Microsoft

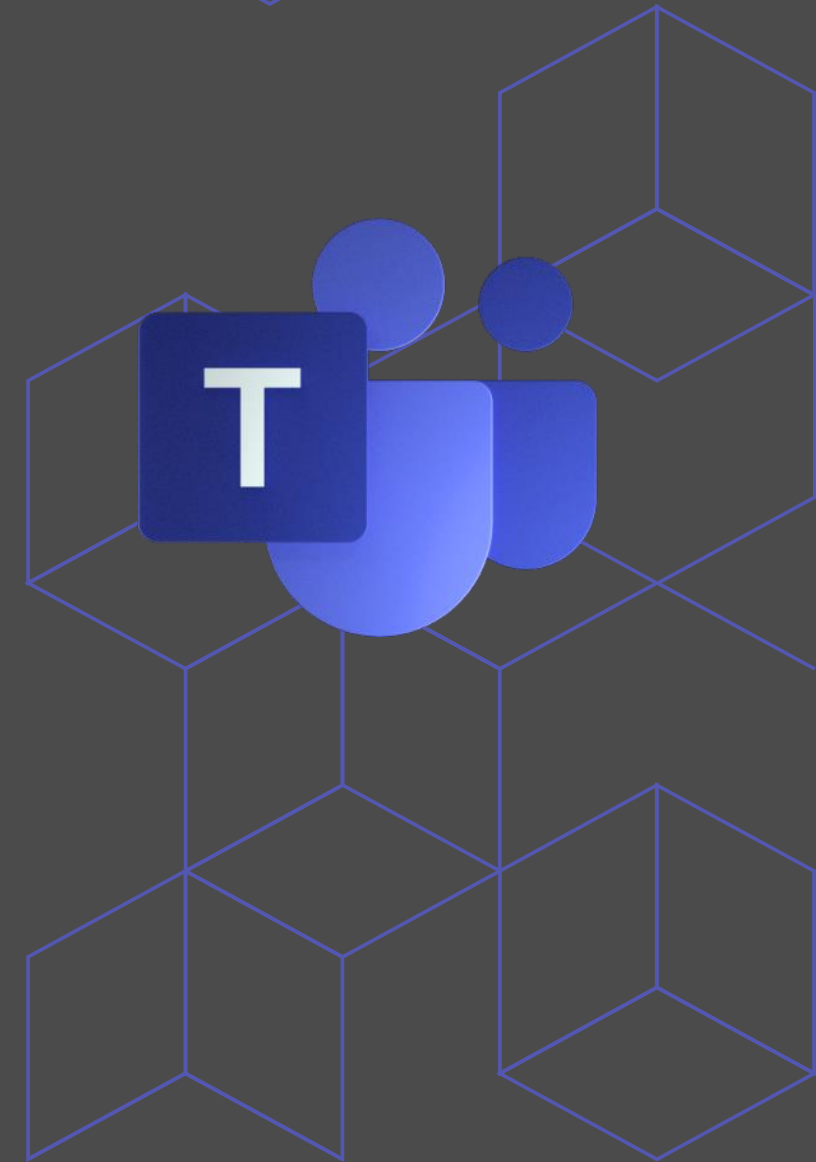# Deploying Direct Routing for Microsoft Teams

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PSA

The content in this presentation is provided without warranty.

Agenda

Introduction

    About Me

    Purpose of Today's Session

    Lab Environment Topology
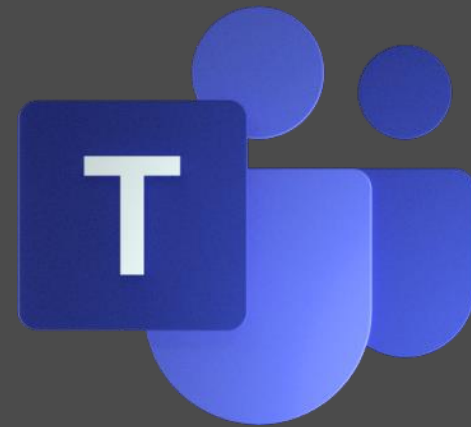
Planning & Prerequisites

