

Role of Regulation in 4G and 5G Technology Implementation

Kyiv, 18 November, 2016 – ITU CIS Regional Workshop

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The Digital Revolution

The Evolving Competitive Landscape

Role of Regulation in 4G & 5G Technology
Implementation

4G is connecting and empowering consumers everywhere generating an explosion of Data Consumption

Performances improvement

4G technologies have enabled a **12k-times improvement in capacity relative to 2G**, with maximum download speeds of 250 megabits per second (Mbps)



Users costs reduction

User costs have plummeted. The **average mobile subscriber cost per megabyte decreased 99 percent** between 2005 (2G) and 2013 (4G).



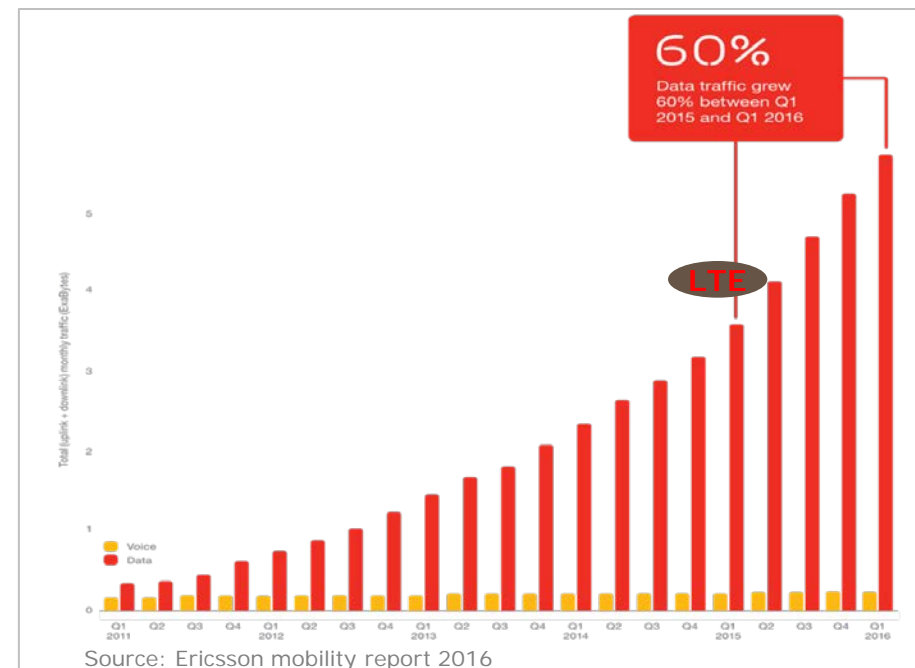
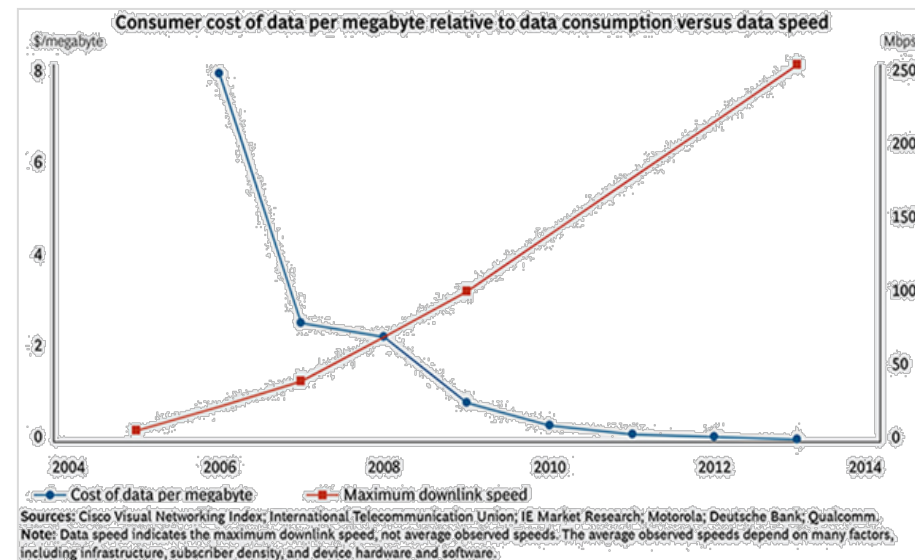
Consumer Surplus

BCG survey (2015) across six countries—the U.S., Germany, South Korea, Brazil, China, and India—reveals that the **value perception of 4G by responding consumers ranges from \$700 to \$6,000 per user**.



