vSG Express Installation Guide

Release 1.02

This document provides the installation steps for the virtualised ANTlabs gateway appliance – vSG.

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Change Log

1.02 Remove mis-translated vSG download URL

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Introduction

The vSG is ANTlabs' offering of the SG 5 gateway appliance in the virtualised form. This document guides the user in installing the vSG in a VM host. It also outlines the initial setup steps common to all SG 5 appliances.

Prerequisites and Preparations

Currently, the vSG supports deployment in the VMware ESXi host environment.

Ensure that your ESXi host meets the following minimum requirements:

- minimum ESXi version: 6.5 (hardware version 13)

Further, to host vSG Express, the ESXi host must meet the following requirements:

- CPU cores: minimum 4
- RAM
  - Total: minimum 13 GB
  - Free: minimum 8 GB
- Disk space
  - Total: minimum 1 TB
  - Free: minimum 500 MB

To ensure success of the vSG installation steps, the following preparatory steps are highly recommended:

a. You must have claimed your vSG with the serial number provided to you
b. Plan the network setup for the vSG and get prepared the required network environment for the vSG

If you have not claimed your vSG, please login to the ASP admin panel with your organization account credentials to claim it. You may obtain the serial number from the vSG instance creation certificate we have sent you.

The vSG Express requires five network interfaces:

vSG Express Network Interface	Purpose
LAN	Connect to downstream network
WAN	Connect to upstream network to access internet
WAN 2	Second WAN link for internet access. Multi-WAN module is required
HA	High Availability for vSG services. Two vSG nodes are required: ID 1 and ID 2. ID 1 is the preferred master and monitors health of LAN and WAN links. If LAN link or all WAN links of ID 1 are down, ID 2 will take over as active node until ID 1 LAN/WAN link health is restored.
Management	Extra means of accessing vSG user interfaces (GUI and console)

Typically you will need LAN and WAN connectivity minimally, and perhaps Management as a means of accessing the gateway.

You may use a mix of virtualized network adapters and PCI passthrough host network ports for the VSG.

If you plan to have dedicated hardware for hosting ESXi just for vSG, you could plan for extra network cards to provide for PCI passthrough ports for LAN and WAN and perhaps more in order to have dedicated port performance for your interfaces.

If you plan to set up vSG high availability (HA) with the default settings (LAN virtual MAC address turned off), you can but the time it takes for all downstream devices' traffic to fail over will be slower compared to that with LAN virtual MAC address enabled. This is because each downstream device will take time to timeout on its ARP entry for its gateway.

If you desire faster fail-over of downstream devices' traffic to the HA peer, you need to turn on virtual MAC address for the LAN link. See Step 6 below (page 13). Further, with LAN virtual MAC address enabled, if your vSG LAN is using virtualized network adaptors (i.e. not using PCI passthrough), you must ensure the port group the two vSG peers' LAN network adaptors connect to have the following Security settings:

- **Promiscuous**[1] mode: **Accept**
- **MAC address change**[2]**: Accept**

1 VMware port group's Promiscuous in Accept mode means all objects attached to the port group can receive all incoming traffic on the same port group on that same host. So all interfaces and virtual machines within the port group will be able to see all traffic passing on the port group on that host.

2 A port group with MAC address change Accept means the virtual machines attached to the port group can receive frames with a MAC Address that is different from the one configured in the VM Edit Settings (VMX).

- **Forged transmits[3]: Accept**

If you plan to use PCI passthrough network ports, it is highly recommended to take note of the MAC addresses of the PCI passthrough ports. Head to ESXi host GUI > **Networking** > **Physical NICs** tab. Click on the vmnics you want to later on assign as passthrough. Copy down their corresponding MAC address and PCI address. Note: it is important to take note of the PCI address as the Toggle Passthrough GUI shows the physical port's PCI address but not its MAC address; once the physical port's passthrough is toggled on, the port will be removed from the Physical NICs vmnic list. Hence it is important to take note of the MAC address and PCI address of the ports you are interested in before toggling their passthrough on.

