



ApplianX AP Gateway

User Guide

Revision 1.0.4



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Document Revision

Rev	Date	By	Detail
1.0.d1	04/10/16	MC	Draft for AP Gateway User Guide
1.0.d2	12/10/16	EBJ	Changed to corporate fonts and reformatted.
1.0	13/10/16	EBJ	First Issue
1.0.1	14/10/16	EBJ	System Overview added
1.0.2	07/11/16	MC	Updates from QA feedback and Factory Reset section added
1.0.3	08/11/16	EBJ	Final reformatting
1.0.4	19/12/16	MC	Document change in VNC port behaviour. Update figure references to account for system overview.

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1 Overview

The Aculab AP Gateway enhances the Aculab IP Gateway by providing an additional Virtual Machine (VM) for use by the customer. The goal of the AP Gateway interface is to simplify the process of creating and maintaining the VM, allowing you to focus on getting the most from the VM without having to worry about the virtualisation details.

For details of the standard IP Gateway features please see the ApplianX IP Gateway user guide.

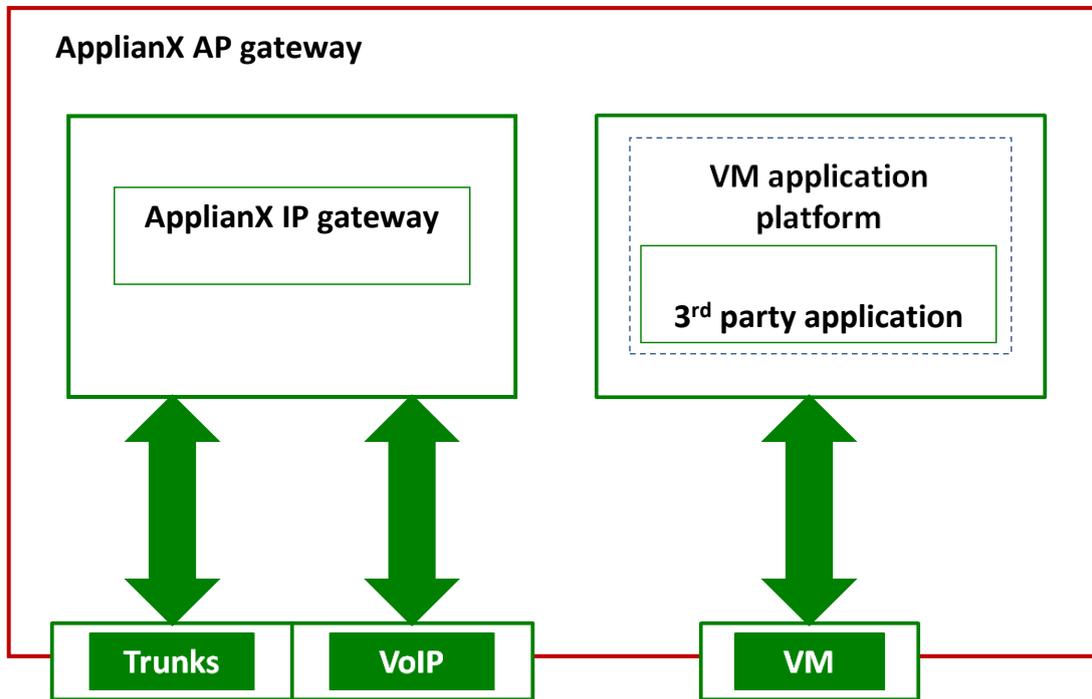


Figure 1. System Overview.

2 VM Storage

The VM Storage page allows you to add data in to the hypervisor’s storage pool. By default the hypervisor does not have visibility of the whole disk. When searching for installation media or for a backup file the storage areas will be searched. It is important to note that only the first level of the storage locations are searched. Subdirectories are not considered part of the storage pool.

There is a 10GB upload area available for installation media. This quota is in addition to the 400GB storage reserved for the virtual machines. Only known file types are accepted, this list of expected file types is as follows; iso, vfd, img, raw, qcow, qcow2, vdi, vmdk, ova.

