**3GPP TSG-SA1 Meeting #104 *S1-23xxxx***

**Chicago, USA, 13 – 17 November 2023** (rev of S1-232371)

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| *CR-Form-v12.2* |
| **CHANGE REQUEST** |
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|  | **22.261** | **CR** | **0xxx** | **rev** | **-** | **Current version:** | **19.x.0** |  |
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| *For* [***HELP***](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:***  | DualSteer Normative requirements |
|  |  |
| ***Source to WG:*** | Qualcomm, *[Lenovo, CableLabs, Xiaomi, Comcast Corporation, Verizon UK Ltd, Tencent, Thales, Charter Communications, SyncTechno Inc., InterDigital, KDDI, Nokia, Nokia-Shanghai Bell, Vivo, Lockheed Martin, Sennheiser, Viasat, KPN, LG Electronics, Apple, Novamint, NEC, ETRI, IRT Saint Exupery, CATT, DSIT, Ericsson, IIT Bombay, CeWIT, JSAT, Ligado, Omnispace, SA Catapult, Avanti, Hughes, Gilat, TNO, Terrestar Solutions, Inmarsat, Sateliot, TTP, ESA, Intelsat, Gatehouse, University of Surrey, SES, Hispasat, Airbus, Eutelsat, Dish Networks]* |
| ***Source to TSG:*** |  |
|  |  |
| ***Work item code:*** | DUMMY |  | ***Date:*** | 2023-11-17 |
|  |  |  |  |  |
| ***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-8 (Release 8)Rel-9 (Release 9)Rel-10 (Release 10)Rel-11 (Release 11)…Rel-16 (Release 16)Rel-17 (Release 17)Rel-18 (Release 18)Rel-19 (Release 19)* |
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| ***Reason for change:*** | Introducing DualSteer service requirements, based on the outcome of the FS\_DualSteer study |
|  |  |
| ***Summary of change:*** | Added a new section 6.x, and updated definitions |
|  |  |
| ***Consequences if not approved:*** | Missing DualSteer requirements |
|  |  |
| ***Clauses affected:*** | 3.1, 6.xx (new) |
|  |  |
|  | **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 =======================================

## 3.1 Definitions

For the purposes of the present document, the terms and definitions given in 3GPP TR 21.905 [1] and the following apply. A term defined in the present document takes precedence over the definition of the same term, if any, in 3GPP TR 21.905 [1].

**5G enhanced positioning area:** a subset of the 5G positioning service area that is assumed to be provided with additional infrastructure or deploy a particular set of positioning technologies to enhance positioning services.

NOTE 1: The enhanced positioning service area represents for example a factory plant, a dense urban area, an area along a road or railway track, a tunnel and covers both indoor and outdoor environments.

**5G LAN-type service**: a service over the 5G system offering private communication using IP and/or non-, i.e. UEs that are members of the same 5G LAN-VN IP type communications.

**5G LAN-virtual network**: a virtual network capable of supporting 5G LAN-type service.

**5G satellite access network**: 5G access network using at least one satellite.

**5G positioning service area:** a service area where positioning services would solely rely on infrastructures and positioning technologies that can be assumed to be present anywhere where 5G is present (e.g. a country-wide operator-supplied 5G network, GNSS, position/motion sensors).

NOTE 2: This includes both indoor and any outdoor environments.

**active communication:** a UE is in active communication when it has one or more connections established. A UE may have any combination of PS connections (e.g. PDP contexts, active PDN connections).

**activity factor:** percentage value of the amount of simultaneous active UEs to the total number of UEs where active means the UEs are exchanging data with the network.

**aggregated QoS:** QoS requirement(s) that apply to the traffic of a group of UEs.

**area traffic capacity:** total traffic throughput served per geographic area.

**authorised administrator:** a user or other entity authorised to partially configure and manage a network node in a CPN (e.g. a PRAS, or eRG) or a PIN element in a PIN.

**communication service availability**: percentage value of the amount of time the end-to-end communication service is delivered according to a specified QoS, divided by the amount of time the system is expected to deliver the end-to-end service.

NOTE 3: The end point in "end-to-end" is the communication service interface.

NOTE 4: The communication service is considered unavailable if it does not meet the pertinent QoS requirements. For example, the communication service is unavailable if a message is not correctly received within a specified time, which is the sum of maximum allowed end-to-end latency and survival time.

**Customer Premises Network:** a network located within a premise (e.g. a residence, office or shop), which is owned, installed and/or (at least partially) configured by the customer of a public network operator.

**direct device connection:** the connection between two UEs without any network entity in the middle.

**direct network connection:** one mode of network connection, where there is no relay UE between a UE and the 5G network.

