

5G & IoT - Accelerating Digital & Transforming Life

Agenda

OTE Group: Indisputable Leader in Greek Market

COSMOTE 5G

COSMOTE Network Mobile Broadband Facts

Global Mobile Broadband Facts

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5G Basic Requirements

5G Air Interface

Cellular IoT market outlook

IoT re-shaping effect on society

Cellular IoT technologies

IoT hot apps

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The Shape of Things to come

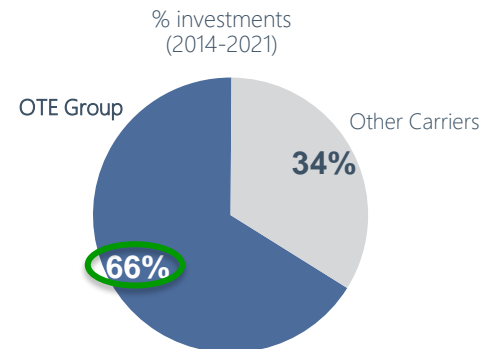
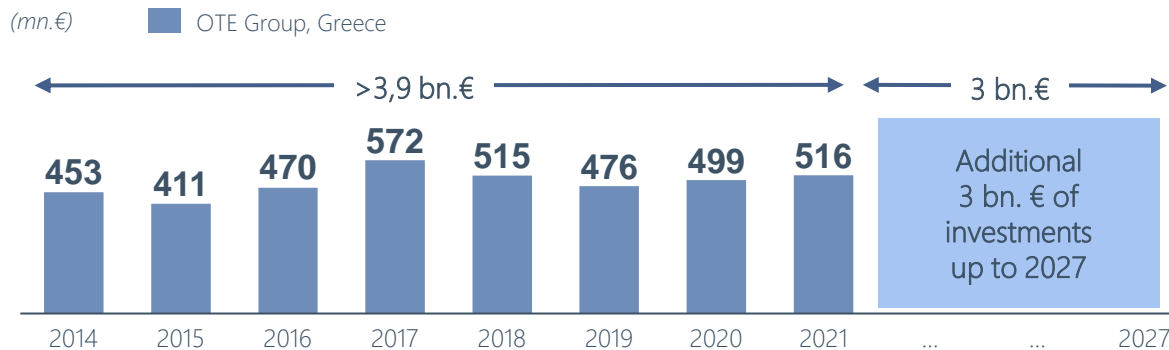
OTE Group: Indisputable Leader in Greek Market – By far the largest Investor

> 60% of total sector investments in years 2014 - 2022



Financial Results 2022	REVENUES	EBITDA (adj. AL)	CAPEX (adj. AL, no spectrum cost)	oFCF (adj. AL)
	3.455 €κ.€	1.348 €κ.€	638 €κ.€	654 €κ.€