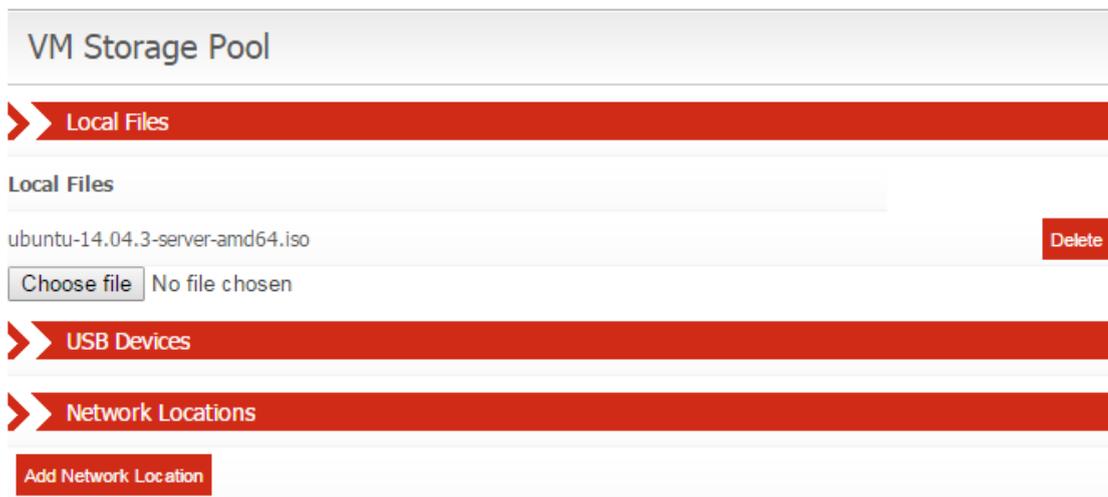


Figure 2. Linux distro uploaded to local storage.

In Fig 2 we can see the installation media for a Linux distro has been uploaded to the local storage on the box.

In addition to the local disk, USB storage devices can be used as part of the storage pool. Any USB devices inserted will be mounted and their contents made visible through the storage pool.

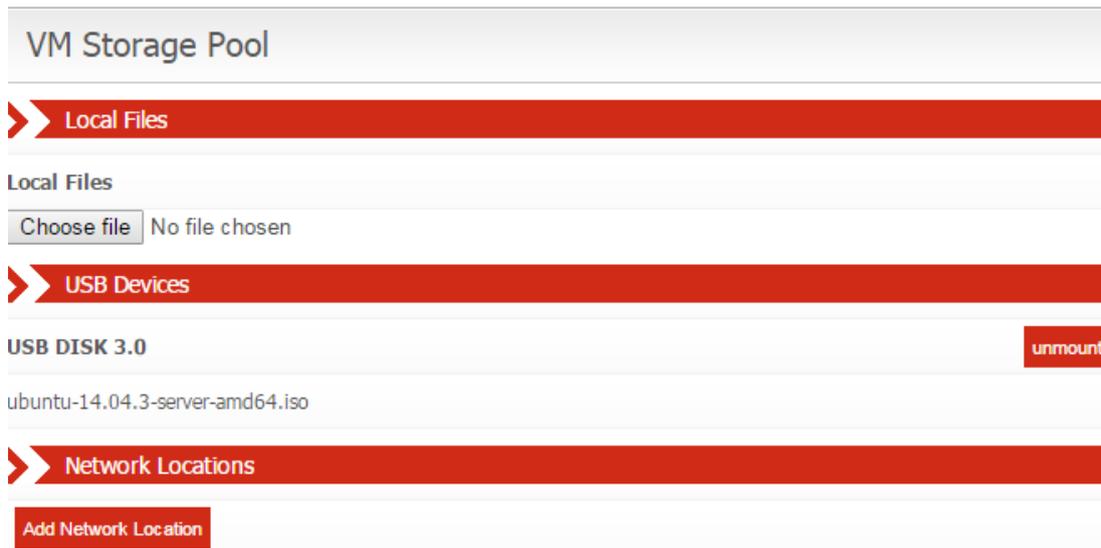


Figure 3. Linux distro ISO file on USB storage device.

USB devices will be automatically searched for and mounted when viewing the VM Storage page or any page that makes use of the VM Storage pool. At the present time this includes the VM Installation, VM Backup and VM Import pages. In order to safely remove a device you should unmount it from the VM Storage page if you have visited any of these pages.

WARNING

Certain write operations on USB can take significant amounts of time to sync to disk after they appear to complete. As such it is always recommended that you unmount any USB devices using the unmount button before removing the device from the Gateway to ensure that the file is correctly written.

