



ΕΝΩΣΗ ΕΤΑΙΡΕΙΩΝ ΚΙΝΗΤΗΣ ΤΗΛΕΦΩΝΙΑΣ

Mobile Communications, a key factor for growth and productivity improvement across the economy

FITCE, December 2018



Mobile Telecommunications Future Prospects & Opportunities for Greece

- ❑ **Rapid mobile telecommunications technological evolution: 4 generations in 3 decades & parallel evolution in devices to catch up with continuous network developments**
- ❑ **5G technological requirements, footprint & services**
- ❑ **Mobile telecommunications - a stimulus for growth**
- ❑ **Growth potential: opportunities, prerequisites & incentives**
- ❑ **Greece's digital snapshot**
- ❑ **Steps towards a “mobile first” digital strategy for Greece**

4G-LTE Radio Networks Key Technologies

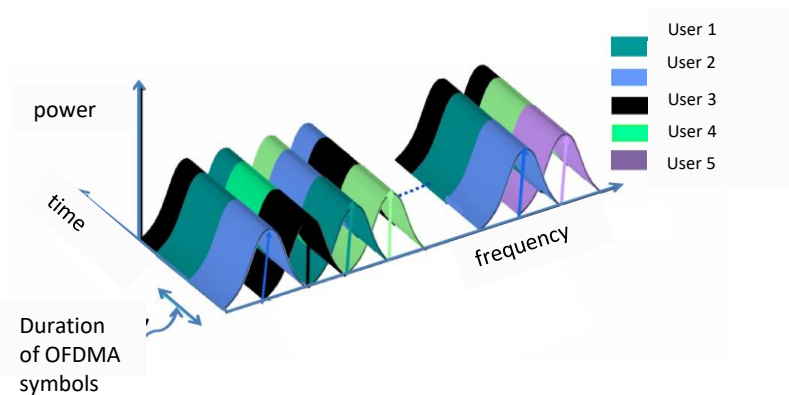
Standardisation & Commercial Development

- ❑ **2008** - The 1st 4G standardisation (3GPP Rel.8) was finalised
- ❑ **2008 - today** - 6 upgrades in the standard (Rel. 9 to 14)
 - Key upgrades :**
 - LTE-A (Rel.10), finalised in 2010.
 - LTE-A Pro (Rel.13), finalised in March 2016.
- ❑ **2009** - The first 4G commercial network operated in Stockholm
- ❑ **2018** - in operation approximately
 - 644 LTE commercial networks in more than 200 countries worldwide.
 - 100 LTE-A commercial networks in more than 50 countries worldwide.

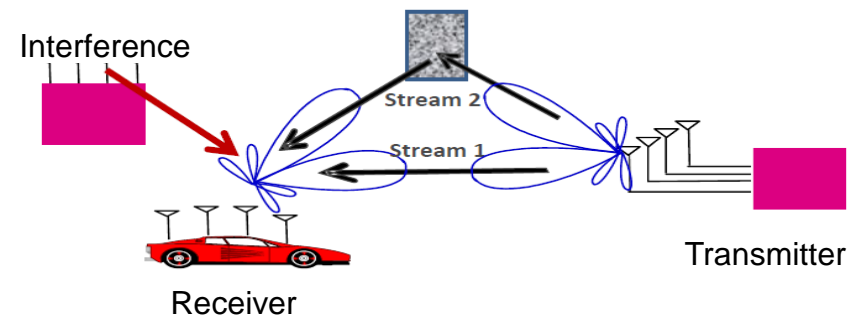
Key Technologies

- ❑ OFDM/OFDMA techniques in down-link, SC-FDMA in up-link.
- ❑ Adaptive differential /codification and scheduling of telecommunication traffic.
- ❑ Inter-Cell Interference Coordination - ICIC.
- ❑ Use of MIMO techniques (multiplexing, diversity, beamforming).
- ❑ Multicasting & Broadcasting Support.
- ❑ Carrier aggregation.

