of the main trends and issues in Next Generation transport technology, services and market developments
- Benchmark your Next Generation network and service evolution strategies and technology selections against those of your competitors

Who you will meet:
300 senior professionals attended Transport Network Strategies in 2004.

Analysis by job function:
- Network Development: 29%
- Business Strategy: 13%
- Service Development: 6%
- Network Operations: 31%
- Marketing: 18%
- Other: 3%

Analysis by region:
- Western Europe: 44%
- Eastern Europe: 15%
- Scandinavia: 17%
- Middle East: 18%
- Asia: 4%
- ROW: 5%

Analysis by industry:
- Mobile Operator: 24%
- Fixed Operator: 33%
- Vendor: 37%
- Consultant: 6%

Pre-Conference Seminar
Scrutinising Carrier Ethernet Transport
Led by Siemens
Princesa Sofia Inter-Continental, Barcelona 7th November 2005
09:00 Registration
09:30 Opening remarks
09:45 Examining the emergence of Carrier Ethernet as a transport technology
- Analysing and explaining the rising interest in Carrier Ethernet as a transport technology, resulting from major changes in the carrier services environment.
10:30 Customer case study
11:20 Refreshment break
11:45 Understanding how Carrier Ethernet addresses the challenges of QoS and network availability
- Explaining the technical attributes of Carrier Ethernet that can be used to sustain QoS and network availability in transport networks
- Meeting carriers' requirements as they evolve their services from point-to-point with full protection and static SLAs to new any-to-any services with flexible and more complex QoS
- Demonstrating how Carrier Ethernet supports flexible QoS, scalability and full protection
12:15 Analysing the transport business case for broadband applications – assessing the cost benefits of Carrier Ethernet
- Considering the growth of emerging broadband applications, for example, video and remote data storage
- Understanding the impact of emerging broadband applications on current transport networks and identifying how Carrier Ethernet may solve the financial equation, allowing carriers to maintain margins and competitive positioning
13:00 Lunch
14:20 Determining the optimal Ethernet migration for your transport networks: MSPP or pure Ethernet?
- Comparing Carrier Ethernet with MSPPs
- Examining the benefits and costs of the different approaches considering:
- Different applications to be supported: voice, video and data
- Greenfield, Brownfield and overlay network
14:50 Addressing network management challenges: Can Carrier Ethernet provide E2E management platform?
- Examining how Carrier Ethernet copes with the challenges of End-to-End (E2E) management while maintaining its connectionless character
- Addressing the key management requirements, including service provisioning, OAM, alarms, statistics...
15:35 Refreshment break
16:00 Customer case study
16:40 Final discussion and conclusions
17:00 End of seminar

IIR's Optical Transmission Portfolio events
Over the last ten years IIR's market leading Optical Transmission industry conference portfolio has produced highly focused events that chart the development of new technologies for access, metro and backbone networks. Reflecting the evolution of networking technologies and services, IIR's conferences give delegates the opportunity to identify, examine and evaluate industry trends and understand the business context and value proposition driving investment in service provider networks.

Valuable Networking Opportunities:
Carrier Ethernet World Congress, Berlin, 12th-16th September 2005
www.carriereqethernational.com
Network Convergence, February 2006
Transport Networks for Mobile Operators (TNMO 2006), Berlin, 8th-11th May 2006
WDM & Next Generation Optical Networking, Cannes, 20th – 30th June 2006
For more details visit www.optical-transmission.com
To find out more details concerning sponsorship at Next Generation Transport Network Strategies, or any of the Optical Transmission Portfolio events, please contact
Ed Mallouk, Business Development Director, IIR Telecommunications - London Tel: +44 (0)20 7915 5086 Email: emallouk@iir-conferences.com

To Register Please Call: +44 (0) 20 7915 5055 Fax: +44 (0) 20 7915 5056
Conference Day One – Tuesday 8th November 2005

Transport Networks for Mobile Operators

09.00 Registration
09.30 Chair's opening remarks
09.40 Opening Keynote: The future of transport networks for mobile operators
-Reviewing today's network architecture and transport technologies
-Considering the main access transport alternatives of Next Generation Microwave, WiMAX, xDSL and pseudo-code emulation techniques
-Discussing the role of TDM, ATM & Ethernet in the access transport domain
-Understanding the needs and addressing the challenges of Frequency Synchronization distribution
-

