Ultra Cloud Core 5G Session Management Function, Release 2023.03 - Release Change Reference

First Published: 2023-07-28

C O N T E N T S

About this Guide

Note The documentation set for this product strives to use bias-free language. For purposes of this documentation set, bias-free is defined as language that does not imply discrimination based on age, disability, gender, racial identity, ethnic identity, sexual orientation, socioeconomic status, and intersectionality. While any existing biased terms are being substituted, exceptions may be present in the documentation due to language that is hardcoded in the user interfaces of the product software, language used based on RFP documentation, or language that is used by a referenced third-party product.

This Release Change Reference (RCR) describes new and modified feature and behavior change information for the applicable 5G SMF release(s).

UCC 5G SMF - Release Change Reference

Features and Changes Quick Reference

Features / Behavior Changes	Release Introduced / Modified	Default
5QI Remapping , on page 6	2023.03.0	Disabled – Configuration Required
Alternate RAT Tunnel Creation for 4G, 5G, and Wi-Fi	2023.03.0	Enabled – Always-on
Auto-Reclamation of Under-Utilized IP Chunks	2023.03.0	Disabled-Configuration required to enable
Bitrate Mapping across Diameter Interfaces, on page 8	2023.03.0	Disabled – Configuration Required
Change Notification Support Handling	2023.03.0	Enabled – Always-on
Destination Host AVP for CCR and Retried Messages	2023.03.0	Enabled – Always-on
Diameter Endpoint RFC Compliance for Origin State ID, on page 11	2023.03.0	Enabled – Always-on

Features / Behavior Changes	Release Introduced / Modified	Default
Diameter Session Failover Support, on page 12	2023.03.0	Disabled – Configuration Required to Enable
Disconnect Peer Request Management, on page 13	2023.03.0	Enabled – Always-on
DNN Profile Optimization, on page 13	2023.03.0	Enabled – Always-on
Dynamic Configuration	2023.03.0	• Diameter Endpoint: Enabled – Always-on • Multiple and Virtual DNN Support: Disabled – Configuration required • RADIUS Authentication and Accounting: Disabled – Configuration required • Subscriber Charging: Disabled – Configuration required
Enhancements to clear subscriber Command, on page 15	2023.03.0	Not - Applicable
EPS Interworking with Diameter Interfaces, on page 16	2023.03.0	Enabled – Always-on
ETCD Client Fallback	2023.03.0	Enabled – Always-on
ETCD Traffic Optimization, on page 20	2023.03.0	Not Applicable
Extended QoS Support for SMF with Legacy Interfaces, on page 21	2023.03.0	Enabled – Configuration Required
Final Unit Indication Support for Gy Interface	2023.03.0	Disabled-Configuration required to enable
GR Strengthening	2023.03.0	Disabled-Configuration required to enable
GTPP Endpoint, on page 24	2023.03.0	Enabled – Always-on
GTPP Resiliency	2023.03.0	Enabled – Always-on
Gx Interface, on page 25	2023.03.0	Enabled – Always-on
Gx and Gy Dictionaries, on page 26	2023.03.0	Enabled – Always-on
Gy Interface, on page 27	2023.03.0	Enabled – Always-on

Features / Behavior Changes	Release Introduced / Modified	Default
Gy Failure Handling, on page 29	2023.03.0	Enabled – Always-on
Gy Usage Reporting, on page 30	2023.03.0	Enabled – Always-on
Identification of Corrupted IP Chunks	2023.03.0	Disabled- Configuration required to enable.
Indirect Communication for NFs through SCP Model D	2023.03.0	Enabled – Always-on
Inter Site Redundancy, on page 39	2023.03.0	Disabled – Configuration Required
IP Chunk Auto-Throttle and ToD Chunk Clearance	2023.03.0	Disabled- Configuration required to enable.
IPv6 Data Interface Support, on page 40	2023.03.0	Enabled – Always-on
Metrics for Diameter Endpoint, on page 42	2023.03.0	Enabled – Always-on
Multiple 3GPP Compliance Versions Support on SMF, on page 44	2023.03.0	Enabled – Always-on
N16 SMF and SEPP Failure Handling, on page 44	2023.03.0	Enabled – Always-on
Panic Recovery for Diameter Endpoint, on page 45	2023.03.0	Enabled – Always-on
Peer Management in Diameter Endpoint, on page 46	2023.03.0	Enabled – Always-on
Pending Traffic Treatment over Diameter Interfaces, on page 47	2023.03.0	Enabled – Always-on
Pod Failure Detection using K8 Liveness Probe	2023.03.0	Domain-based User Authorization Using Ops Center ETCD Traffic Optimization: Enabled - Always-on Roaming Peer Optimization- Disabled – Configuration required to enable GTPC IPC Cross-rack Support: Disabled – Configuration required to enable Handling PDU Session Modifications based on RRC Inactive Cause Codes: Disabled – Configuration required to enable

Features / Behavior Changes	Release Introduced / Modified	Default
Presence of 3gpp-sbi-discovery-service-names IE in SCP , on page 50	2023.03.0	Enabled – Always-on
RADIUS Features, on page 50	2023.03.0	Enabled – Always-on
RAT Type Update in Show Subscriber Command for 4G Calls	2023.03.0	Enabled – Always-on
Reconciliation of IP Chunks between SMF and UPF	2023.03.0	Disabled – Configuration required to enable.
Roaming Peer Optimization	2023.03.0	Disabled – Configuration Required
Roaming Support Enhancements, on page 54	2023.03.0	Enabled – Always-on
Rolling Software Update Enhancement, on page 57	2023.03.0	Not Applicable
Route Aggregation to Handle Switch Limit	2023.03.0	Disabled – Configuration Required
Rulebase-driven Subscriber Information, on page 59	2023.03.0	Enabled – Always-on
Session Count Support per Slice and NSSAI, on page 59	2023.03.0	Not Applicable
Session Idle Timers, on page 61	2023.03.0	Disabled – Configuration Required
Suppress Locality Information in NRF Messages	2023.03.0	Enabled – Always-on
Traffic Monitoring on L2 VIP for Active Instance	2023.03.0	Disabled – Configuration Required
UPF Monitor Subscriber from SMF	2023.03.0	Not Applicable
Virtual DNN Support, on page 66	2023.03.0	Disabled – Configuration Required

5QI Remapping

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	Disabled – Configuration Required
Related Changes in this Release	Not Applicable
Related Documentation	Not Applicable

Revision History

Table 2: Revision History

Revision Details	Release
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

SMF currently detects priority calls (WPS) based on ARP. To use QCI in addition to ARP for WPS calls, SMF supports 5QI Remapping functionality to enable mapping of nonstandard QCI with the standard QCI, which UE can understand.

The SMF facilitates the following functions:

- **Seamless handover to 4G**: The SMF remaps the QCI sent in a mapped EPS QoS parameter with a mapped EPS bearer context to the configured value.

- **Seamless handover to 5G**: The SMF remaps the QCI sent in QoS Flow description in the protocol configuration option in the Create Session Response, Create Bearer Request, and Update Bearer Request.

