

The logo for大唐电信 (Datang Telecom) is written in red Chinese characters.

大唐电信科技产业集团

Views on LTE R12 and Beyond

CATT

RWS-120025

3GPP RAN workshop on REL-12 and onwards

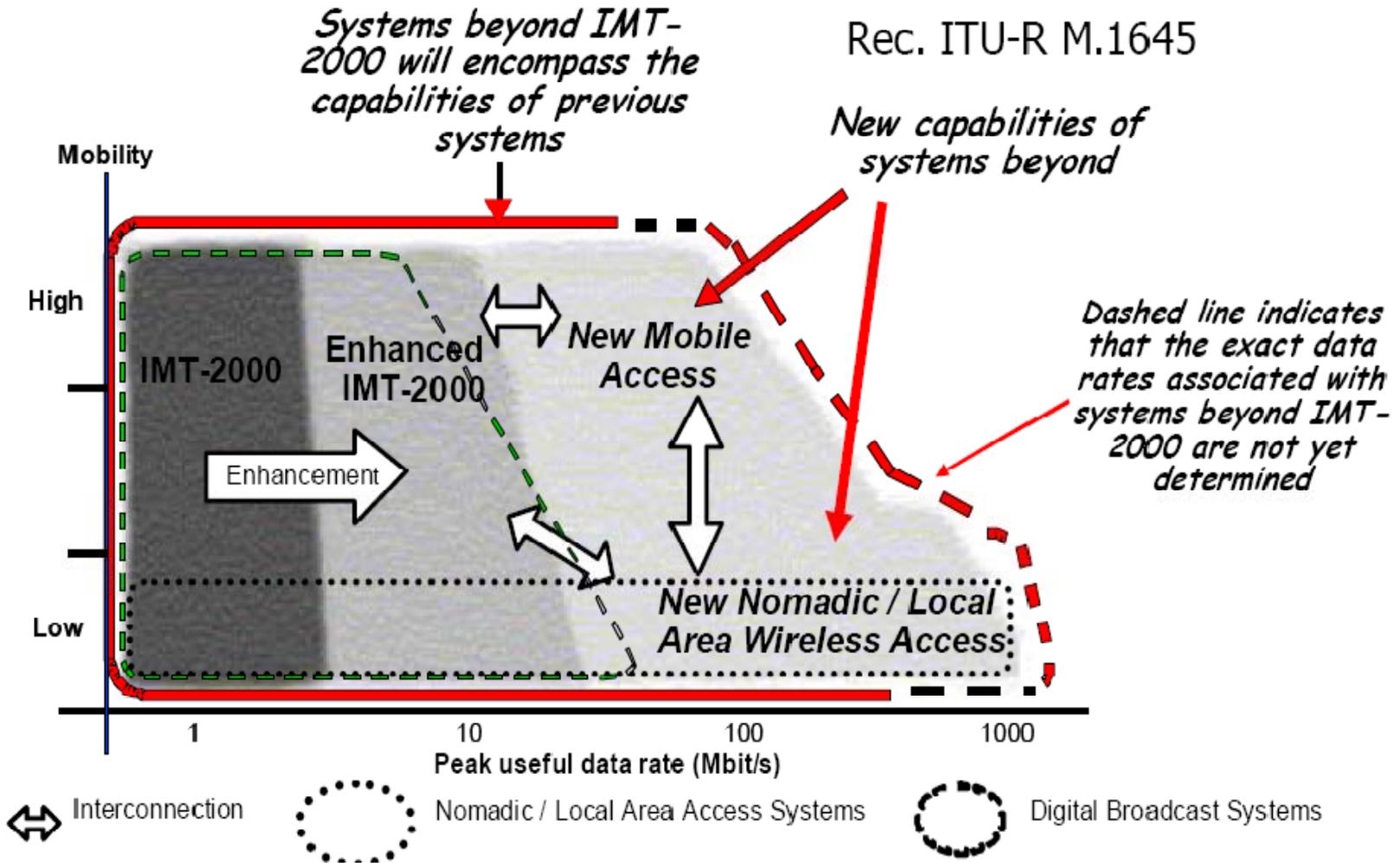
Ljubljana, Slovenia

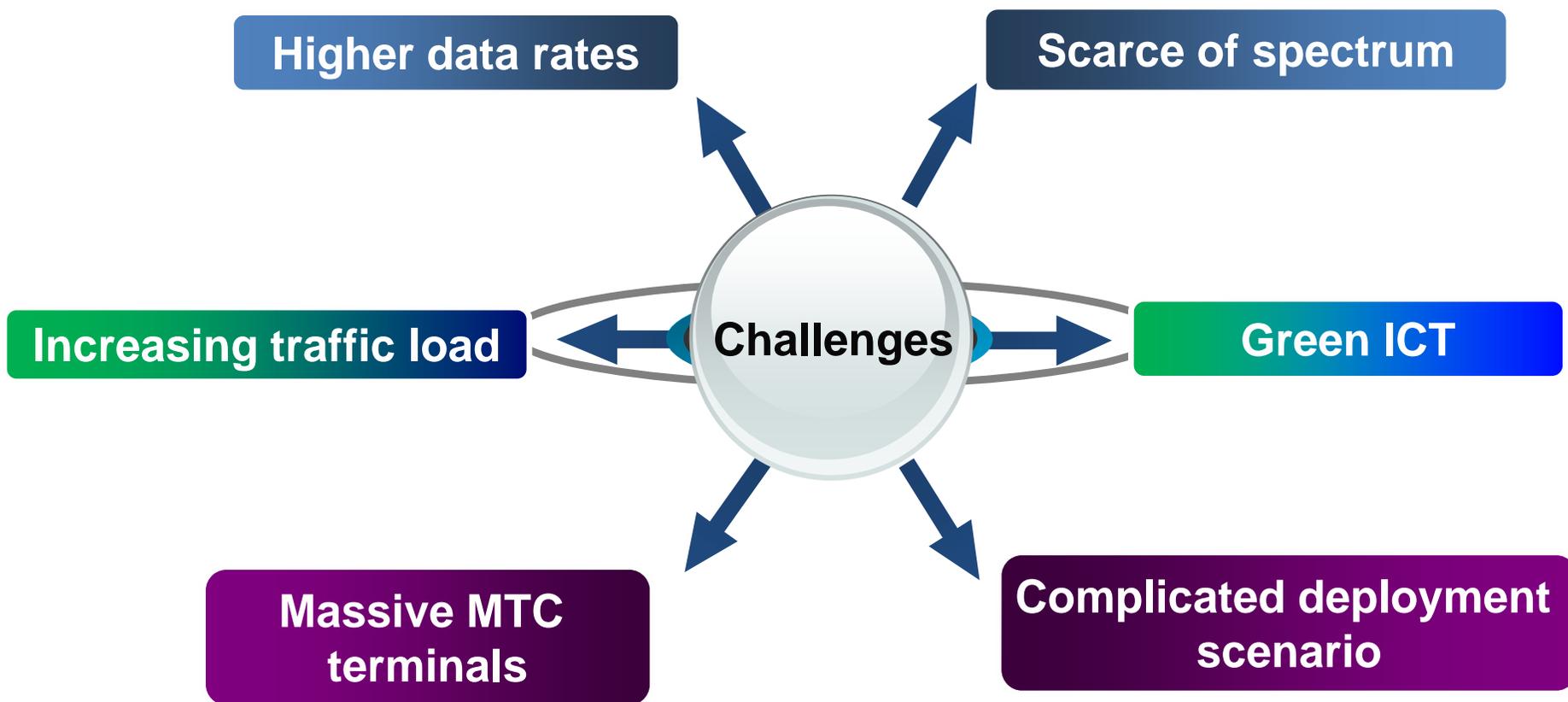
June 11 – 12, 2012

Requirements & challenges in the future

Views on 3GPP Rel-12

ITU IMT-Advanced Requirements





Explosive increase of traffic over mobile network

- Doubling per year
- Mobile traffic 50x in 2015 and 1000x in 2020 compared to 2009



Higher data rates and capacity

- LTE-A provides >1Gbps for hot spot coverage, and >100Mbps for wide area coverage
- 10x data rates for future systems
- Rapidly increasing demands on user density and data rate per square kilometer

