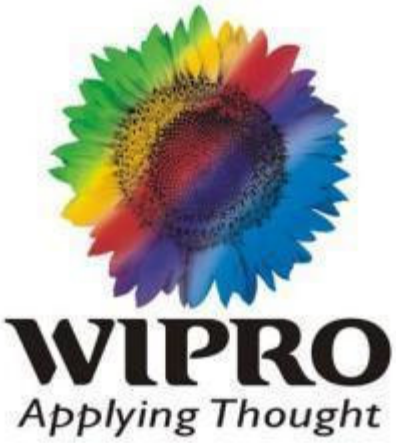


Challenges in Transforming Networks to Support Premium IPTV and Triple Play Services

Presenter Name: **Vishwanathan S**
Girish Dandin

Date:04/21/2009

Introduction Summary

- As the broadband market grows demand for triple play services to mass market is increasing.

- Service providers are required to evaluate their existing network infrastructure to support Triple play services.

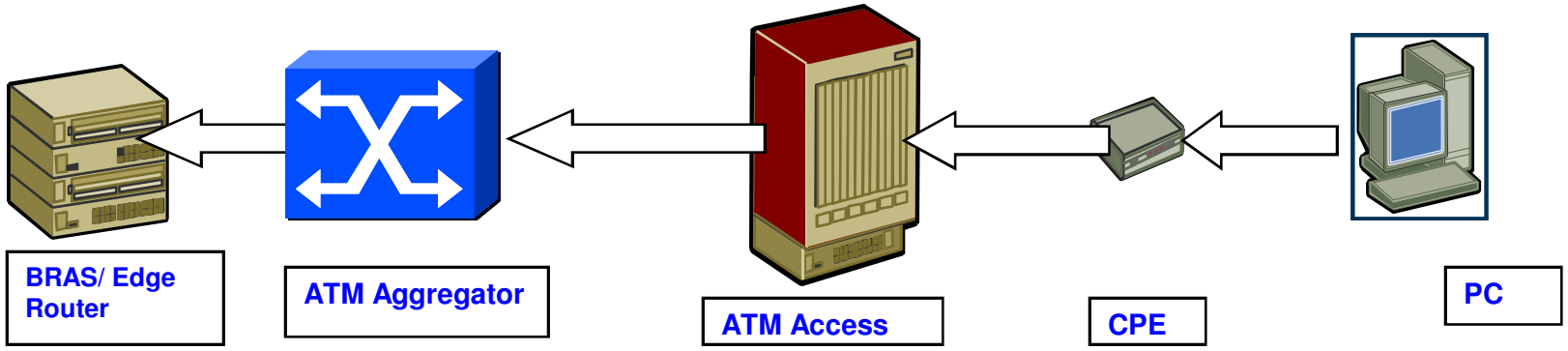
- In order to meet growing bandwidth need for Triple play services Operators are exploring different strategies to have tangible infrastructure for delivering Triple play services.

- This paper focuses on challenges involved in restructuring the network and how Wipro's Solution can overcome the challenges.

Traditional Internet

- Internet was used for e-mail, web browsing and other services were handled as data with best effort QoS.
- With introduction of Triple Play services demand for IPTV, VOD, Voice and other real time sensitive applications are increasing.
- Real time sensitive applications have stringent requirements for Jitter, delay, loss and bandwidth and requires something more than best effort.
- Since all Triple Play Services are handled as IP applications, this requires paradigm shift from best effort to IP QoS based services.
- All these requirements impose a change in network infrastucture.
- Wipro's ISBD(Integrated Services Broadband Delivery) solution helps operators in adapting and designing the network infrastructure to support Triple Play with optimized Capex and Opex.

Legacy ATM Network



- Legacy ATM based Access Node mainly functioned as traffic aggregator and steered traffic into BRAS.
- In traditional networks QoS, Scheduling, accounting and all complex functionalities were done by BRAS.

