UCC 5G UPF - Release Change Reference

Features and Behavior Change Quick Reference

Features / Behavior Changes	Release Introduced / Modified
Bias-free Terminologies	2022.01.0
Cisco Ultra Traffic Optimization with VPP, on page 6	2022.01.1
Design of RCM HA Switchover on Mass UP Failure	2022.01.0
ECS Regular Expression, on page 8	2022.01.2
Home Routed Roaming Support on UPF	2022.01.0
Intel Ice Lake Support for VPC-SI	2022.01.0
Nexthop Forwarding Support	2022.01.0
Preventing Multiple Configuration Push Notifications, on page 12	2022.01.1

Features / Behavior Changes	Release Introduced / Modified
QCI 80 Support on UPF, on page 13	2022.01.1
SNMP Trap Notification when UPF Reloads	2022.01.2
Software Management Operations	2022.01.2
Support for Arbitrary Redundancy Group Numbers in RCM Controller	2022.01.2
UPF Deployment Model Support on RH OSP16	2022.01.0
UPF Usage Monitoring over PCF, on page 17	2022.01.0

Feature Defaults Quick Reference

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

Feature	Default
Bias-free Terminologies	Enabled - Always-on
Cisco Ultra Traffic Optimization with VPP	Disabled - Configuration Required
Design of RCM HA Switchover on Mass UP Failure	Enabled - Always-on
ECS Regular Expression	Disabled - Configuration Required
Home Routed Roaming Support on UPF	Enabled - Always-on
Intel Ice Lake Support for VPC-SI	Enabled - Always-on
Nexthop Forwarding Support	Disabled – Configuration Required
Preventing Multiple Configuration Push Notifications	Disabled – Configuration Required
QCI 80 Support on UPF	Enabled – Always-on
SNMP Trap Notification when UPF Reloads	Enabled - Always-on
Software Management Operations	Enabled - Always-on
Support for Arbitrary Redundancy Group Numbers in RCM Controller	Enabled - Always-on
UPF Deployment Model Support on RH OSP16	Enabled - Always-on
UPF Usage Monitoring over PCF	Enabled - Always-on

Bias-free Terminologies

Feature Summary and Revision History

Summary Data

Table 1: Summary Data

Applicable Product (s) or Functional Area	5G-UPF
Applicable Platforms	VPC-SI
Feature Default Setting	Enabled – Always-on
Related Changes in this Release	Not Applicable
Related Documentation	Not Applicable

Revision History

Table 2: Revision History

Revision Details	Release
First introduced.	2022.01.0

Feature Description

Our product and documentation set strives to use bias-free language. For purposes of this documentation set, bias-free is defined as language that doesn't imply discrimination based on age, disability, gender, racial identity, ethnic identity, sexual orientation, socioeconomic status, and intersectionality.

With this release, biased terms present in CLI commands, messages, and logs are being replaced with bias-free terms.

Note   Biased CLI configuration is also supported in this release. However, in the show CLI commands you'll not be able to see biased terms in the output.

The following table provides the list of CLI commands that are updated to replace the biased terms.

CLI Commands in Releases Prior to 2022.01.0	CLI Commands in 2022.01.0 and Later Releases
clear blacklisted-gtpu-bind-address	**clear blockedlisted-gtpu-bind-address**
clear mme-service sgw-blacklist	**clear mme-service sgw-blockedlist**
clear mme-service sgw-blacklist sgw-ip	**clear mme-service sgw-blockedlist sgw-ip**

