



Nexmo SIP Trunking Configuration Guide

**Skype for Business 6.0.9319
With
Oracle E-SBC Acme Packet 3820
ECZ7.3.0 Patch 2 (Build 75)**

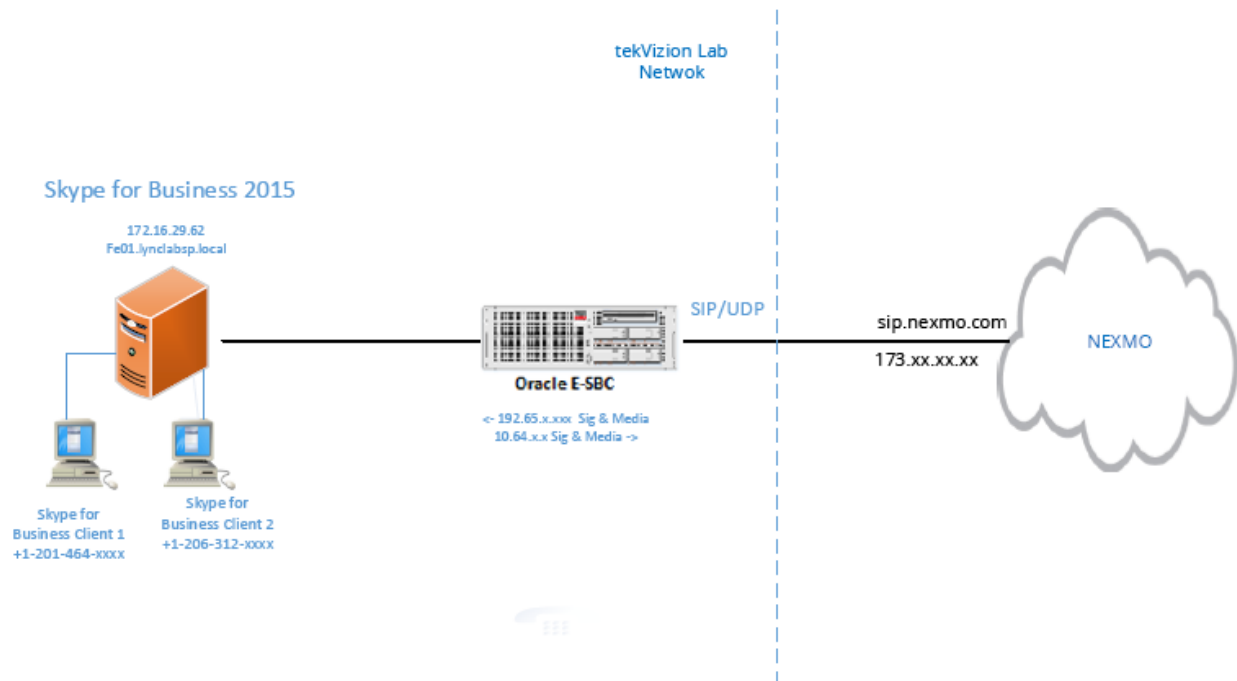
July 2017

1 Audience

This document is intended for the SIP trunk customer's technical staff and Value Added Retailer (VAR) having installation and operational responsibilities. This configuration guide provides steps for configuring Skype for Business 6.0.9319 and Oracle Enterprise SBC Acme Packet 3820 ECZ7.3.0 Patch 2 (Build 75) to Nexmo SIP Trunking services.

2 SIP Trunking Network Components

The network for the SIP trunk reference configuration is illustrated below and is representative of a Skype for Business and Oracle SBC configuration to Nexmo SIP trunking.



2.1 Network Components

Component	Version	Comments
Skype for Business	6.0.9319	
Oracle E-SBC	Acme Packet 3820 ECZ7.3.0 Patch 2 (Build 75)	
Microsoft Exchange Server 2016	15.1.225.42	Microsoft Exchange UM

Skype for Business Client	15.0.47.7.1000	
Cisco IP Phone	Model: CP-7965	This Cisco IP Phone is the PSTN test device
	App Load ID: jar45sccp.9-4-2TH1-1.sbn	
	Boot Load ID: tnp65.9-3-1-CR17.bin	

3 Features

3.1.1 Features Supported

- Incoming and outgoing off-net calls using G711ULAW & G711ALAW voice codecs
- Calling Line (number) Identification Presentation
- Calling Line (number) Identification Restriction
- Call hold and resume
- Call transfer (unattended and attended)
- Call Conference
- Call forward (All, No answer)
- DTMF relay both directions (RFC2833)
- Media flow-through on Oracle E-SBC

3.1.2 Features Not Supported by PBX

- None

3.1.3 Features Not Tested

- None

3.1.4 Caveats and Limitations

- No Session Audit message is sent from Nexmo
- Session refresh is always done by Nexmo. Skype for Business does Session refresh only through UPDATE message and Nexmo does not support UPDATE.

4 Configuration

4.1 IP Address Worksheet

The specific values listed in the table below and in subsequent sections are used in the lab configuration described in this document, and are for **illustrative purposes only**. The customer must obtain and use the values for your deployment.

Component	Lab Value	Customer Value
Oracle E-SBC		
LAN IP Address	10.70.59.40	
LAN Subnet Mask	255.255.255.0	
WAN IP Address	192.xx.xx.xxx	
WAN Subnet Mask	255.255.255.128	
Skype for Business		
System IP Address	172.16.29.62	

4.2 Configuring Skype for Business

This section describes the Skype for Business configuration necessary to support connectivity to Oracle E-SBC. A SIP trunk is established between Skype for Business and Oracle E-SBC for use by signaling traffic to and from Nexmo via Oracle E-SBC.

4.2.1 Enable TCP Mode

Skype for Business and Oracle E-SBC will communicate over TCP since UDP is not supported by Skype for Business. To enable TCP mode in Skype for Business follow the steps below.

