

Broadband for Africa business & policy challenges

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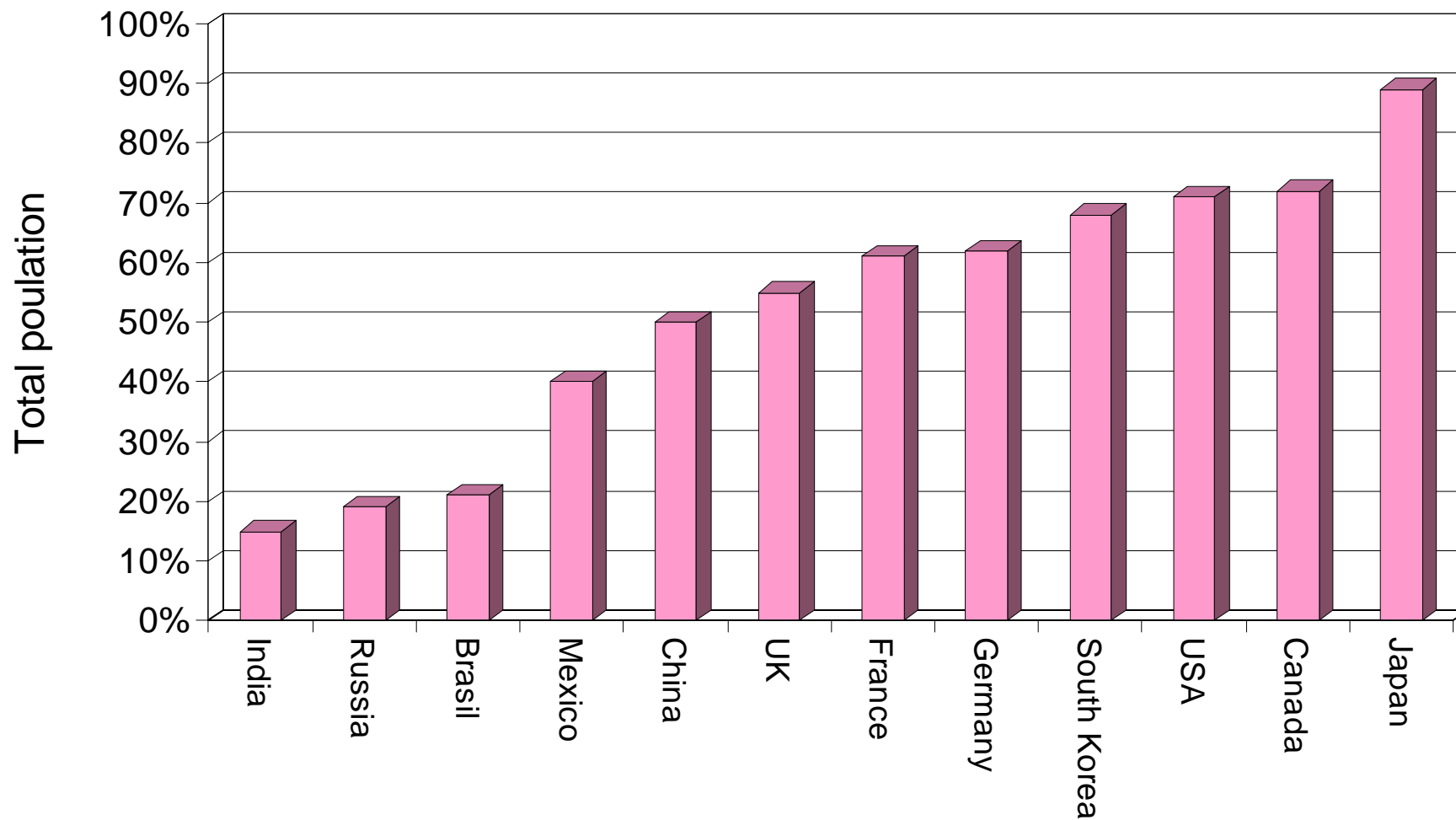
Contents

- Introduction
- World class competitive markets
- Some examples from Asia and Africa
- Fixed broadband
- Wireless broadband
- Conclusions
- Issues

What is world class?

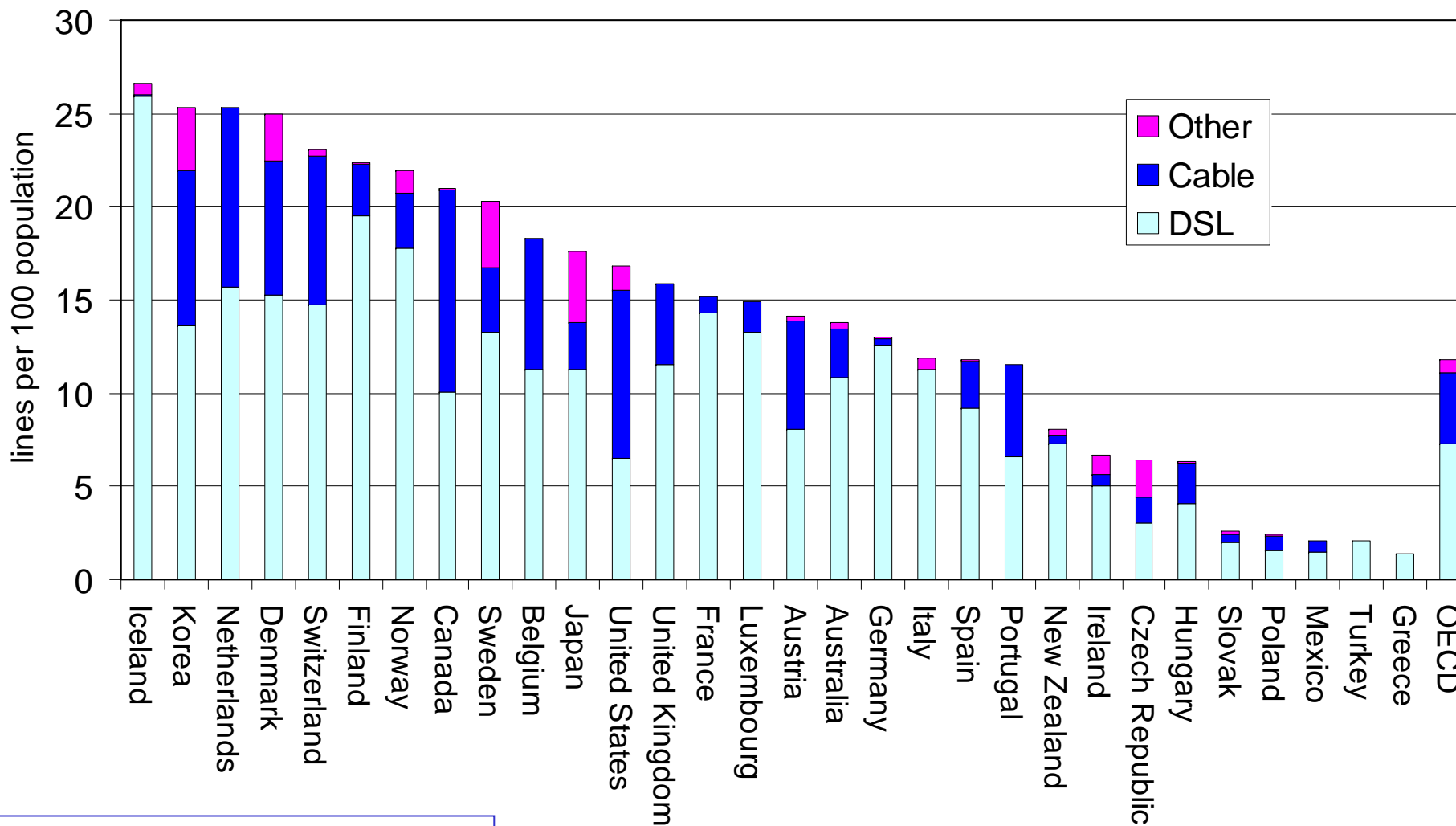
- Residential services:
 - 1,000 Mbits per second
 - Wi-Fi or WiMAX for individuals and devices
- Competition:
 - low and affordable prices
 - diversity of providers and offers
 - wide range of complementary services
- Innovation:
 - new devices
 - new services
 - new business models
- Policy instruments:
 - pro-competition
 - opening licensed and unlicensed spectrum
 - local loop unbundling
 - government-industry collaboration
 - targeted state aid
 - content creation industry to support demand

Internet usage in last 30 days



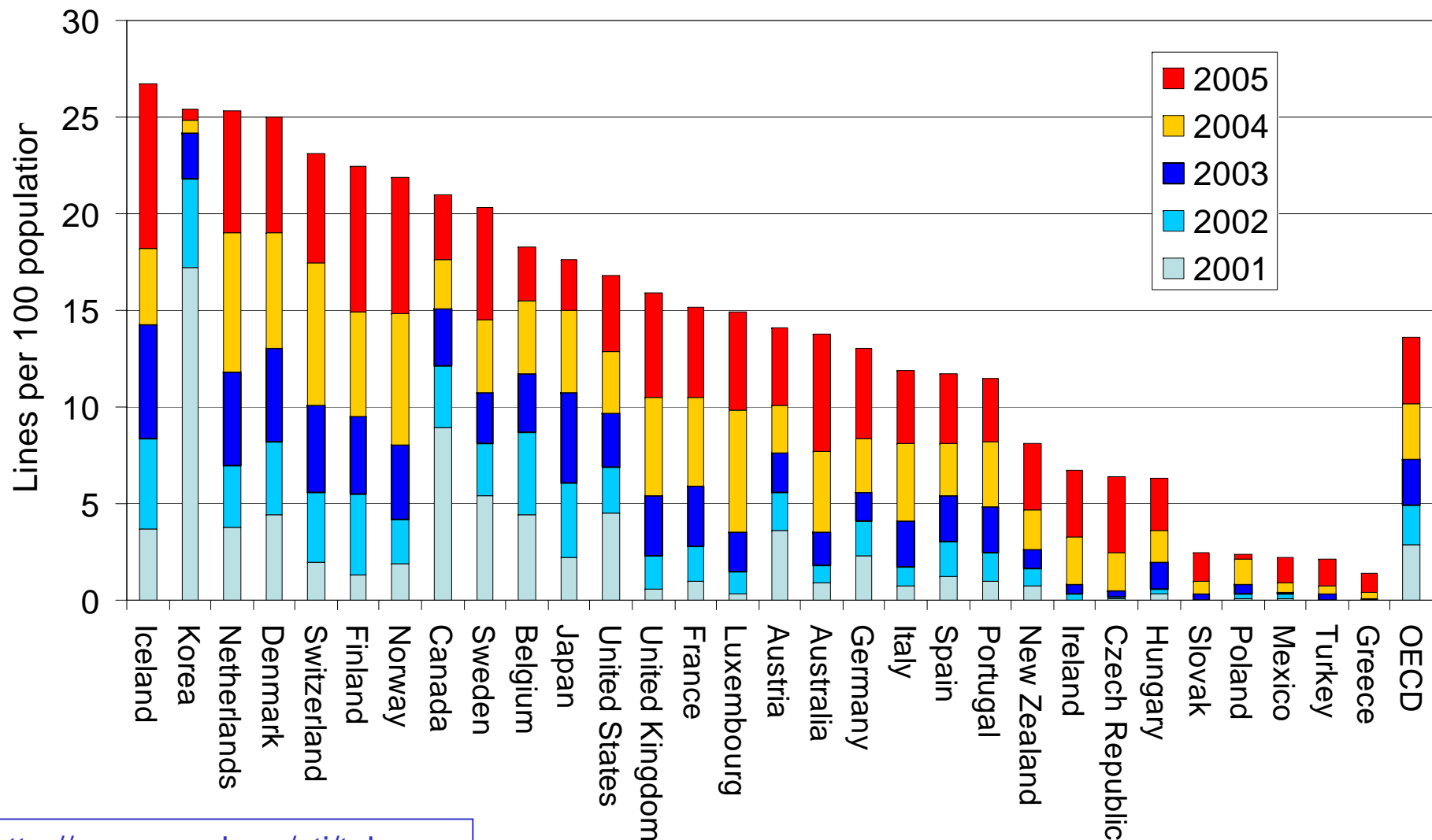
<http://www.ipsos-na.com/news/pressrelease.cfm?id=3030>

