

Low-Power Wide-Area Networks

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SIGFOX

LoRa

NB-IoT

Weightless

RPMA

Low-Power Wide-Area Networks

25 mW transmission power

Low-Power Wide-Area Networks

20 years on simple battery

15-50 km rural outdoor

Low-Power **Wide-Area** Networks

2-3 km urban indoor

Low-Power Wide-Area **Networks**

No scheduling

No routing

ALOHA

Device-initiated com
Huge densities
Low throughput

250 kHz or less

Narrow-band

Low-Power Wide-Area Networks

Collisions

Data-over-NAS In-band

Duty cycling

Acknowledgements

Guard-bands

License free

In licensed spectrum

250 kHz or less

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Narrow-band
15-50 km rural outdoor

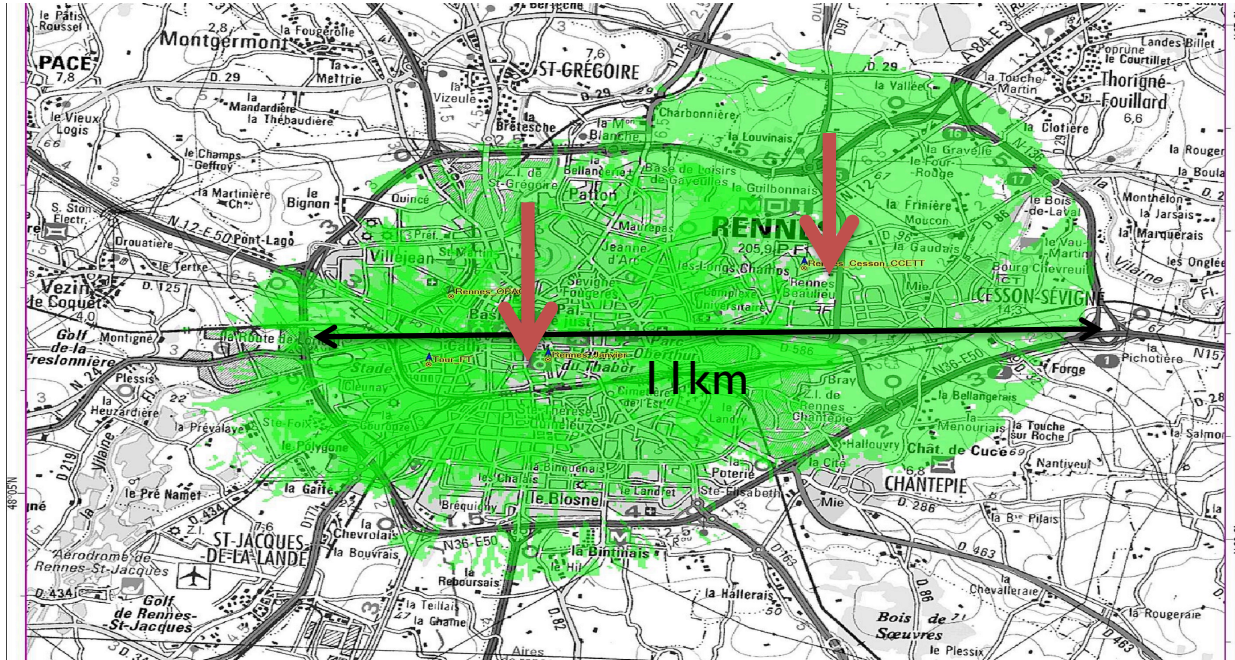
Low-Power Wide-Area Networks
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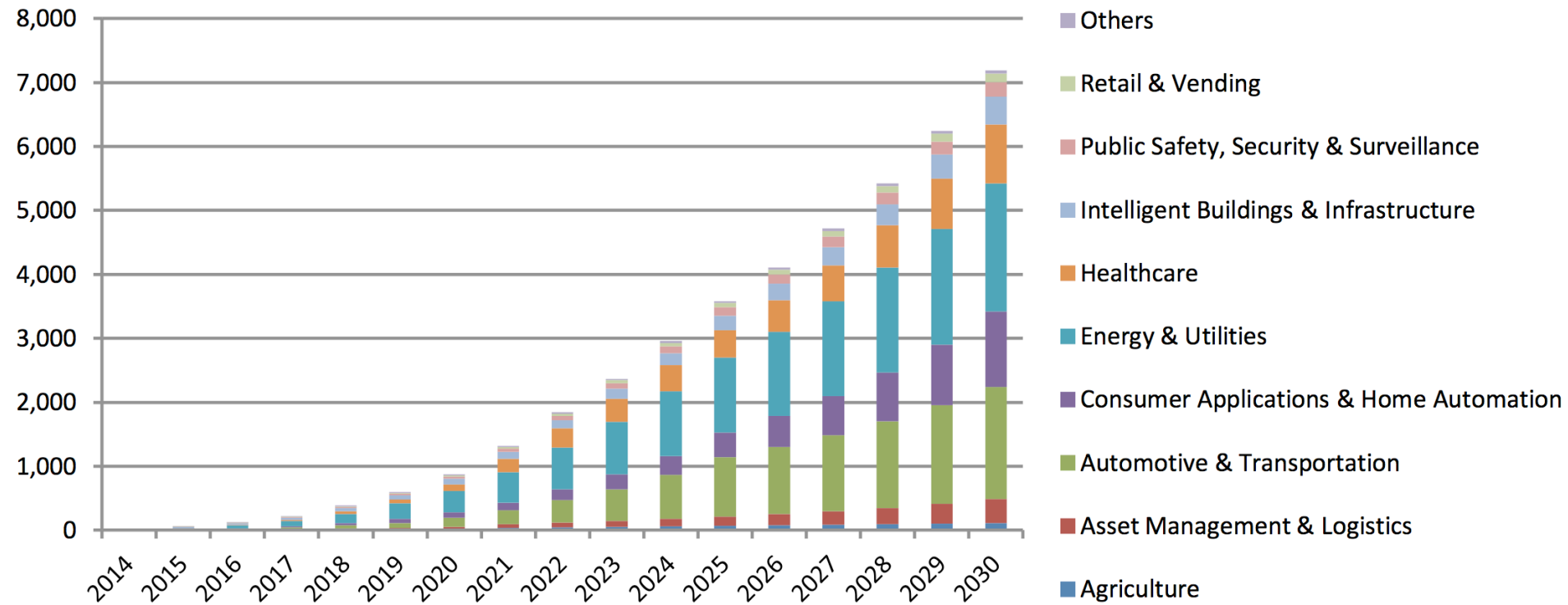
100 bps
(50 kbps max)