The final option is to use a network location as part of the storage pool.

VM Storage Pool

Local Files

Local Files

Choose file No file chosen

USB Devices

Network Locations

URI ? \\acufs\temp\matthewc

Username ? matthewc

Password ?

Domain (opt) ? aculab.com

Submit Cancel

Figure 4. Network location form.

To mount a network location simply click the ‘Add Network Location’ button and complete the form as shown above.

VM Storage Pool

Local Files

Local Files

Choose file No file chosen

USB Devices

Network Locations

//acufs/temp/matthewc	unmount
guest.img	
ubuntu-14.04.3-server-amd64.iso	

Add Network Location

Figure 5. Files present in network location.

Once the location has been mounted the available files will be listed as shown in Fig 5. Multiple locations can be mounted.

Mounted network locations are not mounted permanently and will not be remounted after the AP Gateway is restarted.

3 VM Installation

The AP Gateway provides a 2.4Ghz 4 core atom processor, 12GB of ram, 400GB hard disk and 2 dedicated 1 Gbit network interfaces. These resources are always allocated when installing a new VM through the VM Installation page.

In addition each network interface can be multiplexed with up to 4 virtual network interfaces to provide the guest operating system with up to 8 possible network interfaces.

Installation begins with selecting your VM source media. There are four options for providing the installation media (Fig 5.) ;

- **VM Storage** – Files that are present in the AP Gateway’s storage pools, either uploaded to the device or present on USB or Network share
- **Web URL** – Providing the URL of an ISO file to download. This will automatically download the ISO file to the local uploaded files storage and start the installation from the local copy.
- **PXE Server** – If you have a PXE server configured to provide an installation over the network then supplying the boot URL of the server will start the VM and download the installation media from the server.
- **Import Disk Image** – If you have an existing VM disk available in the AP Gateways storage pool then the VM can be constructed and the disk imported from USB or Network location. This will result in the disk being copied from the external location on to the AP Gateways local disk. Disks in raw and qcow2 images can be imported directly. VMDK and VDI files can be imported but must be converted. Conversion can take considerable time depending on the size of the disk to be imported.

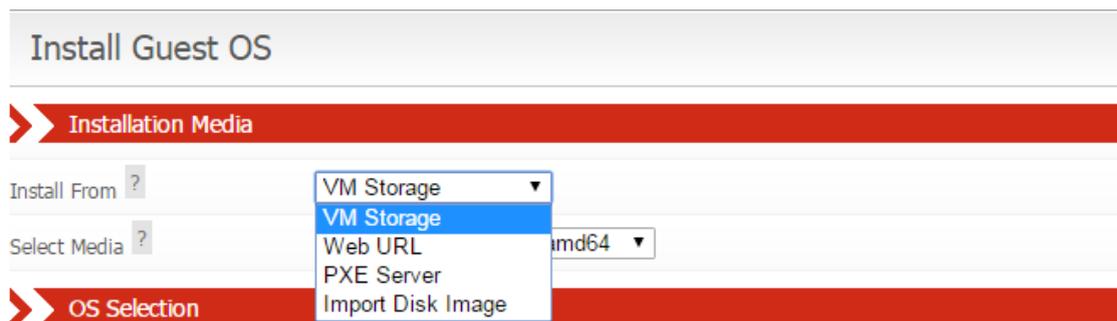


Figure 6. Installation media selection.

The next step is to select the OS Variant. You should select the OS that most closely matches the OS you intend to install. This selection acts as a hint to the hypervisor to help select suitable defaults for disk controllers, network device mode and disk caching modes amongst other things to provide the optimal performance for the guest OS. (Fig 7.)

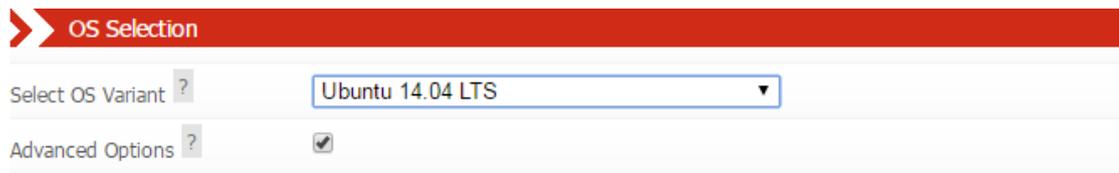


Figure 7. OS Variant selection.

