# BROADBAND COMMISSION

FOR SUSTAINABLE DEVELOPMENT

# 5G in the developing world:
# What can 5G do for developing countries
# &
# how can it be ensured that this is truly a technology for all?

## 5G Huddle, London, 27 April 2016

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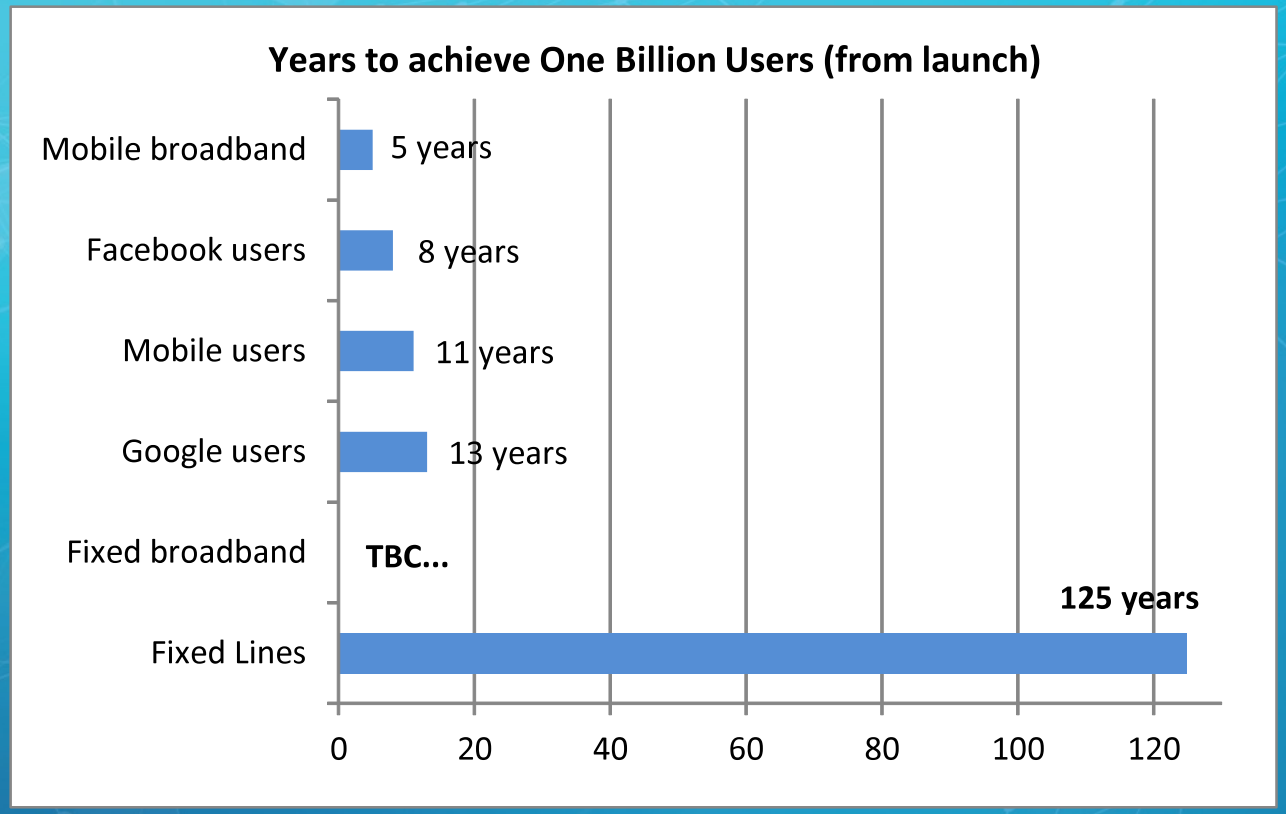
# Stellar growth of mobile broadband – fastest growing tech




ITU "State of Broadband 2015 report".

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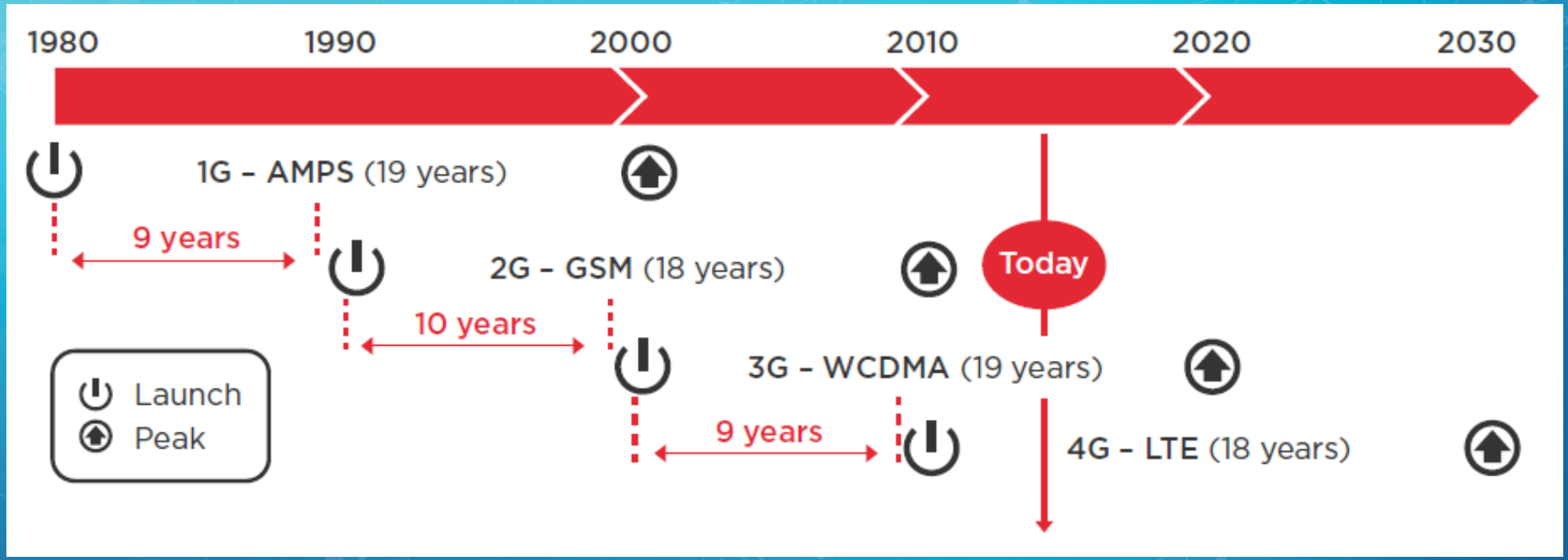
# Stable launches – stable lifetimes – sweating the assets?




GSMA Intelligence.

