Voice Chalk Talk

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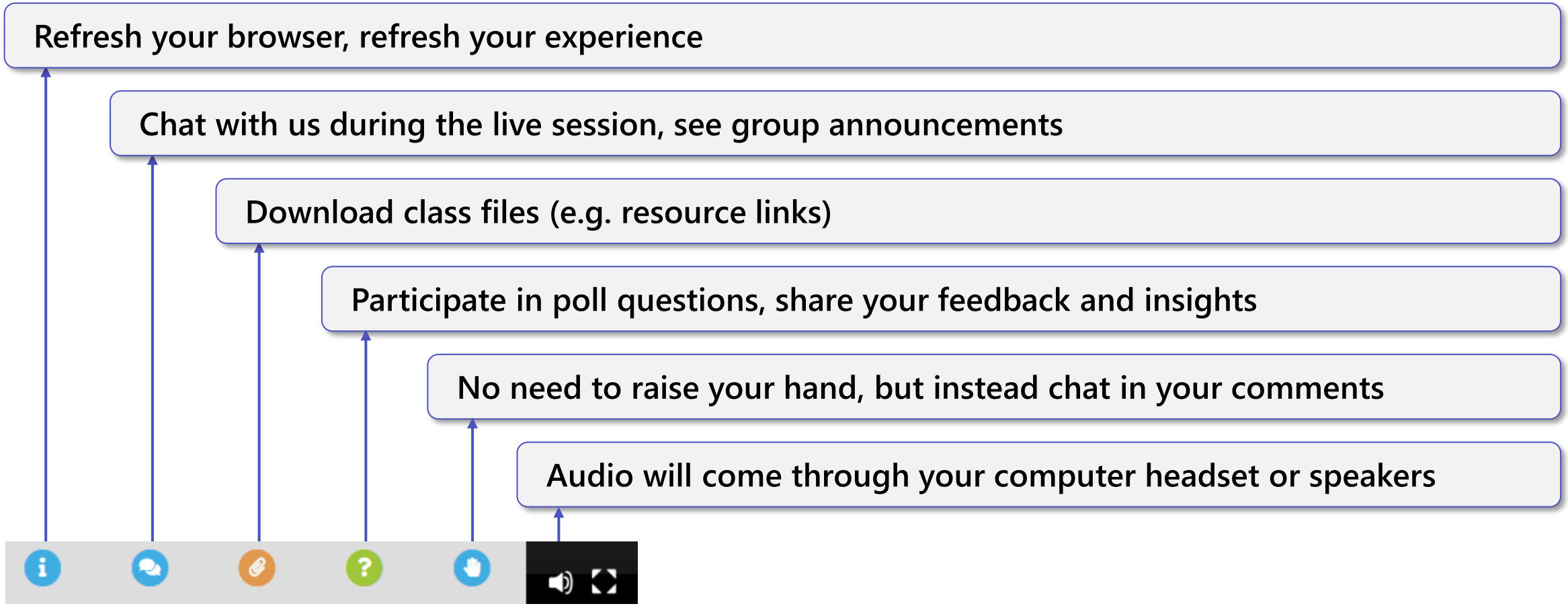
Optimize your learning experience for today's live streaming event



Learning objectives

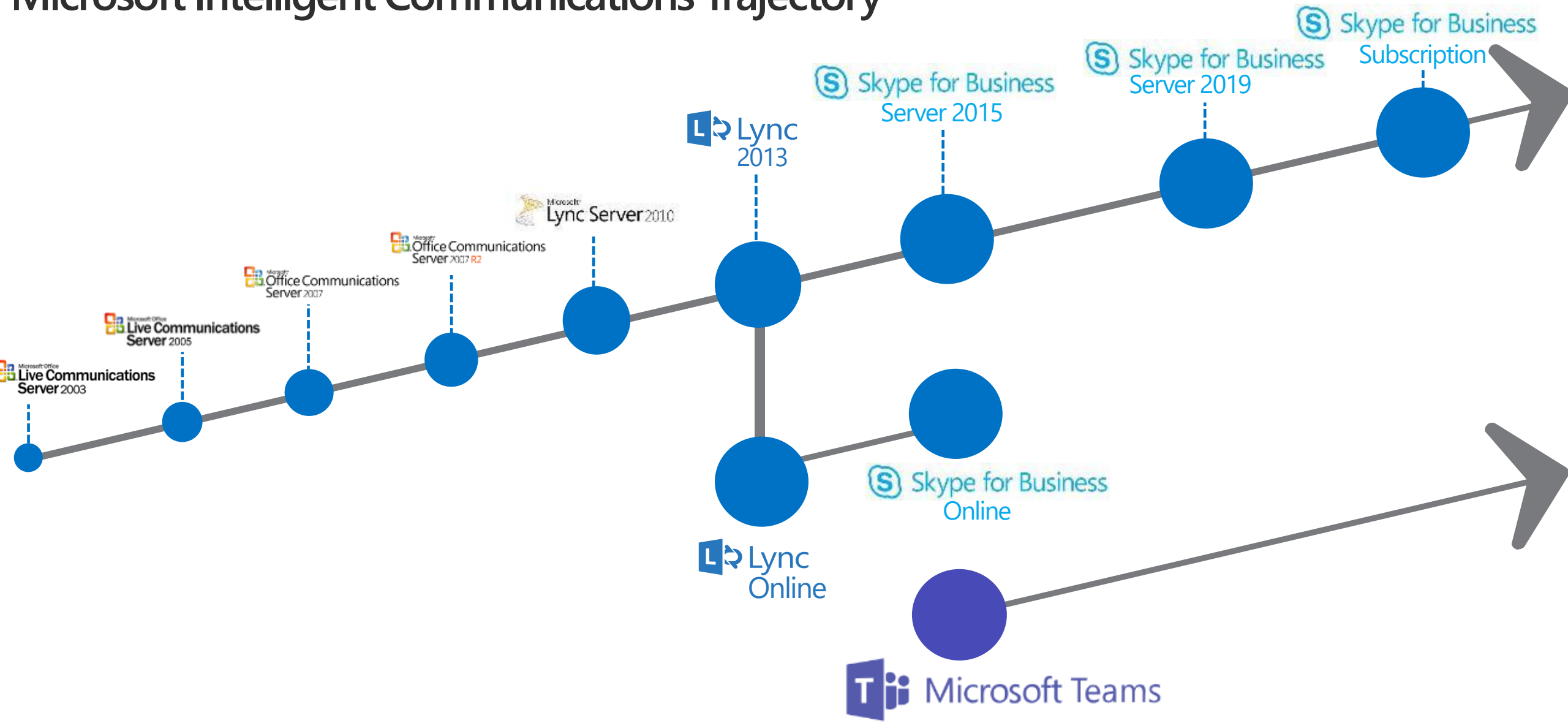
László Somi

After this session, you will be able to:

