

Primus Telecom

ATUG 2010 NBN Wholesale Services Definition Framework Forum

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Outline

- Welcome & Overview
- NBN Structure
- Challenges for the Future
- Opportunities
- Q&A

Primus Telecom - Overview

- Primus was formed in 1993. After deregulation of the Australian telecommunications industry occurred in July 1997, Primus obtained its Australian carriers licence and began operating on July 1, 1997.
- Provide local, long distance, international, voice, video, data, Internet, private networks and value added services
- Carrier licences in Australia, the USA, Canada and the UK
- *As a Tier 1 carrier we have our own infrastructure - our own exchanges and optical fibre to every State capital city*
- An extensive global network of owned and leased transmission facilities, 40 undersea fibre optic cable systems, 23 international gateway switches, a satellite earth station and a variety of operating relationships
- Top Tier-1 carriers in Australia, Group Rev \$2BN+
- Just Announced FY2008 results - **profits up** ↑

Primus Telecom Network - Australia

- Most advanced & modern network in Australia (Equipment used Nortel, Nokia, Cisco and Marconi)
- Nortel carrier grade voice switches
- Cisco IP (MPLS) / ATM backbone
- Redundant “self healing” Architecture
- All major switching centres have **fully redundant power** systems comprising battery arrays and diesel generators
 - All major switching centres are serviced by **multiple redundant fibre optic** cable systems
 - Major network systems are deployed with redundant elements such that failure of a single element is not sufficient to cause a total service failure
- All network elements under remote surveillance 24x7x365 via NMC/NOC in Sydney & Melbourne

Primus Products & Services

Data Services

- ADSL/SHDSL/xDSL
- Managed Data Networks – IP(MPLS), ATM, Frame Relay, Fibre, Ethernet (L2);
- Managed Firewalls
- Internet Services
- VoIP / VoDSL
- International Private Lines
- Hosting
- Storage / Virtualisation

Voice Services

- Hosted Telephony – “Accella”
- Foreign Exchange Lines
- Calling Cards
- Mobile
- Digital Centrex
- Consultancy and training
- Tollfree and Freecall Services
- National Long Distance
- International Long Distance
- Direct Connect
- International TollFree (ITF)

Primus Opticomm Tasmanian NBN Deployment Stage 1

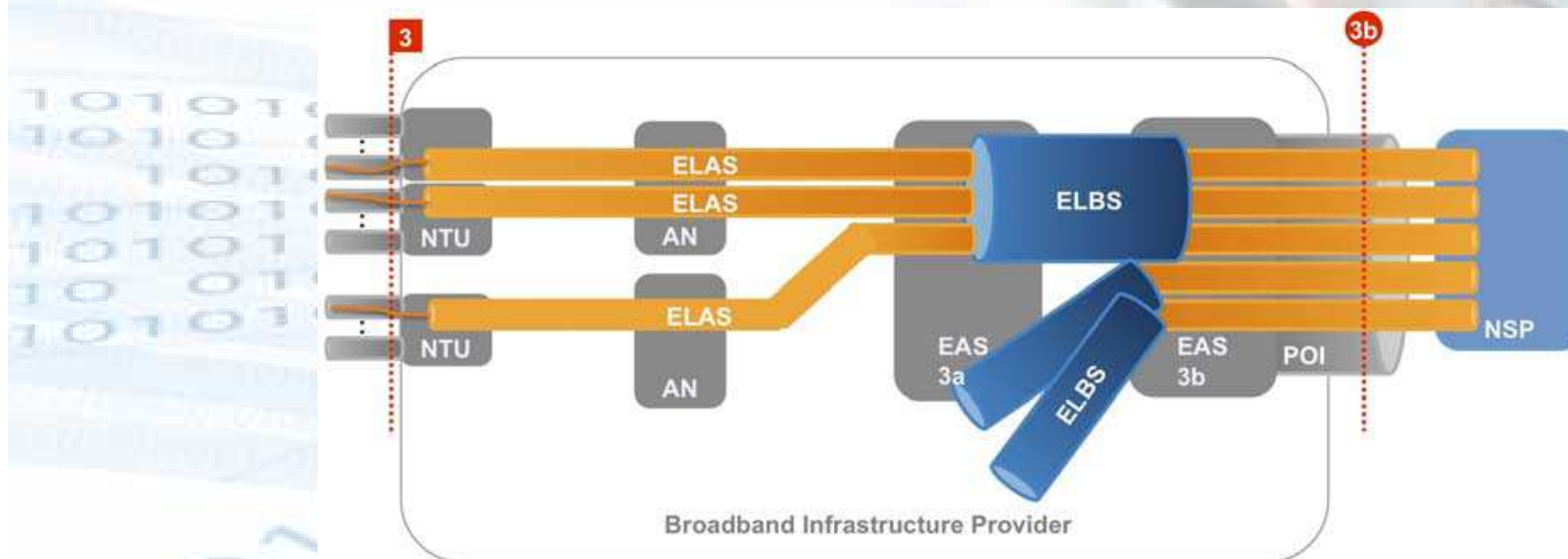
- Under the 'letter of intent', OptiComm will supply and manage the active components of NBN deployment in Tasmania;
- Opticomm is to provide communities of Smithton, Scottsdale and Midway Point with access to high-speed broadband at speeds of up to 100 Mbps;
- Primus is providing network connectivity for Opticomm in Hobart Datacentre and over BassLink back to mainland;
- Primus is providing Network and Internet Content as one of three selected Service Providers for the Tasmanian NBN Deployment;

