UCC 5G SMF - Release Change Reference

Features and Changes Quick Reference

Features / Behavior Changes	Release Introduced / Modified
APN-AMBR Configuration Support, on page 8	2021.02.0
Back-off Timer Support, on page 10	2021.02.0

Features / Behavior Changes	Release Introduced / Modified
Bit Rate Mapping Support, on page 11	2021.02.0
Cause IE Support on N11 Interface, on page 12	2021.02.0
Changes to the ULI Data Format—CSCvx66959, on page 13	2021.02.0
CHF Trigger-based CDR Generation for 4G Sessions—CSCvy17526, on page 14	2021.02.0
clear subscriber and show subscriber Command Enhancement, on page 15	2021.02.0
Configure DNS Timeout Range—CSCvx74277, on page 17	2021.02.1
Configure Purge Interval Range—CSCvx74279, on page 18	2021.02.0
Configure Range Values for ICMPv6 Configuration Parameters—CSCvx74188, on page 19	2021.02.1
Configure Response Timeout Range—CSCvx74235, on page 20	2021.02.0
Control Event Trace Data—CSCvx81816	2021.02.0
DNS Test Query Support, on page 22	2021.02.0
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Dynamic Routing by Using BGP, on page 24	2021.02.1
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Enhanced IP Address Quarantine Timer—CSCvx88334, on page 26	2021.02.0
Error Handling with HTTP Error Codes, on page 27	2021.02.0
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GTP Cause Code Handling, on page 29	2021.02.0
GTPC Load and Overload Control, on page 30	2021.02.0
GTPC Path Failure Detection Enhancements and Debugging Improvements, on page 32	2021.02.0
GTPC Peer Restart Detection Support Improvements, on page 33	2021.02.0
GTPv2 IE and Cause Codes, on page 35	2021.02.0

Features / Behavior Changes	Release Introduced / Modified
Guard Timer-based Handling of Dedicated Bearer Procedures—CSCvv64995, on page 36	2021.02.0
Handling Absent Bearers—CSCvx90742, on page 37	2021.02.0
Handling Calls with Static IP Address, on page 38	2021.02.0
Handling Requests with Handover Indication, on page 39	2021.02.0
Handling SLA Timer-based Dedicated Bearer Procedure Failures, on page 40	2021.02.0
Handover Support in Home Routed Roaming, on page 42	2021.02.0
IE Support for GTPC Messages, on page 42	2021.02.0
Instance-aware Configuration Changes, on page 48	2021.02.0
Instance-aware RADIUS Configuration, on page 51	2021.02.0
IP Address Validation with CDL Configuration—CSCvx83539, on page 44	2021.02.0
Kubernetes Version Upgrade	2021.02.2.t1.0
IPv6 Interface ID Generation—CSCvw93433, on page 46	2021.01.1 2021.02.0
LI Event Generation For 4G Procedure Failures, on page 55	2021.02.0
Location-based UPF Selection, on page 55	2021.02.0
Mesh Connectivity to all UPFs, on page 58	2021.02.1
MTU Support in PCO	2021.02.0
NAS Messages Compliance with Invalid Protocol Data Handling, on page 61	2021.02.0
New Container Identifier Support, on page 62	2021.02.0
New Radio Dual Connectivity, on page 64	2021.02.2
New RADIUS Accounting Trigger for TFT Change, on page 65	2021.02.0
Non-standard QCI Support for Dynamic PCC and Session Rules, on page 67	2021.02.2
NPLI Support for VoLTE and VoNR, on page 68	2021.02.0

Features / Behavior Changes	Release Introduced / Modified
NRF Failure Handling for Profiles	2021.02.0
Optimized UPF Selection, on page 70	2021.02.0
ProblemDetails JSON Object Support on N11 Interface, on page 72	2021.02.0
Query Interface IE Support—CSCvx69260, on page 73	2021.02.0
Reconciliation of Billing Records, on page 74	2021.02.0
Reporting of Deferred Usage with Quota Request—CSCvy31552, on page 75	2021.02.0
Restoration of Old Deployment CLI for Grafana Dashboard—CSCvx73885	2021.01.1 2021.02.0
Session-level URR Limitation, on page 77	2021.01.1 2021.02.0
Session Setup Timer Support, on page 78	2021.02.0
Show Subscriber Output Change for ARP—CSCvy54440, on page 79	2021.02.2
show subscriber supi Command Support, on page 80	2021.02.0
SMF Service Node and Replica Configuration—CSCvx45374, on page 83	2021.02.0
smf-service Restart—CSCvy02596	2021.02.0
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UPF Interaction while Deleting WPS Dynamic Rule—CSCvx68018, on page 87	2021.02.0
User Location Information Reporting Enhancement, on page 88	2021.02.0

Feature Defaults Quick Reference

The following table indicates what features are enabled or disabled by default.

Feature	Default
APN-AMBR Configuration Support	Disabled – Configuration Required

Feature	Default
Back-off Timer Support	Disabled – Configuration Required
Bit Rate Mapping Support	Disabled – Configuration Required
Cause IE Support on N11 Interface	Enabled – Always-on
Changes to the ULI Data Format—CSCvx66959	Enabled – Always-on
CHF Trigger-based CDR Generation for 4G Sessions—CSCvy17526	Enabled – Always-on
clear subscriber and show subscriber Command Enhancement	Disabled – Configuration Required
Configure DNS Timeout Range—CSCvx74277	Disabled – Configuration Required
Configure Purge Interval Range—CSCvx74279	Disabled – Configuration Required
Configure Range Values for ICMPv6 Configuration Parameters—CSCvx74188	Disabled – Configuration Required
Configure Response Timeout Range—CSCvx74235	Disabled – Configuration Required
Control Event Trace Data—CSCvx81816	Enabled – Always-on
DNS Test Query Support	Enabled – Always-on
Download Oam-pod Files from the Web Browser	Enabled – Always-on
Dynamic Routing by Using BGP	Enabled – Always-on
EDR Generation for PDU Session Modification	Disabled - Configuration Required
Enhanced IP Address Quarantine Timer—CSCvx88334	Disabled – Configuration Required
Error Handling with HTTP Error Codes	Enabled – Always-on
Event-level EDR Generation	Disabled – Configuration Required
GTP Cause Code Handling	Disabled – Configuration Required
GTPC Load and Overload Control	Disabled – Configuration Required
GTPC Path Failure Detection Enhancements and Debugging Improvements	Enabled – Always-on
GTPC Peer Restart Detection Support Improvements	Enabled – Always-on
GTPv2 IE and Cause Codes	Enabled – Always-on
Guard Timer-based Handling of Dedicated Bearer Procedures—CSCvv64995	Disabled – Configuration Required

Feature	Default
Handling Absent Bearers—CSCvx90742	Enabled – Always-on
Handling Calls with Static IP Address	Disabled – Configuration Required
Handling Requests with Handover Indication	Disabled – Configuration Required
Handling SLA Timer-based Dedicated Bearer Procedure Failures	Disabled – Configuration Required
IE Support for GTPC Messages	Enabled – Always-on
Instance-aware Configuration Changes	Enabled – Always-on
Instance-aware RADIUS Configuration	Enabled – Always-on
IP Address Validation with CDL Configuration—CSCvx83539	Enabled – Always-on
IPv6 Interface ID Generation—CSCvw93433	Disabled – Configuration Required
Kubernetes Version Upgrade	Not Applicable
LI Event Generation for 4G Procedure Failures	Enabled – Always-on
Location-based UPF Selection	Disabled – Configuration Required
MBR Short Circuit Optimization	Enabled – Always-on
MTU Support in PCO	Enabled – Always-on
NAS Messages Compliance with Invalid Protocol DataHandling	Enabled – Always-on
New Container Identifier Support	Enabled – Always-on
New Procedure Types for vSMF and hSMF Instances	Enabled – Always-on
New Radio Dual Connectivity	Enabled – Always-on
New RADIUS Accounting Trigger for TFT Change	Disabled – Configuration Required
Non-standard QCI Support for Dynamic PCC and Session Rules	Disabled – Configuration Required
NPLI Support for VoLTE and VoNR	Enabled – Always-on
NRF Failure Handling for Profiles	Enabled – Always-on
Optimized UPF Selection	Disabled – Configuration Required
ProblemDetails JSON Object Support on N11 Interface	Enabled – Always-on
Query Interface IE Support—CSCvx69260	Enabled – Always-on

Feature	Default
Reconciliation of Billing Records	Enabled – Always-on
Reporting of Deferred Usage with Quota Request—CSCvy31552	Enabled – Always-on
Restoration of Old Deployment CLI for Grafana Dashboard—CSCvx73885	Disabled – Configuration Required
Session-level URR Limitation	Disabled – Configuration Required
Session Setup Timer Support	Disabled – Configuration Required
Show Subscriber Output Change for ARP—CSCvy54440	Disabled – Configuration Required
show subscriber supi Command Support	Disabled – Configuration Required
SMF Application Metrics Configuration—CSCvz58341	Disabled – Configuration Required
SMF Interworking with ISE	Disabled – Configuration Required
SMF Service Node and Replica Configuration—CSCvx45374	Disabled – Configuration Required
smf-service Restart—CSCvy02596	Enabled – Always-on
Subscriber IMEI Support	Disabled – Configuration Required
Update on SMF Rolling Upgrade	Not applicable
UPF Interaction while Deleting WPS Dynamic Rule—CSCvx68018	Enabled – Always-on
User Location Information (ULI) Reporting Enhancement	Enabled – Always-on

APN-AMBR Configuration 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
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 SMF provides support to configure the APN-AMBR action for GTPC messages.