- Understand the history of voice services in Microsoft products
- Identify what calling options in Microsoft Teams are right for you
- Configure your calling options in the Teams admin portal
- Monitor and use call quality tools in Teams

Microsoft Voice, Video and Meetings

Microsoft Intelligent Communications Trajectory

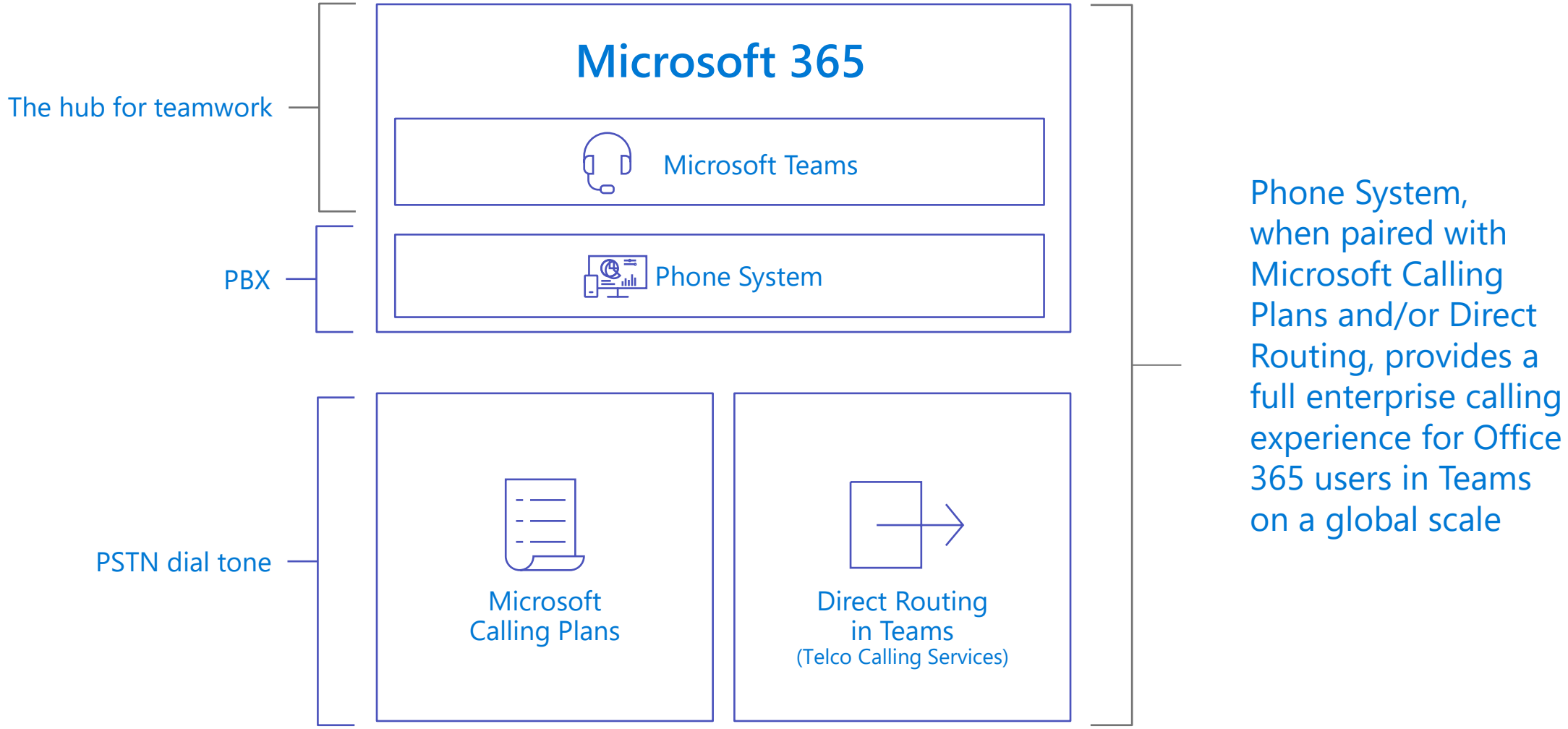


Microsoft Voice Services

- Microsoft Voice Services supports two main workloads in Office 365 and Microsoft 365
  - Audio Conferencing for Skype for Business Online and Microsoft Teams Meetings
  - Phone System for Microsoft Teams and Skype for Business Online
- Voice Services are available ala carte or are included in Office 365 E5 and Microsoft 365 E5
- For customers that do not want to use the cloud for voice, they can deploy on-premises Skype for Business Server 2019 software and hardware and still leverage Office 365 and Microsoft 365 licensing
- Voice services tie in closely with Meetings and Video
- Customers are not required to have both Audio Conferencing and Phone System

