



UCC 5G SMF - Release Change Reference

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New in Documentation

Information on new features, enhancements, and behavior changes in the Release Change Reference (RCR) document will now be available under the **What's New in this Release** section in the 5G release notes.



Note This document will be deprecated in 2024.01 and later releases.

Features and Changes Quick Reference

Features / Behavior Changes	Release Introduced / Modified	Default
3GPP R16 Compliance Support	2023.04.0	Disabled – Configuration required to enable
Avoiding Session Loss During Application VIP Switchover	2023.04.0	Not Applicable
Call Handling in the Absence of PCF Configuration in DNN Profile	2023.04.0	Not Applicable
DLDR Handling for N3 Connection Reactivation	2023.04.0	Not Applicable
DRB Level Data Forwarding	2023.04.0	Not Applicable
DWR/DWA Message Handling	2023.04.0	Enabled – Always-on
GBR Bearer Creation Based on Local Policy	2023.04.0	Disabled – Configuration Required
Gx/Gy Custom Dictionary for RAR Messages, on page 16	2023.04.0	Enabled – Always-on
Gz and Gy Interface Enhancements, on page 17	2023.04.0	Enabled – Always-on
Handling Periodic Report of Secondary RAT Usage , on page 20	2023.04.0	Enabled – Always-on
HSS-Initiated QoS Modification, on page 22	2023.04.0	Enabled – Always-on
Network Address Translation Support , on page 27	2023.04.0	Disabled – Configuration required to enable
Non-Standard PLMN List Configuration for MccMncExceptionList Dynamic Update	2023.04.0	Disabled – Configuration required to enable
Processing GTPv2 Modify Bearer Request Messages, on page 31	2023.04.0	Enabled – Always-on

Features / Behavior Changes	Release Introduced / Modified	Default
Releasing N4 Resources or Association	2023.04.0	Disabled - Configuration required to enable
Routing CCR-U/CCR-T Message to Bounded Peer from CCR-I/U or CCA-I/U Message	2023.04.0	Enabled – Always-on
Sending Create QER to UPF, on page 36	2023.04.0	Disabled – Configuration Required
Statistics Updates for Internal Transaction Triggered for RAR Scenario	2023.04.0	Not Applicable
VRF for Diameter Interfaces, on page 36	2023.04.0	Disabled – Configuration required to enable
Wait Time Display for Ongoing Bulk clear Subscriber CLI and Blocking the Consecutive CLI	2023.04.0	Enabled – Always-on
Wireless Priority Services Enhancement, on page 39	2023.04.0	Enabled – Configuration required to disable

3GPP R16 Compliance Support

Feature Summary and Revision History

Summary Data

Table 1: Summary Data

Applicable Product(s) or Functional Area	SMF
Applicable Platform(s)	SMI
Feature Default Setting	Enabled – Always-on
Related Changes in this Release	Not Applicable
Related Documentation	Not Applicable

Revision History

Table 2: Revision History

Revision Details	Release
First Introduced.	2023.04.0

Feature Description

SMF provides the following support for 3GPP R16 specification compliance:

- SMF decodes the ePCO IE in PDU session establishment request to:
 - Check the UE support for QoS rules and QoS descriptions with the ePCO length of two octets option in the PDU Session establishment request. It is used during 4G modification for encoding QoS rules and QoS descriptions in the ePCO IE for EPS interworking.
 - Indicates the local IP address in TFT in S1 node for a PDU session during 5G-4G interworking.
- SMF supports semantic and syntactic error handling for the QoS Rules and QoS description or for mapped EPS Bearer Contexts errors from the UE.
- SMF handles CB or UB responses with ePCO containing 5GSM cause and all the cases for emergency sessions where the AMF rejects N1 PDU Session Modify request received by sending N1 PDU Session Modify reject.
- Mandates the MFBR validation while receiving the GBR flow creation or QoS modification from PCF.
- Updated the event management CLI with the event names, actiondef and ruledef for the configuration of 4G and 5G error handling.

For more information, refer to the [UCC 5G SMF Configuration and Administration Guide > EPS Networking](#) chapter.

Avoiding Session Loss During Application VIP Switchover

Feature Summary and Revision History

Summary Data

Table 3: Summary Data

Applicable Product or Functional Area	SMF
Applicable Platform	SMI
Feature Default Setting	Not Applicable.
Related Documentation	Not Applicable

Revision History

Table 4: Revision History

Revision Details	Release
Enhanced the High Availability Redundancy support to minimize the session loss during application VIP switchover between master nodes.	2023.04.0
Support added for the following sub-features: <ul style="list-style-type: none"> • Traffic Monitoring on L2 VIP for Active Instance. • Inter-site Redundancy. • GR Strengthening. 	2023.03.0
Support added for Maintenance Mode.	2021.04.0
Geographic Redundancy (GR) support introduced.	2021.02.0
First introduced.	Pre-2020.02.0

Feature Description

In the High Availability redundancy support, there is session loss whenever an application VIP's switch over from Master-1 node to Master-2 node or vice versa, due to any unhealthy application or BGP/BFD link downtime with a leaf or due to any other fault on the active Master node.

The High Availability redundancy support is enhanced in SMF in a way that when the gRPC IPC stream breaks, the App-Infra library re-tries immediately and the IPC connection is re-established between gRPC endpoints within milliseconds.

This helps avoid the session loss during the VIP switchovers.

For more information, see the [UCC 5G SMF Configuration and Administration Guide > Redundancy Support](#) chapter.

