**3GPP TSG-SA5 Meeting #158 *S5-247160***

Orlando, US, 18 - 22 November 2024

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| *CR-Form-v12.3* | | | | | | | | |
| **CHANGE REQUEST** | | | | | | | | |
|  | | | | | | | | |
|  | **28.104** | **CR** | **0145** | **rev** | **1** | **Current version:** | **18.5.0** |  |
|  | | | | | | | | |
| *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 | **X** | Core Network | **X** |

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|  | | | | | | | | | | |
| ***Title:*** | Rel-19 CR TS 28.104 New use case and solution on traffic steering analytics | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Source to WG:*** | Nokia | | | | | | | | | |
| ***Source to TSG:*** | SA5 | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Work item code:*** | DUMMY | | | | |  | ***Date:*** | | | 2024-11-07 |
|  |  | | | |  | |  | | |  |
| ***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 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-17 (Release 17) Rel-18 (Release 18) Rel-19 (Release 19)  Rel-20 (Release 20)* | |
|  |  | | | | | | | | | |
| ***Reason for change:*** | | There are rules configured for ATSSS and N4 that needs to be followed by the UE that includes aspects such as the steering mode and the amount of traffic to be steered between 3GPP and non-3GPP access. The network decides on these rules based on immediate performance measurements (e.g. RTT and packet loss) and local configuration at SMF. This means of deciding rules do not capture holistic view on the past network traffic trends, the history, and trends of the performance measurements (RTT and packet loss) from the past and situation on different accesses, ATSSS/N4 rules usage statistics, impact on available accesses, nor the predictions of the network behaviour in the future. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Summary of change:*** | | New use case on MDA is added to capture the use case and the solution. The solution is to enable MDA to predict the recommendations that can be used to come up with the rules. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Consequences if not approved:*** | | No MDA use case on traffic steering analytics | | | | | | | | |
|  | |  | | | | | | | | |
| ***Clauses affected:*** | | 2, 3.3  7.2.x, 8.4.x, 8.5.x (new clauses added) | | | | | | | | |
|  | |  | | | | | | | | |
|  | | **Y** | **N** |  | | | |  | | |
| ***Other specs*** | |  | **N** | Other core specifications | | | | TS/TR ... CR ... | | |
| ***affected:*** | |  | **N** | Test specifications | | | | TS/TR ... CR ... | | |
| ***(show related CRs)*** | |  | **N** | O&M Specifications | | | | TS/TR ... CR ... | | |
|  | |  | | | | | | | | |
| ***Other comments:*** | |  | | | | | | | | |
|  | |  | | | | | | | | |
| ***This CR's revision history:*** | | S5-247160 is a revision of S5-246590 | | | | | | | | |

***Start of First change***

# 2 References

The following documents contain provisions which, through reference in this text, constitute provisions of the present document.

- References are either specific (identified by date of publication, edition number, version number, etc.) or non‑specific.

- For a specific reference, subsequent revisions do not apply.

- For a non-specific reference, the latest version applies. In the case of a reference to a 3GPP document (including a GSM document), a non-specific reference implicitly refers to the latest version of that document *in the same Release as the present document*.

[1] 3GPP TR 21.905: "Vocabulary for 3GPP Specifications".

[2] Void

[3] 3GPP TS 28.535: "Management and orchestration; Management services for communication service assurance; Requirements".

[4] 3GPP TS 28.552: "Management and orchestration; 5G performance measurements".

[5] 3GPP TS 28.554: "Management and orchestration;5G end to end Key Performance Indicators (KPI)".

[6] 3GPP TS 32.422: "Telecommunication management; Subscriber and equipment trace; Trace control and configuration management".

[7] 3GPP TS 32.423: "Telecommunication management; Subscriber and equipment trace; Trace data definition and management".

[8] 3GPP TS 28.405: "Telecommunication managemen; Quality of Experience (QoE) measurement collection; Control and configuration".

[9] 3GPP TS 28.406: "Telecommunication management; Quality of Experience (QoE) measurement collection; Information definition and transport".

[10] 3GPP TS 23.288: "Architecture enhancements for 5G System (5GS) to support network data analytics services".

[11] 3GPP TS 28.532: "Management and orchestration; Generic management services".

[12] 3GPP TS 32.425: "Telecommunication management; Performance Management (PM); Performance measurements Evolved Universal Terrestrial Radio Access Network (E-UTRAN)".

[13] 3GPP TS 38.331: "NR; Radio Resource Control (RRC); Protocol specification".

[14] 3GPP TS 23.273: "5G System (5GS) Location Services (LCS); Stage 2".

[15] 3GPP TS 28.541: "Management and orchestration; 5G Network Resource Model (NRM); Stage 2 and stage 3".

[16] 3GPP TS 28.658: "Telecommunication management; Evolved Universal Terrestrial Radio Access Network (E-UTRAN) Network Resource Model (NRM) Integration Reference Point (IRP); Information Service (IS)".

[17] 3GPP TS 28.662: "Telecommunication management; Generic Radio Access Network (RAN) Network Resource Model (NRM); Information Service (IS)".

