



# **VM-Series Auto Scaling for AWS (v2.1- Community- Supported)**

## **Deployment Guide**

<http://www.paloaltonetworks.com>

Version number	Comments
2.1-CS	<ul style="list-style-type: none"><li>• Panorama is required for this deployment.</li><li>• Panorama in HA is <b>NOT</b> supported.</li><li>• Firewall template can be deployed to existing VPC.</li><li>• Can launch templates with either network load balancer or application load balancer.</li><li>• For different VPC deployments, traffic no longer traverses the public internet.</li></ul>

# 1. Support Policy

## Community Supported

This template and deployment guide are released under an as-is, best effort, support policy. These scripts should be community supported and Palo Alto Networks will contribute our expertise as and when possible. We do not provide technical support or help in using or troubleshooting the components of the project through our normal support options such as Palo Alto Networks support teams, or ASC (Authorized Support Centers) partners and backline support options. The underlying product used (the VM-Series firewall) by the scripts or templates are still supported, but the support is only for the product functionality and not for help in deploying or using the template or script itself.

## 2. About

Palo Alto Networks delivers the Auto Scaling VM-Series Firewalls CloudFormation Templates and scripts for deploying an auto-scaling tier of VM-Series firewalls using several AWS services such as Lambda, auto scaling groups, Elastic Load Balancing (ELB), S3, SNS, and CloudWatch, and the VM-Series automation capabilities including the PAN-OS API and bootstrapping. The templates allow you to leverage the AWS scalability features designed to manage sudden surges in demand for application workload resources by independently scaling the VM-Series firewalls with changing workloads.

The following versions of these template are available on the Palo Alto Networks GitHub repository:

<https://github.com/PaloAltoNetworks/aws-elb-autoscaling/tree/master/Version-2.1-Community-Supported>

This release enables a clear separation of the firewall VPC's from the application VPC's. This separation allows security teams to offer firewall-as-a-service to their internal teams such as line of business, application developers and DevOps who build, ship and maintain applications. This enables separate billing and management of each template. In addition, security and application teams can put specific restrictions such as tight security groups, no IGW (Internet Gateway) etc. on the application VPC's for a stronger security posture and leave all security of inbound traffic to the security team. Enforcement of these policy-based capabilities on the application VPC's can be easily done through services such as RedLock, while the VM-Series provides the network security protections and visibility. Also, as the number of protected applications VPC's grow, security teams can use the auto scaling stack of firewalls for elastic, on-demand, security. Each application (via its related internal load balancer) are mapped to a load balancing rule in the external load balancer.

This architecture uses a load balancer sandwich for protecting Internet facing applications, for other use cases, see <https://github.com/PaloAltoNetworks/aws-elb-autoscaling>

### Important Notes:

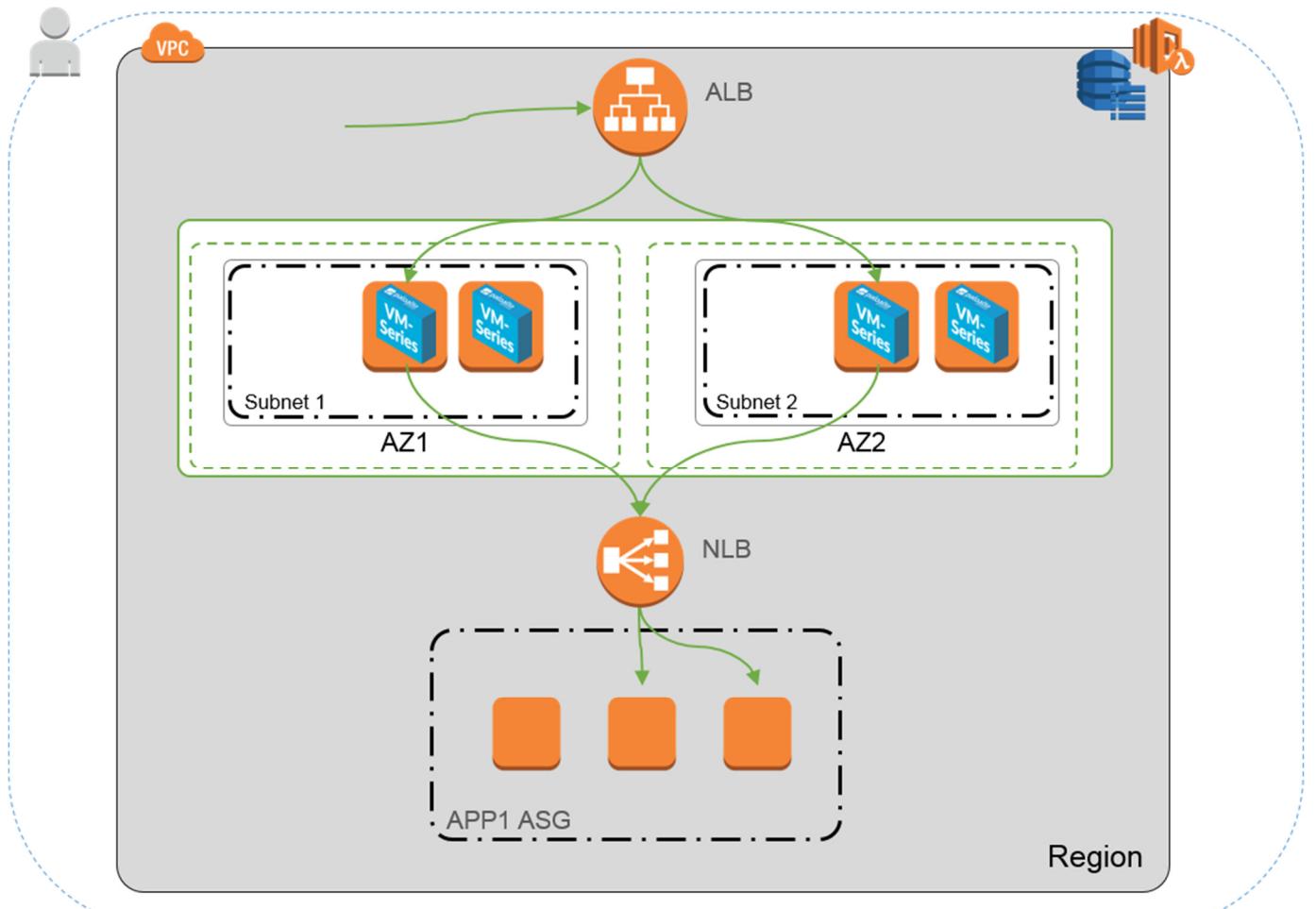
1. VM-Series Auto Scaling for AWS (v2.1-CS) is considered advanced. It requires familiarity with AWS and the VM-Series next generation firewall.
2. This deployment requires **Panorama** (physical or virtual) be deployed SEPERATELY, PRIOR to getting started. Panorama in HA is **NOT** supported.
3. VM-Series Auto Scaling for AWS (v2.1-CS) has NOT been tested in GovCloud.
4. Cross account deployments are not supported in v2.1-CS but will be supported in v2.1.0 Please leave field blank in the template.

