SIP Trunking Configuration Guide
for
Microsoft Teams Direct Routing
Using Ribbon SBC 2000

Document Version 1.2

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1   Audience

This document is intended for the Spectrum Enterprise ("Spectrum") SIP Trunk customer's technical staff and Value Added Retailer (VAR) having installation and operational responsibilities.

2   Introduction

This Configuration Guide describes configuration steps for Spectrum SIP Trunking to Microsoft Teams via Ribbon SBC.

This Guide is written for Ribbon SBCs; however, the general information and configuration steps may be applied to other SBCs certified by Microsoft for Direct Routing. Ribbon-specific elements are called out in the text.
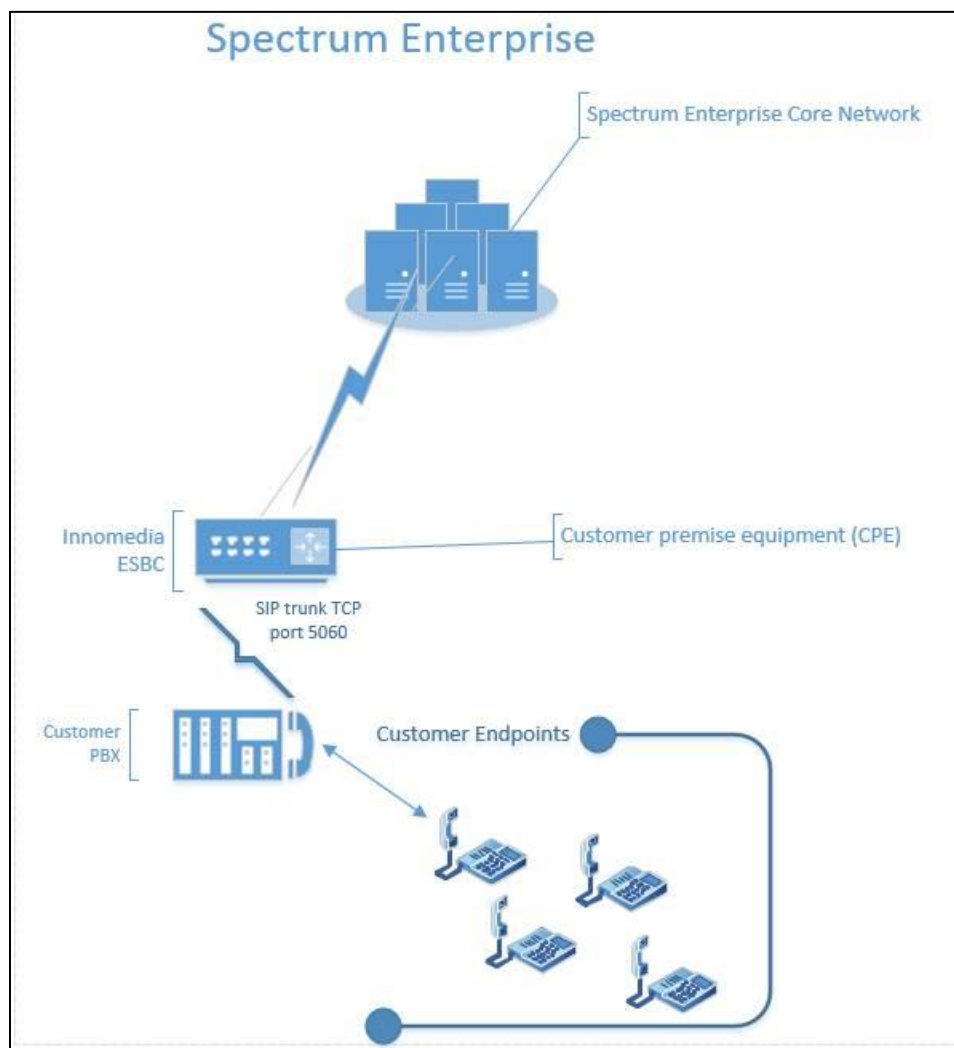
Figure 1: MSO Network

3 SIP Trunking Network Components

The network for the SIP trunk reference configuration is illustrated below and is representative of the Microsoft Teams Direct Routing to Spectrum using Ribbon SBC 2000.
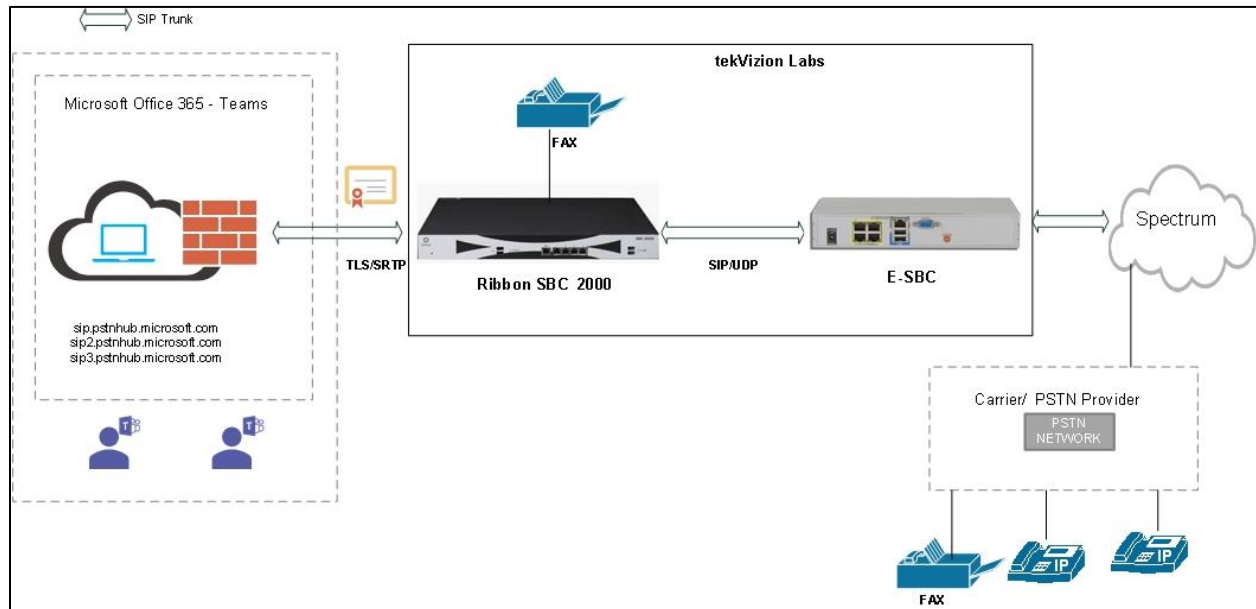

Figure 2: SIP Trunk Lab Reference Network

The lab network consists of the following components:
* Microsoft Office 365 Tenant
* Ribbon SBC 2000
* Ribbon 1k (Version 8.0.3 Build Number 537) is used as SBC for fax test cases due to non-existence of FXS ports in Ribbon 2K (Limitation in hardware). Note: Ribbon 1K and Ribbon 2K belong to same base version.
* The Spectrum E-SBC is the SIP interface to the customer's SIP PBX. The E-SBC acts as a B2BUA and anchors all SIP and RTP packets to the Spectrum SIP Trunks.
* Customer must configure their LAN/VLAN to support Spectrum service.

3.1 Spectrum Enterprise Service Gateway

Spectrum Enterprise Trunking delivers high-quality, secure voice service that can easily scale to shifting business needs. Furthermore, Enterprise Trunking provides the flexibility and productivity features of SIP and PRI voice solutions—backed by competitive service level agreements (SLAs)—over a private, fiber network to ensure quality, reliability and security.

3.2 Hardware Components

* Ribbon SBC 2000
* Spectrum (Innomedia) ESBC (Provided and managed by Spectrum)

3.3 Software Requirements

- Ribbon SBC 2000 Version 8.0.3 Build 537
- Microsoft Teams Client Version 1.3.00.13565
- Spectrum (Innomedia) ESBC 9378-4B-2.0.13.0-Build8 – Provided and managed by Spectrum

3.4 PBX Configuration

Table 1 - PBX Configuration

PBX Parameter	PBX Configuration
SIP Messages	Anchored by Microsoft Phone System
RTP Packets	Tested for both Media flows from Ribbon SBC to Teams Client directly and Media flows via Microsoft Phone System
SIP Registration to ESBC	Non-registering trunk to ESBC
DTMF offer on calls	RFC2833

4 Features

4.1 SIP Registration Method

Spectrum supports but does not require SIP REGISTER methods. Spectrum requires the SIP PBX to have a static IP address and provide the address to Spectrum for ESBC provisioning.

4.2 Features Supported

- Basic inbound and outbound calls using G.711ulaw
- Hold/Resume
- Call Transfer
- Call Forward No Answer
- Call Forward Always
- Simultaneous Ring
- Three-Way Calling
- Call Waiting
- CLID Restriction
- Early Media
- Session Audit
- DTMF RFC2833
- Fax (G711 and T38)

4.3 Features Not Supported

- G729 codec is not supported by Spectrum

4.4 Caveats, Limitations and Known Issues

- Spectrum Innomedia SBC accepts both G711 and T38 Fax re-INVITE. Hence fallback from T38 to G711 is not tested
- Ribbon 1k (Version 8.0.3 Build Number 537) is used as SBC for fax test cases due to non-existence of FXS ports in Ribbon 2K (Limitation in hardware). Note: Ribbon 1K and Ribbon 2K belong to same base version
- Ribbon 1K supports only G3 with the speed limitation up to 14,400 b/s

5 Configuration

5.1 Configuration Checklist

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.