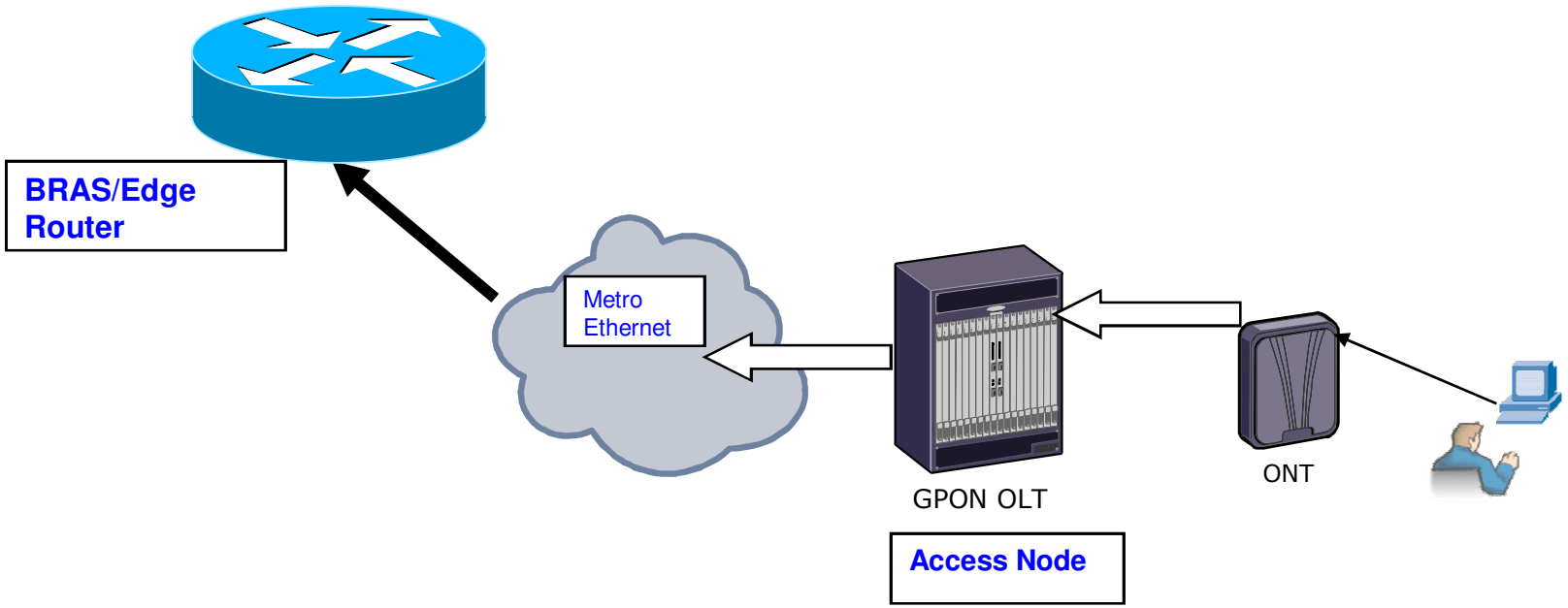
Challenges in Network transitioning

- All media rich services like IPTV, VOD etc require high bandwidth and accurate QoS.
- Achieving Subscriber Scalability and bandwidth capacity is crucial for operators success in Triple Play.
- Service segregation based on Voice, Video and data were limited. With Triple play new services like VOD, IPTV etc do not scale well with this architecture.
- An efficient IP QoS model is required to handle the Triple Play Services.
- Triple play services like IPTV, VOD etc need high bandwidth which results in increased bandwidth requirement at Access Node.
- With the growth of IP based services, Operators are faced with challenges of Transport, Reliablity, bandwidth efficiency and scalability.

Solutions

- Overcoming Transport, reliability, bandwidth efficiency and scalability requires addition of IP Aware Elements in the network.
- The network elements like Access Node, Aggregation/Metro Ethernet Switches and the BRAS needs to be intelligent.
- Access Node need to have IP QoS and layer 2 Switching Capability
- Metro Ethernet Switches should support QoS at Layer 2 and have all the Carrier Grade Ethernet features.
- BRAS should be capable of having enhanced subscriber management, IP QoS and increased traffic engineering capabilities.

