**3GPP TSG-SA5 Meeting #158 *S5-247115***

Orlando, USA, 18 - 22 November 2024

**Source: Huawei**

**Title: Update annex A**

**Document for: Approval**

**Agenda Item: 6.19.20**

# 1 Decision/action requested

***The group is asked to discuss and agree on the proposal.***

# 2 References

[1] 3GPP TR 28.880 v1.1.0: Study on energy efficiency and energy saving aspects of 5G networks and services

# 3 Rationale

This contribution proposes to update Annex A Rel-19 SA1 requirements on energy consumption / energy efficiency in TR 28.880 [1] based on the latest progress of SI.

# 4 Detailed proposal

This document proposes the following changes in TR 28.880 [1].

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| **1st Change** |

Annex A:
Rel-19 SA1 requirements on energy consumption / energy efficiency

Table A-1 provides the list of SA1 requirements with respect to 5G Energy Consumption/Energy Efficiency (see 3GPP TS 22.261 [7]) and identifies which of those may find a solution to be provided in Rel-19 by SA5 OAM.

Table A-1: Analysis of Rel-19 SA1 requirements on energy consumption / energy efficiency

| Id. | Requirement | 3GPP TS 22.261 [7], clause | In scope of SA5 OAM in Rel-19 | Observation |
| --- | --- | --- | --- | --- |
| **Energy efficiency** |
| 1 | The 5G access network shall support an energy saving mode with the following characteristics:- the energy saving mode can be activated/deactivated either manually or automatically;- service can be restricted to a group of users (e.g. public safety user, emergency callers).NOTE: When in energy saving mode the UE's and Access transmit power may be reduced or turned off (deep sleep mode), end-to-end latency and jitter may be increased with no impact on set of users or applications still allowed. | 6.15.2 | Yes | Already partially supported.- Energy saving mode already supported at cell level.- Restriction of service to a group of users for energy saving purposes is not supported. |
| 2 | The 5G system shall support mechanisms to improve battery life for a UE over what is possible in EPS. | 6.15.2 | FFS |  |
| 3 | The 5G system shall optimize the battery consumption of a relay UE via which a UE is in indirect network connection mode. | 6.15.2 | FFS |  |
| 4 | The 5G system shall support UEs using small rechargeable and single coin cell batteries (e.g. considering impact on maximum pulse and continuous current). | 6.15.2 | FFS |  |
| **Energy related information as a service criteria** |
| 5 | Subject to operator's policy, the 5G system shall support subscription policies that define a maximum energy credit limit for services without QoS criteria. | 6.15a.2.2 | No |  |
| 6 | Subject to operator's policy, the 5G system shall support a means to associate energy consumption information with charging information based on subscription policies for services without QoS criteria. | 6.15a.2.2 | No |  |
| 7 | Subject to operator's policy, the 5G system shall support a mechanism to perform energy consumption credit limit control for services without QoS criteria. NOTE 1: The result of the credit control is not specified by this requirement.NOTE 2: Credit control [49] compares against a credit control limit. It is assumed charging events are assigned a corresponding energy consumption and this is compared against a policy of energy credit limit. It is assumed there can be a new policy to limit energy consumption allowed. | 6.15a.2.2 | No |  |
| 8 | Subject to operator's policy, the 5G system shall support a means to define subscription policies and means to enforce the policy that define a maximum energy consumption (i.e. quantity of energy for a specified period of time) for services without QoS criteria.NOTE 3: The granularity of the subscription policies can either apply to the subscriber (all services), or to particular services. | 6.15a.2.2 | No |  |
| 9 | The 5G system shall provide a mechanism to include Energy related information as part of charging information. | 6.15a.2.2 | No |  |
| 10 | Subject to operator policy and agreement with 3rd party, the 5G system shall provide a mechanism to support the selection of an application server based on energy related information associated with a set of application servers. | 6.15a.2.2 | FFS |  |
| 11 | Subject to user consent and operator policy, 5G system shall be able to provide means to modify a communication service based on energy related information criteria based on subscription policies. | 6.15a.2.2 | No | The use case and potential requirement for energy saving by converting QoS of a service are described in clause 5.8. There is no potential solution for this use case. Therefore, no Rel-19 normative work is foreseen. |
| 12 | Subject to user consent, operator policy and regulatory requirements, the 5G system shall be able to provide means to operate part or the whole network according to energy consumption requirements, which may be based on subscription policies or requested by an authorized 3rd party. | 6.15a.2.2 | Yes | Clause 5.11 Use case #11: Handling of power shortages |
| **Support of different energy states** |
| 13 | The 5G system shall support different energy states of network elements and network functions. | 6.15a.3.2 | Yes | Cell and UPF already support two energy saving state values. |
| 14 | 5G system shall support dynamic changes of energy states of network elements and network functions.NOTE: This requirement also includes the condition when providing network elements or functions to an authorized 3rd party, the dynamic changes can be based on pre‑configured policy (the time of changing energy states, which energy state map to which level of load, etc.) | 6.15a.3.2 | Yes | Cell and UPF already support two energy saving state values. |
| 15 | The 5G system shall support different charging mechanisms based on the different energy states of network elements and network functions. | 6.15a.3.2 | No |  |