As per 3GPP TS 29.274, the SMF sends APN-AMBR in Create Session Response if it is not received in Create Session Request or if the value has changed as part of PCF negotiation. The new CLI command **gtpc message-handling create-session-response action apn-ambr** added under access profile overrides this behavior.

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

Back-off Timer Support

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

Revision History

Table 4: Revision History

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

Feature Description

The SMF uses back-off timer as a mechanism to delay the broadcast of access requests from peer NFs. The SMF provides configuration support for back-off timer.

The SMF sends the configured back-off timer value to AMF during the N4 path failure and the exhaustion of IP addresses. The SMF or PGW-C sends the back-off timer value to S-GW during the exhaustion of IP addresses.

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

Bit Rate Mapping Support

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
Related Changes in this Release	Not Applicable
Related Documentation	Not Applicable

Revision History

Table 6: Revision History

Revision Details	Release
Introduced support for non-standard QCI for dynamic PCC and session rules	2021.02.2
Introduced support for the following features: • Bit rate mapping • UPF Selection based on Slice and Location • UP Optimization	2021.02.0
Introduced support for the following: • 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

Revision Details	Release
Introduced support for the following: • 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

The SMF receives Access Point Name Aggregate Maximum Bit Rate (APN-AMBR) for uplink and downlink traffic in bits per seconds (bps) from PCF.

If an interface other than the GTPv2 interface sends APN-AMBR, the SMF converts the received value to kilobits per seconds (kbps). This conversion results in truncation of fractional value to the nearest integer (floor value).

To minimize the bandwidth loss, a new CLI command **bitrates rounded-up** is introduced to control the rounding off of the fractional QoS value to ceiling value or floor value. This behavior is in compliance with the 3GPP TS 29.274, version 12. If the CLI command is enabled within **profile network-element pcf** configuration, the SMF sends the ceiling value over N1, N4, S5, or S8 interface.

By default, the SMF rounds off the bit rate to the floor value during conversion.

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

Cause IE Support on N11 Interface

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:
 	
    • 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 cause IE on N11 interface messages. With this feature:

• SMF supports sending and handling the received causes, which are available in Cause IE. For this support, SMF complies with the 3GPP TS 29 502 V15.4.0.0, section 6.1.6.3.8.

• SMF supports the following 3GPP Change Requests (CR):

    • 3GPP TS 29 502, CR 0097 to send the new "INSUFFICIENT_UP_RESOURCES" cause information.

    • 3GPP TS 29 518 CR 161 not to support the UE_IN_NON_ALLOWED_AREA cause in N1N2 Message Transfer Error from AMF.

• SMF supports the statistics for the causes on the N11 interface messages.

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

Changes to the ULI Data Format—CSCvx66959

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	Enabled – Always-on
Related Changes in this Release	Not Applicable
Related Documentation	Not Applicable

Revision History

Table 10: Revision History

Revision Details	Release
First introduced. CDETS ID: CSCvx66959	2021.02.0

Behavior Change

When the SMF receives the EUTRA location from ePDG through GTP messages, it relays the same user location information over N7, N40, N4, and RADIUS interfaces.

Previous Behavior: SMF used to send the TAC and CellID (CID) in decimal form to the PCF and CHF through N7 and N40 interfaces respectively.

New Behavior: Now, the SMF sends the TAC and CID in hexadecimal form to the PCF and CHF.

CHF Trigger-based CDR Generation for 4G Sessions—CSCvy17526

Behavior Change Summary and Revision History

Summary Data

Table 11: 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 12: Revision History

Revision Details	Release
First introduced. CDETS ID: CSCvy17526	2021.02.0

Behavior Change

Previous Behavior: Even after receiving the CHF triggers during the exchange of GTPv2 Create Bearer Request message and other GTP messages, SMF did not generate CDR for an empty charging ID list.

New Behavior: If the CHF triggers for 4G call are enabled, then the SMF generates charging records after N4 interaction.

clear subscriber and show subscriber Command Enhancement

Feature Summary and Revision History

Summary Data

Table 13: 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 14: Revision History

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

The **clear subscriber** and **show subscriber** commands are enhanced in this release.

The supported enhancements are:

• The **clear subscriber** and **show subscriber** commands support the new **nf-service** keyword. This keyword specifies the network function service (S-GW or SMF).

> ☞
>
> **Important** The **namespace** keyword is deprecated in this release and replaced with the **nf-service** keyword.

- The **clear subscriber** and **clear subscriber nf-service smf** commands support the new **reactivation** keyword to clear sessions when release cause as "reactivation required" is set. This change also supports new disconnect and release reasons for 4G and 5G calls.

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

Configure DNS Timeout Range—CSCvx74277

Behavior Change Summary and Revision History

Summary Data

Table 15: 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 16: Revision History

Revision Details	Release
Added permissible range values for **profile dns-proxy timeout** command.	2021.01.1
Added support for randomization of P-CSCF addresses from DNS.	2021.01.0
First introduced.	Pre-2020.02.0

Behavior Change

Previous Behavior: SMF did not enforce any range for the **profile dns-proxy timeout** *dns_timeout_value* CLI command.

New Behavior: SMF now defines a range for the **profile dns-proxy timeout** *dns_timeout_value* command. *dns_timeout_value* must be an integer in the range of 200-10000.

For more information, refer to the UCC 5G SMF Configuration and Administration Guide > IMS PDU Sessions for Voice chapter.

Configure Purge Interval Range—CSCvx74279

Behavior Change Summary and Revision History

Summary Data

Table 17: 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 18: Revision History

Revision Details	Release
First introduced. CDETS ID: CSCvx74279	2021.02.0

Behavior Change

Previous Behavior: SMF did not enforce any range for the **purge-processed-files purge-interval** *purge-interval* CLI command configured within **local-storage** command in GTPP Profile configuration.

New Behavior: SMF now defines a range for the **purge-interval** command. *purge-interval* must be an integer in the range of 0-259200. A value of 0 disables the processed file purging functionality.

Configure Range Values for ICMPv6 Configuration Parameters—CSCvx74188

Behavior Change Summary and Revision History

Summary Data

Table 19: 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 20: Revision History

Revision Details	Release
Added permissible range values for the following commands in ICMPv6 Profile configuration options. • **mtu** • **reachable-time** • **retrans-timer**	2021.02.1
First introduced.	Pre-2020.02.0

Behavior Change

Previous Behavior: SMF did not enforce any range for the following parameters in the ICMPv6 Profile configuration

- MTU

- Retransmission timer

- Reachable time

New Behavior: SMF now defines a range for the following commands in ICMPv6 Profile configuration options.

- **mtu**: Must be an integer in the range of 1280-1500

- **reachable-time**: Must be an integer in the range of 0-3600

- **retrans-timer**: Must be an integer in the range of 0-4294968

For more information, refer to the UCC 5G SMF Configuration and Administration Guide > IPv6 PDU Sessions chapter.

Configure Response Timeout Range—CSCvx74235

Behavior Change Summary and Revision History

Summary Data

Table 21: Summary Data

Applicable Products 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 22: Revision History

Revision Details	Release
Added retransmission support for the following request messages: • Namf_Communication EBI Assignment Request • Namf_Communication N1 N2 Message Transfer Request	2021.02.2
Added permissible range values for **response-timeout** command in the PCF and UDM configuration	2021.02.0
RAT type FHT support and graceful timeout handling and its related statistics introduced.	2021.01.0
First introduced.	Pre-2020.02.0

Behavior Change

Previous Behavior: SMF did not enforce any range for the **response-timeout** *response_timeout_value* CLI command in the UDM and PCF configuration.

