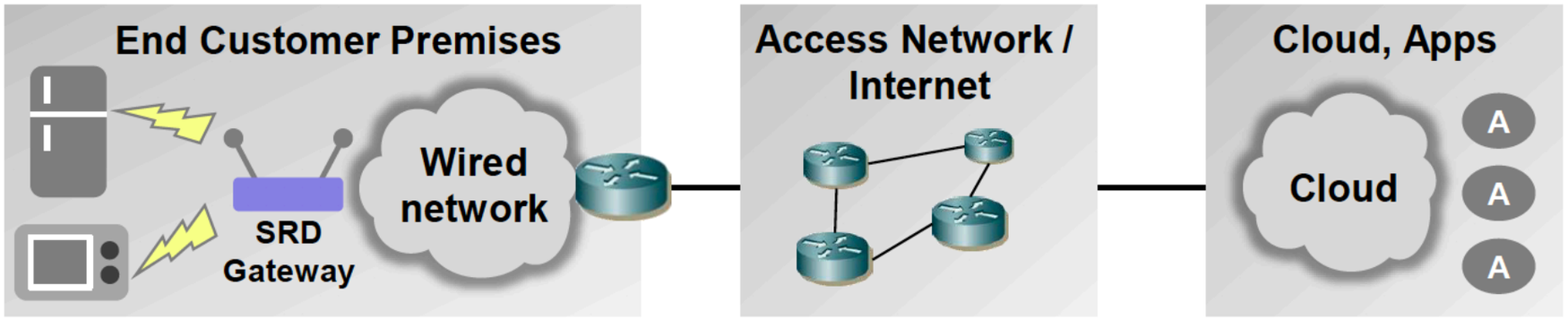
ICN/LoRa

Dirk Kutscher

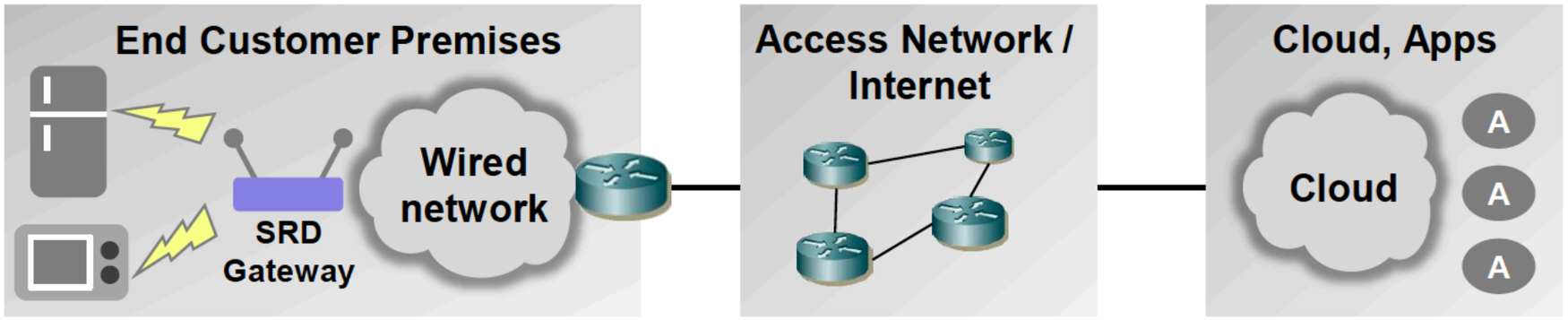
LPWAN Compared to LowPAN

- Low-Power, local/personal Area (802.15.4 etc.)

