Pexip Infinity
VMware Installation Guide

Introduction

This installation guide describes the minimum steps required to deploy and test a simple Pexip Infinity platform in a VMware environment.

ℹ Full information on configuring and using Pexip Infinity is available:

- on the Pexip Infinity technical documentation website (from where all documentation can also be downloaded in PDF format)
- as online help, by clicking the **Help** link in the top right corner of the Pexip Infinity Administrator interface (available after the Management Node has been deployed).

ℹ You must ensure you have completed all necessary platform-based Planning and prerequisites prior to installation.

Configuring VMware for Pexip Infinity

This section describes the basic VMware configuration required before you install the Management Node or automatically deploy / manually install a Conferencing Node. For more advanced deployments, see also Advanced VMware ESXi administration.

Supported ESXi versions

Version 19 of the Pexip Infinity platform supports VMware vSphere ESXi 5.x and 6.x, although we recommend ESXi 5.5 or higher. Support for ESXi 4.1 is being deprecated - if you have upgraded from a version prior to v12, you can still deploy Conferencing Nodes to servers running ESXi 4.1; however if you have a new deployment using v12 or later and attempt to deploy a Conferencing Node to a server running ESXi 4.1, that node will go straight into maintenance mode.

Supported VMware editions

The Pexip Infinity platform will run on the **free edition** of vSphere Hypervisor. However, this edition has a number of limitations (limited support from VMware, no access to vCenter or vMotion, no access to VMware API). In particular, the lack of access to the VMware API means that all Conferencing Nodes will have to be deployed manually. For this reason we do not recommend its use except in smaller deployments, or test or demo environments.

The minimum edition of VMware that we recommend is the vSphere **Standard edition**. This does not have the limitations of the free edition. If you do not already use VMware in your enterprise, the vSphere **Essentials Kit** is a simple way to get started and will provide you with Standard edition licenses for 3 servers (with 2 CPUs each) plus a vCenter license.

The **Enterprise Plus edition** includes further additional features relevant to the Pexip Infinity platform that could be of benefit to larger deployments. These include Storage DRS and Distributed Switch.

For a comparison of the VMware editions, see **http://www.vmware.com/products/vsphere.html#compare**.

Prerequisites

You must have a suitable VMware environment already installed.

ⓘ If an ESXi host is being managed by vCenter Server, all administration must be performed via vCenter Server. Do not log in directly to the ESXi host; configuration changes made in this way may be lost. To ensure that ESXi hosts being managed by vCenter Server are accessible via vCenter Server only and are not directly accessible, you should put them in Lockdown mode. Lockdown mode forces all operations to be performed through vCenter Server.

Synchronizing time

ⓘ All host servers **must** be synchronized with accurate time before you install the Pexip Infinity Management Node or Conferencing Nodes on them.

- NTP **must** also be enabled on the Management Node VM before you deploy any Conferencing Nodes (this is done during installation of the Management Node).
- We strongly recommend that you configure at least three distinct NTP servers or NTP server pools on all your host servers and the Management Node itself. This will ensure that log entries from all nodes are properly synchronized.
- Pexip Infinity Management Node and Conferencing Node VMs use the UTC timezone, and all logs are in UTC. Do not attempt to change the timezone on these systems.

To synchronize time on the host server using the vSphere web client:

1. Log in to the VM manager (vCenter Server).
2. From the vSphere client's navigation panel, select the host server on which the software image is to be installed.
3. From the main panel, select the **Configure** tab.
4. From the left-hand panel, select **System > Time Configuration**.
5. From the top right of the page, select **Edit**. The **Edit Time Configuration** dialog box appears.
6. Select **Use Network Time Protocol (Enable NTP client)**.
7. In the **NTP Servers** field, we strongly recommend that you enter at least 3 distinct NTP servers or NTP server pools to ensure that log entries from all nodes are properly synchronized.
8. From the **NTP Service Startup Policy** drop-down menu, select **Start and stop with host**.
9. Select **OK**.

To verify that NTP has been enabled correctly:

1. Select the **Configuration** tab and then **System > Time Configuration**.
2. From the **Time Configuration** page, ensure that value in the **Date & Time** field is correct.

Using a static MAC address for the Management Node

We recommend using a static MAC address for the virtual machine hosting your Management Node. This will ensure that the licenses on your Management Node do not become invalid if, for example, the node reboots and comes up on a different physical blade.

Advanced VMware ESXi administration

Simple deployments of the Pexip Infinity platform should not require any special VMware knowledge or configuration beyond that described in Configuring VMware for Pexip Infinity.

This section describes some important requirements for advanced VMware ESXi administration when used with Pexip Infinity. It assumes that you are already familiar with VMware. For more information on VMware ESXi in general, see **http://www.vmware.com/products/esxi-and-esx.html**.

ℹ If an ESXi host is being managed by vCenter Server, all administration must be performed via vCenter Server. Do not log in directly to the ESXi host; configuration changes made in this way may be lost. To ensure that ESXi hosts being managed by vCenter Server are accessible via vCenter Server only and are not directly accessible, you should put them in Lockdown mode. Lockdown mode forces all operations to be performed through vCenter Server.

Management Node network requirements

When deploying Conferencing Nodes, the Management Node connects to the vCenter Server (or the ESXi host directly) on port 443 (https).

This communication port must be open when creating new Conferencing Nodes.

Permissions in vCenter Server (or on ESXi hosts)

A valid username and password for the vCenter Server or ESXi host must be entered every time a new Conferencing Node is created. For security and tracking reasons, these credentials will not be stored by the Management Node.

The account used to log in to vCenter Server or the ESXi host from the Management Node must have sufficient permissions to create virtual machines (VMs) on the folder or resource group where the Conferencing Node will be deployed. The permissions listed below are required as a minimum (in vCenter Server, these permissions should be set on **Datacenter** level or higher):

- Datastore > Allocate space
- Datastore > Browse datastore
- Network > Assign network
- Resource > Assign virtual machine to resource pool
- vApp > Import
- Virtual Machine > Configuration > Add new disk
- Virtual Machine > Interaction > Configure CD media
- Virtual Machine > Interaction > Power On

ℹ The **Administrator** role includes all the above permissions (in addition to many others).

Host server requirements

The recommended hardware requirements for the Management Node and Conferencing Node host servers are described in Server design recommendations. In addition to this:

- **GPU**: host servers do not require any specific hardware cards or GPUs.
- **Disk**: either direct attached storage or shared storage can be used. The primary disk activity will be logging.
- **Multitenancy**: this version of Pexip Infinity requires a dedicated VMware host for supported deployments. Multitenancy with other applications may be supported in the future, and is possible in a test environment as long as other applications on the same host server are not consuming significant CPU and Pexip Infinity can be given reserved memory.

General recommendations

Pexip Infinity can take advantage of advanced CPU features, so for optimal performance we recommend that you run Conferencing Nodes on your newer host servers.