Table 2 – IP Addresses

Component	Lab Value	Customer Value
E-SBC		
• LAN IP Address	10.64.5.1	
• LAN Subnet Mask	255.255.255.0	
Ribbon SBC 2000		
• WAN IP Address	10.64.5.10	
• Subnet Mask	255.255.0.0	
• WAN IP Address	192.65.X.X	
• Subnet Mask	255.255.255.0	

5.2 Microsoft Teams Direct Routing Configuration

- These are the main tasks to configure Microsoft Teams Direct Routing

  5.2.1 Create Users in Office 365
  5.2.2 Configure Calling policy to Users
  5.2.3 Configure User parameters
  5.2.4 Create Online PSTN Gateway
  5.2.5 Configure Online PSTN usage
  5.2.6 Configure Online PSTN Voice Route
  5.2.7 Configure Online Voice Routing Policy

5.2.1 Create Users in Office 365

- Login to http://portal.office.com/ using Office 365 tenant administrator credentials
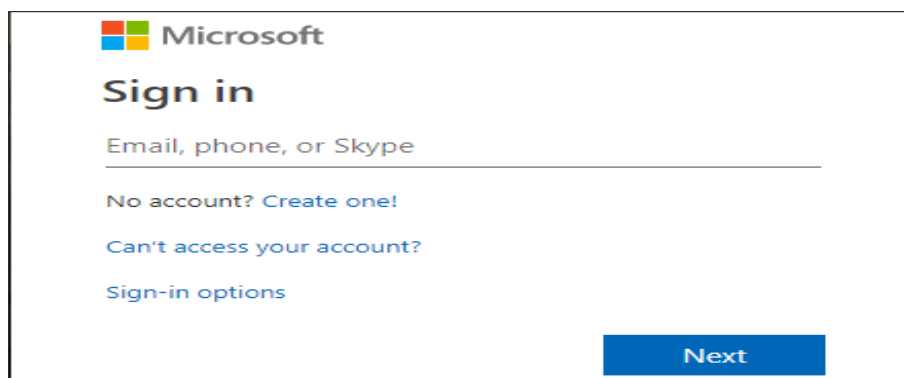
Figure 3: Office 365 Portal Login

- Select the Office 365 **Admin** Icon to login Office 365 admin center
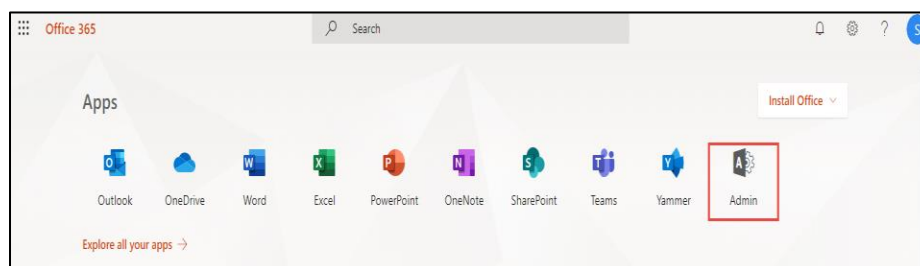
Figure 4: Office 365 Portal Login (cont.)

- Select **"Add a user"** from the Microsoft 365 admin center
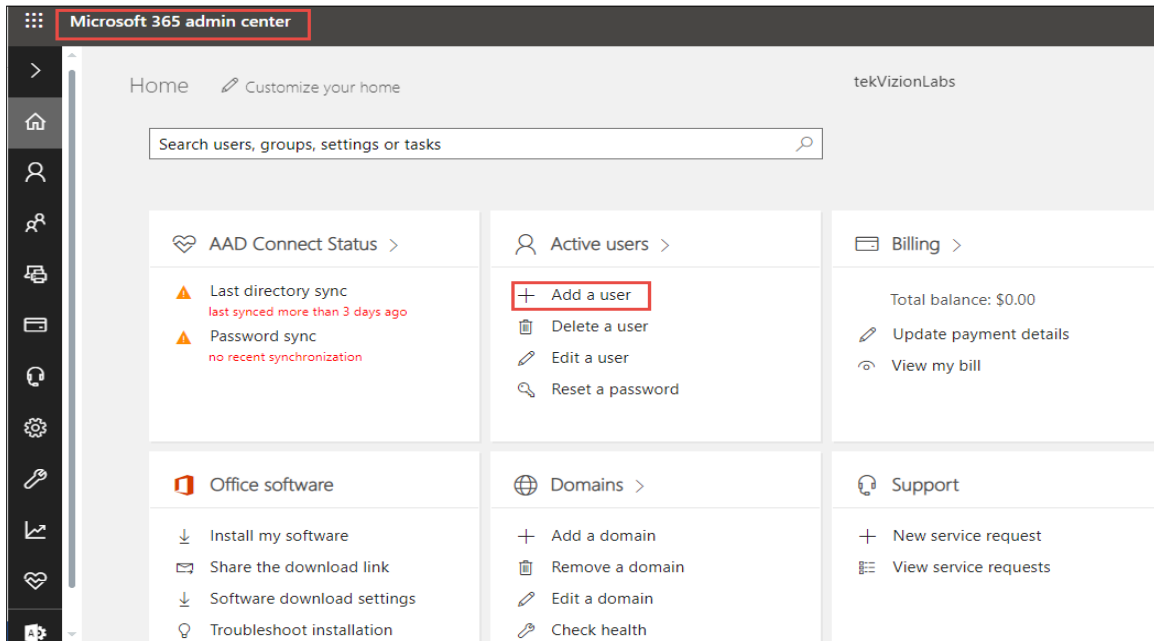
Figure 5: Teams user creation

- Enter the user details, password and assign required license to the users
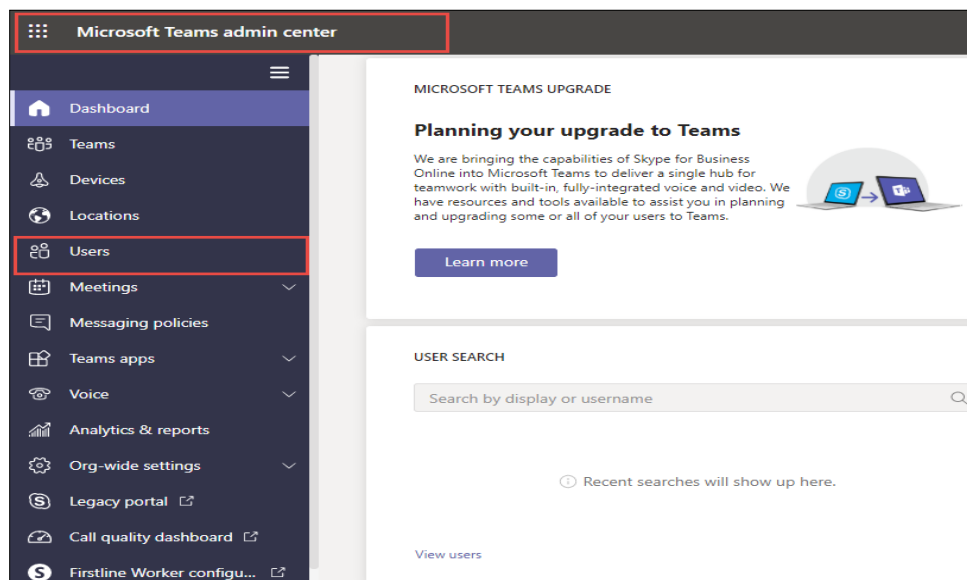

Figure 6: Teams user creation (cont.)