10.20 Determining a technical roadmap for the evolution from ATM to IP transport for 3G networks
-Understanding the drive to 3G:
-Examining the challenges faced by mobile operators in backhaul and backbone transport networks
-Examining the business case of leasing versus buying alternatives
-Making the right technology choices now to smooth the evolution to 3G:
-using NG-SDH to cost-effectively backhaul traffic and support advanced Ethernet capabilities
-leveraging the ATM layer for multiservice delivery and to provide switching and aggregation capabilities
-examining the benefits of migrating 3G services into a common IP/MPLS core network
-Simplifying network operations through end-to-end management:
-integrated management across SDH, Ethernet and ATM elements
-examining the benefits of migrating towards a flatter, more efficient and simpler network architecture

Jose Luis Benitez, Senior Manager, Optical Transport Systems Engineering, Lucent Technologies
including an operator customer case study to be announced at www.optical-transportation.com/tns

11.00 Morning coffee

11.20 Deploying NG-SDH to support 3G and the growth in data traffic
-Explaining the decision to deploy a national optical backbone to support 2G and 3G traffic:
-Evacuating the core, metro and access networks to support growing data traffic demand in both 2G and 3G services:
-determining the role of NG-SDH in the evolution of the metro/access:
-GMPLS, VCAT, LCAS, GFP

Considering the business case for a lease or build approach to transport network evolution

Ehud Bejerano, Director, Product Line Management – MSPP, Optical Networks Division, ECI Telecom

12.00 Examining the evolution of transport networks for mobile operators
-Reviewing today's network architecture and transport technologies
-Considering the main access transport alternatives of Next Generation Microwave, WiMAX, xDSL
-Discussing the role of TDM, ATM & Ethernet in the last mile
-Addressing the challenges of Frequency Synchronization distribution
-Understanding key trends in Metro network evolution
-

12.40 Lunch

13.40 Deploying Ethernet architecture to minimise the Opex and Capex of mobile access and backbone networks
-Understanding the pressures on mobile service providers' existing access and backbone networks as demand grows for IP-based services
-Understanding the role Ethernet can play in the evolution of mobile networks in the future
-Examining new ETSI and ITU standards for wireless data transmission, including new initiatives and updates on work in progress
-Developing Wireless Carrier Class Ethernet transmission:
-Explaining why and how carrier Ethernet can be used to architect the backhaul and access for 3G services

Alain Hourteau, Senior Director, Market Development, StrateX Networks

14.30 Building an IP/MPLS backbone to meet changing transport requirements
-Examining the cost of implementing an IP/MPLS backbone network:
-Can there be cost benefits?
-Taking a layered approach to the core network:
-Examining the benefits of combining MPLS with other technologies:
-Examining the benefits of using SDH, ATM and Ethernet in core transport:
-Assessing transport of ATM on MPLS networks:
-

15.10 Afternoon tea

15.30 Cost optimising the mobile transport network – minimising the operational cost of the mobile transport network
-Examining the cost of implementing a mobile transport network:
-how can you reduce Opex and Capex?
-What are the key factors that influence the cost?

Roberto Micalli, Mobile Network Engineer, Telecom Italia Lab

16.10 Making the business case for converging GSM / GPRS, WCDMA and WiFi traffic onto a single unified access network
-Examining the benefits of building a unified access network to carry GSM / GPRS, WCDMA and WiFi traffic:
-Examining the most cost-effective and future-proof technology to build upon, considering ATM, IP, MPLS, DSL, Leased Lines and SDH
-Examining the topology options and indicating key design features

Ovidio Michelangelo, Head of Wireless and Wireline Technology Development, Wind Telecomunicazioni

Kevin Evans, Market Manager, Mobile Networks, Eastern Research

16.50 Cost optimising the access network, migrating from leased lines to radio access and accessing an efficient optimisation strategy – considering WiMAX backhaul
-Briefly introducing the services portfolio, customer profile and transport network:
-Examining the impact that changing service demands are having on transport network economics
-Making the business case for changing the services demanded by customers and the need to access the network:
-Examining the potential of WiMAX as a backbone transport technology

Morgan Zimmermann, Vice President, Infrastructure Planning Solutions, CTS - CRIL Telecom Software

Email: registration@ilr-conferences.com  Web: www.optical-transportation.com/tns
Conference Day Two – Wednesday 9th November 2005

09.00  Registration
09.30  Chair’s opening remarks

Adapting to changing customer requirements

09.40  Identifying service demand trends and changing customer requirements - Developing a transport network evolution strategy
- Examining demand trends for different network services and forecasting where growth will occur over the next 12 months, considering:
  - Ethernet connectivity
  - L2 and L3 VPNs
  - Wavelength services and the carrier’s business
  - Service and business continuity
  - Next Generation services, VoIP, IPTV/HDTV, video, Triple Play, PSTN migration
- Identifying areas in the network most under pressure from increasing bandwidth demands and considering different growth / evolution strategies:
  - Is local investment sufficient or is a network overlay necessary?
  - Core transport technology upgrades, OTN, MPLS/PLS
  - Optimising metro bandwidth, Carrier Ethernet
  - 40G transmission speeds
- Discussing the role of convergence between data and optical layers:
  - How will the roles of transport and data change as IP traffic begins to dominate both traffic and revenue streams?
- Developing a network evolution strategy to meet Next Generation service requirements while meeting challenging Opex reduction targets
Nigel Stevens, Product Director, THUS

