Broadband Provisioning for Developing Countries

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What is broadband?

- VoIP and interactive voice

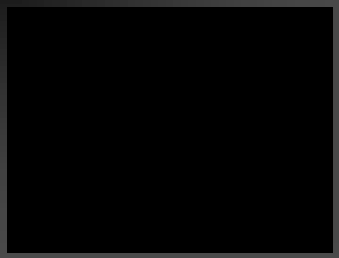
What is broadband?

- Interactive video chat

What is broadband?

- Fast downloads

What is broadband?



- Full motion (asynchronous) video

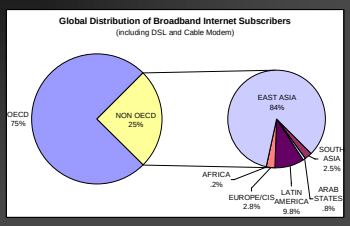
Broadband by the numbers….

- ITU currently defines broadband as a network whose combined capacity (up and down) sums to 256 Kbps or above.

Tomorrow's broadband?

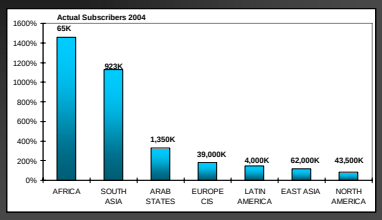
- Streaming DVD quality video while traveling at vehicular speeds???

Where is broadband?



- 75% of broadband subscribers are in the OECD.

Where is broadband?



- But most of the growth is outside the OECD.

How do we provision broadband?

There are three principle families of technologies for provisioning of broadband Internet:

- Broadband wireline networks (e.g. DSL, cable modems, FTTH)
- Broadband wireless solutions (e.g. WiMax, WCDMA, CDMA 2000)
- Non-terrestrial wireless networks (e.g. VSAT)

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Broadband wireless solutions

There are four principle families of technologies for terrestrial wireless provisioning of broadband Internet:

- GSM
- CDMA
- WiMAX
- 802.20

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- CDMA

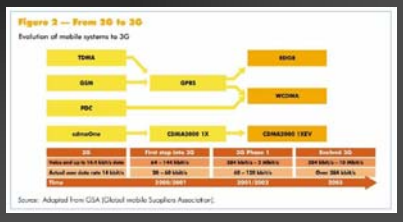
mobile telco sector

- WiMAX
- 802.20

data networking sector

GSM and CDMA

GSM and CDMA



W-CDMA and CDMA2000

- Bandwidth, costs, range, etc. are very contingent (on cell size and congestion, spectrum fees, installed base, etc.)
- W-CDMA can support up to 2 Mbps (HSDPA allows downlink up to 14 Mbps)
- CDMA 1xEV support 3.1 Mbps down and 1.8 Mbps up.

WiMAX and 802.20

- Still emerging standards, with range of offerings, and very contingent capabilities.
- Less support for mobility and ubiquity compared to 3G offerings, can support pt-to-mltpt and pt-to-pt environments, generally higher capacity, generally lower-cost in low subscriber density regions.

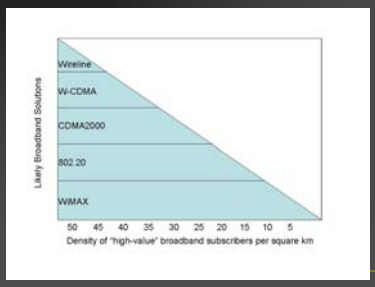
And Others….

- Broadband corDECT, a NLOS low cost fixed wireless system delivering 512 Kbps dedicated bandwidth per user.
- WiFi beyond hotspots, pt-to-pt WiFi systems with “rural network” MAC extensions.
- WiBro from Korea, TD-SCDMA from China

As regulators….

- Remain technologically neutral and ask vendors/operators the hard questions in terms of their:
- Mobility
- Ubiquity
- Spectral efficiency
- Capacity
- Cost
- QoS
- Security
- Session management
- AAA

And to shamelessly have it both ways…



Fibre Networks

Network Topology

Network layers

	Backbone Network	IXP	Service Network	Access Network
Application	*Triple play: Voice & Video over IP and Data*			
Transport	*TCP/UDP*			
Network	*IP*			
Link	*100/40G*	*10G*	*1G*	*10/100M*
	SDH	*IEEE 802 LAN (Ethernet)*		*WLAN*
Physical	*WDM & Optical Switching*		*Cu TP* / *Cu Coax*	*Wireless spectrum*
	Passive (dark) fibre point-to-point & multipoint (PON)			

Enabling Factors

- Open Access
  - Lease resources at any level
    - physical, link, network
  - and provide value added services at a higher level
- Shared & independent access networks
  - Local sustainable business models
- Cheaper and simpler technologies
  - Students built a 400 km transborder Gigabit network over a submarine fibre network for less than 40 keuro (www.balticopen.net)

Fibre in developing countries?

Ubuntunet Alliance

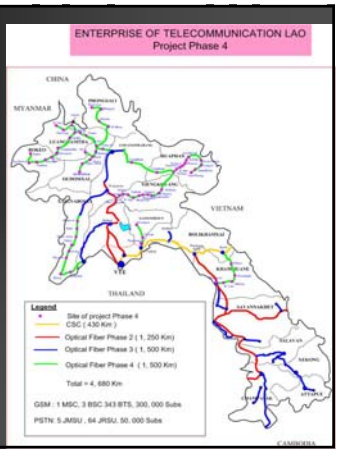
- An African University Consortium buying in at wholesale level in the EASSy Submarine Cable.

Malawi

- Power Utility Company ESCOM will operate as a Carriers Carrier for Telecom Providers, Operators and Users.
- The following bundled services will be offered:
  - Voice/Fax and Data circuit leasing
  - Narrowband and Broadband leasing
  - TV carrier circuit leasing
  - Audio broadcast circuit leasing
  - 10/100 BaseT Ethernet circuit leasing
  - Dark Fiber leasing

Laos

- Fibre to all provinces and districts
- Vientiane Gigabit Network
- Could build a national gigabit backbone for a couple of MUSD



Bolivia

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