OFDMA



MIMO



The Future is almost here (5th Generation)

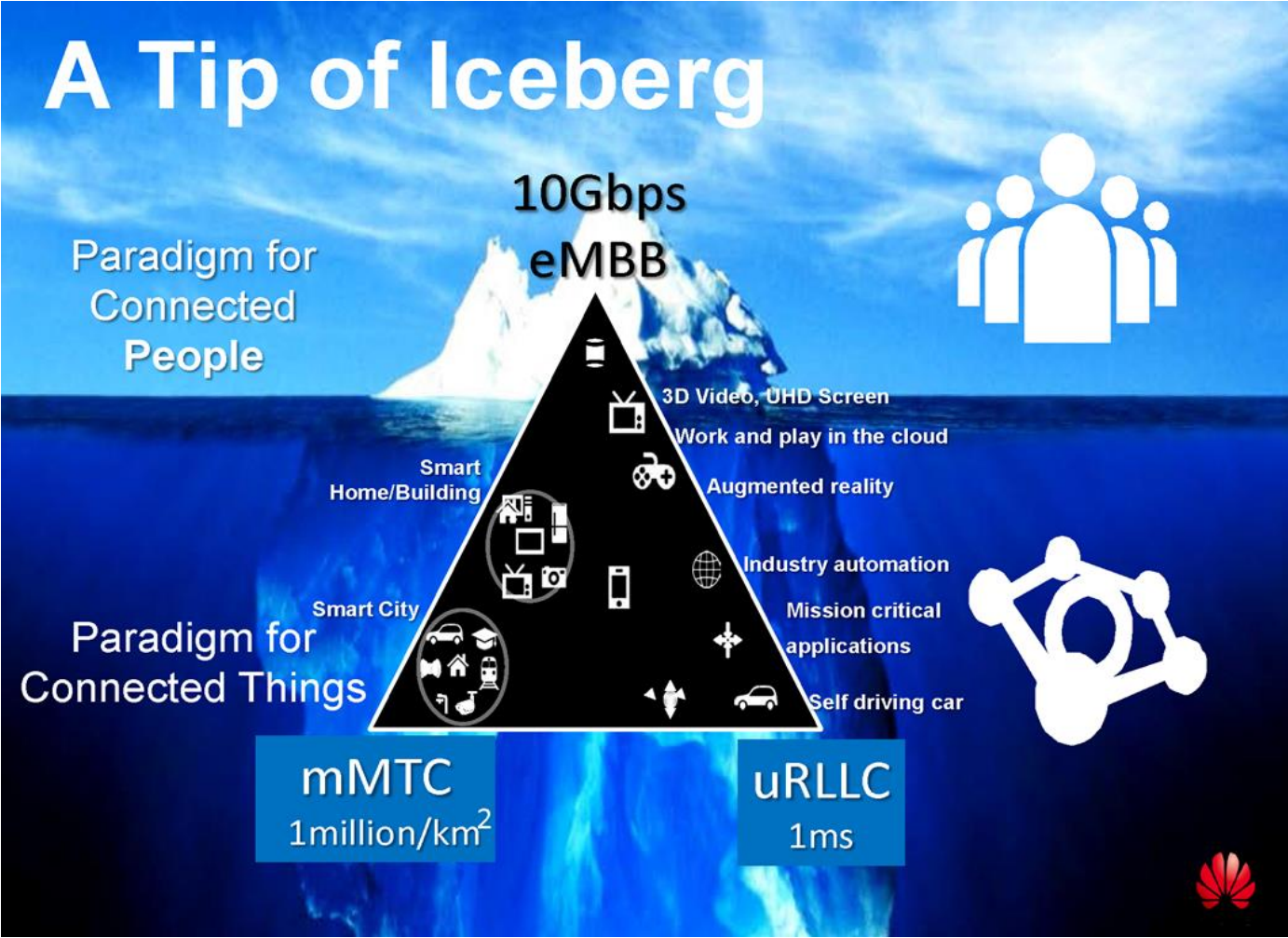
Next generation (5G) has already taken its first steps

- ❑ **March 2017**, 3GPP published the first studies for Release 14, which constitutes the first version systematically referring to 5G.
- ❑ **2020**: The 1st wide-range pilot operation (Tokyo Olympic Games)
- ❑ **Software and Service centric transformation**
 - Telecoms → Multiple stakeholders
 - Bit pipe → Enabling platform
 - Phones → Things
 - Procedures → Services
 - Protocols → APIs
 - Dedicated Hardware → Orchestrated Resources
 - Network Function → Virtualized Software Instances
 - Network → Slice

Parallel steps in Greece

- ❑ **Consultation process initiation for drafting comprehensive 5G roadmap** – collaboration among policymakers, mobile telcos & critical sectors of the economy
- ❑ **5G pilots underway by the 3 providers in 3 municipalities** – estimated launch date 2nd half of 2019
- ❑ **2020 onwards new spectrum frequencies allocation**