If you choose to you can override some of these settings using the Advanced Options. The advanced options allow for changing the following options (Fig 8) :

- **Network Driver** – Default, let the hypervisor choose a suitable default. VirtIO, use the VirtIO network device, this has better performance than the standard RTL8139 device but is not supported on all OS's. RTL8139, use the widely supported realtek 8139 device. This should work for all operating systems.
- **Disk Controller** – Default, let the hypervisor choose a suitable default. VirtIO, the the VirtIO disk controller, like the network driver this has better performance that the standard SATA and IDE drivers in the virtual machine environment, but is not necessarily supported on all guest OS's. IDE, use an IDE controller, this is the slowest performing but guaranteed to be supported option. SATA, use a SATA disk controller in the VM, better performing than IDE and widely supported.
- **Disk Caching Mode** – Default, let the hypervisor choose a suitable default. Off, in most cases the Hypervisor default will be off. In this case no disk caching will be done. Writethrough mode ensures that the write is confirmed on the VM disk before the write is confirmed by the OS. Write-back allows for the OS to report the write as complete once the cache update is done, but does not wait for the physical disk write.
- **Disk Image Format** – Default, by default the raw disk format will be used. Raw should allow for the best performance. Qcow2 will use the qcow2 format.
- **Tablet Device** – Optionally add a usb tablet device to the VM for input. A tablet device provides absolute positioning of the mouse. This can be useful if you experience issues with a offset between the host machines mouse cursor and the VM's mouse cursor. Tablet devices are recommended on Windows platforms.



Figure 8. Advanced Opts.

If you have a virtual floppy disk image containing device drivers available in the Gateway’s storage pool then these will also be listed under the advanced options. Simply check the box next to the required disk and it will be made available to the VM during the installation. (See Fig 9).

NOTE

Windows VM’s can experience issues with power management of the mouse. This can result in the mouse freezing. In addition to adding a Tablet Device to Windows VM’s it is recommended that you disable power saving on the interface device in windows. This is done from Device Manager -> Human Interface Devices right click on HID-compliant device -> Properties -> Power Management and deselecting the “Allow the computer to turn off this device to save power” option.

Additional Drivers ?

>> Driver Disks

virtio-win-drivers.vfd

Figure 9. Additional driver disk selection.

The next step is to select the network interfaces for the VM. By default two devices are created for you. These map directly to the physical network devices labelled VM A and VM B on the AP Gateway. If you require additional network devices then virtual devices can be added that will share the physical network device. At most 4 virtual devices can be created on each physical device (Fig 10).

>> Network Device A

#	MAC Address
1	52:54:00:c5:39:4a

Add Interface

>> Network Device B

#	MAC Address
1	52:54:00:ee:4a:ee

Add Interface

Figure 10. Network device configuration.

To add a new virtual device simply click the ‘Add Interface’ button. A new device will be added to the list with a suitable MAC address generated for you (Fig 11) . You are free to change this MAC address if you wish, but any MAC address you change is required to start with the prefix 52:54:00 by the hypervisor.

#	MAC Address	
1	52:54:00:c5:39:4a	
2	52:54:00:7f:9e:f5	Delete

Add Interface

Figure 11. Adding an additional virtual network device.

If you want to remove a device simply click the 'Delete' button next to the device.

NOTE

The first device cannot be removed.

The final step is to set the VNC settings. Here you can specify the VNC port, the keyboard binding of the VNC server and any password for the VNC connection (fig 12).

VNC Port ? 5900

Keyboard Layout ? en-gb ▼

VNC Password ?

Install

Figure 12. VNC Settings.

NOTE

Be sure to choose the correct keyboard layout to match your guest OS. A mismatch here can result in some keys being unavailable when using VNC.

The AP Gateway contains an internal VNC client that will automatically connect to the guest VM when it is running. These settings are used automatically for the internal client. However if you wish to use a 3rd party VNC client to connect to the guest VM then you are able to do so. Using the admin IP address of the AP Gateway itself and the port and password set in this section.

The default setting for the VNC port of 0 will disable external connections. If you wish to use a third party VNC client then the VNC port should be set to a value ≥ 5900 . This connection can be protected with a password for security, but it not encrypted.

If you require an encrypted remote connection to the guest OS you are advised to install a remote desktop server on guest machine.