1. Navigate to **Mediation Pools** in the Skype for Business Topology Builder
2. Here we use the co-located mediation server to communicate with the Oracle E-SBC
3. Right click and click **Edit**
4. Assign **Listening ports** for TCP on the Skype for Business side
5. Check **Enable TCP Port** option

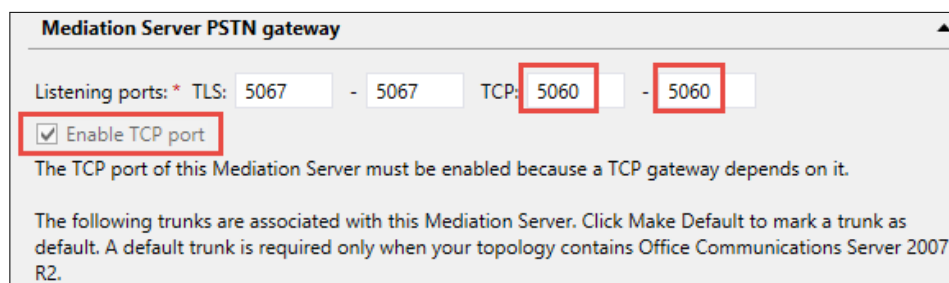
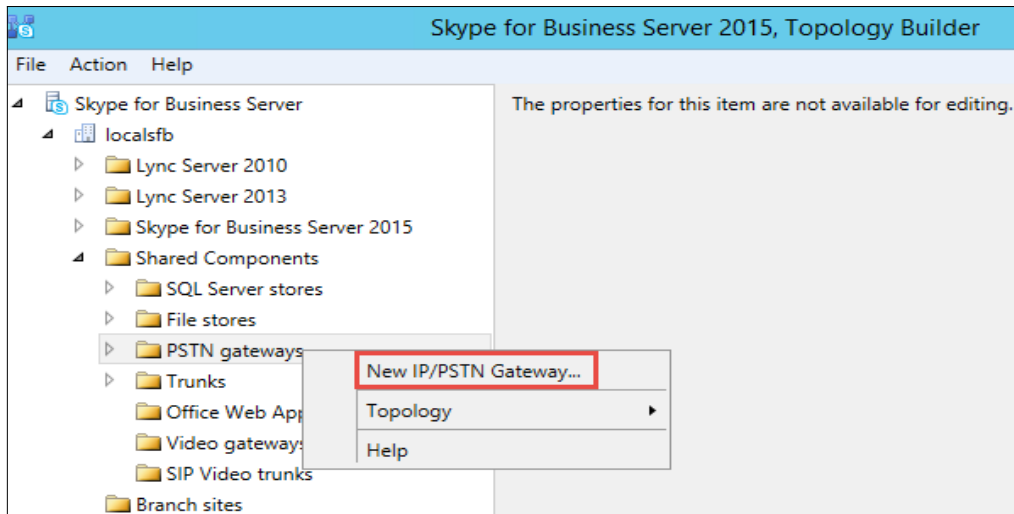


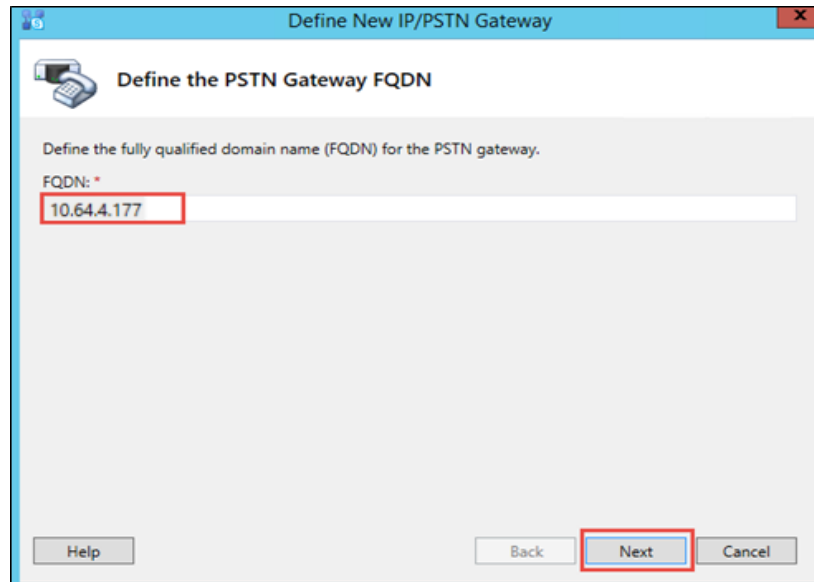
Figure 2: TCP Mode

4.2.2 Adding a Trunk

1. Right click on the **PSTN gateways** option and select **New IP/PSTN Gateway**



2. Enter the IP address of the Oracle E-SBC
3. Click **Next**



4. In **Define the root trunk** page
5. **Trunk name:** 10.64.4.177 (Oracle E-SBC LAN IP)
6. **Listening Port for IP/PSTN Gateway:** 5060, Configure the listening port of the SBC
7. **SIP Transport Protocol:** Select **TCP**
8. **Associated Mediation Server:** fe01.sfbsp.local, Select the mediation pool to be associated
9. **Associated Mediation Server port:** 5060
10. Click **Finish**
11. Publish the topology for the configuration to be reflected

Define New IP/PSTN Gateway

Define the root trunk

Trunk name: *

10.64.4.177

Listening port for IP/PSTN gateway: *

5060

SIP Transport Protocol:

TCP

Associated Mediation Server:

fe01.sfbsp.local central site

Associated Mediation Server port: *

5060

Help Back Finish Cancel

4.2.3 Trunk Configuration

1. Open the Skype for Business Control Panel
2. Navigate to **Voice Routing**
3. Go to the **TRUNK CONFIGURATION** page
4. Click **New** and select **Pool Trunk**
5. In the **Select a Service** page, select the trunk added in section 4.2.2
6. Assign a name
7. Set **Encryption Support Level**: Select *Not supported*
8. Set **Refer Support**: *None*
9. Set the remaining options as seen in the figure below
10. Click **OK** and **Commit** the changes.

Home
Users
Topology
IM and Presence
Persistent Chat
Voice Routing
Voice Features
Response Groups
Conferencing
Clients
Federation and External Access
Monitoring and Archiving
Security
Network Configuration

DIAL PLAN
VOICE POLICY
ROUTE
PSTN USAGE
TRUNK CONFIGURATION

[Create voice routing test case information](#)

Edit Trunk Configuration - PstnGateway:10.64.4.177

OK
Cancel

Name: *
PstnGateway:10.64.4.177

Description:

Maximum early dialogs supported:
20

Encryption support level:
Not supported

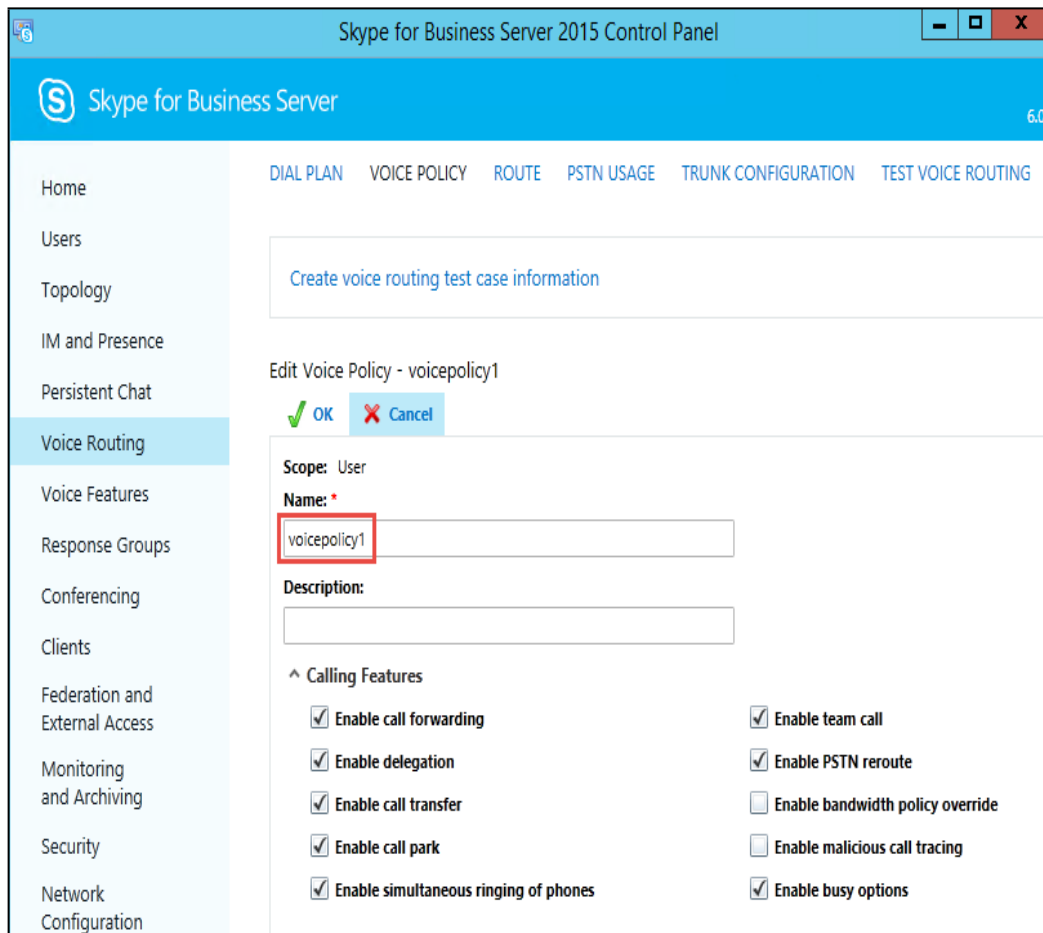
Refer support:
None

☒ Enable media bypass
☒ Centralized media processing
☐ Enable RTP latching
☒ Enable forward call history
☐ Enable forward P-Asserted-Identity data
☒ Enable outbound routing failover timer

4.2.4 Voice Routing

The trunk created in the previous step needs to be assigned to a Route. This is done so that when a Skype for Business user dials a call out to the Nexmo, the calls terminate via the configured Oracle E-SBC trunk.

1. Open the Skype for Business control panel
2. Navigate to **Voice Routing** → **VOICE POLICY**
3. A **Dial Plan** can be configured for users if any digit modifications are needed. Here the Global Dial Plan is used.
4. Configure a **Voice Policy** for the users to use when dialing a call out to the Oracle E-SBC



5. Click **New** under **Associated PSTN Usages** to create a new PSTN Usage
6. Assign a name
7. Click **New** under **Associated Routes** to create a new Route

Edit Voice Policy - voicepolicy1

✓ OK ✗ Cancel

Associated PSTN Usages

+ New Select... Show details... Remove ↑ ↓

PSTN usage record	Associated routes
pstnusage1	route1

Call forwarding and simultaneous ringing PSTN usages:

Route using the call PSTN usages

Translated number to test:

Go

8. Assign a **Name** for the new route
9. Create a match pattern for the calls going out under **Build a Pattern to match** section. Here **" +1214242 "** is used to match PSTN number.
10. Select the Trunk under **Associated trunks** section and click **OK**

Edit Voice Policy ▶ Edit PSTN Usage Record - pstnusage1

✓ OK ✗ Cancel

Name:

pstnusage1

Associated Routes

+ New Select... Show details... Remove

Name	Pattern to match
route1	^\+1214242

Select Trunk

Service Site

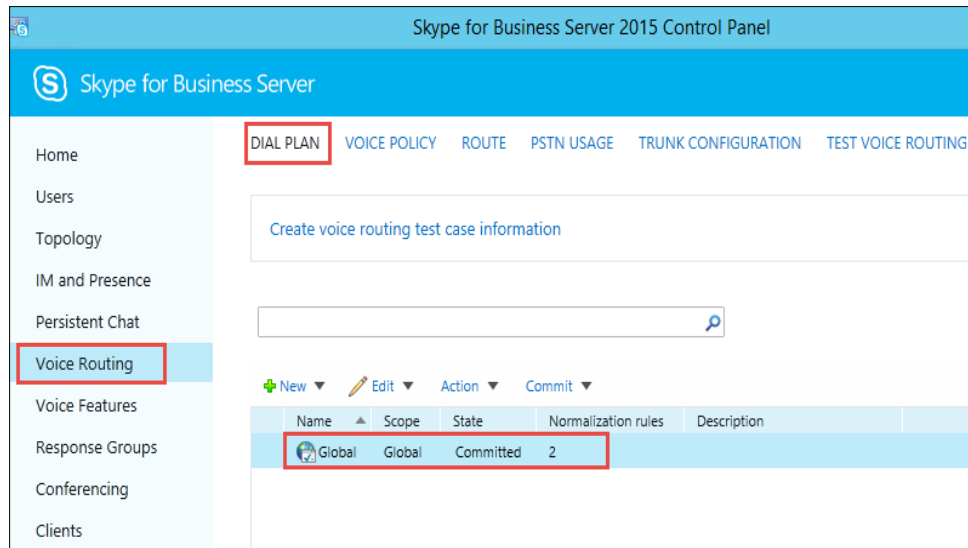
PstnGateway:10.64.4.177

11. Save the Route
12. Save the PSTN Usage
13. Save the Voice Policy
14. Commit all the changes

4.2.5 Dial Plan

Dial Plan is used to strip or insert digits.

1. Navigate to **Voice Routing** section in the **Skype for Business Control Panel**
2. Select **Global Dial Plan**. Here the Global Dial Plan is used.



3. Open the Global dial plan
4. Navigate to **Associated Normalization Rules** and add normalization rules
5. **Keep All** is a default normalization rule which allows all the numbers
6. **Save** the changes

Associated Normalization Rules

New
 Copy
 Paste
 Select...
 Show details...
 Remove

Normalization rule	State	Pattern to match	Translation pattern
Keep All	Committed	^\d+\$	\$1

4.3 Oracle E-SBC Configuration

4.3.1 Create Physical Interfaces

This section defines the physical interfaces to the Skype for Business and Nexmo networks.