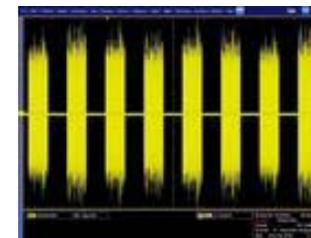


Scarce of spectrum resources

- Most of the spectrum suitable for mobile communications (e.g. <3.5GHz) has been allocated
- Necessity of utilizing higher frequency for future Mobile Broadband (MBB) communication

Machine type of communications

- MTC becomes an essential part of wireless communication systems
- Massive MTC terminal impacts network design and performance



Green ICT

- Reduction of energy consumption for environmental protection and mitigating climate change
- Gaining more attention in various standard bodies

Complicated deployment scenarios

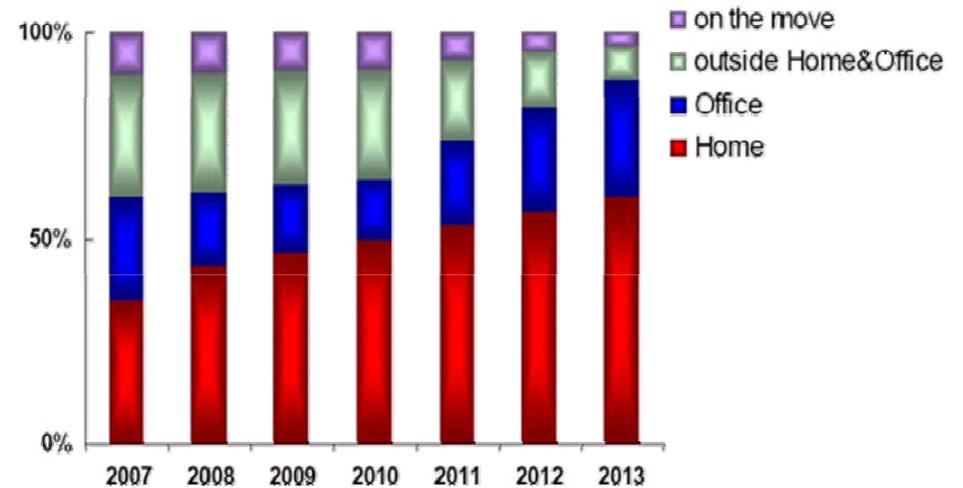
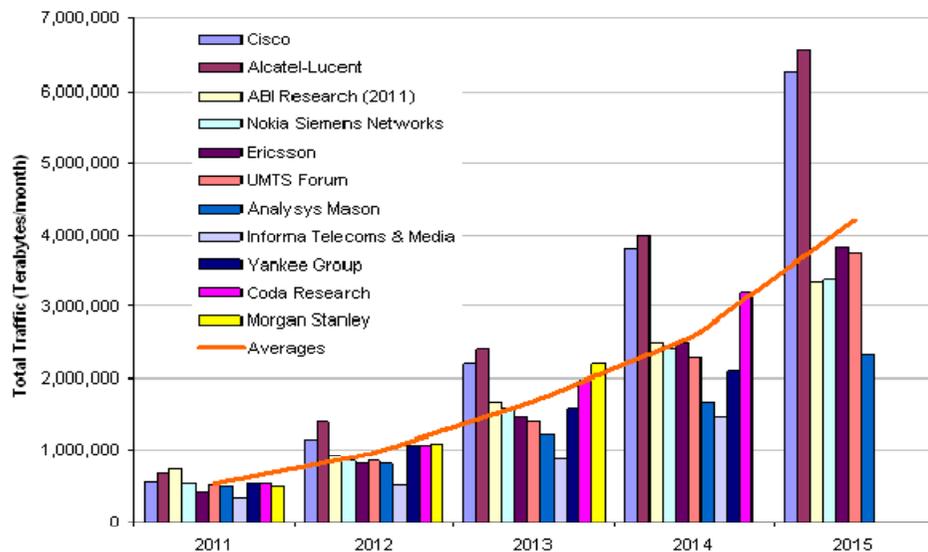
- Multi-RAT and multi-tier networks
- Advanced SON to reduce network OPEX and CAPEX



