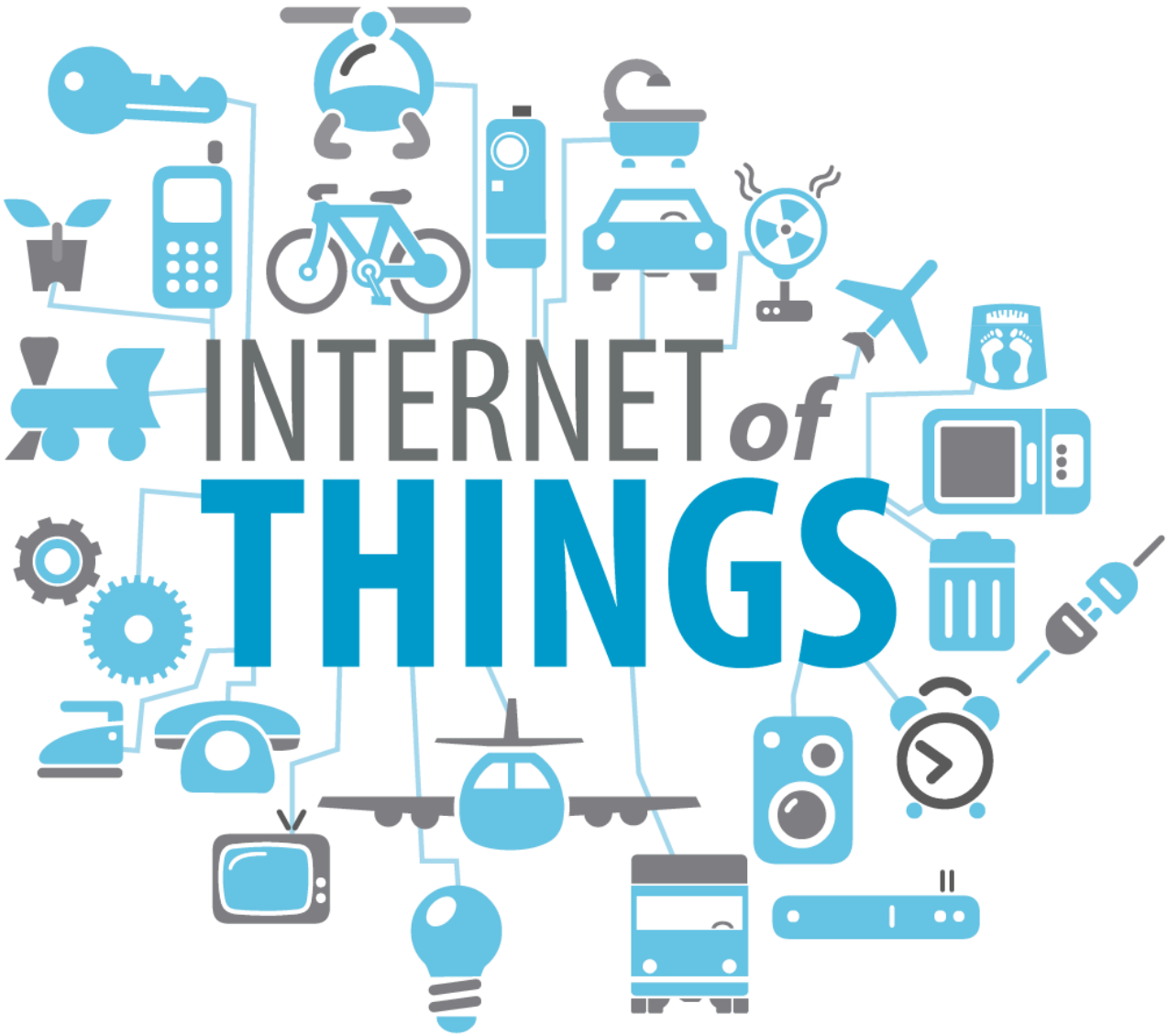
Narrow-band IoT: an opportunity to extend IoT world with 5G

