



Affordable Access to Broadband in the Arab States: Policy considerations

ITU Regional Economic and Financial Forum of Telecommunications/ICTs for Arab States

The Transport and ICT
Global Practice
Smart Connections for All

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Boutheina Guermazi
Practice Manager
World Bank

Affordable Access to Broadband: Agenda

Digital dividends

- Why affordable access to broadband is important in achieving digital dividends
- How the Middle East and North Africa (MENA) region is faring

Addressing bottlenecks to affordability

- First mile (where internet enters a country)
- Middle mile (where internet passes through the country)
- Last mile (where internet reaches the end users)
- Invisible mile (hidden elements of the internet value chain)
- Broader policy environment (tax, handset costs, etc)

Additional Issues to consider

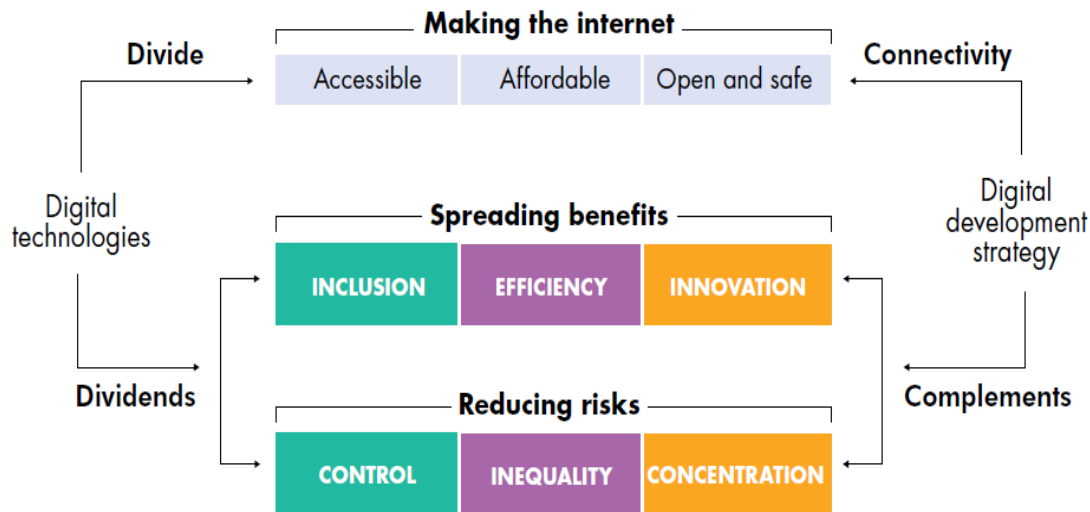
- Infrastructure sharing and IXPs
- How to stimulate demand to reduce prices?
- Public Private Partnerships

World Bank Broadband Resources

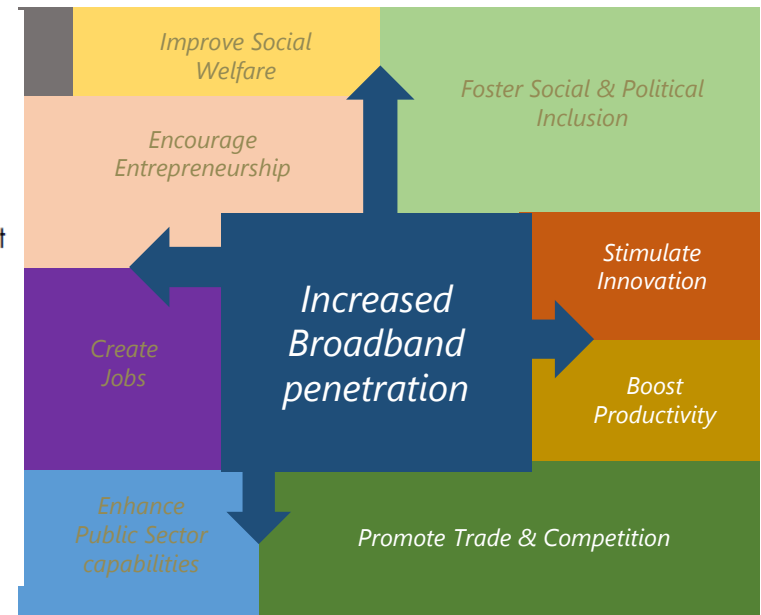


Affordable broadband key to reach digital dividends

Broadband supports development through inclusion, efficiency and innovation



The contribution of Broadband to GDP growth is 2x that of Mobile and brings about substantial social benefits.



Affordable broadband key to reach digital dividends



Internet of Things

Mobile
Broadband
Sensors



Cloud Storage

Data centers
Private and public clouds
Cloud applications



Smart Transport

Intelligent transport systems
Supply chain and logistics
Big data analytics



Green Growth

Environmentally friendly
Bioderived Chemicals/Fuels/Materials
for various applications