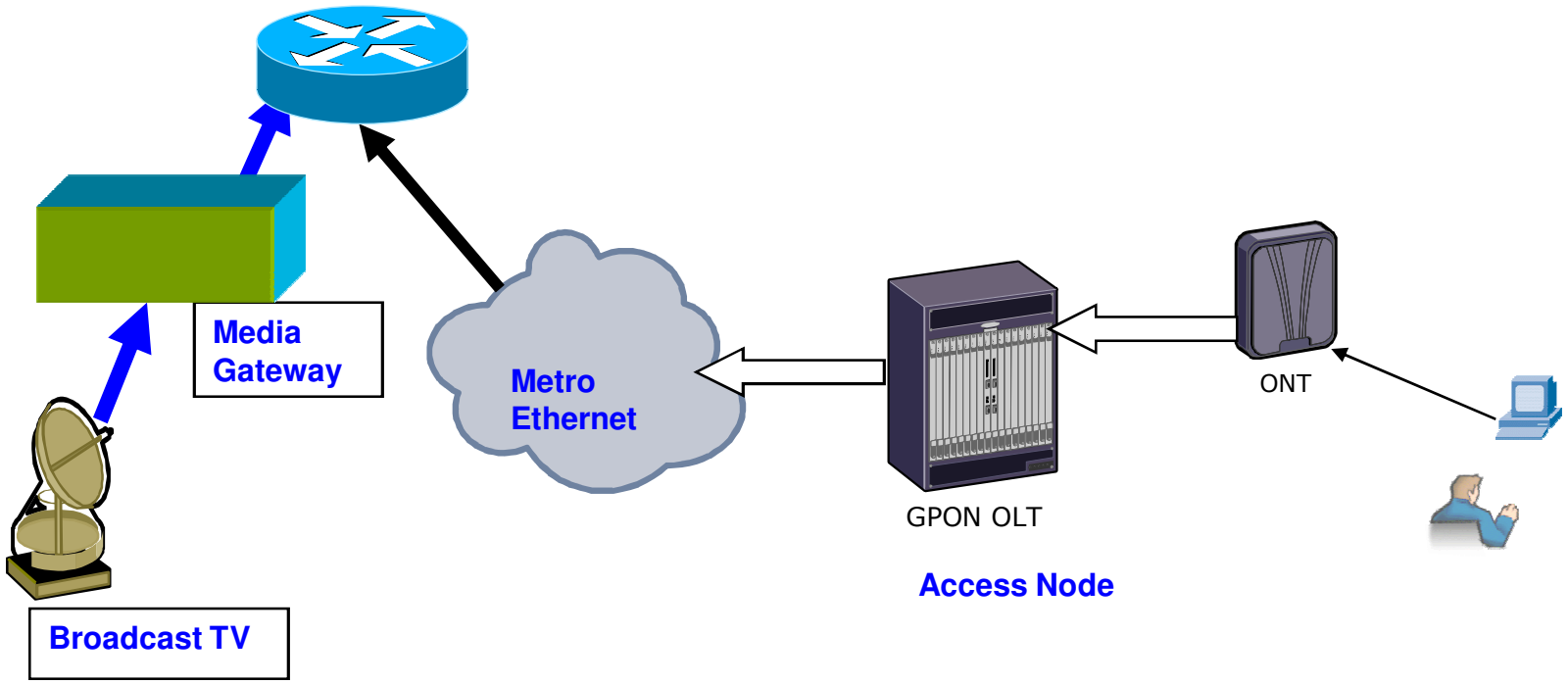
Wipro Network Solution



Wipro Integrated Service Broadband Delivery

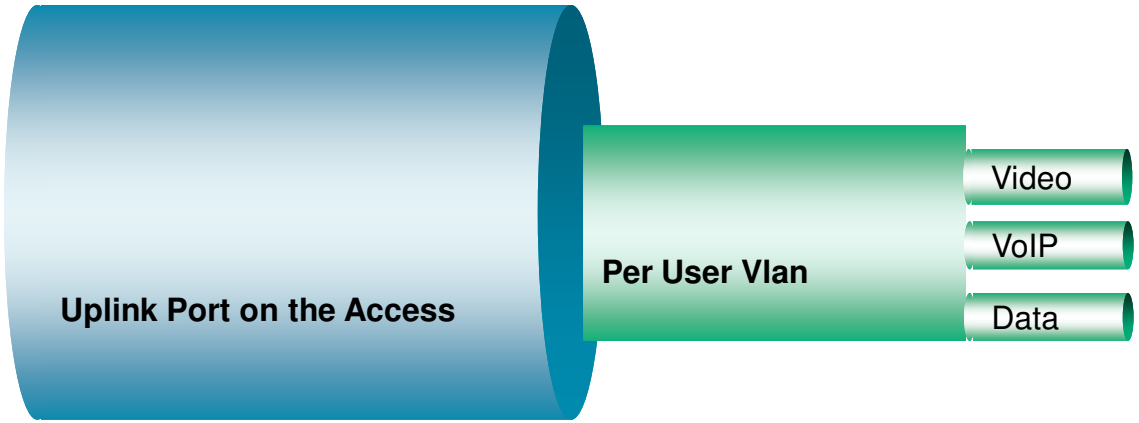
- This model utilizes the intelligence and rich features of all the network elements between the end user and the BRAS. (Access Node, Aggregation/Metro Switches and BRAS/Edge Router)
- Each network element can be configured with QoS in such a way that end-to-end QoS can be achieved between the User and the BRAS.
- With Access technologies like GPON, EFM, VDSL ensures that all the services can be delivered without bandwidth availability constraint.
- The increase in bandwidth towards the Access Nodes, causes an impact on the Aggregation and BRAS. The demand on these network elements to handle bandwidth capacity increases.