### 3. Topology

To help you manage increased application scale, version 2.1-CS of the auto scaling VM-Series firewall template provides a hub and spoke architecture that simplifies deployment. This version of the solution provides two templates that support a single and multi-VPC deployment both within a single AWS account and across AWS accounts.

- **Firewall Template**—The firewall template deploys an application load balancer and VM-Series firewalls within auto scaling groups across two Availability Zones (AZs). This internet-facing application load balancer distributes traffic that enters the VPC across the pool of VM-Series firewalls. The VM-Series firewalls automatically publish custom PAN-OS metrics that enable auto scaling.

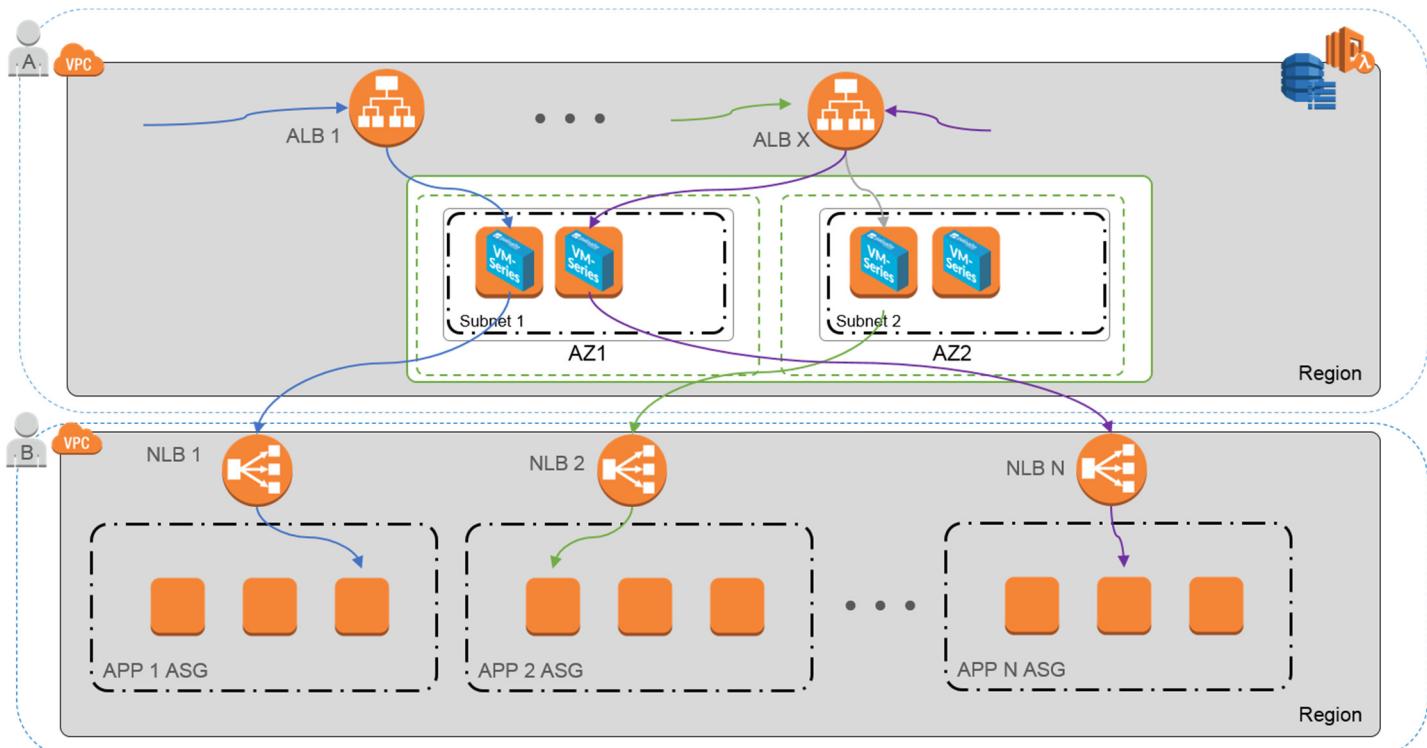
Palo Alto Networks officially supports the VM-Series firewall only. With a valid support entitlement, you can request assistance from Palo Alto Networks Technical Support. [The Cloud Formation Templates are Community Supported.](#)