OECD Broadband December 2005



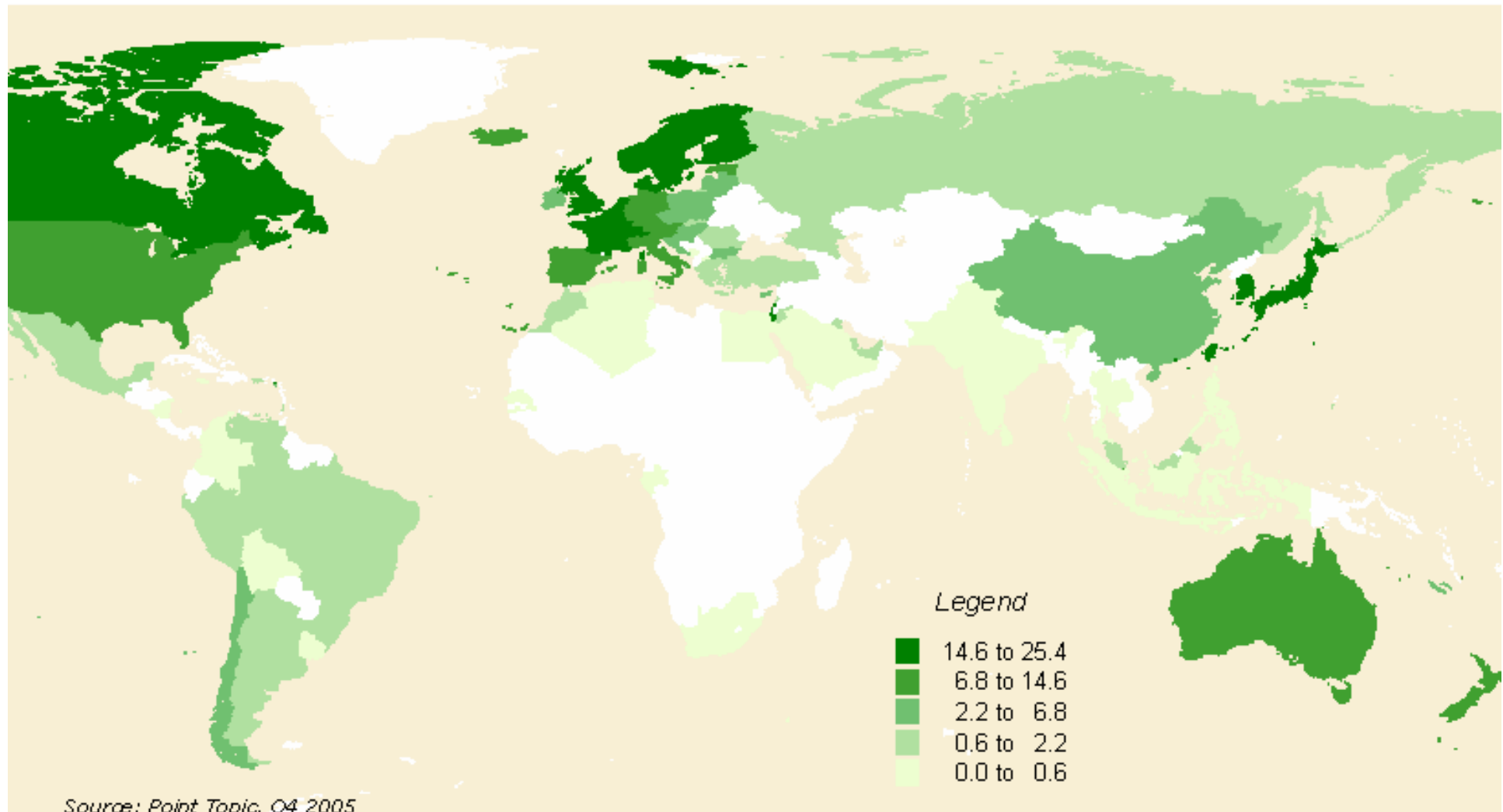
<http://www.oecd.org/sti/telecom>

OECD broadband growth



<http://www.oecd.org/sti/telecom>

Global broadband teledensity



Source: Point Topic, Q4 2005

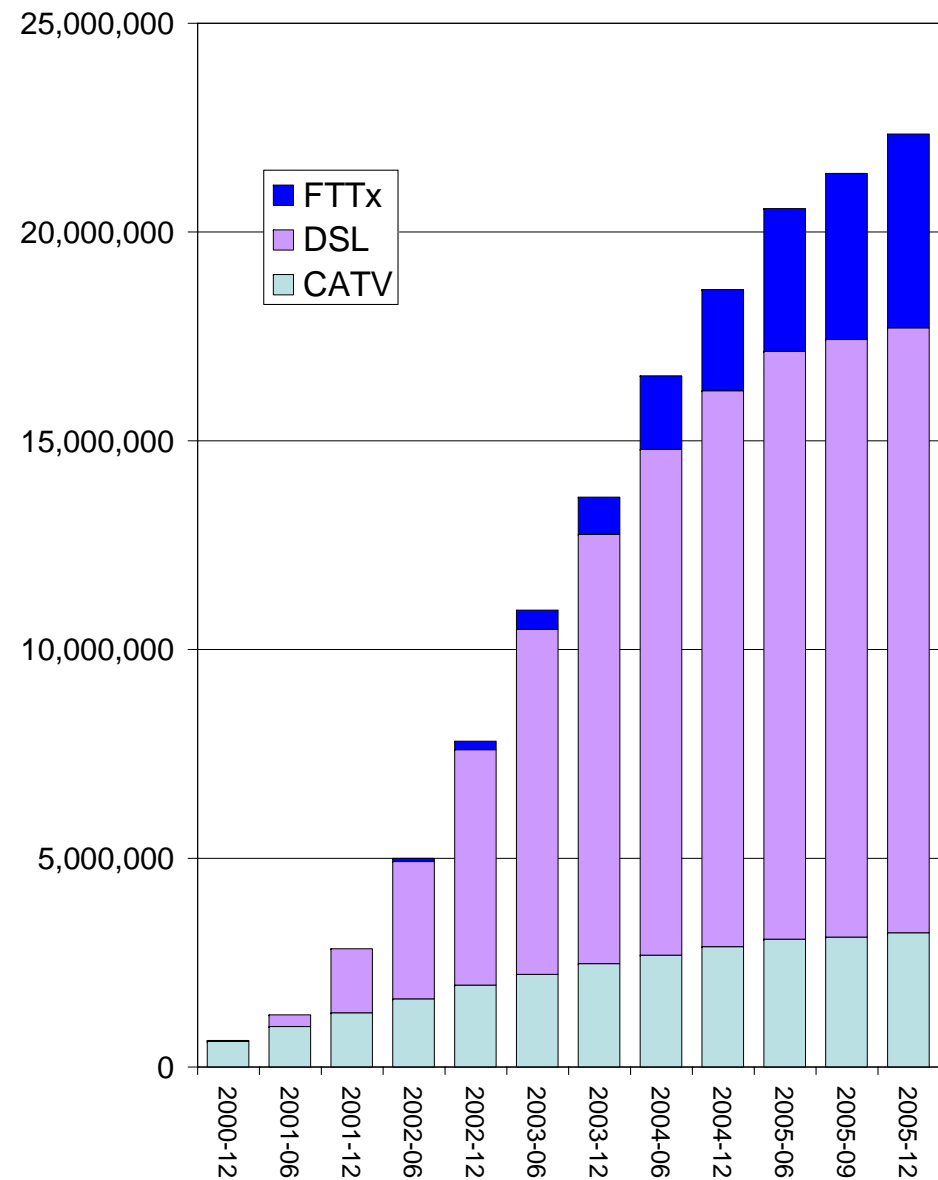
Lines per 100 population

<http://www.point-topic.com/>

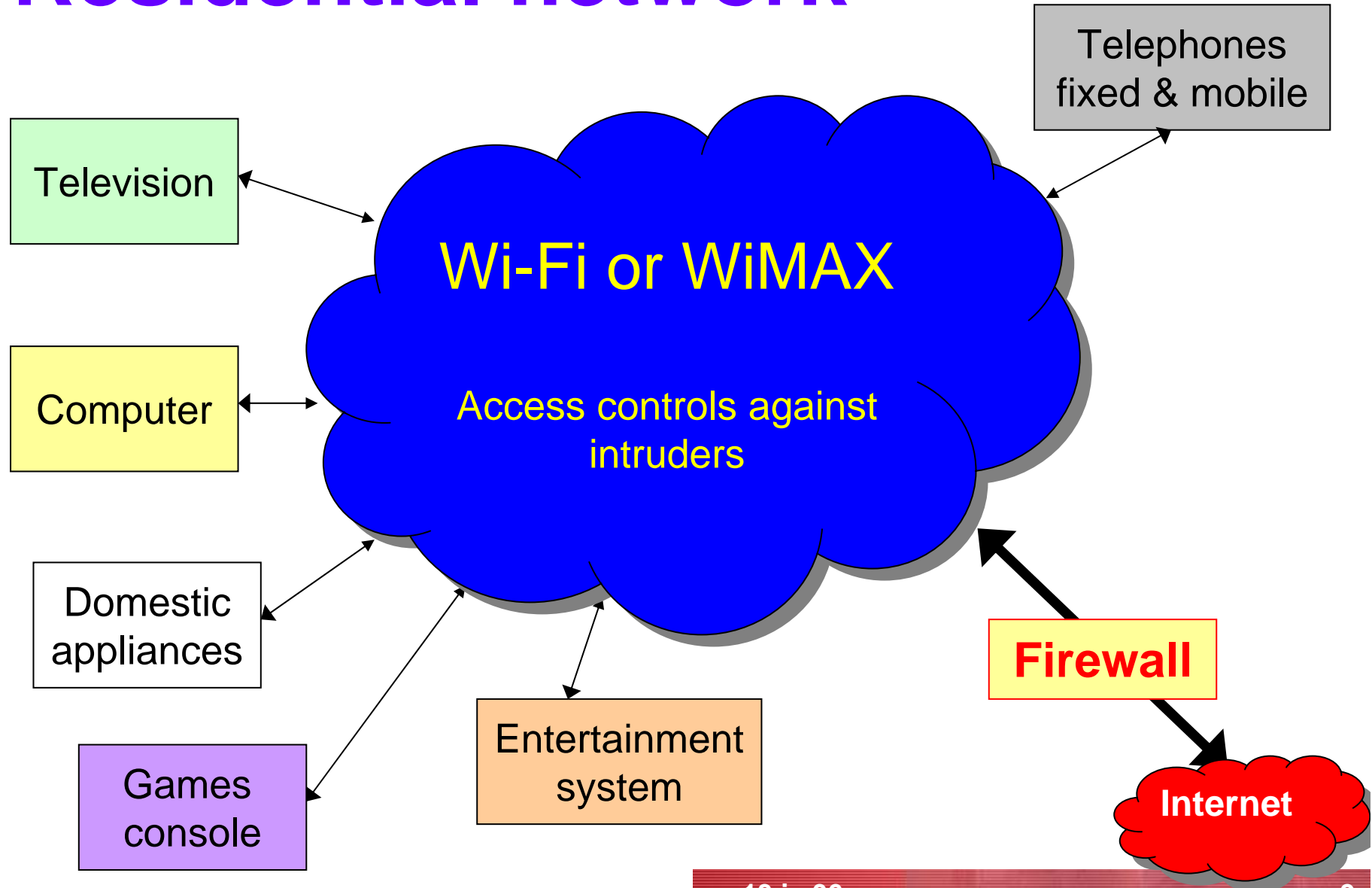
Japan

- Yahoo! BB
 - 50 Mbps downstream
 - 12.5 Mbps upstream
 - ¥ 4,500 per month
 - VoIP and television
- NTT market shares
 - 37.5% of retail DSL
 - 33.9% of FTTB
 - 77.8% of FTTH
- Hikari FTTx
 - symmetric 100 Mbps
 - from ¥ 6,000 per month
- Significant growth of “heavy-hitters” on the backbone, such traffic is gradually increasing

<http://www.nanog.org/mtg-0602/pdf/cho.pdf>



Residential network



Hong Kong SAR

- 4 million people
- High-tech image
- High-rise apartments
- Competition in wiring cabinets of multi-storey buildings
- Very high mobile tele-density and 3G

ETB 10 = HK\$ 9.39

<http://www.speedtest.com.hk/>

HKBN residential offers:

- bb10 (Mbps)
- bb25
- bb100 for HK\$238
- bb1000 for HK\$1,680 (since June 2005)
- Movies to download, free for first 18 minutes (DVD in 7 minutes)

Singapore

- Market dominated by two state-owned firms
- SingTel offers:
 - 0.5 Mbps for SG\$ 47.25 per month
 - 25 Mbps for SG\$ 128.00 per month
- Starhub offers:
 - 2 Mbps for SG\$ 2.50 per day
 - 30 Mbps for SG\$ 121.80 per month, includes 6 TV channels
- Leong Kheng Thai: “We are still holding our own, but if we don't step on the accelerator, we will be left behind. So the time is ripe for us to do the next upgrade”
- Next Generation National Broadband Network will be capable of ultra high speeds of symmetric 1Gbps or more, with initial provisioning of 100Mbps.

