

# Enterprise IP-PBX & Amazon Chime Voice Connector using AudioCodes Mediant™ Virtual Edition (VE) SBC

Version 7.2





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## Abbreviations and Terminology

Each abbreviation, unless widely used, is spelled out in full when first used.

## Document Revision Record

LTRT	Description
10850	Initial document release.
10851	Date and time configuration added.
10853	Mediant VE SBC – PAYG product and Mediant VE SBC product; Configuring the SBC section split into two.

## Documentation Feedback

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# 1 Introduction

This document describes how to set up connectivity between an Enterprise IP-PBX (e.g., Cisco Unified Communications / CUCM) and Amazon Chime Voice Connector, using the AudioCodes Mediant Virtual Edition (VE) Session Border Controller (hereafter, referred to as *SBC*).

## 1.1 Intended Audience

This document is intended for Engineers, or AudioCodes and Amazon partners, who are responsible for installing and configuring connectivity between an Enterprise IP-PBX and Amazon Chime Voice Connector, using AudioCodes SBC.

## 1.2 About AudioCodes SBC Product Series

AudioCodes' family of SBC devices enables reliable connectivity and security between the Enterprise's and the service provider's VoIP networks.

The SBC provides perimeter defense as a way of protecting Enterprises from malicious VoIP attacks; mediation for allowing the connection of any PBX and/or IP-PBX to any service provider; and Service Assurance for service quality and manageability.

Designed as a cost-effective appliance, the SBC is based on field-proven VoIP and network services with a native host processor, allowing the creation of purpose-built multiservice appliances, providing smooth connectivity to cloud services, with integrated quality of service, SLA monitoring, security and manageability. The native implementation of SBC provides a host of additional capabilities that are not possible with standalone SBC appliances such as VoIP mediation, PSTN access survivability, and third-party value-added services applications. This enables Enterprises to utilize the advantages of converged networks and eliminate the need for standalone appliances.

AudioCodes SBC is available as an integrated solution running on top of its field-proven Mediant Media Gateway and Multi-Service Business Router (MSBR) platforms, or as a software-only solution for deployment with third-party hardware or in a virtualized environment, supporting the following platforms: AWS, Azure, OpenStack, Google Cloud, VMware, Hyper-V and KVM.

## 1.3 About Amazon Chime Voice Connector

Amazon Chime Voice Connector provides SIP Trunking connectivity to over 100 countries for on-premises phone systems. Customers can purchase low-cost inbound calling, outbound calling, or both. With Voice Connector, customers can reduce voice calling costs by up to 50% by eliminating fixed telephone network costs, and simplifying voice network administration by transitioning it to Amazon Web Services (AWS).

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## 2 Component Information

### 2.1 AudioCodes SBC Version

Table 2-1: AudioCodes SBC Version

<b>SBC Vendor</b>	AudioCodes
<b>Product</b>	Mediant VE SBC
<b>Software Version</b>	7.20A.256.399 or later
<b>Protocol</b>	<ul style="list-style-type: none"><li>▪ SIP/TCP or SIP/TLS (to Amazon Chime Voice Connector)</li><li>▪ SIP/UDP, SIP/TCP or SIP/TLS (to Enterprise IP-PBX)</li></ul>
<b>Additional Notes</b>	None

### 2.2 Amazon Chime Voice Connector Version

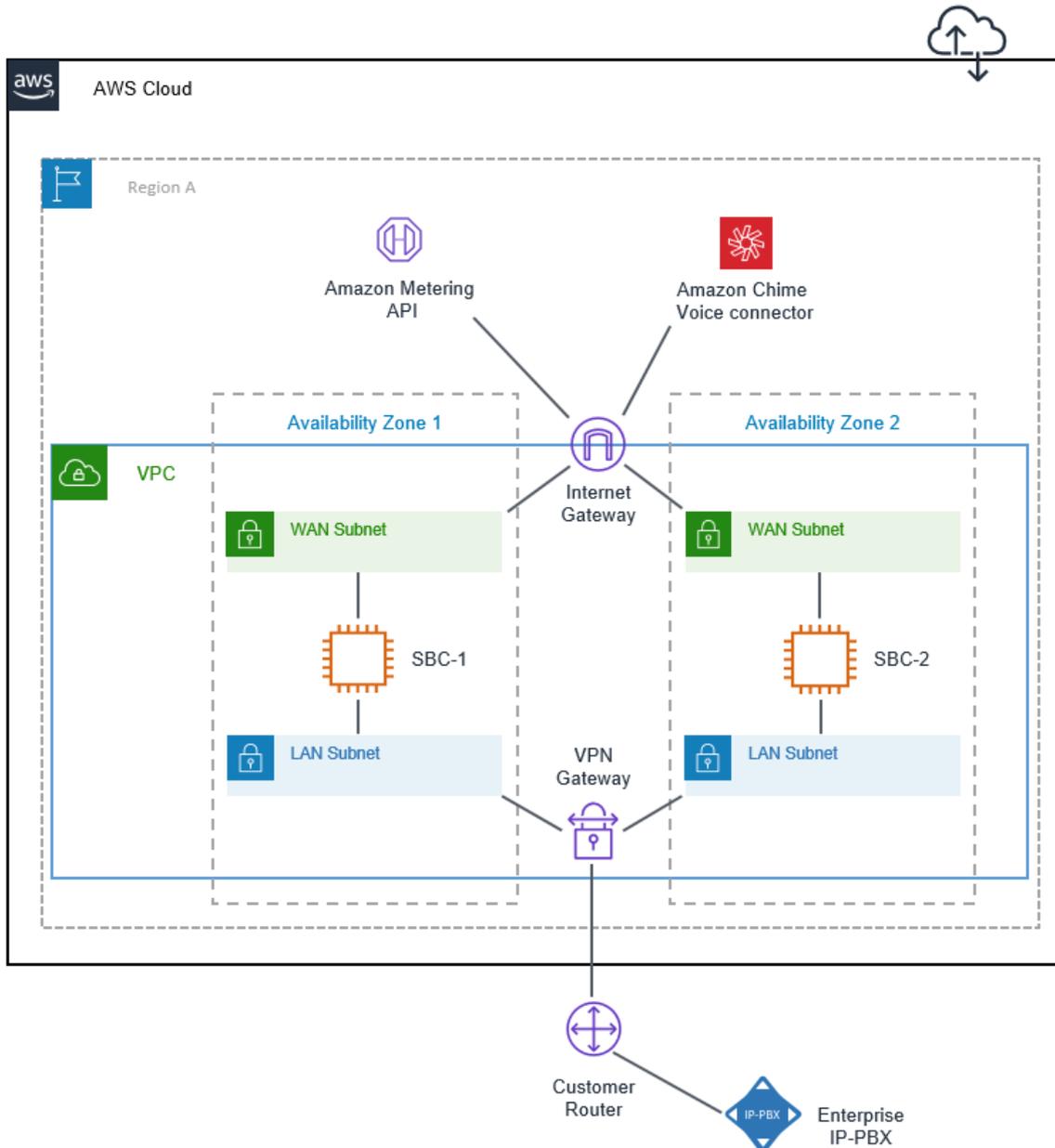
Table 2-2: Amazon Chime Voice Connector Version

<b>Vendor/Service Provider</b>	Amazon Chime
<b>Protocol</b>	SIP
<b>Additional Notes</b>	None

## 2.3 Deployment Topology

This document describes deployment using the following topology:

**Figure 2-1: Deployment Topology**



The SBC is deployed in AWS from the "Mediant VE Session Border Controller (SBC) – PAYG" Marketplace offer. This offer includes pay-as-you-go license that enables Customers to use SBC as much as needed and pay for actual service consumed via their AWS account billing.

Two separate subnets are used—WAN and LAN—to communicate with Amazon Chime Voice Connector and the Enterprise IP-PBX, respectively. Communication with the Enterprise IP-PBX may be performed using private IP addresses (over VPN or Direct Connect, as shown in the figure above) or public IP addresses. Communication with Amazon Chime Voice Connector is always performed using public IP addresses.

The LAN subnet is also used for accessing the management interface (Web or CLI) of the deployed SBC instance.

Two SBC instances may be deployed in different Availability Zones for improved solution reliability.

## 3 Prerequisites

Prior to deploying the SBC instance, make sure that you meet the following prerequisites:

- You have an AWS account. If you don't have an AWS account, you can sign up for one on Amazon's website at <http://aws.amazon.com/>.
- You have created LAN and WAN subnets needed for SBC deployment. Note that these subnets must reside in the same Availability Zone.

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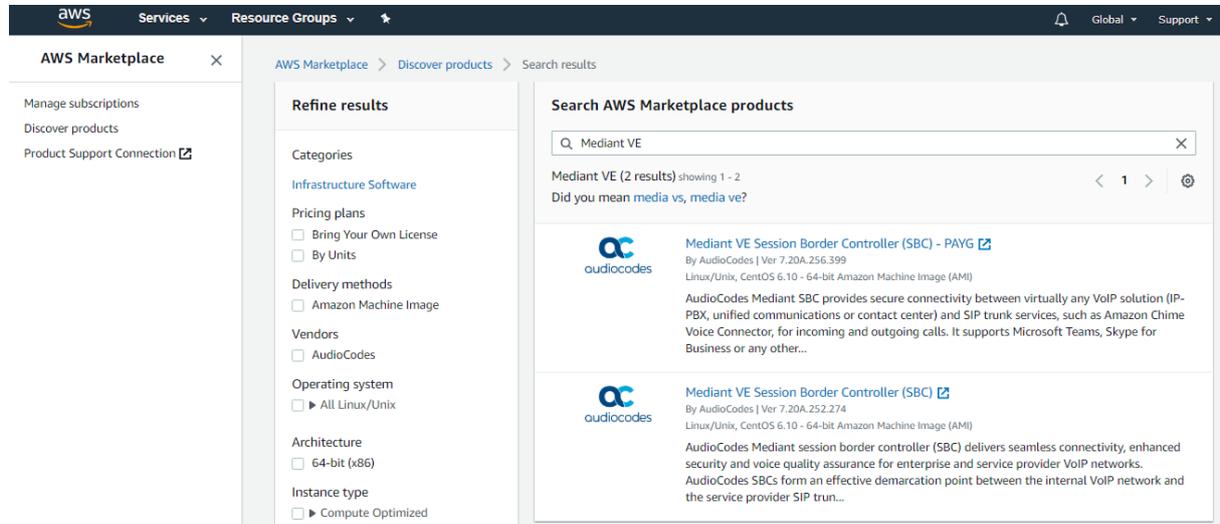
## 4 Deploying the SBC Instance

This section describes how to deploy the SBC instance.

➤ **To deploy SBC instance:**

1. Open the AWS Marketplace console at <https://console.aws.amazon.com/marketplace>.
2. In the **Discover Products** tab, search for the "Mediant VE" product.