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# Global Headline Stats

| | 2015 | Approx. 2020 |
|---|---|---|
| Mobile subscrip'ns | 7.1 bn | 9.2 bn (E) |
| LTE subscrip'ns | 995 m | 3.7 bn (E) |
| Mobile BB subscrip'ns | 3.46 bn | 7.7 bn (E) |
| Unique mobile subscribers* | 4.3 bn | 5.4 bn (Cisco)<br>4.6 bn (GSMA) |
| Fixed broadband lines | 794 m | 1 bn (2019) |
| Internet users | 3.19 bn | 4 bn (2019 - FB) |
| Smartphone stock | 2.2 bn (Del) | 5.53 bn (GSMA) |
| 5G subscriptions | -/- | 150 m (2021)?? |

**Source: ITU, and various others.**

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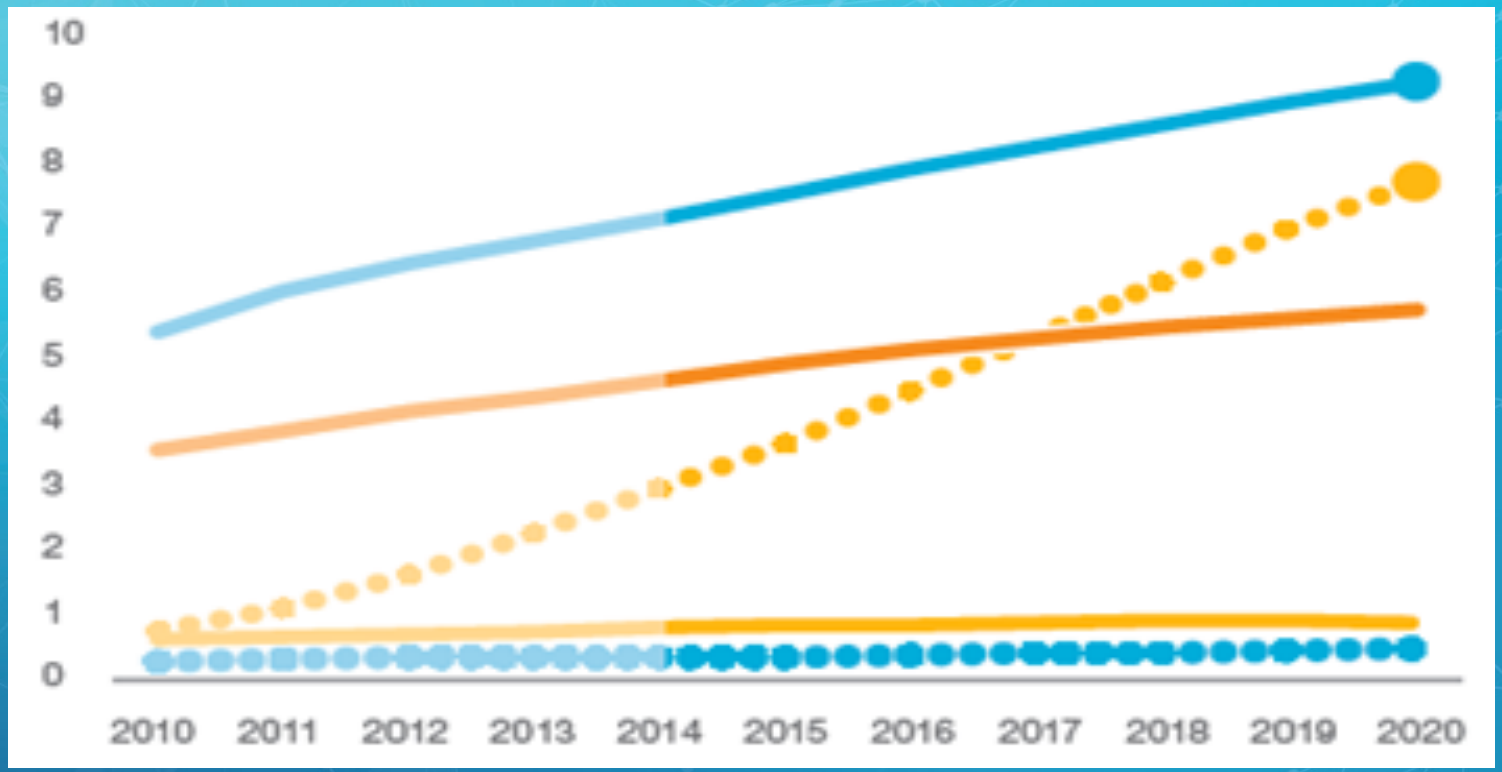
# Stellar Growth of Mobile Broadband




Mobile sub'ns

Mobile BB sub'ns

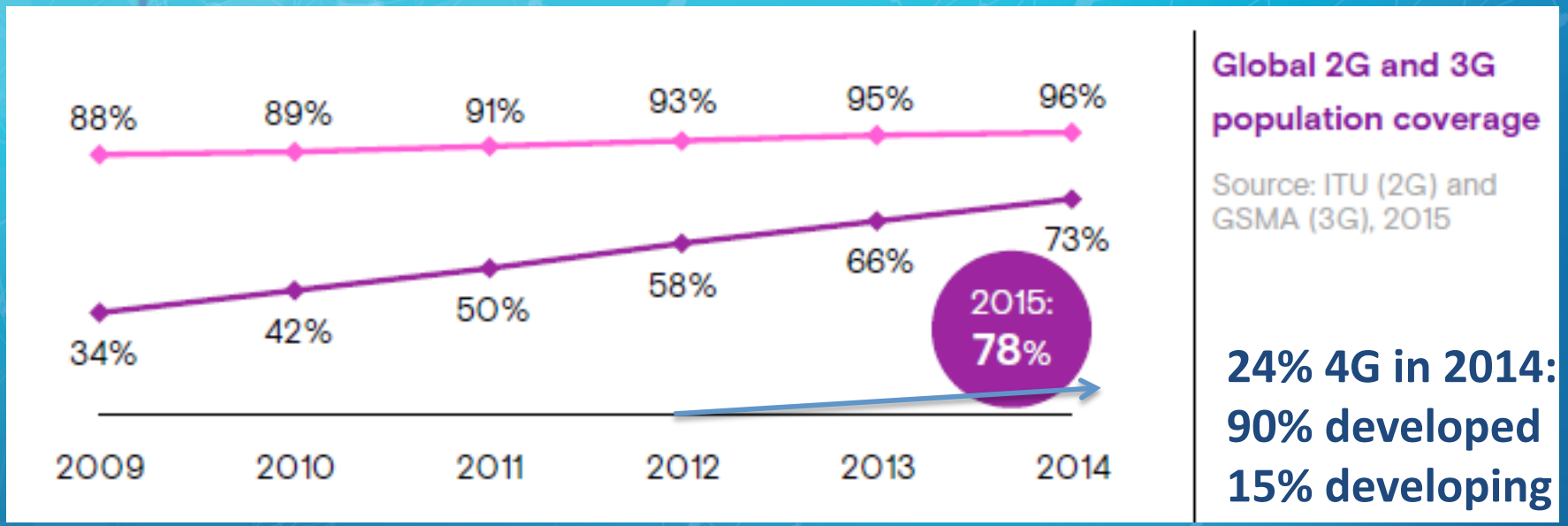
Mobile sub'ers

Fixed BB lines

Ericsson Traffic in Mobility report.

# Coverage – Global Population Coverage

100%




**Global 2G and 3G population coverage**

Source: ITU (2G) and GSMA (3G), 2015

**24% 4G in 2014:**
**90% developed**
**15% developing**

**Source: ITU and GSMA.**

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# Where are the total offline populations located?

