



BROADEN YOUR LIFE

Technical Evolution of Optical Networks Towards New Revenue-Generating Applications

**Wireless & Optical Communication
Conference in Taipei on March 9th 2004**

Asian Operators – Healthy and Growing in 2003

Increased revenue and profitability ...

	Revenue			Profit Margin	
	Growth 02/01	2002	Growth 03/02 E	2002	2003E
Fixed	-5.1%	113 BE	1.4%	4.5%	6.0%
Mobile	4.9%	111 BE	4.4%	8.3%	11.5%
Fixed & Mobile	7.6%	30 BE	2.2%	17.3%	16.0%
Total	0.5%	254 BE	2.8%	7.7%	9.6%

Estimated CY2003

Source: MSDW, Company data

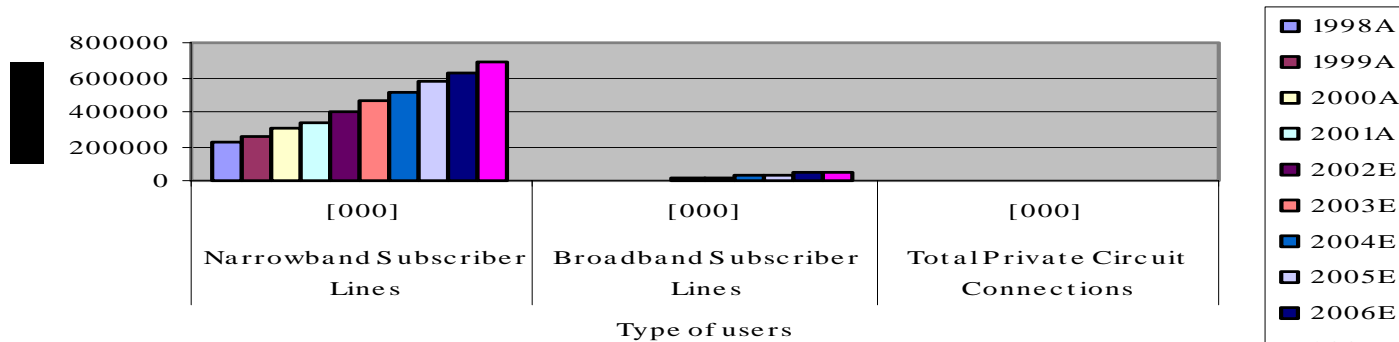
Operators expect Revenues up, Costs down, Profits up

Indicator	2002	2003E	
Fixed Line			
Overall Penetration	29.7%	29.8%	Stable Top line
ARPU	\$26.2	\$26.1	
Lines/employee	385	418	Productivity up
Capex/sales	24.0%	20.3%	
Mobile			
Overall Penetration	45.5%	48.8%	Subscriber growth offsets ARPU decline
ARPU	\$21.3	\$20.8	
Data Rev/Total Rev	4.8%	7.8%	Data ARPU important
Subs/employee	2,111	2,273	Cost Reductions
Capex/sales	66.3%	34.4%	

Source: Goldman Sachs. Figures are arithmetic averages, not weighted averages.

