



LTE Status and the plans for 3GPP Release 12 and beyond

Tang Hai

3GPP TSG-RAN Vice Chairman TM

China Mobile Communications Corp.

A GLOBAL INITIATIVE



Contents



 Release of 3GPP specifications

 3GPP LTE Release 10 and 11

 3GPP TSG-RAN Workshop on Release 12 Onward

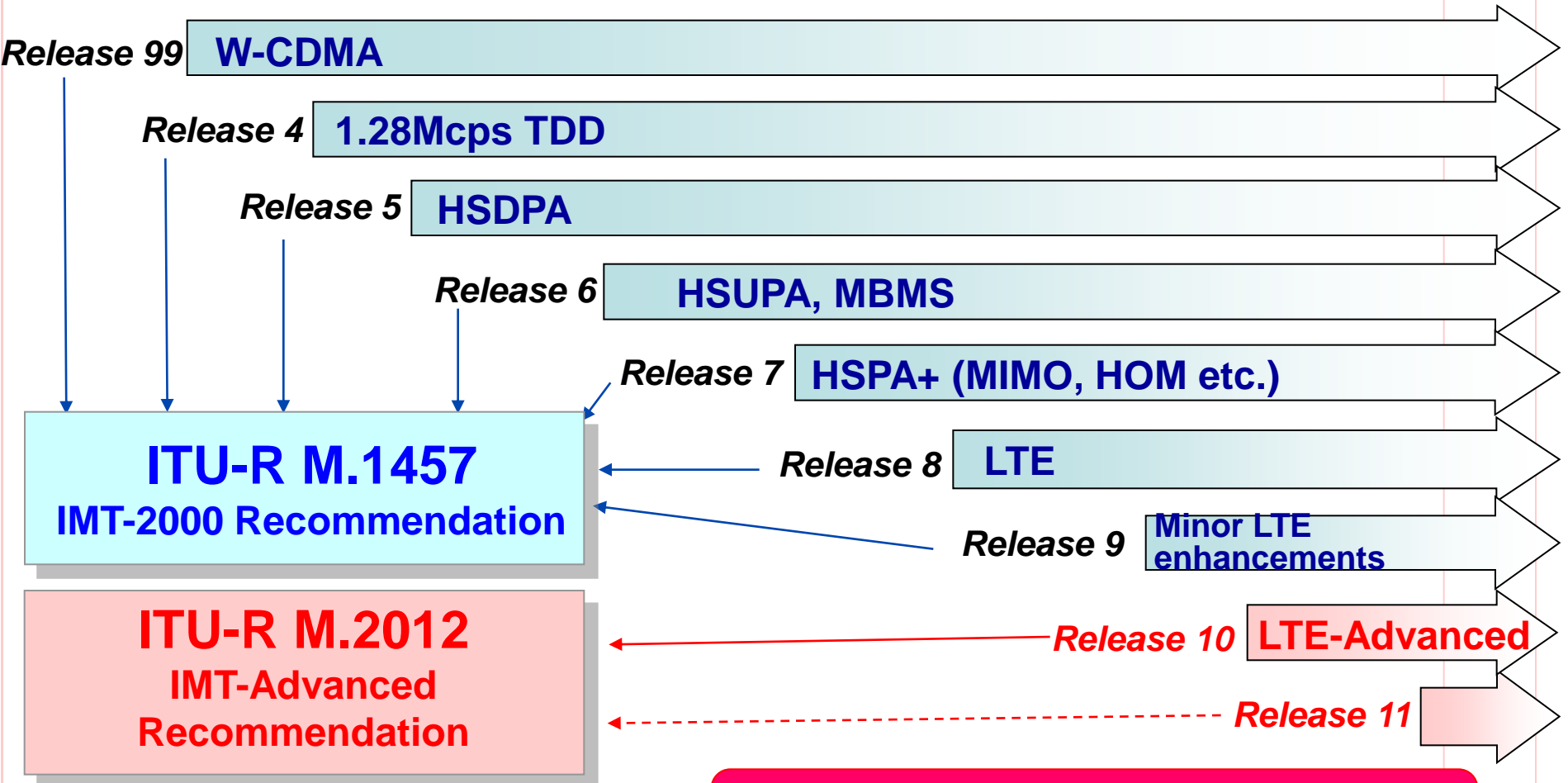
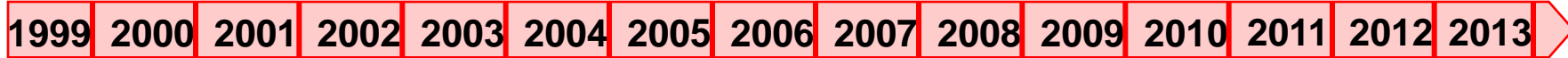
- Scope of the Workshop
- Results of the Workshop
- Summary of the Workshop