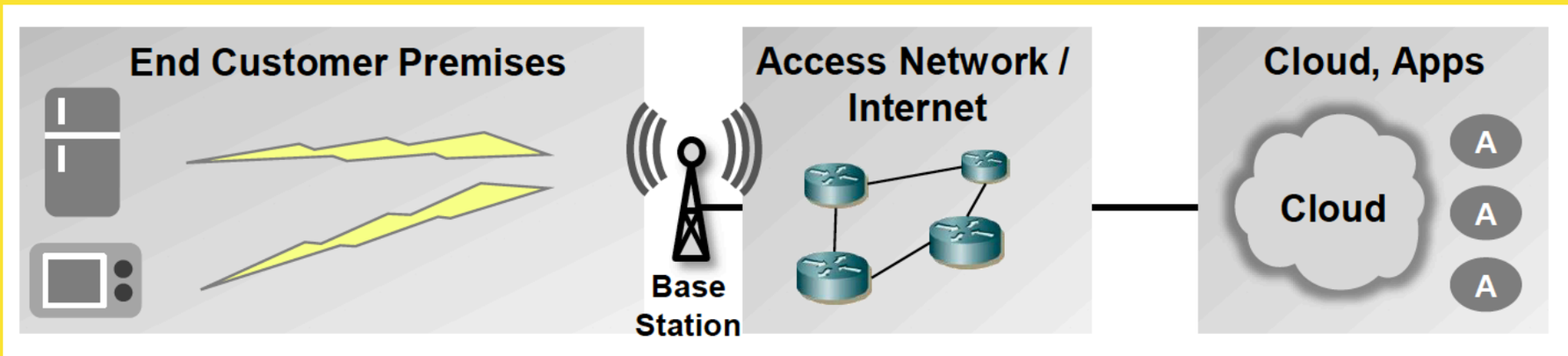


LPWAN Compared to LowPAN

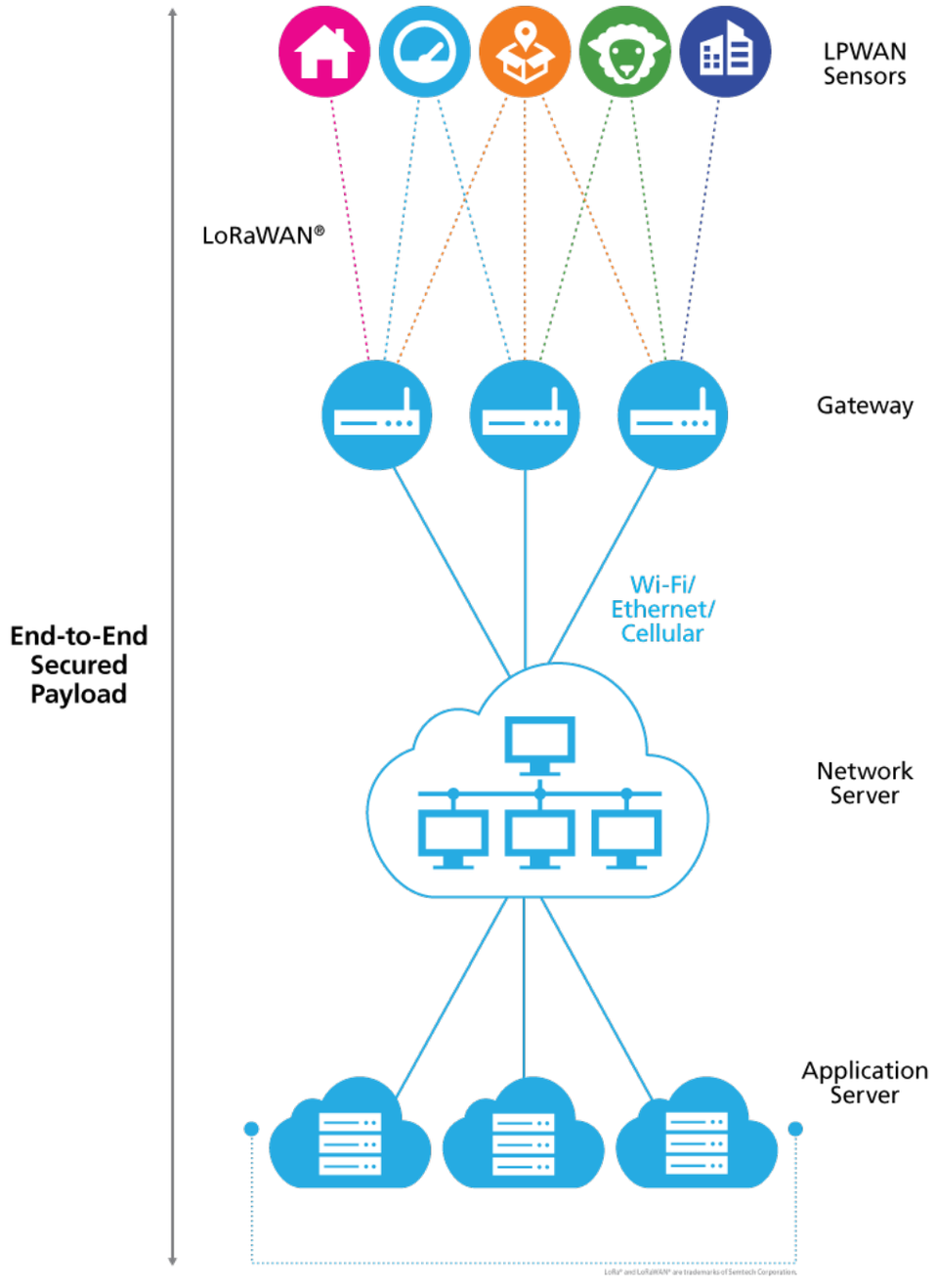
- Low-Power, local/personal Area (802.15.4 etc.)