Explosion of Data Consumption

An **hyper-linear growth of Data Consumption** have been experienced worldwide, driven by an increasing demand of mobile video and is **expected to continue or even accelerate**



4G has accelerated innovation worldwide and triggered the rise of the Digital Society

Impact on emerging industries

The 4G Ecosystem triggered the **expansion of several emerging industries** generating the OTTs phenomena, the trend to “smart” (IoT/M2M), the market of BIG Data and **positive externalities for the whole society** (social inclusion from e-learning, e-banking, e-Government, e-Health; benefits for the environment due to smart grid adoption, etc.)

Impact on existing industries

Strong benefits both in terms of **cost saving and competitive advantage** for all the Businesses adopting 4G.

BCG research (2015) found that “SMEs that are *mobile leaders* are winning. Typically, the 25 percent of SMEs that use mobile services more intensively see their **revenues growing up to two times faster** and **add jobs up to eight times faster** than their peers

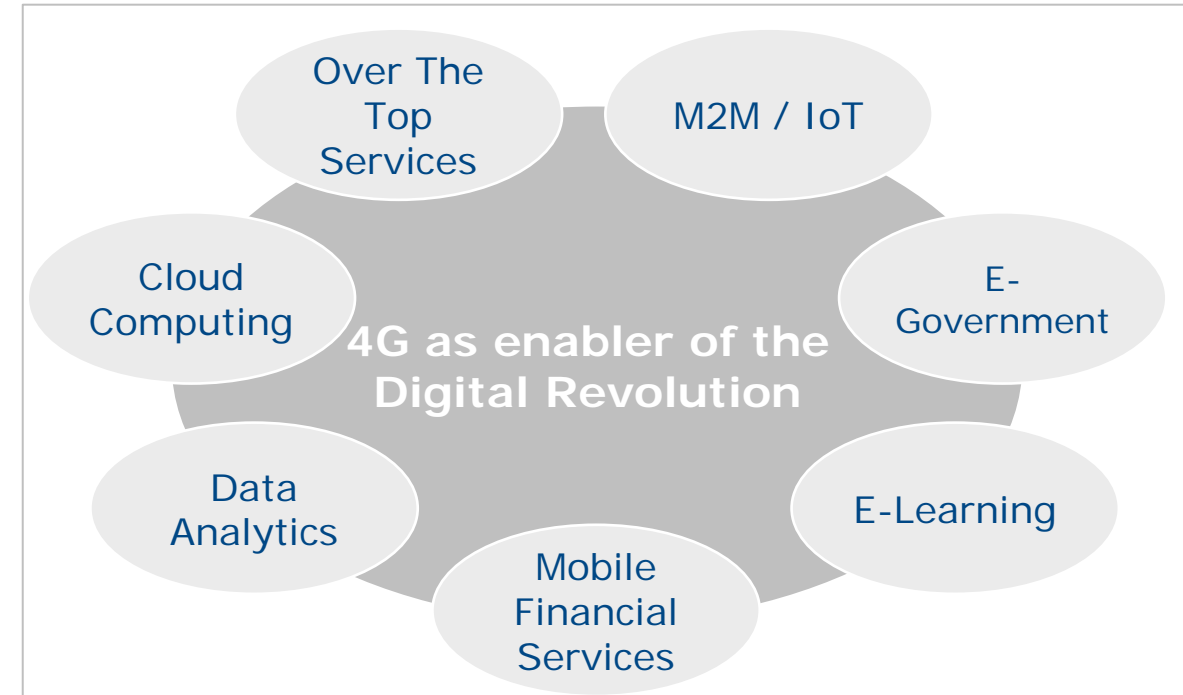
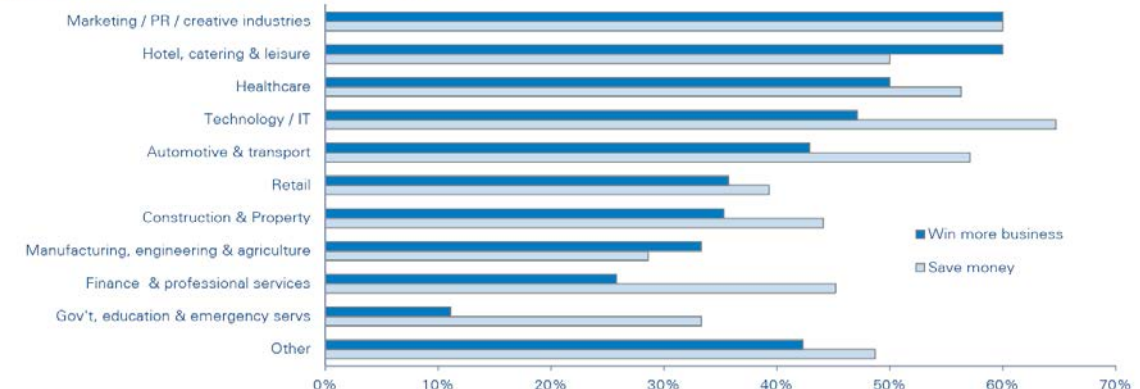


