

# Amazon RDS on VMware

VMware vSphere Cluster Requirements  
Installing the RDS on VMware Installer

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#### VMWARE VSPHERE

- Any vSphere that can accommodate the requirements listed will be able to run Amazon RDS on VMware
- vCloud Foundation and other SDDC flavors will work if requirements are met

#### OTHER VMWARE TECHNOLOGIES

- [NSX](#) is not required but has been properly validated with the solution
- [vSAN](#) is not required but has been properly validated with the solution
- [VxRail](#) has been validated (development occurred over VxRail)

## Introduction

Amazon RDS on VMware (also referred to as RDS on VMware) is a service that will make it easy for customers to set up, operate, and scale databases in VMware-based software-defined data centers (SDDC) and hybrid environments.

RDS on VMware automates database provisioning, operating system and database patching, backup, point-in-time restore, instance scaling, instance health monitoring, and failover.

RDS on VMware supports Microsoft SQL Server, PostgreSQL, and MySQL.

RDS on VMware has been certified to leverage most of the resiliency, durability and high availability features available on vSphere 6.5 and 6.7. We don't recommend deploying Amazon RDS on VMware atop of older vSphere editions.

## Intended Audience

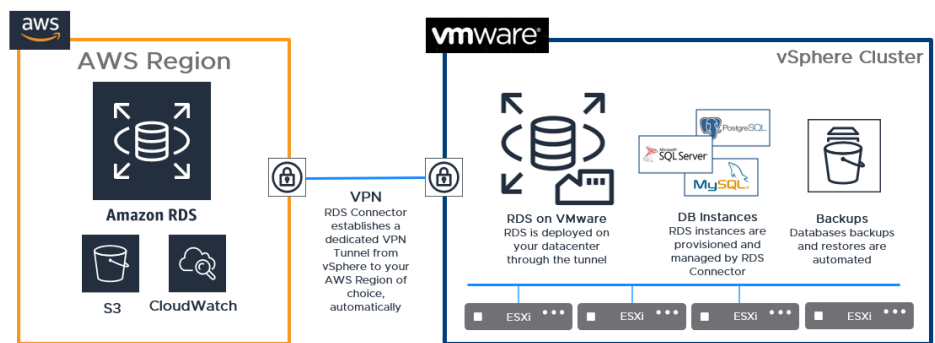
This document is intended for users who want to deploy RDS on VMware as a service on a vSphere Cluster. The document assumes you are familiar with AWS, virtualization, and database technologies.

## RDS on VMware Architectural Concepts

Each RDS on VMware Customer Availability Zone is mapped to a single vSphere Cluster and a vSphere Cluster can only be mapped to a single RDS on VMware Customer Availability Zone.

A vSphere Cluster must be onboarded to become a Customer Availability Zone. Once onboarded, RDS on VMware deploys a few control plane proxy VMs into the corresponding vSphere Cluster. In addition, such a vSphere Cluster is also the target where the managed Amazon RDS on VMware Database instances will be deployed.

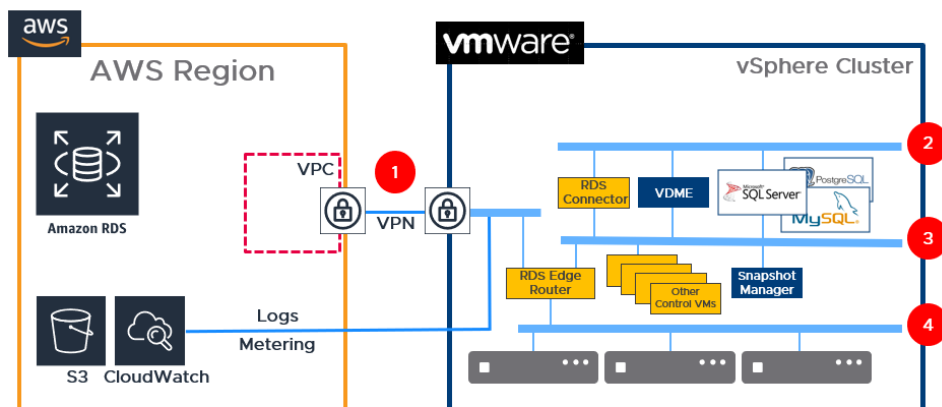
**NOTE** Currently, the US East North Virginia region is supported and support for other regions is in progress.