10.20  Developing a transport network strategy to meet the drive for Opex efficiency
- Identifying realistic Opex reduction targets
- Examining different options for reducing Opex
- The importance of plug and play, or plug and pay service deployment
- Defining Key Performance Indicators to measure and manage Opex
- Developing an action plan
- Identifying key future technologies that will increase network efficiency and forecasting timescales for their availability
- How will service price more relative to cost savings – what will happen to margins?
Patrick George, Manager of International Network Engineering and Operations, Service and Engineering, Belgacom International Carrier Services

11.00  Morning coffee

11.30  Examining alternative sourcing strategies for transport networks
- Discussing the key drivers, feature requirements, and challenges of building 21st century networks
- Analysing telecom markets – identifying the main challenges and determining the priorities for operators
- Examining alternative strategies:
  - MPLS
  - managed services
  - alternative sourcing
Michael Heuer, Vice President, Business Development & Consulting, Global Telecom Markets, BT Global Services

12.10  Next Generation Ethernet Product Strategy - Case Study ntl:
- Understanding the requirements of Next Generation Ethernet services
- Examining to what market segments may be supported from a single Ethernet platform
- Developing a clear understanding of the Ethernet product proposition:
  - targeting investments in your Ethernet platform to address the requirements of key markets and sectors
  - understanding customer requirements and translating demand into strategy
- The importance of Metro Ethernet before Carrier Class Ethernet for ntl - Case study
- Shifting the balance of strategy towards Next Generation products and services:
  - fear of change - adaptation for survival
  - understanding the significance of true product marketing for successful service launches
- The four seasons of product marketing
- Customer touch and communication
- Internal education of staff - empower and educate your staff into product champions
- Next generation technology training - deploying new product
Alex Bennett, Senior Product Manager – Data Products, ntl

12.50  Lunch

Next Generation core architecture

14.10  OPEX reduction through GMPLS/ASON - a business case study
- Modelling of typical operators’ processes
- Survey on process costs of European operators
- Process and cost analysis
- Evaluation of reduction potential using ASON/GMPLS
Dr. Ing Andreas Iseit, Senior Principal Research Scientist, Competence Center High Speed Networks, Siemens – Representing Project NOBEL

14.50  Considering the evolution to a MPLS/VPLS core network to support a Next Generation services portfolio
- Understanding the drivers for building a Next Generation MPLS/VPLS core network to support a converged voice and data strategy:
  - meeting growing capacity demands
  - managing the increasing complexity of the network
  - resilience for carrier-class services – PSTN migration
- Considering the requirements of guaranteeing carrier-class performance over a Next Generation MPLS/VPLS core network, considering:
  - resilience and protection
  - QoS
- Considering alternative approaches to building a Next Generation carrier-class IP/MPLS core network, including:
  - GMPLS/ASON layered approach
  - Carrier-class routers
- Considering the Opex and Capex issues of taking a network upgrade or upgrade approach
- Examining the main steps and timelines for the migration to a multiservice core
Dr. Kevin Smith, Next Generation Networks, BT

15.30  Afternoon tea

Determining the best technology mix to deliver a flexible and cost-effective Next Generation core network
- Discussing the key drivers, goals and feature requirements for the Next Generation core network
- Considering the demands and costs of core evolution versus core replacement / stove-pipe developments
- Integrating additional / new technologies into an MPLS core to provide scalable and cost-effective multi-service networking
- Examining the role of GMPLS - how should this be integrated?
  - comparing the benefits of integrating GMPLS into a GMPLS core
  - comparing the benefits of integrating GMPLS into a GMPLS core
Bob Hase, Strategic Development Manager, ntel Networks

Dynamic Optical Network Deployments - Case Studies and Lessons Learned
- Exploring why carrier are investing in Automated Optical Networks, including:
  - simplified deployment & provisioning, rapid service delivery, robust network survivability
  - The key elements of an Automated Optical Network:
    - wavelength switching ROADMs, bandwidth tunability, gain flattening
    - variable gain, Transient Amplifiers, simple, time network engineering, automated GMPLS control plane
11.30 Considering the development of a Next Generation architecture utilising a Multiservice Edge platform (MSE) linking to an MPLS core
- Addressing the readiness of the approach to deliver both Next Generation and TDM services
- Identifying the requirements of a Multiservice Transport Network based on the MSEs in conjunction with an MPLS core
  - Investigating the QoS requirements on such a network to deliver meaningful SLAs for voice, video and data services
- Examining the effectiveness and efficiency of GMPLS at encapsulating IP, Ethernet, FR and ATM services in the MPLS core network
- Determining how VPNs, IP, Ethernet, ATM membership and topology information is propagated across the MPLS core network
- Discussing strategies for interworking with existing networks and services
  - Transporting mission critical, latency sensitive TDM and public telephony traffic across the MPLS packet optimised core network
Tim Hubbard, Director, NGN Technical Marketing, Nortel