This training is focusing on Microsoft Teams only

Microsoft Teams Calling



Microsoft Calling Plans

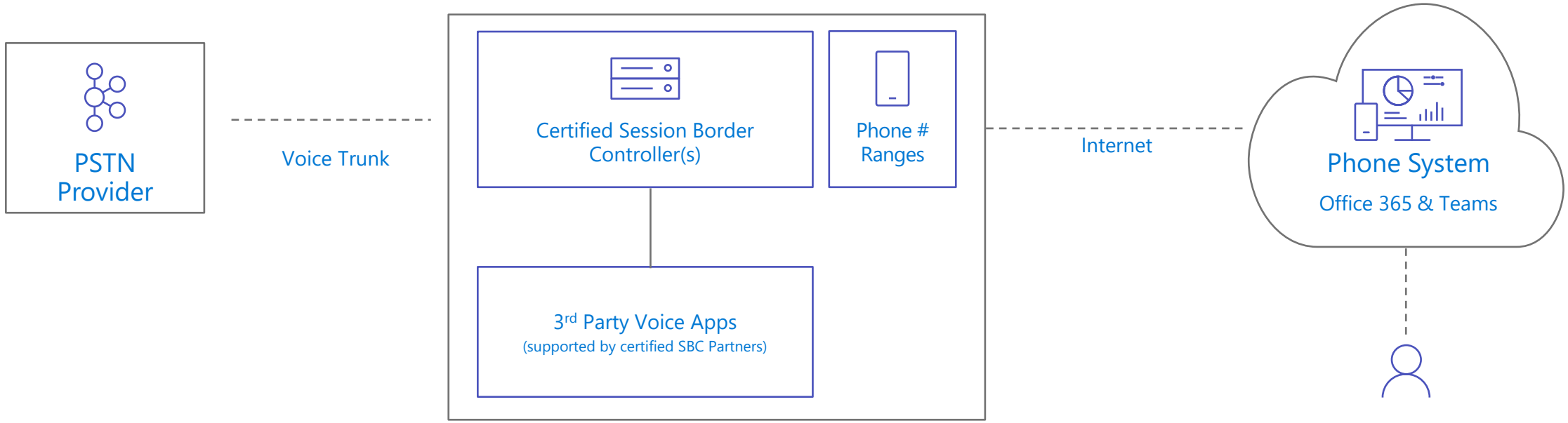
Bring the benefits of the cloud to your phone system

Rapid provisioning
Procure and assign phone numbers in minutes with no on-premises equipment

Number porting and Dynamic Emergency Calling
Use your existing phone numbers with Microsoft calling plans, and meet E-911 and other legal obligations

Local, long distance and international calling
Reach the people important to your business, with a choice of calling plans

Direct Routing



Direct Routing in Office 365 allows customers to connect their SIP trunks directly from their network. Customers can work with their local Telecommunications provider to enable Microsoft Teams users to make and receive telephone calls.

Direct Routing allows customers with users in the Microsoft cloud to continue using 3rd party systems such as PBXs, Call Center, and Analog Telephony Adaptors (ATA) helping preserve key investments.

Direct Routing Considerations

- Service Numbers
  - Designed to handle high concurrency of calls
  - Call queues, Auto Attendant – supported through Direct Routing
  - Conferencing – not available through Direct Routing (except in GCC-H/DoD)
    - Dial in numbers are provided by the conferencing service (Microsoft numbers)
    - Dial back from a conference will be initiated from the conference bridge (not through Direct Routing)
- Dynamic Emergency Calling
  - Available for Calling Plans and Direct Routing
  - Direct Routing requires additional Emergency Routing Service Provider: https://aka.ms/dr-sbc
  - See https://aka.ms/TeamsAcademy for deep-dive session
- Direct Routing is not supported for Skype for Business

Direct Routing and Calling Plans

- **Global coverage? No problem. Use Microsoft Teams Calling.**

- Calling Plans in 12 different countries
- 2020 additions: Austria, Denmark, Italy, Portugal Puerto Rico, Switzerland
- Direct Routing for all other countries
- Mix and match both as you need

Demo time!

In this demo we will focus on:

- Acquiring a new number in the Teams Admin portal for end users and conferencing
- Assign a number to a licensed Teams user
- Setup conferencing numbers

Configure Direct Routing

Configuration steps

Configure the SBC

- SBC configuration documented by SBC vendors
  - https://aka.ms/dr-sbc-config
- SBC Configuration steps (high level)
  - SBC license
  - LAN and WAN IP interfaces
  - Certificate
  - Signaling and media ports
  - SIP Options and SRTP
  - Codecs
  - Routing

Connect the SBC

New-CsOnlinePSTNGateway -Fqdn <SBC FQDN> -SipSignallingPort <SBC SIP Port> -MaxConcurentSessions <Max Concurrent Session which SBC capable handling> -Enabled $true

```
PS C:\Util> New-CsOnlinePSTNGateway -Fqdn sbc1.       -SipSignalingPort 5068 -MaxConcurrentSessions 50 -Enabled $True -
ForwardCallHistory $True -ForwardPai $True


Identity                          : sbc1.
InboundTeamsNumberTranslationRules : {}
InboundPstnNumberTranslationRules  : {}
OutboundTeamsNumberTranslationRules : {}
OutboundPstnNumberTranslationRules : {}
Fqdn                              : sbc1.
SipSignalingPort                  : 5068
FailoverTimeSeconds               : 10
ForwardCallHistory                : True
ForwardPai                        : True
SendSipOptions                    : True
MaxConcurrentSessions             : 50
Enabled                           : True
MediaBypass                       : False
GatewaySiteId                     :
GatewaySiteLbrEnabled             : False
FailoverResponseCodes             : 408,503,504
GenerateRingingWhileLocatingUser  : True
PidfLoSupported                   : False
MediaRelayRoutingLocationOverride :
ProxySbc                          :
BypassMode                        : None
```

- Microsoft recommends setting a maximum call limit in the SBC.
- The domain portion of the SBC name must match one of the registered domains in the tenant (excluding *.onmicrosoft.com)

Common CsOnlinePSTNGateway parameters

- SipSignallingPort
  - Listening port SIP on SBC
- Enabled
  - Used to enable the SBC for outbound calls. Can be used to temporarily remove the SBC while it is being updated (draining).
- ForwardPAI
  - Indicates whether the P-Asserted-Identity (PAI) header will be forwarded along with the call. The PAI header provides a way to verify the identity of the caller. The default value is False ($False).
- ForwardCallHistory
  - Indicates whether call history information will be forwarded through the trunk. If enabled, the Office 365 PSTN Proxy sends two headers, History-info and Referred-By. The default value is False ($False).