Agri-tech

Land management
Natural pesticides natural fertilizers
Cold chain logistics



E-commerce

Business to business
Business to consumer
Government to consumer



Med-tech

Telemedicine
Healthcare IT
Innovative devices for human health



Edu-tech

Online education
Remote learning
Innovative learning models

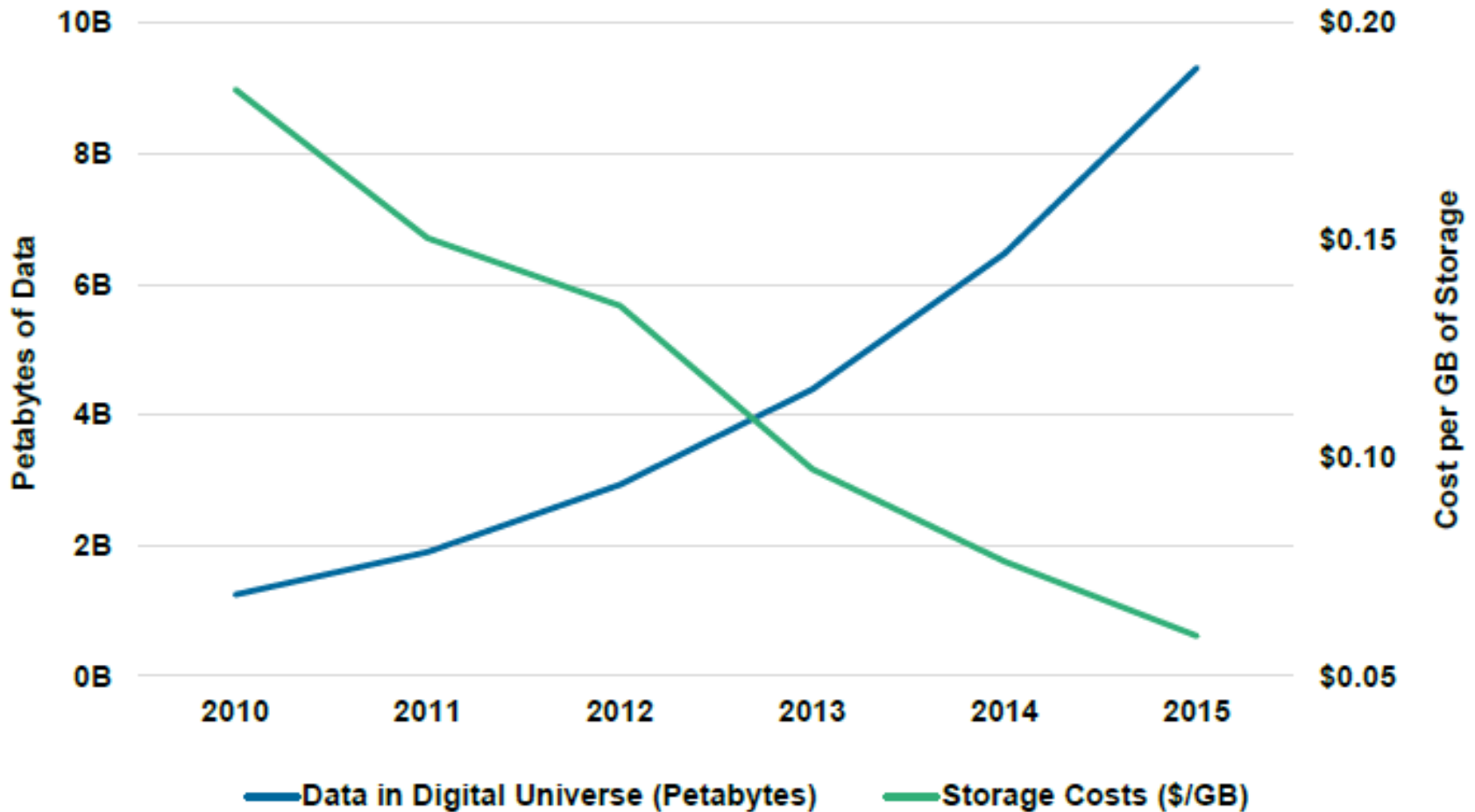


Energy

Smart grid
Renewables and Generation
Energy Storage and efficiency

ICT price reductions are driving the digital revolution

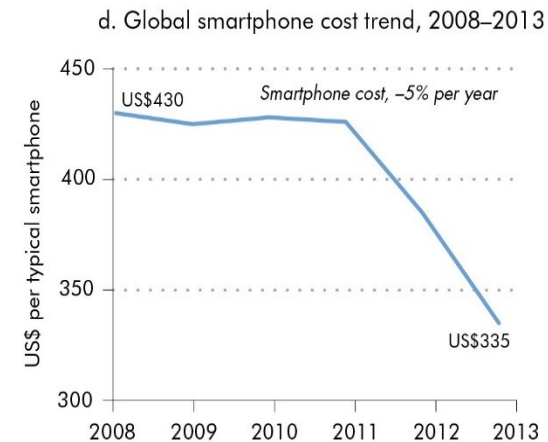
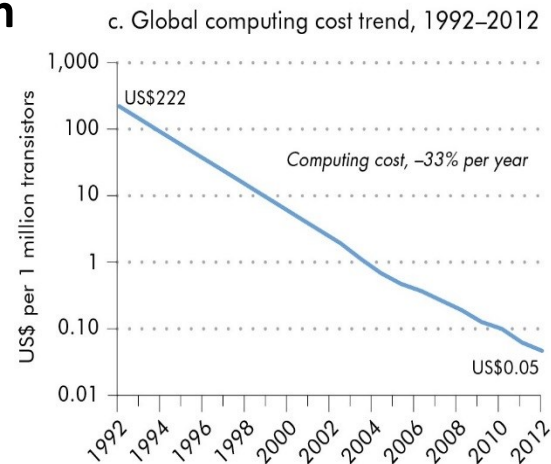
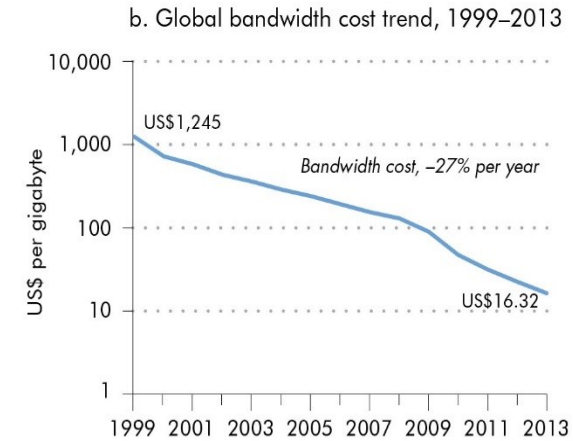
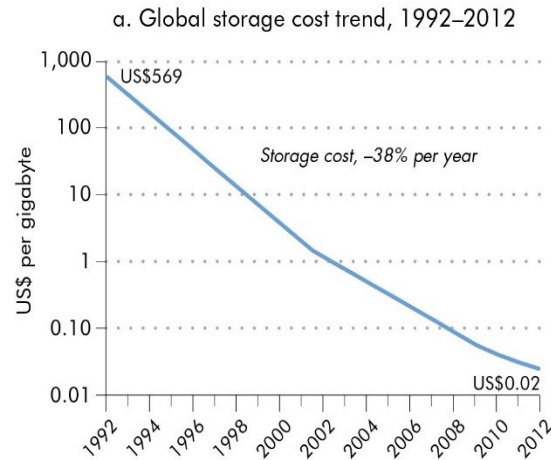
Data in Digital Universe vs. Data Storage Costs, 2010 – 2015