The largest investor in telecoms >60% of sector investments



A considerable part of the revenues is re-invested in new technologies

COSMOTE 5G

97%

ATHENS
AREA

90%

THESSALONIKI
AREA

90%

37 MORE CITIES

85%

OF
POPULATION → 90% @ Eo23

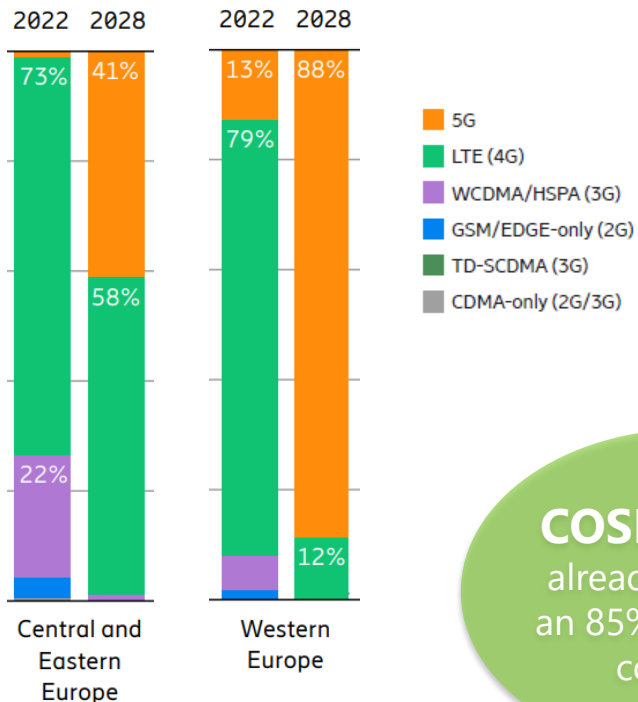


> 1 Gbps

SPEEDS IN
SPECIFIC
AREAS

COSMOTE Network Mobile Broadband Facts

More than ready for 2028 MBB Challenge



COSMOTE 5G
already providing
an 85% population
coverage

Umlaut
Best in
Test for 9
consecutive
years

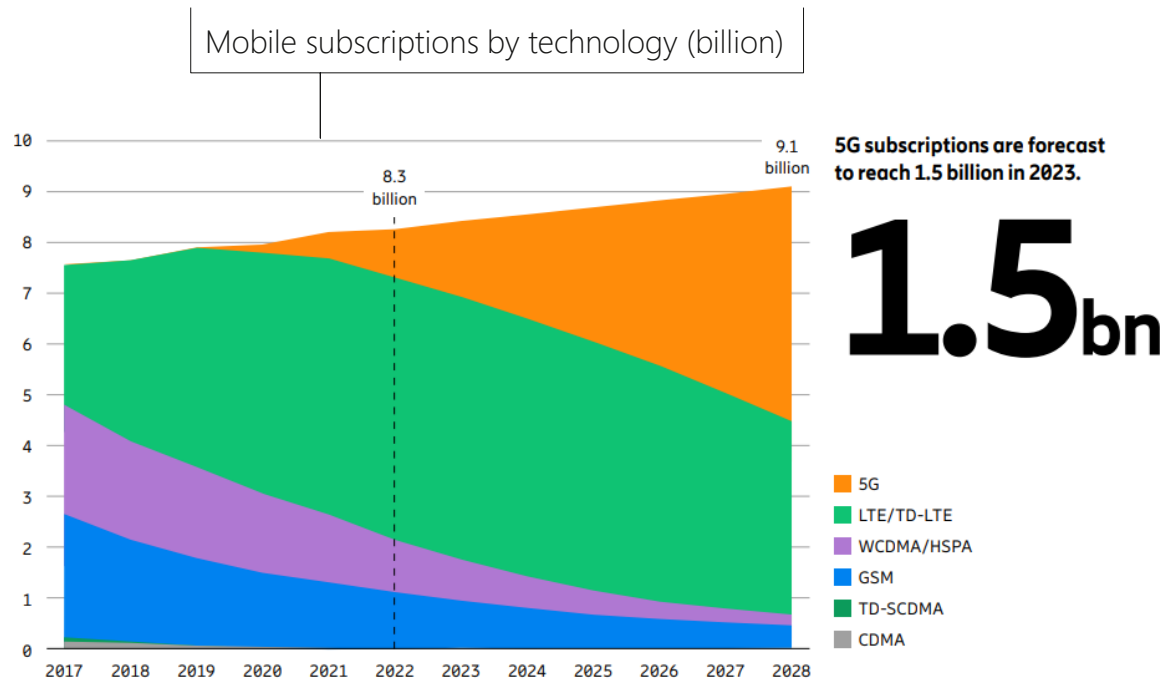
OOKLA
Best MBB
Network
for 7
consecutive
years



source: ERICSSON mobility report - June 2023

Global Mobile Broadband Facts

Subscribers and Technology Outlook



Fast-growing 5G adoption

5G share >50% in subscriptions footprint after 5 years

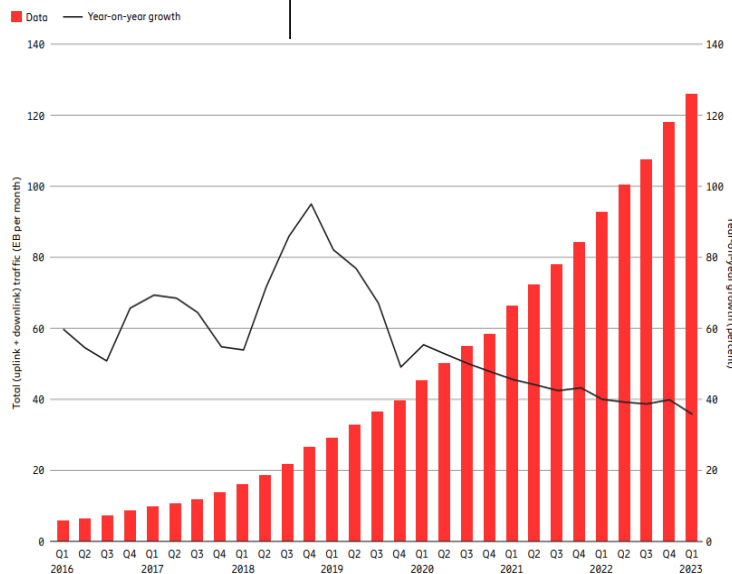
source: ERICSSON mobility report - June 2023