Common CsOnlinePSTNGateway parameters

- SIPOptionsEnabled
  - If disabled, SBC will be excluded from the Monitoring and Alerting system. Microsoft highly recommends turning on SIP options. The default value is True ($True)
- MaxConcurentSessions
  - This parameter is used by an alerting system. When values are set, the alerting system will generate an alert to the tenant administrator if the number of concurrent sessions is 90% or higher than this value.
- EnableFastFailoverTimer
  - When set to True, outbound calls that are not answered by the gateway within 10 seconds will be routed to the next available trunk. If there are no additional trunks, the call will automatically be dropped. In an organization with slow networks and gateway responses, that could potentially result in calls being dropped unnecessarily. The default value is True ($True).
- MediaBypass
  - Enables media bypass. The default value is False ($False).

Voice Routing

Voice Configuration Objects

Voice Routing Policy

User authorization

Class of service

Dial Plan

Dialing Habits & Number patterns

PSTN Usage

Purpose (usage, caller's intent)

Calling location

Priority

Gateway (Trunk)

Number manipulation (optional)

Gateway features (E-911, LBR)

Voice Route

Called number

Cost of call

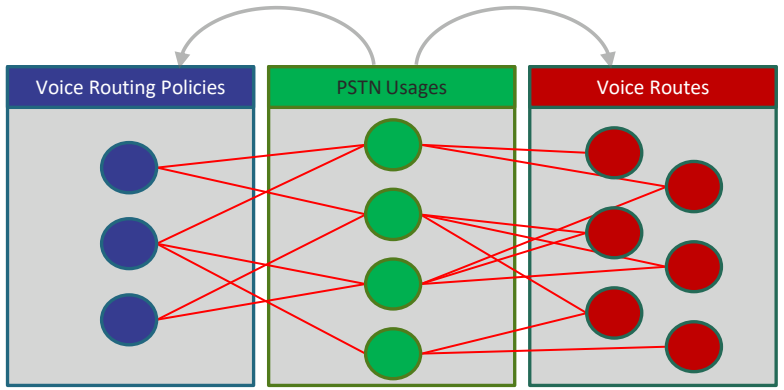
PSTN Usages

A PSTN usage record specifies a class of call (such as internal, local, or long distance) that can be made by various users or groups of users in an organization

By themselves, PSTN usage records do not do anything. For them to work, they must be associated with:

Voice routing policies, which are assigned to users

Voice routes, which are assigned to gateways (SBCs)

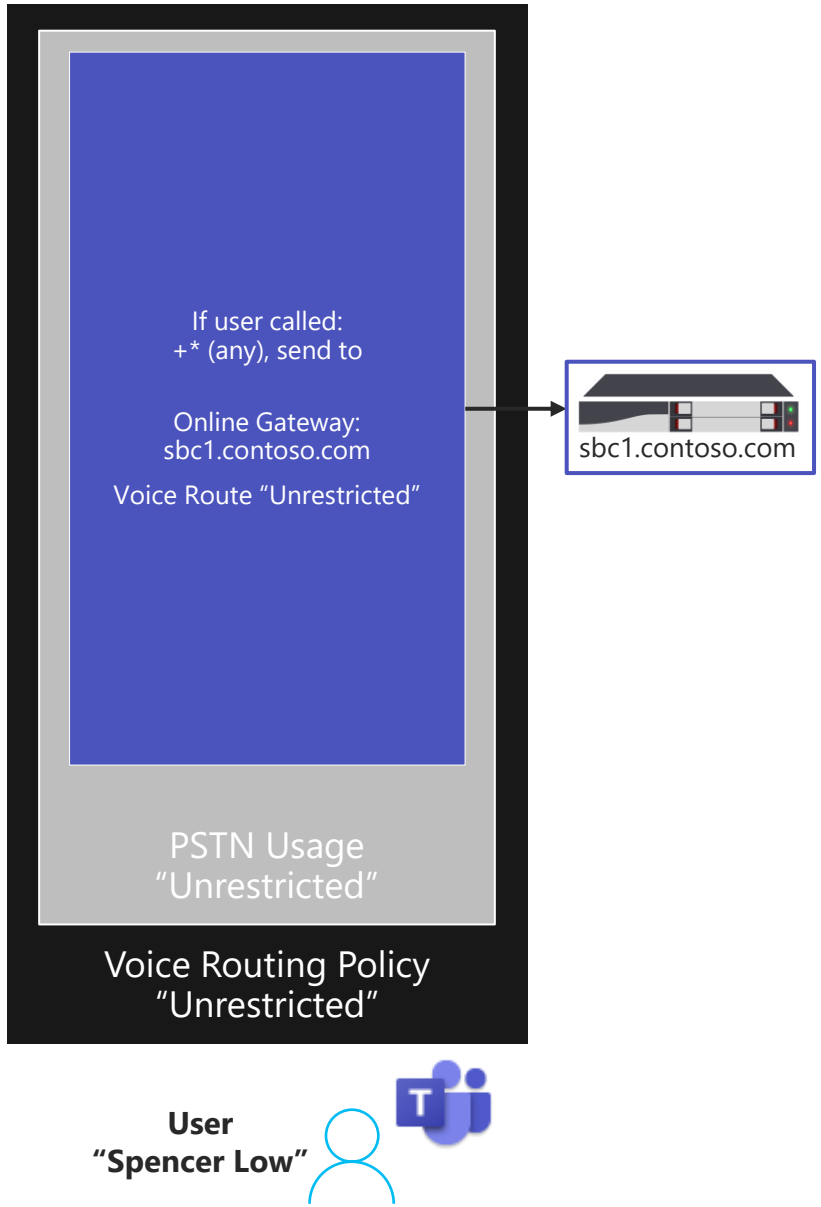


Order of Usages is critical

Usages are applied in order

Upon first match – other usages are not evaluated

Simple voice routing configuration



Online PSTN Gateway

New-CsOnlinePSTNGateway -Fqdn sbc1.contoso.com -SipSignallingPort 5068 -Enabled $true

