

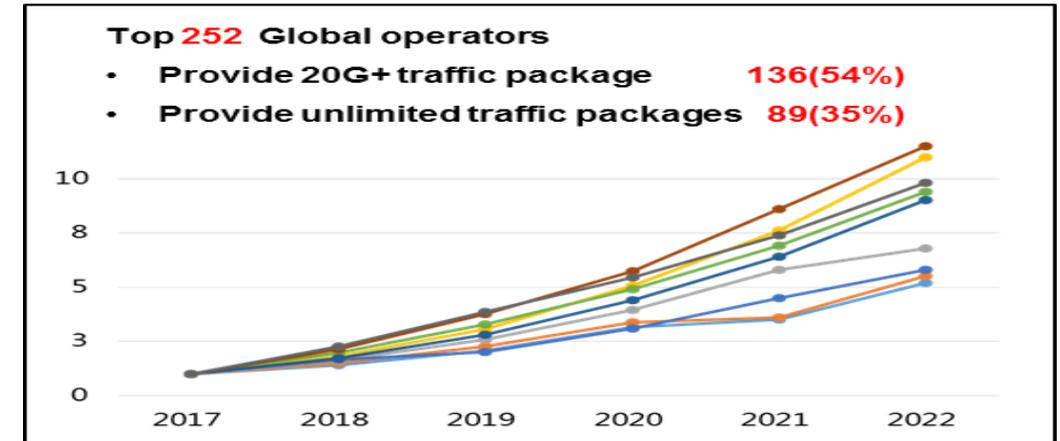
Motivation of LTE eMBB enhancements for Rel-17



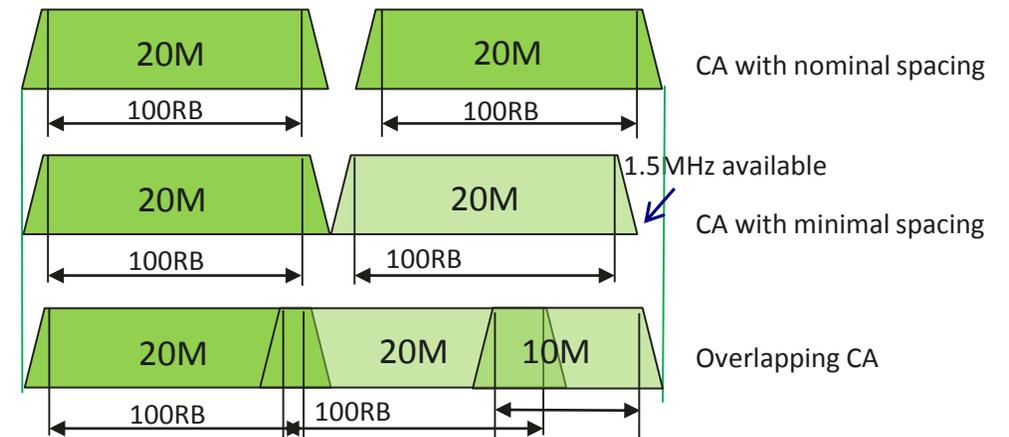
Traffic explosion for eMBB

Motivation

- LTE market status: penetration rate $\approx 2/3$ in 2025, the dominant eMBB traffic would still be delivered by LTE in the next few years.
- Due to the roll out of unlimited package service, the DOU (dataflow of usage) keeps growing quickly and it is essential for operators to provide LTE based capacity enhancements by leveraging the existing tons of sites.
- Spectrum utilization could be enhanced to support better use of intra-band contiguous CA and irregular spectrum, otherwise some deployment issues may exist for operators
- eMBB enhancements for LTE could benefit the user experience in NSA as well.



