**3GPP TSG-CT WG1 Meeting #129-eC1-212096**

**Electronic meeting, 19-23 April 2021**

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| *CR-Form-v12.0* |
| **CHANGE REQUEST** |
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|  | **24.193** | **CR** | **0031** | **rev** | **-** | **Current version:** | **17.0.1** |  |
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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:***  | Support for MA PDU Session with 3GPP access in EPC |
|  |  |
| ***Source to WG:*** | InterDigital, Nokia, Nokia Shanghai Bell, ZTE |
| ***Source to TSG:*** | C1 |
|  |  |
| ***Work item code:*** | ATSSS\_Ph2 |  | ***Date:*** | 2021-03-31 |
|  |  |  |  |  |
| ***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 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-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:*** | SA2 has agreed to extend the support for MA PDU Session with 3GPP access in EPC from 5G-RG to general ATSSS capable UE. The related changes are captured in Clause 5.32.1 of TS 23.501 and Clause 4.22.2.3 of TS 23.502. |
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| ***Summary of change:*** | Replace "5G-RG" with "UE" in various clauses related to MA PDU Session with 3GPP access leg in EPC. |
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| ***Consequences if not approved:*** | MA PDU Session with 3GPP access leg in EPC is not supported for general ATSSS capable UE. |
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| ***Clauses affected:*** | 1, 4.1, 4.6, 4.7,5.1, 5.3 |
|  |  |
|  | **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 \*\*\*\*\*\*\*\*

# 1 Scope

The present document specifies the procedures for access traffic steering, switching and splitting (ATSSS) between the UE and the network across one 3GPP access network and one non-3GPP access network as specified in 3GPP TS 23.501 [2], 3GPP 23.502 [3], and 3GPP TS 23.316 [4].

The ATSSS can be supported over the access network where an MA PDU session can be established. The type of access network includes NG-RAN and untrusted non-3GPP access network as specified in 3GPP TS 23.501 [2], trusted non-3GPP access network, wireline access network and as specified in 3GPP TS 23.316 [4]. An MA PDU session established by the UE can also simultaneously use one 3GPP access network connected to EPC and one non-3GPP access network connected to 5GCN as specified in 3GPP TS 23.502 [3].

\*\*\*\*\*\*\*\* NEXT CHANGE \*\*\*\*\*\*\*\*

## 4.1 Introduction

ATSSS is an optional feature that can be supported by the UE and the 5GC network to route data traffic across 3GPP access and non-3GPP access networks. An ATSSS capable UE establishes an MA PDU session supporting multi-access connectivity over 3GPP access and non-3GPP access networks as described in clause 4.2. The ATSSS capable UE can support ATSSS-LL and/or MPTCP steering functionality as described in clause 4.3, with associated steering modes, i.e. active-standby, smallest delay, load balancing, priority based. The ATSSS capable UE indicates the steering functionality and associated steering modes to the 5GC network.

When the ATSSS capable UE registers to a registration area, it receives an indication from the AMF if the network supports the ATSSS. The procedure for how the AMF indicates the UE about its ATSSS support is specified in 3GPP TS 24.501 [6]. The UE capable ATSSS and the network supporting ATSSS exchange access performance measurements as described in clause 4.4. Clause 4.5 describes the traffic distribution over 3GPP access and non-3GPP access networks. Clause 4.6 provides a description for interworking with EPS network. Clause 4.7 describes ATSSS when the ATSSS capable UE is interconnected with EPS.

Editor's note: For an MA PDU Session with Ethernet PDU Session type, the system behaviour, when the UE requests an EPC leg while Ethernet PDN Connection type is not possible over EPC, is FFS.

The architecture reference model for ATSSS support is described in clause 4.2.10 of 3GPP TS 23.501 [2].