## Networks Architecture and Overview

### Network Architecture

The following diagram shows the network architecture of RDS on VMware:



### Networks Overview

RDS on VMware requires access to 4 different networks:

1. Internet Network:
  - a. Provides connectivity to AWS
  - b. It could be an existing network with outbound internet access. The main goal of this network is to establish the site-to-site VPN that RDS on VMware creates and maintains automatically.
2. Application Network:
  - a. Existing customer network.
  - b. RDS on VMware database instances are connected to this network (each database instance also has an interface in Cluster Control network). Database instances are offering the SQL access for the client applications on the interface bind to this network.
3. Cluster Control Network:
  - a. Network managed by AWS to be used exclusively for RDS on VMware.
  - b. Guest network with a unique VLAN id. This network will not be shared with any other application/solution, it will be used only to bind local control plane components.
  - c. Each vSphere Cluster onboarded as Custom AZ requires its own Custom Control network.
  - d. This network runs a DHCP Server provided by RDS on VMware (once the Edge Router appliance is deployed). RDS on VMware assigns IP addresses

- in pre-defined 54.239.236.0/22 range of public IP addresses that is not internet-routable.
- e. RDS on VMware runs a DNS server on this network. The corporate/local DNS must forward resolutions to this server.
- 4. ESXi Management Network:
  - a. Management network usually present in most of the vSphere installations where ESXi Hosts and vCenter are bound on a relatively isolated network which hosts only ESXi related traffic.

## Software and Network Requirements

### Software Requirements

1. vCenter Server and ESXi versions 6.5 onwards
  - a. For specific VMware vSphere Hypervisor ESXi versions go ([here](#))
  - b. For specific VMware vCenter Server versions go ([here](#))
  - c. Release Notes Known Issues go ([here](#))
2. License for vSphere Enterprise Edition Plus or higher
  - a. For production environments, a vSphere Cluster is required with at least 3 nodes. For non-production environments or labs, 1 single ESXi node is enough.

### Network Requirements

**NOTE** For Microsoft SQL Server DB instances, access to Microsoft endpoints by using HTTPS such as \*.microsoft.com (http://microsoft.com) must be reachable. This requirement does not apply to databases other than Microsoft SQL Server.

NETWORK	REQUIREMENTS
<b>Internet Network</b>	The outbound connectivity to the internet should meet the following requirements: <ul style="list-style-type: none"> <li>• Have an outgoing fixed public facing IP (Originator IP)</li> <li>• All URLs (including public and vCenter FQDN) must be DNS resolved.</li> <li>• Be able to access public AWS service endpoints over HTTPS</li> <li>• Must have DHCP services and its broadcast should not cross up-link on this interface. DHCP services should include default gateway.</li> <li>• Allow outbound to ports 50, 500, 4500 (IKE/IPSec for site-to-site VPN, UDP or TCP)</li> <li>• Allow outbound TCP port 443 (HTTPS to access AWS endpoints)</li> </ul>

**NOTE** You must provision the VMKernel adapter for each cluster's ESXi hosts into the Cluster Control Network and set the DHCP IP. You must also enable Replication and NFC Replication.

NETWORK	REQUIREMENTS
<p><b>Cluster Control Network</b></p>	<p>The Cluster Control network should meet the following requirements:</p> <ul style="list-style-type: none"> <li>• The distributed port group must be accessible from all ESXi hosts that are part of the selected vSphere cluster and should use the Elastic "Port Allocation" flag.</li> <li>• This network will run a DHCP Server provided by AWS RDS on VMware (once the Edge Router appliance is deployed). <i>So, no DHCP services are needed.</i></li> <li>• RDS on VMware assigns IP addresses in pre-defined 54.239.236.0/22 range of public IP addresses that is not internet-routable.</li> <li>• The network administrator should verify that broadcast packets do not cross over up-link (associated with a unique VLAN id)</li> </ul>
<p><b>Application Network</b></p>	<p>The SQL interfaces listen on the Application Network. This network should meet the following requirements:</p> <ul style="list-style-type: none"> <li>• Provide DHCP services including Default Gateway</li> <li>• Must verify that DHCP broadcast does not cross over up-link.</li> <li>• Distributed port group must be accessible from all ESXi hosts underlying the RDS on VMware cluster.</li> <li>• Distributed port group should use Elastic "Port Allocation" flag</li> </ul>
<p><b>ESXi Management Network</b></p>	<p>The ESXi Management Network should meet the following requirements:</p> <ul style="list-style-type: none"> <li>• A static IP</li> <li>• Mandatorily verify that all ESXi Servers use the same NTP Server.</li> </ul>