Structure of NBN

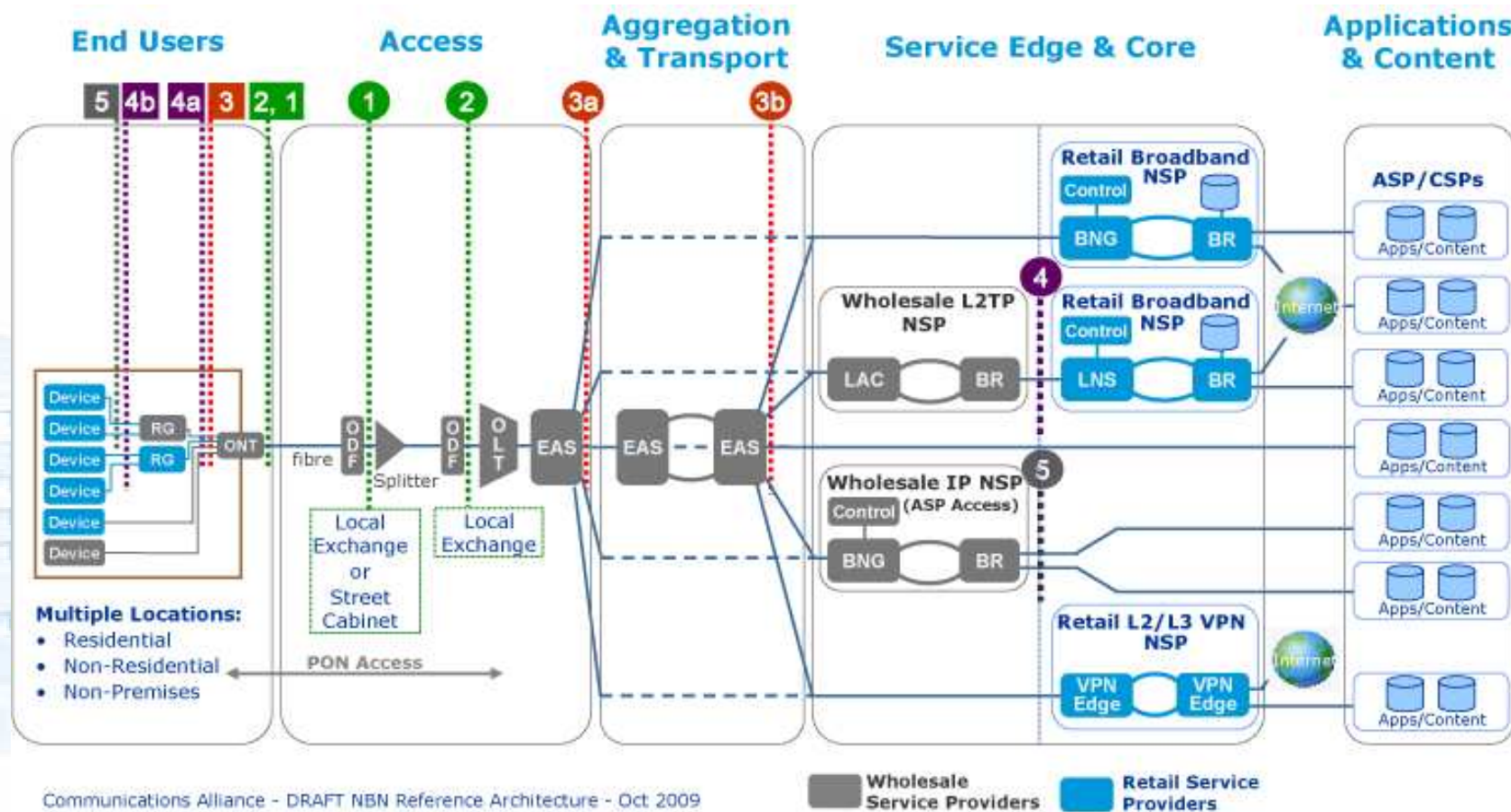
- ELAS – Ethernet Line Access Service;
 - ELBS – Ethernet Line Backhaul Service; and
 - EMCS – Ethernet Multicast Service.
- Traffic Management based on Committed and Excess Information Rate (CIR in kbps and EIR in kbps) and Committed and Excess Burst Size (CBS in bytes and EBS in bytes) with one CoS.
- OR
- Each segment (ELAS and ELBS) has specific Service Levels defined (CoS)
 - Service Performance Parameters are defined as Frame Delay (one-way mean), Frame Delay Variation (one-way) and Frame Loss Ratio. (Latency, Jitter and Packet Loss)