Figure 11: Business Impact of 4G LTE for US adopters

Has 4G helped your business to win more business or save money?



Sources: EE survey

4G is fueling economic growth worldwide, driving recovery from the global recession: an engine of economic prosperity

Huge level of investments required

Companies in the mobile value chain **invested \$1.8 trillion in infrastructure and R&D from 2009 through 2013** (time window of 4G introduction across western Countries), relying almost exclusively on private-sector funding (source: BCG analysis, 2015)



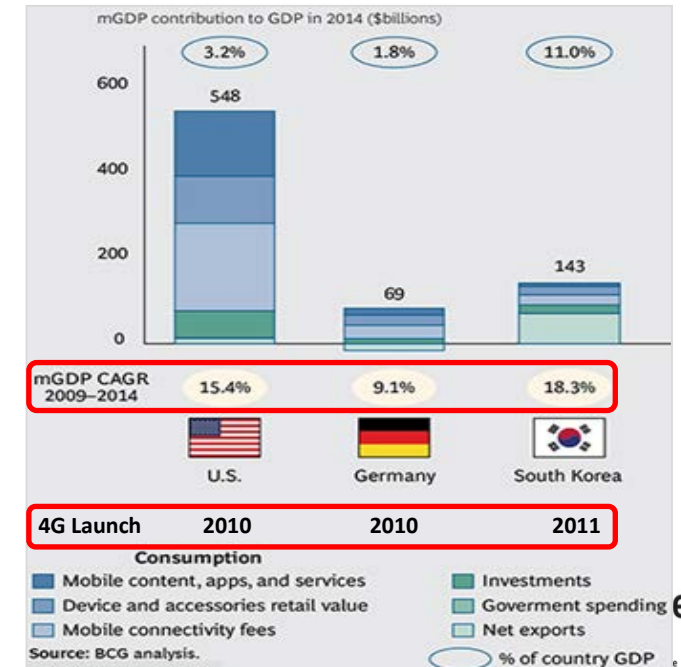
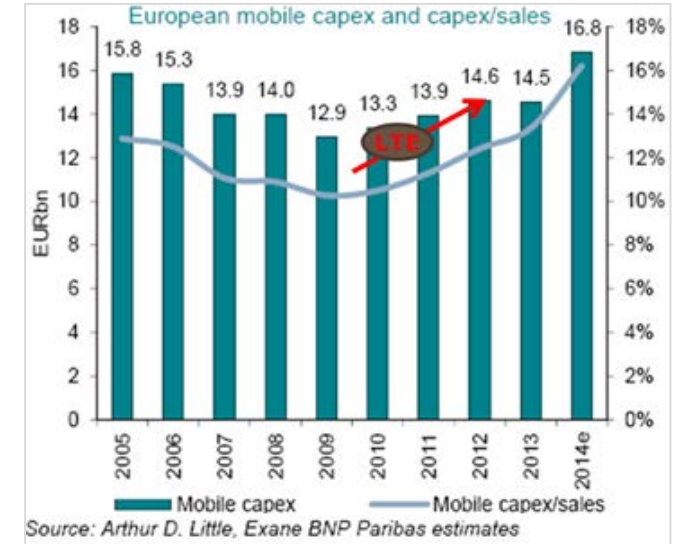
Direct contribution to Job creation

The mobile value chain is **directly responsible for 11 million jobs** across a vast array of industries (source: BCG analysis, 2015)



Direct contribution to GDP growth

Across the countries evaluated by BCG, **mobile's share of GDP is growing at a 10 to 20 percent annual rate** and **can continue or even accelerate** as consumers and businesses continually discover new applications for ever more advanced mobile technologies.



