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

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

**Source: Samsung, ...**

**Title: Rel-18 pCR 28.318 5.X Exposed network performance monitoring and prediction requirements**

**Document for: Approval**

**Agenda Item: 6.6.4.2 (NSOEU\_WoP#2) MNO provides management information to the energy utility service operator**

# 1 Decision/action requested

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

# 2 References

[1] 3GPP TR 28.829 "Study on network and service operations for energy utilities".

[2] SP-230632, "Network and Service Operations for Energy Utilities", NSOEU WID approved at SA#100.

# 3 Rationale

This pCR provides a normative clause of the requirements agreed in [1] with respect to network performance monitoring, and pursues the objectives in the agreed WID [2].

# 4 Detailed proposal

|  |
| --- |
| **Begin Change** |

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

# 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".

…

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

[x] <doctype> <#>[ ([up to and including]{yyyy[-mm]|V<a[.b[.c]]>}[onwards])]: "<Title>".

|  |
| --- |
| **Next Change** |

## 5.Y Exposed network performance monitoring and prediction requirements

### 5.Y.1 Description

The DSO requires extremely high availability communication services to provide smart energy services such SCADA and DA. These services, if available, in the energy system enable increased availability of energy service.

The availability requirement of communication for the energy system's most critical services is higher than that which can be achieved by the mobile telecommunication system. To achieve the required availability of communication service, the DSO can operate with the possibility of employing a back up communication system.

Operation with of both the primary and back up systems continuously is not feasible, for operational reasons such as energy consumption, operational expenditures, etc. Rather, at opportune times, the back up system is activated and used in lieu of the primary system. The difficulty faced by a DSO is to determine when to activate the back up system. If the primary system cease to be available, the back up must be brought into service. This operation costs minutes. where each minute is 1.9 \* (10)-6 of a year. It is impossible to achieve 99.9999% availability with even 2 minutes of down time in a year.

If a problem were to occur during the time between communication offered by the primary and back up service were to occur, in which remote monitoring and control is done, it could be catastrophic. Even if a catastrophic event were not to occur, recovering from even an incident of moderate severity may require manual intervention at remote sites. Until recovery completes, energy service may be interrupted for a significant period of time (e.g. 1 hour). A service outage of the energy system must be avoided as it can cause damage to property and endanger human life. This is not only a business and social consideration, there are often regulations that DSOs are subject to.

To avoid the risk of being surprised by the primary communication system's failure, the DSO monitors diverse aspects of the communication service, including latency, packet loss, cell and network availability etc. The monitoring can be analyzed by the DSO to identify 'problematic conditions,' using past experience as a guide and model. Once a potential problem is identified, the DSO can proactively activate the back up communication system. In practice, this approach allows the DSO to avoid or significantly reduce communication service interruptions.

DSO monitoring can be done 'over the top' even without 3GPP standards, but this has three shortcomings. First, if the network is not available, the measurements taken by remote systems cannot be obtained by the centralized DSO network management system. Second, probes to determine the network's latency and packet loss can only be sent infrequently without contributing significantly to traffic on the network. Third, if there is a problem, it is not clear whether it is a problem with the DSO's network or the mobile telecommunication system that it relies on.

To address these problems and to increase the availability of the energy system, the 5G management system supports standardized functionality to expose network monitoring and performance prediction information to the DSO.

### 5.Y.1 Use Case

A DSO can determine levels of service over time by means of their own infrastructure. The DSO has many routers in their network. These provide networking within substation networks and have wireless access interfaces to connect the substation network over a wide area. These routers perform periodic monitoring operations, e.g. sending ICMP echo (ping) messages to ascertain latency and network availability. In addition, the UE has access to radio and cellular information - signal strength, serviced Cell ID, radio technology. These measurements are captured on the UE and obtained 'over the top' by the DSO using their own management system over time. The acquired data are assessed to discern trends that, historically considered, indicate that an incident is likely. This monitoring occurs at a coarse granularity (e.g. one measurement per minute.) There are two shortcomings to this approach that this use case seeks to overcome:

1. The information is based on measurements of single nodes only, not the overall network. The DSO knows

(a) The location of each of their devices and the serving Cell ID.

(b) The DSO has several devices (in the same cell) and can by means of correlation of data received by devices identify possible problems that affect the entire cell.

(c) The nature of the deterioration of performance remains ambiguous - is it an issue in the DSO's own network (essentially a managed set of VLANs and substation networks), or is it a problem in the MNO's network?

2. The granularity of the measurement is coarse, the bandwidth requirements to control and collect the data significant compared to the service data traffic (when there is no need for more than routine monitoring and management of the energy system) and the measurements are distributed - requiring connectivity to all UEs. To the extent the performance deteriorates, so too does the access of the DSO to the UEs that provide measurements. So, as an incident approaches, just when more information granularity is needed, it becomes increasingly difficult to acquire data.