Structure of NBN

ELBS Overview – Ethernet Line Backhaul Service



Structure of NBN



Typical Network Layout.

Typical Network layout - based on three layers.

- **Core Network** – This is the network for the transport of data between major city nodes
- **Distribution Network** – This is the network that connects the capital city CBD with all state based exchanges
- **Access Network** – This is the network that connects the exchanges with the individual end users

Structure of NBN

Networking Terminology	NBN Terminology
Core Network	Service Edge and Core
Distribution Network	Aggregation and Transport
Access Network	Access

Structure of NBN

- Core Network is typically a L3 IP/MPLS based
- Is the NBN Core a L2 network – VPLS (Virtual Private LAN Services)

Quality vs Quantity

- **Bandwidth** - more is not always better – Guaranteed Bandwidth
- **Packet Loss** - when one or more packets of data travelling across a computer network fail to reach their destination
- **Latency** – measure of the time from the source sending a packet to the destination receiving it
- **Jitter** - measure of the variability over time of the packet latency across a network

Challenges for the Future

PRIMUS Experience in management of networks:

- Matching of CIR/EIR and CBS/EBS between ELAS and ELBS is Critical;
- Mismatching of Bandwidth and Buffers results in Frame Loss, High Delay and Increased Delay Variation;
- Level of Oversubscription of the POI is up to the WSA – some level of visibility and control.
- Oversubscription of backhaul services is a commercial reality – no visibility to WSA.

TRAFFIC CLASIFICATION

CLASS OF SERVICE – QUALITY OF SERVICE

Who gets how much of which service?

Quality of Service QoS – Layer 3 control

Type of Service (ToS)

Differentiate Services (DiffServe) using Differentiated Services Code Point (DSCP) to identify per hop behaviour

Class of Service (CoS) IEEE 802.1p - Layer 2

Challenges for the Future

- There are seven IEEE 802.1p CoS levels. Recommended deployment as per table below.