- Select the **Admin** icon from the Microsoft 365 admin center home page and navigate to **Microsoft Teams admin center**
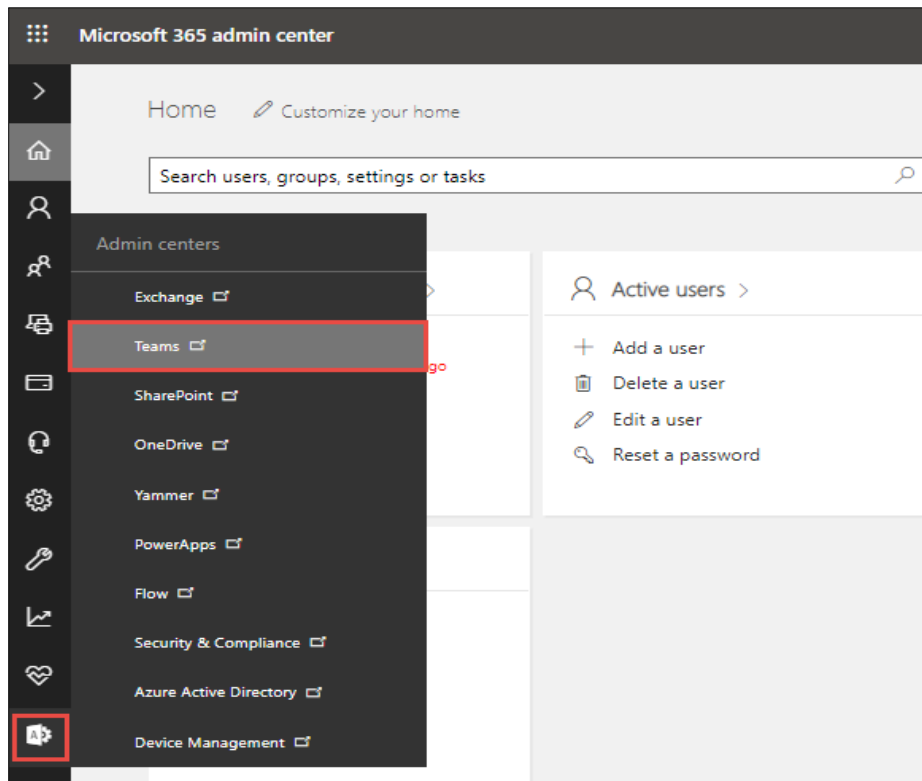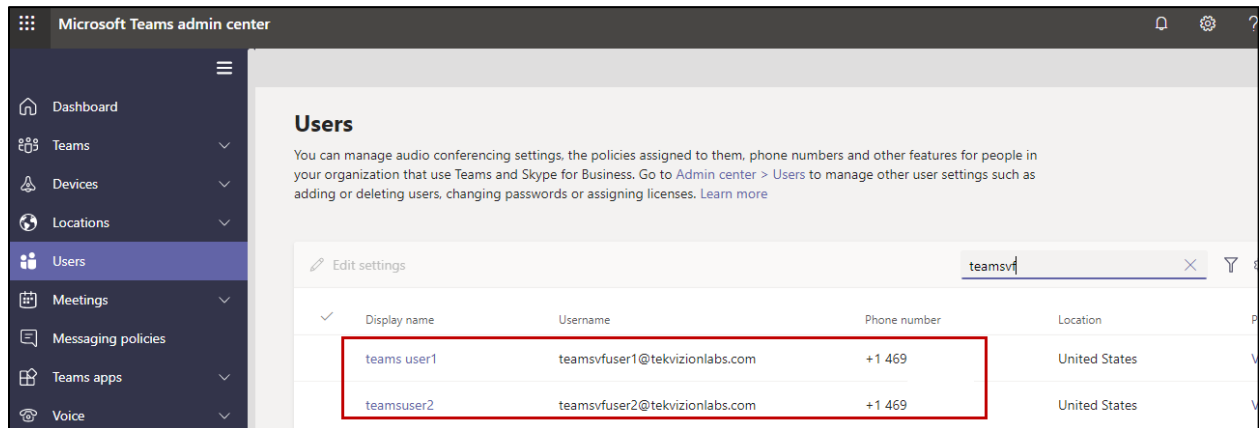

Figure 7: Teams user creation (cont.)

- Select **Users** from the Microsoft Teams admin center to view the list of available users

Figure 8: Teams user creation (cont.)

- Search for the created user and click on the user display name to view user properties

Figure 9: Teams user creation (cont.)

- Under user properties, navigate to **Account** and set the teams upgrade mode to **Teams Only**
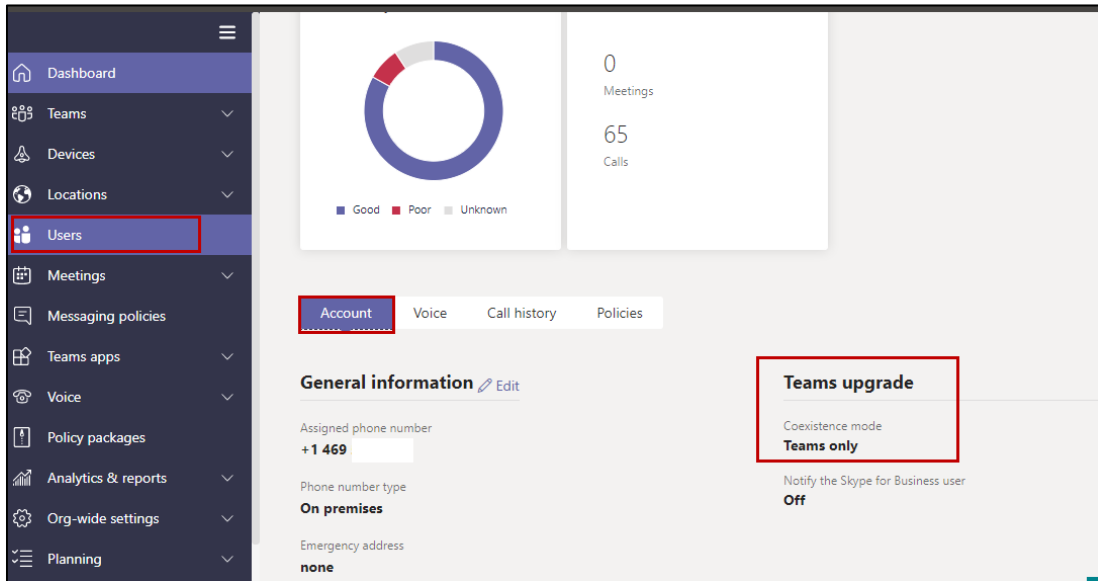
Figure 10: Teams user creation (cont.)

- Under user properties, navigate to **Policies** and set the Calling Policy as shown below. Here in the below example custom policy **"Call waiting"** is assigned to user.
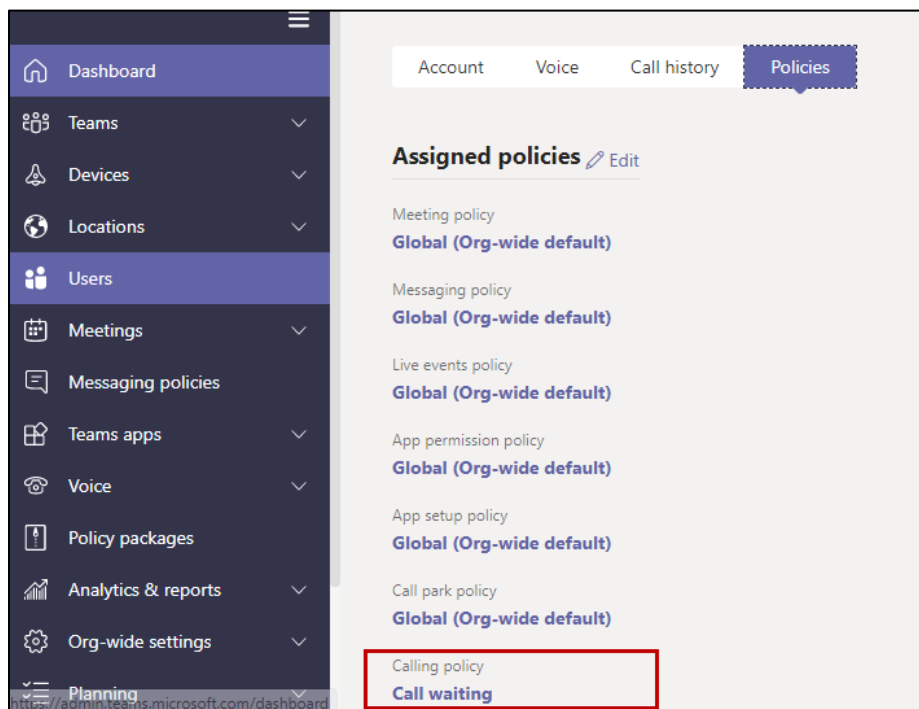

Figure 11: Teams user creation (cont.)

5.2.2 Configure Calling policy to Users

- To configure a custom policy, navigate to **Microsoft Teams admin center > Voice > Calling policies > Add**

Figure 12: Teams user creation (cont.)

- Below calling policy is created to turn on **Call waiting**

Figure 13: Teams user creation (cont.)

5.2.3   Configure User parameters

- Using the Remote PowerShell connect to Microsoft Office365 Tenant. Use the below commands to set DID and enable Enterprise Voice, Hosted Voicemail for Teams users.

```
Set-CsUser -Identity "<User name>" -EnterpriseVoiceEnabled $true -HostedVoiceMail $true -OnPremLineURI <E1.164 phone number with tel: prefixed>
```

- An example is shown below

```
Set-CsUser -Identity \.[redacted] -EnterpriseVoiceEnabled $true -HostedVoiceMail $true -OnPremLineURI tel:+[redacted]
```

Figure 14: Teams user configuration

5.2.4   Create Online PSTN Gateway

- Using administrator account connect to the remote PowerShell of office 365 tenant

> New-CsOnlinePSTNGateway -Fqdn <SBC FQDN> -SipSignallingPort <SBC SIP Port>
> -ForwardCallHistory $true –ForwardPai $true -MaxConcurrentSessions <Max Concurrent
> Sessions the SBC can handle> -Enabled $true

- After creating Online PSTN Gateway use "Get-CsOnlinePstnGateway" command to view the online PSTN gateway created. Gateway Identity must be a valid FQDN for the office 365 tenant to reach SBC

- An example is shown below for Media Bypass Enabled. Media Bypass parameter needs to be set to False to disable Media Bypass using the below command

> Set-CsOnlinePSTNGateway -Fqdn <SBC FQDN> -Identity –MediaBypass $False

```
PS C:\WINDOWS\system32> Get-CsOnlinePSTNGateway -Identity "sbc11.tekvizionlabs.com"


Identity                             : sbc11.tekvizionlabs.com
InboundTeamsNumberTranslationRules   : {}
InboundPstnNumberTranslationRules    : {}
OutboundTeamsNumberTranslationRules  : {}
OutboundPstnNumberTranslationRules   : {}
Fqdn                                 : sbc11.tekvizionlabs.com
SipSignalingPort                     : 5061
FailoverTimeSeconds                  : 10
ForwardCallHistory                   : True
ForwardPai                           : True
SendSipOptions                       : True
MaxConcurrentSessions                : 100
Enabled                              : True
MediaBypass                          : True
GatewaySiteId                        :
GatewaySiteLbrEnabled                : False
GatewayLbrEnabledUserOverride        : False
FailoverResponseCodes                : 408,503,504
GenerateRingingWhileLocatingUser     : True
PidfLoSupported                      : False
MediaRelayRoutingLocationOverride    :
ProxySbc                             :
BypassMode                           : None
```