- Low-Power Wide Area



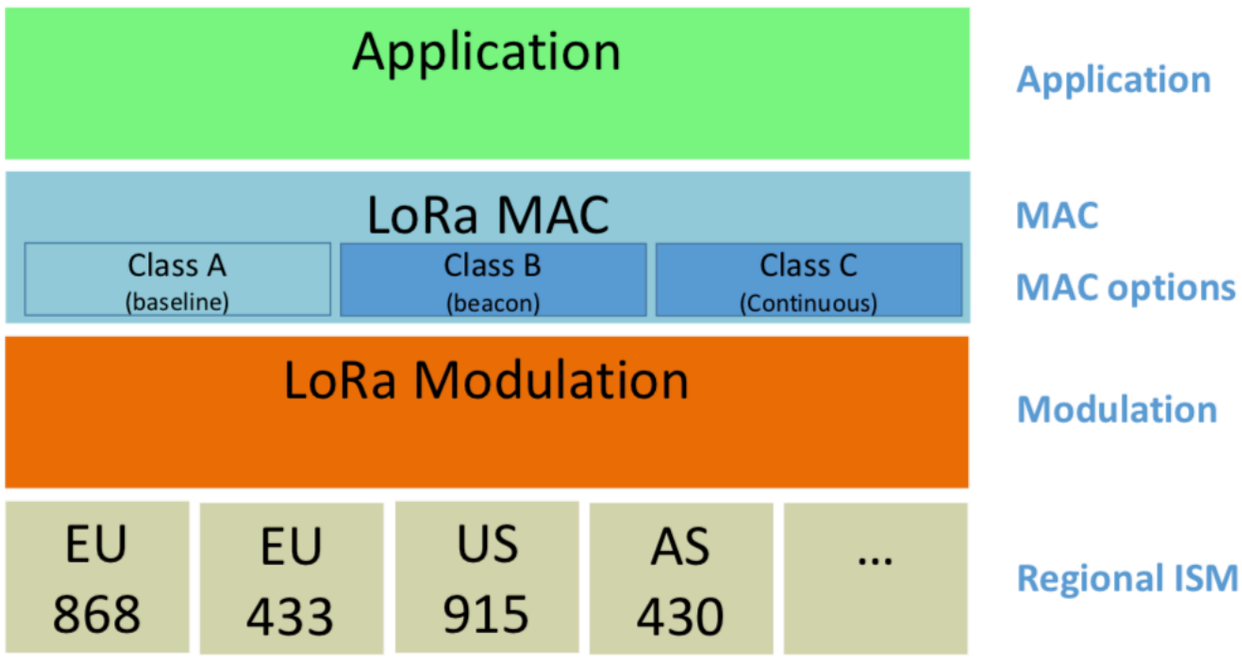
LoRa (Long-Range)