Globally, ICT prices have been falling

- **Storage cost reduction**
38% per year (1992–2012)
- **Bandwidth cost reduction**
27% per year (1999–2013)
- **Computing cost reduction**
-33% per year (1992–2012)
- **Smartphone cost reduction**
-5% per year (2008–2013)

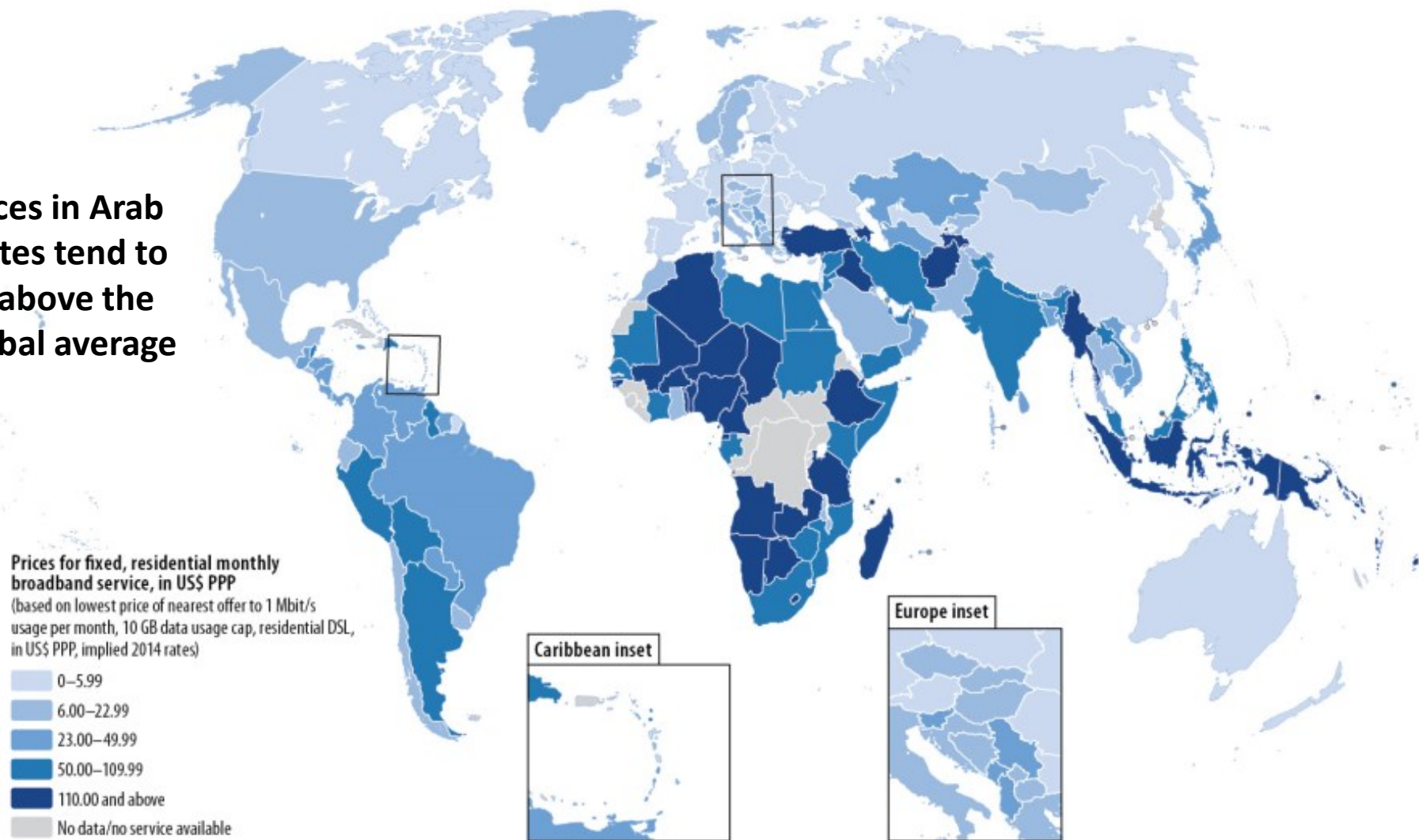
Source: WDR 2016



Source: Deloitte Shift Index 2013; see <http://www2.deloitte.com/us/en/pages/center-for-the-edge/topics/deloitte-shift-index-series.html>. Data at http://bit.do/WDR2016-Fig4_1.