Significant portion of mobile traffic in indoor or hotspots

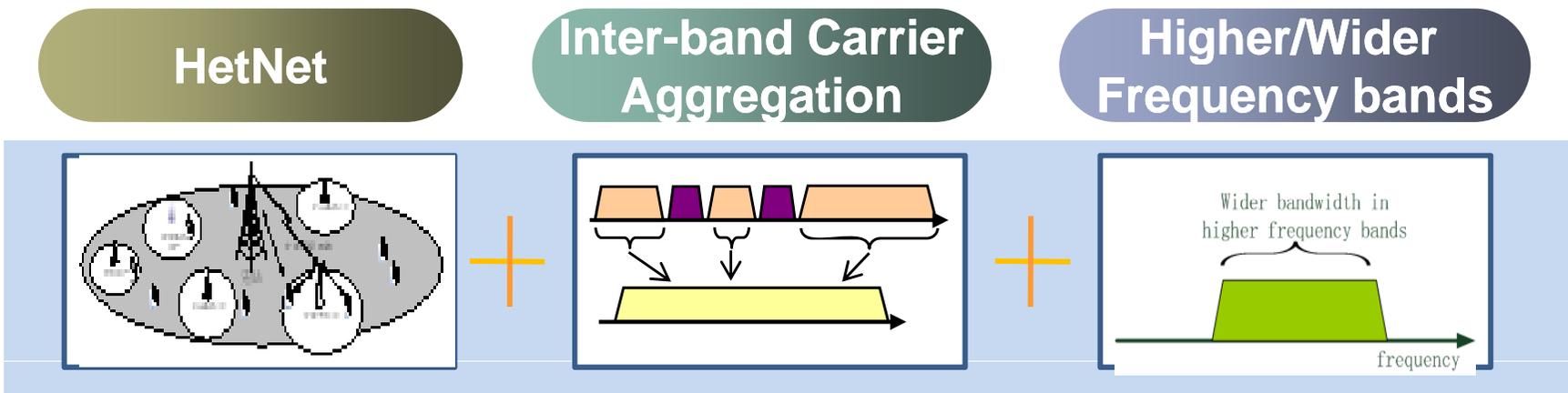
- Currently 70% of traffic happens at home or office
- In the near future, it will increase to 90% or even more
- Indoor and small cell solution will play an important role in the future

Supplement LTE wide area networks with high performance hotspot/indoor nodes



Source: Mobile Broadband Access at Home, Informa Telecoms & Media

- Key evolution for future wireless communication networks



- Seamless access for both wide area and local area

- More flexible and efficient usage of spectrum

- Richer spectrum resources at high frequency

ITU Spectrum assignment

WRC-07(2007)

- 450-470 MHz
- 698-806 MHz
- 2.3-2.4 GHz
- **3.4-3.6 GHz**

In many countries, TDD is adopted for this band

WRC-12(2012)

- WRC-12 Agenda Item 1.1&1.2

WRC-15(2015)

Potential candidate bands

- 1427-1525 MHz
- **3600-3800 MHz (Already in EU)**
- **3800-4200 MHz**
- ...

