

Running IxLoad in the Cloud

Release 8.50

Notices

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Introduction

AWS's CloudFormation Templates (CFT) simplify the process of provisioning and management on AWS.

Templates are configure to create for the services or applications desired, and AWS CloudFormation uses those templates quickly and reliably provision of the services or applications (called "stacks").

Ixia has created a CloudFormation template to enable deployment of IxLoad in AWS. The template deploys IxVM instances and DUT instances in a new VPC.

Every newly-deployed instance has one public network and 1 to 8 test network ports, each with a private IP address.

In addition to the instances, the IxLoad CloudFormation template automatically creates the following AWS entities:

- One VPC with same name as given for Stack name.
- One public subnet and one private subnets for each of the test interface specified during stack creation.
- Two new routing tables named with the stack name. One table is for public routing and the other for private routing. All private subnets are associated with the private routing table.
- An internet gateway that is assigned to the public routing table and public subnet
- Two security groups named with the stack name. One group is the for management interface and the other is for the test interfaces.
- Two IAM roles, EC2ReadonlyRole and LambdaExecutionRole ,named with stack name. These roles are assigned to newly created virtual test appliance instances.

The image below shows the IxLoad AWS topology.

IxLoad AWS topology



IxLoad test topology

You can configure the client network with or without an Emulated Router (ER).

The image below shows an IxLoad client NetTraffic connected to a server NetTraffic through a DUT.



Deployment

This section describes how to use the Ixia CloudFormation template to deploy and configure IxVM virtual test appliance instances on AWS.

Before you begin

Before you begin, you must:

- have an AWS user ID that has IAM Role Creation and Lambda Execution privileges
- create a key pair before using CFT
- know the AMI IDs of the virtual test appliance image and the DUT image. These images should be visible in the AMI bucket of the required region. To find the virtual test appliance AMI ID, open the AWS community, filter for ixia and select Ixia Virtual Test Appliance <version> AMI ID.
- know the external IP (NAT) address of the network that you use to access AWS. You can get this address from your IT department, or you can get it by using the following procedure:
 - 1. In your AWS account, create a new security rule
 - 2. For Source, select My IP.

AWS will display your network's external IP.

After deploying the template, you must configure the secondary IP addresses of each instance, either manually or by using a script.

Deployment

To deploy the template:

- 1. Login to AWS.
- 2. Select the json template file.
 - You can either use the pre-configured Ixia S3 template json file or you can use your own.
 - If you want to use the Ixia json file, its url is: https://s3.amazonaws.com/ixia-solution-group/Ixia_Virtual_Test_Appliance_ CFT_v1.1.json
 - If you want to use your own, upload it to your local S3 bucket and get the url for the json file.

Deployment

Properties	Permissions	Management	
nter to search. Press ESC to clear.			
		l	ast modified 1=
	Properties	Properties Permissions nter to search. Press ESC to clear.	Properties Permissions Management Iter to search. Press ESC to clear.

3. Click Services | CloudFormation, then click Create Stack.

	aws	Services 🗸	Resource Group	os v 🏌								
٩	❶ CloudFormation ∽ Stacks											
C	Create Stack Actions Design template											
Fi	Filter: Active By Stack Name											
	Stack Name	9	C	Created Time		Status						
	CFT-hogan-	t2	2	2017-11-29 17:11:2	2 UTC+0550	CREATE_COMPLETE						
	hogan-cft-t1		2	2017-11-29 16:59:3	1 UTC+0550	DELETE_FAILED						
	testplay		2	2017-11-27 18:07:1	6 UTC+0550	CREATE_COMPLETE						

The Create Stack page displays.

4. Under Choose a template, click Specify an Amazon S3 template URL, then enter the URL of the json file you want to use.

0	Select Template		
Options Review	Select the template that descri	ibes the stack that you want to create. A stack is a group of related resources that you manage as a sing	gle unit.
	Design a template	Use AWS CloudFormation Designer to create or modify an existing template. Learn more. Design template	
	Choose a template	A template is a JSON/YAML-formatted text file that describes your stack's resources and their propertie O Select a sample template	es. Learn more.
		 Upload a template to Amazon S3 Browse No file selected. Specify an Amazon S3 template URL 	

5. Click Next.

The Specify Details page displays.

6. Enter the parameters for the VMOne instance.

Observe the following guidelines:

DUT:

- If you intend to deploy a DUT, configure 2 interfaces (Eth1 and Eth2) under the IXIA-VM Configuration section.
- If you do not intend to deploy a DUT, specify 0 for "Instance count" under "DUT Configuration"

Enhanced Networking:

- If you want to use an instance that has SR-IOV (Enhanced Networking) enabled, select "C3.8xlage" in the Instance type field.
- If you do not need an instance that has SR-IOV enabled, select "m3.xlarge" in the Instance type field.
- For a list of other instance types that support SR-IOV, see "Enhanced Networking Types" in http://docs.aws.amazon.com/AWSEC2/latest/UserGuide/enhanced-networking.html.
- Make sure you enter your network's external IP (NAT) that you use to access AWS.
- 7. After you have entered the VMOne parameters, click Next.