CLI Commands in Releases Prior to 2022.01.0	CLI Commands in 2022.01.0 and Later Releases
clear mme-service sgw-blacklist mme-service-name	clear mme-service sgw-blockedlist mme-service-name
clear user-plane-service url-blacklisting	clear user-plane-service url-blockedlisting
clear user-plane-service url-blacklisting statistics	clear user-plane-service url-blockedlisting statistics
crypto blacklist file	crypto blockedlist file
crypto blacklist file update	crypto blockedlist file update
crypto whitelist	crypto permitlist
default url-blacklisting	default url-blockedlisting
default url-blacklisting action	default url-blockedlisting action
diameter msg-type ccrt suppress-blacklist-reporting	diameter msg-type ccrt suppress-blockedlist-reporting
diameter reauth-blockedlisted-content	diameter reauth-blockedlisted-content
flow end-condition timeout url-blacklisting	flow end-condition timeout url-blockedlisting
link-aggregation master group	link-aggregation primary group
require diameter-proxy master-slave	require diameter-proxy primary-secondary
sgw-blacklist	sgw-blockedlist
sgw-blacklist timeout	sgw-blockedlist timeout
sgw-blacklist timeout 8 msg-timeouts-per-min	sgw-blockedlist timeout 8 msg-timeouts-per-min
show active-charging url-blacklisting	show active-charging url-blockedlisting
show crypto blacklist	show crypto blockedlist
show crypto whitelist	show crypto permitlist
show crypto whitelist file	show crypto permitlist file
show mme-service sgw-blacklist	show mme-service sgw-blockedlist
show user-plane-service inline-services url-blacklisting statistics	show user-plane-service inline-services url-blockedlisting statistics
snmp trap suppress BlackListingDBFail	snmp trap suppress BlockedListingDBFail
snmp trap suppress BlacklistingDBFailClear	snmp trap suppress BlockedlistingDBFailClear
snmp trap suppress BlackListingDBUpgradeFail	snmp trap suppress BlockedListingDBUpgradeFail
snmp trap suppress BlacklistingDBUpgradeFailClear	snmp trap suppress BlockedlistingDBUpgradeFailClear
url-blacklisting	url-blockedlisting
url-blacklisting action	url-blockedlisting action
url-blacklisting action discard content-id	url-blockedlisting action discard content-id
url-blacklisting match-method	url-blockedlisting match-method

CLI Commands in Releases Prior to 2022.01.0	CLI Commands in 2022.01.0 and Later Releases
whitelist	permitlist

The help string of the following CLI commands has been updated to replace the biased terms:

- **act-mmgr-inst**

- **diameter enable-quota-retry**

- **diameter enable-quota-retry end-user-service-denied**

- **ispc link A**

- **sgsn op enable ccpu debug_log facility mmgr**

- **sgsn retry-unavailable-ggsn**

- **sgsn test mmgr**

- **show ssi ccpu debug_log facility**

- **system packet-dump di-net card 3 bond a/b**

- **uidh-insertion server-name svc bypass wl-lookup**

Downgrade Procedure

When you downgrade from 2022.01.0 to any prior release version (2021.x.y), the biased term keywords used in CLI commands get lost due to the biased language changes. To have smooth backward compatibility transition along with bias-free terms in CLI commands, follow the prerequisite before downgrading to the lower versions:

Prerequisite:

- Before you upgrade from a lower version to 2022.01.0, back up the existing configurations.

Downgrade the chassis with the version 2021.x.y using the backed-up configuration.

Note After the downgrade, the show configuration won't have the biased terms CLI.

If you fail to save the configurations before upgrade, configure the required biased CLI commands manually, save, and reload the chassis.

Cisco Ultra Traffic Optimization with VPP

Feature Summary and Revision History

Summary Data

Table 3: Summary Data

Applicable Product(s) or Functional Area	5G-UPF
Applicable Platform(s)	VPC-SI
Feature Default Setting	Disabled - Configuration Required
Related Changes in this Release	Not Applicable
Related Documentation	*UCC 5G UPF Configuration and Administration Guide*

Revision History

Table 4: Revision History

Revision Details	Release
First introduced.	2022.01.1

Feature Description

The UPF supports Cisco Ultra Traffic Optimization (CUTO) on Vector Packet Processing (VPP).

The Cisco Ultra Traffic Optimization is a RAN optimization technology that increases the subscriber connection speeds in congested cells and, as a result, increases the cell capacity significantly. The result is an optimized RAN, where Mobile Network Operators (MNOs) can deploy fewer cells, on an ongoing basis, and absorb more traffic growth while meeting network quality targets.

Large traffic flows, such as Adaptive Bit Rate (ABR) video, saturate radio resources and swamp the eNodeB scheduler. The Cisco Ultra Traffic Optimization employs machine learning algorithms to detect large traffic flows (such as video) in the network. It also optimizes the Delivery of those flows to mitigate the network congestion without changing the user quality (that is, video works the same for you). In other words, by employing software intelligence at the network core, Cisco Ultra Traffic Optimization mitigates the overwhelming impact the video has on the RAN.