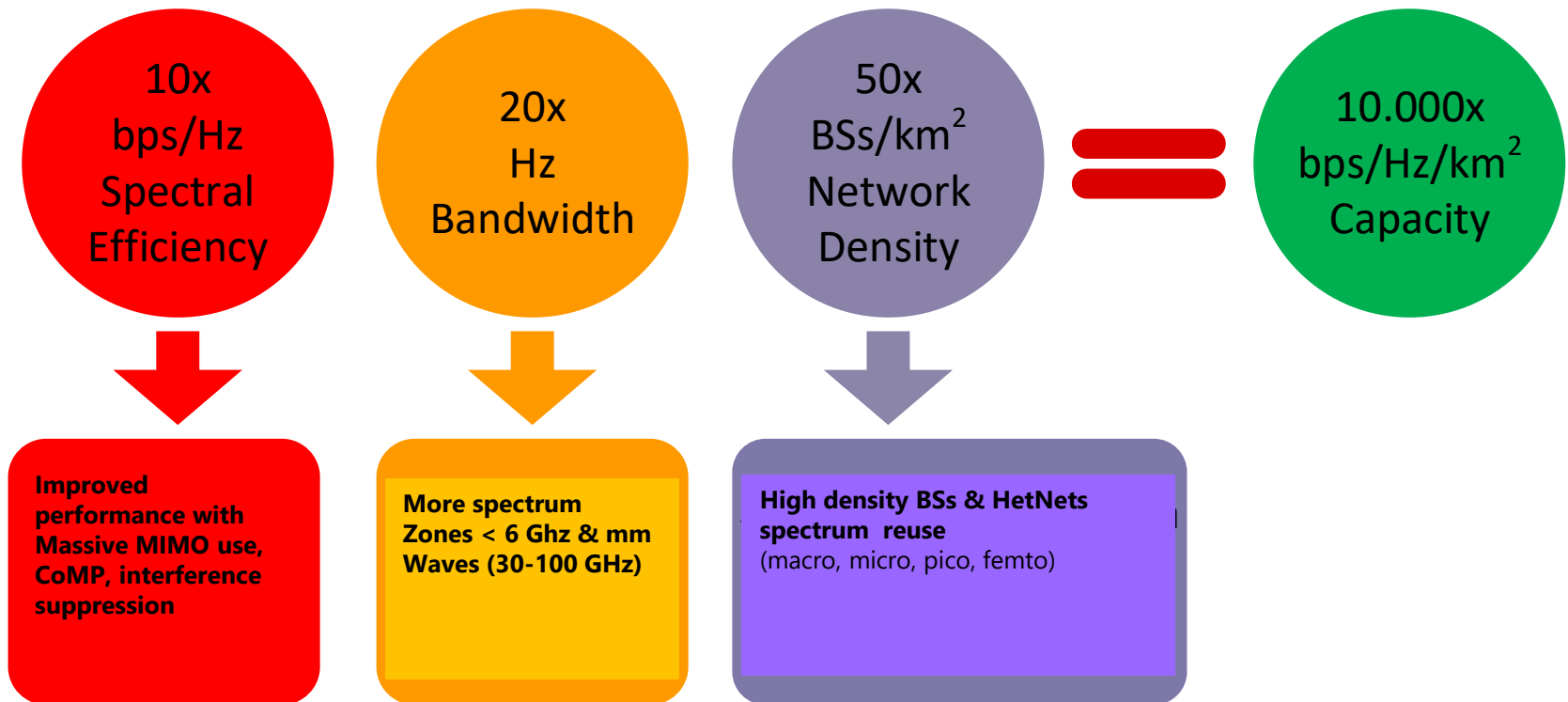
Evolution of 5G new reality (2020-2030)



Source: HUAWEI Technologies

The 5G “10.000x” Challenge

- ❑ Mobile data traffic demand is almost doubling each year
- ❑ In a decade, 10,000 times higher telecommunications volumes (bits/sec/Hz/km²) shall be required