Deployment

Services V Resource	ce Groups 👻 🏌		Ω kbiswas⊕ixiacom.com @ aws ▼ N. Virginia ▼ Support ▼
CloudFormation Y Stacks	 Create Stack 		
Create stack			
Select Template	Specify Details		
Specify Details Options	Specify a stack name and parar	meter values. You can use or change the defaul	t parameter values, which are defined in the AWS CloudFormation template. Learn more.
Review			
	Stack name	xia-virtual-test-appliance	
	Parameters		
	NETWORK CONFIGURA	ATION	
	VPC Configuration		
	Username	keysight	Enter Team or Individual Name Responsible for the Stack.
	Project	AWS project	Enter Project Name
	Availability Zone	us-east-1a -	
		Preferred availability zone	
	VPC	10.0.0/16	IP Address range for the VPC
	Management-Network	10.0.0.0/24	IP Address range for the Management-Subnet (eth0)
	IXIA-VM Configuration		
	AMI-ID for VMOne	ami-bca19ac6	AMI-ID for the vmone instances
	Instance Type	c3.8xlarge 🗸	
		Please select VMOne instance type. NOTE-1::Before s following::t2.micro,t2.medium,m3.xlarge,c3.4xlarge,c4	eleiding, ensure if that instance-type is supported in the selected region. NOTE-2: if you want to select low-performance single-test-NIC explicitely, select one of the .4xdarge.m4.4xdarge.
	SSH Key	aws_reg •	
		Existing KeyPair to login to the VMONE instances	
	Eth1	10.0.1.0/24	Subnet CIDR for the connected Interface; Eth1 is compulsory
	Eth2	10.0.2.0/24	Subnet CIDR for the connected Interface; Eth2 is compulsory
	Eth3		Subnet CIDR for the connected interface; NIC won't be created if value is not provided
	Eth4		Subnet CIDR for the connected interface, NIC won't be created if value is not provided
	Eth5		Subnet CIDR for the connected Interface; NIC won't be created if value is not provided
	Eth6		Subnet CIDR for the connected Interface; NIC won't be created if value is not provided
	Eth7		Subnet CIDR for the connected interface; NIG won't be created if value is not provided
	Instance Count	2	Number of VMOne instances to be launched, Min-Value=1, Max-Value=20
	DUT Configuration		
	AMI-ID for DUT		AM-ID for DUT
	Instance Type	c3.8xlarge	Please select DUT instance type. NOTE: Before selecting, ensure if that instance-type is supported in the selected region.
	SSH Kev	aws reg .	
	,	Existing KeyPair to login to the DUT	
	Instance Count	0	Number of DUT to be launched. Min-Value=0, Max-Value=20
	Security-Group Configura	ation	
	External-IP	XXXXXX	IP address range used to SSH and access management GUI on the EC2 instances
			Cancel Previous Next

The Options page displays.

8. Enter a tag a (key-value pair) that you can use to identify the instance.

Tags		
/ou can specify tags (key-valu	e pairs) for resources in your stack. You can add up to 50 unique key-value pair	s for each stack. Learn more.
Key (127 characters max	imum)	Value (255 characters maximum)
1 Name		СЕТІ
ormissions		
ermissions ou can choose an IAM role th	at CloudFormation uses to create, modify, or delete resources in the stack. If yo	u don't choose a role, CloudFormation uses the permissions defined in your account. Learn
Permissions You can choose an IAM role th IAM Role	at CloudFormation uses to create, modify, or delete resources in the stack. If yo Choose a role (optional) There role arn	u don't choose a role, CloudFormation uses the permissions defined in your account. Learn
Permissions 'ou can choose an IAM role th IAM Role	at CloudFormation uses to create, modify, or delete resources in the stack. If yo	u don't choose a role, CloudFormation uses the permissions defined in your account. Learn
² ermissions ^{fou can choose an IAM role th IAM Role}	at CloudFormation uses to create, modify, or delete resources in the stack. If yo Choose a role (optional) T Enter role am	u don't choose a role, CloudFormation uses the permissions defined in your account. Learn
Permissions iou can choose an IAM role th IAM Role • Advanced	at CloudFormation uses to create, modify, or delete resources in the stack. If yo Choose a role (optional) • Enter role am	u don't choose a role, CloudFormation uses the permissions defined in your account. Learn

9. Under Capabilities, click the checkbox for "I acknowledge that AWS CloudFormation might create IAM resources. The template needs this permission to access and control custom resources through the lambda function.

0	The following resource(s) require capabilities: [AWS::IAM::Role]										
	This template contains identify and Access Management (IAM) resources that might provide entities access to make changes to your AWS account. Check that you want to create each of these resources and that they have the minimum required permissions. Learn more.										
✓ Lack	nowledge that AWS CloudFormation might create IAM resources.										
Quick C	reate Stack (Create stacks similar to this one, with most details auto-populated)										
	Cancel Previous Create										

10. Click Create.

Capabilities

AWS begins deploying the stack.