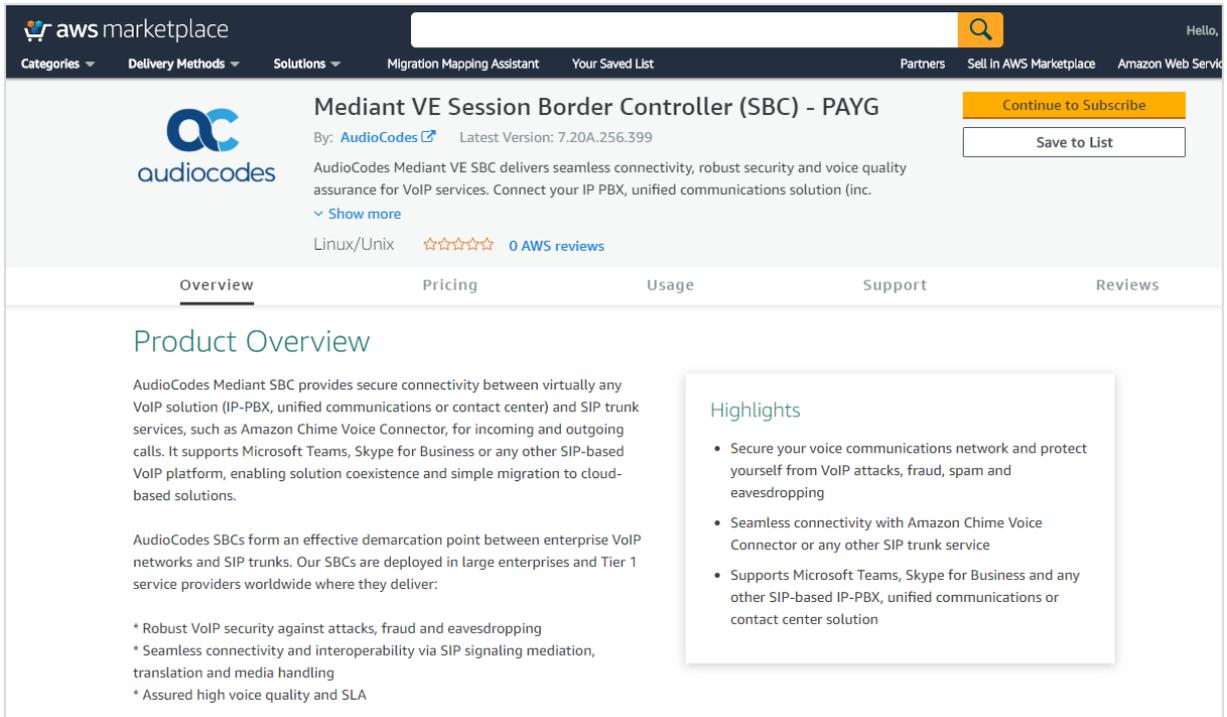
**Figure 4-1: Searching for Mediant VE Product in AWS Marketplace**



3. Two products are displayed:
  - "Mediant VE Session Border Controller (SBC)": This product includes a trial license (limited by 3 sessions) and requires purchase of production license from AudioCodes.
  - "Mediant VE Session Border Controller (SBC) – PAYG": This product includes a pay-as-you-go license that enables Customers to use the SBC as much as needed and pay for the actual service consumed via their AWS account billing.

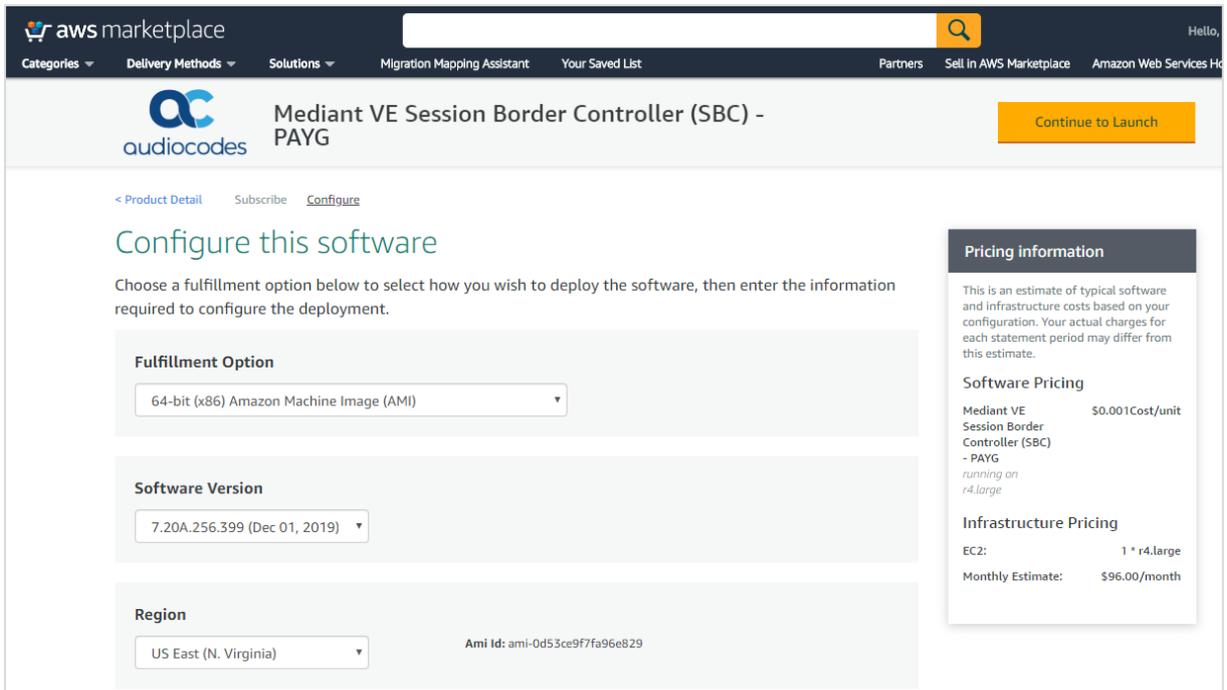
- Choose the Mediant VE product that matches your licensing needs. For example, choose **Mediant VE Session Border Controller (SBC) – PAYG** product.

**Figure 4-2: Mediant VE Product Page in AWS Marketplace**



- Click **Continue to Subscribe** to subscribe to the Mediant VE SBC – PAYG product.
- Click **Continue to Configuration** to proceed with SBC deployment.

**Figure 4-3: Mediant VE Configuration Page in AWS Marketplace**



7. Choose the Region where you want to launch the SBC.



**Note:** For the **Mediant VE SBC – PAYG** product support is currently provided for installations in US regions only. For support in other regions, please contact us at <https://online.audiocodes.com/aws-support-cloud>.

8. Click **Continue to Launch**.

**Figure 4-4: Mediant VE Launch Page in AWS Marketplace**

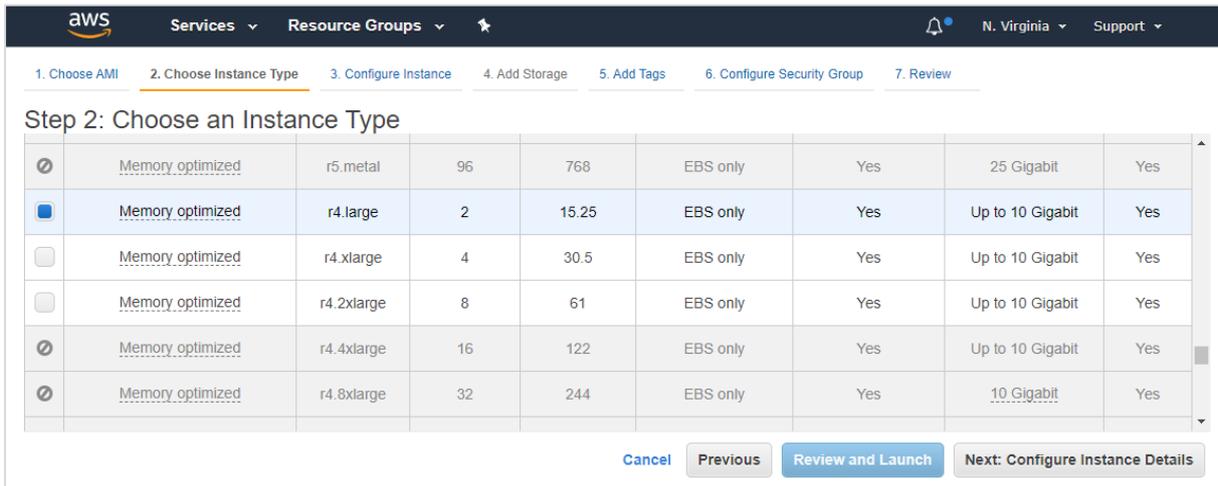
The screenshot displays the AWS Marketplace interface for the Mediant VE Session Border Controller (SBC). The page title is "Mediant VE Session Border Controller (SBC)" and the Audiocodes logo is visible. The navigation bar includes "Categories", "Delivery Methods", "Solutions", "Migration Mapping Assistant", "Your Saved List", "Partners", and "Sell in AWS Marketplace". The main content area has a breadcrumb trail: "< Product Detail", "Subscribe", "Configure", and "Launch". The heading "Launch this software" is followed by the instruction "Review your configuration and choose how you wish to launch the software." Below this, the "Configuration Details" section lists:

Fulfillment Option	64-bit (x86) Amazon Machine Image (AMI) Mediant VE Session Border Controller (SBC) <i>running on r4.large</i>
Software Version	7.20A.252.274
Region	US East (N. Virginia)

A "Usage Instructions" button is located below the configuration details. The "Choose Action" section features a dropdown menu with "Launch through EC2" selected. A note next to the dropdown reads: "Choose this action to launch your configuration through the Amazon EC2 console." A prominent orange "Launch" button is positioned at the bottom right of the configuration area.

9. From the 'Choose Action' drop-down list, select **Launch through EC2**, and then click **Launch**; the Choose Instance Type page appears:

Figure 4-5: Choose Instance Type Page



10. Choose the instance type as follows:

- If the Enterprise IP-PBX supports the G.711 U-law coder, choose the **r4.large** instance type. This instance type is recommended for deployments that do not require transcoding and/or other DSP capabilities.
- Otherwise, choose the **c4.2xlarge** instance type. This instance type is recommended for deployments that require transcoding and/or other DSP capabilities.

Refer to the *SBC Series Release Notes* for a complete list of instance types supported by Mediant VE SBC, their capacities and capabilities.

11. Click **Next**; the Configure Instance page appears:

Figure 4-6: Configure Instance Page

**Step 3: Configure Instance Details**  
Configure the instance to suit your requirements. You can launch multiple instances from the same AMI, request Spot instances to take advantage of the lower pricing, assign an access management role to the instance, and more.