Based on
LTE/LTE-A

Short range
coverage

High
throughput

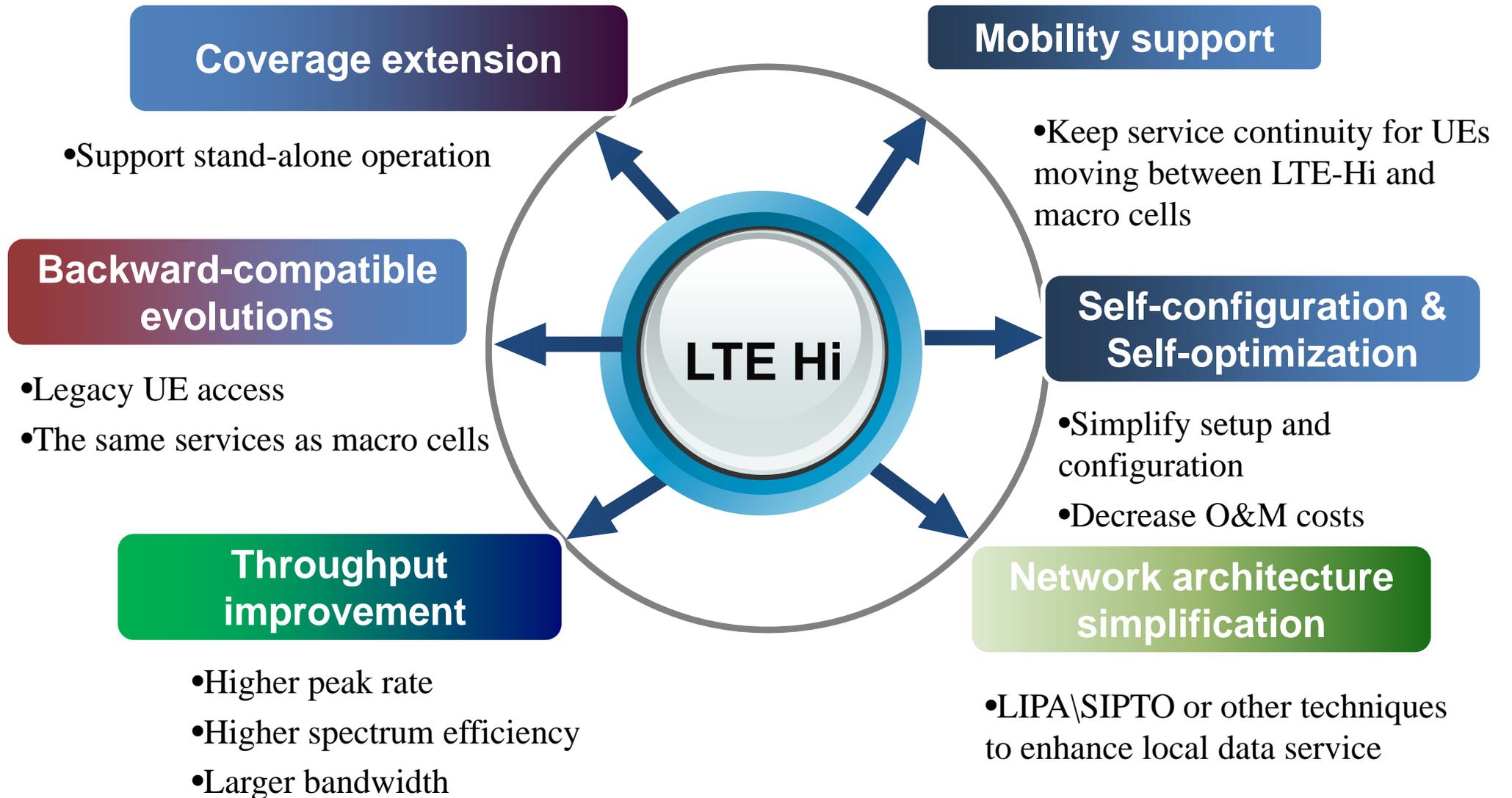
Simplified
architecture

- Hotspot and Indoor

- Higher frequency

- High bandwidth

- Higher performance

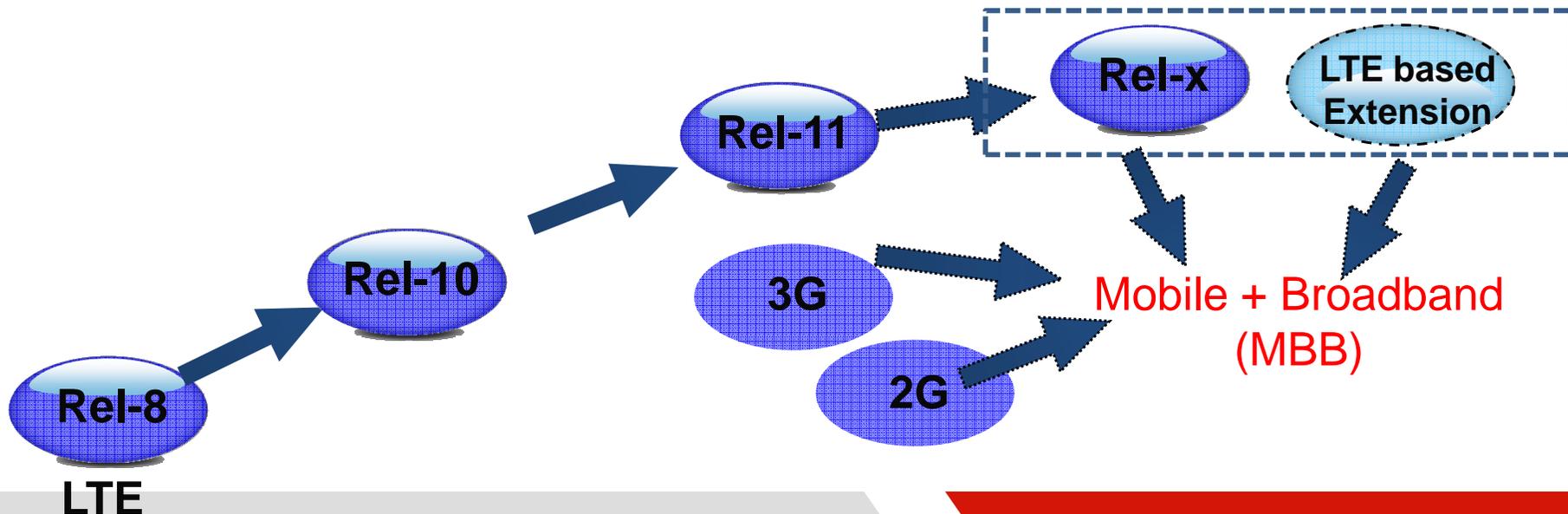


LTE-Hi (LTE/LTE-A based evolution for Hotspot/indoor scenario)

- Higher frequency bands for Hotspot/indoor
- Wider bandwidth for MBB traffic offload
- High throughput for low mobility
- Small coverage / high density AP for frequency reuse
- Low cost device and AP
- Simplified network architecture
- Easy network deployment

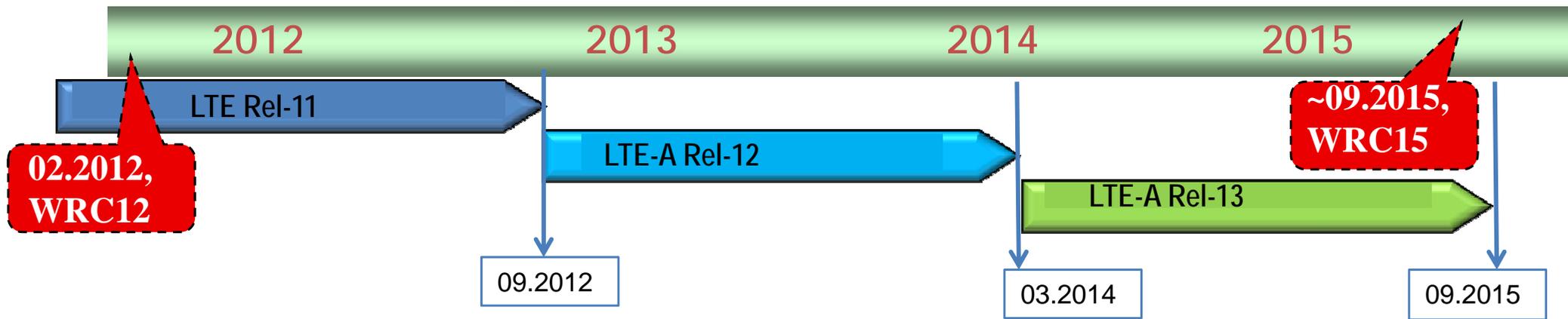
Cellular networks complimented by broadband access technologies

