

IndigoVision

**Enterprise NVR-AS 4000
Linux Appliance**

User Guide



IndigoVision

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1 ABOUT THIS GUIDE

This guide is written for users of IndigoVision's Enterprise NVR-AS 4000 and provides an overview of the Enterprise NVR-AS 4000 as well as installation and configuration information.

Safety notices

This guide uses the following formats for safety notices:



Indicates a hazardous situation which, if not avoided, could result in death or serious injury.



Indicates a hazardous situation which, if not avoided, could result in moderate injury, damage the product, or lead to loss of data.

Notice

Indicates a hazardous situation which, if not avoided, may seriously impair operations.



Additional information relating to the current section.

2 OVERVIEW

IndigoVision's Enterprise NVR-AS 4000 - Linux Appliance is part of IndigoVision's Control Center suite. It provides a powerful and integrated recording and playback system for video and audio from IP cameras and encoders, to suit all your requirements.

The Enterprise NVR-AS 4000 can be located at any point on the network and operation can continue without the need for management software providing a truly scalable and reliable system.

The Enterprise NVR-AS 4000 provides the following features:

- Record and playback MJPEG, JPEG 2000, MPEG-4, and H.264 video and audio streams
- Full frame rate recording of up to 100 streams (1U variant) or up to 200 streams (2U/G3 2U variants) with simultaneous playback of up to 25 streams (up to 100 streams on Enterprise NVR-AS 4000 G3 2U)
- Third party camera support
- RAID storage resilience and redundant power and network connections
- Powerful and distributed alarm management
- Digital Signatures and Tamper Protection of recordings
- Integrated hardware fault monitoring

Hardware

The Enterprise NVR-AS 4000 is available as a 1U or 2U rack mounted chassis. Two generations of 2U platforms are supported - the 2U and G3 2U.

Enterprise NVR-AS 4000 1U variant

The Enterprise NVR-AS 4000 1U variant has four hot-swappable hard-disk bays, accessible from the front of the device. The disks in these bays are configured as a RAID5 array. This array is used for the operating system, configuration information and for video storage.

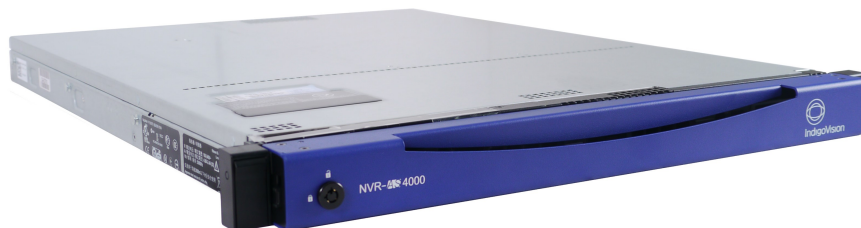


Figure 1: Enterprise NVR-AS 40001U

This variant has two 1Gbps Ethernet ports which are aggregated for greater throughput and redundancy.

Enterprise NVR-AS 4000 2U variant

The Enterprise NVR-AS 4000 2U variant has 12 hot-swappable hard-disk bays, accessible from the front of the device. The disks in these bays are configured as a RAID6 array. This array is used for video storage.



Figure 2: Enterprise NVR-AS 4000 2U

The 16 disk variant has an additional four hard-disk bays, accessible internally. These are not hot-swappable.

These four bays and the 12 front-accessible bays are configured as a single RAID6 array for video storage.

In addition there are also two hot-swappable disks, accessible from the rear of the device. These disks are configured as a RAID1 array. This array is used for the operating system and configuration information.

This variant has two 10Gbps Ethernet ports and two 1Gbps Ethernet ports. These are configured as separate aggregated pairs for greater throughput and redundancy.

In order to use the 10Gbps Ethernet ports, you must also purchase Direct Attach twinax cables or 10GBASE-SR fibre optic SFP+ transceiver modules from IndigoVision.

Notice *The Enterprise NVR-AS 4000 2U only supports either the 1Gbps Ethernet pair or the 10Gbps Ethernet pair to be connected at any given time, not both.*

Enterprise NVR-AS 4000 G3 2U variant

The Enterprise NVR-AS 4000 G3 2U variant has three configurations, defined by base video storage capacity. In all three configurations, storage is divided between a RAID1 array which is used to store OS and configuration data and a RAID6 array which is used to store recorded video. Each configuration only differs by the location and type of the physical disks included in these arrays.



Figure 3: Enterprise NVR-AS 4000 2U/G3

The disk configurations are as follows:

- 48TB

- RAID1: Two hot-swappable solid-state disks, accessible from the rear of the device
- RAID6: 12 hot-swappable hard-disk bays, accessible from the front of the device
- 100TB
 - RAID1: Two hot-swappable solid-state disks, accessible from the rear of the device
 - RAID6: Four internal (i.e. non-hot-swappable) hard-disk drives and 12 hot-swappable hard-disk bays, accessible from the front of the device
- 140TB
 - RAID1: Two internal (non-hot-swappable) solid-state disks
 - RAID6: Four internal (non-hot-swappable) hard-disk drives, 12 hot-swappable hard-disk bays, accessible from the front of the device and two hot-swappable hard-disk bays, accessible from the rear of the device

All three configurations have two 10Gbps Ethernet ports and two 1Gbps Ethernet ports. These are configured as an aggregated group.

In order to use the 10Gbps Ethernet ports, you must also purchase Direct Attach twinax cables or 10GBASE-SR fibre optic SFP+ transceiver modules from IndigoVision.

Notice *The Enterprise NVR-AS 4000 G3 2U only supports either the 1Gbps Ethernet pair or the 10Gbps Ethernet pair to be connected at any given time, not both.*

Fault monitoring

The Enterprise NVR-AS 4000 provides hardware fault monitoring integrated with IndigoVision Control Center.

The following hardware is monitored:

- RAID arrays for video storage and the Operating System
- System fans
- Redundant power supplies (if installed)
- Network interfaces

The RAID arrays and fans are always monitored. The redundant power supplies and network interface fault monitoring must be configured before these components are monitored.