**Number of instances**  [Launch into Auto Scaling Group](#)

**Purchasing option**  Request Spot instances

**Network**  [Create new VPC](#)

**Subnet**  [Create new subnet](#)  
4091 IP Addresses available

**Auto-assign Public IP**

**Placement group**  Add instance to placement group

**Capacity Reservation**  [Create new Capacity Reservation](#)

**IAM role**  Automatically create an IAM role with the required permission and the name below  
 Choose an existing IAM role from your account  
 [Create new IAM role manually](#)

**Shutdown behavior**

**Enable termination protection**  Protect against accidental termination

**Monitoring**  Enable CloudWatch detailed monitoring  
[Additional charges apply.](#)

**Tenancy**   
Additional charges will apply for dedicated tenancy.

[Cancel](#) [Previous](#) [Review and Launch](#) [Next: Add Storage](#)

## 12. Configure network devices and IP addresses:

- For **Network**, select the VPC where SBC should be deployed.
- For **Subnet**, select the LAN Subnet. This subnet is used to communicate with the Enterprise IP-PBX and for accessing the SBC management interface (Web or CLI).
- For **IAM role**:
  - ◆ If you are deploying the **Mediant VE SBC – PAYG** product, select 'Automatically create an IAM role with the required permission and the name below', and then enter the IAM role name (e.g., "metering-role").
  - ◆ If you are deploying the **Mediant VE SBC** product, leave the IAM role empty.



**Note:** The **Mediant VE SBC – PAYG** product requires an IAM role with the following policy:

```
{
  "Version": "2012-10-17",
  "Statement": [
    {
      "Action": [
        aws-marketplace:MeterUsage
      ],
      "Effect": "Allow",
      "Resource": "*"
    }
  ]
}
```

This role allows the Mediant VE SBC PAYG instance to communicate with the AWS Metering API and must be assigned to the launched instance – either automatically (as described above) or manually.

- In the **Network Interfaces** section located at the bottom of the page, click **Add Device**, and then select the WAN Subnet for the **eth1** device. This subnet is used to communicate with Amazon Chime Voice Connector.



**Note:** Because you are creating multiple network devices, AWS EC2 console doesn't automatically allocate public IP addresses for the instance. These should be assigned manually as described below.

13. Click **Next**; the Add Storage page appears:

**Figure 4-7: Add Storage Page**

14. From the 'Volume Type' drop-down list, select the required volume of the instance. This setting does not affect SBC performance and may be set to any value.

15. Click **Next**; the Tag Instance page appears:

**Figure 4-8: Tag Instance Page**

16. In the 'Value' field, enter a name for your instance, and then click **Next**; the Configure Security Group page appears:

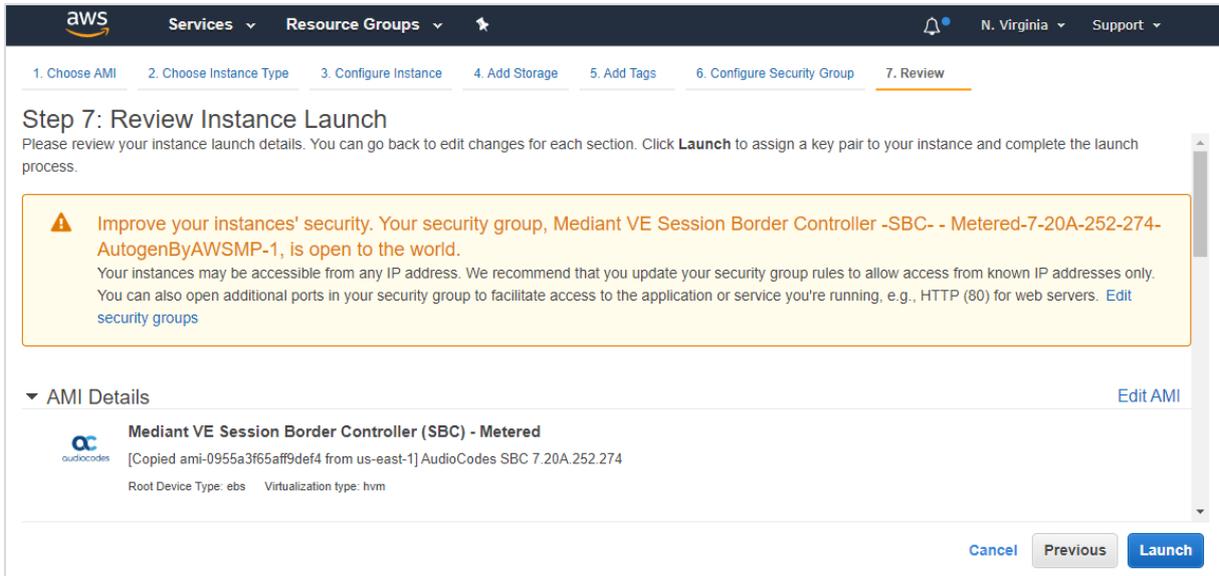
**Figure 4-9: Configure Security Group Page**

Type	Protocol	Port Range	Source	Description
SSH	TCP	22	Custom 0.0.0.0/0	e.g. SSH for Admin Desktop
HTTP	TCP	80	Custom 0.0.0.0/0	e.g. SSH for Admin Desktop
HTTPS	TCP	443	Custom 0.0.0.0/0	e.g. SSH for Admin Desktop
Custom UDP	UDP	5060 - 5080	Custom 0.0.0.0/0	e.g. SSH for Admin Desktop
Custom TCP	TCP	5060 - 5080	Custom 0.0.0.0/0	e.g. SSH for Admin Desktop
Custom UDP	UDP	6000 - 65535	Custom 0.0.0.0/0	e.g. SSH for Admin Desktop

17. Configure firewall rules to allow management (SSH, HTTP, and HTTPS), signaling (SIP) and media (RTP/RTCP) traffic with your instance. Use default rules as a starting point and modify them to match your actual deployment needs.

18. Click **Review and Launch**; the Review page appears displaying a summary of your instance configuration:

**Figure 4-10: Review Page**



19. Click **Launch**; the Select an existing key pair window appears.
20. Select a key pair to authenticate SSH connection with the SBC instance, click the **I acknowledge** check box, and then click **Launch Instances**.
21. Proceed to the next step to assign Elastic IPs to the launched SBC instance

## 4.1 Assigning Elastic IP Addresses to SBC Instance

The AWS EC2 environment assigns "private" IP addresses to the instances running in it. These addresses may be used for communication between the instances running inside the same network (VPC); however, they may not be used to connect to the instance over the Internet.

If the instance has only one network device, AWS EC2 may automatically assign a public IP address to it. The exact behavior depends on the VPC and/or Subnet configuration. This address however is taken from a "shared pool" and changes if you stop/start the instance. Therefore, it is not very useful for production environment.

To make SBC properly reachable over the Internet, you must allocate Elastic IP addresses and assign them to your instance. Multiple Elastic IP addresses may be assigned to the same AWS EC2 instance, depending on the number of configured private IP addresses.

When an Elastic IP address is associated with the specific instance's private IP address, AWS EC2 environment performs NAT translation by converting the Elastic IP address to the private IP address, while preserving the port range. If the SBC needs to communicate with a SIP entity using the Elastic IP address, the latter must be configured in the NAT Translation table to ensure proper modification of SIP / SDP messages for NAT traversal.

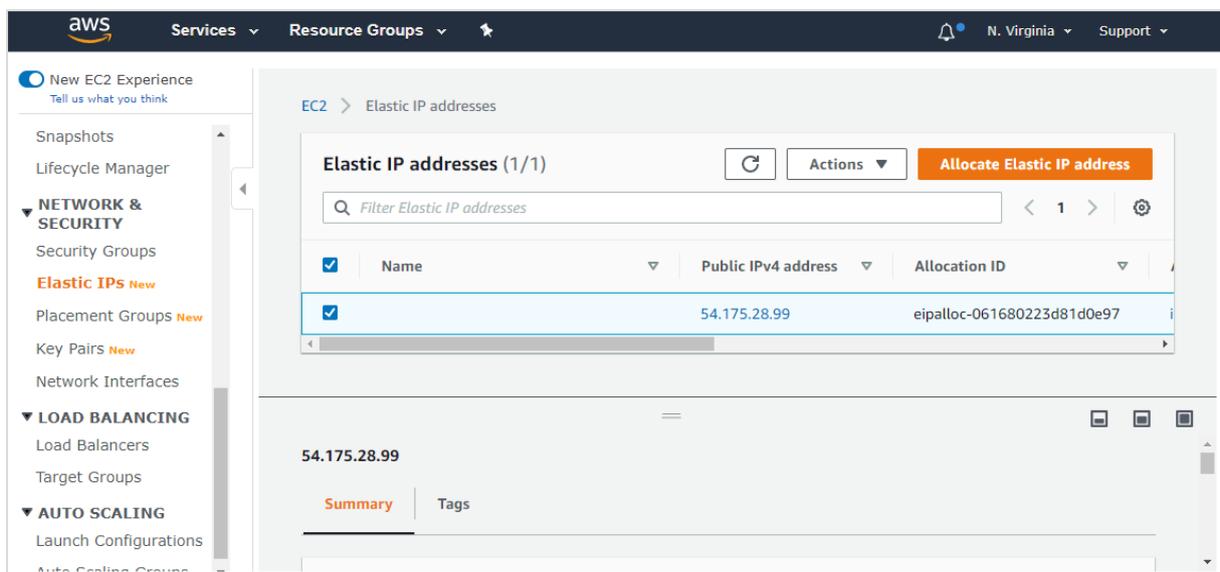
In the deployment topology shown in Figure 2-1, you need to assign Elastic IPs to the following SBC network interfaces:

- **eth1** – connected to the WAN Subnet
- (Optional) **eth0** – connected to the LAN Subnet. This is needed only if communication with the Enterprise IP-PBX is performed over the open Internet using public IP addresses or if you want to access the SBC management interface over the open Internet.

### ➤ To allocate an Elastic IP address to SBC instance:

1. Open the EC2 console at <https://console.aws.amazon.com/ec2>.
2. Navigate to **Elastic IPs** page under NETWORK & SECURITY.

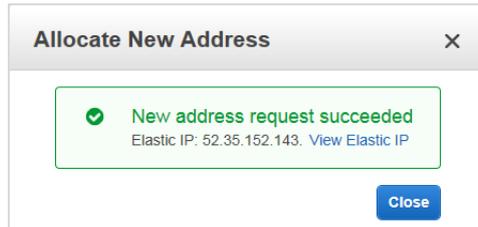
Figure 4-11: Elastic IPs Page



3. Click **Allocate Elastic IP address**; a message box appears requesting you to confirm.

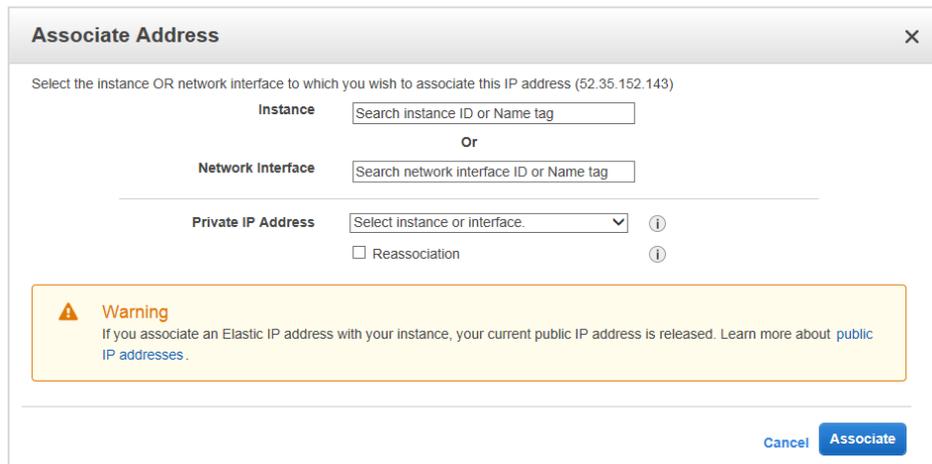
- Click **Yes, Allocate** to confirm; a message box appears displaying the allocated IP address:

**Figure 4-12: Allocated IP Address**



- Click **Close** to close the message box.
- From the 'Actions' drop-down list, select **Associate Address**.