Deploying Direct Routing

Testing & Verification

Wrap-Up

Introduction

About Me

- From Barberton, Ohio
- Full-Time Day 2 Engineer at Time2Market
- Full-Time Student at The University of Akron
- Certifications
  - MCSE: Productivity Solutions – April 2019
  - MSCA: Office 365 – April 2019
- IT has been a life-long passion/hobby for me
- UC Interest took off in Early 2016
  - Company had a migration from a Toshiba Phone System to SFB
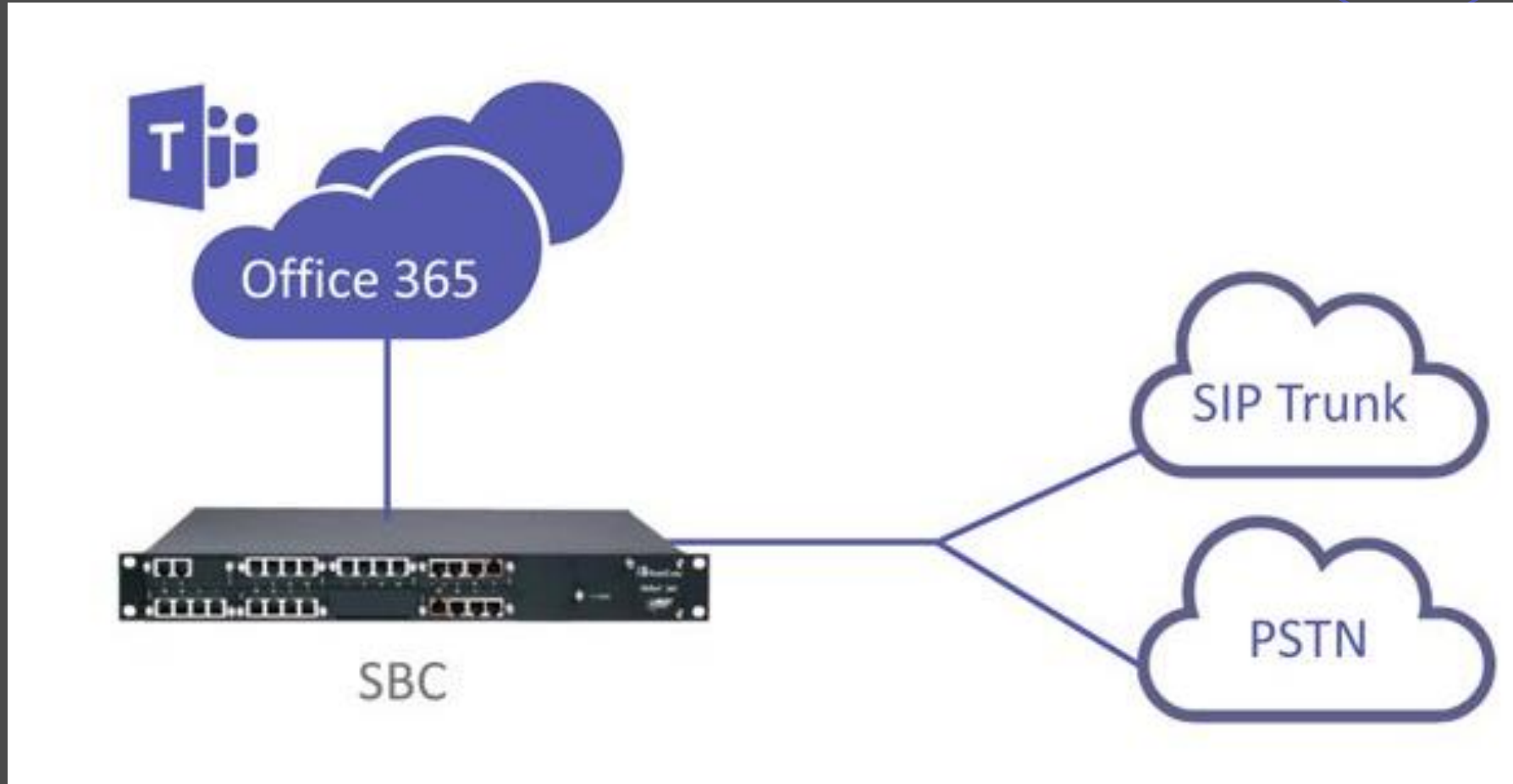 - Skype for Business Users Group – April 2016

