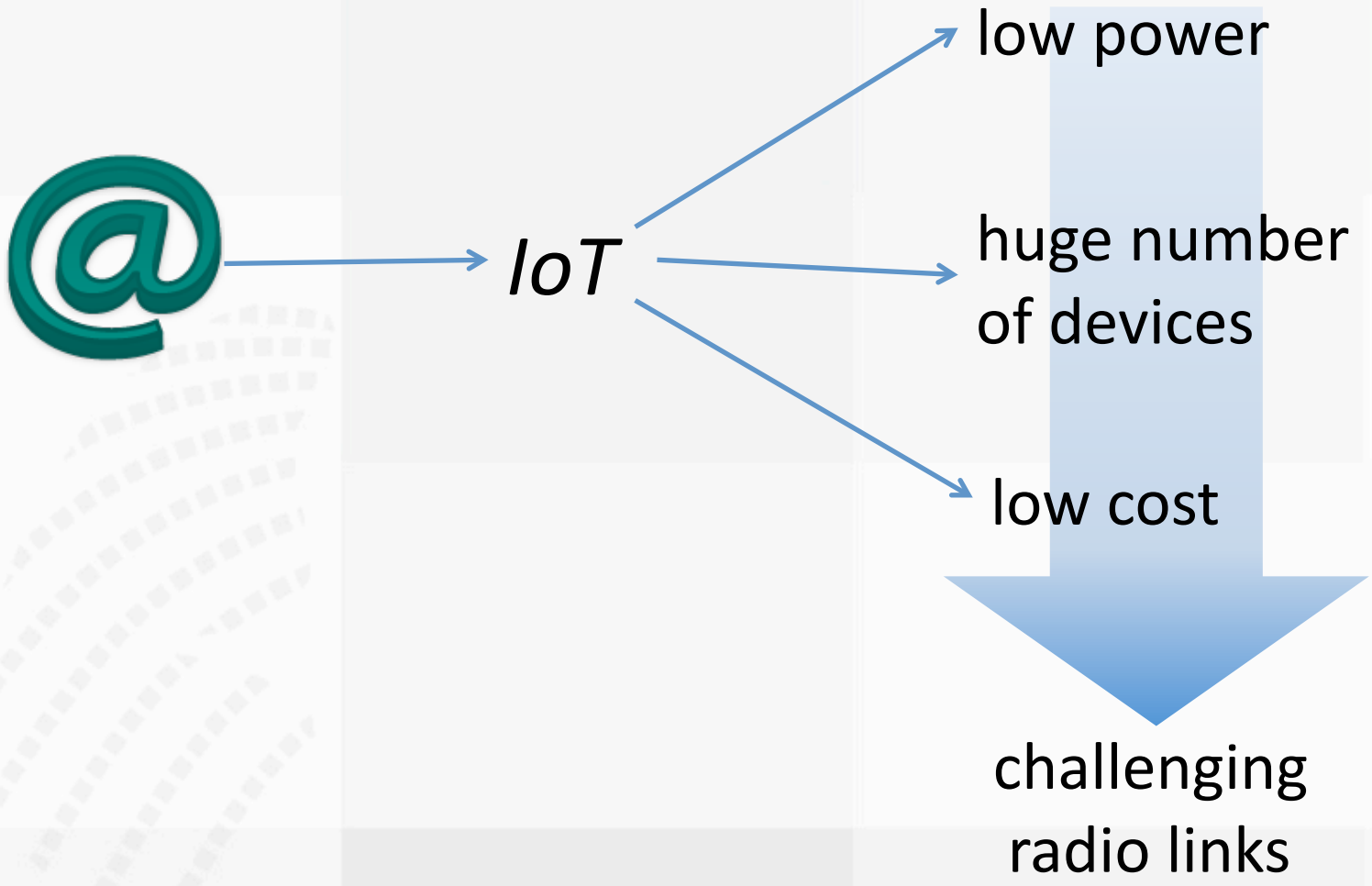
Low power wireless networks connecting objects of the IoT

CEPT workshop, 21-22 March 2016

Mainz, Germany

B. PONSARD

Internet of things : the radio differentiator



Presentation overview

- landscape of IoT connectivity
- what is UNB
- suggestions for regulation evolution

Various answers from various actors

Low Power, battery operated IoT devices

cellular based	autonomous	dedicated network
EC-GSM-IoT	802.11ah	LTN
NB-IoT	BTLE	RPMA
LTE for MTC	802.15.4q	WMbus
5G mMTC	DECT ULE	802.15.4g
…	…	…

Constraints on the radio access technology

- asymmetrical network
  - 10k of devices / km2
  - 0.1 base station per km2
- asymmetrical offered traffic
  - UL: a few messages per day per device
  - DL: focal point in base stations
- licence exempt frequency band

