Low-Power Wide-Area Network

technological landscape

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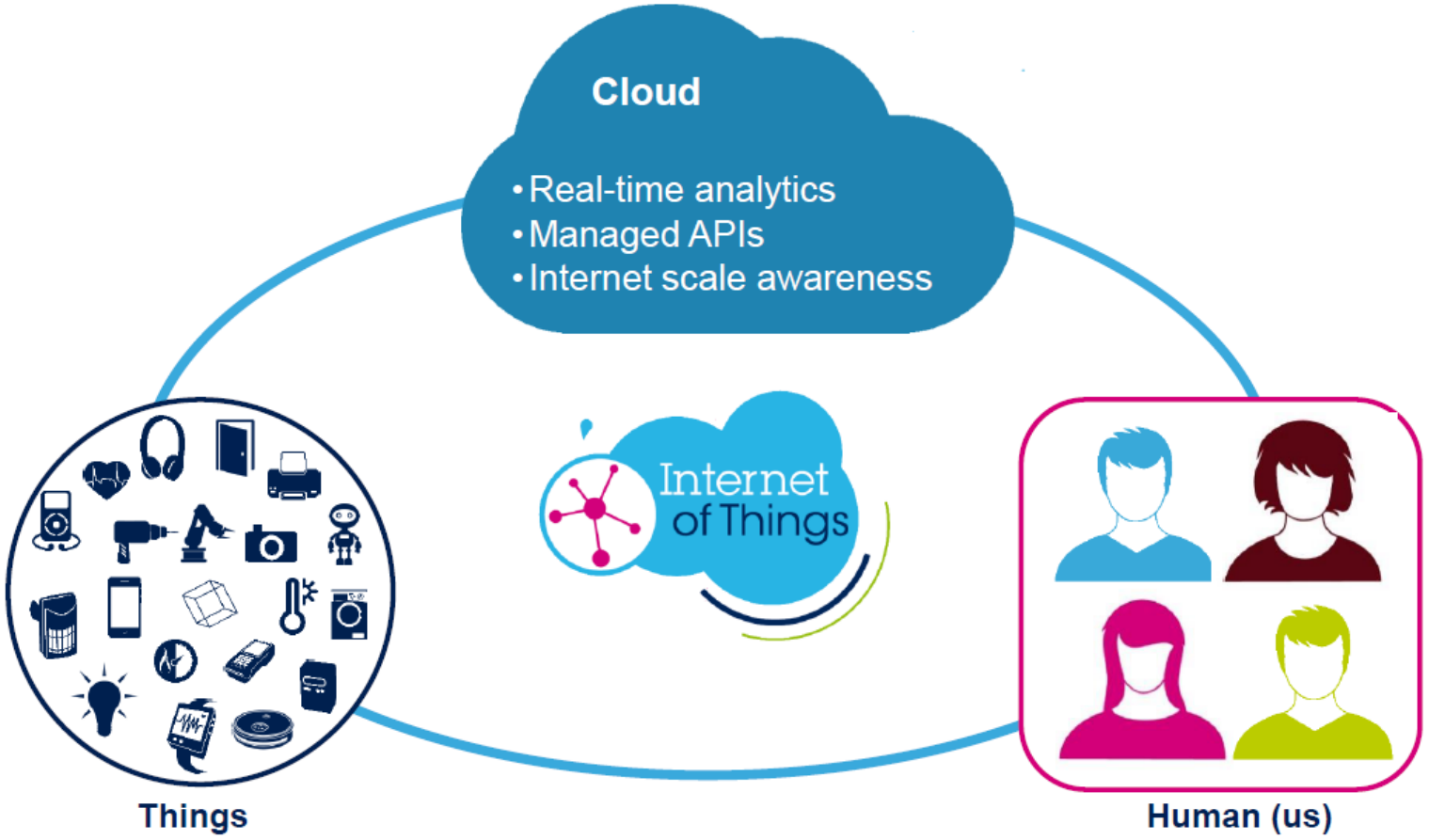
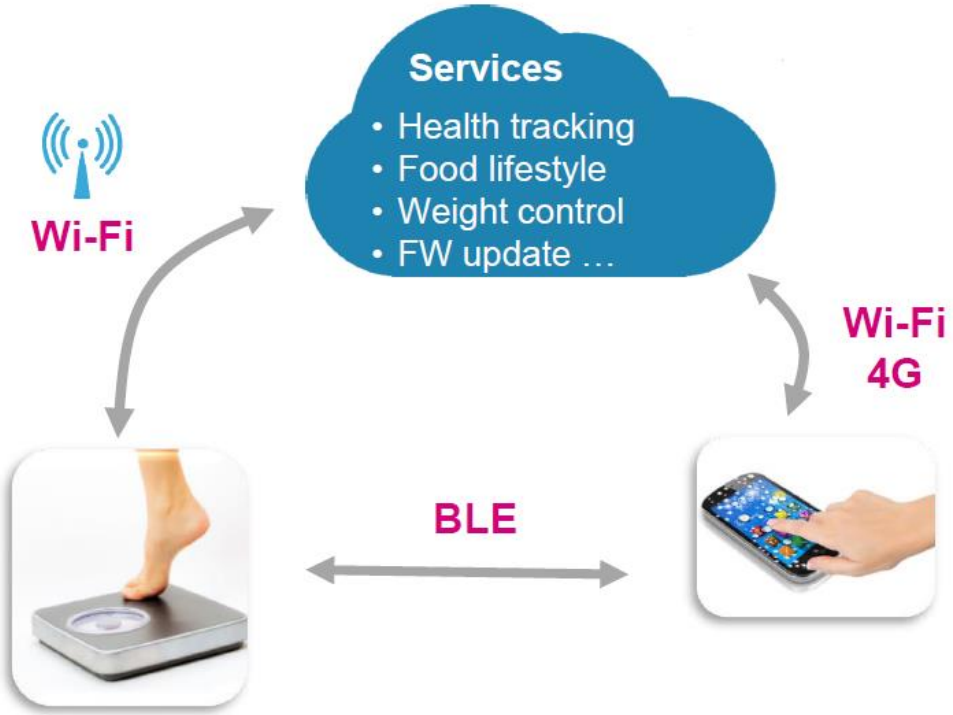
What is IoT

