



# Release Notes for StarOS™ Software Version 21.28.h0

**First Published:** October 13, 2022

**Last Updated:** October 13, 2022

## Introduction

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

## Release Package Version Information

**Table 1 - Release Package Version Information**

Software Packages	Version
StarOS packages	21.28.h0, build 87243

## Feature and Behavior Changes

Refer to the [Release Change Reference](#) for a complete list of feature and behavior changes associated with this software release.

## Related Documentation

For a complete list of documentation available for this release, go to <http://www.cisco.com/c/en/us/support/wireless/asr-5000-series/products-installation-and-configuration-guides-list.html>.

## 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.

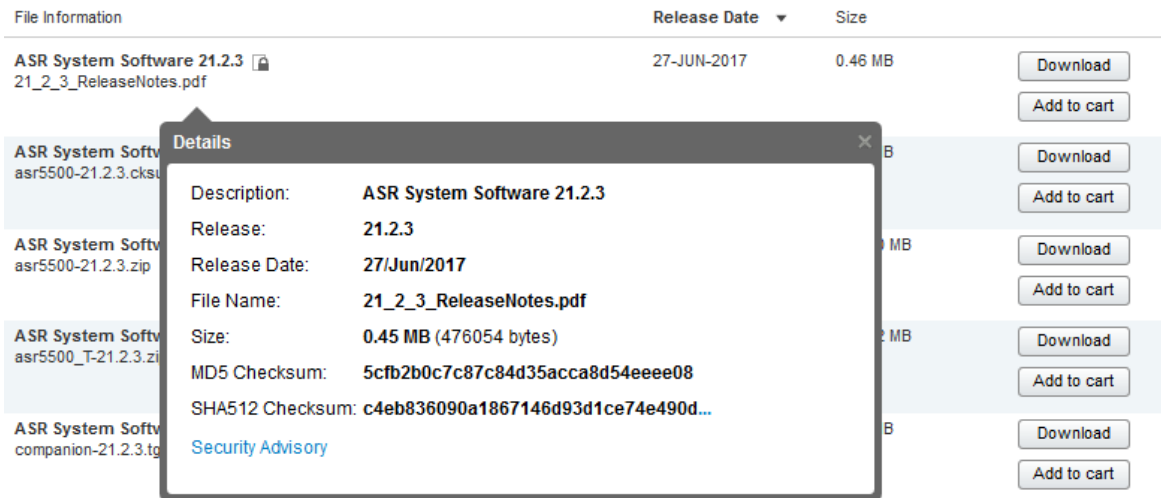
## Firmware Updates

There are no firmware upgrades required for this release.

## 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.



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 2](#) and verify that it matches either the one provided on the software download page.

To calculate a SHA512 checksum on your local desktop see [Table 2](#).

**Table 2 - Checksum Calculations per Operating System**

Operating System	SHA512 checksum calculation command examples
Microsoft Windows	Open a command line window and type the following command  <pre>&gt; certutil.exe -hashfile &lt;filename&gt;.&lt;extension&gt; SHA512</pre>
Apple MAC	Open a terminal window and type the following command  <pre>\$ shasum -a 512 &lt;filename&gt;.&lt;extension&gt;</pre>
Linux	Open a terminal window and type the following command  <pre>\$ sha512sum &lt;filename&gt;.&lt;extension&gt;</pre> <p>Or</p> <pre>\$ shasum -a 512 &lt;filename&gt;.&lt;extension&gt;</pre>
<p><b>NOTES:</b></p> <p>&lt;filename&gt; is the name of the file.</p> <p>&lt;extension&gt; is the file extension (e.g. .zip or .tgz).</p>	

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

In 21.12.0 and later releases, software images for StarOS, VPC-DI, and VPC-SI, and the companion software packages for StarOS and VPC are signed via x509 certificates. In pre-21.12.0 releases, image signing is not supported for VPC-DI and VPC-SI images, and for StarOS and VPC companion software packages.

USP ISO images are signed with a GPG key.

For more information and instructions on how to validate the certificates, refer to the README file available with the respective software packages.

## Open Bugs in this Release

The following table lists the known bugs that were found in, and remain open in this software release.