These two problems have one clear solution: centralized information obtained from the MNO instead of decentralized information acquisition. The exposed information from the MNO will correspond to the network performance absolutely, it need not be approximated. It will assist in determining the cause of performance problems - if the MNO does not report the problem but it is detected in the DSO network, this indicates that the problem is in the DSO network. If the MNO reports performance indicating a problem, then the DSO can focus on this rather than on investigating the root cause of the problem in their own network. The centralized measurements will be more efficient, can be of finer granularity, will be available even if the network performance seriously declines.

The acquired data is used to determine when to initiate back up communication capabilities. These take some time (e.g. 2 minutes) to activate. Accurate, timely, sufficiently granular information can lead to better historical information, which correlates diverse behaviours of the network including service performance incidents. This can lead to improved understanding of service, such as periodic changes in service levels and on the other hand developments that have historically been associated with service level incidents.

The DSO may elect to take proactive decisions. These proactive decisions will improve communication service availability. It is essential to maintain the best possible cell/network availability to avoid even brief intervals of lack of availability of communication service. If there is a specific need to monitor and manage the network during one of these intervals, it will not be possible to do so (i.e. by means of Distribution Automation or SCADA smart energy services), and this could lead to damage or an outage affecting energy service customers..

The use case supported is one that has two actors.

- The management service consumer, the authorized third party, is operated by the DSO.

- The management service producer, which selectively exposes specific functionality of the 3GPP managmeent system.

In this use case, the management service consumer requests monitoring of specific performance metrics. Reports are generated that enable the DSO to analyze the data provided, including sufficient measurement information as expressed in the requirements in clause 5.1.2.Editor's Note: How predications are applicable in addition to exposed monitoring measurements is FFS.

### 5.Y.2 Requirements

|  |  |  |
| --- | --- | --- |
| Requirement label | Description | Related use cases |
| REQ-5.Y-1 | The 3GPP management system shall, according to mobile network operator policy, regulatory requirements and contractual obligations, expose standardized interfaces to authorized third parties that provide the ability to initiate and terminate requests for monitoring including the configuration of the monitoring (monitoring interval, threshold levels, measurement period granularity, location of interest.)  Specific requirements:  - The 3GPP management system shall enable the DSO to request monitoring configuration including monitoring interval, threshold level values and measurement period granularity. This monitoring configuration is general applied to any monitoring done to satisfy this requirement.  - The 3GPP management system shall enable the DSO to request location of interest (Latitude/Longitude, TAC, cell ID). Monitoring location of interest will be used to scope the object instance to be monitored. | None |
| REQ-5.Y-2 | The 3GPP management system shall, according to MNO policy, regulatory requirements and contractual obligations, expose standardized interfaces to authorized third parties that provide a mechanism for the MNO to send reports containing required performance metrics measurements to the DSO. The measurements in these reports are provided in a form such that it will be possible to ascertain the number of measurements made as well as to calculate the standard deviation of those measurements, in order to aid in the interpretation of the reported measurement.  Specific requirement:  - The 3GPP management system shall communicate monitoring information by means of Measurements [P] for any monitoring data provided by the MNO to the DSO. | None |
| REQ-5.Y-3 | The 3GPP management system shall support the following performance metrics to monitor information according to the associated configuration:  a) Latency between all served UEs and the corresponding base stations, at the granularity of a base station or network slice. Specifically, latency is determined over Uu, for traffic between the UE and the base station (averaged) - either for all traffic or for the network slice traffic;  b) Throughput [an average for the base station's network traffic or network slice]. Specifically througput is determined over Uu, for traffic between the UE and the base station (averaged) - either for all traffic or for the network slice traffic;  c) Availability [an average for the cell's availability at a specific base station or at a (RAN) network level]. Specifically, availability is determined by the average of cells availability at the base station.  d) Packet loss [an average for the base station's network traffic or network slice]. Specifically packet loss is determined over Uu, for traffic between the UE and the base station (averaged) - either for all traffic or for the network slice traffic. | None |
| REQ-5.Y-4 | Authentication of the consumer (third party) by the producer (3GPP management system) shall be possible. | None |
| REQ-5.Y-5 | Authentication of the producer (3GPP management system) by the consumer (third party) shall be possible. | None |
| REQ-5.Y-6 | Authorization of the consumer (third party) by the producer (3GPP management system) shall be possible, | None |
| REQ-5.Y-7 | Communication between the consumer (third party) and the producer (3GPP management system) shall be confidentially protected. | None |
| REQ-5.Y-8 | Communication between the consumer (third party) and the producer (3GPP management system) shall be integrity protected. | None |

|  |
| --- |
| **End of Changes** |