PSTN Usages

Set-CsOnlinePstnUsage -Identity Global -Usage @{Add="Unrestricted"}

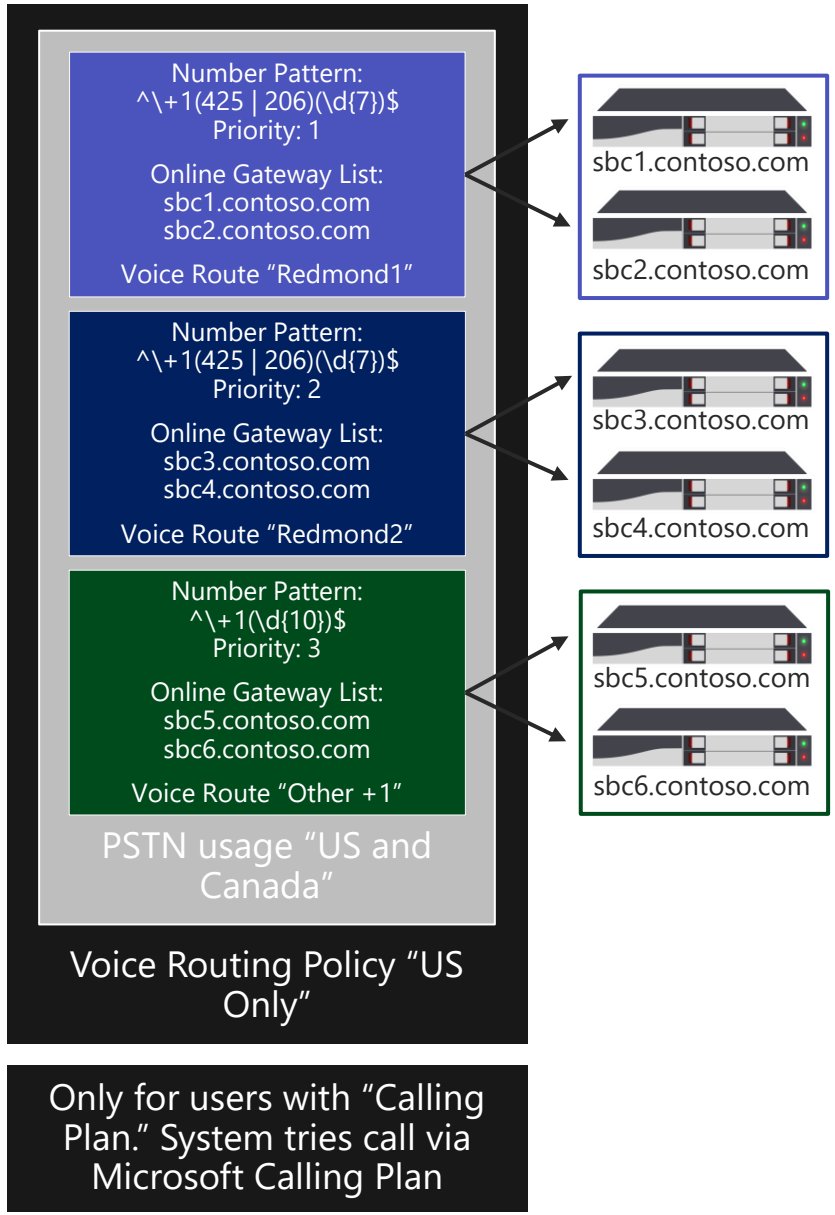
Voice Routes

New-CsOnlineVoiceRoute -Identity "Unrestricted" -NumberPattern "." -OnlinePstnGatewayList sbc1.contoso.com -Priority 1 -OnlinePstnUsages "Unrestricted"*

Voice Routing Policy

New-CsOnlineVoiceRoutingPolicy "Unrestricted" -OnlinePstnUsages "Unrestricted"

Advanced voice routing configuration



Online PSTN Gateway

New-CsOnlinePSTNGateway -Fqdn sbc1.contoso.com -SipSignallingPort 5068 -Enabled $true
New-CsOnlinePSTNGateway -Fqdn sbc2.contoso.com -SipSignallingPort 5068 -Enabled $true

New-CsOnlinePSTNGateway -Fqdn sbc3.contoso.com -SipSignallingPort 5068 -Enabled $true
New-CsOnlinePSTNGateway -Fqdn sbc4.contoso.com -SipSignallingPort 5068 -Enabled $true

New-CsOnlinePSTNGateway -Fqdn sbc5.contoso.com -SipSignallingPort 5068 -Enabled $true
New-CsOnlinePSTNGateway -Fqdn sbc6.contoso.com -SipSignallingPort 5068 -Enabled $true

PSTN Usages

Set-CsOnlinePstnUsage -Identity Global -Usage @{Add="US and Canada"}

Voice Routes

Route for +1425 and +1206 (Priority 1):
New-CsOnlineVoiceRoute -Identity "Redmond 1" -NumberPattern "^\+1(425|206)(\d{7})$" -OnlinePstnGatewayList sbc1.contoso.com, sbc2.contoso.com -Priority 1 -OnlinePstnUsages "US and Canada"

Route for +1425 and +1206 (Priority 2)
New-CsOnlineVoiceRoute -Identity "Redmond 2" -NumberPattern "^\+1(425|206)(\d{7})$" -OnlinePstnGatewayList sbc3.contoso.com, sbc4.contoso.com -Priority 2 -OnlinePstnUsages "US and Canada"

Route for other calls:
New-CsOnlineVoiceRoute -Identity "Other +1" -NumberPattern "^\+1(\d{10})$" -OnlinePstnGatewayList sbc5.contoso.com, sbc6.contoso.com -OnlinePstnUsages "US and Canada"