Global Mobile Broadband Facts

Mobile Traffic Outlook & Data Rates Evolution

36% YoY mobile data traffic growth from Q1' 22 to Q1' 23

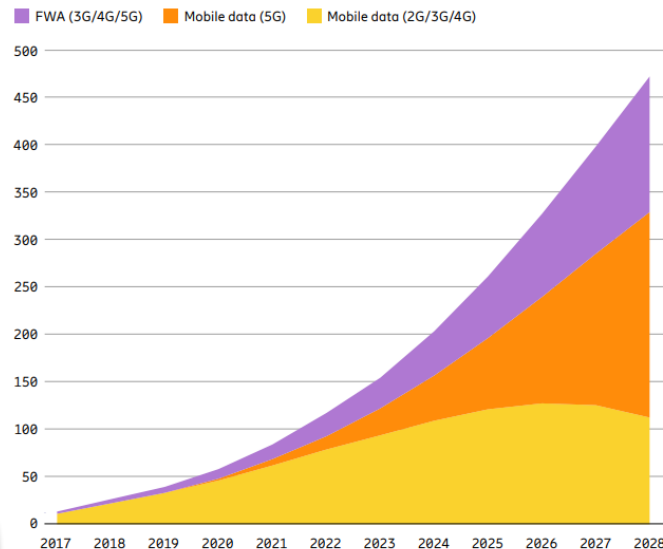
Global mobile network data traffic and year-on-year growth (EB per month)



source: ERICSSON mobility report - June 2023

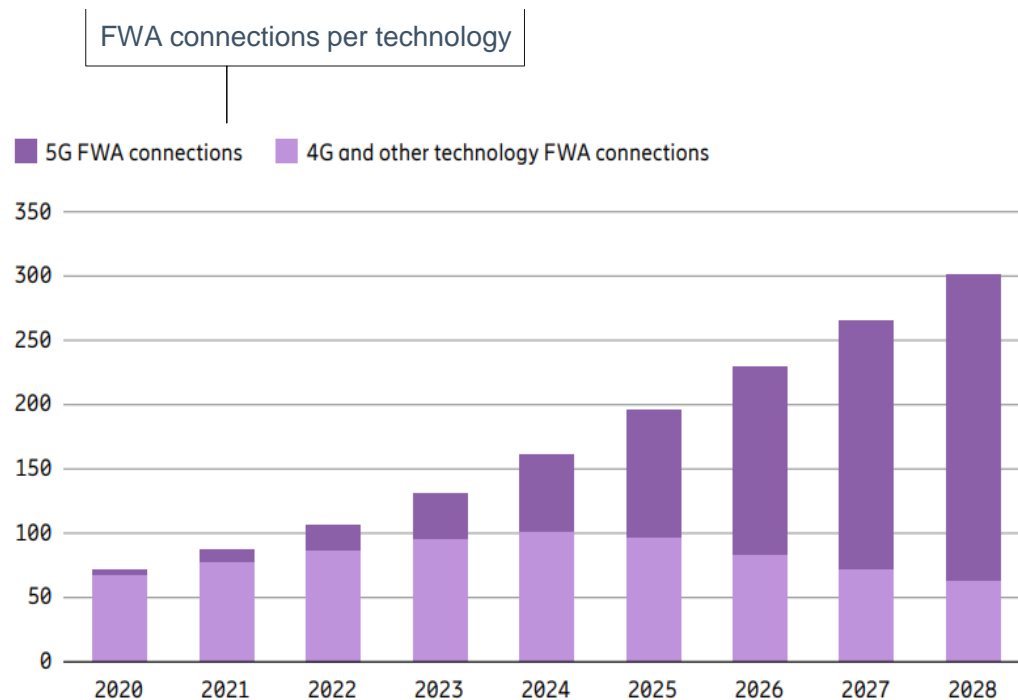
Avg. global monthly traffic per device: 20 Eo23, 47 Eo28

By 2027, all data traffic growth will come from 5G



Global Mobile Broadband Facts

FWA Uptake through 5G



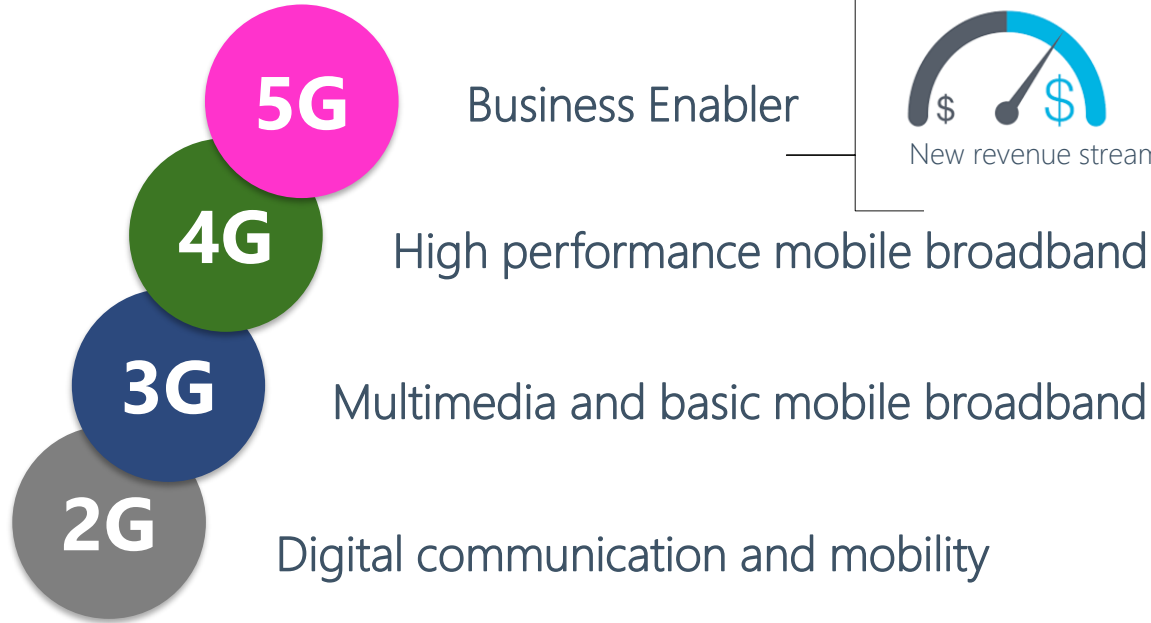
source: ERICSSON mobility report - June 2023