\*\*\*\*\*\*\*\* NEXT CHANGE \*\*\*\*\*\*\*\*

## 4.6 EPS interworking

In the network supporting N26 interface:

a) if the UE established an MA PDU session over non-3GPP access only, no EPS bearer identity can be assigned to any QoS flow of the MA PDU session as specified in 3GPP TS 23.502 [3];

b) if the UE established an MA PDU session over 3GPP access and non-3GPP access and the user plane of the MA PDU session over 3GPP access is released, the EPS bearer identity assigned for the MA PDU session can be revoked as specified in 3GPP TS 23.502 [3];

c) for an inter-system change from N1 mode to S1 mode:

1) if the UE established an MA PDU session over 3GPP access only, the UE follows the procedure as specified in clause 6.1.4.1 of 3GPP TS 24.501 [6]; or

2) if the UE established an MA PDU session over 3GPP access and non-3GPP access, the UE follows the procedure as specified in clause 6.1.4.1 of 3GPP TS 24.501 [6], and

A) if the MA PDU session is transferred to EPS as a PDN connection, the SMF can initiate the network-requested PDU session release procedure over non-3GPP access as specified in clause 6.3.3.2 of 3GPP TS 24.501 [6] or perform a local release of the MA PDU session. The UE performs a local release of the MA PDU session over 3GPP access and non-3GPP access; or

NOTE 1: If the UE receives from the network a PDU SESSION RELEASE COMMAND message which indicates to release the MA PDU session over non-3GPP access and the UE has already performed or is performing a local release of the MA PDU session, the error handling as specified in clause 6.3.3.6 of 3GPP TS 24.501 [6] is applied.

NOTE 2: The QoS flow(s) with EBI assigned over non-3GPP access is also transferred to the corresponding PDN connection.

B) if the MA PDU session is not transferred to EPS as a PDN connection and the SMF decides to move the traffic of the MA PDU session from 3GPP access to non-3GPP access, the SMF can initiate the network-requested PDU session modification procedure as specified in clause 6.3.2.2 of 3GPP TS 24.501 [6]; and

d) for an inter-system change from S1 mode to N1 mode, if the UE requests an MA PDU session or the related URSP or UE local configuration does not mandate that the PDU session is established over a single access when transferring the PDN connection to 3GPP access, the PDN connection can be converted by the network to an MA PDU session via the UE-requested PDU session modification procedure (see clause 5.2.5).

In the network not supporting N26 interface:

a) for an inter-system change from N1 mode to S1 mode, if the UE intends to transfer the MA PDU session to EPS, the UE follows the procedure as specified in clause 6.1.4.2 of 3GPP TS 24.501 [6] and performs a local release of the MA PDU session over 3GPP access and non-3GPP access. The SMF can initiate the network-requested PDU session release procedure over non-3GPP access as specified in clause 6.3.3.2 of 3GPP TS 24.501 [6] or perform a local release of the MA PDU session; and

NOTE 3: If the UE receives from the network a PDU SESSION RELEASE COMMAND message which indicates to release the MA PDU session over non-3GPP access and the UE has already performed or is performing a local release of the MA PDU session, the error handling as specified in clause 6.3.3.6 of 3GPP TS 24.501 [6] is applied.

b) for an inter-system change from S1 mode to N1 mode, if the related URSP or UE local configuration does not mandate that the PDU session is established over a single access, the UE can initiate the UE-requested PDU session establishment procedure to request an MA PDU session (see clause 5.2.1) or to allow the PDU session to be upgraded to an MA PDU session (see clause 5.2.6) when transferring the PDN connection to 5GS.

\*\*\*\*\*\*\*\* NEXT CHANGE \*\*\*\*\*\*\*\*

## 4.7 MA PDU session when UE is connected to EPS

A UE can connect to both 5GCN and EPC as specified in clause 4.22.2.3 of 3GPP TS 23.502 [3].

When establishing a PDN connection over EPS, the UE can indicate that the PDN connection is to be used as a user-plane resource associated with:

a) a new MA PDU session; or

b) an existing MA PDU session established in non-3GPP access connected to 5GCN.

NOTE: For b), it is wireline access network connected to 5GCN if the UE is the 5G-RG.

In the network supporting N26 interface, for an inter-system change from N1 mode to S1 mode and from S1 mode to N1 mode, the MA PDU session established by the 5G-RG is handled as specified in clause 6.1.4.1 of 3GPP TS 24.501 [6].

