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English only

ITU Workshop on Spectrum Management for Internet of Things Deployment (Geneva, 22 November 2016)

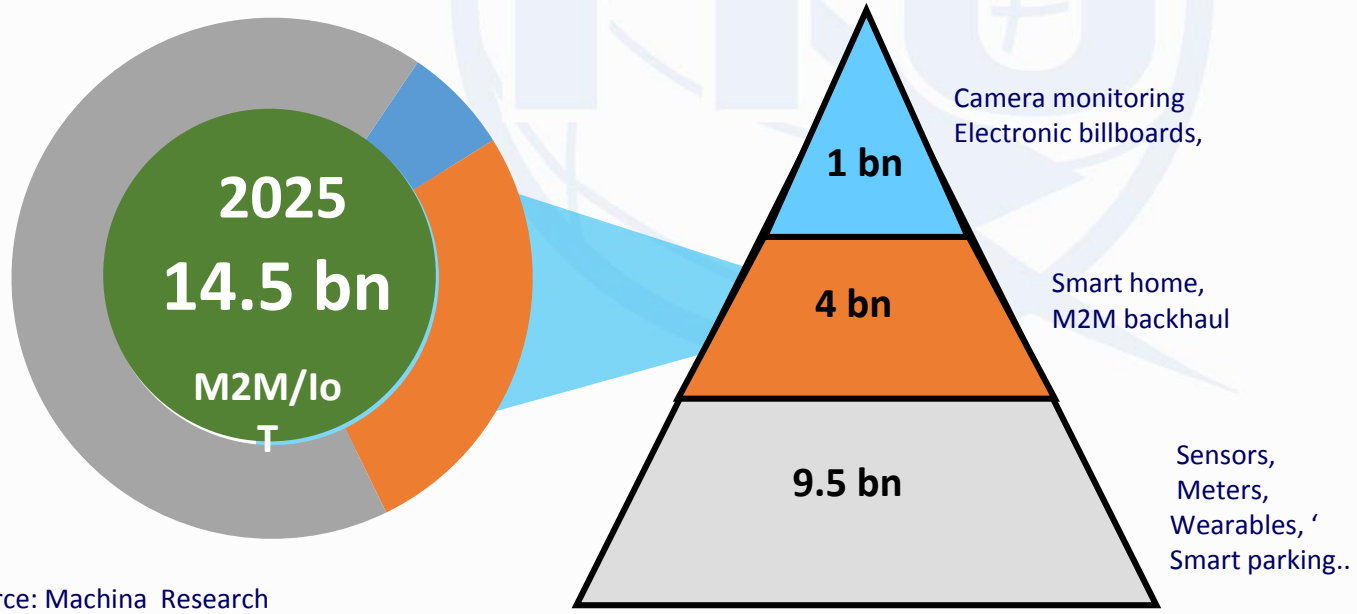
M2M spectrum management in China

LI Bo
Senior Engineer

Policy and Market Scale in China

- M2M/IoT communications is key to deliver Chinese national strategies "Made in China 2025" and "Internet plus" initiative;

- China has a substantial and rapidly growing market demand for M2M/IoT development in various smart applications (e.g. manufacturing, transportation, civil utilities, etc.)"



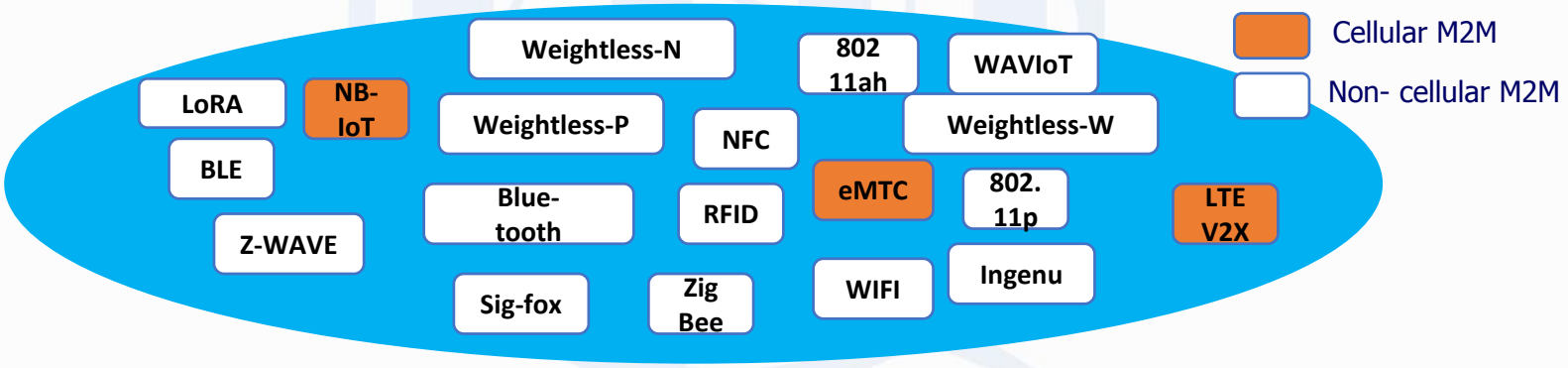
Source: Machina Research

Requirements, Technologies & ITU-R studies

Key Requirements

Battery life | Low cost | Coverage | Roaming | Reliability | Security

M2M/IoT solutions



Study in ITU-R

WRC-19 agenda item 9.1, issue 9.1.8 (MTC)