Figure 15: Microsoft Teams – Online PSTN Gateway reference

5.2.5 Configure Online PSTN usage

- Use the below command to add a new PSTN usage

```
Set-CsOnlinePstnUsage -identity Global -Usage @{Add="<usage name>"}
```

- After creating Online PSTN usage use the command "(Get-CsOnlinePstnUsage).usage" to view the online pstn usage created. Example is shown below

```
PS C:\WINDOWS\system32> (Get-CsOnlinePstnUsage).usage
US and Canada
Test
CCE
Non E.164
ThinkTel
sbc3
sbc4
Newsbc2
sbc5
sbc2
emergencyusage
SBC6
emergencyusagesbc6
sbc7
sbc8
sbc9
emergencyusagesbc2
sbc10
emergencyusagesbc3
emergencysbc2
<sbc11>
sbc11
sbc12
sbc13
```

Figure 16: Microsoft Teams – Online PSTN usage reference

5.2.6 Configure Online Voice Route

- Use the below command to add a new online Voice Route and associate the online pstn usage with online PSTN gateway created earlier

```
New-CsOnlineVoiceRoute -Identity "<Route name>" -NumberPattern ".*"
-OnlinePstnGatewayList "<SBC FQDN>" -Priority 1 -OnlinePstnUsages "<PSTN usage name>"
```

- After creating online voice route use "Get-CsOnlineVoiceRoute" command to view the online voice route created. Here we can see the association of PSTN usage with the PSTN gateway. Example is shown below

```
PS C:\WINDOWS\system32> Get-CsOnlineVoiceRoute -Identity sbc11


Identity             : sbc11
Priority             : 2
Description          :
NumberPattern        : .*
OnlinePstnUsages     : {sbc11}
OnlinePstnGatewayList : {sbc11.tekvizionlabs.com}
Name                 : sbc11
```

Figure 17: Microsoft Teams – Online PSTN Voice Route reference

5.2.7 Configure Online Voice Routing Policy

- Create a new online Voice Routing Policy using the below command

```
New-CsOnlineVoiceRoutingPolicy "<policy name>" -OnlinePstnUsages "<pstn usage name>"
```

- After creating online Voice Routing Policy use "Get-CsOnlineVoiceRoutingPolicy" command to view the online Voice Routing Policy created. Example is shown below

```
PS C:\WINDOWS\system32> Get-CsOnlineVoiceRoutingPolicy -Identity sbc11


Identity          : Tag:sbc11
OnlinePstnUsages  : {sbc11}
Description       :
RouteType         : BYOT
```

Figure 18: Microsoft Teams – Online PSTN Voice Routing Policy reference

- Associate Teams user with online voice routing policy using the below command.
- Note: Online Voice Routing is created using above steps

```
Grant-CsOnlineVoiceRoutingPolicy -Identity "<User name>" -PolicyName "<policy name>"
```

```
PS C:\WINDOWS\system32> Grant-CsOnlineVoiceRoutingPolicy -Identity teamsvfuser1 -PolicyName sbc11
```
Figure 19: Voice Route Policy Creation

5.3   Ribbon SBC Configuration

- Below are the main tasks to configure Ribbon SBC 2000 Version 8.0.3 Build 537 for Microsoft Teams Direct Routing and towards Spectrum

    5.3.1 Login to Ribbon SBC 2000
    5.3.2 Create Logical Interfaces
    5.3.3 Configure System Information
    5.3.4 Configure SRTP for Teams
    5.3.5 Create TLS Profile and Generate CSR
    5.3.6 Create SIP Profile
    5.3.7 Configure FXS Port
    5.3.8 Create FXS Profile
    5.3.9 Create Media Profiles
    5.3.10 Create Media List
    5.3.11 Create SIP Server Tables
    5.3.12 Create Signaling Groups
    5.3.13 Create Call Routing Table
    5.3.14 Create Transformation Table
    5.3.15 Message Manipulations

5.3.1   Login to Ribbon SBC 2000

- Log into Ribbon SBC 2000 web interface through its Management IP Address
- Enter the Username and Password, Click Login

Figure 20: Ribbon SBC Login

5.3.2 Create Logical Interfaces

- To configure Logical Interfaces navigate to **Settings > Node Interfaces > Logical Interfaces**. Create Logical Interfaces for Spectrum and Teams as shown below

Figure 21: Ribbon SBC – Logical Interface towards Spectrum

5.3.3 Configure System Information

- Navigate to **Settings > System > Node-Level Settings** to configure DNS Server IP, Host Name and Domain Name as shown below

Figure 23: Ribbon SBC- System Information

5.3.4 Configure SRTP for Teams

- To configure SRTP towards Teams navigate to **Settings > Media > SDES-SRTP Profiles**. Create new SRTP profile for Teams as shown below

SRTP Config	
Description	SRTP_Profile_for_MSTeams
Operation Option	Required
Crypto Suite	AES_CM_128_HMAC_SHA1_80
Master Key	
Master Key Lifetime	Set
Lifetime Value	2^{31}
Derivation Rate	0
Key Identifier Length	1

Figure 24: Ribbon SBC- SRTP Profile for Teams

5.3.5 Create TLS Profile and Generate CSR

- Microsoft Teams Direct Routing allows only TLS connections from SBCs for SIP traffic with a certificate signed by one of the trusted Certification Authorities. Currently, supported Certification Authorities are:

  - AffirmTrust
  - AddTrust External CA Root
  - Baltimore CyberTrust Root
  - Buypass
  - Cybertrust
  - Class 3 Public Primary Certification Authority
  - Comodo Secure Root CA
  - Deutsche Telekom
  - DigiCert Global Root CA
  - DigiCert High Assurance EV Root CA
  - Entrust
  - GlobalSign
  - Go Daddy
  - GeoTrust
  - Verisign, Inc.
  - Starfield
  - Symantec Enterprise Mobile Root for Microsoft
  - SwissSign
  - Thawte Timestamping CA
  - Trustwave
  - TeliaSonera
  - T-Systems International GmbH (Deutsche Telekom)
  - QuoVadis

- To configure TLS profile navigate to **Settings > Security > TLS Profiles**. Create TLS profile for Teams as shown below

Figure 25: Ribbon SBC - TLS Profile for Teams

- Navigate to **Settings > Security > SBC Certificates > Generate SBC Edge CSR** to generate CSR as shown below.
- Note: Root Certificates used by Microsoft Direct Routing has to be uploaded to SBC trusted Root Certificates

Figure 26: Ribbon SBC- Generate CSR for Teams

- Copy and paste the generated CSR below and get it signed from CA trusted by direct routing

Figure 27: Ribbon SBC- CSR

- Navigate to **Settings > Security > SBC Certificates > SBC Edge Certificate** and upload the signed CA as shown below
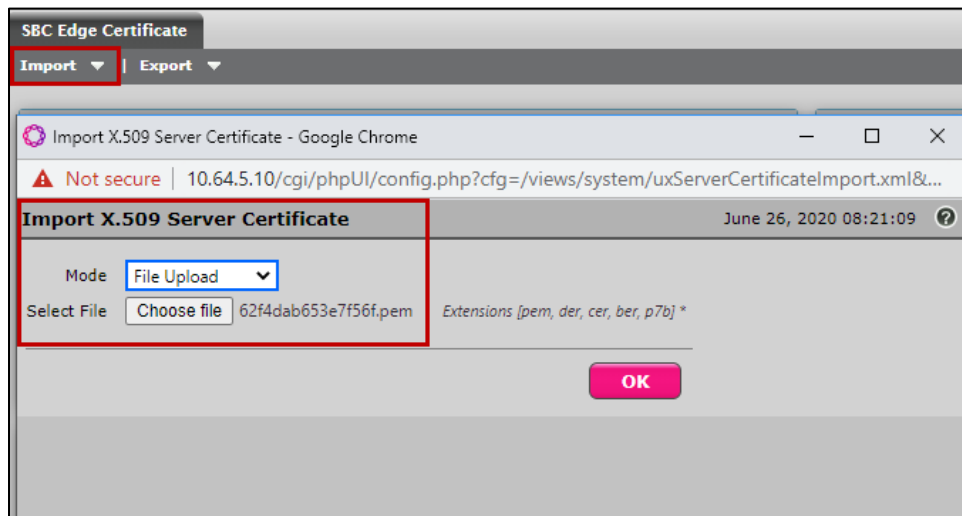
Figure 28: Ribbon SBC – Import SBC Edge Certificate