In the network not supporting N26 interface, for an inter-system change from N1 mode to S1 mode and from S1 mode to N1 mode, the MA PDU session established by the UE is handled as specified in clause 6.1.4.2 of 3GPP TS 24.501 [6].

\*\*\*\*\*\*\*\* NEXT CHANGE \*\*\*\*\*\*\*\*

## 5.1 Introduction

The ATSSS control procedures include:

a) handling of multi-access PDU connectivity service procedures (see clause 5.2);

b) handling of hybrid access with multi-access PDU connectivity (see clause 5.3); and

c) access performance measurement procedures (see clause 5.4).

In clause 5.2, handling of multi-access PDU connectivity service procedures include following management procedures:

a) activation of multi-access PDU connectivity service;

b) re-activation of user-plane resources;

c) release of user-plane resources;

d) updating ATSSS parameters;

e) converting PDU session transferred from EPS to MA PDU session; and

f) PDU session establishment with network modification to MA PDU session.

In clause 5.3, the multi-access PDU connectivity procedures over E-UTRAN and non-3GPP access network are specified.

In clause 5.4, access performance measurement procedures are performed by exchanges of PMF protocol messages between the PMF in a UE and the PMF in the UPF over the user plane. For MA PDU sessions of IPv4, IPv6, or IPv4v6 PDU session type, the PMF protocol messages are transported using UDP. For MA PDU sessions of Ethernet PDU session type, the PMF protocol messages are transported using Ethernet frames. The protocol stacks of the PMF protocol are specified in clause 5.32.5.4 of 3GPP TS 23.501 [2].

\*\*\*\*\*\*\*\* NEXT CHANGE \*\*\*\*\*\*\*\*

## 5.3 Multi-access PDU connectivity over E-UTRAN and non-3GPP access network

### 5.3.1 UE establishing a PDN connection as a user-plane resource of an MA PDU session to be established

In order to establish a PDN connection as a user-plane resource of an MA PDU session to be established, the UE shall initiate the UE requested PDN connectivity procedure according to 3GPP TS 24.301 [10].

In the PDN CONNECTIVITY REQUEST message or, when applicable, in the ESM INFORMATION RESPONSE message, of the UE requested PDN connectivity procedure:

a) the UE shall set the request type to "initial request" as specified in 3GPP TS 24.301 [10];

NOTE: According to 3GPP TS 24.301 [10], a newly generated PDU session ID is included in the protocol configuration options IE or the extended protocol configuration options IE of the PDN CONNECTIVITY REQUEST message with the request type "initial request".

b) the UE shall set the PDN Type IE to "IPv4", "IPv6" or "IPv4v6"; and

c) in the protocol configuration options or extended protocol configuration options IE of the PDN CONNECTIVITY REQUEST message, the UE shall include the ATSSS request PCO parameter. In the ATSSS request PCO parameter:

1) if the UE supports ATSSS Low-Layer functionality with any steering mode as specified in clause 5.32.6 of 3GPP TS 23.501 [2], the UE shall set the ATSSS-ST field to "ATSSS Low-Layer functionality with any steering mode supported";

2) if the UE supports MPTCP functionality with any steering mode and ATSSS-LL functionality with only active-standby steering mode as specified in clause 5.32.6 of 3GPP TS 23.501 [2], the UE shall set the ATSSS-ST field to "MPTCP functionality with any steering mode and ATSSS-LL functionality with only active-standby steering mode supported"; or

3) if the UE supports MPTCP functionality with any steering mode and ATSSS-LL functionality with any steering mode as specified in clause 5.32.6 of 3GPP TS 23.501 [2], the UE shall set the ATSSS-ST field to "MPTCP functionality with any steering mode and ATSSS-LL functionality with any steering mode supported".