CPUs with a large cache (15–30 MB+) are recommended over CPUs with a smaller cache (4–10 MB), especially when running 10 or more participants per conference.

To protect the overall quality of the conference, we highly recommend that any hardware resources allocated to a Conferencing Node are reserved specifically for its own use.

Impact on virtual environment

CPU

The CPU is the most critical component in a successful deployment of the Pexip Infinity platform.

Newer Intel (or AMD) CPUs typically provide more features which Pexip Infinity will utilize to give better performance. We therefore recommend that you deploy Pexip Infinity on newer hardware, and move applications that are not so time-critical (for example, mail servers, web servers, file servers) to your older hardware.

Memory

The memory specified for the Pexip Infinity deployment should not be shared with other processes, because Pexip Infinity accesses memory at a high speed when active. However, the amount of memory needed is quite small compared to the workload, and increasing the memory beyond the recommended scope will not significantly increase performance.

Storage

Apart from storing the Pexip Infinity application, the disk activity during operation will mainly be used for logging. There is therefore no need to deploy your fastest or newest SSD drives for this application, as most of the real-time activity happens in memory. SSDs are not a requirement, but general VM processes such as snapshots and backups will be faster with SSDs. Standard disk access as required for most servers should be used to get good logging performance.

Network

Gigabit Ethernet connectivity from the host server is strongly recommended, because Conferencing Nodes are sending and receiving real-time audio and video data, and any network bottlenecks should be avoided. The amount of traffic to be expected can be calculated based on the capacity of the servers, but typically 100 Mbps network links can easily be saturated if there is a large number of calls going through a given Conferencing Node. In general, you can expect 1–3 Mbps per call connection, depending on call control setup.

Traffic shaping

Any shaping of the Conferencing Node traffic that can potentially limit its flow should not be used without considerable planning. If bandwidth usage to or from a Conferencing Node is too high, this should be addressed in the call control, as shaping it on the Conferencing Node level will most likely reduce the experience for the participants.

Changing NIC to VMXNET3

Conferencing Node VMs newly deployed from Pexip Infinity v15.x and later use the VMXNET3 NIC as default. We recommend that any Conferencing Nodes VMs deployed using v14.x or earlier and subsequently upgraded to v15 or later are manually changed from using the E1000 NIC to VMXNET3.

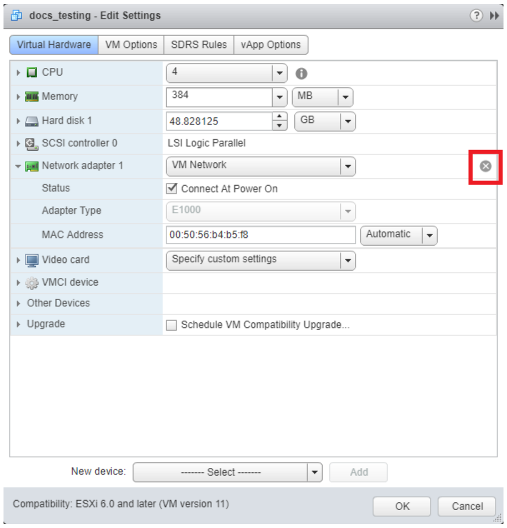
Note that this change is not required for the Management Node - changing the NIC may change the MAC address, resulting in issues with licensing.

Changing a Conferencing Node VM NIC from E1000 to VMXNET3

The MAC address of the VM may change, depending on your VMware environment.

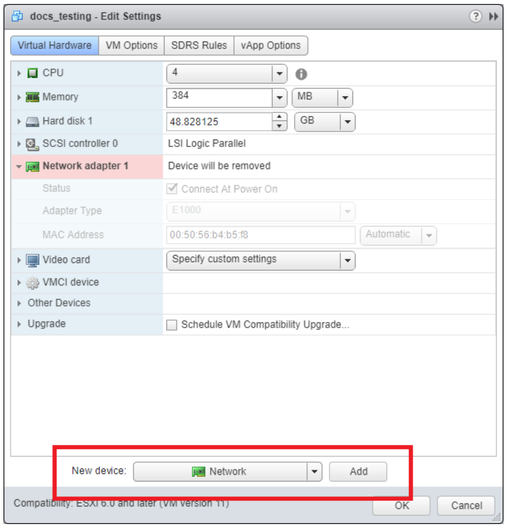
To change a Pexip Infinity Conferencing Node VM NIC from E1000 to VMXNET3:

1. Put the Conferencing Node into maintenance mode and wait until all calls have cleared.
2. Launch your vSphere client.
3. Select the Conferencing Node VM you wish to change and select **Shut Down Guest**.
4. Select **Edit Settings**, and from the **Virtual Hardware** tab, select the network adapter to be changed.
5. Make note of the **Network label**, as you will need to select this again later.
6. Select the **Remove** icon next to the adapter:



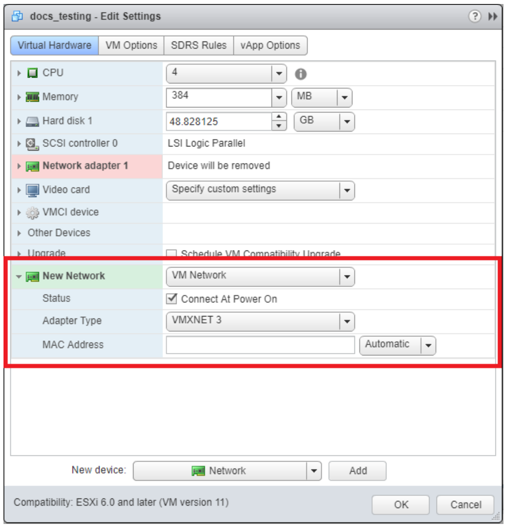
CPU: 4
Memory: 384 MB
Hard disk 1: 48.828125 GB
SCSI controller 0: LSI Logic Parallel
Network adapter 1: VM Network
Status: ☑ Connect At Power On
Adapter Type: E1000
MAC Address: 00:50:56:b4:b5:f8 Automatic
Video card: Specify custom settings
VMCI device
Other Devices
Upgrade: □ Schedule VM Compatibility Upgrade...
New device: ------- Select ------- Add
Compatibility: ESXi 6.0 and later (VM version 11)

7. At the bottom of the window, from the **New device** drop-down, select **Network**, and then select **Add**:



CPU: 4
Memory: 384 MB
Hard disk 1: 48.828125 GB
SCSI controller 0: LSI Logic Parallel
Network adapter 1: Device will be removed
Status: ☑ Connect At Power On
Adapter Type: E1000
MAC Address: 00:50:56:b4:b5:f8 Automatic
Video card: Specify custom settings
VMCI device
Other Devices
Upgrade: □ Schedule VM Compatibility Upgrade...
New device: Network Add
Compatibility: ESXi 6.0 and later (VM version 11)