- SBC Edge Certificate is uploaded as shown below
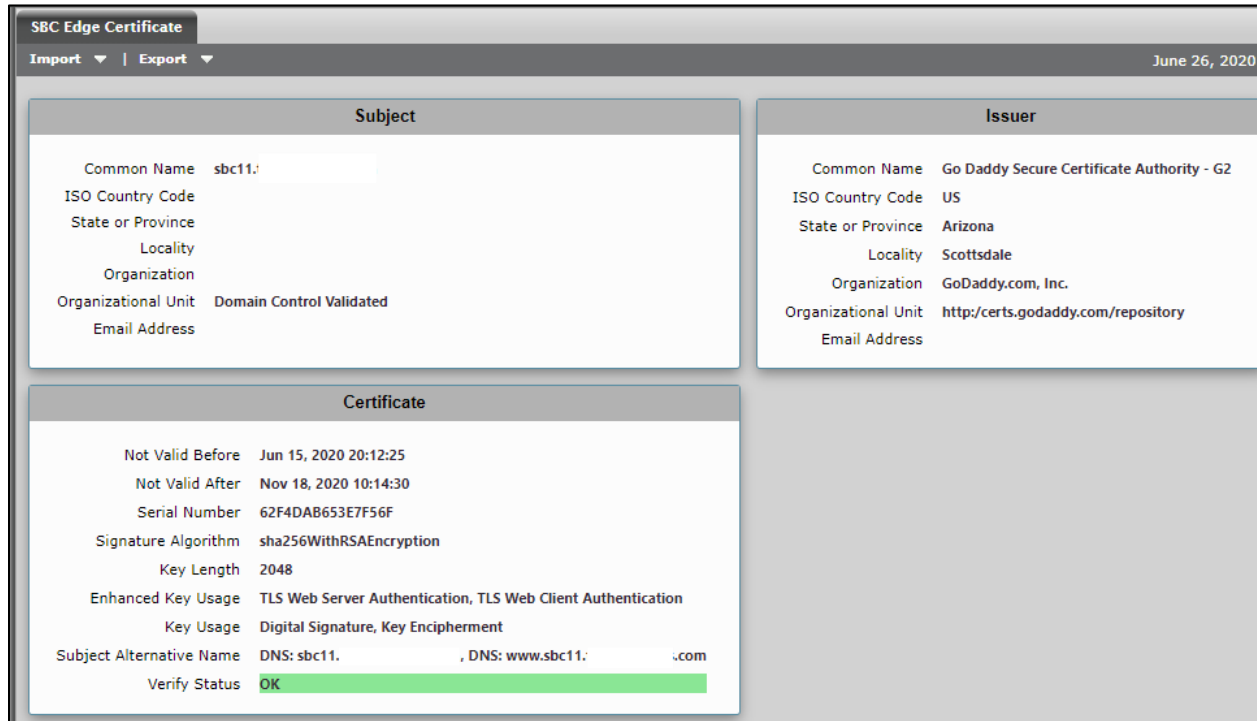
Figure 29: Ribbon SBC – SBC Edge Certificate

- Navigate to **Settings > Security > SBC Certificates > Trusted CA Certificates** and import the Root and Intermediate Certificates for Teams as shown below
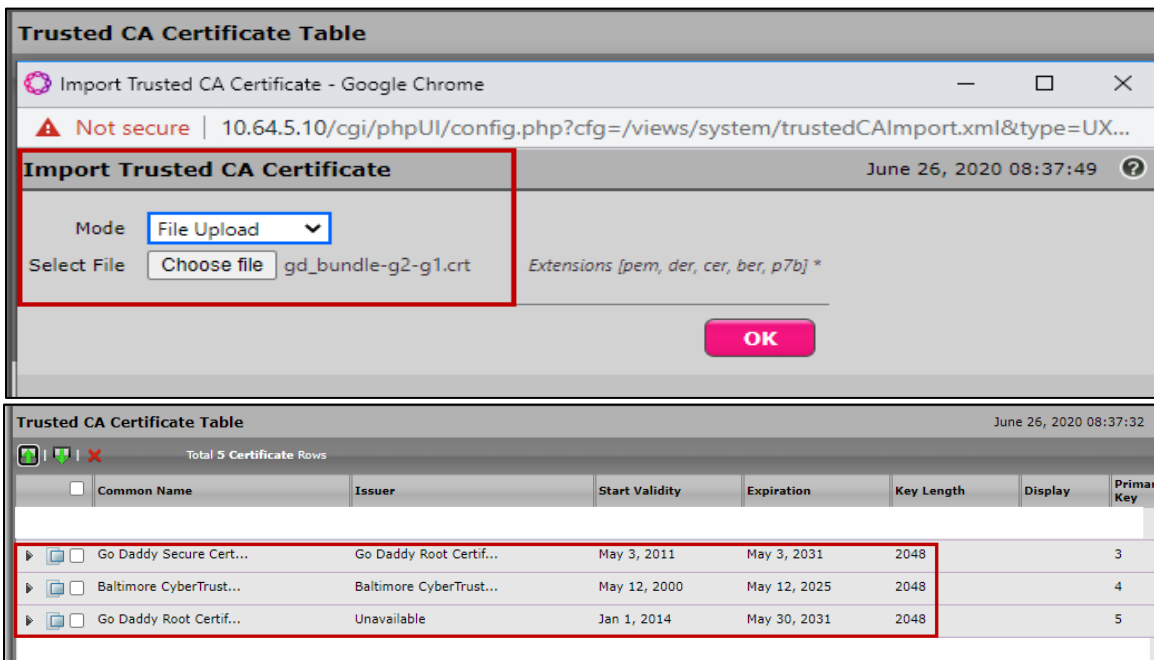
Figure 30: Ribbon SBC – Root Certificates for Teams

5.3.6 Create SIP Profile

- To configure SIP profile navigate to **Settings > SIP > SIP Profiles**. Create SIP profiles for Spectrum and Teams as shown below

Figure 31: Ribbon SBC – SIP Profile for Spectrum

Figure 32: Ribbon SBC – SIP Profile for Teams

5.3.7 Configure FXS Port

- To configure FXS port navigate to **Settings > SIP > Node Interfaces > Ports> FXS Port**

Figure 33: Ribbon SBC – configure FXS Port

5.3.8 Create FXS Profile

- To configure FXS profile navigate to **Settings > SIP > CAS > CAS Signaling Profiles > Create CAS Profile > FXS Profile**. Create FXS profiles for Fax as shown below

Figure 34: Ribbon SBC – FXS Profile for Spectrum

5.3.9 Create Media Profiles

- To configure Media Profile navigate to **Settings > Media > Media Profiles > Create Media Profile > Fax Codec Profile**. Configure the Media Profile for T38 Fax as shown below

Figure 35: Ribbon SBC – T38 Fax Profile for Spectrum

5.3.10 Create Media List

- To configure Media List navigate to **Settings > Media > Media List**. Configure the Media List for Spectrum and Teams as shown below

Figure 36: Ribbon SBC – Media Profile for Spectrum

Figure 37: Ribbon SBC – T38 Fax Profile for Spectrum

Figure 38: Ribbon SBC – Media Profile for Teams

5.3.11 Create SIP Server Tables

- To configure SIP Server tables, navigate to **Settings > SIP > SIP Server Tables**. Click the **+** icon to create a new entry for Spectrum and Teams
- Select **Spectrum** from the left pane and select **IP/QDN** from the **Create SIP Server** as shown below
- Repeat the same procedure to create SIP Server for Teams
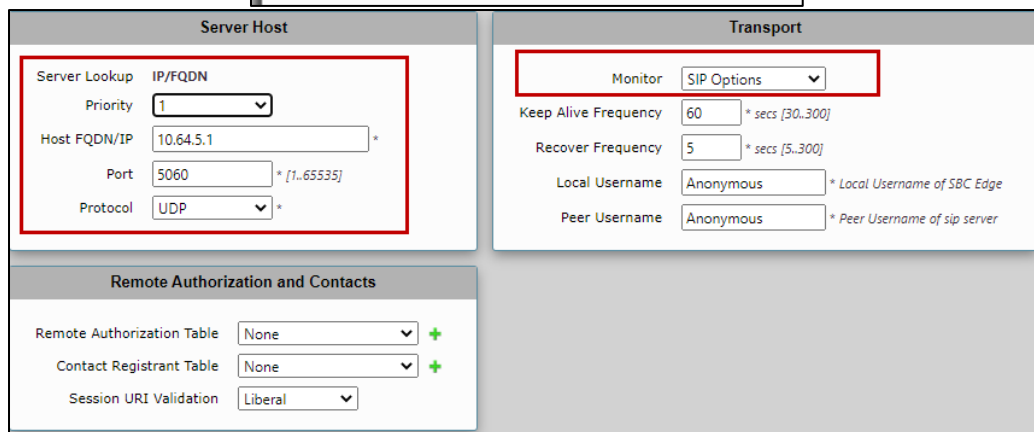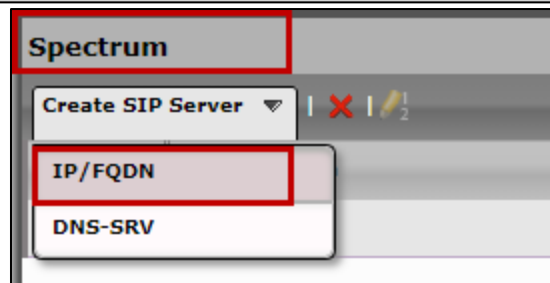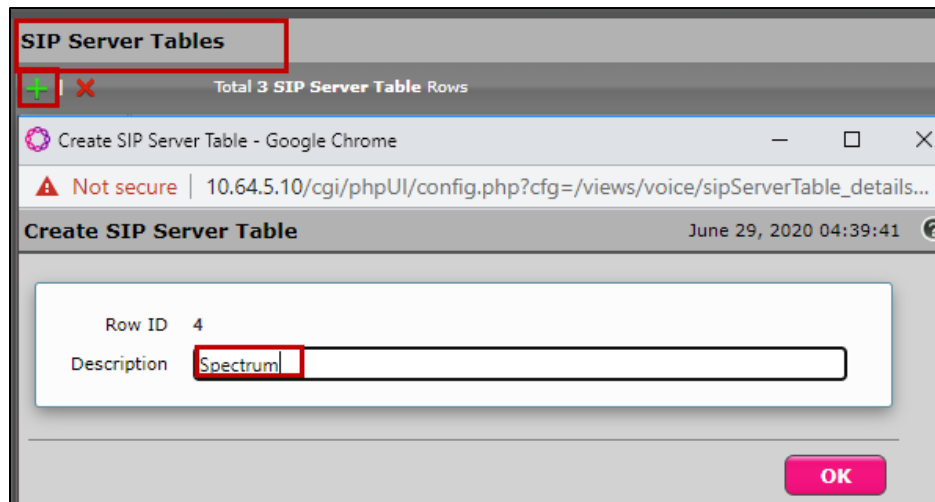
Figure 39: Ribbon SBC – Spectrum SIP Server Configuration