## Management Network Appliances per Network

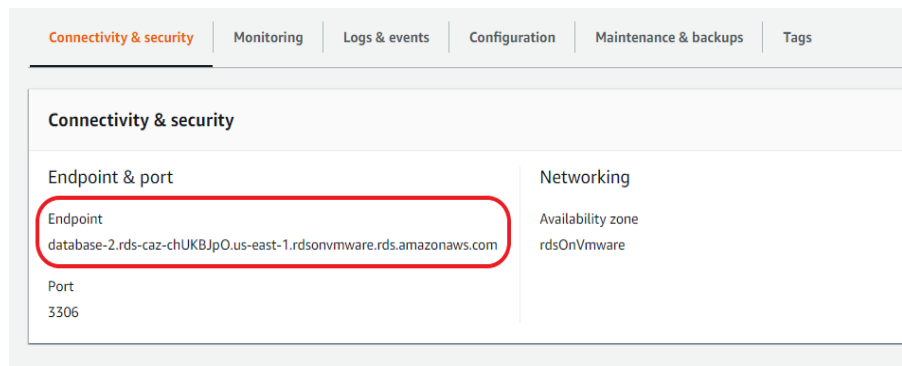
OVA / NETWORK	ESX	INTERNET	APP	CONTROL
RDS Edge Router	X	X		X
First RDS Connector			X	X
Second RDS Connector	X	X	X	X
RDS Event Proc				X
RDS Event Stream				X
RDS Object Storage				X
VDME			X	X
VDME Snapshot				X
All Databases			X	X

## Corporate/Local DNS configuration

Access to RDS on VMware DB instances is by DNS name rather than by the IP address.

To make sure that DNS resolution can occur for RDS on VMware Database instances, configure your corporate/local DNS services to forward requests for **\*.rdsonvmware.rds.amazonaws.com** to one of the IP addresses assigned to RDS Edge Router VM. These addresses will not be known until the vSphere Cluster has been onboarded. Use the IP address of either the Management or Internet Network. You can find your DB instance endpoints using the AWS Management Console.

Add the following configuration once the cluster has been onboarded.





#### AWS REGIONS AVAILABLE

Currently, the US East NORTH VIRGINIA region is supported and support for other regions is in progress.

#### SQL SERVER

If you are using Microsoft SQL Server, you must provide your own media and on-premises license to create the database.

## Installing RDS on VMware

To download and deploy the installer, you must first create a custom Availability Zone (AZ) from the AWS management console in the region where you want to use the service.

You then download the installer and deploy it on the on-premises vSphere cluster where you want to use the service. All the management and database components will be deployed on this cluster. Hence, you must ensure that there is enough space on the cluster that you choose.

When you deploy the installer, it deploys the local components on your vSphere cluster and connects your cluster to the RDS service running in the AWS region.

After the installation and configuration process is completed, your AZ becomes “active”, and you can create a new database, add media, and so on, from the AWS management console.

RDS on VMware supports Microsoft SQL Server, PostgreSQL, and MySQL.

## Prerequisites

Before you can download and install the Amazon RDS on VMware installer, you must have the following account information, credentials, VPN information, and deployment parameters handy.

1. AWS Console login credentials:
  - a. 12-digit Account ID
  - b. IAM username & Password
  - c. AWS Access Key ID and Secret Access Key
2. You must create a custom Availability Zone (AZ) from your AWS Console before you can download the installer. You must know the value of the **VPN Originator ID** to create the AZ.
3. vCenter Settings:
  - a. Username
  - b. Password
  - c. You must have administrator or equivalent privileges on the vCenter.
  - d. Port group and vMK must already be created.
4. Storage – Name of Storage. Must be shared storage.
5. Deployment Parameters:
  - a. ESXi management network IP (free IP)
  - b. Netmask
  - c. DNS
  - d. Gateway
  - e. NTP
6. Configure the following settings:
  - a. Enable DRS
  - b. vSphere HA
  - c. Create Resource Pool
  - d. VMK network on CCN DVS port group configured with DHCP enabled for every host in the vSphere cluster, with vSphere replication and vSphere replication NFC enabled.
7. Go through the requirements section to ensure that you meet the minimum requirement for ESXi servers, network, DNS configuration, and so on.

