

ISR-WAAS Installation Guide on ISR 4000 Series Router

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Introduction

This document describes the installation guide for Cisco ISR-WAAS on Cisco Integrated Services Router (ISR). It is the implementation of virtual Wide Area Application Services (vWAAS) on a Cisco ISR.

ISR-WAAS is deployed inside an IOS-XE container. A container in this context, refers to the hypervisor that runs virtualized applications on a Cisco ISR 4000 Series router.

ISR-WAAS Installation Prerequisites

Each WAAS software version can have different resource requirements (Memory, CPU, and Solid State Drives (SSD)), if you do not meet the requirements, it can lead to performance issues or even errors during installation.

Please review the configuration guide at this link:

<https://www.cisco.com/c/en/us/support/routers/virtual-wide-area-application-services-waas/products-installation-and-configuration-guides-list.html>

This table summarizes the resource requirements and supported ISR platforms for each ISR model.

ISR-WAAS Model	CPUs	Memory	Disk Storage	Supported ISR Platform
ISR-WAAS-200 (for WAAS 5.x and 6.2.1)	1	3 GB	151 GB	ISR-4321
ISR-WAAS-200 (for WAAS 6.2.3x and later)	1	4 GB	151 GB	ISR-4321
ISR-WAAS-750	2	4 GB	151 GB	ISR-4351, ISR-4331, ISR-4431, ISR-4451
ISR-WAAS-1300	4	6 GB	151 GB	ISR-4431, ISR-4451
ISR-WAAS-2500	6	8 GB	338 GB	ISR-4451

Difference between NIM-SSD and ISR-SSD

NIM-SSD

NIM-SSD is the one that is located outside of ISR and is hot swappable.

```
NAME: "NIM subslot 0/3", DESCR: "NIM SSD Module"
PID: NIM-SSD , VID: V01, SN: F0C1915299D
```

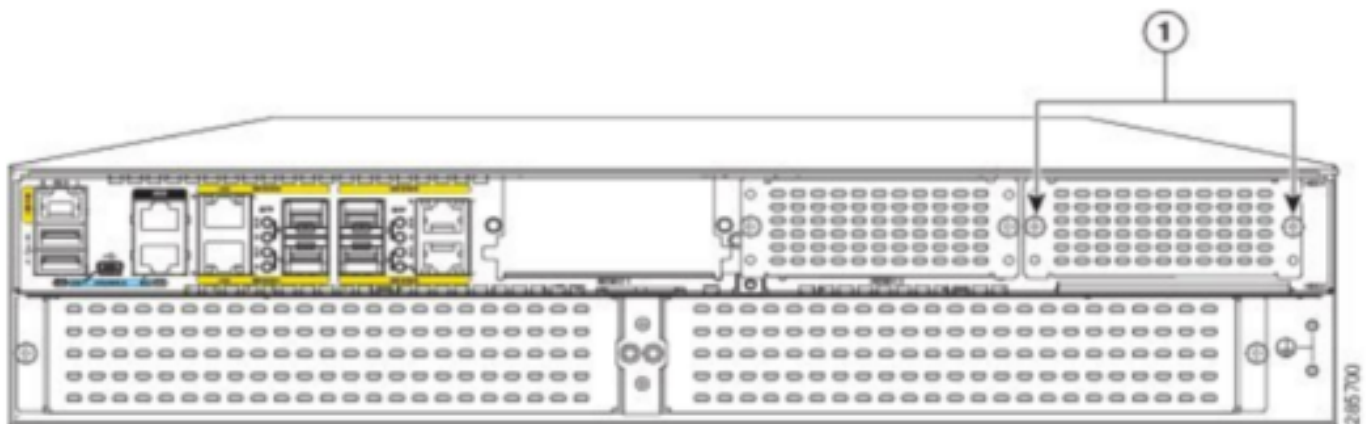
This is a module that gets installed in one of the available Network Interface Modules (NIM) of ISR Routers.