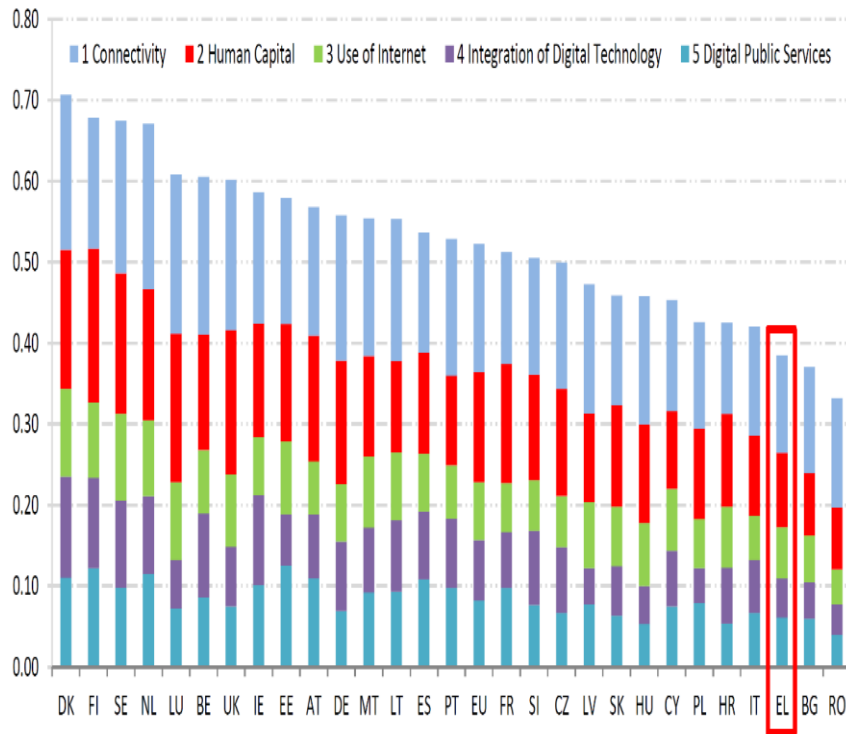


Greece compared to the EU

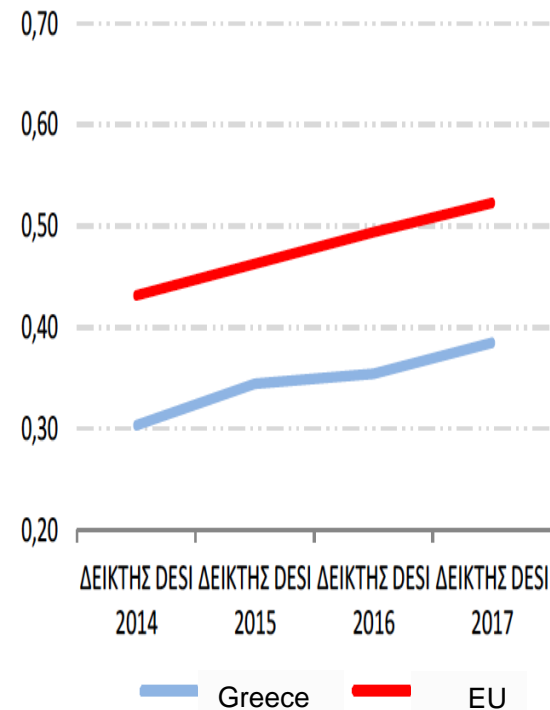
Greece is far behind the EU average (26th in EU-28)

Greece fails to converge with the EU, lagging steadily behind 4-5 years in digital modernization

2017 ranking based on Digital Economy and Society Index (DESI)



