3GPP SA WG1 Meeting #99e S1-22xxxx

Electronic Meeting, 22 Aug - 1 Sept 2022

**Source: ZTE Corporation, CEPRI, China Telecom, China Unicom**

**Title: New WID on Measurement Data Collection**

**Document for: Agreement**

**Agenda Item: 4**

3GPP™ Work Item Description

Information on Work Items can be found at <http://www.3gpp.org/Work-Items>   
See also the [3GPP Working Procedures](http://www.3gpp.org/specifications-groups/working-procedures), article 39 and the TSG Working Methods in [3GPP TR 21.900](http://www.3gpp.org/ftp/Specs/html-info/21900.htm)

Title: Measurement Data Collection

Acronym: MeasureData

Unique identifier:

Potential target Release: *{Rel-19}*

# 1 Impacts

{For Normative work, identify the anticipated impacts. For a Study, identify the scope of the study}

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Affects: | UICC apps | ME | AN | CN | Others (specify) |
| Yes |  |  | X | X |  |
| No | X | X |  |  |  |
| Don't know |  |  |  |  |  |

# 2 Classification of the Work Item and linked work items

## 2.1 Primary classification

### This work item is a …

|  |  |
| --- | --- |
| X | Feature |
|  | Building Block |
|  | *Work Task* |
|  | Study Item |

## 2.2 Parent Work Item

|  |  |  |  |
| --- | --- | --- | --- |
| Parent Work / Study Items | | | |
| Acronym | Working Group | Unique ID | Title (as in 3GPP Work Plan) |
| N/A | N/A | N/A | N/A |

### 2.3 Other related Work Items and dependencies

|  |  |  |
| --- | --- | --- |
| Other related Work /Study Items (if any) | | |
| Unique ID | Title | Nature of relationship |
| 720005 | New Services and Markets Technology Enablers (SMARTER) | Previous normative work including QoS monitoring requirements |
| 800007 | Service requirements for cyber-physical control applications in vertical domains | Previous normative work in SA1, specifying industrial service requirements. |
| 840041 | Enhancements for cyber-physical control applications in vertical domains | Previous normative work in SA1, specifying industrial service requirements. |
| 790004 | QoS Monitoring | Previous normative work in SA1, specifying QoS monitoring service requirements. |

# 3 Justification

As indicated in TS 22.261-Annex D, the 5G system is required to provide specific communication services for different vertical domains e.g. critical infrastructure control, safe and efficient transport, integrated systems, environmental control etc. Considering the communication QoS will be the key factor to impact vertical applications, it is very important to support QoS monitoring.

However, the vertical industry applications have stringent communication service performance requirements which have been specified in TS22.104. The existing QoS monitoring enabled by the 5G system can’t support sufficient monitoring and reporting granularity for network operators and vertical industry users to accurately and instantly determine whether the service fault or interruption is caused by the communication network.

As example in below table, the 5G based motion control is a typical use case in factory automation. And it has stringent requirements in latency, service availability and reliability as specified in TS22.104. Taking 500μs transfer interval and survival time as an example, 2000 messages are delivered per second, and an immediate service disruption will be caused if one message is delayed or failed.

TS22.104 Table 5.2-1: Periodic deterministic communication service performance requirements

| Characteristic parameter | | | | Influence quantity | | | | | | Remarks |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Communica­tion service availability: target value (note 1) | Communication service reliability: mean time between failures | End-to-end latency: maximum (note 2) (note 12a) | Service bit rate: user experienced data rate (note 12a) | Message size [byte] (note 12a) | Transfer interval: target value (note 12a) | Survival time (note 12a) | UE  speed (note 13) | # of UEs | Service area  (note 3) |  |
| 99.999 % to 99.999 99 % | ~ 10 years | < transfer interval value | – | 50 | 500 μs | 500 μs | ≤ 75 km/h | ≤ 20 | 50 m x 10 m x 10 m | Motion control (A.2.2.1) |

Another example is shown in below table, the 5G based high-speed current differential protection is a typical use case of power distribution automation, which can support sub-millisecond fault detection. A protection relay shall collect samples at a frequency of 600Hz, 1200Hz, 1600Hz, or 3000Hz, which indicates that thousands of samples can be delivered in one second. If the protection relay can not receive the remote sample from the remote protection relay within a certain period of time, it will enter blocking mode, which may cause a false trip and further negatively impact Smart Grid availability and reliability according to TR22.867.

