Broadband for Africa

business & policy challenges

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- Introduction
- World class competitive markets
- Some examples from Asia and Africa
- Fixed broadband
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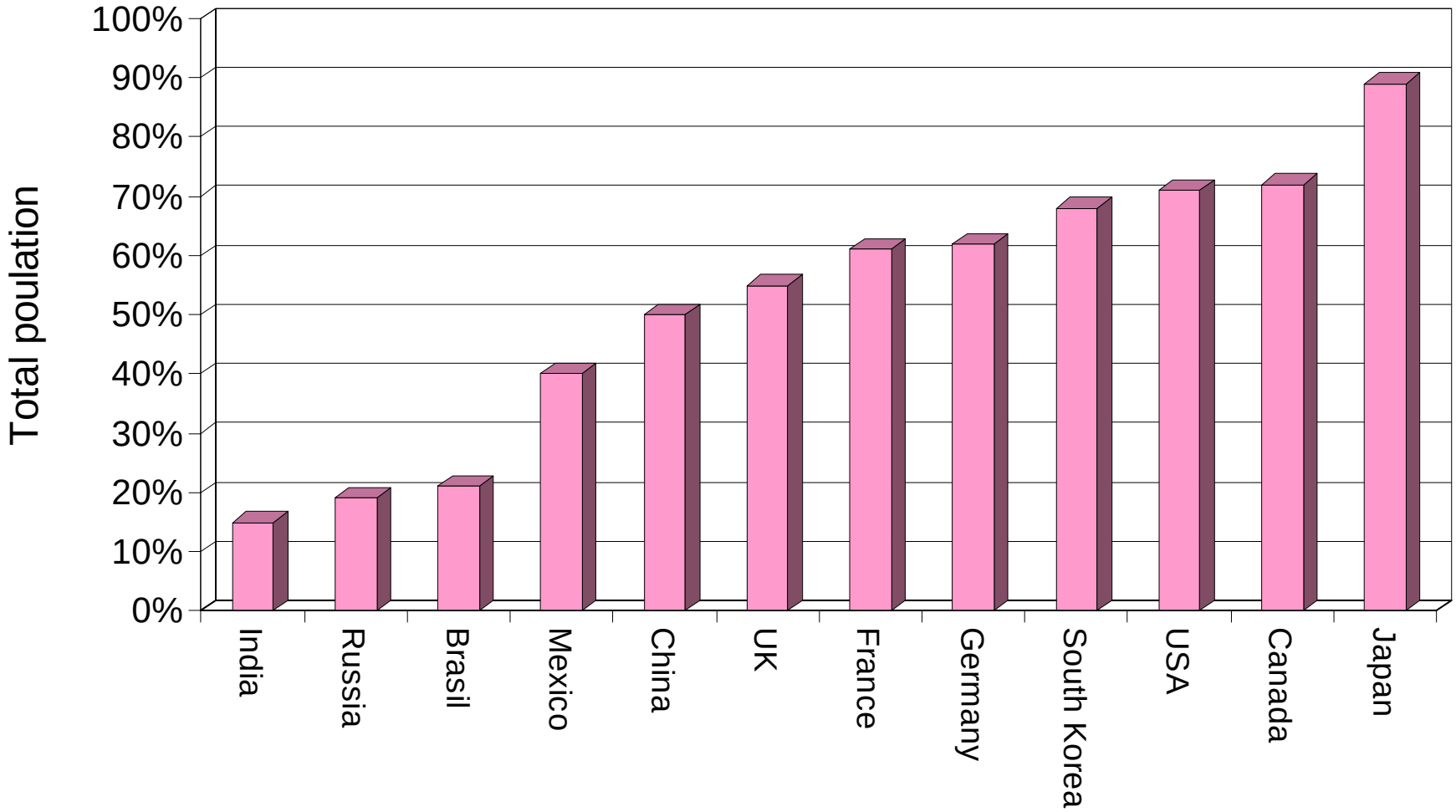
What is world class?

- 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

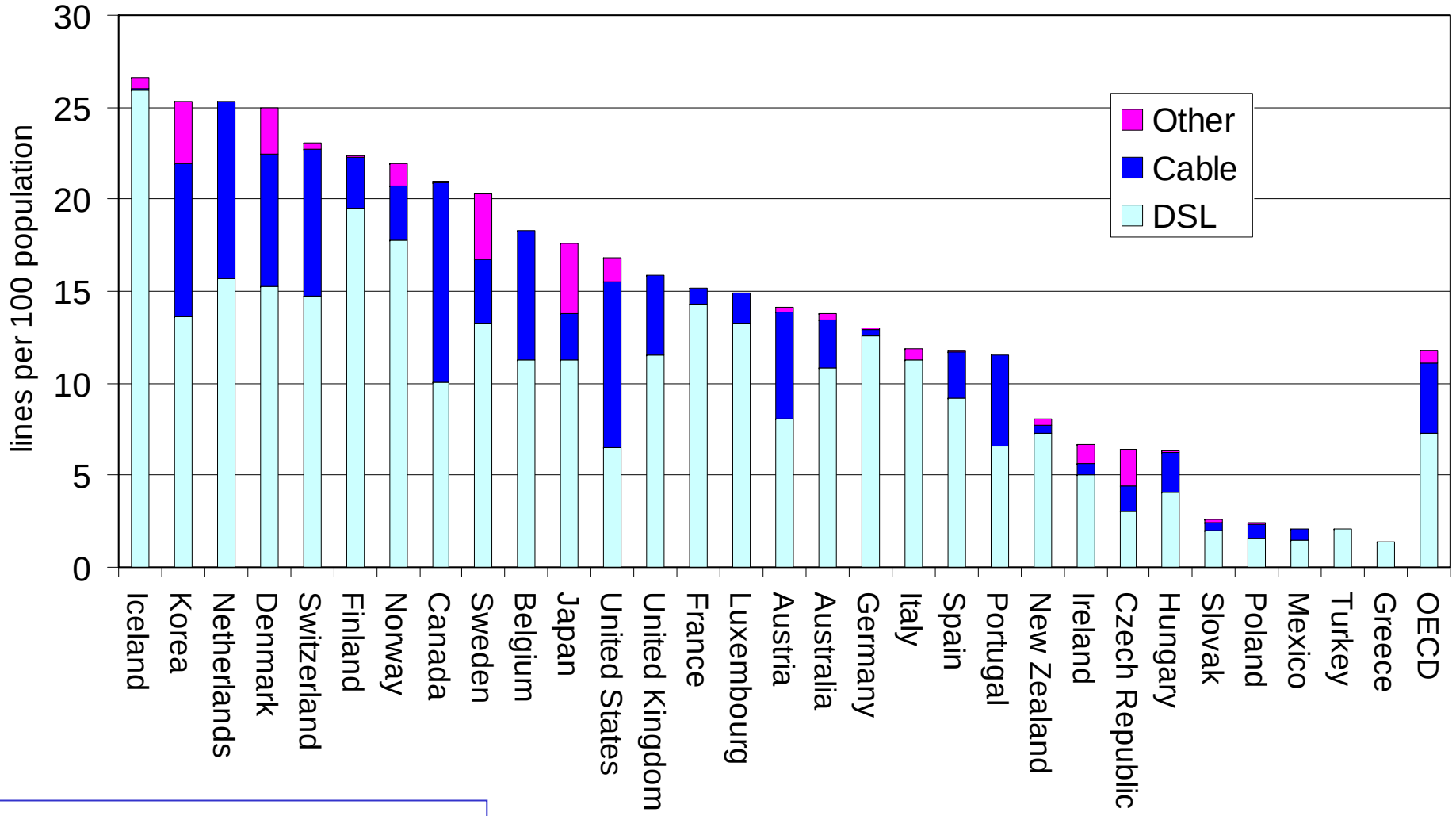
- Policy instruments:
  - pro-competition
  - removing bottlenecks
  - opening licensed and unlicensed spectrum
  - local loop unbundling
  - government-industry collaboration
  - targeted state aid
  - content creation industry to support demand

