UCC 5G UPF Release Notes, Release 2024.01.1

First Published: 2024-03-26

Ultra Cloud Core User Plane Function

Introduction

This Release Notes identifies changes and issues related to this software release.

Release Lifecycle Milestones

Release Lifecycle Milestone	Milestone	Date
First Customer Ship	FCS	30-Apr-24
End of Life	EoL	30-Apr-24
End of Software Maintenance	EoSM	29-Oct-25
End of Vulnerability and Security Support	EoVSS	31-Oct-25
Last Date of Support	LDoS	31-Oct-26

These milestones and the intervals between them are defined in the Cisco Ultra Cloud Core (UCC) Software Release Lifecycle Product Bulletin available on cisco.com.

Release Package Version Information

Software Packages	Version
companion-vpc-21.28.m21.tgz.SPA.tar.gz	21.28.m21
qvpc-si-21.28.m21.bin.SPA.tar.gz	21.28.m21
qvpc-si-21.28.m21.qcow2.tgz.SPA.tar.gz	21.28.m21
NED package	ncs-6.1.3-cisco-staros-5.52
NSO	6.1.3

Descriptions for the various packages provided with this release are available in the Release Package Descriptions, on page 9 section.

Verified Compatibility

Products	Version
ADC Plugin	2.73.9.2019
RCM	2024.01.1
Ultra Cloud Core SMI	2024.01.1
Ultra Cloud Core SMF	2024.01.2

What's New in this Release

New in Documentation

This version of Release Notes includes a new section titled **What's New in this Release** comprising all new features, enhancements, and behavior changes applicable for the release.

This section will be available in all the 5G release notes and will supersede content in the Release Change Reference (RCR) document. Effective release 2024.01, the RCR document will be deprecated.

Features and Enhancements

This section covers a brief description of the features and enhancements introduced in this release. It also includes links to detailed documentation, where available.

Feature	Description
Gating Control Using Additional QER	The number of QERs per PDR supported in UPF is increased from two to three in this release. All rules and filters are sent to UPF through PDRs. SMF sends an additional QER for dynamic rules installed on default QFI/bearer. The Gate Status IE indicates whether the gate is open or closed. **Default Setting**: Not Applicable

Feature	Description
Liveliness Check between UPF and RCM using Heartbeat Communication	The application-level heartbeat mechanism allows you to monitor the liveliness of the TCP connection between UPF and RCM. This feature will resolve the half-closed TCP connections between RCM checkpoint managers and UP session managers. RCM sends a heartbeat message every 3 seconds. It checks if it has received the heartbeat message from UPF in the last 60 seconds. RCM will close the TCP connection if it has not received the message. This behavior is applicable for both Active UP to RCM and RCM to Standby UP communication. UPF also behaves similarly where it sends a heartbeat message every 3 seconds. UPF checks if it has received the heartbeat from RCM in the last 60 seconds. If UPF has not received the message, then it will close the TCP connection. The heartbeat functionality is configurable on RCM and UPF using the following commands: • RCM—**k8 smf profile rcm-config-ep enable-up-heartbeat { true | false }** in Config mode • UPF—**up-sm-heartbeat { enable | disable }** in Redundancy Configuration Module mode The following show commands on RCM and UPF display the total number of heartbeat messages received and sent: • RCM—**rcm show-statistics checkpointmgr-endpointstats** • UPF—**show rcm checkpoint statistics sessmgr all** **Default Setting**: Disabled – Configuration required to enable

Behavior Changes

This section covers a brief description of behavior changes introduced in this release.

Behavior Change	Description
Accurate Correlation of Application Instance IDs for Traffic Optimization	When you configure the **adc app-notification once-per-app** CLI in ACS Rulebase, UPF optimizes the reporting once per application. Upon detecting traffic for an application, UPF sends an APP-START notification to SMF with an Application Instance ID. This ID is the flow-id for the first data flow of an application. **Previous Behavior**: When the last data flow of the application gets terminated, the flow-id of that data flow is used as the Application Instance ID in APP-STOP notification. This causes issues for PCF to correlate the APP-START and APP-STOP notifications. **New Behavior**: UPF caches the Application Instance ID from the first data flow. When the last data flow of an application terminates, UPF sends the cached Instance ID with the APP-STOP notification. This behavior enables PCF to correlate the APP-START and APP-STOP notifications and identify the application traffic appropriately.
LCI Reporting to Control Plane	UPF sends the load control information (LCI) to the control plane, to inform the operating status of its resources at the node level. The control plane uses this information to augment UPF selection procedures. **Previous Behavior**: UPF reported only one LCI per session manager to the control plane because of which some associated CPs did not receive the LCI. **New Behavior**: UPF reports one LCI to each PFCP peer per session manager. The control plane will be able to distribute calls evenly over multiple UPFs. • For cnSGW or legacy S-GW, LCI is reported only if the CP sends the load bit in the CP Function Features IE during Sx Association Setup or Update. • By default, UPF enables LCI reporting to SMF. Hence, the load bit in CP Function Features IE is optional for SMF. • The debug CLI **show session subsystem facility sessmgr all debug-info** displays the current and reported load metrics on UPF. • Error logs will be generated when the load metric is reported to the control plane. The following is an example of an error log: `2024-Mar-15+08:12:54.517 [sx 221333 info] [1/0/8083 <sessmgr:6> sx_fsm.c:1311] [context: EPC2-UP, contextID: 2] [software internal system critical-info syslog] LCI with load-metric = 19 and sequence-number = 1710489965 sent to Peer: 20.20.20.54` **Customer Impact**: Each CP that supports LCI reporting will now receive multiple messages with the same LCI value from a UPF.