**Disaster Condition:** This is the condition that a government decides when to initiate and terminate, e.g. a natural disaster. When this condition applies, users may have the opportunity to mitigate service interruptions and failures.

**Disaster Inbound Roamer:** A user that (a) cannot get service from the PLMN it would normally be served by, due to failure of service during a Disaster Condition, and (b) is able to register with other PLMNs.

**Disaster Roaming:** This is the special roaming policy that applies during a Disaster Condition.

**end-to-end latency:** the time that it takes to transfer a given piece of information from a source to a destination, measured at the communication interface, from the moment it is transmitted by the source to the moment it is successfully received at the destination.

**evolved Residential Gateway:** a gateway between the public operator network (fixed/mobile/cable) and a customer premises network.

**holdover:** A clock A, previously synchronized/syntonized to another clock B (normally a primary reference or a Master Clock) but whose frequency is determined in part using data acquired while it was synchronized/syntonized to B, is said to be in holdover or in the holdover mode as long as it is within its accuracy requirements.

NOTE 4a: holdover is defined in [31]

**Holdover time:** the time period that is available to repair the first priority timing source when it is lost (e.g., when the primary GNSS reference is lost). During this period the synchronization accuracy requirement should be guaranteed, e.g., by means of defining multiple synchronization references.

**Hosted Service:** a service containing the operator's own application(s) and/or trusted third-party application(s) in the Service Hosting Environment, which can be accessed by the user.

**Hosting NG-RAN Operator:** the operator that has operational control of a Shared NG-RAN.

NOTE 4b: Hosting NG-RAN Operator is a Hosting RAN Operator.

**Hosting RAN Operator:** as defined in 3GPP TS 22.101 [6].

**hybrid access:** access consisting of multiple different access types combined, such as fixed wireless access and wireline access.

**indirect network connection:** one mode of network connection, where there is a relay UE between a UE and the 5G network.

**Indirect Network Sharing:** a type of NG-RAN Sharing in which the communication between the Shared NG-RAN and the Participating Operator’s core network is routed through the Hosting NG-RAN Operator’s core network.

**IoT device:** a type of UE which is dedicated for a set of specific use cases or services and which is allowed to make use of certain features restricted to this type of UEs.

NOTE 5: An IoT device may be optimized for the specific needs of services and application being executed (e.g. smart home/city, smart utilities, e-Health and smart wearables). Some IoT devices are not intended for human type communications.

**network slice:** a set of network functions and corresponding resources necessary to provide the required telecommunication services and network capabilities.

**NG-RAN:** a radio access network connecting to the 5G core network which uses NR, E-UTRA, or both.

**NG-RAN Sharing:** the sharing of NG-RAN among a number of operators.

**non-public network:** a network that is intended for non-public use.

**NR:** the new 5G radio access technology.

**Participating NG-RAN Operator:** authorized operator that is using Shared NG-RAN resources provided by a Hosting NG-RAN Operator.

NOTE 5a: Participating NG-RAN Operator is a Participating Operator.

**Participating Operator:** as defined in 3GPP TS 22.101 [6].

**Personal IoT Network:** A configured and managed group of at least one UE PIN Element and one or more PIN Element that communicate with each other.

**PIN Element:** UE or non-3GPP device that can communicate within a PIN.

**PIN direct connection:** the connection between two PIN Elements without any 3GPP RAN or core network entity in the middle.

NOTE 5A: A PIN direct connection could internally be relayed by other PIN Elements.

NOTE 5B: When a PIN direct connection is between two PIN Elements that are UEs this direct connection is typically known as a direct device connection.

**PIN Element with Gateway Capability:** a UE PIN Element that has the ability to provide connectivity to and from the 5G network for other PIN Elements.

NOTE 5C: A PIN Element can have both PIN management capability and Gateway Capability.

**PIN Element with Management Capability:** A PIN Element with capability to manage the PIN.

**positioning service availability:** percentage value of the amount of time the positioning service is delivering the required position-related data within the performance requirements, divided by the amount of time the system is expected to deliver the positioning service according to the specification in the targeted service area.

**positioning service latency:** time elapsed between the event that triggers the determination of the position-related data and the availability of the position-related data at the system interface.

**Premises Radio Access Station:** a base station installed at a customer premises network.

**priority service:** a service that requires priority treatment based on regional/national or operator policies.

**private communication**: a communication between two or more UEs belonging to a restricted set of UEs**.**

**private network:** an isolated network deployment that does not interact with a public network.

**private slice:** a dedicated network slice deployment for the sole use by a specific third-party.

**ProSe UE-to-UE Relay**: a Public Safety ProSe-enabled UE that acts as a relay between two other Public Safety ProSe-enabled UEs.