Internet usage in last 30 days



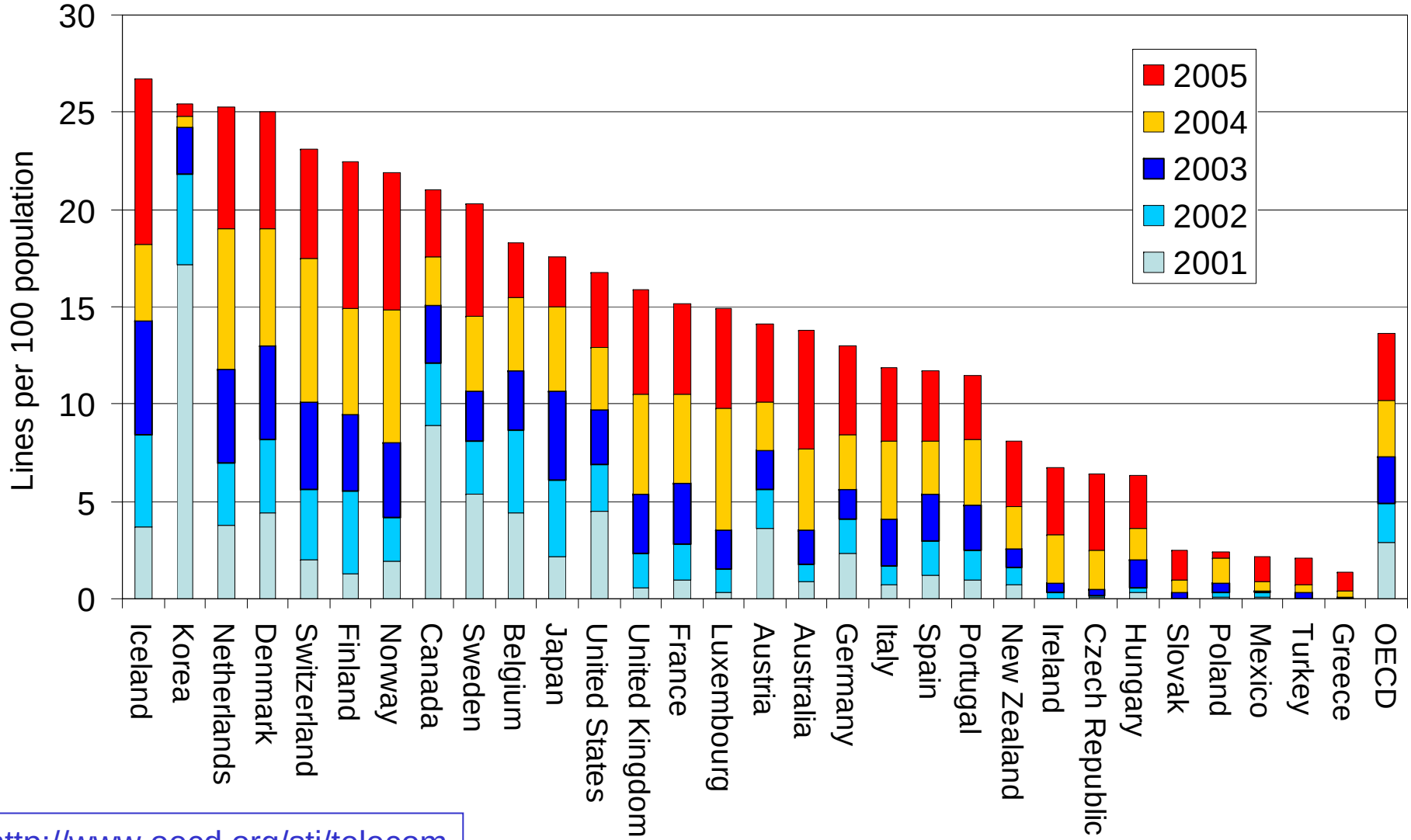
http://www.ipsos-na.com/news/pressrelease.cfm?id=3030

OECD Broadband December 2005



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

OECD broadband growth



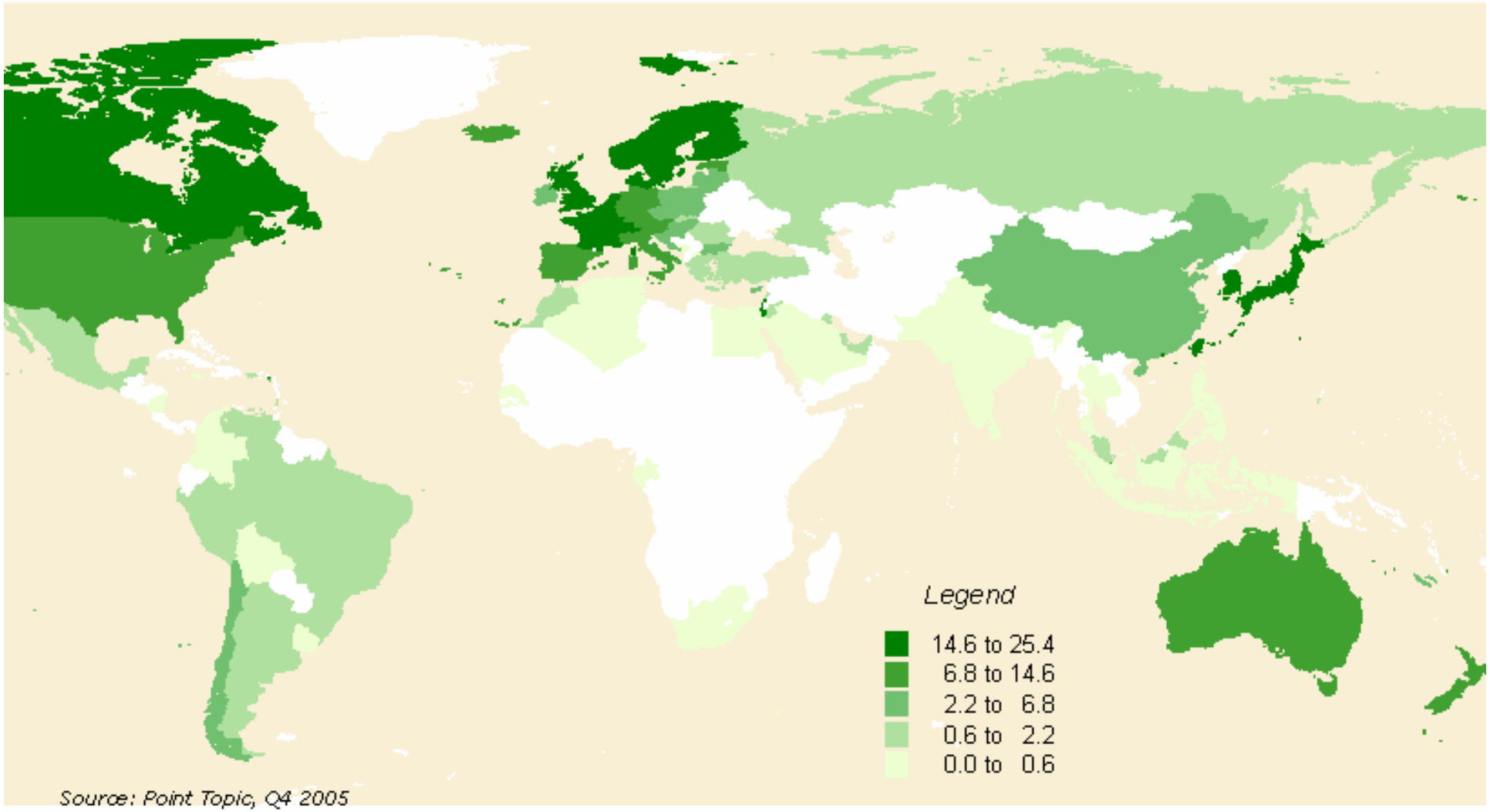
http://www.oecd.org/sti/telecom

Multi-play

- The rollout of broadband has allowed telecommunication, cable and satellite operators to offer an increasingly similar service of video, voice and data
- Multi-play offers represent the first stage in a two-part evolution of converged ICT service delivery.
  1. video, voice and data services consolidated on a single infrastructure
  2. consolidation of access platforms on one IP network, allowing seamless access to content on wired and wireless networks
- Quadruple-play offers were available in 10 OECD countries
- Triple play offers were available from 48 providers in 23 OECD countries
- 29 firms in 21 countries offered double-play services of voice and data over ADSL
- A further 10 providers in 9 countries over double-play over cable networks
- Multiple-play offers increasingly allow:
  - unlimited fixed-to-fixed phone calls for a flat monthly rate
  - Some operators also offer unlimited international phone calls to fixed lines
- Telecommunication operators have been able to offer a similar number of video channels as cable television and satellite providers
- Some fixed line operators offer video services through alliances with satellite providers
- The mere number of channels tells nothing about the quality or desirability of the channels
- Asymmetric bandwidth could become a bottleneck for some multi-play services such as VPNs that require fast upload speeds
- The move towards more symmetric bandwidth may be important as services increase usage of the upstream path
- Set-top boxes and other devices will play an increasing role in the provision of multi-play