New Behavior: SMF now defines a range for the **response-timeout** command. *response_timeout_value* must be an integer in the range of 1000-30000.

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

Control Event Trace Data—CSCvx81816

Behavior Change Summary and Revision History

Summary Data

Table 23: 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 24: Revision History

Revision Details	Release
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

Behavior Change

Previous Behavior: SMF stored event trace data in CDL. SMF had no option to avoid storing event trace data in the database.

New Behavior: With this release, SMF allows you to enable or disable the storage of event trace data in the CDL database record. Configuring the event trace to disabled saves approximately 1 KB of database storage for each SMF database record.

Use the **system-diagnostics event-trace [enable | disable]** CLI command to enable or disable the storage of event trace data in the CDL database record.

For more information, refer to the UCC 5G SMF Configuration and Administration Guide > Cisco Common Data Layer chapter.

DNS Test Query Support

Feature 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 25: Revision History

Revision Details	Release
First introduced.	2021.02.0

Feature Description

DNS Test Client queries and checks the P-CSCF IP address using the FQDN. The DNS Test Client is used as a debug utility for VoNR launch. SMF supports DNS Test queries over SMF operation center command line interface. The DNS client retrieves the results from DNS proxy/server and displays to the user.

For more information, refer to the UCC 5G SMF Configuration and Administration Guide > IMS PDU Sessions for Voice chapter.

Download Oam-pod Files from the Web Browser

Feature Summary and Revision History

Summary Data

Table 26: Feature Summary

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 27: Revision History

Revision Details	Release
In this release, added support to download the following OAM pod files: • Monitor Subscriber • Monitor Protocols • Transaction logs	2021.02.0
First introduced.	Pre-2020.02.0

Feature Description

The App-infra stores locally generated Monitor Subscriber files and the Transaction log file in the OAM Pod. This feature enables you to access and download the locally generated files by using a web browser after authenticating.

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

Dynamic Routing by Using BGP

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	IPAM: Enabled – Always-on Unique IP Pools for UPF: 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: • New calls with 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

Border Gateway Protocol (BGP) allows you to create loop-free inter-domain routing between autonomous systems (AS). An AS is a set of routers under a single technical administration. The routers can use an Exterior Gateway Protocol to route packets outside the AS. The Dynamic Routing by Using BGP feature enables you

to configure the next-hop attribute of a BGP router with alternate local addresses to service IP addresses with priority and routes. The App-Infra BGP speaker pods enable dynamic routing of traffic by using BGP to advertise pod routes.

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

EDR Generation for PDU Session Modification

Feature Summary and Revision History

Summary Data

Table 30: Summary Data

Applicable Products or Functional Area	SMF
Applicable Platforms	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
Introduced EDR support for PDU session modification procedure for roaming and non-roaming scenarios	2021.02.2
Provided support for event-level EDR generation	2021.02.0
Custom EDR Generation	2021.01.0

Feature Description

EDR support was available for both PDU session sreation and deletion scenarios. Now, the SMF extends the support for EDR generation to the PDU session modification procedure for roaming and non-roaming scenarios.

For more details, refer to the UCC 5G SMF Configuration and Administration Guide > Event Detail Records chapter.

Enhanced IP Address Quarantine Timer—CSCvx88334

Behavior Change Summary and Revision History

Summary Data

Table 32: Summary Data

Applicable Product(s) or Functional Area	SMF
Applicable Platform(s)	SMI
Feature Default Setting	IPAM: Enabled – Always-on Unique IP Pools for UPF: Disabled – Configuration required to enable
Related Changes in this Release	Not Applicable
Related Documentation	Not Applicable

Revision History

Table 33: Revision History

Revision Details	Release
Added support for the following features: • New calls with 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

Behavior Change

Previous Behavior: SMF allowed the user to configure **address-quarantine-timer** *quarantine_timer_value* in the range of 4-60 seconds.

New Behavior: This release allows the user to configure the IP address quarantine timer value in the range of 4-3600 seconds. The timer value has been enhanced to detect and ignore any duplicate release requests.

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

Error Handling with HTTP Error Codes

Feature Summary and Revision History

Summary Data

Table 34: 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 35: Revision History

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 error responses and related HTTP error codes for the SM Policy Update Notify service towards PCF with this release. For this feature, SMF complies with 3GPP TS 29.512, section 4.2.3.2—SM Policy Association Update request.

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

Event-level EDR Generation

Feature 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
First introduced.	Pre-2020.02.0

Feature Description

The SMF allows generation of Event Data Records (EDRs) with procedure-level details, event-level details, and field-level details. These granular details help in effective debugging of any errors encountered.

By default, all procedure IDs, event IDs, and field IDs, which were registered by application, are enabled. You can enable or disable the EDRs dynamically during runtime by using **disable procedure-id** *procedure_id_value* CLI command.

For more details, refer to the UCC 5G SMF Configuration and Administration Guide > Event Detail Records chapter.

GTP Cause Code Handling

Feature Summary and Revision History

Summary Data

Table 38: 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 39: Revision History

Revision Details	Release
Added support for: • GTP cause code handling • GTPv2 IE and cause codes	2021.02.0
Added support for 5GSM cause code handling.	2020.02.0

Feature Description

The SMF supports GTP cause code handling for 4G procedures when it detects any failure with the IEs.

The GTP cause code handling feature supports the following enhancements:

• New cause values in Create Session Request

  • Missing or unknown APN

  • User authentication failed

  • APN access denied – no subscription

  • New PDN type due to single address bearer only

  • Late Overlapping Request

  • Timed Out Request

- New cause values in Delete Bearer Request

    - Reactivation required

    - PDN connection inactivity timer expires

- RAN/NAS Cause IE in GTP messages—SMF sends the RAN/NAS Cause IE in the ranNasRelCauses attribute to PCF if SMF receives this cause from access network due to QoS flow termination or PDU session termination.

    The supported GTP messages are Create Bearer Response, Update Bearer Response, Delete Bearer Command, and Delete Session Request.

- Specification derived (TS 29.524) cause code mapping for 5G messages on UDM and PCF interfaces

- Configuration support for GTP cause codes

    - Cause to class mapping configuration under cause-map-class profile and network-element profile

    - Class to cause mapping configuration under class-map-cause profile and access profile

- New disconnect reasons for source interface failures

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

GTPC Load and Overload Control

Feature Summary and Revision History

Summary Data

Table 40: Summary Data

Applicable Products 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
Added support for GTPC load and overload control	2021.02.0

Revision Details	Release
Added support for message priority configuration.	2020.04.0
First introduced.	2020.03.0

Feature Description

☞

Important   The GTPC Load and Overload Control is an optional feature.

The SMF uses the system load information to determine the operating status of the resources of the GTPC entity. This information, when sent to the GTPC peers, helps to balance the session load adaptively across entities supporting the same function based on their effective load.

To enable the GTPC load Control functionality, use the **interface gtpc action advertise** command within load profile.

A GTPC overload occurs when the number of incoming requests exceeds the maximum request throughput supported by the receiving GTPC entity. The exponential increase of unacknowledged GTPC messages lead to a node congestion or collapse resulting in overall network service degradation.

The GTPC Load and Overload Control feature aims at improving load distribution over the network. To achieve this functionality, the SMF sends Load Control Information (LCI) and Overload Control Information (OCI) to GTPC peers (for example, MME via cnSGWc, and ePDG). The GTPC peers use the LCI and OCI, and the configurations defined in the Load and Overload Control profiles for effective overload control.

To enable the GTPC Overload Control functionality, use the **interface gtpc action advertise** command in node-level within overload profile.

GTPC Load Control denotes a preventive action and GTPC Overload Control indicates a corrective action.

This feature works both in a standalone deployment of SMF and an integrated deployment with cnSGW-C.

The GTPC Load and Overload Control feature is compliant to 3GPP TS 29.807, version 12.0.0, and 3GPP TS 29.274, version 15.4.0.