8. From the **New Network** drop-down, select the same Network label used previously.
9. From the Adapter Type drop-down, select **VMXNET 3**:



CPU	4
Memory	384 MB
Hard disk 1	48.828125 GB
SCSI controller 0	LSI Logic Parallel
Network adapter 1	Device will be removed
Video card	Specify custom settings
VMCI device	
Other Devices	
Upgrade	□ Schedule VM Compatibility Upgrade
New Network	VM Network
Status	☑ Connect At Power On
Adapter Type	VMXNET 3
MAC Address	Automatic

Compatibility: ESXi 6.0 and later (VM version 11)

10. Select **OK**.
11. Re-start the Conferencing Node VM.
12. Take the Conferencing Node out of maintenance mode.

NIC teaming

VMware NIC teaming is a way to group several network interface cards (NICs) to behave as one logical NIC. When using NIC teaming in ESXi, we recommend you load balance based on **originating virtual port** ID due to its low complexity (it does not steal CPU cycles from the host). You can also load balance based on **source MAC hash**; however we do not recommend **IP hash** because of the high CPU overhead when a large number of media packets are involved.

Upgrading the hardware version of the Management Node

We recommend upgrading the hardware version of the Management Node VM to version 8 or later (depending on the ESXi host version that the Management Node is running on).

See https://kb.vmware.com/s/article/1010675 for ESXi version to virtual hardware version compatibility information, and instructions on upgrading a VM's hardware version (vmversion).

vMotion

Conferencing Nodes (and the Management Node) can be moved across host servers using vMotion.

ℹ You must put the Conferencing Node into maintenance mode and wait until all conferences on that node have finished before migrating it to another host server. See Taking a Conferencing Node out of service for more information.

For more information on vMotion in general, see **http://www.vmware.com/products/vsphere/features/vmotion.html**.

Enhanced vMotion Compatibility (EVC)

When EVC (Enhanced vMotion Compatibility) is enabled across a cluster of host servers, all servers in that cluster will emulate the lowest common denominator CPU. This allows you to move VMs between any servers in the cluster without any problems, but it means that if any servers in that cluster have newer-generation CPUs, their advanced features cannot be used.

Because Conferencing Nodes use the advanced features of newer-generation CPUs, (for example AVX on newer Intel CPUs), we recommend that you disable EVC (Enhanced vMotion Compatibility) for any clusters hosting Conferencing Nodes where the cluster includes a mix of new and old CPUs.

If you enable EVC on mixed-CPU clusters, the Pexip Infinity platform will run more slowly because it will cause the Conferencing Nodes to assume they are running on older hardware.

If you enable EVC, you must select the Sandy Bridge-compatible EVC mode as a minimum. This is the lowest EVC mode that supports the AVX instruction set, which is required to run the Pexip Infinity platform.

ℹ When enabling EVC or lowering the EVC mode, you should first shut down any currently running VMs with a higher EVC mode than the one you intend to enable.

ℹ When disabling EVC or raising the EVC mode, any currently running VMs will not have access to the new level until they have been shut down and restarted.

For instructions on disabling EVC, see Disabling EVC.

For more information on EVC in general, see **https://pubs.vmware.com/vsphere-60/index.jsp?topic=%2Fcom.vmware.vsphere.vcenterhost.doc%2FGUID-9F444D9B-44A0-4967-8C07-693C6B40278A.html**.

vSphere High Availability

vSphere High Availability (HA) can be configured so that, in the case of an ESXi host failure, it will automatically start the VM on another host in the cluster. This is supported for both Management Node and Conferencing Nodes and will provide protection against hosts failing.

Loss of a Conferencing Node in such circumstances will result in any participants connected to that node being disconnected. They will have to redial the Virtual Meeting Room alias to rejoin the conference.

Momentary loss of the Management Node will not affect running conferences.

For more information on HA, see **http://www.vmware.com/solutions/business-continuity.html#highavailability**.

vSphere Fault Tolerance

For added resilience in the event of hardware outage, the Management Node can be protected with vSphere Fault Tolerance (FT), if your environment meets the necessary requirements.

For more information on FT, see **http://www.vmware.com/products/vsphere/features/fault-tolerance.html** and the relevant documentation for your VMware version and license.

Installing the Management Node

Before installing the Management Node we recommend that you review the VMware configuration prerequisites and the Installation checklist.

Installation of the Management Node is a two-step process:

1. **Deploying the VM template**: this creates a new unconfigured instance of a generic Management Node VM.

   The process for deploying the template in a VMware hypervisor environment is described below.
2. **Running the installation wizard**: after deploying the Management Node template, the installation wizard allows you to enter the basic configuration details for your Management Node VM.

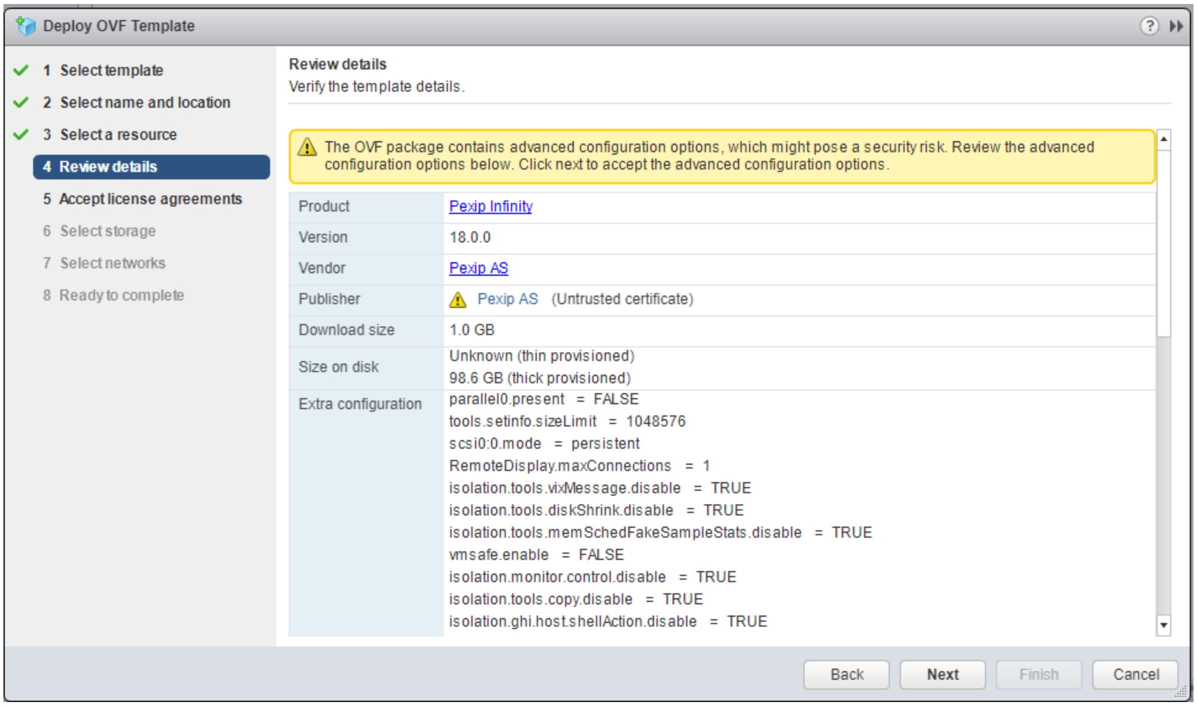
Deploying the Management Node template

If an ESXi host is being managed by vCenter Server, all administration must be performed via vCenter Server. Do not log in directly to the ESXi host; configuration changes made in this way may be lost. To ensure that ESXi hosts being managed by vCenter Server are accessible via vCenter Server only and are not directly accessible, you should put them in Lockdown mode. Lockdown mode forces all operations to be performed through vCenter Server.

