**SA WG2 Meeting #S2-147ES2-2107297**

**18 - 22 October, 2021, Electronic meeting** (revision of S2-2106798)

Source: Nokia, Nokia Shanghai Bell, Verizon, AT&T, Sennheiser, Huawei, HiSilicon, Matrixx, ZTE, China Unicom, Vivo, NTT Docomo, ETRI, Xiaomi, Orange, China Mobile, KDDI, Tencent, T-Mobile USA, Interdigital, Samsung, CATT, Deutsche Telekom, Ericsson, Denso, BMWi, SK Telecom, Oracle, CBN, Broadcom, LG Electronics, NICT

Title: New SID on Study on 5G Timing Resiliency and TSC enhancements

Document for: Approval

Agenda Item: 9.1.3

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: Study on 5G Timing Resiliency and TSC&URLLC enhancements

Acronym: FS\_5GTTUe

Unique identifier:

{A number to be provided by MCC at the plenary}

Potential target Release: *Rel-18*

# 1 Impacts

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

# 2 Classification of the Work Item and linked work items

## 2.1 Primary classification

### This work item is a …

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

## 2.2 Parent Work Item

For a brand-new topic, use “N/A” in the table below. Otherwise indicate the parent Work Item.

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

### 2.3 Other related Work Items and dependencies

|  |
| --- |
| Other related Work /Study Items (if any) |
| Unique ID | Title | Nature of relationship |
| 910039 | 5G Timing Resiliency System | Stage 1 work item |
|  |  |  |
|  |  |  |
|  | (Stage 1 work item for the above study to be added) |  |

# 3 Justification

Following are the justifications for the study objectives:

1) SA1 is also specifying requirements for 5G System to remain resilient if there is GNSS failure and for 5G System to act as a backup and offer wireless and indoor-capable time synchronization service for other applications (e.g. financial, power grid systems).

2) Generic TSC and exposure enhancements to 5GS for IP and ETH applications are needed for the following reasons:

* Current Exposure framework enables AF to request QoS parameters, provide traffic characteristics but not redundancy aspect which is important for some IP and ETH applications

3) It may be possible to apply TSN networks in the transport network. In such deployments, it may be beneficial to be able to interwork so that the transport network can also provide delay guarantees.

It has been raised whether RAN feedback on when the burst should be sent may be helpful. The performance benefit of such proposals can be studied and the gain can be compared with the complexity of such solutions.

# 4 Objective

Following are the objectives for this study:

WT#1. Support for 5G Timing Resiliency requirements defined by SA1.

WT#1.1. Study how to report 5GS network timing synchronization status (divergence from UTC and 5GS network timing source degradation) to UEs and 3rd party applications (AFs):

- Study how RAN and 5GC learn about network 5GS timing synchronization status to be able to inform UEs and AFs.

- Study if additional information needs to be provided to UEs and AFs to inform about 5GS timing synchronization status.

WT#1.2. Study how to enable AFs to request time synchronization service in a specific coverage area and how to enforce the coverage area.

WT#1.3. Study how to control 5G timing service based on subscription

WT#1.4: Study how to enable 5GC to determine if Rel-17 delay compensation is supported by UEs and RAN

NOTE: Configuration and operation of the synchronization network and mitigation actions when time source fails or degrades is assumed to be outside the scope of 3GPP, since there are protocols, techniques and practices already specified by other standardization bodies.

WT2 Study how to enable an AF to request high reliability and how 5GS can configure RAN and CN mechanisms, including redundancy functions (i.e. in addition to QoS) based on the AF request.

WT4. Support for low latency and low jitter:

WT4.1 Study mechanisms for interworking with TSN transport networks. Study interworking mechanisms with TSN networks deployed in the transport network in order to support of E2E determinism and low latency communication and efficient N3 transmission;

WT4.2 Study if it is beneficial to set the applications burst sending time based on feedback from RAN.

## TU estimates and dependencies

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Work Task ID | TU Estimate(Study) | TU Estimate(Normative) | RAN Dependency(Yes/No/Maybe)  | Inter Work Tasks Dependency  |
| WT#1 | 4 | 2 | Yes | WT#1 is self-contained |
| WT#2 | 2 | 1.5 | No | WT#2 is self-contained |
|  |  |  |  |  |
| WT#4 | 3 | 2 | Yes | WT#4 is self-contained |

Total TU estimates for the study phase: 9

Total TU estimates for the normative phase: 5.5

Total TU estimates: 9 + 5.5 = 14.5

# 5 Expected Output and Time scale

|  |
| --- |
| New specifications {One line per specification. Create/delete lines as needed} |
| Type  | TS/TR number | Title | For info at TSG#  | For approval at TSG# | Rapporteur |
| Internal TR | 23.abc | Study on timing resiliency and TSC & URLLC enhancements | SA#96June2022(TBD) | SA#97Sep2022(TBD) | Devaki Chandramouli, Devaki.chandramouli@nokia.com  |
|  |  |  |  |  |  |

|  |
| --- |
| Impacted existing TS/TR {One line per specification. Create/delete lines as needed} |
| TS/TR No. | Description of change  | Target completion plenary# | Remarks |
|  |  |  |  |
|  |  |  |  |

# 6 Work item Rapporteur(s)

Devaki Chandramouli, Devaki.chandramouli@nokia.com

# 7 Work item leadership

SA2

# 8 Aspects that involve other WGs

Potential RAN impact to be covered by RAN WGs.

Potential security impact to be covered by SA3.

Potential charging and OAM impact to be covered by SA5.

# 9 Supporting Individual Members

|  |
| --- |
| Supporting IM name |
| Nokia |
| Nokia Shanghai Bell |
| Verizon |
| AT&T |
| Sennheiser |
| Huawei |
| HiSilicon |
| Matrixx |
| ZTE |
| China Unicom |
| Vivo |
| NTT Docomo |
| ETRI |
| Xiaomi |
| Orange |
| China Mobile |
| Tencent |
| T-Mobile USA |
| Interdigital |
| Samsung |
| CATT |
| Deutsche Telekom |
| KDDI |
| Ericsson |
| Denso |
| BMWi |
| SK Telecom |
| Oracle |
| CBN |
| Broadcom |
| LG Electronics |
| NICT |
| Bell Canada |