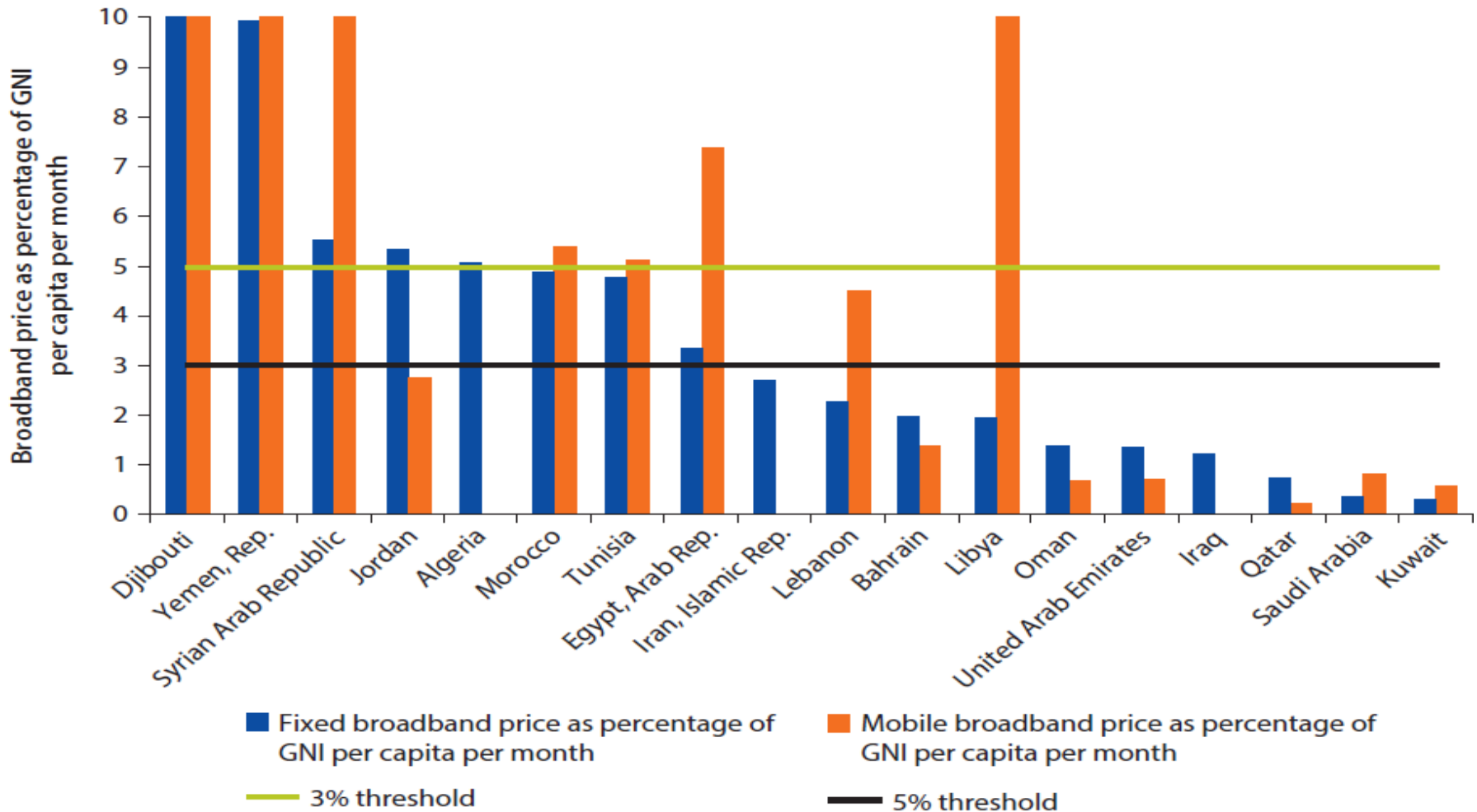
Fixed-line Broadband Prices, per 1 Mbit/s per month (in US\$ PPPs)

Prices in Arab States tend to be above the global average



How the Arab countries are faring?