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

GTPC Path Failure Detection Enhancements and Debugging Improvements

Feature Summary and Revision History

Summary Data

Table 42: 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 43: Revision History

Revision Details	Release
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

PGW-C/SMF triggers cleanup of PDN sessions when it detects a change in the recovery value of peer or if peer is unreachable. SMF is enhanced to avoid peer restart and path failure detection:

- Restart counter values received in EchoRequest/Resp and restart counter values received in control messages received from peer can be configured to ignore. Configuring "ignore" results in avoiding subscriber session cleanup but new restart counter values are stored.

- Echo timeouts or Echo failures can be configured to ignore. Configuring "ignore" results in avoiding subscriber session cleanup.

- Statistics introduced to collect number of false peer restarts and to display restart-time of peer.

Show output is enhanced to display "MaxRemoteRcChange".

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

GTPC Peer Restart Detection Support Improvements

Feature Summary and Revision History

Summary Data

Table 44: 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 45: Revision History

Revision Details	Release
FB Call Continuity Cause Code Expansion	2021.02.2

Revision Details	Release
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

P-GW-C/SMF can detect that there's a change in recovery value of SGW. P-GW-C/SMF can detect this value from the following messages:

- Create Session Request.

- Modify Bearer Request.

- Create Bearer Response.

- Echo Response

If P-GW-C/SMF detects that there's a change in recovery value, then it initiates the cleanup of all the PDN connections associated with the S-GW.

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

GTPv2 IE and Cause Codes

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	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:
 	
  • GTP cause code handling
 	
  • GTPv2 IE and cause codes
	2021.02.0

Added support for 5GSM cause code handling.	2020.02.0

Feature Description

The SMF supports the GPRS Tunneling Protocol, Version 2 (GTPv2) Cause IE for 4G and 5G procedures.

The GTPv2 Cause IE supports the following cause codes and error codes:

- The Cause Source (CS) bit in GTPv2 Cause IE supports the following cause values in Create Session Response, Modify Bearer Response, Modify Bearer Failure Indication (MBFI), and Delete Bearer Failure Indication (DBFI).

    - Context Not Found

    - Missing Or Unknown APN

    - DBFI with cause Context Not Found

    - Delete Session Response with cause Context Not Found

- The Bearer Context IE Error (BCE) bit in GTPv2 Cause IE supports the following cause values in Delete Session Response, Modify Bearer Response, Modify Bearer Failure Indication (MBFI), and Delete Bearer Failure Indication (DBFI).

    - MBFI with cause Context Not Found

    - DBFI with cause Context Not Found

- Remote Node Errors

    - Context not found

    - Missing or unknown APN

    - PduSessionType

    - Mandatory IE missing

    - Malformed message errors

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

Guard Timer-based Handling of Dedicated Bearer Procedures—CSCvv64995

Behavior Change Summary and Revision History

Summary Data

Table 48: 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 49: Revision History

Revision Details	Release
First introduced. CDETS ID: CSCvv64995	2021.02.0

Behavior Change

The SMF interacts with the peer NFs while processing the 4G dedicated bearer procedure. When the dedicated bearer procedure does not end within predetermined guard timeout value, the graceful clean-up is performed at SMF and peer nodes. This clean-up action is based on the stage at which the dedicated bearer procedure is executing.

Previous Behavior: At the expiry of guard timer, dedicated bearer procedure was abruptly terminated without performing necessary clean up.

New Behavior: In this release, the SMF gracefully cleans up the dedicated bearer procedure by informing the concerned peer nodes about the procedure failure status.

Handling Absent Bearers—CSCvx90742

Behavior Change Summary and Revision History

Summary Data

Table 50: 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 51: Revision History

Revision Details	Release
First introduced. CDETS ID: CSCvx90742	2021.02.0

Behavior Change

Previous Behaviour: The SMF handled the absent bearers incorrectly in the Modify Bearer Request. This problem led to sending the Update Bearer Request instead of Create Bearer Request during PCF-initiated bearer creation for such bearers.

The absent bearers were mishandled in the following scenarios:

- MBR with only absent bearer

- MBR with absent bearer and ULI change

New Behaviour: This release supports absent bearer handling for Modify Bearer Request. For such bearers, the SMF gracefully cleans up and informs the bearer removal to PCF, CHF, and UPF.

Handling Calls with Static IP Address

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	IPAM: Enabled – Always-on Unique IP Pools for UPF: Disabled – Configuration required to enable
Related Changes in this Release	Not Applicable
Related Documentation	Not Applicable

Revision History

Table 53: Revision History

Revision Details	Release
Added support for the following features: • New calls with static IP address. • Quarantine queue size. • IP address validation with CDL Configuration and statistics.	2021.02.0

Revision Details	Release
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

The SMF+IWK supports calls with static IP address and validates if the IP address belongs to the static pool.

In this release, the SMF supports Create Session Request with static IP address and also handles Create Session Request received with PAA. The SMF validates if the requested IP address is configured under static pool and assigns the same IP address for the session. If the IP address is not configured under static pool, then SMF rejects the session.

☞

Important	This release does not support fallback to dynamic IP allocation.

The following behavior is applicable only to sessions with static IP address.

- If the SMF receives static IP in Subscription Response from UDM during the 5G Session Create procedure, it assigns the same IP address to the UE session if the IP is configured under static pool. If the IP address is not configured under static pool, then SMF rejects the session.

- If the RADIUS interface is enabled and if the RADIUS server returns the static IP address, then SMF ignores the IP address received in Create Session Request or Subscription Response.

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

Handling Requests with Handover Indication

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
Related Changes in this Release	Not Applicable

Related Documentation	Not Applicable

Revision History

Table 55: Revision History

Revision Details	Release
FB Call Continuity Cause Code Expansion	2021.02.2
Added support for: • Configuring calls with handover indication. • UE Local IP Address and UE UDP Port IEs in GTPC messages.	2021.02.0
TFT Handling for Wi-Fi Handovers is supported.	2021.01.0
The Wi-Fi to 5GS Handover with EPS Fallback feature is fully qualified in this release.	2020.02.2
The Wi-Fi to 5GS Handover with EPS Fallback feature is not fully qualified in this release. For more information, contact your Cisco Account representative.	2020.02.1
First introduced.	Pre-2020.02.0

Feature Description

The SMF+IWK rejects the Create Session Request received with handover (HO) indication even if the session is not present.

With the previous behavior, the SMF accepts S5/S8 Create Session Request with HO indication even when the session is not present and creates a new session. The new CLI command **gtpc message-handling create-session-request ho-ind new-call-reject** added under access profile disables the old behavior and rejects the call with "Context Not Found".

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

Handling SLA Timer-based Dedicated Bearer Procedure Failures

Feature Summary and Revision History

Summary Data

Table 56: 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 57: Revision History

Revision Details	Release
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 SMF interacts with the peer NFs while processing the dedicated bearer procedure.

When the dedicated bearer procedure does not end within a configurable SLA procedure timeout value, the graceful clean-up is performed at SMF and peer nodes. This clean-up action is based on the stage at which the dedicated bearer procedure is executing.

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

Handover Support in Home Routed Roaming

Feature 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 58: Revision History

Revision Details	Release
First introduced.	2021.01.0

Feature Description

SMF supports the EPS interworking procedures (non-Wi-Fi handover procedures) for home-routed roaming during the 4G to 5G handover using N26 interface.

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

IE Support for GTPC Messages

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

Related Changes in this Release	Not Applicable
Related Documentation	Not Applicable

Revision History

Table 60: Revision History

Revision Details	Release
FB Call Continuity Cause Code Expansion	2021.02.2

Added support for:
 	
    • Configuring calls with handover indication.
 	
    • UE Local IP Address and UE UDP Port IEs in GTPC messages.
	2021.02.0

TFT Handling for Wi-Fi Handovers is supported.	2021.01.0
The Wi-Fi to 5GS Handover with EPS Fallback feature is fully qualified in this release.	2020.02.2
The Wi-Fi to 5GS Handover with EPS Fallback feature is not fully qualified in this release. For more information, contact your Cisco Account representative.	2020.02.1
First introduced.	Pre-2020.02.0

Feature Description

The SMF includes the following new IEs in the n3gaLocation attribute of GTPC messages.

    • UE Local IP Address

    • UE UDP Port

The supported GTPC messages are Create Session Request, Create Bearer Response, Modify Bearer Request, and Delete Bearer Response.

