The Last Mile Access – Is Copper at the end?

Olivier GORDIEN – Tendering & Sales Support Director, Alcatel South Asia
ITNSP Symposium, New Delhi, November 6-9 2006
Alcatel’s Vision in Mature Broadband Economies

The World is going **BROADBAND**

**High-Growth Economies:**
It is happening all at once
Telecom industry is evolving: **Service Transformation** with advanced broadband applications.

Require advanced network architecture and service management capabilities.
High-Growth Economies: a Strategic Focus

FACTS

A worldwide market of 6 billion people

Currently under-served, with only:
- 2.7 billion cellular subscriptions
- 1.2 billion fixed telephone lines
- 210 million broadband subscriptions

Source: IDATE, 2006

E-health
E-education
E-government
E-environment
E-business
E-agriculture
E-employment
E-science

Broadband is a necessity for economic and social growth

Alcatel: a Partner for Network Service Providers to Deliver “Broadband for All”
…As Telecom Can be a Transformative Force

GDP Drives Telecom BUT Telecom also Drives GDP

- Connecting communities has the potential to bring in wealth to those communities
- Create new business opportunities for both the urban and rural communities
- Improvements in Healthcare and Education particularly for rural communities
- Improvements in Government related services
  - E-Government
  - Public Safety/Security
Service Providers Need to Address 3 Different User Segments, with 3 Distinct Value Propositions

MOBILE USERS

INTERNET USERS

BROADBAND USERS

Voice & Data

Broadband

User-Centric Broadband

An architecture to deliver a compelling value proposition to each user segment
Opportunity for High-Growth Economies

Leapfrog to Latest Technology

Radical Cost Efficiencies
Most Innovative Services

Leapfrog to Latest Business Approaches

Beyond Fixed and Mobile Innovative Partnerships

Network, Service and Business Transformation to Address All
Focus on Broadband Access:
Four Drivers of Mass-Market Adoption with four key players

1. Public initiatives and policy
   TELECOM POLICY MAKERS

2. Adequate and relevant content
   CONTENT PROVIDERS

3. User awareness and expertise
   PUBLIC EDUCATION

4. Services affordability and accessibility
   NETWORK SERVICE PROVIDERS
Broadband Players Trends: 3 strategic moves

1. Fixed operators / ISPs
   - DSL
   - BWA
   - MVNO
   - Fixed operators / ISPs expanding

2. Mobile operators
   - FVNO
   - BWA
   - EDGE/HSDPA
   - 2G/3G
   - Mobile operators expanding

3. Integrated operators
   - DSL
   - BWA
   - EDGE/HSDPA
   - 2G/3G
   - Fixed + Mobile + ISP association with convergent services
Prepare to Deliver Advanced Services to Mature Broadband Users

Delivering a new user experience at home, in the office, on the go

Example: Triple-Play delivers a new TV experience at home

Towards HDTV
TV becomes personal: VOD, PVR
Community viewing and content sharing

Towards unlimited bandwidth
Requirement for advanced reference solutions
IPTV users forecast per geography

- **90% of wireline broadband** service providers to offer IPTV services by 2010
- **24% penetration** of IPTV into all **DSL Households by 2010**
- **Compound 5% penetration** of IPTV into **TV Households by 2010**
Access Transformation is required - Bandwidth Explosion

Demand estimate by 2008 - 2010

Downstream increase drivers

- SDTV: 2 Mbps/channel
- HDTV: 6 Mbps/channel
- Basic HSI: 0.5-5 Mbps average
- Gaming: 2 Mbps/session
- Multimedia surfing: 8 Mbps average
- Video Conf., learning: 3 Mbps/session
- Home working: 4 Mbps average

Drivers: HDTV, MPEG4, latency needs & peak usage

Upstream increase drivers

- SDTV: 0.2 Mbps/channel
- Basic HSI: 2 Mbps average
- HDTV: 0.5 Mbps/channel
- Personal content upload: 3 Mbps/channel
- Gaming: 2 Mbps/session
- Multimedia surfing: 2 Mbps/session
- Video Conf., learning: 3 Mbps/session
- Remote home monitoring: 0.5 Mbps/call