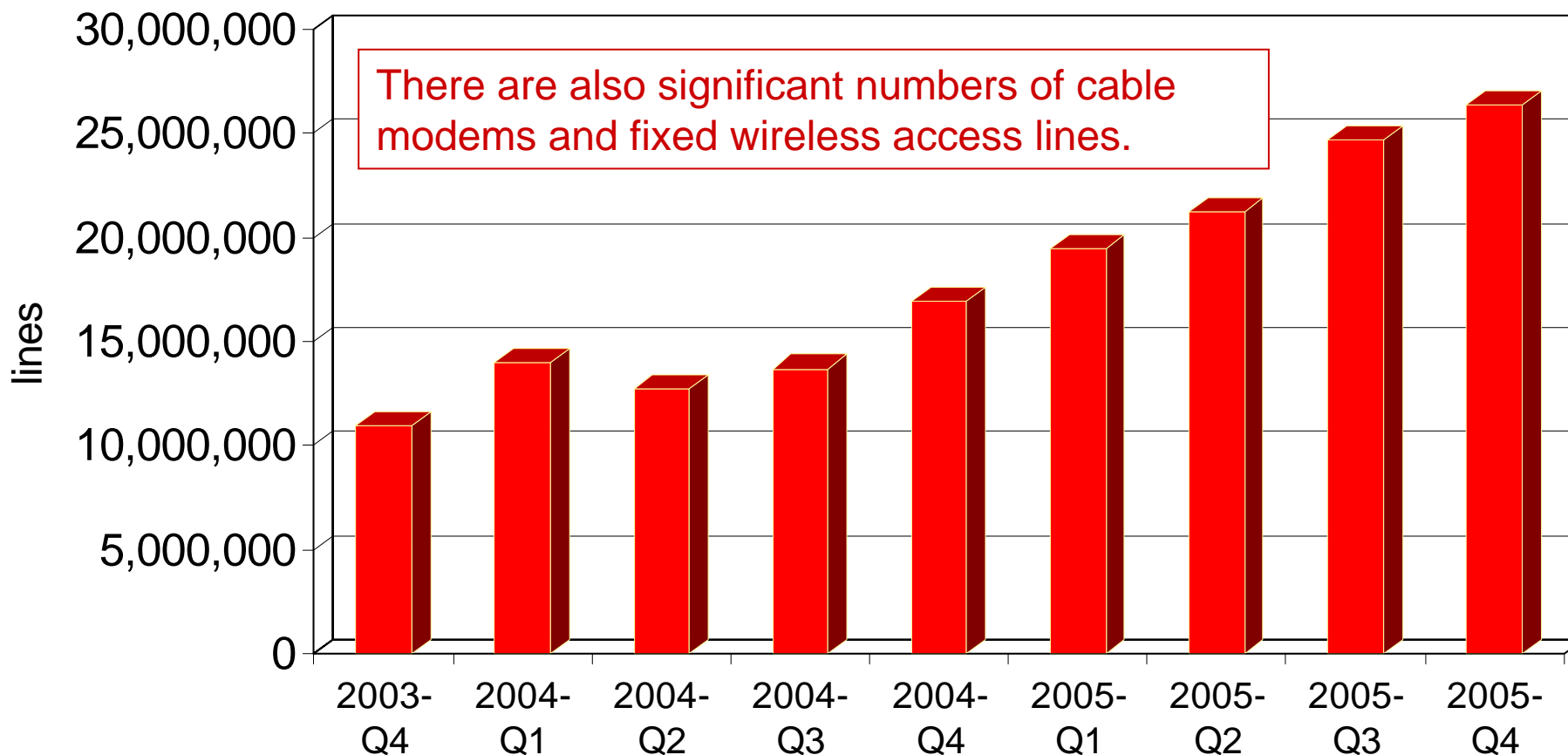
ETB 10 = SG\$ 1.95

<http://www.ida.gov.sg/>

China

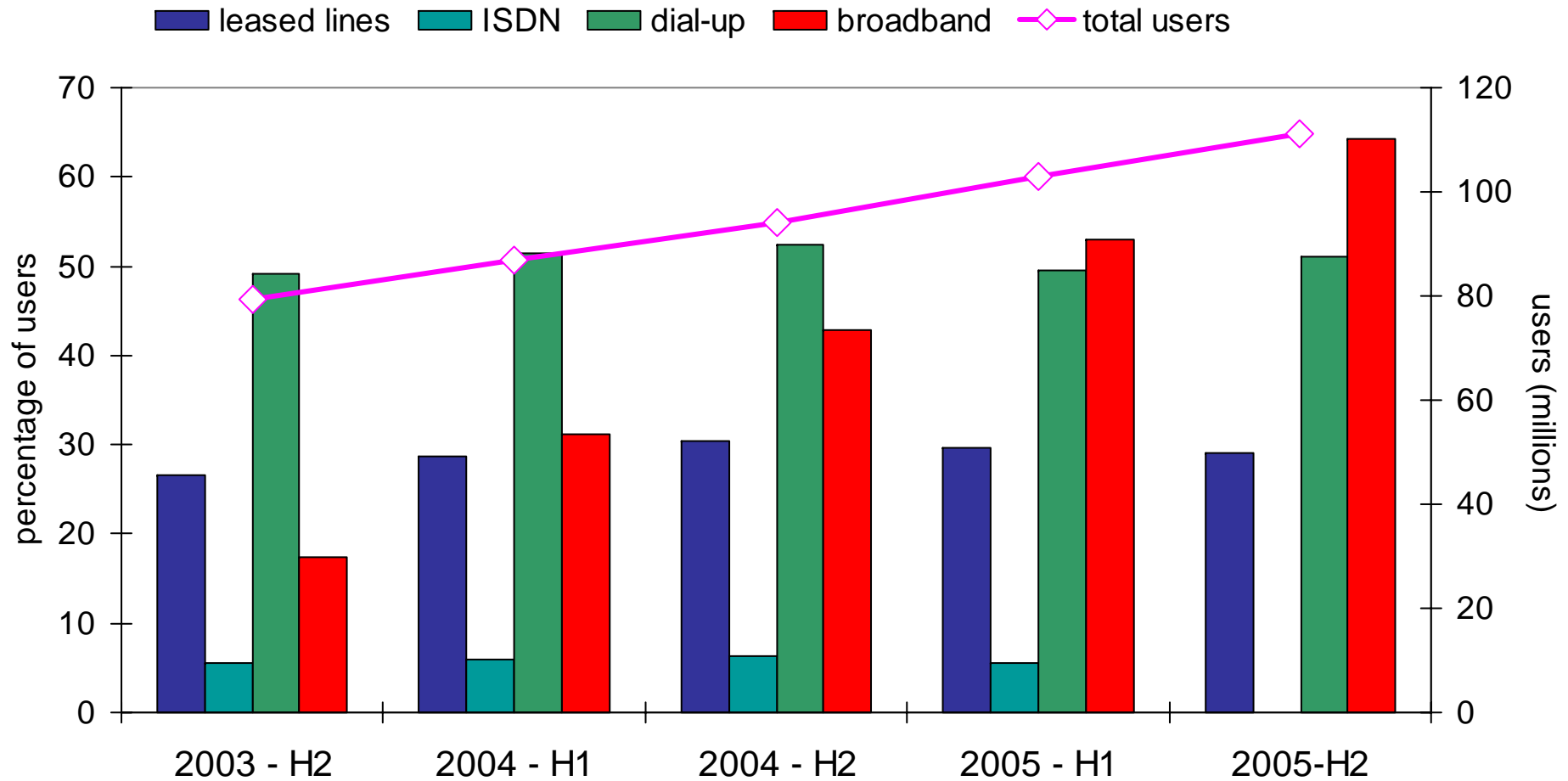
- Substantial growth of WLL
- Very solid broadband growth:
 - ADSL
 - cable modem
 - fibre to the building
 - metro Ethernet
 - fixed wireless access
- Massive growth of GSM and pushing for 3G

China – broadband



Sources: DSL Forum and Point-Topic

China – Internet users



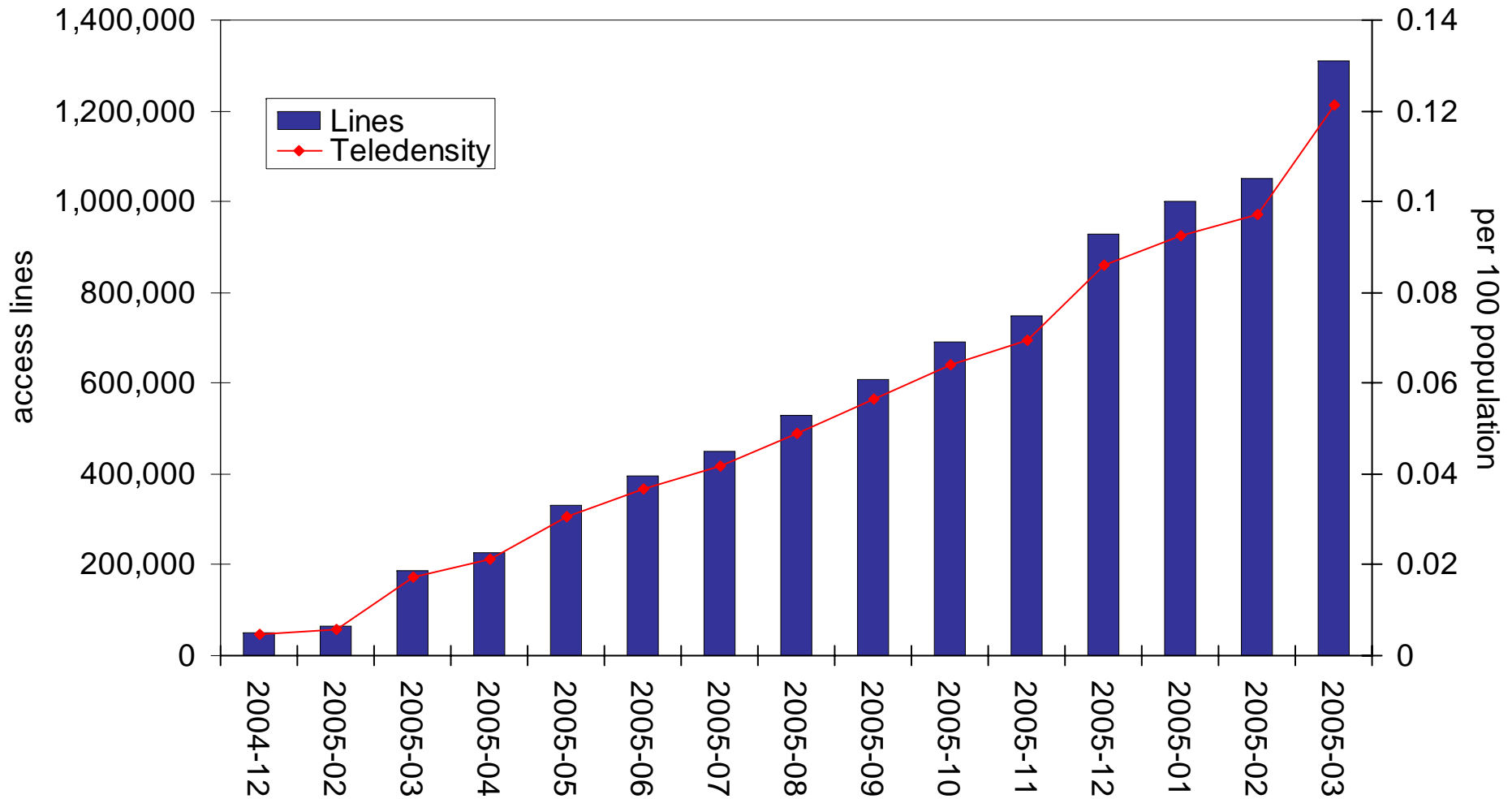
Source: CNNIC statistical survey reports

India

- Action taken to make drastic cuts in national and international leased lines
- Substantial new undersea cable links, especially to South-East Asia
- Broadband services growing slowly:
 - compared to China
 - compared to government plan
- BSNL (incumbent operator)