4.3.1.1 Physical Interface for Skype for Business

1. Navigate to **Configuration** → **Objects** → **system** → **phy-interface**
2. Click **Add**
3. **Name:** s1p0
4. **Operation Type:** Media
1. **Port:** 0
5. **Slot:** 1
6. Click **OK**

Modify Phy interface

Name:	<input type="text" value="s1p0"/>	
Operation type:	<input type="text" value="Media"/>	▼
Port:	<input type="text" value="0"/>	(Range: 0..2)
Slot:	<input type="text" value="1"/>	(Range: 0..2)
Virtual mac:	<input type="text"/>	
Duplex mode:	<input type="text" value="FULL"/>	▼
Speed:	<input type="text" value="100"/>	▼
Wancom health score:	<input type="text" value="50"/>	(Range: 0..100)

4.3.1.2 Physical Interface for Nexmo

1. Navigate to **Configuration** → **Objects** → **system** → **phy-interface**
2. Click **Add**
3. **Name:** s0p0
4. **Operation Type:** Media
2. **Port:** 0
5. **Slot:** 0
6. Click **OK**

Modify Phy interface

Name:	<input type="text" value="s0p0"/>	
Operation type:	<input type="text" value="Media"/>	▼
Port:	<input type="text" value="0"/>	(Range: 0..2)
Slot:	<input type="text" value="0"/>	(Range: 0..2)
Virtual mac:	<input type="text"/>	
Duplex mode:	<input type="text" value="FULL"/>	▼
Speed:	<input type="text" value="100"/>	▼
Wancom health score:	<input type="text" value="50"/>	(Range: 0..100)

4.3.2 Create Network Interfaces

This section defines the network interfaces to the Skype for Business and Nexmo networks.

4.3.2.1 Network Interface for Skype for Business

1. Navigate to **Configuration** → **Objects** → **system** → **network-interface**
2. Click **Add**
3. **Name:** s1p0
4. **Sub port id:** 0
5. **Hostname:** fe01.sfbsp.local (Skype for Business FQDN)
6. **IP address:** 10.64.4.177 (E-SBC LAN IP)
7. **Netmask:** 255.255.0.0
8. **Gateway:** 10.64.1.1
9. Click **OK**

Modify Network interface

Name:	s1p0	
Sub port id:	0	(Range: 0..4095)
Description:	SFB Facing LAN	
Hostname:	fe01.sfbsp.local	
IP address:	10.64.4.177	
Pri utility addr:		
Sec utility addr:		
Netmask:	255.255.0.0	
Gateway:	10.64.1.1	
<input checked="" type="checkbox"/> Gw heartbeat		
State:	<input type="checkbox"/>	
Heartbeat:	0	(Range: 0..65535)
Retry count:	0	(Range: 0..65535)
Retry timeout:	1	(Range: 1..65535)
Health score:	0	(Range: 0..100)

Modify Network interface

DNS IP primary:	172.16.29.61	
DNS IP backup1:	172.16.29.61	
DNS IP backup2:		
DNS domain:	sfbsp.local	
DNS timeout:	11	(Range: 0..4294967295)
Signaling mtu:	0	(Range: 0, 576..4096)
HIP IP list:	<div>Add Edit Delete</div> <div>10.64.4.177</div>	
Ftp address:		
ICMP address:	<div>Add Edit Delete</div> <div>10.64.4.177</div>	

4.3.2.2 Network Interface for Nexmo

1. Navigate to **Configuration → Objects → system → network-interface**
2. Click **Add**
3. **Name:** s0p0
4. **Sub port id:** 0
5. **IP address:** 192.xx.xx.xxx (E-SBC WAN IP)
6. **Netmask:** 255.xxx.x.x
7. **Gateway:** 192.x.x.x
8. Click **OK**

Modify Network interface

Name:	s0p0	
Sub port id:	0	(Range: 0..4095)
Description:	Nexmo facing WAN	
Hostname:		
IP address:	192	
Pri utility addr:		
Sec utility addr:		
Netmask:	255.	
Gateway:	192.	

☐ Gw heartbeat

State: ☐

Heartbeat: 0 (Range: 0..65535)

Retry count: 0 (Range: 0..65535)

Retry timeout: 1 (Range: 1..65535)

Health score: 0 (Range: 0..100)

Modify Network interface

DNS IP primary:	8.8.8.8							
DNS IP backup1:								
DNS IP backup2:								
DNS domain:	null							
DNS timeout:	11							
Signaling mtu:	0							
HIP IP list:	<table><tr><td>Add</td><td>Edit</td><td>Delete</td></tr><tr><td>192.</td><td></td><td></td></tr></table>	Add	Edit	Delete	192.			
Add	Edit	Delete						
192.								
Ftp address:								
ICMP address:	<table><tr><td>Add</td><td>Edit</td><td>Delete</td></tr><tr><td>192.</td><td></td><td></td></tr></table>	Add	Edit	Delete	192.			
Add	Edit	Delete						
192.								

4.3.3 Create Realm-config

Realms are used as a basis for determining egress and ingress associations between physical and network interfaces.

4.3.3.1 Realm for Skype for Business

1. Navigate to **Configuration** → **Objects** → **media-manager** → **realm-config**
2. Click **Add**
3. **Identifier:** SFB
4. **Network Interfaces:** Click Add and select Skype for Business Network interface
5. Click **OK**

Modify Realm config

Identifier:	SFB
Description:	Skype for Business facing
Network interfaces:	<div>Add Edit Delete</div> <div>s1p0:0.4</div>

4.3.3.2 Realm for Nexmo

1. Navigate to **Configuration** → **Objects** → **media-manager** → **realm-config**
2. Click **Add**
3. **Identifier:** nexmo
4. **Network Interfaces:** Click Add and select Nexmo Network interface
5. Click **OK**

Modify Realm config

Identifier:	nexmo
Description:	nexmo side facing
Network interfaces:	<div>Add Edit Delete</div> <div>s0p0:0.4</div>

4.3.4 Create Steering Pool

Steering pool define sets of ports that are used for steering media flows through the Acme Packet E-SBC.

4.3.4.1 Steering Pool for Skype for Business

1. Navigate to **Configuration** → **Objects** → **media-manager** → **steering-pool**
2. Click **Add**
3. **IP Address:** 10.64.4.177 (E-SBC LAN IP)
4. **Realm ID:** SFB (Realm of Skype for Business)
5. **Network Interface:** Select Skype for Business Network interface
6. Click **OK**

The screenshot shows a web form titled "Modify Steering pool". It contains five input fields, each with a label on the left and a text input box on the right. A red rectangular box highlights the first four fields: "IP address:", "Start port:", "End port:", and "Realm id:". The "Network interface:" field is not highlighted. The values entered are: IP address: 10.64.4.177, Start port: 30000, End port: 40000, and Realm id: SFB. The "Start port" and "End port" fields have a range "(Range: 1..65535)" to their right. The "Realm id" and "Network interface" fields have a dropdown arrow on the right.