Strategic aspects in APAC: revenues and users growth

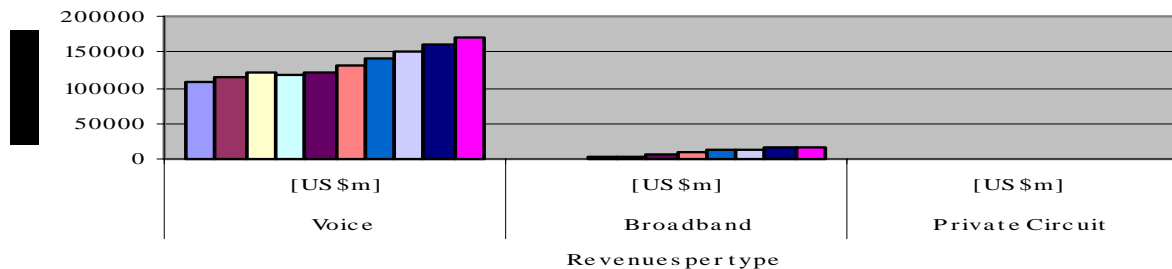
Number of Subscribers



#Narrow band
CAGR: 15%
#Broadband
CAGR: 167%
#Leased Lines
CAGR: 12%

Source: Pyramid Research

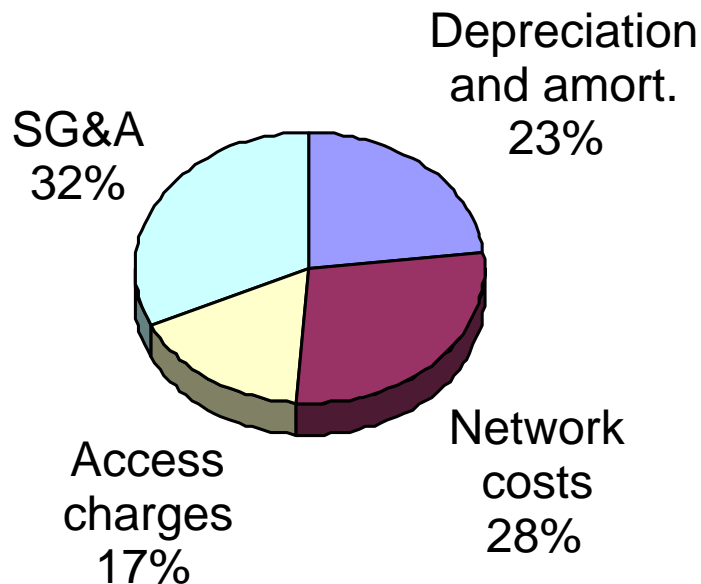
Revenues



\$Total
CAGR: 3%
\$Broadband
CAGR: 115%
\$Leased Lines
CAGR: 9.7%

Do the ABC: Opex improvements becoming as important as Capex improvements

2002 Opex: \$161 billion for
NA ILECs and IXC



Source: RHK Inc. 2003

- > **Network costs**
 - Operations
 - Maintenance
 - Provisioning
- > **Access charges**
 - Fees paid to use another network
- > **SG&A**
 - Sales & Marketing
 - Finance
 - Corporate Overhead
- > **Depreciation and amortization**
 - Allocation of tangible and intangible fixed assets

Revenues Opportunities: Growing demand for metro services

	Service	2007 Revenues (\$Millions USD)	5-year CAGR
1.	Ethernet access	5,657	+59%
2.	IP-VPN	3,239	+27%
3.	VoIP (wholesale)	1,721	+28%
4.	Native ATM	1,126	+20%
5.	Web-hosting (carrier)	875	+40%
6.	Web-hosting (ISP)	673	+41%
7.	IP multi-cast (retail)	450	+115%
8.	Content distribution/ Caching (wholesale)	407	+35%
9.	IP multi-cast (wholesale)	267	+72%
10.	Unified Messaging	246	+63%

Source: Gartner Dataquest Apr03

Worldwide Revenues

Service/Year	2003	2007
Frame Relay	\$16.7B	\$16.7B
Leased Lines	\$23.2B	\$24.2B
Ethernet	\$1.2B	\$8.3B

Source: Infonetics Research

Services Price and Quality Positioning

Leased Lines	100	No Overbooking
Frame Relay	70	CIR + BE nx64Kb/s
Ethernet (Objective)	70	CIR + BE
Network based IP VPN	45	No QoS
CPE IP VPN	15	No guarantees

