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ITUEvents

Towards 5G Enabled Gigabit Society

11-12 October 2018
Athens, Greece

ITU Regional Initiative for Europe on
Broadband Infrastructure, Broadcasting and
Spectrum Management

5G NATIONAL STRATEGIES | POLICIES AND REGULATION | FUTURE NETWORKS | SPECTRUM MANAGEMENT | SMART CITIES
INTERNET OF THINGS | ARTIFICIAL INTELLIGENCE | MACHINE LEARNING | INNOVATION

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SESSION SIX

Challenges and Opportunities in Telecom Sector Implementing 5G

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VODAFONE GROUP

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Chief Strategy Officer
Wind

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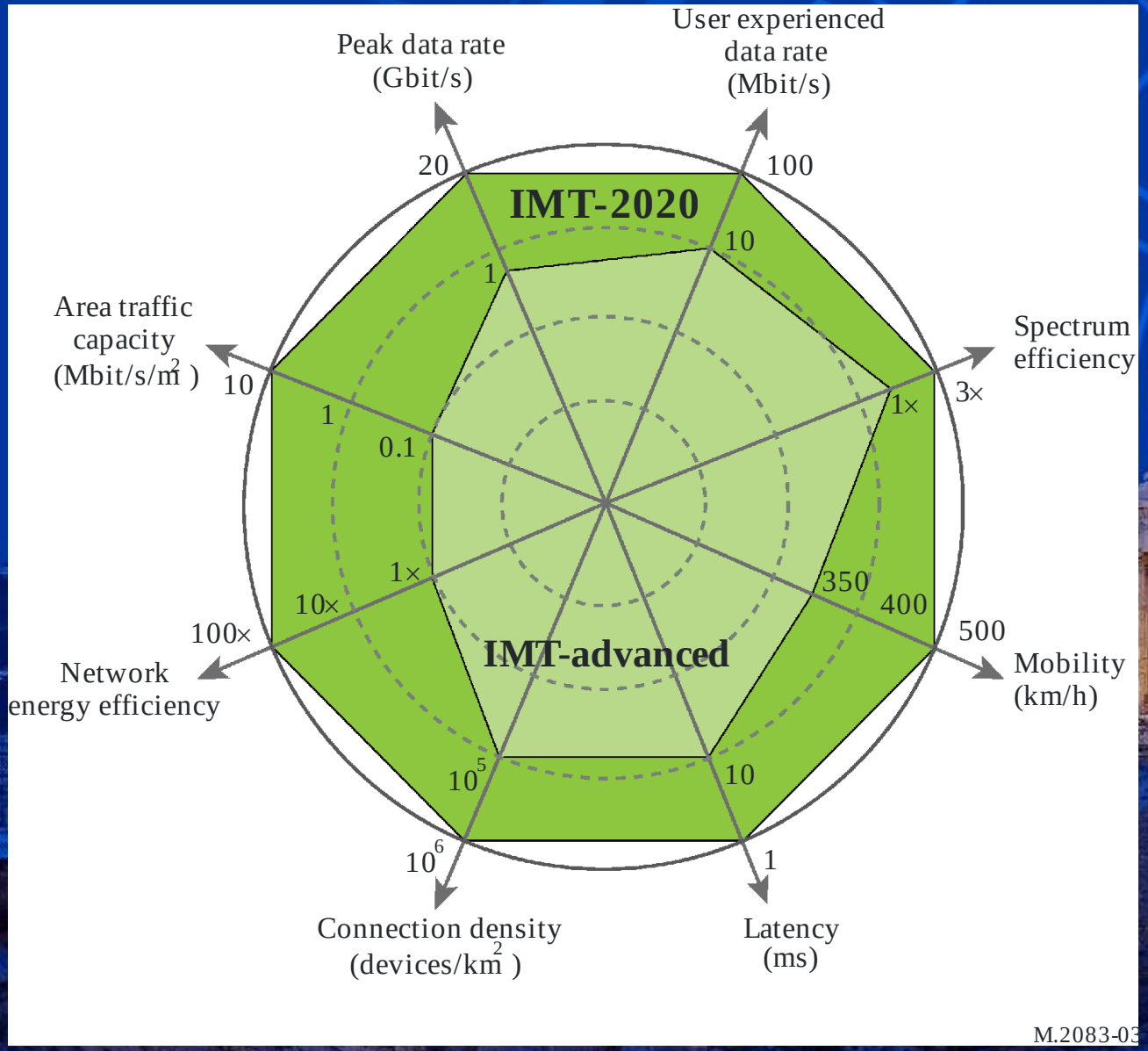