**NOTE** The AZ is unregistered and will become Active after you complete the installer setup.

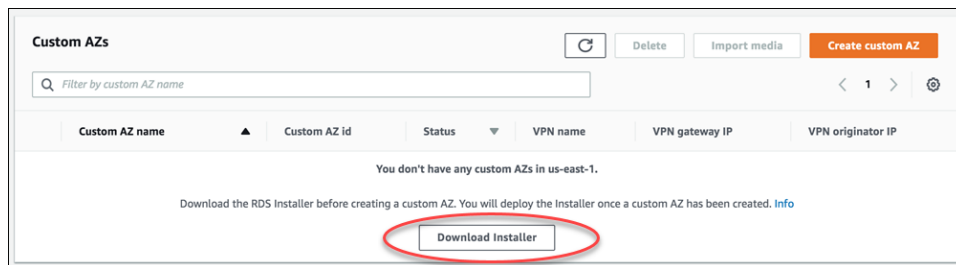
## Installation Procedure

The procedure to download and set up the RDS on VMware installer consists of three parts: download the installer from the AWS management console, log in to the RDS installer UI and set up the installer, and complete the set up from the AWS console.

**Important** Ensure that you have met all requirements before you download and deploy the installer.

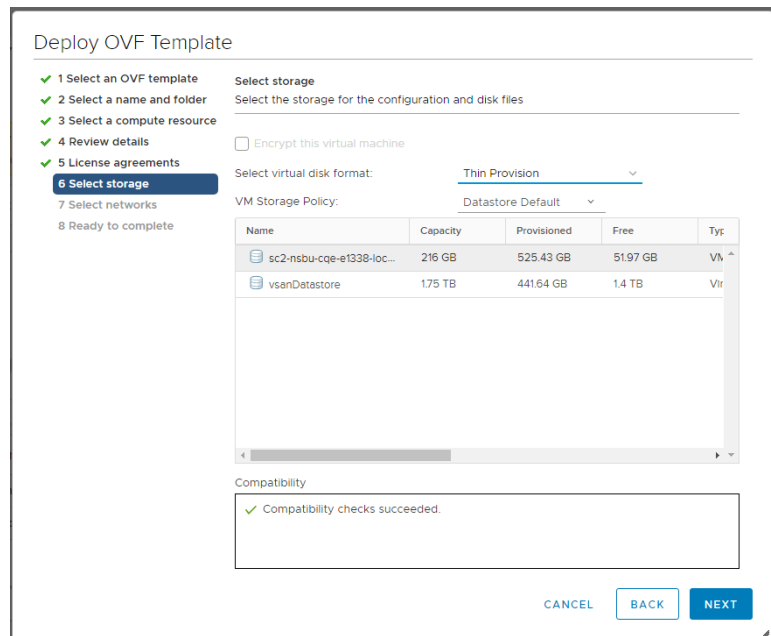
### Download the RDS Installer

1. Log in to your AWS Management Console from the VM where you want to download the RDS installer.
2. Click **RDS on VMware** services.
3. Click **Custom Availability Zones** on the left panel.
4. Click **Create custom AZ** and provide the following information:
  - a. Unique name for the custom AZ
  - b. VPN name
  - c. VPN Originator IP
5. Click **Download Installer**.
6. Click **OK** to accept the Service Agreement.
7. After the download is complete, double-click the installer zip file to unzip and extract the RDS installer file.



## Deploy the RDS on VMware Installer from the vSphere Client

1. Log into the vSphere client with your vCenter credentials.
2. Right-click the cluster or resource where you want to install the installer and select **Deploy OVF Template**.
3. Select the OVF Template:
  - a. Select Local File.
  - b. Click Choose File and browse to the location where you extracted the installer file.
4. Select the .ova file and click **Next**.
5. Select a name and folder:
  - a. Provide a VM name
  - b. Select a location for the VM.
6. Click **Next**.
7. Select a compute resource and click **Next**.
8. Review the information and click **Next**.
9. Accept the license agreement and click **Next**.
10. Select the storage for the configuration and disk files:
  - a. Select **Thin provision** from the drop-down menu.
  - b. Retain the **Datastore Default** for VM Storage Policy.
  - c. Select the appropriate datastore.
  - d. Click **Next**.