Purpose of Today's Session

- Learn why you would want to and what is required to deploy Direct Routing for Microsoft Teams

- Learn how to deploy Direct Routing for Microsoft Teams

- Learn Best Practices

Lab Environment Topology

Planning & Prerequisites

What is Direct Routing and why should I care about it?

Interop with third-party systems
- Allows companies to migrate users in groups from one phone system to another and provides interop between them.
  - Integrates with third-party PBXes, analog devices, and Microsoft Phone System.

Leverage existing contracts with service providers
- Leveraging existing infrastructure would allow a much simpler migration path as the organizations do not have to migrate DIDs from one provider to another.

Single DID for every user
- This can be provided in Teams with a Calling Plan, however, it would be cheaper with more users as $12 a month is a VERY high cost.

Where calling plans are not available
- Calling plans are not available in certain countries so direct routing would allow users to leverage a local trunk.

Can be combined with Calling Plans
- Some users can use a calling plan license, or they can use direct routing. This can be mixed within the organization.
- Perhaps after a migration away from another phone system and a local SBC is used, the company may want to remove the need for the SBC and another vendor. Numbers can then be ported over to Microsoft/Bandwidth.

Less Hardware Footprint (Compared to Skype for Business)
- On-Prem servers for Cloud Connector Edition (CCE) is no longer required and only the SBC in a perimeter network is required
- Some organizations are deploying a software-based SBC in Azure to eliminate the need for any on prem infrastructure. (AnyNode)

Reasons to not deploy Direct Routing?

- The organization does not want to manage any infrastructure
  - SBC's require maintenance
    - Updates
    - SSL Certificates
    - Partner or internal employee for configuration changes/management
  - Small Businesses (<25 employees)

- An extra layer for failure outside of Microsoft's Control
  - Calling Plans with MS Phone System is all within Microsoft's cloud

Infrastructure/Licensing Requirements

- What do I need to get started?
    - A Teams Certified SBC that is available via the edge (Own external IP Address)
        - Can be NATed based on the manufacturer of the SBC
    - Telephony Trunks (SIP, POTS, Other PBX, etc)
    - Office 365 Tenant with E3 w/Phone System or E5
    - User homed in Office 365
    - Dedicated domain with SSL certificate pointing to the SBC
        - Cannot use the .onmicrosoft.com domain as the SBC must be reachable via its own FQDN
        - Must be registered to the tenant
        - SSL Certificate must have the FQDN in the SAN or a Wildcard cert can be used
    - Correct Firewall ports open – See TechNet

Where should I deploy the SBC(s)?

- Depends on the needs of the organization
  - On premises connectivity to services directly (PSTN)
    - Physical SBC from Audio Codes, Ribbon, etc.

  - On prem or in the cloud but connecting to a virtual SIP provider
    - Virtual SBC from anynode, AudioCodes, etc.
      - Appliances are available in the Azure store.

- Branch Survivability
  - If exploring a dual registration scenario for DR/HA, might be required for each site to have its own SBC.
   - Teams uptime is 99.9%

Voice Routing

- Dial Plans, Voice Policies, PSTN Usages, route like Skype for Business Server.
  - Priorities for one PSTN usage can be set over another
  - Some calls can be routed via direct routing trunks and some can be routed towards another trunk or Microsoft Calling Plan
    - Useful for integration with a legacy PBX or other system
- <u>Needs need to be determined before implementation</u>
- Open to your imagination, but keep it simple if possible