**NOTE:** This software release may contain open bugs first identified in other releases. Additional information for all open bugs for this release are available in the [Cisco Bug Search Tool](#).

**Table 3 - Open Bugs in this Release**

Bug ID	Headline	Product Found*
CSCwc34754	Active call got disconnected during handoff from 4G to wifi on ICSR setup with Gx-Alias enabled.	cups-cp
CSCvv13409	[BP-CUPS]URR node not found at CP for URR-id: 0x82 received in Usage Report	cups-cp
CSCwc47854	"with gx-alias, update of default bearer QCI/ARP values leading to creation of dedicated bearer "	cups-cp
CSCwd19554	[BP-CUPS] memory bloating at acsmgr_cups_allocate_charging_snapshot	cups-cp
CSCwd19379	[BP-CUPS] call drops on sessmgr task kill - recover_sgx_from_crr failed	cups-cp
CSCwc53344	[BP-CUPS] Function: Assertion failure sessmgr_func.c:37116 Function: sessmgr_get_session_entry	cups-up
CSCwc73243	[BP-CUPS] Assertion failure at sess/sctrl/sessctrl_uplane_cfg_sync.c:23721	cups-up
CSCwc97902	[BP-CUPS] V6 peers not coming up due to cause PFCP_CAUSE_REQUEST_REJECTED	cups-up
CSCwc65963	sessmgr restart is seen when configuring and unconfiguring Lawful intercept CLIs multiple times	mme
CSCwd29108	[NSO-MOB-FP] error with nfv-vim package with NSO 5.7.6.2 or 5.8.4 or 5.6.8 and MFP 3.4	nso-mob-fp
CSCwd02729	Continuous EGTPCPathFailClear traps after receiving echo requests during no session	pdn-gw
CSCvy09744	[CP-SGSN] sessmgr restart seen with function egtpc_handle_del_bearer_cmd_req_evt	sgsn
CSCwd27711	[UPF-SVI] : Uplane received invalid far id in PDU	upf
CSCwd03136	[NRF]: UPF gives error with configuration of another nrf-service	upf
CSCwd22313	[CUPS-UPF]First SX heartbeat in new active UPF is not retransmitted	upf
* Information in the "Product Found" column identifies the product in which the bug was initially identified.		

## Resolved Bugs in this Release

Since this is first release, there is no specific resolved bug listed.

**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](#).

## Operator Notes

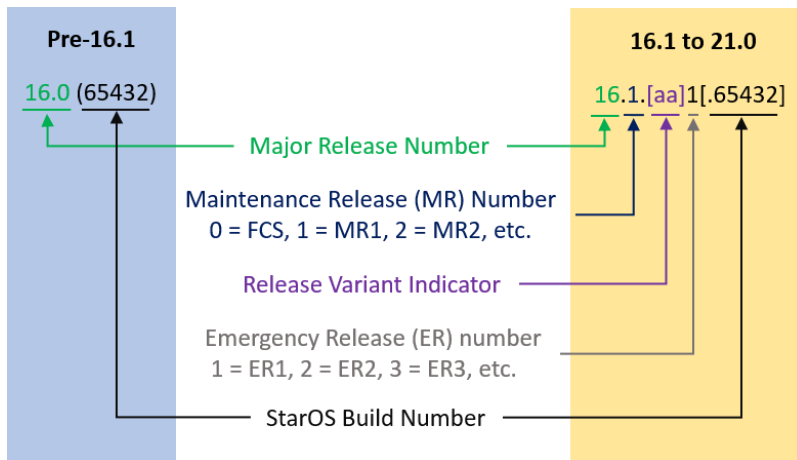
### StarOS Version Numbering System

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.

Prior to release 16.1, the *Image Version* field displayed a branch of software including the build number, for example “16.0 (55435)”. Subsequent releases of software for the major release differed only in build number. Lab Quality/EFT releases versus deployment releases also differed only in build number.