**NOTE** You can see the status of the OVF deployment under **Recent Tasks** at the bottom half of the console. Once the deployment is complete, the status of the custom AZ changes from *Unregistered* to *Active*. You can check the status on the AWS console.

- Assign the correct port groups for each network that has been created and click **Next**. See the Network Overview and Requirements section before you assign the port groups.

**Deploy OVF Template**

- 1 Select an OVF template
- 2 Select a name and folder
- 3 Select a compute resource
- 4 Review details
- 5 License agreements
- 6 Select storage
- 7 Select networks**
- 8 Ready to complete

**Select networks**  
Select a destination network for each source network.

Source Network	Destination Network
Cluster Control Network	Cluster Control Network
Internet Network	Internet
Application Network	Application
Management Network	VM Network

4 items

**IP Allocation Settings**

IP allocation: Static - Manual  
IP protocol: IPv4

CANCEL BACK NEXT

- Review the information and click **Finish**.

**Deploy OVF Template**

- 1 Select an OVF template
- 2 Select a name and folder
- 3 Select a compute resource
- 4 Review details
- 5 License agreements
- 6 Select storage
- 7 Select networks
- 8 Ready to complete**

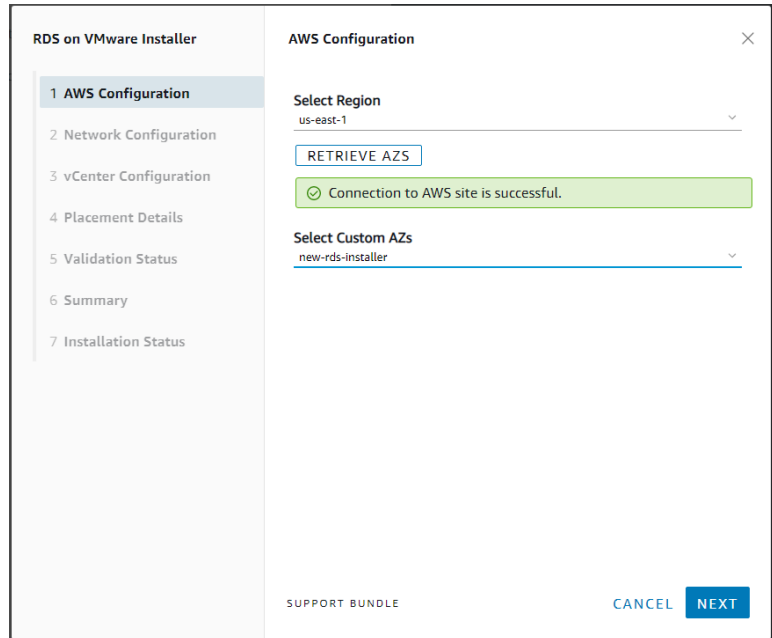
**Ready to complete**  
Click Finish to start creation.

Provisioning type	Deploy from template
Name	RDSonVMwareInstaller-1
Template name	RDSonVMwareInstaller
Download size	4.0 GB
Size on disk	4.5 GB
Folder	dc-65
Resource	ha-65
Storage mapping	1
All disks	Datastore: sc2-nsbu-cqe-e1338-local-storage-1; Format: Thin provision
Network mapping	4
Cluster Control Network	Cluster Control Network
Internet Network	Internet
Application Network	Application

