

Views on LTE-Advanced Requirements

RITT

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Outline

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- ◆ *Applicability and optimization for various spectrums*
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- ◆ *Summary*

Motivation of an Advancement of LTE

- ◆ Further improvement within the current working assumptions, e.g. spectrum and deployment scenarios.
 - ◆ *Smooth migration based on the legacy work in the past 3 years.*
 - ◆ *Keep compatibility to R8 LTE systems*
 - ◆ *Review technical decisions/choices to find out possible space of enhancements.*
 - ◆ *Consider more advanced techniques and optimizations where needed.*
- ◆ Find out optimized technical solutions for the “new” working assumptions, e.g. larger bandwidths, new spectrum and new deployment scenarios.
- ◆ Prepare a highly competitive proposal to ITU-R IMT-Advanced RIT

Applicability and optimization for various spectrums

- ◆ Well take the advantage of lower bands, e.g. 450MHz and UHF bands
- ◆ Optimized solution for higher bands, e.g. >3.4GHz bands
 - ◆ *Are the bands required to fulfill all requirements, full coverage and full mobility?*
 - ◆ *More efficient use of the bands if they only provide limited capabilities, e.g. local coverage and low mobility.*
 - ◆ *The bands can be used cooperatively with lower bands to provide full capabilities.*
 - ◆ *Allow LTE-A RIT to fulfill full requirements with a set of spectrums.*

Bandwidth scalability

- ◆ Up to 40MHz for one FDD link
- ◆ Up to 100MHz for TDD

Peak data rates

- ◆ Peak spectrum efficiency mainly depends on the number of MIMO streams.
 - ◆ *Downlink minimum requirements: 15bps/Hz for downlink in case of 4 streams*
 - ◆ *Uplink minimum requirements:*
 - ◆ *5bps/Hz for uplink in case of 2 streams*
 - ◆ *10bps/Hz for uplink in case of 4 streams*
 - ◆ *1.5 times of above performance is preferred.*
- ◆ Peak data rates are scalable with the system bandwidth.

Spectrum efficiency

- ◆ In the current deployment scenarios, the improvement of spectrum efficiency highly depends on whether a large number of additional antenna sites are added.
 - ◆ *If the current site density is not increased (i.e. no relay stations or additional distributed antenna stations are considered), a small improvement can be obtained.*
 - ◆ *Average cell spectrum efficiency: 1-1.5 times of R8 LTE.*
 - ◆ *Cell edge spectrum efficiency: 1.5-2 times of R8 LTE*
 - ◆ *If the site density is obviously increased (i.e. relay stations or additional distributed antenna stations are considered), a larger improvement can be expected.*
 - ◆ *Average cell spectrum efficiency: 1.5-2 times of R8 LTE*
 - ◆ *Cell edge spectrum efficiency: 1.5-2 times of R8 LTE*
 - ◆ *The improvement highly depends on number of additional sites added*
- ◆ In the indoor-to-indoor coverage scenarios, a higher performance is expected.
 - ◆ *Average cell spectrum efficiency: 3-4bps/Hz*

System capacity

- ◆ VoIP capacity:

- ◆ *200-300 VoIP parallel sessions per 5MHz*

- ◆ C-plane capacity:

- ◆ *A larger number of Active and DTX/DRX UEs than R8 LTE per cell for unit bandwidth is supported considering the future wide use of machine-to-machine communications.*

Latency

- ◆ C-plane latency: 100ms (no changes over R8 LTE)
- ◆ U-plane one-way latency: 10ms
 - ◆ *Coincide with ITU-R requirement.*
 - ◆ *TDD mode fulfills the requirement in any DL/UL ratios*
 - ◆ *No evidence showing 10ms does not meet requirement for real-time services*

Coverage

- ◆ Indoor hotspot coverage
 - ◆ *50m: Requirement fully met.*
 - ◆ *100m: Acceptable performance degradation.*

Compatibility

- ◆ RAN decision in approved SID:
 - ◆ *An LTE terminal can work in an LTE-Advanced E-UTRAN.*
 - ◆ *An LTE-Advanced terminal can work in an E-UTRAN and*
 - ◆ *Non-backward compatible elements could be considered based on RAN decision*

SON

- ◆ Support more effective self configuration/optimization and more effective use of Home eNB.

Summary

- ◆ LTE-Advanced is a smooth migration from LTE with further optimization and consideration of new spectrum and deployment scenarios.
- ◆ Major advancement of requirements over LTE due to:
 - ◆ *Effective use of new spectrum.*
 - ◆ *Optimized supports of new deployment scenarios, e.g. indoor coverage.*
 - ◆ *Potential spectrum efficiency improvements based on change of RAN topology, e.g. relay and distributed antennas.*

Thanks for Attention