http://www.oecd.org/dataoecd/47/32/36546318.pdf

Global broadband teledensity

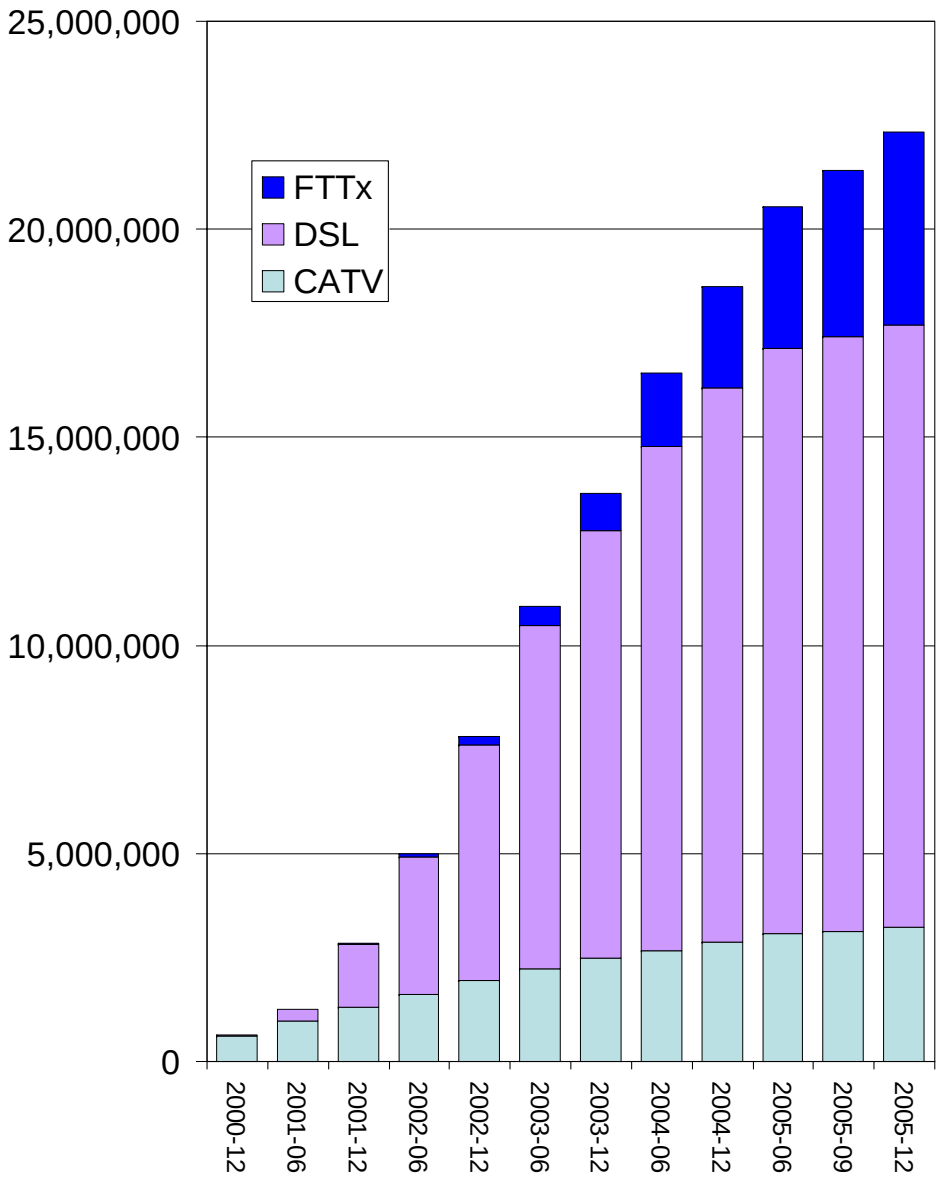


Lines per 100 population

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

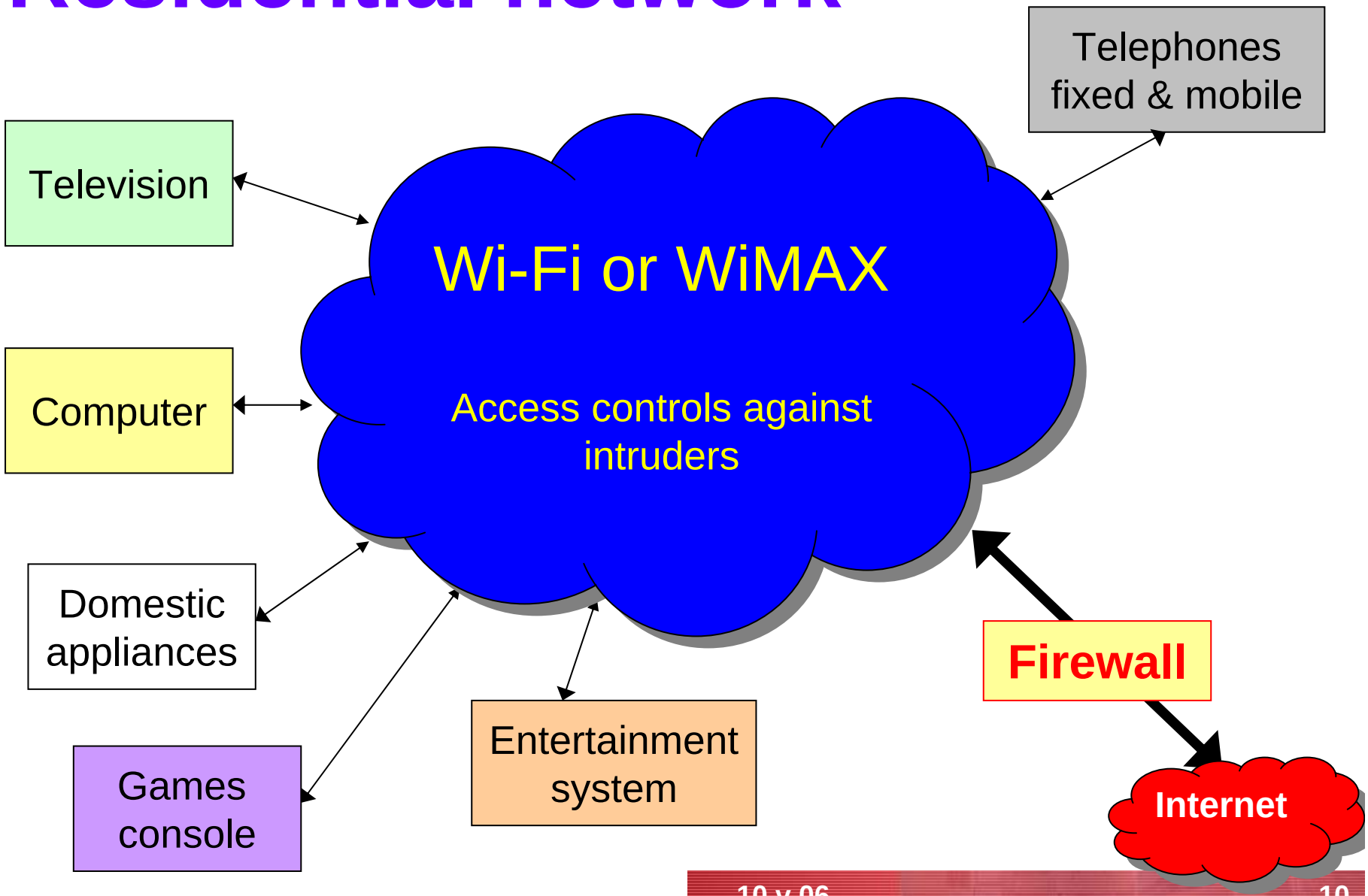
Japan

- 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.

