Positioning of IQRF on the Current and Future Telco Market

IQRF Summit, Prague, June 2017

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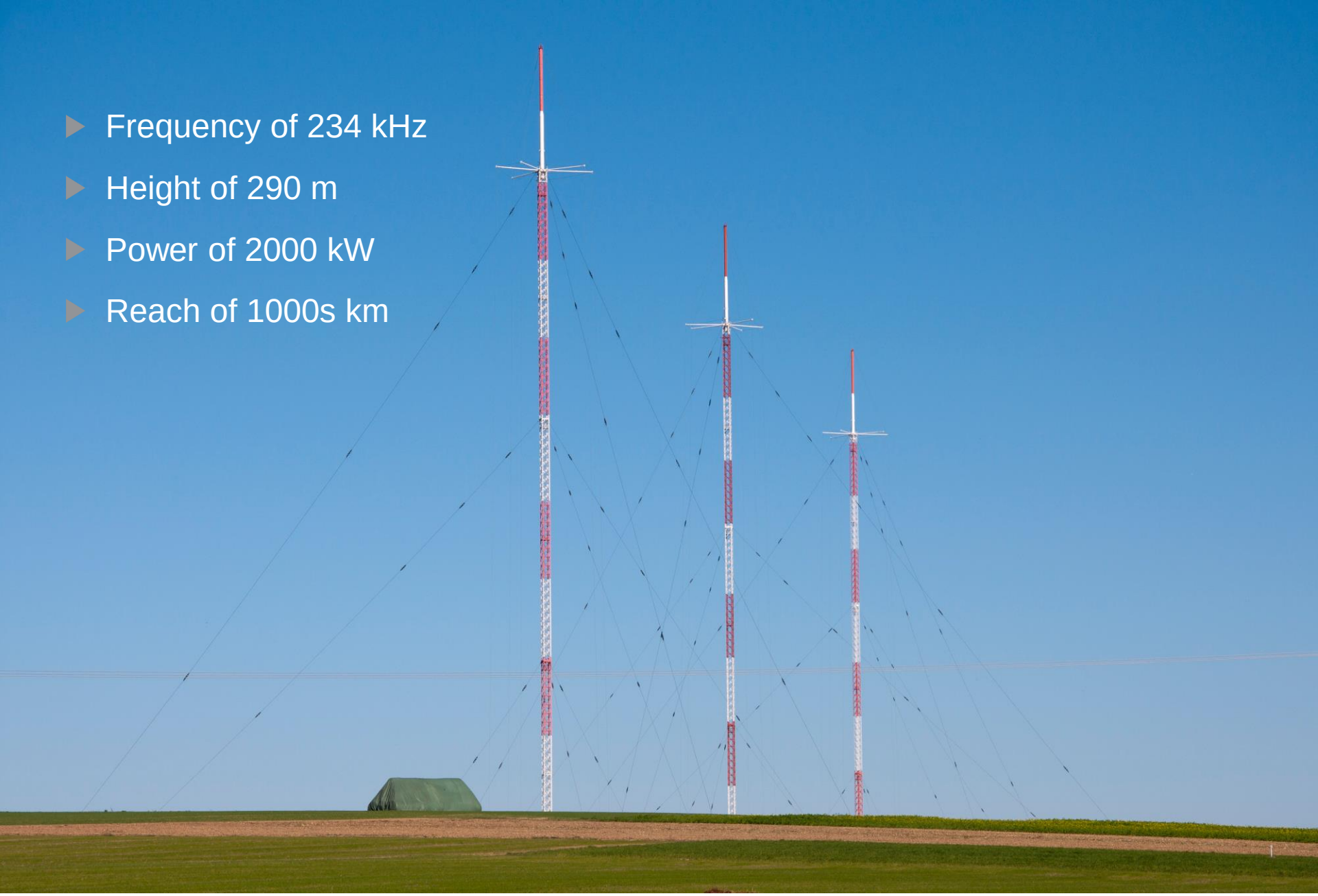