**FWA will
make up 30%
of all mobile
data traffic
by 2028**

**5G will
provide 80%
of FWA
connections
in 2028**

5G Evolution

or revolution?



Virtual networks &
Gigabit networked
society



New business models



New revenue streams

Capacity
& Reliability



Energy
efficiency



Security

5G Basic Requirements

evolving by revolving

(new) requirements:

- 1-10Gbps connections to end points
- 1 millisecond end-to-end round trip delay
- 1000x bandwidth per unit area
- 10-100x number of connected devices
- ~99.99% availability
- ~100% coverage
- 90% reduction in network energy usage
- ~10 years battery life for low power M2M devices

5G

The hyper-connected vision:

5G, mobile operators would create a blend of pre-existing technologies covering 2G, 3G, 4G, Wi-fi to allow higher coverage and availability, with greater connectivity enabling Machine-to-Machine (M2M) services and the Internet of Things (IoT). This vision include a new radio technology to enable low power, low throughput field devices with long duty cycles of ten years or more.

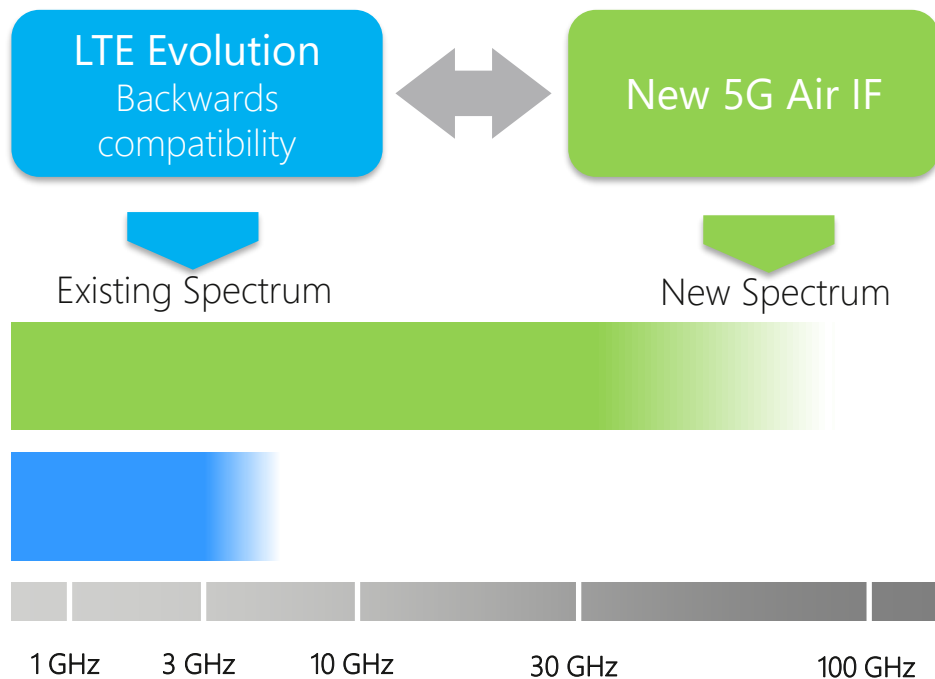
Next Generation Technology vision:

This is more of the traditional 'generation-defining' view, with specific targets for data rates and latency being identified, such that new radio interfaces can be assessed against such criteria. This in turn makes for a clear demarcation between a technology that meets the criteria for 5G, and another which does not.