VSG Interface	VM port	MAC address	PCI device address
HA	Virtualized network adaptor	Fill in later	N/A
WAN 2	Virtualized network adaptor	Fill in later	N/A
Management	Virtualized network adaptor	Fill in later	N/A
LAN	PCI passthrough	E.g. f8:f2:1e:38:0f:e0	E.g. 0000:af:00.0
WAN	PCI passthrough	E.g. f8:f2:1e:38:0f:e1	E.g. 0000:af:00.1

Figure 1 Sample taking note of vSG Express LAN, WAN PCI passthrough MAC addresses and PCI addresses

Then head to the ESXi host GUI > Host > Manage > Hardware > PCI Devices, select the ports you have in mind, and click Toggle Passthrough to turn the **Passthrough mode** to **Active**. If the Passthrough mode remains as Disabled, you will not be able to use the port as passthrough later in your setup.

Download the required vSG OVF (Open Virtualization Format) package (about 630 MB) by pasting this URL in the address bar of your browser:

https://repo:qXmL-kzGAaAjK8K%3FbBmYtrKkcTeG9L-R@repo.antlabs.com/download/recoverymedia/ANTlabs_vSG_Express_OVF.zip

The downloaded file is a ZIP archive.

3 A port group with Forged transmits Accept means ESXi does **not** compare the source MAC address being transmitted by the guest with the effective MAC address for its virtual machine adapter to see if they match. The effective MAC address is the MAC address that a guest operating system configures for the network interface it detects; it generally matches the initial MAC address (in the VM Edit Settings).

After you have fulfilled the above prerequisites, you may proceed to the vSG installation steps.

I.

vSG Installation Steps

1. Unpack the vSG OVF zip file

Unpack the zip file. You should get four files under a newly created ANTlabs VSG Express folder. For example:

'VSG Express - Update 3-1.vmdk'
'VSG Express - Update 3-2.nvram'
'VSG Express - Update 3.mf'
'VSG Express - Update 3.ovf'

2. Import OVF

Next, create the vSG VM by importing the OVF. While there are various ways to go about importing the OVF, e.g. directly into ESXi with the ovftool command-line program, here we will show just the VMware vCenter way.

Note: the following steps are taken from vSphere Client version 7.0.2.00500. The steps may vary slightly depending on your vSphere Client or vCenter version.

Login to your VMware vCenter via the vSphere Client GUI.

Navigate to the Resource Pool or "VM & Template" location where you want to deploy the vSG. Right click and select '**Deploy OVF Template**'. You will see the following pop-up:

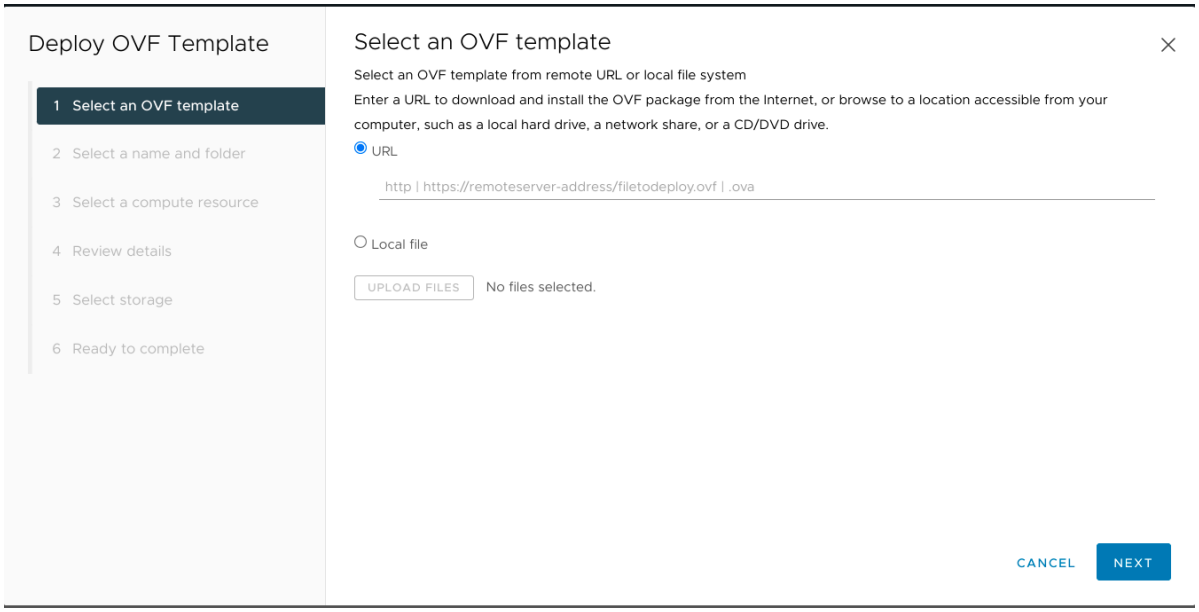


Figure 2 "Deploy OVF Template" wizard of VMware vCenter

Select **Local file**. Click on **Upload Files** and select all four OVF files that you have unpacked earlier on.