[18] 3GPP TS 32.156: "Telecommunication management; Fixed Mobile Convergence (FMC) Model Repertoire".

[19] 3GPP TS 28.622: "Telecommunication management; Generic Network Resource Model (NRM) Integration Reference Point (IRP); Information Service (IS)".

[20] 3GPP TS 28.511: "Telecommunication management; Configuration Management (CM) for mobile networks that include virtualized network functions; Procedures".

[21] 3GPP TS 28.531: "Management and orchestration; Provisioning".

[22] 3GPP TS 26.247: "Transparent end-to-end Packet-switched Streaming Service (PSS); Progressive Download and Dynamic Adaptive Streaming over HTTP (3GP-DASH)".

[23] 3GPP TS 26.114: "IP Multimedia Subsystem (IMS); Multimedia telephony; Media handling and interaction".

[24] 3GPP TS 28.105: "Management and orchestration; Artificial Intelligence/Machine Learning (AI/ML) management".

[25] 3GPP TS 32.160: "Management and orchestration; Management service template".

[26] ETSI GS NFV-IFA 011 (V3.3.1): "Network Functions Virtualisation (NFV) Release 3; Management and Orchestration; VNF Descriptor and Packaging Specification".

[27] Recommendation ITU-T X.733: "Information technology - Open Systems Interconnection - Systems Management: Alarm reporting function".

[28] 3GPP TS 23.501: "System Architecture for the 5G System (5GS); Stage 2".

[x] 3GPP TS 28.623: "Telecommunication management; Generic Network Resource Model (NRM) Integration Reference Point (IRP); Solution Set (SS) definitions".

[y] 3GPP TS 28.558: "Management and orchestration; UE level measurements for 5G system".

***Start of next change***

## 3.3 Abbreviations

For the purposes of the present document, the abbreviations given in TR 21.905 [1] and the following apply. An abbreviation defined in the present document takes precedence over the definition of the same abbreviation, if any, in TR 21.905 [1].

AI Artificial Intelligence

CHO Conditional Handover

DAPS Dual Active Protocol Stack

MDA MnS MDA Management service

MDA Management Data Analytics

MDAF Management Data Analytics Function

MDAS Management Data Analytics Service

ML Machine Learning

ATSSS Access Traffic Steering-Switching-Splitting

***Start of next change***

### 7.2.x Traffic Steering Analytics

##### 7.2.x.1 Description

This MDA capability is for the analytics on the usage of ATSSS and N4 rules and provide recommendations on most suitable ATSSS/N4 rules based on the analytics and predictions performed.

##### 7.2.x.2 Use case

ATSSS feature introduced the concept of Multi Access PDU session, a PDU session for which the data traffic can be served over one or more concurrent accesses (3GPP access, trusted non-3GPP access and untrusted non-3GPP access). Using these services, the UE can access 5G services via 3GPP/non-3GPP access methods.

After the establishment of a MA PDU Session, and when there are user-plane resources on both access networks, the UE applies network-provided policy (i.e. ATSSS rules) and considers local conditions (such as network interface availability, signal loss conditions, user preferences, etc.) for deciding how to distribute the uplink traffic across the two access networks. Similarly, the UPF anchor of the MA PDU session applies network-provided policy (i.e. N4 rules) and feedback information received from the UE via the user-plane (such as access network Unavailability or Availability) for deciding how to distribute the downlink traffic across the two access networks. When there are user-plane resources on only one access network, the UE applies the ATSSS rules and considers local conditions for triggering the establishment or activation of the user plane resources over another access.

In order to optimally steer the traffic across different accesses and based on the load conditions, the network derives a set of rules that are communicated to UE (ATSSS rules) and UPF (N4 rules) as guidance on how to steer the traffic under certain conditions. The PCF derives the ATSSS policy and sends it to SMF in case of dynamic PCC (policy and charging control) enabled. SMF then converts it to ATSSS rules for UEs (UL traffic) and N4 rules for the UPF (DL traffic). These rules are then enforced by the UPF in DL and by the UE in UL to send the PDU packets. The rules contain thresholds values for selection of certain access types including the instruction of which steering modes to be used. If the PCC is not used, then the rules are framed by the SMF based on the local configurations. The structure of the ATSSS rules is described in the table 5.32.8-1 of TS 23.501 [28].

The network derives these rules only based on immediate performance measurements (e.g. RTT and packet loss) and local configuration at SMF. i.e. besides considering the radio link performance data, the traffic steering analytics solution derives traffic steering decisions based on the Quality of Service or Quality of Experience (QoS/E) characteristics of the related service at the UE. The rules do not capture holistic view on the past network traffic trends, the history, and trends of the performance measurements (RTT and packet loss) from the past and situation on different accesses, ATSSS/N4 rules usage statistics, impact on available accesses, nor the predictions of the network behaviour in the future. Therefore, the derived rules may be suboptimal and may lead to network degradation. The MDA can predict the optimal rules and the consumer (e.g. UPF or SMF) decides to apply these rules for the MAPDU sessions.