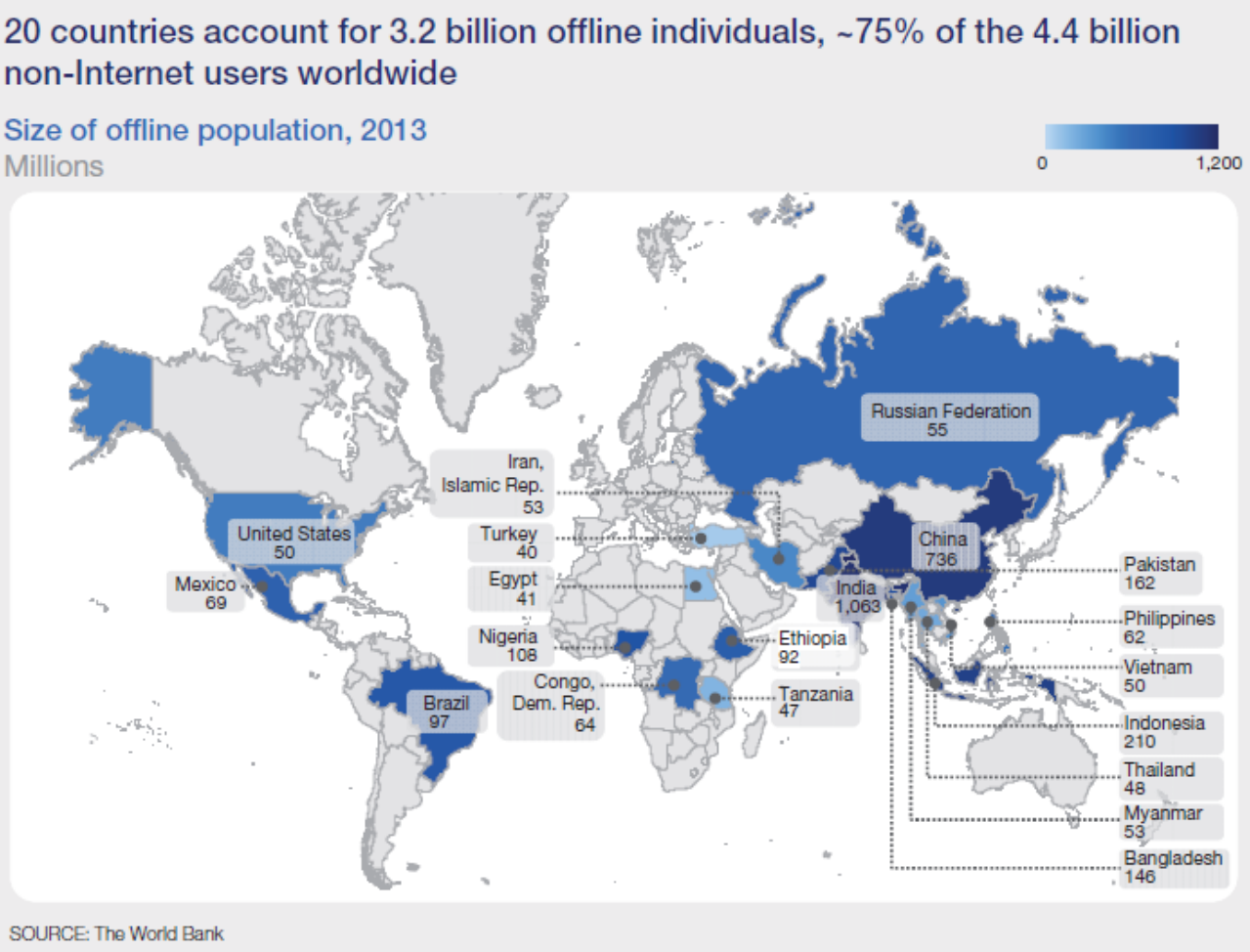
**20 countries = 75%**

**3 countries = 46%**

**6 countries = 55%**

**2014 study (2013 data)**

20 countries account for 3.2 billion offline individuals, ~75% of the 4.4 billion non-Internet users worldwide




SOURCE: The World Bank

# Different visions of 5G

- ***"4G on steroids"*** – defined by technical criteria (different players, different visions)
- ***"Infinite Internet"/"Network of Tomorrow"*** – enabling the hyperconnected world, seamless connectivity, and Internet of Things → Internet of Everything.
- ***"Network of Networks" –*** uniting fixed, wireless & satellite
- ***"The market will decide"*** – whatever some operators have in place in 2018? Standards bodies exist to serve the market, and help provide interface between operators and policy-makers.

- ***Tug of war*** between the market and/or regulators and/or standards process

# Many criteria & players involved – but are all Criteria Equal??

**Aspirational statements from the mobile industry (by GSMA):**
**(5GPPP's view may differ on some criteria)**

- 1-10Gbps connections to end points in the field *(*NOT theoretical maximum*)
- 1 millisecond end-to-end round trip delay (latency)*
- 1000x bandwidth per unit area
- 10-100x number of connected devices
- (Perception of) 99.999% availability
- (Perception of) 100% coverage
- 90% reduction in network energy usage
- Up to ten-year battery life for low power, machine-type devices.

**Source: "Understanding 5G", GSMA Intelligence, Dec 2014**

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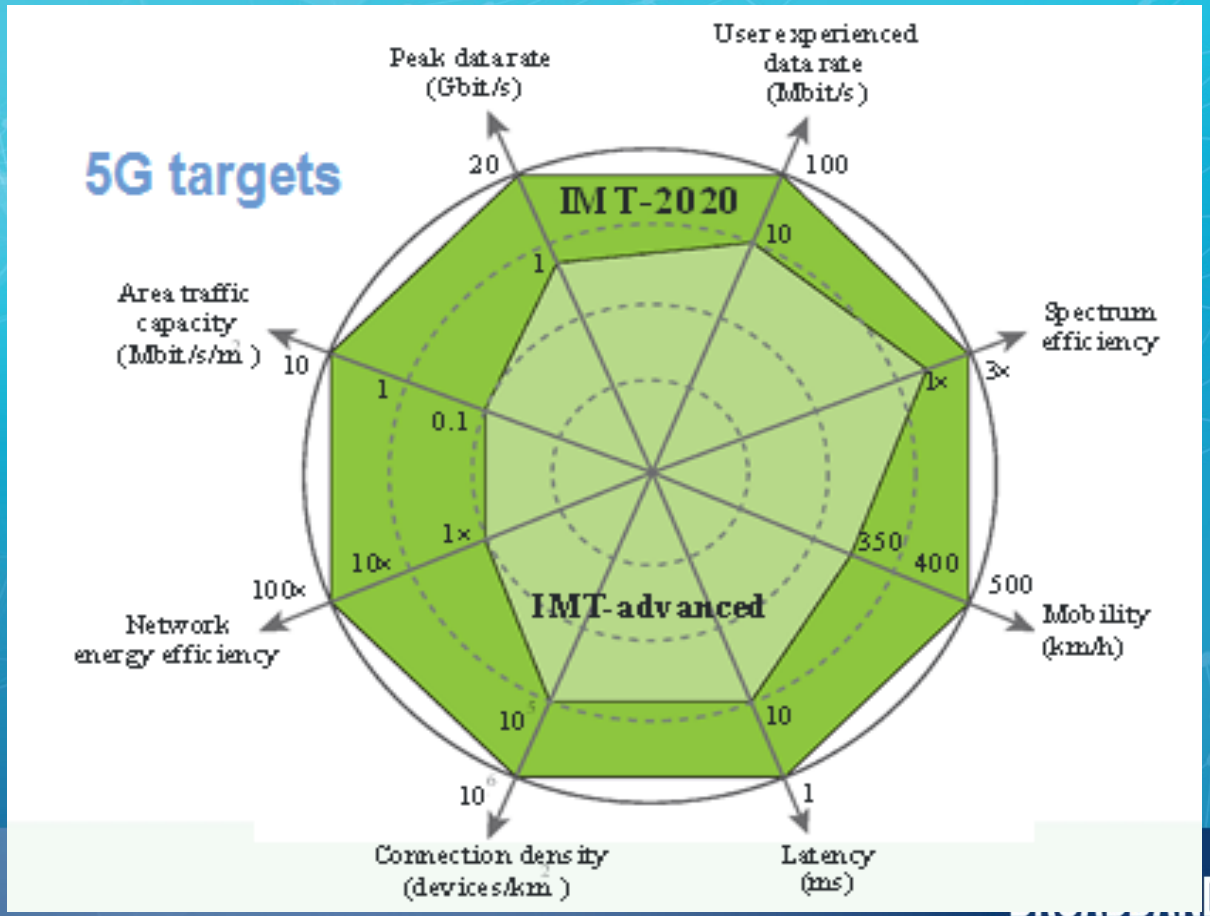
# Technical Considerations – towards an international std

