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RP-211065

Overload and Stability

TSG RAN#92

2021.06.14 – 18

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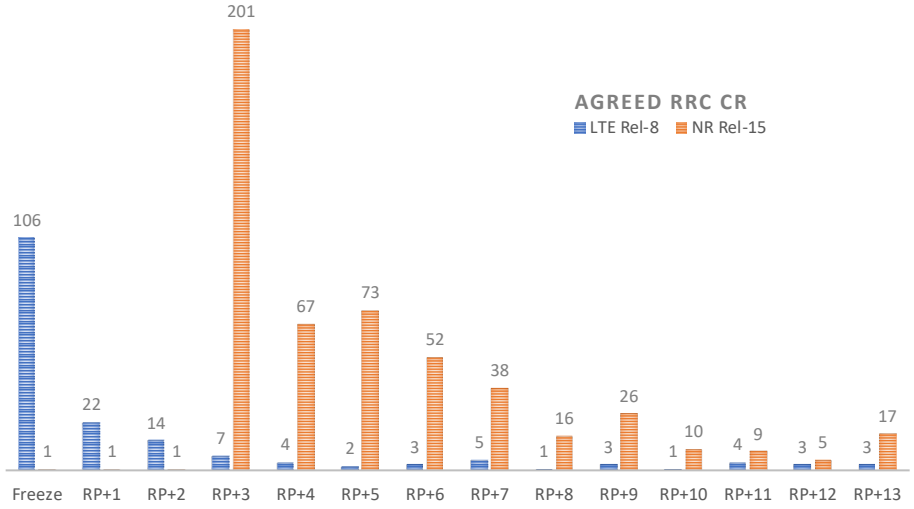
Stability Analysis

- **Viewpoint**
  - Analysis from RAN2 viewpoint (but same observations can be made for other groups) & focus on RRC since it is the aggregation point of all RAN features

- **Agreed RRC CRs after Freeze**
  - Comparing first LTE release (Rel-8) with first NR release (Rel-15)
    - LTE Freeze : March 2009
    - NR First Freeze : March 2018

- **Observations**
  - Stability of 1st NR Release is poor



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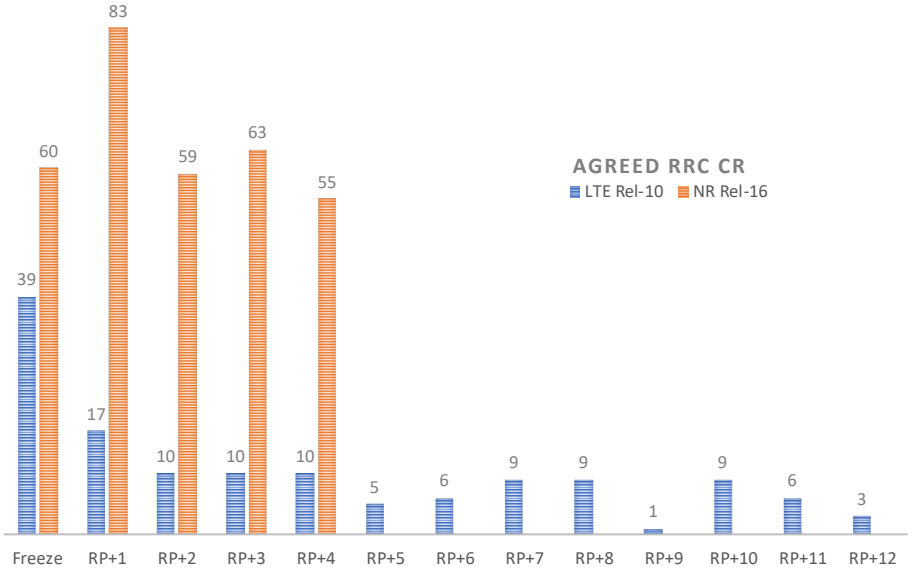
- **Agreed RRC CRs after Freeze**
  - Comparing first major LTE update (Rel-10) with second NR release (Rel-16)
    - LTE Freeze : June 2011
    - NR Freeze : June 2020