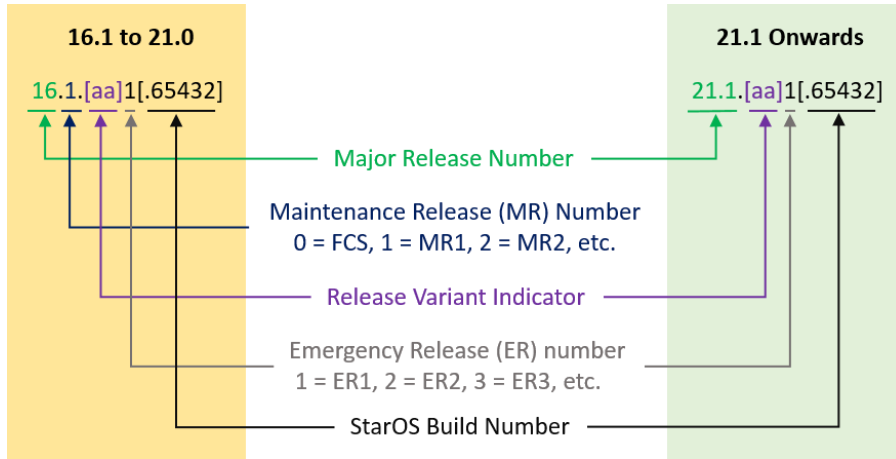
From release 16.1 onwards, the output of the **show version** command, as well as the terminology used to describe the Build Version Number fields, has changed. Additionally, **show version** will display slightly different information depending on whether or not a build is suitable for deployment.

The Version Build Number for releases between 16.1 and 21.0 include a major, maintenance, and emergency release number, for example “16.1.2”.



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

Operator Notes



In either scenario, 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 will facilitate identifying the changes between releases when using Bug Search Tool to research software releases.

## Release Package Descriptions

[Table 4](#) provides descriptions for the packages that are available with this release.

**Table 4 - Release Package Information**

In 21.12.0 and later Releases	In pre-21.12.0 Releases	Description
<b>ASR 5500</b>		
asr5500-<release>.zip	asr5500-<release>.bin	Contains the signed ASR 5500 software image, the signature file, a verification script, the x509 certificate, and a README file containing information on how to use the script to validate the certificate.
asr5500_T-<release>.zip	asr5500_T-<release>.bin	Contains the signed, trusted ASR 5500 software image, the signature file, a verification script, the x509 certificate, and a README file containing information on how to use the script to validate the certificate.
<b>StarOS Companion Package</b>		
companion-<release>.zip	companion-<release>.tgz	Contains numerous files pertaining to this version of the StarOS including SNMP MIBs, RADIUS dictionaries, ORBEM clients. These files pertain to both trusted and non-trusted build variants.  In 21.12.0 and later releases, the StarOS companion package also includes the signature file, a verification script, the x509 certificate, and a README file containing information on how to use the script to validate the certificate.
<b>VPC-DI</b>		
qvpc-di-<release>.bin.zip	qvpc-di-<release>.bin	Contains the VPC-DI binary software image that is used to replace a previously deployed image on the flash disk in existing installations.  In 21.12.0 and later releases, this package also includes the signature file, a verification script, the x509 certificate, and a README file containing information on how to use the script to validate the certificate.
qvpc-di_T-<release>.bin.zip	qvpc-di_T-<release>.bin	Contains the trusted VPC-DI binary software image that is used to replace a previously deployed image on the flash disk in existing installations.  In 21.12.0 and later releases, this package also includes the signature file, a verification script, the x509 certificate, and a README file containing information on how to use the script to validate the certificate.
qvpc-di-<release>.iso.zip	qvpc-di-<release>.iso	Contains the VPC-DI ISO used for new deployments, a new virtual machine is manually created and configured to boot from a CD image.  In 21.12.0 and later releases, this package also includes the signature file, a verification script, the x509 certificate, and a README file containing information on how to use the script to validate the certificate.
qvpc-di_T-<release>.iso.zip	qvpc-di_T-<release>.iso	Contains the trusted VPC-DI ISO used for new deployments, a new virtual machine is manually created and configured to boot from a CD image.  In 21.12.0 and later releases, this package also includes the signature file, a verification script, the x509 certificate, and a README file containing information on how to use the script to validate the certificate.