SIGFOX UNB : a disruptive radio link

EN 300 220 non specific
500mW 10%
OCBW ≈ 0.1 à 1 kHz

shared
spectrum
+
SDR in
base stations

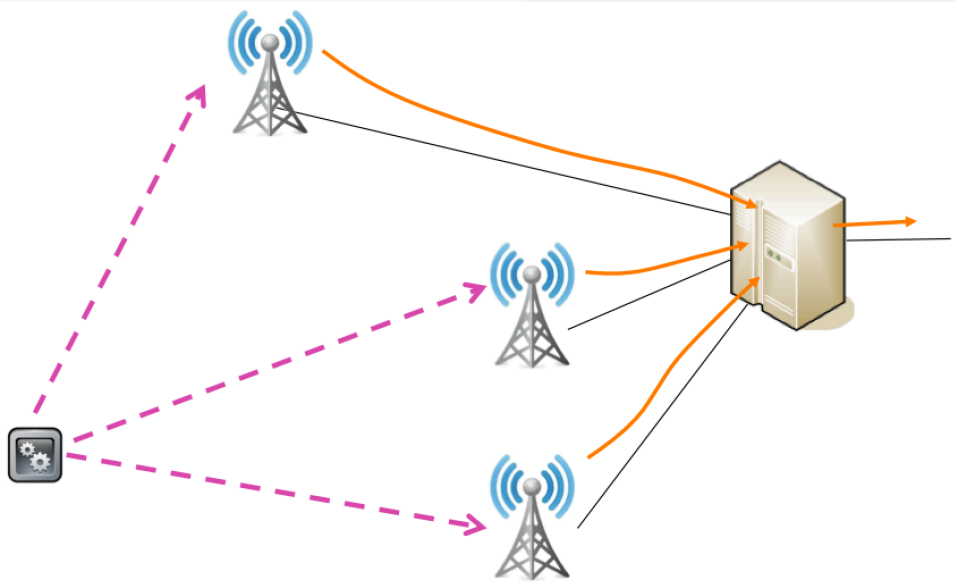
EN 300 220 non specific
25mW 1%
OCBW ≈ 100-250 Hz

OCBW: OCcupied BandWidth

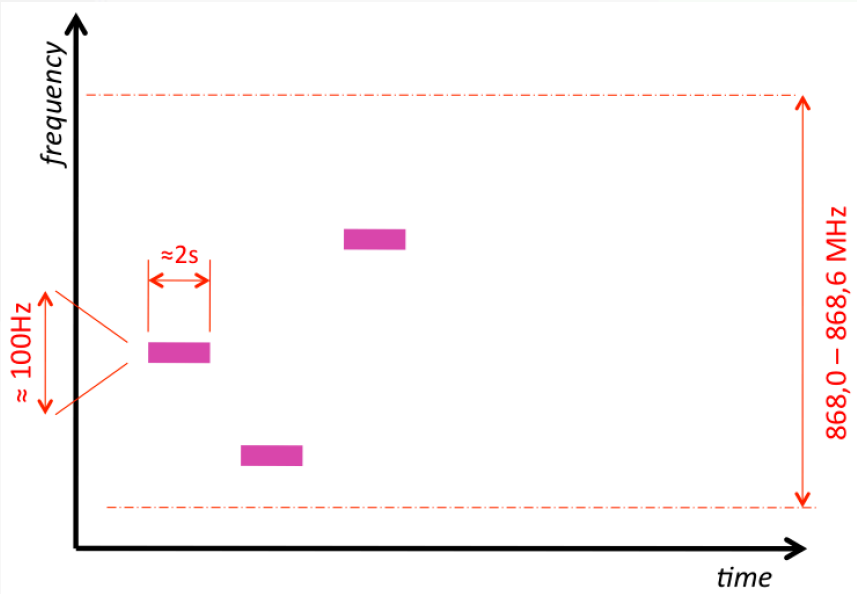
no attachment ➔ predictible power consumption

QoS in shared spectrum bands

- **QoS**
  - **congestion resilience**
  - **delivery success rate**



→ spatial diversity with massive SIMO



→ frequency diversity

Suggestions for IoT regulation (1/)

- **dedicated networks**
  - **licence exempt spectrum** → business model
  - **shared with other equivalent services** → spectrum efficiency

1. **Spectrum**
   - **balanced spectrum in UL and DL**
   - **600kHz + 600kHz**
   - **one single block in UL**
   - **fully harmonised for offering seamless services**

2. **Tx Power**
   - **aligned with increased spectrum**

3. **Duty Cycle**
   - **see next slide**

UNB SRdoc ongoing in ERM/TG28

Suggestions for IoT regulation (2/)

- **duty cycle: current status (EN 300-220 non specific)**
  - **devices: 1%**
  - **base stations: 10%**

  average, over 1 hour window

- **needs for UNB IoT**
  - **base stations: 10% (half duplex operation)**
  - **devices at 1%, but:**
    - **average value ≈ 3-30 msg/day**
  - **tracking use cases:**
    - **1msg per min**
    - **tracking period ≈ 12-24 hours**
    - **occurrence 0.2 day/base station**

more flexibility in DC for devices

About numbering

- identifying & addressing
  - to identify devices and base stations
  - to route packets in and out of the network

- the IP temptation
  - ⊕ 2^{128} Iv6 address space
  - ⊖ heavy protocol stack
  - ⊖ no need of routing in a star topology
  - IP when going to the Internet

- the real need
  - unique identifier
  - source address in UL
  - destination address in DL

one field for all

A dream …

SIGFOX

One network A billion dreams

thank you.