*TS22.104 Table A.4.4**.4**-**1**:* *KPIs for high speed current differential protection*

| **Use case #** | **Communication service availability** | **End-to-end latency: maximum**  **(note)** | **Service bitrate: user experienced data rate** | **Message size [byte]** | **Transfer interval: target value** | **Survival time** | **UE speed** | **UE density [#/km2)]** | **Service area** |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 1 | > 99.999 % | 15 ms | 2.5 Mbit/s | < 245 | ≤ 1 ms | transfer interval (one frame loss) | stationary | ≤ 100/km2 | several km2 |
| 2 | > 99.999 % | 15 ms | 1.2 Mbit/s | < 245 | ≤ 2 ms | transfer interval (one frame loss) | stationary | ≤ 100/km2 | several km2 |
| 3 | > 99.999 % | 10 ms | 2.5 Mbit/s | < 245 | ≤ 1 ms | transfer interval (one frame loss) | stationary | ≤ 100/km2 | several km2 |
| 4 | > 99.999 % | 10 ms | 1.2 Mbit/s | < 245 | ≤ 2 ms | transfer interval (one frame loss) | stationary | ≤ 100/km2 | several km2 |
| 5 | > 99.999 % | 5 ms | 2.5 Mbit/s | < 245 | ≤ 1 ms | transfer interval (one frame loss) | stationary | ≤ 100/km2 | several km2 |
| 6 | > 99.999 % | 5 ms | 1.2 Mbit/s | < 245 | ≤ 2 ms | transfer interval (one frame loss) | stationary | ≤ 100/km2 | several km2 |
| NOTE : UE-to-UE communication. | | | | | | | | | |

*Use case #1:* High-speed current differential protection with a sampling rate of 1200 Hz for legacy systems.

*Use case #**2**:* High-speed current differential protection with a sampling rate of 600 Hz for legacy systems.

*Use case #3:* High-speed current differential protection with a sampling rate of 1200 Hz under voltage condition 1 (see IEC 61850-90-1[28] for more details).

*Use case #4:* High-speed current differential protection with a sampling rate of 600 Hz under voltage condition 1 (see IEC 61850-90-1[28] for more details).

*Use case #5:* High-speed current differential protection with a sampling rate of 1200 Hz under voltage condition 2 (see IEC 61850-90-1[28] for more details).

*Use case #6:* High-speed current differential protection with a sampling rat.

In many practical applications, the delay problems are not caused by the communication network. Therefore, the network operators need to prove this to the vertical industry users when there is service fault or disruption for vertical industry applications, such as motion control and high speed current differential protection. In clause 6.23.2 of TS 22.261, the current existing QoS monitoring and monitoring result reporting requirements have not covered the granularity of packet level, i.e. support QoS monitoring of all the packets in a QoS flow. Therefore, the reported monitoring results may be the average results of several packets, which will lead to inaccurate evaluation and false fault detection .Packet-level QoS monitoring can be used to prove that the delay is not caused by the communication network. It also helps determine whether the delay is caused by which part inside the 3GPP network, e.g. air interface, CU/DU interface, NG interface. In addition, mechanisms shall be supported for operators and vertical industry users to start and stop QoS monitoring and reporting with packet level granularity to avoid network burden. Therefore, new requirements are needed to reflect this new demand from vertical industries and operators.

To support packet level QoS monitoring and monitoring result reporting, it is necessary to increase the refresh rate of network measurement data collection and monitoring result reporting. But the existing refresh rate requirement for QoS monitoring is not clear , i.e. who can specify the refresh rate and whether the collection rate and monitoring result reporting refresh rate are the same. Thus, it is necessary to clarify this requirement to avoid network burden and process cost.

So, the following gaps are identified:

* The 5G system hasn’t supported packet level QoS monitoring especially for periodic deterministic communication service required by vertical industries, such as motion control and high speed current differential protection.
* The refresh rate requirement for QoS monitoring is not clear, i.e. who can specify the refresh rate and whether the collection rate and monitoring result reporting refresh rate are the same..

Considering the above analysis, it is proposed to add new requirements to support support QoS monitoring with packet level granularity, and clarify the existing refresh rate requirement for QoS monitoring.

# 4 Objective

This work item proposes new requirements for TS22.261 which will augment existing TS22.261 QoS monitoring requirements. The following related requirements will be included:

* QoS monitoring and reporting with packet level granularity.
* Mechanisms to enable an authorized application/network entity to start and stop QoS monitoring with packet level granularity.
* Clarification of the existing refresh rate requirement for QoS monitoring.

# 5 Expected Output and Time scale

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| New specifications {One line per specification. Create/delete lines as needed} | | | | | |
| Type | TR number | Title | For info  at TSG# | For approval at TSG# | Rapporteur |
|  |  |  |  |  |  |
|  |  |  |  |  |  |

|  |  |  |  |
| --- | --- | --- | --- |
| Impacted existing TS/TR {One line per specification. Create/delete lines as needed} | | | |
| TS No. | Description of change | Target completion plenary# | Remarks |
| TS 22.261 | Add new requirements for QoS monitoring | SA#97  (Sept 2022) |  |
|  |  |  |  |

# 6 Work item Rapporteur(s)

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# 7 Work item leadership

SA1

# 8 Aspects that involve other WGs

SA2, RAN

# 9 Supporting Individual Members

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| Supporting IM name |
| ZTE Corporation |
| China Electric Power Research Institute |
| China Unicom |
| China Telecom |
| OPPO |
| CALTTA |
| China Mobile |
| Spreadtrum |
| Novamint |
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