LoRa: Long Range

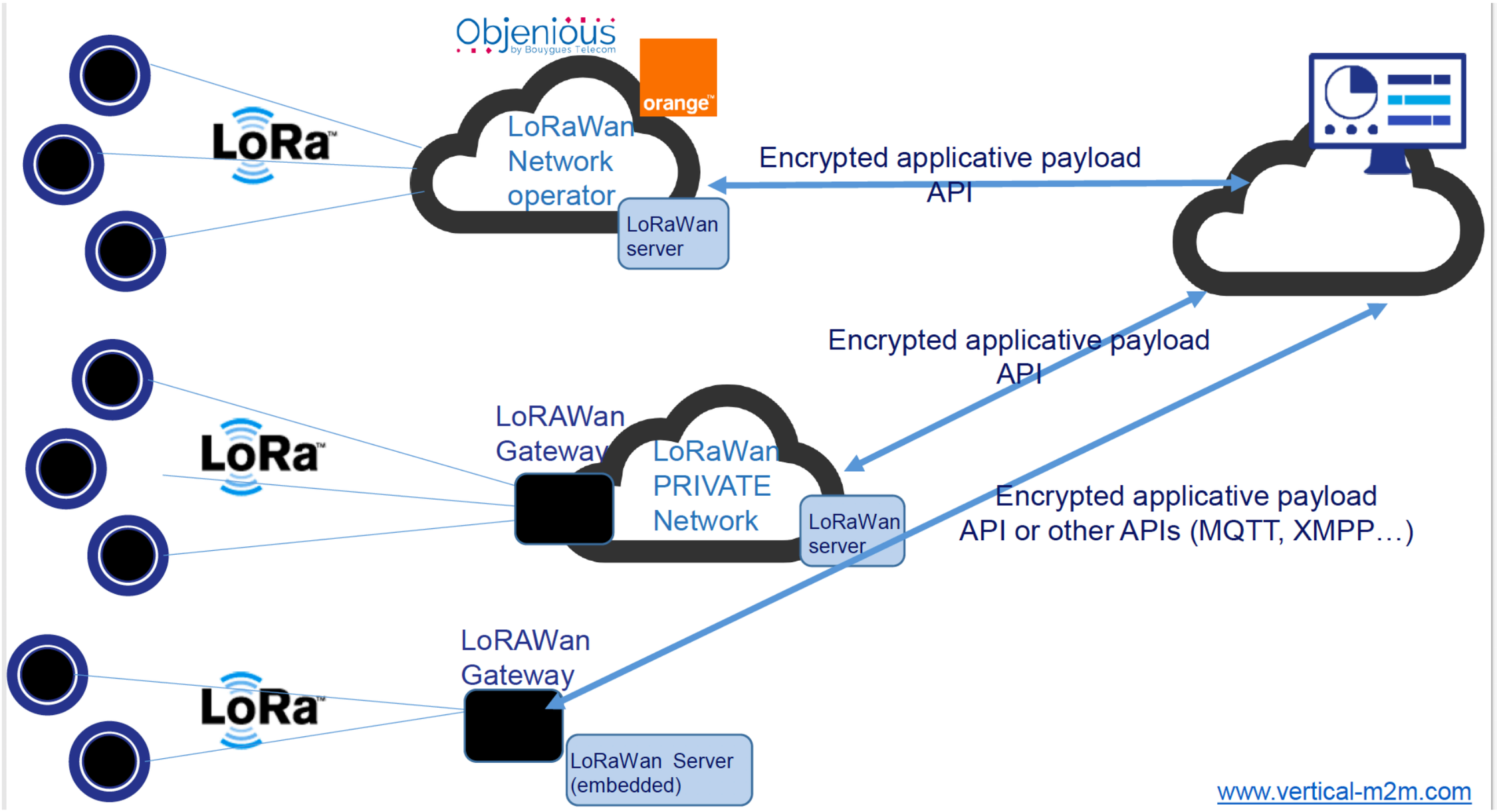
- Technology and protocol engineered by SEMTECH (www.semtech.com)
- LoRa Alliance: >200 members
- 2 successive versions of the protocol, LoRAMAC & LoRAWAN 1.0 (release January 2015)
- 3 classes of devices LoRAWan: A, B, C*
  - Classe A: **Bi-directional end-devices**
  - Classe B: **Bi-directional end-devices with scheduled receive slots**
  - Classe C: **Bi-directional end-devices with maximal receive slots**
- Chipsets exist in unidirectional (860 – 1020 MHz band) or bidirectional (High Band – 860-960MHz & Low Band – 169-510MHz) and for the moment are provided only by Semtech.
- End devices identification: IEEE EUI64 format