For more information on this feature, see the UCC 5G SMF Configuration and Administration Guide > Wireless Priority services chapter.

Alternate RAT Tunnel Creation for 4G, 5G, and Wi-Fi

Feature Summary and Revision History

Summary Data

Table 3: 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 4: Revision History

Revision Details	Release
Added the alternate RAT tunnel creation support for 4G, 5G, and Wi-Fi.	2023.03.0

Feature Description

As per 3GPP specification from release 16.4.0 onwards, the creation of an alternate Radio Access Technology (RAT) tunnel for non-roaming and LBO roaming scenarios helps in a uniform behavior in all the scenarios. The alternate RAT tunnel creation also reduces latency during handover by avoiding CP to UP communication during handover preparation.

SMF creates an alternate RAT tunnel during 4G, 5G, and Wi-Fi sessions for 4G attach and dedicated bearer procedures, 5G PDU establishment procedures, and Wi-Fi attach procedures. This tunnel is reused when a subscriber moves to another RAT during handover.

Note Creation of an alternate RAT tunnel is a prerequisite for the inter-PLMN handover.

For more information on this functionality, see the UCC 5G SMF Configuration and Administration Guide > EPS Interworking and Handover Procedures chapters.

Auto-Reclamation of Under-Utilized IP Chunks

Feature 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 to enable.
Related Changes in This Release	Not Applicable
Related Documentation	Not Applicable

Revision History

Revision History

Revision Details	Release
First introduced.	2023.03.0

Feature Description

SMF supports reclamation of under-utilized IP chunks by identifying the utilization threshold and inactivity time of the chunks. The reclamation process can be triggered instantly or periodically using specific configurations.

For more information on this functionality, see the *UCC 5G SMF Configuration and Administration Guide > IP Address Management* chapter.

Bitrate Mapping across Diameter Interfaces

Feature Summary and Revision History

Summary Data

Table 6: 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 7: Revision History

Revision Details	Release
Introduced support for Bit rate mapping across Diameter Interfaces.	2023.03.0

Feature Description

The SMF receives QoS values for uplink and downlink traffic in bits per seconds (bps) from PCRF.

If an APN-AMBR for uplink and the APN-AMBR for downlink are received from an interface other than the GTPv2 interface, the SMF converts the APN-AMBR for uplink and the APN-AMBR for downlink values in bits per second to kilobits per second. If this conversion results in fractions, then the value of APN-AMBR for uplink and the APN-AMBR for downlink gets rounded upwards.

By default, if the **bitrates** under **profile network-element pcrf** configuration is not configured, the SMF rounds off the bit rate to the CEIL value during conversion.

This feature impacts the following procedures:

- 4G session establishment

- Default bearer update over RAR or CCA-U

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

Change Notification Support Handling

Feature Summary and Revison History

Summary Data

Table 8: 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 9: Revision History

Revision Details	Release
SMF supports the change notification request received with ULI for 4G calls with legacy interfaces.	2023.03.0

Feature Description

SMF supports the change notification requests with ULI for 4G calls with diameter interface.

SMF can process the following request messages only when either Gx or Gy interface is enabled:

- Change Notification with ULI change.
- Change Notification with no change in ULI.

For more information, refer to the *UCC 5G SMF Configuration and Administration Guide > EPS Networking.* chapter.

Destination Host AVP for CCR and Retried Messages

Feature Summary and Revision History

Summary Data

Table 10: 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 11: Revision History

Revision Details	Release
First introduced.	2023.03.0

Feature Description

Based on the end user configuration, SMF supports inclusion of the destination-host Attribute Value Pair (AVP) for the Credit Control Request (CCR) and the retried messages.

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

Diameter Endpoint RFC Compliance for Origin State ID

Feature 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
First introduced.	2023.03.0

Feature Description

SMF provides the Diameter endpoint-originated OSI support for the Credit Control Request (CCR) or Device Watchdog Request (DWR) messages. This support is for the Diameter endpoint RFC compliance for the origin state ID.

You can enable or disable the dynamic OSI value through Ops Center using the **dynamic-origin-state-id** CLI command.

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

Diameter Session Failover Support

Feature Summary and Revision History

Summary Data

Table 14: 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 15: Revision History

Revision Details	Release
Introduced support to include Diameter session failover messages.	2023.03.0

Feature Description

SMF allows Session failover messages to the Diameter endpoint through the following process:

- The SMF processes the CC-Session-Failover AVP received in the CCA-I and CCA-U from OCS.

- The SMF overrides and stores the latest AVP information in the Diameter session on receiving the CC-Session-Failover AVP.

- Based on the configuration and the CC-Session-Failover AVP information, the SMF service sends a session-failover flag indication in the next subsequent request of CCR-U or CCR-T to the Diameter endpoint.

- If the session-failover CLI is enabled and OCS sends the CC-session-failover AVP, SMF retries the request to the secondary server if provisioned under the failure handling template.

- The failover gets overridden by the server in the response message, and it takes precedence over the SMF service indication flag.

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

Disconnect Peer Request Management

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
First introduced.	2023.03.0

Feature Description

The Disconnect Peer Request (DPR) is sent to a peer to inform its intentions to shut down the transport connection. When the peer node sends the DPR to another node, the node validates the DPR for all required AVPs. If the validation isn't successful, the node sends the DPA with the error to the peer node. If the validation is successful, it checks all the configurable AVP parameters to process the request.

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

DNN Profile Optimization

Feature Summary and Revision History

Summary Data

Table 18: 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 19: Revision History

Revision Details	Release
Configuring parent DNN profiles to inherit to child profile(s) is supported.	2023.02.0
First Introduced	2023.01.0

Feature Description

Configuring common attributes multiple times in a different DNN profile is a repetitive activity for the Operators. It becomes time consuming activity as the number of DNN profiles gets increased.

SMF allows you to configure common attributes in a parent DNN profile template and reuse it in other DNN profiles. For example, in child DNN profiles as and when required.

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

Dynamic Configuration

Feature Summary and Revision History

Summary Data

Table 20: Summary Data

Applicable Products or Functional Area	SMF
Applicable Platform(s)	SMI
Feature Default Setting	• Diameter Endpoint: Enabled – Always-on • Multiple and Virtual DNN Support: Disabled – Configuration required • RADIUS Authentication and Accounting: Disabled – Configuration required • Subscriber Charging: Disabled – Configuration required

Related Documentation	Not Applicable

Revision History

Table 21: Revision History

Revision Details	Release
Added the dynamic configuration of APN, ECS, Diameter endpoint, RADIUS endpoint, DNN, and Charging profile in the following chapters: • Multiple and Virtual DNN Support • RADIUS Authentication and Accounting • Diameter Endpoint • Subscriber Charging	2023.03.0

Feature Description

SMF suppports dynamic configuration update of APN, ECS, Diameter endpoint, RADIUS endpoint, DNN, and Charging profiles.

For more information, refer to the UCC 5G SMF Configuration and Administration Guide > Diameter Endpoint, Multiple and Virtual DNN Support, RADIUS Authentication and Accounting, and Subscriber Charging chapters.