► For more information, see *"Status Monitoring" on page 31*

Notice *To effectively monitor the health of the IndigoVision unit, IndigoVision recommends that you create a Device Fault Detector for the NVR.*

► For more information, refer to the Control Center help.

3 GETTING STARTED

This chapter describes the initial steps required to start using the Enterprise NVR-AS 4000 device.

Server installation

Follow the instructions provided in the Quick Start Guide to safely install the server.



Warning

Before installing the Enterprise NVR-AS 4000, review the safety instructions and guides provided with the system.

Notice

Before installing a redundant PSU into the system, perform the initial configuration process.

► For more information, see *"Install, replace or remove a redundant PSU from the Enterprise NVR-AS 4000 2U/G3 2U variant"* on page 18

Installing additional disks (Enterprise NVR-AS 4000 G3 2U only)

If you intend to expand the disk capacity of a standard Enterprise NVR-AS 4000 G3 2U prior to commissioning it, the recommended method is to delete the existing RAID6 virtual disk and recreate it:

1. Insert additional disks.
2. Power on the device.

Notice

The NVR automatically runs self-test on first power-up only. If the device is powered on after installation of the additional disks and successfully runs self-test, it rebuilds the array as part of this process. If however, self-test has already been run prior to inserting the new disks, a manual rebuild is required.

If you need to manually rebuild the array, the following additional steps are necessary:

1. Use a monitor and keyboard to log in to the device. The username is 'root' and the password is the Web Configuration password (default: 'admin', if Web Configuration has not been accessed yet).
2. Run the `raidprep` command to create the new storage array with the correct configuration. This will destroy any data on the disk.

The following table outlines the options for expanding the capacity of the Enterprise NVR-AS 4000 G3 2U variants:

Table 1: Expansion capacity and options

Variant	Initial disk count	Supported expansion options
48TB	8 x 8TB (48TB total when in RAID6 array)	9 (56TB), 10 (64TB), 11 (72TB), 12 (80TB)
100TB	12 x 10TB (100TB total when in RAID6 array)	13 (110TB), 14 (120TB)
140TB	16 x 10TB (140TB total when in RAID6 array)	17 (150TB), 18 (160TB)

Initial configuration

Initial configuration can be done using one of the following methods:

- DHCP (default method)
- Monitor and keyboard connected directly to the device

After initial configuration is complete, further device configuration and setup is completed using the Web Configuration pages.

► For more information, see *"Configuration" on page 27*

DHCP

If your network supports DHCP connections, attach the device to the network and a valid IP address is automatically assigned. The Enterprise NVR-AS 4000 can then be discovered using the Control Center front-end application.

If your network does not support DHCP, the device will not be assigned an IP address and you must follow the monitor and keyboard instructions.

Notice

The Enterprise NVR-AS 4000 2U/G3 2U variant only supports either the 1Gbps ethernet pair or the 10Gbps ethernet pair to be connected at any given time, not both.

Using a monitor and keyboard

The Enterprise NVR-AS 4000 device can be configured by connecting a monitor to the VGA port and a keyboard to one of the USB ports.

1. Connect the keyboard and monitor to the device and press **Enter**.

You should see the following prompt:

```
IndigoVision Enterprise NVR-AS 4000 [standaloneNVR]
login:
```

2. Log in to the device using the username `config` and password `config`.

The device prompts you to enter the new configuration values.

3. At each prompt, press **Enter** to accept the current value.
 - **DHCP** - Enter **Y** or **N** to chose between a DHCP or static IP configuration.
 - **IP Address** — Enter the IP address for the unit's network connection.
 - **Subnet Mask** — Enter the IP network subnet mask for the unit's network connection.
 - **Gateway** — Appropriate default gateway for remote network access: this is only required if the unit is to communicate with devices on a different subnet.

- **Preferred/Alternate Name Server Address** — Enter the IP address of the DNS server used to convert network names into numerical IP addresses. You only need to enter a name servers if you wish to specify NTP or SMTP server addresses as names and not as IP addresses.
- **NVR name** — Enter a name to describe the unit.
- **NVR location** — Enter a name to describe the location of the unit.
- **Reset network security** — Enter to reset all passwords used to access device, disable IP Access Restrictions, and reset the device to HTTP use only by deleting any HTTPS certificate or certificate request.

You are now ready to attach the device to the network.

Configure the License Server

To complete the NVR-AS setup and allow it to record, you must configure the Enterprise NVR-AS 4000 to use an IndigoVision License Server. You can do this by using the device web configuration pages.

- ▶ For more information, see "*License*" on page 34

4 OPERATIONS

This chapter describes common tasks required for the operation of the Enterprise NVR-AS 4000 device.

Disk management

Raid status monitoring and disk replacement uses the Dell™ OpenManage™ Server Administrator (OMSA). The OMSA can be started from the Enterprise NVR-AS 4000 Disk configuration page.

- ▶ For more information, see *"Disk" on page 29*
 - When accessing the OMSA, Internet Explorer indicates that there is a problem with the website's security certificate unless the procedure in OMSA X.509 Certificate Management is followed. Click **Continue to this website** to open the OMSA.
 - ▶ For more information, see *"OMSA X.509 Certificate Management" on page 20*
 - The OMSA then requests credentials. Enter the user name `root` and the password currently set for the Web Configuration pages.

RAID redundancy

The Enterprise NVR-AS 4000 1U variant uses RAID5 for all of the storage in the system: operating system, configuration and video footage.

The Enterprise NVR-AS 4000 2U/G3 2U variants use RAID1 for operating system and configuration information, and RAID6 for video storage.

A RAID1 or RAID5 array can tolerate a single disk failure. A RAID6 array can tolerate up to two disks failing.

If a disk fails, it must receive attention at the earliest opportunity to maintain maximum array redundancy.

Notice *IndigoVision recommend you create a Device Fault Detector for the NVR in order to receive alarms if the video storage array is degraded.*

- ▶ For more information, refer to the Control Center help.
-

Replacing a faulty disk



Do not remove disks unnecessarily while the device is in operation. This causes the system to consider the disk as failed.



Power off the NVR before attempting to examine or replace any internal disks.



Always use ESD protection when examining or replacing the components inside the NVR.