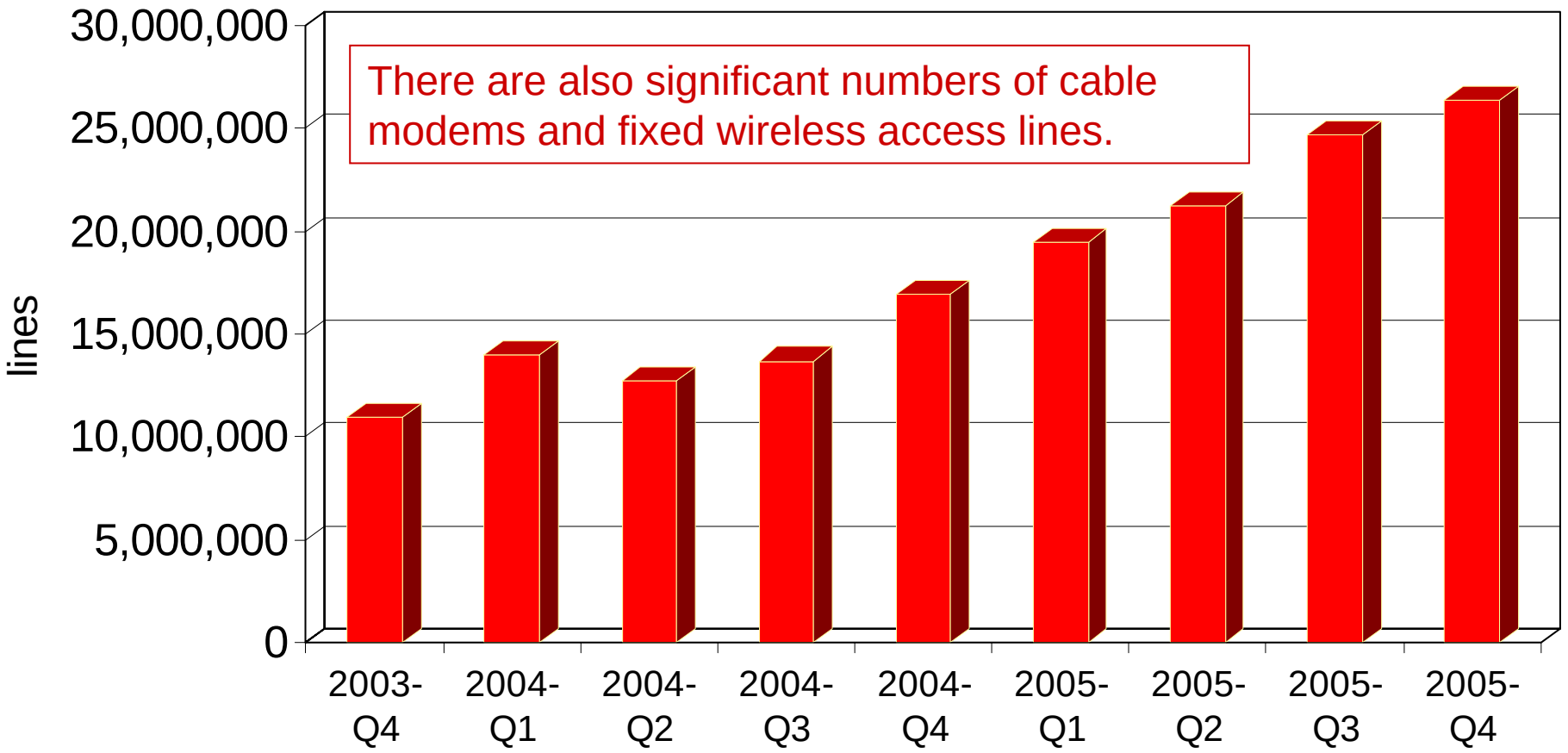
http://www.ida.gov.sg/

ETB 10 = SG$ 1.95

China

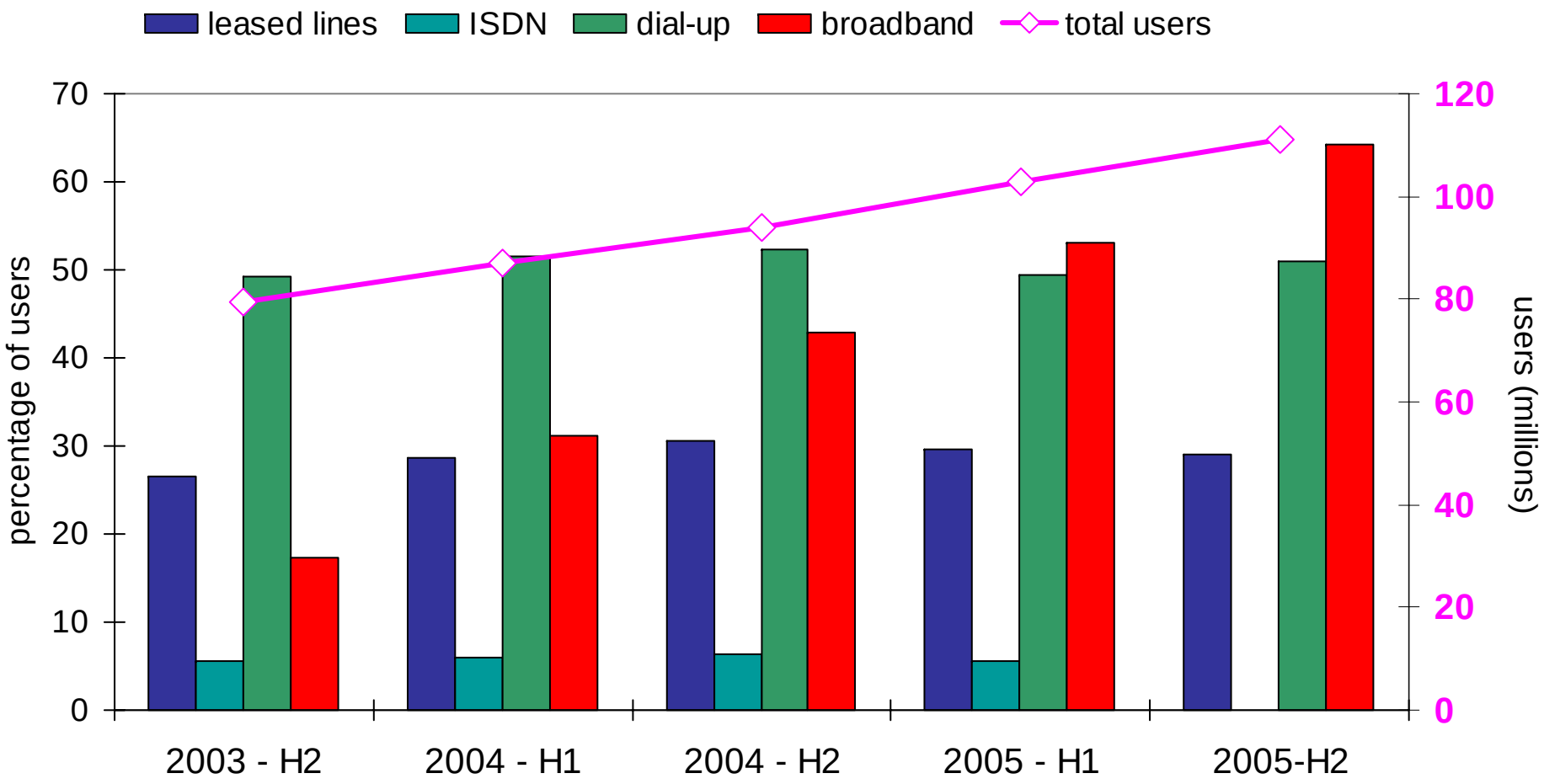
- Massive growth of GSM and pushing for 3G
- Substantial growth of WLL
- Very solid broadband growth:
  - ADSL
  - cable modem
  - fibre to the building
  - metro Ethernet
  - fixed wireless access

China – broadband



Sources: DSL Forum and Point-Topic

China – Internet users



Source: CNNIC statistical survey reports

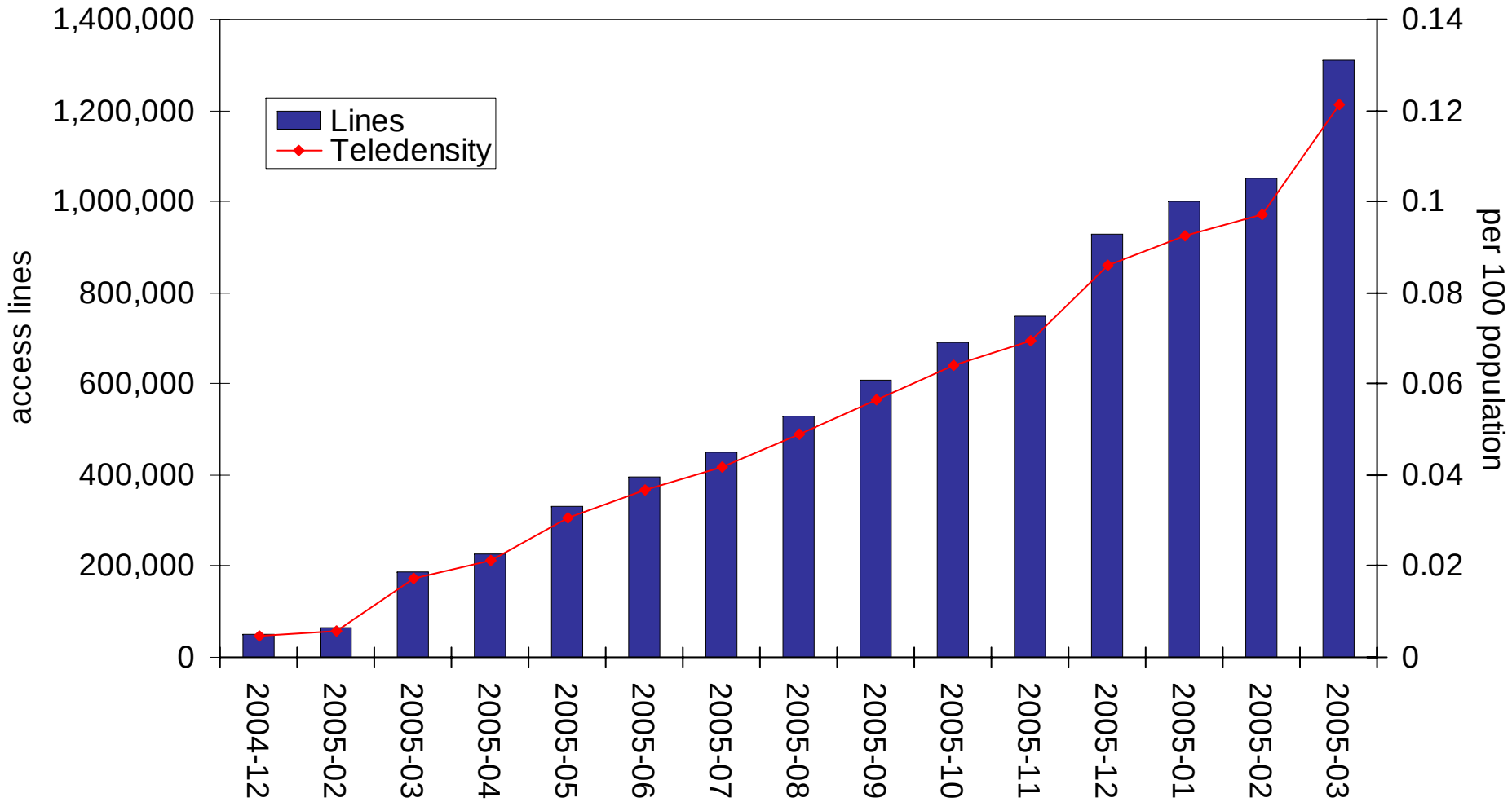
India

- 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

ETB 10 = INR 54

- 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)