Upon receipt of an ACTIVATE DEFAULT EPS BEARER CONTEXT REQUEST message of a default EPS bearer context activation procedure as a response to the PDN CONNECTIVITY REQUEST message as specified in 3GPP TS 24.301 [10], the ACTIVATE DEFAULT EPS BEARER CONTEXT REQUEST message containing the extended protocol configuration options IE with the ATSSS response with the length of two octets PCO parameter:

a) the UE shall consider that the MA PDU session is established based on parameters from the default EPS bearer context of the PDN connection, as follows:

1) the PDN type of the default EPS bearer context shall be mapped to the PDU session type of the MA PDU session as follows:

i) if the PDN type is "IPv4", the PDU session type is set to "IPv4";

ii) if the PDN type is "IPv6", the PDU session type is set to "IPv6"; or

iii) if the PDN type is "IPv4v6", the PDU session type is set to "IPv4v6";

2) the PDN address of the default EPS bearer context shall be mapped to PDU address of the MA PDU session;

3) the APN of the default EPS bearer context shall be mapped to the DNN of the MA PDU session;

4) the PDU session identity of the MA PDU session shall be set to the PDU session identity included by the UE in the Protocol configuration options IE or Extended protocol configuration options IE in the PDN CONNECTIVITY REQUEST message;

5) the S-NSSAI of the MA PDU session shall be set to the S-NSSAI included by the network in the Protocol configuration options IE or Extended protocol configuration options IE in the ACTIVATE DEFAULT EPS BEARER REQUEST message, if the PDN connection is a non-emergency PDN connection;

6) the SSC mode of the MA PDU session shall be set to "SSC mode 1"; and

7) state of the PDU session shall be set to PDU SESSION ACTIVE;

 and that the PDN connection is established as a user-plane resource of the MA PDU session;

b) if the network steering functionalities information is included in the ATSSS response with the length of two octets PCO parameter, the UE shall use the network steering functionalities information; and

c) if the measurement assistance information is included in the ATSSS response with the length of two octets PCO parameter, the UE shall use the measurement assistance information.

Upon receipt of:

a) a PDN CONNECTIVITY REJECT message as a response to the PDN CONNECTIVITY REQUEST message as specified in 3GPP TS 24.301 [10]; or

b) an ACTIVATE DEFAULT EPS BEARER CONTEXT REQUEST message of a default EPS bearer context activation procedure as a response to the PDN CONNECTIVITY REQUEST message as specified in 3GPP TS 24.301 [10] without the extended protocol configuration options IE containing the ATSSS response with the length of two octets PCO parameter;

the UE shall consider that the MA PDU session is not established and the PDN connection is not established as a user-plane resource of the MA PDU session.

### 5.3.2 UE establishing a PDN connection as a user-plane resource of an already established MA PDU session

In order to establish a PDN connection as a user-plane resource of an already established MA PDU session, the UE shall initiate the UE requested PDN connectivity procedure according to 3GPP TS 24.301 [10].

In the PDN CONNECTIVITY REQUEST message or, when applicable, in the ESM INFORMATION RESPONSE message, of the UE requested PDN connectivity procedure:

a) the UE shall set the request type to "handover" as specified in 3GPP TS 24.301 [10];

NOTE: According to 3GPP TS 24.301 [10], the PDU session ID of the already established MA PDU session is included in the protocol configuration options IE or the extended protocol configuration options IE of the PDN CONNECTIVITY REQUEST message with the request type "handover".

b) the UE shall set the PDN Type IE to "IPv4", "IPv6" or "IPv4v6"; and

c) in the protocol configuration options or extended protocol configuration options IE, the UE shall include the ATSSS request PCO parameter.

Upon receipt of the ACTIVATE DEFAULT EPS BEARER CONTEXT REQUEST message of a default EPS bearer context activation procedure as a response to the PDN CONNECTIVITY REQUEST message as specified in 3GPP TS 24.301 [10], the UE shall consider that the PDN connection is established as a user-plane resource of the MA PDU session.

Upon receipt of a PDN CONNECTIVITY REJECT message as specified in 3GPP TS 24.301 [10], the UE shall consider that the PDN connection is not established as a user-plane resource of the MA PDU session.

\*\*\*\*\*\*\*\* End of CHANGE \*\*\*\*\*\*\*\*