Enhancements to clear subscriber Command

Behavior Change Summary and Revision History

Summary Data

Table 22: Summary Data

Applicable Product(s) or Functional Area	SMF cnSGW-C
Applicable Platform(s)	SMI
Default Setting	Not Applicable
Related Changes in this Release	Not Applicable
Related Documentation	*UCC SMF Configuration and Administration Guide* *UCC cnSGW-C Configuration and Administration Guide*

Revision History

Table 23: Revision History

Revision Details	Release
First introduced.	2023.03.0

Behavior Change

Previous Behavior: The SMF Ops center allowed simultaneous triggering of **clear subscriber all** commands to clear all the subscriber sessions.

New Behavior: In a scenario where there are millions of subscriber sessions running in a system, the simultaneous trigger of **clear subscriber all** commands failed to clear all the subscriber sessions. With this release, the SMF Ops center allows you to issue only one **clear subscriber all** command at a time. The Ops center restricts the subsequent **clear subscriber all** and other variants of **clear subscriber** commands until the ongoing **clear subscriber all** command is complete.

Customer Impact: This behavior change improves the usability of the **clear subscriber** command.

EPS Interworking with Diameter Interfaces

Feature Summary and Revision History

Summary Data

Table 24: 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 25: Revision History

Revision Details	Release
Added support for the following SMF Diameter interface call flow procedures for E-UTRAN access types: • Initial Attach • MBR with or without S-GW change • PCRF-intitated RAR • Network-intitated detach from SMF, UPF, PCRF, and RADIUS • UE-intitated detach	2023.03.0
FB Call Continuity Cause Code Expansion	2021.02.2
Added support for: • 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 Converged Core deployment allows signaling from a 4G subscriber. The SMF implements the 3GPP recommendations of interworking Evolved Packet Systems (EPS) and Diameter Interfaces such as Gx for Policy, Gy for OCS, and Gz for offline charging. It also supports authentication and RADIUS accounting for subscribers.

The signaling call flows and Pod level communication over various 3GPP interfaces limit with only E-UTRAN access types.

In this release, the following SMF Diameter interface call flow procedures are described for E-UTRAN access types:

- Initial Attach

- MBR with or without S-GW change

- PCRF-intitated RAR

- Network-intitated detach from SMF, UPF, PCRF, and RADIUS

- UE-intitated detach

For more information, see the UCC 5G SMF Configuration and Administration Guide > EPS Interworking chapter.

ETCD Client Fallback

Feature Summary and Revision History

Summary Data

Table 26: Summary Data

Applicable Products or Functional Area	SMF
Applicable Platforms	SMI
Feature Default Setting	Domain-based User Authorization Using Ops Center
	ETCD Traffic Optimization: Enabled - Always-on
	Roaming Peer Optimization- Disabled – Configuration required to enable
	GTPC IPC Cross-rack Support: Disabled – Configuration required to enable
	Handling PDU Session Modifications based on RRC Inactive Cause Codes: Disabled – Configuration required to enable
Related Documentation	Not Applicable

Revision History

Table 27: Revision History

Revision Details	Release
Added the following support: • ETCD Traffic Optimization • ETCD Client Fallback • Improved liveness check of K8 pods • Diameter service pod in resiliency handling • Roaming Peer Optimization	2023.03.0
First introduced. Added the following support: • Batch ID Allocation, Release, and Reconciliation Support • CDL Flush Interval and Session Expiration Tuning Configuration • Domain-based User Authorization Using Ops Center • Edge Echo Implementation • ETCD Peer Optimization Support • GTPC IPC Cross-rack Support • Handling PDU Session Modifications based on RRC Inactive Cause Codes	2022.04.0

Feature Description

SMF supports the ETCD client, version 3.4.21, which implements the clientv3-grpc1.14 library. This library is backward compatible.

Currently ETCD PUT request doesn't support retries, which results in call failures for transient issues. To avoid this case, after receiving an error for a PUT request, the ETCD client retries this request thrice. The ETCD client completes all the three retries within three seconds, which meet the existing SLA with the applications. The ETCD client performs each retry after an interval of one second. After three retries, the ETCD client returns the outcome to the application.

For more information on this functionality, see the UCC 5G SMF Configuration and Administration Guide > Performance Optimization Support chapter.

ETCD Traffic Optimization

Feature Summary and Revision History

Summary Data

Table 28: Summary Data

Applicable Products or Functional Area	SMF
Applicable Platform(s)	SMI
Feature Default Setting	Not Applicable
Related Documentation	Not Applicable

Revision History

Table 29: Revision History

Revision Details	Release
First introduced.	2023.03.0

Feature Description

The current implementation of the topology data in Extended Distributed Key Value (ETCD) stores both internal and external data with specific prefixes, and the application creates context for all the data and handles all the changes in the ETCD data. This behavior results in lot of traffic towards ETCD from each pod, including some pods that aren't interested in these notifications and records.

To address this issue, this feature allows the pods to opt in/out for these notifications and reloads. The 'restricted notifications' and 'reload' functionalities are optional. With this feature, the notifications are only received for subscribed services and peer data.

Note It's important to retain the current key structure to avoid any impact on the existing functionality of the ETCD, for the production deployment during the upgrade.

ETCD traffic optimization improves the reliability, performance, scalability, and security of distributed systems that rely on ETCD for configuration management and service discovery.

For more information on this functionality, see the UCC 5G SMF Configuration and Administration Guide > Performance Optimization Support chapter.

Extended QoS Support for SMF with Legacy Interfaces

Feature Summary and Revision History

Summary Data

Table 30: Summary Data

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

Revision History

Table 31: Revision History

Revision Details	Release
Added the extended QoS support for SMF with the legacy interfaces.	2023.02.0
The Phase-2 support for 4G-UE and Option-3x feature includes: • DCNR-based UPF selection • Handling Secondary RAT Data Usage Report from S-GW or MME and relaying it to CHF • UE Presence Reporting • Handling GTPV1 messages for 4G to 3G handover • SUPI+IP session and affinity key for 4G and Wi-Fi handover • Avoiding sending of 5G QoS for 4G-only UE • Handling 5GCNRS and 5GCNRI indication flags from S-GW/MME	2021.01.0
First introduced.	2020.03.0

Feature Description

To support option 3x devices and DCNR-enabled 4G devices, the extended QoS support for SMF with legacy interfaces is provided.

When the DCNR-enabled 4G devices connect to the SMF with the legacy interfaces and the Extended-BW-NR feature is negotiated with PCRF, the SMF sends the APN-AMBR values that are greater than 4.2 Gbps towards PCRF in the extended Bit-rates AVP.

For more information, refer to the UCC 5G SMF Configuration and Administration Guide > SMF Capabilities to Support 4G and 5G Devices chapter.

Final Unit Indication Support for Gy Interface

Feature Summary and Revision History

Summary Data

Table 32: 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 33: Revision History

Revision Details	Release
First introduced.	2023.03.0

Feature Description

SMF supports Final Unit Indication (FUI) in Credit Control Answer-Initial (CCA-I)/Credit Control Answer-Update (CCA-U) from the Online Charging System (OCS) to indicate that the given quota is the final quota from the server and the corresponding action as specified in the AVP must be taken.