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

IP Address Validation with CDL Configuration— CSCvx83539

Feature Summary and Revision History

Summary Data

Table 61: Summary Data

Applicable Product(s) or Functional Area	SMF
Applicable Platform(s)	SMI
Feature Default Setting	IPAM: Enabled – Always-on Unique IP Pools for UPF: Disabled – Configuration required to enable
Related Changes in this Release	Not Applicable
Related Documentation	Not Applicable

Revision History

Table 62: Revision History

Revision Details	Release
Added support for the following features: • New calls with 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

Behavior Change

Previous Behaviour: No Additional CDL Check was performed during IP Allocation.

New Behaviour: On Enabling CLI, CDL Check is performed during IP Allocation.

IP validation ignore mismatch responses is meant for avoiding duplicate IPs. If this feature is enabled, SMF Nodemgr checks if the current IP is already used by any other records in CDL. If no records are found, then IP address is assigned to the UE. If CDL record is found, then a new IP is assigned to the UE. New stats display Nodemgr to CDL IP-Validation and IPAM Quarantine IP Batch-related statistics.

Customer Impact: Enabling validation ignore mismatch responses may have certain performance impact..

For more information, refer to the UCC 5G SMF Configuration and Administration Guide > IP Address Management Chapter.

IP Threshold-based UPF Selection

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

Revision History

Table 64: Revision History

Revision Details	Release
Introduced support for non-standard QCI for dynamic PCC and session rules	2021.02.2
Introduced support for the following features: • Bit rate mapping • UPF Selection based on Slice and Location • UP Optimization	2021.02.0

Revision Details	Release
Introduced support for the following: • 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: • 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

The existing threshold configuration for IP pool allows you to define percentage of IP addresses to be considered as threshold hit for a given UPF. IPAM informs SMF when threshold is hit for a particular pool (for each DNN and UPF), SMF gives lower priority to such UPF until UPF hits the threshold condition.

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

IPv6 Interface ID Generation—CSCvw93433

Behavior Change Summary and Revision History

Summary Data

Table 65: 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 66: Revision History

Revision Details	Release
Added support for IPv6 interface ID generation based 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

Behavior Change

The SMF generates the IPv6 interface ID without International Mobile Subscriber Identity (IMSI) or Extended Unique Identifier (EUI).

Previous Behavior: The SMF generated the IPv6 interface ID in EUI-64 format based on configured or default virtual-mac under DNN. The interface ID is common for all subscribers under DNN. This operation resulted in apps like Google Duo to reject connections due to security policy.

New Behavior: The SMF generates unique 64-bit interface ID which is non-EUI-64 format by using SBI VIP address and CommonId of the subscriber.

That is, IPv6 interface ID = VIP-IP (4 bytes) + CommonId (4 bytes)

By default, **virtual-mac** CLI command is now disabled under DNN configuration.

Table 67: Interface ID for Different Messages

Call Model	PDU Session Establishment Accept	Create Session Response
5G	N11-SBI-VIP+CommonID	Not Applicable
4G	Not Applicable	GTP-VIP+CommonID
Wi-Fi	Not Applicable	GTP-VIP+CommonID
5G to 4G	Not Applicable	Not Applicable (N26 HO - there are NAS contents during handover)

Call Model	PDU Session Establishment Accept	Create Session Response
4G to 5G	Not Applicable (N26 HO - there are NAS contents during handover)	Not Applicable
4G to Wi-Fi	Not Applicable	GTP-VIP+CommonID (Same as 4G)
Wi-Fi to 4G	Not Applicable	GTP-VIP+CommonID (Same as 4G)
5G to Wi-Fi	Not Applicable	N11-SBI-VIP+CommonID (Same as 5G)
Wi-Fi to 5G	GTP-VIP+CommonID (Same as WiFi)	Not Applicable

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

Instance-aware Configuration Changes

Feature Summary and Revision History

Summary Data

Table 68: 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 69: Revision History

Revision Details	Release
First introduced.	2021.02.0

Feature Description

To distinguish between local site instance and remote site instance, the instance-awareness support has been introduced in this release.

To support instance awareness, the following configuration changes have been implemented:

- Configuration of two new GR instances through **instances instance** command at the root level for both local and remote sites

- Enable configuration of instance system-id, cluster-id, and slice-name for CDL within each GR instance

  Sample configuration:

  ```
  config
      instances instance gr_instance_id
          system-id system_id
          cluster-id cluster_id
          slice-name cdl_slice_name
          end
  ```

- Local instance configuration using **local-instance** command at the root level

  Sample configuration:

  ```
  config
      local-instance instance instance_id
          end
  ```

- Instance configuration with unique identifier using the instance instance-id command at the root level

  Sample configuration:

  ```
  config
      instance instance-id instance_id
          end
  ```

- Root-level endpoint configuration commands are allowed only under instance configuration.

  Sample configuration:

  ```
  config
      instance instance-id instance_id
          endpoint gtp
          end
  ```

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

- Profile SMF configuration allows configuration of Fully Qualified Domain Name (FQDN) corresponding to the configured instances. For example, **instances 1 fqdn cisco.com.apn.epc.mnc456.mcc123**.

  Sample configuration:

  ```
  config
      profile smf smf_profile_name
          instances instance_id fqdn fqdn_name
          end
  ```

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

- IPAM pools must be associated with a GR instance.

> ✎
>
> **Note**   If you are planning to upgrade the SMF from release 2021.01 to release 2021.02, make sure to remove the existing IPAM configuration and then proceed with the upgrade.

Sample configuration:

```
config
   ipam
      instance instance_id
         address-pool pool_name
         end
```

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

- CDL configuration includes instance-specific data slice information. That is, **slice-name** keyword has been added to the **cdl datastore session** command.

  For more information, refer to the UCC 5G SMF Configuration and Administration Guide > Cisco Common Data Layer chapter.

- Enhancements to the following commands to include **gr-instance** as input.

  - **show endpoint**

  - **show peers**

  - **show subscriber**

  - **clear subscriber**

  - **show ipam pool**

  - **show ipam dp**

  - **show nrf registration-info**

  - **show nrf subscription-info**

  - **show nrf discovery-info**

  - **monitor subscriber**

  - **monitor protocol**

> ✎
>
> **Note**   If the **gr-instance** is not provided, the local instance is used.

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

> • Enhancements to the following CDL commands to include **slice-name** as input:
>
> > • **cdl show sessions count summary**
> >
> > • **cdl show indexes**
> >
> > • **cdl clear sessions**

Instance-aware RADIUS Configuration

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

Revision History

Table 71: Revision History

Revision Details	Release
Added support for interworking with ISE.	2021.02.2.t1.0
Introduced new CLI option in charging profile to generate the RADIUS accounting trigger on TFT change.	2021.02.0
To support instance awareness on RADIUS, the SMF allows: • Instance-level configuration under RADIUS profile • NAS-IP-Address and NAS-Identifier attribute configuration per instance-id in RADIUS profile configuration • RADIUS Disconnect-Request VIP configuration per instance-id in RADIUS endpoint configuration	2021.02.0

Revision Details	Release
Added support for the following: • PAP, CHAP, and MSCHAP-based RADIUS authentication • Multiple RADIUS NAS-IP source addresses • Handling RADIUS Disconnect and CoA Requests • RADIUS Accounting on SMF • New attributes in the RADIUS Access Response message	2020.02.5.t1
First introduced.	Pre-2020.02.0

Feature Description

To support instance awareness on RADIUS, the following changes have been implemented:

- Allow instance-level configuration under RADIUS profile

- Define NAS-IP-Address and NAS-Identifier attribute configurations per instance-id in RADIUS profile configuration

- Define RADIUS Disconnect-Request VIP configuration per instance-id in RADIUS endpoint configuration

- Consider NAS-IP-Address and NAS-Identifier attributes under instance configuration as high priority over non-instance based attribute configuration

- Support new label "grInstId" in the following RADIUS metrics:

  - Radius_Requests_Statistics

  - Radius_Requests_Current

  - Radius_CoaDM_Requests_Statistics

  - Radius_CoaDM_Requests_Current

Note The existing non-instance based NAS-IP-Address and NAS-Identifier attribute configurations are used as default NAS-IP and default NAS-Identifier for local-instance of the site. The precedence of NAS-IP and NAS-ID remain the same as before.