When the Dell OpenManage Server Administrator (OMSA) reports that a disk is faulty, it must be replaced as soon as possible. Contact IndigoVision Technical Support to arrange for a replacement to be supplied.

Notice

The disks installed in the Enterprise NVR-AS 4000 2U variants have different part numbers dependent on where they are located and whether they are video storage disks or not. Before ordering replacements, be sure to obtain the part number of the actual disk that is malfunctioning.

- Remove the faulty disk and replace it with a disk of the same capacity.
- The RAID controller automatically incorporates the replacement disk and starts rebuilding the array.
- Confirm that the disk is incorporated into the array and has started rebuilding using the OMSA.
- In some cases the disk may need to be manually added as a hot spare. Shortly after adding a new disk, the controller starts rebuilding the new disk.

If two disks fail at the same time in the Enterprise NVR-AS 4000 2U/G3 2U variant, do the following:

- Replace one disk and allow it to completely rebuild.
- After the first disk has completely rebuilt and the array has redundancy, replace the second disk

Whole storage array replacement

Whole storage array replacement is only possible on the 2U variants. This allows a running storage array to be archived.

Archiving a storage array

You can archive the storage array by removing the disk array.

1. Press the front panel button on the Enterprise NVR-AS 4000 or use the shutdown button on the Diagnostics Web Configuration page to safely shut down the unit.
2. Remove the entire storage disk array.

**Caution**

Label the disks appropriately to ensure you can identify them at a later date.

After you have removed the disk array, you can replace them with either:

- An archived disk array,
- A new set of disks that can be configured as a blank storage array.

Restoring an archived storage array

You can restore an archive storage array by replacing the archived disk array in an Enterprise NVR-AS 4000 that contains no storage disks.

Before starting this procedure, ensure the Enterprise NVR-AS 4000 is powered off and has no storage disks.

Notice *When restoring an archived storage array, all disks from the archived array must be inserted into the NVR.*

1. Insert the complete archived video storage disk array that is to be restored.
2. Power on the device.
3. Within the BIOS or using the OMSA, import the foreign disk array configuration.
 - ▶ For more information, see *"Importing or clearing a foreign array configuration" on page 26*
4. Reboot the Enterprise NVR-AS 4000.

The Enterprise NVR-AS 4000 is now running with the restored storage array.

Inserting new disks to create a new storage array

You can add new disks to create a blank storage array.

Before starting this procedure, ensure the Enterprise NVR-AS 4000 is powered off and has no storage disks.

1. Insert an array of at least 8 disks that are either blank or can be erased.

Notice *The Enterprise NVR-AS 4000 G3 2U supports a storage array containing any number of disks between 8 and 18.*

2. Power on the device.
3. Within the BIOS or using the OMSA, clear any foreign storage disk array configuration.
 - ▶ For more information, see *"Importing or clearing a foreign array configuration" on page 26*
4. Use an SSH client or a monitor and keyboard to log in to the device. The username is `root` and the password is the Web Configuration password. If Web Configuration has not been accessed and a password set, SSH login will not be available and local login with monitor and keyboard will use the password "admin".
5. Run the `raidprep` command to create the new storage array with the correct configuration.

The Enterprise NVR-AS 4000 is now running with a newly created storage array.

Install, replace or remove a redundant PSU from the Enterprise NVR-AS 4000 2U/G3 2U variant

Redundant PSUs are manually installed, replaced and removed from the Enterprise NVR-AS 4000 2U/G3 2U variant.

Install a redundant PSU in the Enterprise NVR-AS 4000

Notice *Before installing a redundant PSU, perform the initial configuration for the Enterprise NVR-AS 4000 2U/G3 2U variant.*

► For more information, see "Getting Started" on page 11

To add a second PSU to the unit:

1. If installed, remove the power supply unit blank plate.
2. Slide the new PSU into the chassis until the power supply unit is fully seated and the release latch snaps into place.
3. Attach the AC power cable to the new PSU.
4. Wait for 15 seconds for the system to recognize the power supply unit and determine its status.

The power supply redundancy may not occur until discovery is complete.

The power supply unit status indicator turns green to signify that the power supply unit is functioning correctly.

Notice *The next time the unit reboots, it may go through an automatic configuration stage including a 2 minute power-off period. At the end of this process, the unit automatically reboots and starts normally.*

Redundant power can be monitored through Control Center by using an NVR Fault Detector.

Replace a redundant PSU in the Enterprise NVR-AS 4000



When replacing a redundant PSU, ensure that the other PSU is fully operational. Loss of power may lead to corrupt or lost data.

To replace a PSU in the unit:

1. Remove the faulty PSU from the unit.
2. Slide the new PSU into the chassis until the power supply unit is fully seated and the release latch snaps into place.
3. Attach the AC power cable to the new PSU.
4. Wait for 15 seconds for the system to recognize the power supply unit and determine its status.

The power supply redundancy may not occur until discovery is complete.

The power supply unit status indicator turns green to signify that the power supply unit is functioning correctly.

Notice *It can take up to a minute for any configured NVR Fault Detectors monitoring this NVR-AS to deactivate after redundant power is restored.*

Remove a redundant PSU from the Enterprise NVR-AS 4000 2U/G3 2U variant



When removing a redundant PSU, ensure that the other PSU is fully operational. Loss of power may lead to corrupt or lost data.

To remove a secondary PSU from the unit:

1. Disconnect AC power from the PSU to be removed.
2. Remove the PSU.

The removed PSU remains in the system inventory until the following steps are carried out:

1. Power down the unit using the web configuration Diagnostics page
 - ▶ For more information, see *"Diagnostics" on page 35*
2. Remove AC power from the remaining PSU for at least 15 seconds.
3. Re-attach AC power to the remaining PSU and start the unit normally.

Notice *Any configured NVR Fault Detectors monitoring this NVR-AS remain activated until the 'Redundant PSU failure' alert is unchecked on the **Status Monitoring** page.*
▶ For more information, see *"Status Monitoring" on page 31*

Install a new license or update an existing license

You can configure the Enterprise NVR-AS 4000 to act as a License Server for IndigoVision products.