On the CloudFormation Stacks page, the stack deployment status will show $\tt CREATE_IN_PROGRESS.$

You can click the Events tab to view the status of various sub-tasks.

When the stack has been deployed, the stack status displays as CREATE COMPLETE.

	Otesta	0101									🦛 Kolonidas (extracoliticoniti (el aviss	- support -
U CloudFormation	Stacks											
Create Stack - A	ctions -	Design t	emplate									G Ö
Filter: Active - By St	ack Name										SI	howing 4 stacks
Ctack Name			Greated Time		644	4 110		Deserie	tion			
Stack Name			created nine		510			Descrip	uon			
xia-virtual-test-appl	lance		2018-05-24 12:5	5:03 UTC+0550	CR	EATE_IN_PROG	RESS	Stack cre	eating a VP	C and launch EC2 instances within it.	I. "WARNING" This template creates Amazon EC2 instances. You will be billed for the AWS reso	urces used
Overview Outputs	Resources	Events	Template	Parameters	Tags	Stack Policy	Change	e Sets	Rollback	Triggers		
Filter by: Status -												
Sinter by. Guids S	earch events											
018-05-24	Status		Туре				ogical ID			Status Reason		
12:55:50 UTC+0550	CREATE_IN_PRO	JGRESS	AWS	EC2::SubnetRout	e lableAs	sociation	PublicSubnetARouteTable Re		Table	Resource creation initiated		
12.55.50 010+0550	CREATE_COMPL	LETE	AVVS	EC2. NetworkAcie	nuy		Privatervetw	/onkacien	ryegress			
12:55:49 UTC+0550	CREATE_IN_PRO	JGRESS	AVVS	EC2. Subnetikout	erableAs	sociation	PublicSubnetARoute lable		Table			
12:55:49 UTC+0550	CREATE_COMPL	LETE	AWS	EC2::NetWorkAcie	intry		PrivatenetworkAclEntryingress		tryingress	Opposition and the lettine of		
12:55:46 UTC+0550	CREATE_IN_PRO	JGRESS	AVVS	EC2Route			RouteToInternet			Resource creation initiated		
12:55:47 01C+0550	CREATE_IN_PRO	ETE	AWG	EC2::Roule			Route former P					
12:55:44 UTC+0550	CREATE COMPL	ETE	AWS::	EC2:://PCCatewa	vAttachm	ent	StackPublicSubhetA		hment			
12:55:34 UTC+0550	CREATE IN PRO	ORESS	AWS: F	EC2::NetworkAclE	intry	cin	PrivateNetw	orkAcIEn	to/Faress	Resource creation Initiated		
12:55:33 UTC+0550	CREATE IN PRO		AWS	EC2:NetworkAcIE	intry		PrivateNetv	orkAcIEn	to/ingress	Resource creation Initiated		
12:55:33 UTC+0550	CREATE IN PRO		AWS: F	EC2::NetworkAcIE	intry		PrivateNetw	orkAcIEn	tryEaress	resource creation initiated		
12:55:33 UTC+0550	CREATE IN PRO		AWS	EC2: NetworkAcIE	intry		PrivateNetw	orkAcIEn	tryingress			
12:55:31 UTC+0550	CREATE IN PRO		AWS	EC2: SecurityGro	up		Momtinstan	ceSecurit	vGroup	Resource creation Initiated		
12:55:30 UTC+0550	CREATE COMPL	ETE	AWS	EC2: RouteTable			PrivateRout	teTable	/			
12:55:30 UTC+0550	CREATE COMPL	LETE	AWS::E	EC2::SecurityGro	up		TestNetwSe	curityGro	up			
12:55:30 UTC+0550	CREATE IN PRO	OGRESS	AWS::E	EC2::SecurityGro	up		Mgmtinstan	ceSecurit	, yGroup			
12:55:30 UTC+0550	CREATE COMPL	LETE	AWS::E	EC2::NetworkAcl	1		PrivateNetw	/orkAcl				
12:55:30 UTC+0550	CREATE_COMPL	LETE	AWS::E	EC2::VPCDHCPC	ptionsAss	sociation	DhcpOptior	IsAssocia	tion			
12:55:29 UTC+0550	CREATE_COMPL	LETE	AWS::E	EC2::RouteTable			PublicRoute	Table				
12:55:29 UTC+0550	CREATE_IN_PRO	OGRESS	AWS::E	EC2::Subnet			StackPublic	SubnetA		Resource creation Initiated		
12:55:29 UTC+0550	CREATE_IN_PRO	OGRESS	AWS	EC2::VPCDHCPC	ptionsAss	sociation	DhcpOption	IsAssocia	tion	Resource creation Initiated		
12:55:29 UTC+0550	CREATE_IN_PRO	OGRESS	AWS	EC2::NetworkAcl		1	PrivateNetw	vorkAcI		Resource creation Initiated		
12:55:29 UTC+0550	CREATE_IN_PRO	OGRESS	AWS	EC2::SecurityGro	up		TestNetwSe	curityGro	up	Resource creation Initiated		
12:55:29 UTC+0550	CREATE_IN_PRO	OGRESS	AWS::E	EC2::VPCDHCPC	ptionsAss	sociation	DhcpOptior	nsAssocia	tion			
12:55:29 UTC+0550	CREATE IN PRO	OGRESS	AWS::E	EC2::Subnet			StackPublic	SubnetA				

