



COVERT
WIRELESS
COMMUNICATIONS

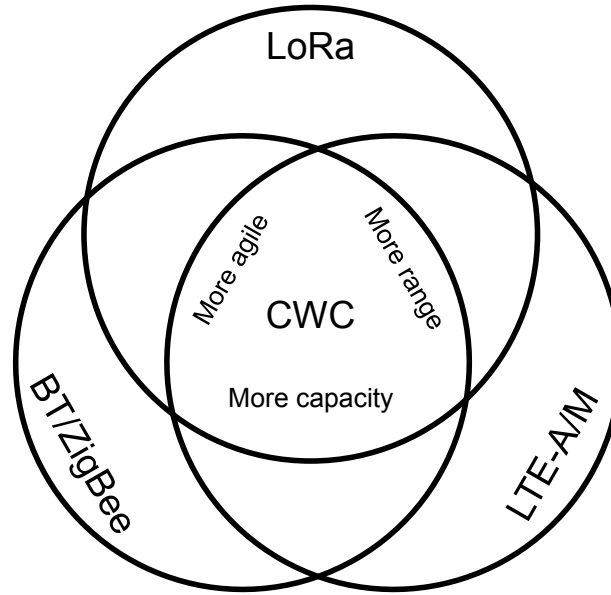
SCALABLE MASS WIRELESS COMMUNICATIONS FOR IOT

Problems

Current wireless communications for IoT/M2M not so effective for mass usage...

- LoRa/SigFox (LPWAN)
 - high range, but...
 - low performance & capacity
- BLE/ZigBee (6LoWPAN)
 - high data rate and advanced networks, but...
 - low range – more devices to cover household
- LTE-A/M (5G - mobile)
 - excellent performance, but...
 - too expensive and not so agile

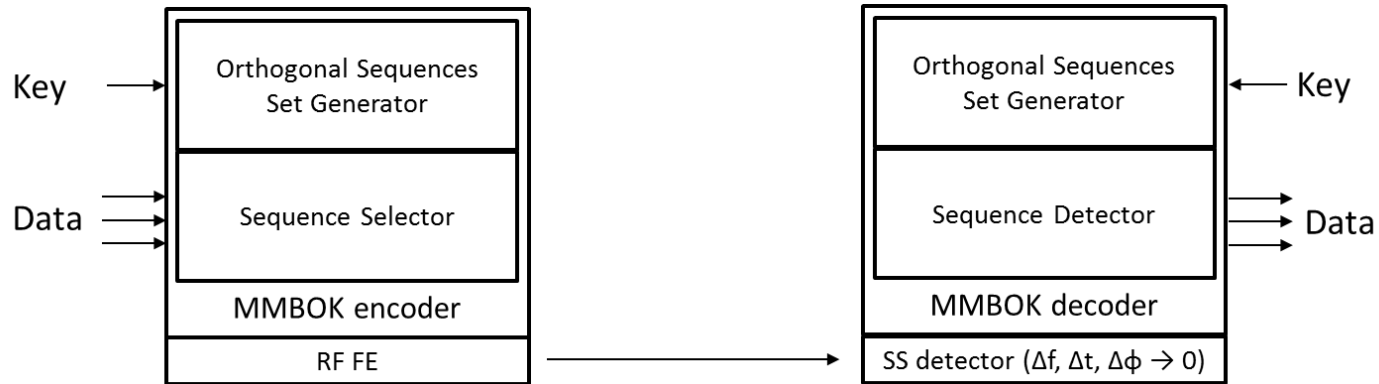
Our Position



Main concepts:

- Pocket Cellular network, that much less expensive and much more agile
- The network that unites 6LoWPAN & LPWAN and based on next level PHY Layer Security
- Decentralized low rate internet, real internet for IoT/M2M devices

Asynchronous DSSS Transceiver



Distinctive features:

- high data-rate DSSS modulation – MMBOK
- does not require outer synchronization channels & carrier signal acquiring
- adaptive to frequency error and interference/noise background
- resistant to any kind (WB or NB) of interferences

PHY Layer Encryption

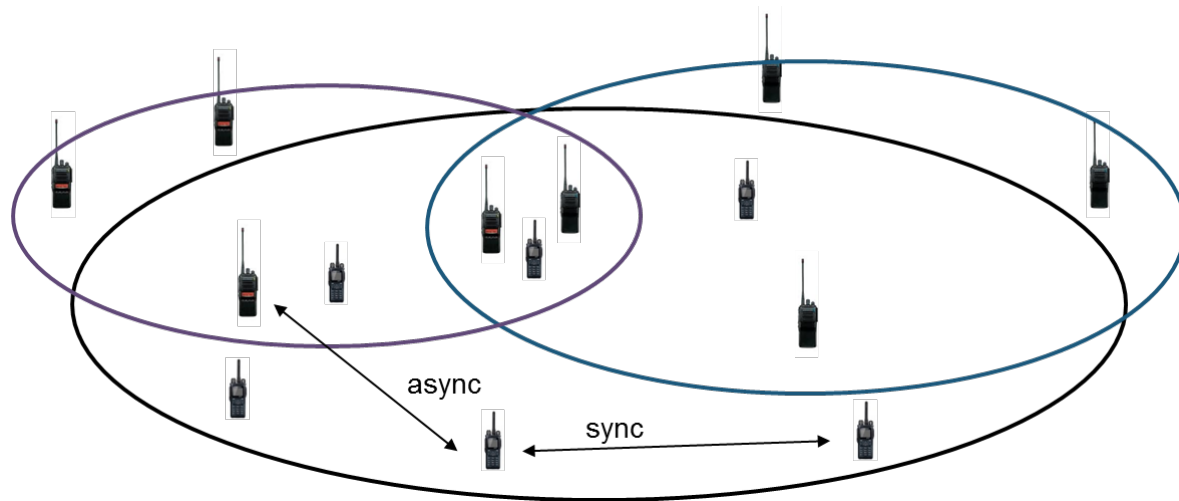


Arbitrary key $\rightarrow$ unique spread spectrum waveforms (modulation)

