**3GPP TSG-SA5 Meeting #142-e *S5-222270rev2***

**e-meeting, 4 - 12 April** **2022**

**Source: Huawei**

**Title: Key Issue on Resource isolation demand for Smart Grid Utilities**

**Document for: Approval**

**Agenda Item: 6.5.17**

# 1 Decision/action requested

***Discuss and approve on the proposal.***

# 2 References

[1] TR 28.907 Study on enhancement of management of non-public networks v0.0.0

[2] TS 22.867 Study on 5G Smart Energy and Infrastructure v18.2.0

# 3 Rationale

Smart Grid is a representative utility for 5G. 3GPP SA1 has standardized use cases, potential new service requirements for 5G system to support Smart Grid in Rel-18. Isolation demand for energy applications is an important use case in Smart Grid with details in clause 5.9 of TS 22.867 [2].

**TS 22.867:**

*According to the regulation of China Grid industry, the power grid business is mainly divided into two working categories: production control and information management. The production control can be further divided into safety zone I and safety zone II. All the real-time monitoring, detection, and controlling energy production applications belong to safety zone I. And other non-controlling energy production applications belong to the safety zone II. The information management also can be further divided into safety zone III and safety zone IV. The applications belong to the safety zone III are information systems for power production, while the internal information services for the energy enterprises belong to safety zone IV. Following Table 5.9.1-1 lists the typical applications belong to different safety zones.*

Table 5.9.1-1: typical safety zone and related energy application

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| **Safety Zone type** | **Typical energy applications** |
| I | distribution automation system, substation automation system, relay protection, distributed energy storage, etc. |
| II | Reservoir dispatch automation system, electric energy metering system, relay protection and fault recording information management system, etc. |
| III | Dispatch production management system (DMIS), lightning monitoring system, power line inspection, statistical report system, etc. |
| IV | Management Information System (MIS), Office Automation System (OA), Customer Service System, etc. |

*According to, different kinds of safety isolation requirements are applied to different safety zones:*

*a) The energy applications belong to production control category i.e. safety zone I and II need to be physically isolated from other applications which don't belong to production control working category.*

*b) The energy applications belong to information management working category i.e. safety zone III and IV can be logically isolation from other applications including non-energy applications.*

*c) The energy applications belong to a same working category can be logically isolated each other.*

*d) The energy applications belong to a same safety zone can be logically isolated each other.*



Figure 5.9.1-1: isolation demand for energy applications

*Typically, the physical isolation requires the traditional wired communication link utilizing different time slots, wavelengths, and physical media to guarantee the safety demand. And the logical isolation may be supported by shared communication resource.*

*With 5G system is utilized to support Smart Grid applications, the different isolation modes will also be supported by 5G system. Not only core network, but also radio network and UE are involved. For 5G system, the physical isolation communication service means dedicated core network element and dedicated radio resource e.g. PRB pool, spectrum etc. The logical isolation communication service on the other hand may be supported by shared network element or shared network resource.*

In summary, 3GPP SA5 needs to study management aspects in eNPN WI to support isolation demands for Smart Grid. It is proposed to add a Key Issue in draft TR 28.907 [1].

# 4 Detailed proposal

This document proposes the following changes in TR 28.907 [1].

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| **1st 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".

[x] 3GPP TS 22.867 "Study on 5G Smart Energy and Infrastructure".

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| **2nd Change** |

## 5.X Key Issue #X: Resource isolation demand for Smart Grid Utilities

### 5.X.1 Description

Smart Grid is a representative utility with NPN. A power grid consists of four building blocks: power generation, transmission, distribution and consumption. These different phases require different services, and these services have distinct communication requirements.

As description in clause 5.9 of TS 22.867 [x]:

According to the regulation of China Grid industry, the power grid business is mainly divided into two working categories: production control and information management. The production control can be further divided into safety zone I and safety zone II. The information management also can be further divided into safety zone III and safety zone IV.

Different kinds of safety isolation requirements are applied to different safety zones:

a) The energy applications belong to production control category i.e. safety zone I and II need to be physically isolated from other applications which don't belong to production control working category.

b) The energy applications belong to information management working category i.e. safety zone III and IV can be logically isolation from other applications including non-energy applications.

c) The energy applications belong to a same working category can be logically isolated each other.

d) The energy applications belong to a same safety zone can be logically isolated each other.

NPN may be deployed to support the different use cases and service requirements for multiple Smart Grid applications. For example, multiple NPNs (e.g. multiple PNI-NPNs, each having on-prem NFs and a dedicated portion of PLMN NFs as a slice of the PLMN) may be deployed to meet the requirements of physical isolation communication service. The logical isolation communication service on the other hand may be supported by shared network element or shared network resource in one NPN for Smart Grid.

To provide management mechanism to assurance resource isolation for different isolation modes, 3GPP management system may need to configure different network parameters whose purpose is for energy applications with different isolation modes.

Therefore, 3GPP management system needs to have the capability to meet the distinct communication requirements with different resource isolation demands for some smart grid applications supported by NPNs.

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| **End of change** |