The resulting benefits are seen in congested network sites. The Cisco Ultra Traffic Optimization:

- Increases average user throughput.

- Increases congested cell site capacity.

- Reduces scheduler latency.

- Maintains user quality of experience even when more users and more traffic share a cell.

- Is measured directly by eNodeB performance counters (for example, average UE throughput, scheduler latency). These are the key performance indicators that are used for network capacity planning.

- Provides permanent savings in RAN investment requirements.

- Is integrated in the Cisco StarOS P-GW.

- Requires no new hardware or cabling complexity - it can be turned on for a market in an hour.

- Supports HTTP or HTTPS, and QUIC traffic.

For more information, refer to the UCC 5G UPF Configuration and Administration Guide > Cisco Ultra Traffic Optimization with VPP chapter.

Design of RCM HA Switchover on Mass UP Failure

Feature Summary and Revision History

Summary Data

Table 5: Summary Data

Applicable Product (s) or Functional Area	5G-UPF
Applicable Platforms	VPC-SI
Feature Default Setting	Enabled – Always-on
Related Changes in this Release	Not Applicable
Related Documentation	Not Applicable

Revision History

Table 6: Revision History

Revision Details	Release
First introduced.	2022.01.0

Feature Changes

RCM HA switchover on mass UP failure is now supported in 5G-UPF.

Previous Behavior: RCM HA switchover occurs instantly when all UPs go down.

New Behavior: RCM HA switchover occurs after three minutes when all UPs go down.

Customer Impact: Reloading all UPs will not trigger RCM HA switchover in the usual RCM operation as the operator intentionally reloads all UPs.

Note	Undetected network isolation is not likely in this case as L2 VRRP protocol will cover any such network isolation case.

ECS Regular Expression

Feature Summary and Revision History

Summary Data

Table 7: Summary Data

Applicable Product(s) or Functional Area	5G-UPF
Applicable Platform(s)	VPC-SI
Feature Default Setting	Disabled - Configuration Required
Related Changes in This Release:	Not Applicable
Related Documentation	*UCC 5G UPF Configuration and Administration Guide*

Revision History

Table 8: Revision History

Revision Details	Release
First introduced.	2022.01.2

Feature Description

The ECS Regular Expression feature supports the implementation of regex engine in the User Plane Function (UPF). Furthermore, this feature allows you to configure the regex rule through RCM.

The UPF supports the following protocols as part of regex engine rebuild and rule matching.

- HTTP
  - URL
  - URI
  - HOST
- WWW

- URL

- URI

- RTSP

  - URL

  - URI

For more information, refer to the UCC 5G UPF Configuration and Administration Guide > ECS Regular Expression chapter.

Home Routed Roaming Support on UPF

Feature Summary and Revision History

Summary Data

Table 9: Summary Data

Applicable Product (s) or Functional Area	5G-UPF
Applicable Platforms	VPC-SI
Feature Default Setting	Enabled – Always-on
Related Changes in this Release	Not Applicable
Related Documentation	*UCC 5G UPF Configuration and Administration Guide*

Revision History

Table 10: Revision History

Revision Details	Release
First introduced.	2022.01.0

Feature Description

The mobile network operators form roaming partnerships to provide seamless services to their subscribers in geographies beyond their network reach. Operator network boundaries are designated by public land mobile networks (PLMN). The home network for a subscriber is called an HPLMN and the visited network, which renders the mobile service is termed as the VPLMN.

The VPLMN provides access network services and packet routing to the packet core, whereas the HPLMN provides data network access to the subscriber. This feature enables the UPF to support the flavor of routing that is termed as the Home Routed (HR) roaming.

This feature provides the following functionalities on the vUPF:

- Handle the dummy PDRs with associated FAR action as buffer.

- Buffer the incoming packets before rule matching.

- Handle the QoS and FAR updates from the SMF for debuffering of packets.

- Send the buffered packets after matching with the PDR.

- Support for sending vUPF traffic over Fast Path.

- Support the N9 interface GTP-U tunnel.