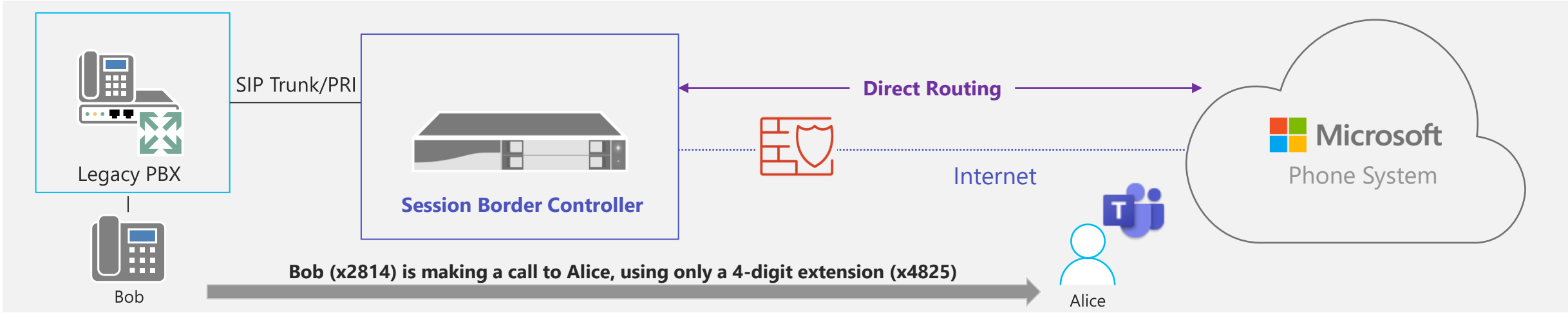
Voice Routing Policy

New-CsOnlineVoiceRoutingPolicy "US Only" -OnlinePstnUsages "US and Canada"

Number Translation (optional)

- Might be necessary for interop with SBCs
- Number Translation Rules
  - Applied at the gateway (SBC) level
  - Inbound calls (from the PSTN endpoint to a Teams client)
  - Outbound calls (from a Teams client to a PSTN endpoint)
- Tenant Remote PowerShell [TRPS]
  - Create/Manage rules with *–CsTeamsTranslationRule* (New, Set, Get, Remove)
  - Affects the *RequestURI*, *From* and *To* headers
  - Assign to gateway (SBC) using New/Set-CsOnlinePstnGateway together with
    - -InboundTeamsNumberTranslationRules
    - -InboundPSTNNumberTranslationRules
    - -OutboundTeamsNumberTranslationRules
    - -OutboundPSTNNumberTranslationRules

Number Translation (inbound example)



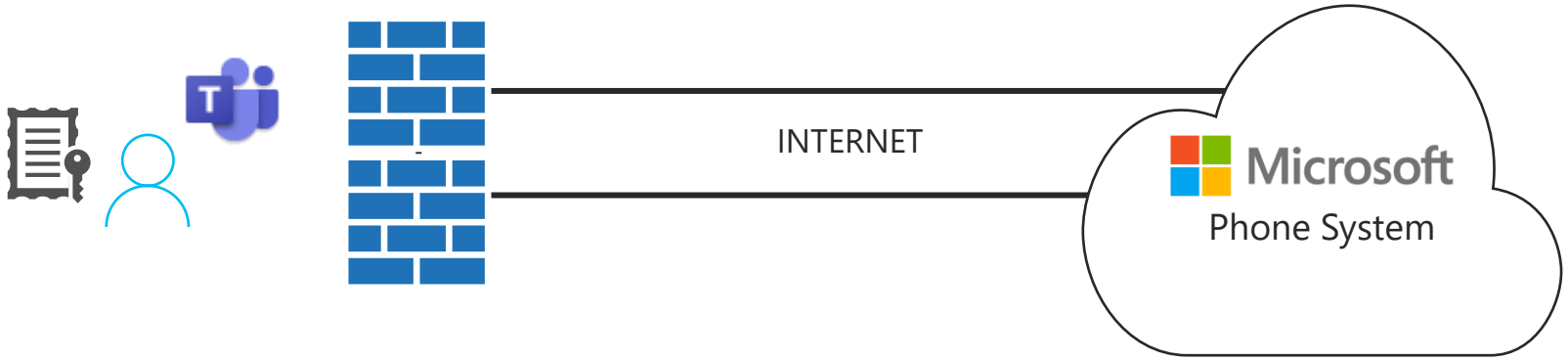
- In Teams, we use E.164 to represent the user's phone number, and for caller ID purposes.
- As a result, we need to translate the 4-digit numbers for Bob and Alice to E.164

Name	Pattern	Translation
AddPlus1	^(\d{10})$	+1$1
AddE164SeattleNPANXX	^(\d{4})$	+1206555$1

Translation Rules
Created
Applied

Header	Original	Translated	Parameter and Rule Applied
RequestURI	INVITE sip:**4825**@sbc.contoso.com	INVITE sip:**+12065554825**@sbc.contoso.com	Inbound**Teams**NumberTranslationRules 'AddE164SeattleNPANXX'
TO	TO: <sip:**4825**@sbc.contoso.com>	TO: <sip:**+12065554825**@sbc.contoso.com>	Inbound**Teams**NumberTranslationRules 'AddE164SeattleNPANXX'
FROM	FROM: <sip:**9495552814**@sbc.contoso.com>	FROM: <sip:**+19495552814**@sbc.contoso.com>	Inbound**PSTN**NumberTranslationRules 'AddPlus1'