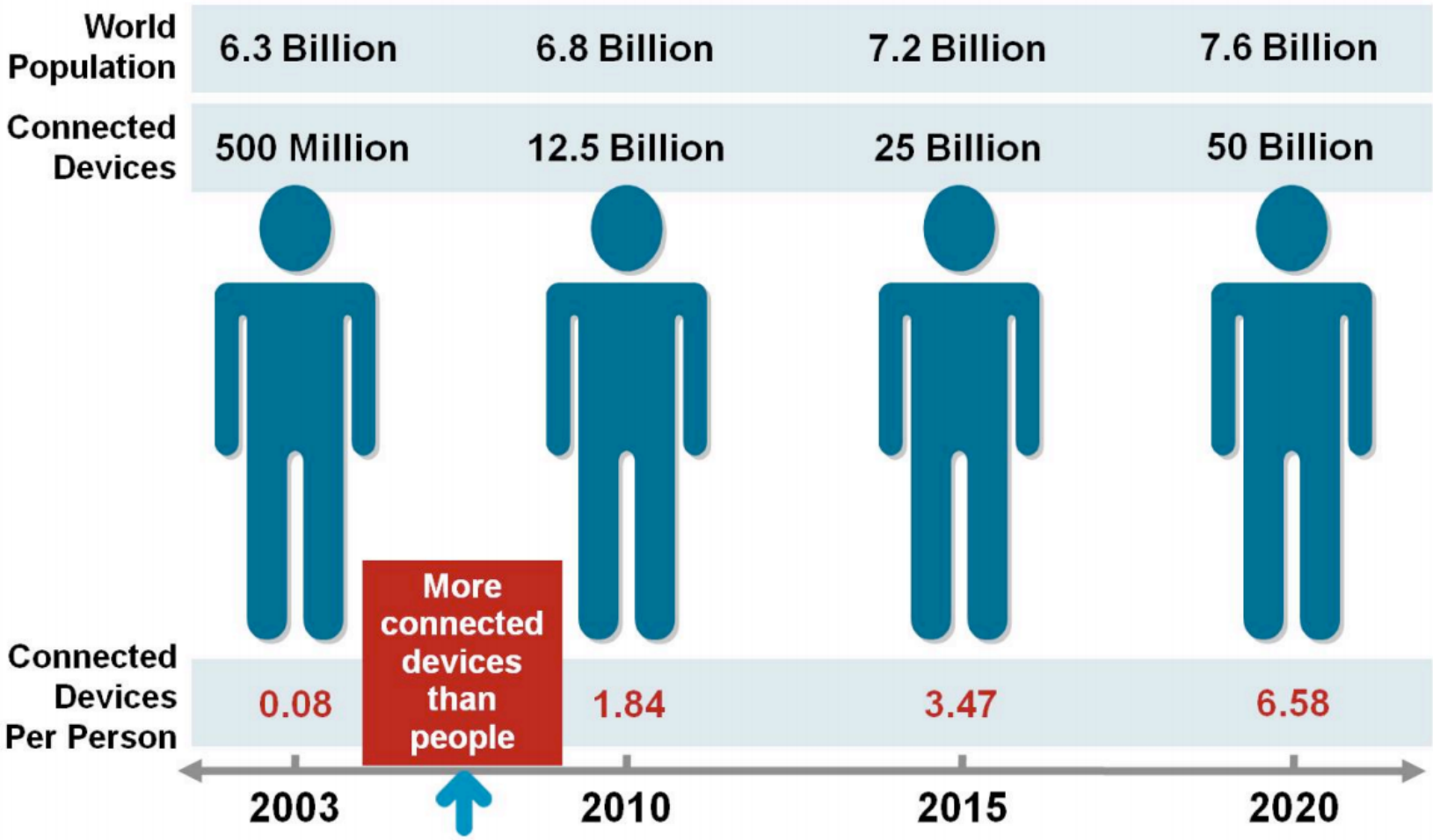
Prof. Gennaro Boggia
(gennaro.boggia@poliba.it)

Dept. of Electrical and Information Engineering (DEI)
Polytechnic University of Bari, Italy