While M2M networks connect machines in closed systems, IoT enhances the existing networks through an intelligent cloud

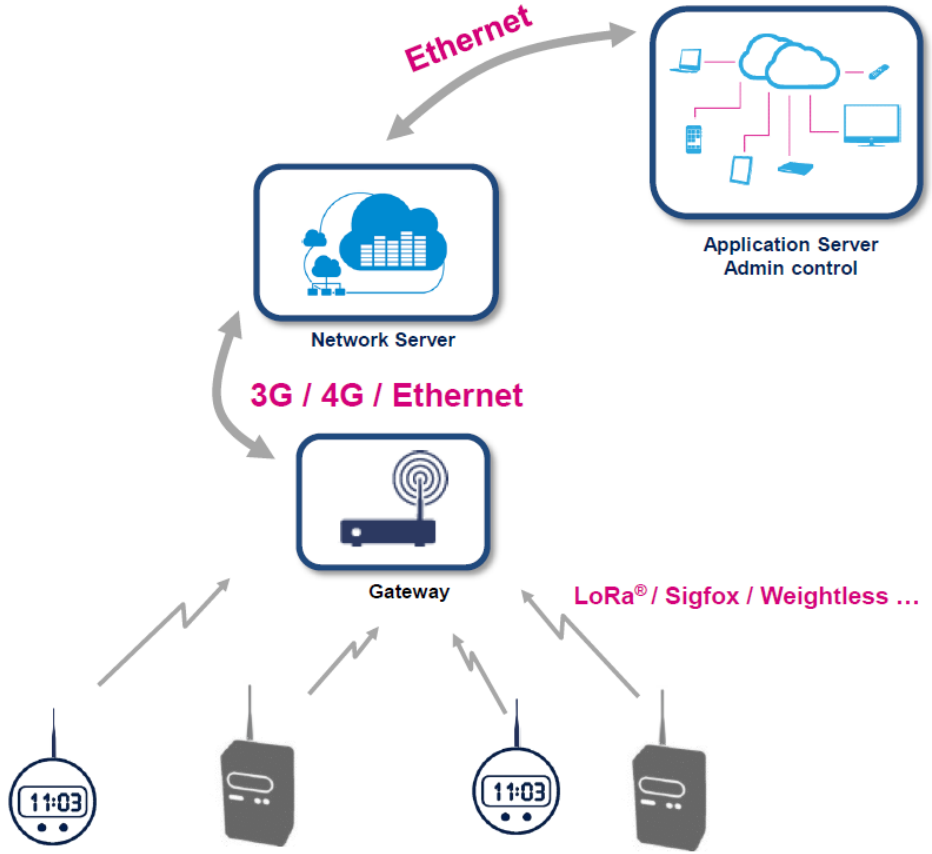


IoT macro-segments

- Consumer



- Industry



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