- Support for LI.

- Support for MonSub CLI command and PCAP file.

This feature provides the following functionalities on the vUPF and hUPF:

- Support QoS flow Based Charging (QBC) on the UPF.

For more information, refer to the UCC 5G UPF Configuration and Administration Guide > Home Routed Roaming Support on UPF chapter.

Intel Ice Lake Support for VPC-SI

Feature Summary and Revision History

Summary Data

Table 11: Summary Data

Applicable Product (s) or Functional Area	5G-UPF
Applicable Platforms	VPC-SI
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.	2022.01.0

Feature Description

With this release, support is added for Intel Ice Lake CPU with Intel E810 for VPC-SI platform.

Nexthop Forwarding Support

Feature Summary and Revision History

Summary Data

Table 13: Summary Data

Applicable Product (s) or Functional Area	5G-UPF
Applicable Platforms	VPC-SI
Feature Default Setting	Disabled – Configuration Required
Related Changes in this Release	Not Applicable
Related Documentation	*UCC 5G UPF Configuration and Administration Guide*

Revision History

Table 14: Revision History

Revision Details	Release
First introduced.	2022.01.0

Feature Description

In uplink direction, the UE and the GI IP can be in a different subnet. The routing path in UPF is defined to allow the uplink packet to be forwarded accordingly.

Nexthop IP address can be configured at both UPF and SMF. At the SMF, you can configure Nexthop IP address under DNN profile or IPAM profile. During PDU Establishment, the SMF relays the IPv4/IPv6 address over the N4 interface in the NEXT HOP IP private IE in a PFCP Session Establishment Request. At the UPF, you can configure Nexthop IP address through Charging-Action.

For more information, refer to the UCC 5G UPF Configuration and Administration Guide > Nexthop Forwarding Support chapter.

Preventing Multiple Configuration Push Notifications

Feature Summary and Revision History

Summary Data

Table 15: Summary Data

Applicable Product (s) or Functional Area	5G-UPF
Applicable Platforms	VPC-SI
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
First introduced.	2022.01.1

Feature Changes

Previous Behavior: On TCP reconnection between UPF and RCM Controller, the UPF sends configuration-push complete notification. If the configuration-push is notified as "false" from the UPF, RCM sends configuration-push re-notification toward NSO.

New Behavior: In 2022.01.1 and later releases, you can prevent multiple configuration-push notifications toward NSO by configuring the following CLI command in RCM ops-center:

```
k8 smf profile rcm-config-ep disable-repeat-config-push { true | false }
```

By default, the CLI command is set to **false**.

Customer Impact: There is no impact if the CLI is not used. Default behavior is the same as existing behavior.

QCI 80 Support on UPF

Feature Summary and Revision History

Summary Data

Table 17: Summary Data

Applicable Product(s) or Functional Area	5G-UPF
Applicable Platform(s)	VPC-SI
Feature Default Setting	Enabled – Always-on
Related Changes in this Release	Not Applicable
Related Documentation	*UCC 5G UPF Configuration and Administration Guide*

Revision History

Table 18: Revision History

Revision Details	Release
First introduced.	2022.01.1

Feature Description

The 5G-UPF supports new standard QoS Class Index (QCI) 80 based on 3GPP TS 23.203, for establishing a non-GBR QoS flow when an application sends traffic to the specific destination.

For more information, refer to the UCC 5G UPF Configuration and Administration Guide > QCI 80 Support on UPF chapter.

SNMP Trap Notification when UPF Reloads

Feature Summary and Revision History

Summary Data

Table 19: Summary Data

Applicable Product(s) or Functional Area	5G-UPF
Applicable Platform(s)	VPC-SI

Feature Default Setting	Enabled – Always-on
Related Changes in This Release:	Not Applicable
Related Documentation	*UCC 5G UPF Configuration and Administration Guide*

Revision History

Table 20: Revision History

Revision Details	Release
First introduced.	2022.01.2

Feature Changes

Previous Behavior: No SNMP trap is generated when the UPF reloads.

New Behavior: New SNMP trap (**UPFReloaded**) is generated when RCM reloads the UPF.

Customer Impact: New trap alerts you when the UPF is reloaded.