**Figure 4-13: Associate Address Window**



- Select the instance or network interface and private IP address to which you want to associate the Elastic IP address, and then click **Associate**.
- If you have configured multiple IP addresses and want to make them reachable over the Internet as well, repeat the procedure for additional IP addresses.

## 5 Configuring Amazon Chime Voice Connector

This section describes how to configure Amazon Chime Voice Connector.

➤ **To configure Amazon Chime Voice Connector:**

1. Open the Amazon Chime console at <https://console.chime.aws.amazon.com/>.
2. Navigate to **Calling > Phone number management** screen.
3. Under the **Orders** tab, click **Provision phone numbers**.
4. Select **Voice Connector** product type.
5. Search phone numbers by location or area code. Once found, select the phone number, and then click **Provision**.

**Figure 5-1: Searching Phone Numbers**

**Provision phone numbers**

Step 2: Search by country and location to display available phone numbers. [Learn more about](#) [Learn more](#)

Country: United States +1 Area: Location California Search by city

<input type="checkbox"/>	Phone number
<input checked="" type="checkbox"/>	+17602550513
<input type="checkbox"/>	+17602550519
<input type="checkbox"/>	+14157121851
<input type="checkbox"/>	+18316094099
<input type="checkbox"/>	+17073617993

1 phone number selected

Cancel Previous Provision

6. Navigate to **Calling > Voice connectors** screen.
7. Click **Create new voice connector**.
8. Enter a name for the voice connector, select a region, enable encryption, and then click **Create**.

**Figure 5-2: Creating New Voice Connector**

**Create new voice connector**

Create an Amazon Chime Voice Connector to make phone calls using your existing SIP infrastructure. .

Voice connector name  
connector1

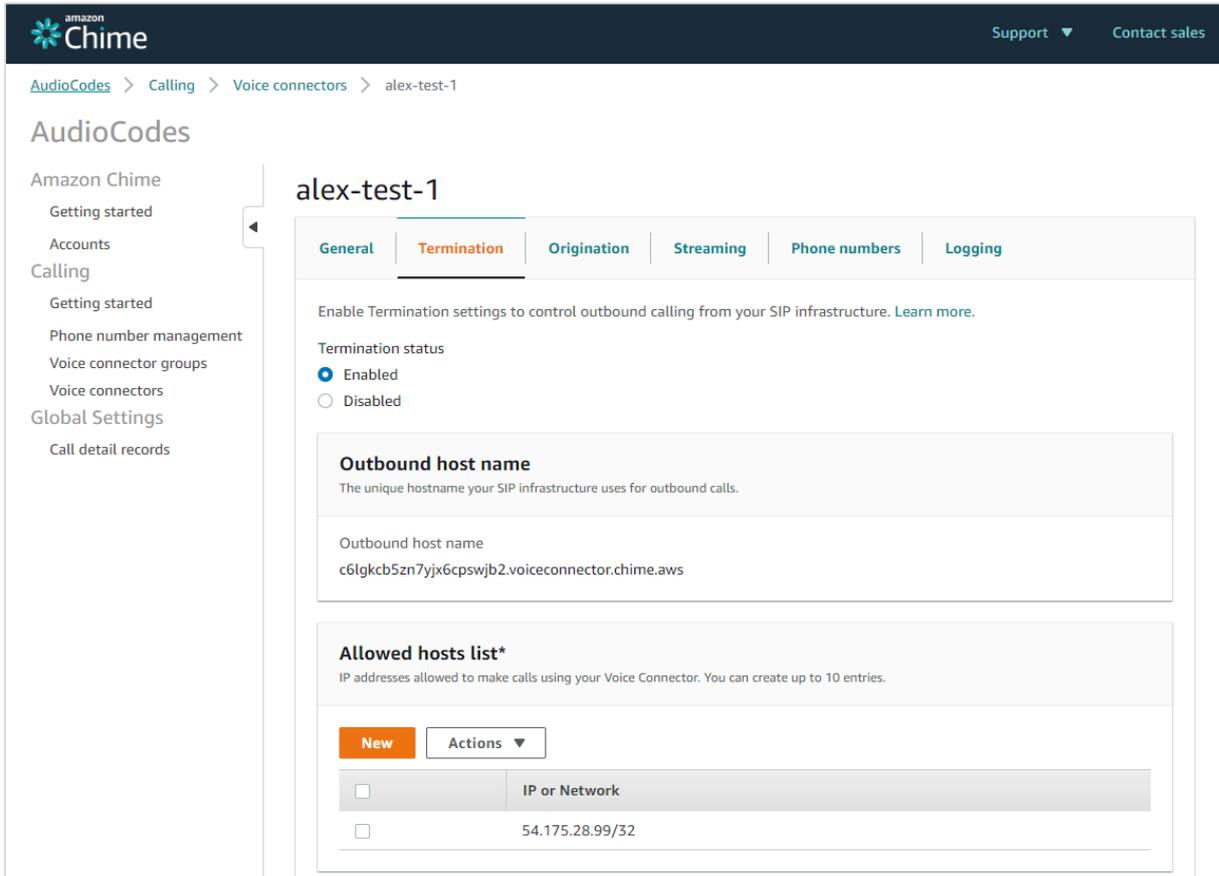
AWS region  
US East (N. Virginia)

Encryption  
 Enabled (Recommended)  
 Disabled

Cancel Create

9. Click the created Voice Connector.
10. Navigate to the **Termination** tab.
11. Change 'Termination status' to **Enabled**, and then write down the hostname displayed in the **Outbound host name** group. You will need it in the next step.
12. Under **Allowed hosts list**, click **New**, and then enter the Elastic IP address assigned to the 1<sup>st</sup> interface (eth0) of the deployed SBC instance (connected to the WAN subnet), followed by the prefix "/32".

**Figure 5-3: Configuring Termination Status and Allowed Hosts List**



13. Under **Calling plan**, select countries to which outbound calls will be allowed.

14. Under **Credentials**, click **New**, and then enter a username / password to authenticate SBC with Amazon Chime Voice Connector. Write down the credentials; you will need them in the next step.

**Figure 5-4: Configuring Calling Plan and Credentials**

The screenshot displays the configuration interface for Amazon Chime Voice Connector. It is divided into several sections:

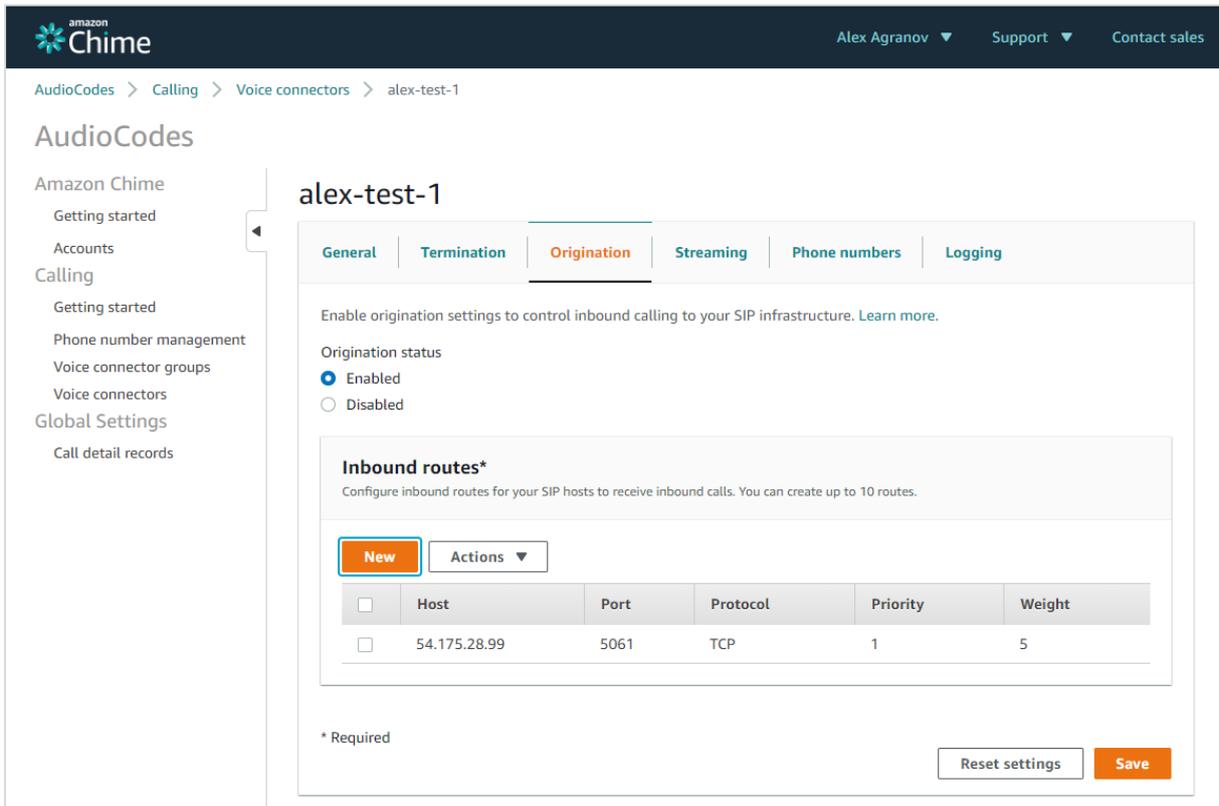
- Calling plan\***: A section with the subtitle "Allow outbound calls to selected countries." It features a "Countries" dropdown menu currently set to "United States of America" with a close button (X).
- Credentials (Recommended)**: A section with the subtitle "Create up to 10 SIP credentials to authenticate outbound calls. If no credentials are created, authentication will not be required." It includes "New" and "Delete" buttons. Below is a table with one entry:
 

<input type="checkbox"/>	Username
<input type="checkbox"/>	audc
- Caller ID override**: A section with the subtitle "The caller ID shown for calls from this Voice Connector without caller ID. Outbound calls without a valid E.164 phone number as caller ID are blocked." It shows "Phone number" as "Currently unselected" with "Edit" and "Delete" buttons.
- Last options ping**: A section with the subtitle "The last SIP OPTIONS message received from your SIP infrastructure, if any." It displays "Last OPTIONS ping" as "54.175.28.99 Feb 10, 2020 at 10:00 PM".

At the bottom right, there are "Reset settings" and "Save" buttons. A "\* Required" note is located at the bottom left of the configuration area.