- 11. After the stack is deployed, click the Outputs tab and make a note of:
 - the login information for each instance.
 - the $\ensuremath{\mathsf{VMONE}}$ instance details, which displays the IP address details in json format

For example, in the deployment shown in the image below, there are two Virtual Test Appliances: IXIA-VMONE-i-0b1fc16f1ef2c6852

and

IXIA-VMONE-i-09231ad866bcc7b7d

Each Virtual Test Appliance has three interfaces: - one management interface (Eth0) and two test interfaces. There are two test interfaces because when the appliance was configured from the CFT, two test interfaces, Eth1 and Eth2, were specified. .

Each Virtual Test Appliance displays its IP address list. For example "IXIA-VMONE-i-0b1fc16f1ef2c6852" has IP list "{'Eth0': ['10.0.0.132'], 'Eth1': '10.0.1.143', 'Eth2': '10.0.2.239', 'Public_IP': ['107.20.71.231']}".

Eth0 interface has a private IP address of 10.0.0.132 , which is associated with public IP address 107.20.71.231. This virtual test appliance can be added to IxLoad using this public IP address.

Eth1 interface has a private IP address of 10.0.1.143, and Eth2 has a private IP address of 10.0.2.239. These are the IP addresses that must be configured as test ports in IxLoad.

aws	Service	s y Resou	Irce Grou	ups 🗸 🏌							🗘 kbiswas@ixiacom.com @ aws 👻 N. Virginia 👻 Support 👻
CloudFo	rmation	 Stacks 									
Create Stack	- Act	ions •	Design t	template							C
Filter: Active	By Sta	:k Name									Showing 4 star
Stack Nar	ne			Created Time		Sta	itus	De	scription		
z ixia-virtual-	-test-applia	nce		2018-05-24 12	:55:03 UTC+0550	CR	EATE_COMPLET	E Sta	ck creating a VF	C and launch EC2 instances within it. **WARNING** This template	creates Amazon EC2 instances. You will be billed for the AWS resources used
Overview	Outputs	Resources	Events	5 Template	Parameters	Tags	Stack Policy	Change Se	ts Rollback	Triggers	8
SSHLoginToDU	Tinstance	CMD			None					ssh command syntax to login to DUT instance	
TestSubnet7					None					Test Subnet-7	
TestSubnet6					None					Test Subnet-6	
TestSubnet5					None					Test Subnet-5	
TestSubnet4					None					Test Subnet-4	
TestSubnet3					None					Test Subnet-3	
TestSubnet2					10.0.2.0/24					Test Subnet-2	
TestSubnet1					10.0.1.0/24					Test Subnet-1	
PublicRoutingT	able				rtb-ddd837a2					Public Routing Table	
SecurityGroup	Testinterfac	e			sg-8ad8b0c2					Test Interface Security Group	
VMONEINSTANCEDETAILS			{"IXIA-VMONE .0.1.143', 'Eth ONE-i-09231; ', 'Eth2': '10.0	(700A-VMONE-I-0b1fc16f1ef2c6852; "("EIh0"; ["10.0.0.132]; "EIh1"; "10 0.1.143; "EIh2"; "10.0.2.239; "Public, IP: [107.20.71.231]"; "X0A-VM ONE-I-09231ad66bcc7b7d"; "("EIh0"; ["10.0.172]; "EIh1"; "10.0.137"; "EIh1"; "10.0.2176; "Public, IP: ["24.235.141.166"])")				vmone instance details			
ManagementNe	etworkSubr	et			subnet-8d569	1d1				Management Interface Subnet	
SecurityGroup	Managemei	ntinterface			sg-64d9b12c					Management Interface Security Group	
DUTINSTANCE	DETAILS				None					DUT instance details	
VPCCIDR					10.0.0/16					VPC CIDR	
SSHLoginToVm	oneinstand	eCMD			ssh -i aws_re	g.pem ad	lmin@Publiclp			ssh command syntax to login to vmone instance	
ManagementNe	etworkCIDR				10.0.0/24					Management Network CIDR	
StackVPC					vpc-f391af88					VPC ID	ixia-virtual-test-appliance-VPCID

Security groups

The CloudFormation template automatically creates security groups and configures the ports allowed for the inbound and outbound rules for both the management and the test interfaces.