## Operator Notes

In 21.12.0 and later Releases	In pre-21.12.0 Releases	Description
qvmc-di-template-vmware-<release>.zip	qvmc-di-template-vmware-<release>.tgz	Contains the VPC-DI binary software image that is used to on-board the software directly into VMware.  In 21.12.0 and later releases, this package also includes the signature file, a verification script, the x509 certificate, and a README file containing information on how to use the script to validate the certificate.
qvmc-di-template-vmware_T-<release>.zip	qvmc-di-template-vmware_T-<release>.tgz	Contains the trusted VPC-DI binary software image that is used to on-board the software directly into VMware.  In 21.12.0 and later releases, this package also includes the signature file, a verification script, the x509 certificate, and a README file containing information on how to use the script to validate the certificate.
qvmc-di-template-libvirt-kvm-<release>.zip	qvmc-di-template-libvirt-kvm-<release>.tgz	Contains the same VPC-DI ISO identified above and additional installation files for using it on KVM.  In 21.12.0 and later releases, this package also includes the signature file, a verification script, the x509 certificate, and a README file containing information on how to use the script to validate the certificate.
qvmc-di-template-libvirt-kvm_T-<release>.zip	qvmc-di-template-libvirt-kvm_T-<release>.tgz	Contains the same trusted VPC-DI ISO identified above and additional installation files for using it on KVM.  In 21.12.0 and later releases, this package also includes the signature file, a verification script, the x509 certificate, and a README file containing information on how to use the script to validate the certificate.
qvmc-di-<release>.qcow2.zip	qvmc-di-<release>.qcow2.tgz	Contains the VPC-DI binary software image in a format that can be loaded directly with KVM using an XML definition file, or with OpenStack.  In 21.12.0 and later releases, this package also includes the signature file, a verification script, the x509 certificate, and a README file containing information on how to use the script to validate the certificate.
qvmc-di_T-<release>.qcow2.zip	qvmc-di_T-<release>.qcow2.tgz	Contains the trusted VPC-DI binary software image in a format that can be loaded directly with KVM using an XML definition file, or with OpenStack.  In 21.12.0 and later releases, this package also includes the signature file, a verification script, the x509 certificate, and a README file containing information on how to use the script to validate the certificate.
<b>VPC-SI</b>		
qvmc-si-<release>.bin.zip	qvmc-si-<release>.bin	Contains the VPC-SI binary software image that is used to replace a previously deployed image on the flash disk in existing installations.  In 21.12.0 and later releases, this package also includes the signature file, a verification script, the x509 certificate, and a README file containing information on how to use the script to validate the certificate.
qvmc-si_T-<release>.bin.zip	qvmc-si_T-<release>.bin	Contains the trusted VPC-SI binary software image that is used to replace a previously deployed image on the flash disk in existing installations.  In 21.12.0 and later releases, this package also includes the signature file, a verification script, the x509 certificate, and a README file containing information on how to use the script to validate the certificate.