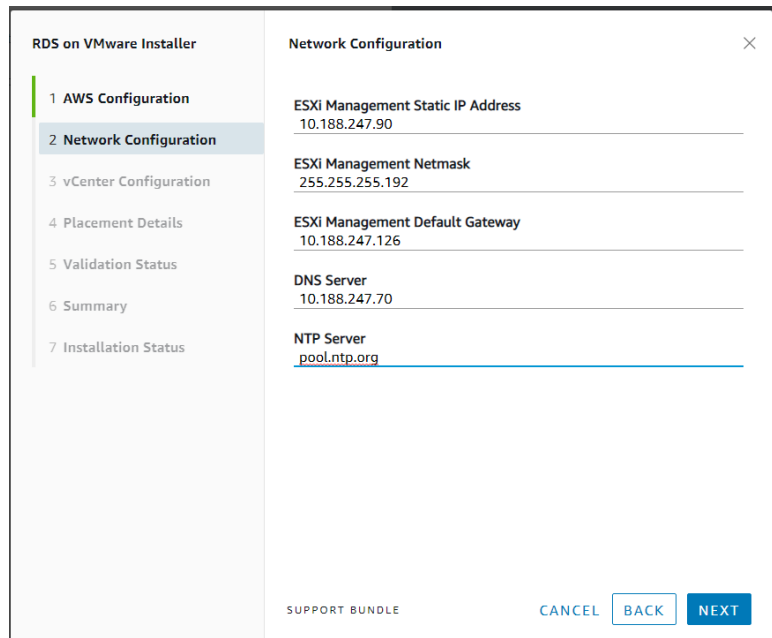
CANCEL BACK FINISH

Set up the RDS Installer for Deployment from the Installer UI

1. Log in to the installer UI with the AWS Access Key and Secret Access Key.
2. Complete the AWS Configuration:
  - a. Choose a region from the drop-down list.
  - b. Click **Retrieve AZs** to get all the AZs in this region.
  - c. Select the custom AZ you created earlier.
  - d. Click **Next**.



3. Enter the Network Configuration details and click **Next**. Use a free IP for the ESXi management static IP address.



4. Enter the vCenter configuration details. Click **Test Connection** to ensure the connection is OK and click **Next**.

The screenshot shows the 'vCenter Configuration' window within the 'RDS on VMware Installer'. The left sidebar lists steps 1 through 7, with '3 vCenter Configuration' selected. The main area contains the following fields and actions:

- FQDN:** vc2.vsphere.local
- Administrator Username:** administrator@vsphere.local
- Administrator Password:** masked with dots
- TEST CONNECTION:** A button that has been clicked, resulting in a green success message: 'Connection to vCenter server is successful.'

At the bottom right, there are buttons for 'CANCEL', 'BACK', and 'NEXT'. A 'SUPPORT BUNDLE' link is also visible at the bottom left.

5. Provide the required Placement details and click **Validate**.

The screenshot shows the 'Placement Details' window within the 'RDS on VMware Installer'. The left sidebar lists steps 1 through 7, with '4 Placement Details' selected. The main area contains the following dropdown menus:

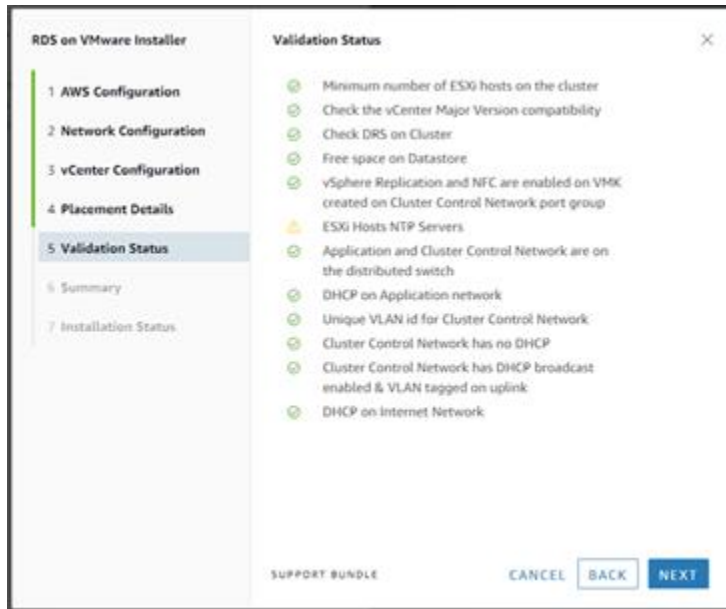
- Select Datacenter:** dc-65
- Select Cluster:** ha-65
- Select Datastore:** sc2-nsbu-cqe-e1338-local-storage-1
- Select Resource Pool:** rp-65

At the bottom right, there are buttons for 'CANCEL', 'BACK', and 'VALIDATE'. A 'SUPPORT BUNDLE' link is also visible at the bottom left.