Once you are happy with the selections, clicking the 'Install' button will start the installation process. Any necessary files will be downloaded. Once the VM has been

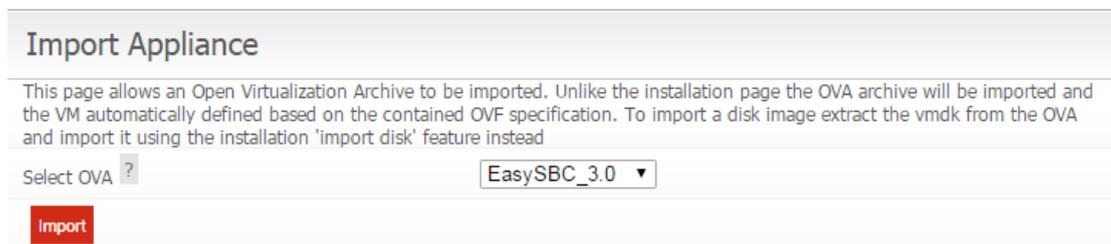
created and booted you will be automatically redirected to the Guest VNC page to complete the installation, if you wish you can use a third party VNC Client at this point to complete the installation.

4 VM Import

The VM import mechanism provides a single click method to import an Open Virtualisation Archive into the AP Gateway. OVA archives contain both a VM definition and hard disk image. This is different to the disk import mechanism available during the installation phase since the VM definition will be taken from the OVA.

During the import of the VM definition, required changes to map network devices to physical devices and replacing unsupported hardware options with default will be done, however the selection of disk size, number of cores and available RAM is defined from the OVA. This means that an imported VM may not fully utilise the resources available to it.

To import the OVA the archive should be made available in the Gateway's storage pools as normal. Once the OVA is visible in the storage pool then it should be available for selection in the Import OVA dropdown menu. Once you have selected the desired OVA simply click the 'Import' button. Since importing the OVA requires the disk to be converted from VMDK to raw, this can take some time depending on the size of the disk.



Import Appliance

This page allows an Open Virtualization Archive to be imported. Unlike the installation page the OVA archive will be imported and the VM automatically defined based on the contained OVF specification. To import a disk image extract the vmdk from the OVA and import it using the installation 'import disk' feature instead

Select OVA ? EasySBC_3.0 ▼

Import

Figure 13. Import page with EasySBC OVA selected for import

NOTE

Tip! You don't need to remain on the import page whilst the operation is in progress. The operation will continue in the background and the status will continue to be reported when you return to the page.

5 VM Overview

The VM Overview page provides information on the guest VM. This information includes the OS type and architecture, VM disk usage, disk read/write, network read/write and CPU usage. This is intended to provide a summary of the VM 's performance at a glance.

Additionally this page allows you to start a VM that is not running, or restart, stop or kill a running VM. If the VM doesn't respond to a shutdown request after 5 minutes then the machine will be forcibly shutdown. This ensures that even a hung machine can always be shutdown. If you choose to you can also Kill a running VM. This will terminate the VM forcible without waiting for the guest OS to shutdown.

Overview	
VM Name:	guest
Guest OS Type:	linux
Guest OS Product:	Ubuntu-Server 14.04.3 LTS "Trusty Tahr" - Beta amd64 (20150805)
Guest OS Architecture:	unknown
Status:	Running
CPUs:	4
CPU Load:	0.42 %
Allocated Ram:	12.3 GB
Maximum Ram:	12.3 GB
Network Read:	2.5 KB/s
Network Write:	0.0 KB/s
Disk Read:	0.0 KB/s
Disk Write:	0.0 KB/s
Disk Size:	400.0 GB
Disk Used:	7.8 GB
Disk Available:	98.04 %

Stop **Restart** **Kill**

WARNING

Killing a VM is equivalent to pulling the power on a physical machine. This can result in data loss and corruption of the disk image. You should only Kill the VM if the VM cannot be shutdown by normal means.

Figure 14. Overview page.

NOTE

Some Windows server editions do not allow a shutdown event until there has been a logon by a user. As such, Windows server will ignore a shutdown request from the hypervisor. This behaviour can be changed to allow the ACPI request to be processed by adding the following registry key to the Windows VM.

```
HKEY_LOCAL_MACHINE\SOFTWARE\MICROSOFT\Microsoft\Windows\
CurrentVersion\Policies\System\shutdownwithoutlogon=1
```

6 VM Configuration

The VM Configuration page allows you to make changes to the VM configuration. This is a subset of the options available during installation.