- LTE/LTE-A + LTE based extension (LTE-Hi)



Requirements & challenges in the future

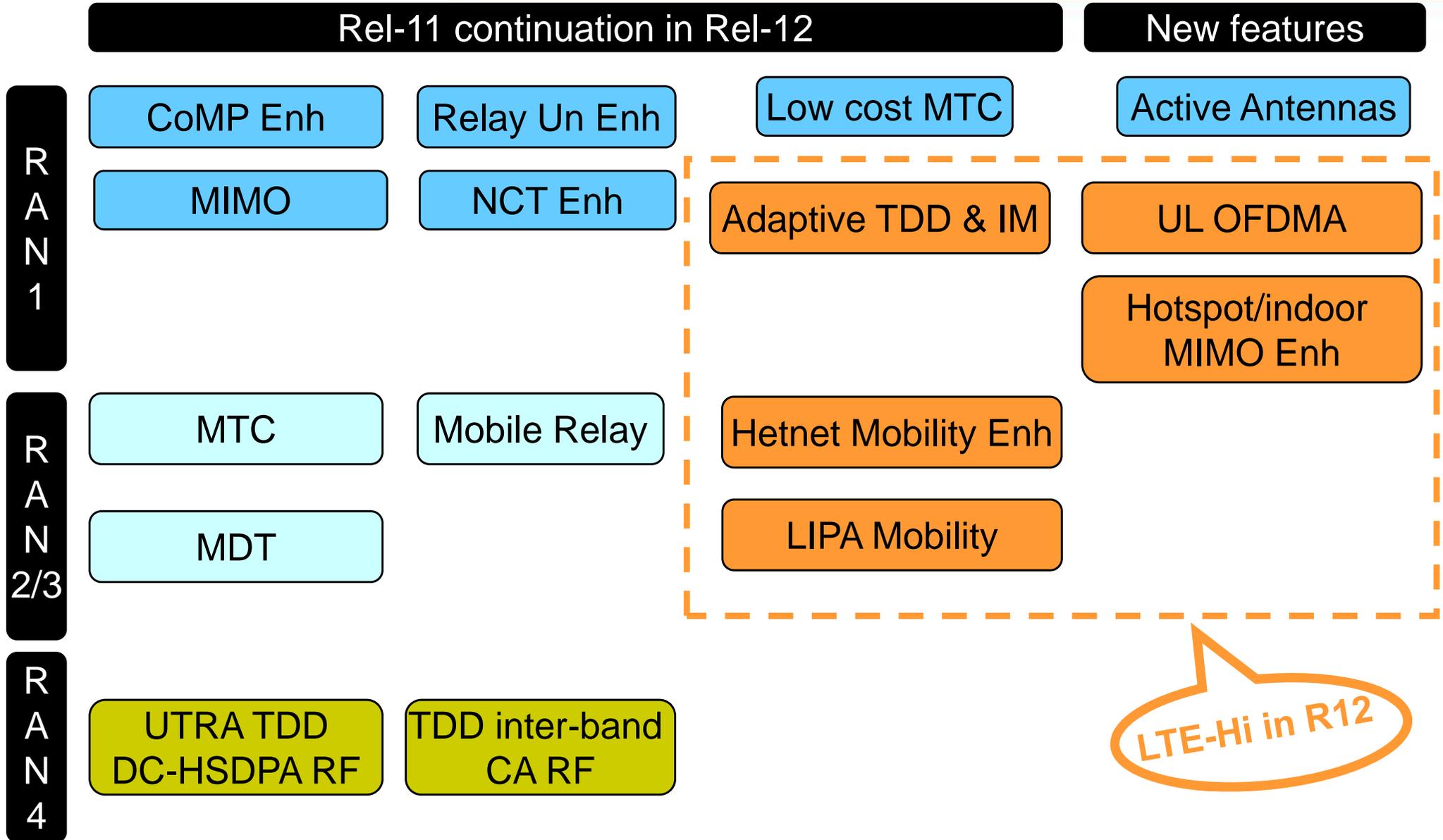
Views on 3GPP Rel-12



R12 timeline

- **06.2012: 3GPP RAN Plenary workshop**
- **09.2012: initiate Study and Work item for R12**
- **03.2014: Functional freeze**
- **06.2014: ASN.1 freeze**

Potential Features for Rel-12



Background

Rel-10/11 SI/WI on CoMP

Rel-11 SI on DL MIMO enhancements

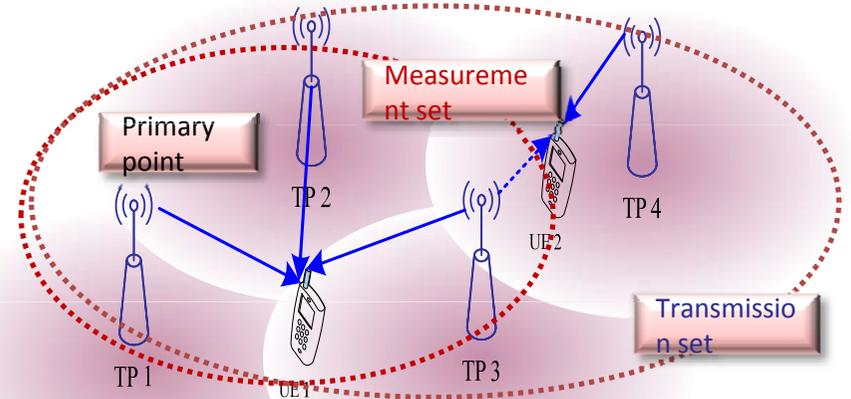
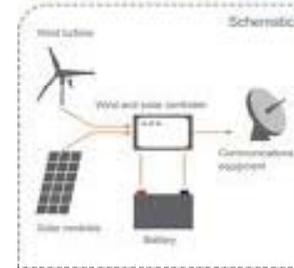
Future standard efforts