Management interfaces

For the management interfaces, the ports allowed are:

Inbound rule:

TCP Ports	22, 80, 443, 111, 2601, 998-999, 1000, 1080, 2345, 3222, 3601, 4501, 4502, 4601, 5285, 5286, 5236, 5237, 5480, 5488, 5489, 6001-6005, 6665, 6967, 6978, 8021, 8022, 8881, 8989, 8990, 9101, 9102, 9613-9676, 10115, 10116, 10119, 17662, 17668-17777, 18765, 21123, 21653
UDP Ports	67, 68, 123, 161, 162, 605, 1000, 6004 ,10116
ICMP	<none></none>

Outbound rule:

ICMP <none>

Test interfaces

Inbound rule: All ports

Outbound rule: All ports

i Note:

IxLoad uses the boto3 python library to extract AWS-related information.

 $\tt boto3$ uses public IP addresses that vary by region to communicate with AWS. These IPs are listed on the following page:

https://ip-ranges.amazonaws.com/ip-ranges.json

You must manually add the required IPs to virtual test appliance's management security group manually.

For more information, see:

http://docs.aws.amazon.com/general/latest/gr/aws-ip-ranges.html

Configuring secondary IP addresses

By default, the CloudFormation template configures only one IP address per interface. If you need to use multiple IP addresses per interface, you must configure secondary IP addresses.

You can configure secondary IP addresses manually or automatically.

Manually

Refer to this page in the AWS documentation for the procedure on configuring secondary IP addresses: https://aws.amazon.com/premiumsupport/knowledge-center/secondary-private-ip-address/

Automatically

Create a python script to automatically configure secondary IP addresses.

- Configure the AWS CLI. Refer to this page in the AWS documentation: <u>https://docs.aws.amazon.com/cli/latest/userguide/awscli-install-linux.html#awscli-install-linux-path</u>
- 2. Install boto3:

```
# pip install boto3 --user
```

3. After installing boto3, configure AWS CLI with the AWS configure command along with the AWS Access Key ID and AWS Secret Access Key.

```
[ec2-user@ip-10-0-0-5 ~]$ aws configure
AWS Access Key ID [*****************12BQ]
AWS Secret Access Key [******************
```

- 4. Create a python script with content listed below.
- 5. Execute the script with required parameters:

```
python createCustomPrivateIP.py [instance-id] [eth1/eth2/...] [start_ip] [stop_
ip] [Region Name]
```

Script

```
## USAGE : python createCustomPrivateIP.py [instance-id] [eth1/eth2/...] [start ip]
[stop ip] [Region Name]
## EXAMPLE: python createCustomPrivateIP.py i-Ocba4998da080d95e eth1 10.0.1.37
10.0.1.39 us-east-1
import sys
import boto3
from botocore.exceptions import ClientError
client = boto3.client('ec2', region name= sys.argv[5])
ec2 = boto3.resource('ec2', region name= sys.argv[5])
start ip = sys.argv[3]
                          #start ip = '172.31.15.171'
stop ip = sys.argv[4]
                         #stop ip = '172.31.15.174'
## Create IP-Address-Range
def undotIPv4 (dotted):
   return sum (int (octet) << ( (3 - i) << 3) for i, octet in enumerate
(dotted.split ('.') ) )
def dotIPv4 (addr):
   return '.'.join (str (addr >> off & 0xff) for off in (24, 16, 8, 0) )
def rangeIPv4 (start, stop):
    for addr in range (undotIPv4 (start), undotIPv4 (stop) ):
        yield dotIPv4 (addr)
if (sys.argv[2] == 'eth1'):
    device index=1
elif (sys.argv[2] == 'eth2'):
    device index=2
elif (sys.argv[2] == 'eth3'):
    device index=3
elif (sys.argv[2] == 'eth4'):
    device index=4
elif (sys.argv[2] == 'eth5'):
    device index=5
elif (sys.argv[2] == 'eth6'):
    device index=6
elif (sys.argv[2] == 'eth7'):
    device index=7
else:
   device index=8
```

```
try:
    vpc_instances = ec2.network_interfaces.filter(Filters=[{'Name':
'attachment.instance-id','Values': [sys.argv[1]]}, {'Name': 'attachment.device-
index','Values': [str(device_index)]}])
    for interfaces in vpc_instances:
        for ip_list in rangeIPv4 (start_ip, stop_ip):
            response1 = client.assign_private_ip_addresses
(NetworkInterfaceId=interfaces.id, PrivateIpAddresses=[ip_list],)
            print(response1)
except ClientError as e:
        print(e)
```

Configuring an IxLoad test in AWS

After using the CFT to deploy your AWS instances, you can use them in an IxLoad test.

There are two ways to configure a test in IxLoad with AWS instances, depending on how you want to configure the MAC and IP addresses for the test:

- <u>Manual configuration</u>, in which you enter the MAC and IP addresses
- Automatic configuration, in which IxLoad detects and learns the MAC and IP addresses

Manually Configuring MAC and IP Addresses

To manually configure an IxLoad test in AWS:

- 1. Start IxLoad.
- Display the network configuration page, and add: one client NetTraffic one DUT NetTraffic one server NetTraffic
- 3. On the client NetTraffic, select the IP stack, and specify test port IP address for client traffic.

