Triple Play Network Design Considerations
Agenda

- Advantages of Triple Play over IP
- Service Convergence over IP
- Bandwidth Considerations
- Key Features for IP Triple Play
- Summary
Advantages of IP/Ethernet

Field proven reach with scalable bandwidth
  - Ethernet 10/100/1000/10000Mbps Scalability
  - 10 to 80Km Optical Reach
    - SFP, GBIC and XFP Pluggable Optics

IP/Ethernet leverages Cost Savings of Volume production to minimize equipment costs

Incremental Business Revenue – off the same scalable Infrastructure
  - Same key technology for Residential and Business Applications
    - Ethernet over Fiber
    - Ethernet over Copper – xDSL, G.SHDSL, T1
  - Optical Ethernet to Schools, Small and Medium Business
  - Legacy Service Delivery
    - POTS, TDM over CES
One network, multiple revenue streams
- Video-optimized Access network
- Video, Voice and Data over ADSL, Ethernet or Fiber
- Bundled revenue streams
- Reduced service delivery costs
- Single Network Management Platform

Customer retention
- Customer with multiple services less likely to change providers
- Customer’s power of choice focused toward service options

Triple Play = Triple Pay

Bundled Service Revenue
Reduced Costs

Indoor or Outdoor Triple Play CPE

End to End Network Management

Video Services
Internet Service
PSTN
CPE for End-to-End Triple-Play Services

“Any Network” Access – (ADSL2+, Active Fiber, GEPON, 10/100)

“Any Service” (Data, VoIP, IPTV, Cable TV)

Layer 2 Switching (VLAN Tagging, Rate limiting, QoS)

Remote Configuration/Management (Auto Discovery, Management and Config, Web GUI)

Intelligent CPE

Security (Statefull Firewall, IDS, NAT, Virtual Server)

Deployment Flexibility (Indoor / Outdoor units, Optional Battery Backup, Eth to Coax, WiFi)

Layer 3 Routing (Routing, IGMP, Multicast, DHCP Client/Server)
IP/Ethernet Services

Create New Revenue Producing Services
- Gaming VPN Networks
- Differentiated Business Ethernet and VPNs
- Vonage Type VoIP and Softswitch POTS

New Services over Any Access
- Ethernet over Copper
  - ADSL2+
  - G.SHDSL
  - T1
  - 10/100 Mbps Ethernet
- Ethernet over Fiber
  - 100Mbps Single Mode, Single Fiber/Dual Fiber, Multi Mode Dual Fiber
  - GEPON
  - GbE
A Simplified Softswitch Network

- Pure Softswitch environment
- All local calls stay On-Net over the Access network
- Decrease LDS Trunk requirements
- POTS and VoIP over IP – Differentiated Voice services
Business Services
CARRIER GRADE REQUIRED

- Business Voice
- Business PBX
- Business VPN

Business Impacts of Network Outages
- Missed Customer Opportunities
- Increased Customer Complaints
- Branch Office Isolation
- Intra-company Inefficiencies
- Dependency on PSTN Communication
- Business WAN Inefficiencies
- Employee Downtime
Bandwidth – How Much Is Enough?
Technology Comparisons

<table>
<thead>
<tr>
<th>Technology</th>
<th>Up</th>
<th>Down</th>
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<tbody>
<tr>
<td>Active</td>
<td>100Mbps</td>
<td></td>
</tr>
<tr>
<td>A/BPON</td>
<td>622Mbps/32 splits = 19Mbps</td>
<td></td>
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<tr>
<td>EPON</td>
<td>1Gbps/32 splits = 30Mbps</td>
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<tr>
<td>GPON</td>
<td>1.2Gbps/32 splits = 38Mbps</td>
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## Services and Bandwidth

### Today’s Services – DSL

<table>
<thead>
<tr>
<th>Service</th>
<th>Bandwidth</th>
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</thead>
<tbody>
<tr>
<td>Broadcast TV (IP): 4Mbps per stream x 2 TV’s:</td>
<td>8Mbps</td>
</tr>
<tr>
<td>High Speed Internet:</td>
<td>1Mbps</td>
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</tbody>
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### Today’s Services – FTTP

<table>
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<tr>
<th>Service</th>
<th>Bandwidth</th>
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</thead>
<tbody>
<tr>
<td>Broadcast TV (IP): 4Mbps per stream x 3 TV’s:</td>
<td>12Mbps</td>
</tr>
<tr>
<td>High Speed Internet:</td>
<td>10Mbps</td>
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### Tomorrow’s Services

<table>
<thead>
<tr>
<th>Service</th>
<th>Bandwidth</th>
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</thead>
<tbody>
<tr>
<td>HDTV (IP): 20Mbps per stream x 3 TV’s:</td>
<td>60Mbps</td>
</tr>
<tr>
<td>High Speed Internet:</td>
<td>10Mbps</td>
</tr>
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Active FTTx

- E/GPON
- ADSL2+ A/BPON
- ADSL2

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Connecting The IP World

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Video over Ethernet

Ethernet Transport and IP/Ethernet

- 200 Channels of Broadcast Video
- Efficient use of Transport Bandwidth
  - Approximately 800Mbps Broadcast Bandwidth
    - Less than 1Gbps of Transport Bandwidth MAXIMUM
  - IGMP Efficiency
    - Bandwidth Consumed ONLY when channels are requested
    - IGMP at All Network Elements to optimize Efficiency
- Add Network Capacity by Adding GbE Links or migrate to 10GbE
- Keeps Content in its Native Format
- Reduces the Network Element types and Node quantities
Multicast and IGMP Features

IP Multicast at all Network points  *Nodes, control/line cards and CPE*

IGMP snooping  *Minimizes uplink traffic and bandwidth needs*

Fast Leave for IGMP  *Minimized link BW & channel change time*

Scale
- Up to 512 simultaneous Multicast Channels support
- Up to 48 Multicast Channels supported per port for MDU/MTU
- Up to 5 STBs supported per port

Video Content Management
- STB Mobility Prevention
- Advanced Layer 2/3 Classifications and IP QoS
- MAC limiting to prevent subscription theft
MAC address can be “locked” to specific Service port
- If MAC address does not match those assigned to that port, the IGMP ‘join’ is refused

Eliminate STB movement to different locations in the network
- Stop content theft with unauthorized devices.
- Premium channels can not “move” to neighbor’s house with STB

Eliminate PC hacking into video content
- Only authorized STB can join multicast video streams
Support for Upstream Forwarding Only (UFO) and VLAN support per 802.1Q

- Required for carrier VPN services with VLANs to coincide with video broadcast services
- Up to 32 VLANs can be assigned UFO status
- Eliminates unnecessary Data traffic “chatter” between end users
- Forces all traffic to common Egress point in Data path
Summary

- Common True Ethernet/IP Platform for FTTH, ADSL2+, POTS
  - Not ATM with IP bolted on top

- Scaleable System sizes to support services
  - True Carrier Grade systems – not just Pizza boxes
  - All Next Gen IP services AND Legacy services

- End to end product portfolio to include Access, Transport/WDM, CPE, Layer 2/3 aggregation.
  - Identify and support total network costs, not just single part of the network

- End to End NMS to manage/provision it all
  - Not just a GUI
  - Manage AND Configure ALL Network Elements
IP Network Convergence

- Head End
- Centralized Management/Provisioning
- Main CO
- Softswitch
- 10 GbE Transport Core
- N x GbE Access Edge
- N x GbE Access Platform
- N x T1/E1

Connecting The (IP) World

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Thank You!

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