LoRa Classes



- Class A: bi-directional communications whereby each end-device's uplink transmission is followed by two short downlink receive windows.
- Class B: extra scheduled receive slots
- Class C: continuously open receive slots (only closed when transmitting)

LoRa Architecture



LoRaWAN Specification-1.0

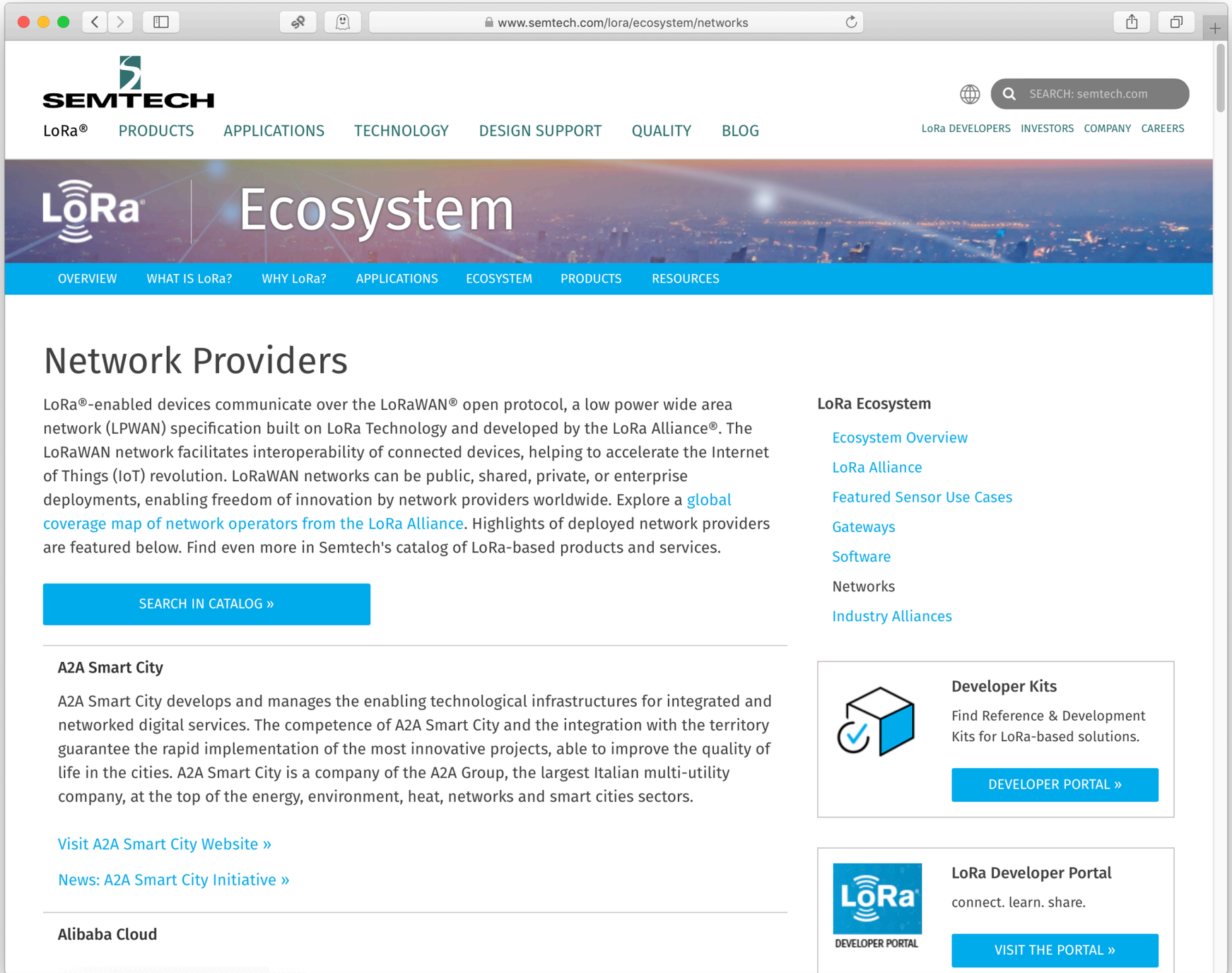
- Datarate of 0,3 to 50 Kb/s
- Encryption AES128 device – server & end-node – user app
- Stars of stars architecture
- 3 classes of devices (bidirectionnal communication)
  - A Class
  - B Class (beacon)
  - C Class (continuous)
- Uplink messages format