 Way forward toward 3GPP Release 12

 Summary



Release of 3GPP specifications



3GPP TSG-RAN Workshop on Release 12 onward held on June 11-12, 2012



3GPP LTE Release 10 and 11

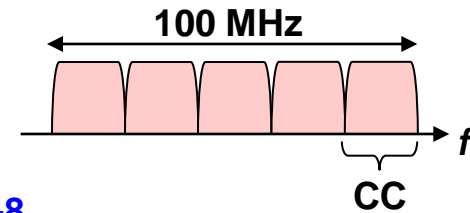


A GLOBAL INITIATIVE

■ Support of Wider Bandwidth(Carrier Aggregation)

- Use of multiple component carriers(CC) to extend bandwidth up to 100 MHz
- Common physical layer parameters between component carrier and LTE Rel-8 carrier

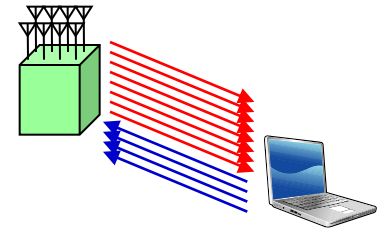
→ Improvement of peak data rate, backward compatibility with LTE Rel-8



■ Advanced MIMO techniques

- Extension to up to 8-layer transmission in downlink
- Introduction of single-user MIMO up to 4-layer transmission in uplink
- Enhancements of multi-user MIMO

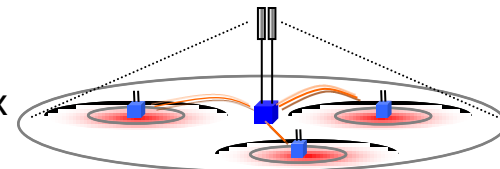
→ Improvement of peak data rate and capacity



■ Heterogeneous network and eICIC(enhanced Inter-Cell Interference Coordination)

- Interference coordination for overlaid deployment of cells with different Tx power

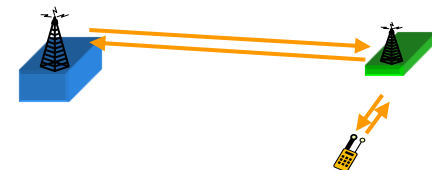
→ Improvement of cell-edge throughput and coverage



■ Relay

- Type 1 relay supports radio backhaul and creates a separate cell and appear as Rel. 8 LTE eNB to Rel. 8 LTE UEs

→ Improvement of coverage and flexibility of service area extension



Carrier aggregation (CA) enhancements

- Additional carrier type (Non-backward compatible carrier) to enhance spectrum efficiency, improve support for HetNet
- Different TDD UL/DL configuration on different band
- Multiple timing advances for UL CA

Enhanced downlink control channel (E-PDCCH)

- Enhanced DL control channel to support increased control channel capacity, additional carrier type, freq. domain ICIC, beamforming and/or diversity

CoMP transmission and reception

- CoMP for Homogeneous/Heterogeneous NW
 - Enhancement on DL/UL reference signal, control signal
 - Channel state information feedback and measurement

Further enhanced inter-cell interference coordination (FeICIC)