| **Monitoring and measurement** |
| 16 | Subject to operator's policy, the 5G network shall support energy consumption monitoring at per network slice and per subscriber granularity.NOTE 1: Energy consumption monitoring as described in the preceding requirement is done by means of averaging or applying a statistical model. The requirement does not imply that some form of 'real time' monitoring is required. The granularity of the subscription policies can either apply to the subscriber (all services), or to particular services. | 6.15a.4.2 | Partially | Per network slice EE KPI already defined.Per-subscriber EC/EE KPI is not in scope of SA5 OAM. |
| 17 | Subject to operator's policy and agreement with 3rd party, the 5G system shall be able to monitor energy consumption for serving this 3rd party.NOTE 2: The granularity of energy consumption measurement could vary according to different situations, for example, when several services share a same network slice, etc.NOTE 3: The energy consumption information can be related to the network resources of network slice, NPNs, etc. | 6.15a.4.2 | Yes | Per network slice energy consumption KPI already defined. Ref clause 6.7.3.3 Network Slice Energy Consumption (EC) in TS 28.554 for further detail. |
| 18 | Subject to operator policy and regulatory requirements, the 5G system shall be able to monitor the energy consumption for serving the 3rd party, together with the network performance statistic information for the services provided by that network, related to same time interval e.g. hourly or daily.NOTE 4: The network performance statistic information could be the data rate, packet delay and packet loss, etc. | 6.15a.4.2 | Yes | Per network slice energy consumption KPI and together with the network performance statistic information for network slice already defined. Ref clause 6.7.3.3 Network Slice Energy Consumption (EC) in TS 28.554 for further detail. Network performance statistic information for network slice see TS 28.552. |
| **Information exposure** |
| 19 | Subject to operator's policy and agreement with 3rd party, the 5G system shall be able to expose information on energy consumption for serving this 3rd party.NOTE 1: Energy consumption information can include ratio of renewable energy and carbon emission information when available. The reporting period could be set, e.g. on monthly or yearly basis and can vary based on location.NOTE 2: The energy consumption information can be related to the network resources of network slice, NPNs, etc. | 6.15a.5.2 | Yes | Clause 5.4 Use case #4: Exposure of carbon and renewable energy related information |
| 20 | Subject to operator's policy, agreement with 3rd party and consent by the customer, the 5G system shall be able to expose the network performance statistic information (e.g. the data rate, packet delay and packet loss) together with energy consumption information resulting from service provided to the customer, to the authorized third party, related to the same time interval e.g. hourly or daily. | 6.15a.5.2 | Yes | Per network slice energy consumption KPI and together with the network performance statistic information for network slice already defined. Ref clause 6.7.3.3 Network Slice Energy Consumption (EC) in TS 28.554 for further detail. Network performance statistic information for network slice see TS 28.552. |
| 21 | Subject to operator's policy, the 5G system shall support a means to expose energy consumption to authorized third parties for services, including energy consumption information related to the condition of energy credit limit (e.g. when the energy consumption is reaching the energy credit limit). | 6.15a.5.2 | FFS |  |
| 22 | Subject to operator policy, the 5G system shall provide means for the trusted 3rd party, to configure which network performance statistic information (e.g. the data rate, packet delay and packet loss) for the communication service provided to the 3rd party, needs to be exposed along with the information on energy consumption for serving this 3rd party. | 6.15a.5.2 | FFS | Use case #4: Exposure of carbon and renewable energy related information enables network performance statistic information (e.g. the data rate, packet delay and packet loss) for the communication service provided to the 3rd party to be exposed along with the information on energy consumption for serving this 3rd party. |
| 23 | Based on operator's policy and agreement with 3rd party, the 5G system shall be able to expose energy consumption information and prediction on energy consumption of the 5G network per application service to the 3rd party. | 6.15a.5.2 | FFS |  |
| 24 | Subject to operator's policy and agreement with 3rd party, the 5G system shall support a mechanism for the 3rd party to provide current or predicted energy consumption information over a specific period of time. | 6.15a.5.2 | Partially | Use case #4: Exposure of carbon and renewable energy related information enables providing current energy consumption information over a specific period of time. |
| **Network actions leveraging energy efficiency as a service criteria** |
| 25 | Subject to regulatory requirements and operators' policies, the 5G system shall enable an operator to temporarily serve UEs of other operators within a geographical area for the purpose of saving energy of the other operators.NOTE 1: The other operators are assumed to stop providing access to their own network infrastructure within the same geographical area to save energy during that time.NOTE 2: Policies may include predefined times/locations, energy consumption/efficiency thresholds, etc.NOTE 3: It is assumed that the 5G system can collect charging information associated with serving UEs of other operators. | 6.15a.6.2 | FFS |  |

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| **End of change** |