Notice *Each IndigoVision site should only have a single License Server. If you configure the Enterprise NVR-AS 4000 to act as a License Server, make sure that there are no other License Servers active in your site.*

The Enterprise NVR-AS 4000 comes with a 45-day trial of an IndigoUltra license. This allows you to access all features and use up to five cameras and one third-party Windows NVR-AS in your site.

The trial period starts when you first configure the Enterprise NVR-AS 4000 to act as a License Server.

Use the following steps to upgrade to a full license:

1. Create a fingerprint file and send it to IndigoVision with your IndigoVision order acknowledgment number.
2. Apply the license file from IndigoVision to the Enterprise NVR-AS 4000.

Create and send a fingerprint file

To upgrade to a full IndigoVision licence, you must first send a fingerprint file to IndigoVision.

1. Access the Enterprise NVR-AS 4000 Web Configuration pages, and navigate to **License**.
2. Click the **Download** button located under **License Management**.
3. When prompted, save the file.
4. Send the fingerprint file to IndigoVision Sales Order with your IndigoVision order acknowledgment number.

IndigoVision then provides a license file.

Apply a license file

To use your IndigoVision license, you must apply it to the Enterprise NVR-AS 4000.

1. Access the Enterprise NVR-AS 4000 Web Configuration pages, and navigate to **License**.
2. Click the **Browse** button located under **License Management**.
3. Select the IndigoVision license file, and click **Upload**.
A notification is displayed, confirming that the license is applied.

The new license is applied.

OMSA X.509 Certificate Management

This section describes how to manage X.509 certificates with the Dell™ OpenManage™ Server Administrator (OMSA).

► For more information about how to access OMSA, see *"Disk management" on page 15*

Web certificates are necessary to ensure the identity of a remote system and ensure that information exchanged with the remote system are not viewed or changed by others.

To ensure system security, IndigoVision recommends that you do the following:

- Generate a new X.509 certificate, reuse an existing X.509 certificate or import a certificate chain from a Certification Authority (CA).
- Ensure that all systems that have Server Administrator installed have unique host names.

To manage X.509 certificates through the Preferences home page, click **General Settings > Web Server > X.509 Certificate**.

The following options are displayed:

- **Generate a new certificate** — Generates a new self-signed certificate used for SSL communication between the server running Server Administrator and the browser.

Notice *When you are using a self-signed certificate, most web browsers display an untrusted warning, because the self-signed certificate is not signed by a Certificate Authority (CA) trusted by the operating system. Some secure browser settings can also block the self-signed SSL certificates. The Server Administrator web GUI requires a CA-signed certificate for such secure browsers.*

- **Certificate Maintenance** — Allows you to generate a Certificate Signing Request (CSR) containing all the certificate information about the host required by the CA to

automate the creation of a trusted SSL web certificate. You can retrieve the necessary CSR file either from the instructions on the

Certificate Signing Request (CSR) page or by copying the entire text in the text box on the CSR page and pasting it in the CA submit form. The text must be in the Base64–encoded format.

Notice *You also have an option to view the certificate information and export the certificate that is being used in the Base64–encoded format, which can be imported by other web services.*

- **Import certificate chain** — Allows you to import the certificate chain (in PKCS#7 format) signed by a trusted CA. The certificate can be in DER or Base64-encoded format.
- **Import a PKCS12 Keystore** — Allows you to import a PKCS#12 keystore that replaces the private key and certificate used in Server Administrator web server. PKCS#12 is a public keystore that contains a private key and the certificate for a web server. Server Administrator uses the Java KeyStore (JKS) format to store the SSL certificates and its private key.
Importing a PKCS#12 keystore to Server Administrator deletes the keystore entries, and imports a private key and certificate entries to the Server Administrator JKS.

Notice *An error message is displayed if you select an invalid PKCS file or type an incorrect password.*

SSL Server Certificates

Server Administrator Web server is configured to use the industry-standard SSL security protocol to transfer encrypted data over a network. The SSL security protocol is built on an asymmetric encryption technology. SSL is widely accepted for providing authenticated and encrypted communication between clients and servers, to prevent eavesdropping across a network.

An SSL-enabled system can perform the following tasks:

- Authenticate itself to an SSL-enabled client
- Allow the two systems to establish an encrypted connection

The encryption process provides a high level of data protection. Server Administrator uses the most secure form of encryption generally available for Internet browsers in North America.

Server Administrator Web server has a Dell self-signed unique SSL digital certificate by default. You can replace the default SSL certificate with a certificate signed by a well-known Certificate Authority (CA).

A Certificate Authority is a business entity that is recognized in the Information Technology industry for meeting high standards of reliable screening, identification, and other important security criteria. Examples of CAs include Thawte and VeriSign.

To obtain and install a CA-signed certificate, do the following:

1. Use the Server Administrator Web interface to generate a Certificate Signing Request (CSR) with your company's information.
2. Submit the generated CSR to a CA such as VeriSign or Thawte. The CA can be a root CA or an intermediate CA.

The CA will return a signed SSL certificate.

3. Upload the certificate to Server Administrator.

In the certificate store of the management station, install the SSL certificates of each Server Administrator which you want to be trusted by the management station.

After the SSL certificate is installed in the management stations, supported browsers can access Server Administrator without certificate warnings.

5 MAINTENANCE

This chapter describes procedures and information required for the maintenance of the Enterprise NVR-AS 4000.

Recover system using USB Restore Media

If the Enterprise NVR-AS 4000 becomes inoperable the USB Restore Media can be used to restore the unit to its original system software.



This procedure deletes all data on the OS Virtual Disk. You will lose all configuration and alarms. You will lose all video footage if you also delete the video Virtual Disk.

Before restoring the system software, replace any faulty hardware and recreate the RAID arrays.

- ▶ For more information about faulty disk replacement, see *"Replacing a faulty disk"* on page 16
- ▶ For more information about RAID configuration for an Enterprise NVR-AS 4000 1U, see *"RAID configuration for the Enterprise NVR-AS 4000 1U"* on page 24
- ▶ For more information about RAID configuration for an Enterprise NVR-AS 4000 2U/G3 2U, see *"RAID configuration for the Enterprise NVR-AS 4000 2U/G3 2U"* on page 24

After the hardware is installed and configured, use the following procedure to recover the system software:

1. Shut down the unit so that it is powered off.
Ensure the keyboard, mouse and monitor are attached.
2. Remove any other USB devices.