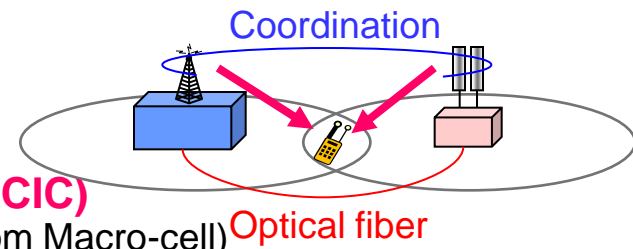
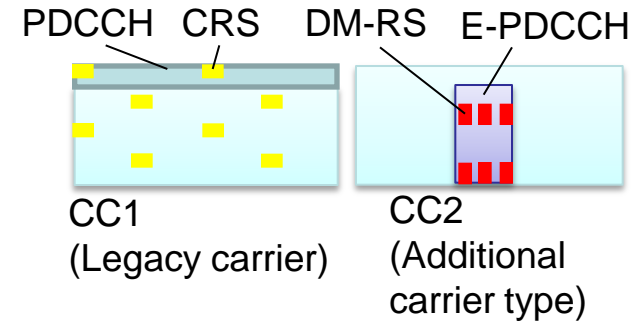
- Interference cancelation technique for UE (e.g., CRS canceller from Macro-cell)
- Non-zero power transmission for almost blank subframe

Improved minimum performance requirements for E-UTRA: Interference rejection

- Interference rejection combining (IRC) UE receiver

Signalling and procedure for interference avoidance for in-device coexistence (IDC)

- Intention is to avoid or mitigate the coexistence interference between the collocated radio transceivers (e.g. LTE, WiFi, Bluetooth transceivers, and GNSS receivers) within the same device
 - R10: Coexistence and usage scenarios identified, feasible solutions selected
 - R11: Necessary signaling and procedure for FDM/TDM based solutions and LTE autonomous denial specified



■ Enhancement of Minimization of Drive Tests (MDT)

- Intention is to provide mechanisms to collect radio measurements together with location information from eNB/UE to reduce operator costs for performing manual drive tests
 - Rel-10: Radio signal reception level measurements (e.g. RSRP/RSRQ) specified
 - Rel-11: QoS measurements (e.g. throughput, traffic volume) will be specified

■ RAN overload control for Machine-Type Communications (MTC)

- Intention is to protect the NW from potentially very large number of MTC terminals
 - Rel-10: Extended wait time (backoff time) indication in RRC connection reject specified
 - » CN overload avoidance specific to MTC terminals made possible
 - Rel-11: Extended access barring in broadcast specified
 - » CN/RAN overload avoidance specific to MTC terminals made possible

■ Further self optimizing networks (SON) enhancements

- Intention is to provide mechanisms to facilitate network optimization
 - Rel-9/10: Procedures for intra-RAT MRO / MLB specified
 - » MRO: Mobility Robustness Optimisation
 - » MLB: Mobility Load Balancing
 - Rel-11: Procedures for inter-RAT MRO will be specified

■ Network Energy Saving

- Intention is to provide mechanisms to facilitate network energy saving
 - Rel-9/10: Procedures for intra-RAT energy saving specified
 - Rel-11: Procedures for inter-RAT and enhanced intra-RAT energy saving are specified

■ LTE RAN Enhancements for Diverse Data Applications (eDDA)

- Intention is to study and possibly specify RAN improvements considering various data traffic, e.g. those generated by smartphones

■ Further enhancements to H(e)NB mobility

- Support of macro to HNB enhanced Hard Handover Mobility and soft handover
- Support of enhanced mobility between macro – open HeNB, macro – hybrid HeNB, open HeNB – hybrid HeNB, and hybrid HeNB – hybrid HeNB





A GLOBAL INITIATIVE

3GPP TSG-RAN Workshop on Release 12 Onward



A GLOBAL INITIATIVE


 Scope of the workshop was approved at RAN#55 meeting in March 2012 as follows:

- 
- The goal of the workshop is to investigate what are the main changes that could be brought forward to evolve RAN toward Release 12 and onward. It is recommended that presentations in the workshop include views on:
 - Requirements
 - Potential technologies
 - Technology roadmap for Releases 12, 13 and after 
 - The discussions from the workshop should be used to define the work plan for Release 12 and onward in TSG-RAN.