Main features:

- Unique modulation for each device in IPv6 network
- Simultaneous communications along with other services on the same frequencies
- Covert communications (below noise level)
- Provide independent multiuser interaction
- Wireless networks separation when joint frequency resource is used

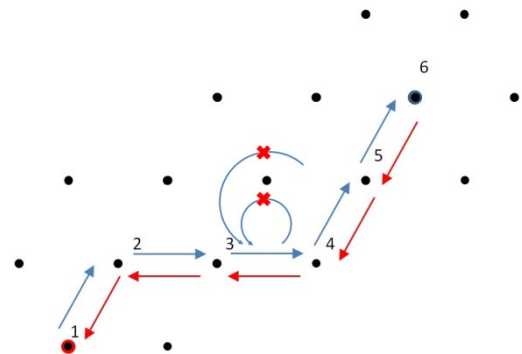
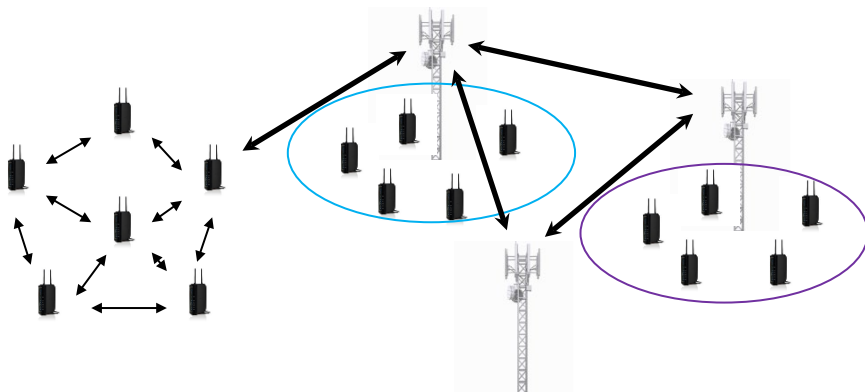
Asynchronous CDMA Multiuser Interaction



Types of connections that can be established:

- multiple independent asynchronous CDMA P2P (point-to-point) communications;
- single synchronous CDMA P2MP (point-to-multipoint) communications (as mobile BS);
- single/multiple asynchronous CDMA P2MP (all-to-all) communications → advanced MESH, MANET.

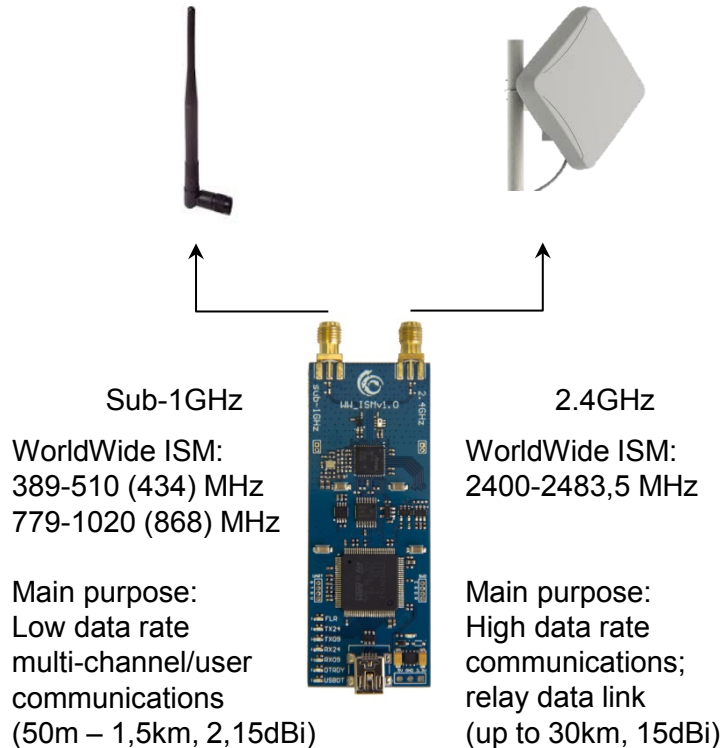
PHY Layer Direct Routing



Distinctive features:

- Effective network architecture. No frequency resource wasting
- High data rate AdHoc/MESH relaying, low time of data delivering
- No repeating/retransmission, no self-jamming, no transmission loops

Current device



Features

Data rates	IEEE Std. 802.15.4g: • FSK2 – 50...400 kbps; • OQPSK – 250...1000 kbps; • OFDM – 50...2400 kbps. CWC Proprietary DSSS • 1,9...112,88 kbps (Spreading Factor 4096...16)
Bandwidth	125/250/500/1000 kHz
TX power	• Up to +14dBm (25mW)
Network capabilities	• Up to 6 independent asynchronous links at one frequency • Up to 16 dependent (led by master) synchronous links at one frequency • Up to 256 devices for one PHY layer key
Power	• 35/150/220/270mA at 5V – idle/RX1/RX6/TX

Services

- Communications for IoT:
 - Smart Devices
 - Smart Home
 - Smart Healthcare
 - Smart City
 - Smart Industry
- Automotive M2M/V2V Communications:
 - Smart Traffic
 - Smart Automotive Services
- Communications for Drones:
 - Smart Drones Management
 - Smart Surveillance / Infrastructure Inspection
- Communications for Military & Security
 - Secure & Reliable Surveillance / Alarm Systems
 - Secure & Reliable Communications for Guards
 - Secure & Reliable Tactical Communications