Field	Value	Range/Notes
IP address:	10.64.4.177	
Start port:	30000	(Range: 1..65535)
End port:	40000	(Range: 1..65535)
Realm id:	SFB	
Network interface:	s1p0:0	

4.3.4.2 Steering pool for Nexmo

1. Navigate to **Configuration** → **Objects** → **media-manager** → **steering-pool**
2. Click **Add**
3. **IP Address:** 192.x.x.x (E-SBC WAN IP)
4. **Realm ID:** nexmo (Realm of Nexmo)
5. **Network Interface:** Select Nexmo Network interface
6. Click **OK**

The screenshot shows a web form titled "Modify Steering pool". It contains five input fields, each with a label on the left and a text input box on the right. A red rectangular box highlights the first four fields: "IP address:", "Start port:", "End port:", and "Realm id:". The "Network interface:" field is not highlighted. The values entered are: IP address: 192., Start port: 30000, End port: 40000, and Realm id: nexmo. The "Start port" and "End port" fields have a range "(Range: 1..65535)" to their right. The "Realm id" and "Network interface" fields have a dropdown arrow on the right.

Field	Value	Range/Notes
IP address:	192.	
Start port:	30000	(Range: 1..65535)
End port:	40000	(Range: 1..65535)
Realm id:	nexmo	
Network interface:	s0p0:0	

4.3.5 Modify SIP Config

SIP-config sets the values for the Acme Packet SIP operating parameters.

1. Navigate to **Configuration** → **Objects** → **session-router** → **sip-config** → **Modify**
2. **Home Realm ID:** SFB (Realm of Skype for Business)
3. **Registrar Domain:** * (This option is required when using Registration Method)
4. **Registrar Host:** * (This option is required when using Registration Method)
5. Click **OK**

Modify SIP config

State:

☒

Dialog transparency:

☐

Home realm id:

SFB

Egress realm id:

Nat mode:

None

Registrar domain:

*

Registrar host:

*

Registrar port:

5060

(Range: 0, 1025..65535)

Init timer:

500

(Range: 0..4294967295)

Max timer:

4000

(Range: 0..4294967295)

Trans expire:

32

(Range: 0..4294967295)

Initial inv trans expire:

0

(Range: 0..999999999)

Invite expire:

180

(Range: 0..4294967295)

Enforcement profile:

Red max trans:

10000

(Range: 0..50000)

Options:

Add

Edit

Delete

max-udp-length=0

4.3.6 Create SIP Interface

SIP interface defines the signaling interface (IP address and port) to which the Acme Packet E-SBC sends and receives SIP messages. SIP Interface and Realm ID are created for both Skype for Business and Nexmo

4.3.6.1 SIP Interface for Skype for Business

1. Navigate to **Configuration** → **Objects** → **session-router** → **sip-interface**
2. Click **Add**
3. **Realm ID:** SFB
4. **SIP Ports:** Click Add
5. **Address:** Enter the SBC LAN IP address
6. **Port:** Configure the SBC listening port for TCP
7. **Transport Protocol:** TCP
8. **Allow Anonymous:** *all*, for example
9. Click **OK**

ORACLE

Home Configuration Monitor and Trace Widgets System

Save Wizards

Objects

- media-manager
- security
 - certificate-record
 - tls-global
 - tls-profile
- session-router
 - access-control
 - account-config
 - filter-config
 - ldap-config
 - local-policy
 - media-profile
 - session-agent
 - session-group
 - session-recording-group
 - session-recording-server
 - session-translation
 - sip-config
 - sip-feature
 - sip-interface**
 - sip-manipulation
 - sip-monitoring
 - translation-rules
- system
 - auto-config
 - host-route
 - network-interface
 - ntp-config
 - phy-interface

Add SIP interface

Show advanced Show configuration

State: ☒

Realm id: SFB

Description:

SIP ports

Address	Port	Transport protocol	TLS profile	Allow anonymous
10.64.4.177	5080	TCP		all

Nat traversal: none

Registration caching: ☐

Route to registrar: ☐

Options:

Add	Edit	Delete
100rel-interworking		

Spl options: playback-on-refer="transferrbt"

4.3.6.2 SIP Interface for Nexmo

1. Navigate to **Configuration** → **Objects** → **session-router** → **sip-interface**
2. Click **Add**
3. **Realm ID:** Nexmo
4. **SIP Ports:** Click Add
5. **Address:** Enter the SBC WAN IP Address
6. **Port:** Configure the SBC listening port for TCP
7. **Transport Protocol:** UDP
8. **Allow Anonymous:** *all*, for example
9. Click **OK**

Modify SIP interface

State: ☒

Realm id:

Description:

SIP ports

Add	Edit	Copy	Delete	
Address	Port	Transport protocol	TLS profile	Allow anonymous
192	5060	UDP		all

Nat traversal:

Registration caching: ☐

Route to registrar: ☐

Spl options:

In manipulationid:

Out manipulationid:

4.3.7 Create Session Agent

A session agent defines an internal “next hop” signaling entity for the SIP traffic. A realm is associated with a session agent to identify sessions coming from or going to the session agent. Session agents are created for both Skype for Business and Nexmo.

4.3.7.1 Session Agent for Skype for Business

1. Navigate to **Configuration** → **Objects** → **session-router** → **session-agent**
2. Click **Add** or **Modify**
3. **Hostname:** 172.16.29.62, for example
4. **IP Address:** 172.16.29.62, for example
5. **Port:** Configure the PBX listening port
6. **Transport Method:** StaticTCP
7. **Realm ID:** SFB

Modify Session agent

Hostname:	172.16.29.62
IP address:	172.16.29.62
Port:	5060 (Range: 0, 1025..65535)
State:	<input checked="" type="checkbox"/>
App protocol:	SIP
App type:	
Transport method:	StaticTCP
Realm id:	SFB
Egress realm id:	
Description:	
Constraints:	<input type="checkbox"/>
Max sessions:	0 (Range: 0..999999999)
Max inbound sessions:	0 (Range: 0..999999999)
Max outbound sessions:	0 (Range: 0..999999999)
Max burst rate:	0 (Range: 0..999999999)
Max inbound burst rate:	0 (Range: 0..999999999)

8. **Out translationid:** addplusone
9. **In manipulationid:** add_pai
10. **Out manipulationid:** outManipToSFB

Modify Session agent

In translationid:

Out translationid:

Trust me: ☐

Local response map:

In manipulationid:

Out manipulationid:

Manipulation string:

Manipulation pattern:

Trunk group:

Add	Edit	Delete

Max register sustain rate: (Range: 0..999999999)

Invalidate registrations: ☐

Rfc2833 mode:

Rfc2833 payload: (Range: 0, 96..127)