- In order to support Media rich Triple play services bandwidth for each subscriber needs to be defined in order to provide services based on SLA
- Wipro's ISBD addresses these constraints and helps the Operator to increase the revenue per user (ARPU)

Wipro's Integrated Service Broadband Architecture



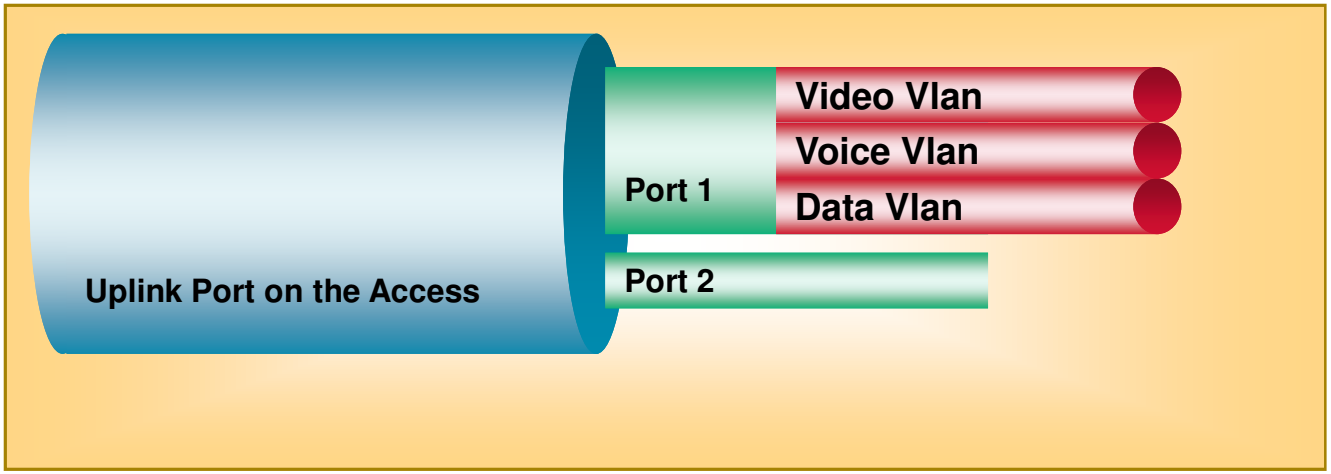
QoS Enforcement

- QoS is key for broadcast, multicast and unicast services. All media rich applications like IPTV, VOD etc need to be in par with existing cable providers for subscribers to experience good quality
- By using Hierarchical QoS to configure the network elements, the Operator can utilize the resources better by having controls per user and per service level
- QoS enforcements varies for each service. In the order of decreasing strictness for services beginning with VoIP, Video and Data.