India – broadband



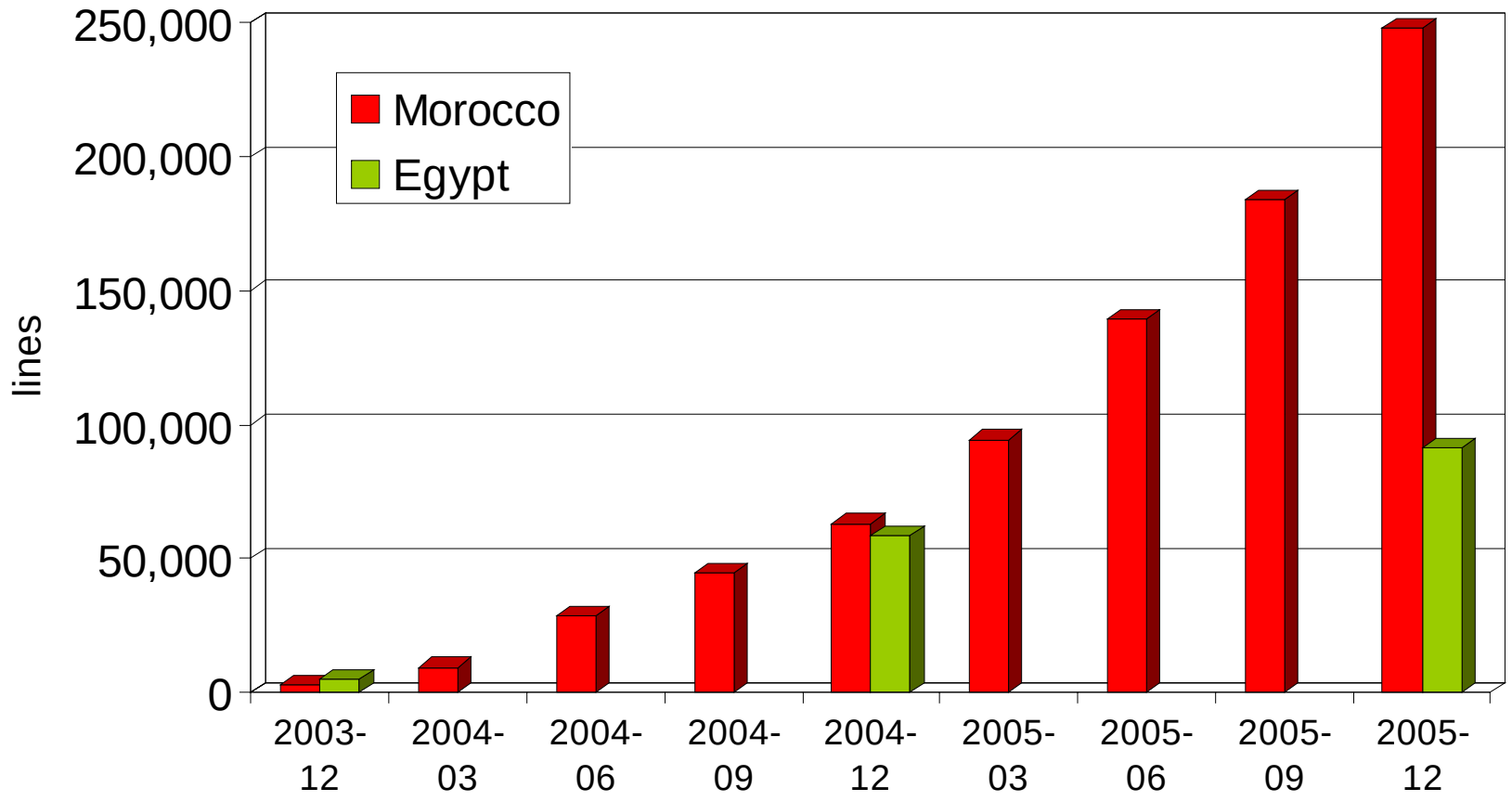
Source: TRAI

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 kpbs 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 Platinium
  2048 kbs
  1,684,000 FCFA HT