Follow through with the wizard steps, making the following entries/selections as you go along:

Select a name and folder	You may give your VM any name. Select a location for your vSG
Select a compute resource	Select a resource pool for the vSG
Review details	
Select storage	Under "Select virtual disk format", choose **Thick Provisioned Lazy Zeroed**
Select networks	Tentatively only one dummy source network is defined for all the required gateway interfaces. Assign any Destination Network or one that connects to nothing to replace the dummy source network. Note: 'Connect at power on' for each of the network adapters is **not** checked by default so nothing gets connected and you can make changes later. You will have the opportunity to reassign the network for each gateway interface or choose to replace any gateway interface with a PCI passthrough port later.
Ready to complete	Click 'Finish'.

3. Implement your VM network plan; optionally configure PCI passthrough ports

Select the vSG VM that you just imported and enter its Edit Settings panel.

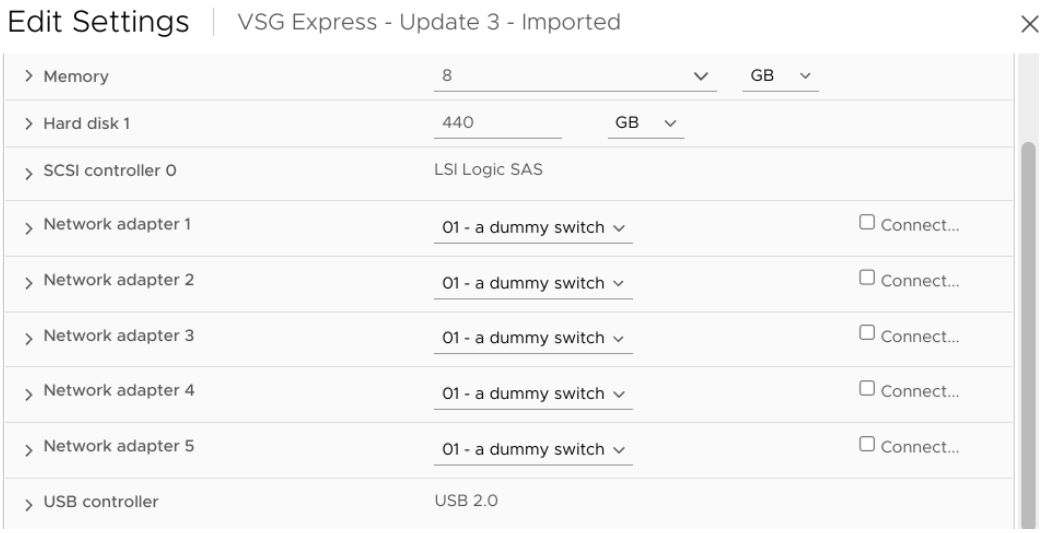


Figure 3 Example of "Edit Settings" for vSG Express

Spend some time to expand each of on

the Network adapter and take note of its MAC address.

VM port	Gateway interface	MAC addresss
Network adapter 1	LAN	
Network adapter 2	WAN	
Network adapter 3	HA	
Network adapter 4	WAN 2	
Network adapter 5	Management	

The above is the default mapping of the VM ports to the gateway interfaces for vSG Express. If you are not using PCI passthrough ports, you do not need to re-assign the default mapping of ports to interfaces, and you may go ahead to connect up the desired Port Groups to the network adapters and check 'Connect on Power Up'.

Alternatively you may choose to replace say LAN and WAN with PCI passthrough ports. In this case you need to remove Network adapter 4 and Network adapter 5 and click 'Add New Device > PCI Device' twice, selecting DirectPath IO and the desired passthrough port for each PCI device, to achieve the following:

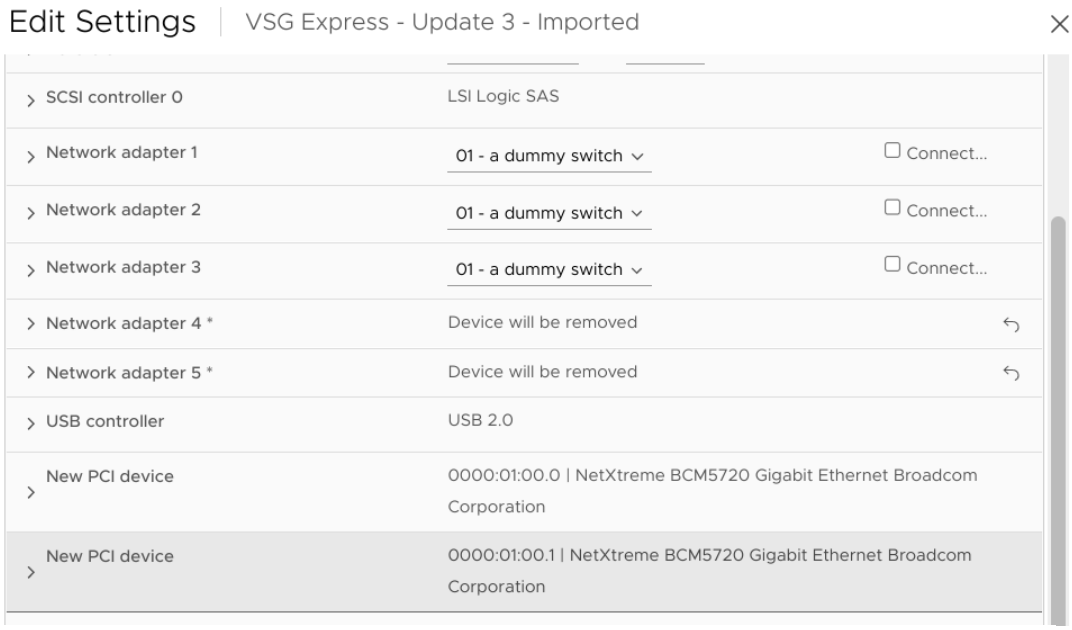


Figure 4 Example of replacing two virtual network adaptors with PCI passthrough ports

Using the above as example, you may keep track of your network ports this way:

VM port	Gateway interface	MAC address	PCI device address
Network adapter 1	HA		N/A
Network adapter 2	WAN 2		N/A
Network adapter 3	Management		N/A
PCI device 0	LAN		
PCI device 1	WAN		

Figure 5 Example of vSG Express using two PCI passthrough ports for LAN, WAN

Fill in the MAC address for each virtualized network adapter and the PCI device address for each passthrough port. Later on you can use the vSG command line interface to blink the LED of the passthrough ports for their easy identification and ascertain their MAC address.

Note: it is important that the total number of configured VM ports (virtualised and passthrough ones included) match the expected number of vSG ports. For vSG Express, there are a total of 5 gateway interfaces and an expected total of 5 vSG ports, each vSG port mapping to one gateway interface. If there is a mismatch between VM port count and the expected number of vSG ports, you may not be able to set up vSG to a desired state.

4. Set vSG serial number

Power up the vSG VM. Access the vSG's primary console (via Web Console or VMware Remote Console app). You will see some service startup log on the terminal.

Click on the black space of the primary console for your keyboard input to go to the primary console. Press **Alt →** key **once** to reach the console login prompt:

Figure 6 vSG's console login prompt

If you see scrolling service startup logs but do not see a login prompt, try pressing <Enter> after the startup logs stop scrolling.

Login with the following credentials:

- Login ID: console
- Password: admin (default password)

The onscreen instructions outline the steps to set the serial number, identify your passthrough ports (if required), and re-assign interfaces (if using passthrough ports).

