3GPP TSG RAN Meeting #101
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Views on Rel. 19 Network Energy Savings Enhancements

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Motivation

Customers and investors increasingly demand sustainability initiatives

Sustainability programs can also mitigate operational costs, energy consumption incl. electricity related ones ranking the highest among them

The RAN is responsible for over half of the energy consumption in a mobile network split roughly equally between air conditioning and equipment *)

The radio and especially the power amplifiers are the largest energy consumers not related to air conditioning *)

*) NGMN. Green Future Future Networks—Network Energy Efficiency. 2021. https://www.ngmn.org/wp-content/uploads/211009-GFN-Network-Energy-Efficiency-1.0.pdf

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Observations

Sustainability and energy efficiency are not a burden but an opportunity
Specifically, improved energy efficiency at the network side and improved power efficiency at the UE side must be jointly considered and, ideally, optimized

Sustainability and energy efficiency are not zero-sum and must benefit everyone in the ecosystem

Specifically, implementation complexities for both the network and UE need to be considered in addition to operational efficiency improvements for operators

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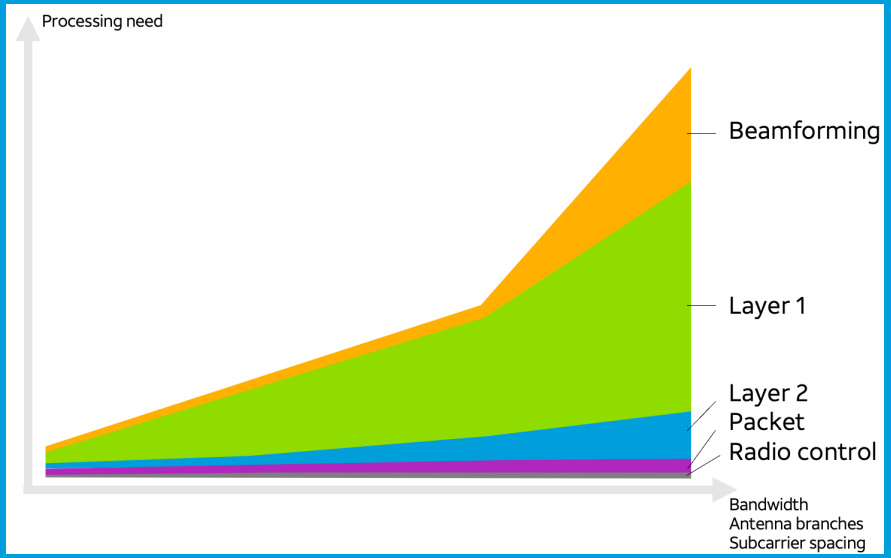
Some More Observations

5G NR delivered many firsts

- Massive MIMO
- Larger bandwidths
- Higher frequencies
- Shorter transmission time intervals (TTI)
- …



Operational efficiency improvements must be at the core of the evolution of 5G NR and 5G-Advanced must provide the foundation for 6G systems with significantly improved cost and energy efficiency