- **Application Template**—The application template deploys your preference of Network or Application Load Balancer and one auto scaling group with a web server in each AZ.

The application template is community supported. This template is provided as an example to help you get started with a basic web application. For a production environment, either use your own application template or customize this template to meet your requirements.

Together these templates allow you to deploy a load balancer sandwich topology with an internet-facing application load balancer and an internal network load balancer. The application load balancer is accessible from the internet and distributes traffic that enters the VPC across a pool of VM-Series firewalls. The firewalls then route traffic using NAT policy to the internal network load balancer(s), which distributes traffic to an auto scaling tier of web or application servers. The VM-Series firewalls are enabled to publish custom PAN-OS metrics to AWS CloudWatch where you can monitor the health and resource load on the VM-Series firewalls and then use that information to trigger a scale in or scale out event in the respective auto scaling group of firewalls.



## What Components Does the VM-Series Auto Scaling Template for AWS (v2.1-CS) Leverage?

### **Firewall Template**

The firewall template deploys a new VPC with two Availability Zones (AZs), subnets, route tables, and security groups required for routing traffic across these AZs, and an AWS NAT gateway. It also deploys an external network or application load balancer, and an Auto Scaling Group (ASG) with a VM-Series firewall. You can deploy this template as a new VPC or deploy firewall template created for an existing VPC. The Auto Scaling template does not deploy Panorama although Panorama is a prerequisite for this deployment.

### **Application Template**

The application template deploys a network or application load balancer and an ASG with a web server. Because the network load balancer has a unique IP address per AZ, and the NAT policy rule on the firewalls must reference a single IP address, there is one ASG for each of the two AZs. All the firewalls in an ASG have identical configuration.

**This version of the auto scaling solution includes 5 application templates variations:**

The application ALB template allows you to deploy the Application Load Balancer version of the application template within a previously existing VPC or a new VPC using the same AWS Account.

The application NLB template allows you to deploy the Network Load Balancer version of the application template within a previously existing VPC or a new VPC using the same AWS Account.

There is also a template that allows you to deploy the application into the same VPC as the VM-series.

### **Lambda Functions**

AWS Lambda provides robust, event-driven automation without the need for complex orchestration software. In the firewall template, AWS Lambda monitors a Simple Queue Service (SQS) to learn about network load balancers that publish to the queue. When the lambda function detects a new network load balancer, it creates a new NAT policy rule and applies it to the VM-Series firewalls within the ASG. The firewalls have a NAT policy rule for each application, and the firewalls use the NAT policy rule (that maps the port to network load balancer IP address) to forward traffic to the network load balancer in front of the application web servers. Upon deletion of the templates, the Lambda functions also deletes all the configuration items that lambda added to the device group and template stack in Panorama. This includes the NAT Rule, Address Object, and Static Routes that were pushed to the VM-Series. The Lambda function will handle delicensing as well.

### Panorama

Unlike v2.0 a previously deployed Panorama is required for Auto Scaling v2.1-CS. Due to the use of Panorama a bootstrap.xml config file is no longer needed in the S3 Bootstrap bucket. A Sample configuration is included in the GitHub repo so that you can copy the configuration from the template stack and device group when you create them in your existing panorama. The untrust and trust zones created in Panorama all must be lower case. In Panorama you must configure your

- Network interfaces using dhcp. Only eth1/1 should automatically create default route
- trust and untrust zones. All zones must be lower case
- Security Policy. Zones in security policy will be untrust and trust.
- Administrator account for admin account named pandemo
- Virtual router with a naming convention VR-<TemplateStackName>

Lambda will populate the following in Panorama once the application template has launched

- NAT policy
- Address object for LB in Application Template
- Static routes in the virtual router.
- Tcp81 service object

### License Deactivation key

- We require a License Deactivation API Key and the “Verify Update Server Identity” to be enabled to deactivate the license keys from Panorama. The License Deactivation Key should be obtained from Palo Alto Customer Support Portal. Steps on how to activate this can be found below.