Drivers: peer-to-peer applications

Increased bandwidth needed despite improved compression techniques
Technology Impact is huge: Breaking Access Bottlenecks…
On ongoing transformation of the Access Network

Consumer’s Digital Home
Millions of users

• Fiber in Access breaking bandwidth bottlenecks
• IP in Access breaking scalability bottlenecks
• Digital Home Care breaking operational bottlenecks

Provider’s Service Offering
Millions of bytes

<table>
<thead>
<tr>
<th>Service Offering</th>
<th>Downstream</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 HDTV, 2 SDTV</td>
<td>16 Mb/s</td>
</tr>
<tr>
<td>2 Gaming channels</td>
<td>512 Kb/s</td>
</tr>
<tr>
<td>2 Voice calls and Visio</td>
<td>220 Kb/s</td>
</tr>
<tr>
<td>High Speed Internet</td>
<td>3 Mb/s</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>20 Mb/s</strong></td>
</tr>
</tbody>
</table>
Broadband access technologies at a glance

Access technology portfolio

(Basis: Frequency Band in the 2GHz range, using 10Mhz)
## Access Transformation Full Service Coverage

### MDU/OSP

<table>
<thead>
<tr>
<th>Location</th>
<th>Distance</th>
<th>% of Homes (Europe)</th>
<th>VDSL2(*)</th>
<th>ADSL2+(*)</th>
</tr>
</thead>
<tbody>
<tr>
<td>CO</td>
<td>1.5km</td>
<td>20%</td>
<td>25Mb/s</td>
<td>18Mb/s</td>
</tr>
<tr>
<td>CO</td>
<td>1km</td>
<td>80%</td>
<td>50Mb/s</td>
<td>24Mb/s</td>
</tr>
<tr>
<td>FTTN</td>
<td>&lt;0.5km</td>
<td>100%</td>
<td>100Mb/s</td>
<td>24Mb/s</td>
</tr>
<tr>
<td>FTTB/C</td>
<td></td>
<td>100%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FTTU/GPON</td>
<td></td>
<td>100%</td>
<td>+100Mb/s</td>
<td></td>
</tr>
</tbody>
</table>

(*) maximum theoretical downstream bitrate

### Fiber-to-the-Most-Economical-Point Solutions
Expand Broadband Footprint for Mass-Market Broadband
Need to Combine Different Broadband Access Technologies

Today: Urban areas
(early adopters)

Central Office

ADSL2+
Served from Central Office
and Multi Dwelling Units
(fiber-to-the-building)

Extensions
Urban/Suburban
(mass-market)

Areas with copper

FTTN

ADSL2+/VDSL2
Extend Central Office footprint
with cost-effective FTTN
extendable with remote sealed units

FTTU

GPON

Greenfield areas

Extensions
Rural/Remote
Communities
(mass-market)

WiMAX
(802.16e-2005)

Optimize Access Network for
Every Deployment Strategy
Expand Broadband Footprint Beyond Copper: Leapfrog to the Latest Broadband Access Technologies

Greenfield higher density areas:

- FTTU GPON and Fiber-to-the-Building
- Provides affordable broadband: share fiber cost and civil works over many users (up to 1,000 users @512kb/s)
- Not subject to cable theft, Same subscriber management as DSL
- Up to 20km from central office

Greenfield lower density areas:

- Leapfrog to WiMAX 802.16e-2005:
  - Best wireless broadband technology for fixed service:
    - Superior indoor penetration (non line-of-sight technology)
    - Self-installing CPEs
    - More efficient use of spectrum (SOFDMA)
  - Commercial deployments in 2006
  - Supporting carrier-grade VoIP services from day one
  - Joint-venture with C-DOT in India: end-to-end solutions for high-growth markets worldwide
Fiber in Access deployments starting worldwide