That is, type

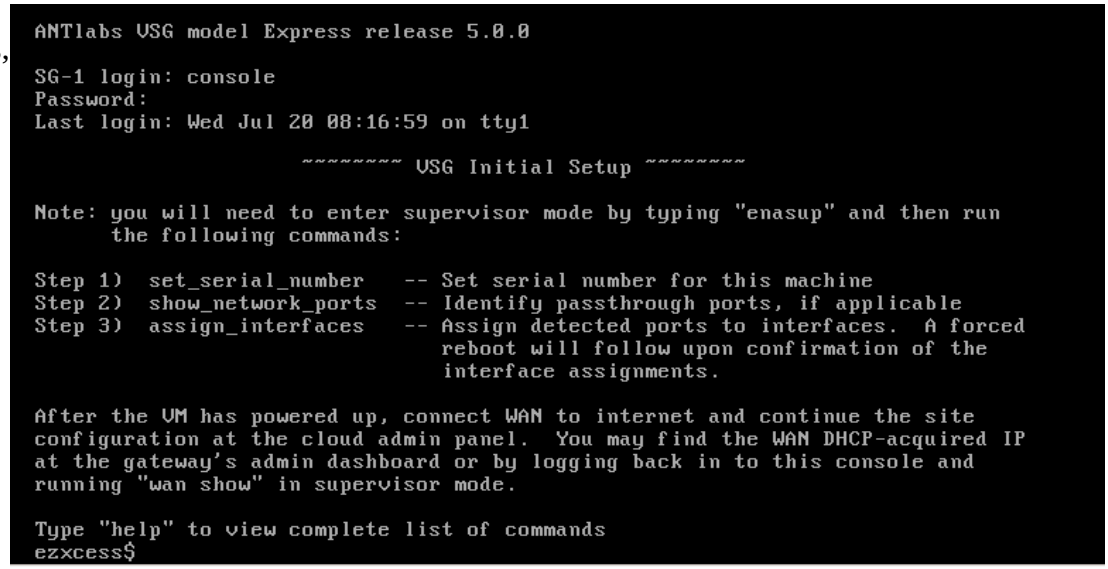


Figure 7 vSG initial setup instructions

"enasup" first and then "set_serial_number" in the supervisor mode.

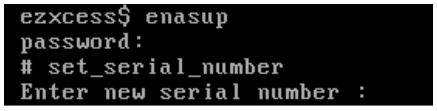


Figure 8 Setting serial number

When prompted, enter the serial number for this vSG. The serial number may be obtained from the vSG Certificate we have sent you. If you do not have a vSG Certificate, please contact the ANTlabs sales representative (sales@antlabs.com).

Setting the serial number will trigger an attempt to connect to the cloud. So if you have completed the network setup and the vSG WAN's internet access is already up, you may go to cloud admin panel to continue with vSG site configuration (see page 13 below).

If you intend to use passthrough ports, you will need to complete Step 5 below.

5. [Optional] Identify passthrough ports and reassign ports to vSG interfaces

Type "show_network_ports" in the supervisor mode.

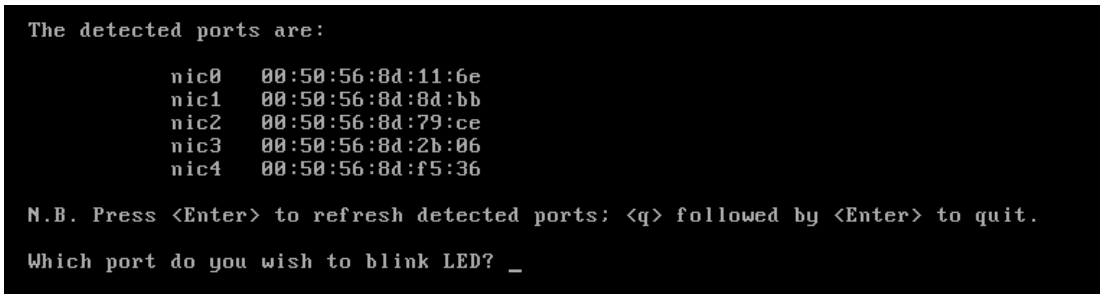


Figure 9 Identifying ports

Note: if you see detected ports labelled starting with `new`, for example `new0` and `new1`, this means that you have more VM ports than vSG expects. You should shut down your VM and remove the extra VM ports to match what vSG expects.

Blink your passthrough ports to identify them. Press Ctrl-C to stop the blinking. Type **q** followed by <Enter> to exit this command.

If you supply link state to any of the ports, you may press <Enter> to refresh the list and you will see link state up and the detected link speed.

Complete the table now you have identified the MAC address of your passthrough ports. For example:

VM port	Gateway interface	MAC address	PCI device address
Network adapter 1	HA		N/A
Network adapter 2	WAN 2		N/A
Network adapter 3	Management		N/A
PCI device 0	LAN		
PCI device 1	WAN		

Then proceed to fix the assignment of the VM ports to the gateway interfaces.