Advanced ecosystems are looking at 5G

Increasing Demand of Data

Consumers expect that mobile will **continue to improve and transform their lives, delivering a broader range of services** that will connect them with everything, everywhere.



Need of additional Capacity

4G is reaching its **physical limits**, strained by increasingly complex human interaction with massive amounts of data and the **rapidly evolving Internet of Things**



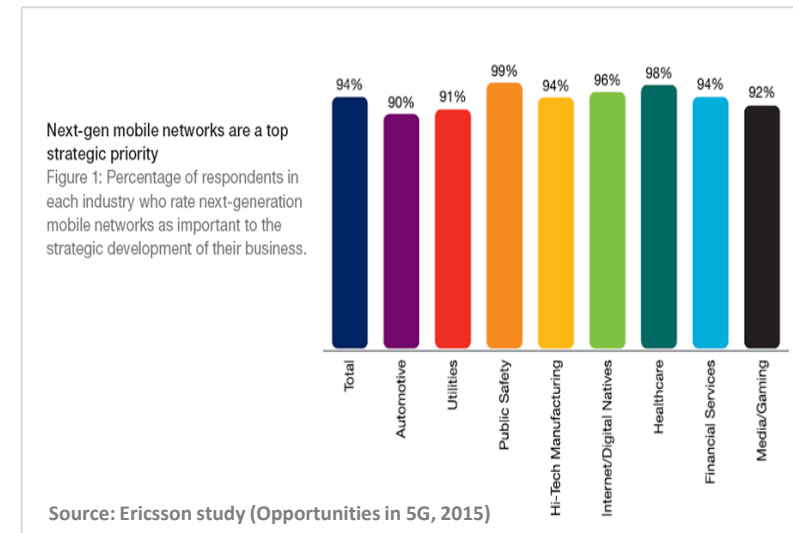
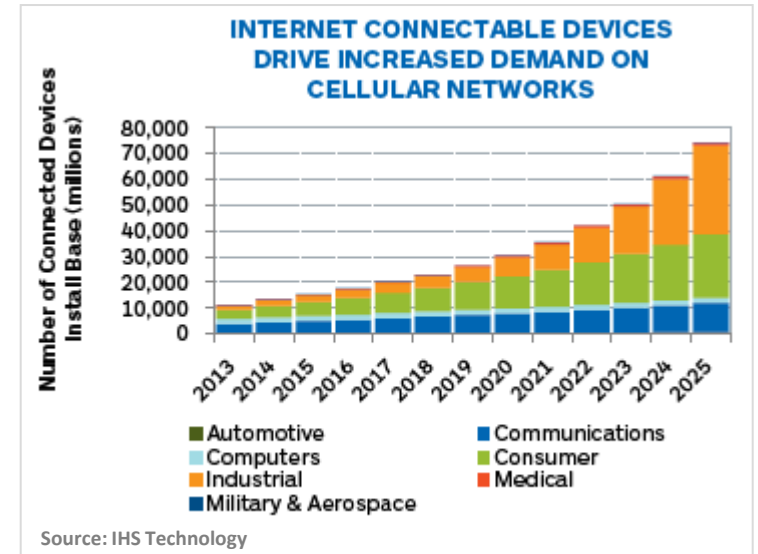
5G performances vs 4G

The 5G network will **spur innovation across many industries**: data rates up to **100 times faster**, **network latency lowered** by a factor of 5, mobile **data volumes 1k times greater** than today's, and battery life of remote cellular devices stretched to 10 years or more



New business opportunities in 5G

Additional capabilities (precise remote control, near-instantaneous communication, greater efficiency, etc.) that will **help industries** to create **new products and services**, to grow their markets, increase productivity and efficiency to **reduce costs**, or increase safety and security to **reduce risk**.