12.10 Examining Bell Canada’s converged Ethernet network evolution strategy and assessing its success at providing transport for multiple applications
- Exploring how changing service demands and technology is driving Bell Canada’s converged Ethernet network strategy
  - Supporting new applications, including IP/VPN, WAMAX, FTTP/ITT/PVT, TISP and cellular backhaul
- Evolving from an Ethernet services network to a multi-service Ethernet network
- Examining the architecture and technological approaches taken by Bell Canada
- Understanding and meeting the operational challenges
  - Interoperability, QAM, scalability, interworking Ethernet with different network devices to provide the full range of applications
- Shaping key learning points and discussing the future development of Bell Canada’s converged Ethernet network
Paul LeBel, Associate Vice-President – Optical / Ethernet Networks, Technology Development, Bell Canada

12.50 Lunch

14.10 Analysing the development of the Ethernet marketplace, understanding the opportunities and threats to operators and developing a strategy to capitalise on Carrier Ethernet and L2 VPNs
- Analysing the current Ethernet services marketplace
  - What services are on offer, which service providers are offering services, which regions are most developed?
- How are Ethernet services being marketed to customers and what is the impact on competitiveness?
  - What market segments are being targeted, what pricing regimes are being adopted and what impact is this having on competition?
- Analysing the network strategies being adopted by operators to deploy Ethernet services and assess the impact:
  - Legacy deployments – network upgrades – NG-SDH
  - Network overlay / Greenfield deployments
- Assessing the viability of the Ethernet services marketplace – Can service providers survive in a commodity marketplace?
  - How many providers can the market sustain?
  - Who is most likely to benefit from the Ethernet services marketplace?
  - How can service providers leverage this new market opportunity to increase profitability?
Mark Lum, Independent Consulting Analyst

15.20 Evolving from a data aware to a service aware transport network
- Exploring the main features of a Next Generation multi-service transport network
- Tracking the rise in demand for IP based services – How is this impacting transport economics and what steps do operators need to take?
  - Capacity planning and meeting growing traffic demands
  - Delivering end-to-end QoS management and service differentiation
- Examining the revolution of network architectures to deliver multi-service convergence in the metro network:
  - Network core layer based on ASON, optical cross-connects and meshing
  - Edge layer 10Gig, MSPPs, traffic grooming and low order switching
  - MSSP access to provide differentiation and multi-service access
- Developing an end-to-end management system to provide:
  - Network resource management
  - Service customer management
  - SLA management
- Evolving network intelligence from the broadband edge into the metro network
Christophe de Maillevere, SVP Network and Product Strategy/Marketing, Alcatel Optical Network Division

Conference Day Three – Thursday 10th November 2005

09.00 Registration

09.30 Chair’s opening remarks
Jens Schroeder, Senior Marketing Manager, Tellabs

Next Generation metro architecture

09.40 Examining the challenges of rolling out a NGN transport network capable of delivering a full range of services over a packet infrastructure
- Making the business case for a step change to a NGN transport network
  - Exploring why it is time to jettison the step by step evolution strategy and commit to a thorough network upgrade
- Identifying the elements of NGN transport
  - Upgrading the core network to MPLS/PLS
  - Aggregating traffic in the metro
  - Evolving to IP access
  - Role of Ethernet and MPLS
- Explaining how to enable voice applications in the MPLS network – Considering the work of the IETF
- Addressing the particular challenges of developing a common transport network for both fixed and mobile services
- Discussing the role of standardisation in the development of NGN transport and fixed mobile convergent networks – Assessing the potential impact of the ITU’s NGN Focus Group

14.50 Dr. Manfred Wiegand, Vice President Technical Sales, Carrier Networks Division, Siemens

10.20 Developing a Multiservice Transport Networking strategy – Comparing different technology options to cost-effectively deliver TDM and packet services over a shared infrastructure
- Drivers – capacity, packet services, Triple Play
- Technology options – NG-SDH or Carrier Ethernet
- Architecture options, considering efficiency and resilience
- Capacity / Optical layer – DWDM / CWDM, 10GigE flexibility
- Legacy migration – ATM, FR, TDM ...