Ensure you use the USB Restore Media supplied with the specific Enterprise NVR-AS 4000 system you are recovering.

3. Insert the USB Restore Media.
4. Power on the Enterprise NVR-AS 4000.
Wait for the keyboard shortcuts to be displayed at the top of the screen.
5. When the keyboard shortcuts appear, press **F11**.
6. Select **One-shot BIOS Boot Menu**.
7. Select the entry corresponding to the USB Restore Media.
The Enterprise NVR-AS 4000 boots from the USB Restore Media and displays the restore instructions.

8. Select **Restore**. A confirmation dialog opens.
9. Select **Continue**. The restore process starts.
The re-imaging process takes 5 to 10 minutes.
10. Select **Reboot** when the restore has completed.
11. Remove the USB Restore Media as soon as the reboot process starts.

The Enterprise NVR-AS 4000 re-starts with its factory system software.

RAID configuration for the Enterprise NVR-AS 4000 1U

The configuration of the disks on the Enterprise NVR-AS 4000 1U is as follows:

- The four front-panel disks are configured as Virtual Disks in a single RAID5 array:
 - The first Virtual Disk contains the operating system and NVR-AS configuration, and must be 64GB in size.
 - The second Virtual Disk is reserved for video footage.
- The following options should be used:
 - No Read Ahead
 - Write Through caching
 - 64KB Stripe Element Size
 - Disk cache enabled

RAID configuration for the Enterprise NVR-AS 4000 2U/G3 2U

The configuration of the disks on the Enterprise NVR-AS 4000 2U is as follows:

- The two internal system disks are configured as a RAID1 mirror, using all of the available capacity, and with the following options:
 - Read Ahead
 - Write Back caching
 - 64KB Stripe Element Size
 - Disk cache disabled
- The disks used for video storage are configured as a RAID6 array, using all of the available capacity, and with the following options:
 - Read Ahead
 - Write Back caching
 - 128KB Stripe Element Size
 - Disk cache disabled

Notice *The Enterprise NVR-AS 4000 G3 2U (140TB) shows two RAID controllers:*

- *BOSS-S1 controller: this should contain two physical disks with which to create the RAID1 array*
- *PERC H730 controller: this should contain the physical disks with which to create the RAID6 array*

The configuration settings to apply to each array are unchanged, with the exception of 'Read Ahead', which is not applicable to the BOSS-S1 controller.

Recreating RAID configuration using the BIOS



Caution

The following instructions for deleting a Virtual Disk will destroy all data on that disk. If the OS Virtual Disk is deleted, the operating system will be destroyed and the system will need to be recovered from the USB Restore Media, after which you will lose all configuration and alarms. If the video Virtual Disk is deleted, you will lose all video footage.

► For more information, see "Recover system using USB Restore Media" on page 23

Notice

If you are rebuilding the video Virtual Disk, you can bypass the instructions below by using an SSH client or a monitor and keyboard to log in to the device (username is 'root' and the password is the Web Configuration password*), then running the `raidprep` command to delete the existing storage array and create the new array with the correct configuration. This will destroy all data on the array.

* If Web Configuration has not been accessed and a password set, SSH login will not be available and local login with monitor and keyboard will use the password "admin".

To reconfigure the RAID array in the BIOS:

1. Ensure that a keyboard and monitor are connected to the unit.
2. Power up the unit, or reboot it if it is already powered on.
3. Early in the boot process, press F2 to enter System Setup.
4. Select Device Settings > Integrated RAID Controller 1.
5. Select Virtual Disk Management.

Notice

The Enterprise NVR-AS 4000 G3 2U (140TB) has two controllers handling RAID arrays.

To recreate the RAID1 OS/config array, select 'Device Settings > AHCI Controller in Slot 1: Boss-S1 Configuration Utility'.

Otherwise select 'Device Settings > Integrated RAID Controller 1: Dell PERC <PERC H730P Mini> Configuration Utility'

There may be existing foreign configurations that need to be imported or cleared.

► For more information, see "Importing or clearing a foreign array configuration" on page 26

Delete any existing broken virtual disks as necessary:

1. Select Virtual Disk Operations.
2. Select the Virtual Disk to be deleted.
3. Click Delete Virtual Disk and confirm the action.
4. Repeat for the remaining Virtual Disks as necessary.

Recreate any virtual disks as necessary by following this procedure:

1. Select **Create Virtual Disk**.
If this option is disabled, press **Escape** to leave the Virtual Disk Operations menu and select **Virtual Disk Operations** again.
2. Select the desired RAID level.

- If creating a Virtual Disk on a set of physical disks that are currently unused, select **Unconfigured Capacity**.
 - If creating a Virtual Disk on a set of physical disks that already have some space allocated to a Virtual Disk, select **Free Capacity**.
3. Click **Select Physical Disks**.
 - If necessary, change **Select Media Type** to **Both**.
 - If necessary, change **Select Interface Type** to **Both**.
 4. Select the check box beside all of the disks on which Virtual Disks should be created.
 5. Make sure that the expected number of disks are selected.
 6. Click **Apply Changes**.
 7. Select the settings for the new Virtual Disk as previously specified.
 - ▶ For more information, see "RAID configuration for the Enterprise NVR-AS 4000 1U" on page 24 or see "RAID configuration for the Enterprise NVR-AS 4000 2U/G3 2U" on page 24
 8. Set the **Default Initialization** option to **Fast**.
 9. Click **Create Virtual Disk**.
 10. Repeat for the remaining Virtual Disks as necessary.

Notice *If the operating system is not being recovered using a USB Restore Media, prepare the video storage with `diskprep -s` after the system is running again. This command attempts to reuse any existing filesystems, but will reformat them when necessary.*

Importing or clearing a foreign array configuration

Using the BIOS:

1. Press **F2** during boot to get into BIOS configuration
2. Select **Device Settings**
3. Select the integrated RAID controller
4. Select **Controller Management > Manage Foreign Configuration > Preview Foreign Configuration**
5. Select **Import Foreign Configuration** or **Clear Foreign Configuration**
6. Follow the instructions

Using the OMSA:

1. Open the OMSA
2. Select the **Storage** node in the OMSA explorer
3. The RAID controller has an Available Tasks drop-down in the main window: select **Foreign Configuration Operations...**
4. On the Foreign Configuration Preview page, click either **Clear** or **Import/Recover**
5. Follow the instructions

After the import has completed, the browser returns to the main page for the Storage node and the imported Virtual Disk is visible under the RAID controller in the main window.