Call Handling in the Absence of PCF Configuration in DNN Profile

Behavior Change Summary and Revision History

Summary Data

Table 5: Summary Data

Applicable Product(s) or Functional Area	SMF
Applicable Platform(s)	SMI
Feature Default Setting	Disabled – Configuration Required
Related Changes in this Release	Not Applicable
Related Documentation	Not Applicable

Revision History

Table 6: Revision History

Revision Details	Release
<ul style="list-style-type: none"> Added support for GBR bearer creation without PCF interaction for 4G and 5G. Added the N7 optimization support. Added support for optional PCF or PCRF configuration for local policy configuration. 	2023.04.0
Added support for the following features: <ul style="list-style-type: none"> QoS group of ruledefs over N7 IPv6 support for N3 interface on UPF 	2023.01.0
Added support for SMF— <ul style="list-style-type: none"> to allocate UPFs with unique IP pools to select the UPF based on PDN type 	2022.04.0
Introduced support for Diff-Serv-Code-Point (DSCP) or Type of Service (ToS) QoS functions during interaction with PCF.	2021.02.3.t3

Revision Details	Release
Introduced support for the following features: <ul style="list-style-type: none"> • Usage Monitoring over PCF • N4 QoS Mismatch Correction • Dynamic QoS Flow-based Application Detection and Control • IP Threshold-based UPF Selection 	2021.02.3
Introduced support for non-standard QCI for dynamic PCC and session rules	2021.02.2
Introduced support for the following features: <ul style="list-style-type: none"> • Bit rate mapping • UPF Selection based on Slice and Location • UP Optimization 	2021.02.0
Introduced support for the following: <ul style="list-style-type: none"> • Co-located UPF Selection • Enhanced Limits for Maximum Groups in Bandwidth Policy Configuration • Handling Session Report Rejection Procedure • New Format of Outer Header information element (IE) 	2021.01.0
Introduced support for the following: <ul style="list-style-type: none"> • UPF node selection based on DNN and PDU Session type • Modification of authorized default QoS • Additional session report and UPF node report request 	2020.03.0
First introduced.	Pre-2020.02.0

Behavior Change

Previous Behavior: SMF mandated the configuration of PCF/PCRF in DNN profile even when the local policy was configured through the **pcf-interaction** command.

New Behavior: PCF or PCRF configuration remains optional if the local policy is configured. Subscriber call setup is successful even in the absence of PCF or PCRF configuration in DNN profile.

For more information, refer to the [UCC 5G SMF Configuration and Administration Guide > Policy and User Plane Management](#) chapter.

Diameter Credit Control Failure Handling

Feature Summary and Revision History

Summary Data

Table 7: Summary Data

Applicable Product(s) or Functional Area	SMF
Applicable Platform(s)	SMI
Default Setting	Enabled – Always-on
Related Changes in this Release	Not Applicable
Related Documentation	Not Applicable

Revision History

Table 8: Revision History

Revision Details	Release
Added support for: <ul style="list-style-type: none"> • Asynchronous and Synchronous Usage Report for Offline Bearer Recalculation • Handling Modify Bearer Request Trigger on the Gz Interface • Gz Change Notification • Default Bearer Modification based on APN-AMBR and Qci change • Handling Periodic Report of Secondary RAT Usage: • EGCDR final record configuration • Zero CDR suppression • Final Unit Indication in subsequent CCR-U • FHT Continue Enhancement • Diameter Credit-Control-Failure-Handling AVP 	2023.04.0

Revision Details	Release
<p>Added support for:</p> <ul style="list-style-type: none"> • Multiple 3GPP specification compliance for SMF interfaces. • Gz Interfaces and associated features: <ul style="list-style-type: none"> • PDN Attach and Detach with Gz Interface • Gz Usage Reporting • Indirect communication for NFs through SCP Model D. • Excluding the optional IE for Locality in the NRF messages. 	2023.03.0
<p>Added support for:</p> <ul style="list-style-type: none"> • Gx interfaces and their associated features: <ul style="list-style-type: none"> • Gx initial attach and detach • Dynamic and predefined rule • Gy interfaces and their associated features: <ul style="list-style-type: none"> • Gy usage reporting • Gy failure handling • Gy MSCC level failure result codes • Gy QVT and QHT • Gy tariff time • IPv6 on data interfaces 	2023.02.0
<p>Added support for:</p> <ul style="list-style-type: none"> • N4 interface over IPsec • IPv6 address on all SMF interfaces • User plane integrity protection • Mutual TLS for the SBI interface • 3GPP specification version compliance configuration for CHF server 	2022.04.0
<p>Added support for configuration-based control of UDM and PCF messages.</p>	2021.02.3.t3
<p>Added support for N2 cause and diagnostic IEs.</p>	2021.02.3

Revision Details	Release
Added support for: <ul style="list-style-type: none"> • Cause IE on the N11 interface. • NAS messages compliance with invalid protocol data handling. • ProblemDetails JSON object on the N11 interface. • Error handling with HTTP error codes. • HTTP/2 TLS support for the SBA interface. 	2021.02.0
First introduced.	Pre-2020.02.0

Feature Description

To define the failure handling behaviour, SMF supports the the Credit-Control-Failure-Handling Attribute Value Pair (AVP). The Online Charging Server (OCS) sends this AVP to the Diameter endpoint. The Diameter endpoint uses the value of this AVP to derive the Gy request failure handling behavior. This scenario is applicable when the requests are prevented due to a network problem.

For more information, refer to the [UCC 5G SMF Configuration and Administration Guide > Interfaces Support](#) chapter.

DLDR Handling for N3 Connection Reactivation

Behavior Change Summary and Revision History

Summary Data

Table 9: Summary Data

Applicable Product(s) or Functional Area	SMF
Applicable Platform(s)	SMI
Feature Default Setting	Not Applicable
Related Changes in this Release	Not Applicable
Related Documentation	Not Applicable

Revision History

Table 10: Revision History

Revision Details	Release
First introduced.	2023.04.0

Behavior Change

Previous Behavior: SMF did not trigger the N1N2 setup request on the N11 interface when SMF received the Downlink Data Request (DLDR) in the N3 activated state. The difference in the upContext state between SMF and UPF resulted in UPF triggering the DLDR. With the N3 in inactive state, UPF used to send the session report request to SMF.

New Behavior: The new CLI command **reactivate-n3-on-dupl-activation-dldr** is added in the supported features at SMF to reactivate the N3 when DLDR is received in the N3 activated state. After this CLI is enabled and if the DLDR is received in the ACTIVATED state, then SMF changes the upState to DEACTIVATED and reactivates the N3 connection.

For more information, refer to the [UCC 5G SMF Configuration and Administration Guide > UP Session Activation and Deactivation Service Request Procedures](#).

