**3GPP TSG-WG SA2 Meeting #136E *S2-2002182r02***

**Elbonia, 24 – 27 January, 2020 (revision of S2-2001145)**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| *CR-Form-v12.0* | | | | | | | | |
| **CHANGE REQUEST** | | | | | | | | |
|  | | | | | | | | |
|  | **23.501** | **CR** | **2036** | **rev** | **3** | **Current version:** | **16.3.0** |  |
|  | | | | | | | | |
| *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)*.* | | | | | | | | |
|  | | | | | | | | |

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| ***Proposed change affects:*** | UICC apps |  | ME | **X** | Radio Access Network |  | Core Network | **X** |

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | | | | | | | | | | |
| ***Title:*** | Corrections for handling of serving networks not supporting ATSSS | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Source to WG:*** | Ericsson (?), ZTE (?), OPPO (?), LG Electronics, Nokia (?), Nokia Shanghai Bell (?) | | | | | | | | | |
| ***Source to TSG:*** | SA2 | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Work item code:*** | ATSSS | | | | |  | ***Date:*** | | | 2020-02-21 |
|  |  | | | |  | |  | | |  |
| ***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)* | |
|  |  | | | | | | | | | |
| ***Reason for change:*** | | The scenario where a UE is registered to a serving PLMN not supporting ATSSS may cause problems in some scenarios, e.g. in roaming cases with different VPLMNs in 3GPP and non-3GPP access. In that case multiple PDU Sessions with the same PDU Session ID may be created.  Rev3: If the AMF does not indicate ATSSS support homogeneously then when the new AMF does not indicate ATSSS support after the MA PDU Session is established, the UE locally releases the MA PDU Session. This may increase network signalling because the UE will request the MA PDU again if the another new AMF indicates support of ATSSS after releasing the MA PDU Session. | | | | | | | | |
| ***xx*** | |  | | | | | | | | |
| ***Summary of change:*** | | Support for AMF to indicate its ATSSS capability to the UE is in introduced, and a requirement on the UE to not initiate ATSSS procedures unless network support is indicated | | | | | | | | |
|  | |  | | | | | | | | |
| ***Consequences if not approved:*** | | Multiple PDU Sessions with the same PDU Session ID may be created | | | | | | | | |
|  | |  | | | | | | | | |
| ***Clauses affected:*** | | 5.32.2 | | | | | | | | |
|  | |  | | | | | | | | |
|  | | **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:*** | | Rev3: Add a note that clarifies signalling issue caused by non-homogeneous deployment and potential solutions to aovid the issue. | | | | | | | | |

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

### 5.32.2 Multi Access PDU Sessions

A Multi-Access PDU (MA PDU) Session is managed by using the session management functionality specified in clause 5.6, with the following additions and modifications:

- When the UE wants to request a new MA PDU Session:

- If the UE is registered to the same PLMN over 3GPP and non-3GPP accesses, then the UE shall send a PDU Session Establishment Request over any of the two accesses containing a "MA PDU Request" indication. The AMF informs the SMF that the UE is registered over both accesses and this triggers the establishment of user-plane resources on both accesses and two N3/N9 tunnels between PSA and the RAN/AN.

- If the UE is registered to different PLMNs over 3GPP and non-3GPP accesses, then the UE shall send a PDU Session Establishment Request over one access containing a "MA PDU Request" indication. After this PDU Session is established with one N3/N9 tunnel between the PSA and (R)AN established, the UE shall send another PDU Session Establishment Request over the other access containing also a "MA PDU Request" indication and the same PDU Session ID. Two N3/N9 tunnels and User-plane resources on both accesses are established.

- If the UE is registered over one access only, then the UE shall send a PDU Session Establishment Request over this access containing a "MA PDU Request" indication. One N3/N9 tunnel between the PSA and (R)AN and User-plane resources on this access only are established. After the UE is registered over the second access, the UE shall establish user-plane resources on the second access.