6 CONFIGURATION

This section explains the various configuration options provided by the Web Configuration pages.

Web Configuration pages

To access the Web Configuration pages, enter the IP address of your device into a web browser.

If a web access password has not been previously defined for the device you will be prompted to set a password.

The password must contain between 8 and 32 printable ASCII (7-bit US-ASCII) characters. Enter the password again to confirm it.

The login page is then displayed. Use the web access password to log in, and the Home page is displayed.

Notice *The web access password must be configured before the NVR is capable of performing any authenticated network services, including recording.*

Notice *IndigoVision devices support Microsoft Internet Explorer (version 8 or higher).*

To access any of the other configuration pages, click the required option in the menu on the left of each page.

To save the changes made on any page, click **Submit** before navigating away from that page.

Home

This section is read-only and provides a basic configuration overview of the Enterprise NVR-AS 4000 device and its operational status.

- **NVR-AS License Status** — This label shows the current status of the Enterprise NVR-AS 4000 license.

If the label is set to **Licensed**, then the Enterprise NVR-AS 4000 is currently connected to a License Server which is online and has a valid license.

If the label is set to **Not Licensed**, then the Enterprise NVR-AS 4000 is not connected to a License Server with a valid license.

Network

Use this page to configure the network settings.

- **NVR Name** — Enter a name to identify the NVR device.
- **Enterprise NVR-AS 4000 Location** — Enter a location to identify the device.
- **Use DHCP** — Check this to enable DHCP for the NVR device. When this is enabled, the IP address, subnet mask, gateway, and name servers are obtained from the DHCP server on the network. The options for these items are grayed out.

Notice *After switching to DHCP, you need to specify the new IP address of the network device in the web browser. Query the DHCP server to find the assigned IP address, then use this IP address in the web browser to navigate to the device.*

The NVR device chooses the first two DNS servers that the DHCP server specifies. If at least one NTP server is specified by the DHCP server then the NVR device will attempt to synchronize with these NTP servers. The Date and Time page will not list these servers and additional NTP servers can still be manually added.

Notice *If the NVR device fails to receive any configuration settings from a DHCP server on the network, it will not be accessible on the network and you will have to use a keyboard and monitor to set a static IP address.*

► For more information, see "Initial configuration" on page 12.

- **IP Address**— Enter the unit's IP address.
- **Subnet Mask** — Enter the unit's IP network subnet mask.
- **Gateway** — Appropriate default gateway for remote network access: this is only required if the unit is to communicate with devices on a different subnet.
- **Broadcast Address** — This value is read-only.
- **Preferred/Alternate Name Server Address** — The IP address of the DNS server used to convert network names into numerical IP addresses. You only need to enter a name server(s) if you need to specify the SMTP Server Address or NTP Server Addresses as a name and not as an IP address.

The above options are not available for editing if DHCP is enabled.

Date & Time

Use this page to configure the Date and Time settings for the NVR device.

- **NTP Servers** - This is a list of up to five NTP Servers that the NVR device will synchronize with.
Servers can be specified as IP addresses or resolvable hostnames, if at least one name server has been specified.
Add new servers by entering the server address in the text field and click **Add**.
Remove servers by highlighting them in the list and click **Remove**.
Changes are applied when you click **Submit**.
- **Timezone** - Select the timezone for the NVR device from the list.
- **Master Time Server** – Check this option if the NVR-AS device is expected to serve as a master time source on a local area network when the configured NTP servers are not available.

- **Hardware Clock** – The date and time for the NVR-AS device can be directly edited using this form. This should not be required when there is an upstream NTP server.

Disk

Use this page to view the disk array status and update its configuration.

- **Array Status** — This indicates the overall status of the video storage array. The status can be as follows:
 - **Array OK** — The video storage is functioning normally.
 - **Array Blank** — The video storage array has not been formatted with a filesystem. This status may be seen if you are in the process of replacing the array. Press **Format** to format the array and the status should change to **OK**.
 - **Array Degraded** — The video storage array redundancy is degraded. Check OMSA for details of the disks involved.

Notice *When the storage array is first built, it will need to spend a considerable amount of time performing background initialisation. During this time, the disk will be usable, but will show as 'Array Degraded'*

- **Array Rebuilding** — The video storage array is rebuilding. Check OMSA for progress of this operation.
- **Array Error** — There is a fault with the video storage array, such that the NVR-AS cannot function. Contact Technical Support.
- **Storage Space** — This figure indicates the total storage space on the disk array.
- **Used Space** — Shows the percentage of disk space currently used.
- **Array Maintenance:**
 - **Open Window** — Click **Open Window** to open the Open Manage Server Administrator (OMSA) interface for this unit. OMSA can be used to monitor the state of the video storage array and other hardware components on the unit.



Note that using OMSA to delete or create the video storage array when the NVR is running is not supported, and could lead to system instability and data loss.

- **Format Array** — Reformats the disk array.
- **Protection:**
 - **Protect All** — Click **Protect All** to protect all recordings on the disks.
 - **Unprotect All** — Click **Unprotect All** to unprotect all recordings on the disk. This allows them to be deleted according to the reaping regime.



If you protect/unprotect all recordings, you lose the ability to identify recordings that were individually protected/unprotected by the user in Control Center.

NVR

Use this menu to configure the NVR parameters.

- **Reaping by:**

Space — Recordings are only deleted when the NVR disk is becoming full.

Time and Space — Recordings are deleted either when the NVR disk is becoming full, or when recordings reach a specified age (max age).

- **Max Age** — This specifies the length of time that recordings are stored on the NVR before they are automatically deleted.
- **Enable Tamper Protection on recordings** — The NVR will embed digital signatures in every recording file allowing the authenticity and integrity of that footage to be verified at any point in the future.