In 21.12.0 and later Releases	In pre-21.12.0 Releases	Description
qvmc-si-<release>.iso.zip	qvmc-si-<release>.iso	<p>Contains the VPC-SI ISO used for new deployments, a new virtual machine is manually created and configured to boot from a CD image.</p> <p>In 21.12.0 and later releases, this package also includes the signature file, a verification script, the x509 certificate, and a README file containing information on how to use the script to validate the certificate.</p>
qvmc-si_T-<release>.iso.zip	qvmc-si_T-<release>.iso	<p>Contains the trusted VPC-SI ISO used for new deployments a new virtual machine is manually created and configured to boot from a CD image.</p> <p>In 21.12.0 and later releases, this package also includes the signature file, a verification script, the x509 certificate, and a README file containing information on how to use the script to validate the certificate.</p>
qvmc-si-template-vmware-<release>.zip	qvmc-si-template-vmware-<release>.ova	<p>Contains the VPC-SI binary software image that is used to on-board the software directly into VMware.</p> <p>In 21.12.0 and later releases, this package also includes the signature file, a verification script, the x509 certificate, and a README file containing information on how to use the script to validate the certificate.</p>
qvmc-si-template-vmware_T-<release>.zip	qvmc-si-template-vmware_T-<release>.ova	<p>Contains the trusted VPC-SI binary software image that is used to on-board the software directly into VMware.</p> <p>In 21.12.0 and later releases, this package also includes the signature file, a verification script, the x509 certificate, and a README file containing information on how to use the script to validate the certificate.</p>
qvmc-si-template-libvirt-kvm-<release>.zip	qvmc-si-template-libvirt-kvm-<release>.tgz	<p>Contains the same VPC-SI ISO identified above and additional installation files for using it on KVM.</p> <p>In 21.12.0 and later releases, this package also includes the signature file, a verification script, the x509 certificate, and a README file containing information on how to use the script to validate the certificate.</p>
qvmc-si-template-libvirt-kvm_T-<release>.zip	qvmc-si-template-libvirt-kvm_T-<release>.tgz	<p>Contains the same trusted VPC-SI ISO identified above and additional installation files for using it on KVM.</p> <p>In 21.12.0 and later releases, this package also includes the signature file, a verification script, the x509 certificate, and a README file containing information on how to use the script to validate the certificate.</p>
qvmc-si-<release>.qcow2.zip	qvmc-si-<release>.qcow2.gz	<p>Contains the VPC-SI binary software image in a format that can be loaded directly with KVM using an XML definition file, or with OpenStack.</p> <p>In 21.12.0 and later releases, this package also includes the signature file, a verification script, the x509 certificate, and a README file containing information on how to use the script to validate the certificate.</p>
qvmc-si_T-<release>.qcow2.zip	qvmc-si_T-<release>.qcow2.gz	<p>Contains the trusted VPC-SI binary software image in a format that can be loaded directly with KVM using an XML definition file, or with OpenStack.</p> <p>In 21.12.0 and later releases, this package also includes the signature file, a verification script, the x509 certificate, and a README file containing information on how to use the script to validate the certificate.</p>



## Operator Notes

In 21.12.0 and later Releases	In pre-21.12.0 Releases	Description
<b>VPC Companion Package</b>		
companion-vpc-<release>.zip	companion-vpc-<release>.tgz	<p>Contains numerous files pertaining to this version of the VPC including SNMP MIBs, RADIUS dictionaries, ORBEM clients. These files pertain to both VPC-DI and VPC-SI, and for trusted and non-trusted build variants.</p> <p>In 21.12.0 and later releases, the VPC companion package also includes the signature file, a verification script, the x509 certificate, and a README file containing information on how to use the script to validate the certificate.</p>
<b>Ultra Service Platform</b>		
usp-<version>.iso		<p>The USP software package containing component RPMs (bundles).</p> <p>Refer to <a href="#">Table 5</a> for descriptions of the specific bundles.</p>
usp_T-<version>.iso		<p>The USP software package containing component RPMs (bundles). This bundle contains trusted images.</p> <p>Refer to <a href="#">Table 5</a> for descriptions of the specific bundles.</p>
usp_rpm_verify_utils-<version>.tar		Contains information and utilities for verifying USP RPM integrity.

Table 5 - USP ISO Bundles

USP Bundle Name	Description
usp-em-bundle-<version>-1.x86_64.rpm*	The Element Manager (EM) Bundle RPM containing images and metadata for the Ultra Element Manager (UEM) module.
usp-ugp-bundle-<version>-1.x86_64.rpm*	The Ultra Gateway Platform (UGP) Bundle RPM containing images for Ultra Packet core (VPC-DI). There are trusted and non-trusted image variants of this bundle.
usp-yang-bundle-<version>-1.x86_64.rpm	The Yang Bundle RPM containing YANG data models including the VNFD and VNFR.
usp-uas-bundle-<version>-1.x86_64.rpm	The Ultra Automation Services Bundle RPM containing AutoVNF, Ultra Web Services (UWS), and other automation packages.
usp-auto-it-bundle-<version>-1.x86_64.rpm	The bundle containing the AutoIT packages required to deploy the UAS.
usp-vnfm-bundle-<version>-1.x86_64.rpm	The VNFM Bundle RPM containing an image and a boot-up script for ESC (Elastic Service Controller).
ultram-manager-<version>-1.x86_64.rpm*	This package contains the script and relevant files needed to deploy the Ultra M Manager Service.
* These bundles are also distributed separately from the ISO.	

## 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, see *What's New in Cisco Product Documentation*, at:

<http://www.cisco.com/c/en/us/td/docs/general/whatsnew/whatsnew.html>.

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