Source: Internal studies

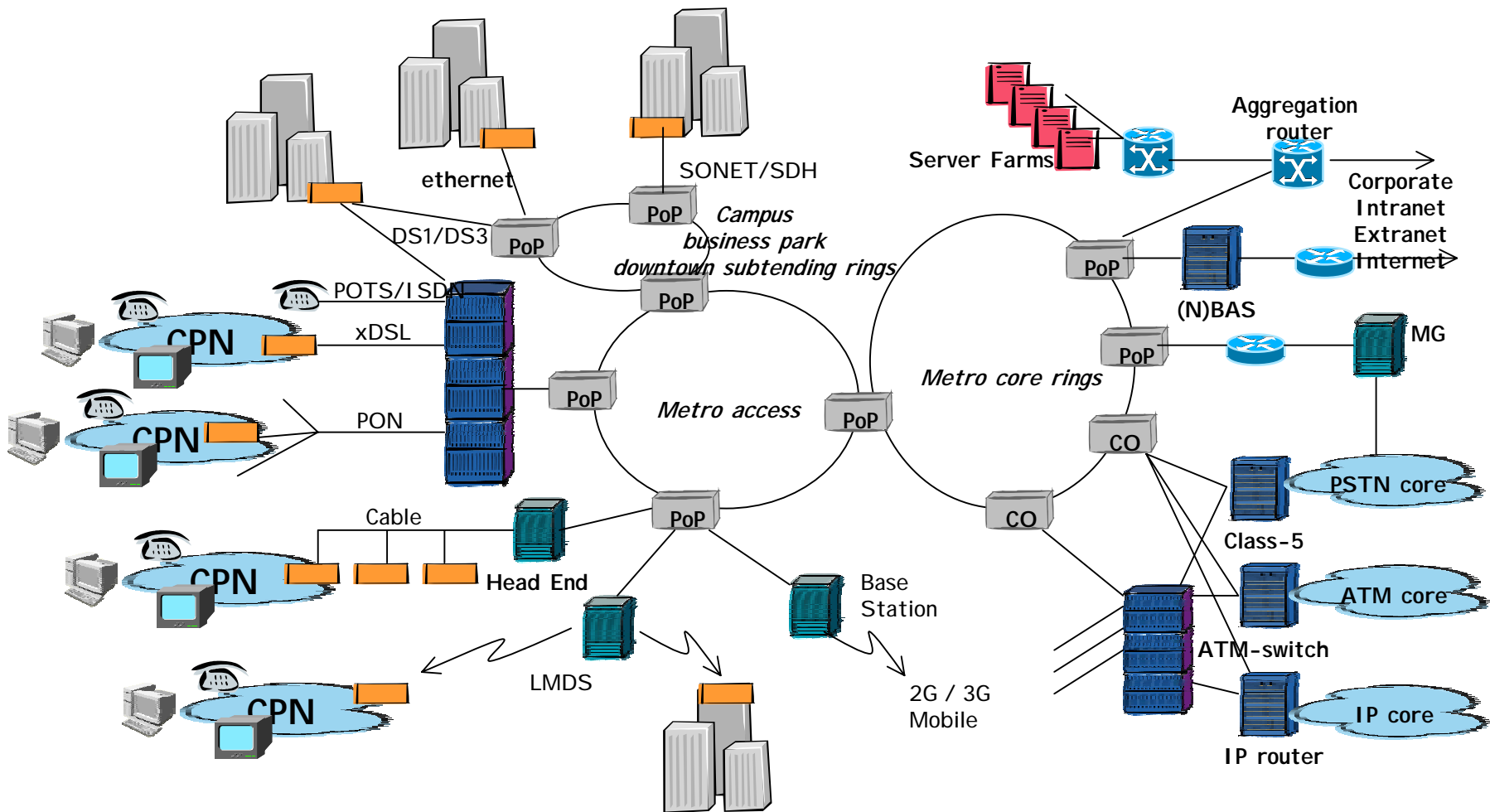
The strategic aspects of the Metro network

- ◆ The metro network has been up to recently built in overlaying networks, one per type of service.
- ◆ The current pressure for financial performance and cost efficiency, is leading operators to built metro networks with the following characteristics:
 - ➔ Migrating services and protecting revenues
 - ➔ Simplifying and collapsing the network reducing the number of overlaying networks.
 - ➔ OPEX reduction through centralized OAMP

Yield management: One metro network or many?

