

# *5G/IoT, AN OPERATOR'S PERSPECTIVE*

FITCE

New Era of Technology Innovation in ICT, 5G and Optical Technologies

Thessaloniki, December 2018

**WIND**






# Few business facts on 5G

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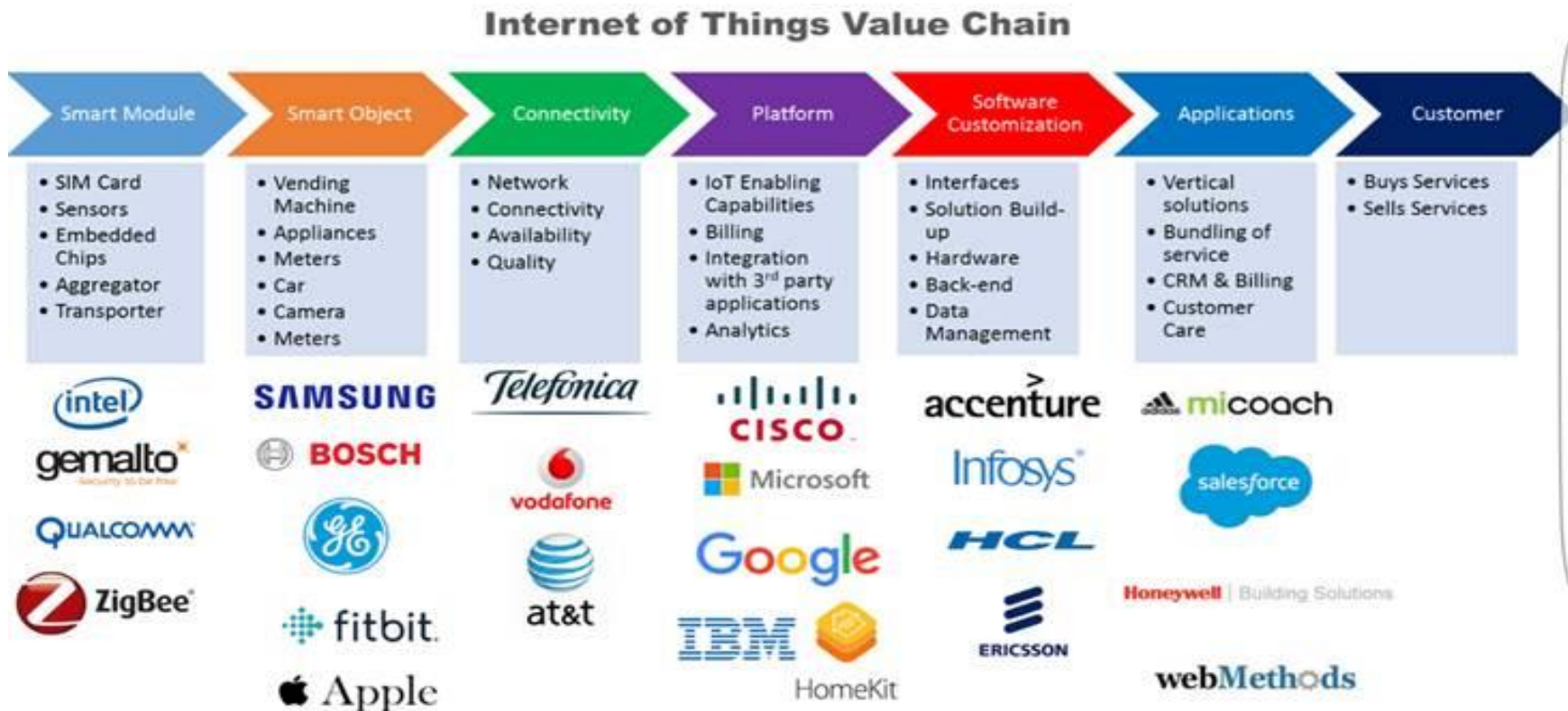
- 5G is not a conventional technology evolution (2G\3G\4G) but a “Network reshuffle” with business focus on:
  - Latency (*ultra low*)
  - Sessions (*density /sqm*)
  - Bandwidth (*Gbps*)
- Unlimited data are already here at the 4G era
- A lot of potential Use Cases, uncertain if they are 5G specific
- The scale of deployment is unknown
- Seems more relevant to B2B - Verticals rather than B2C

# Who is interested? Verticals.

Results of a stakeholders workshop about 5G cases & investment models

Industry	Level of interest	Key services	Key requirements	Ideal scenario	Investment
	Very high	Critical train comms, predictive maintenance, safety, passenger data	URLLC, high mobility, trackside MEC	Dedicated network or slice	Public funds
	Very high	Enhanced IVI, V2I for safety, convoying; autonomy		Slice of MNO network	Investing in testbeds, driverless cars
	Fairly high	Indoor/outdoor automation, robotics, IoT smart supply chain	MEC/uLL, Massive IoT	Localised network under own control	Would invest
	High	Patient monitoring, remote diagnostics	VR, uRLLC, massive IoT,	Dedicated spectrum	Public funds
	High	5G SCADA	Critical IoT	Dedicated spectrum	Would invest

# What is the IoT value chain?



Note, the above is not an exhaustive list of companies and any company may have play in more than one component of value chain  
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# What might be the cost? Drivers.

