**3GPP TSG-SA5 Meeting #148-e *S5-233495***

**e-meeting, 17 – 25 April 2023**

**Source: Huawei, CMCC**

**Title: pCR 28.830 Add description failure prediction enhancement**

**Document for: Approval**

**Agenda Item: 6.7.7.2**

# 1 Decision/action requested

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

# 2 References

[1] [[SP-220153](C:\\Users\\gwx350375\\Downloads\\Docs\\SP-220153.zip" \t "_blank)](https://portal.3gpp.org/desktopmodules/Specifications/SpecificationDetails.aspx?specificationId=3693): "New SID on Fault Supervision Evolution"

[2] TR 28.830 Fault supervision evolution; v0.4.0

[3] TS 28.104: "Management Data Analytics (MDA)"; v17.1.1

# 3 Rationale

This tdoc discusses potential enhancements for failure prediction in FSEV study [1, 2].

Failure of service and network functions may occur during the network operation. It is necessary to predict potential failures and prevent more severe impacts. The MDA capability of failure prediction has been specified in TS 28.104 [3], the analytics output are as follows:

- failurePredictionObject;

- potentialFailureType;

- eventTime;

- issueID;

- perceivedSeverity;

Some enhancements may be needed to provide more information in the analytics output, e.g. potential extension to failure types and demarcation information.

**Proposal 1**: It is proposed to include the potential enhancements for failure prediction analytics output.

# 4 Detailed proposal

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| **1st Change** |

## 5.X Key Issue #X: Potential enhancements for fault related analysis

### 5.X.1 Description

Editor’s note: This clause provides a description of the key issue.

If a potential fault/failure is predicted and reported to the consumer, the consumer would like to know the consequence. More analysis information on 3GPP system is helpful for the consumer to perform more proper actions, e.g., performance degradation analysis and predictions, KPI anomaly analysis and predictions, etc.

For example, the impacts on 3GPP system may not be perceived significantly in densely populated urban areas if there are overlapping coverage when a few sites encounter faults. However, service outage may occur due to faults in a site if there are few overlapping coverage in suburban areas. If this kind of information can be provided, the different handlings may be performed by the consumer.

Based on the topology relationship of the concerned managed objects, the impacted scope and degree are evaluated and provided. It may contain the following aspects:

- scope and severity level of the impacted managed objects: the service types and coverage areas which are affected by the fault, e.g., the VoNR, URLLC service types, number of affected PDU sessions, and the coverage areas etc;

- impacted managed objects: the managed objects which are affected by the fault, e.g. network slice, network slice subnet, network elements, network functions, number of affected gNBs and cells etc;

- Rootcause types, name and descriptions of different types of rootcauses, etc.

- Recommended actions for recovery;

### 5.X.2 Potential solutions

#### 5.X.2.a Potential solution #1: Failure prediction enhancement

##### 5.X.2.a.1 Introduction

Editor's Note: This clause describes briefly the potential solution at a high-level.

Some potential enhancements to failure prediction are provided.

##### 5.X.2.a.2 Description

Editor's Note: This clause further details the potential solution and any assumptions made.

Failure of service and network functions may occur during the network operation. It is necessary to predict potential failures and prevent more severe impacts. The MDA capability of failure prediction has been specified in TS 28.104 [x], the analytics output are as follows:

- failurePredictionObject;

- potentialFailureType;

- eventTime;

- issueID;

- perceivedSeverity;

With the optimization of concepts of error, failure and fault, the MDA capability of failure prediction should be extended to also include error prediction. An error can arise as a result of unforeseen operating conditions or due to a fault within the system, subsystem or component being considered. An error may or may not lead to a service failure. For example, failure of the primary system with redundancy and back up may not result in service failure because the secondary system can take over to provide service. This is an arror but not a failure. The potential failure or error may be service outage, network functions failure or error etc. Performance or KPI degradation may or may not lead to failure or error so that there may or may not be service impact. Failure or error may be caused by faults in RAN and/or CN network. Failure or error may be caused by faults in the managed object itself or other related managed objects. The scope of the failure or error may be small or large depending on the underline faults.The failure or error prediction capability also demarcate problems and provide corresponding recommendations to avoid failures or errors and reduce the impacts on services. Some enhancements may be needed to provide more information in the analytics output. The analytics output may help the consumer to take further actions. It may also coordinate with fault supervision for identification and analysis of alarm types and probable causes etc. More potentialFailureOrErrorTypes may be extended in MDA to assist fault management.

Table x: Additional analytics output for failure or error prediction

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| --- | --- |
| Attribute Name | Description |
| potentialFailureOrErrorType | Indication of type of issues that can cause the failures or errors.  NOTE: Existing attribute of potentialFailureType should be extended, some additional failure types may be considered, e.g., communications failure or error, processing failure or error, environmental failure or error, quality of service failure or error, equipment failure or error etc. |
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Editor's Note: The relationship between the potentialFailureOrErrorType provided by MDA and existing alarmType in alarm notifications will be further studied.

### 5.X.3 Conclusion - Impact on normative work

Editor's Note: This clause provides the conclusion from the aspect of impact on normative work.

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| **End of change** |