<https://www.paloaltonetworks.com/documentation/81/virtualization/virtualization/license-the-vm-series-firewall/deactivate-the-licenses/install-a-license-deactivation-api-key>

### Panorama VM-Auth-Key

- For the bootstrapped firewalls to connect to Panorama to receive their bootstrap configuration, we need a vm-auth-key. The following link will walk you through how to generate this vm-auth key.  
<https://docs.paloaltonetworks.com/vm-series/8-1/vm-series-deployment/bootstrap-the-vm-series-firewall/generate-the-vm-auth-key-on-panorama>

### Panorama API Key

- To authenticate the API, we need a Panorama API Key. The following link will walk you through generating an API Key. Lambda needs this to auto configure template and device group options.  
<https://docs.paloaltonetworks.com/pan-os/8-1/pan-os-panorama-api/get-started-with-the-pan-os-xml-api/get-your-api-key>

### Bootstrap files

This solution requires a init-cfg.txt file so that the VM-Series firewall has the basic configurations needed to

- Perform interface swap so the VM-Series untrust traffic uses AWS ENI for eth0
- Communicate to Panorama for device group and template configuration

A sample init-cfg.txt file is provided in GitHub and has the basic configuration to get started. This auto-scaling solution requires the swapping of the dataplane and management interfaces to enable the load balancer to forward web traffic to the auto-scaling tier of VM-Series firewalls. For details on management interface mapping for use with amazon ELB see the following link

<https://docs.paloaltonetworks.com/vm-series/8-1/vm-series-deployment/set-up-the-vm-series-firewall-on-aws/about-the-vm-series-firewall-on-aws/management-interface-mapping-for-use-with-amazon-elb.html#>

## Launch the VM-Series Auto Scaling Template for AWS (v2.1-CS)

You can choose to deploy the firewall template in one VPC and the sample application template in the same VPC as the one in which you deployed the firewalls, or in a different VPC.

In this version of VM-Series Auto Scaling for AWS (v2.1-CS) AWS cross account deployments are not currently supported. The solution supports a hub and spoke architecture whereby you can deploy the firewall template in one AWS account and use it as a hub to secure your applications (spokes) that belong to the same or to different AWS accounts.

### Launch the VM-Series Firewall Template

This workflow tells you how to deploy the external load balancer and the VM-Series firewalls using the firewall template. The vm-auth-key must be configured on Panorama prior to launching this template.

This firewall template includes an AWS NAT gateway that the firewalls use to initiate outbound requests for retrieving updates, connecting to Panorama, and publishing metrics to AWS CloudWatch. The NAT Gateways also have Elastic IP addresses attached to them for each zone. If you do not have direct connectivity to your Panorama from your auto scaled VM-Series devices via a private channel such as IPsec you have limited ability to secure your Panorama management interface using AWS security groups. Below is the recommended management interface security configuration in this use case.

#### SSH SECURITY

- For SSH explicitly whitelist IP address range you will connect from for management

#### HTTPS SECURITY

- Upon initial deployment of the firewall Template, you will NOT be able to lock down the security group in AWS For HTTPS. You must leave HTTPS open or Lambda will not be able to connect to Panorama
- Once you receive the following conformation of connection in Panorama it is now safe to lock down port 443.

Logged In Admins				
Admin	From	Client	Session Start	Idle For
pandemo	73.170.42.173	Web	01/10 19:04:24	00:00:00s
pandemo	54.156.206.215	Web	01/10 19:19:16	00:11:16s

- When you lock down port 443 you will lock down the IP range you connect from, as well as the EIP's Assigned to the NAT Gateways. You can find both NAT Gateway EIP's in AWS by navigating to VPC>NAT Gateways. Here you will see two NAT gateways and the EIP's associated with them. Note that EIP information for the security group for HTTPS.

Create NAT Gateway		Actions ▾			
<input type="text"/> search : nat-056e65b0f653d3398 <span style="border: 1px solid #ccc; padding: 2px;">X</span>		Add filter			
Name	NAT Gateway ID	Status	Status Message	Elastic IP Address	Private IP Address
	nat-056e65b0f653...	available	-	54.156.206.215	192.168.101.64

### PANORAMA PORT 3978 SECURITY

- This port must be able to receive traffic from any IP address.