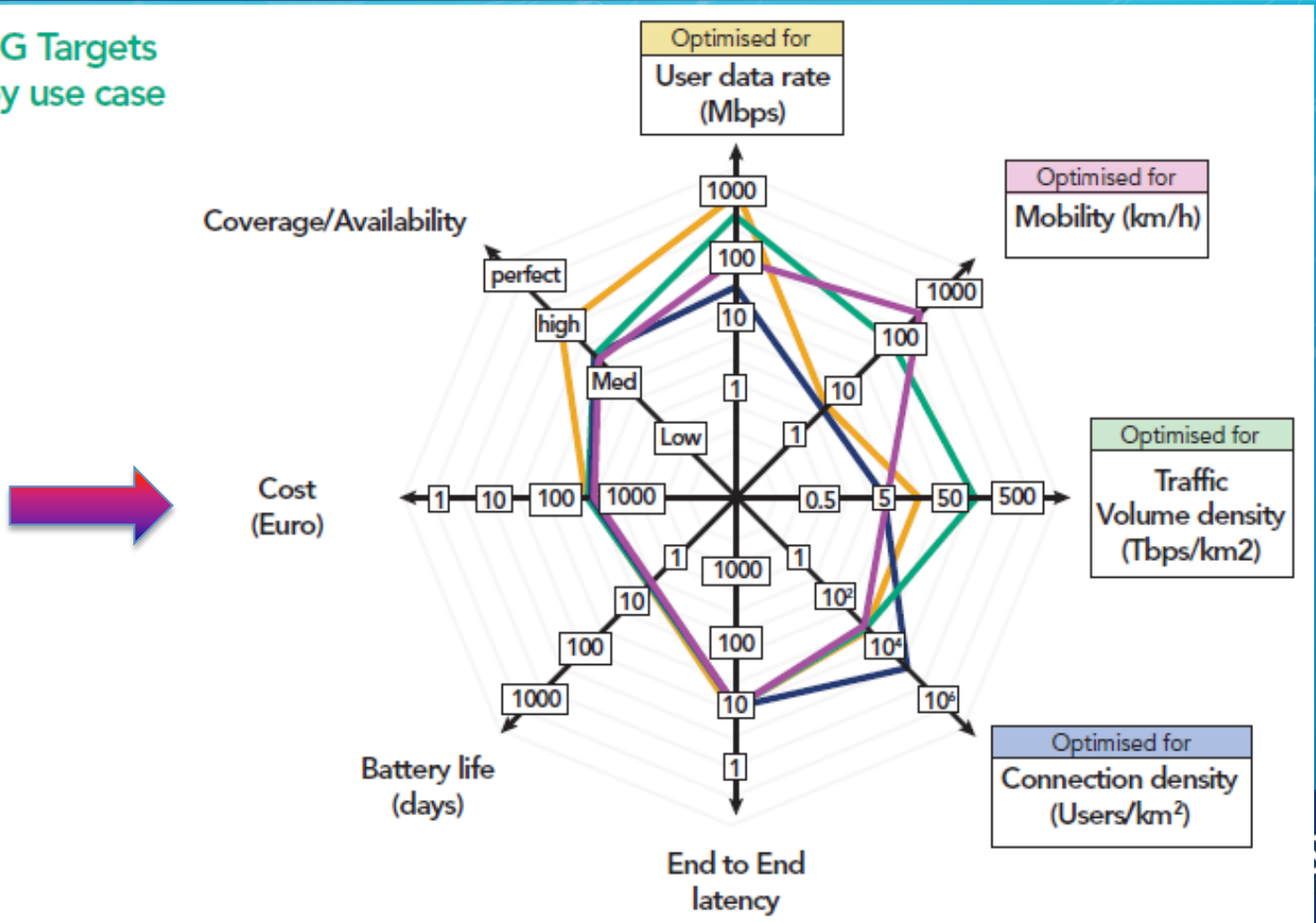



ITU WP5D
TEMP-548-E.

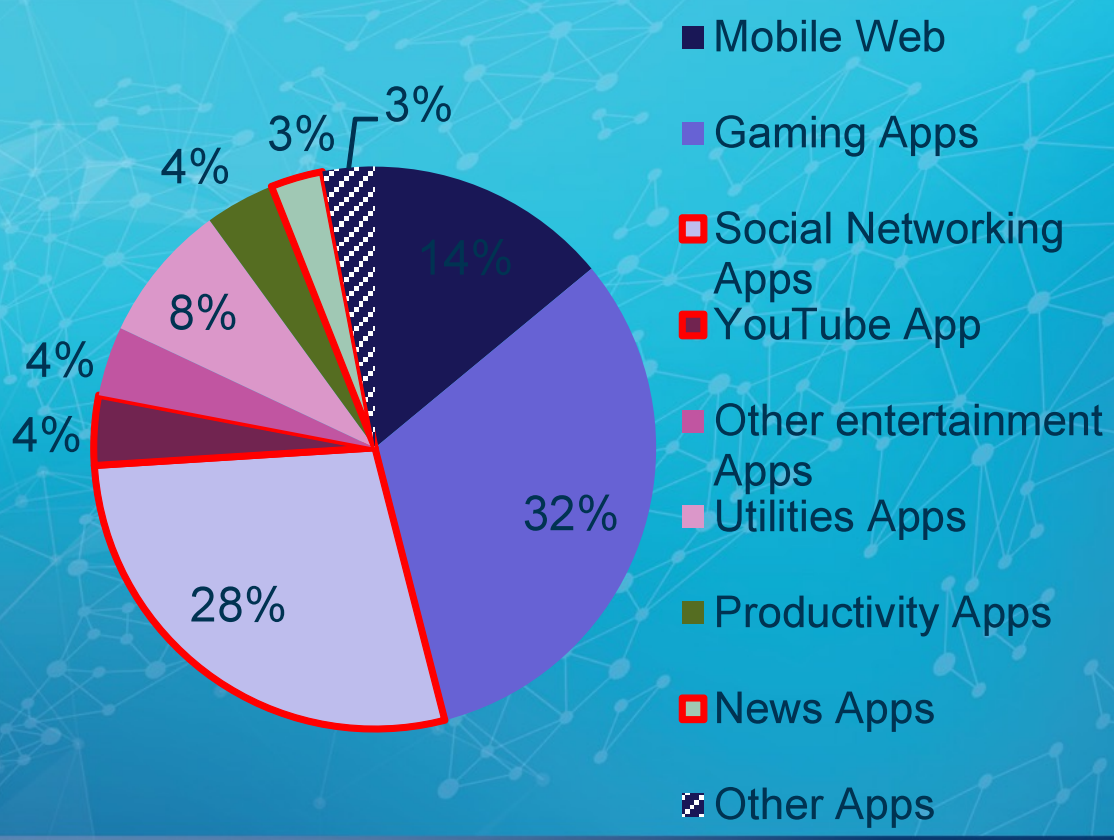
# Trade-offs in the Use Cases

**Cost!!**

**Source: Anritsu**



# But what are people actually using the Internet for?




Pew Internet Research Center, US (2014).

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# 5G in the developing world:

# What can 5G do for developing countries

## 4G Roll outs

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# When 5G arrives…. Positive Arguments for Broadband

- ***Directly increasing GDP*** - growth of the ICT sector (e.g., World Bank, 2009) & access to and trade in new services or new markets abroad;
- ***Greater economic growth or % gain in GDP*** (e.g., McKinsey, 2011);
- ***Reducing transaction costs*** – disintermediation?
- Better, faster, ***more informed decision-making*** (but quantifying difficult!);
- ***Boosting labour productivity*** (e.g., Booz & Company, 200)9 – a 10% increase in broadband penetration correlated with a 1.5% increase in labour productivity over next 5 years – potentially most controversial?
- ***Resulting in a net gain in jobs*** e.g., the *Connected Nation* Report 2008 – a 7% increase in broadband could result in a 2.4m extra jobs worth US$134 bn. McKinsey (2011) - 2.4 jobs are created in Internet industry for every job lost – but more recent evidence less positive (e.g. WDR 2016, ILO 2016).

