**3GPP TSG-SA4 Meeting #128 S4-241082**

**Jeju, South Korea, 20th – 24th May 2024**

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| *CR-Form-v12.0* |
| **CHANGE REQUEST** |
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|  | **26**.**804** | **CR** | **0013** | **rev** | **-** | **Current version:** | **18.1.0** |  |
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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 |  | Radio Access Network |  | Core Network | **X** |

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| ***Title:***  | **[FS\_AMD] Multi-Access with ATSSS** |
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| ***Source to WG:*** | Samsung Electronics Co. Ltd. |
| ***Source to TSG:*** | S4 |
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| ***Work item code:*** | FS\_AMD |  | ***Date:*** | 2024-05-10 |
|  |  |  |  |  |
| ***Category:*** | **B** |  | ***Release:*** | Rel-19  |
|  | *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-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)* *Rel-17 (Release 17)* *Rel-18 (Release 18)* |
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| ***Reason for change:*** | A document S4-240691 was submitted to SA4#127-bis-e meeting on topic of multi-access with ATSSS for 5G media streaming. The document was revised to S4-240808 during the meeting. One of the main comments was to limit the scope of the key issue to identify issues related to impact of ATSSS architecture methods on M4 application flows. This contribution proposes the key issue description, and updates the scope of the study topic to identifying impacts on M4.  |
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| ***Summary of change:*** | Add a new key issue on multi-access using ATSSS architecture for media delivery services |
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| ***Consequences if not approved:*** | One of the study topics will be incomplete |
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| ***Clauses affected:*** | 5.X |
|  |  |
|  | **Y** | **N** |  |  |
| ***Other specs*** |  |  |  Other core specifications  | TS/TR ... CR ...  |
| ***affected:*** |  |  |  Test specifications | TS/TR ... CR ...  |
| ***(show related CRs)*** |  |  |  O&M Specifications | TS/TR ... CR ...  |
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| ***Other comments:*** |  |
|  |  |
| ***This CR's revision history:*** |  |

\* \* \* \* First change (all new text)\* \* \* \*

## 5.X Multi-access for media delivery using ATSSS

### 5.X.1 Description

Clause 5.32 of TS 23.501 [23501] describes ATSSS (Access Traffic Steering, Switching, and Splitting) an optional feature supported by the UE and 5G Core network for multi-access. Some of the key principles this feature defines that are relevant for our study are:

1. The ATSSS feature enables a *Multi-Access PDU Connectivity Service* allowing for the exchange of PDUs between the UE and a Data Network by simultaneously using one 3GPP access network and one non-3GPP access network via two independent N3/N9 tunnels between a PDU Session Anchor UPF (PSA UPF) and the RAN/AN.

NOTE 1: The limits on the number and type of access network refer to Release 18 and may differ in subsequent releases.

2. The Multi-Access PDU Connectivity Service is facilitated by a *Multi-Access PDU (MA PDU) Session* that may have User Plane resources on two access networks. In the context of the generalised media delivery architecture specified in TS 26.501 [15]:

- If conveyed over an MA PDU Session, the application flow between the Media Session Handler and the Media AF (e.g., 5GMS AF) at reference point M5 may use two different access networks.

- If conveyed over an MA PDU Session, the application flow between the Media Access Client (e.g., Media Player or Media Streamer) and the Media AS (e.g., 5GMS AS) at reference point M4 may use two different access networks.

3. The UE is supplied with policy rules ("ATSSS rules") by the network for deciding how to distribute uplink traffic across multiple access networks. Similarly, the UPF anchor is supplied with policy rules ("N4 rules") by the network for deciding how to distribute downlink traffic across the two N3/N9 tunnels and the two access networks. The network entity configuring ATSSS rules and N4 rules is the SMF. The SMF may map PCC rules from the PCF to create these ATSSS and N4 rules.

4. The UE indicates its support for ATSSS (steering functionalities and steering modes) in the *PDU Session Establishment Request* that is sent to request a new MA PDU Session.