Originate	V Net	work1	ti (DUT1			_	Traffic2	TPServer1		
Network	1	_											
	Stack-1												
8	IP-1												
₿	mulated Rout	t											
	MAC/VLAN-1												
	Enabled	Name	Status	IP Type	Address	Mask	Increment	Count	Gateway	Gateway Increment	Gateway Increment Mode	MSS	Rar
▶ 1		IP-R1	Unconfigured	IPv4	20.0.1.126	24	0.0.0.1	9				1460	

On the client-side NetTraffic, select the Emulated Router stack, and specify its IP address. Use the address that is configured on the Eth1 interface of the first VMone instance. You can find this address under VMONEINSTANCEDETAILS on the Outputs tab of the CloudFormation | Stacks page.

Originato	Network	s and Traffic Traffic1	twork1	affic Flow	×		DUT1				Traffic2	work2		
N	etwork1													
Γ		Stack-1												
	≋‡	IP-1												
L	≋‡ En	nulated Rou	t											
		MAC/VLAN-1	1											
		Enabled	Name	Status	IP Гуре	Address	Mask	Increment	Count	Gateway	Gateway Step Size	Gateway Increment Mode	MSS	Autogenerate MAC
	▶ 1		ER-R1	Unconfigured	IPv4	10.0.1.102	16	0.0.0.1	1	0.0.0.0	0.0.0.0	Increment every subnet	1460	

 Select the DUT config, and specify IP address. Use the address that is assigned to Eth1 IP of the DUT deployed by the CFT. You can find this address under DUTINSTANCEDETAILS on the Outputs tab of the CloudFormation | Stacks page.
 Networks and Trattic - New Trattic Flow

Traffic1			Traffi	etwork2 c2 HTTPServer1
DUT1				
Type of DUT Server Load Balancer (SLB)		<		
Settings				
Server Load Balancer (SLB) Options				
Ixia Server Network (if any) None				
🕂 🕂 🛠 🕂 😽 🖓 Check All 🖓 Unche	:k All			
Enable IP or VIP	DSCP (decimal)			
I 1 I 10.0.1.241	None			

5. On the server NetTraffic, select the IP stack, and specify its IP address which is assigned to Eth2 of the 2nd VMone instance. For the gateway IP address, specify the address that is assigned to Eth2 IP of the DUT. You can find this address under VMONEINSTANCEDETAILS on the Outputs tab of

Network2 Stack-2 IP-2 MAC/VLAN-2 Enabled Name Status IP Type Address Mask Increment Count Gateway Gateway Increment Mode N	Networks and Traffic - New Traffic Flow													
Enabled Name Status IP Type Address Mask Increment Count Gateway Gateway Increment Gateway Increment Mode N	Network2	Stack-2												
1 IP-R4 Unconfigured IPv4 10.0.2.95 24.0.0.0.1 1 10.0.2.48 0.0.0.0 Increment every subject		Enabled	Name	Status	IP Type	Address	Mask	Increment	Count	Gateway	Gateway Ir	ncrement	Gateway Increment Mode	M

the CloudFormation | Stacks page.

6. Click **Start** to start the test.

Automatically Configuring MAC and IP Addresses

Before you begin

Before you begin to configure a cloud test with automatic addresses, there are some aspects of IxLoad's behavior in a cloud configuration that you should be aware of:

- The Forcefully Update Network Configuration for Cloud option
- The Update Network For Cloud button
- · How IxLoad distributes the automatically-learned addresses from cloud instances

These are described in this section

On the **Test Run | Test Options** window, there is a checkbox named **Forcefully Update Network Configuration for Cloud**.

Ld Test Options		– 🗆 X						
O.T. J. O. J.	Test Options							
test Options	Test Run	Statistics						
🛃 StatViewer Options	Forcefully Take Ownership	CSV Polling Interval: 2 💭 Seconds						
	Reboot Ports Before Configuring							
	Release Configuration After Test	Throughput Stat Units: Kbps						
	Forcefully Update Network Configuration For Cloud	Enable TCP Advanced Stats						
	Network							
	Network Failure Threshold: 0 💭 %	Show Diagnostics From Apply Config						
		Reset Diagnostics At Start Run						
	Seed For Random Behavior	Show Diagnostics After Run Stops						
	Seed Value: 0	Save Detailed Diagnostics in CSV						
	App Library	Enable QoE Detective						
	Auto update AppLib Flows to latest version	Per User Per IP Per VLAN						
	Auto downgrade AppLib Flows to latest valid version	QoE Detective Profiles						
	Comment:	Name Publish Events						
		ОК						

Checking this control allows IxLoad to update the test configuration with information from the cloud instances. During the Apply Config phase of the test (when IxLoad is downloading the test configuration to the ports), the following happens:

When running a test from the GUI	When running a test from an automation script:			
If Forcefully Update is enabled, IxLoad prompts you if the configuration should be automatically changed.	If Forcefully Update is enabled, IxLoad attempts to modify the configuration and then apply the configuration to the ports.			
The prompt contains information about the changes that are going to be made	If Forcefully Update is disabled, IxLoad attempts to run with the existing configuration and any			
Yes: If you choose "Yes", IxLoad will attempt to modify the configuration and then apply the configuration to the ports.	errors will be returned during the Apply Config phase.			
No: If you choose "No", IxLoad will attempt to run with the existing configuration.				
Cancel: If you choose "Cancel", the test stops (it does not attempt to apply the configuration)				
Apply: If you choose "Apply", IxLoad applies the automatic changes, but does not start the test.				
If Forcefully Update is disabled, IxLoad will attempt to run with the existing configuration, and any errors will be displayed during the Apply Config phase.				