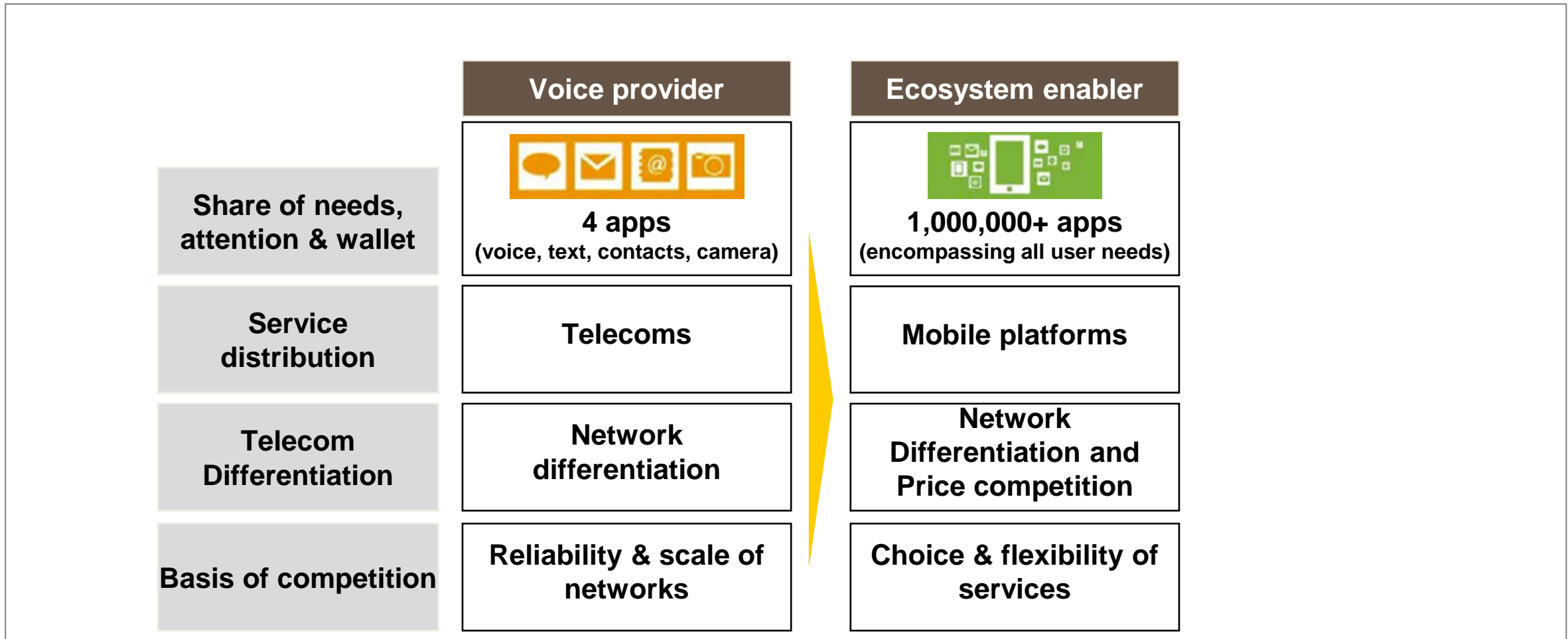
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The Evolving Competitive Landscape

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Telco landscape rapidly evolving towards a digital dimension: from “connectivity provider” to “ecosystem enabler”