 - INR 500 deposit
 - INR 250 per month for 256kbps (download cap 0.4 GB then INR 1.4 per MB)
 - INR 1,000 per month for 384 kbps (download cap 2.0 GB then INR 1.0 per MB)
 - INR 3,300 per month for 1,000 kbps (download cap 10.0 GB then INR per 0.8 MB)
- Airtel broadband
 - INR 500 deposit
 - INR 349 + 99 per month for 256kbps (375 MB then INR 1.2 per MB)

ETB 10 = INR 53.59

India – broadband



Source: TRAI

Pakistan

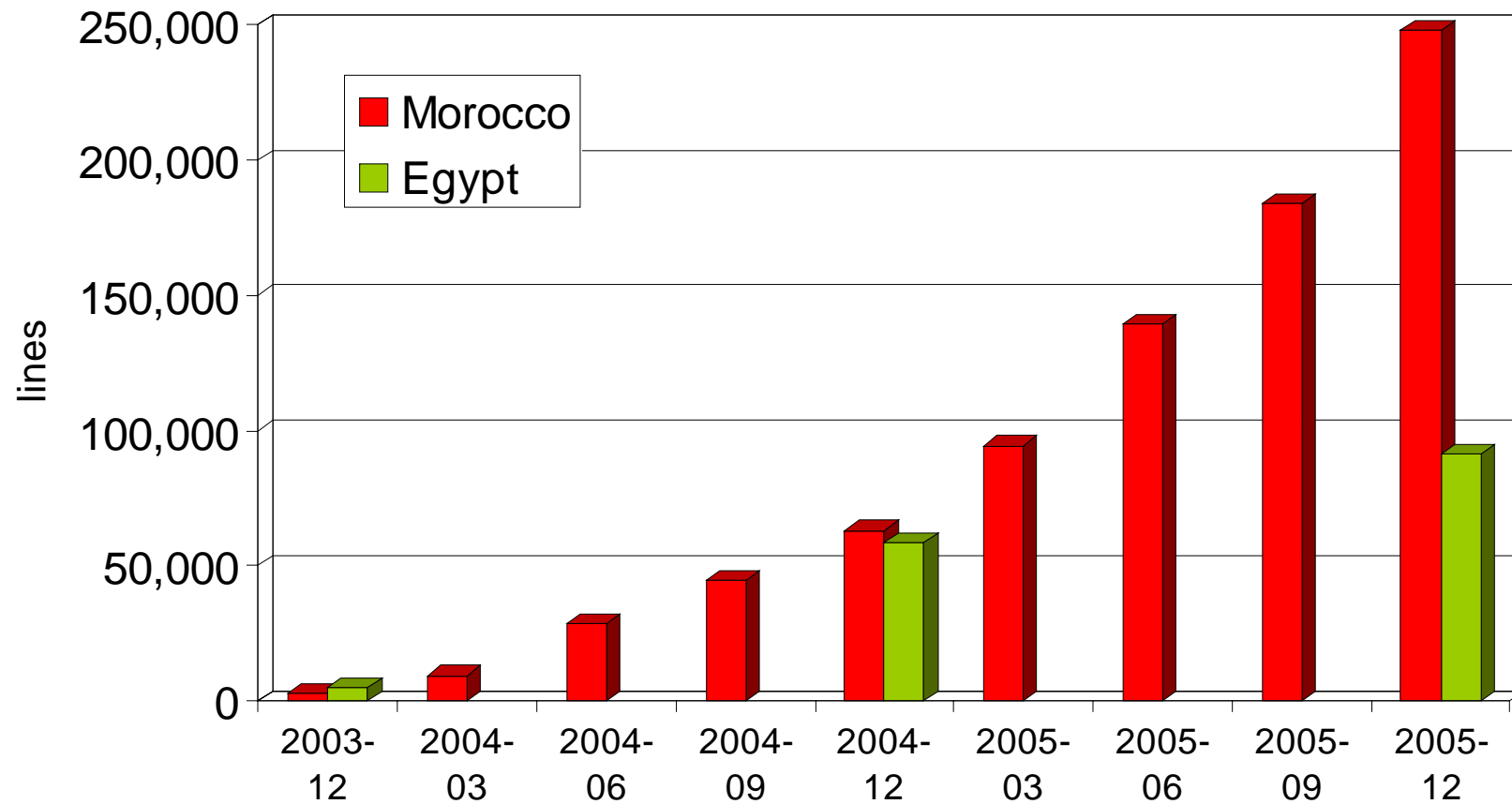
- New broadband policy at end of 2004
- Licensed a dozen ISPs to construct their own last mile
- PTCL and Buraq Telecom rolling out 1.5M lines of Wireless Local Loop (WLL)
- Opening terrestrial fibre link to India following major outage of the only undersea cable
- Also added two GSM licences