For more information, see *UCC 5G SMF Configuration and Administration Guide > Subscriber Charging* chapter.

GR Strengthening

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	Enabled - Configuration required to disable
Related Changes in this Release	Not Applicable
Related Documentation	*UCC 5G Session Management Function - Configuration and Administration Guide*

Revision History

Table 35: Revision History

Revision Details	Release
• First introduced. • Updated data replication behavior and **failback-interval**CLI.	2023.03.0

Feature Description

Geo Strengthening in SMF handles multiple failure scenarios, such as hardware failure, network failure, process failure, abnormal conditions, and code walk-throughs by strengthening various areas of the Geo replication pod.

The inter-rack redundancy halts the data replication process when the instance role is not in STANDBY mode. Also, the parameter **failback-interval** is made an optional parameter. Earlier, this parameter was a mandatory parameter and the current release onwards, this parameter is deprecated and will be discontinued from the subsequent releases.

For more information, see the *UCC 5G SMF Configuration and Administration Guide > Redundancy Support* chapter.

GTPP Endpoint

Feature Summary and Revision History

Summary Data

Table 36: 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 37: Revision History

Revision Details	Release
First introduced.	2023.03.0

Feature Description

The GTPP Endpoint is an App-infra-based service that enables the GPRS Tunneling Protocol Prime (GTPP) protocol functionality for the SMF service. The SMF with Legacy Interfaces supports the GTPP Charging (Gz) interface in the GTPP Endpoint.

For offline charging, the Gz is the reference point from a Charging Data Function (CDF) to the CGF for transporting of CDRs.

The GTPP Endpoint provides the following support to the SMF service:

- Handles the usage and event accounting at a Bearer level and the accounting information gets stored as part of the subscriber session.

- Generates CDR content from this accounting information and then transfers to the GTPP Endpoint. The GTPP Endpoint is responsible for encoding the received CDRs into ASN.1 (based on the configured dictionary).

- Sends the received CDRs to the CGF server using the GTPP protocol.

For more information on this feature, see the UCC 5G SMF Configuration and Administration Guide > GTPP Endpoint chapter.

GTPP Resiliency

Feature Summary and Revision History

Summary Data

Table 38: 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 39: Revision History

Revision Details	Release
First introduced.	2023.03.0

Feature Description

The GTPP endpoint supports resiliency through CDR archiving and file storage.

For more information on this feature, see the UCC 5G SMF Configuration and Administration Guide > GTPP Endpoint chapter.

Gx Interface

Feature Summary and Revision History

Summary Data

Table 40: 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 41: Revision History

Revision Details	Release
First introduced.	2023.03.0

Feature Description

The Gx interface is an interface between SMF and Policy and Charging Rules Function (PCRF). It includes the details for all the AVPs supported over the Gx interface. The policy control and charging architecture (PCC) allows operators to perform service-based QoS policy and flow based charging control. The PCC provides access control, resource control, and QoS control. Following supports are added for SMF as a part of Gx interface support:

- Gx initial attach and detach support
- Dynamic and predefined rule support

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

Gx and Gy Dictionaries

Feature Summary and Revision History

Summary Data

Table 42: 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 43: Revision History

Revision Details	Release
First introduced.	2023.03.0

Feature Description

The Diameter endpoint supports the Gx and Gy dictionaries. You can associate a dictionary with a Diameter client through Ops Center using the **dictionary-name** CLI command.

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

Gy Interface

Feature Summary and Revision History

Summary Data

Table 44: 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 45: Revision History

Revision Details	Release
First introduced.	2023.02.0

Feature Description

Gy MSCC Level Failure Result Codes

This feature explains about the SMF behavior when it receives "failure result codes at MSCC level" for Transient Failures (4xxx) and Permanent Failures (5xxx).

Gy Quota Validity Time (QVT) and Quota Holding Time (QHT)

The following capabilities are added to the SMF as a part of this feature:

- The SMF is capable to receive quota validity time from Gy interface in CCA-I and CCA-U messages. After processing, SMF sends this information towards UPF in the following messages: **PFCP_SESSION_ESTABLISHMENT_REQUEST PFCP_SESSION_MODIFICATION_REQUEST** with trigger as "**timqu**".

If **PFCP_SESSION_REPORT_REQUEST** receives usage report with "**timqu**" trigger, the SMF sends the CCRU message with USU time quota information and sets TGPPReportingReason as "**VALIDITY_TIME**".

- The SMF is capable to receive quota holding time from Gy interface in CCA-I and CCA-U messages. After processing SMF sends this information towards UPF in the following messages: **PFCP_SESSION_ESTABLISHMENT_REQUEST PFCP_SESSION_MODIFICATION_REQUEST** with trigger as "**quhti**".

If **PFCP_SESSION_REPORT_REQUEST** receives usage report with "**quhti**" trigger, the SMF sends the CCR-U message with USU time quota information and sets TGPPReportingReason as "**QHT**".

Quota-Validity-Time

This AVP is optional and can be present in a CCA command. It resides within the Multiple-Services-Credit-Control AVP. This field defines the time to restrict the validity of the granted quota for a specific category instance.

Quota-Holding-Time

This AVP is optional and exists exclusively within a CCA command. It resides within the Multiple-Services-Credit-Control AVP. It equally applies to both the granted time quota and the granted volume quota.

Volume-Quota-Threshold

This AVP is optional and occurs exclusively in a CCA command. It is contained within the Multiple-Services-Credit-Control AVP. If cnPGW receives the "3GPP-Volume-Quota-Threshold" in the Gy CCA-I/CCA-U messages, it reads the information from the charging profile configuration and applies it accordingly.

Gy Tariff Time Support

The Tariff switch time functionality applies when a subscriber switches from one tariff plan to another. The Tariff-Time-Change AVP determines the tariff switch time, while the Monitoring-Time IE supports the functionality of the Tariff Time support.

After a tariff timer expiry, the gateway accumulates the usage separately in a charging bucket and continues to consume from the original quota value. At the time of next reporting, (Quota exhausted or another control events) the gateway reports both usages (before and after tariff time change) for the same charging bucket.

For more information on this functionality, see the UCC 5G SMF Configuration and Administration Guide > Interfaces Support chapter.

Gy Failure Handling

Feature Summary and Revision History

Summary Data

Table 46: 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 47: Revision History

Revision Details	Release
Added support for: • Initial attach and detach procedure • Dynamic and predefined rule • N4 Support for Initial attach and detach • Gy usage reporting • Gy failure handling	2023.02.0
Added support for: • N4 interface over IPsec • IPv6 address on all SMF interfaces • User plane integrity protection • Mutual TLS for SBI interface	2022.04.0
Added support for configuration-based control of UDM and PCF messages.	2021.02.3.t3
Added support for N2 cause and diagnostic IEs.	2021.02.3

Revision Details	Release
Added support for: • Cause IE on N11 interface. • NAS messages compliance with invalid protocol data handling. • ProblemDetails JSON object on N11 interface. • Error handling with HTTP error codes. • HTTP/2 TLS support for SBA interface.	2021.02.0
First introduced.	Pre-2020.02.0

Feature Description

SMF supports the Diameter Failure Handling Template, which is associated to different Diameter services. After receiving a command-level failure for a Gy message from OCS, a Diameter endpoint pod handles the failure handling configuration.