## STEP 1 | Review the checklist for deploying the VM-Series Auto Scaling Template for AWS (v2.1-CS).

Make sure that you have completed the following tasks:

- (**For PAYG only**) Reviewed and accepted the EULA for the PAYG bundle you plan to use.
- (**For BYOL only**) Obtained the auth code. You need to enter this auth code in the /license folder of the bootstrap package.
- Downloaded the files required to launch the VM-Series Auto Scaling template from the GitHub repository

<https://github.com/PaloAltoNetworks/aws-elb-autoscaling/tree/master/Version-2.1-Community-Supported>

## STEP 2 | Modify the init-cfg.txt file and upload to the /config folder.

- Because Panorama is used to bootstrap the VM-Series, your init-cfg.txt file should be modified as follows. No bootstrap.xml file is needed.

```
type=dhcp-client
ip-address=
default-gateway=[REDACTED]
netmask=
ipv6-address=
ipv6-default-gateway=
hostname=
vm-auth-key=[REDACTED]
panorama-server=[REDACTED]
panorama-server-2=
tplname=AWS-tmplspoke1
dgname=AWS-dgspoke1
dns-primary=169.254.169.253
dns-secondary=8.8.8.8
op-command-modes=mgmt-interface-swap
dhcp-send-hostname=yes
dhcp-send-client-id=yes
dhcp-accept-server-hostname=yes
dhcp-accept-server-domain=yes
```

- Verify that the command for swapping the management interface (mgmt) and the dataplane interface (ethernet 1/1) on the VM-Series firewall on AWS is present. The command is listed above as op-command-modes=mgmt-interface-swap. Use the AWS DNS server of 169.254.169.253 for faster load balancer DNS name resolution.

### STEP 3 | (For BYOL only) Add the license auth code in the /license folder of the bootstrap package.

- Create a new .txt file with a text editor, such as Notepad and name it authcodes with NO extension.
- Add the auth code for your BYOL licenses to this file, then save. The auth code must support the number of firewalls that may be required for your deployment, so you must use an auth code bundle. **If you use individual auth codes instead of a bundle, the firewall retrieves only the license key for the first auth code included in the file.**

Amazon S3 > mvbootstrap / license

**Overview**

Type a prefix and press Enter to search. Press ESC to clear.

**Upload** **Create folder** **More** US East (Ohio) **Viewing 1 to 1**

<input type="checkbox"/>	Name	Last modified	Size	Storage class
<input type="checkbox"/>	authcodes	Feb 2, 2018 4:36:45 PM GMT-0800	8.0 B	Standard

**STEP 4 |** Upload Lambda code for Firewall template (panw-aws-zip) and Application template (ilb.zip) to an S3 bucket. You can use the same S3 bucket that you use for bootstrapping.

<input type="checkbox"/>	Name	Last modified	Size	Storage class
<input type="checkbox"/>	config	--	--	--
<input type="checkbox"/>	content	--	--	--
<input type="checkbox"/>	license	--	--	--
<input type="checkbox"/>	software	--	--	--
<input type="checkbox"/>	ilb.zip	Jan 8, 2019 11:36:55 AM GMT-0800	5.6 KB	Standard
<input type="checkbox"/>	panw-aws.zip	Jan 8, 2019 11:36:45 AM GMT-0800	161.2 KB	Standard

**STEP 5 |** Select the firewall template.

1. In the AWS Management Console, select **CloudFormation>Create Stack**.
2. Select **Upload a template to Amazon S3**, choose the firewall template and click **Open** and **Next**.
3. Specify the **Stack name**. The stack name allows you to uniquely identify all the resources that this template deploys.

**STEP 6 |** Configure the parameters for the VPC.

1. Be sure to select at least two availability zones

### Parameters

---

#### VPC Configuration

---

<b>VPCName</b>	<input type="text" value="panwVPC"/>	Name of the newly created VPC
<b>NumberOfAZs</b>	<input type="text" value="2"/>	Total Number of AZs which will be used in this deployment (Min 2 and Max 4 depending on az availability)
<b>Select AZs:</b>	<input type="text" value="Search"/>	Enter the list of Availability Zones (Based on Number of AZs above)
<b>ELBType</b>	<input type="text" value="application"/>	Choose the type of external load balancer required in the firewall template

#### VM-Series firewall Instance configuration

---

<b>AMId of PANFW Image:</b>	<input type="text"/>	Link to Ami Id lookup table: <a href="https://www.paloaltonetworks.com/documentation/global/compatibility-matrix/vm-series-firewalls/aws-cft-amazon-machine-images-ami-list">https://www.paloaltonetworks.com/documentation/global/compatibility-matrix/vm-series-firewalls/aws-cft-amazon-machine-images-ami-list</a>
<b>Key pair:</b>	<input type="text" value="Search"/>	Amazon EC2 Key Pair
<b>SSH From:</b>	<input type="text"/>	Restrict SSH access to the VM-Series firewall (enter a valid CIDR range in the format of x.x.x.x/x)
<b>Enable Debug Log:</b>	<input type="text" value="No"/>	Enable/Disable debug. Default is disabled

2. Look up the AMI ID for the VM-Series firewall and enter it. Make sure that the AMI ID matches the AWS region, PAN-OS version and the BYOL or PAYG licensing option you opted to use.
3. Select the EC2 **Key pair** (from the drop-down) for launching the firewall. To log in to the firewalls, you must provide the name of this key pair and the private key associated with it.
4. For the **SSH from field**, the firewalls will be managed by Panorama and do NOT have an EIP for the management interface. But just in case you decide to assign an EIP configure the IP range you would connect from.

5. Select **Yes** if you want to **Enable Debug Log**. Enabling the debug log generates more verbose logs that help with troubleshooting issues with the deployment. These logs are generated using the stack name and are saved in AWS CloudWatch.