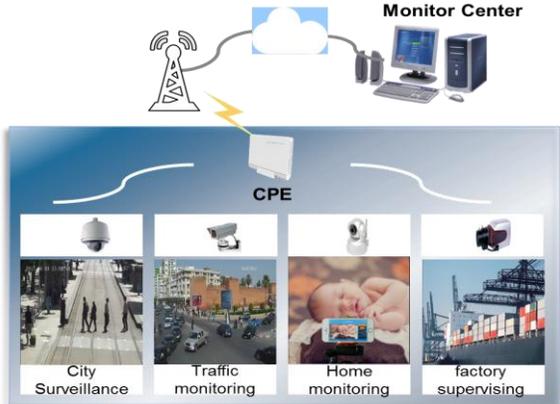
*Source: Huawei



New scenario & new business for eMBB

Motivation

- WTTx video monitoring service has been widely used for various of scenarios, which also generates high demands of wireless capacity.

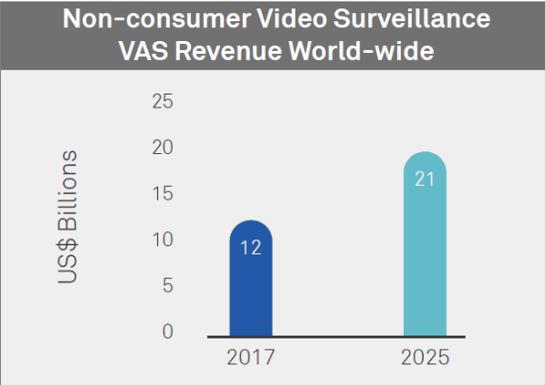


- Both DL and UL capacity improvement is necessary and beneficial for supporting video monitoring Services, enterprise and factories.

	720P	1080P	2K	4K
H.264	2Mbps	4Mbps	8Mbps	16Mbps
H.265	1.5Mbps	2Mbps	4Mbps	8Mbps

Reference: LTE R10 UL 4x4: Cell average~ 50Mbps @20MHz; Cell edge ~ 1.6Mbps@20MHz

- Target markets for wireless operators are diverse.



*Source: <https://www-file.huawei.com/-/media/CORPORATE/PDF/mbb/5g-unlocks-a-world-of-opportunities-v5.pdf?la=en>

With LTE R10 4x4 design @20MHz BW

The performance at cell-edge cannot support even a single camera with 720P

The maximum number of videos with 720P that can be supported simultaneously in a cell is around 15

The maximum number of videos with 4K that can be supported simultaneously in a cell is around 2

Opportunities of eMBB enhancements

For normal UEs:

- MIMO with advanced CSI has been proved to increase the spectral efficiency significantly. Introducing high precision codebook as supported in NR, could further improve the spectral efficiency. It can be easily specified without so much standardization effort since its a straightforward extension of Rel-14 advanced CSI.
- The powerful processing capability of dual-mode UE for NR and LTE enables such advanced CSI enhancements and also could enable minimum spacing of more band combinations for intra-band contiguous and non-contiguous CA

For stationary UEs in new scenario and business:

- Thanks to the characteristic of stationary link, the transmission efficiency can be further improved, and the overhead of RS can be further reduced.
- The CPE type stationary with more powers, processing capabilities, antennas, give another reason to support enhanced MIMO transmission and minimum spacing of more band combinations for intra-band contiguous CA.

Objectives

Proposals:

- Specify CSI enhancement for normal UEs [RAN1, RAN2, RAN4]
 - Extend specification support for advanced CSI reporting including more than 2 beams in W1, subband amplitude reporting, 8PSK phase quantization and other leftovers.
- Specify enhancements for stationary UEs [RAN1, RAN2, RAN4]
 - Overhead reduction for both downlink and uplink,, e.g., RS, etc.
 - Enhanced SU/MU MIMO schemes for the high capacity UEs
 - Define the specific requirements for each band for HPUE [RAN4]
- Extend the requirements for minimum spacing to more intra-band contiguous CA configurations [RAN4]
- Investigate and specify the CA with overlapping CC and the necessary mechanism to support the overlapping CA [RAN4,RAN2]
 - Specify the new intra-band contiguous CA configurations for overlapping CA.
 - Specify the necessary BS/UE RF and RRM requirements to support the overlapping CA.

Thank you.

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