## Spectrum

### Spectrum auctions results EU

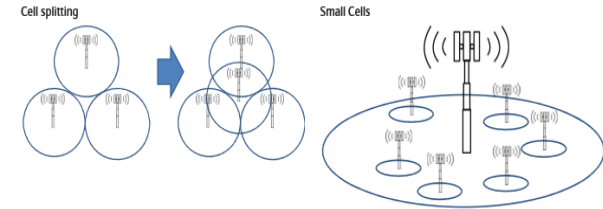
Country	MHz Awarded	Total paid	Price MHz/pop
Czech	200	38.4m	0.02
Finland	130	77.6m	0.004
Hungary	70	2.9m	0.004
Ireland	350	60.5m	0.036
Romania	255	10m	0.002
Slovakia	400	1.17m	0.002
Spain2016	200	2.43m	0.004
Spain2018	200	437m	0.01
UK	274	1.35bn	0.135
Finland	60	66.3m	0.2
France	60	2.8bn	0.69
Germany	274	1.0bn	0.2

3,4/3,8 Ghz

700 Mhz

ITALY: 6,55 bln!

## RAN densification & Backhauling



	Country	2000	2010	>2020
Technology		2G/GPRS	3G	4G 5G
User data rate		30kbps	300kbps	10 100Mbps
Smartphone penetration		n/a	10%	>100%
EU traffic (petabytes)		n/a	82	4400
Base Station backhaul requirements		6Mbps	100Mbps	>10Gbps

# What might be the cost?

## Projections

Country	4G (now)	5G	growth
Data usage per user	5GB	100GB	x20
Number of base stations	mainly macro	mainly micro	x30
Cost of deployment			x5
Capacity provided			x20

- We see a scenario where average usage demand could be 50GB/month within five years, with 100GB/month not appearing outrageous. We estimate the cost of supplying 50GB/month of capacity in a 5G world at €2-3/month (opex and capex). This would imply 5G ARPUs premium would need to be at least €5/month higher than 4G to justify the investment. We also argue that incumbents/fixed operators can offer this capacity at a much lower incremental cost due to having backhaul and penetration of homes with broadband.

How can be justified to consumer ?

- Small Cells come at additional cost. Deploying wide area Small Cell network in prime areas in say Germany could be €2bn additional capex, and up to €1bn annual opex (the opex could be orders of magnitude lower should mobile operators be able to use wireless frequencies for C-RAN deployments as we indicate in the Backhaul section). For DT we note annual mobile capex of ca €1bn already, and so if this were spread over five years the cost would be manageable with group FCF of €4-5bn. For TEF De however we

Unknown additional capex /opex due to densification of RAN

# How Regulators & Policy Makers can contribute?

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- **Affordable spectrum**, excessive prices clearly undermine network infrastructure investment
- **Harmonized power density limits ICNIRP**
- **Facilitate the roll out of backhauling**, encourage sharing of facilities to reduce costs of deployment
- **Expedite small cells deployment**, radical simplification and standardization of small cells related processes
- **Small cells sharing incentives**, access to sites

# What is here?

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## F W A

- 50\$ per month
- 300 Mbps
- No data caps
- Available in "parts of " few cities





# Key takeaways

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- The business paradigm is not crystalized
- Investment framework is a real headache, Policy Makers & Regulators to facilitate
- B2B – Verticals ecosystem under development
- Home Connectivity & Networking (not Fixed or Mobile)
- **Telecoms vertical legacy model disruption seems to be happening**

# What is Greek specific?

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- Not all Vertical Use Cases relevant due to **lack of industrialization & scale**
- **Disposable income constraints** place Telecommunications demand & arpu under strong pressure
- **Unfavorable investment phasing.** MNO's executed heavy investments in wireless (4G infrastructure & spectrum licenses) & FTTx at the same time
- Considerable **network deployment challenges**
- **5G Pilots already scheduled** (end 2019) in 3 cities (one per MNO) under the initiative of the Ministry of Digital Policy

*thank you!*