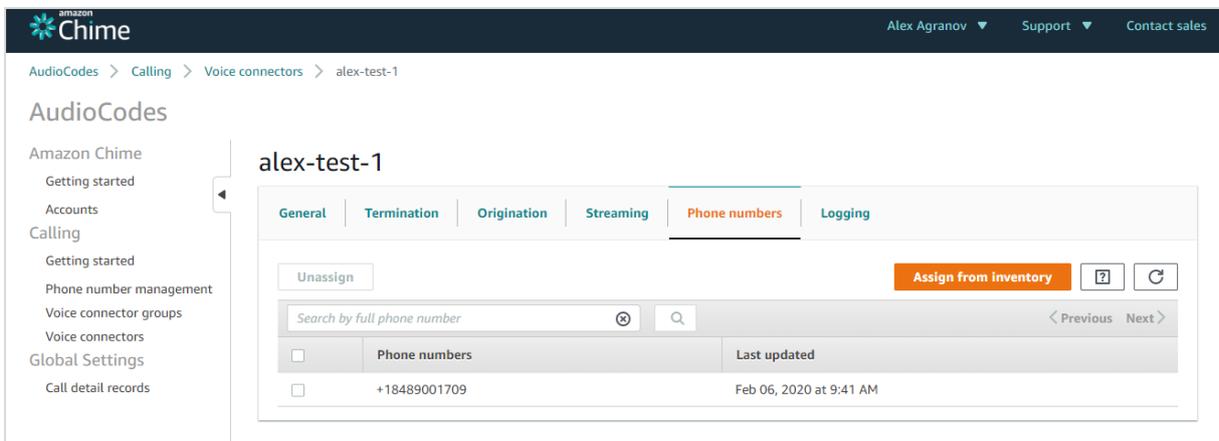
15. Click **Save** to save your settings.
16. Navigate to the **Origination** tab.
17. Change 'Origination status' to **Enabled**.
18. Under **Inbound routes**, click **New**, and then configure the following:
  - **Host**: Elastic IP address assigned to the 1<sup>st</sup> interface (eth0) of the deployed SBC instance (connected to WAN subnet)
  - **Port**: 5061
  - **Protocol**: TCP
  - **Priority**: 1
  - **Weight**: 5

Figure 5-5: Configuring Origination Status



19. Click **Save** to save your settings.
20. Navigate to the **Phone numbers** tab.
21. Click **Assign from inventory**.
22. Select the phone number that you provisioned in the previous steps, and then click **Assign**. Write down the assigned phone number; you will need it in the next step.

Figure 5-6: Configuring Phone Numbers



## 6 Configuring the SBC

This section consists of two parts:

- Section 6.1 describes configuration of interoperability between the Enterprise IP-PBX and Amazon Chime Voice Connector.
- Section 6.2 describes configuration of the metering license for the **Mediant VE SBC – PAYG** product

### 6.1 Configuring Interop between Enterprise IP-PBX and Amazon Chime Voice Connector

This section describes how to configure the SBC to enable connectivity between the Enterprise IP-PBX and Amazon Chime Voice Connector. The SBC Wizard interface is used because it simplifies configuration and leverages the interoperability database, which supports a wide variety of IP-PBX flavors.

#### ➤ To configure SBC:

1. Open the SBC Web interface.



#### Note:

- After deployment, the SBC Web interface is accessible via the 1<sup>st</sup> network interface (eth0) which is connected to the LAN subnet.
- If you assigned an Elastic IP address to the 1<sup>st</sup> network interface (eth0), you may use it to access the Web interface. Otherwise, you'll need to use the private IP address of the 1<sup>st</sup> network interface (eth0).

2. Log in using the following default credentials:
  - Username: **Admin**
  - Password: Instance ID of the launched instance (e.g. "i-0f526bc135adc65a8")
3. On the toolbar, click **Actions**, and then choose **Configuration Wizard**; the SBC Configuration Wizard welcome page appears.

**Figure 6-1: Opening SBC Configuration Wizard**

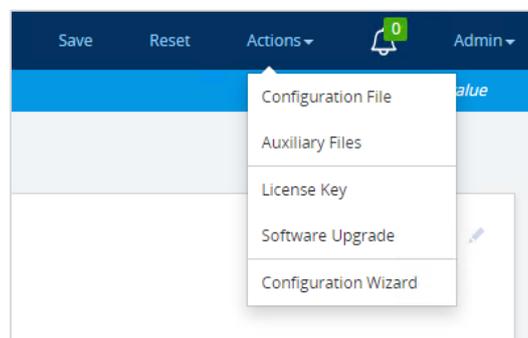
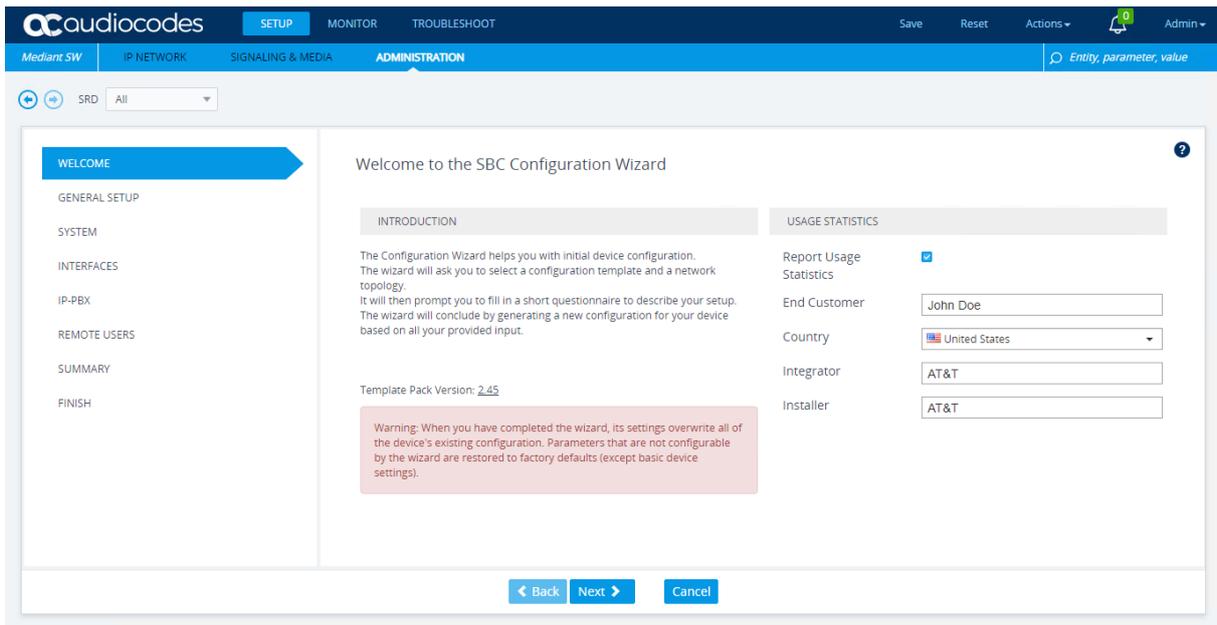
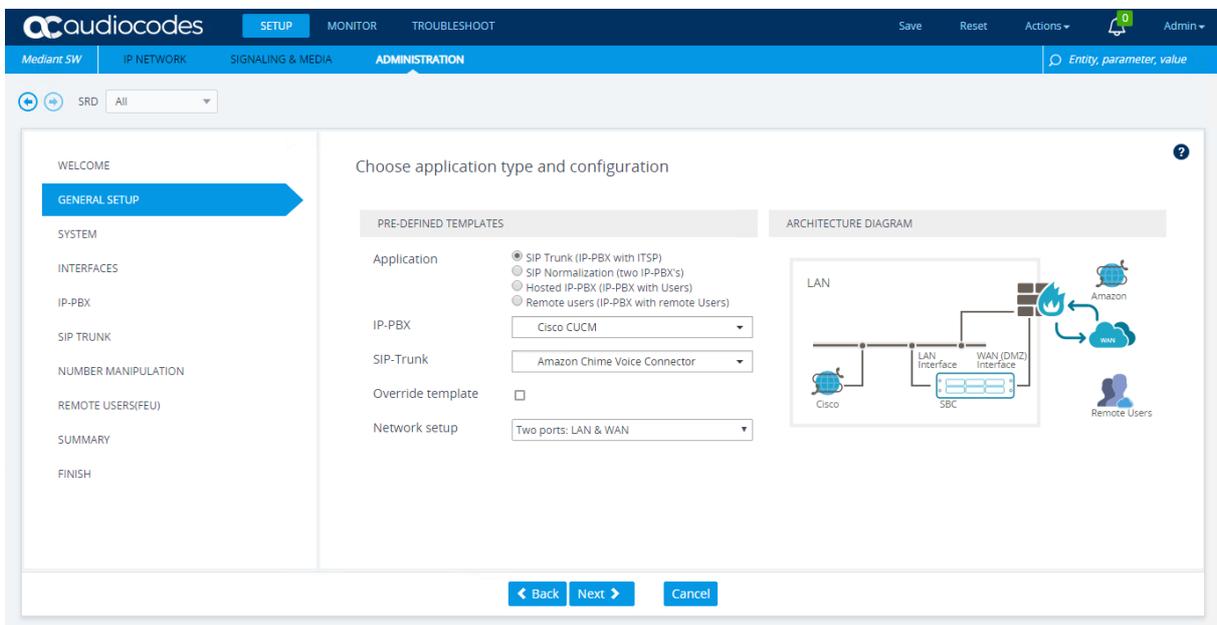


Figure 6-2: SBC Configuration Wizard Welcome Page



4. Fill in the information for usage statistics, and then click **Next**; the General Setup wizard page appears:

Figure 6-3: General Setup Wizard Page



5. Configure the general parameters as follows:
  - For 'Application', select **SIP Trunk (IP-PBX with ITSP)**.
  - For 'IP-PBX', select your Enterprise IP-PBX flavor. If not listed, select **Generic IP-PBX**.
  - For 'SIP Trunk', select **Amazon Chime Voice Connector**.
  - For 'Network Setup', select **Two ports: LAN & WAN**.

- Click **Next**; the System Parameters wizard page appears:

**Figure 6-4: System Parameters Wizard Page**

- Configure system parameters as follows:
  - For 'Time Zone', enter the time zone where the SBC is deployed.
  - For 'Primary NTP Server', enter **169.254.169.123**, which is the IP address of the Amazon Time Sync service.
- Click **Next**; the Network Interfaces wizard page appears:

**Figure 6-5: Network Interfaces Wizard Page**

- In the WAN INTERFACE > 'NAT Public IP' field, enter the Elastic IP address assigned to the 2<sup>nd</sup> SBC interface (eth1).



**Note:** If you want SBC to communicate with the Enterprise IP-PBX using public IP addresses (over the Internet), you need to manually configure NAT Translation on the 1<sup>st</sup> SBC interface (eth0) in the NAT Translation table (Setup > IP Network > Core Entities) after the SBC Configuration Wizard finishes.

