**3GPP TSG-SA5 Meeting #150 S5-235zzz**

**Goteborg, Sweden, August 21-25, 2023 was S5-235zzz**

**Source: Samsung, ...**

**Title: Rel-18 pCR 28.ABC clause 4 Overview**

**Document for: Approval**

**Agenda Item: 6.6.4.1 (NSOEU\_WoP#1) General**

# 1 Decision/action requested

***The group is asked to discuss and approve the proposals.***

# 2 References

This pCR is motivated by reference to preceding work relevant to the feature.

[1] 3GPP TR 22.867, "Study on 5G smart energy and infrastructure".

[2] 3GPP TS 22.104, "Service requirements for cyber-physical control applications in vertical domains".

[3] 3GPP TS 22.261, "Service requirements for the 5G system".

[4] 3GPP TR 28.829, "Study on network and service operations for energy utilities".

# 3 Rationale

The overview will provide an introduction to the TS that clarifies which functionality is supported and why. The overview provides a bit of background, mentioning the overall objectives that were concluded in the SA1 FS\_5GSEI study [1] and then added as normative requirements. [2] [3]

The three supported use cases described in TR 28.829 [4] are explained.

Some of the material from TRs 22.867 [1] and TR 28.829 [4] is summarized.

# 4 Detailed proposal

It is proposed to agree to the following change to TS 28.318, 0.0.0.

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| **Begin Change** |

# 2 References

The following documents contain provisions which, through reference in this text, constitute provisions of the present document.

- References are either specific (identified by date of publication, edition number, version number, etc.) or non‑specific.

- For a specific reference, subsequent revisions do not apply.

- For a non-specific reference, the latest version applies. In the case of a reference to a 3GPP document (including a GSM document), a non-specific reference implicitly refers to the latest version of that document *in the same Release as the present document*.

[1] 3GPP TR 21.905: "Vocabulary for 3GPP Specifications".

[G] IEC "Bringing intelligence to the grid", International Electrotechnical Commission, Geneva, Switzerland, 2018. https://www.iec.ch/basecamp/bringing-intelligence-grid <accessed: 12.7.23>

[H] IEEE SMARTGRID, "Standards", IEEE, 2023. https://smartgrid.ieee.org/about-ieee-smart-grid/standards <accessed: 12.7.23>

[I] [A] Sendin, A., Stafford, J., Grilli, A., "Utilities and Telecommunications in a Nutshell", EUTC, Ediciones Experiencia, 2022.

[J] 3GPP TS 22.104, " Service requirements for cyber-physical control applications in vertical domains; Stage 1".

[K] 3GPP TS 22.261, " Service requirements for the 5G system; Stage 1".

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| **Next Change** |

# 4 Overview

## 4.1 General

The present document specifies exposed management services that enable improved operation of energy utility networks used for energy distribution. Energy service can be logically considered as four components: generation, transmission, distribution and consumption points. In a typical energy system, there are few centralized generation facilities (e.g. nuclear, thermal and hydro plants), where nature's energy is converted into electricity. Then, there are a limited number of high power transmission lines covering great distance with the minimum of energy loss. Then, a great many sites are part of medium and low voltage distribution networks. The distribution system transforms and delivers energy to customers. Finally, there is an extremely large number of consumption points (i.e. every household, business, public infrastructure site such as traffic lights at an intersection.) This simple model of the energy service delivery system is depicted in Figure 4.1-1.



Figure 4.1-1: Energy service delivery system

Diverse standardized "smart grid" services are used to manage the energy system effectively - with high availability, safety and efficiency. IEC, IEEE and other organizations standardize these services. [G] [H] To support these services, diverse communication systems are employed, including fiber optic, mobile telecommunications, power line communications and others. The services are generally defined at the application layer, meaning that they can operate over any access. The choice of which access to employ is made by energy service operators, and is determined by many factors outside of the scope of the present document. In many deployments, the choice is to employ mobile telecommunications to support smart grid services. [I]

Since there are few energy generators and the requirements of transmission facilities are not changing that much over time, the focus for smart energy services and the communication systems that they rely on are mainly on distribution services. The distribution grid is the part of the energy system that is on the outer part of the system, the one closer to end-customers and, thus, the most extensive one. It is here that the energy system is changing fastest, as distributed energy generation, distributed energy storage and other trends disrupt the simpler top-down hierarchy of generation, transmission, distribution, consumption. Though there are smart grid services associated with consumption and distributed generation, these use cases and requirements have not been further developed as part of the present document.

Supporting the communication requirements of the distribution system is the focus of the present document. These networks, operated by Distribution System Operators (DSOs), aim at extremely high availability. The services employed in the distribution system include SCADA and DA, which can detect and correct abnormalities, reconfigure and restart services rapidly. If remote operations and monitoring is not available, even for a short time, it can result in service outages of much longer duration, often requiring manual intervention by a service technician sent to the affected site.

An important form of 'fate sharing' exists between mobile telecommunications networks and the energy system. If energy service interruptions persist, the mobile telecommunications network will also become unavailable once the sites' independent energy storage and generation capacity are exhausted. If the mobile telecommunications service is interrupted, smart grid services will also be interrupted in a significant number of sites, leading to increasing risk of energy service outages over time. These scenarios are considered further in the present document.

Telecom management service exposure requirements, procedures and solution set details are specified to improve communication service availability to DSOs.

## 4.2 Background

The topics described in clause 4.1 have been considered in stage 1 standardization in 3GPP. Relevant requirements are specified in TS 22.104 [J] and TS 22.261 [K]. These requirements are shown in Table 4.2-1.

Table 4.2-1: Relevant Service Requirements

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| Reference | Requirement | Relation to the present document |
| TS 22.261, 6.23.2 | The 5G system shall provide a means by which an MNO informs a third party of network events (failure of network infrastructure affecting UEs in a particular area, etc.). | Motivates clause 5.A.  |
| TS 22.261, 6.23.2 | Based on MNO policy, the 5G system shall provide a mechanism to automatically report service degradations, communications loss, and sustained connection loss in a specific geographic area (e.g., a cell sector, a cell or a group of cells) to a third party. [NOTE1] | Motivates clause 5.B. |
| TS 22.104, 9.2 | Subject to regulatory requirements and operator policy, the 5G system shall support a mechanism by which an MNO can identify the ability of the MNO's infrastructure to continue operation despite a lack of electrical supply service, specifying which physical regions would be affected in terms of physical topology and the remaining time in which operation is possible. [NOTE2] | Motivates clause 5.C. |
| TS 22.104, 9.2 | Subject to regulatory requirements, the 5G system shall support a mechanism by which a third party can, in the event of an energy distribution system service interruption, communicate the energy distribution system recovery status in terms of location and time table to the MNO. [NOTE3] | Motivates clause 5.D. |
| [NOTE1] These reports use a standard format. The specific values, thresholds, and conditions upon which alarms occur can include the measured values for end-to-end latency, service bit rate, communication service availability, end-to-end latency jitter, etc. for a UE, the UE’s location, and the time(s) during which the degradation occurred.[NOTE2] This information can facilitate energy distribution system recovery operations.[NOTE3] This information can facilitate MNO operations to facilitate energy system recovery. |

The stage 1 service requirements in Table 4.2-1 were considered to motivate and scope an investigation of stage 1 telecom management requirements. The motivation, use cases and normative stage 1 requirements that are introduced by the present specification is described in the subclauses of clause 5.

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| **End of Changes** |