DRB Level Data Forwarding

Feature Summary and Revision History

Summary Data

Table 11: Summary Data

Applicable Product(s) or Functional Area	SMF
Applicable Platform(s)	SMI
Feature Default Setting	Not Applicable
Related Changes in this Release	Not Applicable
Related Documentation	Not Applicable

Revision History

Revision Details	Release
Added support for DRB level data forwarding in IDFT during N2-based handover.	2023.04.0
First introduced.	Pre-2020.02.0

Feature Description

In the Inter NG-RAN Node N2-based Handover-Execution phase during the indirect data forwarding process, when the SMF receives a Handover Request Acknowledge, it validates whether it meets the criteria for Session Level Forwarding.

In case the Handover Request Acknowledge message does not meet the criteria for Session Level Forwarding, and if a **Data forwarding response DRB List** is present, SMF proceeds with the DRB Level Forwarding.

For more information, see the [UCC 5G SMF Configuration and Administration Guide > Handover Procedures](#) chapter.

DWR/DWA Message Handling

Behavior Change Summary and Revision History

Summary Data

Table 12: Summary Data

Applicable Products or Functional Area	SMF
Applicable Platform(s)	SMI
Feature Default Setting	Enabled – Always-on
Related Documentation	Not Applicable

Revision History

Table 13: Revision History

Revision Details	Release
Added the wait time display for ongoing bulk clear subscriber CLI and blocking the consecutive CLI.	2023.04.0
Added the following support: <ul style="list-style-type: none"> Enabling UPF Monitor Subscriber from SMF. Session Count per slice and NSSAI. 	2023.03.0
As part of the IP pool allocation per slice and DNN feature, added example configuration to configure NSSAI labels of smf_service_stats metrics.	2022.04.0
Introduced support for classification and configuration of application metrics	2021.02.3

Revision Details	Release
<p>Added support for the following enhancements:</p> <ul style="list-style-type: none"> • The show subscriber nf-service smf smf_url command to show subscriber details based on the IP address value of the vSMF or hSMF. • The clear subscriber nf-service smf smf_url command to clear subscriber details based on the IP address value of the vSMF or hSMF. • The clear subscriber nf-service smf smf_url command to clear subscriber details based on the IP address value of the vSMF or hSMF. • The show subscriber supi supi_id nf-service smf psid psid_value full command to show detailed subscriber information for roaming-specific use case as hSMF and vSMF. • The show subscriber supi supi_id nf-service smf psid psid_value summary command to show detailed information about subscriber sessions for roaming-specific use case as hSMF and vSMF. 	2021.02.2
<p>Added support for the following enhancements:</p> <ul style="list-style-type: none"> • The show subscriber supi supi_value nf-service smf psid psid_value summary command to provide detailed information about subscriber sessions. • The clear subscriber nf-service smf and show subscriber nf-service smf commands with supported keywords and filters. • The clear subscriber and clear subscriber nf-service smf commands to support the reactivation keyword to clear sessions when release cause as reactivation-required is configured. This enhancement also supports disconnect and release reasons. • The imei keyword for monitor subscriber, clear subscriber, and show subscriber CLI commands. 	2021.02.0
First introduced.	Pre-2020.02.0

Behavior Change

Previous Behavior: Diameter peer was considered down only if sending Device Watchdog Request (DWR) failed. Even if the Device Watchdog Answer (DWA) was not received or was received with error result-code, the peer was not considered in the error state.

New Behavior: In addition to the failure in sending DWR, even if the DWA is not received or is received with error result-code, then also peer is considered to be in error state.

For more information, refer to the UCC 5G SMF Configuration and Administration Guide > Diameter Endpoint chapter.

GBR Bearer Creation Based on Local Policy

Feature Summary and Revision History

Summary Data

Table 14: Summary Data

Applicable Product(s) or Functional Area	SMF
Applicable Product(s) or Functional Area	SMI
Feature Default Setting	Disabled – Configuration Required
Related Changes in this Release	Not Applicable
Related Documentation	Not Applicable

Revision History

Table 15: Revision History

Revision Details	Release
<ul style="list-style-type: none"> Added support for GBR bearer creation without PCF interaction for 4G and 5G. Added the N7 optimization support. Added support for optional PCF or PCRF configuration for local policy configuration. 	2023.04.0
Added support for the following features: <ul style="list-style-type: none"> QoS group of ruledefs over N7 IPv6 support for N3 interface on UPF 	2023.01.0
Added support for SMF— <ul style="list-style-type: none"> to allocate UPFs with unique IP pools to select the UPF based on PDN type 	2022.04.0
Introduced support for Diff-Serv-Code-Point (DSCP) or Type of Service (ToS) QoS functions during interaction with PCF.	2021.02.3.t3

Revision Details	Release
Introduced support for the following features: <ul style="list-style-type: none"> • Usage Monitoring over PCF • N4 QoS Mismatch Correction • Dynamic QoS Flow-based Application Detection and Control • IP Threshold-based UPF Selection 	2021.02.3
Introduced support for non-standard QCI for dynamic PCC and session rules	2021.02.2
Introduced support for the following features: <ul style="list-style-type: none"> • Bit rate mapping • UPF Selection based on Slice and Location • UP Optimization 	2021.02.0
Introduced support for the following: <ul style="list-style-type: none"> • Co-located UPF Selection • Enhanced Limits for Maximum Groups in Bandwidth Policy Configuration • Handling Session Report Rejection Procedure • New Format of Outer Header information element (IE) 	2021.01.0
Introduced support for the following: <ul style="list-style-type: none"> • UPF node selection based on DNN and PDU Session type • Modification of authorized default QoS • Additional session report and UPF node report request 	2020.03.0
First introduced.	Pre-2020.02.0

Feature Description

SMF allows creating dedicated GBR bearers for 4G and 5G without PCF interaction, using the local policy configuration. This feature creates two bearers:

- **Default Non-GBR Bearer** The default bearer/flow is created based on the QoS received from UDM (in case of NR) or MME (in case of E-UTRA).

- **Dedicated GBR Bearer:** Dedicated GBR flows/bearers are additionally created based on local policy configuration.

For more information, see the [UCC 5G SMF Configuration and Administration Guide > Policy and User Plane Management](#) chapter.