Figure 40: Ribbon SBC – Teams SIP Server Configuration

5.3.12 Create Signaling Groups

- Navigate to **Settings > signaling Groups**. Select **Create Signaling Group > SIP Signaling Group** and create Signaling group for Spectrum and Teams as shown below
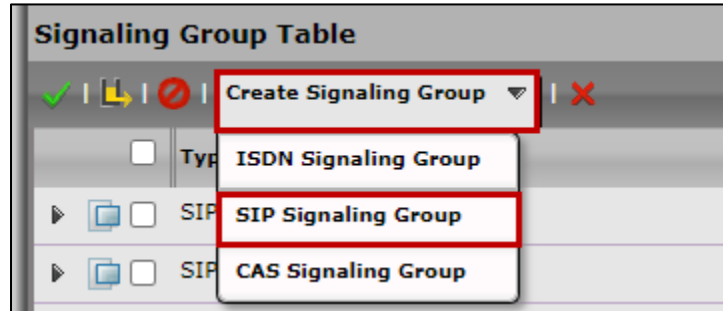
Figure 41: Ribbon SBC – Create SIP Signaling Group

| SIP | **Spectrum** | ✓ | **Up** | Counters \| Channels \| Sessions |

Admin State: Enabled

Service Status: Up

SIP Channels and Routing

Action Set Table	None +
Call Routing Table	ToTeams +
No. of Channels	60 * [1..960]
SIP Profile	Spectrum_Profile +
SIP Mode	Basic Call
Agent Type	Back-to-Back User Agent
Interop Mode	Standard
SIP Server Table	Spectrum +

Load Balancing	Round Robin
Channel Hunting	Most Idle
Notify Lync CAC Profile	Disable
Challenge Request	Disable
Outbound Proxy IP/FQDN	
Outbound Proxy Port	5060 [1..65535]
No Channel Available Override	34: No Circuit/Channel Available
Call Setup Response Timer	255 [180..750] secs
Call Proceeding Timer	180 [24..750] secs
QoE Reporting	Disabled
Use Register as Keep Alive	Enable
Forked Call Answered Too Soon	Disable

Media Information

Supported Audio/Fax Modes	DSP / Proxy / Direct Add/Edit Remove *
Supported Video/Application Modes	Disabled
Media List ID	Spectrum_ML +
Play Ringback	Auto on 180/183
Tone Table	Default Tone Table +

Play Congestion Tone	Disable
Early 183	Enable
Allow Refresh SDP	Enable
Music on Hold	Disabled
RTCP Multiplexing	Disable

Mapping Tables

SIP To Q.850 Override Table	Default (RFC4497) +
Q.850 To SIP Override Table	Default (RFC4497) +
Pass-thru Peer SIP Response Code	Enable

SIP IP Details

Signaling/Media Source IP	Ethernet 1 IP (10.64.5.10)
Signaling DSCP	40 * [0..63]

NAT Traversal

ICE Support	Disabled

Static NAT - Outbound

Outbound NAT Traversal	None

Static NAT - Inbound

Detection	Disabled

Listen Ports

Total 2 SIP Listen Port Rows

	Port	Protocol	TLS Profile ID
	5060	UDP	N/A
	5060	TCP	N/A

Federated IP/FQDN

Total 1 SIP Federated IP Row

	IP/FQDN	Netmask/Prefix
	10.64.5.1	255.255.0.0

Message Manipulation: Enabled

Inbound Message Manipulation

Message Table List   Up / Down / Add/Edit / Remove *

Outbound Message Manipulation

Message Table List   Modify_Diversion / Referred-by   Up / Down / Add/Edit / Remove *

Figure 42: Ribbon SBC – Spectrum SIP Signaling Group

- Navigate to **Settings > signaling Groups**. Select **Create Signaling Group > CAS Signaling Group** and create Signaling group for Fax as shown below

**Figure 43: Ribbon SBC – CAS Signaling Group for Fax**

- Note: **RTCP Multiplexing** and **ICE Support** is **Enabled** only when Media Bypass is Enabled

Figure 44: Ribbon SBC – Teams SIP Signaling Group
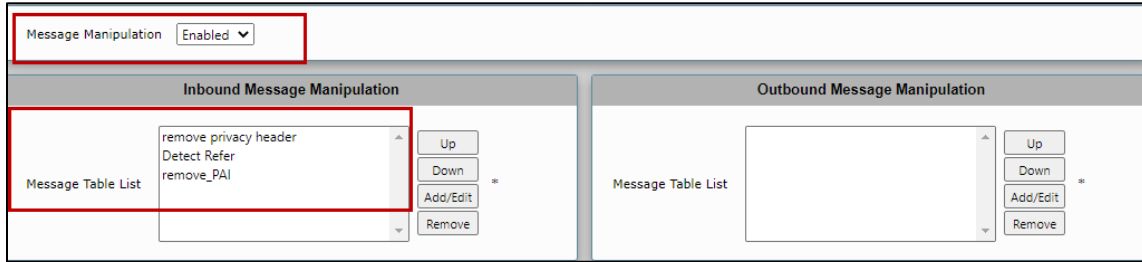
Figure 45: Ribbon SBC – Teams SIP Signaling Group (cont.)

5.3.13 Create Call Routing Table

- Navigate to **Settings > Call Routing > Call Routing Table**. Click on the **+** icon to create a new entry
- Create **Call routing table** for **Spectrum, Fax** and **Teams** as shown below
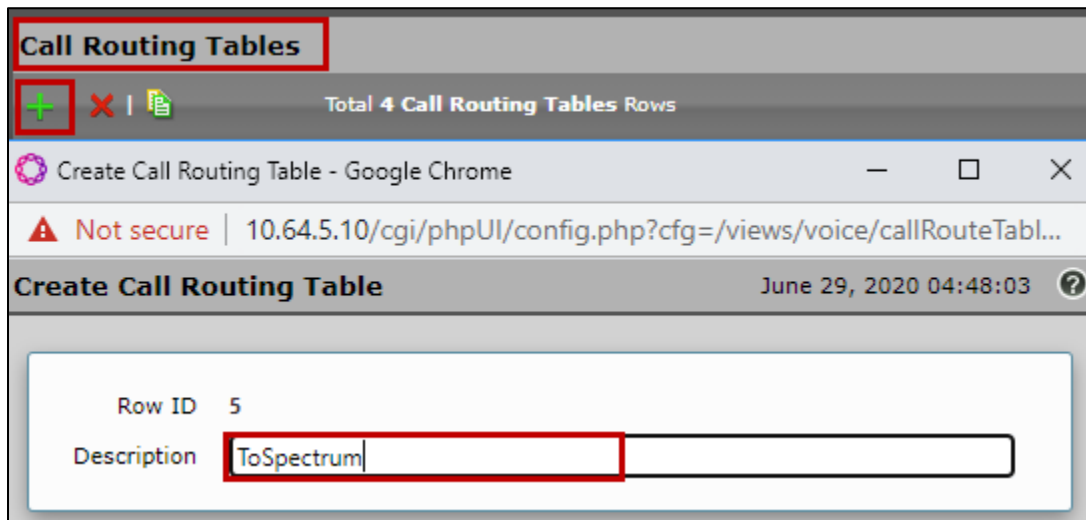
Figure 46: Ribbon SBC – Create Call Routing Table

Figure 47: Ribbon SBC – Create Call Routing Table to Spectrum

Figure 48: Ribbon SBC – Create Call Routing Table to Fax

Description	To Teams
Admin State	Enabled
Route Priority	2
Call Priority	Normal
Number/Name Transformation Table	To Teams
Time of Day Restriction	None

Destination Information

Destination Type	Normal
Message Translation Table	None
Cause Code Reroutes	None
Cancel Others upon Forwarding	Disabled
Fork Call	No
Destination Signaling Groups	(SIP) Teams — Up / Down / Add/Edit / Remove
Enable Maximum Call Duration	Disabled

Media

Audio/Fax Stream Mode	DSP
Video/Application Stream Mode	Disabled
Media Transcoding	Enabled
Media List	None

Quality of Service

Quality Metrics Number of Calls	10	[1..100]
Quality Metrics Time Before Retry	10	[1-60] min.
Min. ASR Threshold	0	% [0..100]
Enable Min MOS Threshold	Disabled	
Enable Max. R/T Delay	Enabled	
Max. R/T Delay	65535	ms [1..65535]
Enable Max. Jitter	Enabled	
Max. Jitter	3000	ms [1..3000]

Figure 49: Ribbon SBC – Create Call Routing Table to Teams

5.3.14 Create Transformation Table

- Navigate to **Settings > Call Routing > Transformation**. Click on the **+** icon to create a new entry for Spectrum, Fax and Teams as shown below