PSTN usage	Voice route	Number pattern	Priority	SBC	Description
US only	"Redmond 1"	^\+1(425|206)(\d{7})$	1	sbc1.contoso.biz sbc2.contoso.biz	Active route for called numbers +1 425 XXX XX XX or +1 206 XXX XX XX
US only	"Redmond 2"	^\+1(425|206)(\d{7})$	2	sbc3.contoso.biz sbc4.contoso.biz	Backup route for called numbers +1 425 XXX XX XX or +1 206 XXX XX XX
US only	"Other +1"	^\+1(\d{10})$	3	sbc5.contoso.biz sbc6.contoso.biz	Route for called numbers +1 XXX XXX XX XX (except +1 425 XXX XX XX or +1 206 XXX XX XX)

Voice Routing Example
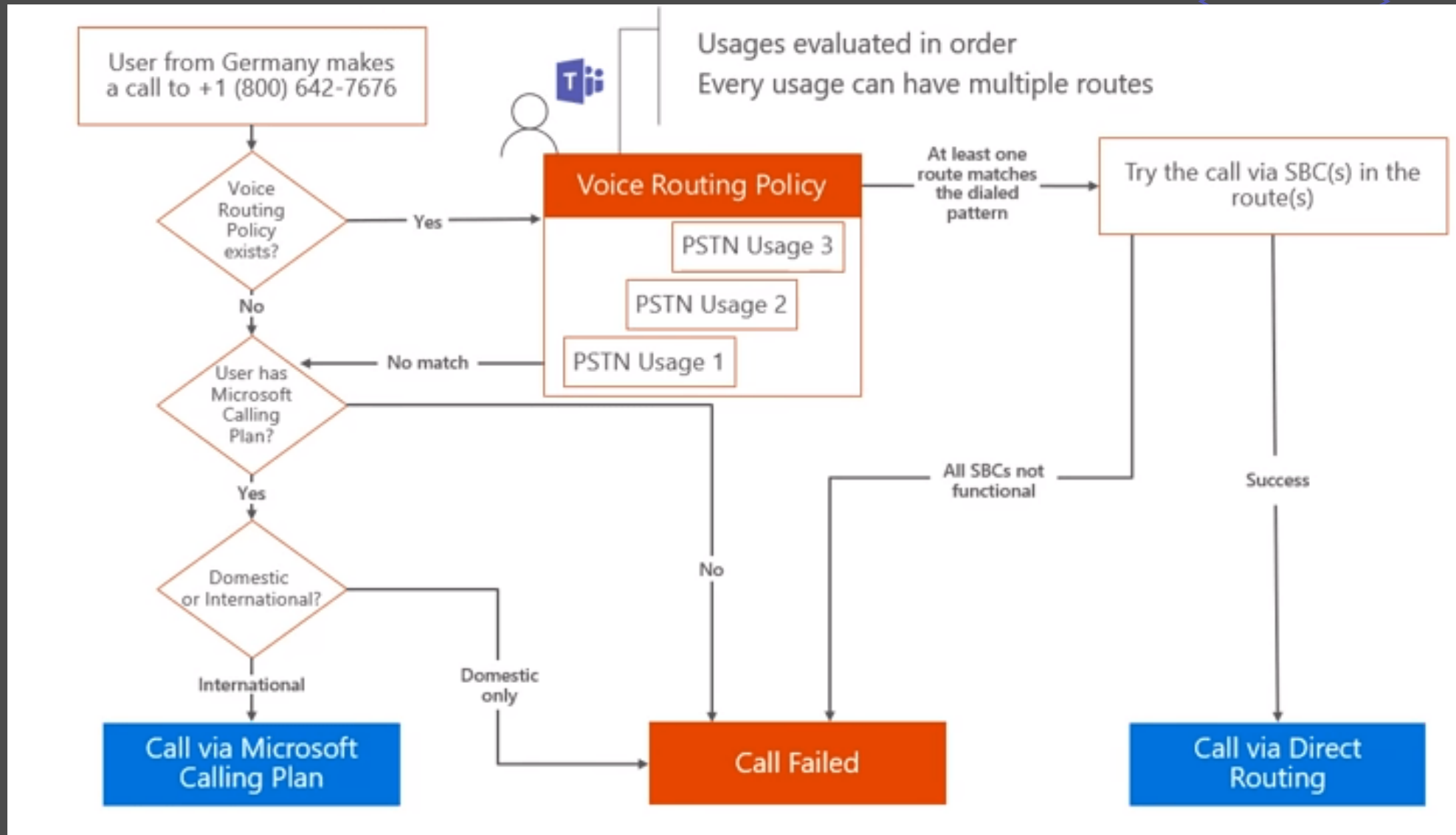
Deploying Teams Direct Routing
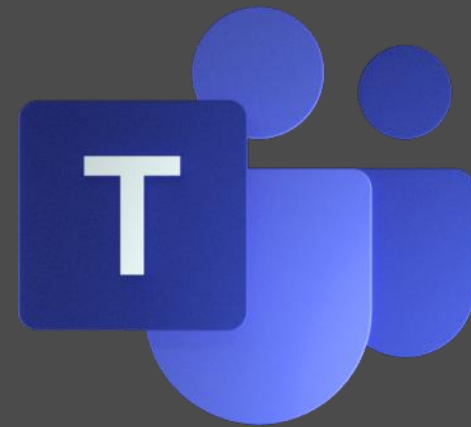
Deploy the SBC(s)