Gx/Gy Custom Dictionary for RAR Messages

Feature Summary and Revision History

Summary Data

Table 16: Summary Data

Applicable Products or Functional Area	SMF
Applicable Platform(s)	SMI
Feature Default Setting	Enabled – Always-on
Related Documentation	Not Applicable

Revision History

Table 17: Revision History

Revision Details	Release
Added the Gx and Gy custom dictionary support for RAR messages.	2023.04.0
First introduced.	2023.03.0

Feature Description

SMF extends the custom dictionary support for Re-Authorization Request (RAR) messages in addition to the existing dictionary support for the Credit Control - Initial (CCR-I), Credit Control - Update (CCR-U), and Credit Control - Terminate (CCR-T) messages.

For more information, refer to the [UCC 5G SMF Configuration and Administration Guide > Diameter Endpoint](#) chapter.

Gz and Gy Interface Enhancements

Feature Summary and Revision History

Summary Data

Table 18: Summary Data

Applicable Product(s) or Functional Area	SMF
Applicable Platform(s)	SMI
Default Setting	Enabled – Always-on
Related Changes in this Release	Not Applicable
Related Documentation	Not Applicable

Revision History

Table 19: Revision History

Revision Details	Release
Added support for: <ul style="list-style-type: none"> • Asynchronous and Synchronous Usage Report for Offline Bearer Recalculation • Handling Modify Bearer Request Trigger on the Gz Interface • Gz Change Notification • Default Bearer Modification based on APN-AMBR and Qci change • Handling Periodic Report of Secondary RAT Usage: • EGCDR final record configuration • Zero CDR suppression • Final Unit Indication in subsequent CCR-U • FHT Continue Enhancement • Diameter Credit-Control-Failure-Handling AVP 	2023.04.0

Revision Details	Release
<p>Added support for:</p> <ul style="list-style-type: none"> • Multiple 3GPP specification compliance for SMF interfaces. • Gz Interfaces and associated features: <ul style="list-style-type: none"> • PDN Attach and Detach with Gz Interface • Gz Usage Reporting • Indirect communication for NFs through SCP Model D. • Excluding the optional IE for Locality in the NRF messages. 	2023.03.0
<p>Added support for:</p> <ul style="list-style-type: none"> • Gx interfaces and their associated features: <ul style="list-style-type: none"> • Gx initial attach and detach • Dynamic and predefined rule • Gy interfaces and their associated features: <ul style="list-style-type: none"> • Gy usage reporting • Gy failure handling • Gy MSCC level failure result codes • Gy QVT and QHT • Gy tariff time • IPv6 on data interfaces 	2023.02.0
<p>Added support for:</p> <ul style="list-style-type: none"> • N4 interface over IPsec • IPv6 address on all SMF interfaces • User plane integrity protection • Mutual TLS for the SBI interface • 3GPP specification version compliance configuration for CHF server 	2022.04.0
<p>Added support for configuration-based control of UDM and PCF messages.</p>	2021.02.3.t3
<p>Added support for N2 cause and diagnostic IEs.</p>	2021.02.3

Revision Details	Release
Added support for: <ul style="list-style-type: none"> • Cause IE on the N11 interface. • NAS messages compliance with invalid protocol data handling. • ProblemDetails JSON object on the N11 interface. • Error handling with HTTP error codes. • HTTP/2 TLS support for the SBA interface. 	2021.02.0
First introduced.	Pre-2020.02.0

Feature Description

SMF allows the following functionalities over Gz Interface:

- **Modify Bearer Request Triggers:** SMF receives the Modify Bearer Request from S-GW for the User Location and TimeZone changes, change notifications. SMF supports N4 Query Interface and Recalculate Interface IEs for Rulebase change, Secondary RAT Usage limit, and Record closing triggers.
- **Gz Bearer Modification:** PCRF-initiated modification of a default Bearer through Gx CCR-U and Gx RAR. You can perform the following functions:
 - Add rules to the Default Bearer
 - Delete rules from the Default Bearer
 - Rulebase Modification
- **Asynchronous and Synchronous Usage Report for Offline Bearer Recalculation:** SMF receives Asynchronous and Synchronous Usage Reporting for Offline Bearer recalculation.

For more information, refer to the [UCC 5G SMF Configuration and Administration Guide > Interfaces Support](#) chapter.

SMF allows the following functionalities over Gy interface enhancements:

- **Final Unit Indication (FUI) support in CCR-U:** As part of Gy Usage Reporting, SMF supports FUI in CCA-U from OCS. FUI is enabled during the session creation or update. After FUI activation, when there is any update triggers due to an event trigger or Usage report, SMF sends subsequent CCR-U toward OCS without requesting further Quota and receives CCA-U.
- **Failure Handling Template (FHT) Enhancement:** During the Modify Bearer Request procedure, if there are N4 Modification Query URR, Gy CCR-U (Usage), or Gy CCA-U (failure) instances, the FHT action is Continue. The FHT subaction is Unknown or None. In this scenario, SMF allocates High Quota with no Gy CCR-T during detach. There is no Gy CCR-U during any trigger/update.

For more information, refer to the [UCC 5G SMF Configuration and Administration Guide > Subscriber Charging](#) chapter.

Handling Periodic Report of Secondary RAT Usage

Feature Summary and Revision History

Summary Data

Table 20: Summary Data

Applicable Product(s) or Functional Area	SMF
Applicable Platform(s)	SMI
Default Setting	Enabled – Always-on
Related Changes in this Release	Not Applicable
Related Documentation	Not Applicable

Revision History

Table 21: Revision History

Revision Details	Release
<p>Added support for:</p> <ul style="list-style-type: none"> • Asynchronous and Synchronous Usage Report for Offline Bearer Recalculation • Handling Modify Bearer Request Trigger on the Gz Interface • Gz Change Notification • Default Bearer Modification based on APN-AMBR and Qci change • Handling Periodic Report of Secondary RAT Usage: • EGCDR final record configuration • Zero CDR suppression • Final Unit Indication in subsequent CCR-U • FHT Continue Enhancement • Diameter Credit-Control-Failure-Handling AVP 	2023.04.0