TSG-RAN Workshop on Release 12 Onward, June 11-12, 2012 in Ljubljana, Slovenia

- About 250 participants
- 43 presentations
- Detailed information and all contributions are found at following link:

<http://www.3gpp.org/Future-Radio-in-3GPP-300-attend>

 Summary of the workshop provided by TSG-RAN chairman before close of the workshop are shown in following slides





Summary of the Workshop *Requirements*



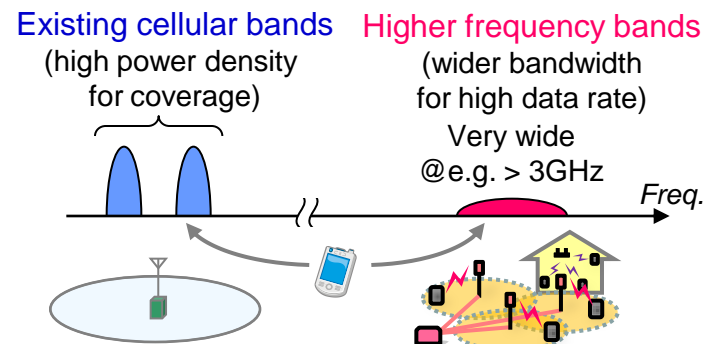
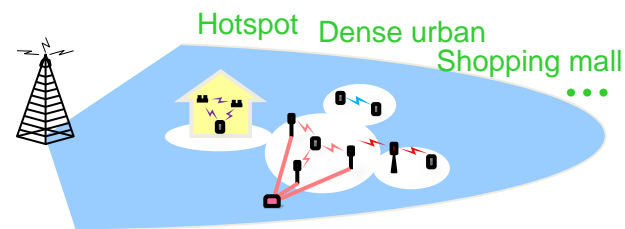
Common and converged requirements identified

- Capacity increase to cope with traffic explosion
- Energy saving
- Cost efficiency
- Support for diverse application and traffic types
- Higher user experience/data rate
- Backhaul enhancement

Summary of the Workshop Potential Technologies (1)

A great majority showed interest in Enhanced Small Cell for LTE. Technologies proposed by many members are:

- Interference coordination / management
- Dynamic TDD
- Enhanced discovery / mobility
- Frequency separation between macro and small cells with higher frequency band, e.g. 3.5 GHz band, for the small cells
- Inter site CA / macro cell assisted small cells
- Wireless backhaul for small cell



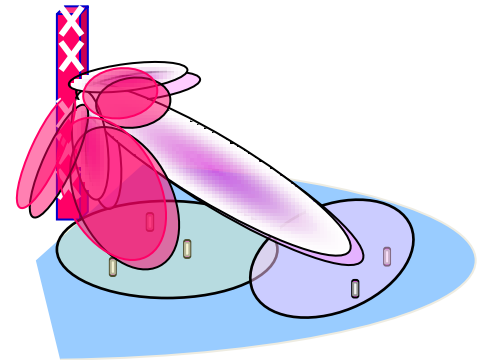



Summary of the Workshop *Potential Technologies (2)*



 Very clear interest related to LTE Multi-Antenna/site technologies such as:

- 3D MIMO/beamforming to allow beam control in both horizontal and vertical directions
- Further CoMP/MIMO enhancements



 New procedures and functionalities for LTE to support diverse traffic types proposed by many members

- Control signaling reduction, etc.



Summary of the Workshop *Potential Technologies (3)*

Good interest in:

- Interworking with WiFi
- Continuous enhancements for:
 - Machine type communications(MTC)
 - Self-organizing network(SON)
 - Minimization of drive test(MDT)
 - Advanced receiver
- Device to Device(D2D)
- Further enhancements for HSPA including interworking with LTE





Way Forward Toward 3GPP Release 12



- 📶 Release 12 time plan was decided at TSG-SA#56 meeting in June 2012 as follows:
 - Stage 2 freezing target December 2013
 - Stage 3 freezing target June 2014, i.e. 21 months between Release 11 stage 3 freezing and Release 12 stage 3 freezing
- 📶 New WI/SI proposal toward Release 12 will be treated at TSG-RAN#57 meeting in Sep. 2012 and after
 - Study Items and Work Items for key topics presented in the Workshop will be proposed
 - Approval of the Study Items and Work Items will depend on remaining work for Release 11 and priority taking into account summary of the workshop
 - Some study toward Release 12 might be started from Sep. 2012 and many of the work for Release 12 will be started from Dec. 2012 or Mar. 2013.
- 📶 In the workshop, it was identified that majority of companies have great interest in small cell enhancements. To clarify the scope of the enhancements, email discussion on the requirements and deployment scenario for small cell enhancements took place before TSG-RAN#57 meeting in Sep. 2012