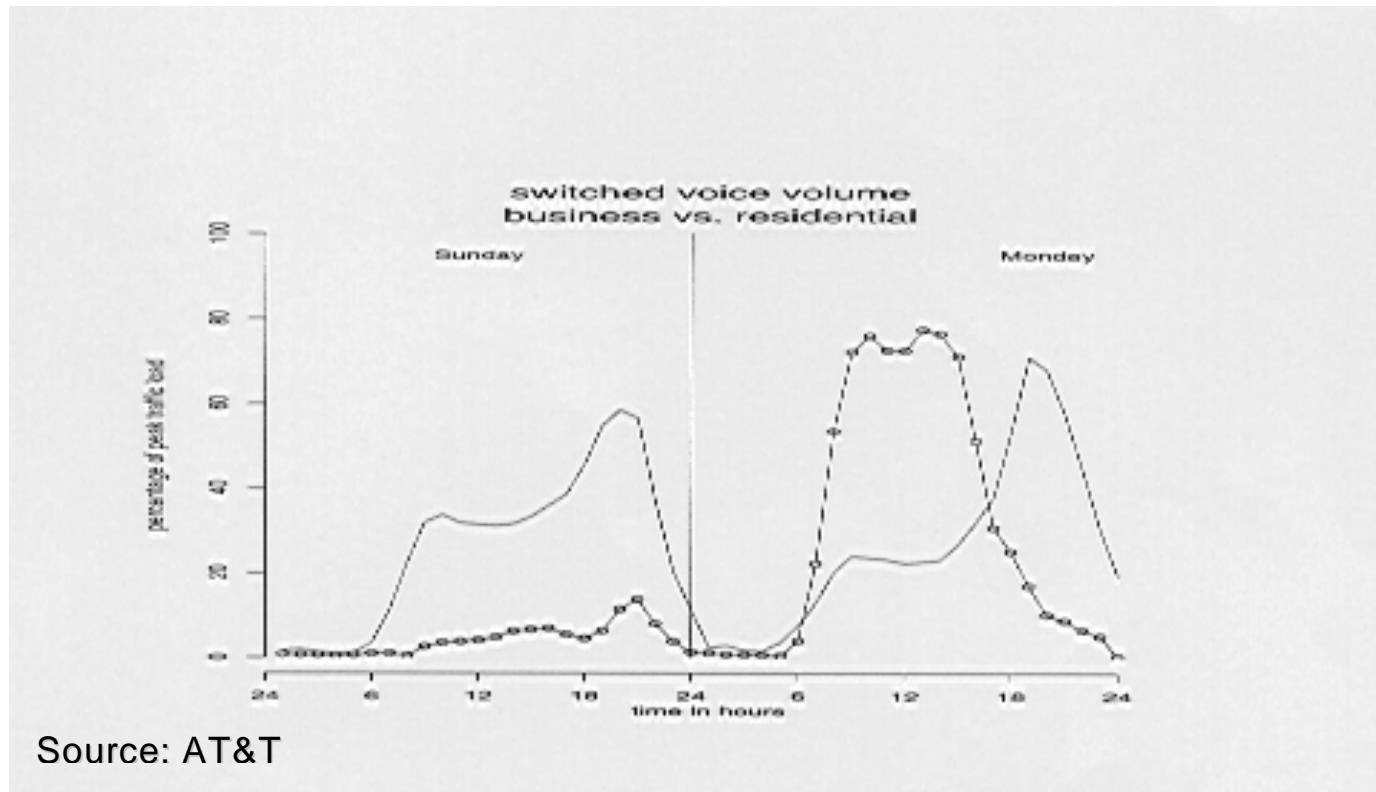
- ◆ How to achieve economies of scale?
- Corporate services:
 - Existing leased lines services and frame relay
 - New emerging Ethernet services
 - Future GPRS/EDGE/3G cellular services
- Residential services:
 - Existing ADSL services
 - Future VDSL services
 - Future GPRS/EDGE/3G cellular services
 - Emerging Ethernet services

Yield management: One metro network or many?