Behavior Change	Description
Redirected Packet Drop Statistics	**Previous Behavior**: The drop counters were not incremented for redirected packets when the **flow action redirect-url** CLI was configured. **New Behavior**: The drop counter is incremented for redirected packets with the **flow action redirect-url** configuration. The new **Redirect-URL** field under **Flow apply action** in the output of the **show user-plane-service statistics drop-counter** command displays the number of redirected packets that are dropped. **Customer Impact**: For each redirected packet, you can view the incremented packet drop counter.
SxDemux Stops IP Pool Deregistration Request towards VPNmgr on Standby UPF	**Previous Behavior**: After receiving the Sx peer delete checkpoint, SxDemux initiated the IP pool deregistration request towards VPNMgr on a standby UPF. This behavior led to IP chunk deletion resulting in call preallocation failure on a standby UPF. **New Behavior**: SxDemux does not initiate the IP pool deregistration request towards VPNMgr on a standby UPF, after receiving the Sx peer delete checkpoint. This behavior prevents call preallocation failure on a standby UPF.

Installation and Upgrade Notes

This Release Note does not contain general installation and upgrade instructions. Refer to the existing installation documentation for specific installation and upgrade considerations.

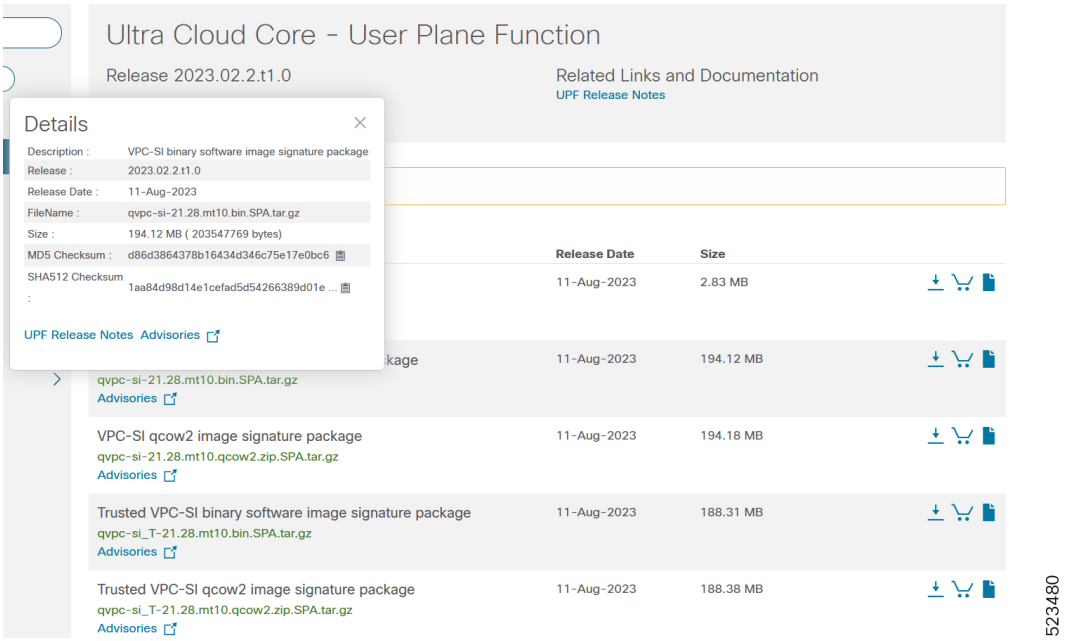
Software Integrity Verification

To verify the integrity of the software image you have from Cisco, you can validate the SHA512 checksum information against the checksum identified by Cisco for the software.

Image checksum information is available through **Cisco.com Software Download Details**. To find the checksum, hover the mouse pointer over the software image you have downloaded.

The following screenshot is an example of a UPF release posted in the Software Download page.

Figure 1:



At the bottom you find the SHA512 checksum, if you do not see the whole checksum you can expand it by pressing the "..." at the end.