By default, the template uses CPU utilization as the scaling parameter for the VM-Series firewalls. Custom PAN-OS metrics are automatically published to the CloudWatch namespace that matches the stack name you specified earlier.

### STEP 7 | Specify the name of the Amazon S3 bucket(s).

S3 Bucket details

<b>Bootstrap bucket for VM-Series firewalls:</b>	<input type="text" value="autoscale2-1"/>	Enter the name of the Bootstrap S3 bucket for the VM-Series firewall
<b>S3 Bucket Name for Lambda Code:</b>	<input type="text" value="autoscale2-1"/>	VM-Series firewall Lambda/Scripts/CFT template S3 Bucket or your own in the same region

1. Enter the name of the S3 bucket that contains the bootstrap package.

If the bootstrap bucket is not set up properly or if you enter the bucket name incorrectly, the bootstrap process fails, and you cannot be able to log in to the firewall. Health checks for the load balancers also fail.

2. Enter the name of the S3 bucket that contains the panw-aws.zip file. As mentioned earlier you can use one S3 bucket for the Bootstrap and Lambda code.

### STEP 8 | Specify the keys for enabling API access to the firewall and Panorama.

VM-Series API Key and Panorama username

<b>API Key for Firewall:</b>	<input type="text" value="*****"/>	API Key associated to username/password of the VM-Series Firewall. By default it is pandemo/demopassword
<b>API Key for Panorama:</b>	<input type="text"/>	API Key associated to username/password of the Panorama.
<b>Admin username for Panorama:</b>	<input type="text"/>	Enter the admin username for the Panorama instance

1. Enter the Firewall API key used to authenticate API calls. The default key is based on the user name and password listed above and is only for testing. For a production deployment, you must create a separate PAN-OS login just for the API call and generate an associated key.

2. Enter the Panorama API Key to allow Lambda to make API calls to Panorama. For a production deployment, you should create a separate login just for the API call and generate an associated key.

**STEP 9 |** Enter the name for the application load balancer.

Other parameters

Name of External Application Load Balancer:  Enter the name of the external Application Load Balancer

**STEP 10 |** Review the template settings and launch the template.

- Select I acknowledge that this template might cause AWS CloudFormation to create IAM resources.
- Click Create to launch the template. The CREATE\_IN\_PROGRESS event displays.
- On Successful deployment the status updates to CREATE\_COMPLETE

Stacks			
	Stack Name	Created Time	Status
<input checked="" type="checkbox"/>	jpas2-1	2019-01-14 09:04:42 UTC-0800	CREATE_COMPLETE

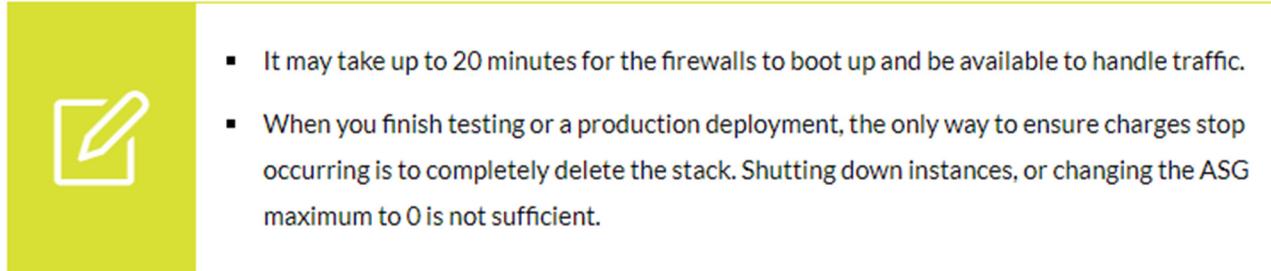
**STEP 11 |** Verify that the template has launched all required resources.

- On the EC2 Dashboard, select **Auto Scaling Groups**. Verify that in each AZ, you have one ASG for the VM-Series firewalls. The ASG name prefix includes the stack name.
- On the AWS Management Console, select the stack name to view the **Output** for the list of resources.
- Your output should look similar to the output in the following image.
  - a. Take note of the Network Load Balancer Queue name.
  - b. Take note of the Elastic Load Balancer public DNS name.