User Priority	Traffic Type
0	Best Effort
1	Background
2	Spare
3	Excellent Effort
4	Controlled Load
5	Video
6	Voice
7	Network Control

MEF standard defines the CoS deployment, but does not stipulated how many queues are supported

Challenges for the Future

- Proposal is Standards Based – IEEE 802, MEF, TR-101, TR-59 and many others...
- Standards are constantly evolving MEF10 and MEF10.1 was already superseded by MEF10.2.
 - What is the mechanism for keeping the NBN specifications up to date.
 - What is the mechanism for ensuring that the Network is in line with Standards.
- L1 Access Technology is not limited or restricted; but
- L2 access is limited Ethernet.
- Where Fibre (GPON) is the preferred method of access - **consideration** should be given to offering Direct Wavelength Access to the Network. **Lambda (λ) Access.**
- GPON is the preferred access method, but other PON standards are available **BPON** and **RFPON** should also be considered for Corporate Data and TV distribution services.

Challenges for the Future

- GPON – currently offers:
 - 1GE Access Speeds;
 - From 32 x Multiplexed data streams;
 - single lambda per fibre;
- GPON – future offers
 - 10 GE Access Speed;
 - up to 128 x Multiplexed data streams;
 - up to 32 separate Wavelengths lambdas (λ) on a single fibre.