11. Click **Add** under **Auth attribute**

Auth attribute

Add	Edit	Copy	Delete
Username	Password	In dialog methods	
911236e3	*****		

12. **Auth Realm:** Nexmo FQDN (sip.nexmo.com is used for this test) provided by Nexmo
13. **Username:** User name (911236e3 is used for this test) provided by Nexmo
14. **Password:** Password provided by Nexmo
15. Click **OK**

Modify Session agent / auth attributes

Auth realm:	<input type="text" value="sip.nexmo.com"/>
Username:	<input type="text" value="911236e3"/>
Password:	<input type="password" value="....."/> <input type="button" value="Set"/>
In dialog methods:	<input type="button" value="Add"/> <input type="button" value="Edit"/> <input type="button" value="Delete"/>

4.3.7.2 Session Agent for Nexmo

1. Navigate to **Configuration → Objects → session-router → session-agent**
2. Click **Add** or **Modify**
3. **Hostname:** Enter the hostname (sip.nexmo.com is issued for this test)
4. **Port:** Configure the PBX listening port
5. **Transport method:** UDP
6. **Realm ID:** Nexmo
7. **Options:** max-udp-length=0 (Note: This setting allows the SBC to fragment UDP packets. Otherwise the maximum size a UDP packet may be is 1500 bytes.). Without this setting, E-SBC sends "513 MESSAGE TOO LARGE" if a UDP packet length is more than 1500 bytes.

Modify Session agent

Hostname:	<input type="text" value="sip.nexmo.com"/>
IP address:	<input type="text"/>
Port:	<input type="text" value="5060"/> (Range: 0, 1025..65535)
State:	<input checked="" type="checkbox"/>
Transport method:	<input type="text" value="UDP"/>
Realm id:	<input type="text" value="nexmo"/>
Egress realm id:	<input type="text"/>
Description:	<input type="text"/>
Ping method:	<input type="text" value="OPTIONS"/>
Ping interval:	<input type="text" value="30"/> (Range: 0..4294967295)
Options:	<input type="button" value="Add"/> <input type="button" value="Edit"/> <input type="button" value="Delete"/>
	<input type="text" value="max-udp-length=0"/>

8. **Out manipulationid:** Surrogate
9. Click **OK**

In translationid:	<input type="text"/>	▼
Out translationid:	<input type="text"/>	▼
In manipulationid:	<input type="text"/>	▼
Out manipulationid:	surrogate	▼
Manipulation string:	<input type="text"/>	
Manipulation pattern:	<input type="text"/>	
Rfc2833 mode:	none	▼
Rfc2833 payload:	0	(Range: 0, 96..127)
Codec policy:	<input type="text"/>	▼
Refer call transfer:	disabled	▼

Kpml interworking:	inherit	▼
Monitoring filters:	<div>Add Edit Delete</div> <div></div>	

4.3.8 Create Local Policy

Local policies are defined to allow any SIP request from Skype for Business realm to be routed to the Nexmo realm and vice-versa.

4.3.8.1 Local Policy for Skype for Business

1. Navigate to **Configuration** → **Objects** → **session-router** → **local-policy**
2. Click **Add** or **Modify**
3. **From Address:** * - Used in this example
4. **To Address:** * - Used in this example
5. **Source Realm:** nexmo
6. **Policy Attributes:** Add or Edit
7. **Next Hop:** Enter the Skype For Business IP Address
8. **Realm:** SFB
9. **Cost:** 0
10. Click **OK**

Modify Local policy

From address:

Add

*

Edit

Delete

To address:

Add

*

Edit

Delete

Source realm:

Add

nexmo

Edit

Delete

Description:

State:
☒

Policy priority:

none

Policy attributes

Add

Edit

Copy

Delete

Next hop	Realm	Action	Cost
172.16.29.62	SFB	none	0

4.3.8.2 Local Policy for Nexmo

1. Navigate to **Configuration** → **Objects** → **session-router** → **local-policy**
2. Click **Add** or **Modify**
3. **From Address:** * is used in this example
4. **To Address:** * - This is used in this example
5. **Source realm:** SFB
6. **Policy Attributes:** Add or Edit
7. **Next Hop:** Enter the Nexmo FQDN
8. **Realm:** nexmo
9. **Action:** *replace-uri* is used in this example
10. **Cost:** 0
11. Click **OK**

Modify Local policy

From address:

Add Edit Delete

*

To address:

Add Edit Delete

*

Source realm:

Add Edit Delete

SFB

State: ☒

Policy priority: none

Policy attributes

Add	Edit	Copy	Delete
Next hop	Realm	Action	Cost
sip.nexmo.com	nexmo	replace-uri	0

4.3.9 Create Surrogate Agent

Surrogate registration allows the Acme Packet SBC to perform trunk side registrations to the Nexmo network. The values for register-user, register-contact-user and password are provided by Nexmo.

1. Navigate to **Configuration → Objects → Show advanced → session-router → surrogate-agent**
2. **Register Host:** sip.nexmo.com is used in this example
3. **Register User:** 911236e3 is used in this example
4. **Realm ID:** SFB
5. **Customer Host:** 172.16.29.62 (Skype for Business IP)
6. **Customer Next Hop:** 172.16.29.62 (Skype for Business IP)
7. **Register Contact Host:** SBC WAN IP
8. **Register Contact User:** 911236e3 is used in this example

9. **Password:** Type the Authentication password
10. **Register Expires:** 60 is used for this test
11. **Route to Registrar:** Enabled
12. **Auth User:** 911236e3 is used in this example
13. Click **OK**

Modify Surrogate agent

Register host:	sip.nexmo.com	
Register user:	911236e3	
Description:		
Realm id:	SFB	
State:	<input checked="" type="checkbox"/>	
Customer host:	172.16.29.62	
Customer next hop:	172.16.29.62	
Register contact host:	192	
Register contact user:	911236e3	
Password:	ffc	
Register expires:	60	(Range: 0..99999999)
Replace contact:	<input checked="" type="checkbox"/>	
Route to registrar:	<input checked="" type="checkbox"/>	
Aor count:	1	(Range: 0..999999999)
Auth user:	911236e3	
Max register attempts:	3	(Range: 0..10)
Register retry time:	300	(Range: 30..3600)
Count start:	1	(Range: 0..999999999)
Register mode:	automatic	
Triggered inactivity interval:	30	(Range: 5..300)
Triggered oos response:	503	

4.3.10 Create Translation Rules

The below translation rule is applied to Out translationid of Skype for Business Session agent. This adds + in the user part of the TO header.

1. Navigate to **Configuration → Objects → session-router → translation-rules**
2. Click **Add**
3. **ID:** addplus1 (Identifier name used for this test)
4. **Type:** add
5. **Add String:** +

Modify Translation rules

Id:
addplus1

Type:
add

Add string:
+

Delete string:

4.3.11 Create SIP Manipulation

SIP manipulation specifies rules for manipulating the contents of specified SIP headers. For the Compliance test, a set of SIP manipulations were configured that contain a set of SIP header manipulation rules (HMR) on traffic From or To with respect to Nexmo and Skype for Business.