Mahgreb – broadband prices

- Menara (Morocco)
 - 4 Mbps for MAD 799
 - 0.512 Mbps MAD 399
 - 0.256 Mbps MAD 299
- Wanadoo (Tunisia)
 - 256 kbps for TND 40
 - 128/256 kbps peak/off-peak for TND 25
 - 128/64 kbps peak/off-peak for TND 17
- Egypt ADSL Yalla
 - 2.0 Mbps for EGP 725
 - 0.2 Mbps for EGP 150
- Arkanet (Egypt)
 - 2.0 Mbps for EGP 725
 - 0.5 Mbps for EGP 250
- Wanadoo (Algeria)
 - 128 kbps for DZD 1900
 - 256 kbps for DZD 3999

ETB 10 = MAD 11.00 = EGP 7.018 = TND 1.65 = DZD 9.15

ADSL growth



Source: ANRT and NTRA

South Africa

- iBurst – G1 tariff
 - device costs ZAR 2190
 - ZAR 469 monthly
 - 0.5 GB free, then ZAR 179 for 1 GB (or ZAR 439 for 3 GB)
- SenTech
 - up to 3 Mbps
 - 0.2 GB for ZAR 499
 - 0.5 MB for ZAR 599
 - 1.0 MB for ZAR 699
 - Thereafter ZAR 1 per Megabyte
- Telkom SA - ADSL
 - 1.0/0.3 Mbps
 - 3 Gigabyte monthly cap
 - installation ZAR 720.10
 - ZAR 772.28 monthly (incl. tax)
- Nashua Mobile (3G)
 - MTN 100 MB for ZAR 100, then 1.50 per MB
 - MTN 1 GB for ZAR 499, then 1.25 per MB
 - Vodacom 1GB for ZAR 599, then ZAR 2.0 per MB

ETB 10 = ZAR 7.485

Other African offers

Gabon Telecom

- Dial-up 25 FCFA per minute
- Ogooué Bronze
256 kbps
875,000 FCFA HT
- Ogooué Silver
512 kbps
1,170,000 FCFA HT
- Ogooué Gold
1024 kbps
1,404,000 FCFA HT
- Ogooué Platinum
2048 kbps
1,684,000 FCFA HT

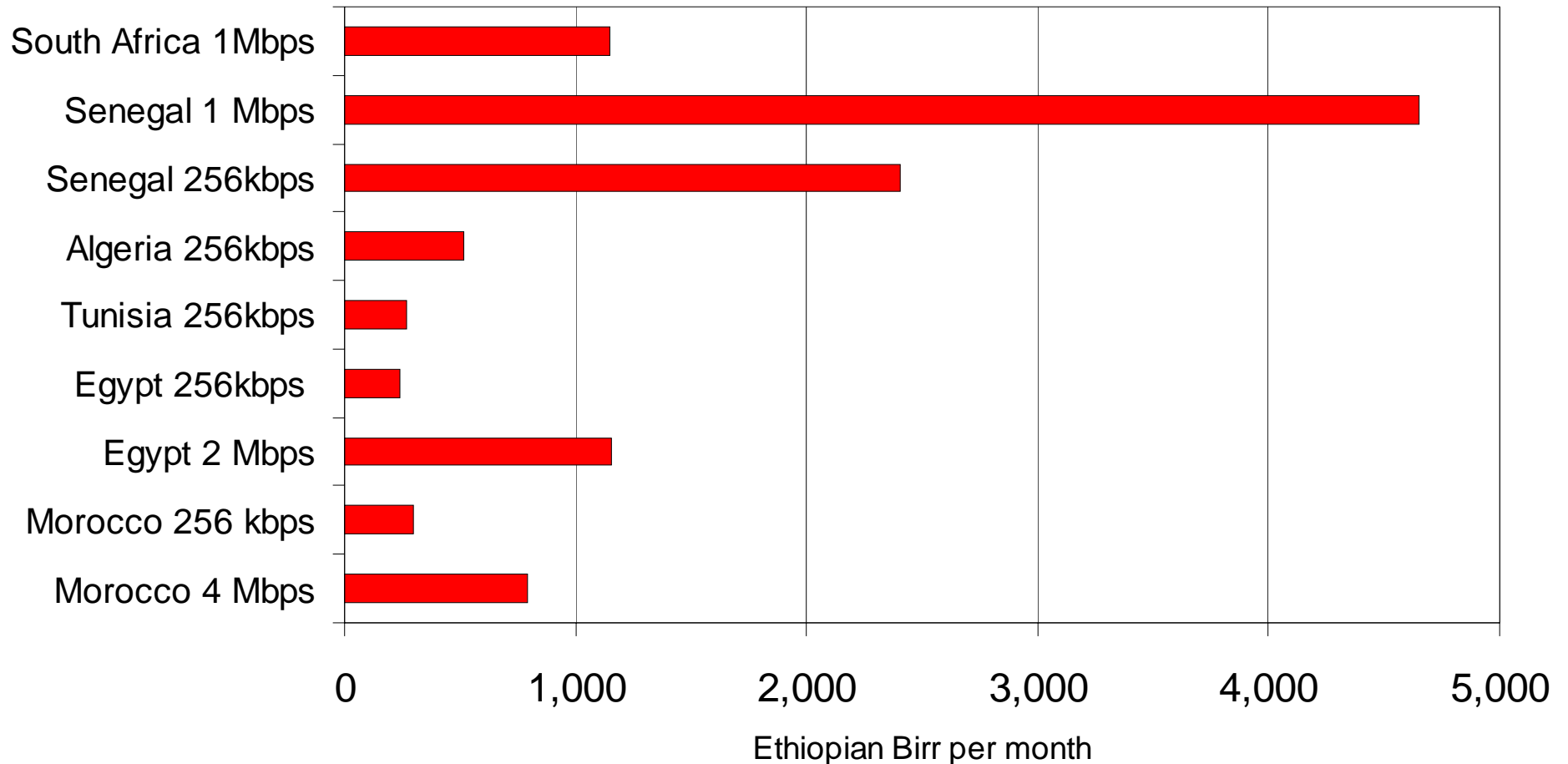
Senegal

Sonatel

- 256 kbps 25,000 FCFA
- 512 kbps 34,500 FCFA
- 1 Mbps 48,350 FCFA

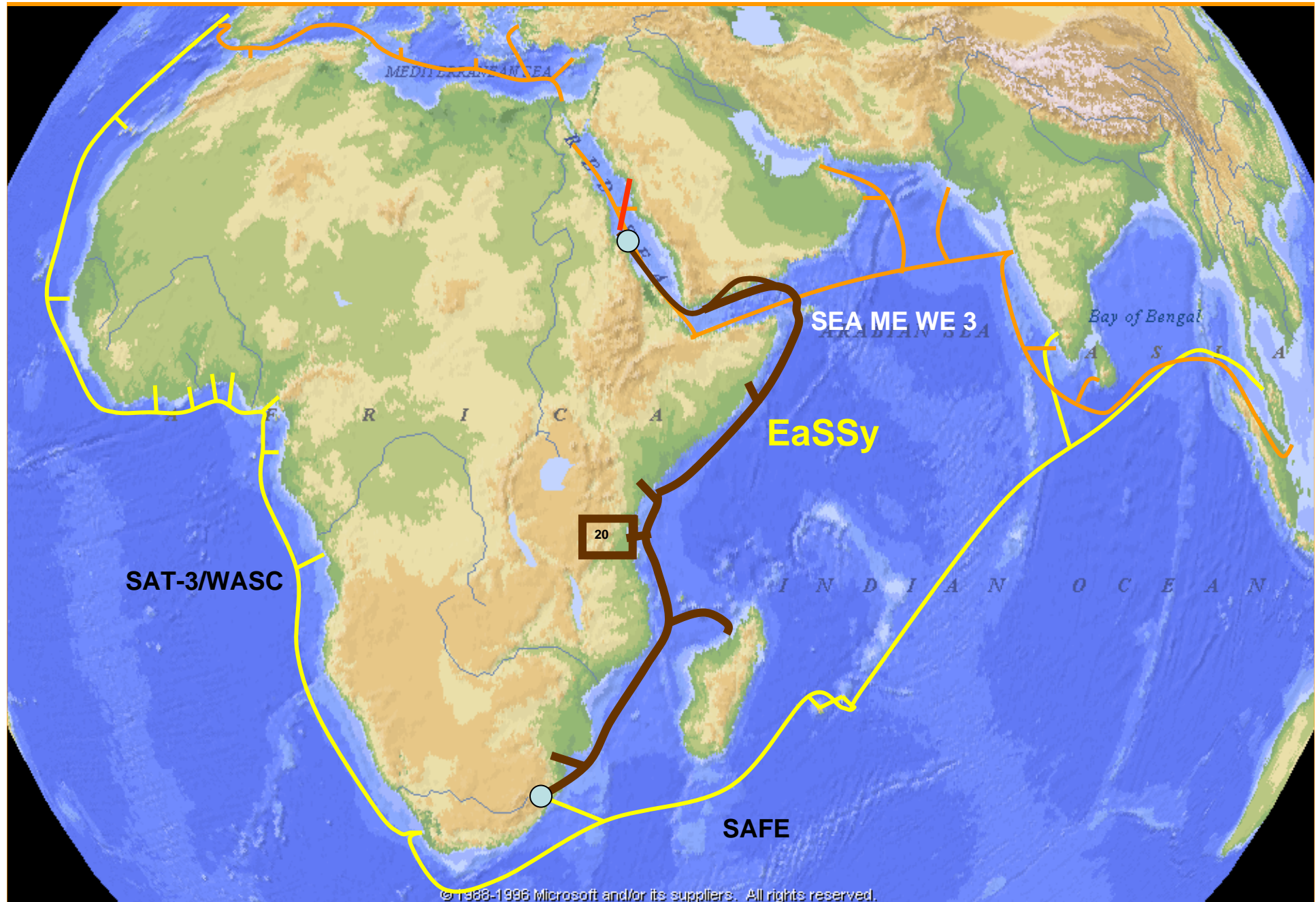
EUR 1 = 655.96 FCFA

Comparative prices of ADSL



Note. South Africa has a download cap so the charges are likely to be significantly higher.