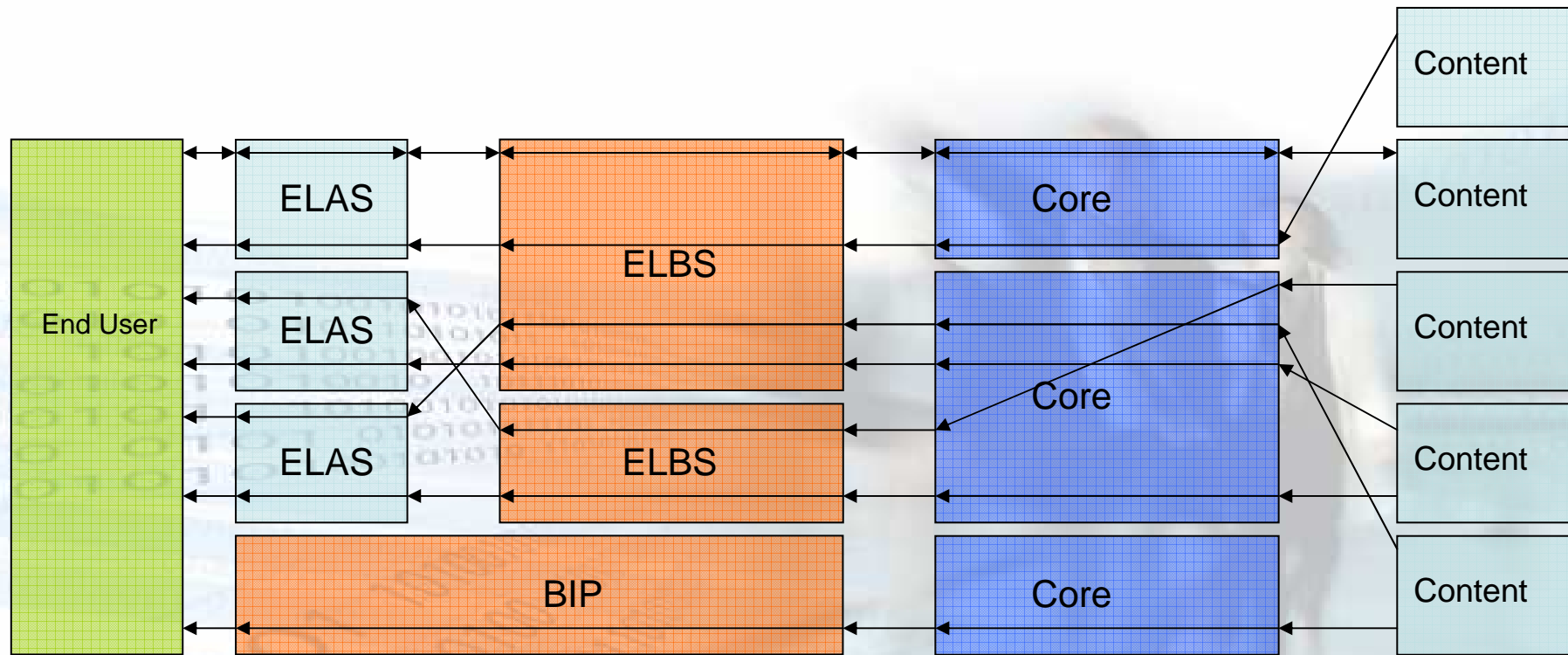
EMCS – Ethernet Multicast Service

- Presence of EAS (Ethernet Access Service) devices at either side of 3a and the aggregation side of 3b are critical to the Multicast Service;
- Lack of definition of capability or standards compliance of the EAS;
- Issues with resource management, processing power and interoperability need to be addressed;

Challenges for the Future

- Customer Premises Equipment (CPE) – Installation and Fault Management is a Challenge – Demarcation is well defined, but
 - Customer Fronting is typically the Application and Content Provider
 - Commercial Agreement between Content Provider and End User;
 - Fault is typically with NTU or the Access/Backhaul Networks
 - Commercial Agreement between ELAS and Core Network;
 - There could be several layers of service providers in between!
 - The person reporting the fault and the person providing the content are not the people fixing the fault – Clarity and transparency are vital.

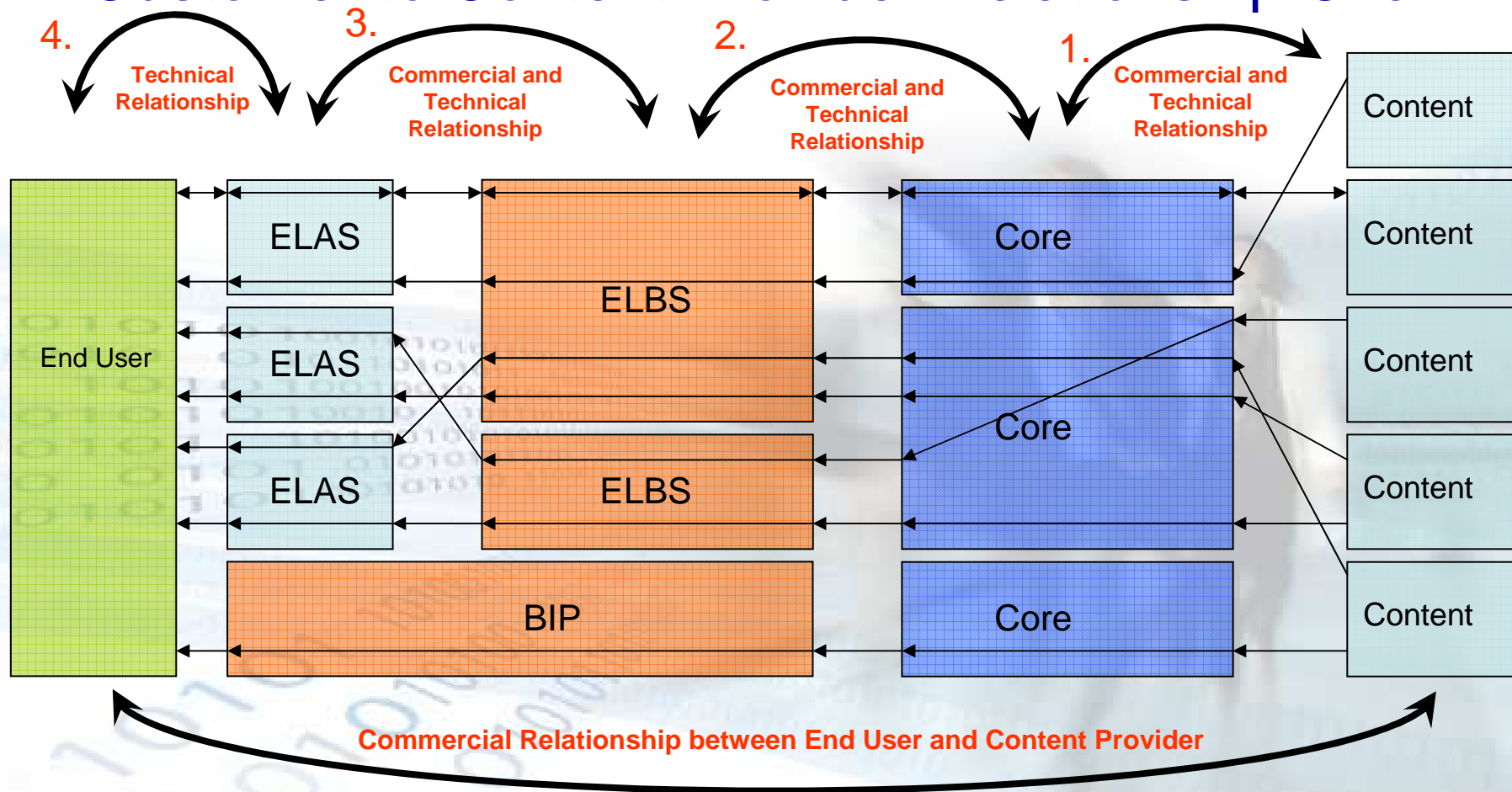
Customer to Content Provider Relationship Chain