- In this demo environment we are going to be using a virtual anynode SBC in a brand-new environment
  - No integrations with any other phone systems
  - One SIP provider

- The installation methods differ between virtual SBC manufacturers

- If physical hardware, deploy and make all the necessary connections

Ok, the SBC is configured, what now?

- Once the SBC is configured with all the necessary requirements (SSL certificate, connection to the PSTN, has all necessary Firewall/DNS configurations, etc.), we can begin the process of pairing the SBC to Microsoft 365

- We need to first connect to Skype for Business Online via Powershell as the ability to do this via the Teams Admin Center does not exist (Not sure if it will or not)

Connecting to Skype for Business Online

- Install the Microsoft Online Services Sign-in Assistant
  - Bit.ly/1TugAlN (lowercase L)
- Install the Skype for Business Online PowerShell Module
  - Bit.ly/1BOlaX2 (Capital i)

- Enable script support in PS: Set-ExecutionPolicy RemoteSigned

- Connect to Skype for Business Online (Standard Authentication)
  - Import-Module SkypeOnlineConnector
  - $userCredential = Get-Credential
  - $sfbSession = New-CsOnlineSession –Credential $userCredential
  - Import-PSSession $sfbSession

Connecting to Skype for Business Online Continued

- Connect to Skype for Business Online (Multifactor Authentication)
  - Import-Module SkypeOnlineConnector
  - $sfbSession – New-CsOnline Session
  - Import-PSSession $ sfbSession

Pairing the SBC to the Tenant

- Now that we are connected to SFB Online, we can pair the SBC to the tenant
  - Use the below command:
    - New-CsOnlinePSTNGateway -Fqdn <SBC FQDN> -SipSignallingPort <SBC SIP Port> -MaxConcurrentSessions <Max Concurrent Sessions the SBC can handle> -Enabled $true –MediaBypass $true
    - New-CsOnlinePSTNGateway -Fqdn az-sbc1.msftnettest.co -SipSignallingPort 5067 -MaxConcurrentSessions 20 -Enabled $true –MediaBypass $true
      - Microsoft highly recommends limiting the maximum call limit in the SBC

```
PS C:\WINDOWS\system32> New-CsOnlinePSTNGateway -Fqdn az-sbc1.msftnettest.co -SipSignallingPort 5067 -MaxConcurrentSessi
ons 20 -Enabled $true -MediaBypass $true


Identity                           : az-sbc1.msftnettest.co
Fqdn                               : az-sbc1.msftnettest.co
SipSignallingPort                  : 5067
FailoverTimeSeconds                : 10
ForwardCallHistory                 : False
ForwardPai                         : False
SendSipOptions                     : True
MaxConcurrentSessions              : 20
Enabled                            : True
MediaBypass                        : True
GatewaySiteId                      :
GatewaySiteLbrEnabled              : False
FailoverResponseCodes              : 408,503,504
GenerateRingingWhileLocatingUser   : True
PidfLoSupported                    : False
MediaRelayRoutingLocationOverride  :
ProxySbc                           :
BypassMode                         : None
```