11.00 Dr. Paul Gunning, Future Testbed, BT

11.00 Morning coffee
Next Generation Transport Network Strategies
Princesa Sofia Inter-Continental, Barcelona ■ 7th-11th November, 2005

15.30 Afternoon tea

16.00 Energies transport evolution case study
Alan Corfield, Energies

16.40 Grasping the opportunities of Carrier Ethernet - Gaining competitive advantage in one of the fastest growing markets
- From Ethernet to Carrier Ethernet:
  - Exploring the evolution and understanding the benefits to operators
  - Positioning Carrier Ethernet amongst the networking technologies available to operators
- Building carrier grade into Ethernet:
  - Exploring the 5 critical class attributes of Carrier Ethernet and operational requirements for cost-effective service delivery; considering:
    - scalability, protection, high QoS, service management, TDM support
- Understanding how operators can deploy Carrier Ethernet to best advantage and identifying the key success factors in deployment
- Exploring how Carrier Ethernet will develop with changing operator requirements:
  - Identifying the obstacles to mainstream carrier deployment
  - Providing a technology roadmap for Carrier Ethernet
Nan Chen, President, Metro Ethernet Forum

17.20 Identifying new opportunities for WDM optical transport
- Making the case for Metro WDM - providing one solution from access to regional networks:
  - Exploring how recent advances in technology are improving the economics of WDM solutions, for example, electronic dispersion mitigation, pluggable transceivers
  - Highlighting two key aspects of the WDM value proposition: scalability and service convergence
- Exploring Metro WDM network applications and their requirements:
  - DSL Backhaul, integrating the existing ATM/Sdh infrastructure and cost Optimising Ethernet transport and aggregation
  - Business continuity and storage solutions: examining current technology trends
  - Wavelength services: G709/98 enabled features
  - Regional networks for carriers and corporate customers
Dr. Lars Friedrich, Director, Product Line Management, ADVA Optical Networking

18.00 Chair's closing remarks

18.10 End of conference day three

Conference Day Four – Friday 11th November 2005

09.00 Registration

09.30 Chair's opening remarks

Transport strategies to support Next Generation services

09.40 Strategically deploying FTTx solutions to support the delivery of Triple Play Video and IP-TV services
- Understanding the network requirements for Video service and IP-TV delivery
- Planning network evolution to meet Triple Play deployment targets
- Spanning the last / first mile:
  - Comparing FTTx solutions to xDSL broadband satellite and broadband wireless alternatives
- Describing how the business case for FTTx can be made to work
- Determining a cost effective and future proofed access architecture for Triple Play, considering:
  - Fibre to the building - fibre to the node plus ADSL2+ / VDSL / VDSL2
- Managing the Triple Play platform to ensure a cost-effective and high performance end-to-end solution
- Forecasting future bandwidth demand and ensuring a smooth transition for the transport network:
  - Examining the role of Ethernet in the multi-service, multi-technology access network
Jörn Hiddessen, Solution Manager Carrier Ethernet and Optical Broadband Access, Siemens

10.20 Comparing different Next Generation Triple Play architectures
- Assessing existing broadband network architecture and service models
- Identifying the pros and cons of various Triple Play implementations
- Highlighting Ethernet edge aggregation challenges and carrier class solutions
- Examining the current state and evolution of Multi-Edge concepts to preserve service control
Matthias Frcke, Network Development and Evolution, T-Com

11.00 Morning coffee

11.20 Protocol frameworks for Triple Play evolution
- Network and service: integration with the intelligent Metro Ethernet edge
- Beyond Ethernet: identifying the role of MPLS in broadband aggregation
- Service survivability: high availability network architectures
- Traffic engineering and optimisation: Uni and Multiservice concepts
Jeremy Steventon-Barnes, Director Service Development, Tellabs

12.00 Cost-Effective backhaul for Next Generation broadband services
- Identifying the access bandwidth demands of Next Generation broadband services
- Discussing the merits of Carrier Ethernet, NG-SDH, FRP and WDM
- Discussing how to combine the best of each technology to develop the optimum broadband aggregation architecture
- Examining the business case for building versus leasing the next generation infrastructure
Jon Bailey, Technical Marketing Manager, Transmode

12.40 Examining the benefits of using point-to-multipoint fixed wireless for Next Generation mobile backhaul
- Examining how the transmission needs of mobile operators are changing as networks evolve from 2G to 3G, considering:
  - The trend towards more data-intensive applications
  - Increasing network density - the challenges of network management
- Highlighting the benefits of a point-to-multipoint fixed wireless solution for mobile backhaul:
  - Comparing a point-to-multipoint solution with point-to-point solutions
  - Using the network to offer additional Next Generation access services
- Sharing practical deployment experiences
Theo Wegbrans, Executive Vice President, Cambridge Broadband