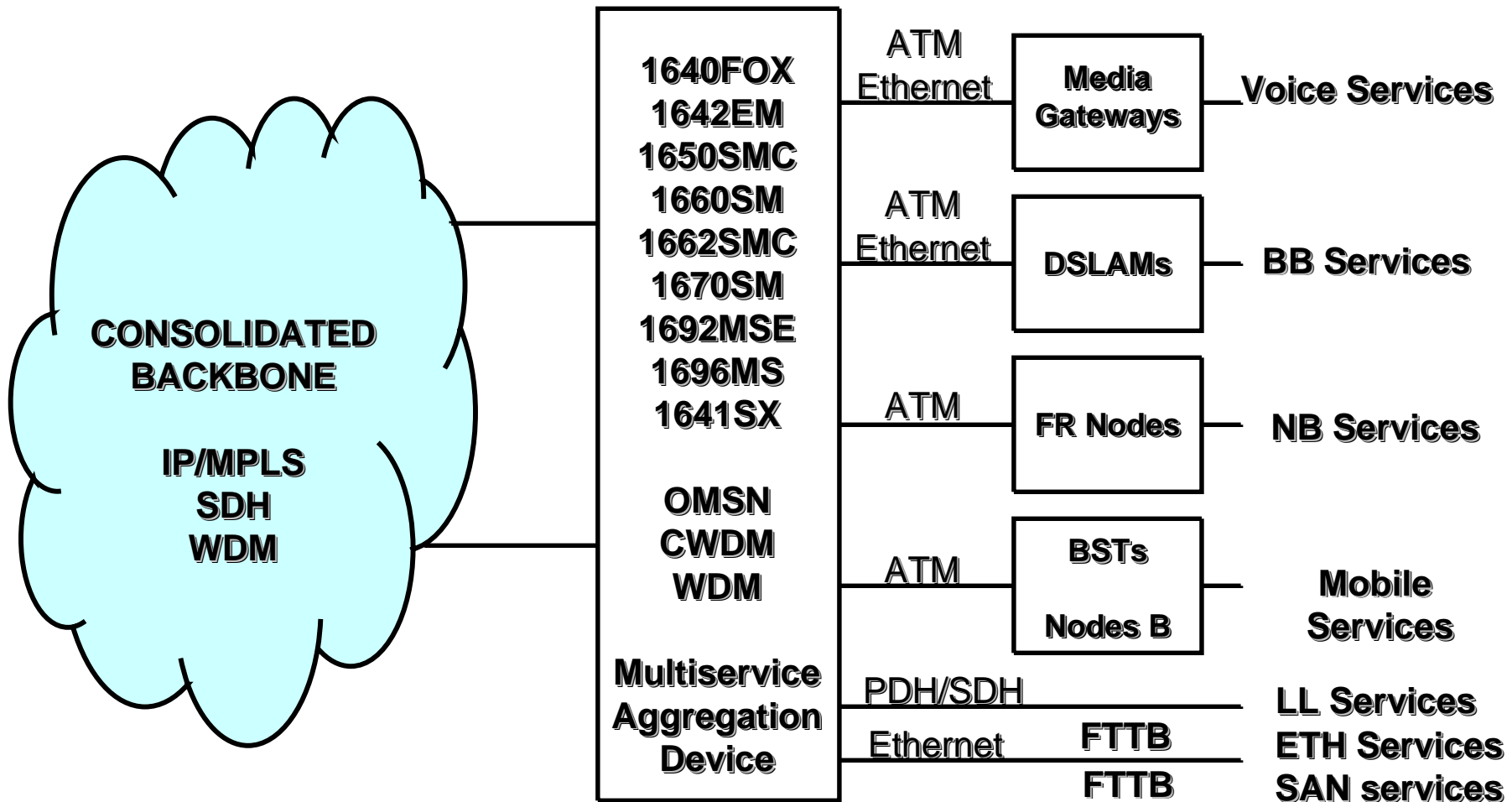


Yield Management: One metro network or many?

→ QoS allows one network to better use complementary traffic matrixes on the same infrastructure.



Yield management: One metro aggregation system or many?

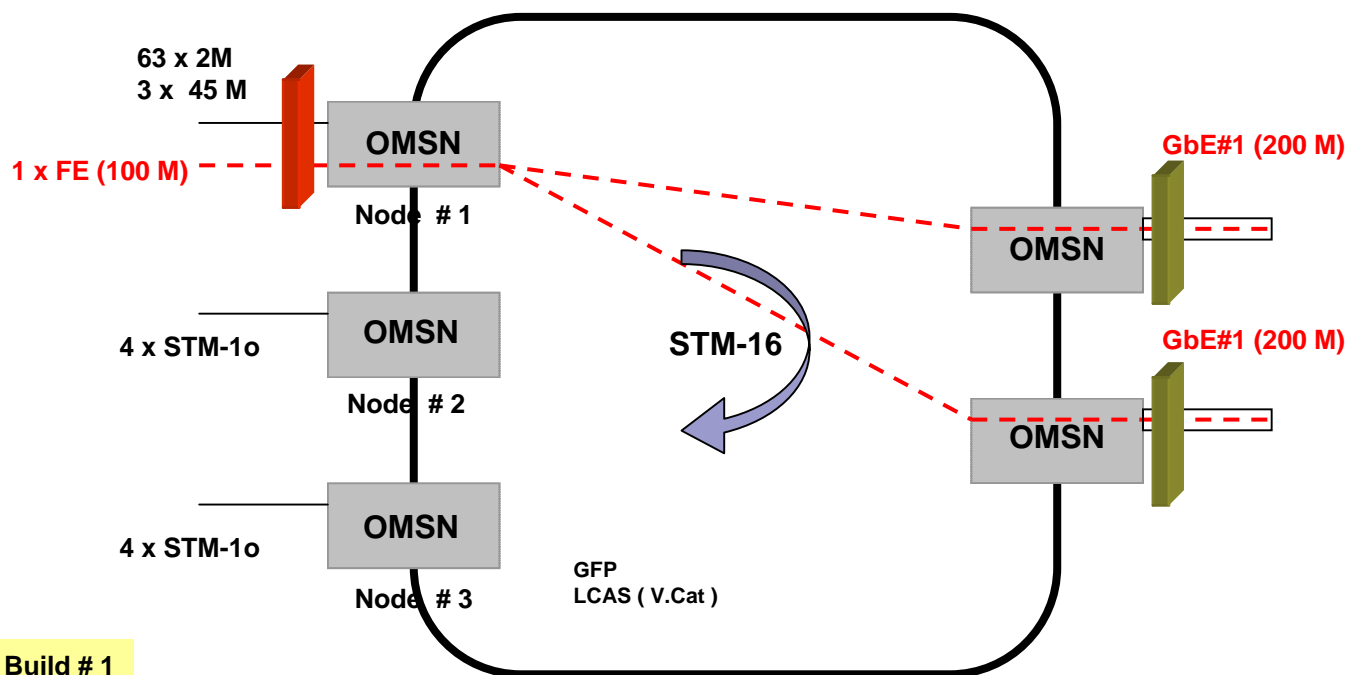


Connectivity required in the WAN

- Connectivity between large hubs
 - Consolidated traffic
 - QoS managed in the enterprise
 - Point to point leased lines type of services suffice
 - *VCX, LCA, GFP are the solutions adopted*