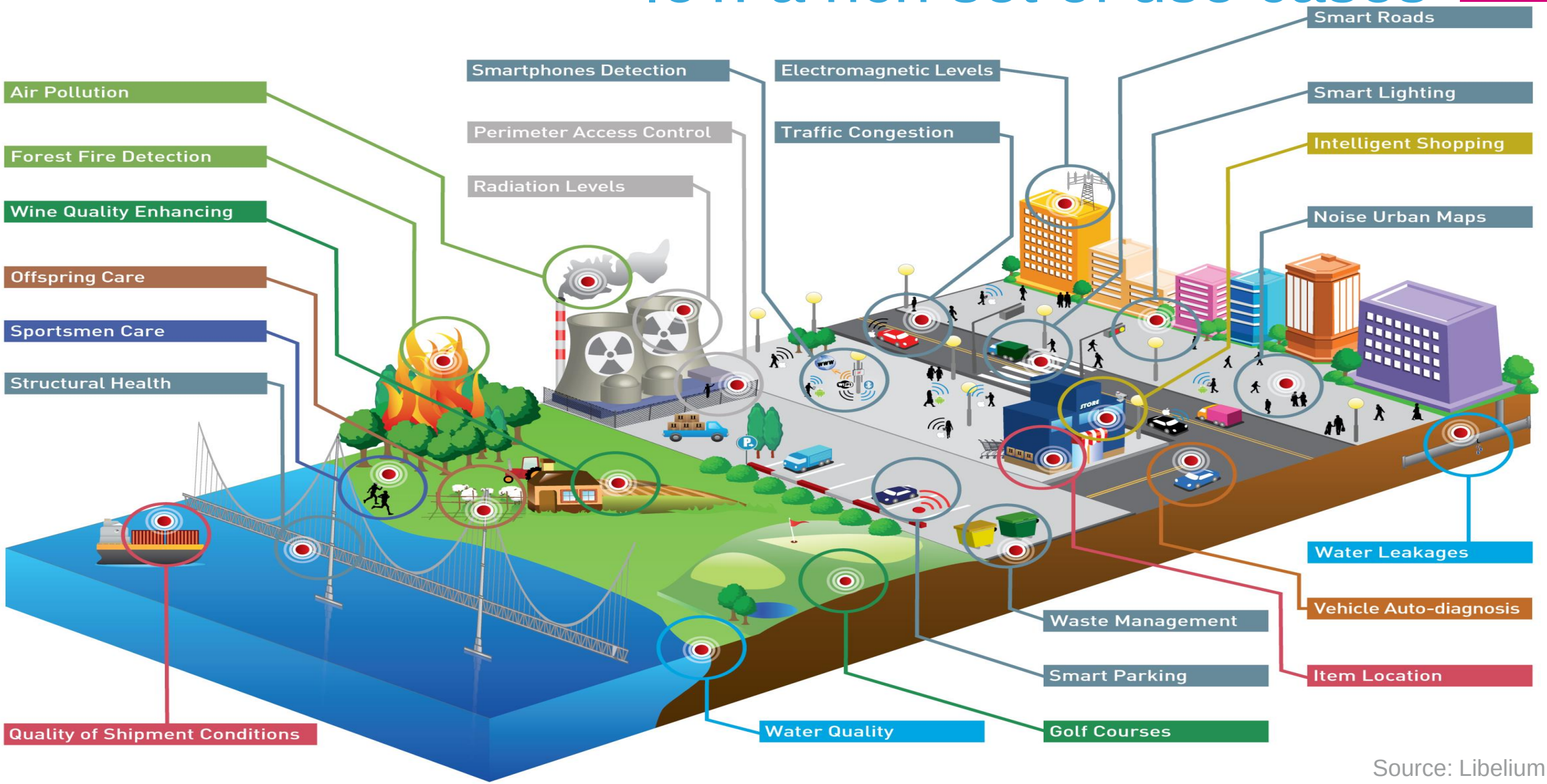
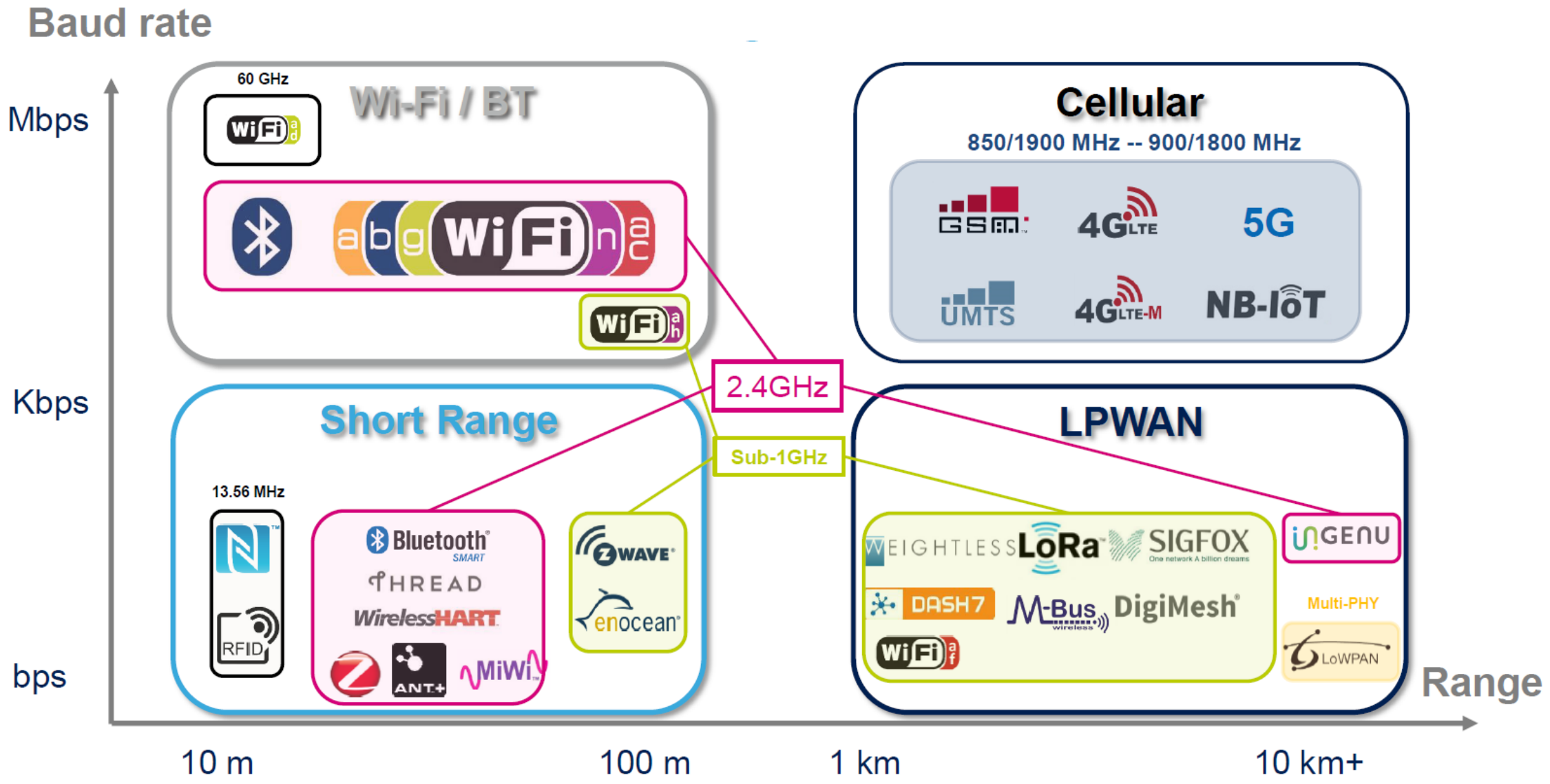
IoT: a rich set of use cases