Configuring an IxLoad test in AWS



Update Network for Cloud Button

On the Ribbon (on the Network tab and Port Tools tab, next to IP Assignments) there is button named Update Network For Cloud.

You can click Update Network For Cloud any time when the test is not running, and IxLoad will retrieve the addresses available from the cloud instances.

Apply: If you choose "Apply", IxLoad applies the automatic changes, but does not start the test.

Cancel: If you choose "Cancel", the test stops (it does not attempt to apply the configuration).



How IxLoad updates the Network Configuration

With an Emulated Router

IxLoad uses the first allowed IP address on each assigned port as the Connected IP address. The number of ranges of Emulated Router and the count of each range are not important.

After the addresses have been learned and the configuration updated, the number of Emulated Router ranges will equal the number of ports assigned and count=1 on each range. If there are not enough ranges, extra ranges are added. If there are more ranges than ports assigned, the extra ranges are removed.

The 'Autogenerate MAC' option is disabled on all the Emulated Router ranges.

MAC addresses are updated.

If the test has both IPv4 and IPv6 addresses. IxLoad does not update the MAC addresses to avoid a MAC overlap error. The test will work because promiscuous mode is disabled.

VLAN is disabled on all ranges.

Unconnected IP addresses are not changed.

Without an Emulated Router

The Random IP checkbox is automatically disabled during the update.

The 'Autogenerate MAC' option is left as it is on all the IP ranges.

IxLoad uses the first chunk of IPs with equal increment on each port.

For example if the cloud allows the following IP addresses:

1.1.1.11 1.1.1.12 1.1.1.13 1.1.1.16 1.1.1.17 1.1.1.20 1.1.1.22 1.1.1.24 the IPs that IxLoad is going to use are startIP = 1.1.1.11, increment = 0.0.0.1, count = 3.

If the existing configuration has three ranges, IxLoad will use:

Range 1: startIP = 1.1.1.11, increment = 0.0.0.1, count = 3 Range 2: startIP = 1.1.1.16, increment = 0.0.0.1, count = 2 Range 3: startIP = 1.1.1.20, increment = 0.0.0.2, count = 3

IxLoad does not add or remove any IP ranges from the configuration. This means that some issues could occur.

For example, if multiple ports are assigned:

- If the per-port distribution type is IP Round Robin, the automatic update fails.
- If the per-port distribution type is Consecutive IPs, the automatic update fails if the existing ranges don't have an equal number of IPs.

If the per-port distribution type is Consecutive Ranges, there shouldn't be any issues, except the case when there are too many ranges in the original configuration.

The typical sequence that can come from Cloud is a counter or a list of counters. A counter is a sequence that can be described with start, increment and count.

Counters and ranges

In the example above, there is a list of 3 counters:

Counter1: start=1.1.1.1, increment=0.0.0.1, count=3 Counter2: start=1.1.1.16, increment=0.0.0.1, count=2 Counter3: start=1.1.1.20, increment=0.0.0.2, count=3

What happens if there are fewer counters than ranges?

Using the example above, assume that there are 4 ranges, and the total number of allowed IPs is 8.

First, the number of IPs is divided by the number of ranges: 8/4=2

This means that IxLoad first tries to allocate 2 IPs for each range.

If it fails, IxLoad tries again with 1 IP for each range.

IxLoad tries allocating 2 IPs for each range by taking IPs from each counter in chunks of 2.

If a counter remains with less than 2 IPs, IxLoad moves to the next range.

Therefore, using the example addresses above, IxLoad attempts to distribute the addresses as follows:

1.1.1.11 1.1.1.12	Range 1
1.1.1.13	skipped, moves to the next counter
1.1.1.16 1.1.1.17	Range 2
1.1.1.20 1.1.1.22	Range 3
1.1.1.24	skipped

At this pont, it gives up because there are no counters to continue with and cover the fourth range. This means that the attempt failed and it will try with 1 IP per range.

With 1 IP per range, it will allocate the addresses as follows:

1.1.1.11	Range 1
1.1.1.12	Range 2
1.1.1.13	Rrange 3
1.1.1.16	Range 4

Suppose there are 3 ranges instead of 4.

The number of IPs is divided by the number of ranges: 8/3=2

It tries with 2 IPs per range, and it succeeds:

1.1.1.11 and 1.1.1.12	Range 1
1.1.1.16 and 1.1.1.17	Range 2
1.1.1.20 and 1.1.1.22	Range 3

What happens if the sequence is not a counter or a list of counters?