To install a new instance of a Pexip Infinity Management Node using the vSphere web client:

1. Download the **Pexip Infinity OVA** file from **www.pexip.com/software-download**.
2. Log in to the VM Manager (vCenter Server).
3. Select **VMs and Templates**.
4. Click on the **Actions** menu and select **Deploy OVF Template...**.

   The **Deploy OVF Template** window will open.
5. At the **Select template** step, **Browse** to the location of the **Pexip Infinity OVA** file and select **Next**.
6. At the **Select name and location** step:
   a. Enter an appropriate **Name** for the Management Node. This name will be used in the VMware interface to identify this Management Node virtual machine (VM).
   b. Select the folder or datacenter within which the Management Node will be located.
   c. Select **Next**.
7. At the **Select a resource** step, select the host, cluster, resource pool or vapp in which to run the template, and select **Next**.
8. At the **Review details** step, you may see the following warning:



✓ 1 Select template
✓ 2 Select name and location
✓ 3 Select a resource
4 Review details
5 Accept license agreements
6 Select storage
7 Select networks
8 Ready to complete

Review details
Verify the template details.

⚠ The OVF package contains advanced configuration options, which might pose a security risk. Review the advanced configuration options below. Click next to accept the advanced configuration options.

Product	Pexip Infinity
Version	18.0.0
Vendor	Pexip AS
Publisher	⚠ Pexip AS (Untrusted certificate)
Download size	1.0 GB
Size on disk	Unknown (thin provisioned) 98.6 GB (thick provisioned)

Extra configuration	parallel0.present = FALSE
	tools.setinfo.sizeLimit = 1048576
	scsi0:0.mode = persistent
	RemoteDisplay.maxConnections = 1
	isolation.tools.vixMessage.disable = TRUE
	isolation.tools.diskShrink.disable = TRUE
	isolation.tools.memSchedFakeSampleStats.disable = TRUE
	vmsafe.enable = FALSE
	isolation.monitor.control.disable = TRUE
	isolation.tools.copy.disable = TRUE
	isolation.ghi.host.shellAction.disable = TRUE

Select **Next**.

9. At the **Accept license agreements** step, read the license agreements, and if you agree to the terms select **Accept** and then **Next**.
10. At the **Select storage** page, select the **virtual disk format**, **VM storage policy** and **Datastore** to be used, and select **Next**.
11. At the **Select networks** step, select the VM Network and IP configuration, and select **Next**.
12. At the **Ready to complete** page, review the configuration and select **Finish**.

Progress is shown in the **Recent Tasks** tab at the bottom of the screen. When the template has been deployed successfully, a green tick will appear.

Enabling automatic startup

After deploying a new Management Node from VMware, you must enable automatic startup of that virtual machine (VM). In VMware, automatic startup is disabled by default for every new VM — which means that if the host server is powered down for any reason, when it restarts the VM will not restart and must be started manually.

You can only enable automatic startup after the Management Node has been deployed.

To enable automatic startup using the vSphere web client:

1. Log in to the VM manager (vCenter Server).
2. From the navigation panel, select the **Hosts And Clusters** tab and navigate to the host server on which the node's VM is installed.
3. From the main panel, select the **Configure** tab.
4. From the left-hand panel, select **Virtual Machines > VM Startup/Shutdown**.
5. At the top right of the page, select **Edit**.
6. In the **System influence** section, select **Automatically start and stop the virtual machines with the system**.
7. Select **OK**.

Running the installation wizard

To run the installation wizard, which configures the Management Node, you must open a console window on the Management Node VM.

Opening a console window

1. Using the vSphere client, log in to the Management Node's VM Manager (vCenter Server or, for stand-alone deployments, the ESXi host).
2. Power on the new Management Node VM (if it is not already powered on).
3. Right-click on the new Management Node VM and select **Open Console**.

Running the installation wizard

1. At the prompt, enter the username ***admin***.

   The display will read:

   ```
   You are required to change your password immediately (root enforced)
   Enter new UNIX password:
   ```
2. Create a password for the Management Node operating system by typing the password, pressing enter, retyping the password, and pressing enter again.
3. Ensure you record the password in a secure location. After you have finished running the installation wizard you will not need the password again unless you need to access the Management Node using SSH.

   You are presented with another login prompt:

   ```
   [sudo] password for admin:
   ```
4. Log in again with the password you just created.

   The Pexip installation wizard will begin.
5. Follow the prompts to set the following configuration for the Management Node.

   If you press enter, the default value will be applied:

Setting	Default value	Multiple entries allowed?	Can be changed via Pexip Infinity Administrator interface?
IP address	192.168.0.100	No	No ‡
Network mask	255.255.255.0	No	No ‡
Gateway	192.168.0.1	No	No ‡
Hostname	<no default>	No	No ‡
Domain suffix	<no default>	No	No ‡
DNS servers	8.8.8.8	Yes, if separated by a space	Yes
NTP servers †	Two of the following: ○ 0.pexip.pool.ntp.org ○ 1.pexip.pool.ntp.org ○ 2.pexip.pool.ntp.org ○ 3.pexip.pool.ntp.org	Yes, if separated by a space	Yes
Web administration username	admin	No	No ‡
Web administration password	<no default>	No	Yes
Enable incident reporting (yes/no)	<no default>		Yes

Setting	Default value	Multiple entries allowed?	Can be changed via Pexip Infinity Administrator interface?
Send deployment and usage statistics to Pexip (yes/no)	<no default>		Yes

† The NTP server must be accessible by the Management Node at the time the startup wizard is run. Installation will fail if the Management Node is unable to synchronize its time with an NTP server.

‡ After they have been configured, do not attempt to change these settings by any other means. To change these settings on server-based deployments, you must re-run the installation wizard.

The installation will begin and the Management Node will restart using the values you have configured.

Initial platform configuration

After you have run the installation wizard, you must perform some preliminary configuration of the Pexip Infinity platform before you can then deploy a Conferencing Node.

This section lists the configuration required, and provides a summary of each step with a link to further information.

