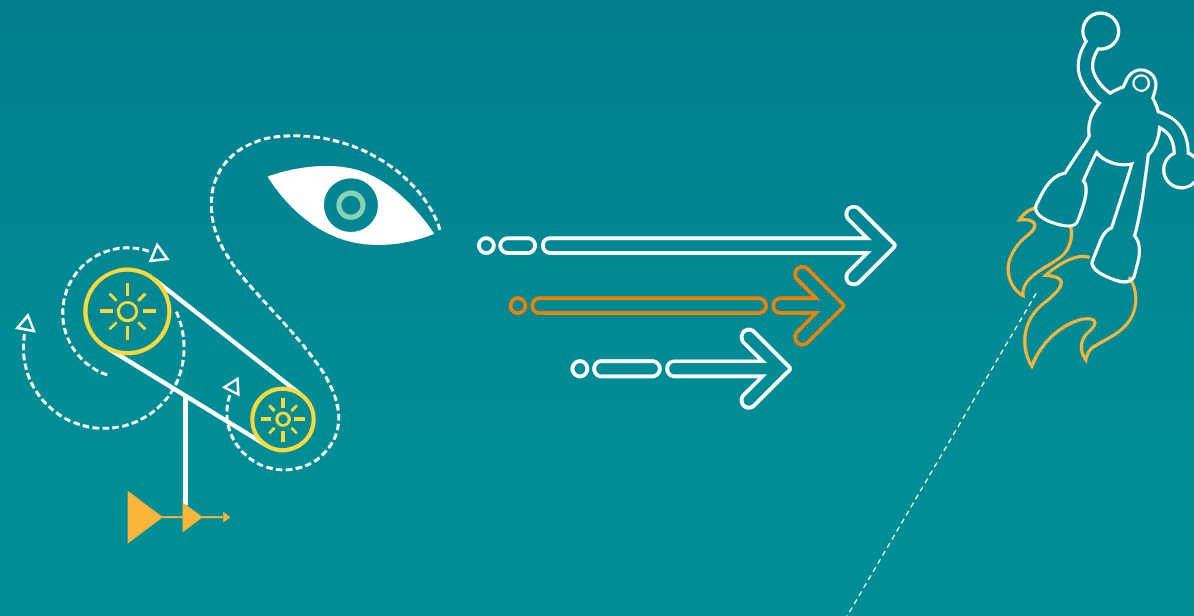


3GPP RAN #77
Sapporo, Japan, September 2017

RP-171652

On 5G IOT evolution

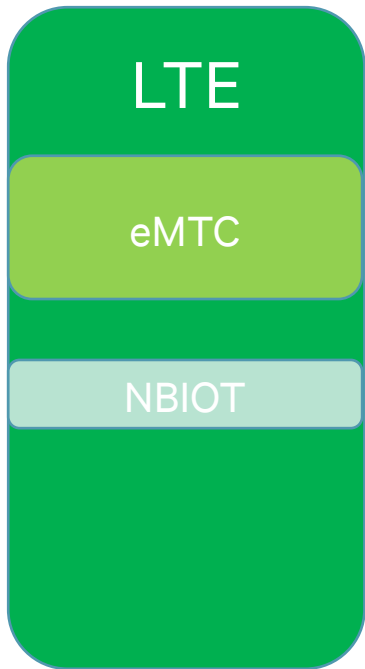


Principles of IOT evolution

- Enable deployment of NR in those bands where eMTC & NB-IoT (in band) have been deployed, without breaking backward compatibility
- Ensure continued evolution of eMTC & NB-IoT leveraging new technologies
 - Eg NOMA, mesh
- Provide a mMTC solution to NR
 - Note that current 5G/IMT-2020 mMTC requirements are essentially met by NB-IoT and eMTC
 - 164dB MCL, 10y battery life, large connection density, 10s latency, low complexity, etc.
 - eMTC/NB-IoT systems were designed with these requirements in mind