**Source: Various.**

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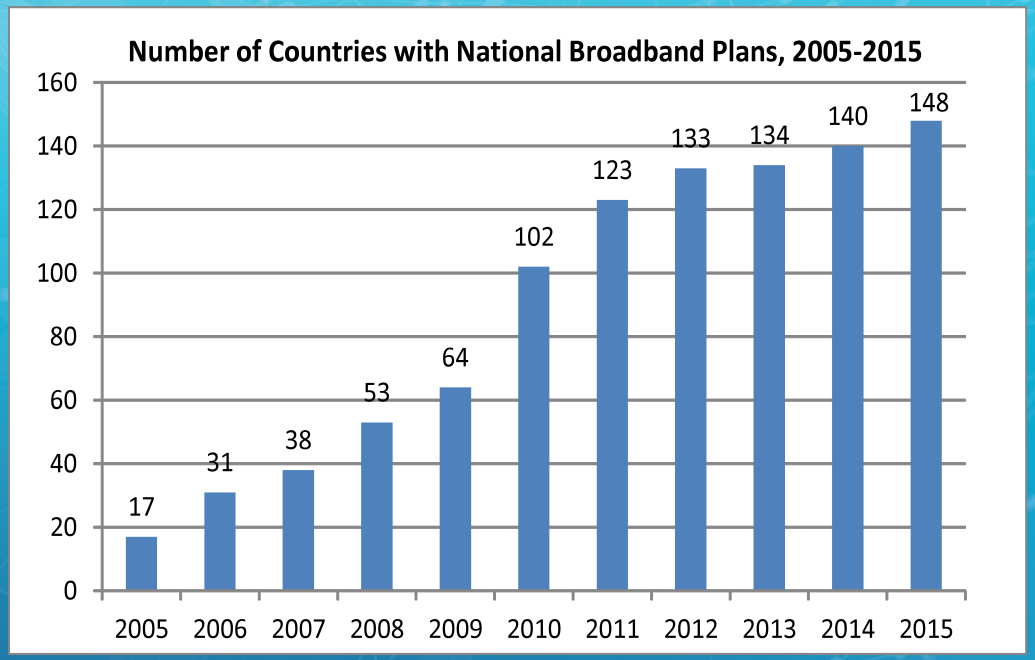
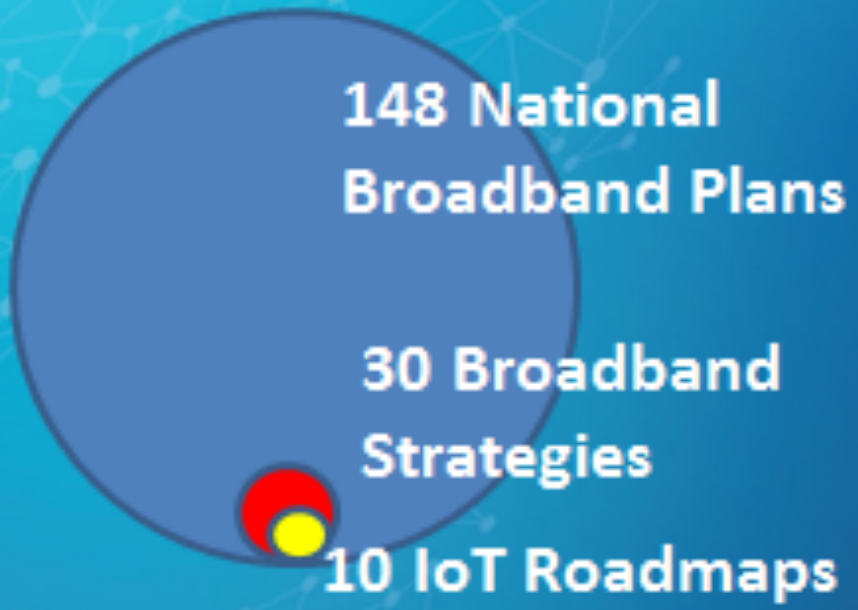
# Arguments + Scale of Funding Needed -> National Broadband Plans




ITU "State of Broadband 2016 report".

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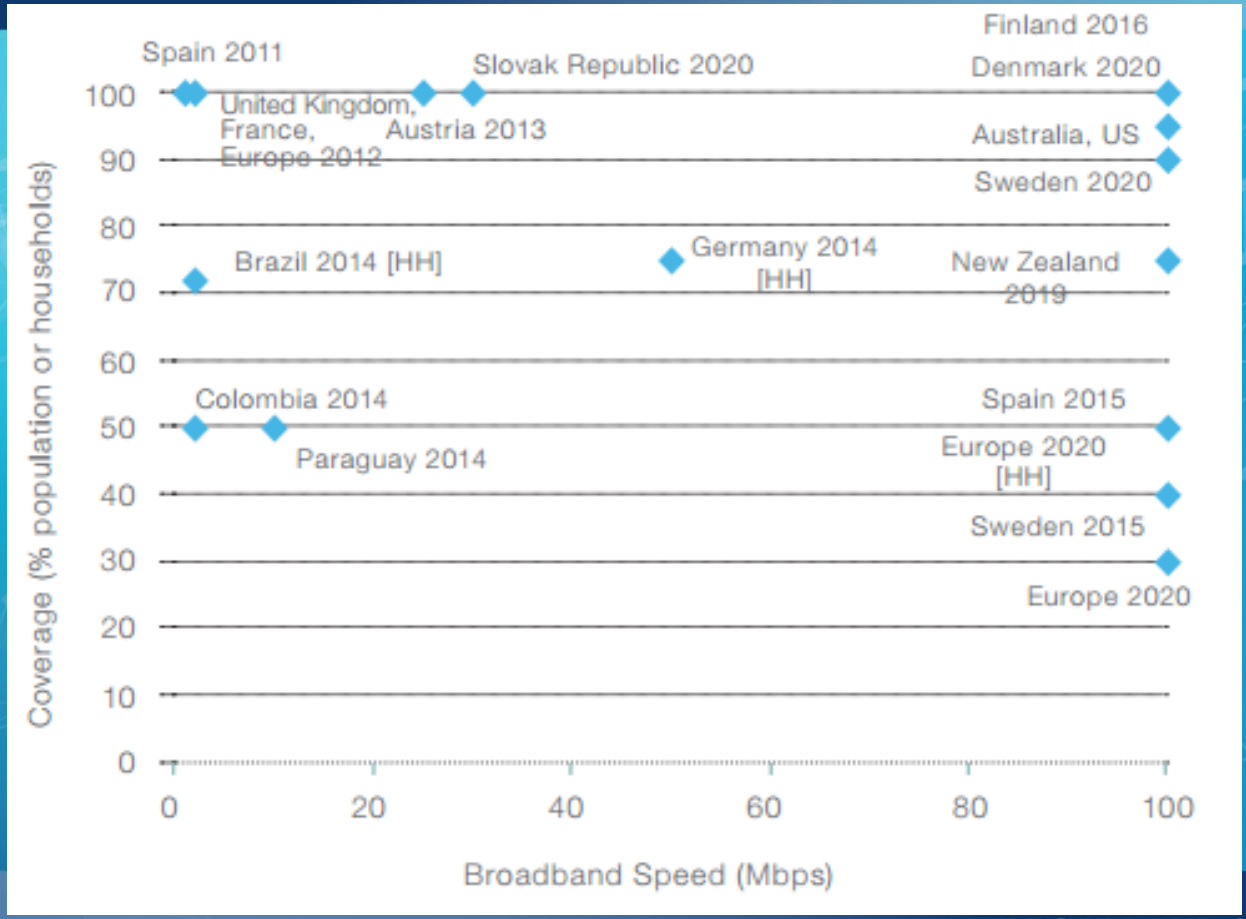
# Coverage versus Speeds




ITU "State of Broadband 2013 report".