13.10 Lunch

14.10 Delivering both Triple Play and TDM services in regional backhaul networks - A techno-economic case study
- Comparing and positioning MSP (Multi-service Platform) and Carrier Ethernet
- Analysing architecture / topology options and optimising costs
- Comparing and positioning WDM options
Blondine Rousset, Architecte et Techno-Economique, France Telecom Research & Development

14.50 Cost-effective transport for digital broadcasters – Equipping SDH networks to carry DVB-T payloads
- Understanding the transport requirements of broadcasters and explaining the significance for network operators
- Identifying the key elements of a broadcast network architecture
- Considering the transport of DVBASI signals over SDH networks using the GFP encapsulation
- Exploring the advantages of Transport using GFP encapsulation
- Proposing a cost-effective and efficient transport for digital broadcast media
- Identifying a new market opportunity for service providers
Giuseppe Abbatepaulo, Network Architect, Rail Way

Broadband access network evolution

15.30 Extending your broadband reach, how to make rural broadband customers more profitable - Considering WiMAX
- Making the business case for rural broadband:
  - Considering different access and backhaul technologies
- Assessing where WiMAX can offer a profitable solution, considering:
  - Capabilities, reach, LOS, backhaul
Patrik Nord, Director, Business Development, Ericsson

16.10 Chair's closing remarks

16.20 End of conference
Siemens Communications is one of the largest players in the global telecommunications industry. Siemens is the only provider in the market that offers its customers a full-range portfolio, from devices for end users to complex network infrastructures for enterprises and carriers as well as related services. Siemens Communications is the world's innovation leader in convergent technologies, products and services for wireless, fixed and enterprise networks. It is the largest Group within Siemens and operates in more than 160 countries around the world. In fiscal 2004 (year-end September 30), its 60,000-strong workforce posted sales of approximately 18 billion euros. More about Siemens Communications at www.siemens.com/communications

ECI Telecom provides advanced telecommunications solutions to carriers and service providers worldwide. ECI Telecom's platforms enable carriers and service providers to introduce new revenue-generating services easily. ECI Telecom has pioneered key technologies including voice compression, SDH/SONET, and DSL. With more than 12 years of experience in optical networking, ECI Telecom offers advanced optical platforms that combine innovative provisioning with on-demand network scalability. ECI Telecom's flagship XDM MPPS converges intelligent networking capabilities with advanced data functionality including ATM and Ethernet Layer 2 over SDH/SONET, CWDM and DWDM. For more information, visit us at www.ecitelecom.com

Lucent Technologies, headquartered in Murray Hill, N.J., USA, designs and delivers networks for the world's largest communications service providers. Backed by Bell Labs research and development, Lucent relies on its strengths in mobility, optical, data and voice networking technologies as well as software and services to develop next-generation networks. The company's systems, services and software are designed to help customers quickly deploy and better manage their networks and create new, revenue-generating services that help businesses and consumers. For more information on Lucent Technologies, visit its Web site at http://www.lucent.com

Nortel is an industry leader and innovator focused on transforming how the world communicates and exchanges information. The Company supplies its service provider and enterprise customers with communications technologies and infrastructure to enable value-added IP data, voice and multimedia services spanning Wireless, Wireline, Enterprise, and Optical Networks. As a global company, Nortel does business in more than 150 countries. For the fourth consecutive year (1999-2002) Nortel was the market's share leader in worldwide total optical transport, according to Dell'Om Group. Nortel continues to hold the #1 market share position in metro and longhaul dense wave division multiplexing (DWDM), and regained the #1 position in SONET/SDH multiservice. More information about Nortel can be found on the Web at www.nortel.com

Tellabs delivers technology that transforms the way the world communicates. Tellabs' experts design, develop, deploy and support wireless and wireline and wireless solutions. Our solutions enable network operators in more than 100 countries to succeed in the new competitive environment. Tellabs has a flexible portfolio of solutions to make operators successful over any network type including Ethernet over IP/MPLS, Ethernet over SDH, Ethernet over Fiber, Ethernet over TDN and Ethernet over DSL. The Tellabs' AssuredEthernet™ solution meets customer demands for Ethernet by enabling operators to offer personalized services with assured delivery. The Tellabs MultiserviceOptima™ solution offers network operators a cost-efficient, carrier-grade Ethernet solution with the same quality-of-service attributes that consumers expect from their wireline providers. This solution offers both ATM and Frame Relay services and new Ethernet and IP services on the same platform. Tellabs.com