Pairing the SBC to the tenant Conti

- Don't be alarmed if there are any errors showing in the Teams Admin Center

- The anynode SBC (or other vendor) should show green connection status to O365 and your PSTN connection
  - This is due to no calls being registered across the trunk in last 24 hours

Enabling Users for Direct Routing

- Users will need to be homed in Skype for Business Online
  - Issue the PS command to verify the user's home pool
    - Get-CsOnlineUser -Identity "<User name>" | fl RegistrarPool
- Configure the user's phone number, enable EV and voicemail
  - Set-CsUser -Identity "<User name>" -EnterpriseVoiceEnabled $true -HostedVoiceMail $true -OnPremLineURI tel:<E.164 phone number>
  - Example from the Lab Environment
    - Set-CsUser -Identity "Teams User1" -OnPremLineURI tel:+13305768160 -EnterpriseVoiceEnabled $true -HostedVoiceMail $true

```
PS C:\WINDOWS\system32> Set-CsUser -Identity "TeamsUser1@msftnettest.co" -OnPremLineURI tel:+13305768160 -EnterpriseVoic
eEnabled $true -HostedVoiceMail $true
PS C:\WINDOWS\system32>
PS C:\WINDOWS\system32>
PS C:\WINDOWS\system32> Set-CsUser -Identity "TeamsUser2@msftnettest.co" -OnPremLineURI tel:+13305768161 -EnterpriseVoic
eEnabled $true -HostedVoiceMail $true
PS C:\WINDOWS\system32>
```

Configuring Voice Routing

- Can be done many ways depending on the needs of the organization.
  - Refer to https://bit.ly/2Zum1da for more information
  - Configure based on the requirements determined during the planning phase
- A basic configuration with a single PSTN usage will be used in this lab environment
  1. Configure PSTN Usage:
     - Set-CsOnlinePstnUsage -Identity Global -Usage @{Add="US"}
  2. Build a Voice Route (Need to add routes to determine if the call should use the PSTN Usage)
     - New-CsOnlineVoiceRoute -Identity "OH1-1" -NumberPattern ".*" -OnlinePSTNGatewayList az-sbc1.msftnettest.co -Priority 1 -OnlinePstnUsages "US"

```
PS C:\WINDOWS\system32> Set-CsOnlinePstnUsage -Identity Global -Usage @{Add="US"}
PS C:\WINDOWS\system32> New-CsOnlineVoiceRoute -Identity "OH1-1" -NumberPattern "^1?(\d{10)$" -OnlinePSTNGatewayList az-
sbc1.msftnettest.co -Priority 1 -OnlinePstnUsages "US"


Identity             : OH1-1
Priority             : 1
Description          :
NumberPattern        : ^1?(\d{10)$
OnlinePstnUsages     : {US}
OnlinePstnGatewayList : {az-sbc1.msftnettest.co}
Name                 : OH1-1
```