**FTTN - VDSL Share of DSL**

Dell’Oro 2006

- Upgrades/Replacements (ADSL2+)
- ADSL/ADSL2+
- VDSL

**FTTU - deployments worldwide**

**NA GPON deployments**
- Verizon, Bell Canada, AT&T, Qwest, Municipalities

**EMAI**
- FT Paris pilot
- Telefonica lab trials,
- Nordic ‘Citynets’
- Kuwait MOC

**APAC**
- Japan – NTT deploying EPON
- China, Singapore,… Preliminary trials

**Very High Speed with Fiber to-the-most-Economical Point**
Combination with Wireless Broadband Technologies

- Not one technology fits all
- Opportunity to leverage 2G assets
- Need flexibility to adapt to fast changes
  - in services
  - in capacity

Best Answer is Multi-Standard Radio equipment

Mapping wireless broadband technologies
- most cost effective by data rate and environment
- high data-rate means more than 1Mb/s
- logarithmic scale

Source: Alcatel
Access Technology Innovation
WiMAX 802.16e – meets versatile market needs

- Residential and SOHO WLL
- Wireless DSL Broadband @ Home & Office
- Mobile Broadband
- 802.16e-2005
- Mobile TV/Games, Mobile office ...
- All Mobile
- VoIP
- Broadband Internet

WiMAX : Worldwide Interoperable Microwave Access
Technology Impact is huge: Convergence in Access 300 million NGN voice replacements by 2010

VoIP Gateways - worldwide forecast

Access & NGN Voice

- VoIP over DSL for high-end triple play users and 2° line voice service
  - Japan 10M: 56% of BB users
  - Brazil 2M: 66% of BB users
  - France 1.2M: 15% of BB users
- VoIP over Fiber is the default FTTU model
- NGN Class 5 for cost-optimized black phone convergence
  - Access Media Gateway line shipments doubling every 2Y

"Converging IMS & IPTV at access is the most popular solution (as) it puts intelligence at the network level"

Source: IMS opportunities & challenges 2006 (Informa UK Ltd)
Access Transformation: Integrating all voice technologies in one single access product (MSAN)

**VoIP gateways Worldwide forecast**

- **VoIP over DSL**: Value Add services
- **VoIP over Fiber**: Greenfield or copper replacement
- **PTSN/C5 emulsion**: OPEX & obsolescence

**Alcatel Vision**

- **Softswitch**
- **IP Edge**
- **Hybridphone**
- **SIP phone**
- **HG W**
- **ON T**
- **PSTN**
- **PON**
- **VoIP Access Gateway**

**ISAM**

- VoDSL High QoS
- Media Gateway (packetization)
- Signaling Gateway H.248 & SIP

Source: Probe Group LLC
Note: Forecast excludes VoCable.
One Service Delivery Architecture for Fixed Service Providers to Enable Mass-Market Broadband and Deliver Advanced Services

Universal Broadband Access
- FTTx
- DSL
- WiMAX

Service-Aware Edge and Transport
- IP Aggregation
- IP Routing
- Transport

Open Service Delivery Environment
- Service Enablers
  - Affordable broadband internet
  - VoIP
- Service Operations
- Applications
  - Triple Play
  - Convergence
  - Managed Communication Services

One IP Architecture for Fixed Service Providers
Leading Transformation Projects Across the World

Services

Network Transformation

Integration

Network of Partnerships

IP & Multimedia Portfolio

Services Integration

ACCA Networks

celcom

KT

SingTel

Telstra

at&t

BT

TCom
The World’s Premier Wireline Networking Vendor

#1 Broadband Access
xDSL, MSAP/DLC

#2 Carrier Ethernet S/R
Consumer, Enterprise

#1 Optics

Optical Networking Leadership

Terrestrial, Submarine

IP / Ethernet Routing Leadership
N°1 - Alcatel to reach 100M DSL lines shipped end Q3

DSL World-wide Line Shipments, 2Q06
Source: Dell’Oro, June 2006

- **Alcatel**: 93.1M
- **Huawei**: 27.5M
- **Siemens**: 18.6M
- **Lucent**: 17.8M
- **NEC**: 14.8M
- **ECI**: 12.8M
- **Others**: 31%

### Geographical Breakdown
- **North America**: 29.0M
- **Europe & Middle East**: 40.4M
- **Asia - Pacific**: 17.5M
- **Rest of World**: 6.3M

All rights reserved © 2006, Alcatel