Cambridge Broadband was established in 2000 with a single aim: to deliver the world's leading broadband fixed wireless access system. VectorStar is a highly flexible carrier-class point-to-point broadband wireless access platform for telecommunications and mobile operators. It can be used for backhaul access or a combination of both in the same network. Applications include cellular (2G), broadband access, business voice services, VDSL, EPON, broadcasting, and the provision of broadband services to remote units. VectorStar operates in a variety of licensed/unlicensed bands, including 5 GHz, 10 GHz and 24 GHz. Operators can mix frequency bands in a single network, providing maximum flexibility with its superior capacity range, service mix, and service efficiency. VectorStar offers operators the best possible price-performance ratio. For more details, visit www.cambridgebroadband.com

Eastern Research Inc. offers the DNF, OX, and BBS families of bandwidth management platforms to meet the access and transmission network requirements of fixed line and mobile operators worldwide. These multistack access-controllers and turnkey solution platforms perform the required switching, access, central-office provisioning, and network management functions that enable reliable and cost-effective service delivery. For mobile operators, deploying packet-switched, broadband 3G networks, the compact BSS 1.5G traffic backhaul in mobile radios and simplifies remote cell site management while saving cost and risk factors. For operators deploying services over existing, and next-generation transport infrastructure, the CB/2000 multiservice cross-connect combines wide-area connectivity and broadband access/SDH/SONET and Ethernet/IP features in a modular, scalable platform that supports Ethernet over IP, MPLS, and SONET. Additional information is available at www.erininc.com

Paradyne (NASDAQ: PFDN) is a leading provider of broadband voice, data and video network access solutions. It develops and manufactures telecommunications products designed for business-class transport and the emerging requirements of today's data providers of voice/data/speech/data services over broadband. Paradyne's engineers all products around 2 core foundations: Operational Intelligence (OI) and Multimedia Traffic Management (MTM). OI allows customer operational costs while MTM increases customer revenues by enabling them to introduce new services such as video on demand and online gaming. Paradyne has shipped more than 500,000 DSLAMs, Access Multiplexers worldwide, representing more than 5 million ports of capacity, as well as providing worldwide service for Network, Hospitality, and enterprise facilities. Leading providers, including AT&T, Bell Canada, Broadband, BSN, Sprint, Verizon, and WohCom, have deployed Paradyne's solutions into mission-critical infrastructure environments. With headquarters and manufacturing in Little Rock, USA, the company's products are used in over 100 countries powering hundreds of telephony companies' data networks and over half the Fortune 500 enterprise networks. www.paradyne.com

Transmode is a powerful new global force in optical networking. The company was formed when two of Europe's most successful private telecom companies, Transmode Systems and Lumera, merged in March 2003. To address network requirements worldwide, Transmode has introduced a new family of optical networking solutions allowing customers to operate with the flexibility and efficiency of an open, multi-service optical networking solution based on WDM, designed to cater for the needs of Next Generation Operators and Enterprises alike while uncompromising on functionality or cost-effectiveness. Transmode's product portfolio addresses Optical networking requirements from regional networks, through metro core and access networks, all the way down to the customer premises. www.transmode.com

Alcatel provides communications solutions to telecommunications carriers, internet service providers and enterprises for delivery of voice, data and video applications. Alcatel brings its leading position in fixed and mobile broadband networking, applications and services, to help its customers and customers' customers build a secure and efficient communications network. Number 1 in worldwide digital switching for 10 years, and number 2 in worldwide optical networking for the 8th consecutive year, Alcatel serves all optical transmission needs - from customer premises applications to metropolitan networks to long-haul and ultra-long haul terrestrial and submarine applications, all controlled by the same management platform. Alcatel's optical portfolio also perfectly fits with other optical solutions, such as Alcatel's B2B solutions, flexible intra-s, etc. with speeds from 100 Mbps to 10 Tbps. Alcatel operates in more than 130 countries. For more information, visit Alcatel or the Internet: www.alcatel.com

Metro Ethernet Forum (MEF) is a global industry association representing more than 70 organizations including telecommunications service providers, network equipment/software manufacturers, semiconductors and vendors and testing organizations. The MEF’s mission is to accelerate the worldwide adoption of Carrier-class Ethernet networks and services. The MEF develops Carrier Ethernet technical specifications and Implementation agreements to provide interoperability and deployment of Carrier Ethernet worldwide. More information about the MEF can be found at www.metroethernetforum.org

Fibersystems Europe in association with LIGHTWAY Europe (roulette) is a single publication, combining Europe's two leading optical communications technology magazines to become the leading information source for optical networking technologies. For further information, visit our website at: http://fibersystems.org/fibersystems

Email: registration@iir-conferences.com Web: www.optical-transmission.com/tns
### Step 1: Decide what you want to attend