12 byte payload
(50 byte payload)

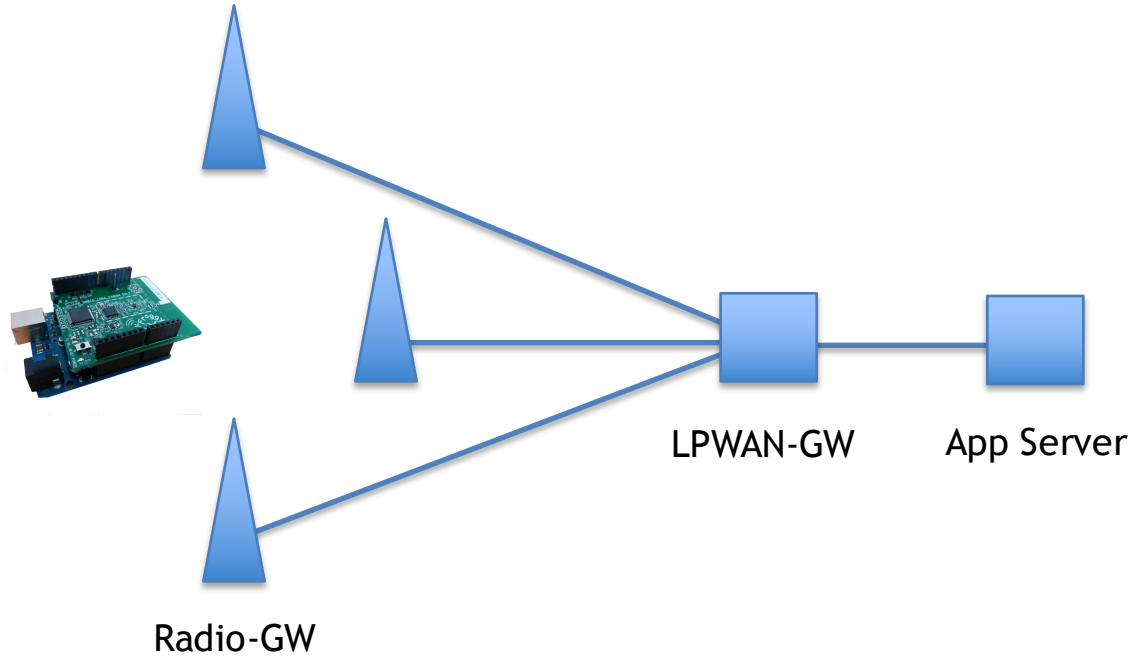
140 messages
uplink

4 messages
downlink

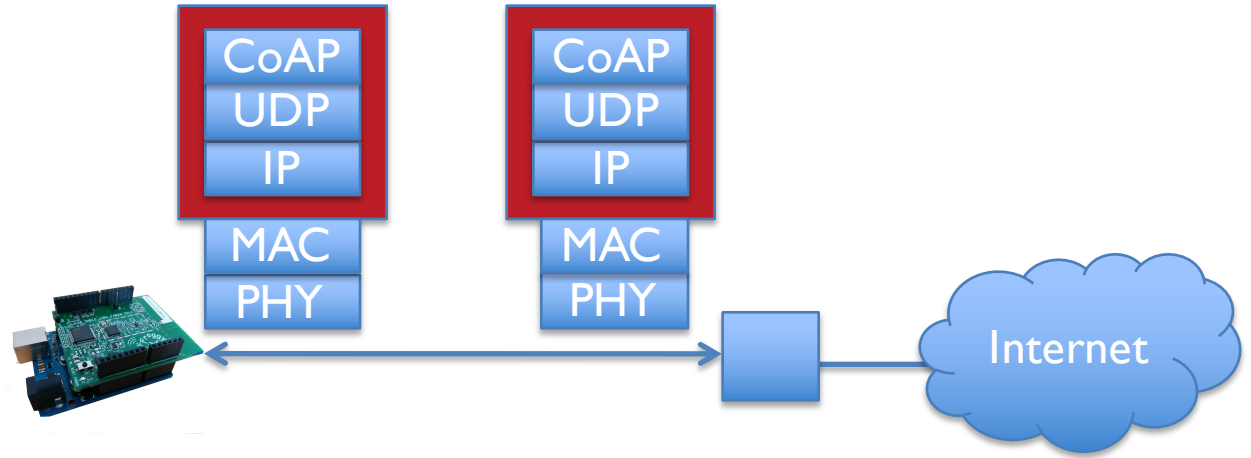




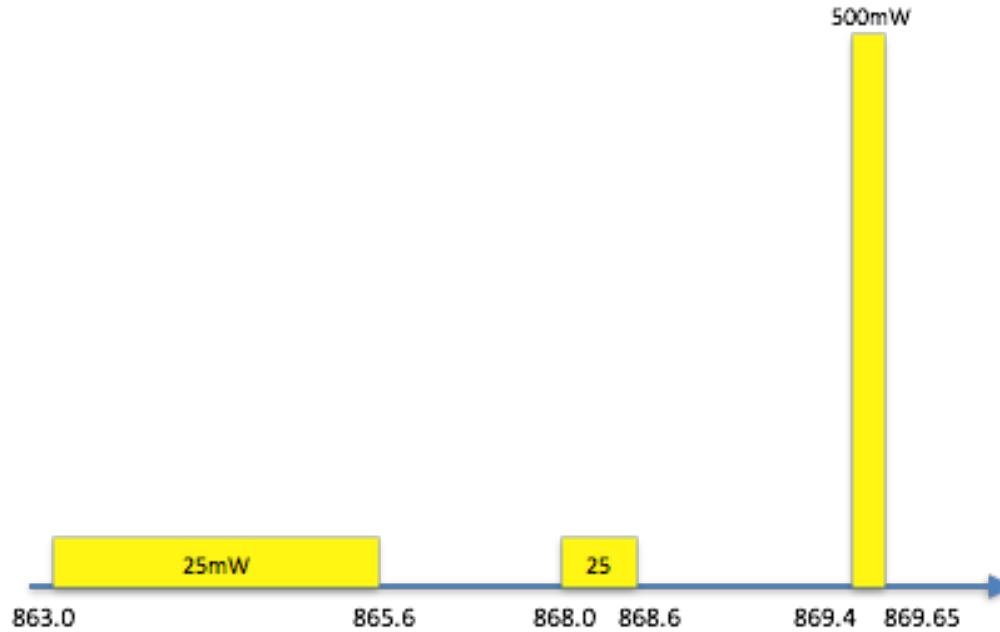
Source : SNS Research, November 2015



Compression



Management



Building the next 10 bln devices

- Device software stack
 - Drivers (available for Contiki)
 - MAC (e.g. LoRaMAC – open C implementation)
 - IP/UDP/CoAP with SCHC IP compression
 - CoOL/CoMI for network and app management
 - RESTful APIs
 - Certificates, COSE, secure element, code verification
 - Design for disposable devices + devices that will be there for 10+ years
- Development tools!
 - Independent of LPWAN technology
- But wait, there is more...
 - 6TiSCH

Thank you! Questions?

IETF LPWAN BoF on Monday

- Join the lp-wan mailing list
- Technical session on Sunday
- Key documents:
 - draft-toutain-6lpwa-ipv6-static-context-hc
 - draft-gomez-lpwan-fragmentation-header

CoOL/CoMI on CoRE:

- draft-ietf-core-yang-cbor
- draft-veillette-core-cool
- draft-somaraju-core-sid