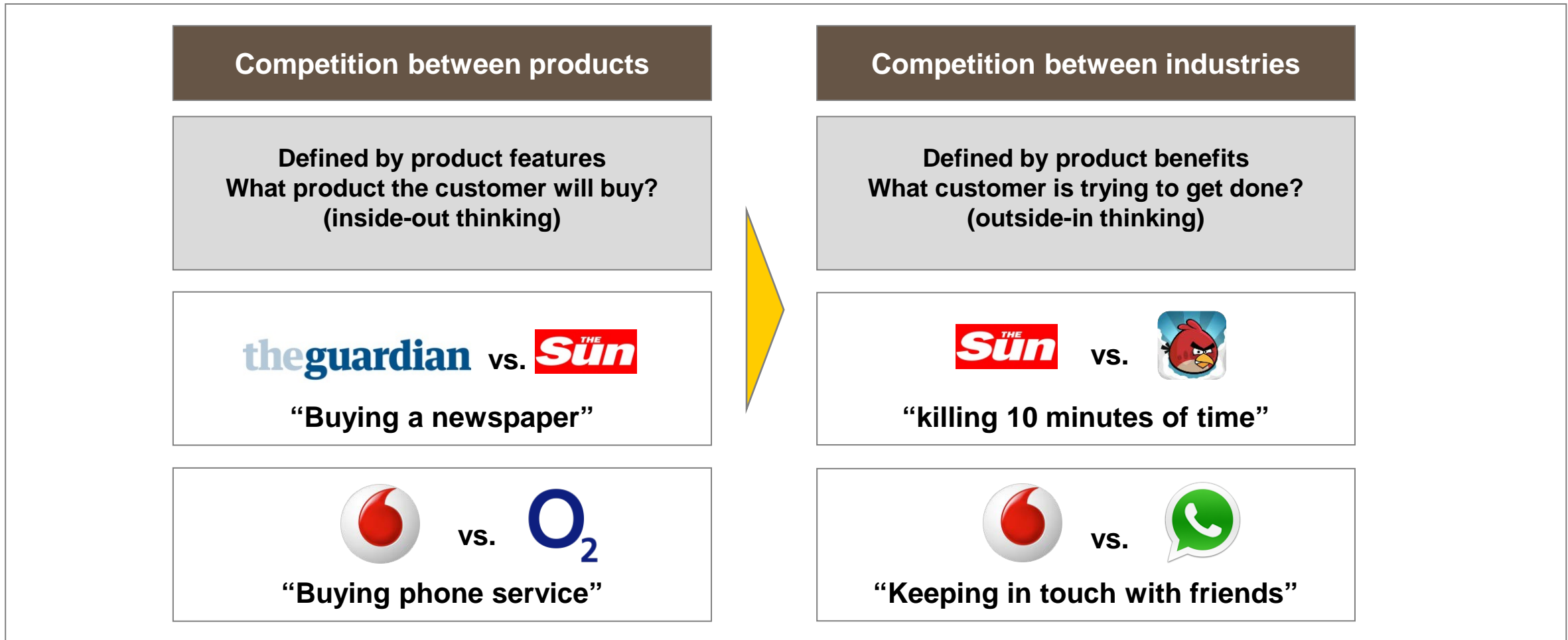
The changing role of Mobile Telco providers



Source: Vision Mobile; Arthur D. Little analysis

Inter-modality and cross-industry competition are challenging the traditional concepts of competitive positioning/advantage

Change of competition in mobile sector



Source: Vision Mobile; Arthur D. Little analysis

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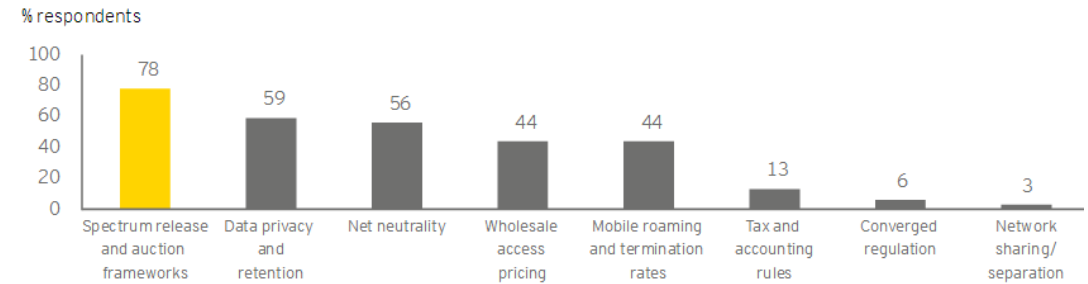
Spectrum Topics: spectrum is a scarce resource and represents the key valuable asset for MNOs

Spectrum as a key asset for the Industry

As mobile data traffic continues to grow in all geographies, **spectrum remains very much the lifeblood of the sector**, and spectrum release, auction frameworks and rules on Spectrum Usage/management will be a leading regulatory issue over the upcoming years

Figure 9: Operator perceptions of evolving regulatory issues

Q. Which regulatory issues will be most likely to impact the industry in the next two to three years? (Please select three.)



Source: EY Survey - 2015 global telecommunications study

Spectrum Release

Assignment mechanism

- Spectrum assignment shouldn't be used as an indirect taxation tool
- Spectrum shall be assigned at market demand price (i.e., low reserve price, with competitive auction to set the final price)

Release Timing

- Spectrum release to be aligned with Market needs in terms of network capacity vs consumer demand

Spectrum rights duration

- Longer spectrum rights duration (indefinite or >20 years) are required to allow MNOs to recap investments

Transparency and predictability

- In order to enable MNOs to plan their investments a predictable spectrum roadmap created by Regulator in consultation with MNOs is a must.