Figure 50: Ribbon SBC – Create Transformation Table to Spectrum

Figure 51: Ribbon SBC – Create Transformation Table to Fax

Figure 52: Ribbon SBC – Create Transformation Table to Teams

5.3.15 Message Manipulations

- Message Manipulation rule for **Detect Refer** is created for Ribbon SBC to handle REFER message sent from Teams

- Navigate to **Settings > SIP > Message Manipulation > Message Rule Table**. Create a new entry for **"Detect Refer"** using the **+** icon

Figure 53: Ribbon SBC – Message Manipulation towards Teams

- Navigate to **Settings > SIP > Message Manipulation > Message Rule Tables > Detect Refer > Create Rule > Request Line Rule**
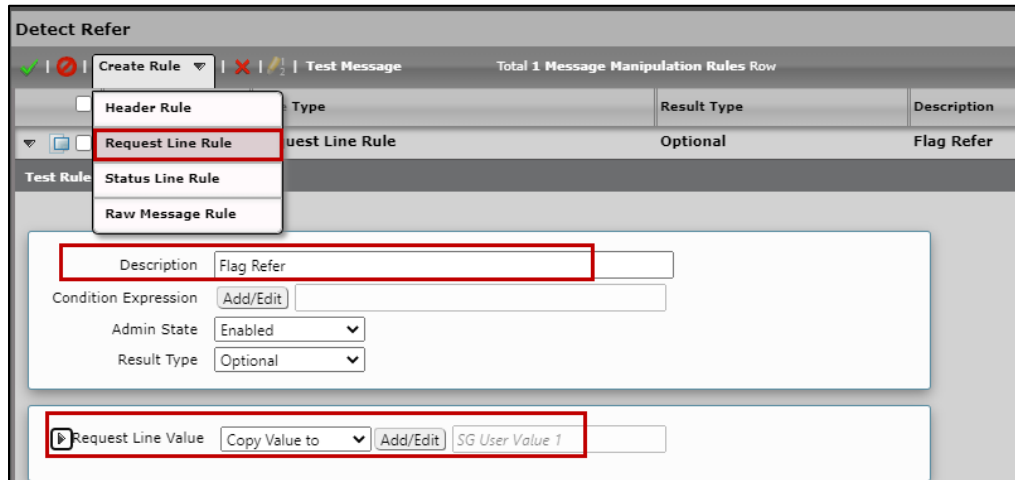
Figure 54: Ribbon SBC – Message Manipulation towards Teams (cont.)

- Navigate to **Settings > SIP > Call Routing > Transformation**. Click on the **+** icon to create a new Transformation Table entry for **"only If REFER"**. Select **"only If REFER"** from the left pane to configure REFER handling as shown below
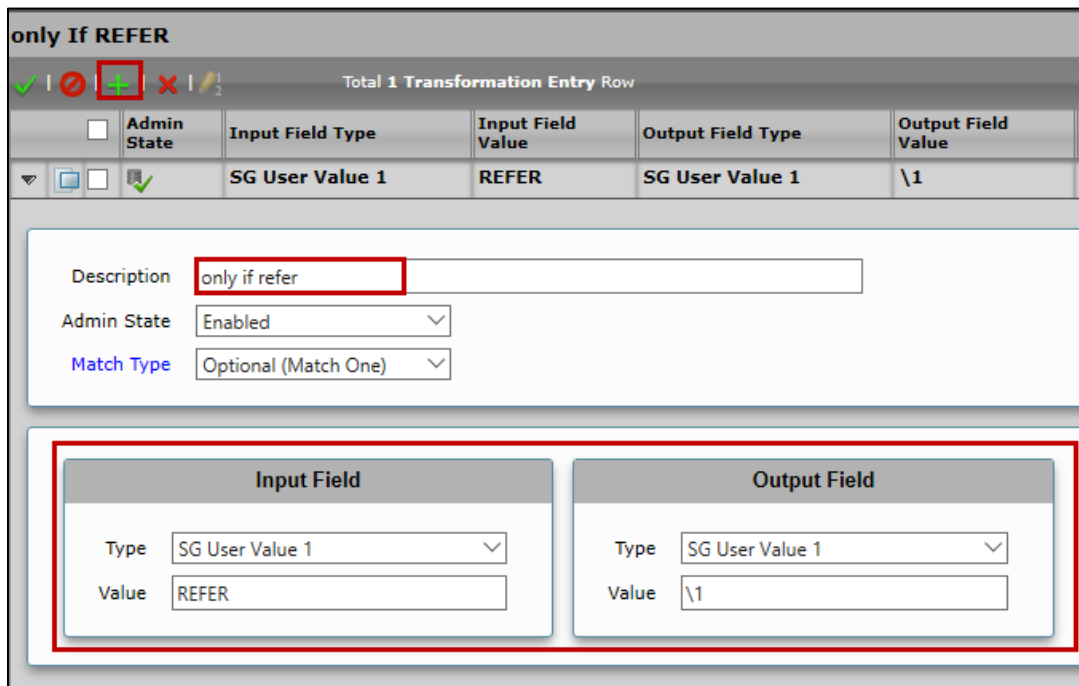
Figure 55: Ribbon SBC – Message Manipulation towards Teams (cont.)

- Navigate to **Settings > Call Routing > Call Routing Table**. Click on the **+** icon to create a new Routing Table entry for **"Refer to teams"**. Select **"Refer to Teams"** from the left pane and Click on the **+** icon. Configure the Routing table for REFER towards Teams as shown below

Figure 56: Ribbon SBC – Message Manipulation towards Teams (cont.)

- Similarly Message Manipulation Rule is created to handle Privacy header from Teams. Navigate to **Settings > SIP > Message Manipulation > Condition Rule Table**. Create a rule for **"Match host in From header"** as shown below

Figure 57: Ribbon SBC – Message Manipulation towards Spectrum (cont.)

- Navigate to **Settings > SIP > Message Manipulation > Message Rule Tables** and create Header Rule for **"remove privacy header"** as shown below

Figure 58: Ribbon SBC – Message Manipulation towards Spectrum (cont.)

- Navigate to **Settings > SIP > Message Manipulation > Message Rule Tables** and create Header Rule for **"Modify_Diversion"** to remove +1 towards Spectrum as shown below

Figure 59: Ribbon SBC – Message Manipulation towards Spectrum (cont.)

- Navigate to **Settings > SIP > Message Manipulation > Message Rule Tables** and create Header Rule for **"Referred-by"** to remove +1 towards Spectrum as shown below

Figure 60: Ribbon SBC – Message Manipulation towards Spectrum (cont.)

- Navigate to **Settings > SIP > Message Manipulation > Message Rule Tables** and create Header Rule for "remove_pai" to remove P-Asserted-Identity header sent from Teams as shown below

Figure 61: Ribbon SBC – Message Manipulation towards Spectrum (cont.)

5.4   Spectrum ESBC Configuration

For enabling Session Audit in the ESBC, below are the configuration changes made.

1. ESBC SIP PBX profile needs to have the option selected to pass UPDATE messages from the SIP provider network as seen in the screenshot below;

Figure 62: SIP PBX Profile

2. The "Trunk SIP Profile" that is in use on the ESBC (default is the TWC SIP trunk profile) also needs to have the Forward Call Audit messages option selected.
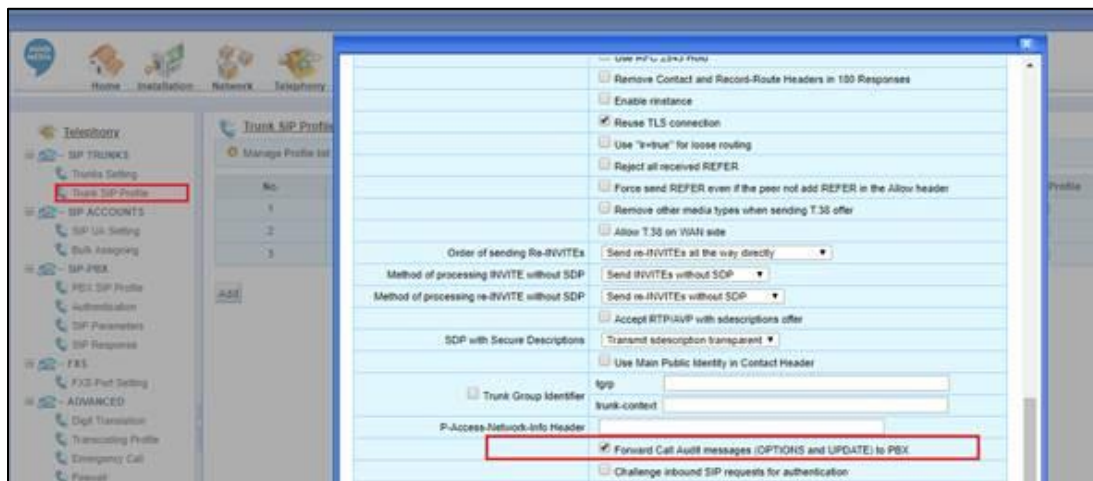
Figure 63: Trunk SIP Profile

If both of these options are not enabled, the SIP audit messages will not be passed from the provider SIP trunk to the PBX.