Verification will happen whenever footage is exported by Control Center as part of an Incident and the result of the verification will be written into the Incident. This provides an extra level of security: the Incident itself is protected by a watermark proving that the Incident has not been tampered with and the NVR digital signatures prove that the footage on the NVR had not been tampered with at the point of export.

Tamper Protection is not compatible with video thinning. You cannot enable Tamper Protection if video thinning is already enabled.

- **Video thinning** — This removes the intermediate P-frames, leaving only independent I-frames. This leads to a reduction in storage requirements at the expense of full motion video. Video thinning is performed on footage only when it becomes older than the specified age.

For effective use of video thinning, it is important to configure the maximum I-frame interval on the transmitter such that the frame rate of thinned footage is acceptable. Video thinning is most effective on footage with significant amounts of motion.

Video thinning is not compatible with Tamper Protection. You cannot enable video thinning if Tamper Protection is already enabled.

- **Automatic Unprotect of Video** — This automatically unprotects footage after a certain time period. Footage will be unprotected only when it becomes older than the specified age.



Enabling Automatic Unprotect in conjunction with Reaping can result in the loss of video data that has been protected to provide evidence relating to an incident.



Recordings which are marked as “protected” are never automatically deleted (unless automatic unprotect of video is configured).

- **Maximum Recording Streams** - This setting specifies the maximum number of streams that the NVR can record. Use this setting to prevent overloading the NVR based on the expected stream bit rates. For example, this NVR could be used as a failover for multiple primary NVRs. In the event of the failure of multiple primary NVRs, this NVR could become overloaded. Set the maximum number of streams to avoid overload.

Changing this setting also affects the amount of free disk space that the NVR maintains. To maximize the retention of footage on your NVR, set the Maximum Recording Streams to the maximum number of simultaneous recording jobs that you intend to configure through Control Center.

Alarms

Use the following parameters to configure the Alarm Server.



In order to configure the Alarm Server, your Control Center license must include the Alarm Management feature.

- **Zone alarm reaping** — This automatically deletes zone alarms based on their age. Select the check box and enter the time after which zone alarms will be deleted.

Notice

When zone alarms are reaped, any activations that contributed to those alarms are also reaped.

- **Activation reaping** — This automatically deletes activations that are not part of an alarm based on their age. Select the check box and enter the time after which activations with no associated alarm will be deleted.
- **Data record reaping**: This automatically deletes data records based on their age. Select the check box and enter the time after which data records will be deleted.



In order to configure data record reaping, your Control Center license must include the Alarm Management and Integrated Data features.

Status Monitoring

This page shows the current state of the monitored hardware diagnostics as well as options for configuring the generated alerts.

Notice

To effectively monitor the health of an Enterprise NVR-AS 4000 unit, IndigoVision recommend that you create a Device Fault Detector for the NVR.

► For more information, refer to the Control Center help.

- **PSU Redundancy (2U variants only)** — Displays whether the unit currently has redundant power through its power supplies.
- **Network Redundancy** — Displays the state of the network ports that have been configured for monitoring.
- **Fan Status** — Displays any fan failures on the unit. For additional information on any indicated failures, open OMSA from the **Disk** page.
 - For more information, see "Disk" on page 29.
- **Generate Alerts** — Configure alerts for the following faults:
 - **Redundant PSU Failure (2U variants only)** — If checked, the Enterprise NVR-AS 4000 generates an alert when it does not have redundant power through its power supplies. If the unit has been intentionally installed without redundant power, this can be unchecked to avoid unnecessary alerts.
 - **Network Link Failure** — If checked, the Enterprise NVR-AS 4000 generates an alert when any of the selected Ethernet ports are not connected to a network switch.



Alerts will always be generated in Control Center for video storage array faults, complete network failure (device unavailable) or fan failures.

Network Security

This page allows you to specify a device password to restrict access to the Web Configuration pages. This device password can also be used to access the device using SSH or SFTP, when logging in as **root**.

- **Configure User**
 - **Change Password** — Enter a password for the unit. This must contain between 8 and 32 printable ASCII (7-bit US-ASCII) characters. Enter the password again to confirm it.

Passwords are automatically verified for security strength, and a warning will be provided if the submitted password is not believed to be secure or could be improved.

Notice *If you forget the password, you will need to log in on the serial console or via a monitor and keyboard connected directly to the device and reset the device's security settings*

► For more information, see "Initial configuration" on page 12

IP Access Restrictions

- **Enable** — Check this box to restrict NVR access to the allowed addresses.

Notice *Before enabling the IP Access Restrictions, please make sure that a management PC is included in the Addresses Allowed list. Failure to do so may result in a loss of connectivity, and require physical access to the unit to disable the restrictions.*

► For more information, see "Reset network security — Enter Y to reset all passwords used to access device, disable IP Access Restrictions, and reset the device to HTTP use only by deleting any HTTPS certificate or certificate request." on page 13.

- **Addresses Allowed** — Enter the IP addresses of cameras that will be used for recording, and Control Center PCs that will be used to administer and play back video from this NVR-AS.
To remove an address, select the address and click **Remove**. Shift-click or Control-click to select more than one address.
- **Add Address** — Enter an IP address and click **Add**.
You can also enter an address range, for example 10.5.1.12-20, or a CIDR address including a netmask, for example 192.168.123.0/24.

HTTPS Configuration

Use these settings to configure the HTTPS settings.



You can only install Signed Certificates when HTTPS is disabled.
Disable HTTPS before changing these settings.

- **Mode**

Select to enable device configuration using HTTP and HTTPS. You must select at least one option.

You must have a valid HTTPS certificate to enable HTTPS. Use the options in this section to create and apply a certificate.

- **Private Key (Regenerate)**

Use this option to regenerate your private key. Using this option invalidates and deletes any certificate or certificate request that is stored on the device.

- **Self Signed Certificate**

Use this option to create and install a self-signed certificate.

To create a self-signed certificate, click **Create**. A new page opens. Enter your details and click **OK**. A self-signed certificate is generated and installed.

This option is unavailable if a certificate is already installed.