- Connectivity between small branches and large hubs and LAN to LAN connectivity
 - Volatile traffic
 - QoS managed by the service provider
 - Point to multipoint services welcome
 - *MPLS switching is the solution adopted*

Initiating Ethernet Point to Point with ISA Ethernet boards



Note:

- Node #1 is equipped with 1 x FE port (100 M), where its traffic is multicasted into towards two directions (two head ends) with STP protocol activated at the client side
- FE mapped in N x VC3/VC12

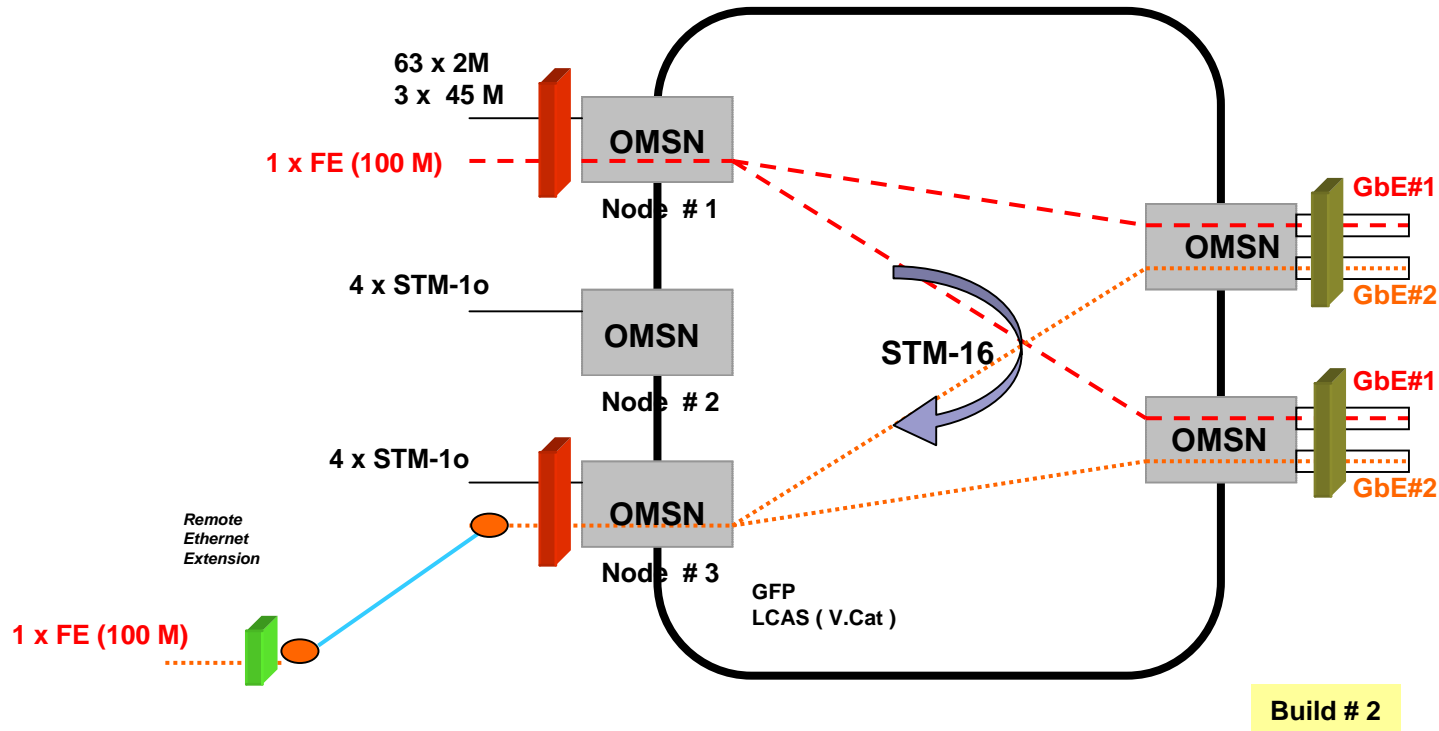