**Ranging:** refers to the determination of the distance between two UEs and/or the direction of one UE from the other one via direct device connection.

**relative positioning:** relative positioning is to estimate position relatively to other network elements or relatively to other UEs.

**reliability**: in the context of network layer packet transmissions, percentage value of the packets successfully delivered to a given system entity within the time constraint required by the targeted service out of all the packets transmitted.

**satellite**: a space-borne vehicle embarking a bent pipe payload or a regenerative payload telecommunication transmitter, placed into Low-Earth Orbit (LEO) typically at an altitude between 300 km to 2 000 km, Medium-Earth Orbit (MEO) typically at an altitude between 8 000 to 20 000 k m, or Geostationary satellite Earth Orbit (GEO) at 35 786 km altitude.

**satellite access:** direct connectivity between the UE and the satellite.

**satellite NG-RAN:** a NG-RAN which uses NR in providing satellite access to UEs.

**service area:** geographic region where a 3GPP communication service is accessible.

NOTE 6: The service area can be indoors.

NOTE 7: For some deployments, e.g. in process industry, the vertical dimension of the service area can be considerable.

**service continuity:** the uninterrupted user experience of a service that is using an active communication when a UE undergoes an access change without, as far as possible, the user noticing the change.

NOTE 8: In particular service continuity encompasses the possibility that after a change the user experience is maintained by a different telecommunication service (e.g. tele- or bearer service) than before the change.

NOTE 9: Examples of access changes include the following. For EPS: CS/PS domain change. For EPS and 5G: radio access change, switching between a direct network connection and an indirect network connection.

**Service Hosting Environment:** the environment, located inside of 5G network and fully controlled by the operator, where Hosted Services are offered from.

**Shared NG-RAN:** as defined in 3GPP TS 22.101 [6].

**synchronization threshold:** A synchronization threshold can be defined as the maximum tolerable temporal separation of the onset of two stimuli, one of which is presented to one sense and the other to another sense, such that the accompanying sensory objects are perceived as being synchronous.

NOTE 10: This definition is based on [41].

**survival time:** the time that an application consuming a communication service may continue without an anticipated message.

**Time to First Fix (TTFF):** time elapsed between the event triggering for the first time the determination of the position-related data and the availability of the position-related data at the positioning system interface.

**Traffic steering:** the procedure that selects an access network for a new data flow and transfers the traffic of this data flow over the selected access network. This can apply to two 3GPP access networks, when available.

**Traffic splitting:** the procedure that splits the traffic of a data flow across multiple access networks. When traffic splitting is applied to a data flow, some traffic of the data flow is transferred via one access and some other traffic of the same data flow is transferred via another access. This can apply to two 3GPP access networks, when available.

**Traffic switching:** the procedure that moves all traffic of an ongoing data flow from one access network to another access network in a way that maintains the continuity of the data flow. This can apply to two 3GPP access networks, when available.

**User Equipment:** An equipment that allows a user access to network services via 3GPP and/or non-3GPP accesses.

**user experienced data rate:** the minimum data rate required to achieve a sufficient quality experience, with the exception of scenario for broadcast like services where the given value is the maximum that is needed.

**wireless backhaul:** a link which provides an interconnection between 5G network nodes and/or transport network using 5G radio access technology**.**

============================== Next Change =======================================

## 6.xx Traffic steering, splitting, switching over two 3GPP access networks

### 6.xx.1 Description

The following requirements cover scenarios and functionalities for supporting enhanced traffic steering, splitting and switching of UE’s user data (of the same data session) across two 3GPP access networks, using a single PLMN subscription.
Target scenarios cover two 3GPP access networks belonging to the same PLMN, or between two different PLMNs, or between one PLMN and one NPN, over same or different RAT, which can use terrestrial and/or satellite access (including the case of two different satellite orbits).

Traffic steering, splitting and switching may or may not be used together (during the same UE data session), depending e.g. PLMN-RAT combination, coverage conditions (overlapping / disjoint), type of service, target improvement (e.g. load, throughput, mobility). Traffic policies are in full control of the MNO (HPLMN).

Traffic splitting assumes overlapping coverage of the two RATs and its performance can vary based on the RAT combination. In certain scenarios, other traffic split mechanisms can be available and more suitable (e.g. RAN-based dual connectivity, in case of intra PLMN using the same RAT).

A UE can use traffic steering, splitting and switching (over two 3GPP access networks) for certain services, while other applications or services use single 3GPP access.

The requirements below do not foresee RAN impacts, and can apply to different UE types (e.g. smartphones, IoT, UAV, VSAT devices).

