

draft-minaburo-lpwan-gap-analysis-00

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Outline

- LPWAN Characteristics
- LPWAN at IETF
 - IPv6, compression, fragmentation, management

LPWAN Characteristics



License-exempt
or Licensed
bands

Constrained and
challenged network
(as defined RFC
7228)

Property industrial
deployments,
huge potential

Battery powered
devices with
limited
communications

Deep Coverage

LPWAN Technologies

Asymmetric Lines

Small message size

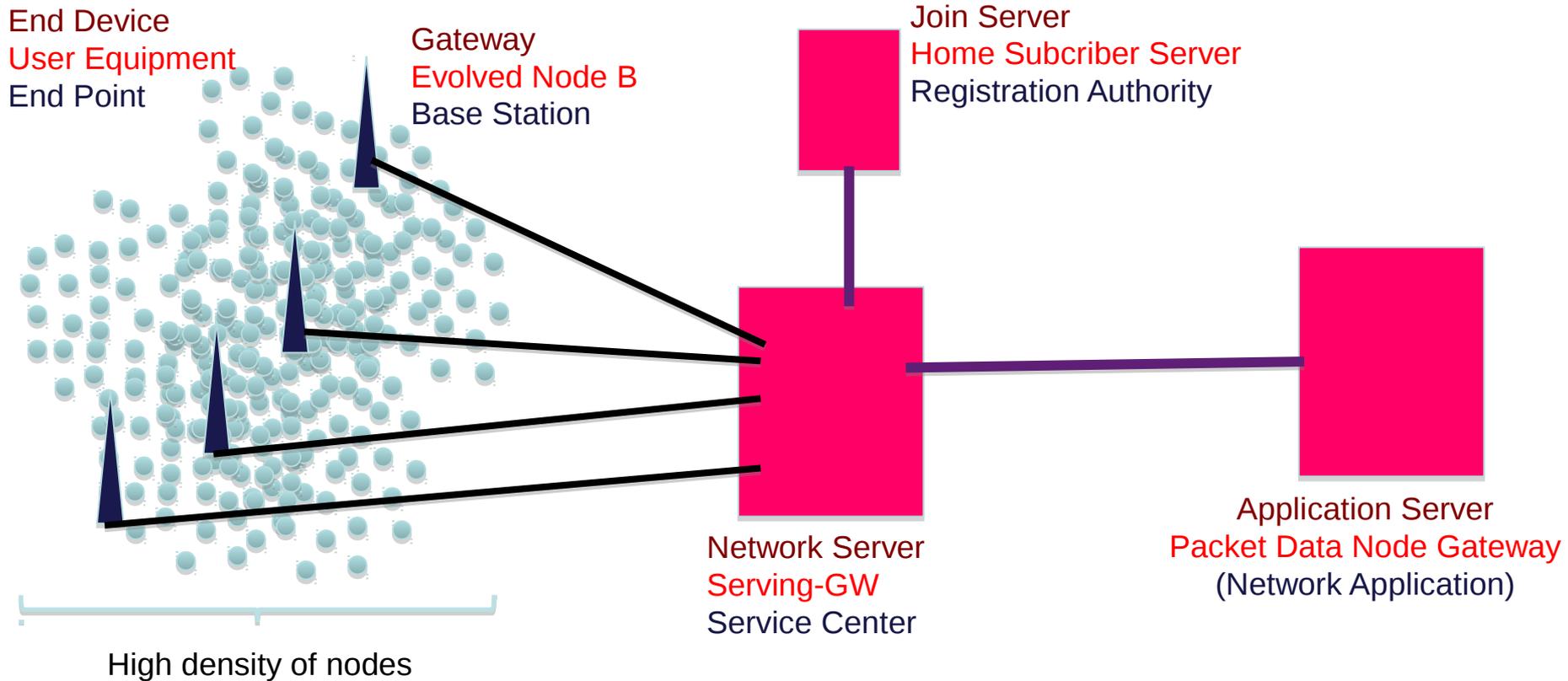
Limit number of
messages per device
and per day

Complex Device
and Network
management

Acknowledgement
management

No
IP capabilities

Similar architecture: Lorawan NB-IoT SIGFOX



LPWAN at IETF

- IP communication
 - Global connectivity (reachability)
 - Independence from L2
 - Use or adapt actual protocols
 - Use existing addressing spaces and naming schemes
- Strong Security
 - Adapted to the LP-WAN applications as: health, personal usages (water, gas, bus timing, etc.)
- Scalability
- High Reliability
- Interoperability
- Header Compression to reduce overhead

IPv6 => LPWAN

Impossible to send directly IPv6 packet, even with a fragmentation layer:

- The overhead of IPv6 is not compatible with LPWAN
- The variable MTU gives a variable fragmentation solution
- Need to adapt NDP (Neighbor Discovery) to LPWAN

6Lowpan, 6lo => LPWAN

- 6LoWPAN reduce header overhead for reliable L2 protocols
- 6LoWPAN traditionally used for constrained node networks
 - The LPWAN technologies are even more constrained than typical 6LoWPAN
- Challenge for 6LoWPAN mechanisms is that LPWAN does not send ACK at L2
- 6Lo adapts 6LoWPAN for other technologies
 - In LP-WAN the network is also constrained
 - In LP-WAN devices are challenged
- Best IPv6/UDP header compression: 6 Bytes (10% of a LoRaWAN frame) and 37 bytes with global @.

Configuration

- Neighbor Discovery
 - Decentralized configuration
 - 6LoWPAN ND uses unicast messages
- Messages size: [**draft-gomez-lpwan-ipv6-analysis-00**]
 - -- Size of RS with SLLAO = 14 bytes
 - -- Size of RA with SLLAO, PIO and 6CO = 62 bytes
 - -- Size of NS with ARO and SLLAO = 46 bytes
 - -- Size of NA + ARO = 40 bytes

RoHC

- Define originally for IP/UDP/RTP streams
 - LPWAN traffic is not a stream => long convergence time
 - Bandwidth is extremely short to support IR packets (larger than a full header)
- Allows unidirectional and bidirectional links
- Extended to any protocol with RoHCv2
- Send full header, followed by field deltas
 - Impossible to send full headers in LPWAN
- Manage by a Master SN
- No Routable
- Complex: Profiles, Operation Modes, Level of Compression, Compression Parameters, Header Formats, & Patents?

6TiSCH => LPWAN

- Can be adapted to LPWAN
- 6TiSCH use synchronization to performs determinism
- 6tisch infrastructure is MESH
 - LPWAN does not have a slotted channel

Routing => LP-WAN

- LPWAN topology is a STAR
 - Not need routing for the moment
- Future topologies could need an adaptation of a routing protocol

CORE => LP-WAN

- Adapt CORE solution to:
 - Duty cycle
 - Limited throughput
 - To use CoAP
- No existing standard for CoAP compression

IPv6 Architecture for LPWAN

- Put the IETF components together
 - IPv6
 - Security
 - Authentication
 - AAA
 - 6TiSCH
 - Header Compression
 - ND- Configuration
 - CoAP / CoMI-CoOL

THANKS !!!

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