- Frequency of 234 kHz
- Height of 290 m
- Power of 2000 kW
- Reach of 1000s km

- Luxembourg, Beidweiler, 1972

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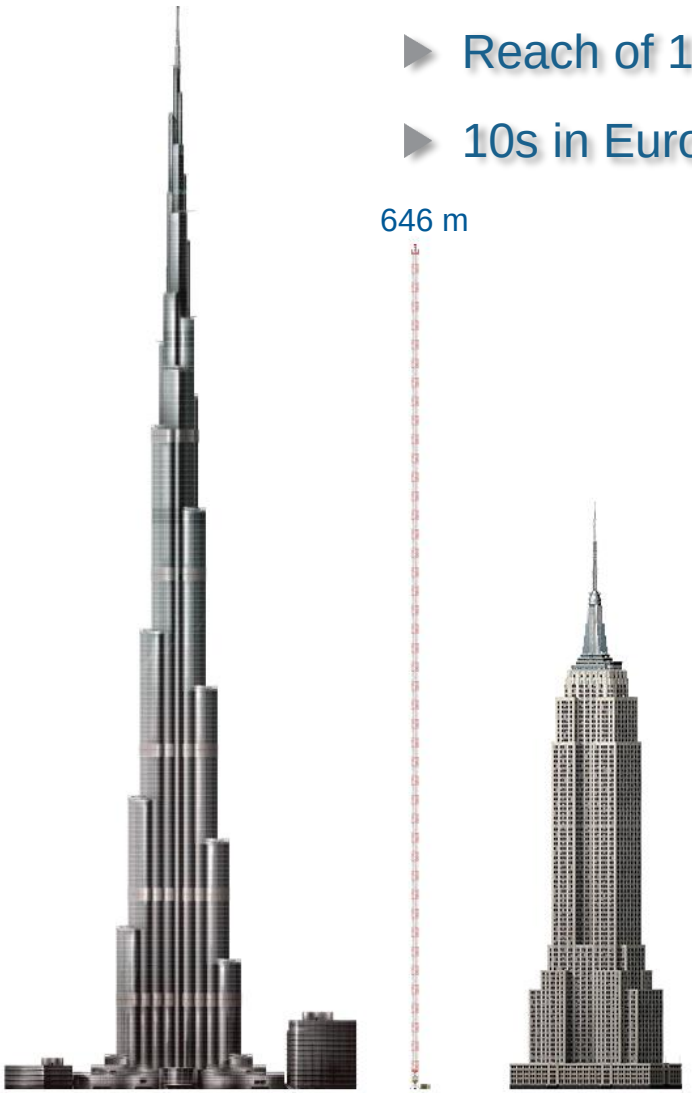
Past

- Frequency of 227 kHz
- Power of 6000 kW
- Reach of 1000s km
- 10s in Europe



Burj Khalifa | Warsaw Radio | Empire State Building

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Close future

- Frequency of 3.7+ GHz
- Power up to 5 W
- Reach of 200 m
- 1000s in the city

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- 100 000s of street cabinets
- 22 millions km of copper pairs
- 38 000 km of fiber optic routes

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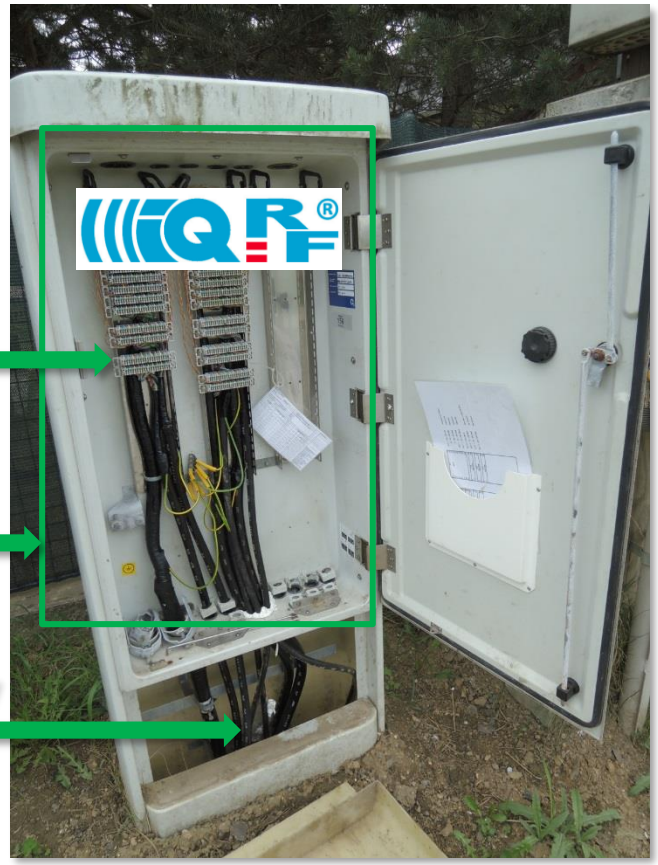
CETIN Capabilities to Employ the Fixed Network Infrastructure for IoT Wireless Communication



- ☑ IP connectivity
- ☑ Rack space
- ☑ Power supply

- Local
- On-demand
- Meshed
- Short-range

What about nationwide coverage?