source: NGMN

5G Air Interface

Massive channels, massive MIMO

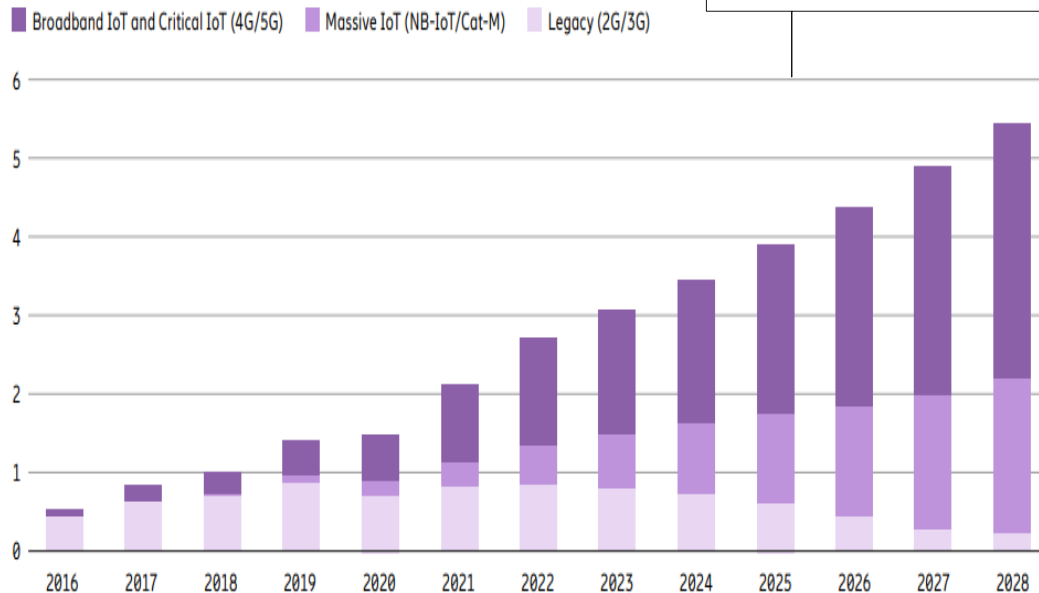


- Evolution of existing technology adding new RAN technology
- LTE+ and New Air Interface combined allows rapid switching based on radio conditions
- New Air Interface initially applied at new spectrum (up to millimeter waves) with super channels, massive MIMO & beam forming
- Gradual migration of New Air Interface into existing spectrum