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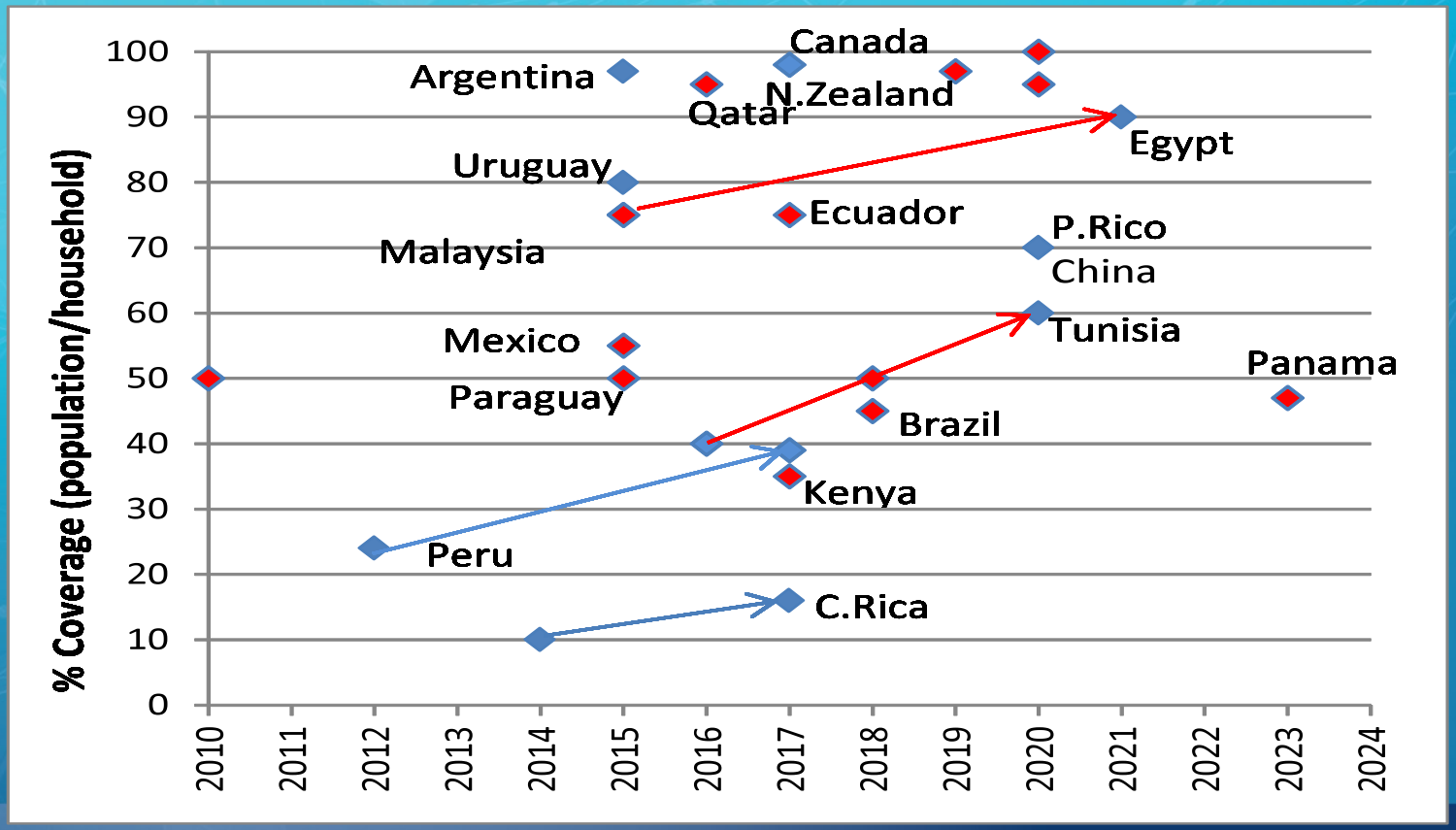
# Coverage over Time




ITU "State of Broadband 2015 report".

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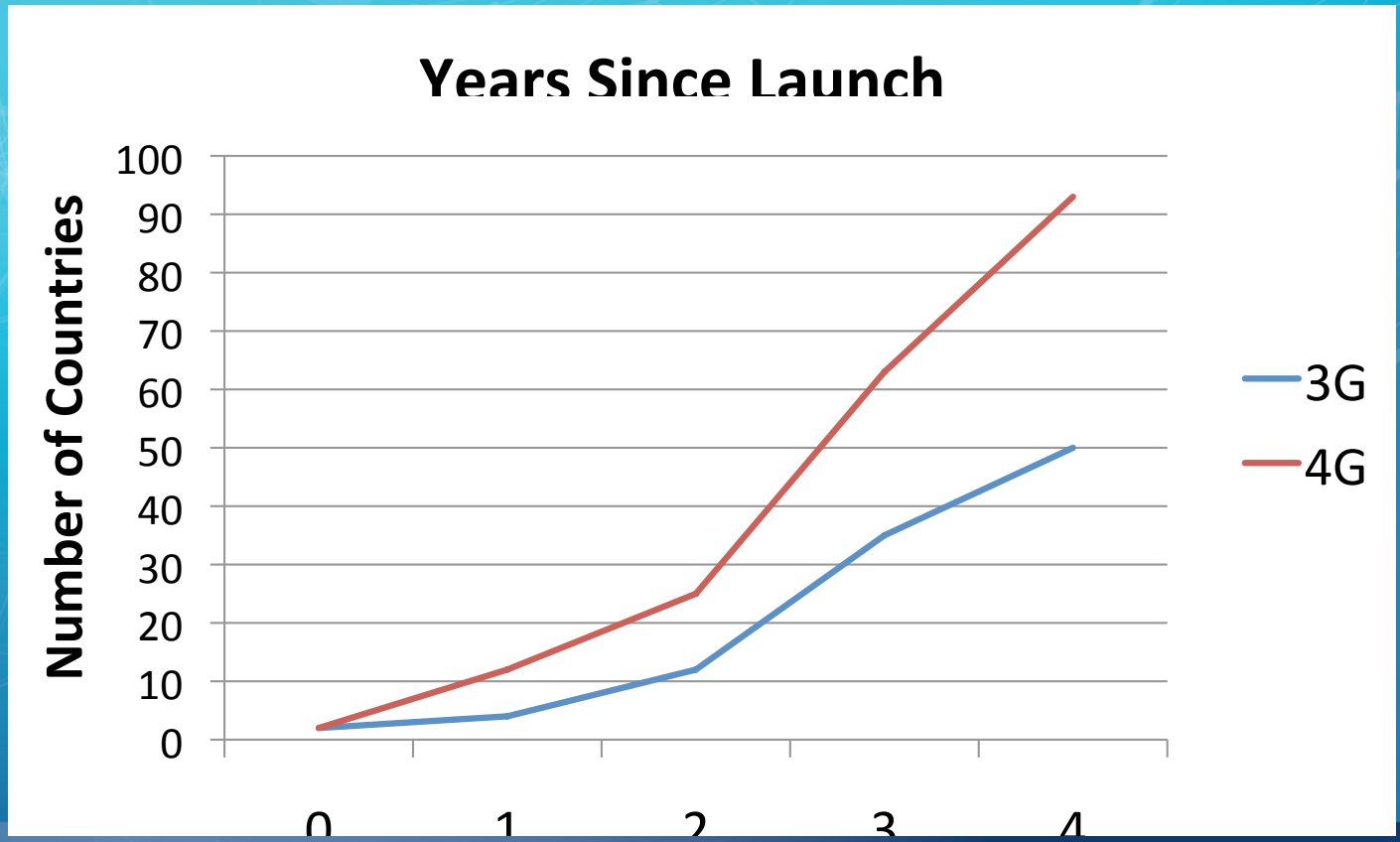
# Industry roll-outs of 4G compared to 3G




Source: ITU data.