Spectrum Topics: spectrum is a scarce resource and represents the key valuable asset for MNOs

Tech Neutrality

Spectrum Efficiency

→ re-farm native GSM/UMTS spectrum bands to 4G to drive spectrum efficiency and innovation as well as to accelerate service roll-out and to ensure better services for customers.

International Best Practices

→ According to GSMA intelligence currently worldwide there are 401 MNOs using 1800Mhz band to provide 4G, 186 operators using 900MHz band to provide 3G and 23 operators using 900MHz band to provide 4G

Procedural steps

→ According to international best practices TN should be granted on all spectrum at a marginal cost and through easy administrative procedure enabling MNOs to update the licenses of their current spectrum holdings

Spectrum Trading

Economical efficiency

→ A secondary market mechanism may be able to increase the economic efficiency, as it allows spectrum rights to be traded more easily with respect to the disposal and/or acquisition of the entire owner of the spectrum

Market Awareness

→ A secondary market can increase market awareness of prevailing spectrum value, since spectrum trading involves a monetary exchange

Spectrum Rebalancing

→ A secondary market represents an effective market driven way for spectrum rebalancing among operators.

Electromagnetic fields and permissions for BTS

4G and 5G introduction

→ Constantly increasing demand of bandwidth requires more dense networks

→ Band from 3.6 to 3.8 GHz is likely to be dedicated in the near future for the 5G introduction.

→ A huge number of microcells will be required

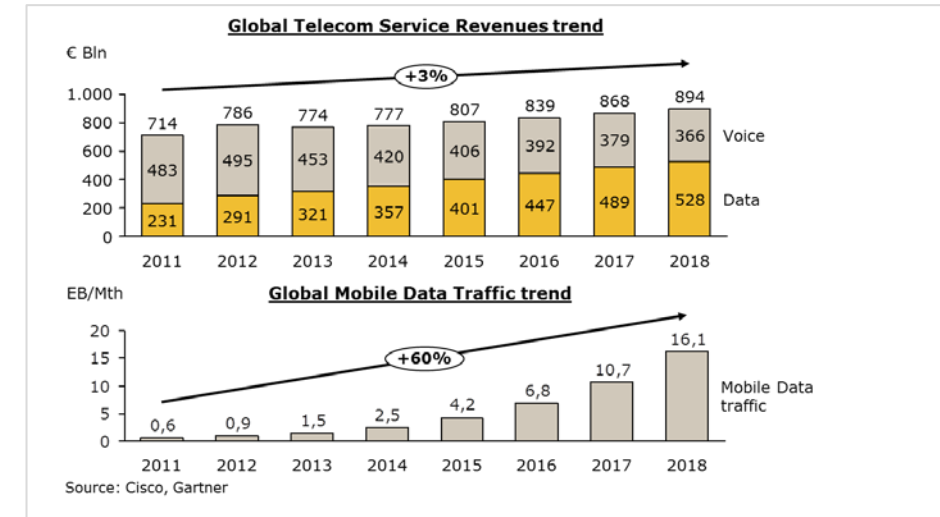
→ Need of lighter procedures for asking the permission to build BTS

→ Need of the revision of the limits on electromagnetic fields compatibly with the safeguard of the environment and of the public health.

Network Sharing to speed up Network roll-out and to reduce environmental impact

Network Sharing

A **Business friendly Regulation**, encouraging (not mandating) Infrastructure sharing is becoming **crucial to secure financial efficiency** given that Mobile data traffic is growing exponentially and requires **increasing MNOs investments** to enhance networks capacity and performances while **MNOs' Revenues are growing much more slowly or even falling**



Network Sharing drivers and benefits

- **Speed up roll out of new technologies** by avoiding investments duplication and reducing the impact on the environment
- **Reduce operators OpEx and CapEx** enabling business cases for LTE and costs savings for MNOs in the market that can be partially transferred to end customers
- **Incentivize coverage** (especially in less dense/populated areas)
- **Optimize usage of scarce resources**
- **Improve quality of service** (especially in congested areas)
- **Boost product and service innovation/penetration**
- **Increase consumer Welfare** (service availability, choice, reduced retail prices, etc.)

MORAN for 4G roll out in urban areas using 2600 MHz band

Urban population coverage