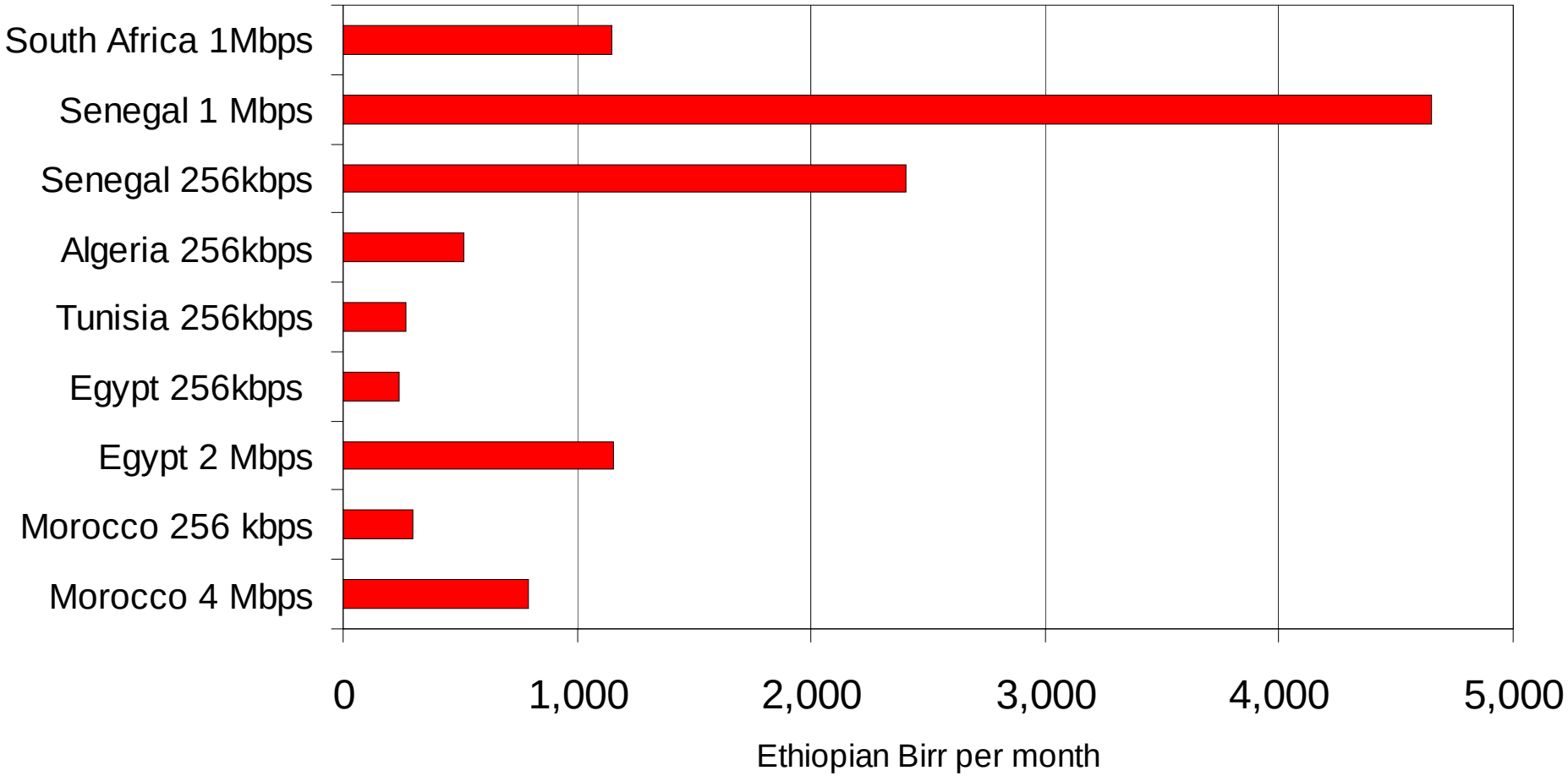
EUR 1 = 655.96 FCFA

Senegal

Sonatel

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

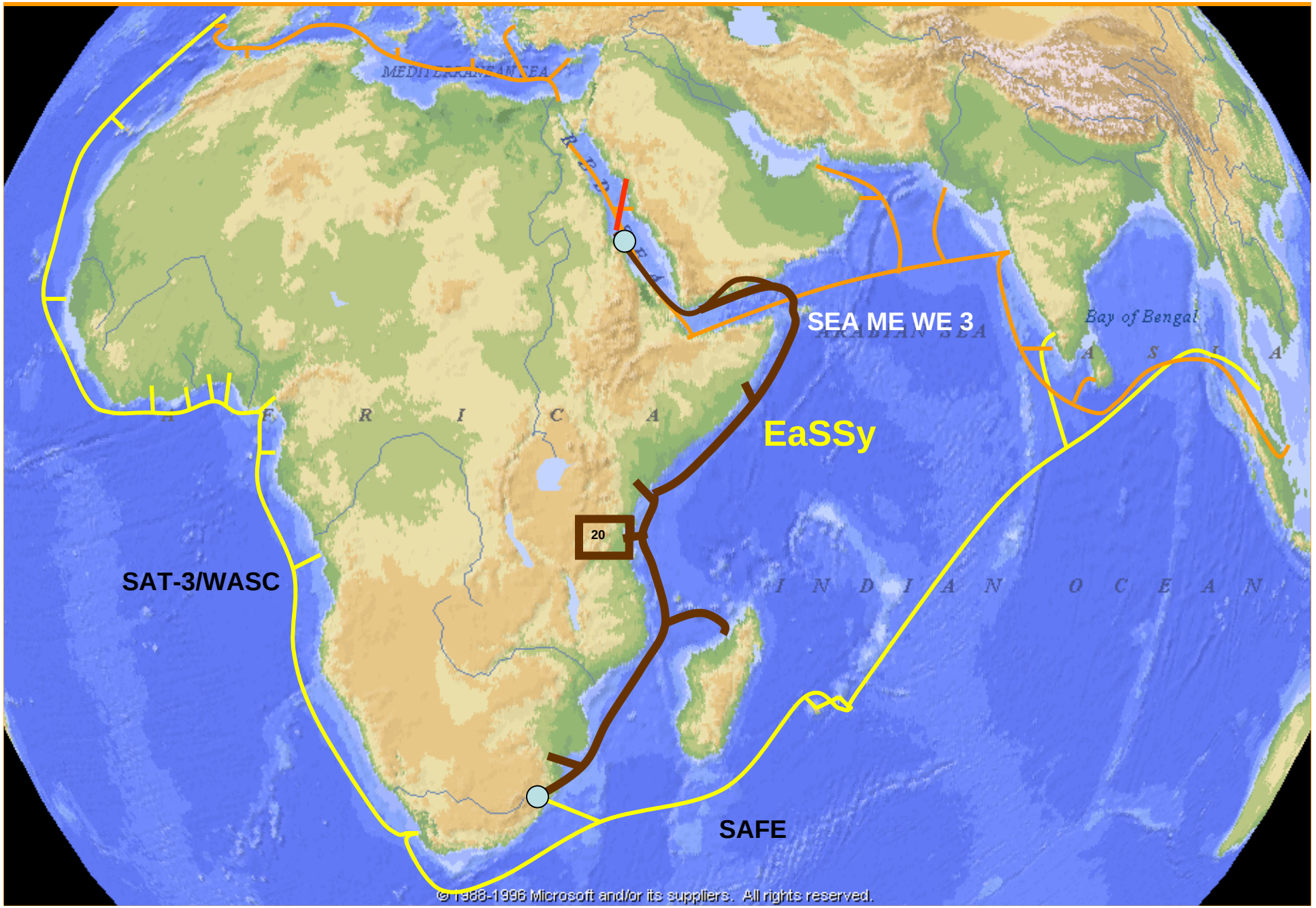
Comparative prices of ADSL



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

Eastern Africa Submarine Cable System

GSTIT.edu.et



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

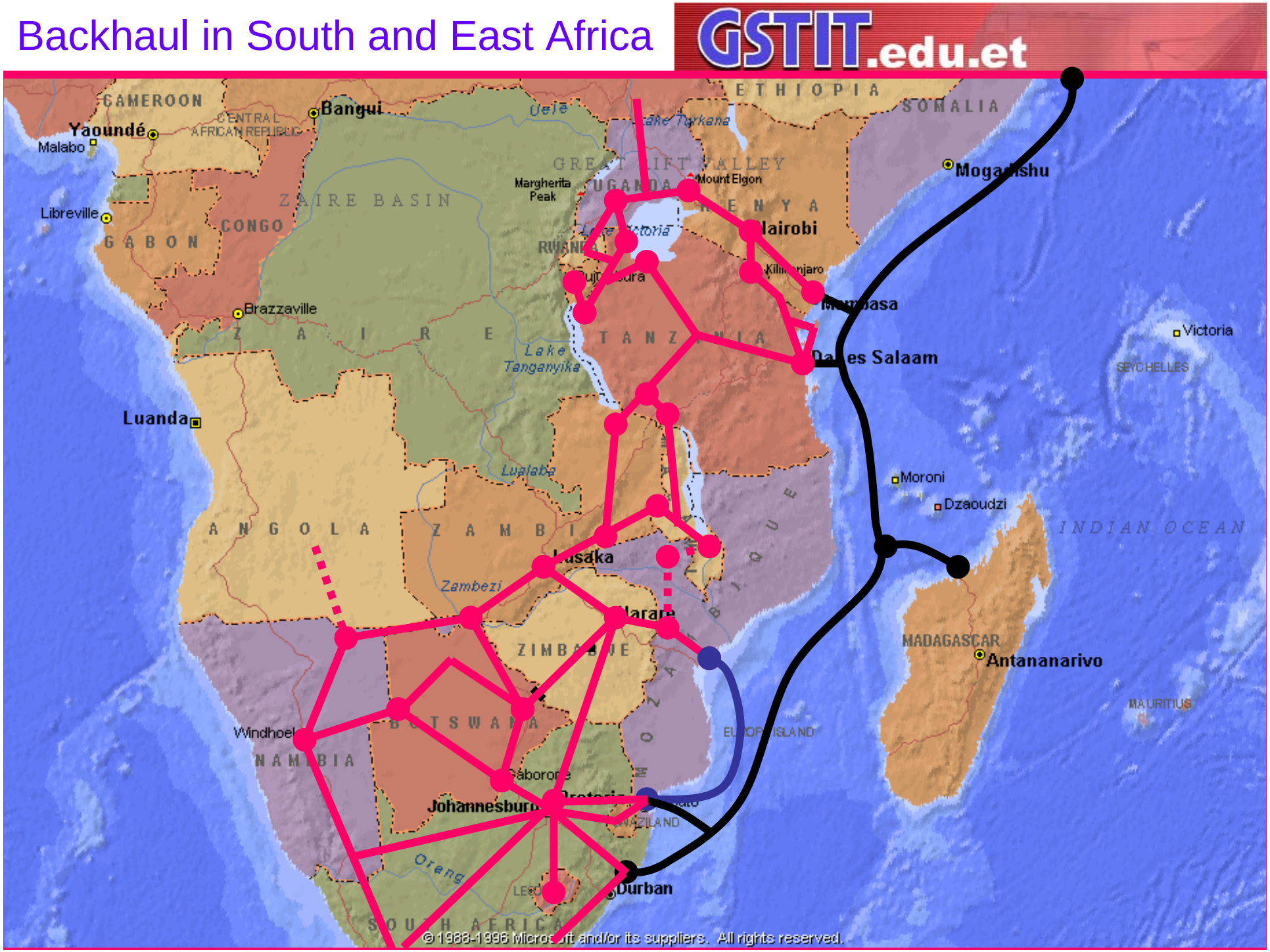
- A major debate over open access to EaSSy
- Repetition of the errors of SAT-3 would be a disaster
- The only acceptable outcome will be to open the EaSSy to all commercial players
- A cartel of incumbents would doom the region to unaffordable prices

http://www.eassy.org/

EaSSy

- Port Sudan (Sudan)
- Mitsiwa (Eritrea)
- Djibouti
- Mogadishu (Somalia)
- Mombasa (Kenya)
- Toliary (Madagascar)
- Dar es Salaam (Tanzania)
- Maputo (Mozambique)
- Mtunzini (South Africa)