Scope of Rel. 19 Network Energy Savings Enhancements

Multi-carrier enhancements

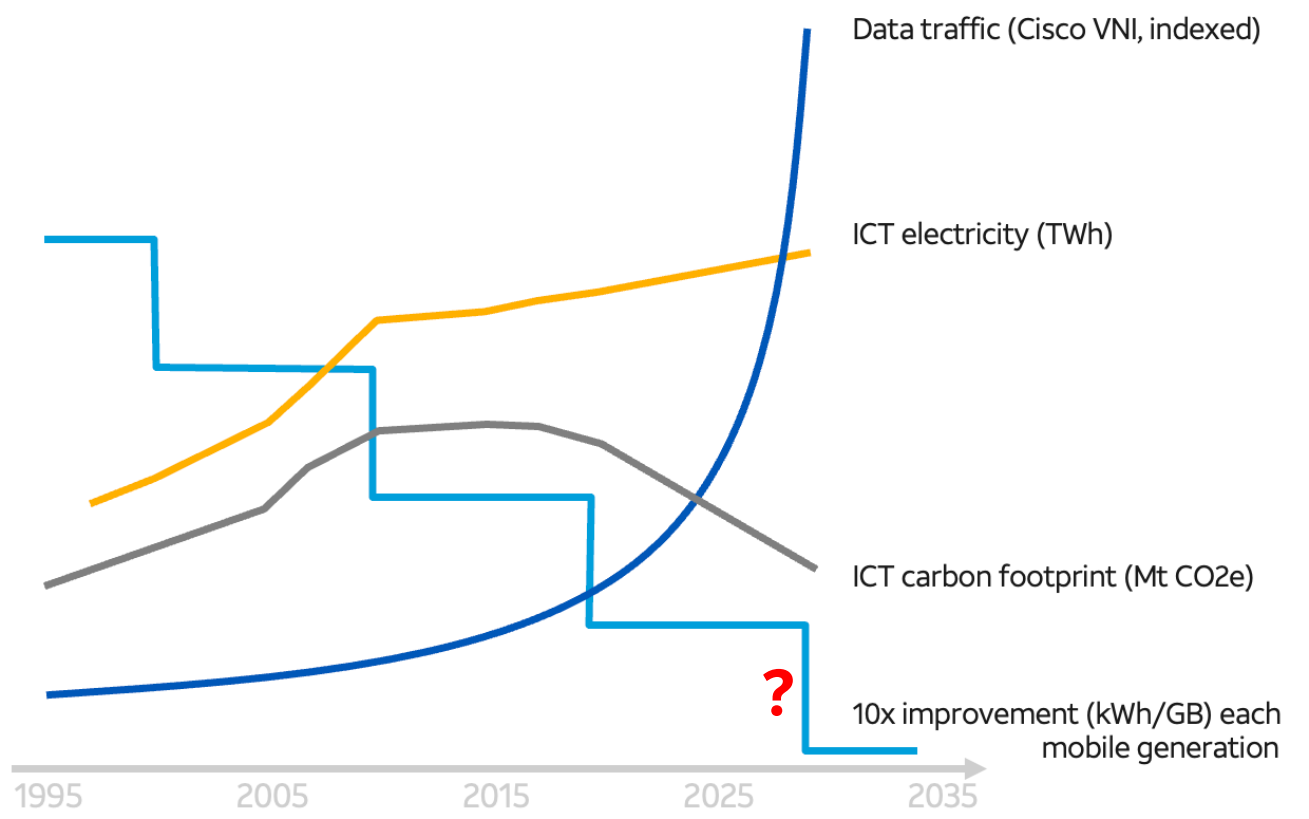
High-load enhancements

Complexity Improvements

Higher Layer Aspects

Rel. 18 Leftovers

SSB related enhancements



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Potential Rel. 19 Multi-Carrier Network Energy Savings Enhancements

Adaptation of common signals/channels

Rel. 18 mainly focused on UE-specific signals/channels

Rel. 19 should thus focus on the transmission of common signals/channels

Extend the “intra-carrier” 5G NR lean design across carriers/cells

At least CA scenario should be considered for common signal/channel reduction

Specify anchor cell concept similar to NB-IoT with SSB-less or on-demand SSB

In addition to network-based approaches optionally reuse existing signal/channel (e.g., PRACH) for SSB triggering taking into account network energy consumption for its reception

Specify necessary enhancements to support RRM (e.g., DRS)

Paging enhancements and other time-domain reductions of common signals/channels

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Potential Rel. 19 High Load Network Energy Savings Enhancements

Network energy savings in high load scenarios

Rel. 18 mainly focused on low load scenarios

Rel. 19 should thus enhance high load scenarios (time, spatial, and power domains)

Complete Rel. 18 study on power domain techniques for potential standardization of over the air digital pre-distortion and UE post distortion

Continue to drive simplification into 5G NR procedures specifically relating to massive antenna deployments incl. network energy savings enhancements for multi-TRP scenarios

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Potential Rel. 19 Other Network Energy Savings Enhancements

Higher-Layer Aspects

Specify cell shutdown enhancements that allow for faster cell on/off

Rel. 18 Left-Overs

Rel. 18 work item was extremely short due to preceding study item

Rel. 19 should thus allow for completion of Rel. 18 work incl. overhead/complexity reduction for multiple CSI in one reporting occasion

SSB related enhancements

Support beam-specific SSB power configuration for non-uniform spatial coverage

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