Source: Libelium

Technological Subsets Overview



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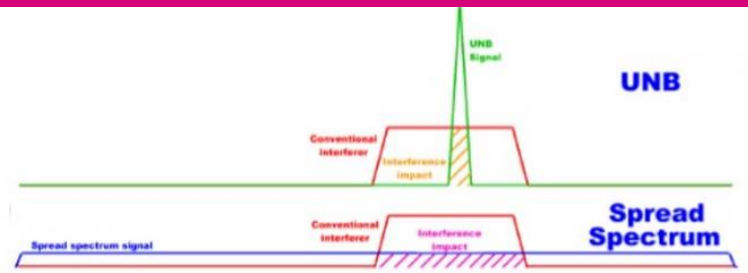
Sigfox and LoRa® - Overview

2 differents technology to support IoT

1. Ultra Narrow Band (UNB) → SIGFOX One network A billion dreams
2. Spread Spectrum (SS) → LoRa™



	Sigfox	LoRa®
Modulation	UNB	DSS-like
Throughput	100bps	300bps to 50Kbps
Payload	12bytes	64bytes
Link Adaptation	No (BPSK)	VSF (SF7-Sf12)
BW	100Hz	125KHz
DutyCycle Limited	Yes	Yes
Channel Hopping	Yes	Yes
Best Sensitivity (dBm)	-142	-142
Bi-Directional	4 message maximum /day	Yes
Battery Life	10years	10Years
Localization	No	Yes (30m)
Encryption	AES-128	AES-128
SDR	Yes	N/A
Benefits	Robustness to RF coexistence / Multi Radio vendor Low cost module / Network deployed in EU	2 to 3x longer Range / Less sensitive to noise and environment True Bi-directional / Private & Public network possible WW massive network deployment
Drawbacks	Limited baud rate (->limited application) /Limitation in the USA Not true Bi-dir / Only 1 network possible	Single radio provider

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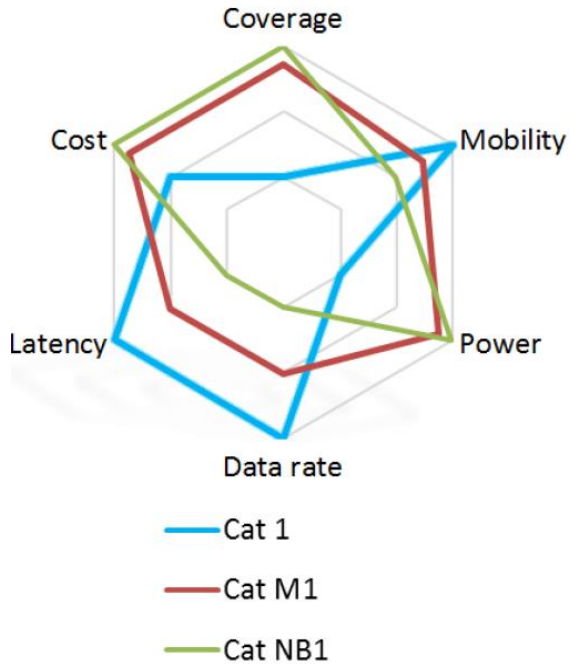
LTE Cat M1 vs NB1