- In the PDU Session Establishment Request that is sent to request a new MA PDU Session, the UE shall provide also its ATSSS capabilities, which indicate the steering functionalities and the steering modes supported in the UE. These functionalities are defined in clause 5.32.6.

- If the UE indicates it is capable of supporting the ATSSS-LL functionality with any steering mode (as specified in clause 5.32.6.1) and the network accepts to activate this functionality, then the network may provide to UE Measurement Assistance Information (see details in clause 5.32.5) and shall provide to UE one or more ATSSS rules.

- If the UE indicates it is capable of supporting the MPTCP functionality with any steering mode and the ATSSS-LL functionality only the Active-Standby steering mode (as specified in clause 5.32.6.1) and the network accepts to activate these functionalities, then the network provides MPTCP proxy information to UE, and allocates to UE one IP address/prefix for the MA PDU session (as defined in clause 5.8.2.2) and two additional IP addresses/prefixes, called "link-specific multipath" addresses. Further details are provided in clause 5.32.6.2. In addition, the network may provide to UE Measurement Assistance Information and shall provide to UE one or more ATSSS rules including an ATSSS rule for non-MPTCP traffic. The ATSSS rule for non-MPTCP traffic shall use the ATSSS-LL functionality and the Active-Standby Steering Mode to indicate how the non-MPTCP traffic shall be transferred across the 3GPP access and the non-3GPP access in the uplink direction.

- If the UE indicates it is capable of supporting the MPTCP functionality with any steering mode and the ATSSS-LL functionality with any steering mode (as specified in clause 5.32.6.1) and the network accepts to activate these functionalities, then the network provides MPTCP proxy information to UE, and allocates to UE one IP address/prefix for the MA PDU session (as defined in clause 5.8.2.2) and two additional IP addresses/prefixes, called "link-specific multipath" addresses. Further details are provided in clause 5.32.6.2. In addition, the network may provide to UE Measurement Assistance Information and shall provide to UE one or more ATSSS rules.

- If the UE requests an S-NSSAI, this S-NSSAI should be allowed on both accesses. Otherwise, the MA PDU Session shall not be established.

- The SMF determines the ATSSS capabilities supported for the MA PDU Session based on the ATSSS capabilities provided by the UE and per DNN configuration on SMF, as follows:

- If the UE includes in its ATSSS capabilities "MPTCP functionality with any steering mode and ATSSS-LL functionality with only Active-Standby steering mode" (as specified in clause 5.32.6.1); and

- if the DNN configuration allows both MPTCP and ATSSS-LL with any steering mode, the MA PDU Session is capable of (1) MPTCP and ATSSS-LL with any steering mode in the downlink, and (2) MPTCP and ATSSS-LL with Active-Standby mode in the uplink; or

- if the DNN configuration allows MPTCP with any steering mode and ATSSS-LL with only Active-Standby steering mode, the MA PDU Session is capable of MPTCP and ATSSS-LL with Active-Standby mode in uplink and downlink.

- If the UE includes in its ATSSS capabilities "ATSSS-LL functionality with any steering mode" (as specified in clause 5.32.6.1) and the DNN configuration allows ATSSS-LL with any steering mode, the MA PDU Session is capable of ATSSS-LL with any steering mode in the uplink and in the downlink.

- If the UE includes in its ATSSS capabilities "MPTCP functionality with any steering mode and ATSSS-LL functionality with any steering mode" (as specified in clause 5.32.6.1), and the DNN configuration allows both MPTCP and ATSSS-LL with any steering mode, the MA PDU Session is capable of both MPTCP and ATSSS-LL with any steering mode in the uplink and in the downlink.

The SMF provides the ATSSS capabilities of the MA PDU Session to the PCF during PDU Session Establishment.