User provisioning



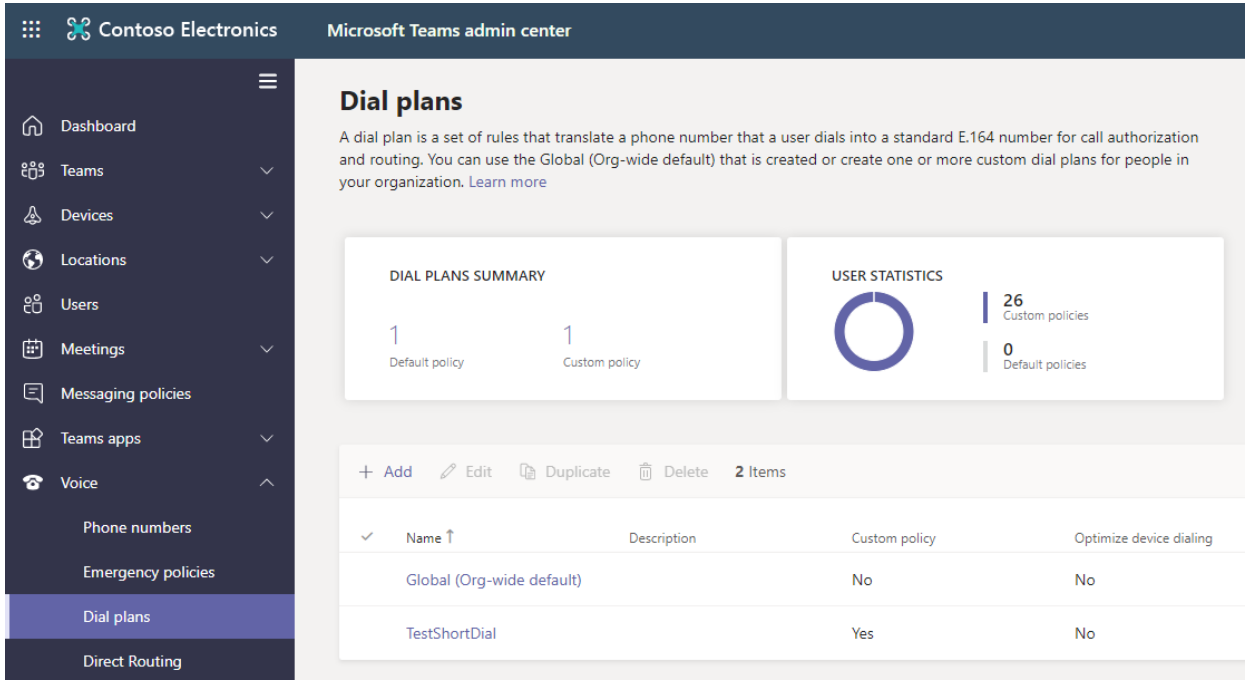
	Direct Routing only	Microsoft Calling Plan and Direct Routing
Licenses required	Microsoft Phone System Microsoft Teams Audio Conferencing (for scheduled meeting dial in/out)	Microsoft Phone System Microsoft Teams Audio Conferencing (for scheduled meeting dial in/out) Microsoft Calling Plan
Number provisioned	In Azure Active Directory (User Online or AADSync)	Acquired from **Microsoft** or **ported to Phone System**
Enable the user	*Set-CsUser -Identity "Spencer Low" -OnPremLineURI tel:+14255388797 -EnterpriseVoiceEnabled $true -HostedVoiceMail $true*	User is assigned a number through Teams Admin Center or *Set-CsOnlineVoiceUser* (inbound calling is anchored on Calling Plan)
Assign Routing	*Grant-CsOnlineVoiceRoutingPolicy –Identity "Spencer Low" –PolicyName "US Only"*	
Routing behavior	Only administrator configured routes evaluated, if no routes exist matching the callee number, the call drops	Step 1. Routes configured by administrator evaluated; Step 2. If no routes matching the callee number exist on Step 1, route the call via Microsoft Calling plan

Dial Plans

View the assigned Service Country Dial Plan

```
PS C:\Util> Get-CsOnlineUser adelev@[redacted].onmicrosoft.com | Select DialPlan

DialPlan
--------
US


PS C:\Util> (Get-CsDialPlan Tag:US).NormalizationRules


Description          : US International Dialing Rule
Pattern              : ^011(\d+)$
Translation          : +$1
Name                 : US Intl Dialing
IsInternalExtension  : False

Description          : US Extensions rule
Pattern              : ^((\+)?(\d+))(;)?(ext|extn|EXT|EXTN|x|X)(=)?(\d+)$
Translation          : $1;ext=$7
Name                 : US Extension Rule
IsInternalExtension  : False

Description          : US Long Distance Dialing Rule
Pattern              : ^1(\d+)$
Translation          : +1$1
Name                 : US Long Distance
IsInternalExtension  : False

Description          : US United States Custom 10 digit Rule
Pattern              : ^(\d{10})$
Translation          : +1$1
Name                 : US Custom 10 digit Rule
IsInternalExtension  : False
```