In supervisor mode, type "assign_interfaces".

```
ezxcess$ enasup
password:
# assign_interfaces

The detected ports are:

        nic0 00:50:56:8d:11:6e
        nic1 00:50:56:8d:8d:bb
        nic2 00:50:56:8d:79:ce
        nic3 00:50:56:8d:2b:06
        nic4 00:50:56:8d:f5:36

The current interface assignments are as follows:

LAN         ->  nic0
HA          ->  nic2
Management  ->  nic4
WAN         ->  nic1
WAN 2       ->  nic3

N.B. Hitting <Enter> without entering any port means you want to use the
     port currently assigned to this interface.

Enter the detected port you want to map to LAN [Current: nic0]
(nic0 nic1 nic2 nic3 nic4): _
```

Figure 10 Assigning Interfaces

For each gateway interface, you will be prompted to enter its desired VM port. If you type just <Enter> it means you do not want to change the current assignment for this interface.

You will be prompted to confirm your assignments. Press Ctrl-C if you want to abort this operation. There will be a forced reboot after you have confirmed your interface assignents.

Note: for virtualized network adapters that require connectivity, remember to check 'Connect at Power On' and also ensure the adapter's 'Connected' status is checked after power up.

After the vSG has powered up, connect WAN of the vSG to your upstream network with internet access. If your upstream network is DHCP-enabled, your WAN interface will get DHCP IP. To determine the DHCP-acquired WAN IP of your vSG, you may issue `wan show` in the supervisor mode of the console CLI.

If your upstream network does not have DHCP, you will need to issue the `wan edit` command in the supervisor mode. For example, if your upstream network is 192.168.1.0/24, default via 192.168.1.254, and you desire vSG WAN physical IP to be 192.168.1.1, the following command will suffice to apply these settings without the need to reboot:

```
# wan edit WAN 1.phy.mode=static 1.phy.addr=192.168.1.1/24
1.phy.gw=192.168.1.254
```

You may browse to the vSG's web-admin GUI via 'https://<wan_ip>/admin'.

In about 3 minutes, your vSG will be detected at the cloud (provided you have already claimed the vSG serial number). Proceed to configure the site at the cloud admin panel.

6. **[Optional] For HA setup with quick fail-over of client traffic - turn on LAN virtual MAC address**

For HA setup, login to the console CLI. Enter the supervisor mode via enasup

Run the following command to turn on virtual MAC address for LAN.

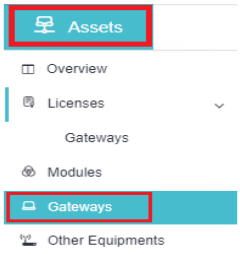
virtual_mac lan on

ASP Site Configuration

ASP admin GUI

Login to the ASP admin panel with your organization admin credentials. For ANTlabs as service provider, please access https://asp-cloud.antlabs.com

Go to **Assets** menu and click **Gateways**. At the Gateways page, look for this gateway and check its Connection status (last column). It should be **Up**.



Note: if the connection status is shown as Down, go to vSG VM Settings and/or the gateway's primary console CLI to check the vSG's internet connectivity

Click on **Up** button. You will see 2 options to assign gateway to site. Use either one:

a. Assign to new site, or
b. Assign to existing site

After you have updated/created the site, go to **Assets** menu > **Overview** page. Under **Sites** section, look for your vSG site and click on its corresponding icon (under **Actions** column) to assign site license.

At **Site Management** menu, you may proceed to configure the vSG's Bandwidth, Plans, Location Portals and VLANs.

Note: it will take a minute or two for the site settings to apply to the gateway; to get vSG to apply the settings sooner, you may go to the vSG's admin GUI, click 'ANTlabs Service Platform', and then click the sync button.

Verify site license at vSG admin GUI

After vSG has been associated to a site, you may use the ASP site detail page's Remote Access feature to access the vSG's admin GUI. The site detail page is accessible via **Assets** > **Gateways** page, clicking on **Up** button. You see and click '**Connect to Gateway**'. You will then get redirected to site details page. Alternatively click **Site Management** > **Site**, then click on the vSG site to get to the site details page. Once you are at the site details page, click '**Remote Access**' to start a remote access session. Then click '**Connect to gateway**' to access the vSG admin GUI.