Studies on the technical and operational aspects of radio networks and systems, as well as spectrum needed, including possible harmonized use of spectrum to support the implementation of narrowband and broadband machine-type communication infrastructures

Frequency Use for M2M/IoT

M2M Radiocommunication Technologies

Technology	Spectrum band
NB-IoT	MBB bands
eMTC	MBB bands
Sigfox	868MHz
LTE-V2X	MBB bands (Uu)
	5.8,5.9GHz (PC5)
Bluetooth	2.4GHz
ZigBee	868/2450MHz
RFID	13.56/27.12/433/ 860MHz ...
NFC	13.56MHz
Z-WAVE	868 MHz
Ingenu	2.4GHz

Frequency range

- Sub-1 GHz band are most suitable for efficient provision of wide area coverage;

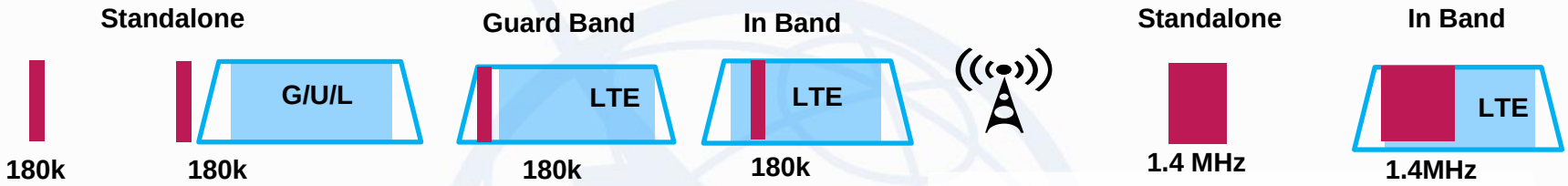
Authorization

- Sharing spectrum with unlicensed authorization to achieve low cost and low power requirements

- Licensed (exclusive) spectrum is more suitable for wide area coverage and/or higher reliability requirements for delay sensitive applications

Cellular IoT Technologies

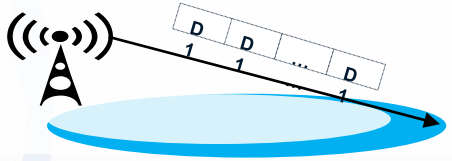
NB-IoT | **Licensed spectrum** | **eMTC/FeMTC**



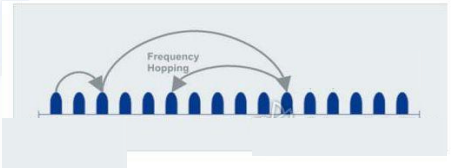
NB-IoT Downlink access technology

Downlink OFDMA with 15kHz Subcarrier Spacing is chosen because it can fit In-Band scenario