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

Gy Usage Reporting

Feature Summary and Revision History

Summary Data

Table 48: 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 49: Revision History

Revision Details	Release
Added the support for Gy usage reporting.	2023.02.0
Added support for: • N4 interface over IPsec • IPv6 address on all SMF interfaces • User plane integrity protection • Mutual TLS for SBI interface	2022.04.0
Added support for configuration-based control of UDM and PCF messages.	2021.02.3.t3
Added support for N2 cause and diagnostic IEs.	2021.02.3
Added support for: • Cause IE on N11 interface. • NAS messages compliance with invalid protocol data handling. • ProblemDetails JSON object on N11 interface. • Error handling with HTTP error codes. • HTTP/2 TLS support for SBA interface.	2021.02.0
First introduced.	Pre-2020.02.0

Feature Description

SMF supports the usage reporting on the Gy interface. P-GW User Plane sends the usage report for various triggers. Otherwise, the SMF sends the query usage report after detecting a charging condition event or the removal of a Usage Reporting Rule (URR) as part of PCC Rule removal at SMF. A usage report is either synchronous or asynchronous.

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

Gz Interface

Feature Summary and Revision History

Summary Data

Table 50: 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 51: Revision History

Revision Details	Release

Added support for:
 	
• Multiple 3GPP specification compliance for SMF interfaces.
 	
• Gz Interfaces and associated features:
 	
    • 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

Revision Details	Release

Added support for:
 	
   • Gx interfaces and their associated features:
 	
      • Gx initial attach and detach
 	
      • Dynamic and predefined rule
 	
   • Gy interfaces and their associated features:
 	
      • Gy usage reporting
 	
      • Gy failure handling
 	
      • Gy MSCC level failure result codes
 	
      • Gy QVT and QHT
 	
      • Gy tarrif time
 	
   • IPv6 on data interfaces
	2023.02.0

Added support for:
 	
   • 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

Added support for configuration-based control of UDM and PCF messages.	2021.02.3.t3
Added support for N2 cause and diagnostic IEs.	2021.02.3

Added support for:
 	
   • 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 supports the GTPP charging (Gz) interface in the GTPP Endpoint to perform following functions:

- Sends Charging Data Records (CDR) to the Charging Gateway Function (CGF) server using GTPP
- Allows multiple CGF Server, priority, GTPP group, server specific configuration parameters
- Allows all GTPP message types except for Redirect Request and Response
- ASN.1 based encoding of CDR
- Buffers CDR records when waiting for ACK from CGF Server
- Retransmission of GTPP messages
- GTPP Redundancy mechanism
- Stores GTPP messages on HDD when all the CGF servers are down

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

PDN Attach and Detach with Gz Interface

Feature Description

The SMF with Legacy Interface supports the Packet Data Network (PDN) attach with Gz interface for a default Bearer to enable offline accounting functions.

How It Works

On receiving offline rules from the PCRF through Gx CCA-I, SMF with the Diameter interface creates offline URRs, maps to the corresponding charging buckets (SDFs), and sends N4EstablishmentRequest toward SMF with the Legacy Interface.

On receiving the Usage report for offline SDF/Bearer level URRs, in the N4 Delete Session Response from UPF, it sends the GTPP Data Record Transfer request toward GTPP. For more information about the Gz Usage Report, see the *Subscriber Charging > Gz Usage Report Handling with GTPP* section.

Use the PDN attach and detach with Gz inteface functionality to:

- Attach Procedure with:
    - offline rules only (Gx+Gz)
    - offline and online rules (Gx+Gy+Gz)

- Detach Procedure with:
    - offline rules only (Gx+Gz)
    - offline and online rules (Gx+Gy+Gz)

Gz Usage Reporting

Feature Description

At the time of a converged User Plane function, the P-GW (User Plane) sends the Usage report for triggers such as Volume or Time threshold value for offline charging. During the converged Control Plane function, the P-GW (Control Plane) queries a Usage report when the Charging condition event is detected or URR is removed as part of the Policy Control and Charging (PCC) rule removal at SMF.

After receiving the Usage report, the Control Plane maps URRs to the corresponding offline charging parameter. If the offline charging parameter is not available, then a Service Data Flow (SDF) or Bearer level charging parameter is created for static or predefined rules, and the GTPP Data Record Transfer request is initiated for the respective SDFs. Thus, a Synchronous usage report is received through the N4 Modification Response or N4 Deletion Response message. Asynchronous usage report is received through the N4 Session report request message.

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

Handling CDL Failure Responses

Feature Summary and Revision History

Summary Data

Table 52: 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 53: Revision History

Revision Details	Release
Added the failure handling support.	2023.03.0
Added the procedures for configuration and verification of the event trace data in the CDL database record.	2021.02.0
First introduced.	Pre-2020.02.0

Feature Description

In case of specific errors or failures from CDL to SMF, the retry mechanism is used for the Create, Find, and Delete requests as well along with the earlier supported Update requests.

For more information on this feature, see the UCC 5G SMF Configuration and Administration Guide > Cisco Common Data Layer chapter.

Identification of Corrupted IP Chunks

Feature Summary and Revision History

Summary Data

Table 54: 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

Revision History

Revision Details	Release
First introduced.	2023.03.0

Feature Description

SMF supports identification of corrupted IP chunks by auditing the configured IP pools and their data in cache-pod and IPAM internal states.

For more information on this functionality, see the *UCC 5G SMF Configuration and Administration Guide > IP Address Management* chapter.

Indirect Communication for NFs through SCP Model D

Feature Summary and Revision History

Summary Data

Table 55: 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 56: Revision History

Revision Details	Release

Added support for:
 	
• Multiple 3GPP specification compliance for SMF interfaces.
 	
• Gz Interfaces and associated features:
 	
    • 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

Revision Details	Release

Added support for:
 	
   • Gx interfaces and their associated features:
 	
      • Gx initial attach and detach
 	
      • Dynamic and predefined rule
 	
   • Gy interfaces and their associated features:
 	
      • Gy usage reporting
 	
      • Gy failure handling
 	
      • Gy MSCC level failure result codes
 	
      • Gy QVT and QHT
 	
      • Gy tarrif time
 	
   • IPv6 on data interfaces
	2023.02.0

Added support for:
 	
   • 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

Added support for configuration-based control of UDM and PCF messages.	2021.02.3.t3
Added support for N2 cause and diagnostic IEs.	2021.02.3

Added support for:
 	
   • 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 supports Service Communication Proxy (SCP) Model D to perform indirect communication for network functions (NFs). By default, SMF performs the NRF discovery to select the NF peer, such as PCF, CHF, and AMF. If the NRF discovery fails and if the local configuration is available for the peer, SMF selects the local configured peer.

For more information on this feature, see the UCC 5G SMF Configuration and Administration Guide > Interfaces Support chapter.

