3GPP RAN #75
Dubrovnik, Croatia, March 6-9, 2017
Agenda Item 10.1.1

RP-170549

Discussion on the evolution of IoT for LTE

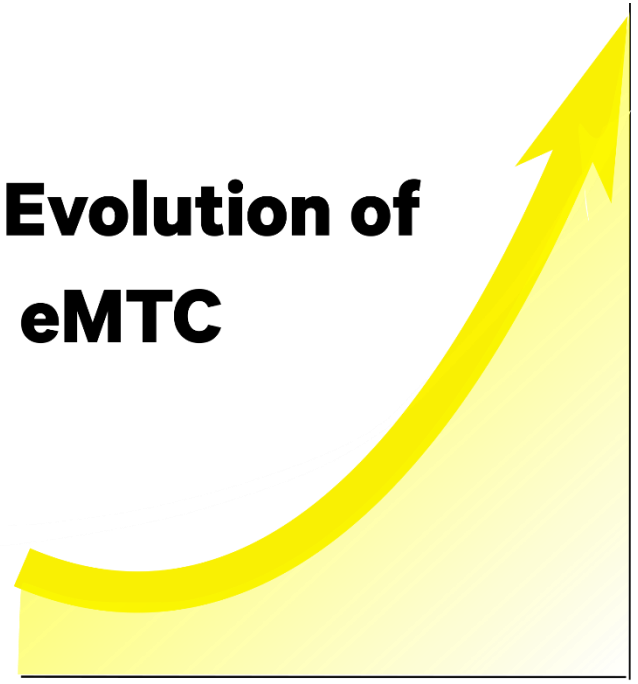
QUALCOMM®

Background on IoT in 3GPP

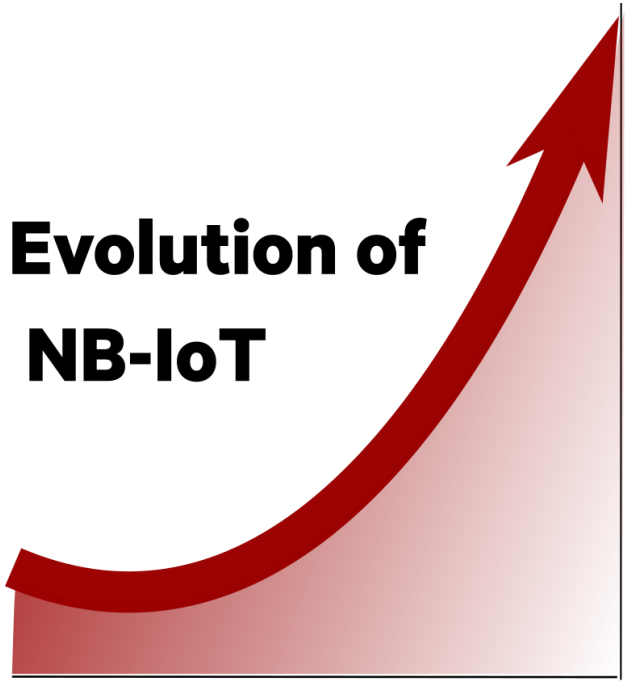
- Rel-13 introduced two different technologies for IoT/MTC applications:
  - **eMTC:**
    - data rates up to 1Mbps
    - 1MHz bandwidth
    - in-band deployment with dynamic resource partitioning between eMTC and LTE
    - 155.7dB MCL
  - **NB-IoT:**
    - 180kHz channel bandwidth
    - 21kbps DL, 62.5kbps UL
    - In-band, standalone and guard-band deployments
    - 164dB MCL
- The evolution of these two technologies in Rel-14 bring them closer
  - E.g. increased number of repetitions for eMTC, higher data rates for NB-IoT

Future evolution

- Rel-14 and probably Rel-15 will evolve both technologies in such way that some overlapping between them may occur.
  - This is desirable to cover some use cases in which, depending on the scenario, a UE may want to behave like eMTC or NB-IoT (e.g. depending on coverage level or battery level)
- This may lead to **convergence in some use cases** but **divergence** in solutions, which is not desirable.



Sync signals for extreme coverage
Sub-PRB allocations
Higher data rates
Increased coverage
Beamforming support
Multiple HARQ processes
Connected mode mobility
Reduced complexity



Beamforming support
Connected mode mobility
Increased bandwidth
Leaner integration with LTE
Higher data rates
Multiple HARQ processes
Sub-PRB allocations
Sync signals for extreme coverage
Low complexity

Proposed framework for technology evolution

- When introducing a new feature for eMTC/NB-IoT that overlaps with features introduced with the other technology, incorporate the **solution adopted for the other technology with minor changes**
  - E.g. allow an eMTC UE to transmit NPUSCH, or an NB-IoT UE to receive PDSCH

