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Motivation for study on multi-RAT energy efficiency enhancement

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/01 Background and scenarios

- **Background**
  - The power consumption of 5G base station, composing of BBU and AAU (e.g. 64T64R AAU with 192 AE), is 3~4 times of power consumption of 4G base station. The OPEX on power consumption will be unaffordable costs for operators when 5G network is large-scale deployed in several years. Even though the traffic is low at the start of 5G commercial deployment, the power consumption of 5G base station is still be 2~3 times of power consumption compared to 4G station.
- **Scenarios**
  - **Scenario 1** :For the overlapping area of 4G and 5G network, 4G network is deployed with multiple carriers, such as B1 and B3, and 5G network is single carrier in 3.5GHz.
  - **Scenario 2**: For the overlapping area of 4G and 5G network, both 4G and 5G network are single carrier.
  - **Scenario 3**: For the overlapping area of 4G and 5G network, 4G network is deployed with single carrier, such as B3, 5G network are multiple carrier in 3.5GHz and mmWave.

Motivations

- In E-UTRAN, energy saving is considered when the second LTE carrier and more carriers are deployed for LTE capacity boosting. When the traffic load decreases to some threshold, some energy saving solutions will be activated for the capacity layer/carrier, such as antenna port switching off, carrier switching off and etc. But these requirements may be different as operators requires for efficient, intelligence energy saving solutions when they start to deploy 5G base station.
- In RAN-Centric DCU SI, inter-RAT inter-system energy saving solution is studied to support for indicating the switch-off action by NG-RAN nodes to eNB, NR cell re-activation based on neighbour’ s traffic load information, etc., over S1 and NG interface. These mechanisms may not be sufficient for inter-vendor scenarios, as the energy efficiency of the network might not be optimized for inter-RAT energy saving scenarios (such as 4G and 5G).
- Thus, the energy efficiency enhancement for multi-RAT network, such as E-UTRAN and NG-RAN, is required for optimizing energy efficiency for multi-RAT scenarios than existing solutions.

Objectives

EEE for Multi-RAT in RAN

- Study the multi-RAT energy saving enhancement solution for inter-RAT inter-system scenarios.
  - Study the enhancement mechanism for multi-RAT scenarios for inter-vendor scenarios, cooperated with AI/ML solution.
  - Study the potential impacts on S1 and NG interface, X2 and Xn interface.

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