- The PCC rules provided by PCF include ATSSS control information (see TS 23.503 [45]). They are used by SMF to derive ATSSS rules for the UE and N4 rules for the UPF. When dynamic PCC is not used for the MA PDU Session, the SMF shall provide ATSSS rules and N4 rules based on local configuration (e.g. based on DNN or S-NSSAI).

- The UE receives ATSSS rules from SMF, which indicate how the uplink traffic should be routed across 3GPP access and non-3GPP access. Similarly, the UPF receives N4 rules from SMF, which indicate how the downlink traffic should be routed across 3GPP access and non-3GPP access.

- When the SMF receives a PDU Session Establishment Request containing a "MA PDU Request" indication and determines that UP security protection (see clause 5.10.3) is required for the PDU Session, the SMF shall only confirm the establishment of the MA PDU session if the 3GPP access network can enforce the required UP security protection. The SMF needs not confirm whether the non-3GPP access can enforce the required UP security protection.

- After the MA PDU Session establishment:

- At any given time, the MA PDU session may have user-plane resources on both 3GPP and non-3GPP accesses, or on one access only, or may have no user-plane resources on any access.

- The AMF, SMF, PCF and UPF maintain their MA PDU Session contexts, even when the UE deregisters from one access (but remains registered on the other access).

- When the UE deregisters from one access (but remains registered on the other access), the AMF informs the SMF that an access type becomes unavailable for the MA PDU Session. Subsequently, the SMF notifies the UPF that the access type has become unavailable and the N3/N9 tunnel for the access type are released.

- If the UE wants to add user-plane resources on one access of the MA PDU Session, e.g. based on access network performance measurement and/or ATSSS rules, then the UE shall send a PDU Session Establishment Request over this access containing PDU Session ID of the MA PDU Session and a "MA PDU Request" indication. If there is no N3/N9 for this access, the N3/N9 tunnel for this access is established.

- If the UE wants to re-activate user-plane resources on one access of the MA PDU Session, e.g. based on access network performance measurement and/or ATSSS rules, then the UE shall initiate the UE Triggered Service Request procedure over this access.

- If the network wants to re-activate the user-plane resources over 3GPP access or non-3GPP access of the MA PDU Session, the network shall initiate the Network Triggered Service Request procedure, as specified in TS 23.502 [3], clause 4.22.7.

A MA PDU Session may be established either:

a) when it is explicitly requested by an ATSSS-capable UE; or

b) when an ATSSS-capable UE requests a single-access PDU Session but the network decides to establish a MA PDU Session instead. This is an optional scenario specified in TS 23.502 [3], clause 4.22.3, which may occur when the UE requests a single-access PDU Session but no policy (e.g. no URSP rule) and no local restrictions in the UE mandate a single access for the PDU Session.

A MA PDU Session may be established during a PDU Session modification procedure when the UE moves from EPS to 5GS, as specified in TS 23.502 [3], clause 4.22.6.3.

The AMF indicates as part of the Registration procedure whether ATSSS is supported or not. When ATSSS is not supported, the UE shall not

- request establishment of a MA PDU Session (as described in clause 4.22.2 of TS 23.502 [3]); or

- request addition of User Plane resources for an existing MA PDU Session (as described in clause 4.22.7 of TS 23.502 [3]); or

- request establishment of a PDU Session with "MA PDU Network-Upgrade Allowed" indication (as described in clause 4.22.3 of TS 23.502 [3]); or

- request PDU Session Modification with Request Type of "MA PDU request" or with "MA PDU Network-Upgrade Allowed" indication after moving from EPC to 5GC (as described in clause 4.22.6.3 of TS 23.502 [3]).

NOTE: In this release, the support of ATSSS is homogenous within the network slice.

An ATSSS-capable UE may decide to request a MA PDU Session based on the provisioned URSP rules. In particular, the UE should request a MA PDU Session when the UE applies a URSP rule, which triggers the UE to establish a new PDU Session and the Access Type Preference component of the URSP rule indicates "Multi-Access" (see TS 23.503 [45]).

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