<table>
<thead>
<tr>
<th>Tick Title</th>
<th>Date</th>
<th>Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-Conference Seminar</td>
<td>Monday 7th November</td>
<td>CG2225W</td>
</tr>
<tr>
<td>Conference Day One</td>
<td>Tuesday 8th November</td>
<td>CG2225C</td>
</tr>
<tr>
<td>Conference Day Two</td>
<td>Wednesday 9th November</td>
<td>CG2225M</td>
</tr>
<tr>
<td>Conference Day Three</td>
<td>Thursday 10th November</td>
<td>CG2225N</td>
</tr>
<tr>
<td>Conference Day Four</td>
<td>Friday 11th November</td>
<td>CG2225Q</td>
</tr>
</tbody>
</table>

For more than one delegate please photocopy this form.

### Step 2: Work out the price

<table>
<thead>
<tr>
<th></th>
<th>Price - available for registrations BEFORE 16th September (Tick box)</th>
<th>Price - available for registrations BEFORE 7th October (Tick box)</th>
<th>Price - available for registrations AFTER 7th October (Tick box)</th>
</tr>
</thead>
<tbody>
<tr>
<td>5 DAYS</td>
<td>□ £2095 (+VAT@16%) = £2405.20</td>
<td>□ £2115 (+VAT@16%) = £2546.20</td>
<td>□ £2295 (+VAT@16%) = £2766.20</td>
</tr>
<tr>
<td>4 DAYS</td>
<td>□ £1795 (+VAT@16%) = £2028.20</td>
<td>□ £1895 (+VAT@16%) = £2198.20</td>
<td>□ £1995 (+VAT@16%) = £2314.20</td>
</tr>
<tr>
<td>3 DAYS</td>
<td>□ £1495 (+VAT@16%) = £1734.20</td>
<td>□ £1595 (+VAT@16%) = £1850.20</td>
<td>□ £1695 (+VAT@16%) = £1960.20</td>
</tr>
<tr>
<td>2 DAYS</td>
<td>□ £1195 (+VAT@16%) = £1386.20</td>
<td>□ £1195 (+VAT@16%) = £1386.20</td>
<td>□ £1295 (+VAT@16%) = £1502.20</td>
</tr>
<tr>
<td>1 DAY</td>
<td>□ £595 (+VAT@16%) = £699.00</td>
<td>□ £595 (+VAT@16%) = £699.00</td>
<td>□ £795 (+VAT@16%) = £922.00</td>
</tr>
</tbody>
</table>

If you wish to claim my 50% operator / telecoms service provider discount, please photocopy the form below to register additional delegates.

### Step 3: Easy ways to pay

Billing address different from above:

<table>
<thead>
<tr>
<th>Personal details</th>
<th>Mr/Mrs/Ms</th>
<th>First Name</th>
<th>Last Name</th>
<th>Job Title</th>
<th>Department</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st delegate</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2nd delegate</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Company: ___________________________  Address (if different from label above) ___________________________  Postcode: __________

Tel.: ___________________________  Fax: ___________________________  Email: ___________________________

No. of employees on your site: 1) □ 0-49 2) □ 50-249 3) □ 250-499 4) □ 500-999 5) □ 1000+  

Nature of your company's business: ___________________________

Yes, I would like to receive information about upcoming events via e-mail: □ Yes  □ No

By giving my email address, I am giving the IIR the right to contact me by email

Please photocopy the form below to register additional delegates.

### Step 4: Five easy ways to register

Telephone: +44 (0) 207915 5085 Please remember to quote CG2225C/M/N/Q/W

E-mail: registration@iir-conferences.com

Web: www.optical-transmission.com/tns

Data Protection: Personal data is obtained in accordance with the Data Protection Act 1998. Your details may be passed to other companies who wish to contact you or to companies related to your business activities. If you do not wish to receive these offers, please write to the Data Protection Manager at the above address.

What Happens If I Have to Cancel? Cancel your registration in writing (letter or fax) on or before 26th October 2005 and receive a refund less 20% (£50.00 VAT service charge) if the travel between that date and 26th October 2005 is not within a 50% refund. Refunds may not be available in the case of cancellations received less than 24 hours prior to the conference. A substitute delegate is welcome to replace you.

By fax: Complete and send this registration form to: +44 (0) 207915 5085

Post: Complete and return the registration form together with payment to:

Customer Service Manager, IIR Ltd, 29 Bressenden Place, London SW1E 5DR

In case of multiple registrations you may change any details or remove your name from our list at any time by contacting our Data Protection Manager at the above address: +44 (0) 207915 5085, e-mail: registration@iir-conferences.com

A substitute delegate is welcome to replace you.

Visit: www.optical-transmission.com/tns  Email: registration@iir-conferences.com