- **Observations**
  - Stability of 2nd NR Release is also poor

- **So why so many CRs ?**



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Complexity Analysis

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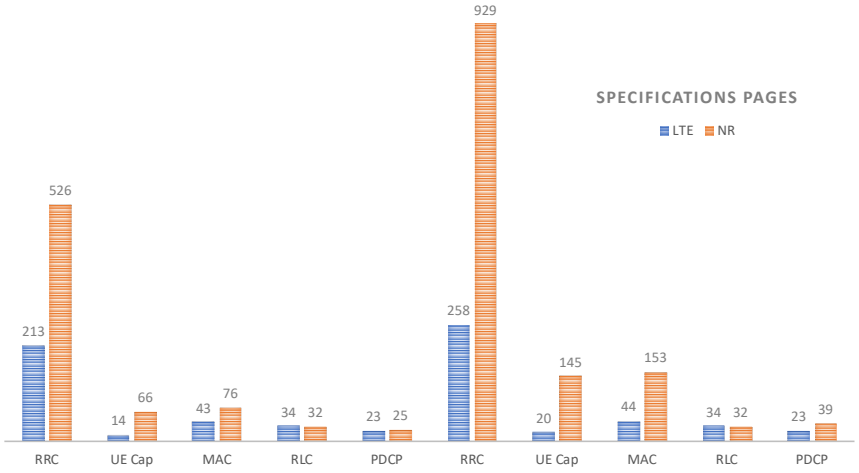
- **Why so many CRs ?**

1. NR is complex

- First NR release is much more complex than the LTE one
  - the further we get from L1, the more comparable to LTE NR becomes though
- Also, the delta between the first and 2nd release is much higher in NR than in LTE (e.g. R16 introduced 21 new WI in RAN2)
  - The overall complexity does not scale linearly with the number of features as features need to work together → exponential increase of complexity with the number of WI



LTE Rel-8 / NR Rel-15 LTE Rel-9 / NR Rel-16

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Flexibility Analysis

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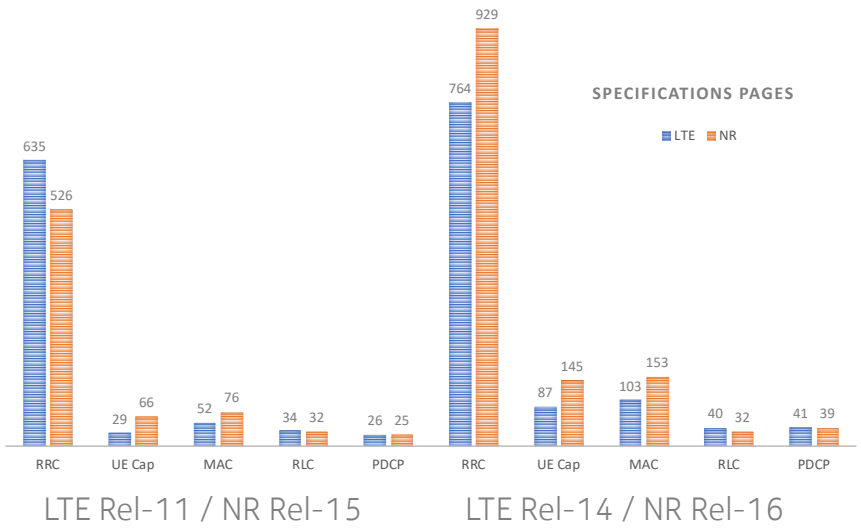
- **Why so many CRs ?**

2. NR is flexible

- First NR release introduced x10 more options and capabilities than LTE did, mostly related to L1, and even when comparing similar Releases*, NR still introduced a lot more options than LTE did

*Comparing LTE Rel-11 with NR Rel-15
truth is between Rel-11 and 12 (no D2D but DC)

Comparing LTE Rel-14 with NR Rel-16
not entirely fair since LTE also include NB-IoT, MTC…



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Relevance

- **Why does it matter ?**
  - Frozen releases can no longer be implemented right away
  - New features are delayed
  - Complex features cannot be deployed without IoDT issues
  - Precious resources are pulled away from new release work
  - TEI originating from real field issue can no longer be quickly addressed
  - Gap between standardization and implementation has increased significantly

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Going Forward

- **Possible Solutions**
  - Limit the number of agreed WIs
    with a very large part of the work taking place offline, TU allocation is currently not realistic
  - Limit the scope of agreed WIs
    and when items are agreed as 2nd priority, treat them as such in all WGs without any exception
  - Ensure that cross-WG aspects of all WIs are properly identified from the start
    and allocate appropriate TUs in all affected groups
  - Limit flexibility
    compromises including many options must be ruled out
    avoid specifying multiple solutions for a similar purpose
  - Freeze only what can be frozen
    and when a WI is not stable enough, move it (or at least the unstable objectives) to the next release
  - Set a clear milestone for conclusion of related UE capabilities
    physical layer features to be defined early enough to allow freeze no later than overall ASN.1 freeze

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