Inter Site Redundancy

Feature Summary and Revision History

Summary Data

Table 57: Summary Data

Applicable Products or Functional Area	SMF
Applicable Platform(s)	SMI
Feature Default Setting	Disabled – Configuration required to enable
Related Documentation	Not Applicable

Revision History

Table 58: Revision History

Revision Details	Release
First introduced.	2023.03.0

Feature Description

Mobile operators set up redundant data centers in different geographical locations, so that if one data center goes down, the other can take over. This feature allows to extend the existing inter-rack solution to the inter-site solution. Inter-site and inter-rack solution cannot co-exist together, so customer need to select any one of the solutions. The current HA notation inside a rack continues to work in conjunction with Inter-Site Redundancy to provide a more comprehensive high availability solution.

For more information on this functionality, see the UCC 5G SMF Configuration and Administration Guide > Redundancy Support chapter.

IP Chunk Auto-Throttle and ToD Chunk Clearance

Feature Summary and Revision History

Summary Data

Table 59: 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 60: Revision History

Revision Details	Release
First introduced.	2023.03.0

Feature Description

SMF supports Auto-Throttling of IP chunks to utilize the IP pools and manage the IP address chunk allocation across multiple UPFs. This feature balances the load across UPFs by allowing the SMF to throttle additional or new IP address chunk when a particular UPF has reached its maximum session capacity as per the bandwidth/sizing requirement. This feature is enabled using the CLI **max-upf-sessions**.

For more details, see the *UCC 5G SMF Configuration and Administration Guide > IP Address Management* chapter.

IPv6 Data Interface Support

Feature Summary and Revision History

Summary Data

Table 61: 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 62: Revision History

Revision Details	Release

Added support for:
 	
  • Gx interfaces and their associated features:
 	
    • Gx initial attach and detach
 	
    • Dynamic and predefined rule
 	
  • Gy interfaces and their associated features:
 	
    • Gy usage reporting
 	
    • Gy failure handling
 	
    • Gy MSCC level failure result codes
 	
    • Gy QVT and QHT
 	
    • Gy tarrif time
 	
  • Multiple 3GPP specification compliance for SMF interfaces
 	
  • For 4G calls with legacy interfaces, peer SGW IPv4, IPv6, or IPv4v6 data address is supported
	2023.02.0

Added support for:
 	
  • 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

Added support for configuration-based control of UDM and PCF messages.	2021.02.3.t3

Revision Details	Release
Added support for N2 cause and diagnostic IEs.	2021.02.3
Added support for: • 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

With this release, for 4G calls with legacy interfaces, peer SGW IPv4, IPv6, or IPv4v6 data address is supported.

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

Metrics for Diameter Endpoint

Feature Summary and Revision History

Summary Data

Table 63: 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 64: Revision History

Revision Details	Release
First introduced.	2023.03.0

Feature Description

In SMF, the following new statistics are added at application level to support the Diameter endpoint with legacy interfaces.

- diameter_request_message_total

- diameter_response_message_total

- diameter_response_message_seconds_total

- diam_base_msg_total

- diam_base_msg_seconds_total

- diameter_decode_message_total

- diameter_pod_status

- dispatch_error_total

- dispatch_error_seconds_total

- policy_engine_message_total

- policy_engine_message_seconds_total

- diameter_route_status

- diameter_routes_total

- diameter_route_hits_total

- diameter_route_expires_total

- diameter_route_misses_total

For more information, refer to the *UCC 5G SMF Metrics Reference Guide*

Multiple 3GPP Compliance Versions Support on SMF

Feature Summary and Revision History

Summary Data

Table 65: 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 66: Revision History

Revision Details	Release
Introduced a new CLI to configure multiple 3GPP compliance version support.	2023.03.0

Feature Description

The SMF supports configuring maximum two 3GPP compliance versions 15.x (December 2018 and June 2019) for the interfaces N1, N2, N7, N10, N11, N40, and Nnrf using a new CLI **version-list version**. It allows configuring the same set of specifications as the existing CLI **version**.

For more information, see the *UCC 5G SMF Configuration and Administration Guide > Interfaces Support* chapter.

N16 SMF and SEPP Failure Handling

Feature Summary and Revison 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 67: Revision History

Revision Details	Release
First introduced.	2023.03.0

Feature Description

SMF supports the N16 SMF with SEPP for failure handling in the roaming funtionality. The client SMF detects the originator of the failure response based on the 3GPP Header "Server" or "Via" message received in the HTTP response.

A new label **failed_nf_type** indicates the origin of the N16 SMF and SEPP failure response.

For more information on this functionality, see the UCC 5G SMF Configuration and Administration Guide > Roaming Support chapter.

Panic Recovery for Diameter Endpoint

Feature Summary and Revison History

Summary Data

Table 68: Summary Data

Applicable Products or Functional Area	SMF
Applicable Platforms	SMI
Feature Default Setting	Domain-based User Authorization Using Ops Center
	ETCD Traffic Optimization: Enabled - Always-on
	Roaming Peer Optimization- Disabled – Configuration required to enable
	GTPC IPC Cross-rack Support: Disabled – Configuration required to enable
	Handling PDU Session Modifications based on RRC Inactive Cause Codes: Disabled – Configuration required to enable

Related Documentation	Not Applicable

Revision History

Table 69: Revision History

Revision Details	Release
Introduced a panic recovery framework to support Diameter Enpoint.	2023.03.0

Feature Description

SMF extends the existing panic recovery framework to the Diameter Endpoint service pod. When a fault is observed in the Diameter Endpoint service pod, SMF initiates graceful reload of the pod.

For more information on this functionality, see the UCC 5G SMF Configuration and Administration Guide > Performance Optimization Support chapter.

Peer Management in Diameter Endpoint

Feature Summary and Revision History

Summary Data

Table 70: 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 71: Revision History

Revision Details	Release
Added peer management support for routing in the Diameter Endpoint.	2023.03.0

Feature Description

The SMF supports peer management in routing. It allows to choose an appropriate peer for a transaction to occur with multiple Diameter Routing Agents in the Diameter Endpoint.

As a part of this feature, the peer management explains the following process:

- Route Flags
- Route Status
- Route Selection Process
- Route Search Order

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

Pending Traffic Treatment over Diameter Interfaces

Feature Summary and Revision History

Summary Data

Table 72: 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 73: Revision History

Revision Details	Release
Introduced support for Pending traffic treatment over Gy interface.	2023.02.0

Feature Description

The SMF implements the 3GPP recommendations for interworking of Evolved Packet System (EPS) and Diameter Interfaces such as Gy for OCS for prepaid subscribers, where it supports pending traffic management during the quota refresh procedure.

Pending Traffic Treatment (PTT) allows pass or drop treatment of traffic that flows at the User Plane Function (UPF) while waiting for Quota Information from P-GW. The traffic is treated based on the following supported configurations under the credit-control group in the Active Charging Service in UPF:

- pending-traffic-treatment noquota pass

- pending-traffic-treatment noquota drop

- pending-traffic-treatment noquota limited-pass volume < in bytes, ranging from 1 to 4294967295>

- pending-traffic-treatment quota-exhausted pass

- pending-traffic-treatment quota-exhausted drop

Note To enable pending traffic treatment over Diameter interfaces no configuration is required under SMF.