To validate the information, calculate a SHA512 checksum using the information in Table 1 and verify that it matches either the one provided on the software download page.

To calculate a SHA512 checksum on your local desktop, refer to the following table.

Table 1: Checksum Calculations per Operating System

Operating System	SHA512 checksum calculation command examples
Microsoft Windows	Open a command line window and type the following command: **`> certutil.exe -hashfile`** *`filename.extension`* **`SHA512`**
Apple MAC	Open a terminal window and type the following command: **`$ shasum -a 512`** *`filename.extension`*
Linux	Open a terminal window and type the following command: **`$ sha512sum`** *`filename.extension`* OR **`$ shasum -a 512`** *`filename.extension`*
NOTES: *filename* is the name of the file. *extension* is the file extension (for example, .zip or .tgz).	

If the SHA512 checksum matches, you can be sure that no one has tampered with the software image or the image has not been corrupted during download.

If the SHA512 checksum does not match, we advise you to not attempt upgrading any systems with the corrupted software image. Download the software again and verify the SHA512 checksum again. If there is a constant mismatch, please open a case with the Cisco Technical Assistance Center.

Certificate Validation

UPF software images are signed via x509 certificates. Please view the .README file packaged with the software for information and instructions on how to validate the certificates.

Open Bugs for this Release

There are no open bugs in this specific software release.

Resolved Bugs for this Release

The following table lists the resolved bugs in this specific software release.

Note This software release may contain bug fixes first introduced in other releases. Additional information for all resolved bugs for this release are available in the Cisco Bug Search Tool.

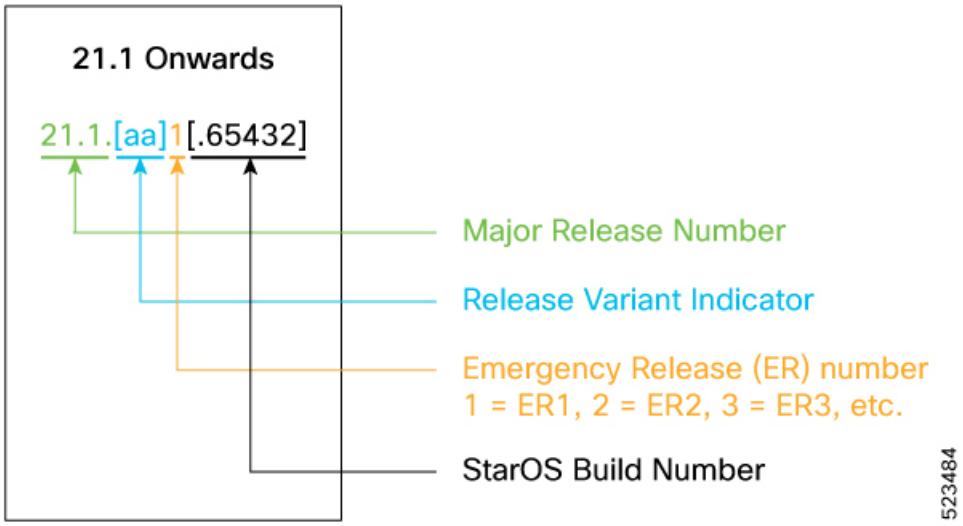
Bug ID	Headline	Behavior Change
CSCwi03248	Some of non-std QCI bulkstats counters are zero	No
CSCwi47535	First-Packet-Time is wrongly set for RB URR whn recal measmnt IE is receivd & data sent again	No
CSCwi75020	Data drop is seen on UPF, when Pure p call (using cnPGW) attached with Dual stack cli	No
CSCwi94430	Need to stop IP chunk deregistration reqest on sxdemux on standby chassis	Yes
CSCwi97129	Application instance identifier correlation is incorrect with ADC optimization	Yes
CSCwj03102	UPF needs to send LCI to all supported CP	Yes
CSCwj12799	UPF behavior not correct to flip the byte order in ID field	No

Operator Notes

StarOS Version Numbering System

The output of the **show version** command displays detailed information about the version of StarOS currently running on the ASR 5x00 or Cisco Virtualized Packet Core platform.

The Version Build Number for releases 21.1 and later include a major and emergency release number, for example, "21.1.1".