Backhaul in South and East Africa



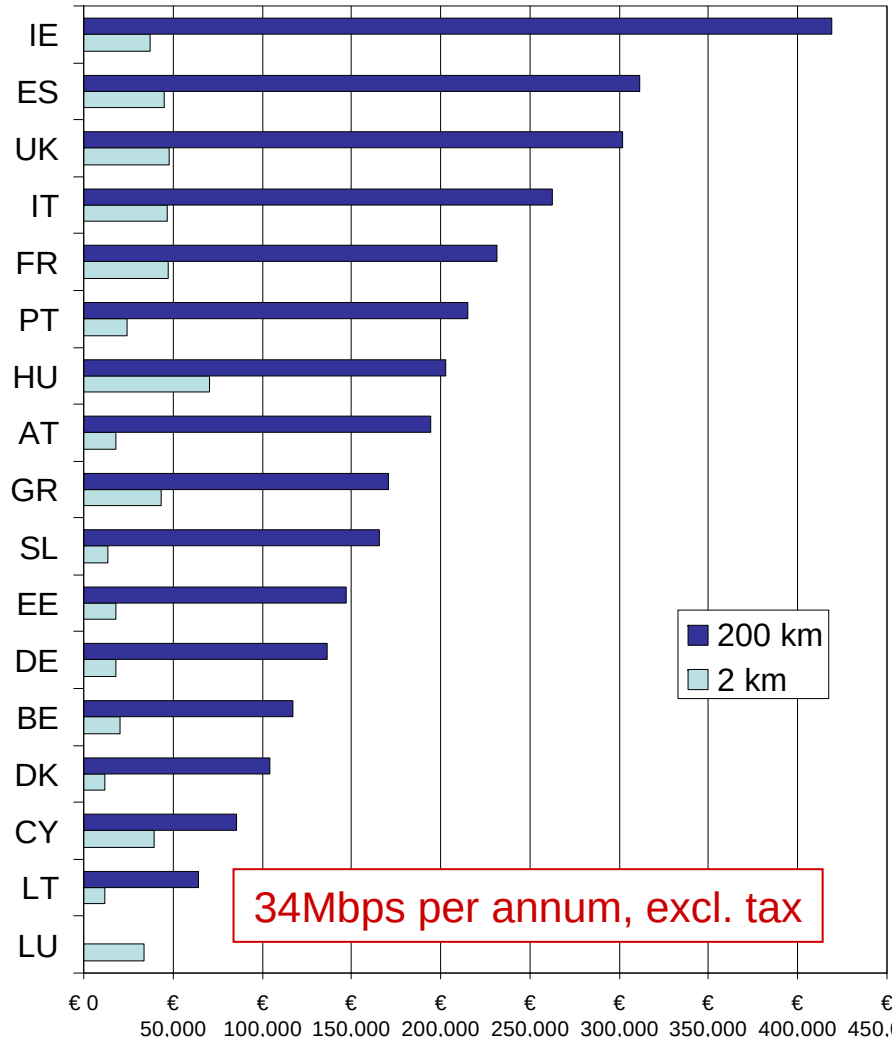
Backhaul and leased lines

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

http://www.infodev.org/files/2569_file_OPEN_ACCESS_REPORT.pdf

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/AfricaIXPRep.pdf

IXPs

Country	*City*	*Name*	*Start date*	*Peers*
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 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
- In developing countries there is a pressing need to develop human capital, particularly inter-networking skills
- Traffic exchange, between different networks, has largely been commercially driven and free of regulation (but subject to competition law), a model that has proved highly successful in its ability to scale and its openness to new entrants
- 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

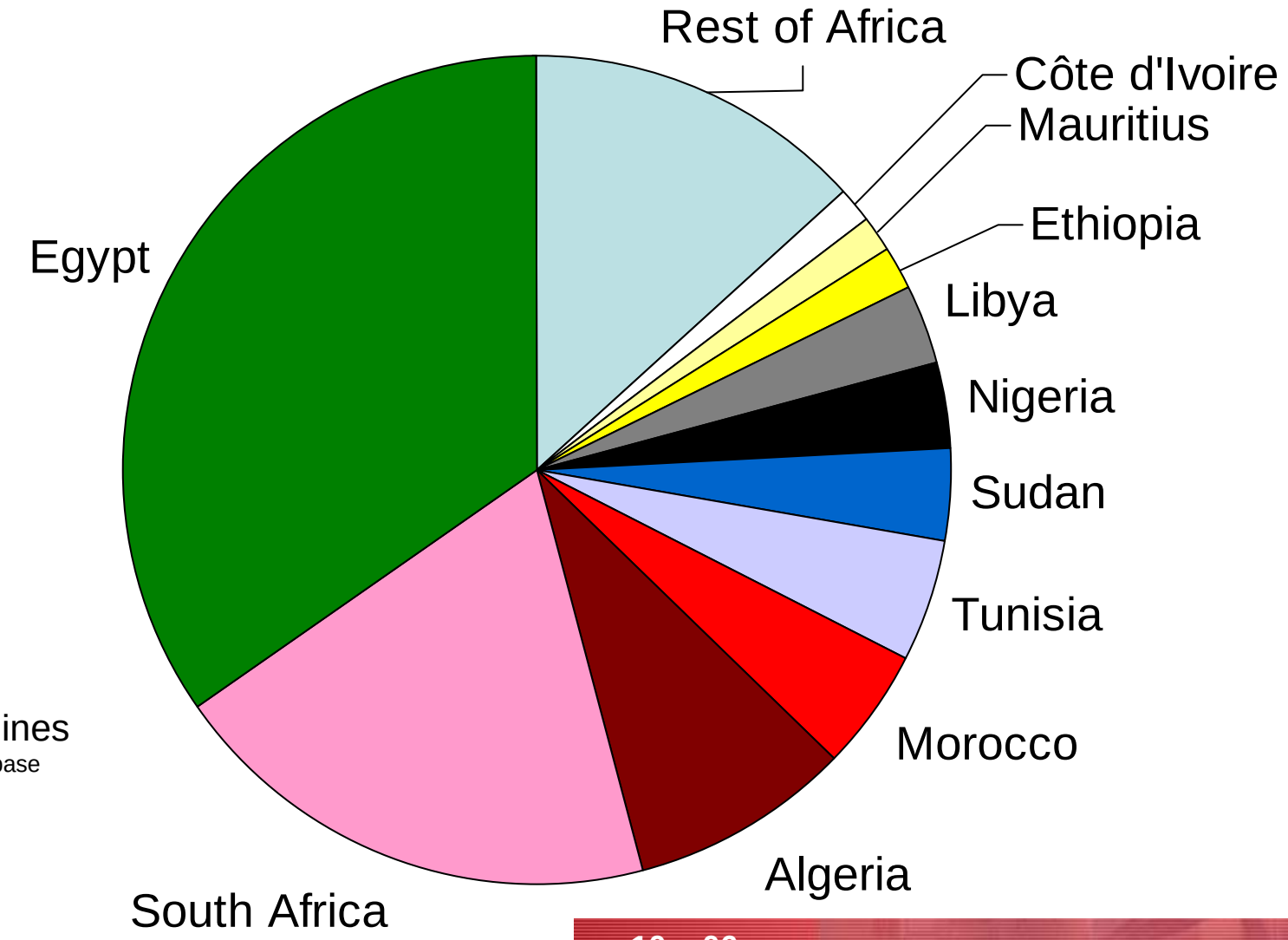
http://www.oecd.org/dataoecd/25/54/36462170.pdf

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
- Some examples:
  - Czech Republic - Eurotel
  - Romania – ZAPP (with pre-paid pricing)
  - Russia – VolgaTelecom
  - Argentina – Cotecal
  - Indonesia – Mobisel

3G

- Claims for considerable speeds
- Especially with 3.5G or HSDPA and HSUPA
- Very doubtful if networks are configured for heavy usage, mostly for a few bursts
- Operators seem more interested in bundling content, than open Internet access
- They try to insist on “walled gardens”
- Data prices are high, download caps are low
- CDMA2000 has delivered more 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

Satellite radio plus

- Samsung Helix XM2go
- For the North American market
- Satellite radio
  - 70 channels of music
  - 29 channels of sports and news
- MP3 player
- Can store satellite programmes

We can expect to see more of these imaginative consumer products.

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/

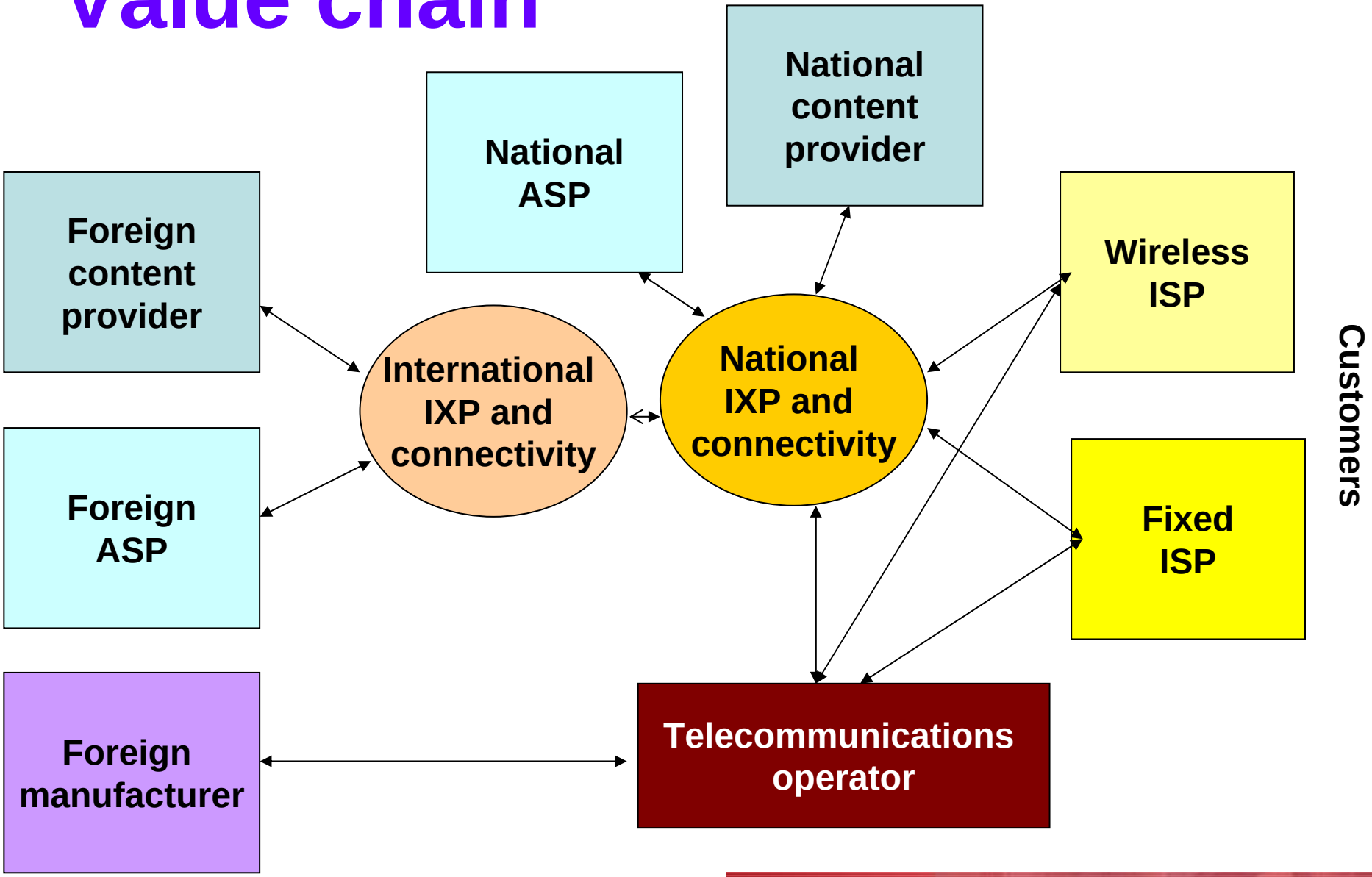
Wireless ISPs

- 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.bbwexchange.com/wisps/

Value chain


National content provider
National ASP
Foreign content provider
Wireless ISP
International IXP and connectivity
National IXP and connectivity
Customers
Foreign ASP
Fixed ISP
Foreign manufacturer
Telecommunications operator

