

5G Energy Efficiency

S5-243093

Release 19 Study on energy efficiency and energy saving aspects of 5G networks and services

- 📶 The study item is described in [SP-231723](#)
- 📶 The study includes 5 Work Tasks (WTs):
 - **WT-1: Left-over SA5 topics from Rel-18**
 - WT-1.1 Study new or enhanced Energy Consumption (EC) and Energy Efficiency (EE) KPIs and measurements, e.g. for new types of network slices, RAN sharing, etc.
 - **WT-1.2 Consideration of containerized VNFs, study enhancements to virtualized NF EC KPIs, including containerized VNF/VNFCs, and possible impacts to metrics collected from NFV MANO so as to be able to estimate their energy consumption based on e.g. their virtual CPU usage, virtual memory usage, etc.**
 - WT-1.3 Study new use cases, requirements and solutions for energy efficiency and energy saving, applying to NG-RAN and/or 5GC and/or network slicing, (including but not limited to intent based, analytics based and AI/ML assisted energy saving)
 - WT-1.4 Study deployment scenarios involving multiple actors, e.g. in case of passive RAN sharing, active RAN sharing, MNO VNFs hosted on private cloud or public cloud, etc

Release 19 Study on energy efficiency and energy saving aspects of 5G networks and services

- **WT-2: New Rel-19 topics from other SA WGs**
- **WT-3: OAM support to new Rel-19 RAN energy saving features**
- **WT-4: Coordination with other SDOs / fora to build comprehensive and consistent solutions for EE**
- **WT-5: Other**

Release 19 Study on energy efficiency and energy saving aspects of 5G networks and services



- 📶 WT-1.2 -> Energy Consumption of 5G Network Functions
 - Rel-17
 - Focus on VM-based VNF/VNFs
 - EC is estimated based on vCPU usage of underlying virtual compute resource instance
 - Rel-18
 - Still focused on VM-based VNF/VNFs
 - EC can be estimated based on vCPU usage, vMemory usage, vDisk usage, I/O traffic

Energy Consumption of 5G Network Functions in Rel-19 (1/2)



- 📶 To be addressed in Rel-19, wrt. Energy Consumption of 5G Network Functions
 - Consider Container-based VNF/VNFs (terminology under discussion in Rel-19 study on Cloud Aspects of Management and Orchestration)
 - Two approaches being studied:
 - Extend the Rel-17/18 approach for estimating the Energy Consumption of Container-based VNF/VNFs
 - New approach aiming at measuring the actual Energy Consumption of Container-based VNF/VNFs
 - A potential solution is being investigated for both approaches if the new ETSI NFV performance measurements defined in IFA 027 (to be published) collected from ETSI NFV MANO could be used.

Energy Consumption of 5G Network Functions in Rel-19 (2/2)



- Both approaches have pros and cons, and will be further investigated in SA5
- Other approaches may be studied, some of which may not be based on ETSI NFV MANO
- Energy consumption KPIs at VNF and VNFC level would be required for container-based solution from ETSI NFV MANO to be used in SA5.

Summary

- 📶 The current 3GPP SA5 Rel-19 study item on EE is expected to be completed by August 2024, and normative phase is planned for Sept. 2024 to Sept. 2025
- 📶 SA5 expects that the two approaches (cf. previous slides) will have solutions in Rel-19
- 📶 Requests to ETSI NFV:
 - 📶 Energy consumption KPIs at VNF and VNFC level would be required for container-based solution from ETSI NVF MANO to be used in SA5.
 - 📶 SA5 asks ETSI NFV to inform SA5 as soon as IFA 027 Release 5 has been published, so that SA5 can use it to investigate the potential solutions for new EE KPIs.

Thank you !