QoS Enforcement

- Having QoS per service level at Aggregation switches and BRAS/Edge Router causes the traffic to be shaped before it arrives at the Access Node.
- This reduces the shaping to be done at Access Node and also reduces the traffic between Aggregation Switch and Access Node.
- Having service level control enables the BRAS to drop the traffic early in the network instead of packet traversing to the Access Node and being dropped there.



Bandwidth Efficiency

- Bandwidth efficiency and optimization is one of the key challenges for deploying Triple play services.
- Triple play services like IPTV, VOD and other media rich applications consume huge bandwidth capacity.
- Wipro's ISBD model, addresses the need for optimizing the bandwidth, efficient utilization of network resources with help of intelligent network elements deployed in the operators network.
- IPTV applications which are multicasted, bandwidth efficiency can be achieved by each element in the network replicating and sending a single copy of multicast packet. (BRAS->Aggregation Switch -> Access Node)
- IGMP proxy in Access Node allows only requested traffic to the Node. Having similar functionality in Aggregation switches results in bandwidth being used efficiently.

Bandwidth Efficiency

- Operator has to provision the available bandwidth for IPTV ,VOD and data services. Streaming all IPTV channels might not be efficient solution as the bandwidth capacity usage will be high between BRAS-> Aggregation->Access Node
- Wipro's Solution to above problem is by having Operator some of the common channels constantly and the remaining channels can be streamed on need basis.
- VOD being unicast application needs fixed amount of bandwidth based on SDTV or HDTV.
- In order to support VOD application bandwidth availability between the BRAS->Aggregation Switches->Access Node must be evaluated dynamically for a video request

Reliability and Resiliency

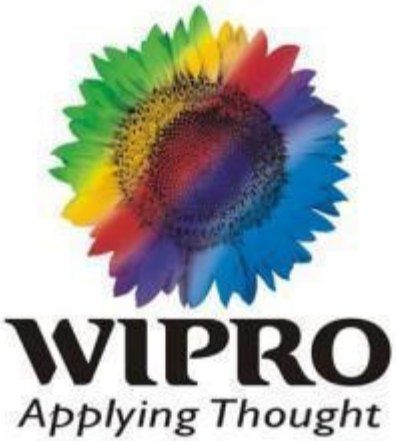
- All Triple Play services cannot tolerate any disruption in service or network outage. Offering reliability of 5 nines is essential for network
- Wipro's network model builds on highly reliable network elements.
- The Access Node must support redundancy which enables hitless failover.
- The Aggregation switches must support both link and node protection.
- BRAS is highly reliable with quick failover recovery mode.

Policy and Admission Control

- Operators network require proper policy and admission control.
- Proper design and dimensioning of network is required to support Triple play services like IPTV, VOD etc.
- The admission control policy must ensure that requests to view additional channels of IPTV or VOD do not affect the quality of service and quality of experience for the existing viewers.
- Policy and Admission Control must be applied at Access Node, Aggregation Switches and BRAS. This is required to verify if sufficient bandwidth capacity is available between the subscriber and BRAS for a requested Triple play service like IPTV, VOD etc.
- Access Node can have admission control in form of access list which can verify subscribers request for video or IPTV channel
- Multicast admission control works in conjunction with IGMP proxy
- BRAS has its own set of Admission control policies.

Security

- Security is one of the key challenges for the service provider as it is necessary to protect the media rich contents of the content providers.
- Any unauthorized replication or content traffic will result in loss of revenue for the content providers.
- IGMP snooping of join/leave messages coming from end user could potentially be used for Denial of Service attack against the Access Node or BRAS .
- Wipro's model builds security by distributing it across the network in Access Node, BRAS.
- Access Node checks the IP Address spoofing and MAC address checks.
- Access Node incorporates rate limiting to avoid DOS.
- At the BRAS towards the ISP network IPSec can be deployed.



Thank You

Contact details :
girish.dandin@wipro.com
vishwanathan.sundaram@wipro.com