## VM-Series Auto Scaling for AWS (v2.1-CS) Deployment Guide

Create Stack		Actions	Design template						
Filter: Active ▾ jpas		x	Stack Name	Created Time	Status	Drift Status	Description		
<input checked="" type="checkbox"/>	jpas2-1	2019-01-14 09:04:42 UTC-0800	CREATE_COMPLETE	NOT_CHECKED	Creates VPC, Subnets, Route Tables, SG, External Application...				
<hr/>									
Overview	Outputs	Resources	Events	Template	Parameters	Tags	Stack Policy	Change Sets	Rollback Triggers
Key	Value	Description							
KeyName	JP-NV-NEW	Key Pair you have selected for SSH							
TrustSubnets	192.168.2.0/24,192.168.12.0/24	Trust subnets in the VPC							
ELBName	jppublb1	Elastic Application Load Balancer (Public) name							
SSHLocation	199.167.0.0/16	Make sure you SSH from this IP address							
LambdaCodeFile	panw-aws.zip	File name of the Lambda Code being run							
NetworkLoadBalancerQueue	<a href="https://sqs.us-east-1.amazonaws.com/">https://sqs.us-east-1.amazonaws.com/</a> LoadBalancerQueue-1TBECBB1XURF0	/jpas2-1-Network	Network Load Balancer queue						
ScalingParameter	DataPlaneCPUUtilizationPct	Scaling Parameter you have selected							
LambdaS3Bucket	arn:aws:s3:::jpautoscale2-1s3	Your Template/Lambda Code bucket being used for this deployment							
BootstrapS3Bucket	arn:aws:s3:::jpautoscale2-1s3	Your Bootstrap bucket being used for this deployment							
ELBDNSName	jppublb1-299078079.us-east-1.elb.amazonaws.com	Elastic Application Load Balancer (Public) DNS name							
TransitAssumeRoleArn	arn:aws:iam::..role/TransitAssumeRole-jpas2-1	Transit Assume Role Arn, This will be given as a Parameter while la...							

- You must use Panorama to access the user interface on the firewall.



**STEP 12 |** Save the following information. You need to provide these values as inputs when deploying the application template.

- IP addresses of the NAT Gateway in each AZ. You need this IP address to restrict HTTPS access to your Panorama so that Lambda using the EIP's for the NAT Gateway can communicate with Panorama when needed.
- Network Load Balancer SQS URL. A lambda function in the firewall stack monitors this queue so that it can learn about any network load balancers that you deploy and create NAT policy rules (one per application) in the Panorama that enable the firewalls to send traffic to the network load balancer IP address.

## Launch the Application Template

The application template allows you to complete the sandwich topology and is provided so that you can evaluate the auto scaling solution. This application template deploys either an application or network load balancer and a pair of web servers behind the auto scaling group of VM-Series firewalls, which you deployed using the firewall template. Use this template to evaluate the solution but build your own template to deploy to production. For a custom template, make sure to enable SQS Messaging Between the Application Template and Firewall Template.

When launching the application template, you must select the template based on whether you want to deploy the application template within the same VPC in which you deployed the firewall template or in a separate VPC. When deploying into a separate VPC cross account deployments are not supported in AWS Auto Scaling (v2.1-CS).

### STEP 1 | Upload the ilb.zip file into an S3 bucket to use when launching the application template.

1. Upload the ilb.zip file to the S3 bucket you created earlier or to a new bucket. As mentioned earlier you can use the same bucket for everything.

<input type="checkbox"/>	Name ▾	Last modified ▾	Size ▾	Storage class ▾
<input type="checkbox"/>	config	--	--	--
<input type="checkbox"/>	content	--	--	--
<input type="checkbox"/>	license	--	--	--
<input type="checkbox"/>	software	--	--	--
<input type="checkbox"/>	ilb.zip	Jan 8, 2019 11:36:55 AM GMT-0800	5.6 KB	Standard
<input type="checkbox"/>	panw-aws.zip	Jan 8, 2019 11:36:45 AM GMT-0800	161.2 KB	Standard

### STEP 2 | Select the application launch template you wish you launch.

2. In the AWS Management Console, select **CloudFormation>Create Stack**.

3. Select **Upload a template to Amazon S3**, to choose the application template to deploy the resources that the template launches within the same VPC as the firewalls, or to a different VPC. Click **Open** and **Next**.
4. Specify the **Stack name**. The stack name allows you to uniquely identify all the resources that are deployed using this template.

### STEP 3 | Configure the parameters for the VPC and network load balancer.

1. Select the two Availability Zones that your setup will span in **Select list of AZ**. If you are deploying within the same VPC make sure to select the same Availability Zones that you selected for the firewall template.
2. If deploying to a new VPC enter a **CIDR Block for the VPC**. The default CIDR is 192.168.0.0/16.
3. If deploying to the same VPC you will **select the previous VPC** and use the Trust subnets.

#### Parameters

##### VPC Section

**Number of AZ for deployment:**  Total Number of AZs which will be used in this deployment (Min 2 and Max 4 depending on az availability)

**Select list of AZ:**   Enter the list of Availability Zones (Based on Number of AZs above). Required for the deployment of the backend application

**VPC CIDR:**  Enter the VPC CIDR that you want to use

**VPC ID:**  VPC ID to be deployed into

**Subnet IDs:** "/> Enter the Subnet IDs that are to be leveraged

### STEP 4 | Select the load balancer type.

##### Load Balancer Section

**ILB Name:**  Enter the name to associate with the ILB

**ILB Type:**  Choose the type of load balancer required in the application template

## STEP 5 | Configure the parameters for Lambda.

### Lambda Section

S3 Bucket Name:	<input type="text"/>	Enter the name S3 Bucket Name which contains the template and lambda code
Lambda Zip File Name:	<input type="text"/>	Enter the name of the S3 object which contains the lambda function code
Queue URL:	<input type="text"/>	Enter the URL of the Queue to send ILB updates to

1. Enter the S3 bucket name where ilb.zip is stored.
2. Enter the name of the zip file name.
3. Paste the SQS URL that you copied earlier.

