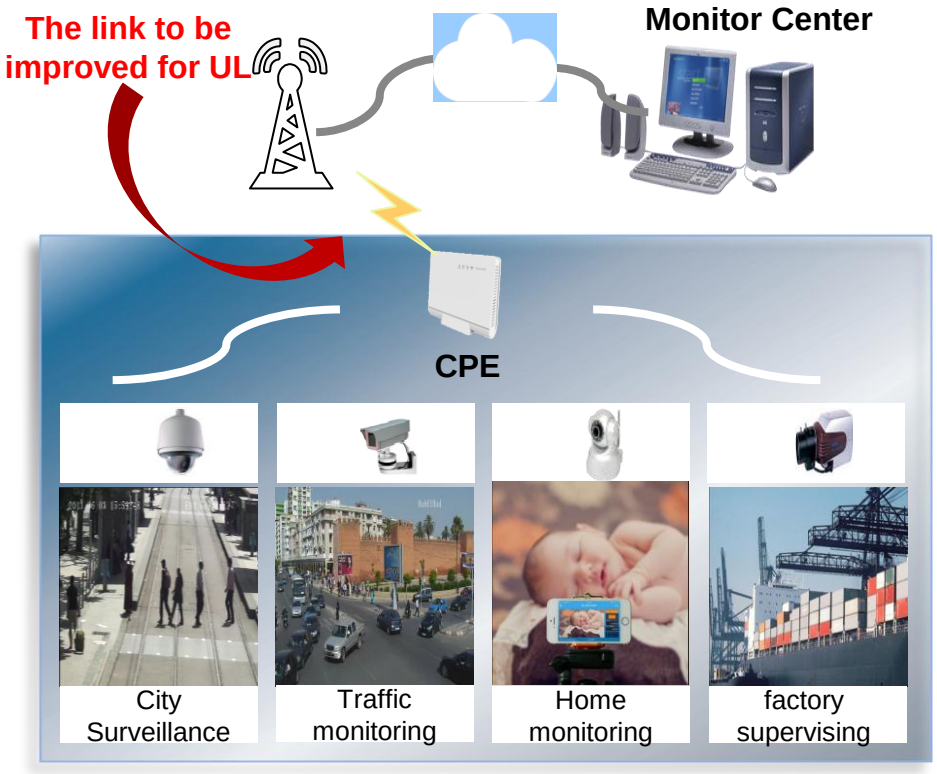
3GPP TSG RAN Meeting #80
La Jolla, USA, June 11 – 14, 2018
Agenda Item: 10.1.1

RP-180879

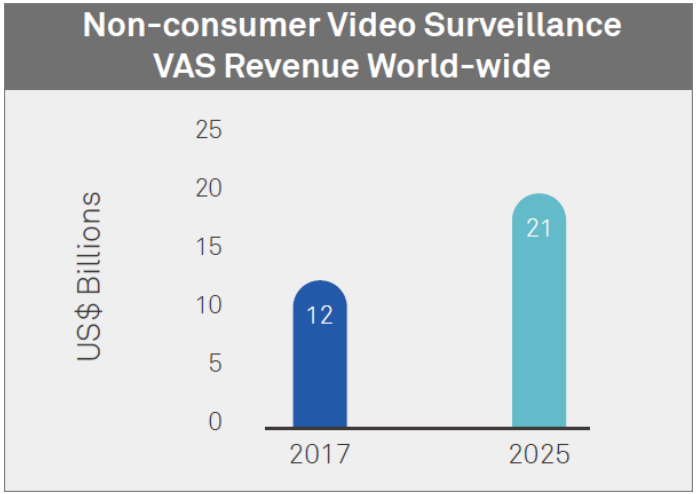
Motivation for new SI proposal on LTE uplink enhancements for WTTc

Huawei, HiSilicon

Video monitoring services boost



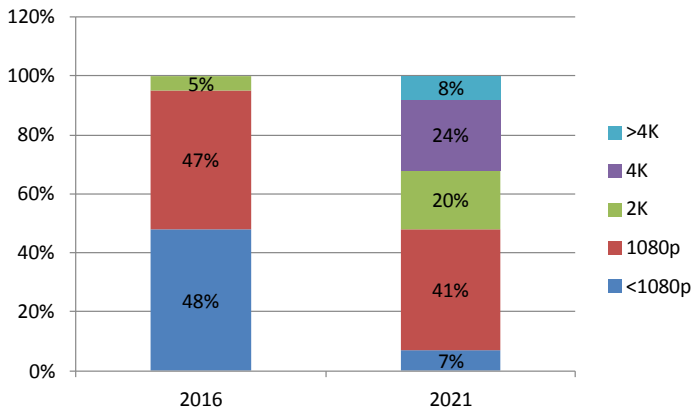
Video monitoring has rapidly been developed nowadays. Target markets for wireless operators are diverse.



Video monitoring over wireless

- Benefits to carry video services over wireless:
  - For the areas hard to dig trenches, lay fiber, such as protected districts, rural areas, special road surface, etc.
  - Much less costs (up to 60% cost reduction) than fiber, esp. when the camera is far from the collector.
  - Many areas can reuse the existing eNB equipments with software updating
  - Easy to expand
  - Quick to deploy

Requirements of video capacity



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

Spectrum resources with1.5~2 times of data rate are needed to guarantee the real-time video quality.

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

UL capacity improvement is necessary and beneficial for supporting video monitoring services

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 uplink enhancements

- For safe city and smart home monitoring, the application and environment characteristics should and need to be utilized for uplink enhancements
  - ➢ Less limitation on device cost, power, size, and processing capabilities

    UEs in such scenarios are typically new type of devices, so it is feasible to introduce more advanced features in LTE uplink, e.g., codebook extension and non-codebook-based precoding.

  - ➢ Stationary UEs with slow-varying channels between UEs and eNBs

    The channels would vary quite slowly for typical deployment scenarios. This characteristic can be utilized to further improve the spectral efficiency by e.g.,

    - more accurate uplink channel measurement and more accurate uplink CSI acquisition. Since one measurement and one report can stay valid for longer time, it becomes possible to have more accurate channel measurement and more accurate CSI acquisition with given overhead.
    - RS overhead reduction

  - ➢ Continuous traffic with large packet size and usually small inter-packet interval, with fixed UEs

    This characteristic can be utilized for better link adaptation and can enable better MU-MIMO paring

HUAWEI

Objectives

Email discussion has been performed on the RAN draft reflector with two phases. The following objectives were provided for phase 2 discussion

- To study techniques for enhancing the uplink of stationary UEs, including the specification impact (RAN1, RAN2, RAN4)
  - Enhanced uplink SU/MU MIMO schemes for capacity enhancements such as codebook extension and non-codebook-based precoding.
  - More accurate uplink channel measurement and uplink CSI acquisition
  - Overhead reduction of uplink reference signals for slow-varying channels
  - Special improvement for the users with poor link quality, such as enhancements to inter-cell coordination techniques
- Both types of UEs with and without high power are assumed. For high power UEs, 26 dB Tx power is assumed

Thank you !