The IoT



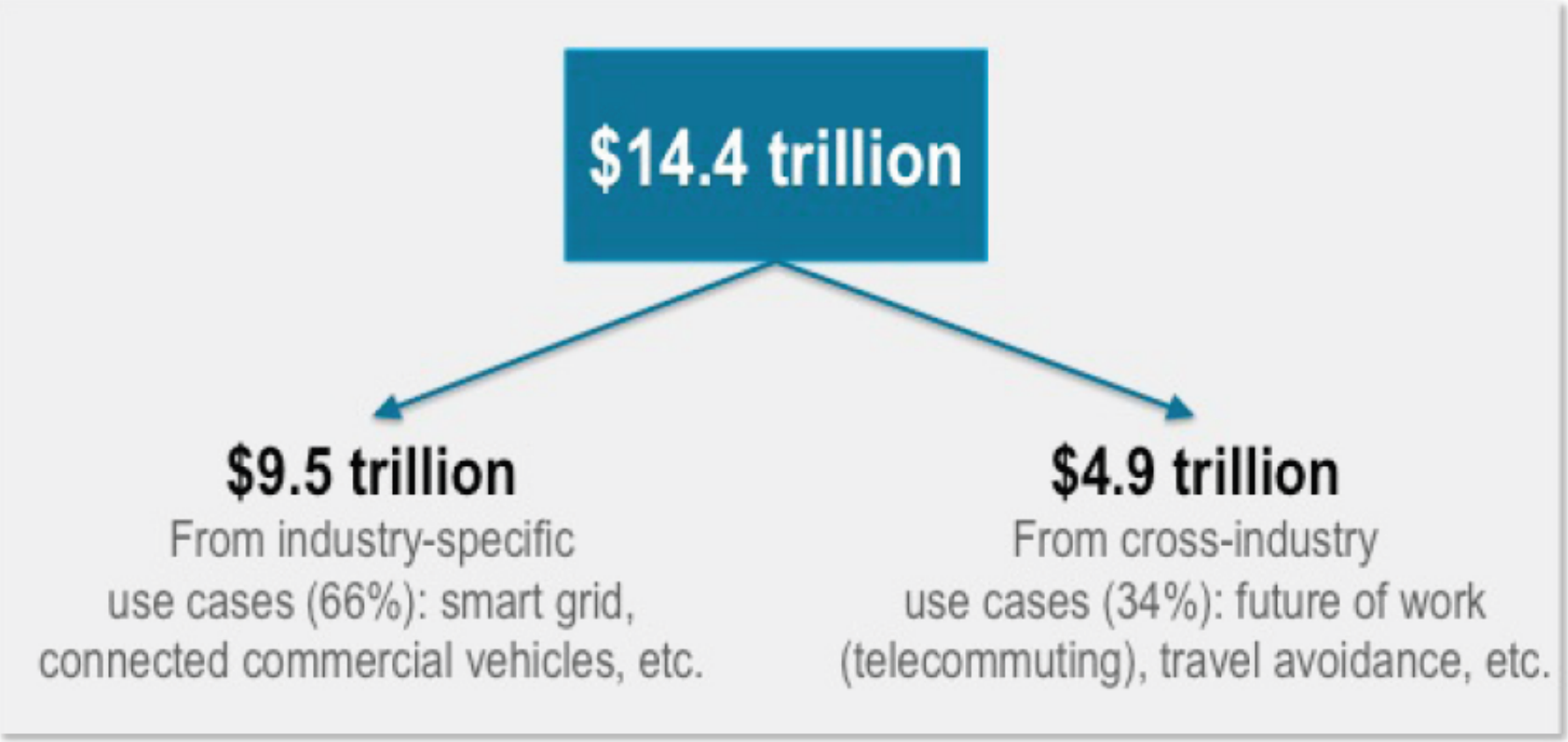
How many ”things” per person?