Revision Details	Release
<p>Added support for:</p> <ul style="list-style-type: none"> • Multiple 3GPP specification compliance for SMF interfaces. • Gz Interfaces and associated features: <ul style="list-style-type: none"> • PDN Attach and Detach with Gz Interface • Gz Usage Reporting • Indirect communication for NFs through SCP Model D. • Excluding the optional IE for Locality in the NRF messages. 	2023.03.0
<p>Added support for:</p> <ul style="list-style-type: none"> • Gx interfaces and their associated features: <ul style="list-style-type: none"> • Gx initial attach and detach • Dynamic and predefined rule • Gy interfaces and their associated features: <ul style="list-style-type: none"> • Gy usage reporting • Gy failure handling • Gy MSCC level failure result codes • Gy QVT and QHT • Gy tariff time • IPv6 on data interfaces 	2023.02.0
<p>Added support for:</p> <ul style="list-style-type: none"> • N4 interface over IPsec • IPv6 address on all SMF interfaces • User plane integrity protection • Mutual TLS for the SBI interface • 3GPP specification version compliance configuration for CHF server 	2022.04.0
<p>Added support for configuration-based control of UDM and PCF messages.</p>	2021.02.3.t3
<p>Added support for N2 cause and diagnostic IEs.</p>	2021.02.3

Revision Details	Release
Added support for: <ul style="list-style-type: none"> • Cause IE on the N11 interface. • NAS messages compliance with invalid protocol data handling. • ProblemDetails JSON object on the N11 interface. • Error handling with HTTP error codes. • HTTP/2 TLS support for the SBA interface. 	2021.02.0
First introduced.	Pre-2020.02.0

Feature Description

The SMF handles the periodic Secondary RAT data volume report messages from the MME over the S5 or S8 interface in the Modify Bearer Request, Change Notification Request, Delete Session Request, and Delete Bearer Response based on the Intended Receiver PGW-C (IRPGW) flag. SMF retains the Usage-Report if IRPGW = 1.

The SMF supports multiple instances of Secondary RAT Usage Data Report IEs. It stores reports until they are sent out to OFCS based on the triggers. SMF sends out the stored secondary RAT usage data report through gtp-p endpoint when any of the charging triggers are met.

For more information, refer to the [UCC 5G SMF Configuration and Administration Guide > Interfaces Support](#) chapter.

HSS-Initiated QoS Modification

Feature Summary and Revision History

Summary Data

Table 22: Summary Data

Applicable Product(s) or Functional Area	SMF
Applicable Platform(s)	SMI
Feature Default Setting	Enabled – Always-on
Related Changes in this Release	Not Applicable
Related Documentation	Not Applicable

Revision History

Table 23: Revision History

Revision Details	Release
<p>Added the following support:</p> <ul style="list-style-type: none"> • Receiving QoS rules and QoS descriptions with the ePCO length of two octets option in PDU session establishment. • Indication of local IP address in TFT in S1 node during the PDU session establishment in 5G for a PDU session supporting 5G-4G internetworking. • Semantic and syntactic error handling for the QoS rules and QoS description or for mapped EPS Bearer Contexts errors from the UE. • Handles CB or UB response with ePCO containing 5GSM cause. • Mandatory MFBR validation while receiving GBR flow creation or QoS Modification from PCF. • HSS-initiated QoS modification for 4G UE. 	2023.04.0
<p>Added the following support:</p> <ul style="list-style-type: none"> • For the change notification request received with ULI for 4G calls with legacy interfaces. • The alternate RAT tunnel creation for 4G. • Added the Show command for 4G call for the change in output of RAT Type. 	2023.03.0
<p>Added support for:</p> <ul style="list-style-type: none"> • E-UTRAN initial attach procedure with Diameter interfaces. • Network-initiated Detach Procedures with Diameter Interfaces • PCRF-initiated CCAU or RAR • Modify Bearer Request with or without S-GW Change • UE-Initiated Detach Procedure • Support for Context Replacement 	2023.02.0
FB Call Continuity Cause Code Expansion	2021.02.2

Revision Details	Release
Added support for: <ul style="list-style-type: none"> • Configuring APN-AMBR action in Create Session Response • Container field—0005H (Selected Bearer Control Mode) for the PCO, ePCO, or aPCO IE in Create Session Response • GTP-C path failure detection and debugging improvements • GTP-C peer restart detection improvements • Handling the dedicated bearer procedure failures observed at the expiry of procedure SLA timer 	2021.02.0
Introduced procedure to support dynamic configuration of the Access Profile configuration.	2020.03.0
New CLI command in the DNN profile configuration to reject calls from 4G-only UE devices.	2020.02.1
First introduced.	Pre-2020.02.0

Feature Description

The HSS Initiated Bearer QoS Modification procedure is used in one or several of the EPS Bearer QoS parameters. For example, the EPS Bearer QoS parameters can be QCI or the ARP of the default EPS Bearer. If the HSS changes the default Bearer QCI or the ARP and APN-AMBR, the HSS initiates such message to the MME, which then generates the Modify Bearer Command (MBC) toward the P-GW through S-GW.

For more information, refer to the [UCC 5G SMF Configuration and Administration Guide > EPS Interworking](#) chapter.

N7 Optimization

Feature Summary and Revision History

Summary Data

Table 24: Summary Data

Applicable Product(s) or Functional Area	SMF
Applicable Platform(s)	SMI
Feature Default Setting	Disabled – Configuration Required
Related Changes in this Release	Not Applicable
Related Documentation	Not Applicable

Revision History

Table 25: Revision History

Revision Details	Release
<ul style="list-style-type: none"> • Added support for GBR bearer creation without PCF interaction for 4G and 5G. • Added the N7 optimization support. • Added support for optional PCF or PCRF configuration for local policy configuration. 	2023.04.0
<p>Added support for the following features:</p> <ul style="list-style-type: none"> • QoS group of ruledefs over N7 • IPv6 support for N3 interface on UPF 	2023.01.0
<p>Added support for SMF—</p> <ul style="list-style-type: none"> • to allocate UPFs with unique IP pools • to select the UPF based on PDN type 	2022.04.0
<p>Introduced support for Diff-Serv-Code-Point (DSCP) or Type of Service (ToS) QoS functions during interaction with PCF.</p>	2021.02.3.t3
<p>Introduced support for the following features:</p> <ul style="list-style-type: none"> • Usage Monitoring over PCF • N4 QoS Mismatch Correction • Dynamic QoS Flow-based Application Detection and Control • IP Threshold-based UPF Selection 	2021.02.3
<p>Introduced support for non-standard QCI for dynamic PCC and session rules</p>	2021.02.2
<p>Introduced support for the following features:</p> <ul style="list-style-type: none"> • Bit rate mapping • UPF Selection based on Slice and Location • UP Optimization 	2021.02.0