Eastern Africa Submarine Cable System



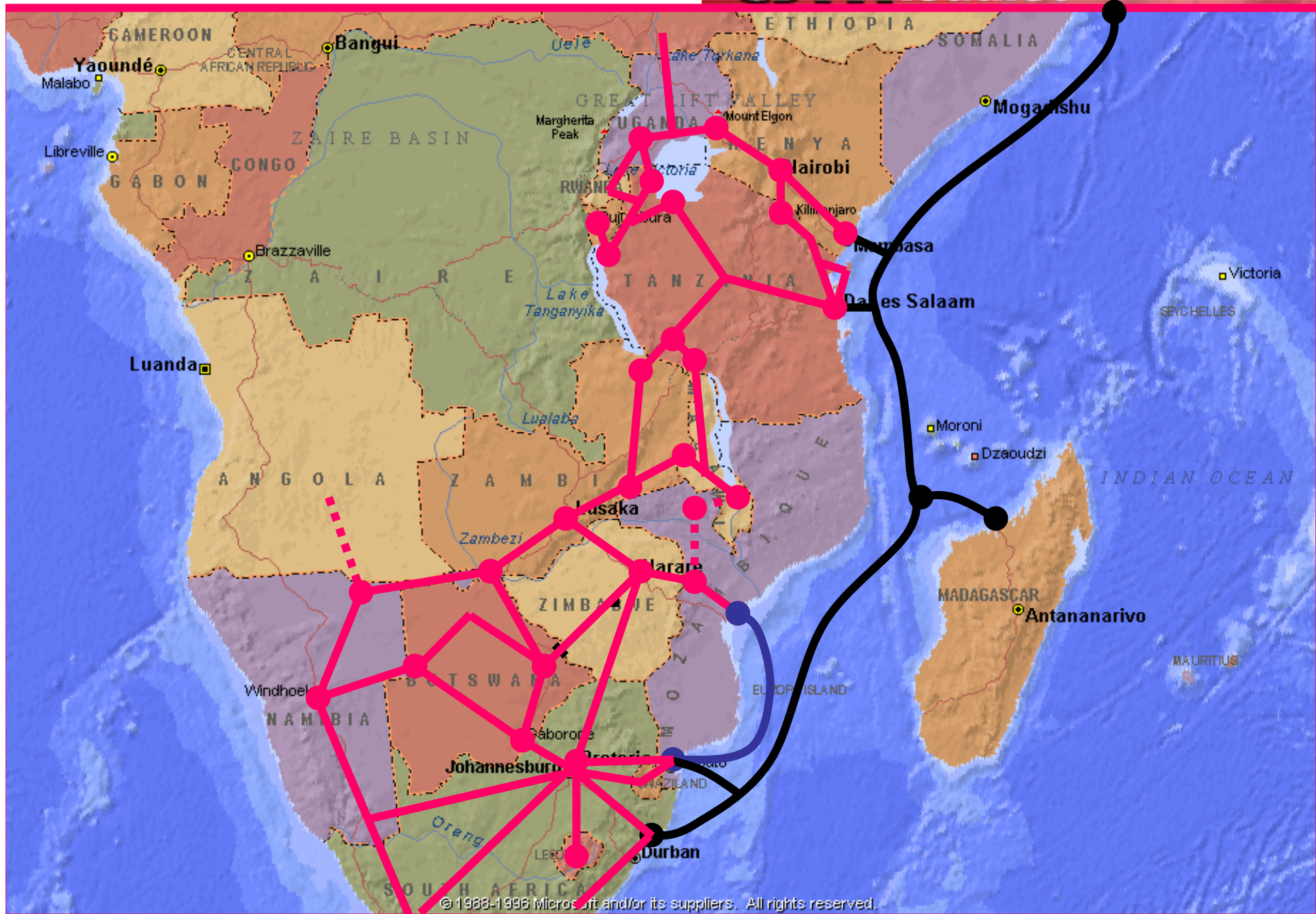
East Africa Submarine System

- Missing link in global undersea cable network
- NEPAD priority
- Commercially viable
- Lowering international communications costs
- Improving quality
- Reducing latency
- Investment of US\$ 205 millions
- Operational H2/2007
- Also providing links to landlocked countries
- A major debate over open access to EaSSy
- A strong case made not to repeat the errors of SAT-3
- The best outcome will be to open the EaSSy to all commercial players

<http://www.eassy.org/>



Backhaul in South and East Africa

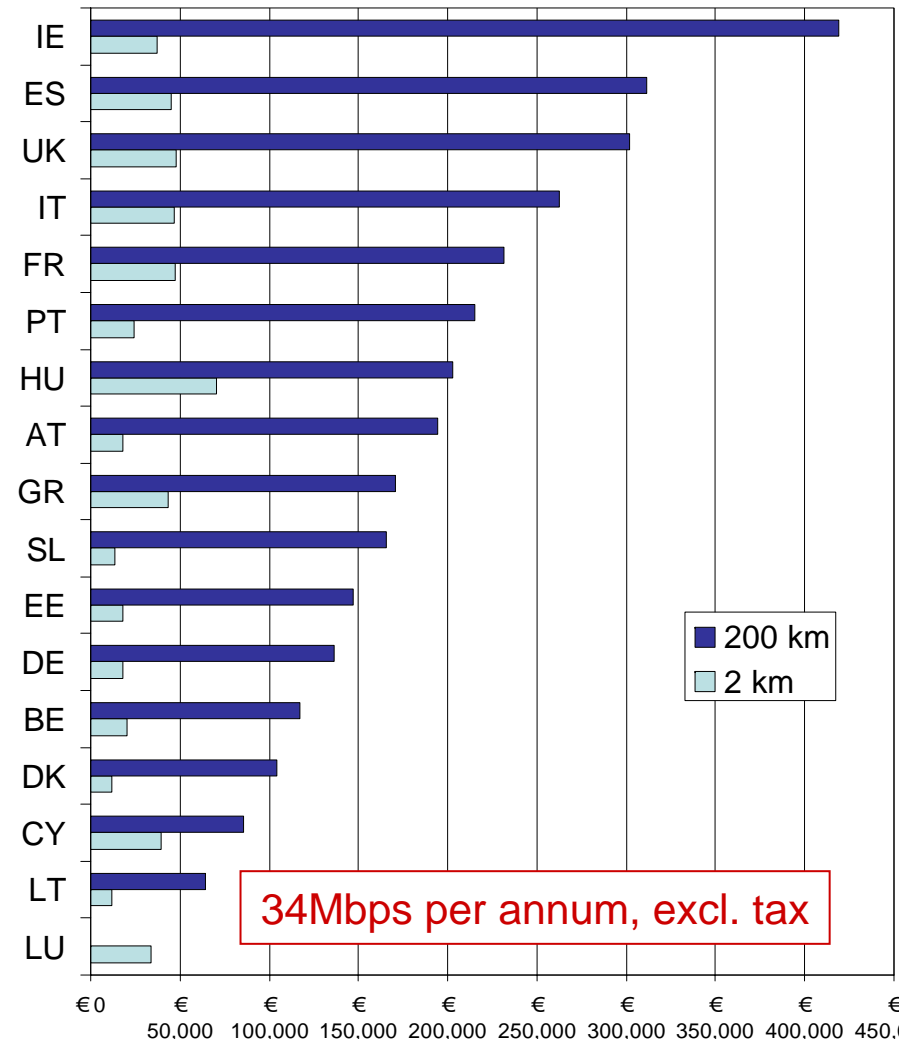


Backhaul and leased lines

- In too many cases a monopoly in the provision of national infrastructure
- The incumbent operator controls access to undersea cables (notably SAT-3)
- Restrictions on the use of VSAT
- The result is over-pricing of leased lines:
 - domestic
 - International
- That makes it impossible for ISPs to compete

European Union

- Legal obligations on dominant operators
- Must provide leased lines to other operators without discrimination
- Control of:
 - prices
 - delivery times
 - repair times
- Data are published annually



Internet eXchange Points

- Lack of national IXPs
- Lack of intra-continental IXPs
- Consequently poor aggregation of traffic
- Nearby countries may still interconnect not directly but in North America or Europe
- Lack of local content and services

<http://www.connectivityafrica.ca/>

Via Africa; creating local and regional IXPs
<http://www.itu.int/ITU-D/treg/publications/AfricalXPRep.pdf>

IXPs

<i>Country</i>	<i>City</i>	<i>Name</i>	<i>Start date</i>	<i>Peers</i>
South Africa	Johannesburg	JINX	December 1996	15
Kenya	Nairobi	KIXP	February 2002	13
Mozambique	Maputo	MozIX	July 2002	7
DRC	Kinshasa	PdX	November 2002	4
Eqypt	Cairo	CR-IX	December 2002	9
Nigeria	Ibadan	IBIX	March 2003	2
Tanzania	Dar es Salaam	TIX	June 2003	10
Uganda	Kampala	UIXP	July 2003	5
Swaziland	Mbabane	SZIX	June 2004	3
Rwanda	Kigali	RINEX	July 2004	6
Ghana	Accra	GIXA	October 2005	24

