**3GPP TSG-SA5 Meeting #148e S5-233233d1**

**Electronic meeting, Online, 17 -25 April 2023**

**Source: Samsung, EUTC, EDF, Deutsche Telekom, BMWK, NOVAMINT**

**Title: Rel-18 pCR 28.829 – Potential Solution for Energy utility and telecommunication coordinated rapid recovery of energy service**

**Document for: Approval**

**Agenda Item: 6.9.3.10**

# 1 Decision/action requested

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

# 2 References

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

[2] 3GPP TR 28.829: "Study on Network and Service Operations for Energy Utilities"

[3] S5-216428 : New SID on Network and Service Operations for Energy Utilities

# 3 Rationale

This document proposes the potential solution for the Key Issue of Energy utility and telecommunication coordinated recovery of energy service outage as mentioned in clause 6.8 and 6.9 of TR 28.829 [2].

This document was considered at SA5 147 and noted as a result of request to keep this open for further review until SA5 148e.

Changes in d1

- removed 'third party' as requested by Huawei from 7.3.2.1.1 1st paragraph.

- replaced MNO with the site operator in 'the MNO has information on the state of its power backup'

# 4 Detailed proposal

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| **Start of Changes** |

# 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".

[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 28.824: " Study on network slice management capability exposure"

[5] IT Process Wiki – The ITIL Wiki:. https://wiki.en.it-processmaps.com/index.php/ITIL\_Service\_Operation Content is available according to Creative Commons Attribution-NonCommercial-ShareAlike 3.0 Germany License. Access 08.12.21.

[6] 3GPP TR 22.867: "Study on 5G smart energy and infrastructure"

[7] Connected Nations 2020, UK Report, Ofcom. https://www.ofcom.org.uk/\_\_data/assets/pdf\_file/0024/209373/connected-nations-2020.pdf Access 20.4.22.

[8] Telecom Services Security Incidents 2019 Annual Analysis Report, ENISA European Agency for Cybersecurity, July 23, 2020. https://www.enisa.europa.eu/publications/annual-report-telecom-security-incidents-2019 This publication is intended for information purposes only and is accessible free of charge. Reproduction is authorised provided the source is acknowledged. Access 20.4.22.

[9] DIRECTIVE (EU) 2019/ 944 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL - of 5 June 2019 - on common rules for the internal market for electricity and amending Directive 2012/ 27/ EU (europa.eu)
<https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32019L0944&from=EN>

[10] IEC TC 57 <https://www.iec.ch/ords/f?p=103:7:511571509228708::::FSP_ORG_ID,FSP_LANG_ID:1273,25>

[11] 3GPP TR 22.867: "Study on 5G smart energy and infrastructure".

[12] 3GPP TS 28.554: "Management and orchestration; 5G end to end Key Performance Indicators (KPI)".

[13] 3GPP TS 28.552: "Management and orchestration; 5G performance measurements".

[14] 3GPP TS 22.104, " Service requirements for cyber-physical control applications in vertical domains ".

[15] 3GPP TS 32.404, " Performance Management (PM); Performance measurements; Definitions and template".

[16] Study on Network and Service Operations for Energy Utilities [SP-211622].

[17] Study on Network Slice Management Capability Exposure [SP-220350].

[18] CAMARA: Telco Global API Alliance <https://www.gsma.com/futurenetworks/ip\_services/understanding-5g/camara-telco-global-api-alliance/>, accessed 16.02.23.

[x] IETF RFC 1628: "UPS Management Information Base", 1994.

[y] ETSI TS ETSI 202 336: " Monitoring and Control Interface for Infrastructure Equipment (Power, Cooling and Building Environment Systems used in Telecommunication Networks)".

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| **Next Change** |

7 Key Issues and potential solutions

### 7.3.2 Potential Solutions

#### 7.3.2.1 Potential Solution # 3: Energy utility and telecommunication coordinated rapid recovery of energy service

###### 7.3.2.1.1 Introduction

The solution addresses key issues of Energy utility and telecommunication coordinated rapid recovery of energy service. It involves mutual exchange of information between an energy utility (DSO) and MNO using mechanisms exposed by 3GPP network management system. The mechanisms are for rapid recovery of utility’s energy service outage and subsequent fallback by MNO from its UPS to utility’s energy supply for MNO communications service/network operations. The solution also involves mechanisms to protect MNO sites from complete breakdown in case of UPS running out of its capacity due to prolonged DSO energy service outage.The DSO informs about its energy service outages like time of outage, locations, expected recovery time etc. to MNO. MNOs Rapid Intervention (MRI) is the approach by which DSO seeks dedicated communication service support from MNO using its UPS backup for network operations. DSO needs this to use its automated smart energy services for the rapid recovery of its energy distribution services.

The site operator has information on the state of its power backup e.g. UPS backup duration at different base station locations, base station IDs that are enduring DSO’s power outage and are depending on UPS backup, base stations that provide communications services to DSOs substations for smart energy services implementation etc.

The UPS capacity can be obtained using the IETF standard UPS Management Information Base [x]. Another possibility to obtain the UPS capacity information is to use the ETSI standard ETSI 202 336 [y].