DESI - Evolution over time

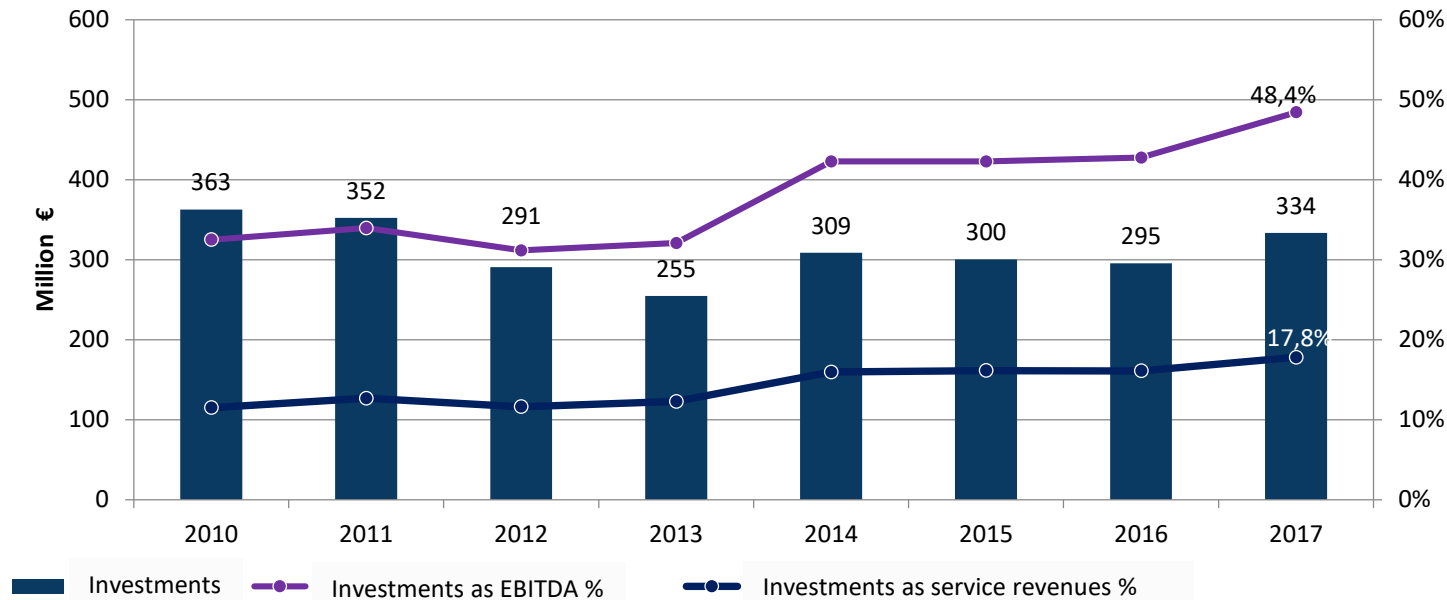


Πηγή: Digital Economy and Society Index (DESI) 2017

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However the Industry is One of the Largest & More Stable Investors

- ❑ €334 million investments in 2017 or 48,4% of EBITDA
- ❑ €537 MinEcon investments including cost for spectrum licenses
- ❑ €2.5 bn investments in fixed and mobile networks for the 2017-2020 period
- ❑ 3,6% of industry's turnover invested in R&D



Source: Providers' data processed

The roll out of new generation networks is expected to create the necessary broadband dynamics that shall support the new 5G services.

Greek Economy Growth Potential

The industry's additional contribution*

- ☐ +2.05% or €3.06 bn to GDP
- ☐ + € 1.62 bn to public revenues

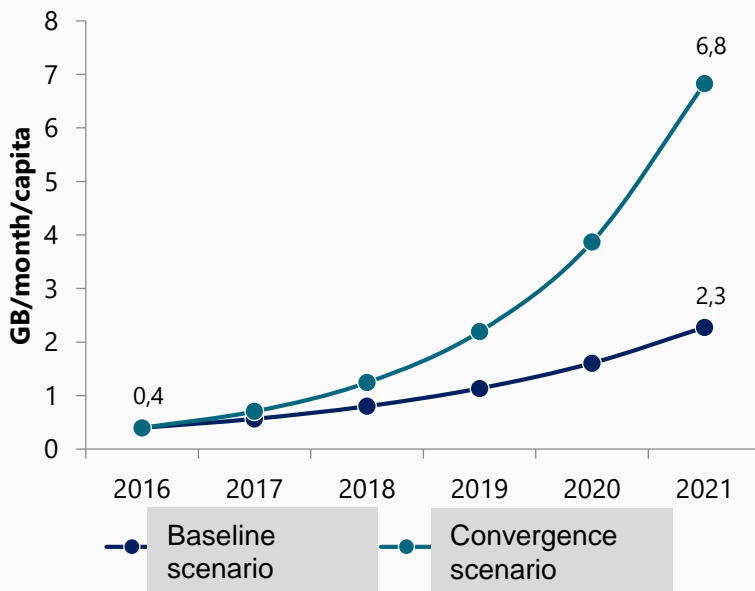
* Prerequisite: the implementation of required reforms, so that Greece may digitally converge with the rest of the EU (Convergence scenario).

Mobile data

• **Baseline scenario:** data penetration increases by 42% annually, reaching 2.3 GB per inhabitant in 2021, without converging with european average

• **Convergence scenario:** Greece converges with the average of Italy, Spain and Portugal in 2021 (at 6.8 GB per inhabitant per month)

Evolution GB / per capita by scenario



Impact on public revenues per scenario in million € in 2021