http://www.afrispa.org/african_ixps.htm

Peering and transit

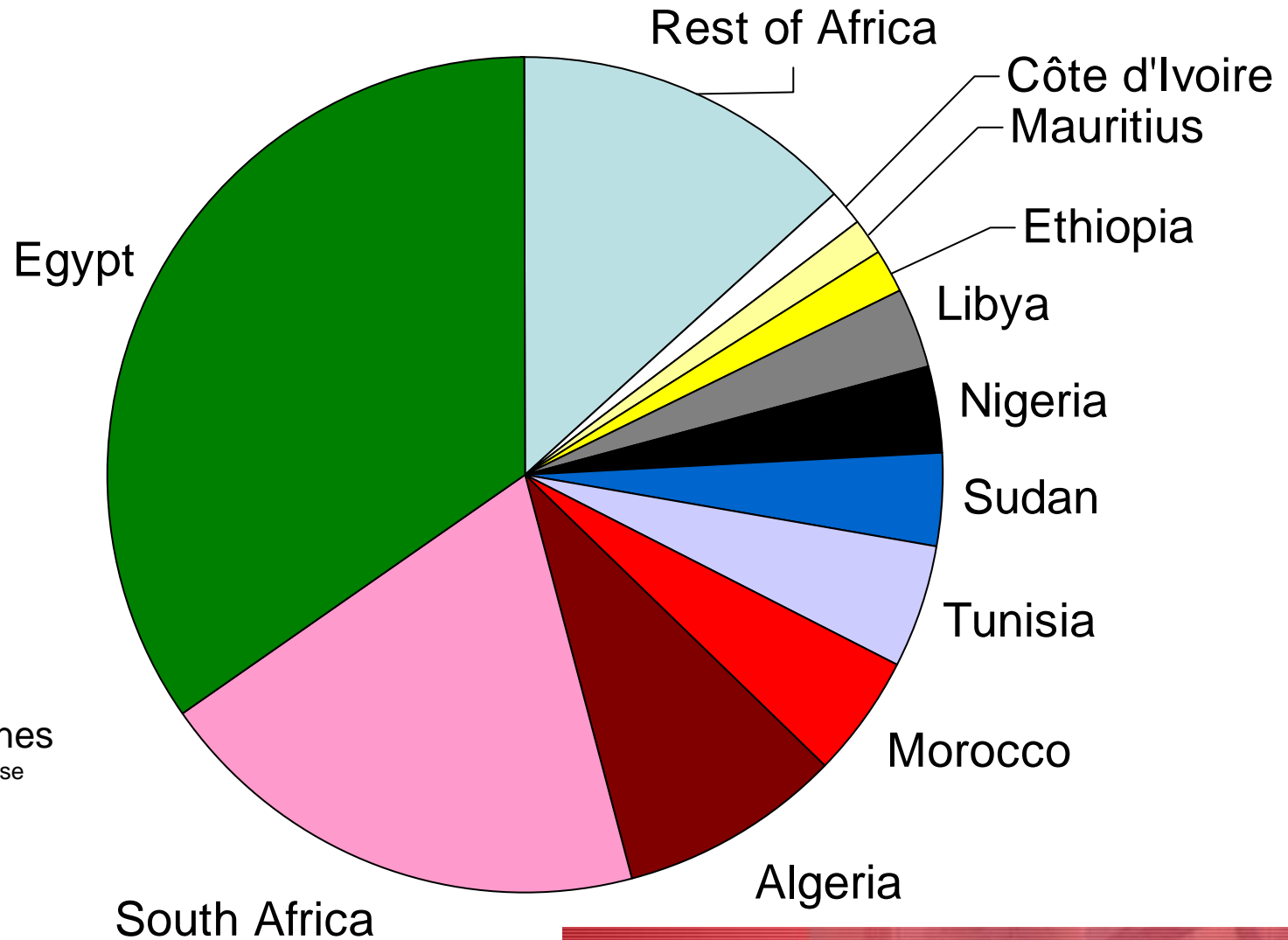
- Concerns raised about Internet traffic exchange have disappeared as commercial solutions, enabled by liberalisation of markets, have been applied
- A commercial and competitive market-based approach has dramatically lowered the price of Internet access
- Inter-networking is no longer confined to a small group of homogenous carriers but includes a diverse set of carriage, service and content providers
- There is an ongoing need for regulatory safeguards where there is insufficient competition
- There is a pressing need to develop human capital, particularly inter-networking skills in developing countries
- Traffic exchange, between different networks, has largely been commercially driven and free of regulation, a model that has proved highly successful in its ability to scale and its openness to new entrants
- Ongoing problems exist where monopoly carriers, or those with dominant market power in domestic markets, have constrained the ability of domestic ISPs to exchange traffic at a reasonable price

Local loop unbundling

- Important in developed countries to open up markets
- Evolved into several strands:
 - shared access
 - “naked” DSL
 - bitstream access
- Often failed in the face of incumbent operator resistance
- Many incumbent operators cannot:
 - give up vertical integration
 - see wholesale as a more profitable alternative

But there are few loops to unbundle in Africa

Fixed networks



Total 25,250,000 lines
Source: ITU Telecoms Database

If not existing copper then what?

- Lay more copper wires:
 - is there a business case?
- Fibre:
 - needs economies of scale
 - expensive – where is the ROI?
 - uncertain business models
- Wireless services:
 - cellular (beyond 2G)
 - Wireless Local Loop (WLL)
 - Fixed Wireless Access (FWA)
 - WiMAX and WiBro

Spectrum

- Unlicensed:
 - 2.4 GHz
 - 5.8 GHz
- Licensed:
 - 450 MHz
 - 2G:
 - 900 MHz
 - 1800 MHz
 - 3G:
 - 2300 MHz
 - 2600 MHz
 - 3.5 GHz

Policies:

- open all of these bands
- licensing:
 - unified
 - technology neutral licenses (e.g., telecommunications, rather than GSM)
- obligation to use, strict measures to stop hoarding
- allow secondary trading in spectrum

450 MHz

- Mostly CDMA, some FLASH-OFDM
- Wider coverage, fewer base stations, lower cost
- Better in-building penetration
- Czech Republic - Eurotel
- Romania – ZAPP (with pre-paid pricing)
- Russia – VolgaTelecom
- Argentina – Cotelcal
- Indonesia – Mobisel

3G - UMTS

- Claims for considerable speeds
- 3.5G or HSDPA and HSUPA reach 2 Mbps
- Very doubtful if networks are configured for heavy usage, mostly for bursts
- Operators seem more interested in bundling content, than open Internet access
- They insist on “walled gardens”
- Data prices are high, download caps are low
- CDMA2000 seems more promising than UMTS

Digital broadcasting

- Digital Audio Broadcasting (DAB)
- Digital Multimedia Broadcasting (DMB)
- Digital Video Broadcasting (DVB)
- For streamed audio and video, DxB is a viable alternative
- More efficient than services over cellular networks
- Terrestrial and satellite are both feasible

WiMAX

- Now standardised by IEEE
- Can use spectrum bands that are:
 - licensed
 - unlicensed
- Can be used for:
 - point-to-point
 - local distribution
- Adopted by Intel (so being built into the chip sets)
- Looks quite disruptive, but may be over-hyped
- So far, little real evidence either way

Macedonia

- Internet costs:
 - US\$1.30 an hour for dial-up
 - US\$ 45 a month for broadband
 - villages workers earn an average of \$150 a month
- Macedonia Connects Project:
 - world's first national wireless broadband network
 - “To establish a national wireless network requires that at least 95 percent of a country's population has ready access to low-cost Internet connectivity”
- Wi-Fi repeaters at 531 locations in schools, universities and local government offices

<http://www.on.net.mk/>

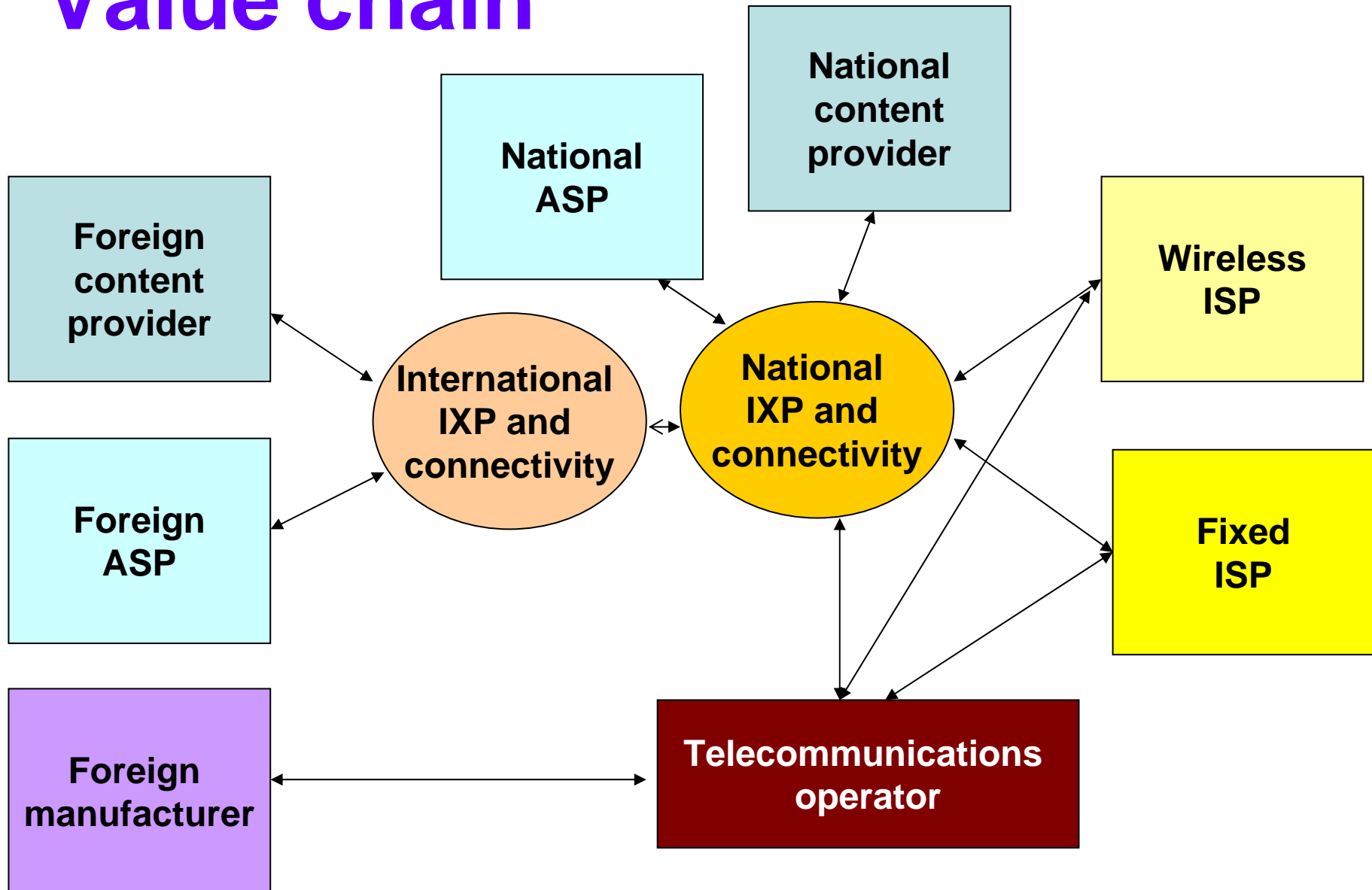
Wireless ISPs

- Many technologies
- Several business models emerging:
 - SSI Micro in Yellowknife, Canada:
CA\$ 59.95 per month for 1.5 Mbps (5GB cap)
 - Clearwire, Belgium:
€28.99 per month for 1 Mbps
€38.00 per month for 3 Mbps
 - Altitude, France:
€39 per month for 1 Mbit/s
- Very different economies of scale from copper networks
- Costs of devices falling