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

Pod Failure Detection using K8 Liveness Probe

Feature Summary and Revision History

Summary Data

Table 74: Summary Data

Applicable Products or Functional Area	SMF
Applicable Platforms	SMI
Feature Default Setting	Domain-based User Authorization Using Ops Center
	ETCD Traffic Optimization: Enabled - Always-on
	Roaming Peer Optimization- Disabled – Configuration required to enable
	GTPC IPC Cross-rack Support: Disabled – Configuration required to enable
	Handling PDU Session Modifications based on RRC Inactive Cause Codes: Disabled – Configuration required to enable
Related Documentation	Not Applicable

Revision History

Table 75: Revision History

Revision Details	Release
Added the following support: • ETCD Traffic Optimization • ETCD Client Fallback • Improved liveness check of K8 pods • Diameter service pod in resiliency handling • Roaming Peer Optimization	2023.03.0
First introduced. Added the following support: • Batch ID Allocation, Release, and Reconciliation Support • CDL Flush Interval and Session Expiration Tuning Configuration • Domain-based User Authorization Using Ops Center • Edge Echo Implementation • ETCD Peer Optimization Support • GTPC IPC Cross-rack Support • Handling PDU Session Modifications based on RRC Inactive Cause Codes	2022.04.0

Feature Description

Kubernetes uses Liveness probe to periodically monitor the health of all pods. With this mechanism, it is easy to detect the pod failures. The K8 configuration parameter values for Liveness probe are adjusted to enable faster detection of pod failures and timely restart of faulty pods.

The early detection of pod failures by K8 enables backup or standby pod to take over message processing and achieve seamless communication.

For more information on this functionality, see the UCC 5G SMF Configuration and Administration Guide > Performance Optimization Support chapter.

Presence of 3gpp-sbi-discovery-service-names IE in SCP

Behavior Change Summary and Revision History

Summary Data

Table 76: 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 77: Revision History

Revision Details	Release
The 3gpp-sbi-discovery-service-names IE is not supported in SCP.	2023.03.0

Behavior Change

Previous Behavior: 3GPP standard TS 29.500 mandates SMF to send **3gpp-sbi-discovery-service-names** attribute in the message sent towards SCP.

New Behavior: With this release, the mandatory attribute **3gpp-sbi-discovery-service-names** is no longer sent in SCP as there is no support for this attribute at SCP.

RADIUS Features

Feature Summary and Revision History

Summary Data

Table 78: 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 79: Revision History

Revision Details	Release
First introduced.	2023.03.0

Allow Authentication

Feature Description

If allow-auth is enabled in the RADIUS profile configuration, it allows the ongoing call to continue irrespective of authentication being successful, timed out, or any error message received. The default value is false, configuration is required to enable the allow-auth.

For more information on this functionality, see the UCC 5G SMF Configuration and Administration Guide > RADIUS Authentication and Accounting chapter.

Consecutive Failures

Feature Description

This feature allows you to configure the number of consecutive timeouts that must occur on the server before the RADIUS server is marked as dead. Whether a request is a retry request or a regular request, the failure count is incremental when the server returns a timeout response or an error response. When a server's failure count reaches the threshold for consecutive failures, the server is declared as the dead server.

For more information on this functionality, see the UCC 5G SMF Configuration and Administration Guide > RADIUS Authentication and Accounting chapter.

Max Transmissions

Feature Description

This feature allows you to configure the transmission parameters for all the available servers. This feature helps to cross-check if the number of transmissions exceeds the number of retries once the retry cycle for a request is finished, and if so, it begins the subsequent retry cycle on a different server if one is available. If no server is available or if max transimissions limit is reached, then the server timeout response is sent.

For more information on this functionality, see the UCC 5G SMF Configuration and Administration Guide > RADIUS Authentication and Accounting chapter.

RADIUS Accounting and Authorization Attributes and 3GPP Dictionary

Feature Description

This feature supports the additional authorization and accounting attributes for RADIUS. 3GPP dictionary support is also available now along with the ISE dictionary support for the RADIUS authentication and accounting attributes.

For more information on this functionality, see the UCC 5G SMF Configuration and Administration Guide > RADIUS Authentication and Accounting chapter.

RAT Type Update in Show Subscriber Command for 4G Calls

Behavior Change Summary and Revision History

Summary Data

Table 80: 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 81: Revision History

Revision Details	Release
Added the following support: • 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

Revision Details	Release
Added support for: • 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
Added support for: • 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

Behavior Change

Previous Behavior: In a 4G call, the RAT type in the **show subscriber** CLI command output appeared as "EUTRAN".

New Behavior: In a 4G call, the RAT type in the **show subscriber** CLI command output appeared as "EUTRA".

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

Reconciliation of IP Chunks between SMF and UPF

Feature Summary and Revision Histoy

Summary Data

Table 82: 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

Revision History

Revision Details	Release
First introduced.	2023.03.0

Feature Description

SMF supports reconciliation of the IP chunks that is caused due to a mismatch between the list of DP chunks allocated at SMF and UPF using a CLI.

For more information, see the *UCC 5G SMF Configuration and Administration Guide > IP Address Management* chapter.

Roaming Support Enhancements

Feature Summary and Revision History

Summary Data

Table 83: 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 84: Revision History

Revision Details	Release
SMF supports the following Roaming functionalities: • N3 and N9 Separation for Homer and Roamer calls • Support for Allowed PLMN list and Requester PLMN list through CLI configuration • Roaming status on N4 messages • Support for SEPP/N16 SMF failure handling and Alternate hSMF	2023.03.0
Introduced support for the following non-Wi-Fi handover procedures in a roaming scenario: • EPS to 5G Handover Using N26 Interface • EPS to 5G Idle Mode Mobility Using N26 Interface	2021.02.2
First introduced	2021.02.0

Feature Description

In this release, SMF supports the following additional roaming functionalities:

- N3 and N9 User Plane separation – For keeping an N3 and N9 network separately on the SMF or UPF that handles both non-roaming subscribers and home routed subscribers, UPF doesn't have any way to know if the UE is an outbound roamer or a homer. So SMF passes interface-type information to UPF to let UPF know what interface to use for a subscriber.

- Allowed PLMN list – SMF supports registration of Network Repository Function (NRF) with the Allowed PLMN list. Either non-roaming SMF can register with list of home serving PLMNs or HSMF can register with partner serving PLMNs.

- Roaming Status on the N4 Interface – A proprietary IE parameter is added in N4 messages to allow the UPF to know about the roaming status.

- SEPP or N16 SMF failure handling and Alternate hSMF – SMF supports failure handling configuration for N16 SMF and Security Edge Protection Proxy (SEPP).

- Inter-PLMN Roaming Mobility – SMF supports Inter-PLMN Roaming Mobility with the following functionalities:

  - Handovers from H-PLMN to V-PMLN and vice versa.

  - Enabling and disabling of Inter-PLM handover functionalities through a CLI.

  - Advertises Deployments Topologies with specific SMF Service Areas (DTSSA) in supported features on N11 and N16 interfaces.

  - Creates Secondary PDRs for secondary RATs for homer calls for efficient inter-rat handoffs.