Updates of The Way Forward toward 3GPP Release 12



 3GPP TSG-RAN#57 meeting was held on Sep. 4-7, 2012 and decided as follows:

- 16 new WIs (each may include Core & Perf part WIs) and 21 new SIs, not related to spectrum and conformance test aspects, were proposed for REL-12
 - Most of the proposals were postponed to RAN#58 to prioritize REL-11 completion in the next 3 months
 - All proposals were reviewed at RAN#57 aiming to avoid duplication and clarify the scope
 - Proponents are encouraged to continue offline discussion to improve WIDs/SIDs
- An evening Ad hoc session was held on Sep. 4th to get consensus on the fundamental issues of small cell enhancement scenarios
- An Study Item on requirements and scenarios for small cell enhancements was approved
 - Main discussion took place on TSG-RAN mailing list before RAN #58
 - Studies on physical and higher layer enhancements will follow



Proposed Work Items and Study Items



Title	WI/SI
Scenarios and Requirements of Small Cell Enhancements	SI
Small Cell Enhancements (Physical-layer)	SI
TDD for DL-UL IMTA	WI
New Carrier types for LTE	WI
3D Channel model	SI
DL Enhancements for Elevation Beamforming	SI
Study on Full Dimension MIMO	SI
Further Downlink MIMO Enhancement for LTE-Advanced	WI
Enhanced CoMP for LTE	WI
D2D Discovery	SI
D2D communication	SI
Further Enhanced Receivers for LTE UEs	SI
Enhanced Interference Suppression for LTE	SI
LTE and HSDPA Carrier Aggregation	SI
Low cost MTC UEs	WI
LTE Coverage Enhancements	WI
eMBMS enhancements	WI
LTE (UL) CA Enhancements	WI




Title	WI/SI
Small Cell Enhancements for E-UTRA and E-UTRAN – Higher-layer Aspects	SI
Study on WLAN/3GPP Radio Interworking	SI
Push to talk over Cellular for LTE	SI
RAN Enhancements for Machine Type Communications	WI
eDDA	WI
Small Data Transmission Optimization for High Mobility in LTE	SI
HetNet mobility	WI
Further mobility enhancements for H(e)NB	WI
Mobile Relay	WI
UMTS/HSPA and LTE interworking	SI
MDT	WI
MDT	SI
SON	SI
LIPA and SIPTO	WI
Performance Requirements of 8 Rx Antennas for LTE UL	WI



Summary



A GLOBAL INITIATIVE

-  LTE Rel-10/11 provided significant improvements
-  Key Rel-12 features e.g. small cell enhancements and 3D- MIMO/beamforming will enable the further evolution of LTE to meet vast demands of future mobile data services
-  TSG RAN has been working on future-proof technologies, and will be keeping open for innovations



Thank You



Tang Hai 3GPP TSG-RAN Vice chairman



THE Mobile Broadband Standard

3GPP A GLOBAL INITIATIVE

Home Site Map Contact

Search
3GPP Website:

Search and download specs, docs, CRs and more from the 3GPP FTP Server:
Advanced FTP Search

RSS Subscription

- 3GPP News
- 3GPP Partners News
- 3GPPlive tweets

Statistics
7638 unique visitors average per day

3GPP Satisfaction Survey

5 minute survey Please help us by completing the new 2012 Survey. Take the Survey

TSG Structure

Project Co-ordination Group (PCG)

TSG GERAN	TSG RAN	TSG SA	TSG CT
<ul style="list-style-type: none"> GERAN WG1 GERAN WG2 GERAN WG3 	<ul style="list-style-type: none"> RAN WG1 RAN WG2 RAN WG3 RAN WG4 RAN WG5 	<ul style="list-style-type: none"> SA WG1 SA WG2 SA WG3 SA WG4 SA WG5 	<ul style="list-style-type: none"> CT WG1 CT WG3 CT WG4 CT WG5

More Information about 3GPP:

www.3gpp.org

contact@3gpp.org