All configuration should be done using the Pexip Infinity Administrator interface.

No changes should be made to any Pexip VM via the terminal interface (other than as described when running the initial Pexip installation wizard) unless directed to do so by Pexip support. This includes (but is not limited to) changes to the time zone, changes to IP tables, configuration of Ethernet interfaces, or the installation of any third-party code/applications.

Accessing the Pexip Infinity Administrator interface

The Pexip Infinity Administrator interface is hosted on the Management Node. To access this:

1. Open a web browser and type in the IP address or DNS name that you assigned to the Management Node using the installation wizard (you may need to wait a minute or so after installation is complete before you can access the Administrator interface).
2. Until you have uploaded appropriate TLS certificates to the Management Node, your browser may present you with a warning that the website's security certificate is not trusted. You should proceed, but upload appropriate TLS certificates to the Management Node (and Conferencing Nodes, when they have been created) as soon as possible.

   The **Pexip Infinity Conferencing Platform** login page will appear.
3. Log in using the web administration username and password you set using the installation wizard.

You are now ready to begin configuring the Pexip Infinity service and deploying Conferencing Nodes.

As a first step, we strongly recommend that you configure at least 2 additional NTP servers or NTP server pools to ensure that log entries from all nodes are properly synchronized.

It may take some time for any configuration changes to take effect across the Conferencing Nodes. In typical deployments, configuration replication is performed approximately once per minute. However, in very large deployments (more than 60 Conferencing Nodes), configuration replication intervals are extended, and it may take longer for configuration changes to be applied to all Conferencing Nodes (the administrator log shows when each node has been updated).

Brief details of how to perform the initial configuration are given below. For complete information on how to configure your Pexip Infinity solution, see the Pexip Infinity technical documentation website at docs.pexip.com.

Configuring the Pexip Infinity platform

This table lists the Pexip Infinity platform configuration steps that are required before you can deploy Conferencing Nodes and make calls.

Configuration step	Purpose
1. Enable DNS **(System Configuration > DNS Servers)**	At least one DNS server must be added to your system. DNS is required when using hostnames instead of IP addresses when setting up NTP servers, syslog servers and VM managers. It is also used for call routing that depends on FQDNs. You will already have configured at least one DNS server when running the install wizard, but you can now change it or add more DNS servers.

Configuration step	Purpose
2. Enable NTP (System Configuration > NTP Servers)	Pexip Infinity uses NTP servers to obtain accurate system time. This is necessary to ensure correct operation, including configuration replication and log timestamps. We strongly recommend that you configure at least 3 distinct NTP servers or NTP server pools to ensure that log entries from all nodes are properly synchronized. You will already have configured at least one NTP server when running the install wizard, but you can now change it or add more NTP servers.
3. Add licenses (Platform Configuration > Licenses)	You must install a system license with sufficient concurrent call capacity for your environment before you can place calls to Pexip Infinity services.
4. Add a system location (Platform Configuration > Locations)	These are labels that allow you to group together Conferencing Nodes that are in the same datacenter. You must have at least one location configured before you can deploy a Conferencing Node.
5. Upload TLS certificates (Platform Configuration > TLS Certificates)	You must install TLS certificates on the Management Node and — when you deploy them — each Conferencing Node. TLS certificates are used by these systems to verify their identity to clients connecting to them. All nodes are deployed with self-signed certificates, but we strongly recommend they are replaced with ones signed by either an external CA or a trusted internal CA.
6. Add Virtual Meeting Rooms (Service Configuration > Virtual Meeting Rooms)	Conferences take place in Virtual Meeting Rooms and Virtual Auditoriums. VMR configuration includes any PINs required to access the conference. You must deploy at least one Conferencing Node before you can call into a conference.
7. Add an alias for the Virtual Meeting Room (done while adding the Virtual Meeting Room)	A Virtual Meeting Room or Virtual Auditorium can have more than one alias. Conference participants can access a Virtual Meeting Room or Virtual Auditorium by dialing any one of its aliases.

Adding a VM manager

(System Configuration > VM Managers)

This is the address of the application to use when automatically deploying your Conferencing Nodes. It is your vCenter Server, or if you are not using vCenter, it is vSphere on the ESXi host.

Automatically deploying a new Conferencing Node on a VMware host

To automatically deploy a new Conferencing Node on to a VMware ESXi host:

1. Ensure that the Management Node can connect directly to the ESXi host server over HTTPS (port 443/TCP), even if you are using vCenter server.
2. Go to **Platform Configuration > Conferencing Nodes** and select **Add Conferencing Node**.
3. From the **Deployment type** field, select ***Automatic (ESXi 4.1, 5.x and 6.x)***.
4. Select **Next**.
5. You are now asked to log in to the VM manager via which the Conferencing Node virtual machine is to be created, by completing the following fields:

Option	Description
VM manager	Select the VM manager via which this Conferencing Node VM will be created. If the VM manager does not appear in the drop-down list, you can add it by clicking ➕ to the right of the field.
Username Password	Enter a valid username and password to log in to the selected VM manager.
Verify TLS certificates	Determines whether the certificate presented by the VM manager is verified before the connection is allowed.

6. Select **Next**.

   There may be a slight delay while Pexip Infinity locates and logs in to the VM manager, and obtains information from it.
7. You are now asked to select the datacenter on the VM manager where the Conferencing Node VM will be created, by completing the following field:

Option	Description
Datacenter	Select the path of the datacenter in which the Conferencing Node will be created. The options available in the drop-down menu reflect what is currently configured in the VM manager.

   Note that this step is skipped if there is only one datacenter configured in the VM manager.
8. Select **Next**.
9. You are now asked to nominate the resource pool on the VM manager where the Conferencing Node VM will be created, by completing the following field:

Option	Description
Resource path	Select the path of the resource pool in which the Conferencing Node will be created. The options available in the drop-down menu are filtered by the datacenter selected in the previous step and reflect what is currently configured in the VM manager. To add a new path, you must do so using vCenter Server (or the ESXi host if you are not using vCenter Server) prior to creating the Conferencing Node.

10. Select **Next**.
11. You are now asked to provide the VM manager with parameters relating to the Conferencing Node, by completing the following fields:

Option	Description

Host network	Select the host network on which this Conferencing Node will be deployed. The options shown here are the vSphere switches that have been configured on the VM manager on which this Conferencing Node is being deployed.
Secondary interface host network	If a secondary network interface for this Conferencing Node is required, select the host network to use for that second interface.
Host datastore	Select the datastore on the host server to be used by this Conferencing Node. The options shown here are the datastores that have been configured on the VM manager via which this Conferencing Node is being deployed.