Source: Cisco IBSG, April 2011

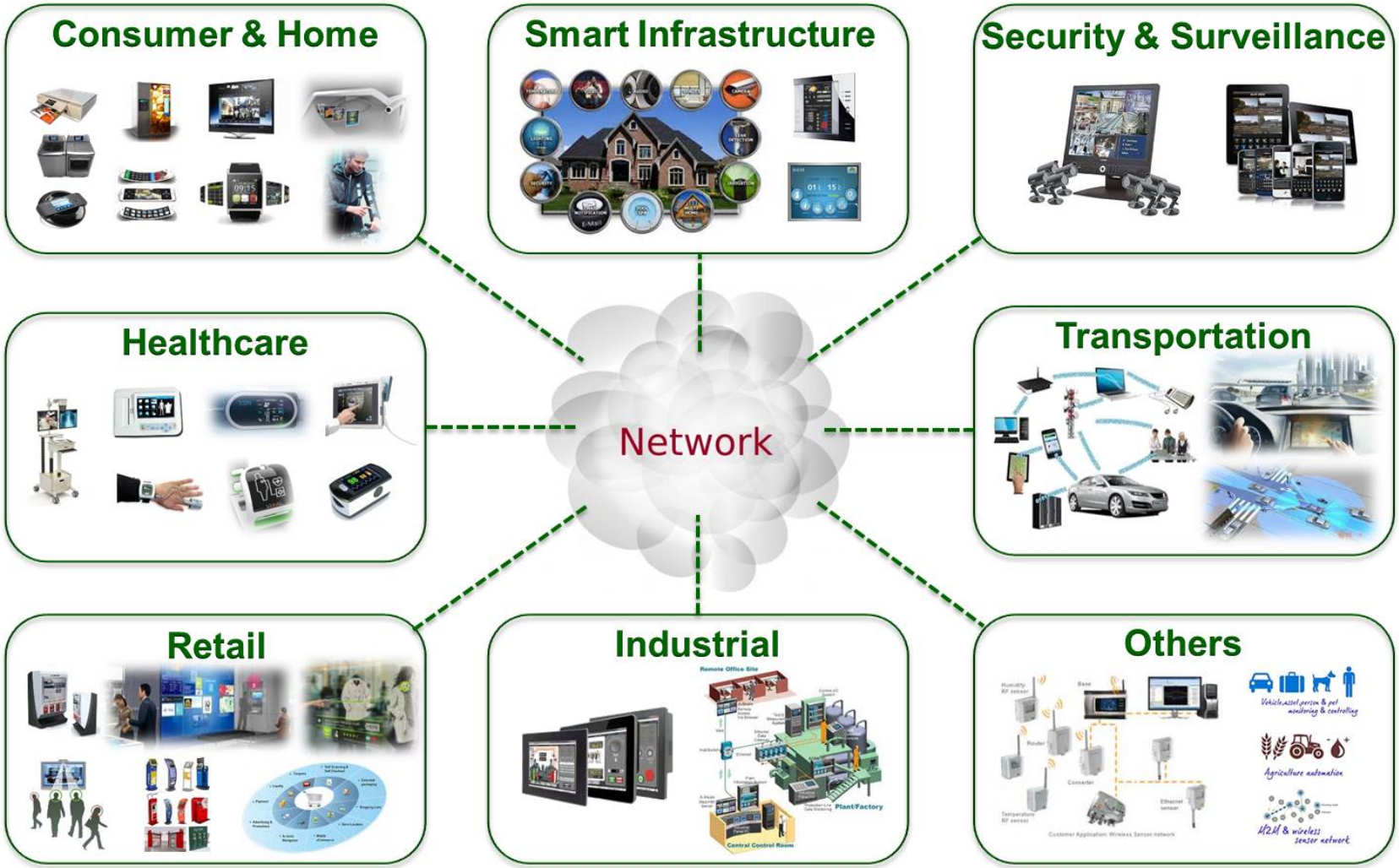
Expected Value in the IoT world

How Much Value Is at Stake in the IoE Economy?