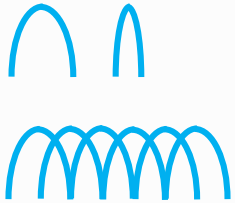
Repetition



Frequency Hopping



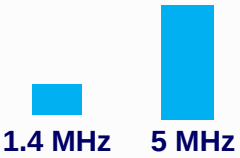
NB-IoT Uplink access technology



Single-tone and Multi-tone are supported
Single-tone: 3.75kHz and 15kHz

Multi-tone: 15kHz Subcarrier Spacing

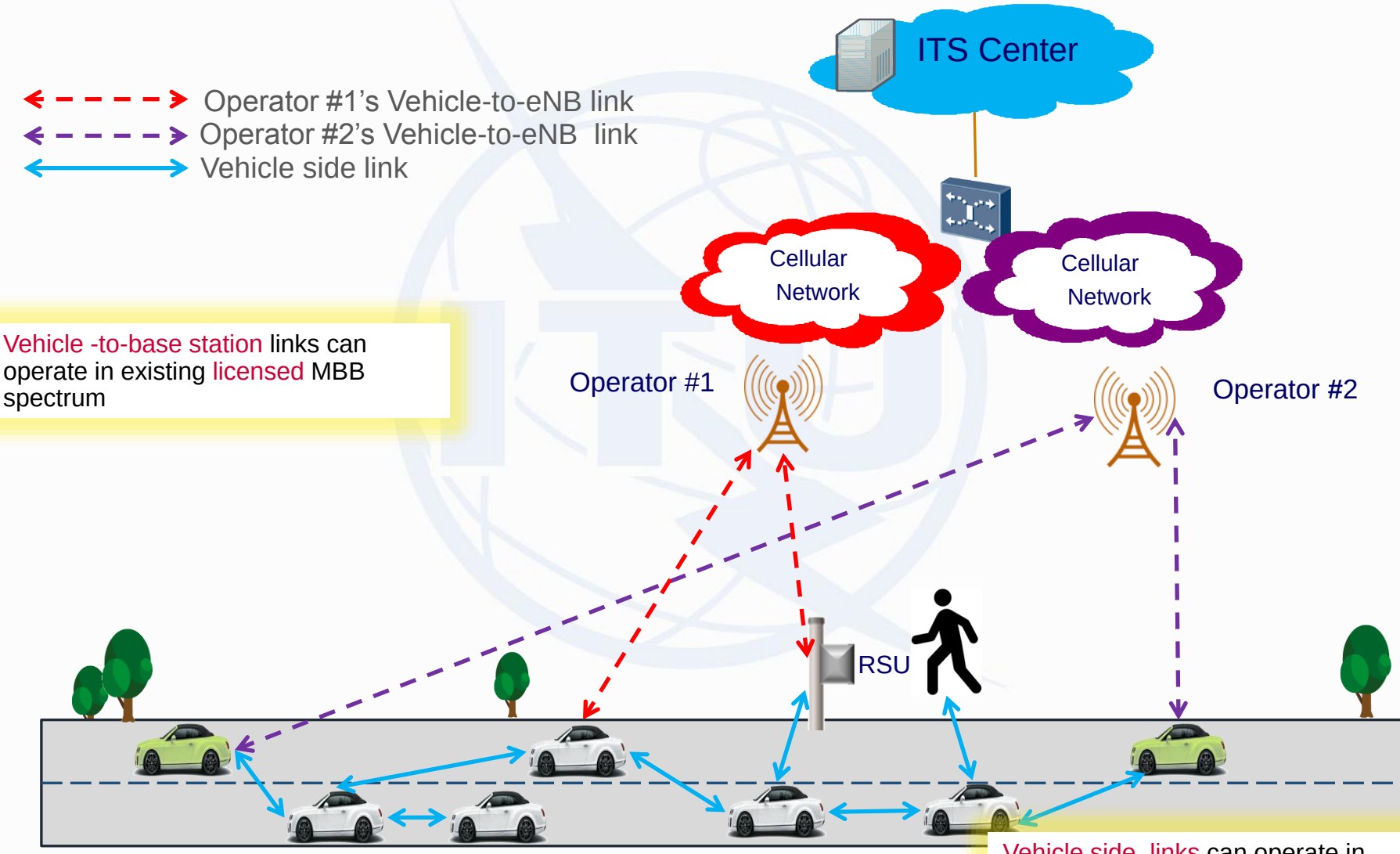
Scalable Bandwidth



4Mbps *FeMTC

NB-IoT technology is an important technology for efficient use of IMT band for M2M/IoT communication

Cellular Based V2X Technology



Vehicle -to-base station links can operate in existing licensed MBB spectrum

Vehicle side links can operate in dedicated ITS spectrum

Developments of Cellular Based M2M Technologies

2015.10 smart parking field testing
2016.2 Demo of Smart parking, Smart bin in MWC

2015, LTE-V2X demo
2016, Hangzhou, Chongqing LTE-V2X field test

2016, LTE-V field testing

DT

LTE-V

2015.10 Demo of smart parking

2015.10 smart parking field testing

Bell

T··Mobile·

vodafone

中国移动 China Mobile

2015.12 Smart parki
2016.2
MWC
Demo of gas sensor with Huawei;
Demo of ITS with Ericsson

2015.3 Water meter field testing in MWC
2015.12 NB-IoT field test
2016.2 MWC
Demo of smart water meter and parking with Huawei;
Demo of smart bicycle with Nokia;
Demo of ITS with Ericsson

at&t

2016.1 AT&T demo
NB-IoT in CES

China unicom中国联通

2015.7 smart parking, water meter filed testing

2015.10 smart parking field test

etisalat

M2M/IoT spectrum in China

Spectrum for M2M/IoT applications

Unlicensed spectrum

Low cost /no license fees
Regulatory limits (EIRP restrictions)
Non-guaranteed QoS

- All devices can have access to spectrum, subject to compliance with technical conditions as specified in regulations
- Short range and delay-tolerant applications are typical use cases