Cellular IoT market outlook

5.4 billion cellular IoT @ 2028

Cellular IoT 2021-2027 CAGR of 12%



Cosmote within the first twenty networks commercially deployed in 2017

NB-IoT & Cat-M will make up >40% of cellular IoT connections in 2027

source: ERICSSON mobility report - June 2023

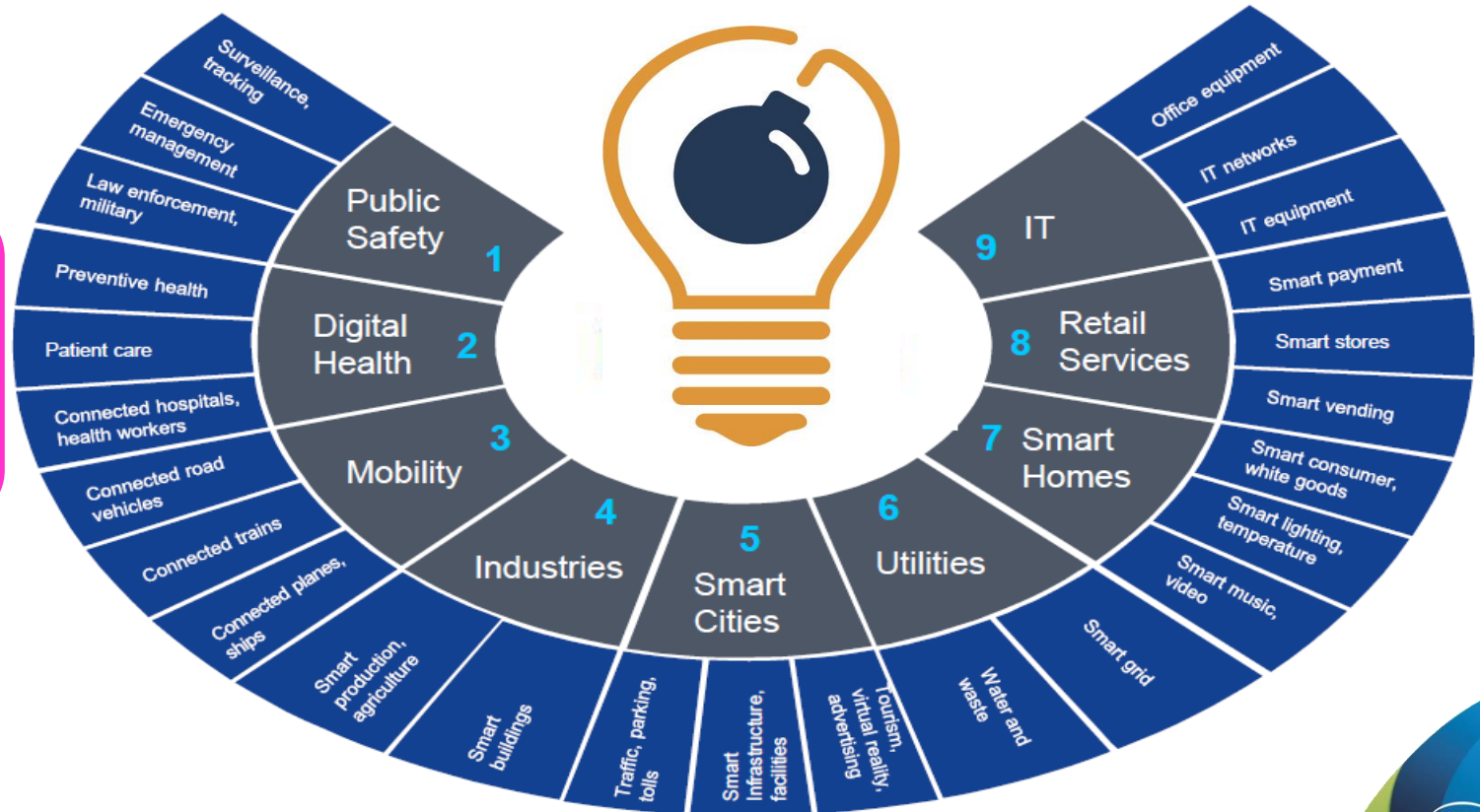


IoT re-shaping effect on society

Transformational impact in all industries, value chains & entire business configurations

IoT transforms the way we:

- Work
- Commute
- Interact
- Entertain



source: Nokia

Cellular IoT Technologies

LTE is already sufficient - 5G advantage is on critical side

NB-IoT

- Very** low complex & cost UE
- Very** high device volumes
- Very** small data packages
- Very tough static radio conditions

Extreme Battery Efficiency

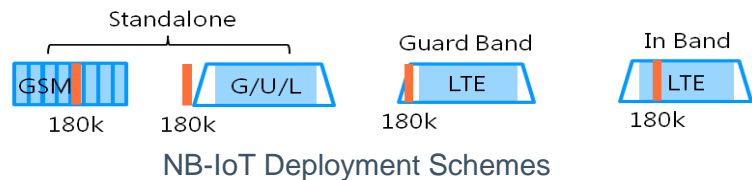
High Coverage

Long Cell Range
(120km NB-IoT
100km Cat-M)

IoT Positioning

CAT-M

- Low** complex & cost UE
- High** device volumes
- Low** size data packages
- Mobility
- Voice Support