Customer to Content Provider Relationship Chain

- **End Users** are after **Content** =>
 - => **Commercial Relationship** between Content Providers and End Users
- **Content Providers** Reside in Data Centres =>
 - => **Commercial and Technical Relationship** between Content Providers and Core Network Operator/s
- Core Network Requires Access to End Users =>
 - => **Commercial and Technical Relationship** with ELBSs and BIP's
- ELBS Require Last Mile Connectivity =>
 - => **Commercial and Technical Relationship** between ELBSs and ELASs
- ELASs and BIP's own the Access to End Users =>
 - => **Technical Relationship** between ELBSs and BIP's and End Users

Customer to Content Provider Relationship Chain



Challenges for the Future

- Provisioning of Services – now referred to as Operations Support Systems (OSS)
 - Needs to be Transparent, Automated and Standardised
 - Ordering and management of services will be critical to the successful uptake of the NBN.
 - Online Ordering of services
 - Ability to scale up/down services in real time;
 - Ability to change CoS and CIR/EIR configuration;
 - Online Management of MAC's (Moves, Adds and Changes)
 - Online Live Update on provisioning status;
 - Online Portal advising of network operation status;

Challenges for the Future

- Billing of Services – now referred to as Business Support Systems (BSS)
 - Accuracy and speed of update are critical to the success of the NBN.
 - Ability to quickly and accurately reflect current network configuration and changes;
 - Recognition of network outages;



Conclusions

Strengthening consumer safeguards

- **Universal Service Obligation (USO)**
 - The USO requires Telstra, as the universal service provider, to enable all people in Australia to have reasonable access on an equitable basis to standard telephone services, including payphones
- **Customer Service Guarantee (CSG)**
 - The CSG currently provides that telephone companies must financially compensate customers where certain minimum performance requirements are not met
- **Priority Assistance (PA)**
 - PA arrangements require the highest level of telephone service to residential consumers who have a diagnosed life-threatening medical condition. The legislation will require telephone companies to either offer PA services or inform the customer where they can purchase these services.
- **Effective Enforcement of Consumer Safeguards**
 - The legislation will provide the ACMA with increased powers to issue infringement notices (on-the-spot) fines instead of commencing procedures in court.

Conclusions

- Excellent Progress with the scoping of the operating parameters

BUT focus is needed on:

- Definition of OSS and BSS processes;
- Definition of greater Network Visibility end-to-end;
- Definition of Network Traffic Management end-to-end;
- Definition of the Multicast Network;

Questions?

