**3GPP TSG-CT WG1 Meeting #130-eC1-21xxxx**

**Electronic meeting, 20-28 May 2021**

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| *CR-Form-v12.1* | | | | | | | | |
| **CHANGE REQUEST** | | | | | | | | |
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|  | **24.501** | **CR** | **3139** | **rev** | **4** | **Current version:** | **17.2.0** |  |
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| *For* [***HE******LP***](http://www.3gpp.org/3G_Specs/CRs.htm#_blank)*on using this form: comprehensive instructions can be found at* [*http://www.3gpp.org/Change-Requests*](http://www.3gpp.org/Change-Requests)*.* | | | | | | | | |
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| ***Proposed change affects:*** | UICC apps |  | ME | **x** | Radio Access Network |  | Core Network | **x** |

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| ***Title:*** | Introduction of NAS enablers for IIoT | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Source to WG:*** | Nokia, Nokia Shanghai Bell | | | | | | | | | |
| ***Source to TSG:*** | C1 | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Work item code:*** | IIoT | | | | |  | ***Date:*** | | | 2021-05-21 |
|  |  | | | |  | |  | | |  |
| ***Category:*** | **B** |  | | | | | ***Release:*** | | | Rel-17 |
|  | *Use one of the following categories:* ***F*** *(correction)* ***A*** *(mirror corresponding to a change in an earlier release)* ***B*** *(addition of feature),* ***C*** *(functional modification of feature)* ***D*** *(editorial modification)*  Detailed explanations of the above categories can be found in 3GPP [TR 21.900](http://www.3gpp.org/ftp/Specs/html-info/21900.htm). | | | | | | | | *Use one of the following releases: Rel-8 (Release 8) Rel-9 (Release 9) Rel-10 (Release 10) Rel-11 (Release 11) ... Rel-15 (Release 15) Rel-16 (Release 16) Rel-17 (Release 17) Rel-18 (Release 18)* | |
|  |  | | | | | | | | | |
| ***Reason for change:*** | | S2-2102020 and S2-2102030 reformulate 5GS features enabling time sensitive communication and time synchronization. They further describe that, different from Rel-16, where integration with TSN network is the only deployment scenario, an AF (not necessarily a TSN AF) can request a 5GS to provide time synchronization and time sensitive communication services.  With these changes in Rel-17, it makes more sense, in 3GPP TS 24.501, to describe NAS-specific enablers to support time synchronization and time sensitive communication rather than stating NAS operations per deployment scenario.  In addition, S2-2102071 specifies how PTP Sync and Follow\_Up messages are distributed within a 5GS, which requires additional UE operations in terms of interaction between UE and DS-TT and between UE and network. | | | | | | | | |
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| ***Summary of change:*** | | Clause 4.15 is reformulated to describe enablers in the NAS layer to support time synchronization and time sensitive communication.  UE operations in terms of interaction between UE and DS-TT and between UE and network are described. | | | | | | | | |
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| ***Consequences if not approved:*** | | Mis-implementation of the stage 2 requirements made available via S2-2102020, S2-2102030, and S2-2102071. | | | | | | | | |
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| ***Clauses affected:*** | | 4.15, 4.15.1 4.15.2, 4.15.2.1, 4.15.2.2, 4.15.2.3 4.15.x (new), 4.15.y (new) | | | | | | | | |
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|  | | **Y** | **N** |  | | | |  | | |
| ***Other specs*** | |  | **X** | Other core specifications | | | | TS/TR ... CR ... | | |
| ***affected:*** | |  | **X** | Test specifications | | | | TS/TR ... CR ... | | |
| ***(show related CRs)*** | |  | **X** | O&M Specifications | | | | TS/TR ... CR ... | | |
|  | |  | | | | | | | | |
| ***Other comments:*** | |  | | | | | | | | |
|  | |  | | | | | | | | |
| ***This CR's revision history:*** | | **Changes after CT1#129-e:** 5GS bridge 🡪 User plane node | | | | | | | | |

## 4.15 Time synchronization and time sensitive communication

\*\*\*\*\* Next change \*\*\*\*\*

### 4.15.1 General

A 5GS can support time synchronization and TSC (see 3GPP TS 23.501 [8], 3GPP TS 23.502 [9], and 3GPP TS 23.503 [10]). The clause describes NAS-specific aspects of the 5GS features to support time synchronization and TSC.

\*\*\*\*\* Next change \*\*\*\*\*

### 4.15.2 Void

\*\*\*\*\* Next change \*\*\*\*\*

#### 4.15.2.1 Void

\*\*\*\*\* Next change \*\*\*\*\*

#### 4.15.2.2 Void

\*\*\*\*\* Next change \*\*\*\*\*

#### 4.15.2.3 Void

\*\*\*\*\* Next change \*\*\*\*\*

### 4.15.x Time synchronization

Two types of synchronization processes are supported by the 5GS: 5GS synchronization and (g)PTP domain synchronization (see 3GPP TS 23.501 [8]).

For 5GS synchronization, the lower layers provide the 5G internal system clock signalled via the NG-RAN (see 3GPP TS 38.331 [30]) and the UE forwards the 5G internal system clock to the DS-TT(s).

For (g)PTP domain synchronization, the UE supports forwarding (g)PTP messages (see 3GPP TS 23.501 [8], 3GPP TS 23.502 [9], and 3GPP TS 24.535 [19A]). For all (g)PTP domains associated with a PDU session:

a) if the UE receives (g)PTP message via the PDU session, the UE forwards the (g)PTP messages to the DS-TT associated with the PDU session; or

b) if the UE receives (g)PTP messages from the DS-TT associated with the PDU session, the UE forwards the (g)PTP messages via the PDU session.

\*\*\*\*\* Next change \*\*\*\*\*

### 4.15.y User plane node management

A 5G system (5GS) can act as a user plane node of an external network (e.g. IEEE TSN bridge) or a 5GS can be independently used to enable TSC. For these purposes, information available at a UE is provided to the network and port management information containers are exchanged between a DS-TT and a TSN AF or an NEF (see 3GPP TS 24.519 [19D]).

During a UE-requested PDU session establishment procedure, if the UE supports transfer of port management information containers, then the UE indicates that transfer of port management information container is supported and the UE provides a DS-TT Ethernet port MAC address (if the PDU session type is Ethernet), port management information container, and a UE-DS-TT residence time (if available) to the network (see subclause 6.4.1.2).

Once the UE has successfully established a PDU session and the UE has indicated that transfer of port management information container is supported during the UE-requested PDU session establishment procedure (see subclause 6.4.1.2), then port management information containers are exchanged via a UE-requested PDU session modification procedure and a network-requested PDU session modification procedure (see subclauses 6.3.2 and 6.4.2). The UE receiving a port management information container from the network shall forward the port management information container to the DS-TT. The SMF receiving a port management information container from the UE shall operate as described in 3GPP TS 23.502 [9].