The following is an example configuration for NAS-IP-Address and NAS-Identifier attributes.

```
config
 profile radius
  attribute
   instance 1
    nas-ip 209.165.200.225
```

```
      nas-identifier  smf1
     exit
     instance 2
      nas-ip 209.165.201.2
      nas-identifier  smf2
     exit
    exit
    accounting
     attribute
      instance 1
       nas-ip 209.165.200.225
       nas-identifier  smf1
      exit
      instance 2
       nas-ip 209.165.201.2
       nas-identifier  smf2
      exit
     exit
    exit
   exit
   server-group g1
    attribute
     instance 1
      nas-ip 209.165.200.225
      nas-identifier  smf1
     exit
     instance 2
      nas-ip 209.165.201.2
      nas-identifier  smf2
     exit
    exit
   exit
   accounting
    attribute
     instance 1
      nas-ip 209.165.200.225
      nas-identifier  smf1
     exit
     instance 2
      nas-ip 209.165.201.2
      nas-identifier  smf2
     exit
    exit
   exit
  exit
```

The following is an example configuration for RADIUS Disconnect-Request VIP.

```
config
 instance instance-id 1
  endpoint radius
   replicas 1
   interface coa-nas
    vip-ip 10.0.0.0 vip-port 3799
   exit
  exit
 exit
 instance instance-id 2
  endpoint radius
   replicas 1
   interface coa-nas
    vip-ip 10.1.0.0 vip-port 3799
   exit
  exit
```

```
 exit
exit
```

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

Kubernetes Version Upgrade

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	Not Applicable
Related Changes in this Release	Not Applicable
Related Documentation	Not Applicable

Revision History

Table 73: Revision History

Revision Details	Release
First introduced.	2021.02.2.t1.0

Feature Description

SMF is built on Cisco Cloud Native Infrastructure, which is a Kubernetes-based platform that provides a common execution environment for container-based applications.

In this release, the Kubernetes (K8s) version is upgraded from 1.21.0 to 1.22.0.

LI Event Generation For 4G Procedure Failures

Feature Summary and Revision History

Summary Data

Table 74: 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 75: Revision History

Revision Details	Release
First introduced.	2021.02.0

Feature Description

The SMF generates the SMFPROCEDUREFAIL LI event for all 4G procedure failure scenarios. Contact your Cisco account representative for more information.

Location-based UPF Selection

Feature Summary and Revision History

Summary Data

Table 76: 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 77: Revision History

Revision Details	Release
Introduced support for non-standard QCI for dynamic PCC and session rules	2021.02.2
Introduced support for the following features: • Bit rate mapping • UPF Selection based on Slice and Location • UP Optimization	2021.02.0
Introduced support for the following: • 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: • 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

The SMF selects the UPF node for EPS and 5GS sessions based on certain predefined query parameters such as DNN, pdn-type-subscription, pdn-type-session, priority, load, and Dual Connectivity with New Radio (DCNR). The DCNR is applicable only to the EPS calls.

The following two query parameters are new in this release:

• Subscriber location

• Network slice

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

MBR Short Circuit Optimization

Feature 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 78: Revision History

Revision Details	Release
First introduced.	2021.02.x

Feature Description

Generating the Modify Bearer Response message at gtpc-ep pod is called MBR short circuit. SMF now generates Modify Bearer Response messages at gtpc-ep pod to limit the impact of processing Modify Bearer Request, sending Modify Bearer Response message (Modify Bearer Response) with success cause at the smf-service pods, the Modify Bearer Response message are generated at gtpc-ep pod.

For more information, refer to the UCC 5G SMF Configuration and Administration Guide > MBR Short Circuit Optimization chapter.

Mesh Connectivity to all UPFs

Feature 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 79: Revision History

Revision Details	Release
First introduced.	2021.02.1

Feature Description

Mesh connectivity enables UPF to connect to all SMFs in particular region. However, subscriber is hosted on only one UPF.

All UPFs in the region must be connected to all the SMFs in the region. Ideally, SMF can be connected to a maximum of 1024 UPFs. UPF can support up to a maximum of four peers (SMF, SGW-C, and cnSGW).

For more information, refer to the UCC 5G SMF Configuration and Administration Guide > Mesh Connectivity to All UPFs chapter.

MTU Support in PCO

Feature 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
First introduced.	2021.02.0

Feature Description

SMF allows IPv4 addresses to be configured in MTU. If UE requests, configuration links MTU in PCO IE. When CSR comes with PCO requesting IPv4 link MTU, SMF sends create session response with PCO containing link MTU configured under network-capability policy. When N1 Pdu session Establishment Request comes with PCO requesting IPv4 link MTU, SMF sends N1 Pdu Session Establishment response with PCO containing link MTU configured under network-capability policy.

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

N4 QoS Mismatch Correction

Feature Summary and Revision History

Summary Data

Table 82: 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 83: Revision History

Revision Details	Release
Introduced support for non-standard QCI for dynamic PCC and session rules	2021.02.2
Introduced support for the following features: • Bit rate mapping • UPF Selection based on Slice and Location • UP Optimization	2021.02.0
Introduced support for the following: • 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: • 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 supports QoS enforcement only at PCC rule and session levels. This feature captures the requirements to support QoS enforcement at QoS flow level.

New configuration is added for this feature under the QoS profile (associated with DNN Profile) to enable flow level Qos-enforcement.

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

NAS Messages Compliance with Invalid Protocol Data Handling

Feature Summary and Revision History

Summary Data

Table 84: 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 85: Revision History

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

The SMF is NAS messages compliant with invalid protocol data handling as defined in 3GPP TS 24.501 with this release.

SMF complies to the following sections of 3GPP TS 24.501 for this feature:

  • 7.2 Message too short or too long

    • 7.2.1 Message too short

    • 7.2.2 Message too long

- 7.6 Unknown and unforeseen IEs in the non-imperative message part

  - 7.6.1 IEIs unknown in the message

  - 7.6.2 Out of sequence IEs

  - 7.6.3 Repeated IEs

- 7.7 Non-imperative message part errors

  - 7.7.1 Syntactically incorrect optional IEs

  - 7.7.2 Conditional IE errors

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

New Container Identifier Support

Feature Summary and Revision History

Summary Data

Table 86: 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 87: Revision History

Revision Details	Release
FB Call Continuity Cause Code Expansion	2021.02.2

Revision Details	Release
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 SMF populates the container identifier 0005H (Selected Bearer Control Mode) in PCO, ePCO, and aPCO IE in Create Session Response. The container identifier contents field with value 2 indicates that the MS/NW mode is selected.

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

New Procedure Types for vSMF and hSMF Instances—CSCvy67848

Behavior Change Summary and Revision History

Summary Data

Table 88: 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 89: Revision History

Behavior Change

Previous Behaviour: HPLMN and VPLMN related procedures were not available.

New Behaviour: This release supports the following HPLMN and VPLMN type procedures in "smf-service-stats" metrics.

- hplmn_req_pdu_sess_mod

- hplmn_req_ebi_assign_req

- vplmn_req_pdu_sess_mod

- vplmn_req_pdu_sess_mod

- vplmn_req_pdu_sess_rel

New Radio Dual Connectivity

Feature Summary and Revision History

Summary Data

Table 90: 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 91: Revision History

Revision Details	Release
First introduced.	2021.02.0

Feature Description

With this release, SMF supports 5G aggregation along with New Radio Dual Connectivity (NR-DC) to achieve higher 5G data rates.

This feature has the following key points:

- Use NR-DC only for data traffic.

- Use only default flow for data traffic.

- One tunnel is sufficient.

- SMF requires no configuration.

For more information, refer to the UCC 5G SMF Configuration and Administration Guide > New Radio Dual Connectivity chapter.

New RADIUS Accounting Trigger for TFT Change

Feature Summary and Revision History

Summary Data

Table 92: 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 93: Revision History

Revision Details	Release
Added support for interworking with ISE.	2021.02.2.t1.0
Introduced new CLI option in charging profile to generate the RADIUS accounting trigger on TFT change.	2021.02.0

Revision Details	Release
To support instance awareness on RADIUS, the SMF allows: • Instance-level configuration under RADIUS profile • NAS-IP-Address and NAS-Identifier attribute configuration per instance-id in RADIUS profile configuration • RADIUS Disconnect-Request VIP configuration per instance-id in RADIUS endpoint configuration	2021.02.0
Added support for the following: • PAP, CHAP, and MSCHAP-based RADIUS authentication • Multiple RADIUS NAS-IP source addresses • Handling RADIUS Disconnect and CoA Requests • RADIUS Accounting on SMF • New attributes in the RADIUS Access Response message	2020.02.5.t1
First introduced.	Pre-2020.02.0

Feature Description

The SMF generates RADIUS ACCOUNTING-INTERIM-UPDATE trigger whenever a change in Traffic Flow Template (TFT) is detected during the 4G or 5G call.