CoMP enhancements

- CSI enhancements for DL CoMP
- UL power control enhancements for DL/UL CoMP
- CoMP scheme for any backhaul scenario

Further downlink MIMO enhancement

- 4-Tx codebook enhancements
- New CSI feedback mode providing sub-band CQI and sub-band PMI
- Finer frequency-domain granularity
- Enhanced control of the reported rank



Background

Some preliminary discussion on 3D beamforming at the beginning of Rel-11 SI on DL MIMO enhancements

Rel-11 SI on Study of RF and EMC Requirements for Active Antenna Array System (AAS) Base Station in RAN4

Benefit

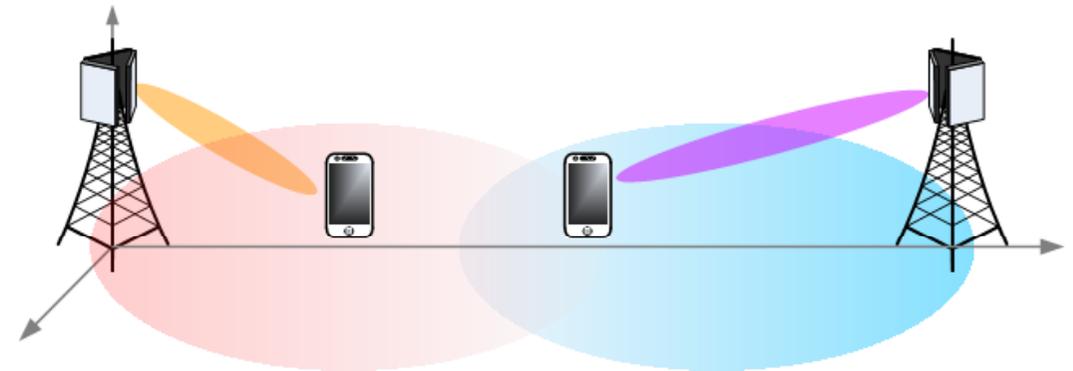
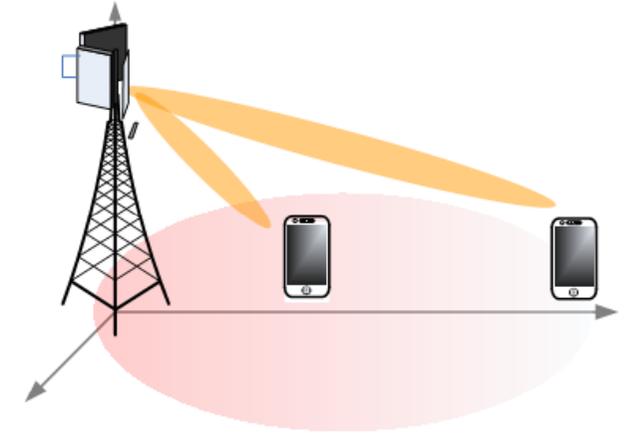
SNR improved by the UE specific tilt

Interference reduction

Future standard efforts

Active antennas/3D beamforming

- 3D Channel modeling
- 3D performance evaluation
- 3D codebook design
- 3D feedback design
- Reference signals design
- Control signaling design



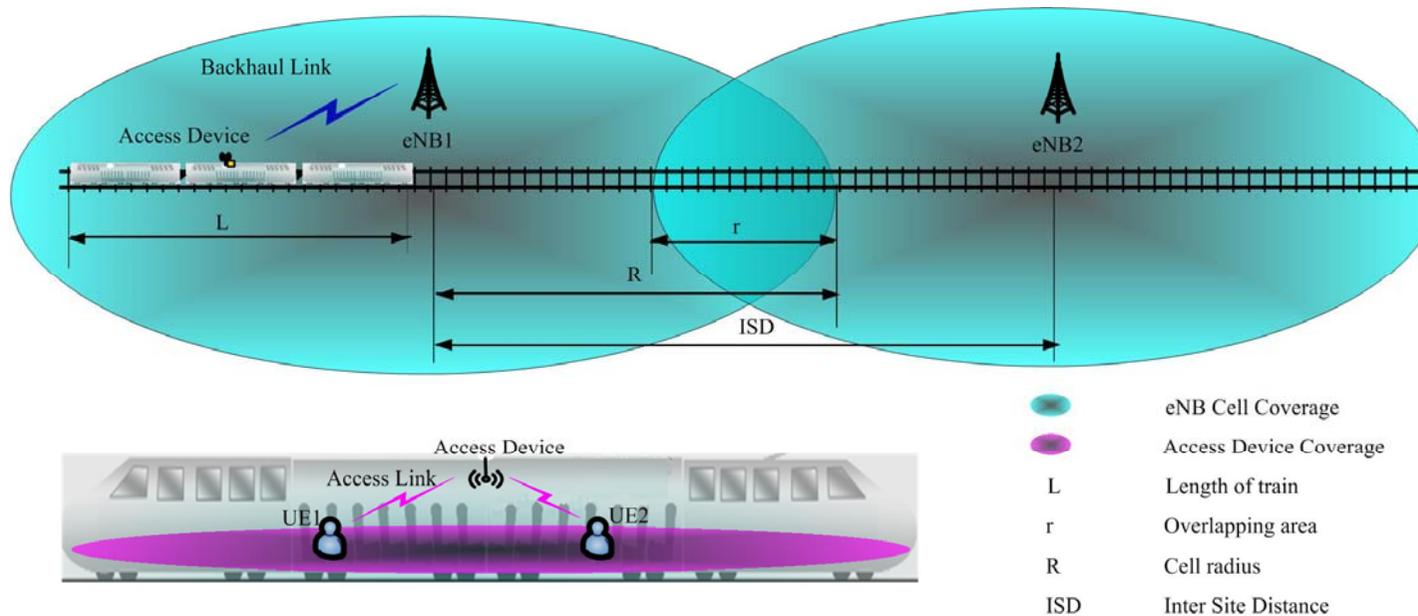
Background

Rel-10 WI on relay targeting for stationary relay

Rel-11 SI on mobile relay targeting for high speed environments

Future standard efforts

- Design of mobile relay system architecture and protocol
- Support of carrier aggregation on relay backhaul