These are Product Identifiers (PIDs) for the NIM-SSD and SSD that can be used to raise RMA:

NIM-SSD(=)NIM Carrier Card for SSD drives
 SSD-SATA-200G(=)200 GB, SATA Solid State Disk for NIM-SSD

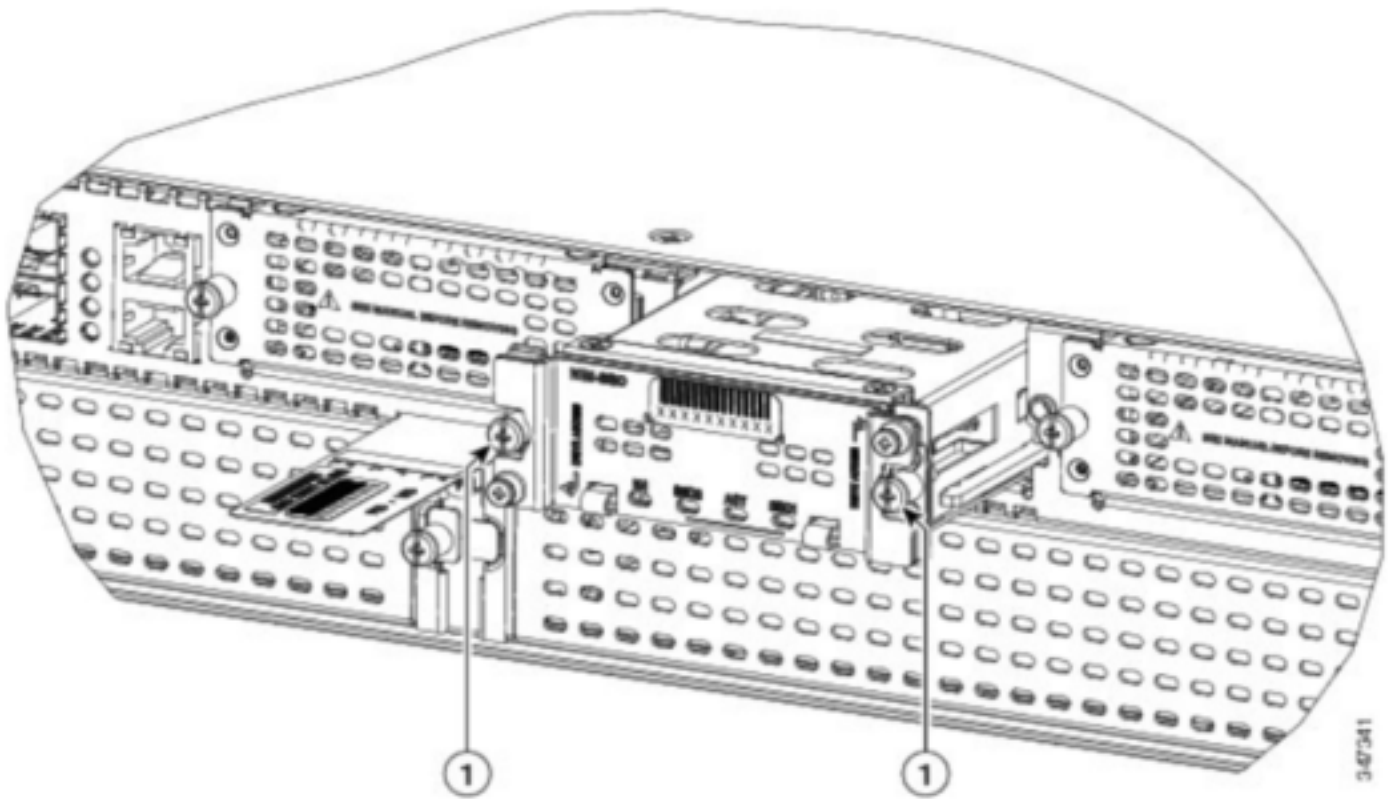
In order to remove the NIM-SSD or NIM-HDD from the Router, follow these steps:

Step 1. Use a Phillips screwdriver to loosen the captive screws on either side, as shown in this image:



1 Captive screws holding the NIM-SSD to the router

Step 2. Remove the NIM-SSD or NIM-HDD from the route, as shown in this image:



1 Captive screws holding the NIM-SSD to the router

ISR-SSD

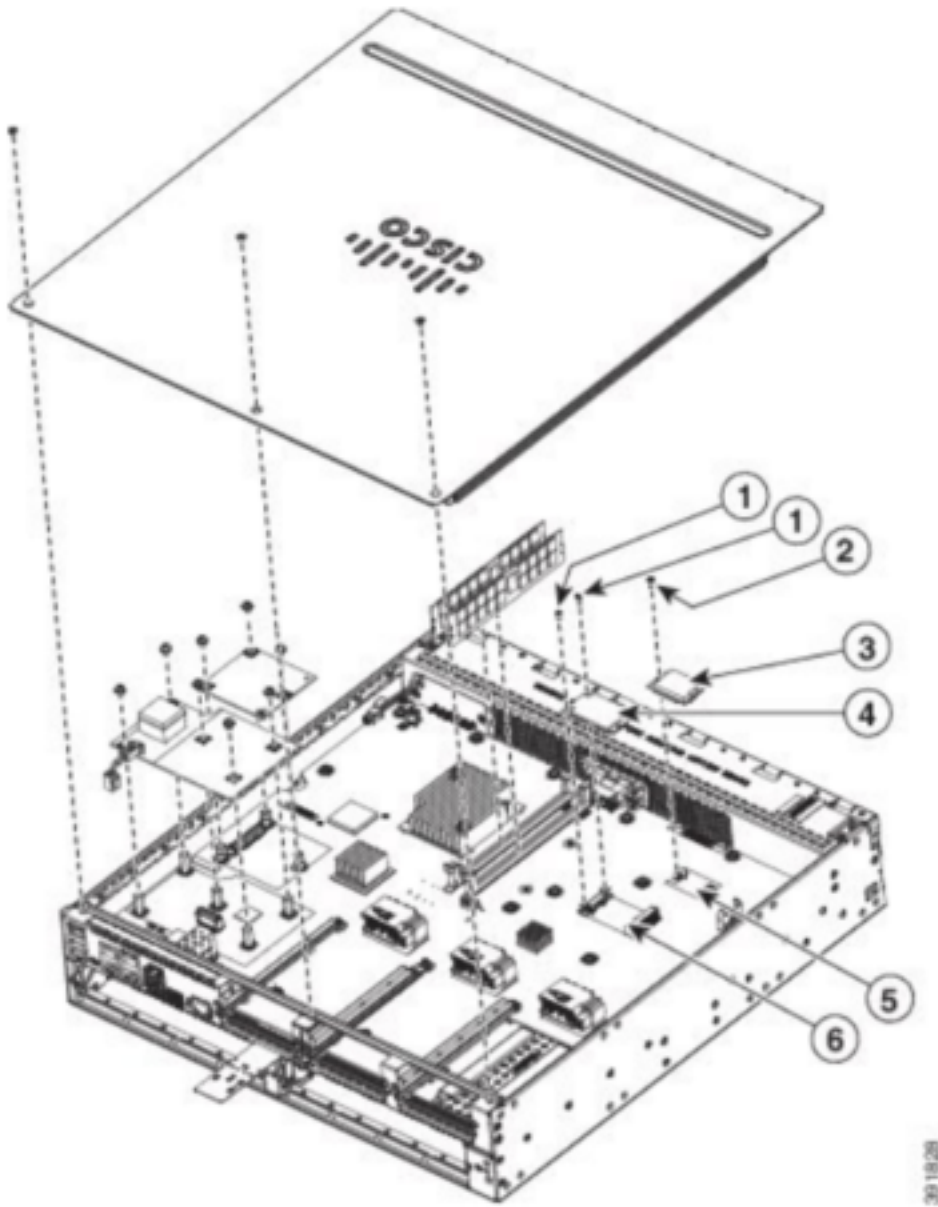
ISR-SSD on the other hand is installed inside the router chassis, you need to power down the router, open its cover to locate the ISR-SSD.

The ISR-SSD is not hot swappable.

This is PID for the ISR-SSD on ISR 4300 series that can be used to raise RMA:

SSD-MSATA-200G(=)200 GB, mSATA Solid State Disk

This image shows Flash Memory Card and SSD mSATA Storage Device Locations :



1	Supplied screw	2	Supplied screw
3	Flash memory card	4	SSD mSATA storage device
5	Flash memory card connector	6	SSD mSATA connector

ISR-WAAS Installation

Once you meet all the requirements for the installation of ISR-WAAS, the next step is to download an Open Virtualization Appliance (OVA) file of the ISR-WAAS version you intend to deploy. You can download software from this link:

<https://software.cisco.com/download/home/280484571/type/280836712>

Once you have downloaded the software, you need to transfer the file to the bootflash of the router :

```

BR1-ISR4451#dir bootflash: | in .ova
81929  -rw-      986142720   Feb 1 2016 18:21:13 +12:00  ISR-WAAS-5.5.5a.9.ova
540682 -rw-      1057904640  May 10 2018 16:55:58 +11:00  ISR-WAAS-6.4.1a.6.ova
147457 -rw-      1002700800  Aug 20 2018 16:27:43 +11:00  ISR-WAAS-6.2.3e.45.ova
278534 -rw-      1009551360  Aug 8 2018 17:56:57 +11:00  ISR-WAAS-6.2.3d.68.ova
BR1-ISR4451#