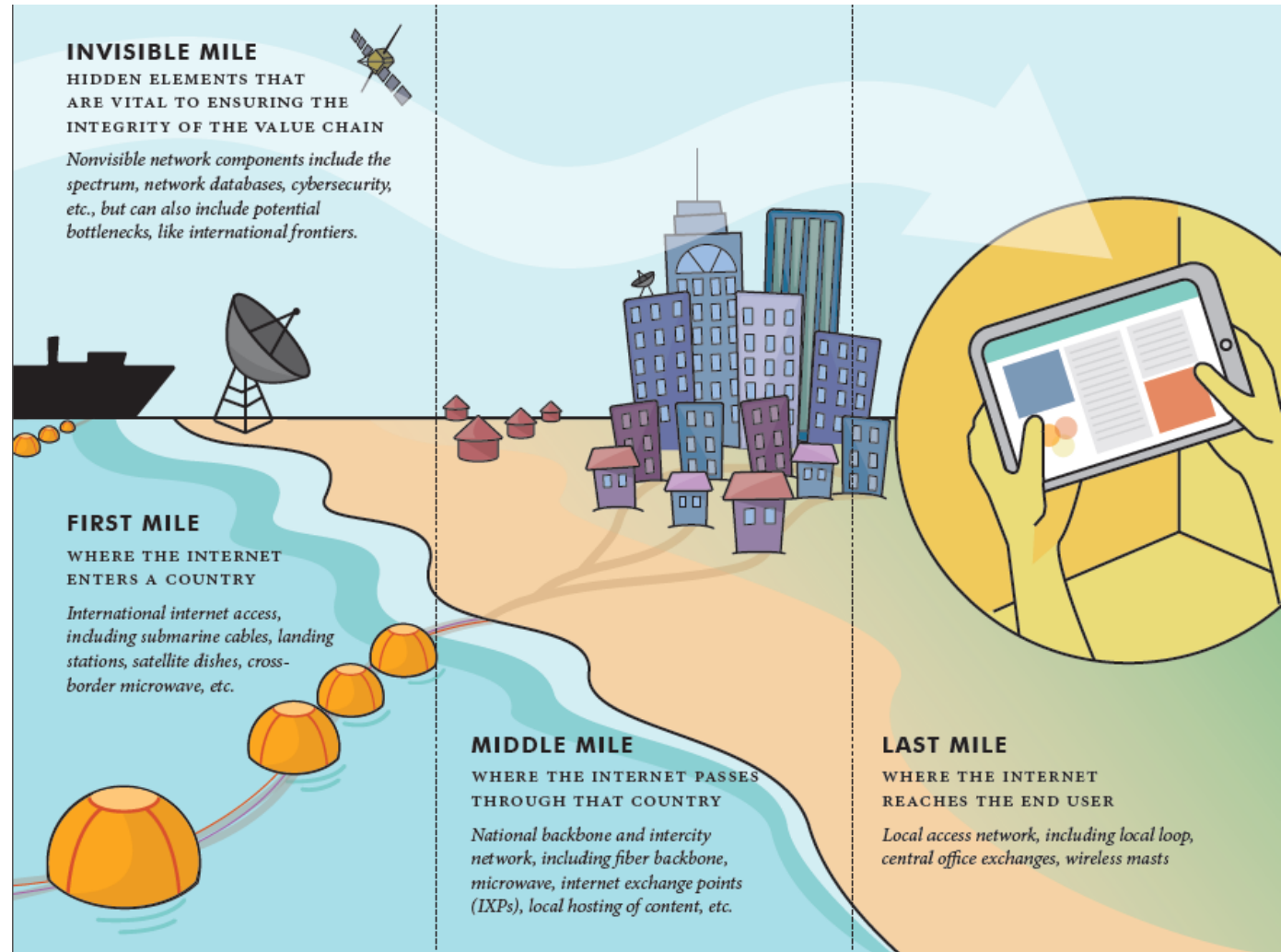
Affordability?



Broadband Policy Interventions

When designing policy interventions designed to boost broadband in a country, it can be useful to think in terms of the different network elements:

- **First mile** (where the internet enters a country)
- **Middle mile** (where the internet passes through a country)
- **Last mile** (where the internet reaches the end user)
- **Invisible mile** (hidden elements in the internet value chain)

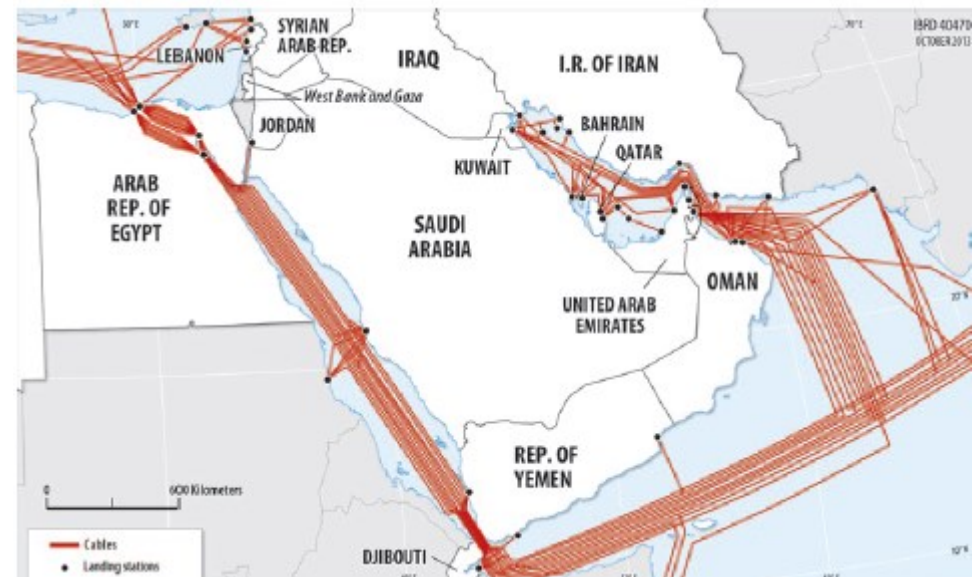
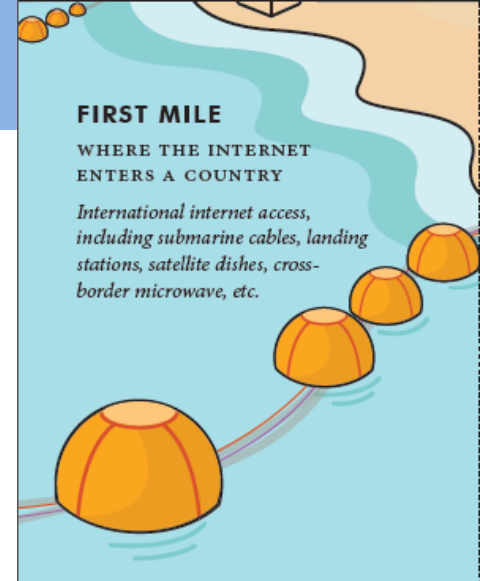


First Mile

Thanks to its strategic geography, the MNA region is generally well served with **submarine fibre optic cables**, especially in the Gulf region where many cables pass through the Red Sea and Suez Canal

- **UAE** is best served, with 13 cables supplying 1'597 Gbit/s of bandwidth in 2015
- **West Bank and Gaza** is worst served, with no international cables, due to landlocked position, dependent on neighboring economies for transit
- **Lebanon, Syria and Yemen** also poorly served with less than 30 Gbit/s of capacity
- Used international bandwidth in MNA grew by **43 per cent** p.a. between 2011 and 2015