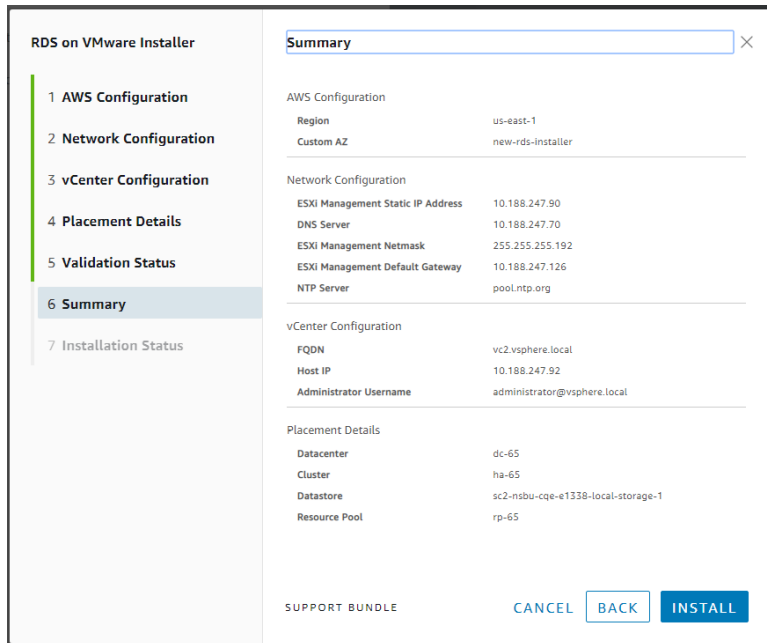
**NOTE** Ensure that the cluster you select here has enough disk space since the installer's management and database components are deployed on this cluster.

**NOTE** You must fix any errors that are displayed on the Validation screen before you can proceed. It is recommended that you also fix any warnings, but this is not mandatory.

6. Review the information after the validation is completed.



7. Review the Summary and click **Install**.





**NOTE** After the installation is complete, the status of the Custom AZ you created changes from Unregistered to Active.

The screenshot shows a window titled "RDS on VMware Installer" with a sub-tab "Installation Status". On the left is a navigation menu with seven items: 1 AWS Configuration, 2 Network Configuration, 3 vCenter Configuration, 4 Placement Details, 5 Validation Status, 6 Summary, and 7 Installation Status (which is highlighted). The main content area displays the following text: "RDS on VMware installation is in progress. Do not power off this VM. This VM will automatically power off once the installation is complete. Once the installation is complete the status of the corresponding Custom AZ in Amazon RDS will switch to 'Available'. You can check the status via RDS Console, APIs, or CLI." At the bottom right of the window, there is a "SUPPORT BUNDLE" link and a green "CLOSE" button.

## Validations performed by the RDS on VMware Installer

The following table shows the different validations that are performed by the RDS on VMware installer. These validations are displayed on the Validation screen when deploying the installer.

Validation	Description
Minimum number of ESXi hosts on the cluster	The minimum number of ESXi hosts per cluster in production are 3. This is the recommended number of hosts for vSphere High Availability.
Check the vCenter Major Version compatibility	The installer validates that the version of vCenter Server to which the installer is connected is among the currently supported versions, (vSphere 6.5, 6.7, and 7.0). Support for the respective minor versions must be validated against the <a href="#">VMware Product Interoperability Matrix</a> .
Check DRS on Cluster	Checks if DRS is enabled on the selected vSphere cluster.
Free space on Datastore	Checks that the selected datastore has a minimum of 700 GB free space.
vSphere Replication and NFC enabled VMK created on Cluster Control Network port group	Check that each ESXi Host on the vSphere Cluster has the corresponding vSphere Kernel Adapter (VMK) and the configuration of each VMK is correct (vSphere Replication and vSphere Replication NFC enabled). The installer validates that there is no IP assigned to the VMK.

Validation	Description
ESXi hosts NTP Servers	Each ESXi Host connected to the vSphere Cluster has the same NTP Server defined than vCenter Server.
Application and Cluster Control Network on the distributed switch	Checks that Application and Cluster Control Networks assigned during the deployment of the RDS installer are assigned to the vSphere Distributed Switch
DHCP on Application Network	DHCP service must be running on the Application Network (DHCP Service on Application Network is the customer's responsibility)
DHCP on Internet Network	DHCP service must be running on the Internet Network (DHCP Service on Internet Network is the customer's responsibility)
Unique VLAN id for Cluster Control Network	Ensure that a unique VLAN has been configured on Cluster Control Network and not in any other port group.
Cluster Control Network has no DHCP	Check that the Cluster Control Network does not receive any DHCP broadcast (DHCP Service on this network is AWS responsibility)

### Other Validations

The RDS on VMware installer performs other validations, these validations are displayed on the different screens during the installation process.