Software Management Operations

Feature Summary and Revision History

Summary Data

Table 21: Summary Data

Applicable Product(s) or Functional Area	5G-UPF
Applicable Platform(s)	VPC-SI
Feature Default Setting	Enabled – Always-on
Related Changes in This Release:	Not Applicable
Related Documentation	*UCC 5G UPF Configuration and Administration Guide*

Revision History

Table 22: Revision History

Revision Details	Release
First introduced.	2022.01.2

Feature Description

5G UPF supports backward compatibility of software releases on the SMF and the UPF. The feature allows seamless upgrade/downgrade of the software from/to one previous release (N-1). The functionality includes support for the following:

- N-1 compatibility of software releases on two UPFs in ICSR mode—allows seamless upgrade of UPFs from one version to another in UPF 1:1 redundancy scenario.

- N-1 compatibility of software releases between SMF and UPF—allows seamless upgrade of the associated SMF or UPF from one version to another.

- N-1 compatibility of software releases between SMF and UPF with multi-Sx—allows seamless upgrade of the associated SMF or UPF from one version to another in multi-Sx scenario.

For more information, refer to the UCC 5G UPF Configuration and Administration Guide > Software Management Operations chapter.

Support for Arbitrary Redundancy Group Numbers in RCM Controller

Feature Summary and Revision History

Summary Data

Table 23: Summary Data

Applicable Product(s) or Functional Area	5G-UPF
Applicable Platform(s)	VPC-SI
Feature Default Setting	Enabled – Always-on
Related Changes in This Release:	Not Applicable
Related Documentation	Not Applicable

Revision History

Table 24: Revision History

Revision Details	Release
First introduced.	2022.01.2

Feature Changes

Previous Behavior: RCM Controller does not support redundancy group number greater than 10.

New Behavior: Arbitrary redundancy group numbers are supported (subject to minimum value of 1). For example, in the **rcm pause switchover { true | false } [red-group** *red_group_number* **]** CLI command, you can provide an arbitrary *red_group_number* value.

Customer Impact: None

UPF Deployment Model Support on RH OSP16

Feature Summary and Revision History

Summary Data

Table 25: Summary Data

Applicable Product (s) or Functional Area	5G-UPF
Applicable Platforms	VPC-SI
Feature Default Setting	Enabled – Always-on
Related Changes in this Release	Not Applicable
Related Documentation	Not Applicable

Revision History

Table 26: Revision History

Revision Details	Release
First introduced.	2022.01.0

Feature Description

With this release, support is added for the UPF deployment model of installing a Virtual Machine (VM) on Red Hat OpenStack Platform 16.

UPF Usage Monitoring over PCF

Feature Summary and Revision History

Summary Data

Table 27: Summary Data

Applicable Product(s) or Functional Area	5G-UPF
Applicable Platform(s)	VPC-SI
Feature Default Setting	Enabled - Always-on
Related Changes in This Release:	Not Applicable
Related Documentation	• *UCC 5G SMF Configuration and Administration Guide* • *UCC 5G UPF Configuration and Administration Guide*

Revision History

Revision Details	Release
First introduced.	2022.01.0

Feature Description

UPF supports usage monitoring control over existing N4 interface to report usage thresholds provided from PCF over N7 interface through SMF for both 4G and 5G sessions. UPF reports the usage threshold breach to SMF through Session Report Request and SMF sends the data to PCF. UPF supports the modification of usage monitoring parameters, such as Total Volume, Uplink Volume, or Downlink Volume thresholds and the disabling of usage monitoring based on non-reception of usage monitoring threshold or related triggers from PCF.

Usage Reporting

UPF measures the volume and the time usage of all traffic for the PDU session or the corresponding service data flows. UPF sends the accumulated usage report in either the PFCP Session Report Request or the PFCP Session Modification Response to SMF. SMF includes one or multiple accumulated usage reports in the "accuUsageReports" attribute towards PCF.

Note The *Usage Monitoring over PCF* feature is enabled from SMF.

NOTE: To know more about how SMF handles this functionality, refer to the *Usage Monitoring over PCF* section in the *Policy and User Plane Management* chapter of *UCC 5G SMF Configuration and Administration Guide*.