But, in 13 out of 19 MENA countries surveyed, international submarine connectivity is **under control of incumbent**



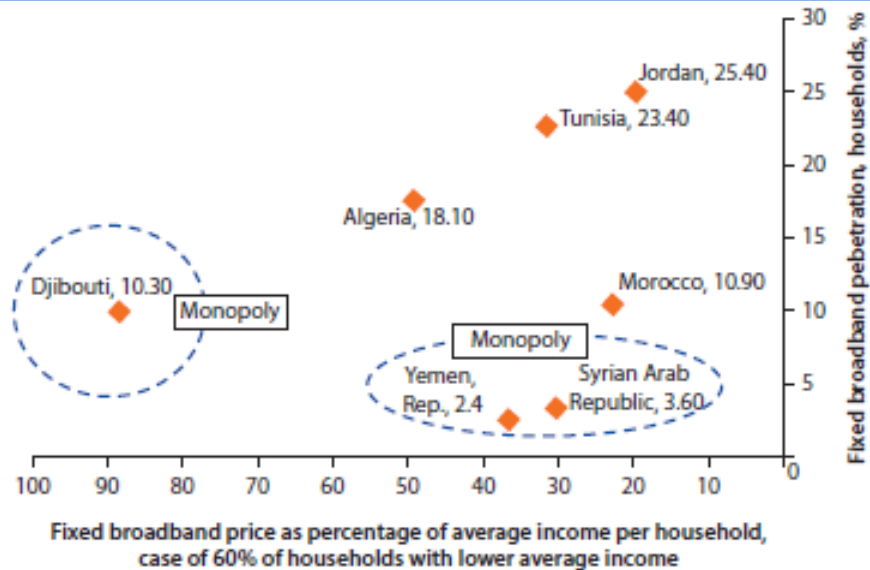
Submarine cables serving Eastern MENA
Source: World Bank, 2014.

Middle Mile

In the Middle Mile, **competition** is the critical factor. Countries that have retained fixed monopolies (like **Djibouti, Syria or Yemen**) are more likely to have lower penetration

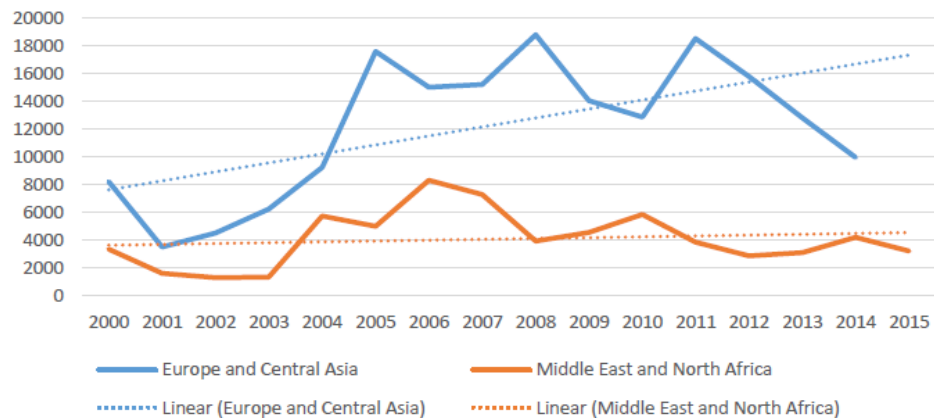
Private investment is lower in MENA than other regions

Cross-sectoral infrastructure sharing can help. In **Tunisia**, the railway operator (SNCFT) has more than 1'000 km of fibre in service



Sources: World Bank analysis; Penetration: TeleGeography's GlobalComms Database (<http://www.telegeography.com>, data retrieved August 2013).

Private investment in telecom in ECA and MENA



MIDDLE MILE

WHERE THE INTERNET PASSES THROUGH THAT COUNTRY

National backbone and intercity network, including fiber backbone, microwave, internet exchange points (IXPs), local hosting of content, etc.

Last Mile

Reaching the end-user remains the biggest policy challenges, especially in countries with **extensive, thinly-populated rural areas**.

Universal Service Funds can help. In **Egypt** the NTRA has operated a USF since 2005, with operators contributing 0.25% of revenues. But the fund was only activated in 2014.

New technologies can also help, including **drones**, nanosats, balloons and use of TV White Spaces spectrum



MobiNil 3G coverage, Egypt (Source: GSMA)



INTERNET OF THE FUTURE



LAST MILE

WHERE THE INTERNET REACHES THE END USER

Local access network, including local loop, central office exchanges, wireless masts