4.3.11.1 SIP Manipulation for Skype for Business

add_pai rule is applied in the SIP header coming from Skype for business to Oracle E-SBC. The manipulation script is assigned to **In manipulationid** of Session agent of Skype for Business.

```

sip-manipulation
  name          add_pai1
  description
  split-headers
  join-headers
  header-rule
    name        add_pai2
    header-name P-ASSERTED-IDENTITY
    action      add
    comparison-type case-sensitive
    msg-type    request
    methods     INVITE
    match-value
    new-value    <sip:+$FROM_USER.$0+@192.xx.xx.xxx;user=phone>

    header-rule
      name        inactsendonlytosendrecv3
      header-name Content-Type
      action      manipulate
      comparison-type case-sensitive
      msg-type    request
      methods     INVITE
      match-value

```

1 HMR for SIP headers coming from Skype for Business to E-SBC

2 SIP manipulation rule developed to insert P-Asserted-Identity header

3 SIP manipulation rule developed to change SDP attribute from INACTIVE to SENDRCV in the INVITE

new-value	
element-rule	
name	inactivetosendrecv
parameter-name	application/sdp
type	mime
action	find-replace-all
match-val-type	any
comparison-type	case-sensitive
match-value	a=inactive
new-value	a=sendrecv
element-rule	
name	sendonlytosendrecv ⁴
parameter-name	application/sdp
type	mime
action	find-replace-all
match-val-type	any
comparison-type	case-sensitive
match-value	a=sendonly
new-value	a=sendrecv
header-rule	
name	sessionrefresh ⁵
header-name	Session-Expires
action	manipulate
comparison-type	case-sensitive
msg-type	reply
methods	
match-value	
new-value	
element-rule	
name	uactouas
parameter-name	
type	header-value
action	find-replace-all
match-val-type	any
comparison-type	case-sensitive
match-value	refresher=uas
new-value	refresher=uac

outManipToSFB rule is applied to SIP headers sending from Oracle E-SBC to Skype for business. The manipulation script is assigned to **out manipulationid** of Session agent of Skype for Business.

sip-manipulation	
name	outManipToSFB ⁶
description	To SFB

⁴ SIP manipulation rule developed to change SDP attribute from SENDONLY to SENDRCV in the INVITE

⁵ SIP manipulation rule developed to change Session refresher parameter from UAS to UAC in the response message

⁶ HMR for SIP headers sending from E-SBC to Skype for Business.

```

split-headers
join-headers
header-rule
    name                From7
    header-name          From
    action               manipulate
    comparison-type      case-sensitive
    msg-type             request
    methods
    match-value
    new-value
    element-rule
        name            From_header
        parameter-name
        type             uri-host
        action           replace
        match-val-type   any
        comparison-type  case-sensitive
        match-value
        new-value        $LOCAL_IP
header-rule
    name                To8
    header-name          To
    action               manipulate
    comparison-type      case-sensitive
    msg-type             request
    methods
    match-value
    new-value
    element-rule
        name            To
        parameter-name
        type             uri-host
        action           replace
        match-val-type   any
        comparison-type  case-sensitive
        match-value
        new-value        sfpsp.local

header-rule
    name                modURI9
    header-name          Request-uri
    action               manipulate
    comparison-type      case-sensitive
    msg-type             any
    methods

```

7 SIP manipulation rule developed for changing the URI host IP to local SBC LAN IP in the FROM header

8 SIP manipulation rule developed for changing the URI host IP to Skype for Business FQDN in the TO header

9 SIP manipulation rule developed to replace the URI host IP to Skype for Business FQDN in the REQUEST-URI

match-value	
new-value	
element-rule	
name	mod2
parameter-name	
type	uri-host
action	replace
match-val-type	fqdn
comparison-type	case-sensitive
match-value	
new-value	sfbsp.local

4.3.11.2 SIP Manipulation for Nexmo

Surrogate rule is applied to SIP header coming from Oracle E-SBC to Nexmo. The manipulation script is assigned to **out manipulationid** of Session agent of Nexmo.

sip-manipulation	
name	surrogate ¹⁰
description	
split-headers	
join-headers	
header-rule	
name	ModURI ¹¹
header-name	request-uri
action	manipulate
comparison-type	case-sensitive
msg-type	any
methods	
match-value	
new-value	
element-rule	
name	mod2
parameter-name	
type	uri-host
action	replace
match-val-type	fqdn
comparison-type	case-sensitive
match-value	
new-value	sip.nexmo.com+:+\$REMOTE_PORT
header-rule	
name	from_nexmo ¹²
header-name	FROM
action	manipulate

10 HMR for SIP headers sending from E-SBC to Nexmo network

11 SIP manipulation rule developed for replacing the URI host IP with Nexmo FQDN and the remote port number in the REQUEST_URI

12 SIP manipulation rule developed for replacing the URI host IP to SBC WAN IP in the FROM header

comparison-type	case-sensitive
msg-type	request
methods	
match-value	
new-value	
element-rule	
name	from_add_nexmo
parameter-name	
type	uri-host
action	replace
match-val-type	any
comparison-type	case-sensitive
match-value	
new-value	\$LOCAL_IP
header-rule	
name	contact ¹³
header-name	CONTACT
action	manipulate
comparison-type	case-sensitive
msg-type	request
methods	
match-value	
new-value	
element-rule	
name	contactlocalip
parameter-name	
type	uri-host
action	replace
match-val-type	ip
comparison-type	case-sensitive
match-value	
new-value	\$LOCAL_IP
element-rule	
name	contactlocalport ¹⁴
parameter-name	
type	uri-port
action	replace
match-val-type	any
comparison-type	case-sensitive
match-value	
new-value	\$LOCAL_PORT
element-rule	
name	contactuserpart ¹⁵
parameter-name	
type	uri-user
action	add

13 SIP manipulation rule developed for replacing the URI host IP to SBC WAN IP in the CONTACT header

14 SIP manipulation rule developed for replacing the Contact Port to SBC port number in the CONTACT header

15 SIP manipulation rule developed for adding the valid FROM header digits in the URI User part of CONTACT header

match-val-type	any
comparison-type	case-sensitive
match-value	
new-value	\$FROM_USER.\$0
header-rule	
name	nexmooptions
header-name	FROM
action	manipulate
comparison-type	case-sensitive
msg-type	any
methods	OPTIONS
match-value	
new-value	
element-rule	
name	nexmooptions ¹⁶
parameter-name	
type	uri-host
action	replace
match-val-type	any
comparison-type	case-sensitive
match-value	
new-value	\$LOCAL_IP
header-rule	
name	nexmosipoptions ¹⁷
header-name	TO
action	manipulate
comparison-type	case-sensitive
msg-type	any
methods	OPTIONS
match-value	
new-value	
element-rule	
name	nexmosipoptions
parameter-name	
type	uri-host
action	replace
match-val-type	any
comparison-type	case-sensitive
match-value	
new-value	sip.nexmo.com
header-rule	
name	nexmtoheader ¹⁸
header-name	TO
action	manipulate
comparison-type	case-sensitive