Configuring Voice Routing Continued

- Creating a Voice Routing Policy
  - PSTN Usages cannot be directly assigned to a user so a Voice Routing Policy must be created
    - New-CsOnlineVoiceRoutingPolicy "OH1" -OnlinePstnUsages "US"
- Assigning the Voice Policy to Users
  - Can be done via the Microsoft Teams Admin Center or via PowerShell
    - Grant-CsOnlineVoiceRoutingPolicy -Identity "TeamsUser1@msftnettest.co" -PolicyName "OH1"
    - Grant-CsOnlineVoiceRoutingPolicy -Identity "TeamsUser2@msftnettest.co" -PolicyName "OH1"
    - May get an error stating
      - **Policy "OH1" is not a user policy. You can assign only a user policy to a specific user**
      - This is due to replication speed within Office 365, give it some time and retry again

```
PS C:\WINDOWS\system32> New-CsOnlineVoiceRoutingPolicy "OH1" -OnlinePstnUsages "US"


Identity        : Tag:OH1
OnlinePstnUsages : {US}
Description      :
RouteType        : BYOT

PS C:\WINDOWS\system32> Grant-CsOnlineVoiceRoutingPolicy -Identity "TeamsUser1@msftnettest.co" -PolicyName "OH1"
Policy "OH1" is not a user policy. You can assign only a user policy to a specific user.
    + CategoryInfo          : NotSpecified: (:) [Grant-CsOnlineVoiceRoutingPolicy], ManagementException
    + FullyQualifiedErrorId : Microsoft.Rtc.Management.AD.ManagementException,Microsoft.Rtc.Management.AD.Cmdlets.Assi
   gnOnlineVoiceRoutingPolicyUsingLros
    + PSComputerName        : admin4a.online.lync.com

PS C:\WINDOWS\system32> Grant-CsOnlineVoiceRoutingPolicy -Identity "TeamsUser1@msftnettest.co" -PolicyName "OH1"
PS C:\WINDOWS\system32> Grant-CsOnlineVoiceRoutingPolicy -Identity "TeamsUser2@msftnettest.co" -PolicyName "OH1"
```
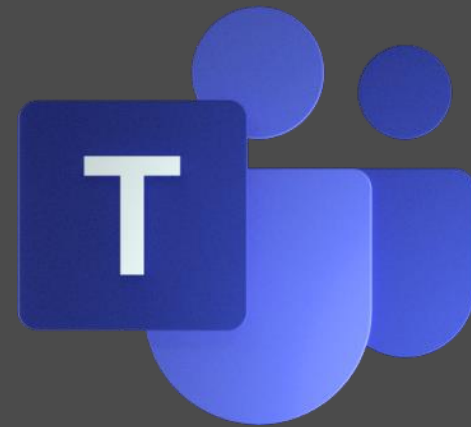
Testing & Verification