Revision Details	Release
Introduced support for the following: <ul style="list-style-type: none"> • Co-located UPF Selection • Enhanced Limits for Maximum Groups in Bandwidth Policy Configuration • Handling Session Report Rejection Procedure • New Format of Outer Header information element (IE) 	2021.01.0
Introduced support for the following: <ul style="list-style-type: none"> • UPF node selection based on DNN and PDU Session type • Modification of authorized default QoS • Additional session report and UPF node report request 	2020.03.0
First introduced.	Pre-2020.02.0

Feature Description

With the N7 optimization support, the SMF skips the N7 Update message by sending the UE IP address in the N7 Create message. After you enable this feature, the SMF allocates the IP address and performs the UPF selection before connecting with the PCF. If you have configured the SMF to select an alternate UPF that needs IP reallocation, then during the N4 failure, the SMF sends an N7 Update message after the N4 Success message to indicate the new IP address.

For more information, refer to the [UCC 5G SMF Configuration and Administration Guide > Policy and User Plane Management](#) chapter.

N10 Fail Open on Converged Core

Feature Summary and Revision History

Summary Data

Table 26: Summary Data

Applicable Product(s) or Functional Area	SMF
Applicable Product(s) or Functional Area	SMI
Feature Default Setting	Enabled – Always-on

Related Changes in this Release	Not Applicable
Related Documentation	Not Applicable

Revision History

Table 27: Revision History

Revision Details	Release
Added the N10 fail open support.	2023.04.0
First introduced.	2020.02.2

Feature Description

This feature provides the following support:

- Fail open for ignore and continue failure handling actions as well for the call during the N10 message failures.
- Interaction with SCP Model-D.

For more information, refer to the [UCC 5G SMF Configuration and Administration Guide > UDM Integration](#) chapter.

Network Address Translation Support

Feature Summary and Revision History

Summary Data

Table 28: Summary Data

Applicable Product(s) or Functional Area	SMF
Applicable Platform(s)	SMI

Feature Default Setting	<ul style="list-style-type: none"> • IPAM: Enabled – Always-on • Unique IP Pools for UPF: Disabled – Configuration required to enable • Auto-Reclamation of Under-Utilized IP Chunks: Disabled- Configuration required to enable • Identification of Corrupted Chunks: Disabled- Configuration required to enable. • Reconciliation of IP Chunks between SMF and UPF: Disabled- Configuration required to enable. • IP Chunk Auto-Throttle and ToD Chunk Clearance: Disabled- Configuration required to enable. • Route Aggregation to Handle Switch Limit: Disabled- Configuration required to enable. • NAT Support: Disabled- Configuration required to enable.
Related Changes in this Release	Not Applicable
Related Documentation	Not Applicable

Revision History

Table 29: Revision History

Revision Details	Release
Added support for the following features: <ul style="list-style-type: none"> • Releasing N4 resources using a CLI • Network Address Translation (NAT) along with sending NAT binding updates in SMF. 	2023.04.0
Added support for the following features: <ul style="list-style-type: none"> • Auto-Reclamation of Under-Utilized IP Chunks. • Identification of Corrupted Chunks. • Reconciliation of IP Chunks between SMF and UPF. • IP Chunk Auto-Throttle and ToD Chunk Clearance. • Route Aggregation to Handle Switch Limit. 	2023.03.0
Nexthop forwarding address configuration added to IPv6 address range and prefix range.	2023.01.4

Revision Details	Release
Added support for the following features: <ul style="list-style-type: none"> • IPAM Periodic Reconciliation • UPF Fallback functionality 	2023.01.0
Added support for the following features: <ul style="list-style-type: none"> • IPAM reconciliation CLI commands for IPAM hardening. • IP pool allocation per slice and DNN feature. • SMF to allocate UPFs with unique IP pools. 	2022.04.0
Added support for the following features: <ul style="list-style-type: none"> • New calls with a static IP address. • Quarantine queue size. • IP address validation with CDL Configuration and statistics. 	2021.02.0
IP Address Validation with CDL Configuration introduced.	2021.02.0
Updated quarantine time range to 3600 seconds.	2021.02.0
VRF Support introduced.	2020.02.5
First introduced.	Pre-2020.02.0

Feature Description

Network Address Translation (NAT) is a service that enables private IP networks to use the internet and cloud. NAT translates private IP addresses in an internal network to a public IP address before packets are sent to an external network. This helps to save IP addresses and improve security.

When NAT is enabled on the UPF, external platforms require the real-time NAT binding updates. This allows the mapping of private IP address to public IP address used on the Gi interface to be provided to external platforms.

SMF supports NAT Binding Record functionality where, N4 Session Report Request Message is used for providing NAT Binding Record Information from UPF to SMF. After SMF receives NAT Binding Record Information from UPF, it sends the corresponding NAT Binding Updates to the AAA Server over the RADIUS interface.

For more information, refer to the [UCC 5G SMF Configuration and Administration Guide > IP Address Management](#) chapter.

Non-Standard PLMN List Configuration for MccMncExceptionList Dynamic Update

Behavior Change Summary and Revision History

Summary Data

Table 30: Summary Data

Applicable Product(s) or Functional Area	SMF
Applicable Platform(s)	SMI
Feature Default Setting	Disabled – Configuration Required
Related Changes in this Release	Not Applicable
Related Documentation	Not Applicable

Revision History

Table 31: Revision History

Revision Details	Release
Added the non-standard PLMN list configuration.	2023.04.0
Removed the visitor-hrt CLI keyword from the configuration in Operator Policy.	2021.02.3
First introduced.	2021.01.0

Behavior Change

Previous Behavior: No CLI command existed for the non-standard PLMN values.

New Behavior: The new **non-standard-plmn-list** CLI command is added in the SMF profile. Use this command to enable SMF to update MccMncExceptionList dynamically.

For more information, refer to the [UCC 5G SMF Configuration and Administration Guide > Multiple PLMN Support](#) chapter.