From here you can change the advanced options for the VM, with the exception of the disk image format. This can be useful for improving performance of the VM, though users should be aware that changing settings such as disk bus mode can result in a VM being unable to locate the boot disk. If this happens reverting the change should resolve the issue.

You can update MAC addresses and add or remove virtual network devices. Changes to the network interfaces can result in the VM being unable to connect to a network until those changes have been applied in the guest OS. However a VNC connection to the VM should always be possible using the internal VNC client, or the IP address of the AP Gateway itself.

You can update the VNC connection settings.

These changes typically require a VM to be rebooted before they take effect. Once you are happy with the changes clicking the 'Update Configuration' button will allow you to choose whether to reboot now or later.

In addition this page allows you to delete the currently defined VM. Deleting the VM will remove the VM definition and the hard disk. Clicking 'Delete VM' will prompt for confirmation before removing the VM.

VM Configuration

VM guest (Ubuntu-Server 14.04.3 LTS "Trusty Tahr" - Beta amd64 (20150805)) Status: Running Delete VM

> **Advanced Options**

Network Driver ?

Disk Controller ?

Disk Caching Mode ?

Tablet Device ?

> **Network Device A**

MAC Address

1

Add Interface

> **Network Device B**

MAC Address

1

Add Interface

> **Remote Desktop**

VNC Port ?

Keyboard Layout ?

VNC Password ?

Update Configuration

Figure 15. Configuration Page.

WARNING

This operation cannot be undone. Deleting a VM without a backup will result in the loss of any data stored on the VM.

7 VM Backup

The VM Backup page allows you to make a backup of the current VM and to restore a VM from a backup.

Backups can be made to either USB storage device or network location. Backup location should be present in the Gateway's storage pool, and should contain enough space to hold the allocated disk space.

The Backup view shows the disk capacity, 400 GB by default, the Size on Disk, which is the actual size of the data stored on the disk and the available space in the backup location (fig 16).

VM Backup	
Action	Backup ▾
Backup Destination	USB DISK 3.0 ▾
Disk capacity ?	400.0 GB
Size on disk ?	9.01 GB
Available space ?	22.0 GB
Backup	

Figure 16. Backup view, showing disk capacity, allocated disk space, available space on backup target

To create a backup select the Backup Destination from the available options, and click the 'Backup' button. The VM does not need to be stopped for this to work. A running VM will have a temporary snapshot file created, this is the file that will be backed up, meaning that changes made to the disk after the backup has begun will not be present in the backup. Once the backup process has completed the snapshot file will be automatically merged back into the active disk and the VM will continue as normal, without loss of service or data.

Backup files are automatically named with the name of the guest VM, typically guest if installed, followed by the date and time of the backup. This name is purely informational. The VM details are contained within. You should feel free to rename the resulting backup file to something meaningful.

NOTE

The Fat32 file system is not supported. Backups to USB devices require the USB stick be formatted with NTFS. Typically a VM hard disk image exceeds 4GB's in size, which is the maximum file size supported by Fat32.

WARNING

Once the backup operation has completed it can take some time before the USB device completes the background task of syncing the disk. This can result in a blocking operation on the AP Gateway while waiting for the disk to become fully synchronised. During this time removing the USB device will result in the backup being truncated and consequently can result in data corruption. Always use the unmount option on the VM Storage page to unmount the device before removing it to avoid this possibility.

To restore a VM from backup, select the Restore option from the Action drop down menu.

This will give you a list of all the backup files in the Gateway's storage pool. Select the appropriate file and click the 'Restore' button.

In order for the VM to be restored the existing VM will be removed along with all associated data. The backup archive will then be imported and a new VM created based on the definition in the backup file. This requires copying the entire hard disk to the AP Gateway, when using USB in particular be aware that this can take considerable time depending on the size of the disk being imported.

NOTE

Tip! You don't need to remain on the backup or restore pages whilst the operation is in progress. The operation will continue in the background and the status will continue to be reported when you return to the page.

8 Guest VNC

The Guest VNC page allows remote desktop access to the guest VM. This functions like a normal VNC client, only embedded in the web client, For convenience, the 'Ctrl+Alt+Del' button is available to send a Ctrl, Alt, Delete key combination to the guest OS as is the 'Win' button to send the Windows/Super key to the guest OS. Clipboard integration is not currently supported due to the restriction in web browsers access to the system clipboard.