The DSO can obtain these UPS related information from the MNO and can avoid shutting down of energy service for base station IDs that their UEs camp on or for the critical MNO infrastructure that have insufficient UPS backup capacity to survive the planned outage. The DSO can potentially create the strategic energy service interruptions as long as there is sufficient UPS backup capacity remaining for the duration of the outage at the MNO site.

##### 7.3.2.1.2 Description

The procedure below includes the interactions required between the DSO MnS and MNO MnS in order to satisfy the operational requirements in key issue 7.3.1.2 and 7.3.1.3. The procedure is general in that it can be extended to other attributes easily, and it is based on existing mechanisms specified by SA5.

1. createMOI () Request

**DSO**

(MnS Consumer)

**MNO**

(MnS Producer)

3. createMOI Response

2. MOI will be created

5. createMOI(IntfSubscriptionCtrl) Request

4. IOC containing

UPS info instantiated

6. IoC will be created

7. CreateMOI Response

8. notifyMOIAttributeValueChanges

9. modifyMOIAttributes Request

10. modifyMOIAttributesResponse

11. getMOIAttributeRequest

12. getMOIAttributeResponse

**Initialization**

**MNO informs DSO of the changes**

**DSO updates the information**

**DSO retrieves the changes**

**Figure 7.3.2.1.2-1: Coordinated Rapid Recovery and strategic outage plan Procedure**

NOTE 1: Steps 1-7 in the procedure flow can be considered 'initial set up' to enable operations to address the functional requirements in 6.8 and 6.9 and described in Key Issues 7.3.1.2 and 7.3.1.3.

1. In order to be able to provide energy service outage and recovery related information for MNO, DSO sends createMOI request for creating an IOC which contains information attributes for outage and rapid recovery by DSO such as:

a) Time stamp of DSO’s energy distribution service outage

b) Locations (latitude-longitude pair and Energy Supply Id) where DSO’s energy service outage occurs

c) Time by when DSO expects restoration of its distribution services for MNO.

d) Time when DSO has restored its energy transmission service and starts expecting rapid intervention by MNO.

e) Time duration for which DSO expects to require MNO’s rapid intervention for being able to use smart energy services to restore its energy distribution services.

f) Information of locations where for example DSO substations need to restore distribution services on priority.

g) The time at which MNO will actually be able to provide rapid intervention to DSO.

h) The time duration for which MNO will actually be able to provide rapid intervention to DS

i) The information of locations where MNO will actually be able to provide rapid intervention to DSO.

j) The time stamp at which DSO’s energy distribution services are finally restored.

k) The information of locations where (e.g. DSO substations) distribution energy service has been finally restored.

NOTE 2: Not all of the above will be configured at the time of IOC creation.

2. MnS producer in MNO creates the MOI that contains these information attribute records for multiple sites.

3. createMOI response is sent by MNO MnS producer to DSO.

4. MNO creates the MOI representing the UPS related information of MNO site. It is name-contained by IOC created in step 1. This is required by DSO from MNO to achieve coordinated intelligent outage planning by DSO during its energy outage recovery. UPS related information of MNO site shall be:

4.1 Information on whether the MNO site has UPS installed/available or not.

4.2 Information on the total UPS backup capacity installed in MNO site (suggested granularity: number of in minutes) i.e. the MNO site UPS backup has installed capacity of how many minutes.

4.3 Information on the status of the remaining UPS backup capacity (suggested granularity: number of minutes) available for MNO site at any given time.

4.4 The identity of DSO energy supply meter present in MNO site.

4.5 The identity of base station present in MNO site.

5. In order to be able to get automatically notified of any changes in the attributes information in the MOI, DSO sends createMOI request for NtfSubscriptionControl IOC to MNO.

NOTE 3: In step 5, if done, a subscription is created such that, subject to parameters in the NtfSubscriptionControl IOC, notifications are sent from the MNO to the DSO . This allows, for example, the MNO to notifiy the DSO of changes in the UPS backup capacity over time. This step is shown as step 8 below.

6. MNO MnS producer creates the MOI for NtfSubscriptionControl IOC .

7. createMOI response is sent by MNO MnS producer to DSO.

8. If there is a change in the attributes, the MNO sends a notifyMOIAttributeValueChanges notification to inform DSO about the changes.

NOTE 4: In step 9 and 10 below, there is a change in an attribute of the MOI. This is done by DSO to update MNO on the changes, e.g. information about an expected outage for a specific site.

9. DSO can modify/update any information like outage start time stamp by sending a modifyMOIAttributes request to MNO. DSO can create/read/update/delete (CRUD operations) the information in the MOI by using provisioning MnS (defined in 3GPP TS 28.532).

10. MNO MnS producer provides the modify response to the DSO.

NOTE 5: In step 11 and 12 below, the DSO MnS requests and receives respectively the current value of one or more attribute(s).

 DSO can also query the UPS related information as and when required by using the getMOIAttributes operation. For example the information could include identity of DSO energy supply meter, MNO base station, remaining UPS backup duration of a particular site, etc.11. DSO requests the required information from the MNO by using getMOIAttributes operation.

12. MNO provides the required information in the response to the DSO.

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| **End of Changes** |