```

On the router CLI, please follow these steps to deploy ISR-WAAS use the EZConfig program:

1. Run the Service WAAS enable command.
2. Select the previously transferred .ova image for the WAAS version you wish to deploy.
3. Select the WAAS profile you want to deploy.
4. Configure the ISR-WAAS IP address.
5. Configure the WAAS central manager IP address.

```

BR1-ISR4451#service waas enable
*****
****  Entering WAAS service interactive mode.          ****
****  You will be asked a series of questions, and your answers      ****
****  will be used to modify this device's configuration to          ****
****  enable a WAAS Service on this router.                ****
*****
Continue? [y]: y
At any time: ? for help, CTRL-C to exit.
Select a WAAS image to install:
1. bootflash:/ISR-WAAS-5.5.5a.9.ova
2. bootflash:/ISR-WAAS-6.4.1a.6.ova
3. bootflash:/ISR-WAAS-6.2.3e.45.ova
4. bootflash:/ISR-WAAS-6.2.3d.68.ova
5. Enter your own image
Select option [3]: 3
Extracting profiles from bootflash:/ISR-WAAS-6.2.3e.45.ova, this may take a couple of minutes ...
These are the available profiles
1. ISR-WAAS-2500
2. ISR-WAAS-1300
3. ISR-WAAS-750
Select option [1]: 3
An internal IP interface and subnet is required to deploy a WAAS service on this router.
This internal subnet must contain two usable IP addresses that can route and communicate with the WAAS Central Manager (WCM).
The following ip address type supported for ISR-WAAS
1) ipv4
2) ipv6
Select ip address type (1 or 2):1
Enter the IPV4 address to be configured on the WAAS service: 10.66.86.44
The following ip address type supported for Host on Router
1) ipv4
2) ipv6
Select ip address type (1 or 2):1
The following ip address type for WCM
1) ipv4
2) ipv6
Select ip address type (1 or 2):1
Enter the IP address of the WAAS Central Manager (WCM): 10.66.86.106

```

6. Select the Wide Area Network (WAN) interface on the router where you would like to enable WAAS interception.
7. Save the configuration after you have finished. This is the image from successful installation.


```

*****
** Configuration Summary: **
*****
a) WAAS Image and Profile Size:
  bootflash:/ISR-WAAS-6.2.3e.45.ova (1002700800) bytes
  ISR-WAAS-750

b) Router IP/mask:
  Using ip unnumbered from interface GigabitEthernet0/0/2

  WAAS Service IP:
  10.66.86.44

c) WAAS Central Manager:
  10.66.86.106

d) Router WAN Interfaces:
  GigabitEthernet0/0/0

Choose one of the letter from 'a-d' to edit, 'v' to view config script, 's' to apply config [s]: s
The configuration will be applied and the status of the WAAS service will be displayed after deployment

Installing bootflash:/ISR-WAAS-6.2.3e.45.ova

Installing!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!

% Activating virtual-service 'AUTOWAAS', this might take a few minutes. Use 'show virtual-service list' for progress.

System is attempting to deploy and activate WAAS image, this may take up to 10 minutes
activating!!!!!!!!!!

Waiting for WAAS application to be at a stage to accept WCM IP configuration.

Waiting!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
management services enabled

WAAS service activated!
Note:Please issue "copy running-config startup-config" command to save changes!

```

Troubleshoot ISR-WAAS

WAAS Installation Failure Scenario

The ISR-WAAS installation fails if there is no SSD, so first check if the SSD is present.

```

GigabitEthernet0/1/0 unassigned YES unset down down
GigabitEthernet0/1/1 unassigned YES unset down down
GigabitEthernet0/1/2 unassigned YES unset down down
GigabitEthernet0/1/3 unassigned YES unset down down
ucse1/0/0 10.66.86.34 YES unset administratively down down
ucse1/0/1 unassigned YES NVRAM administratively down down
GigabitEthernet0 unassigned YES NVRAM administratively down down
Dialer0 unassigned YES unset up up
Dialer1 unassigned YES unset up up
Loopback200 unassigned YES unset up up
Tunnel0 10.66.86.61 YES unset up up
VirtualPortGroup31 10.66.86.41 YES unset down down
Vlan1 unassigned YES NVRAM administratively down down
Enter a WAN interface to enable WAAS interception (blank to skip) []: GigabitEthernet0/0/0
Enter additional WAN interface (blank to finish) []:
*****
** Configuration Summary: **
*****
a) WAAS Image and Profile Size:
  bootflash:/ISR-WAAS-6.2.3e.45.ova (1002700800) bytes
  ISR-WAAS-750

b) Router IP/mask:
  Using ip unnumbered from interface GigabitEthernet0/0/2
  WAAS Service IP:
  10.66.86.44

c) WAAS Central Manager:
  10.66.86.106

d) Router WAN Interfaces:
  GigabitEthernet0/0/0

Choose one of the letter from 'a-d' to edit, 'v' to view config script, 's' to apply config [s]: s
The configuration will be applied and the status of the WAAS service will be displayed after deployment
installation failure decision to exit
pp1 ISR1451#