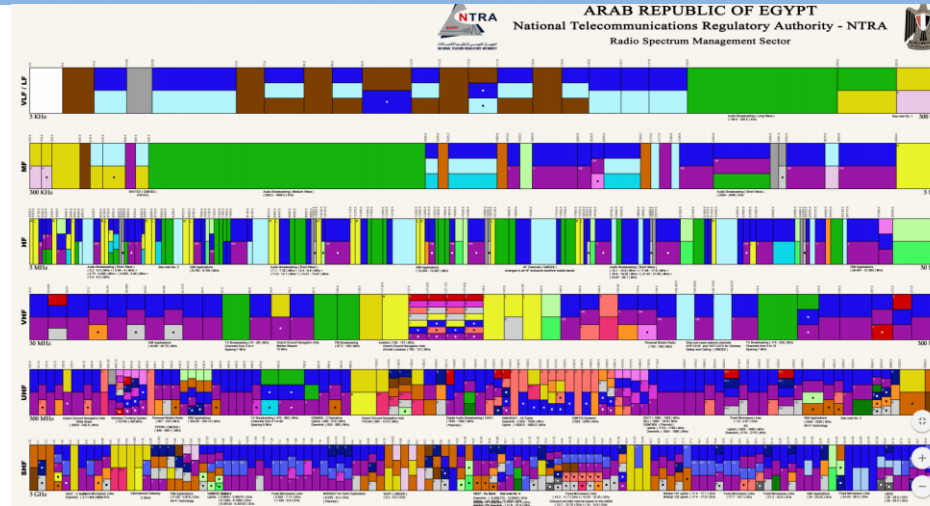
Invisible mile

INVISIBLE MILE

HIDDEN ELEMENTS THAT ARE VITAL TO ENSURING THE INTEGRITY OF THE VALUE CHAIN

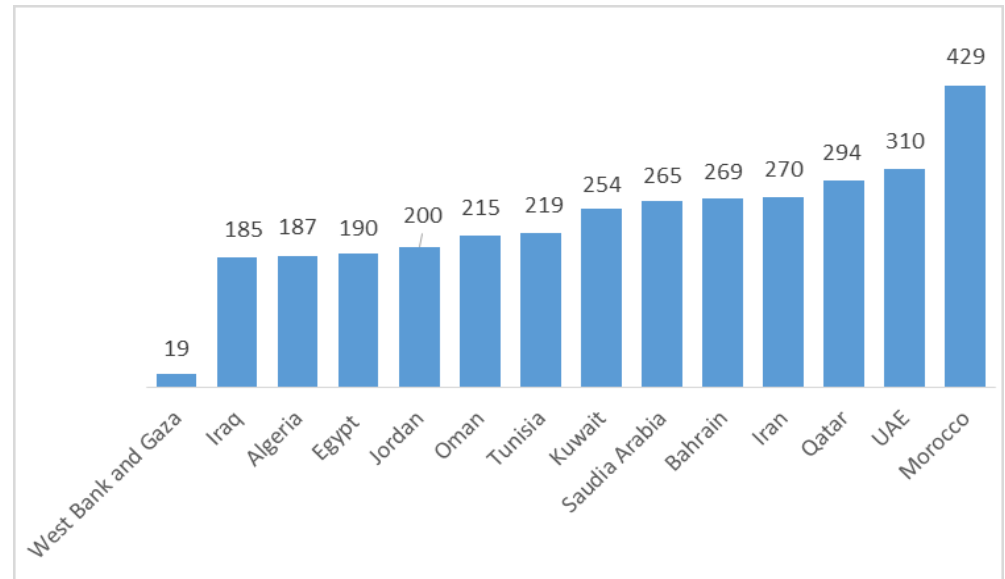
Nonvisible network components include the spectrum, network databases, cybersecurity, etc., but can also include potential bottlenecks, like international frontiers.

The “invisible mile” refers to hidden elements that are vital to the integrity of the internet value chain, such as spectrum, numbering plan, cybersecurity, privacy etc



Egypt's spectrum allocation chart

For broadband, allocation of spectrum to mobile services, esp. 3G and 4G/LTE is critical. All MENA countries fall below global best practice of >700 MHz allocated to mobile cellular services. **Morocco** is best placed with 429 MHz of usable spectrum. **West Bank and Gaza** has less than 20 Mhz available.



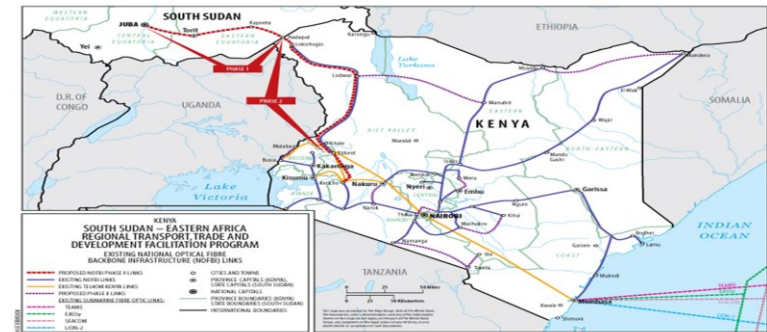
Spectrum in use for cellular mobile. Source: GSMA

Promotion of Shared Infrastructure

...to reduce cost of deployment

- Active Infrastructure (elements managed by operators)
 - Transmission systems, antenna
 - Spectrum
 - Internet Exchange Points (IXPs) at national/local level
- Passive Infrastructure (elements not necessarily managed by operators after installation)
 - Ducts
 - Fiber optic cables
 - Towers
 - Cabinets containing power supply, air conditioning
 - Physical space on the ground
- “Dig Once” policy: collaboration with other sectors, especially transport
 - Largest cost element (90%*) for deploying broadband is burying fiber optic cables and conduits underground.

* FHWA (Federal Highway Administration of USA), 2013



Example: World Bank financed Transport project in East Africa (ongoing). Aside from building roads, fiber optic cables are being deployed alongside the road, from Eldoret, Kenya to Juba, South Sudan (total length: approx. 1,000 km). This will allow the connection to the submarine cable landing stations in Mombasa, Kenya.