The SMF controls the trigger generation using the new CLI keyword **tft-change**. The **accounting triggers** CLI command in Charging Profile configuration includes the new keyword option.

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

Non-standard QCI Support for Dynamic PCC and Session Rules

Feature Summary and Revision History

Summary Data

Table 94: 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 95: Revision History

Revision Details	Release
Introduced support for non-standard QCI for dynamic PCC and session rules	2021.02.2

Introduced support for the following features:
   • Bit rate mapping
   • UPF Selection based on Slice and Location
   • UP Optimization
	2021.02.0

Introduced support for the following:
   • 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

Revision Details	Release
Introduced support for the following: • 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

The SMF supports non-standard QCI values in dynamic PCC and session rules along with the standard QCI values. Non-standard QCIs are the values from 1 through 255 and that are not part of standard QCI values as defined in section 6.1.7.2 of 3GPP 23.203 specification.

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

NPLI Support for VoLTE and VoNR

Feature Summary and Revision History

Summary Data

Table 96: 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 97: Revision History

Revision Details	Release
First introduced.	2021.02.0

Feature Description

SMF provides NetLoc forward User location information, Access Type, UE time zone towards PCF for VoNR and VoLTE support. SMF informs support of Access Network Information Reporting to PCF by sending the NetLoc bit to PCF in SmPolicyContextData.

For more information, refer to the UCC 5G SMF Configuration and Administration Guide > IMS PDU Sessions for Voice chapter.

NRF Failure Handling for Profiles

Feature Summary and Revision History

Summary Data

Table 98: 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 99: Revision History

Revision Details	Release
In this release, added support for the following functionality: • Configurable retry actions for specific error codes. • Flexible options for the retry action associated with an error code. • Httpv2 status code range in the failure handling templates of NFs.	2021.02.0

Revision Details	Release

Introduced support for individual NF Profile member changes through NRF notification
 	
Included the following new parameters as part of the NRF discovery query:
 	
    • limit
 	
    • max-payload-size
 	
    • requester-snssais
	2020.03.0

First introduced.	Pre-2020.02.0

Feature Description

Currently, the system performs error-handling by segregating error codes into recoverable and non-recoverable error codes. It attempts to recover the endpoints with continuous retries when an NF service consumer receives recoverable error from the NRF server for messages like NFRegistration, NFUpdate, NF Heart-Beat, and so on. The NRF Failure Profile Support feature provides a flexible way for handling errors during the NRF interactions with other NF service consumers.

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

Optimized UPF Selection

Feature Summary and Revision History

Summary Data

Table 100: 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 101: Revision History

Revision Details	Release
Introduced support for non-standard QCI for dynamic PCC and session rules	2021.02.2
Introduced support for the following features: • Bit rate mapping • UPF Selection based on Slice and Location • UP Optimization	2021.02.0
Introduced support for the following: • 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: • 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

The converged core gateway with the cnSGWc and SMF supports selection of a converged UP node to truly realize convergence. With this functionality, it is possible to create an optimized data path for the UE.

The SMF uses the existing UPF selection logic and sends information on the selected UPF to cnSGWc so that it selects the same UPF. This feature involves implementing some configuration changes to select the same UPF during initial EPS attach and 5G to 4G handover procedures.

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

ProblemDetails JSON Object Support on N11 Interface

Feature Summary and Revision History

Summary Data

Table 102: 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 103: Revision History

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 sending and receiving the ProblemDetails JSON object on the N11 interface.

An application error can prevent the SMF service, acting as an HTTP server, from completing the HTTP request. In this case, the SMF service maps the application error to the similar 4xx or 5xx HTTP status.

An HTTP status code determines the cause of the error. However, sometimes these status codes don't have adequate information about an error. In this case, the SMF service acting as the HTTP server provides more application-related error information to the SMF service acting as an HTTP client. This SMF service provides

the additional information by including the representation of "ProblemDetails" data structure in the response body.

3GPP specification defines JSON as one of the document formats. HTTP APIs reuse this format to identify various problem types based on the requirement.

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

Query Interface IE Support—CSCvx69260

Behavior Change Summary and Revision History

Summary Data

Table 104: Summary Data

Applicable Products or Functional Area	SMF
Applicable Platforms	SMI
Feature Default Setting	Disabled – Configuration Required
Related Changes in this Release	Not Applicable
Related Documentation	Not Applicable

Revision History

Table 105: Revision History

Revision Details	Release
Added support for Query Interface IE.	2021.02.0
Introduced support for reconciliation of billing records when CHF is unreachable.	2021.02.0
Added session-level limitations on the N4 interface.	2021.01.1
Introduced support for the following: • Zero Usage Report Suppression • Dynamic ACS Configuration Change	2021.01.0
First introduced.	Pre-2020.02.0

Behavior Change

Previous Behavior: If the Charging Characteristics (CC) trigger happened at SMF, then the SMF sent QUERY URR to the CHF for the created URR.

New Behavior: If the CC trigger happens at SMF and the trigger is armed at session level, the SMF queries the online and offline URRs at UPF, and the RADIUS URR if accounting is enabled. This feature enables SMF to discover the URR present at UPF.

A new custom IE, QUERY_INTERFACE is introduced to support this functionality. The QUERY_INTERFACE IE is set along with the QUARR flag while sending the N4 Modification Request. The new CLI command **query-all-urr** in the Charging Profile configuration can be configured to query all URRs. By default, this command is enabled.

If the QUARR flag is not set, the UPF does not report all URRs even if the QUERY_INTERFACE IE is set. If QUARR flag is set with the QUERY_INTERFACE IE, the Query URR will not be relayed to the UPF.

Customer Impact: The SMF sends the CDR message to CHF if the CC trigger happens at SMF.

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

Reconciliation of Billing Records

Feature Summary and Revision History

Summary Data

Table 106: Summary Data

Applicable Products or Functional Area	SMF
Applicable Platforms	SMI
Feature Default Setting	Disabled – Configuration Required
Related Changes in this Release	Not Applicable
Related Documentation	Not Applicable

Revision History

Table 107: Revision History

Revision Details	Release
Added support for Query Interface IE.	2021.02.0
Introduced support for reconciliation of billing records when CHF is unreachable.	2021.02.0

Revision Details	Release
Added session-level limitations on the N4 interface.	2021.01.1
Introduced support for the following: • Zero Usage Report Suppression • Dynamic ACS Configuration Change	2021.01.0
First introduced.	Pre-2020.02.0

Feature Description

The SMF falls back to the offline CHF when all the converged CHF servers are unreachable. Then, the SMF sends the usage to the offline CHF.

The reporting to offline CHF does not include any differentiator in Used Unit Container (UUC) for the offline service and the converted offline service.

SMF supports a new enumerated value "CONVERTED_OFFLINE" in the Quota Management Indicator (QMI) added to the UUC. The SMF uses this enumerated value to mark the converted offline usage records sent to the offline CHF.

☞

Important   The Reconciliation of Billing Records is a customer-specific enhancement that requires IE level compliance across both the SMF and the CHF.

With this enhancement, the offline CHF can easily differentiate between normal offline usage and converted usage records.

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

Reporting of Deferred Usage with Quota Request—CSCvy31552

Behavior Change Summary and Revision History

Summary Data

Table 108: 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 109: Revision History

Revision Details	Release
First introduced. CDETS ID: CSCvy31552	2021.02.0

Behavior Change

Previous Behavior: Earlier while requesting quota for new PCC rules installed by PCF, SMF did not relay the deferred usage to CHF.

New Behavior: If the deferred usage report exists, then the SMF sends such report to the CHF along with the quota request for new PCC rules.

Restoration of Old Deployment CLI for Grafana Dashboard—CSCvx73885

Behavior Change Summary and Revision History

Summary Data

Table 110: 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 111: Revision History

Revision Details	Release
First introduced.	2021.01.1
CDETS ID: CSCvx73885	2021.02.0

Behavior Change

Previous Behavior: Earlier deployment CLI caused Grafana dashboard queries to fail.

The earlier deployment used the following CLI commands:

- K8s name laucs504-cnat

- K8s namespace smf-data

- K8s nf-name smf

New Behavior: In this release, the old deployment CLI is restored to maintain the same behaviour as existed in the SMF Release 2020.02.0. With this deployment CLI, you can configure the app-name, cluster-name, and dc-name that is required for the Grafana dashboard queries.