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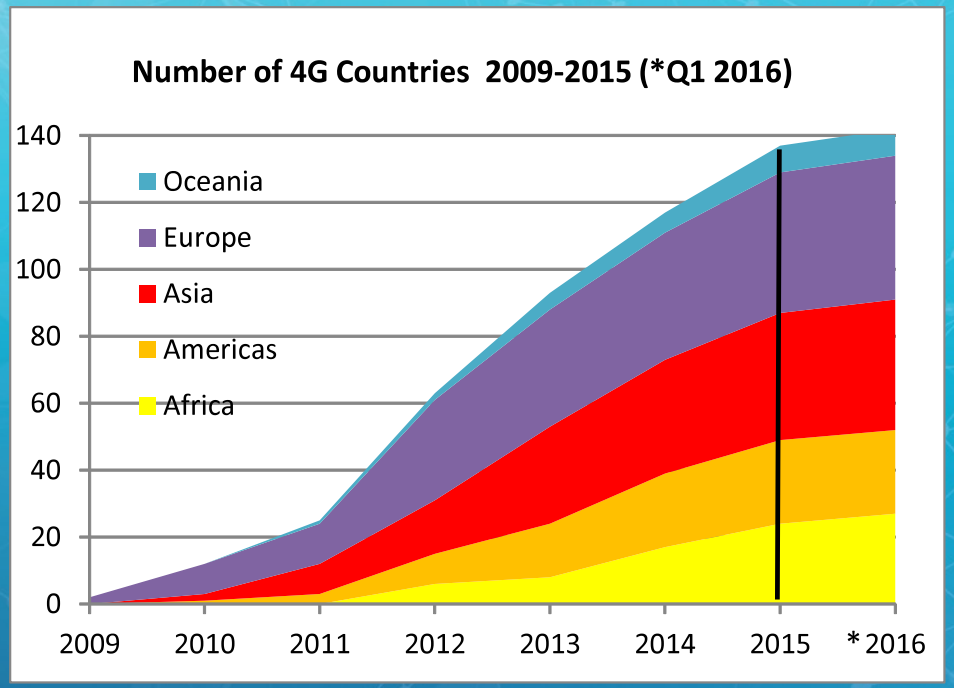
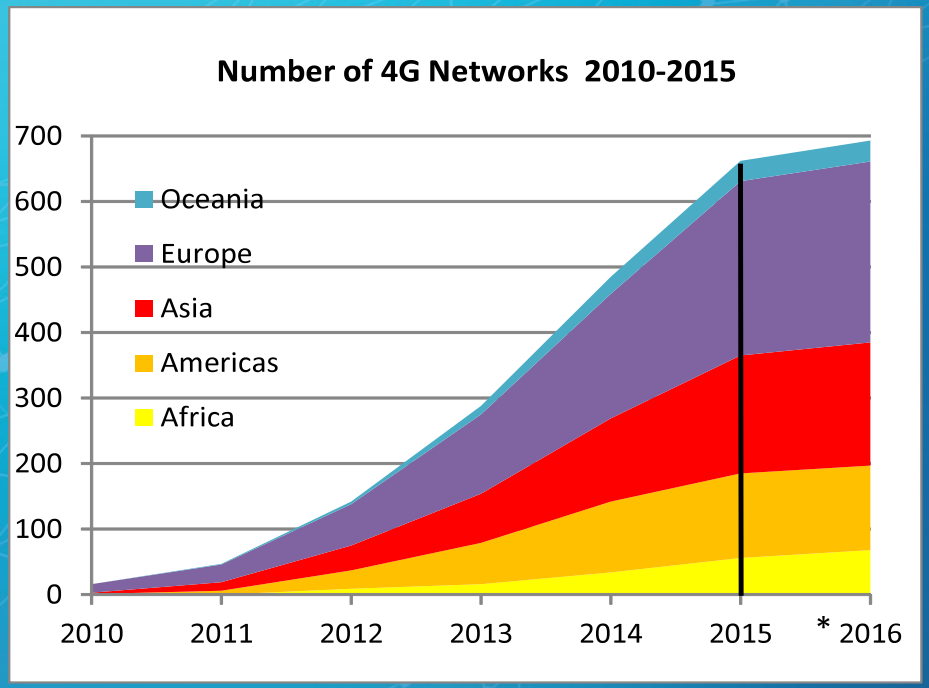
# 4G Roll-outs at the global level




Source: ITU, GSMA.

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# 4G roll-outs by region

| | Region | No countries | Total # Countries | % region | No networks | %Total 4G NWs | Average No networks/ country |
|---|---|---|---|---|---|---|---|
| 1 | Africa | 27 | 52 | 52% | 68 | 9.8% | 2.5 |
| 2 | Americas | 25 | 37 | 67.6% | 129 | 18.6% | 5.2 |
| 3 | Asia | 39 | 45 | 79.6% | 188 | 27.1% | 4.8 |
| 4 | Europe | 43 | 49 | 95.6% | 276 | 39.8% | 6.4 |
| 5 | Oceania | 8 | 15 | 53.3% | 32 | 4.6% | 4.0 |
| | Total | 142 | 198 | | 693 | | |

Source: ITU.