5. If the UE requests a network slice instance, the same S-NSSAI is allowed to span both access networks.

NOTE 2: Support for slice QoS when slice PDUs are conveyed over a non-3GPP access network is unknown.

6. For QoS support, the same 5G QoS model used for conventional PDU Sessions also applies to MA PDU Sessions, i.e. QoS Flow is the finest granularity of QoS differentiation. However, QoS Flow is access-agnostic: the same network QoS applies to each of the different access network comprising the MA PDU Session, i.e. the same QoS is available across two different paths in different access networks. The network (SMF) may provide QoS rules to the UE via one access network that are used for both the 3GPP access network and non-3GPP access network.

- In the context of the generalised media delivery architecture, application flows at reference point M5 and/or M4 using a MA PDU Session may have similar network QoS as when they are transmitted via the 3GPP access network alone.

NOTE 3: Support for PDU Session QoS when PDUs are conveyed over a non-3GPP access network is unknown.

7. The network may provide Measurement Assistance Information to the UE and/or UPF to assist them in determining which measurements (packet round-trip time measurements, packet loss rate measurements) are to be performed before deciding how to distribute traffic across the two access networks.

8. The ATSSS rules provided to the UE by the network contain information about the type of steering functionality to be used to distribute traffic across multiple access networks. Steering functionality is the functionality that can steer, switch, and split traffic across multiple access networks. From clause 5.32.8 of TS 23.501 [23501], the supported steering functionalities include:

- *Higher-layer MPTCP (Multipath TCP) functionality* – The UPF provides MPTCP proxy functionality. Corresponding MPTCP functionality in the UE may communicate with the MPTCP proxy in the UPF to distribute and aggregate traffic across multiple access networks.

- *Higher-layer MPQUIC (Multipath-enabled QUIC) functionality* – The UPF provides MPQUIC proxy functionality. The corresponding MPQUIC functionality in the UE may communicate with the MPQUIC proxy in the UPF to distribute and aggregate traffic across multiple access networks.

- *ATSSS-LL (ATSSS Low-Layer) functionality* – The UPF allows steering, switching, and splitting of traffic across two access networks based on information from the IP layer and below.

9. The ATSSS rules provided to the UE by the network indicate which steering mode is to be applied to matching traffic for each Service Data Flow (SDF). The steering mode determines how the matching traffic is to be distributed across 3GPP and non-3GPP access networks. Supported steering modes in Release 18 include:

- *Active-Standby:* Used to steer matching SDF packets onto one access network (the "Active access") when this is available, and onto another (the "Standby access") when the Active access is unavailable.

- *Smallest Delay:* Matching SDF packets are steered to the access network with smallest packet round-trip time.

- *Load-Balancing:* Used to split the delivery of SDF packets between both the access networks if both of them are available.

- *Priority-based:* Used to steer SDF packets onto an access network with a higher priority.

*- Redundant:* Used to duplicate SDF packets on both access networks if both of them are available.

To support the operation of media delivery services specified in TS 26.501 [26501], TS 26.506 [26506], and TS 26.502 [26502] with multi-access, there is a need to first document clear potential issues to split, steer, and switch the M4 application flows of the above media delivery services based on methods specified in ATSSS architecture.

### 5.X.2 Collaboration scenarios

Editor’s Note: Study collaboration scenarios between the 5G System and Application Provider for each of the key topics.

### 5.X.3 Architecture mapping

Editor’s Note: Based on existing architectures, develop one or more deployment architectures that address the key topics and the collaboration models.

### 5.X.4 High-level call flow

Editor’s Note: Map the key topics to basic functions and develop high-level call flows.

### 5.X.5 Gap analysis and requirements

The following potential open issues are identified:

1. Document potential open issues to split, switch, and steer M4 application flows based on methods specified in ATSSS architecture.

### 5.X.6 Candidate solutions

Editor’s Note: Candidate solutions for identified key issue.

### 5.X.7 Summary and conclusions

\* \* \* \* End of changes \* \* \* \*