ISA-ETH V2



ISA-GBE

Continuing Ethernet Point to Point with ISA Ethernet

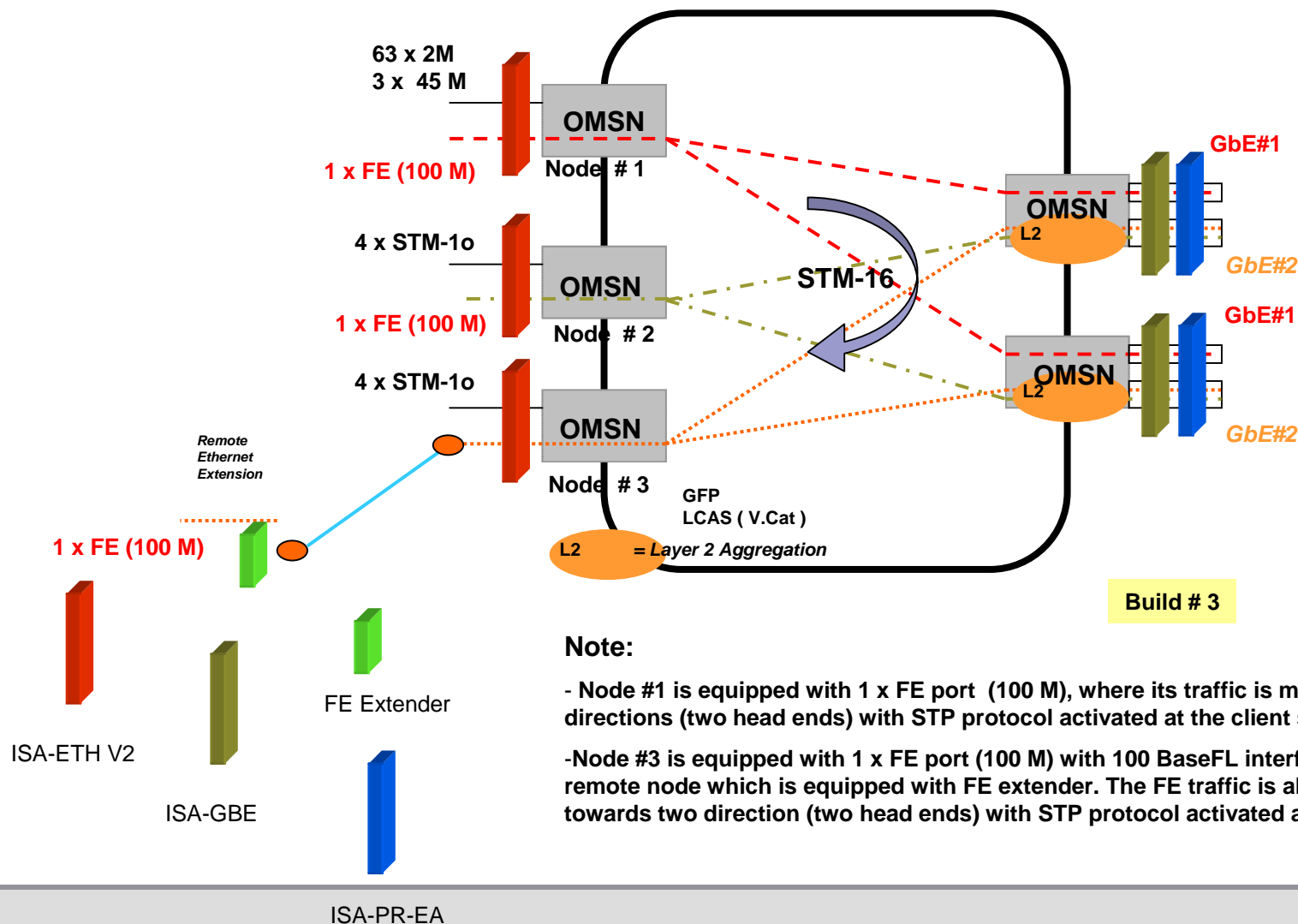


Note:

- Node #1 is equipped with 1 x FE port (100 M), where its traffic is multicasted towards two directions (two head ends) with STP protocol activated at the client side.
- Node #3 is equipped with 1 x FE port (100 M) with 100 BaseFL interface to reach the remote node which is equipped with FE extender. The FE traffic is also multicasted towards two direction (two head ends) with STP protocol activated at the client side.