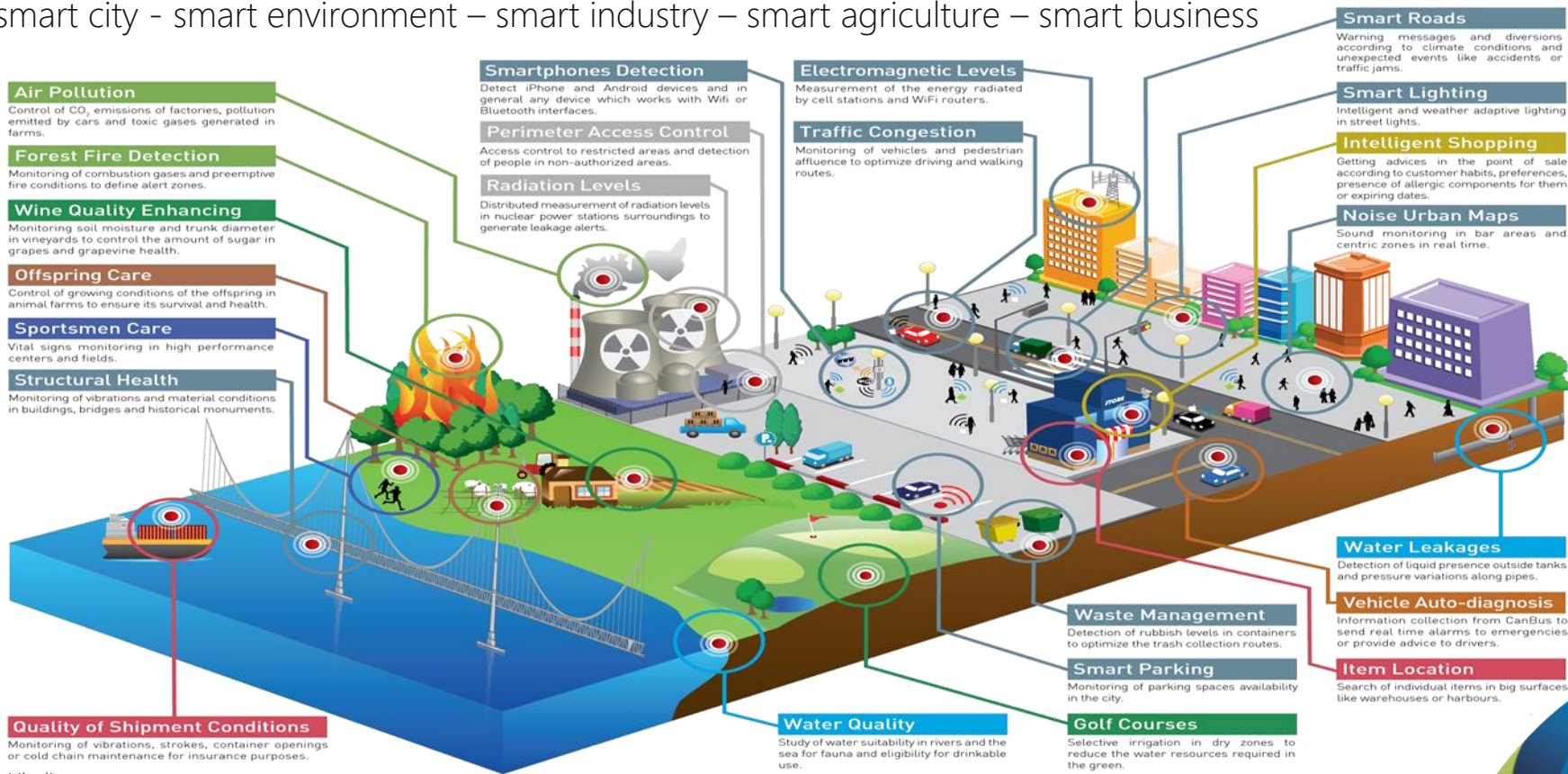
	NB-IoT	CAT-M1	LTE
Uplink Peak Throughput/ UE	~105 kbps ¹⁾	~1,119 Mbps ²⁾	Inherited from LTE (UE category dependent)
Downlink Peak Throughput/ UE	~80 kbps ¹⁾	~533 kbps ²⁾	Inherited from LTE (UE category dependent)
Bearer	FDD (1 Anchor PRB)	FDD (Single Narrowband)	FDD & TDD
Cell Range	Up to 120 km	Up to 100 km	Up to 100 km
Coverage extensions	CE Level 0,1,2	Coverage Enhancement Mode A	
Battery Life	Up to 10 Years	Up to 10 years	Use case dependent
Energy Efficiency	Power Saving Mode, extended DRX	Power Saving Mode, extended DRX	Power Saving Mode, extended DRX
Mobility	Idle Mode Mobility	Connected & Idle Mode mobility	Connected & Idle Mode mobility
Voice	Not supported	VoLTE	VoLTE
Positioning	CID	OTDOA (3GPP R9), ECID	ECID, OTDOA, A-GPS
Baseband Unit support	Baseband 52/66 – Full	Baseband 52/66 – Full	Baseband 52/66 – Full
Capacity (#cells, #users etc.)	<i>See latest "Ericsson RAN Compute Capacity Roadmap"</i>		

Mass market IoT already took off over LTE with R13 SW/HW

Critical IoT coming over 5G NR

IoT hot apps

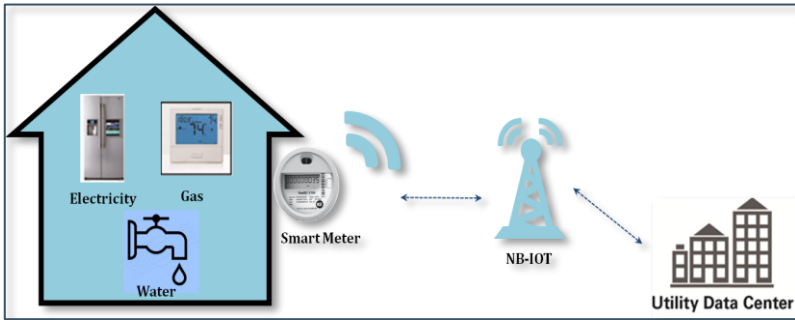
smart city - smart environment – smart industry – smart agriculture – smart business