When prompted with the EULA, click "**I Agree**". Then login with these credentials when presented with the admin login page:

- Login ID: root
- Default password: admin

Go to **System** on the left menu. Click **License**. Check that License Activated is **Yes** and you get your desired **License** and **Burst**:

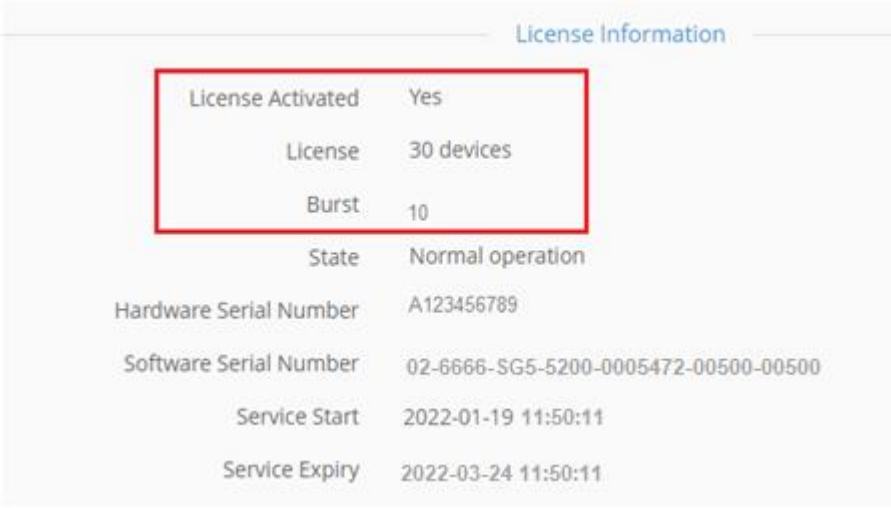


Figure 11 Checking vSG license activation status and site license

Note: if you see License Activated is "Yes" but License is 0 devices, please go to ASP admin GUI to set the required site license.

You will also see the list of modules assigned to this gateway:

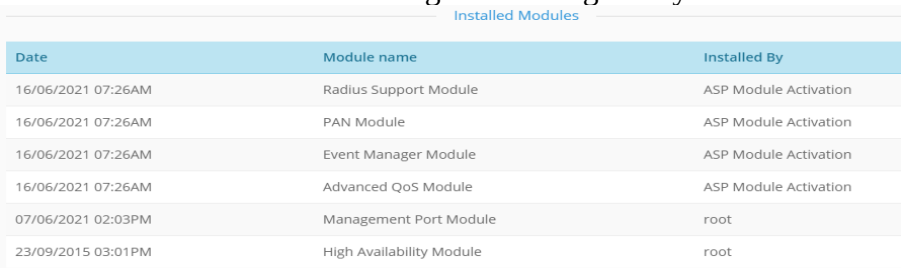
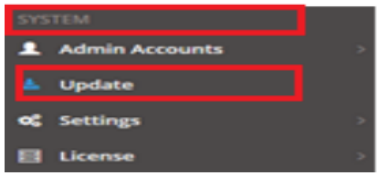


Figure 12 Checking activated vSG modules

With the above steps, vSG will have the required site license and settings synced down from the cloud. Finally, connect up the downstream network to vSG's LAN and this gateway is ready to authenticate downstream clients to access the internet.

Keeping software up-to-date



It is recommended to download and install the latest updates available for your gateway before using it.

Administrators can use the online update feature for this. Make sure the gateway is connected to Internet before using this feature.

Login to vSG admin GUI. Go to **System** > **Update**.

Click on the "**Check for Updates**" button.

If there are new updates available, they will be listed on the page. Click on "**Download All**" to download all updates from the server.

After all updates are downloaded, click on the "Install Next Update" button to install the next update.

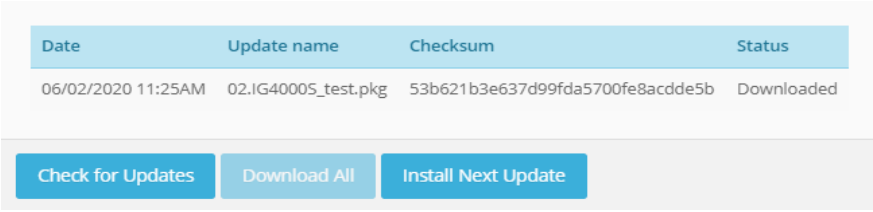


Figure 13 Keeping software up-to-date

Technical Support

If you encounter technical problems, please contact our support team:

Hotline: +65 6100 7877
For US Customers: +1-858-217-5147
Email: tech-support@antlabs.com
URL: http://www.antlabs.com/support/

Please prepare the following information when you are contacting our technical support team:

- Name of contact person
- Company name
- Contact number
- Email address
- Serial number*
- IP address
- Current software update level
- Description of the problem (Attach a screenshot of the error if any)

*You can get the serial number from the dashboard of the web-admin GUI.