- **Certificate Authority**

Use this option to create a certificate request to submit to a Certification Authority for signing. Certificate Authority Certificates created this way are specific to this device.

To create a certificate request, click **Create**. A new page opens. Enter your details and click **OK**. A certificate request is generated and displayed in your browser. Copy the certificate request and submit it to the Certification Authority for signing.

After the certificate request has been signed and returned, **Browse** to the location of the saved certificate, then **Upload** it to the device.

You can **View** and **Delete** a certificate request if one is available.

- **Installed Certificate**

You can **View** and **Delete** the installed certificate.

Email

Use these pages to configure the email parameters.

- **Email Configuration**

- **SMTP Server Address** — The address of your email server. You can enter an IP address, or a name such as **server.example.com** (if you have specified a name server).
- **SMTP Server Port** — The port number used to connect to the email server. This is usually 25 or 587.
- **SMTP Server Username** — This is the username used to log into your SMTP email account (if required).
- **SMTP Server Password** — This is the password for the email account.
- **SMTP From: Address** — All emails sent by the NVR are sent from this email address. The address must be in standard email address format.

The Enterprise NVR-AS 4000 automatically uses secure TLS encryption for email servers that support STARTTLS. This allows emails to be sent using many corporate or Internet mail providers.

Bandwidth Management

- **Bandwidth Manager**

None — Select if no bandwidth manager is used. Playback speeds will be unconstrained.

Run Local Server — Select to run the bandwidth manager on this unit. This can be used to limit access to cameras and NVRs on the same network.

Enter the maximum uplink bandwidth available. This is the maximum network speed at which cameras and NVRs can be accessed from remote locations. Access from the local network is unrestricted.

Use Remote Server — Select to use a remote bandwidth manager. Enter the IP address of the machine hosting the bandwidth manager.

- **NVR Bandwidth Limit**— If a bandwidth manager is enabled, enter the maximum bandwidth available to a playback session for this unit. The bandwidth is shared between all playback streams in a session.



Changing the Bandwidth Manager configuration will cause a momentary interruption in recording.

License

Use these pages to view or change the License Server used by the Enterprise NVR-AS 4000.

License Server — A valid License Server must be configured to allow the Enterprise NVR-AS 4000 to record.

► For more information, refer to the Control Center Installation Guide.

The Enterprise NVR-AS 4000 can access an IndigoVision License Server in the following ways:

- The Enterprise NVR-AS 4000 can use an existing License Server running on a separate device specified using the License Server's IP address
- The Enterprise NVR-AS 4000 can act as a License Server for the Control Center site

Notice *Each IndigoVision site should only have a single License Server. If you configure the Enterprise NVR-AS 4000 to act as a License Server, make sure that there are no other License Servers active in your site.*

Notice *If the Enterprise NVR-AS 4000 is configured to act as a License Server, you must manually configure all instances of Control Center and the other NVR-AS devices in your site to use this Enterprise NVR-AS 4000 as a License Server.*

License Management

The installed Control Center license can be updated here when the Enterprise NVR-AS 4000 is acting as a License Server.

► For more information, see *"Install a new license or update an existing license"* on page 19

License Information

This section shows information about the configured License Server.

- **License Server Status** — This shows the status of the configured License Server. This can be one of the following:
 - **Unconfigured**
 - **Offline**
 - **Unlicensed**
 - **Licensed**
- **License ID** — The unique id of the installed license. This is only shown if the License Server is licensed.
- **Trial Expiry** — The date which the trial license expires. This is only shown if the License Server is using a trial license.
- **License Tier** — The tier of the installed License. This is only shown if the License Server is licensed.
- **Device Connections** — The total number of Device Connections the installed license supports and the number that are currently unused. This is only shown if the License Server is licensed.
- **Third Party Windows NVR-AS Connections** — The total number of third-party Windows NVR-AS Connections the installed license supports and the number that are currently unused. This is only shown if the License Server is licensed.

Firmware Upgrade

Browse to the vex file you require to upgrade your unit, then click **Perform Upgrade**. Uploading the vex file may take a few minutes. After the file has been uploaded, follow the on-screen instructions to start the upgrade process. The upgrade itself will take several minutes. It is important not to power off the unit or disconnect it from the network during this process.

Diagnostics

These pages provide support information which may be requested by your IndigoVision supplier.

- **Support Information** - This button downloads a zip archive containing diagnostic information. Provide this file to Technical Support when reporting any issues with the unit.
- **Maintenance:**
 - **Reset** - Click to reset all NVR-AS settings configured from the web pages and the device password, and reboot the unit.
The NVR-AS device retains its IP address, subnet mask, gateway and DNS servers, and HTTPS configuration.
 - **Reboot** - Click to reboot the device.
 - **Power Off** - Click to power off the device.



If the device is powered off using this option, the device will only power on again when the physical power button on the front panel is pressed.

7 TROUBLESHOOTING

This chapter provides troubleshooting information to resolve common issues.

Monitor recordings

To monitor jobs that are currently recording, use IndigoVision's Control Center application.

Control Center allows you to monitor all jobs on your NVR-AS. It allows you to set up recording jobs on NVRs on a visible network. You can also use it to view any existing jobs and their current state (enabled, disabled, recording, etc).

If a transmitter shows ***Trying to record*** in Control Center's recording schedule this indicates a problem with the transmitter. You should check the network connections and that the device is switched on. You should then try to access the device's Web Configuration pages.

NVR Alerts

You should pay particular attention to the following alerts in Control Center:

- **Disk Full**

Disk full alerts indicate that the NVR-AS disk is full, and that the NVR-AS cannot delete any recordings, for example, because they are protected. Use Control Center to check for recordings marked as Protected and unprotect these recordings.

- **Maximum Recordings**

These indicate that the maximum number of recordings has been exceeded. This may be because there are too many short recordings.

Recording failure alerts

Recording failure alerts indicate that one or more transmitters are not recording correctly.

- Check the network connectivity between the transmitter and the NVR-AS.
- Ensure that the maximum number of licensed streams has not been exceeded.

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This license makes it a requirement to release changes made to the source code. In compliance, the GPL source code and any changes made by IndigoVision are available on request through IndigoVision Customer Support.