Testing & Verification

- Different Testing is required depending on the deployment scenario
- In this scenario, we can:
  - Verify that the Dialpad appears in the Teams Client
  - Verify that calls can be made outbound
  - Verify that calls normalize correctly
  - Verify that inbound external calls are routed to the internal user
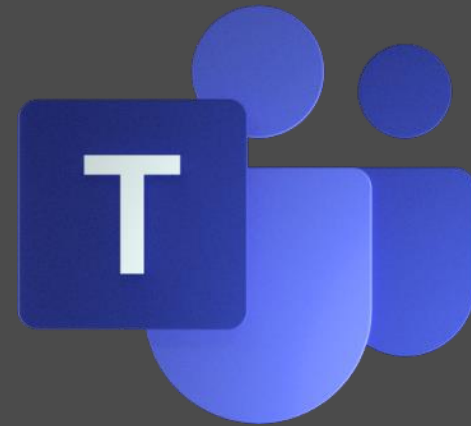 - Verify that Incoming calls route to voicemail
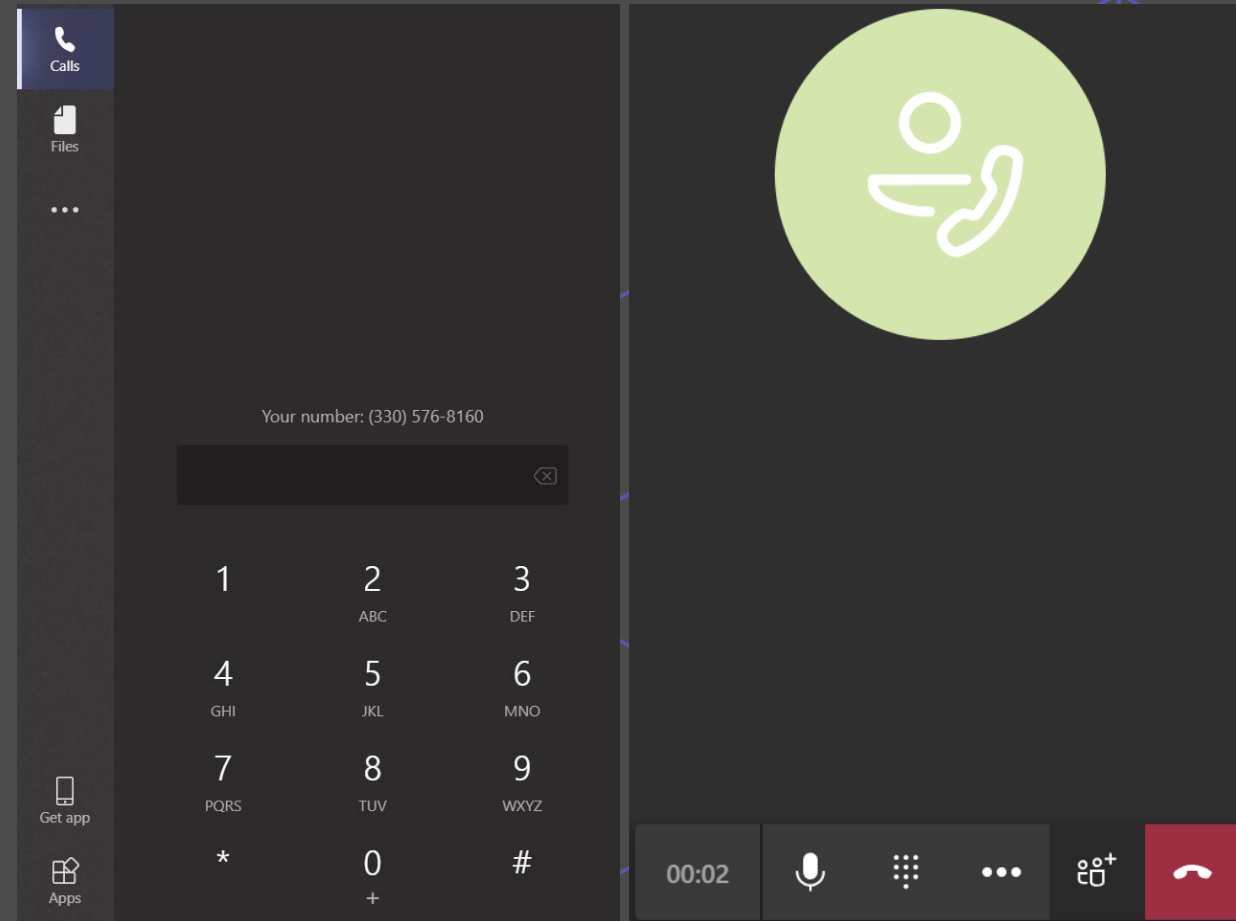
Special Thank You to

anynode
The Software SBC
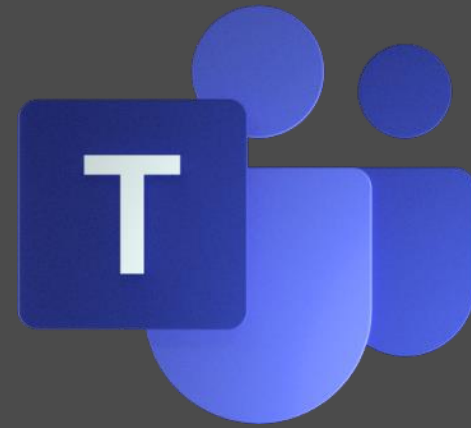
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Questions?
Run Into Issues?

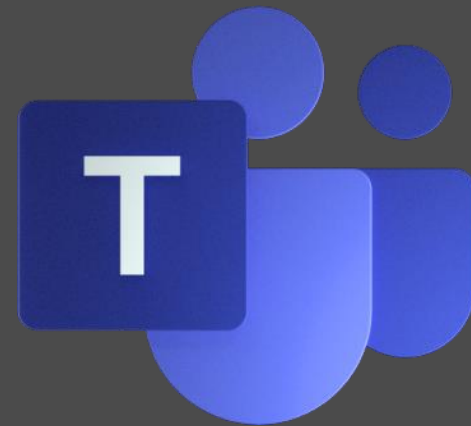# Reach Out to Me on Twitter or via my blog!

@EricMarsi

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Thank You!