### 6.xx.2 Requirements

##### 6.xx.2.1 General

Subject to operators’ policy, the 5G system shall be able to support mechanisms to enable traffic steering and switching of UE’s user data (of the same data session) across two 3GPP access networks belonging to the same PLMN (either HPLMN or VPLMN), assuming data anchoring in the HPLMN and non simultaneous transmission over the two networks. Subject to operators’ policy, the 5G system may be able to support mechanisms to enable traffic steering and splitting of UE’s user data (of the same data session) simultaneously across two 3GPP access networks belonging to the same PLMN (either HPLMN or VPLMN), assuming data anchoring in the HPLMN.

Subject to operators’ policy, the 5G system shall be able to support mechanisms to enable traffic steering and switching of UE’s user data (of the same data session) across two 3GPP access networks belonging to two PLMNs, assuming a business agreement between operators and data anchoring in the HPLMN and non simultaneous transmission over the two networks.

Subject to operators’ policy, the 5G system may be able to support mechanisms to enable traffic steering and splitting of UE’s user data (of the same data session) simultaneously across two 3GPP access networks belonging to two PLMNs, assuming a business agreement between operators and HPLMN data anchoring.

Subject to operators’ policy, the 5G system shall be able to support mechanisms to enable traffic steering and switching of UE’s user data (of the same data session) across two 3GPP access networks belonging to a PLMN and an NPN, assuming non simultaneous transmission over the two networks.

Subject to operators’ policy, the 5G system may be able to support mechanisms to enable traffic steering and splitting of UE’s user data (of the same data session) simultaneously across two 3GPP access networks belonging to a PLMN and an NPN.

NOTE 1: PLMN-NPN scenarios assume a proper business agreement between the two network operators and data anchoring in the HPLMN core network. Furthermore, traffic splitting and switching between PLMN and NPN assume a PLMN-integrated NPN (NPN hosted by a PLMN or offered as a slice of a PLMN).

For traffic steering, splitting and switching of UE’s user data across two 3GPP access networks (if/when supported), the 5G system shall be able to allow a HPLMN to provide a UE with policies and criteria to connect to an additional PLMN/NPN, or an additional RAT within the same PLMN.

NOTE 2: The above requirements assume configuration of traffic policies, under HPLMN control or negotiated between the HPLMN and other network operators, considering e.g., user subscription, application/traffic type, service preference, QoS requirements, location, time, UE capabilities, mobility, connectivity conditions. Traffic policies may also include data duplication over the two access networks.

NOTE 3: The above requirements include the possibility to report UE specific user data measurements (e.g., RTT, packet loss rate) between the UE and the anchoring core network.

##### 6.xx.2.2 Mobility and connectivity changes

Subject to operators’ policy, the 5G system shall be able to support mechanisms to enable service continuity when switching UE’s user data, of the same data session, between two 3GPP access networks.

Subject to operators’ policy, for traffic steering, splitting and switching of UE’s user data across two 3GPP access networks belonging to the HPLMN and a VPLMN (if/when supported), the 5G system shall be able to support mechanisms to move UE’s user data from one VPLMN to another VPLMN, while maintaining the same access connection with the HPLMN.

NOTE 1: UE can be connected to a maximum of two PLMNs simultaneously, including the HPLMN.

NOTE 2: The above requirement can also apply to two 3GPP access networks belonging to a single PLMN, when moving UE’s user data from one 3GPP access network to a third 3GPP access network of the same PLMN.

Subject to operators’ policy, for traffic steering, splitting and switching of UE’s user data across two 3GPP access networks (if/when supported), the 5G system shall be able to support mechanisms to change one 3GPP access network to a non-3GPP access network (and vice versa).

##### 6.xx.2.3 Other aspects

Subject to operators’ policy, the 5G system shall be able to collect charging information during traffic steering, splitting and switching of UE’s user data across two 3GPP access networks (if/when supported).

NOTE 1: Charging information should be collected for both 3GPP access networks; in case the two 3GPP access networks belong to different PLMNs, or a PLMN and NPN, a proper business agreement among network operators is assumed.

Subject to operators’ policy, the 5G system shall be able to support traffic steering and switching of UE’s user data between a NPN and a PLMN, for one or more UEs with a NPN subscription accessing NPN services, to meet specific QoS requirements for each UE.

NOTE 2: The above assumes a NPN hosted by a PLMN or offered as a slice of a PLMN, data anchoring in the NPN, and a business agreement between the PLMN and the NPN operators (if different).

NOTE 3: The above assumes traffic steering using non simultaneous transmission over the two 3GPP access networks. Traffic steering, or split, with simultaneous transmission over the two networks may be supported.

============================== End of Changes =======================================