## STEP 6 | Modify the web server EC2 instance type to meet your needs.

1. For POC the default value should work.

### Application Section

Instance Type of Web Servers behind ILB:	<input type="text" value="t2.medium"/>	▼	WebServer EC2 instance type
--	--	---	-----------------------------

**STEP 7 |** Select the EC2 **Key pair** (from the drop-down) for launching the web servers. To log in to the web servers, you must provide the key pair name and the private key associated with it.

**STEP 8 |** Select the IP address of the network you will be accessing the servers from for management access only. Web traffic comes through the ELBDNS name you copied when you launched the firewall template.

### Access Section

Key pair:	<input type="text" value="Search"/> ▼	Amazon EC2 Key Pair
SSH From:	<input type="text" value="0.0.0.0/0"/>	Restrict SSH access to the VM-Series firewall. Recommend to specify IP / CIDR of the VPC.

**STEP 9 |** Review the template settings and launch the template.

**STEP 10 |** After completion of the application template it can take up to 20 minutes for the web pages to become active. You will want to check the following.

1. Verify that the application template load balancer is marked active.

Actions				
	Name	DNS name	State	VPC ID
<input checked="" type="checkbox"/>	jpilb-lb1	jpilb-lb1-b665a4321190d179...	active	vpc-0c6d37e1f...

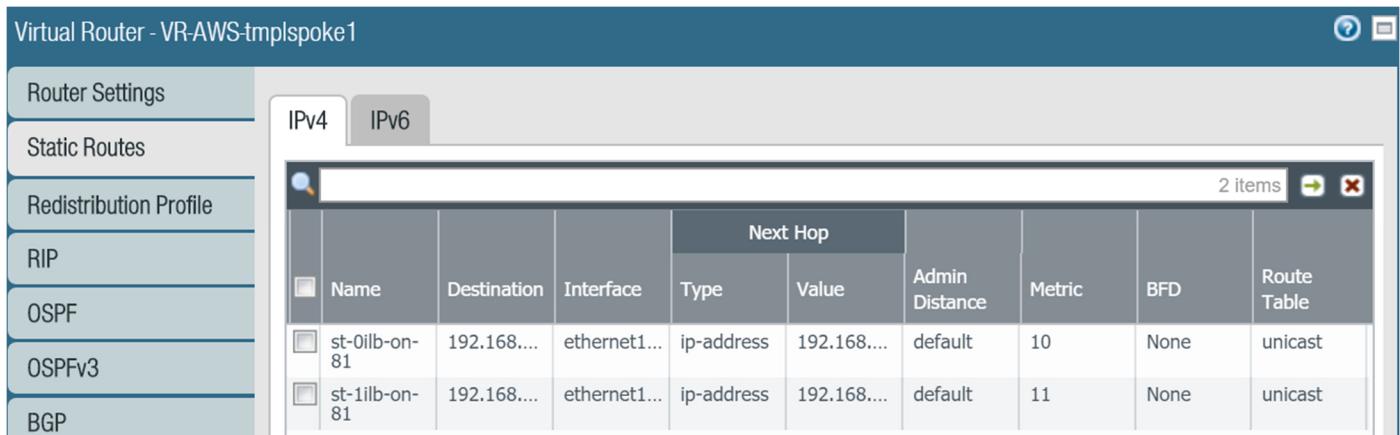
2. Verify that Panorama has a NAT object in the device group.

	Name	Location	Tags	Source Zone	Destination Zone	Destination Interface	Original
1	natrule-port81	AWS-dgspoke1	none	any	untrust	ethernet1/1	

3. Verify that Panorama has an address object in the device group.

Name	Location	Type	Address
ilb-on81	AWS-dgspoke1	FQDN	jpilb-lb1-b665a4321190d179.elb.us-east-1.amazonaws.com

4. Verify that Panorama has static routes in the template stack.



The screenshot shows the 'Virtual Router - VR-AWS-tmplspoke1' configuration. On the left, a sidebar lists 'Router Settings', 'Static Routes', 'Redistribution Profile', 'RIP', 'OSPF', 'OSPFv3', and 'BGP'. The 'Static Routes' tab is selected, showing two entries in the main pane:

Name	Destination	Interface	Next Hop		Admin Distance	Metric	BFD	Route Table
			Type	Value				
st-0ilb-on-81	192.168....	ethernet1...	ip-address	192.168....	default	10	None	unicast
st-1ilb-on-81	192.168....	ethernet1...	ip-address	192.168....	default	11	None	unicast

**STEP 11** | Get the DNS name you saved earlier for the application load balancer and enter it into a web browser.

**STEP 12** | Upon successful launch your browser should look like this output.



**Congratulations, you have successfully launched VM-Series ASG CloudFormation. This file is coming from Webserver Region: us-east-1**

**StackID: arn:aws:cloudformation:us-east-1: :stack/jpappstk1/1c197cb0-18f4-11e9-b92e-0ab87eb901cc**

**StackName: jpappstk1**