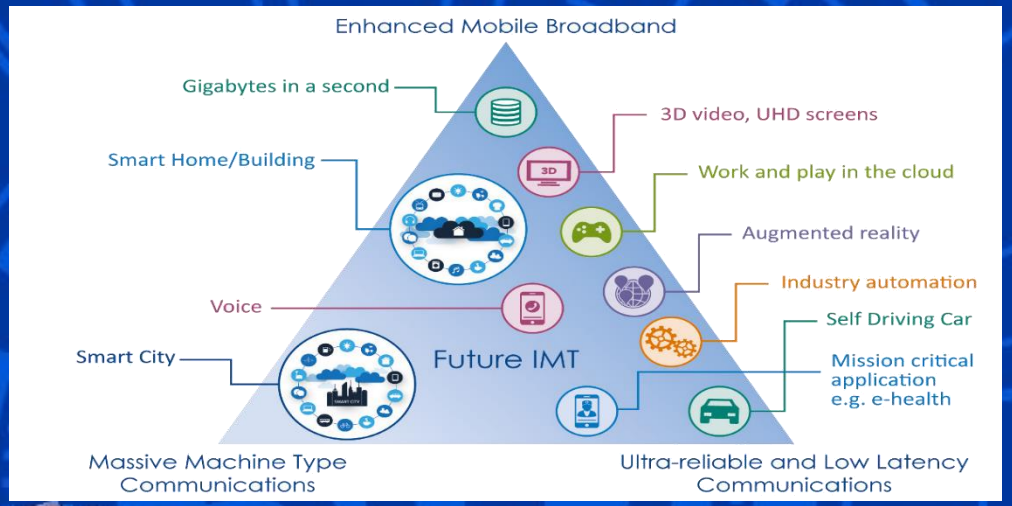

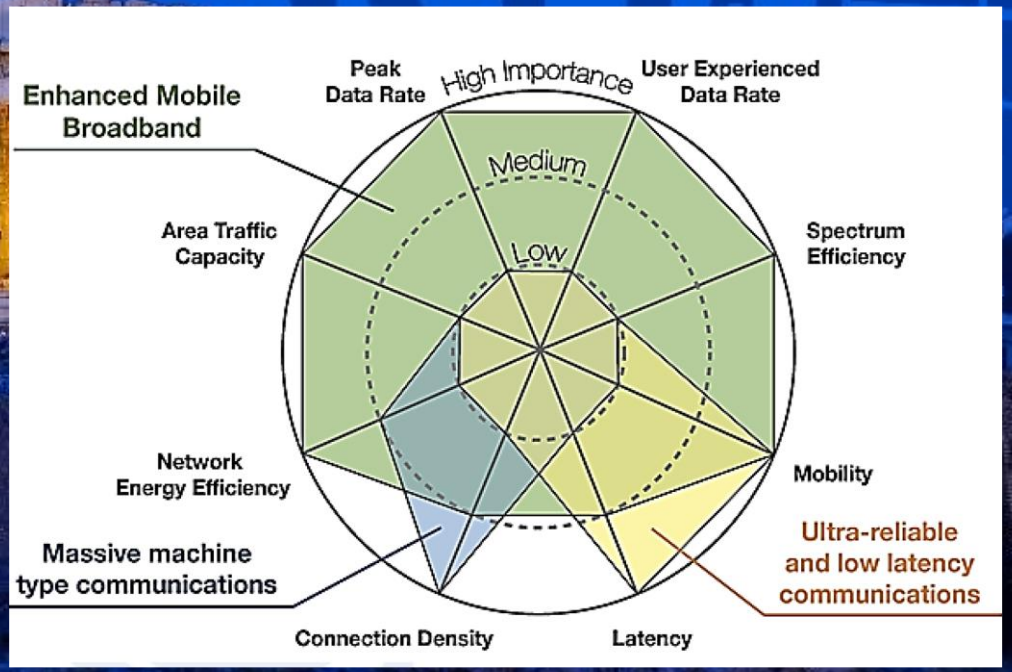

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SESSION SIX | Challenges and Opportunities in Telecom Sector Implementing 5G

- Small cell deployment challenges
  - Local permitting and planning processes
  - Lengthy engagement and procurement exercises
  - High fees and charges to access street furniture
  - Human exposure to radiofrequency electromagnetic fields (EMF)
  - Access and code powers
- Fibre backhaul
- Spectrum
- Device availability
- Coordination of industry verticals
- Net neutrality

