**3GPP TSG-CT WG4 Meeting #96C4-200618**

**E-Meeting, 17th – 28th February 2020**

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| *CR-Form-v12.0* | | | | | | | | |
| **CHANGE REQUEST** | | | | | | | | |
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|  | **23.007** | **CR** | **0370** | **rev** | **-** | **Current version:** | **16.0.0** |  |
|  | | | | | | | | |
| *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 |  | Radio Access Network |  | Core Network | **X** |

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| ***Title:*** | The Recovery Time Stamp in PFCP Session Establishment Request message | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Source to WG:*** | Ericsson | | | | | | | | | |
| ***Source to TSG:*** | CT4 | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Work item code:*** | TEI16 | | | | |  | ***Date:*** | | | 2010-02-04 |
|  |  | | | |  | |  | | |  |
| ***Category:*** | **F** |  | | | | | ***Release:*** | | | Rel-16 |
|  | *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-12 (Release 12)* *Rel-13 (Release 13) Rel-14 (Release 14) Rel-15 (Release 15) Rel-16 (Release 16)* | |
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| ***Reason for change:*** | | After a CP function restart, there will be a lot of re-establishment of PDN connection / PDU session signalling, which lead huge amount of PFCP Session Establishment signalling.  Though it is specified in the specification,  "When peer PFCP entities information is available, i.e. when the PFCP Association is still alive, the restarted PFCP entity shall send its updated Recovery Time Stamps in a Heartbeat Request message to the peer PFCP entities before initiating any PFCP session signalling."  the restarted CP function may have to continue to re-establish the PFCP sessions without waiting for the heartbeat response message, delaying such re-establishment of PFCP session may not acceptable, therefore many "healthy" PFCP sessions maybe established before the UP function can handle Recovery timestamp included in the Heartbeat request or Heartbeat response message, this leads those "healthy" PFCP sessions may also be deleted during the cleanup, as the UP function may assume those PFCP sessions are still associated with the old timestamp.  It is proposed to add Recovery Timestamp also in PFCP Session Establishment Request message, this will allow UP function to receive the incremented Recovery Timestamp earlier, i.e. already at the first PFCP Session Establishment Request, so the UPF can clear the staled PFCP sessions which are established before the CP function restart. | | | | | | | | |
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| ***Summary of change:*** | | Add Recovery Timestamp in the PFCP Session Establishment Request message. | | | | | | | | |
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| ***Consequences if not approved:*** | | Some new PFCP Sessions established after a CP function restart may be accidently deleted. | | | | | | | | |
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| ***Clauses affected:*** | | 19A | | | | | | | | |
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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:*** | |  | | | | | | | | |

\* \* \* First Change \* \* \* \*

# 19A PFCP based restart procedures

Across PFCP based interfaces, an SGW-C, SGW-U, PGW-C and PGW-U Node shall utilize PFCP Heartbeat Request and Heartbeat Response messages to detect and handle a peer PFCP entity failure or restart. A PFCP entity shall be prepared to receive a Heartbeat Request message at any time (even from unknown peers), and it shall reply with a Heartbeat Response message.

A PFCP entity shall maintain two Recovery Time Stamps:

- in volatile memory a remote Recovery Time Stamp of a peer PFCP entity with which the entity is in contact;

- in non-volatile memory own, or local Recovery Time Stamp that was sent to a peer PFCP entity.

After a PFCP entity has restarted, it shall immediately update all local Recovery Time Stamps and shall clear all remote Recovery Time Stamps. When peer PFCP entities information is available, i.e. when the PFCP Association is still alive, the restarted PFCP entity shall send its updated Recovery Time Stamps in a Heartbeat Request message to the peer PFCP entities before initiating any PFCP session signalling.

A PFCP entity may have a common local Recovery Time Stamp for all peer PFCP entities, or it may have a separate local Recovery Time Stamp for each peer PFCP entity.

A PFCP entity may probe the liveliness of each peer PFCP entity with which it is in contact by sending a Heartbeat Request message (see clause 20 "Path management procedures").

The Recovery Time Stamp signalled in the PFCP Heartbeat Request and Response messages is associated with the PFCP entity identified by the source IP address of the message.

The Recovery Time Stamp signalled in the PFCP Session Establishment Request message is associated with the IP address in the CP F-SEID IE.

The PFCP entity that receives a Recovery Time Stamp Information Element from a peer PFCP entity shall compare the received remote Recovery Time Stamp value with the previous Recovery Time Stamp value stored for that peer PFCP entity.

- If no previous value was stored, the Recovery Time Stamp value received in the Heartbeat Request or Response messages or the PFCP Session Establishment Request messages shall be stored for the peer PFCP entity.

- If the value of a Recovery Time Stamp previously stored for a peer PFCP entity is smaller than the Recovery Time Stamp value received in the Heartbeat Request or Response messages or the PFCP Session Establishment Request messages, this indicates that the entity that sent the Heartbeat Request or Response messages has restarted. The received, new Recovery Time Stamp value shall be stored by the receiving entity, replacing the value previously stored for the peer PFCP entity.

- If the value of a Recovery Time Stamp previously stored for a peer PFCP entity is larger than the Recovery Time Stamp value received in the Heartbeat Request or Response message or the PFCP Session Establishment Request messages, this indicates a possible race condition (newer message arriving before the older one). The received Sx node related message and the received new Recovery Time Stamp value shall be discarded and an error may be logged.

A PFCP function shall ignore the Recovery Timestamp received in PFCP Association Setup Request and PFCP Association Setup Response messages (see clause 6.2.6 of 3GPP TS 29.244 [43]).

\* \* \* End of Changes \* \* \* \*