The new deployment uses the following CLI commands:

- app-name LASMF106

- cluster-name LAUCS504-SMF-DATA

- dc-name LAUCS504

Session-level URR Limitation

Feature Summary and Revision History

Summary Data

Table 112: Summary Data

Applicable Products or Functional Area	SMF
Applicable Platforms	SMI
Feature Default Setting	Disabled – Configuration Required
Related Changes in this Release	Not Applicable
Related Documentation	Not Applicable

Revision History

Table 113: Revision History

Revision Details	Release
Added support for Query Interface IE.	2021.02.0
Introduced support for reconciliation of billing records when CHF is unreachable.	2021.02.0
Added session-level limitations on the N4 interface.	2021.01.1
Introduced support for the following: • Zero Usage Report Suppression • Dynamic ACS Configuration Change	2021.01.0
First introduced.	Pre-2020.02.0

Feature Description

The SMF Charging feature includes the following limitations on the N4 interface:

- If the session-level URR (CDR-i) is created once, it will remain through the session. It will not get deleted in the subsequent session (CDR-u).

- If the session-level URR is not created, then it will not be created in the subsequent CDR-u even if session limits are available.

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

Session Setup Timer Support

Feature Summary and Revision History

Summary Data

Table 114: 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 115: Revision History

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

Feature Description

The SMF supports the custom-driven session setup timer. The session setup timer is triggered when new calls are established. If the call is not established within the defined timeout value, the SMF aborts the call. This timer is applicable to 4G, 5G, and Wi-Fi sessions.

The new **timeout setup** CLI command added under profile DNN configures the session setup timeout value.

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

Show Subscriber Output Change for ARP—CSCvy54440

Behavior Change Summary and Revision History

Summary Data

Table 116: 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 117: Revision History

Revision Details	Release
First introduced. CDETS ID: CSCvy54440	2021.02.2

Behavior Change

Previous Behavior: The values for "preemptCap" and "preemptVuln" attributes of Allocation and Retention Priority (ARP) were displayed as numbers in the output of **show subscriber** CLI command.

The following is an example output of the **show subscriber** command.

```
"arp": {
"preemptCap": 1,
"preemptVul": 1,
"priorityLevel": 8,
}
```

New Behavior: Now, these ARP flags are displayed as strings instead of numbers.

The following is an example output of the **show subscriber** command.

```
"arp": {
"preemptCap": MAY_PREEMPT,
"preemptVul": PREEMPTBLE,
"priorityLevel": 8,
}
```

show subscriber supi Command Support

Feature Summary and Revision History

Summary Data

Table 118: 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 119: Revision History

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

The **show subscriber supi** *supi_value* **psid** *psid_value* **summary** is a new CLI command added in this release to display detailed information about subscriber sessions. This command improves usability and can be used for debugging purposes.

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

SMF Interworking with ISE

Feature Summary and Revision History

Summary Data

Table 120: 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 121: Revision History

Revision Details	Release
Added support for interworking with ISE.	2021.02.2.t1.0
Introduced new CLI option in charging profile to generate the RADIUS accounting trigger on TFT change.	2021.02.0
To support instance awareness on RADIUS, the SMF allows: • Instance-level configuration under RADIUS profile • NAS-IP-Address and NAS-Identifier attribute configuration per instance-id in RADIUS profile configuration • RADIUS Disconnect-Request VIP configuration per instance-id in RADIUS endpoint configuration	2021.02.0

Revision Details	Release
Added support for the following: • PAP, CHAP, and MSCHAP-based RADIUS authentication • Multiple RADIUS NAS-IP source addresses • Handling RADIUS Disconnect and CoA Requests • RADIUS Accounting on SMF • New attributes in the RADIUS Access Response message	2020.02.5.t1
First introduced.	Pre-2020.02.0

Feature Description

SMF supports communication with ISE for Cisco private 5G. Based on the policies that SMF receives from ISE, Cisco private 5G supports various behaviors on the enterprise side. ISE provides a mechanism for the enterprise customers to perform tasks, such as identifying the subscriber, defining groups for the subscribers, and assigning policy.

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

SMF Service Node and Replica Configuration—CSCvx45374

Behavior Change Summary and Revision History

Summary Data

Table 122: 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 123: Revision History

Revision Details	Release
First introduced. CDETS ID: CSCvx45374	2021.02.0

Behavior Change

Previous Behavior: The **endpoint service** and **endpoint sgw-service** configurations allowed a non-zero value to be configured for **nodes**.

New Behavior: This release allows you to configure a zero value for **nodes** and non-zero value for **replicas** in the **endpoint service** and **endpoint sgw-service** configurations.

The SMF service pod template is updated to allow zero count for nodes so that all replicas are part of a single replica set. If node count is configured as zero, the pod affinity rules are not applied and the pod topology constraints are applied (Kubernetes 1.19 and above) instead.

For example:

```
endpoint service
   replicas 10
   nodes 0
   exit
```

Customer Impact: This change provides flexibility to spin service pods on any node matching the node labels with sufficient resources.

smf-service Restart—CSCvy02596

Behavior Change Summary and Revision History

Summary Data

Table 124: 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 125: Revision History

Revision Details	Release
First introduced. CDETS ID: CSCvy02596	2021.02.0

Behavior Change

Previous Behavior: When the call model events (mix of both the 4G and the 5G events) ran and if the smf-service or the in-service upgrade stopped, the smf-service crash occurred.

New Behavior: When the call model events (mix of both the 4G and the 5G events) run, the smf-service pod restart occurs in the following cases:

- smf-service pod recovery operation
- smf-service in-service upgrade

Subscriber IMEI Support

Feature Summary and Revision History

Summary Data

Table 126: 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 127: Revision History

Revision Details	Release
The **monitor subscriber** CLI command includes the **imei** keyword to support subscriber IMEI.	2021.02.0

Revision Details	Release
Added show commands for the RPC feature in App-Infra SMF.	2020.03.0
First introduced.	Pre-2020.02.0

Feature Description

The subscriber IMEI support is added for monitoring and troubleshooting purposes. The following CLI commands are enhanced in this release:

- **monitor subscriber**—The **imei** keyword added to this command specifies the subscriber IMEI as a 15 or 16 digit integer. For example: 123456789012345, *

- **clear subscriber**—The **imei** keyword added to this command clears subscriber details with the specified IMEI ID.

- **show subscriber**—The **imei** keyword added to this command displays subscriber details with the specified IMEI ID.

- **show peers all**—The **interfaceName** keyword added to this command specifies the interface name.

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

Update on SMF Rolling Upgrade

Feature Summary and Revision History

Summary Data

Table 128: 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 129: Revision History

Revision Details	Release
First introduced.	2021.02.0

Feature Description

The SMF does not support rolling software upgrade from release 2021.01 to release 2021.02. In order to upgrade from release 2021.01 to release 2021.02, you must perform a fresh SMF deployment from the Ops Center. For details, see the *Deploying and Configuring SMF through Ops Center* chapter in the *Ultra Cloud Core 5G Session Management Function, Release 2021.02 - Configuration and Administration Guide*.

After the fresh deployment is complete, make sure that all the instance-aware configuration changes are available. For the complete list of configuration changes, see the Instance-aware Configuration Changes, on page 48 section in this document.

Also, make sure to clean up the etcd entries if the **etcd persistence** is enabled through **k8s volume-claims true** command. For the clean-up operation, use the **kubectl exec -it etcd-**<*namespace*>**-etcd-cluster-0 -n cn-cn1 -- etcdctl del --prefix ""** command.

UPF Interaction while Deleting WPS Dynamic Rule—CSCvx68018

Feature Summary and Revision History

Summary Data

Table 130: 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 131: Revision History

Revision Details	Release
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

Behavior Change

Previous Behavior: SMF sets MP flag in N4 message while deleting dynamic rule.

New Behavior: With this release, SMF will not set MP flag in N4 message while deleting dynamic rule if no other existing rules ARP isn't matching wps-profile.

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

User Location Information Reporting Enhancement

Feature Summary and Revision History

Summary Data

Table 132: 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 133: Revision History

Revision Details	Release
Provided support for User Location Information (ULI) reporting	2021.02.0
First introduced.	Pre-2020.02.0

Feature Description

The SMF generates the usage report whenever a change in the subscriber location is detected in the following messages:

- Delete Bearer Command

- Delete Bearer Response

- Modify Bearer Request

This feature is compliant with the 3GPP TS 32.291, version 15.4.0.

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