##### 7.2.x.3 Requirements

Table 7.2.x.3-1

|  |  |  |
| --- | --- | --- |
| Requirement label | Description | Related use case(s) |
| **REQ-TRF\_STR\_MDA-01** | MDA capability for traffic steering analytics shall be able to produce recommendations on ATSSS rules and N4 rules and their precedence for a (set of) network slice(s) or network slice subnet(s). | Traffic Steering Analytics |

***Start of next change***

### 8.4.x ATSSS performance Analytics

#### 8.4.x.1 Traffic Steering Analytics

##### 8.4.x.1.1 MDA type

The MDA type for traffic steering analytics is: ATSSSPerformance.TrafficSteeringAnalytics

##### 8.4.x.1.2 Enabling data

The enabling data for traffic steering analytics are provided in table 8.4.x.1.2-1.

For general information about enabling data, see clause 8.2.1.

**Table 8.4.x.1.2-1: Enabling data for traffic steering analytics**

| **Data category** | **Description** | **References** |
| --- | --- | --- |
| Performance measurements | Packet loss rate | DL packet loss rate on Uu interface (clause 5.1.1.35 of TS 28.552 [4]) |
| SDU loss rate and F1U loss rate | UL PDCP SDU loss rate and DL/UL F1-U packet loss rate (clause 5.1.3.1 of TS 28.552 [4]) |
| GTP packet loss rate | Incoming and outgoing GTP packet loss rate (clauses 5.4.1.7, 5.4.1.8 from TS 28.522 [4]) |
| Packet delay measurements | GTP packet delay (clause 5.4.1.9 from TS 28.552 [4]) |
| UE level performance measurements | packet delay and packet loss rate (clauses 6.2.2.1, 6.3.1.1, 6.3.1.2, 6.3.1.3 from [y]) |
| MDT reports | MDT reports containing RSRPs of the serving cell and neighbour cells, and UE location. | M6 and M7 measurements for NR in TS 32.422 [6] and TS 32.423 [7]. |

##### 8.4.x.1.3 Analytics output

The specific information elements of the analytics output for virtualized resource utilization analysis, in addition to the common information elements of the analytics outputs (see clause 8.3), are provided in table 8.4.x.1.3-1.

**Table 8.4.x.1.3-1: Analytics output for traffic steering analytics**

| **Information element** | **Definition** | **Support qualifier** | **Properties** |
| --- | --- | --- | --- |
| trafficSteeringRecommendations | Indicates the recommendation of the traffic steering rules. | M | type: TrafficSteeringRecommendations  multiplicity: \*  isOrdered: True  isUnique: True  defaultValue: None  isNullable: False |

***Start of next change***

### 8.5.x TrafficSteeringRecommendations <<datatype>>

#### 8.5.x.1 Definition

This data type specifies the traffic steering recommendations.

#### 8.5.x.2 Information elements

Table 8.5.x.2-1

|  |  |  |  |
| --- | --- | --- | --- |
| Name | Definition | Support qualifier | Properties |
| steeringMode | This specifies the recommended steering mode. Steering mode determines how the traffic of the matching SDF may be distributed across 3GPP and non-3GPP accesses  Allowed Values: Active-Standby, Smallest delay, Load-balancing, Priority-based, Redundant | M | type: enumeration  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: False |
| steeringModeIndicator | This attribute indicates that the UE may change the default steering parameters provided as part of the Steering Mode component and may adjust the traffic steering based on its own decisions. The following are the possible values for this attribute, autonomous load-balance indicator and UE assistance indicator. UE assistance indicator is applicable only when "steeringMode" is set to " Load Balancing "  Allowed values: autonomous load balancing operation, UE assistance indicator | M | type: enumeration  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: False |
| steeringModeAssistanceInfo | This attribute provides the assistance information for the steering mode. If steering mode is recommended as active-standby, the active and standby components between 3GPP and non-3GPP is recommended. For instance, one possible option may be "Active 3GPP and non-3GPP standby". This indicates that the active steering mode is 3GPP and the non-3GPP is used as standby mode. If the steering mode is recommended as "load-balancing, the split of load between 3GPP and non-3GPP access methods may be recommended. For instance, the following may be an option. "90% over 3GPP and 10% over non-3GPP" or "0% over 3GPP and 100% over non-3GPP". | M | type: string  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: False |
| rttThreshold | This attribute indicates the RTT threshold beyond which the UE can decide autonomously to change the rules to maximize the bandwidth. This attribute is valid if the steering mode is recommended as load-balancing, priority-based or redundant.  Allowed values: 0 - 100 | M | type: Integer  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: False |
| packetLossThreshold | This attribute indicates the packet loss threshold beyond which the UE can decide autonomously to change the rules to maximize the bandwidth. This attribute is valid if the steering mode is recommended as load-balancing, priority-based or redundant.  Allowed values: 0 - 100 | M | type: Integer  multiplicity: 1  isOrdered: N/A  isUnique: N/A  defaultValue: None  isNullable: False |

***End of change***