CA\$ 1.28 = 10 ETB = €0.92

<http://www.bbwxchange.com/wisps/>

Value chain



IP services

- Voice over IP:
 - very low and flat rate calling plans
 - secondary numbers in remote locations for nomads and ex-pats
- Television over IP:
 - access to more content
 - much more flexible access
- Radio over IP:
 - terrestrial and satellite
 - listen in real time or on demand
- Which firms have the expertise to make profits in these areas?
 - probably not TelCos

IP television

- Fixed:
 - pull rather than push
 - search for content
 - few geographical constraints
 - changes the way we watch
 - what about advertisers?
- Mobile:
 - smaller screen size
 - more disruptions
 - will change how and what we watch
 - evidence of demand is still very unclear

Slingbox:

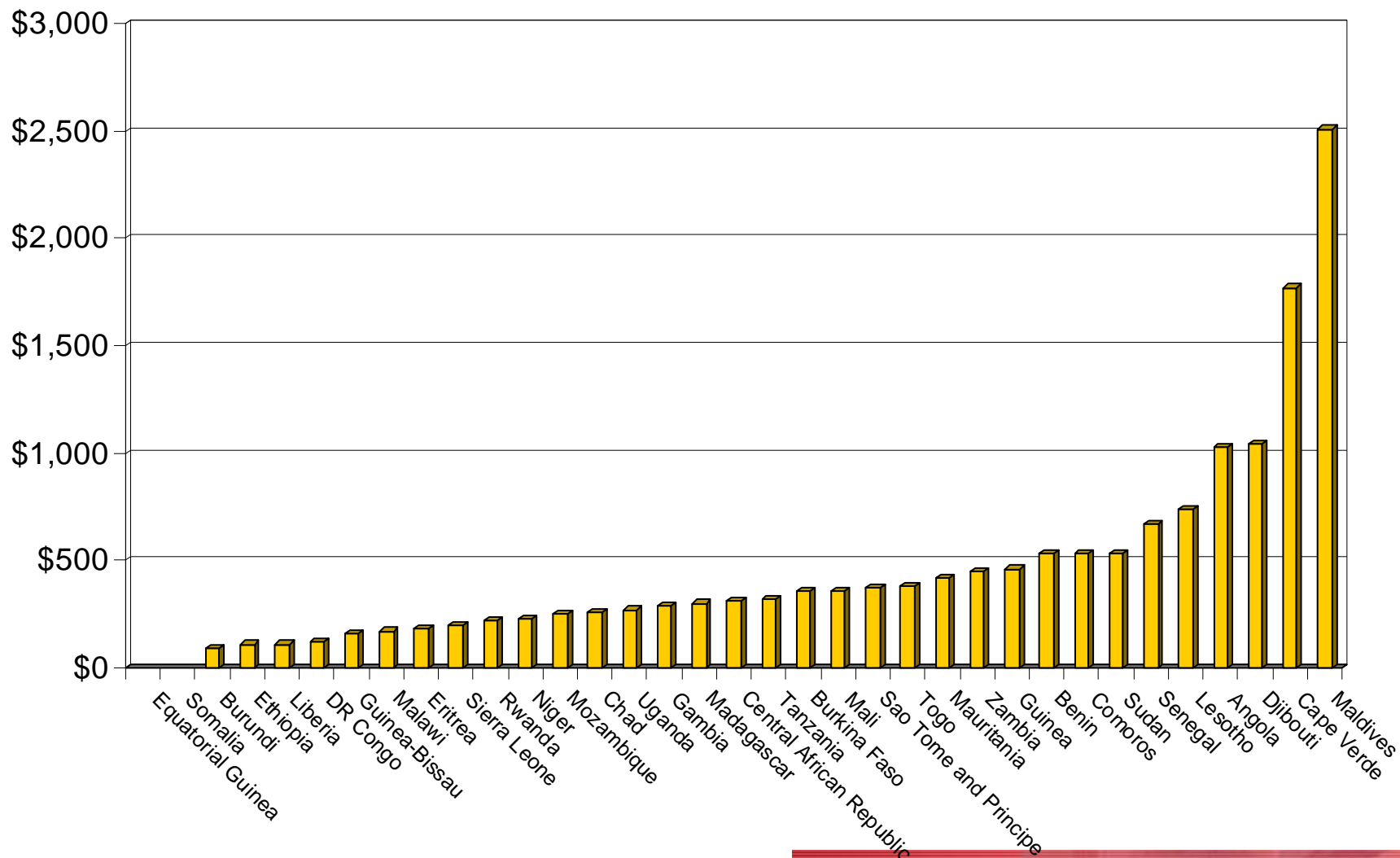
- a personal bridge between satellite or cable television with your Internet access
- re-transmits content
- accessible when not at home:
 - fixed networks
 - mobile networks
- now a software alternative
- what comes next?

<http://www.slingmedia.com/>

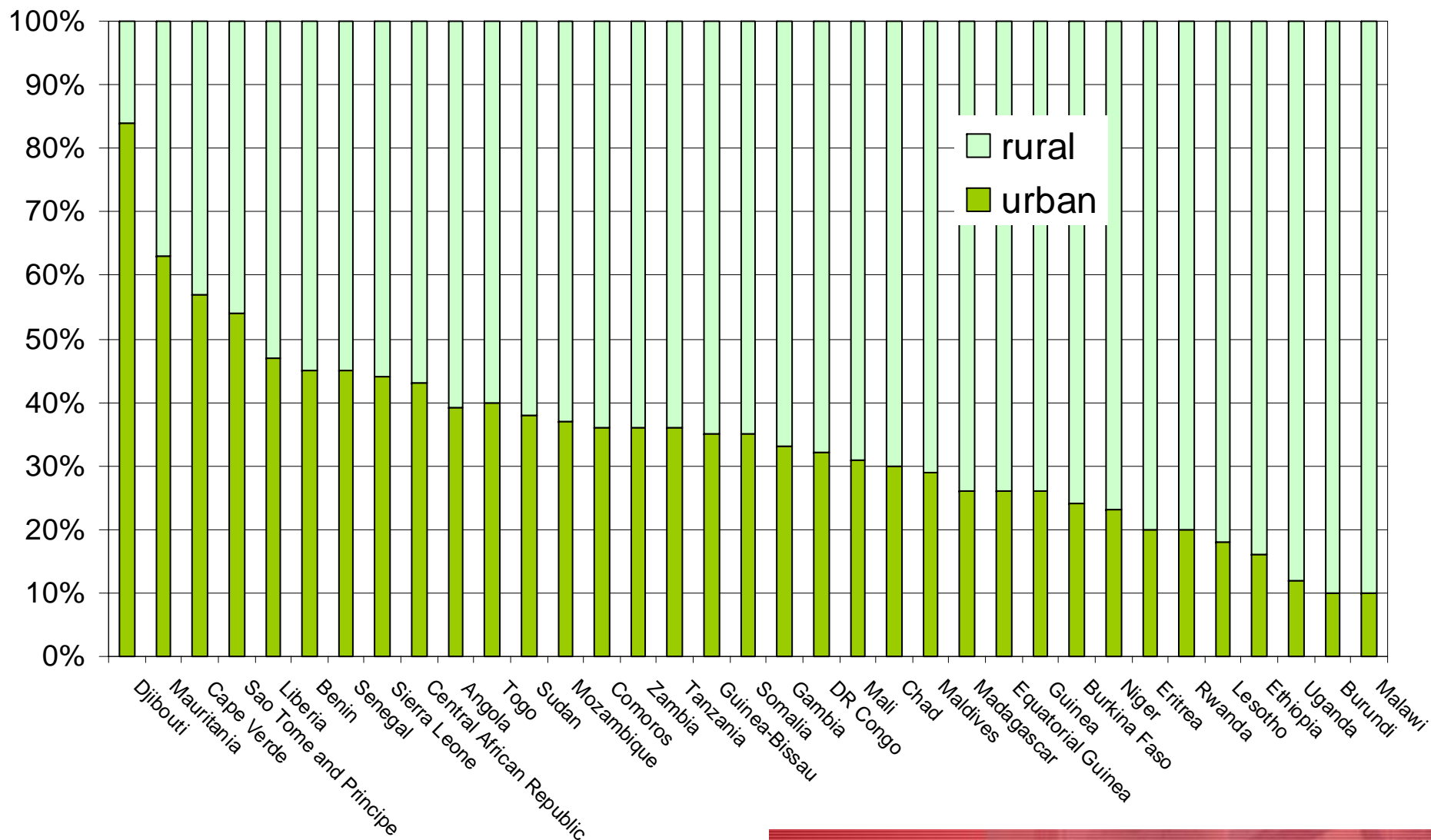
Constraints on demand

- Income levels:
 - low GDP per capita
 - maldistribution of wealth within countries
- Spending capacity:
 - established willingness to spend on telephony
 - but what about spending on entertainment?
- Literacy:
 - low levels of traditional literacy
 - low levels of ICT literacy
- Infrastructure:
 - lack of electricity
 - lack of computers
 - lack of telecommunications networks
 - lack of investment

GNI per capita of LDCs



Rural population in LDCs



Conclusions

- Broadband continues to evolve:
 - technologies and business models
 - content is the main driver
 - no longer passively received, it is also generated
- Competition remains weak:
 - how do we remove incumbent operators from bottlenecks?
 - will the innovative be encouraged to disrupt markets?
- There are many policy challenges:
 - how do we achieve affordability?
 - how do we learn from other parts of the world?
- For LDCs it will be necessary to be very creative to find appropriate solutions
- Moving the business model from pre-paid voice to broadband will be very tough

Research issues

- What are the business models?
 - for operators?
 - for ISPs?
 - for content providers?
- How do you regulate this?
- How do we reach rural areas?

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