Low cost MTC UEs based on LTE

Background

Rel-11 SI on Low cost MTC UEs based on LTE

Future standard efforts

- Specify for the aspects (e.g. peak data rate reduction) depending on the Rel-11 SI conclusions

MTC improvements

Background

Rel-10 WI on RAN mechanisms to avoid CN overload due to MTC

Rel-10 SI on RAN improvements for MTC

Rel-11 WI on RAN overload control for MTC

Future standard efforts

- Efficient resource usage for small data application
- Support of group-based MTC application
- Lower power consumption for MTC device

Flexible TD-LTE via interference mitigation

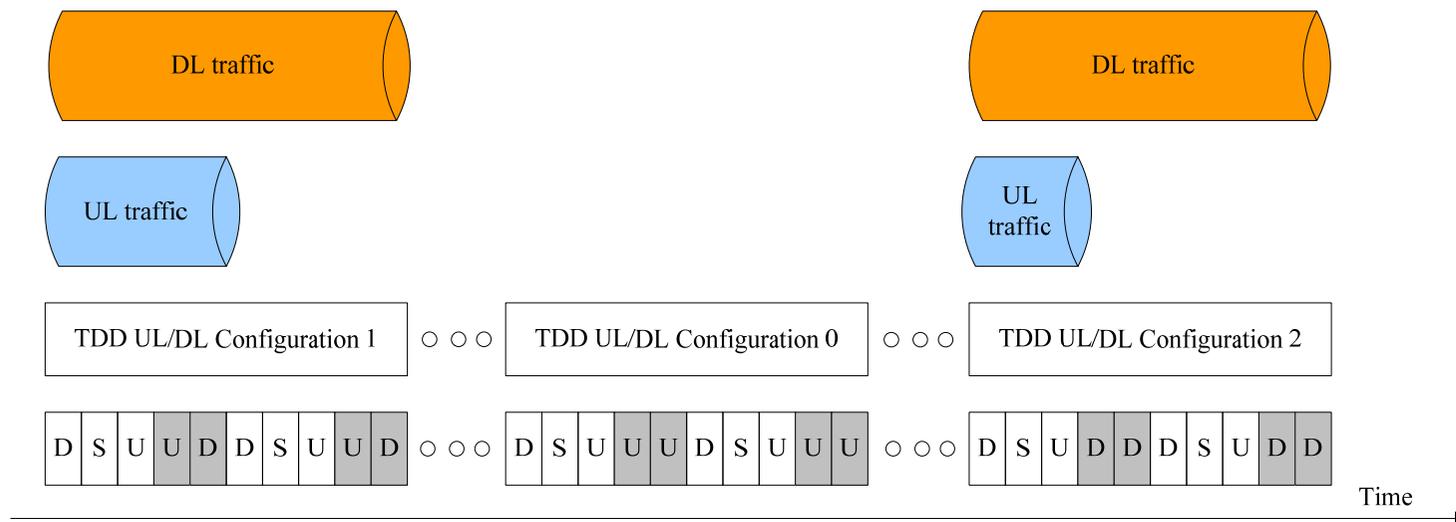
Background

Rel-11 SI on TDD UL-DL reconfiguration based on traffic adaptation and interference mitigation

More flexible usage of TDD spectrum and energy saving

Future standard efforts

- Interference mitigation schemes in multi-cell TDD networks
- Methods for adaptive TDD UL-DL reconfigurations



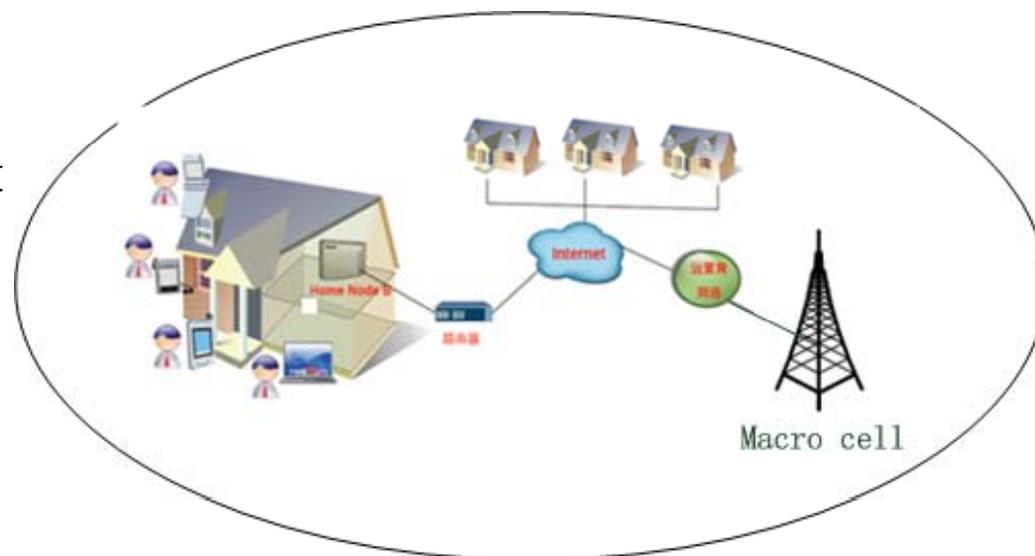
MIMO Enhancements in Hotspot/Indoor scenario

- Motivations

- DL/UL MIMO and reference signals not optimized for hotspot/indoor scenario

- Study/work areas

- Hotspot/indoor channel modeling
- DL/UL codebook enhancement
- CSI feedback enhancement
- Higher order MIMO
- DL/UL UE specific reference signals design, including overhead reduction