During Inter-PLMN mobility, vSMF:

- Selects operator policy based on the configured subscriber policy.

- Selects V-UPF and V-CHF based on the configuration.

- Uses Roaming status configured under the Operator policy to override the HRT roaming request to treat the UE as Local Breakout (LBO).

For more information, refer to the *UCC 5G SMF Configuration and Administration Guide > Roaming Support* chapter.

Roaming Peer Optimization

Feature Summary and Revision History

Summary Data

Table 85: Summary Data

Applicable Products or Functional Area	SMF
Applicable Platforms	SMI
Feature Default Setting	Disabled – Configuration required to enable.
Related Documentation	Not Applicable

Revision History

Table 86: Revision History

Revision Details	Release
First introduced.	2023.03.0

Feature Description

SMF supports the configuration of S8 VIP under endpoint. SMF detects a peer SGW as ROAMING SGW if a Create Session Request/Modify Bearer Request/Echo Request from the peer lands on S8 VIP.

For more information on this functionality, see the *UCC 5G SMF Configuration and Administration Guide > Performance Optimization Support*

Rolling Software Update Enhancement

Feature Summary and Revision History

Summary Data

Table 87: 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 Diameter Gx, Gy and Gz (GTP-Prime)	2023.03.0
First introduced.	Pre-2020.02.0

Feature Description

Rolling software upgrade is a process of upgrading or migrating the build from an older to a newer version or upgrading the patch for the prescribed deployment set of application pods.

For more details, refer to the *UCC 5G SMF Configuration and Administration Guide > SMF Rolling Software Update* chapter.

Route Aggregation to Handle Switch Limit

Feature Summary and Revision History

Summary Data

Table 88: 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

Revision History

Revision Details	Release
First introduced.	2023.03.0

Feature Description

SMF supports defining smaller IP chunks to optimize the routes and efficiently manage the IP chunks. SMF allocates continuous IP chunks to UPF and publishes a single or aggregated route records as per the subnet of the continuous chunk. This feature facilitates two major benefits:

- Better IP utilization with lesser chunk size.

- Chunk within a chunk group can be utilized by different node manager instances.

For more information, see the *UCC 5G SMF Configuration and Administration Guide > IP Address Management* chapter.

Rulebase-driven Subscriber Information

Feature Summary and Revision History

Summary Data

Table 89: Summary Data

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

Revision history

Table 90: Revision History

Revision Details	Release
First introduced.	2023.02.0

Feature Description

This release introduces new filter "rulebase" in the show subscriber and clear subscriber commands.

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

Session Count Support per Slice and NSSAI

Behavior Change Summary and Revision History

Summary Data

Table 91: 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 92: Revision History

Revision Details	Release
Added the following support: • 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: • 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
Added support for the following enhancements: • 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: Earlier there is no way to determine the number of session per slice through the **show subscriber** CLI or metrics.

New Behavior: New keyword **nssai** is added to the **show subscriber count** CLI command. With this new behavior,the number of sessions per slice can be determined.

Impact on Customer: Improves debuggability and serviceability.

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

Session Idle Timers

Feature Summary and Revision History

Summary Data

Table 93: 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	*UCC 5G SMF Configuration and Administration Guide*

Revision History

Table 94: Revision History

Revision Details	Release
Added support for session idle timers.	2023.03.0
Added support for session setup timer and back-off timer.	2021.02.0
First introduced.	2020.02.0

Feature Description

The SMF supports non-3GPP session timers for each PDU session. The following is a list of non-3GPP session timers:

- Absolute Timer
- Control Plane and User Plane Idle Timer
- User Plane Inactivity Timer
- Session Setup Timer

✎

Note   The session idle timer feature is also applicable to 4G calls with Diameter interfaces.

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

Suppress Locality Information in NRF Messages

Behavior Change Summary and Revision History

Summary Data

Table 95: 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 96: Revision History

Revision Details	Release
First introduced.	2023.03.0

Behavior Change

Previous Behavior: SMF used to always send the "locality" attribute in the NRF registration and update messages in the **skip optional-ies locality** configuration.

New Behavior: By default, SMF does not send the "locality" attribute to NRF.

☞

Important	The **skip optional-ies locality** CLI configuration is currently ineffective and will require backend changes in the future releases. This CLI must be enabled to facilitate seamless rolling upgrade to future releases when this CLI backend support is fully available.

For more information, refer to the UCC 5G SMF Configuration and Administration Guide > Interfaces Support and NF Discovery and Management chapters.

Traffic Monitoring on L2 VIP for Active Instance

Feature Summary and Revision History

Summary Data

Table 97: Summary Data

Applicable Product or Functional Area	SMF
Applicable Platform	SMI
Feature Default Setting	Disabled - Configuration required to enable.
Related Documentation	Not Applicable

Revision History

Table 98: Revision History

Revision Details	Release
First introduced.	2023.03.0

Feature Description

SMF Supports identification of IPC connectivity issue on the protocol node having an active VIP for a specified time duration using a CLI.

For more information, see *UCC 5G SMF Configuration and Administration Guide > Redundancy Support* chapter.

UPF Monitor Subscriber from SMF

Feature Summary and Revision History

Summary Data

Table 99: 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 100: Revision History

Revision Details	Release
Added support for enabling UPF Monitor Subscriber from SMF.	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
Added support for the following enhancements: • 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***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***psid** *psid_value* **summary** command to show detailed information about subscriber sessions for roaming-specific use case as hSMF and vSMF.	2021.02.2
Added support for the following enhancements: • The **show subscriber supi** *supi_value* **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

Feature Description

SMF sends the tracing trigger to the selected UPF automatically. Sending the trigger from SMF facilitates in parsing minimum files for troubleshooting across Control Plane and User Plane.

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

Virtual DNN Support

Feature Summary and Revision History

Summary Data

Table 101: Summary Data

Applicable Products or Functional Area	SMF
Applicable Platform(s)	SMI
Feature Default Setting	Disabled – Configuration Required
Related Documentation	Not Applicable

Revision History

Table 102: Revision History

Revision Details	Release
Added the CLI for overide command	2023.03.0
Added support for IP pool allocation per slice and DNN.	2022.04.0
Added support for: • Charging Characteristics lookup parameter in the subscriber policy configuration. • Extension in Charging Characteristics ID range values.	2021.02.3.t3
Added support for IPv6 interface ID generation based 2021.01.1 on SBI VIP address and CommonId of the subscriber.	2021.01.1
SMF supports the maximum limit of 2048 for the following configurations: • Precedence • Operator policy • DNN policy • DNN profile	2021.01.0
SMF supports case insensitive DNN configuration	2020.02.5.t1
First introduced.	Pre-2020.02.0

Feature Description

The SMF has the capability to override the access DNN with the vDNN received from the RADIUS server. The RADIUS server sends vDNN to SMF in access accept and SMF includes this DNN in N4 messages to UPF. A new configuration is added on the SMF to decide whether to override the DNN sent on specific interfaces with the value received from RADIUS server.

For more information on this functionality, see the UCC 5G SMF Configuration and Administration Guide > Multiple DNN and Virtual DNN Support chapter.