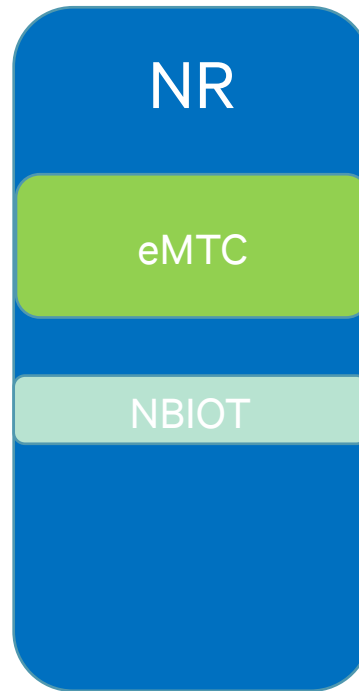
IOT evolution

Enabling in band to NR



Rel-13 to Rel-15

eMTC & NB-IoT in band to LTE

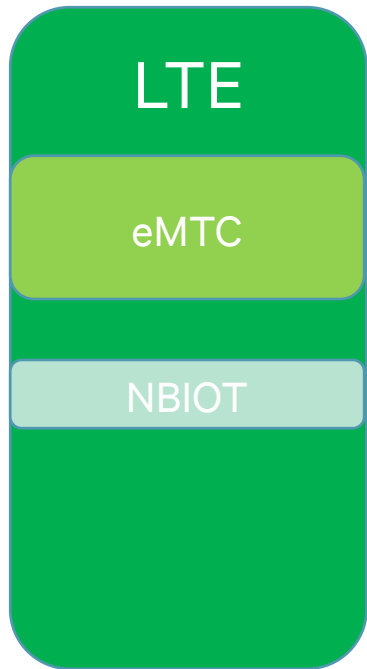


Rel-16 (proposed)

=> eMTC & NB-IoT in band within NR so to enable NR deployment in those bands

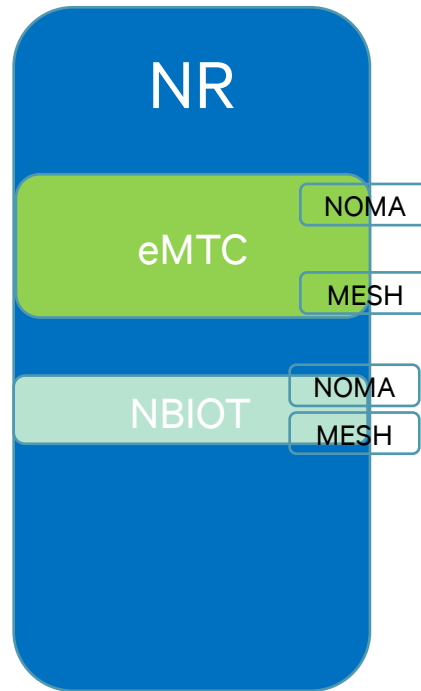
IOT evolution

Adding NOMA & Mesh



Rel-13 to Rel-15

eMTC & NB-IoT in band to LTE



Rel-16 (proposed)

=> eMTC & NB-IoT in band within NR so to enable NR deployment in those bands

=> Further, eMTC & NB-IoT continue to evolve (NOMA, mesh)

How a “5G IOT” work item could look like

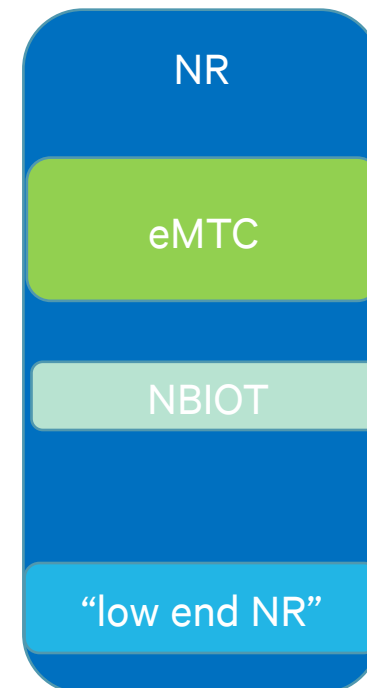
Key attributes / areas of study/specification

- Study in-band insertion of eMTC and NB-IoT in NR
- Study addition of NOMA to eMTC
- Study addition of NOMA to NB-IoT
- Study addition of mesh/multi-hop architecture to eMTC (will require a longer study part)
- Study addition of mesh/multi-hop architecture to NB-IoT (will require a longer study part)
- Extensions to unlicensed spectrum?

What about a NR-based IOT?

Introduction of further NR-based categories

- In parallel, or at a later point in time, there will be motivation to introduce a further category, NR-based, “designed from scratch”
 - Eg to support multi-beam to take advantage of massive MIMO base stations or to enable more dynamic resource multiplexing with NR eMBB and NR URLLC traffic
- ”Low end NR”
 - For example for “non-sensor” IOT use cases
- Timing for that to be discussed separately
 - When new motivations or new requirements are identified
 - That cannot be met by NB-IOT/eMTC



Conclusions

- Next phase of IOT evolution should be based on eMTC/NB-IoT
- Enable in-band deployment to NR
- Add NOMA & mesh
- Consider a newly designed "Low end NR" if & when new motivations & requirements emerge

Thank you

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