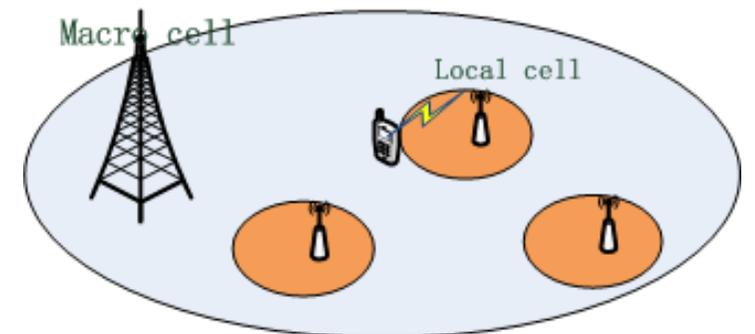
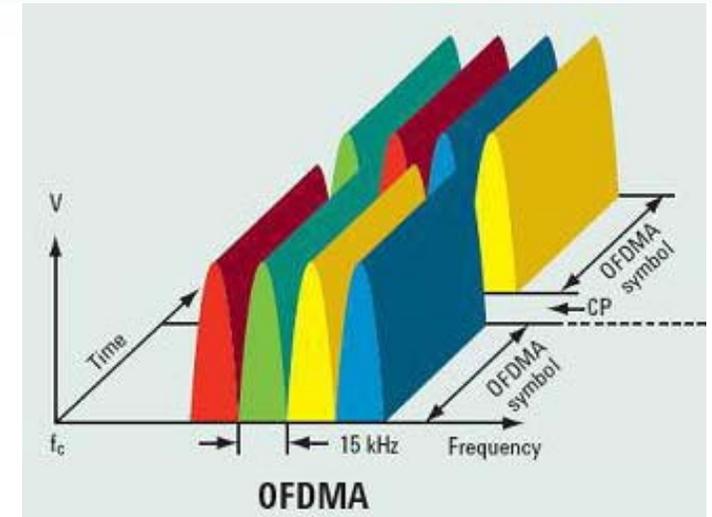
OFDMA in LTE UL

- Motivations

- PAPR not critical in hotspot/indoor scenario
- Reduced receiver complexity and improved performance for UL MIMO
- UL reference signal overhead reduction
- Better scheduling flexibility

- Study/work areas

- Design of physical uplink channels/reference signals based on OFDMA
- DL control channel in support of OFDMA in UL



PAPR not critical in hotspot/indoor scenario

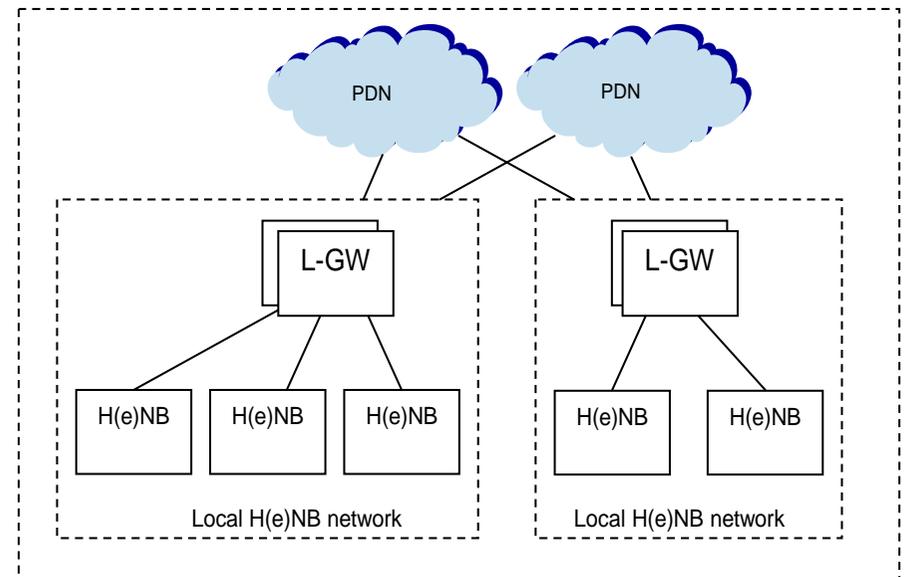
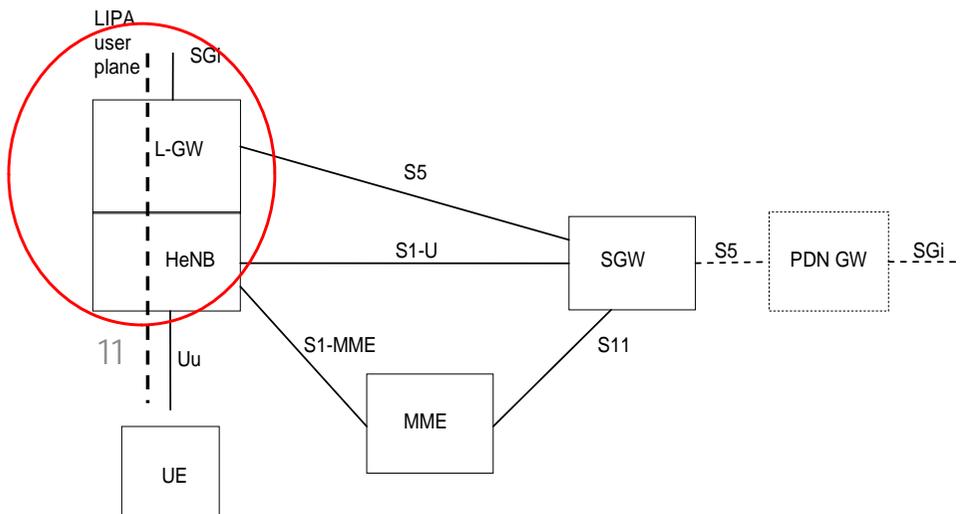
LIPA mobility enhancement

Motivations

- LIPA only supports coexistence of local GW(L-GW) and HeNB
- Mobility between different HeNB not supported

Study/work areas

- LIPA mobility realized by several HeNB sharing one L-GW.



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Thank you

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