- This would enable UEs to operate optimally in a various scenarios while keeping **cohesion within 3GPP specifications and reducing specification work.**
  - This technical convergence would also leverage the fact that RANs may support both features in many deployments

Proposed framework for technology evolution

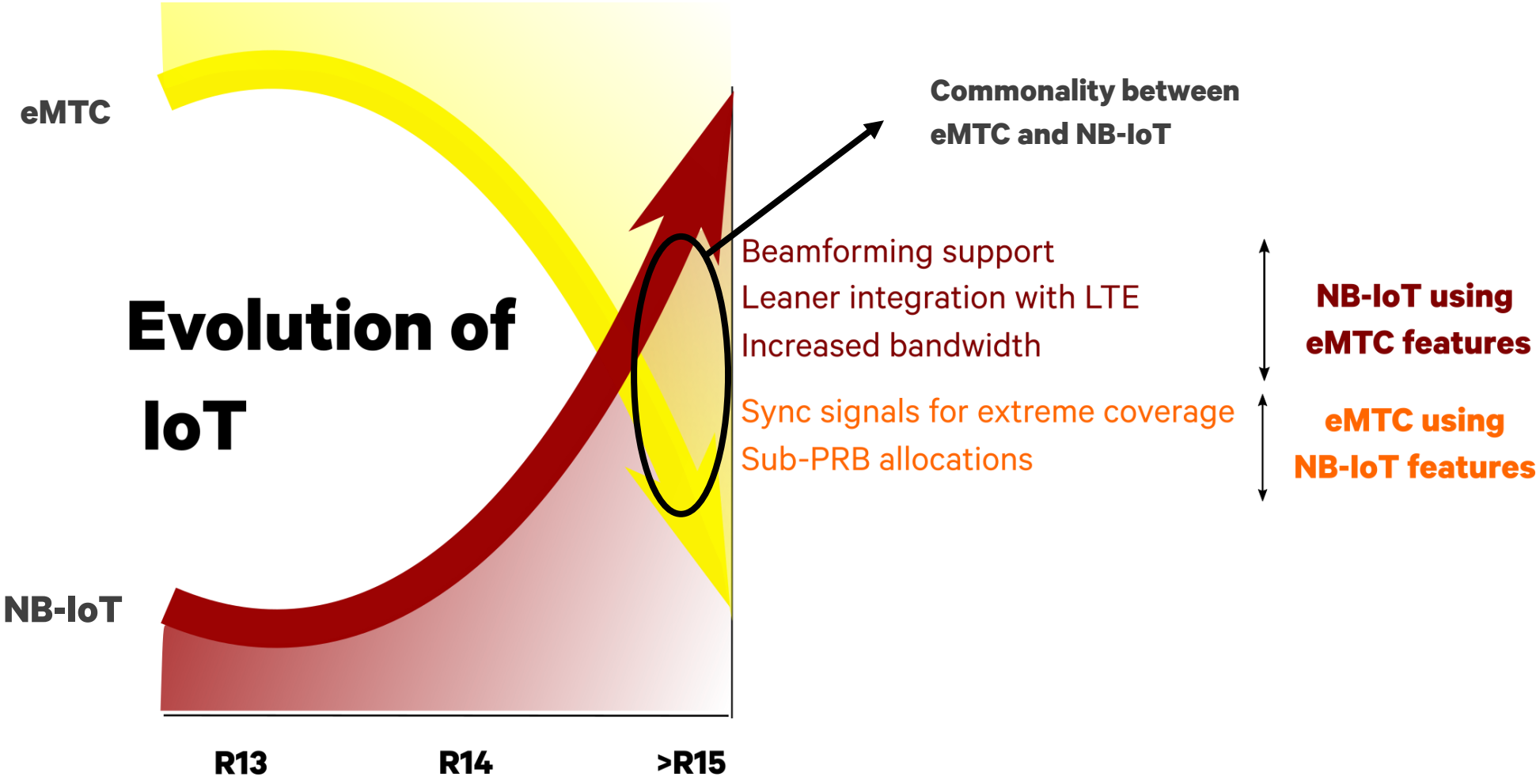
- Going forward, when considering addition of features in the overlap areas, there should always be sufficient justification that takes into consideration the different characteristics of the two technologies
  - Adding a feature to one technology **should not be done just because the other one already has it.**

- At the same time, no benefit in setting up artificial barriers
  - Adding a feature to one technology **should not be prevented just because the other one already has it.**

Proposed framework for technology evolution

- In future releases, allow to develop an **IOT UE** that has support for some eMTC features and for some NB-IoT features, depending in the use case. Some examples:
  - UE for downlink-heavy traffic but reduced uplink traffic
    - Adopt UL transmissions for NB-IoT and DL for eMTC with increased bandwidth
  - UE that always needs connectivity, with high data rates in good coverage and low rates in bad coverage
    - High category UE + eMTC coverage enhancement + use NB-IoT channels for extreme coverage

Proposed framework for technology evolution



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