There are situations in which the sequence may not be a counter or a list of counters

For example, this sequence:

1.1.1.1 1.1.1.2 1.1.1.3 1.1.2.1 1.1.2.2 1.1.1.3 1.1.3.1 1.1.3.2 1.1.3.3 ...

In these situations, IxLoad simply converts this sequence to a list of counters of 1 element each and applies the usual algorithm. Each range will receive a single IP.

What happens if a range is OK and doesn't need to be changed?

- All the IP addresses must be included in the sequence of the allowed IPs
- The prefix must be correct
- The gateway must be correct
- Random IP must be disabled

If the cloud allows the following sequence of IPs:

1.1.1.11 1.1.1.12 1.1.1.13 1.1.1.16 1.1.1.17 1.1.1.20 1.1.1.22 1.1.1.24

and the configuration has 3 ranges,

One range has IP = 1.1.1.12, increment = 0.0.0.4, count = 3

The other two ranges have bad configurations because they that do not match.

The good range will not be changed.

IP addresses 1.1.1.12, 1.1.1.16 and 1.1.1.20 will be removed from the sequence of allowed IPs as they are already used by this range:

1.1.1.11 1.1.1.12 1.1.1.13 1.1.1.16 1.1.1.17 1.1.1.20 1.1.1.22 1.1.1.24 The remaining sequence will be represented as 3 counters:

Counter1: start=1.1.1.11, increment=0.0.0.2, count=2 Counter2: start=1.1.1.17, increment=0.0.0.5, count=2 Counter3: start=1.1.1.24, increment=0.0.0.0, count=1

Then the usual algorithm will be applied for the two remaining ranges:

Range1 will receive addresses 1.1.1.11 and 1.1.1.13 Range2 will receive addresses 1.1.1.17 and 1.1.1.22

Limitations

Automatic address learning has the following limitations:

- Only plain IP stacks (with or without emulated router) are updated.
- For Custom Mesh configurations, updates are not reflected in the Custom Mesh GUI.
- Only IP addresses in Stack Manager stacks are updated. IP addresses used in other areas of IxLoad (for example, as the destination for L4-7 traffic or on a virtual DUT) are not updated. These addresses must be updated manually.
- If the configuration has IPv6 enabled on any range but the port has no IPv6 addresses, the update will fail. The reverse is also true: if the port has only IPv6 addresses but IPv6 is disabled on the ranges, the update will also fail.

Configuring a test with automatic MAC and IP address learning

To automatically configure an IxLoad test in AWS:

- 1. Start IxLoad.
- 2. On the Test Run | Test Options window, check **Forcefully Update Network Configuration for Cloud** option.
- Display the network configuration page, and add: one client NetTraffic one DUT NetTraffic one server NetTraffic
- 4. Select the DUT config, and specify IP address.

Networks and Traffic - New Traffic Flow								
Originate	University in the second seco	nt1	B DUT1		Trerminate	Itetwork2 ic2 HTTPServer1		
DUT1								
Type of DUT Comment	Server Load	Balancer (SLB) 🛛		<				
Settings								
Server Load B	Balancer (SLB)	Options						
Ixia Server	Network (if an Direct Server R	y) None						
🖶 🗱 省 🖶 🖉 Check All 🕞 Uncheck All								
Enable		IP or VIP	DSCP (decimal)					
Ϊ1		10.0.1.241	None			l		

- 5. On the Ribbon (on the Network tab and Port Tools tab, next to IP Assignments), click **Update Network For Cloud**.
- 6. Click **Start** to start the test.

Deleting a stack

To delete a stack:

- 1. Display the CloudFormation page.
- 2. Select the stack
- 3. Click the "Actions" drop down list, then click Delete Stack.

AWS terminates all instances, and deletes all resources created during the stack creation process.



Known Limitations

Delete stack operations can take more than 10 minutes

Instead of an elastic IP address, a public IP address is assigned to management interface of each instance

A maximum of 5 elastic IP addresses can be allocated per account / per region

A maximum of 5 VPCs can be created per account / per region

For instances based on the c3.8xlarge, c4.8xlarge, and similar instance types, a maximum of 8 interfaces can be created on each instance.

For instances based on the c3.8xlarge, c4.8xlarge, and similar instance types, a maximum of 30 IP addresses (including secondary IPs) can be allocated per interface on each instance.

Promiscuous mode must be disabled on all interfaces. All IP packets will use the interface MAC address

All Data protocols are supported on IxLoad AWS instances. Storage protocols are not supported.

The IP versions (IPv4/IPv6) used on the VM port and in the IxLoad configuration must be compatible:

- If the configuration has IPv6 enabled on any range, but the port has no IPv6 addresses, the update will fail. If the port has only IPv6 addresses but the configuration has no IPv6 ranges enabled, the update will fail.
- If the configuration has IPv4 enabled on any range, but the port has no IPv4 addresses, the update will fail. If the port has only IPv4 addresses, but the configuration has no IPv4 addresses ranges enabled, the update will fail.



 \odot Keysight Technologies, 2018–2018

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