12. Select **Next**.
13. You are now asked to provide the VM manager with information regarding the CPUs and memory of the Conferencing Node, by completing the following fields:

Option	Description
Number of virtual CPUs to assign	Enter the number of virtual CPUs to assign to the Conferencing Node. We recommend no more than one virtual CPU per physical core, unless you are making use of CPUs that support hyperthreading.
System memory (in megabytes) to assign	Enter the amount of RAM (in megabytes) to assign to the Conferencing Node. The number entered must be a multiple of 4. We recommend 1024 MB (1 GB) RAM for each virtual CPU. The field automatically defaults to the recommended amount, based on the number of virtual CPUs you have entered.

14. Select **Next**.
15. You are now asked to provide the network configuration to be applied to the Conferencing Node, by completing the following fields:

Option	Description
Name	Enter the name that will be used to refer to this Conferencing Node in the Pexip Infinity Administrator interface.
Description	An optional field where you can provide more information about the Conferencing Node.
Role	This determines the Conferencing Node's role: ○ ***Proxying Edge Node***: a Proxying Edge Node handles all media and signaling connections with an endpoint or external device, but does not host any conferences — instead it forwards the media on to a Transcoding Conferencing Node for processing. ○ ***Transcoding Conferencing Node***: a Transcoding Conferencing Node handles all the media processing, protocol interworking, mixing and so on that is required in hosting Pexip Infinity calls and conferences. When combined with Proxying Edge Nodes, a transcoding node typically only processes the media forwarded on to it by those proxying nodes and has no direct connection with endpoints or external devices. However, a transcoding node can still receive and process the signaling and media directly from an endpoint or external device if required.
Hostname Domain	Enter the hostname and domain to be assigned to this Conferencing Node. Each Conferencing Node and Management Node must have a unique hostname. The Hostname and Domain together make up the Conferencing Node's DNS name or FQDN. We recommend that you assign valid DNS names to all your Conferencing Nodes.
IPv4 address	Enter the IP address to be assigned to this Conferencing Node when it is created.
Network mask	Enter the IP network mask to be assigned to this Conferencing Node.
Gateway IPv4 address	Enter the IP address of the default gateway to be assigned to this Conferencing Node.

Option	Description
Secondary interface IPv4 address	The optional secondary interface IPv4 address for this Conferencing Node. If configured, this interface is used for signaling and media communications to clients, and the primary interface is used for communication with the Management Node and other Conferencing Nodes.
Secondary interface network mask	The optional secondary interface network mask for this Conferencing Node.
System location	Select the physical location of this Conferencing Node. A system location should not contain a mixture of Proxying Edge Nodes and Transcoding Conferencing Nodes. If the system location does not already exist, you can create a new one here by clicking ✚ to the right of the field. This will open up a new window showing the **Add System Location** page.
SIP TLS FQDN	A unique identity for this Conferencing Node, used in signaling SIP TLS Contact addresses.
TLS certificate	The TLS certificate to use on this node. This must be a certificate that contains the above **SIP TLS FQDN**. Each certificate is shown in the format **<subject name> (<issuer>)**.
IPv6 address	The IPv6 address for this Conferencing Node. Each Conferencing Node must have a unique IPv6 address.
Gateway IPv6 address	The IPv6 address of the default gateway.
IPv4 static NAT address	The public IPv4 address used by this Conferencing Node when it is located behind a NAT device. Note that if you are using NAT, you must also configure your NAT device to route the Conferencing Node's **IPv4 static NAT address** to its **IPv4 address**.
Static routes	From the list of **Available Static routes**, select the routes to assign to the node, and then use the right arrow to move the selected routes into the **Chosen Static routes** list.
Enable distributed database	This should usually be enabled (checked) for all Conferencing Nodes that are expected to be "always on", and disabled (unchecked) for nodes that are expected to only be powered on some of the time (e.g. nodes that are likely to only be operational during peak times).
Enable SSH	Determines whether this node can be accessed over SSH. ***Use Global SSH setting***: SSH access to this node is determined by the global **Enable SSH** setting (**Platform Configuration > Global Settings > Enable SSH**). ***Off***: this node cannot be accessed over SSH, regardless of the global **Enable SSH** setting. ***On***: this node can be accessed over SSH, regardless of the global **Enable SSH** setting. Default: ***Use Global SSH setting***.
SSH password	Enter the password to be used when logging in to this Conferencing Node's Linux operating system over SSH. The username will always be ***admin***. Logging in to the operating system is required when changing passwords or for diagnostic purposes only, and should generally be done under the guidance of your Pexip authorized support representative. In particular, do not change any configuration using SSH — all changes should be made using the Pexip Infinity Administrator interface.

16. Select **Finish**.

You will be taken to the **Deploying Conferencing Node** page. The deployment will take several minutes. When complete, the progress bar will show that the Conferencing Node VM has been deployed successfully and the **Status** will say ***Deployment succeeded***.

Go to **Platform Configuration > Conferencing Nodes** to return to the list of Conferencing Nodes.

After deploying a new Conferencing Node, it takes approximately 5 minutes before the node is available for conference hosting and for its status to be updated on the Management Node. (Until it is available, the Management Node will report the status of the Conferencing Node as having a last contacted and last updated date of "Never".)

Enabling automatic startup

After deploying a new Conferencing Node from VMware, you must enable automatic startup of that virtual machine (VM). In VMware, automatic startup is disabled by default for every new VM — which means that if the host server is powered down for any reason, when it restarts the VM will not restart and must be started manually.

You can only enable automatic startup after the Conferencing Node has been deployed.

To enable automatic startup using the vSphere web client:

1. Log in to the VM manager (vCenter Server).
2. From the navigation panel, select the **Hosts And Clusters** tab and navigate to the host server on which the node's VM is installed.
3. From the main panel, select the **Configure** tab.
4. From the left-hand panel, select **Virtual Machines > VM Startup/Shutdown**.
5. At the top right of the page, select **Edit**.
6. In the **System influence** section, select **Automatically start and stop the virtual machines with the system**.
7. Select **OK**.

Disabling EVC

We strongly recommend that you disable EVC (Enhanced vMotion Compatibility) for any ESXi clusters hosting Conferencing Nodes that include a mix of old and new CPUs. If EVC is enabled on such clusters, the Pexip Infinity platform will run more slowly because the Conferencing Nodes will assume they are running on older hardware.

For more information, see Enhanced vMotion Compatibility (EVC).

To disable EVC:

1. From the vSphere client's navigation panel, select the cluster.
2. From the main panel, select the **Configure** tab.
3. From the left-hand panel, select **Configuration > VMware EVC**.
   The current EVC settings will be shown.
4. At the top right of the page, select **Edit** .
5. Select **Disable EVC**.

Manually deploying a Conferencing Node on an ESXi host

The manual deployment process generates an **.ova** file that must then be manually deployed from within VMware on to an ESXi host. Note that:

- This file is specific to the Conferencing Node being deployed. It cannot be used to deploy multiple Conferencing Nodes.
- The file is single-use. It cannot be used to re-deploy the same Conferencing Node at a later date. To re-deploy the Conferencing Node, you must first delete it from the Pexip Infinity Management Node and from VMware, and then deploy a new Conferencing Node with the same configuration as the deleted node.
- Before you start, ensure that you are currently using the same machine that you will subsequently want to use to upload the generated file on to your host server.