Processing GTPv2 Modify Bearer Request Messages

Behavior Change Summary and Revision History

Summary Data

Applicable Product(s) or Functional Area	SMF
Applicable Platform(s)	SMI
Feature Default Setting	Enabled – Always-on
Related Changes in this Release	Not Applicable
Related Documentation	Not Applicable

Revision History

Table 32: Revision History

Revision Details	Release
First introduced.	2023.04.0

Behavior Change

Previous Behavior: At the time of GTPv2 MBReq message processing, Modify Bearer Request (MBR) from a Visitor PLMN (V-PLMN) or any PLMN was accepted by PGW-C+SMF.

New Behavior: If the inter-plmn CLI is not configured in PGW-C+SMF, MBR from a V-PLMN is rejected by PGW-C+SMF. To handle handovers from V-PLMN, configuring the **inter-plmn-ho** in the DNN profile is mandatory.

For more information, refer to the [UCC 5G SMF Configuration and Administration Guide > Roaming Support](#) chapter.

Releasing N4 Resources or Association

Table 33: Feature History

Feature Name	Release Information	Description
N4 Resource or Association Release	2023.04	SMF supports clearing resources with respect to a particular UPF from the SMF using a CLI release-resource .

Feature Summary and Revision History

Summary Data

Table 34: Summary Data

Applicable Product(s) or Functional Area	SMF
Applicable Platform(s)	SMI
Feature Default Setting	Disabled-Configuration required to enable.
Related Changes in this Release	Not Applicable
Related Documentation	Not Applicable

Revision History

Table 35: Revision History

Revision Details	Release
Added support for the following features: <ul style="list-style-type: none"> • Releasing N4 resources using a CLI • Network Address Translation (NAT) along with sending NAT binding updates in SMF. 	2023.04.0
Added support for the following features: <ul style="list-style-type: none"> • Auto-Reclamation of Under-Utilized IP Chunks. • Identification of Corrupted Chunks. • Reconciliation of IP Chunks between SMF and UPF. • IP Chunk Auto-Throttle and ToD Chunk Clearance. • Route Aggregation to Handle Switch Limit. 	2023.03.0
Nexthop forwarding address configuration added to IPv6 address range and prefix range.	2023.01.4
Added support for the following features: <ul style="list-style-type: none"> • IPAM Periodic Reconciliation • UPF Fallback functionality 	2023.01.0

Revision Details	Release
Added support for the following features: <ul style="list-style-type: none"> • IPAM reconciliation CLI commands for IPAM hardening. • IP pool allocation per slice and DNN feature. • SMF to allocate UPFs with unique IP pools. 	2022.04.0
Added support for the following features: <ul style="list-style-type: none"> • New calls with a static IP address. • Quarantine queue size. • IP address validation with CDL Configuration and statistics. 	2021.02.0
IP Address Validation with CDL Configuration introduced.	2021.02.0
Updated quarantine time range to 3600 seconds.	2021.02.0
VRF Support introduced.	2020.02.5
First introduced.	Pre-2020.02.0

Feature Description

SMF introduces a CLI **release-resource** that triggers and automates N4 associations or resources releasing process per UPF from the SMF. As part of this feature, SMF performs two primary functions when **release-resource** is triggered:

1. It clears all the IP pools associated to the peer.
 - It clears the calls using the pool.
 - It deletes the routes.
2. A new call disconnect reason is added to the SMF Disconnect Statistics. Also, the routes are re-registered with UPF post a quarantine time of 2 minutes.

For more information, see the [UCC 5G SMF Configuration and Administration Guide > IP Address Management](#) chapter.

Routing CCR-U/CCR-T Message to Bounded Peer from CCR-I/U or CCA-I/U Message

Behavior Change Summary and Revision History

Summary Data

Table 36: Summary Data

Applicable Product(s) or Functional Area	SMF
Applicable Platform(s)	SMI
Feature Default Setting	Disabled – Configuration Required
Related Changes in this Release	Not Applicable
Related Documentation	Not Applicable

Revision History

Table 37: Revision History

Revision Details	Release
Added VRF support for Diameter interfaces.	2023.04.0
The following enhancements are introduced: <ul style="list-style-type: none"> • Extended the maximum number of VRFs to 129 • Static and Dynamic Policy Removal 	2023.01.0
Support overlapping AAA server addresses for PAPN use case	2022.04.0
First introduced.	2020.02.5

Behavior Change

Previous Behavior: No bounded peer existed.

New Behavior: Peer with which the last CCR-I/U interaction happened is considered as the bounded peer. Route matching the bounded peer is given the highest priority for sending subsequent CCR-U/T messages.

For more information, refer to the UCC 5G SMF Configuration and Administration Guide > Diameter Endpoint chapter.

Statistics Updates for Internal Transaction Triggered for RAR Scenario

Behavior Change Summary and Revision History

Summary Data

Table 38: Summary Data

Applicable Product(s) or Functional Area	SMF
Applicable Platform(s)	SMI
Feature Default Setting	Not Applicable
Related Changes in this Release	Not Applicable
Related Documentation	Not Applicable

Revision History

Table 39: Revision History

Revision Details	Release
First introduced.	2023.04.0

Behavior Change

Previous Behavior: When the Modify Bearer Request (MBR) or Modify Bearer Command (MBC) triggered RADIUS update towards RADIUS accounting server, the **procType** label was updated as PDU Session Modify - SMF initiated.

For Gy metrics, **proc_name** label displayed the PDU Session Modify - SMF initiated value.

New Behavior: The new statistics **PDN Session Modify - PCRF initiated** is added for this scenario.

For more information, refer to the [UCC 5G Session Management Function, Statistics Reference > SMF Metrics](#) chapter.

Sending Create QER to UPF

Behavior Change Summary and Revision History

Summary Data

Table 40: Summary Data

Applicable Product(s) or Functional Area	SMF
Applicable Platform(s)	SMI
Feature Default Setting	Disabled – Configuration Required
Related Changes in this Release	Not Applicable
Related Documentation	Not Applicable

Revision History

Table 41: Revision History

Revision Details	Release
First introduced.	2023.04.0

Behavior Change

Previous Behavior: If the predefined rules are mapped to a dedicated flow/bearer, the SMF did not send the Create QER Request to the UPF.

New Behavior: If the predefined rules are mapped to a dedicated flow/bearer, the SMF sends the Create QER Request for both default and dedicated flows to the UPF.