Validation	Description
vCenter Certificate Validation	The installer connects to vCenter using the FQDN provided by the user. Once connected, the installer retrieves the public key of the vCenter Certificate and validates if the given FQDN corresponds to the CN or the Subject Alternate Name. Certificate expiry date is also validated. No IPs are supported at this time.
AWS credentials	Check for AWS access key and secret key validity.
Unregistered Custom AZ lists	Check if Custom AZ has been created and its status (in the selected region) is Unregistered.
vCenter Connectivity	Test the vCenter Server connectivity to ensure that unused ESXi management Network IP and related details are accurate.
vCenter User	Check if vCenter user is part of SSO Administrators group.
Datastore selection	Ensure selected datastore is connected to all ESXi servers.

## Troubleshooting

You may run into some of the following error messages when you are deploying the installer. You must correct the errors before proceeding.

### Error Message “Create Custom AZ Failed”

Your request to create custom availability zone: <name> has failed.

*CustomAvailabilityZoneQuotaExceeded: Custom Availability Zones quota exceeded*

#### Resolution

Delete an unused AZ and try again.

### Error Message “Installer failed with connector version”

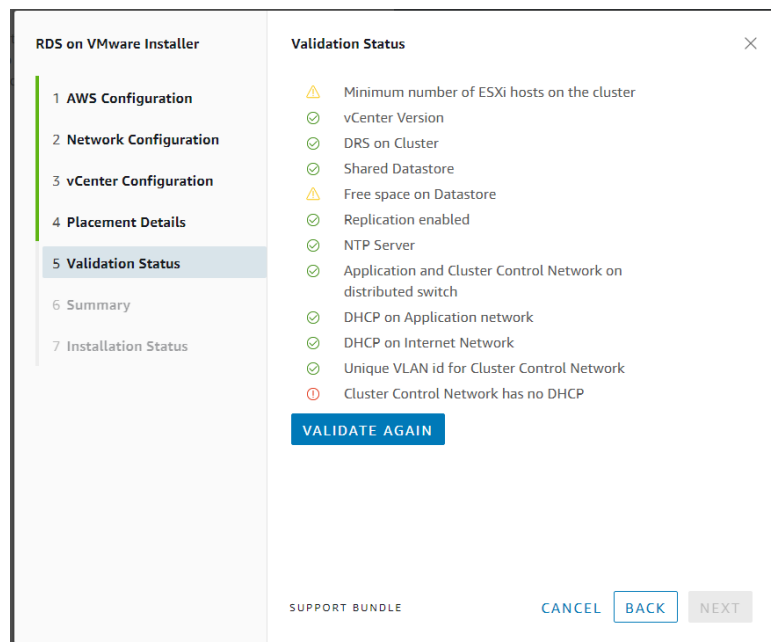
Installer [<version>] version validation failed with connector [<connector-id>] and Edge [<edge-id>]. Please download a latest installer from AWS account.

#### Resolution

You are using an older version of the installer. Download the latest version from the AWS console.

### Error detected during Validation Status in the Installer

If the cluster control network does not have DHCP configured correctly, you will see this error.



### Resolution

Ensure that the Cluster Control Network has DHCP configured correctly before you set up the RDS on VMware installer.

### Generate the Support Bundle

You can generate the support bundle from either the Installer UI or by sending an API request.

#### Generate from the UI

To get help on any screen during the deployment, click the Support Bundle link on the bottom of the screen to generate a support bundle zip file. Download the zip file, raise a AWS ticket and attach the support bundle zip file. This will help to speed up the troubleshooting process.

**NOTE** In Postman, after you enter the API request, click “Send and Download”, instead of only “Send”. When prompted, specify a location to save the downloaded file.

#### Generate the support bundle though an API request

1. Using Postman or any other client, send the following GET request to log in to AWS, authenticate and retrieve the token. Note down the token received. <https://<RDS-Installer-UI>/deployer/aws/loginWithAWS>
2. Send the following GET request to download the support bundle zip file. Include the token in the authorization header (Bearer Auth) of the request. <https://<RDS-Installer-UI>/deployer/support/bundle>



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