10. Click **Next**; the IP-PBX Configuration wizard page appears:

**Figure 6-6: IP-PBX Configuration Wizard Page**

The screenshot shows the 'IP-PBX configuration' wizard page. On the left is a navigation menu with options: WELCOME, GENERAL SETUP, SYSTEM, INTERFACES, **IP-PBX** (highlighted), SIP TRUNK, NUMBER MANIPULATION, SUMMARY, and FINISH. The main content area is titled 'IP-PBX configuration' and contains the following sections:

- NETWORK INTERFACE:** Network Type is set to 'LAN'.
- IP-PBX:** Address is '10.15.28.101', Backup Address is '0.0.0.0 or domain.com', SIP Domain is '0.0.0.0 or domain.com', and Keep Alive is checked.
- SIP INTERFACE:** Transport Type is 'TCP', Destination Port is '5060', and Listening Port is '5060'.
- MEDIA PORTS (REALM):** Media Protocol is 'RTP', Base Port is '6000', and Number Of Sessions is '100'.

At the bottom of the form are three buttons: '< Back', 'Next >', and 'Cancel'.

11. Configure the IP-PBX parameters as follows:

- For 'Address', enter the IP address or hostname of the Enterprise IP-PBX.
- Verify that the other parameters match your Enterprise IP-PBX configuration and adjust them as needed.

12. Click **Next**; the SIP Trunk Configuration wizard page appears:

Figure 6-7: SIP Trunk Configuration Wizard Page

The screenshot shows the 'SIP Trunk configuration' wizard page. The left sidebar lists navigation steps: WELCOME, GENERAL SETUP, SYSTEM, INTERFACES, IP-PBX, **SIP TRUNK**, NUMBER MANIPULATION, SUMMARY, and FINISH. The main content area is divided into several sections:

- NETWORK INTERFACE:** Network Type: WAN
- NAT:** NAT Public IP: (empty)
- SIP TRUNK:** Address: c6lgkcb5zn7yjk6cpswjb2.voiceconnector.c; Backup Address: 0.0.0.0 or domain.com; SIP Domain: 0.0.0.0 or domain.com; Keep Alive:
- SIP INTERFACE:** Transport Type: TLS; Destination Port: 5061; Listening Port: 5061
- SIP ACCOUNT:** Account Type: Authentication; Trunk Main Line: +18489001234; Username: audc; Password: .....
- MEDIA PORTS (REALM):** Media Protocol: SRTP; Base Port: 7000; Number Of Sessions: 100

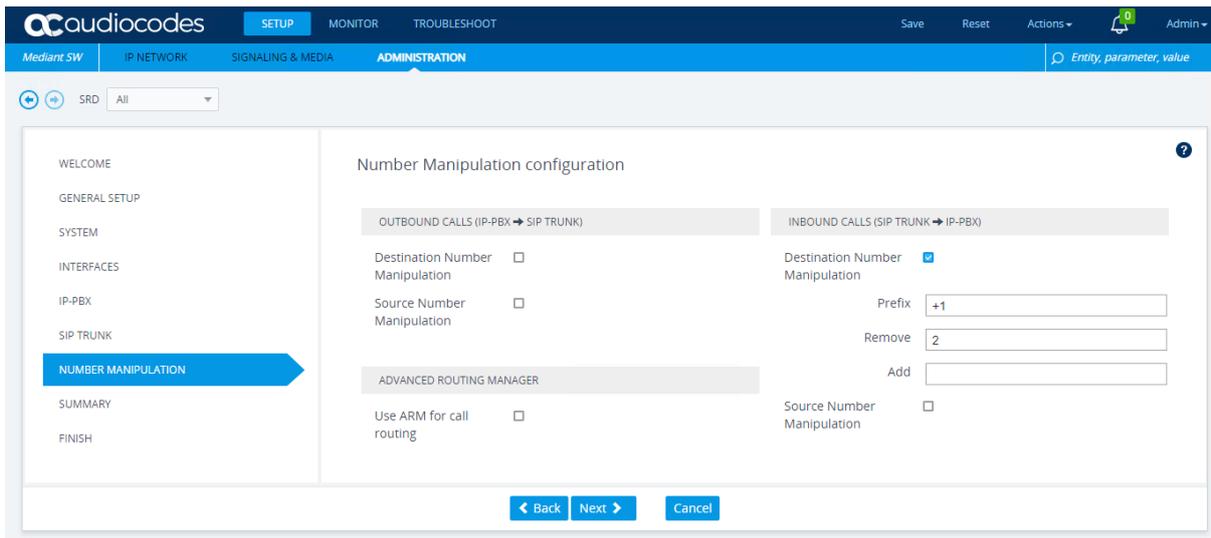
At the bottom, there are buttons for '< Back', 'Next >', and 'Cancel'.

**13.** Configure the SIP Trunk parameters as follows:

- For 'Address', enter the **Outbound host name** of your Amazon Chime Voice Connector.
- For 'Trunk Main Line', enter the phone number that is assigned to your Amazon Chime Voice Connector.
- The 'Transport Type' and 'Media Protocol' settings depend if encryption is enabled or disabled for Amazon Chime Voice Connector:
  - ◆ **Encryption enabled:**
    - 'Transport Type': **TLS**
    - 'Media Protocol': **SRTP**
  - ◆ **Encryption disabled:**
    - 'Transport Type': **TCP**
    - 'Media Protocol': **RTP**
- The 'Account Type', 'Username' and 'Password' settings depend if credentials are configured for Amazon Chime Voice Connector:
  - ◆ **Credentials configured:**
    - 'Account Type': **Authentication**
    - 'Username': enter configured username
    - 'Password': enter configured password
  - ◆ **Credentials not used:**
    - 'Account Type': **None**
    - 'Username' and 'Password': leave empty

**14.** Click **Next**; the Number Manipulation wizard page appears:

Figure 6-8: Number Manipulation Wizard Page



15. Configure number manipulation for inbound and outbound calls. The wizard allows you to configure basic number manipulation rules for source and destination numbers:
  - 'Prefix': Defines the number prefix for which manipulation is applied.
  - 'Remove': Defines the number of digits (or characters) to remove from the left of the number.
  - 'Add': Defines new digits to add to the left of the number.

Note that Amazon Chime Voice Connector uses the international number format, including the "+" sign and country code (e.g., +18489001709). If your IP-PBX uses a different number format, you must configure number manipulation for both inbound and outbound calls.

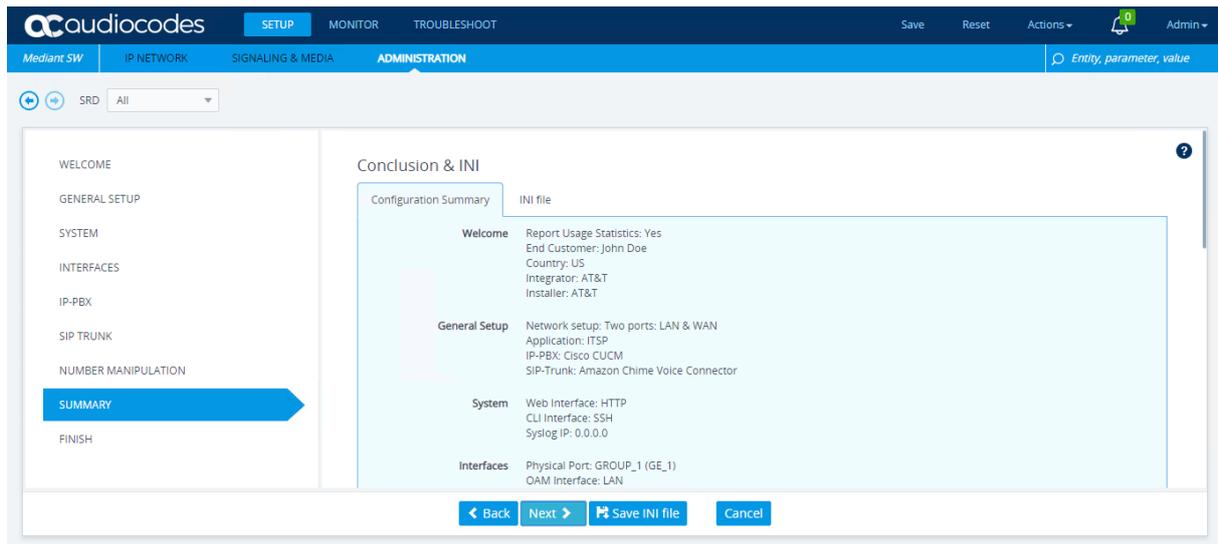
For example:

- The rule — 'Prefix': +1, 'Remove': 2, 'Add': <empty> — converts international US numbers into a national format. For example, it changes +18489001709 to 8489001709.
- The rule — 'Prefix': 00, 'Remove': 2, 'Add': + — replaces the prefix 00 with +. For example, it changes 008489001709 to +18489001709.
- The rule — 'Prefix': \*, 'Remove': 0, 'Add': +1848900 — assumes that all IP-PBX numbers are 4 digits and converts them into an international US format. For example, it changes 1709 to +18489001709.

Additional manipulation rules may be defined through the regular SBC Web interface after you have completed initial SBC configuration.

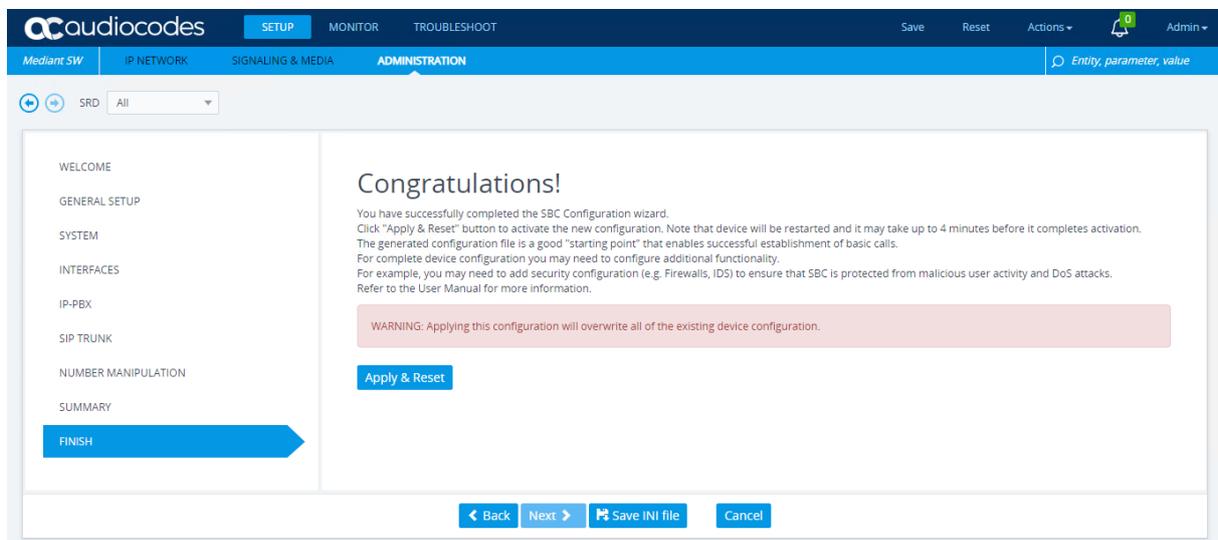
16. Click **Next**; the Summary wizard page appears:

Figure 6-9: Summary Wizard Page



17. Review the configuration summary, and then click **Next**; the Finish wizard page appears:

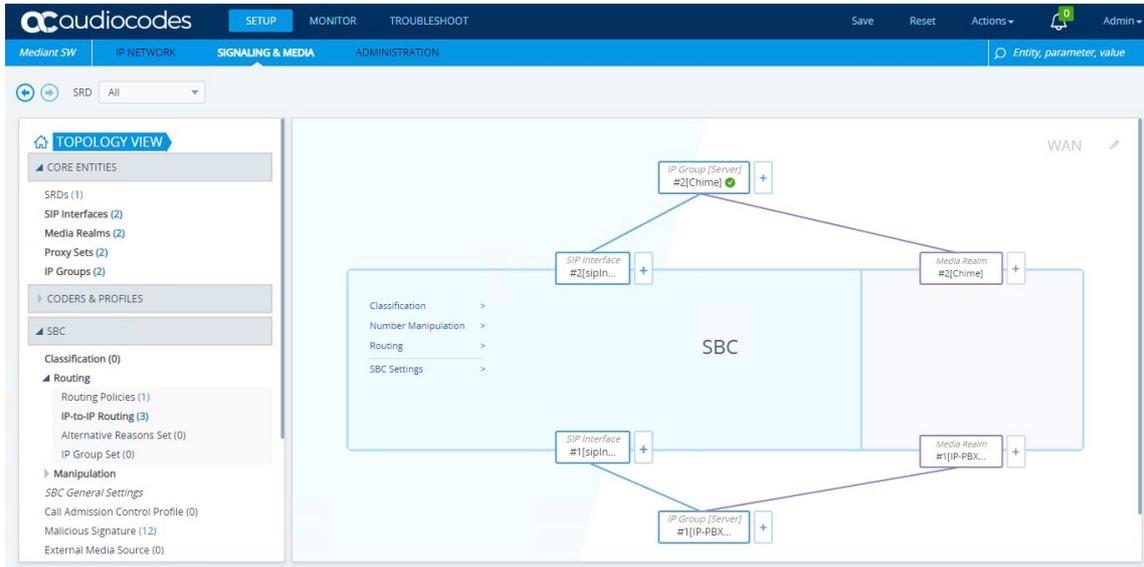
Figure 6-10: Finish Wizard Page



18. Click **Apply & Reset** to apply the configuration. This may take about four minutes to complete.

19. After the SBC completes its reset, you are redirected to the Web Login page. Log in using the default credentials.
20. Review the SBC configuration:
  - In the TOPOLOGY VIEW page, verify that two IP Groups, representing Amazon Chime Voice Connector and the Enterprise IP-PBX were created.
  - Verify that IP Group #2, which represents Amazon Chime Voice Connector, is displayed with a check mark indicating that the SBC has successfully connected to it.
  - Verify that CORE ENTITIES and SBC sections in the configuration menu have no red dots (indicating entities with invalid configuration).

Figure 6-11: Topology View Page



## 6.2 Configuring Metering License for Mediant VE SBC – PAYG Product

The "Mediant VE SBC – PAYG" product includes a pay-as-you-go (PAYG) license that requires a persistent connection between the SBC and the AWS Metering API. This connection is performed using public IP addresses via the network interface that is configured as described below.

This configuration is very important, as without it the SBC will be unable to communicate with the AWS Metering API and will seize its service. The PAYG license also requires that the correct system time is configured on the SBC. Therefore, it's important that you verify it as well, as described below.



**Note:** This section is applicable only to the "Mediant VE SBC – PAYG" product that uses pay-as-you-go (PAYG) license. If you deployed the "Mediant VE SBC" product that requires a production license purchased from AudioCodes, skip to the next section.

➤ **To configure SBC:**

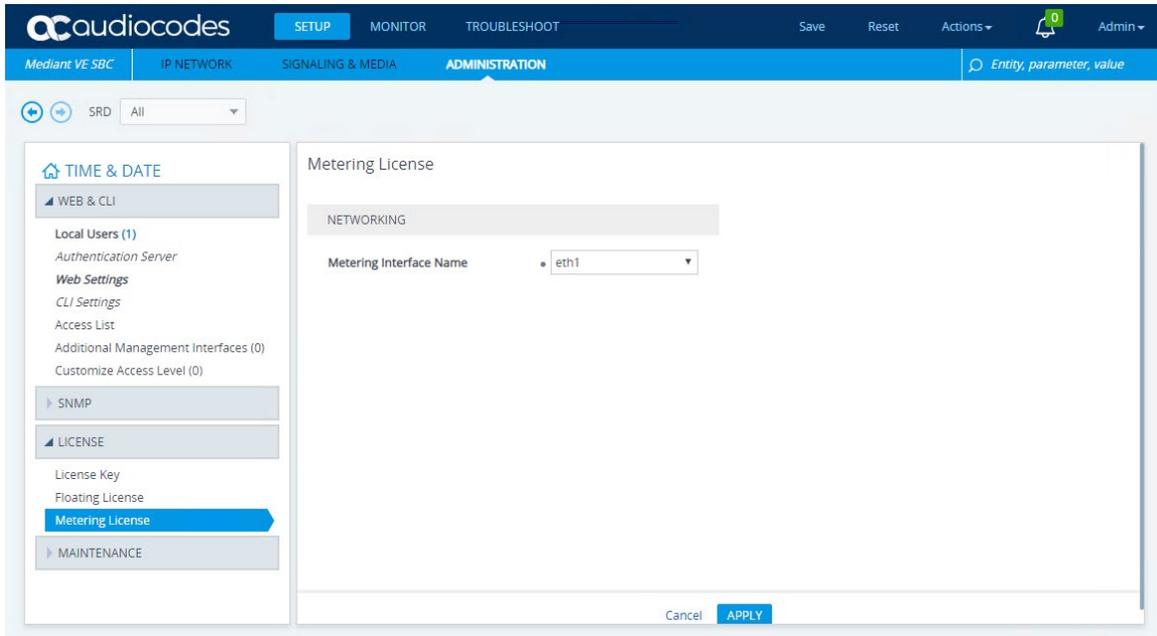
1. Navigate to the Time & Date page (**ADMINISTRATION > TIME & DATE**).

**Figure 6-12: Time & Date Page**

The screenshot displays the 'Time & Date' configuration page in the AudioCodes Mediant VE SBC administration interface. The interface includes a top navigation bar with 'SETUP', 'MONITOR', and 'TROUBLESHOOT' tabs, and a sub-navigation bar with 'IP NETWORK', 'SIGNALING & MEDIA', and 'ADMINISTRATION' tabs. The 'ADMINISTRATION' tab is active, and the 'TIME & DATE' page is selected. The page is divided into three main sections: LOCAL TIME, NTP SERVER, and TIME ZONE. The LOCAL TIME section shows a date of 2020-2-19 11:35:43. The NTP SERVER section has 'Enable NTP' set to 'Enable' and a primary NTP server address of 169.254.169.123. The TIME ZONE section shows a UTC time of 19 Feb, 2020 09:35:43 and a UTC offset of 2 hours. The page also includes a left sidebar with navigation options like 'WEB & CLI', 'SNMP', 'LICENSE', and 'MAINTENANCE', and a bottom 'APPLY' button.

2. Verify that the 'Local Time' field displays the correct value that matches the configured time zone. If not, modify the parameters under the NTP SERVER and TIME ZONE groups.
3. Navigate to the Metering License page (**ADMINISTRATION > LICENSE > Metering License**).

**Figure 6-13: Metering License Page**



4. From the 'Metering Interface Name' drop-down list, select the network interface that is associated with the Elastic IP address. In the deployment topology described in Figure 2-1: Deployment Topology, this is **eth1**.
5. Click **Apply** to apply your settings.
6. On the toolbar, click **Save** to save your settings.

## 7 Configuring the Enterprise IP-PBX

Refer to the configuration manual of your Enterprise IP-PBX for detailed instructions on how to connect it to the SBC. Configuration on the Enterprise IP-PBX depends on the IP-PBX flavor, but typically it includes the following steps:

1. Create a **SIP Trunk** that represents the SBC.
  - Configure the **destination address** as the IP address of the 1<sup>st</sup> SBC network interface (eth0).
    - ♦ If you want the Enterprise IP-PBX to communicate with the SBC using private IP addresses (over VPN or Direct Connect), use the private IP address of the 1<sup>st</sup> SBC network interface (eth0).
    - ♦ If you want the Enterprise IP-PBX to communicate with the SBC using public IP addresses (over the Internet), use the Elastic IP address assigned to the 1<sup>st</sup> SBC network interface (eth0).
  - Configure the **destination port** to match the SBC listening port (configured on the IP-PBX Configuration wizard page of the SBC Configuration Wizard).
  - Configure the **protocol** to match the SBC transport type (configured on the IP-PBX Configuration wizard page of the SBC Configuration Wizard).
2. Create a **route** to the SBC:
  - Configure the **route pattern** (e.g., "+1XXXXXXXXXX").
  - Configure the **route destination** as the **SIP Trunk** that represents the SBC.

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## 8 Deploying a Second SBC Instance for Improved Reliability

After successfully completing deployment and configuration of the first SBC instance, you can improve your solution reliability by deploying a second SBC instance in a different Availability Zone, as show in Figure 2-1: Deployment Topology.

➤ **To deploy a second SBC instance:**

1. Deploy the second SBC instance, as described in Deploying the SBC Instance on page 13. Use different LAN and WAN subnets that reside in a different Availability Zone of the same VPC.
2. Configure the second SBC instance, as described in Configuring the SBC on page 27.
3. In the Amazon Chime Voice Connector settings:
  - Add the second SBC instance to the list of allowed hosts in **Termination** tab > **Allowed hosts list** (see Step 12 in Section Configuring Amazon Chime Voice Connector).
  - Add the second SBC instance to the inbound routes in **Origination** tab > **Inbound routes** (see Section Configuring Amazon Chime Voice Connector). Use priority and weight to create active/active or active/standby SBC deployment.
  - Amazon Chime Voice Connector routes calls first according to priority, where 1 is the highest priority. If hosts are equal in priority, calls are distributed among them based on their relative weight.
4. In the Enterprise IP-PBX settings, add the second SBC to the outbound rules list. Refer to your specific IP-PBX configuration manual for detailed instructions.

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## 9 Troubleshooting SBC Deployment

This section describes typical problems with SBC deployment described in this document and corresponding solutions.