Licensed spectrum

Better Inference management
Network Security
Reliability

Mobile operator Network

Reuse cellular infrastructure and device eco-system for M2M/ IoT apps

- IMT spectrum can be used for supporting NB-IoT, eMTC and LTE-V2N (eNB-to –vehicle)

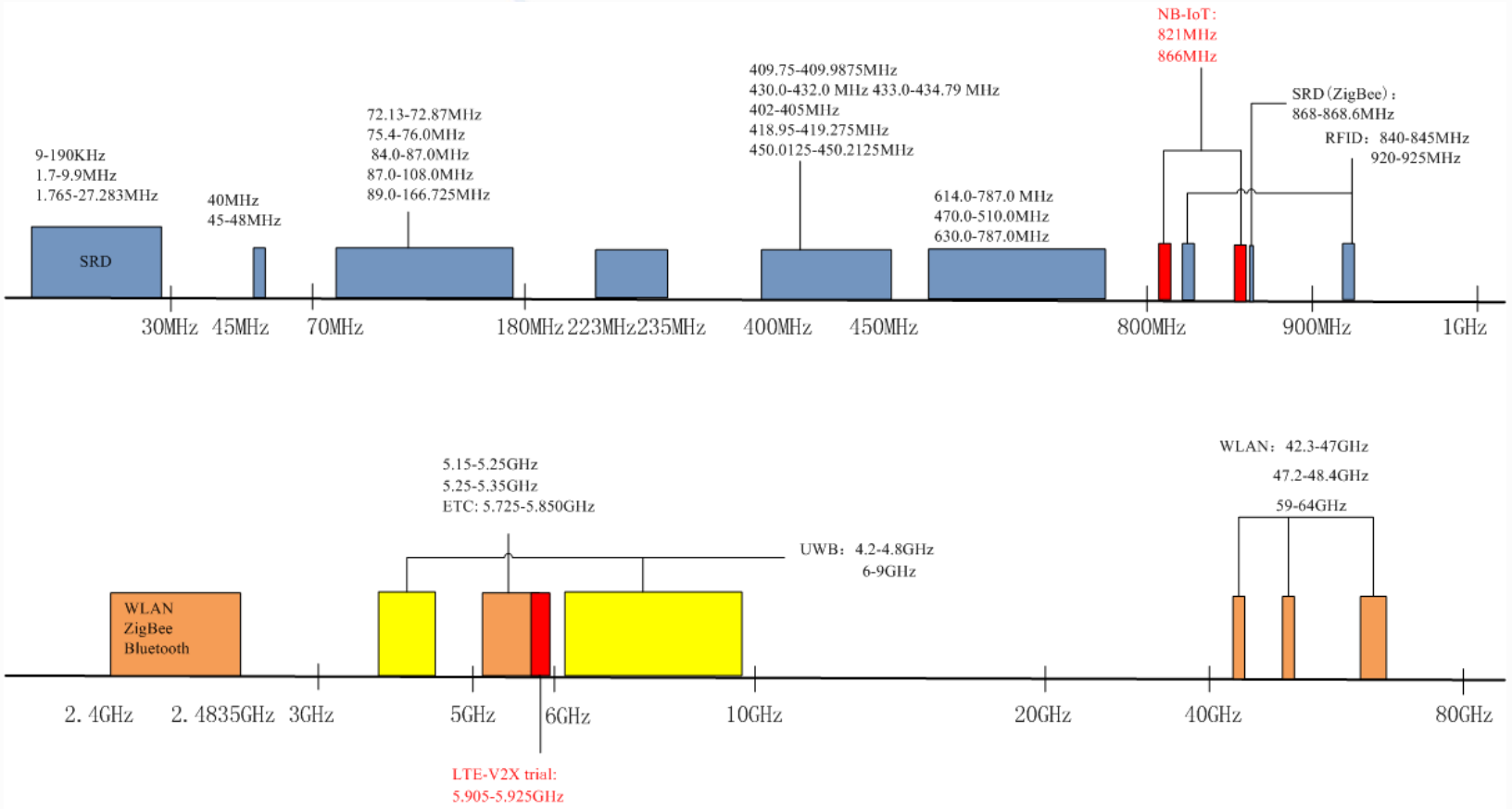
Dedicated Network

Private network customized for specific M2M/IoT apps.

New bands for M2M in China:

- 5 905 -5 925 MHz for LTE-V2X trials
- 2 x 2.3 MHz in 800MHz can be used for NB-IoT

M2M/IoT Spectrum in China



- MBB spectrum also can be used for M2M/IoT

Summary of M2M Spectrum Management in China

- According to Chinese national strategies and substantial market demands on M2M/IoT, China spectrum development is supportive of planning/allocating frequency bands for M2M/IoT communication;

- WRC-19 issue 9.1.8 is an opportunity to study machine type communication systems and radio networks
    - China is engaged and supportive on these studies

Thank you~!