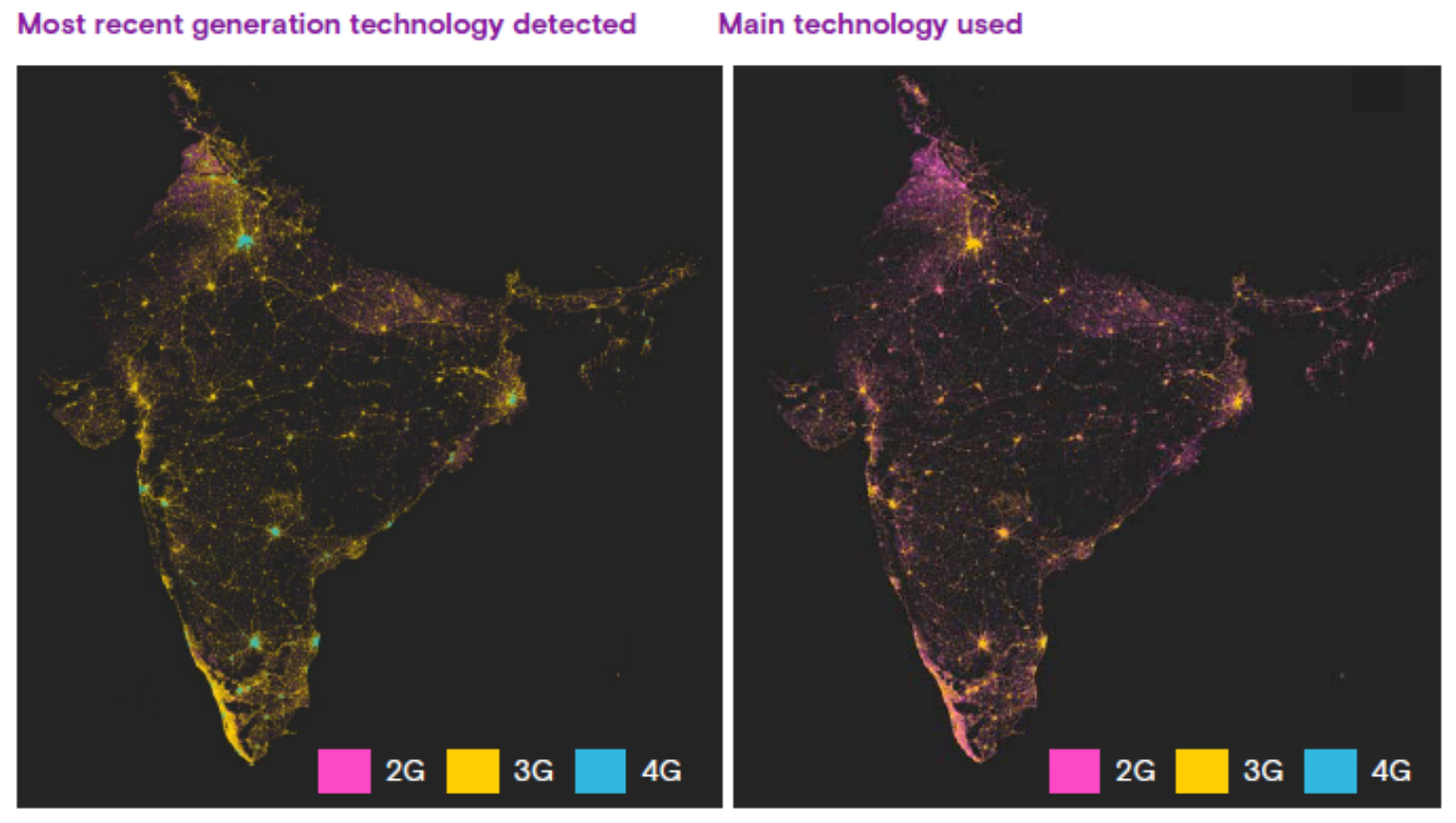
# 4G Roll-outs

- Some unusual/unexpected countries – Benin, Cote d'Ivoire and Guinea-Bissau have deployed 4G. For example, Gabon Telecom has extended 3G and 4G coverage of its networks to 21 major towns in all nine provinces.
- Equally, there are some countries missing – Egypt, Viet Nam.
- In China, China Mobile was planning a city-by-city roll-out of VoLTE services in 145 cities by end 2015 – intending to go very fast.

But…. mainly in urban centres with pre-existing 3G services.

***At the global level, operators are tending to layer in additional connectivity where it exists already, rather than provide new connections***

# Usage




Facebook State of Connectivity 2016 report.

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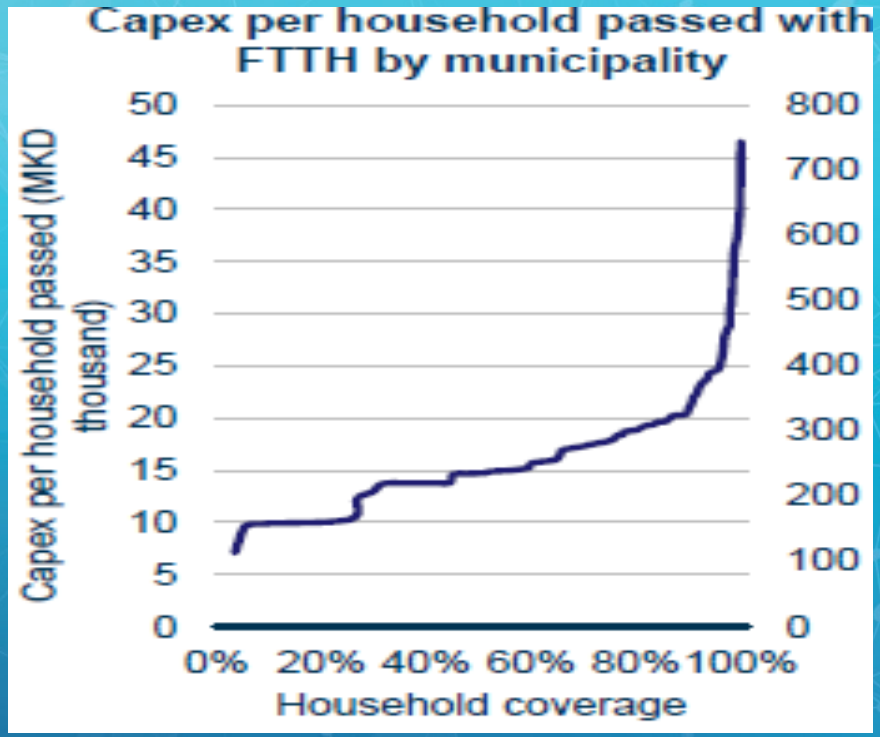
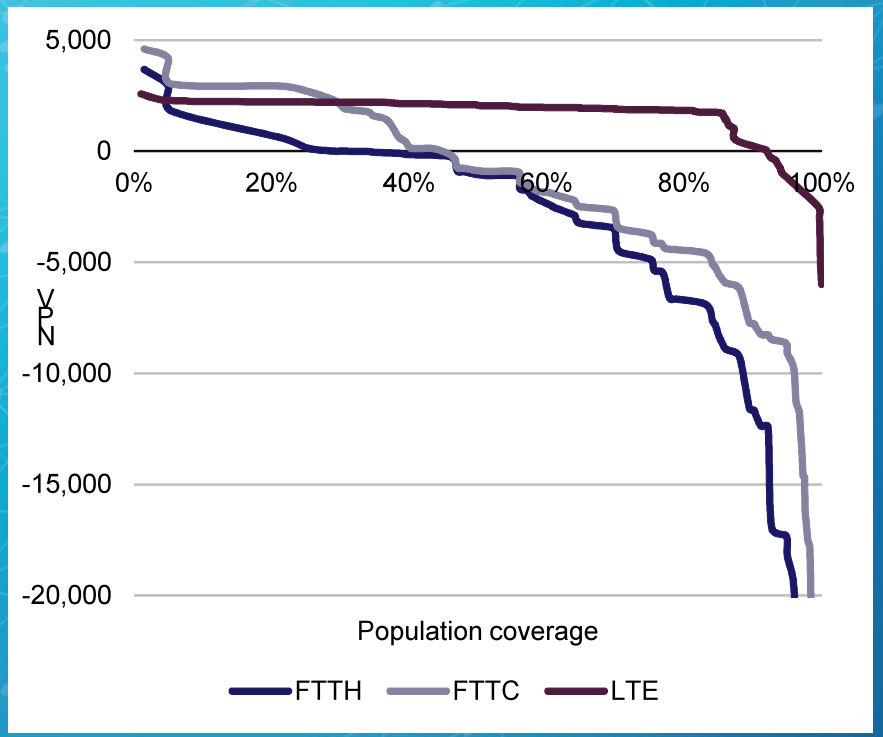
# The Business Case for Broadband

Commercially viable coverage (NPV=0); FTTH=44%, LTE=93%




TFYR Macedonia Analysys Mason, 2015.

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## 5G in Developing Countries

- It will undoubtedly happen, and quite rapidly once it starts – still large uncertainties surrounding 'which' set of 5G technologies, in 'which' countries…
- 5G issue part is of a much bigger issue – connecting the unconnected, and bridging the digital divide.
- Coverage versus speed trade-off reflects a larger debate about social objectives versus 'cherry-picking' profitable areas
- Need a credible, viable commercial business case going forward for 5G deployments to happen in most optimal way.

Thank you very much

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# Coverage question – measuring Urban/Rural Digital Divide

The urban-rural digital divide is defined as the gap between those with regular, effective access to digital technologies (including the Internet) in urban areas, versus rural areas.

In practice, administrative criteria are typically used to clarify this definition:

- ***Population density***: Eurostat uses the categories 'urban', 'intermediate' and 'rural'.
- ***Population concentration:***. and/or distributions – used by many countries.
- ***Absolute town size***: The U.S. Census
- ***Administrative districts***: Wood (2007), "Broadband Availability in Metropolitan and non-Metropolitan Pennsylvania: A Narrowing Broadband Divide?", available at: www.netcom-journal.com/volumes/articlesV213/349_362Wood_Broadband.pdf