In addition to allowing a VNC connection this page supports a couple of additional operations which can be useful when interacting with the VM.

Any ISO files that are available in the Gateway's storage pool are listed in the first drop down menu. Clicking the 'Insert' button will mount that ISO in the guest VM. When an ISO is mounted the 'Insert' button will become the 'Eject' button. Clicking this will eject the device from the VM. Only one disc can be inserted at a time.

In addition, any USB Storage devices connected to the AP Gateway will be listed in the second dropdown menu. Clicking the 'Attach' button will detach this device from the AP Gateway and attach it to the running VM. If a device is attached the 'Attach' button will be replaced with the 'Detach' button. Only one device is allowed to be mounted at any time.

```
Remote Desktop
Ctrl+Alt+Del|Win|ubuntu-14.04.3-server-amd64 ▾|Insert|USB DISK 3.0 ▾|Attach
Ubuntu 14.04.3 LTS ubuntu tty1
ubuntu login: aculab
Password:
Last login: Mon Sep 26 16:00:11 BST 2016 on tty1
Welcome to Ubuntu 14.04.3 LTS (GNU/Linux 3.19.0-25-generic x86_64)

* Documentation:  https://help.ubuntu.com/

System information as of Mon Sep 26 16:00:11 BST 2016

System load:  1.0                Processes:           109
Usage of /:   0.8% of 381.76GB    Users logged in:    0
Memory usage: 1%                IP address for eth0: 10.202.200.92
Swap usage:  0%

Graph this data and manage this system at:
  https://landscape.canonical.com/

New release '16.04.1 LTS' available.
Run 'do-release-upgrade' to upgrade to it.
```

Figure 17. Guest VNC

WARNING

If a USB Storage device is in use by the VM it is no longer available to the AP Gateway's storage pool. No attempt is currently made to ensure that a mounted ISO file is not resident on the USB device when you attempt to attach it to the VM.

WARNING

Attaching and detaching a USB device only makes the hardware available to the VM. The details of what happens to the device after that are dependent on the guest OS. If the guest OS has mounted the device then you should unmount the device in the guest OS before physically removing it from the AP Gateway.

NOTE

Third party VNC Clients are able to connect to the VM using the IP address/hostname of the gateway itself. The Guest OS does not need to have a VNC server installed.

9 Factory Reset

The factory reset page provides options for resetting your AP Gateway to the factory default settings.

The hardware factory reset available via the reset button on the front of the AP Gateway will reset the Gateway functionality to the factory default but will not affect any VM that is configured on the device.

The Factory Reset page provides the same functionality as the reset button, in addition to the option to reset the VM at the same time, completely restoring the box to the factory default state.

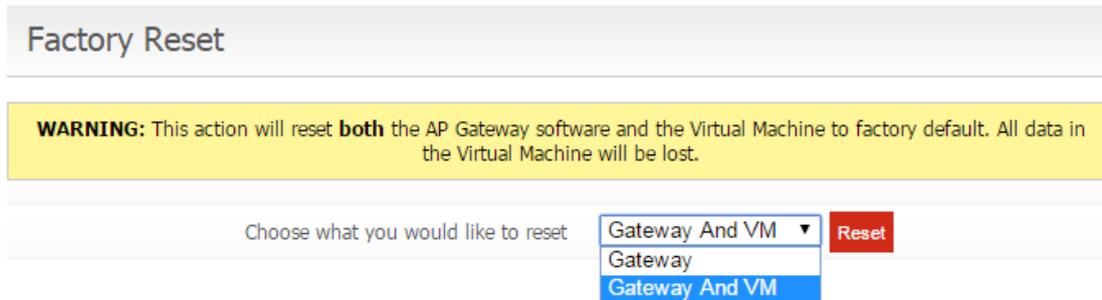


Figure 18. Factory Reset Options

WARNING

Resetting the VM will result in any data not backed up being lost. This operation is irreversible.

10 Glossary of Terms

Virtual Machine – A software computer comprised of a set of specification and configuration files, utilising the physical resources of the host.

Hypervisor – Software that creates and runs virtual machines.

ACPI – Advanced Configuration and Power Interface. Industry standard for configuration and control of hardware devices.

PXE - Preboot Execution Environment, industry standard to allow computers to be configured and booted from a network.