16 SIP manipulation rule developed for replacing the URI host IP to SBC WAN IP in the FROM header in the OPTIONS message

17 SIP manipulation rule developed for replacing the URI host IP to Nexmo FQDN in the TO header in the OPTIONS message

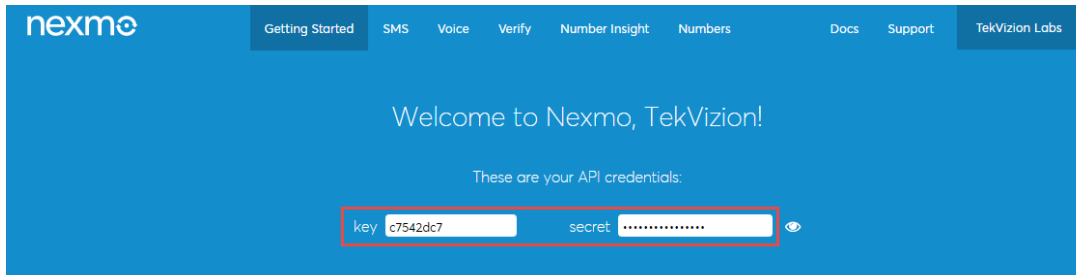
18 SIP manipulation rule developed for replacing the URI host IP to Nexmo FQDN in the TO header

msg-type	request
methods	
match-value	
new-value	
element-rule	
name	nexmotoheader
parameter-name	
type	uri-host
action	replace
match-val-type	any
comparison-type	case-sensitive
match-value	
new-value	sip.nexmo.com

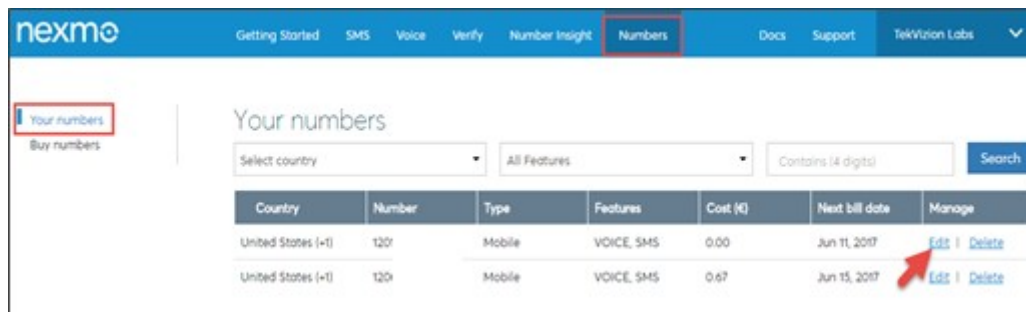
4.4 Nexmo Configuration

4.4.1 Configure Numbers in Nexmo Account

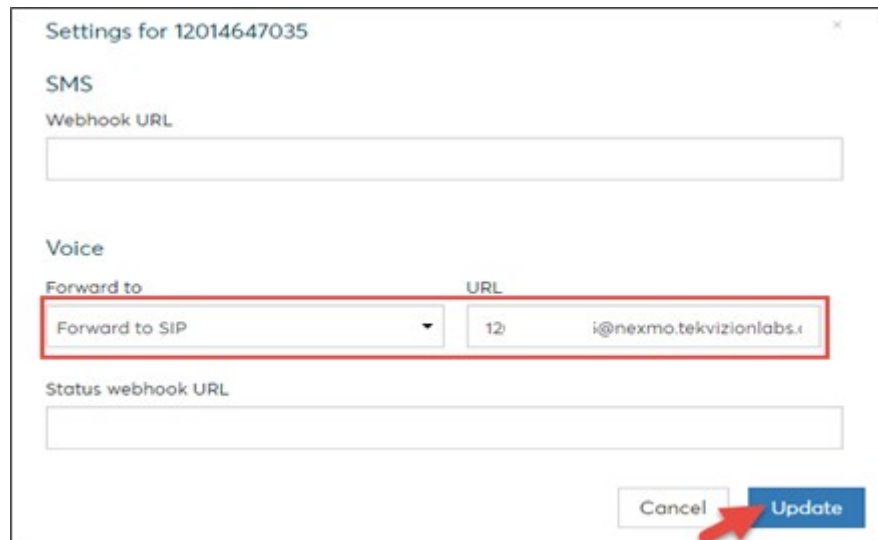
1. Login to the Nexmo account using the credentials provided at the time of registration. A **Key** and **Secret** will be displayed on the dashboard and this can be used as the username and password for Registration SIP Trunks.



2. In order to provide the URL to which the call has to be routed from Nexmo, navigate to the **Numbers** tab
3. Click **Edit** against each number as shown below



4. A pop-up will be displayed
5. Select the **"Forward to"** and provide the URL to which the calls route
6. Click **Update** to save the changes



5 Summary of Tests and Results

N/S = Not Supported N/T= Not Tested N/A= Not Applicable

Test Case #	Test Case Description	Result	Notes
1	Calling Party Disconnects Before Answer	PASS	

2	Calling Party Disconnects After Answer	PASS	
3	Called Party Disconnects After Answer	PASS	
4	Three Way Calling	PASS	
5	Calling Party Presentation Restricted	PASS	
6	Calling Party Disconnect Before Answer	PASS	
7	Calling Party Disconnects after Answer	PASS	
8	Called Party Disconnects after Answer	PASS	
9	Calling Party Receives Busy	PASS	
10	International Outbound Dialing	PASS	
11	Outbound Call Forward Always	PASS	
12	Outbound Call Forward Not Available (Ring No Answer)	PASS	
13	Outbound Consultative Call Transfer	PASS	
14	Outbound Semi-Attended/Blind Call Transfer	PASS	
15	Outbound Call Hold	PASS	
16	Terminate Early Media Outbound Call Before Answer	PASS	
17	Early Media Forward Call	PASS	
18	Outbound, Wait for Session Audit	PASS	No Session Audit message is sent by Nexmo. HMR rule is applied in E-SBC to initiate Nexmo to send Session refresh at specified interval.
19	Inbound, Wait for Session Audit	PASS	
20	Outbound DTMF (RTPevent)	PASS	
21	Inbound DTMF(RTPevent)	PASS	