To manually deploy a new Conferencing Node on to a VMware ESXi host:

1. Go to **Platform Configuration > Conferencing Nodes** and select **Add Conferencing Node**.
2. From the **Deployment type** field, select either ***Manual (ESXi 6.x)***, ***Manual (ESXi 5.x)*** or ***Manual (ESXi 4.1)*** as appropriate.
3. Select **Next**.
4. You are now asked to provide information regarding the CPUs and memory of the Conferencing Node, by completing the following fields:

Option	Description
Number of virtual CPUs to assign	Enter the number of virtual CPUs to assign to the Conferencing Node. We recommend no more than one virtual CPU per physical core, unless you are making use of CPUs that support hyperthreading.
System memory (in megabytes) to assign	Enter the amount of RAM (in megabytes) to assign to the Conferencing Node. The number entered must be a multiple of 4. We recommend 1024 MB (1 GB) RAM for each virtual CPU. The field automatically defaults to the recommended amount, based on the number of virtual CPUs you have entered.

5. Select **Next**.
6. You are now asked to provide the network configuration to be applied to the Conferencing Node, by completing the following fields:

Option	Description
Name	Enter the name that will be used to refer to this Conferencing Node in the Pexip Infinity Administrator interface.
Description	An optional field where you can provide more information about the Conferencing Node.
Role	This determines the Conferencing Node's role: ○ ***Proxying Edge Node***: a Proxying Edge Node handles all media and signaling connections with an endpoint or external device, but does not host any conferences — instead it forwards the media on to a Transcoding Conferencing Node for processing. ○ ***Transcoding Conferencing Node***: a Transcoding Conferencing Node handles all the media processing, protocol interworking, mixing and so on that is required in hosting Pexip Infinity calls and conferences. When combined with Proxying Edge Nodes, a transcoding node typically only processes the media forwarded on to it by those proxying nodes and has no direct connection with endpoints or external devices. However, a transcoding node can still receive and process the signaling and media directly from an endpoint or external device if required.
Hostname Domain	Enter the hostname and domain to be assigned to this Conferencing Node. Each Conferencing Node and Management Node must have a unique hostname. The Hostname and Domain together make up the Conferencing Node's DNS name or FQDN. We recommend that you assign valid DNS names to all your Conferencing Nodes.

Option	Description
IPv4 address	Enter the IP address to be assigned to this Conferencing Node when it is created.
Network mask	Enter the IP network mask to be assigned to this Conferencing Node.
Gateway IPv4 address	Enter the IP address of the default gateway to be assigned to this Conferencing Node.
Secondary interface IPv4 address	The optional secondary interface IPv4 address for this Conferencing Node. If configured, this interface is used for signaling and media communications to clients, and the primary interface is used for communication with the Management Node and other Conferencing Nodes.
Secondary interface network mask	The optional secondary interface network mask for this Conferencing Node.
System location	Select the physical location of this Conferencing Node. A system location should not contain a mixture of Proxying Edge Nodes and Transcoding Conferencing Nodes. If the system location does not already exist, you can create a new one here by clicking ✚ to the right of the field. This will open up a new window showing the **Add System Location** page.
SIP TLS FQDN	A unique identity for this Conferencing Node, used in signaling SIP TLS Contact addresses.
TLS certificate	The TLS certificate to use on this node. This must be a certificate that contains the above **SIP TLS FQDN**. Each certificate is shown in the format **<subject name> (<issuer>)**.
IPv6 address	The IPv6 address for this Conferencing Node. Each Conferencing Node must have a unique IPv6 address.
Gateway IPv6 address	The IPv6 address of the default gateway.
IPv4 static NAT address	The public IPv4 address used by this Conferencing Node when it is located behind a NAT device. Note that if you are using NAT, you must also configure your NAT device to route the Conferencing Node's **IPv4 static NAT address** to its **IPv4 address**.
Static routes	From the list of **Available Static routes**, select the routes to assign to the node, and then use the right arrow to move the selected routes into the **Chosen Static routes** list.
Enable distributed database	This should usually be enabled (checked) for all Conferencing Nodes that are expected to be "always on", and disabled (unchecked) for nodes that are expected to only be powered on some of the time (e.g. nodes that are likely to only be operational during peak times).
Enable SSH	Determines whether this node can be accessed over SSH. ***Use Global SSH setting***: SSH access to this node is determined by the global **Enable SSH** setting (**Platform Configuration > Global Settings > Enable SSH**). ***Off***: this node cannot be accessed over SSH, regardless of the global **Enable SSH** setting. ***On***: this node can be accessed over SSH, regardless of the global **Enable SSH** setting. Default: ***Use Global SSH setting***.
SSH password	Enter the password to be used when logging in to this Conferencing Node's Linux operating system over SSH. The username will always be ***admin***. Logging in to the operating system is required when changing passwords or for diagnostic purposes only, and should generally be done under the guidance of your Pexip authorized support representative. In particular, do not change any configuration using SSH — all changes should be made using the Pexip Infinity Administrator interface.

7. Select **Finish**.

   You will be taken to the **Manually Deploy Conferencing Node** page.
8. Select **Download Conferencing Node**.

   A file with the name **pexip-<hostname>.<domain>.ova** will be downloaded.
9. When you wish to deploy the Conferencing Node VM, use a vSphere client to log in to vCenter Server (or the ESXi host directly, if it is not managed in vCenter Server) and select **File > Deploy OVF Template...**. Follow the on-screen prompts to deploy the

.ova file.

After deploying a new Conferencing Node, it takes approximately 5 minutes before the node is available for conference hosting and for its status to be updated on the Management Node. (Until it is available, the Management Node will report the status of the Conferencing Node as having a last contacted and last updated date of "Never".)

Enabling automatic startup

After deploying a new Conferencing Node from VMware, you must enable automatic startup of that virtual machine (VM). In VMware, automatic startup is disabled by default for every new VM — which means that if the host server is powered down for any reason, when it restarts the VM will not restart and must be started manually.

You can only enable automatic startup after the Conferencing Node has been deployed.

To enable automatic startup using the vSphere web client:

a. Log in to the VM manager (vCenter Server).

b. From the navigation panel, select the **Hosts And Clusters** tab and navigate to the host server on which the node's VM is installed.

c. From the main panel, select the **Configure** tab.

d. From the left-hand panel, select **Virtual Machines > VM Startup/Shutdown**.

e. At the top right of the page, select **Edit**.

f. In the **System influence** section, select **Automatically start and stop the virtual machines with the system**.

g. Select **OK**.

Disabling EVC

We strongly recommend that you disable EVC (Enhanced vMotion Compatibility) for any ESXi clusters hosting Conferencing Nodes that include a mix of old and new CPUs. If EVC is enabled on such clusters, the Pexip Infinity platform will run more slowly because the Conferencing Nodes will assume they are running on older hardware.