```

ISR-WAAS Activation Failure Scenario

In some scenarios, ISR-WAAS will failed to activate after you have replaced the router and installed the SSD into the new chassis.

These errors could be seen on the ISR router :

```
09/16 11:44:08.946 [vman]: [31298]: (note): VM (AUTOWAAS) State Transition: next_state:
LIFECYCLE_DEACTIVATE

09/16 11:44:17.613 [vman]: [31298]: (ERR): Loading of machine definition (/vol/harddisk/virtual-
instance/AUTOWAAS/ISR4331X.xml) failed

09/16 11:44:17.613 [vman]: [31298]: (ERR): Failed to load machine definition

09/16 11:44:17.613 [vman]: [31298]: (note): Setting failure response (1)

09/16 11:44:17.613 [vman]: [31298]: (ERR): Virtual Service failure
log[AUTOWAAS]::Validation::Package validation::Failed to process package-def file::File
'/vol/harddisk/virtual-instance/AUTOWAAS/ISR4331X.xml'

09/16 11:44:17.613 [errmsg]: [31298]: (ERR): %VMAN-3-PROCESS_PKG_DEF: Virtual
Service[AUTOWAAS]::Validation::Package validation::Failed to process package-def file::File
'/vol/harddisk/virtual-instance/AUTOWAAS/ISR4331X.xml'

09/16 11:44:17.613 [vman]: [31298]: (note): VM (AUTOWAAS) State Transition: next_state:
LIFECYCLE_WAIT_ACTIVATE

09/16 11:44:17.613 [vman]: [31298]: (note): IF MTU message received:

09/16 11:44:17.613 [vman]: [31298]: (ERR): Invalid bridge ID or the bridge(31) has not been
created yet

09/16 11:44:17.614 [vman]: [31298]: (ERR): Failed to set DP IF mtu for DP bridge 31

09/16 11:44:17.614 [vman]: [31298]: (note): vman IF MTU message processed

09/16 11:44:24.725 [vman]: [31298]: (note): Get local RP location rp/0/0

09/16 11:44:27.758 [vman]: [31298]: (note): Get local RP location rp/0/0

09/16 11:44:27.759 [vman]: [31298]: (note): Get local RP location rp/0/0

09/16 11:44:27.772 [vman]: [31298]: (note): Get local RP location rp/0/0

09/16 11:44:27.779 [vman]: [31298]: (note): Get local RP location rp/0/0

09/16 11:44:27.779 [vman]: [31298]: (note): Successfully removed VM init ctx for VM [AUTOWAAS]

09/16 11:44:27.780 [vman]: [31298]: (note): Per-VM message marshalled successfully into
persistent DB

09/16 11:44:27.780 [vman]: [31298]: (note): Successfully reset per-VM mac address binding into
TDL msg

09/16 11:44:28.063 [vman]: [31298]: (ERR): vman_libvirt_err: code=1

09/16 11:44:28.063 [vman]: [31298]: (ERR): internal error '/usr/sbin/lvremove -f
/dev/lvm_raid/vdc.AUTOWAAS' exited with non-zero status 5 and signal 0: /dev/harddisk1: read
failed after 0 of 4096 at 21474770944: Input/output error
```

/dev/harddisk1: read failed after 0 of 4096 at 21474828288: Input/output error

/dev/harddisk1: read failed after 0 of 4096 at 0: Input/output error

/dev/harddisk1: read failed after 0 of 4096 at 4096: Input/output error

/dev/dm-1: read failed after 0 of 4096 at 4429119488: Input/output error

/dev/dm-1: read failed after 0 of 4096 at 4429176832: Input/output error

/dev/dm-1: read failed after 0 of 4096 at 0: Input/output error

/dev/dm-1: read failed after 0 of 4096 at 4096: Input/output error

/dev/dm-2: read failed after 0 of 4096 at 11072897024: Input/output error

/dev/dm-2: read failed after 0 of 4096 at 11072954368: Input/output error

/dev/dm-2: read failed after 0 of 4096 at 0: Input/output error

/dev/dm-2: read failed after 0 of 4096 at 4096: Input/output error

/dev/dm-3: read failed after 0 of 4096 at 1630

09/16 11:44:28.063 [vman]: [31298]: (ERR): Failed to delete volume vdc.AUTOWAAS in pool virt_strg_pool_vg