Preamble	PHDR	PHDR_CRC	PHYPayload	CRC

- Downlink messages format

Preamble	PHDR	PHDR_CRC	PHYPayload

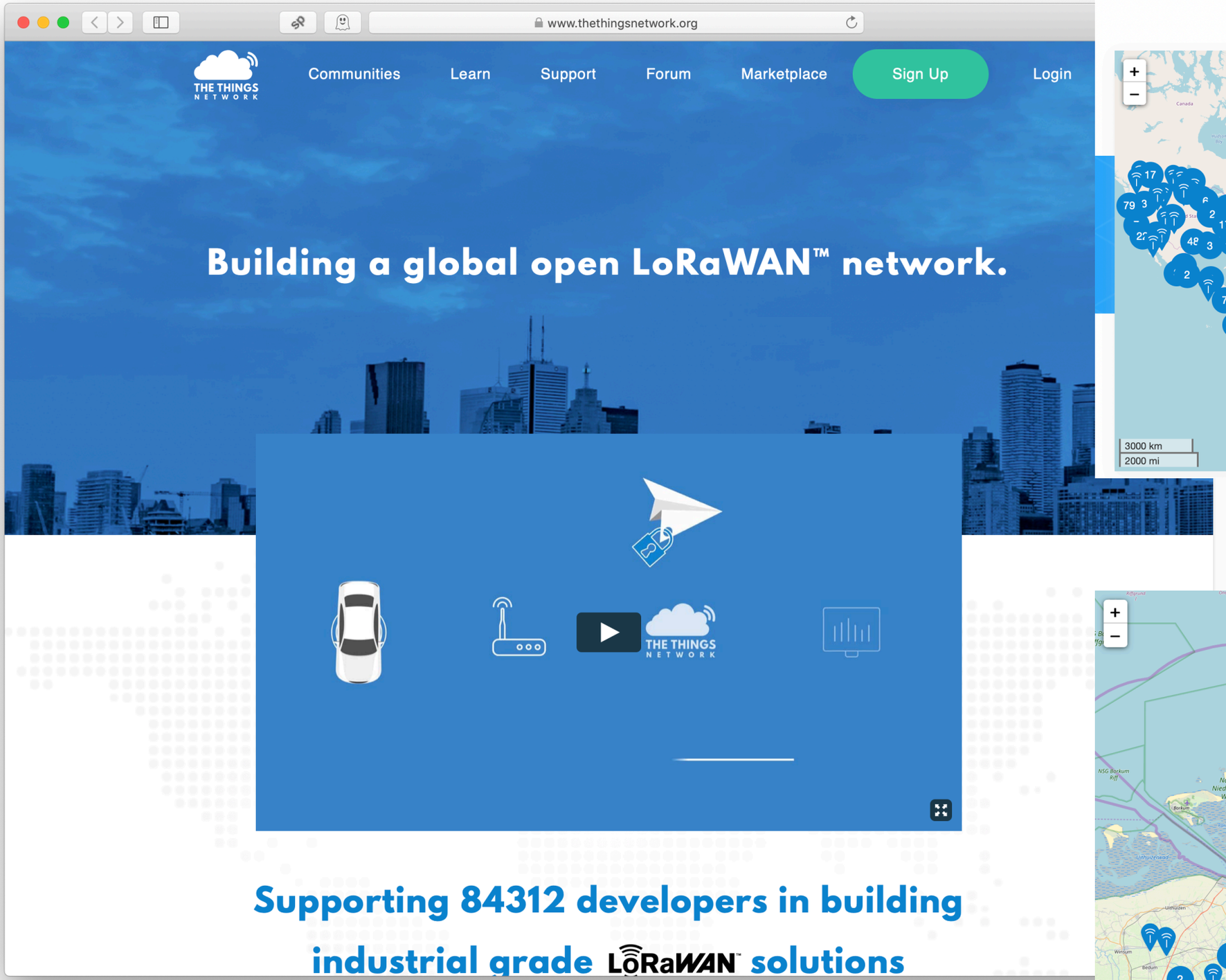
LoRa Networks

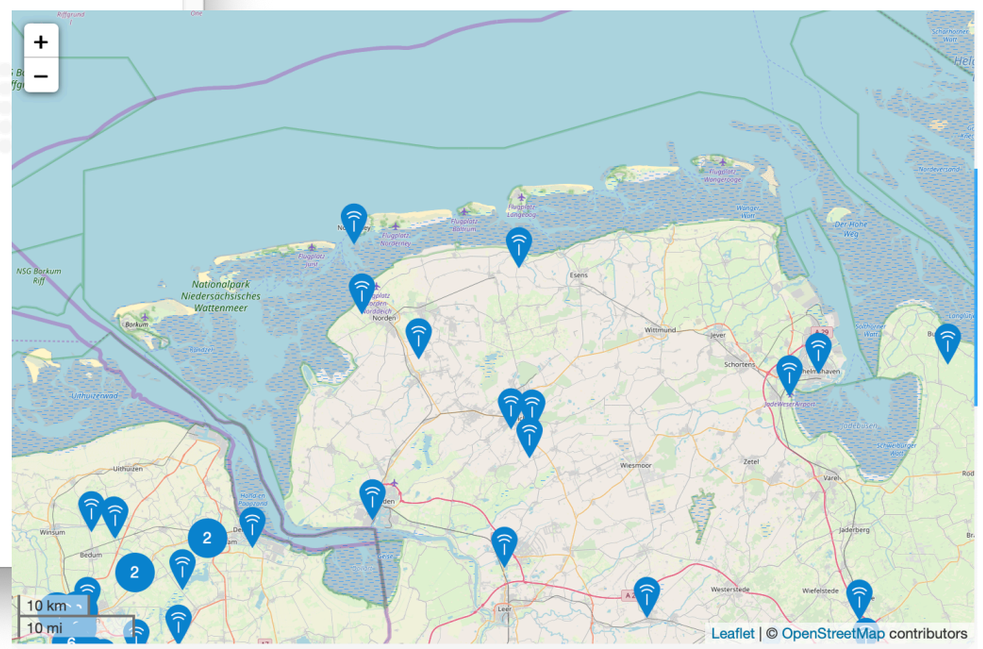


University of Applied Sciences

HOCHSCHULE EMDEN·LEER Networked Systems

Example: The Things Network





LoRaWAN Messages

MType	Description
000	Join-request
001	Join-accept
010	Unconfirmed Data Up
011	Unconfirmed Data Down
100	Confirmed Data Up
101	Confirmed Data Down
110	Rejoin-request
111	Proprietary

Opportunities for ICN