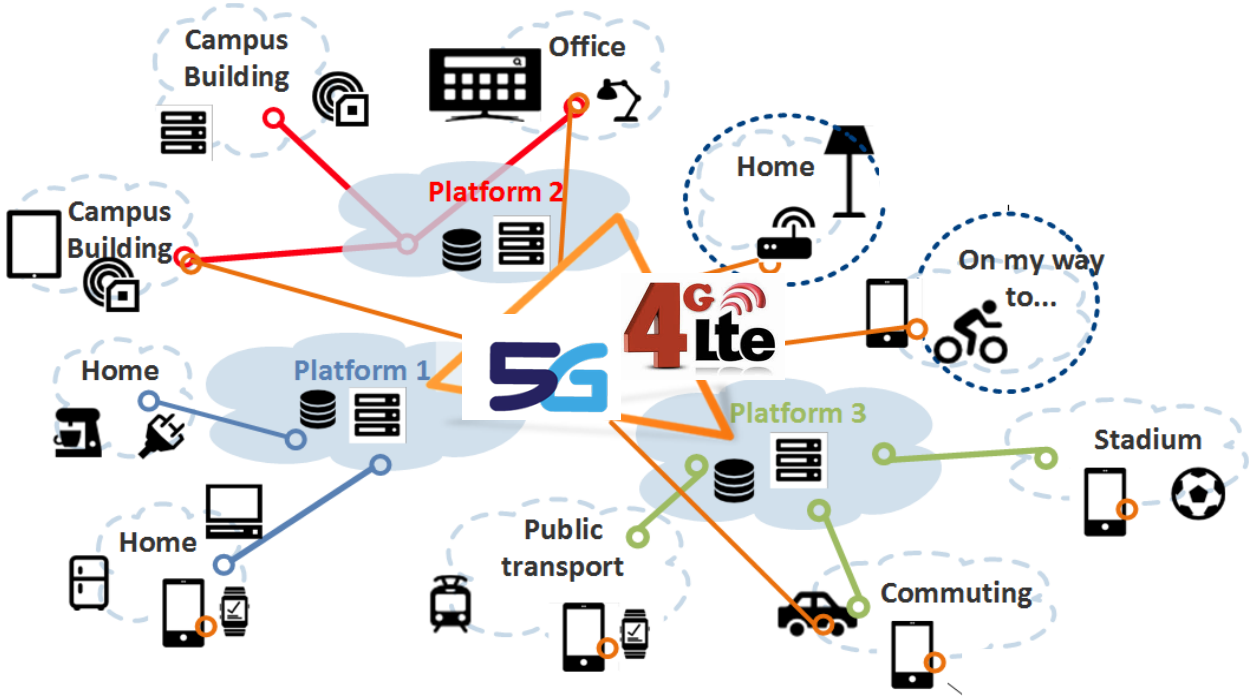
Source: Cisco IBSG, 2013

Some IoT use cases



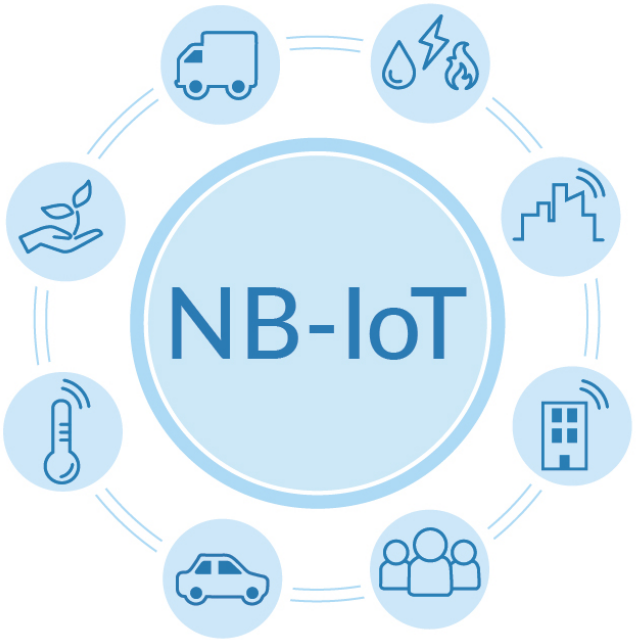
Cellular Communications and IoT

- Several separated IoT islands: need for intercommunication
- How to connect them?...wide area coverage of cellular networks: 4G, 5G technologies
- The control plane of cellular systems can be very useful