5.5 Test Results

Test Case #	Test Case Description	Results	Notes
	Inbound Calling Test Cases (Media Bypass Enabled)		
1.1	Calling Party Disconnects Before Answer	Pass	
1.2	Calling Party Disconnects After Answer	Pass	
1.3	Called Party Disconnects After Answer	Pass	
1.4	Calling Party Times Out	Pass	Teams sends 408 Request Timeout
1.5	Calling Party Places Call on Hold	Pass	
1.6	Called Party Places Call on Hold	Pass	
1.7	Calling Party Disconnects during Hold	Pass	
1.8	Calling Party Presentation Restricted	Pass	
	Outbound Calling Test Cases (Media Bypass Enabled)		
1.9	Calling Party Disconnects Before Answer	Pass	
1.10	Calling Party Disconnects After Answer	Pass	
1.11	Called Party Disconnects After Answer	Pass	
1.12	Calling Party Times Out	Pass	
1.13	Calling Party Receives Busy	Pass	
1.14	Outbound call to Unprovisioned Subscriber	Pass	
1.15	Calling Number Presentation	Pass	
1.16	Conference	Pass	
1.17	Outbound Call Hold	Pass	
1.18	Outbound Call Hold	Pass	
	Dialing Plan Test Cases (Media Bypass Enabled)		
1.19	International Outbound Dialing	Pass	
1.20	800/866/877/888 Outbound Dialing	Pass	
	Microsoft Teams Feature Test Cases (Media Bypass Enabled)		
1.21	Outbound Call Forward Always	Pass	
1.22	Outbound Call Forward Always to an Out of Service Subscriber	Pass	
1.23	Outbound Call Forward Not Available (Ring No Answer)	Pass	
1.24	Inbound Call Blind Transfer to PSTN	Pass	
1.25	Inbound Call Consultative Transfer to PSTN	Pass	
1.26	Outbound Call Blind Transfer to another PSTN	Pass	
1.27	Outbound Call Consultative Transfer to another PSTN	Pass	
1.28	Outbound Call Consultative Call Transfer to another Teams user	Pass	

1.29	Call Waiting	Pass	
	Early Media Test Cases (Media Bypass Enabled)		
1.30	Terminate Early Media Outbound Call Before Answer	Pass	Spectrum sends Session Refresh every 15 minutes
1.31	Early Media Forward Call	Pass	
1.32	Simultaneous Call/Ring to teams delegates	Pass	
	Session Audit Test Cases (Media Bypass Enabled)		
1.33	Outbound, Wait for Session Audit	Pass	
1.34	Inbound Call, Wait for Session Audit during Hold	Pass	
	DTMF Test Cases (Media Bypass Enabled)		
1.35	Outbound DTMF (RFC2833)	Pass	
1.36	Inbound DTMF (RFC2833)	Pass	
	Codec Test Cases (Media Bypass Enabled)		
1.37	Codec Support – ITSP support G711 codec	Pass	
1.38	Codec Support – ITSP support G729 codec	Not Applicable	Spectrum offer only G711U codec
	SRTP (Media Bypass Enabled)		
1.39	Verify SRTP negotiated in outbound call	Pass	
1.40	Verify SRTP negotiated in inbound call	Pass	
	SRTCP (Media Bypass Enabled)		
1.41	Verify SRTCP packets	Pass	
1.42	Verify SRTCP packets	Pass	
	Comfort Noise (Media Bypass Enabled)		
1.43	Verify Comfort Noise Packets in outbound call	Pass	
1.44	Verify Comfort Noise Packets in inbound call	Pass	
	Support For FailOver (Media Bypass Enabled)		
1.45	Fail over	Pass	
	SIP OPTIONS		
1.46	SIP OPTIONS – SBC to Teams	Pass	
1.47	SIP OPTIONS – Teams to SBC	Pass	
	Inbound Calling Test Cases (Media Bypass disabled)		
2.1	Calling Party Disconnects Before Answer	Pass	
2.2	Calling Party Disconnects After Answer	Pass	
2.3	Called Party Disconnects After Answer	Pass	

2.4	Calling Party Times Out	Pass	Teams sends 408 Request Timeout
2.5	Calling Party Places Call on Hold	Pass	
2.6	Called Party Places Call on Hold	Pass	
2.7	Calling Party Disconnects during Hold	Pass	
2.8	Calling Party Presentation Restricted	Pass	
	Outbound Calling Test Cases (Media Bypass disabled)		
2.9	Calling Party Disconnects Before Answer	Pass	
2.10	Calling Party Disconnects After Answer	Pass	
2.11	Called Party Disconnects After Answer	Pass	
2.12	Calling Party Times Out	Pass	
2.13	Calling Party Receives Busy	Pass	
2.14	Outbound call to Unprovisioned Subscriber	Pass	
2.15	Calling Number Presentation	Pass	
2.16	Conference	Pass	
2.17	Outbound Call Hold	Pass	
2.18	Outbound Call Hold	Pass	
	Dialing Plan Test Cases (Media Bypass disabled)		
2.19	International Outbound Dialing	Pass	
2.20	800/866/877/888 Outbound Dialing	Pass	
	Microsoft Teams Feature Test Cases (Media Bypass disabled)		
2.21	Outbound Call Forward Always	Pass	
2.22	Outbound Call Forward Always to an Out of Service Subscriber	Pass	
2.23	Outbound Call Forward Not Available (Ring No Answer)	Pass	
2.24	Inbound Call Blind Transfer to PSTN	Pass	
2.25	Inbound Call Consultative Transfer to PSTN	Pass	
2.26	Outbound Call Blind Transfer to another PSTN	Pass	
2.27	Outbound Call Consultative Transfer to another PSTN	Pass	
2.28	Outbound Call Consultative Call Transfer to another Teams user	Pass	
2.29	Call Waiting	Pass	
	Early Media Test Cases (Media Bypass disabled)		
2.30	Terminate Early Media Outbound Call Before Answer	Pass	
2.31	Early Media Forward Call	Pass	
2.32	Simultaneous Call/Ring to teams delegates	Pass	
	Session Audit Test Cases (Media Bypass disabled)		
2.33	Outbound, Wait for Session Audit	Pass	Spectrum sends Session Refresh every 15 minutes

2.34	Inbound Call, Wait for Session Audit during Hold	Pass	
	DTMF Test Cases (Media Bypass disabled)		
2.35	Outbound DTMF (RFC2833)	Pass	
2.36	Inbound DTMF (RFC2833)	Pass	
	Codec Test Cases (Media Bypass disabled)		
2.37	Codec Support – ITSP support G711 codec	Pass	
2.38	Codec Support – ITSP support G729 codec	Not Applicable	Spectrum offers only G711U codec
	SRTP (Media Bypass disabled)		
2.39	Verify SRTP negotiated in outbound call	Pass	
2.40	Verify SRTP negotiated in inbound call	Pass	
	SRTCP (Media Bypass disabled)		
2.41	Verify SRTCP packets	Pass	
2.42	Verify SRTCP packets	Pass	
	Comfort Noise (Media Bypass disabled)		
2.43	Verify Comfort Noise Packets in outbound call	Pass	
2.44	Verify Comfort Noise Packets in inbound call	Pass	
	Support For FailOver (Media Bypass disabled)		
2.45	Fail over	Pass	
	Fax		
3.1	T.38 Fax- G3 CPE to PSTN fax - G3-G3	Pass	Voice call is sent through G711. Spectrum offers only G711 codec
3.2	T.38 Fax- G3 CPE to PSTN fax - G3-SG3	Pass	
3.3	T.38 Fax- G3 CPE from PSTN fax - G3-G3	Pass	Voice call is sent through G711. Spectrum offers only G711 codec
3.4	T.38 Fax- G3 CPE from PSTN fax - SG3-G3	Pass	
3.5	T.38 Fax- SG3 CPE to PSTN fax - SG3-G3	Pass	
3.6	T.38 Fax- SG3 CPE to PSTN fax - SG3-SG3	Pass	Ribbon 1K supports only G3 with maximum speed of 14,400 b/s
3.7	T.38 Fax- SG3 CPE from PSTN fax - G3-SG3	Pass	
3.8	T.38 Fax- SG3 CPE from PSTN fax - SG3-SG3	Pass	Ribbon 1K supports only G3 with maximum speed of 14,400 b/s
3.9	G711 Fax Pass-Through- G3 CPE to PSTN fax - G3-G3	Pass	

3.10	G711 Fax Pass-Through- G3 CPE to PSTN fax - G3-SG3	Pass	
3.11	G711 Fax Pass-Through- G3 CPE from PSTN fax - G3-G3	Pass	
3.12	G711 Fax Pass-Through- G3 CPE from PSTN fax - SG3-G3	Pass	
3.13	G711 Fax Pass-Through- SG3 CPE to PSTN fax - SG3-G3	Pass	
3.14	G711 Fax Pass-Through- SG3 CPE to PSTN fax - SG3-SG3	Pass	
3.15	G711 Fax Pass-Through- SG3 CPE from PSTN fax - G3-SG3	Pass	
3.16	G711 Fax Pass-Through- SG3 CPE from PSTN fax -SG3-SG3	Pass	Ribbon 1K supports only G3 with maximum speed of 14,400 b/s
3.17	Fall back to G711 from T.38- Outbound Fax	Pass	Spectrum Innomedia SBC accepts both T38 and G711 Fax re-INVITE. Fax is sent with T38
3.18	Fall back to G711 from T.38- Inbound Fax	Pass	Spectrum Innomedia SBC accepts both T38 and G711 Fax re-INVITE. Fax is sent with T38
3.19	T.38-Fax-Multiple Pages(30) Inbound Fax	Pass	
3.20	T.38 Fax- Multiple Pages(30) Outbound Fax	Pass	
3.21	G.711 Pass-Through-Fax-Multiple Pages(30) Inbound Fax	Pass	
3.22	G.711 Pass-Through- Multiple Pages(30) Outbound Fax	Pass	