**3GPP TSG-CT WG1 Meeting #131-eC1-21xxxx**

**E-meeting, 19-27 August 2021 *revision of C1-214560***

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| *CR-Form-v12.1* |
| **CHANGE REQUEST** |
|  |
|  | **24.535** | **CR** | **0008** | **rev** | **1** | **Current version:** | **17.0.0** |  |
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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:***  | Correction of timestamping the messages for time synchronization and delay measurements |
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| ***Source to WG:*** | NTT DOCOMO, Nokia, Nokia Shanghai Bell |
| ***Source to TSG:*** | C1 |
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| ***Work item code:*** | IIoT, Vertical\_LAN |  | ***Date:*** | 2021-08-11 |
|  |  |  |  |  |
| ***Category:*** | **C** |  | ***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 canbe 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)* |
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| ***Reason for change:*** | How the timestamping is performed in clause 5.2 is incorrect. Only (g)PTP Sync messages are timestamped in the ingress TT, (g)PTP Follow\_Up message should not be timestamped. Also, TS 23.501 Annex H.4 describes the procedure to timestamp the PTP Delay\_Req messages when the 5GS operates as end to end Transparent Clock. This is missing from TS 24.535. |
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| ***Summary of change:*** | The ingress TT timestamps the (g)PTP event messages and adds this value to the Suffix field. The Suffix field is conveyed either in Sync message (for one-step operation), Follow\_Up message (for two-step operation), or Delay\_Req message for path and link delay measurements. The egress TT timestamps the received (g)PTP message and uses the ingress timestamp carried in the Suffix field to calculate the residence time of the event message.  |
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| ***Consequences if not approved:*** | Wrong specification that leads to wrong implementation. |
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| ***Clauses affected:*** | 5.2 |
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|  | **Y** | **N** |  |  |
| ***Other specs*** | **X** |  |  Other core specifications  | TS 23.501, CR 3198 |
| ***affected:*** |  | **X** |  Test specifications | TS/TR ... CR ...  |
| ***(show related CRs)*** |  | **X** |  O&M Specifications | TS/TR ... CR ...  |
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| ***Other comments:*** |  |
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| ***This CR's revision history:*** | Rev-1 is only to add the link to TS 23.501, CR 3198 on the cover page. |

## 5.2 Signalling of ingress time for time synchronization and delay measurements

Upon reception of a downlink (g)PTP event message (Sync message for time synchronization or Delay\_Req message for path and link delay measurements) by an ingress TT (either a DS-TT or a NW-TT), the ingress TT creates an ingress timestamping (TSi) for each (g)PTP event message and adds Suffix field with TSi to the (g)PTP message (Sync message for one-step operation or Follow\_Up message for two-step operation of time synchronization, or Delay\_Req message for path and link delay measurements) encoded as specified in clause 5.3.1. For a gPTP message, if the ingress TT is:

a) a NW-TT, support for these operations by the NW-TT is mandatory; or

b) a DS-TT, support for these operations by the DS-TT is optional.

For a PTP message, if the ingress TT is:

a) a NW-TT, support for these operations by the NW-TT is optional; or

b) a DS-TT, support for these operations by the DS-TT is optional.

Upon reception of a (g)PTP message over the user plane, the UE or UPF shall forward the (g)PTP message to the DS-TT or NW-TT, respectively. The DS-TT or NW-TT (i.e. egress TT) creates an egress timestamping (TSe) for every (g)PTP event message. The egress TT uses TSi from the Suffix field of the (g)PTP message to calculate the residence time spent within the 5GS for the (g)PTP event message. For time synchronization (Sync message), the egress TT calculates the residence time expressed in 5GS time as specified in 3GPP TS 23.501 [2] for the corresponding (g)PTP domain. The egress TT then removes the Suffix field that contains TSi from the (g)PTP message before sending the (g)PTP message toward the downstream node. For a gPTP message, if the egress TT is:

a) a NW-TT, support for these operations by the NW-TT is optional; or

b) a DS-TT, support for these operations by the DS-TT is mandatory.

For a PTP message, if the egress TT is:

a) a NW-TT, support for these operations by the NW-TT is optional; or

b) a DS-TT, support for these operations by the DS-TT is optional.

In case of multiple (g)PTP domains, the time synchronization procedure (Sync message) above is repeated for each (g)PTP domain sending its own (g)PTP messages.

In case of a (g)PTP message (Sync message for one-step operation or Follow\_Up message for two-step operation) locally generated by the NW-TT (i.e. synchronization is provided by the 5G clock), the NW-TT makes the time generating the (g)PTP event (Sync) message as TSi and add Suffix field with TSi to the (g)PTP message encoded as specified in clause 5.3.1.