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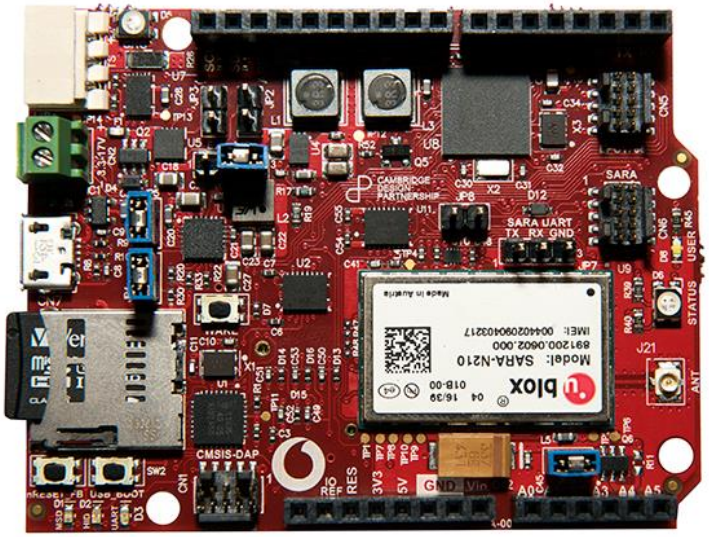
NB-IoT, Another Buzzword or Ultimate Solution for IoT?

- Standardization process started in 2014
- Standardized by 3GPP in June, 2016
- CETIN verified NB-IoT Nokia technology by pilot in its network in December, 2016
- The very first launch in commercial network by Vodafone and Huawei in Spain (Valencia and Madrid) in January, 2017
- CETIN will be ready to launch the technology in its network in Q4Y17



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NB-IoT: LP-WAN on the Top of LTE Network

	IQRF	SigFox	LoRa	LTE	NB-IoT (New)	LTE-M (New)
System	Short range, mesh, open	UNB, closed	CDMA, open	LTE (FDD, TDD)	LTE (FDD, TDD)	LTE (FDD, TDD)
Standardization	Proprietary	Proprietary	Proprietary	Standardized	Standardized	Standardized
Band	Unlicensed 433/868/916 MHz	Unlicensed 868 MHz	Unlicensed 168/433/868 MHz	Licensed 700/800/900/1800/2100/2600 MHz	Licensed 700/800/900/1800/2100/2600 MHz	Licensed 700/800/900/1800/2100/2600 MHz
Bandwidth	100 kHz	100 Hz	125 - 500 kHz	1,4 – 20 MHz	180 kHz	1,4 MHz
Range (outdoor)	300 m x 240 hops = 72 km (rural), 100 m x 240 hops = 24 km (urban)	30-50 km (rural), 3-10 km (urban)	15 km (rural), 2-5 km (urban)	5 km (800 MHz)	10 km (800 MHz)	5 km (800 MHz)
Link budget	120 dB	162 dB	157 dB	106 dB	164 dB	155,7 dB
Output power	12 mW	25 mW	79 mW	200 mW	25 mW	75 mW
User's data load	0-64 B	1-12 B	Defined by user	735 B	DL: 680 bit UL: 1000 bit	100 - 1000 B
Uplink	20 kbps	100 bps, 140 msgs/day	EU: 0,3 to 50 kbps	150 Mbps	250 kbps	10 kbps – 1 Mbps
Downlink	20 kbps	Max 4 msgs (8 B/day)	EU: 0,3 to 50 kbps	300 Mbps	250 kbps	10 kbps – 1 Mbps
Devices per access point	239	<1 mil.	Uplink: >1 mil., Downlink: <100 tis.	20 tis.+	<100 tis.	20 tis.+
Battery lifetime	5 – 10 years	5 – 10 years	5 – 10 years	days	5 – 10 years	5 years
On the market	Y2004	Y2014	Y2015	Y2010	Q4Y2016	Q1Y2017

Our View of Future Wireless Communication for IoT

- 5G small cells everywhere

- Local IoT complementary systems

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We Engage IQRF Seriously

- Ongoing pilot project: smart metering of water distribution launched in Q4Y16
- W-Mbus / IQRF protocol bridge to verify communication in CETIN's network

- Invitation to all who want to provide IQRF services in our network

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Thank you

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