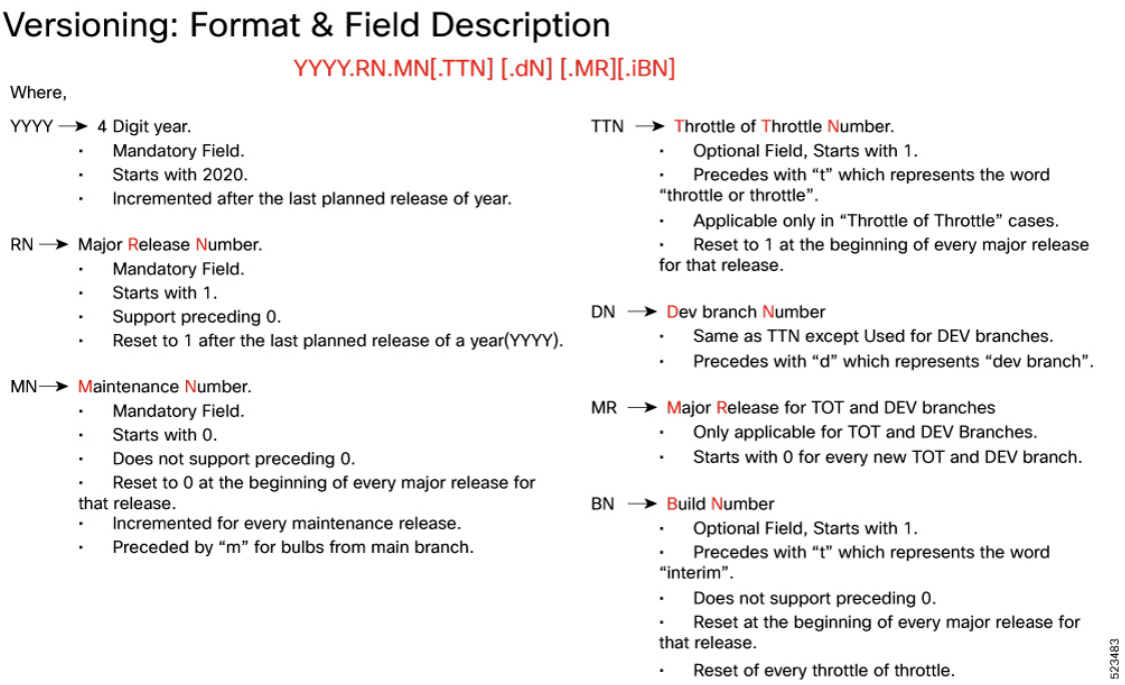


The appropriate version number field increments after a version has been released. The new version numbering format is a contiguous sequential number that represents incremental changes between releases. This format facilitates identifying the changes between releases when using Bug Search Tool to research software releases.

Note The 5G UPF software is based on StarOS and implements the version numbering system described in this section. However, as a 5G network function (NF), it is posted to Cisco.com under the Cloud Native Product Numbering System as described in Cloud Native Product Version Numbering System, on page 8.

Cloud Native Product Version Numbering System

The show helm list command displays detailed information about the version of the cloud native product currently deployed.



The appropriate version number field increments after a version has been released. The new version numbering format is a contiguous sequential number that represents incremental changes between releases. This format facilitates identifying the changes between releases when using Bug Search Tool to research software releases.

Release Package Descriptions

The following table provides descriptions for the packages that are available with this release.

Software Packages	Description
companion-vpc-<staros_version>.zip.SPA.tar.gz	Contains files pertaining to VPC, including SNMP MIBs, RADIUS dictionaries, ORBEM clients, etc. These files pertain to both trusted and non-trusted build variants. The VPC companion package also includes the release signature file, a verification script, the x.509 certificate, and a README file containing information on how to use the script to validate the certificate.
qvpc-si-<staros_version>.bin.SPA.tar.gz	The UPF release signature package. This package contains the VPC-SI deployment software for the UPF as well as the release signature, certificate, and verification information. Files within this package are nested under a top-level folder pertaining to the corresponding StarOS build.

Software Packages	Description
qvpc-si-<staros_version>.qcow2.zip.SPA.tar.gz	The UPF release signature package. This package contains the VPC-SI deployment software for the UPF as well as the release signature, certificate, and verification information. Files within this package are nested under a top-level folder pertaining to the corresponding StarOS build.
qvpc-si_T-<staros_version>.bin.SPA.tar.gz	The trusted UPF release signature package. This package contains the VPC-SI deployment software for the UPF as well as the release, signature, certificate, and verification information. Files within this package are nested under a top-level folder pertaining to the corresponding StarOS build.
qvpc-si_T-<staros_version>.qcow2.zip.SPA.tar.gz	The trusted UPF release signature package. This package contains the VPC-SI deployment software for the UPF as well as the release, signature, certificate, and verification information. Files within this package are nested under a top-level folder pertaining to the corresponding StarOS build.
ncs-<nso_version>-cisco-staros-<version>.signed.bin	The NETCONF NED package. This package includes all the files that are used for NF configuration. Note that NSO is used for NED file creation.

Obtaining Documentation and Submitting a Service Request

For information on obtaining documentation, using the Cisco Bug Search Tool (BST), submitting a service request, and gathering additional information, refer to https://www.cisco.com/c/en/us/support/index.html.