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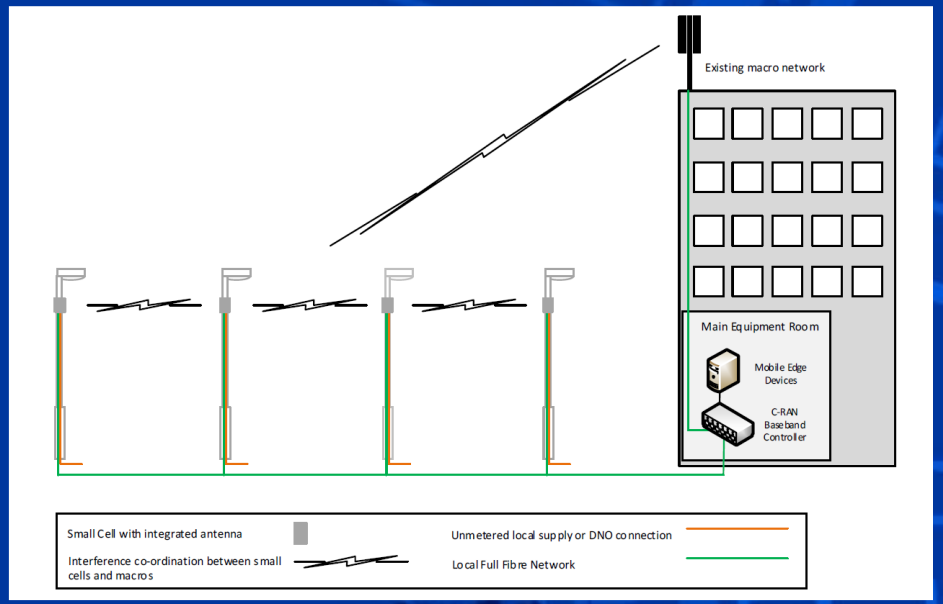
- AT&T estimate that the deployment costs can range from **USD 20 000 to USD 50 000** per site assuming fibre backhaul for sites, something AT&T has in abundance.
- According to Nokia, site CAPEX is estimated to be between **USD 40 000 to USD 50 000** for a site that requires trenching and power
- Work undertaken by independent analysts estimates a total cost of ownership of **GBP 71 billion to build a ubiquitous 5G** network in the UK delivering 50 Mbit/s, built in 2020 and operated until 2030. This reduces to GBP 38 billion when infrastructure sharing is encouraged.
- Other reports estimate the cost of deploying 5G across the US as being in the order of **USD 300 billion.**
- In Europe investment costs are expected to range between EUR 300 billion to EUR 600 billion according to one mobile operator.
- Although these reports do not state the frequency spectrum used to derive the analysis, it is assumed that much of the cost results from network densification (through small cell deployment) – necessary for the smaller cell sizes required because of the use of higher mMWave frequency spectrum used by 5G, e.g. above 24GHz



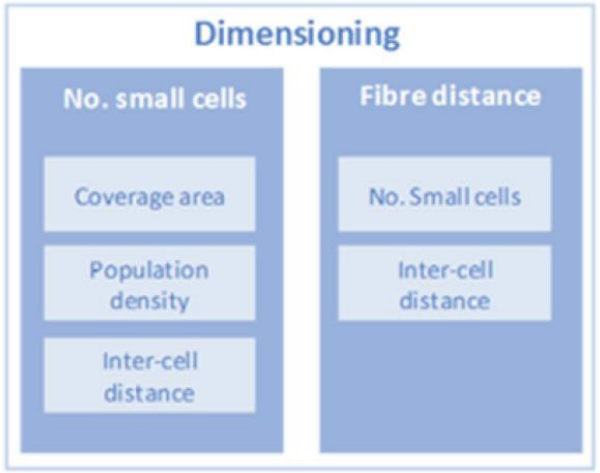
Scenario 1 – large densely populated city

In this scenario the following assumptions are made:

- Proposed urban coverage area: 15 sq km
- Population density of coverage area: 12 000 people per sq km
- Inter-site small cell distance: 150 m.

Scenario 2 – small medium density city

- Proposed urban coverage area: 3 sq km
- Population density of coverage area: 3 298 people per sq km
- Inter-site small cell distance: 200 m.



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Item	Value
Total CAPEX (USD millions)	**55.5**
Number of small cell sites	1 027
Cost per square km (USD millions)	3.7
CAPEX per site (USD thousands)	54.1

Item	Value
Total CAPEX (USD millions)	**6.8**
Number of small cell sites	116
Cost per square km (USD millions)	2.3
CapEx per site (USD thousands)	58.6

Small cell distance	Scenario 1	Scenario 2
RAN equipment (antenna, street cabinet, base station electronics, battery backup and network maintenance modules)	25%	24%
Implementation costs (design and planning costs, site upgrade costs, permit costs and civils costs to lay street cabinets)	50%	46%
Fibre (provision of 144 fibre along the route of activated street assets)	25%	30%
MER (single rack and termination equipment)	<0.1%	<0.1%

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