Innovative PPP models wholesale / passive shared infrastructure hybrids

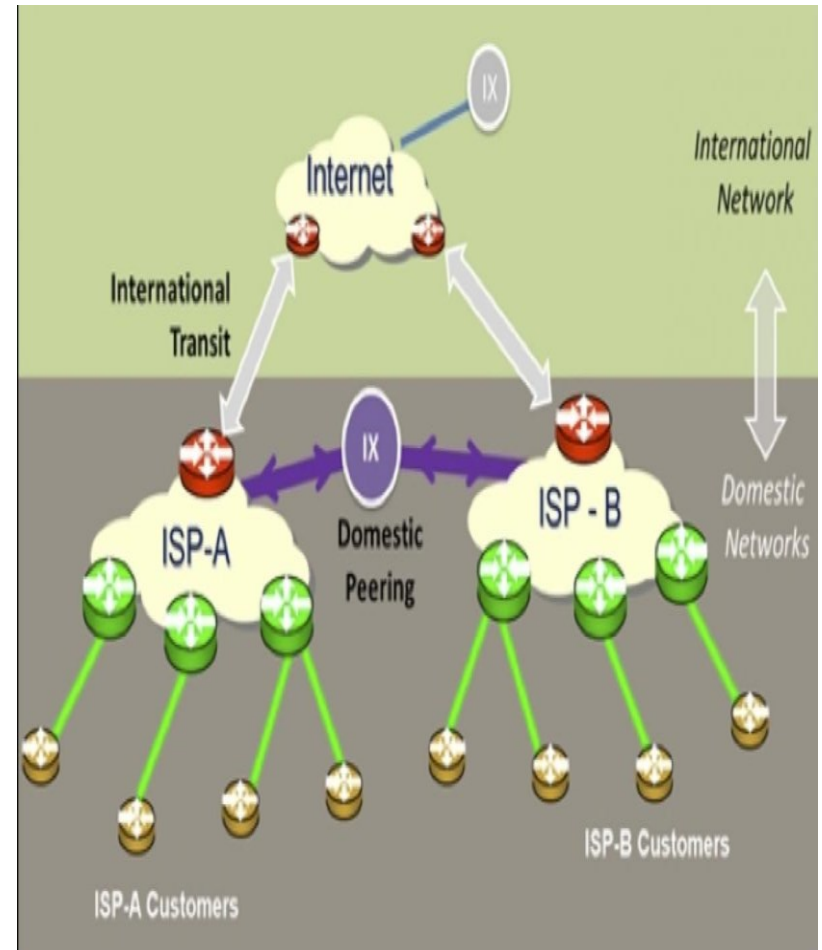
Model	Description	Examples
Passive	<ul style="list-style-type: none"> Build-out of the Next Generation National Broadband Network (NGNBN) segmented into three components. BOO model. SingTel (incumbent) outsources first layer (passive) to 	Singapore
Passive	<ul style="list-style-type: none"> Government subsidized build-out of passive infrastructure (towers and renewable energy) in remote areas to be provided on an open access basis, owned and managed by the private 	Madagascar
Wholesale / Passive	<ul style="list-style-type: none"> Build-out of the Qatar National Broadband Network (QNBN) QNBN focuses on the deployment of a passive dark fiber network infrastructure, providing equal and open access to 	Qatar
National Wireless (LTE) Wholesale	Build-out of a national wholesale wireless backbone network utilizing 700 MHz spectrum block. Private ownership and management. Government provided subsidized spectrum, rights of way and access to passive infrastructure.	Mexico

IXPs – Lowering internet costs / increasing affordability

Internet Exchange Points (IXPs) are a vital component of a well-functioning internet ecosystem and a great tool to make internet more affordable.

A number of success stories in the region (UAE-IX/ data center connects network operators and content providers in the GCC region, Egypt became the first country in the Arab region to create an IXP, hosts 60 local ASNs with 232 international links

IXPs are an untapped potential for the region- Is a regional IXP MENA will encourage the development of local content and applications and support more uptake



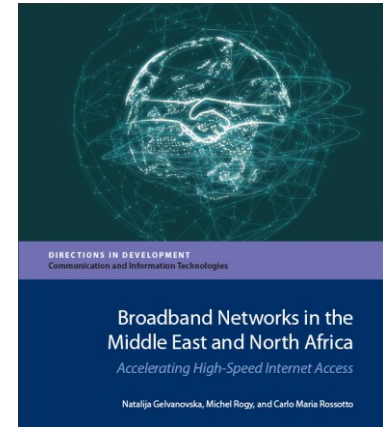
Source: <http://mobileapps.gov.kn/?q=node/14>

Additional enablers for affordability: Demand side

Model	Description
Addressing High cost devices	Lower barriers for buying smartphones (and other devices) by enabling monthly payment plans Pooling device purchases to obtain bulk discounts and reduce costs Remove taxes (e.g. VAT) on smartphones to lower prices and stimulate increased (Not luxury goods) Need for policy coherence between ICT policy and taxation policy
Demand aggregation	Stimulate greater use and interaction of public with useful broadband e-Government applications Subsidized bandwidth to support local capacity building institutions e.g. schools and IT-based business incubators Create local appreciation and demand for broadband
Improve relevant content	Improve availability of local content, Improve digital literacy skills Empower the youth-digital natives to become producers of content (not just consumers) Embrace the idea of openness where public sector data is available for use
Increase trust	Personal data protection Cybersecurity

World Bank Resources on Broadband in MNA

- Broadband Networks in the Middle East and North Africa (2014): Flagship regional report
- Broadband Strategies Toolkit (launched in 2013): www.broadbandtoolkit.org including case studies of Morocco and Egypt. New module on cross-sector infrastructure sharing
- World Development Report 2016: Digital Dividends: available at www.worldbank.org/WDR2016. Also available as mobile app



DDP (Digital Development Partnership)

WBG has launched initiatives to respond to a changing global landscape.



- The DDP offers a platform for digital innovation and development financing.
- The partnership brings public and private sector partners together to catalyze support to developing countries in the articulation and implementation of digital development strategies and plans.

Launching Partners



WBG has the operational experience and country presence to help client governments on the digital infrastructure side as well as on the policy, regulatory and institutional complements needed to reap the benefits of digital investments.