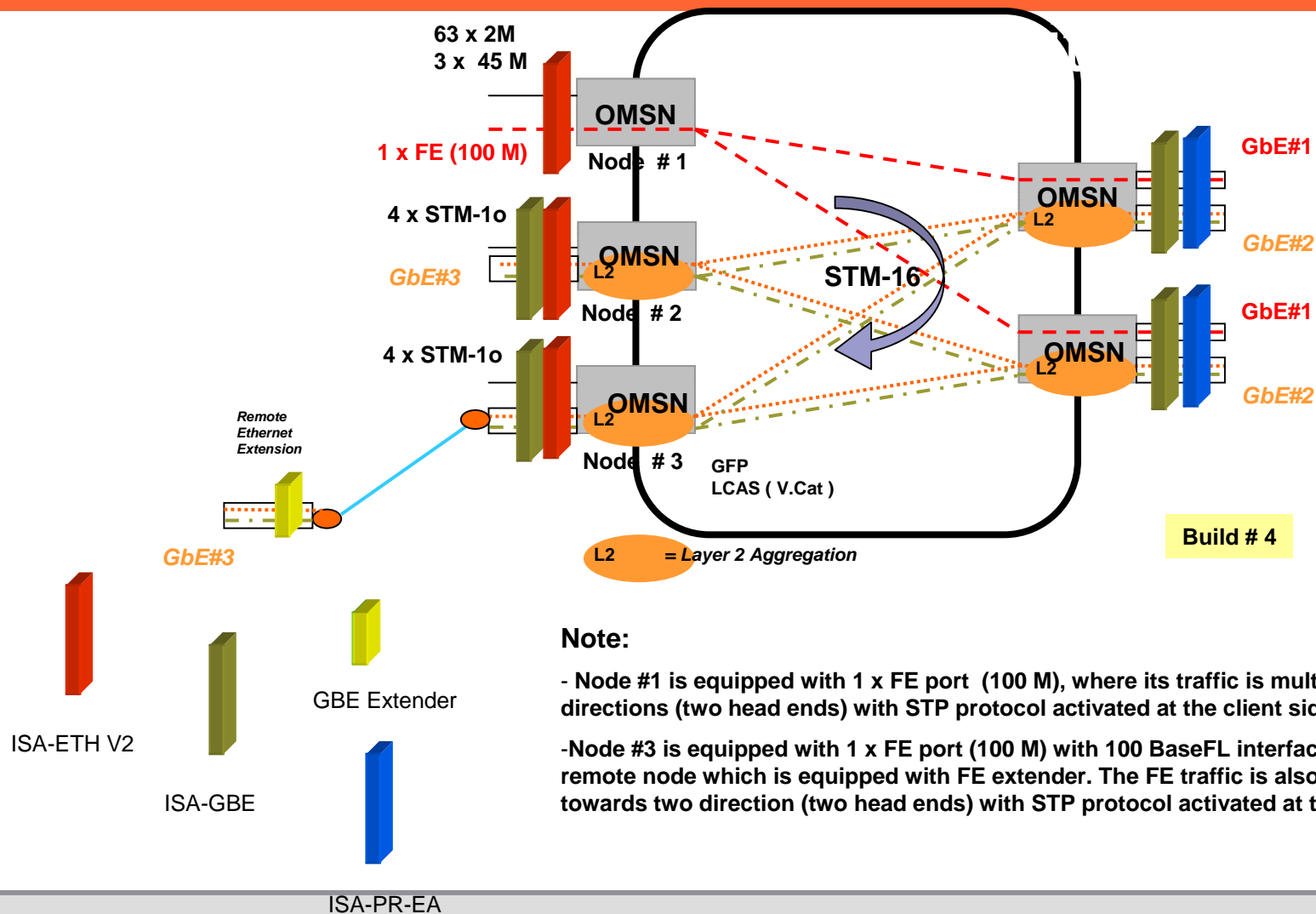
Extending Ethernet Point to Multi-Point with ISA Ethernet



Note:

- Node #1 is equipped with 1 x FE port (100 M), where its traffic is multicasted towards two directions (two head ends) with STP protocol activated at the client side.
- Node #3 is equipped with 1 x FE port (100 M) with 100 BaseFL interface to reach the remote node which is equipped with FE extender. The FE traffic is also multicasted towards two direction (two head ends) with STP protocol activated at the client side.

Extending Ethernet Multi-Point to Multi-Point



Note:

- Node #1 is equipped with 1 x FE port (100 M), where its traffic is multicasted towards two directions (two head ends) with STP protocol activated at the client side.
- Node #3 is equipped with 1 x FE port (100 M) with 100 BaseFL interface to reach the remote node which is equipped with FE extender. The FE traffic is also multicasted towards two direction (two head ends) with STP protocol activated at the client side.

- ◆ The metro network holds the key to revenues generation and operator's profitability.
- ◆ It is also the most capital intensive piece of infrastructure.
- ◆ Tight financial controls will be applied to metro investments strongly focusing on risk management and ROI.
- ◆ The only way to achieve these objectives is to have a single convergent multi-service transmission metro network.

謝謝

www.alcatel.com