For more information, refer to the [UCC 5G SMF Configuration and Administration Guide > Policy and User Plane Management](#) chapter.

VRF for Diameter Interfaces

Feature Summary and Revision History

Summary Data

Table 42: Summary Data

Applicable Product(s) or Functional Area	SMF
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Applicable Platform(s)	SMI
Feature Default Setting	Disabled – Configuration Required
Related Changes in this Release	Not Applicable
Related Documentation	Not Applicable

Revision History

Table 43: Revision History

Revision Details	Release
Added VRF support for Diameter interfaces.	2023.04.0
The following enhancements are introduced: <ul style="list-style-type: none"> Extended the maximum number of VRFs to 129 Static and Dynamic Policy Removal 	2023.01.0
Support overlapping AAA server addresses for PAPN use case	2022.04.0
First introduced.	2020.02.5

Feature Description

SMF supports the client-side VRF for the Diameter Gx and Gy interfaces. The profile Diameter endpoint refers to the VRF name and interface name that you configure from the Diameter endpoint. The Diameter endpoint uses the VRF name to create a TCP connection from the Diameter client.

For more information, refer to the [UCC 5G SMF Configuration and Administration Guide > Diameter Endpoint](#) and [Virtual Routing and Forwarding Function](#) chapters.

Wait Time Display for Ongoing Bulk clear Subscriber CLI and Blocking the Consecutive CLI

Behavior Change Summary and Revision History

Summary Data

Table 44: Summary Data

Applicable Product(s) or FunctionalArea	SMF
Applicable Platform(s)	SMI

Feature Default Setting	Not Applicable
Related Changes in this Release	Not Applicable
Related Documentation	Not Applicable

Revision History

Table 45: Revision History

Revision Details	Release
Added the wait time display for ongoing bulk clear subscriber CLI and blocking the consecutive CLI.	2023.04.0
Added the following support: <ul style="list-style-type: none"> • Enabling UPF Monitor Subscriber from SMF. • Session Count per slice and NSSAI. 	2023.03.0
As part of the IP pool allocation per slice and DNN feature, added example configuration to configure NSSAI labels of smf_service_stats metrics.	2022.04.0
Introduced support for classification and configuration of application metrics	2021.02.3
Added support for the following enhancements: <ul style="list-style-type: none"> • The show subscriber nf-service smf smf_url command to show subscriber details based on the IP address value of the vSMF or hSMF. • The clear subscriber nf-service smf smf_url command to clear subscriber details based on the IP address value of the vSMF or hSMF. • The clear subscriber nf-service smf smf_url command to clear subscriber details based on the IP address value of the vSMF or hSMF. • The show subscriber supi supi_id nf-service smf psid psid_value full command to show detailed subscriber information for roaming-specific use case as hSMF and vSMF. • The show subscriber supi supi_id nf-service smf psid psid_value summary command to show detailed information about subscriber sessions for roaming-specific use case as hSMF and vSMF. 	2021.02.2

Revision Details	Release
<p>Added support for the following enhancements:</p> <ul style="list-style-type: none"> • The show subscriber supi <i>supi_value</i> nf-service smf psid <i>psid_value</i> summary command to provide detailed information about subscriber sessions. • The clear subscriber nf-service smf and show subscriber nf-service smf commands with supported keywords and filters. • The clear subscriber and clear subscriber nf-service smf commands to support the reactivation keyword to clear sessions when release cause as reactivation-required is configured. This enhancement also supports disconnect and release reasons. • The imei keyword for monitor subscriber, clear subscriber, and show subscriber CLI commands. 	2021.02.0
First introduced.	Pre-2020.02.0

Behavior Change

Previous Behavior: The Ops Center didn't display the expected waiting time for an ongoing bulk **clear subscriber** CLI command. In addition, you could run the **clear subscriber** CLI while the processing of the earlier CLI was still in progress.

New Behavior: The Ops Center displays the expected waiting time for an ongoing bulk **clear subscriber** CLI command. In addition, the **clear subscriber** CLI gets blocked while the processing of the earlier CLI is in progress.

Customer Impact: Ease of use and maintenance in processing of the subscriber profiles.

For more information, refer to the [UCC 5G SMF Configuration and Administration Guide > Troubleshooting Information](#) chapter.

Wireless Priority Services Enhancement

Feature Summary and Revision History

Summary Data

Table 46: Summary Data

Applicable Product(s) or Functional Area	SMF
Applicable Platform(s)	SMI
Feature Default Setting	Disabled – Configuration Required
Related Changes in this Release	Not Applicable

Related Documentation	Not Applicable
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Revision History

Table 47: Revision History

Revision Details	Release
Enhancements to SBI Message Priority Mechanism and Message-Prioritization based on Procedures	2023.04.0
5QI Mapping support introduced	2023.03.0
UPF Interaction while Deleting WPS Dynamic Rule	2021.01.0
SBI Message Priority Mechanism and Message-Prioritization based on Procedures are introduced.	2021.01.0
The Wireless Priority Services feature is fully qualified in this release.	2020.03.0
First introduced. This feature is not fully qualified in this release. For more information, contact your Cisco Account representative.	2020.02.0

Feature Description

The primary usage of SBI Message Priority (SMP) is to provide guidance to 5GC NF acting as HTTP/2 clients or servers while making throttling decisions related to overload control. You can use the priority information for routing in the proxies. Eventually a server uses the priority information to process higher-priority requests before lower-priority requests. The SMP mechanism uses the "3gpp-Sbi-Message-Priority" custom HTTP header to set and carry the message priority between the client and the server. The custom HTTP header enforces the message priority end to end between the client and the server through one or more proxies.



Note Stream Priority mechanism is not supported.

The header contains the HTTP/2 message priority value: The encoding of the header follows the ABNF as defined in IETF RFC 7230 [12].

```
3gpp-Sbi-Message-Priority = "3gpp-Sbi-Message-Priority" ":" (DIGIT / %x31-32 DIGIT / "3" %x30-31)
```

A message with

```
3gpp-Sbi-Message-Priority "0"
```

has the highest priority.

Example:

```
3gpp-Sbi-Message-Priority: 10
```


For more information, refer to the [UCC 5G SMF Configuration and Administration Guide > Wireless Priority Services](#) chapter.