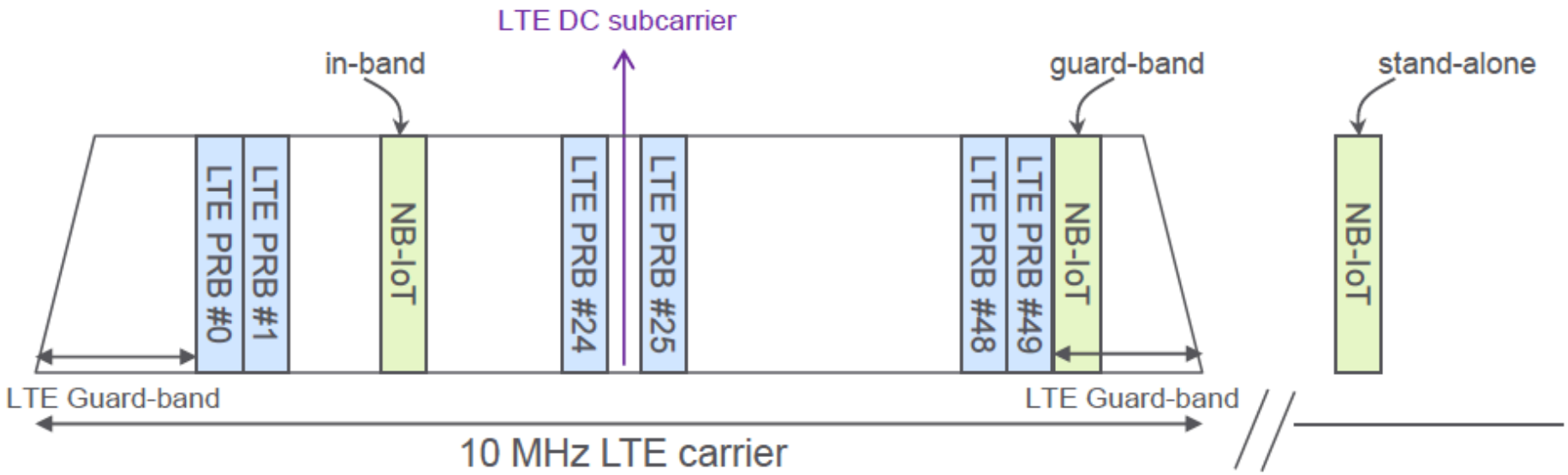
The answer in 4G: the NB-IoT

- Narrowband-IoT: introduced with Rel. 13 in LTE advanced Pro (2016)
- It's a new technology coexisting with 4G systems
- It could be considered the real link of cellular networks with IoT world



Main characteristics of NB-IoT

- Very narrowband (180 kHz)
  - In-band: using the frequencies of LTE
  - Guard-band: using the LTE guard band
  - Stand-alone: a dedicated frequency
- Peak data rates
  - *Downlink: up to* 226.7 Kbit/s (at layer-1)
  - *Uplink:* up to 250 Kbit/s (layer-1)



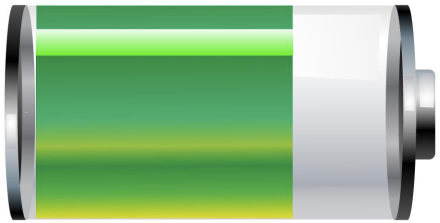
NB-IoT meets IoT key requirements

- NB-IoT is very useful for effective IoT deployment

Increased coverage

Low device complexity/cost

Long battery lifetime



Massive numbers of device

5G and Machine Type Communication

- End-to-end communication between machines
- **Massive** amount of sensors/meters/actuators are deployed anywhere in the landscape
- Low device cost
- Long battery life
- Small data volumes

NB-IoT and MTC

- NB-IoT meets MTC requirements
- It's 4G..but ready for first 5G deployments
- Really, it could be the first step towards a IoT world using cellular capabilities

Future of NB-IoT

- We need to test/study such a technology
- Improvements in the next releases
- Use/verify the paradigm with new air interface for 5G
- Deployment in real environment
- Creation of a reliable IoT with very large coverage

Thanks!!

Any questions?