**Table 9-1: Troubleshooting SBC Deployment**

Problem	Solution
<p>Connection cannot be established with the SBC's Web interface</p>	<p>The SBC's Web interface is accessible via the 1<sup>st</sup> network interface (eth0) only. In typical deployment topology (described previously), the 1<sup>st</sup> SBC network interface (eth0) is not assigned with a public (Elastic) IP address. Therefore, you should use one of the following means to access the SBC Web interface:</p> <ul style="list-style-type: none"> <li>▪ Establish a VPN / Direct Connect connection between your datacenter and the LAN subnet to which the 1<sup>st</sup> SBC network interface (eth0) is connected. Access the SBC's Web interface from a PC in your datacenter over this VPN / Direct Connect connection.</li> <li>▪ Launch another AWS instance with Windows OS. Connect it to the LAN subnet and assign it with the public (Elastic) IP address. Use this instance as a "jump server". In other words, log in to it first (via the public IP address) and then access the SBC's Web interface from it (via the private IP address).</li> <li>▪ Assign the Elastic IP address to the 1<sup>st</sup> SBC network interface (eth0) and use it to access the SBC's Web interface.</li> </ul>
<p>SBC refuses to accept calls and displays the "No connection to Metering API" alarm</p>	<p>The "Mediant VE SBC – PAYG" Marketplace offer includes a pay-as-you-go license that enables Customers to use SBC as much as needed and pay for the actual service consumed via their AWS account billing. This licensing model requires a persistent connection between the SBC and AWS Metering API. The "Metering" IAM role that grants permission to use this API must be assigned to the SBC instance (see Section 4 for details). If connection with the AWS Metering API is unavailable, SBC seizes its operation until connection is available. The "No connection to Metering API" alarm is raised to indicate this problem.</p> <p>In the deployment topology described in Figure 2-1: Deployment Topology, the SBC should use the 2<sup>nd</sup> network interface (eth1) to connect to the AWS Metering API. This is because this connection is performed via public IP addresses and eth1 is assigned with an Elastic IP address. The network interface used for accessing the AWS Metering API can be changed on the Metering License page (ADMINISTRATION &gt; LICENSE).</p> <p>Typical reasons that may cause lack of connectivity between SBC and the AWS Metering API include:</p> <ul style="list-style-type: none"> <li>▪ No "metering" IAM role assigned to the SBC instance.</li> <li>▪ No Public IP address on the network interface used for communication with the AWS Metering.</li> <li>▪ Incorrect time configured on the SBC (ADMINISTRATION &gt; TIME &amp; DATE).</li> <li>▪ A Network Security Group or some other firewall device is blocking communication between SBC and the AWS Metering API endpoint (<a href="https://metering.marketplace.&lt;region&gt;.amazonaws.com">https://metering.marketplace.&lt;region&gt;.amazonaws.com</a>).</li> </ul> <p>Use the above checklist to identify the reason why your SBC instance can't access the AWS Metering API and resolve it.</p>

Problem	Solution
SBC doesn't forward calls to/from Amazon Chime Voice Connector	<p>Initial configuration created by the SBC Configuration Wizard may need minor adjustments to suit your specific setup. For example, you may need to adjust number manipulation rules (SETUP &gt; SBC &gt; Manipulation &gt; Outbound Manipulations) to match the number format used by your IP-PBX.</p> <p>To troubleshoot such problems, collect logs from the SBC as described in Section Collecting and Analyzing Logs from SBC, analyze them using the Syslog Viewer utility, identify the root cause of the problem, and then solve it by adjusting the corresponding SBC configuration. Refer to the <a href="#">AudioCodes Mediant VE SBC User Manual</a> for detailed description of SBC capabilities and configuration.</p>

## 10 Collecting and Analyzing Logs from SBC

This section describes how to collect logs from the SBC and analyze them to perform advanced troubleshooting.

➤ **To collect logs from SBC:**

1. Download AudioCodes Syslog Viewer from <https://www.audiocodes.com/library/firmware>.
2. Install it on the PC that has access to the SBC management interface, through the LAN network connected to the 1<sup>st</sup> SBC network interface (eth0).
3. Run the Syslog Viewer tool.

**Figure 10-1: AudioCodes Syslog Viewer Tool**

The screenshot shows the Syslog Viewer application window. The main area displays a list of log entries with columns for time, IP address, and log level. The selected entry is expanded to show a detailed SIP message. The status bar at the bottom indicates 'Line: 586 Column: 0', 'Syslog Listener: UDP', 'Write Log: OFF', 'Web Connection: 172.31.12.241', and 'Total: 586 Error: 0 Warning: 0'.

```

-> (#114)SBCEndPoint[Initiated->Session]
-> (#13)SBCCall[Alerting->Connected]
-> (#120)SIPSBCCallLeg [File:Logger.cpp Line:417] [Time:13-02@10:53:34.845]
10:53:35.000 172.31.12.241 local0.notice [S=55552] [SID=3f32bb:12:4293] (N 47065) SBCOfferAnswerMgr(#120)::AddPreviousSDPToMess:
10:53:35.000 172.31.12.241 local0.notice [S=55553] [SID=3f32bb:12:4293] (N 47066) AcSIPCall(#1238): Handling CONNECT_REQ in statu
10:53:35.000 172.31.12.241 local0.notice [S=55554] [SID=3f32bb:12:4293] (N 47067) UdpRtxMgr::Transmit 200 Response 4525 INVITE f
10:53:35.000 172.31.12.241 local0.notice [S=55555] [SID=3f32bb:12:4293] (N 47068) ----- Outgoing SIP Message to 172.31.6.166:56218
10:53:35.000 172.31.12.241 local0.notice [S=55556] [SID=3f32bb:12:4293] SIP/2.0 200 OK
Via: SIP/2.0/UDP 172.31.6.166:56218;received=172.31.6.166;rport=56218;branch=z9hG4bKPjc0097:
From: <sip:+18489001700@172.31.12.241>;tag=8a73c497cb0f433d9d525d869286ccb
To: <sip:+1800444444@172.31.12.241>;tag=4eF0mrg15BQH
Call-ID: d4830ad76295451f9dd21ce8d281032f
CSeq: 4525 INVITE
Contact: <sip:172.31.12.241:5060>
Supported: sdp-anat
Server: Mediant SW/v.7.20A-u9001.256.393
Content-Type: application/sdp
Content-Length: 256
v=0
o=Sonus_UAC 105113295 2066628126 IN IP4 172.31.12.241
s=SIP Media Capabilities
t=0 0
m=audio 6000 RTP/AVP 0 101
c=IN IP4 172.31.12.241
a=rtpmap:0 PCMU/8000
a=rtpmap:101 telephone-event/8000
a=fmtp:101 0-15
a=sendrecv
a=rtcp:6001
a=ptime:20
[File:TransportObject.cpp Line:133] [Time:13-02@10:53:34.845]
10:53:35.000 172.31.12.241 local0.notice [S=55557] [SID=3f32bb:12:4293] (N 47069) States: (#1238)AcSIPCall[Invited->LocalAccepte
(#318)SBCFeature[Deallocated] [File:Logger.cpp Line:417] [Time:13-02@10:53:34.845]
10:53:35.000 172.31.12.241 local0.notice [S=55558] [SID=3f32bb:12:4293] (N 47070) ----- Incoming SIP Message from 172.31.6.166:56:
10:53:35.000 172.31.12.241 local0.notice [S=55559] [SID=3f32bb:12:4293] ACK sip:172.31.12.241:5060 SIP/2.0
Via: SIP/2.0/UDP 172.31.6.166:56218;rport;branch=z9hG4bKPjb8b497f7a0e34fd910cb154563245d0
Max-Forwards: 70
  
```

4. Connect to the SBC Web interface, and then log in using the default credentials.
5. Open the Logging Settings page (**TROUBLESHOOT > Logging > Logging Settings**).
6. Configure the following parameters:
  - From the 'Enable Syslog' drop-down list, select **Enable**.
  - In the 'Syslog Server IP' field, enter the IP address of the PC where Syslog Viewer is running.
  - From the 'VoIP Debug Level' drop-down list, select **Basic**.

7. Click **Apply** to apply your settings.
8. Make a few calls; detailed logs, including all the send and received SIP messages are displayed in the Syslog Viewer.

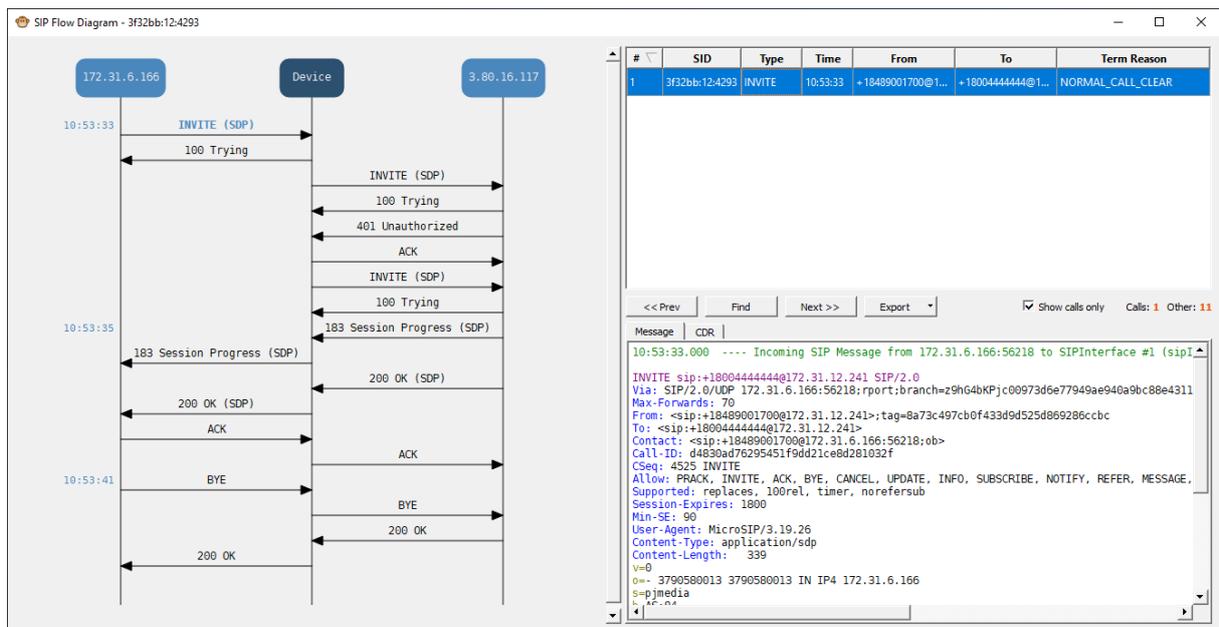


**Note:** The above procedure configures the SBC to send syslog messages to the PC where Syslog Viewer is installed. If such communication is not possible (e.g., due to a firewall or NAT devices in the middle), you may use the *Web Connect* feature in the Syslog Viewer to establish an HTTP connection with the SBC and pull logs from it. Refer to the Syslog Viewer's Help > Overview for configuration details.

- **To analyze the collected logs:**

  1. After collecting the call logs, use the *SIP Flow Diagram* feature in the Syslog Viewer (  button) to display a ladder diagram of the SIP call.

**Figure 10-2: SIP Flow Diagram**



2. Click the call to display its SIP ladder diagram. Click the message in the SIP ladder diagram to display its content.
3. Use the main Syslog Viewer screen to view additional logs sent by the SBC; these may help you to identify the root cause of the problem.

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