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Functional Split Impact on RRU Power Consumption

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Analyzing NGFI Impact on Energy Efficiency

- 1914.1 should take into consideration the impact the functional split might have on Energy Efficiency (EE) of 5G networks.
- Splitting the baseband processing functions shifts processing load to the RRU, which in the case of macro cells, is placed at or near the top of towers (>300ft).
- Thus RRU power consumption is expected to increased due to increased pre-amplifier processing.
- Impact on EE is mostly due to power loss in power cables that deliver power from base to top of tower.
- Power loss in cable is proportional to the square of current through cable ($P_L = R_c * I_{RRU}^2$), thus dissipated power increases nonlinearly with increased RRU current draw.

Balancing the EE Equation

- On one side of the equation, BBU function virtualization in C-RAN does increase EE by centralizing processing load, reducing cooling and power consumption at the base of cell site.
- On the other side of the equation, increasing power demand at the top of the tower means more power dissipation in power delivery cables.
- Offsetting power loss by increasing cable efficiency, such as increasing cable cross-sectional width to reduce R_C, means using more copper, however that also creates a negative environmental impact as Copper is a limited natural resource.

Suggestions for 1914.1

- RRU vendors can help by providing test data, when available, to quantify power consumption increase in the RRU resulting from the functional split.
- If necessary, energy efficient designs should be explored to offset power consumption increase introduced new functionality in RRU.
- 1914 WG should include the impact on EE as one of the affected factors under consideration, not just the data rate performance.
- Analyzing NGFI impact on EE can be challenging as there are many parameters consider, however, that should not preclude us from assessing any environmental impacts as this projects matures.

Questions or Comments?