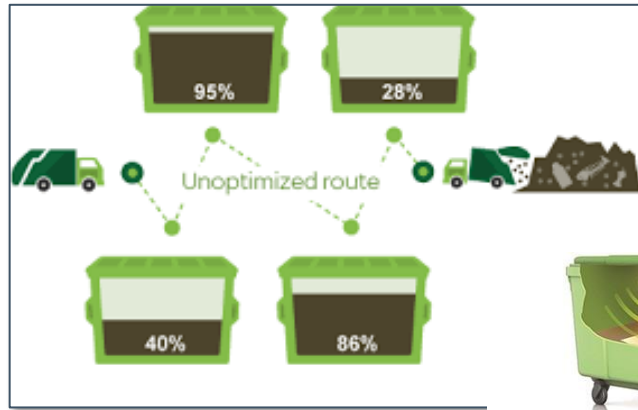
source: Libelium

IoT hot apps - Public

Typical applications & use cases



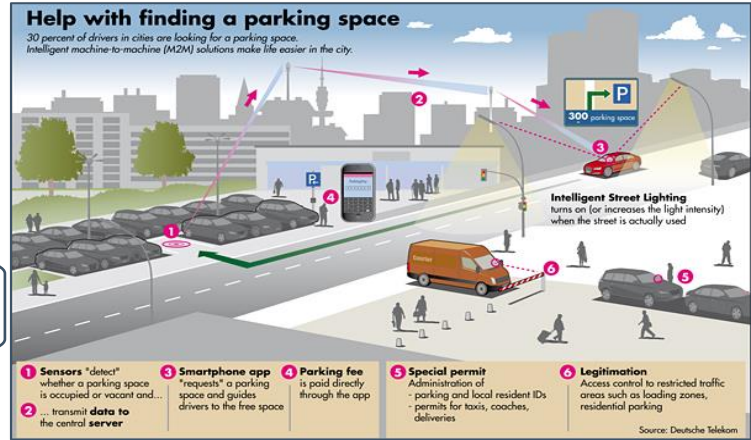
Smart metering



Smart waste management

Smart parking

Alarms & Event Detectors (safety)



source: Huawei, DT

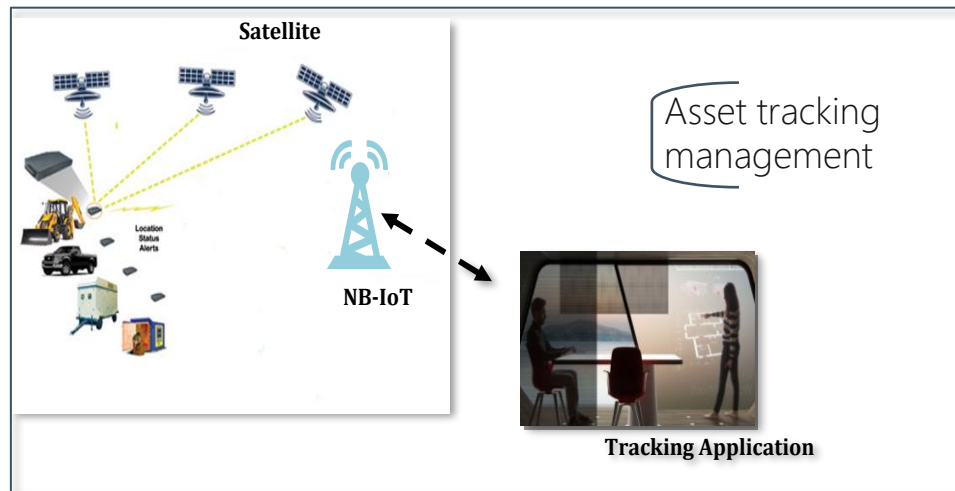
IoT hot apps - Industry

Typical applications & use cases



Logistics tracking

Smart agriculture



source: Huawei

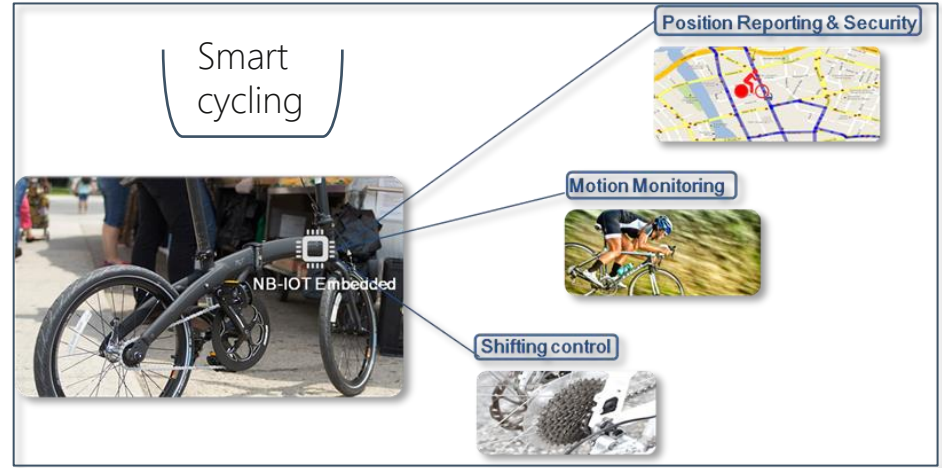


IoT hot apps - Personal

Typical applications & use cases



Wearables



Kids monitoring



source: Huawei



Conclusions

Key messages

- Having started out as a mobile evolution, 5G is actually a revolutionary enabler, because it:
 - enables a litany of new functionalities for people, societies, businesses & industries
 - facilitates the deployment of huge numbers of devices, new applications and the internet of things
 - eventually employs new network structures & architectures as centralized functions, virtual networks, real-time processing, etc.
- IoT is already here with NB-IoT and Cat-M1 supporting most current app needs. 5G will support critical ones.
- While 5G is further evolving, 4G is also making the necessary convergence steps, allowing for smooth inter-operation of the two ecosystems → 1 Gbps already available with LTE advanced technology.

The new era is already here !

The Shape of Things to come



Thank You!