09/16 11:44:28.241 [vman]: [31298]: (ERR): vman_libvirt_err: code=1

09/16 11:44:28.241 [vman]: [31298]: (ERR): internal error '/usr/sbin/lvremove -f /dev/lvm_raid/vdb.AUTOWAAS' exited with non-zero status 5 and signal 0: /dev/harddisk1: read failed after 0 of 4096 at 0: Input/output error

/dev/dm-1: read failed after 0 of 4096 at 0: Input/output error

/dev/dm-2: read failed after 0 of 4096 at 0: Input/output error

/dev/dm-3: read failed after 0 of 4096 at 0: Input/output error

/dev/harddisk1: read failed after 0 of 4096 at 21474770944: Input/output error

/dev/harddisk1: read failed after 0 of 4096 at 21474828288: Input/output error

/dev/harddisk1: read failed after 0 of 4096 at 4096: Input/output error

/dev/dm-1: read failed after 0 of 4096 at 4429119488: Input/output error

/dev/dm-1: read failed after 0 of 4096 at 4429176832: Input/output error

/dev/dm-1: read failed after 0 of 4096 at 4096: Input/output error

/dev/dm-2: read failed after 0 of 4096 at 11072897024: Input/output error

/dev/dm-2: read failed after 0 of 4096 at 11072954368: Input/output error

/dev/dm-2: read failed after 0 of 4096 at 4096: I

09/16 11:44:28.241 [vman]: [31298]: (ERR): Failed to delete volume vdb.AUTOWAAS in pool virt_strg_pool_vg

09/16 11:44:28.418 [vman]: [31298]: (ERR): vman_libvirt_err: code=1

09/16 11:44:28.418 [vman]: [31298]: (ERR): internal error '/usr/sbin/lvremove -f /dev/lvm_raid/vda.AUTOWAAS' exited with non-zero status 5 and signal 0: /dev/harddisk1: read

failed after 0 of 4096 at 0: Input/output error

/dev/dm-1: read failed after 0 of 4096 at 0: Input/output error

/dev/dm-2: read failed after 0 of 4096 at 0: Input/output error

/dev/dm-3: read failed after 0 of 4096 at 0: Input/output error

/dev/harddisk1: read failed after 0 of 4096 at 21474770944: Input/output error

/dev/harddisk1: read failed after 0 of 4096 at 21474828288: Input/output error

/dev/harddisk1: read failed after 0 of 4096 at 4096: Input/output error

/dev/dm-1: read failed after 0 of 4096 at 4429119488: Input/output error

/dev/dm-1: read failed after 0 of 4096 at 4429176832: Input/output error

/dev/dm-1: read failed after 0 of 4096 at 4096: Input/output error

/dev/dm-2: read failed after 0 of 4096 at 11072897024: Input/output error

/dev/dm-2: read failed after 0 of 4096 at 11072954368: Input/output error

/dev/dm-2: read failed after 0 of 4096 at 4096: I

09/16 11:44:28.418 [vman]: [31298]: (ERR): Failed to delete volume vda.AUTOWAAS in pool virt_strg_pool_vg

09/16 11:44:28.420 [vman]: [31298]: (note): Found orphaned volume(vda.AUTOWAAS) in pool(virt_strg_pool_vg). Deleting...

It is possible that harddisk is corrupted and these actions can be taken:

```
# show platform hardware subslot <ssd subslot> module device filesystem
```

```
# request platform hardware filesystem harddisk: destroy
```

```
# hw-module subslot 0/5 reload
```

SSD Failure Scenario

In some cases if the SSD is faulty, while you run commands related to hard disk and file system, you see these errors.

```
"request platform hardware filesystem harddisk: destroy"  
%This operation can take some time, please be patient  
%Harddisk not present. Destroy filesystem aborted.
```

To resolve it, you can try these steps:

Step 1. Try to reseal the SSD.

Step 2. Reboot the router.

Step 3. If those steps failed, just RMA the SSD.