For more information, see Enhanced vMotion Compatibility (EVC).

To disable EVC:

1. From the vSphere client's navigation panel, select the cluster.
2. From the main panel, select the **Configure** tab.
3. From the left-hand panel, select **Configuration > VMware EVC**.

   The current EVC settings will be shown.
4. At the top right of the page, select **Edit** .
5. Select **Disable EVC**.

Testing and next steps after initial installation

After you have completed your installation and initial configuration of Pexip Infinity, you can make a test call to check that your system is working. You can also extend your deployment by integrating it with other call control or third-party systems, or by customizing the user experience.

Making a test call

When you have deployed a Conferencing Node and configured a Virtual Meeting Room and an alias, you can make a test call to check that your system is working.

An easy way to do this is by using the Infinity Connect web app to dial the alias of one of the Virtual Meeting Rooms you've already created, as follows:

1. Open a browser (we recommend Chrome) and type in the IP address (or FQDN, if you've set it up already) of one of the Conferencing Nodes.
2. In the **Person or conference to call** field, enter the alias of the VMR you want to use for testing.
3. Select **Connect** and check your microphone, camera and speakers are working as expected.
4. Select **Start**.
   You will be connected to the VMR.
5. From another machine, join the conference in the same way.

The two participants should be able to see and hear each other, and share content.

See About the Infinity Connect web app for more information.

Further configuration

You are now ready to continue configuring the Pexip Infinity platform and services and deploying more Conferencing Nodes.

Specifically, you should now do the following:

- Assigning hostnames and FQDNs
- Enabling SNMP on Conferencing Nodes

At some point you may also want to:

- integrate the Pexip Infinity platform with your call control system
- configure the Pexip Distributed Gateway
- register devices directly to the Pexip Infinity platform
- customize the user experience

Integrating with a call control system

To integrate Pexip Infinity with your call control system, you must configure a trunk or neighbor zone towards each of the Conferencing Nodes.

For further information about how to configure your specific call management system to work with Pexip Infinity, see the following documentation:

- **Pexip Infinity and Microsoft Skype for Business / Lync Deployment Guide**
- **Pexip Infinity and Cisco VCS Deployment Guide**
- **Pexip Infinity and Cisco Unified Communications Manager Deployment Guide**
- **Pexip Infinity and Polycom DMA Deployment Guide**

Configuring the Pexip Distributed Gateway

The Pexip Distributed Gateway service enables endpoints to make calls between devices or systems that use different protocols and media formats, including SIP and H.323 systems, Skype for Business / Lync (MS-SIP), and Infinity Connect clients (WebRTC and RTMP). It also enables you to route calls from VTCs and standards-based endpoints into an externally-hosted conference, such as Google Hangouts Meet or a Skype for Business / Lync meeting

For more information, see About the Pexip Distributed Gateway service.

Registering devices directly to the Pexip Infinity platform

SIP and H.323 endpoints, and some Infinity Connect clients can register directly to Pexip Infinity Conferencing Nodes. This allows Pexip Infinity to route outbound calls to those registered devices without having to go via a SIP proxy or H.323 gatekeeper, or rely on DNS.

For more information, see Registering devices to Pexip Infinity.

Customizing the user experience

You can easily apply your own corporate branding to the Pexip Infinity platform, and produce a personalized user experience for all of your Pexip Infinity services.

For more information, see Customizing the user experience.

Pexip Infinity installation checklist

Use this checklist to identify the key tasks involved in preparing for and deploying the Pexip Infinity platform. Also, there is a configuration datasheet below to help you gather the key network and configuration information required.

Prior to installation

1. Download the appropriate Pexip Infinity Management Node installation file from www.pexip.com/software-download.
2. Ensure that you have appropriate host servers (see Server design guidelines).
3. Assign network IP addresses and host names for the Management Node and Conferencing Nodes.
4. Create DNS records for your Management Node administration.
5. Create DNS records to allow endpoints/clients to discover your Pexip Infinity Conferencing Nodes (see DNS record examples).
6. Generate or request certificates (Base64-encoded X.509 PEM format) for the Management Node and Conferencing Nodes (see guidelines at Certificate creation and requirements).

Hypervisor / host servers

1. Note the CPU model number and the number of cores per socket on the host server to be used with the Conferencing Nodes, as this determines the maximum number of vCPUs to assign for the Conferencing Nodes.
2. Prior to deploying the Management Node or a Conferencing Node, ensure that all host servers are synchronized to NTP servers.
3. Upload the OVA file (or ZIP for Hyper-V) of the Management Node and run the setup wizard from the hypervisor console.

Pexip Infinity Administrator interface

1. Configure basic Management Node settings after installation (licenses, VM managers, any additional DNS or NTP servers).
2. Add a system location.
3. Deploy Conferencing Nodes to the location (and use your hypervisor management tools for manual deployments).
4. Configure the SIP TLS FQDN on the Conferencing Nodes.
5. Verify your node's DNS records. (You can use the tool at http://dns.pexip.com to lookup and check SRV records for a domain.)
6. Replace the self-signed server certificates on the Management Node and Conferencing Nodes with your own certificates that have been signed by either an external CA or a trusted internal CA (see Managing TLS certificates).
7. Upload any required chain of intermediate CA certificates to the Management Node.

   You can use a tool such as https://www.sslshopper.com/ssl-checker.html to verify certificates and the chain of trust (specify port 5061 i.e. use the format **<domain>:5061** for the server hostname to ensure that SIP TLS connections are checked).
8. Configure your VMRs and aliases.
9. Configure the Pexip Distributed Gateway (via Call Routing Rules), if required.

Hypervisor maintenance

1. Enable automatic startup on every VM.
2. Backup your Management Node VM, and optionally, your Conferencing Node VMs.

Pexip Infinity configuration datasheet

Use this datasheet to help you gather the key network and configuration information required for your deployment.

Management Node (installation wizard)

Management Node IP address: ....

Network mask: ....

Gateway IP address: ....

Management Node hostname: ....

Management Node domain: ....

DNS server 1: ....

DNS server 2: ....

NTP server 1: ....

NTP server 2: ....

Management Node (configuration)

VM name: ....

System location 1 name: ....

License entitlement key: ....

VM manager IP/hostname: ....
(VMware automatic deployments only)

Conferencing Nodes

CPU cores per socket on host server: ....
(to determine the size of each node)

Conferencing Node 1 name / VM name: ....

Conferencing Node 1 IP address: ....

Conferencing Node 1 hostname and domain: ....

Conferencing Node 2 name / VM name: ....

Conferencing Node 2 IP address: ....

Conferencing Node 2 hostname and domain: ....

For complete information on how to configure your Pexip Infinity solution, see the Pexip Infinity technical documentation website at docs.pexip.com.