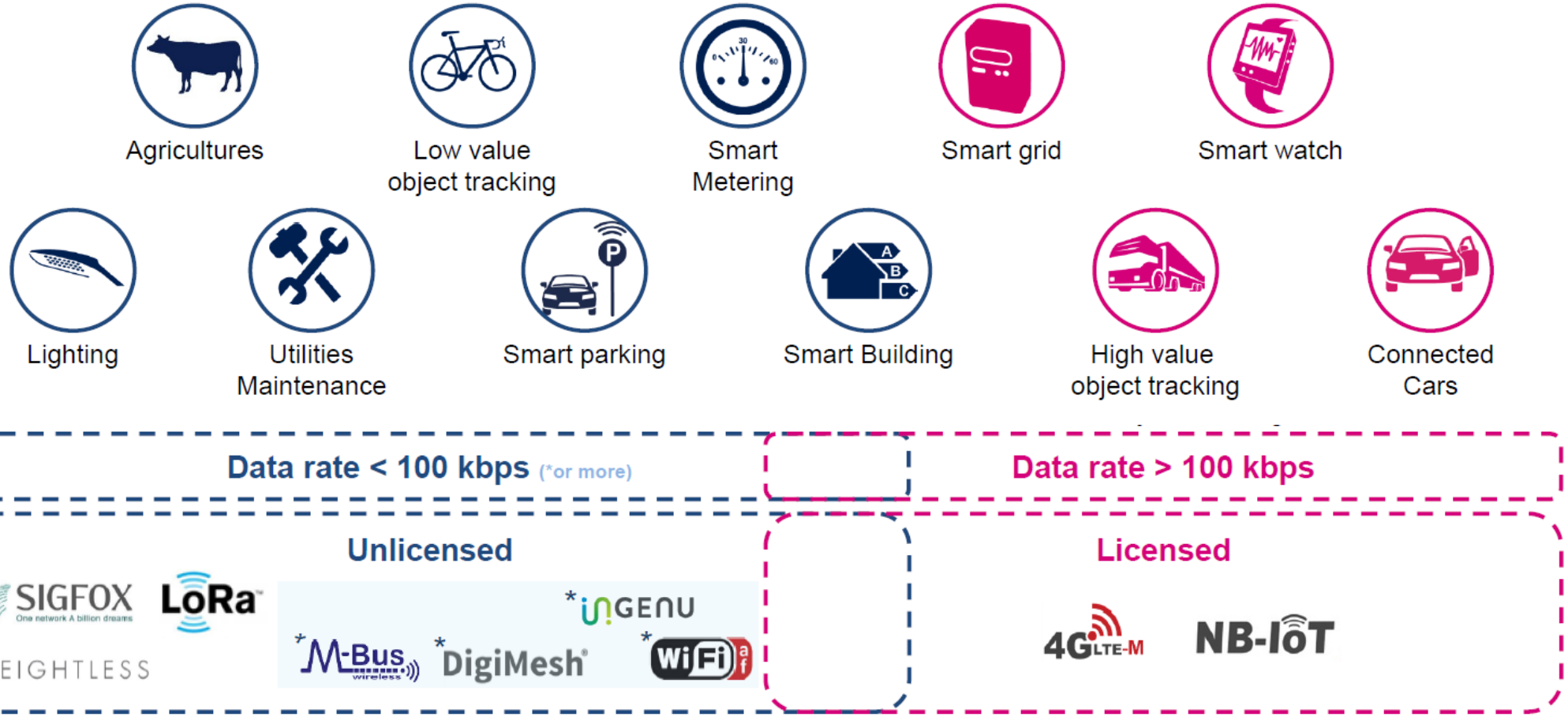
Cat M1/NB1 is a LPWAN technology for IoT devices to connect directly to a 4G network that extends battery life and coverage while offering enough bandwidth for communication.

	LTE Cat M1 (eMTC)	LTE Cat NB1 (NB-IoT)
Deployment	In-band LTE	In-band & Guard-band LTE, Standalone
Downlink Peak Rate	1 Mbps	50 kbps
Uplink Peak Rate	1 Mbps	50 kbps (multi-tone) 20 kbps (single-tone)
Latency	50 ~100 ms	1.6 ~ 10 s
Number of Antennas	1	1
Duplex Mode	Full / Half Duplex, FDD & TDD	Half Duplex FDD
Bandwidth	1.08 MHz	180 kHz
Transmit Power	20 or 23 dBm	20 or 23 dBm



User Cases vs Data Rate

- User cases will help to identify the most appropriated technology



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Releasing Your Creativity

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