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 profit from these?
  - 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/

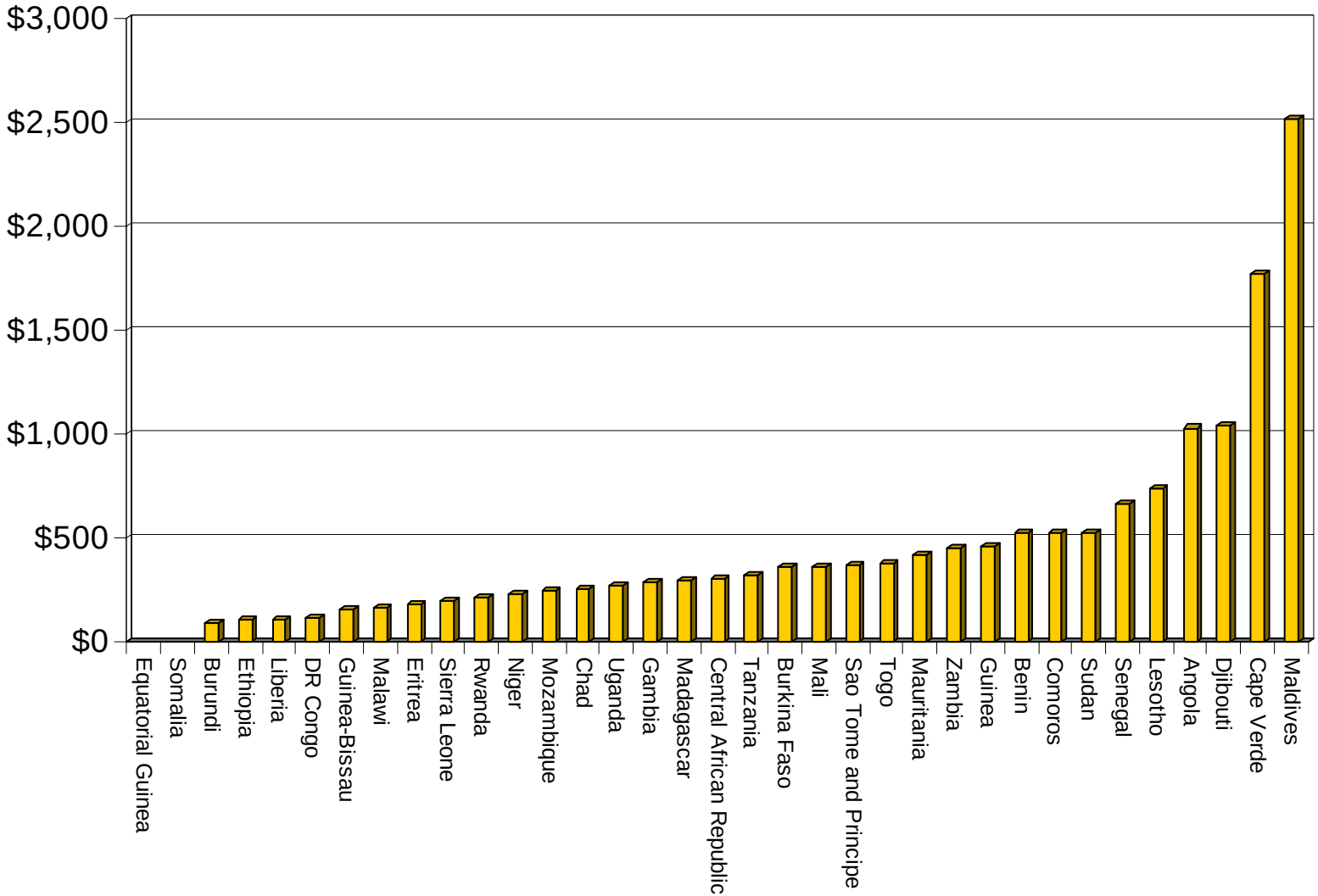
Some other developments

- Tivo is adding web-based programming
- Warner Brothers selling through BitTorrent
- China has issued its first mobile television licence
- Walt Disney providing free programmes on the ‘net
- Nintendo has added television and web-browsing to its games consoles

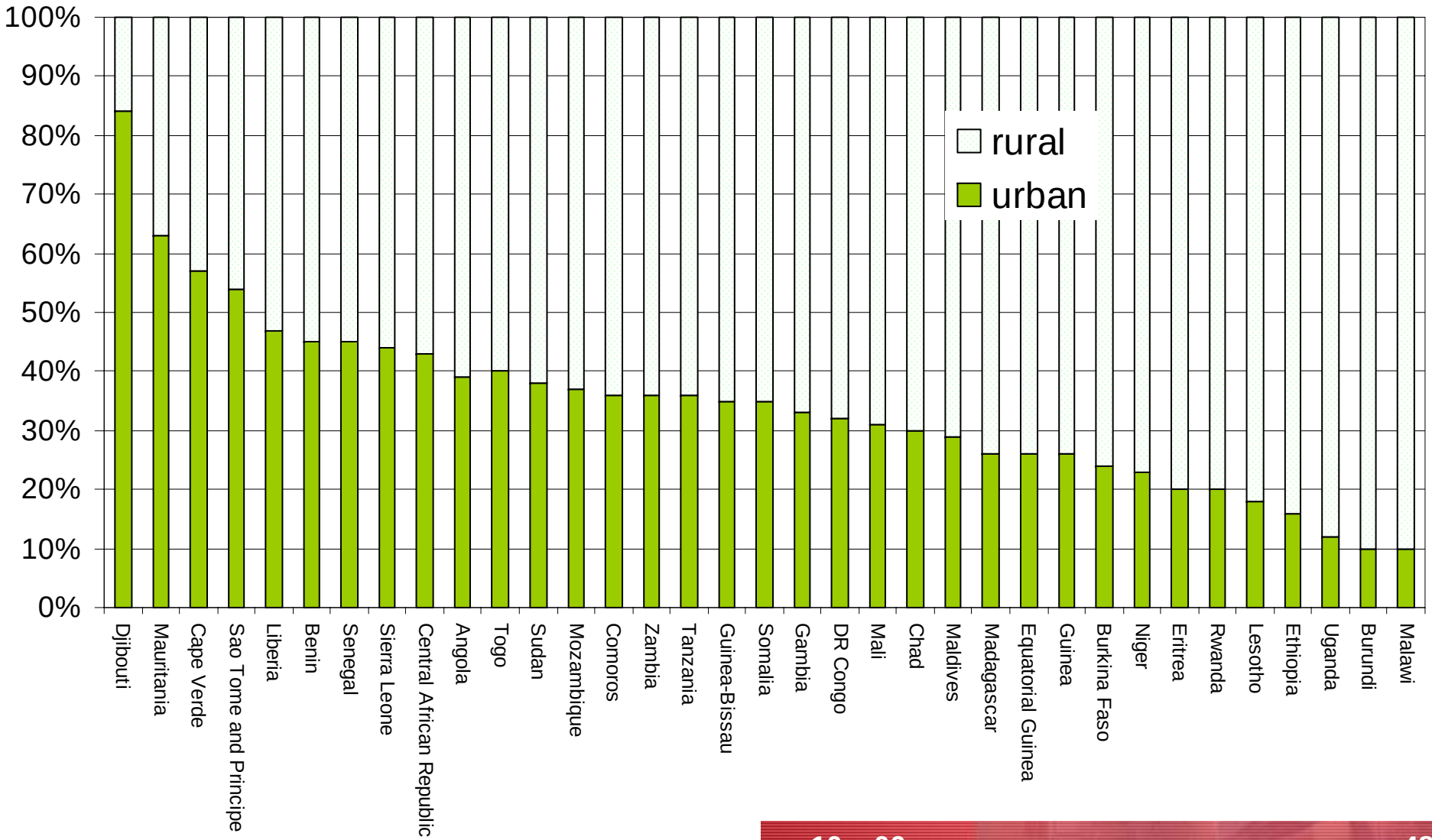
Constraints on demand

- 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?
  - Where should regulatory forbearance apply?
- How do we reach rural areas?

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