(optionally) Create/Assign Tenant Dial Plan



Modify Tenant (Global): Set-CsTenantDialPlan –Identity Global

Create Tenant (User): New-CsTenantDialPlan

Grant-CSTenantDialPlan

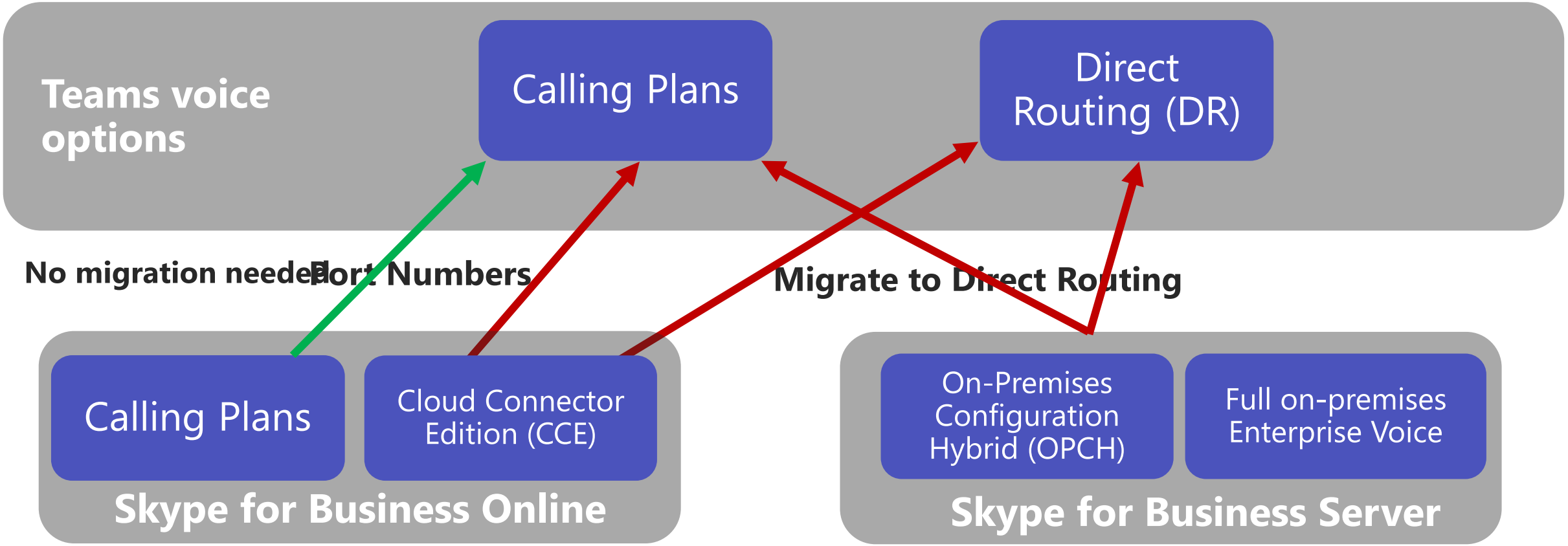
Get-CsEffectiveTenantDialPlan

What about Migrations?

Voice migration options

Phone systems with calling plans – Client-side change only

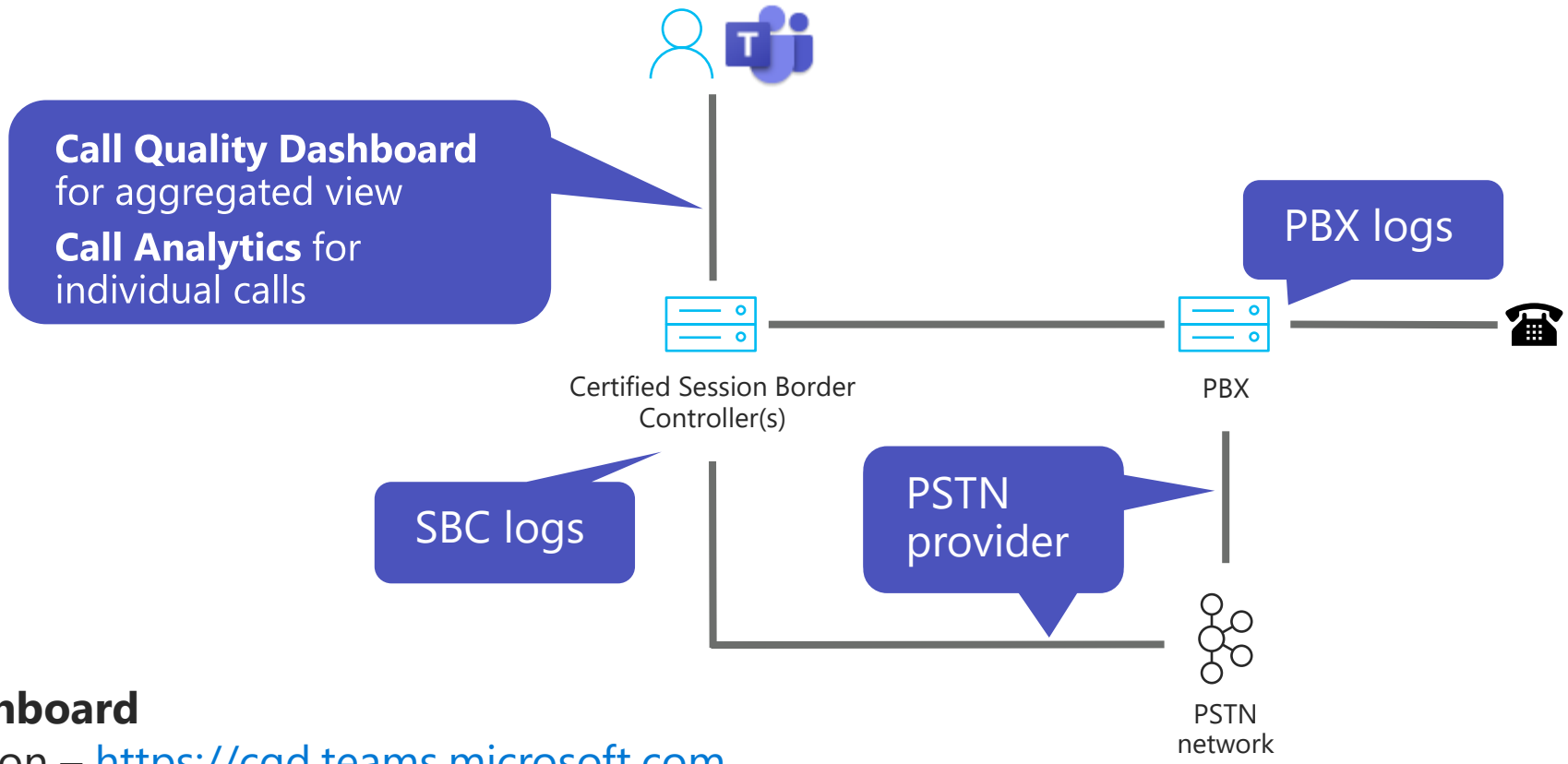
Phone system with CCE, OPCH or Full EV – Port the numbers to online or Implement Direct Routing.*



The journey and available options are the same, but the steps will differ

Managing Direct Routing

Support map



Call Quality Dashboard

Current version – https://cqd.teams.microsoft.com
Near Real Time
Contains EUII – BSSID, Call Details with User IDs and users full IP address, MAC address

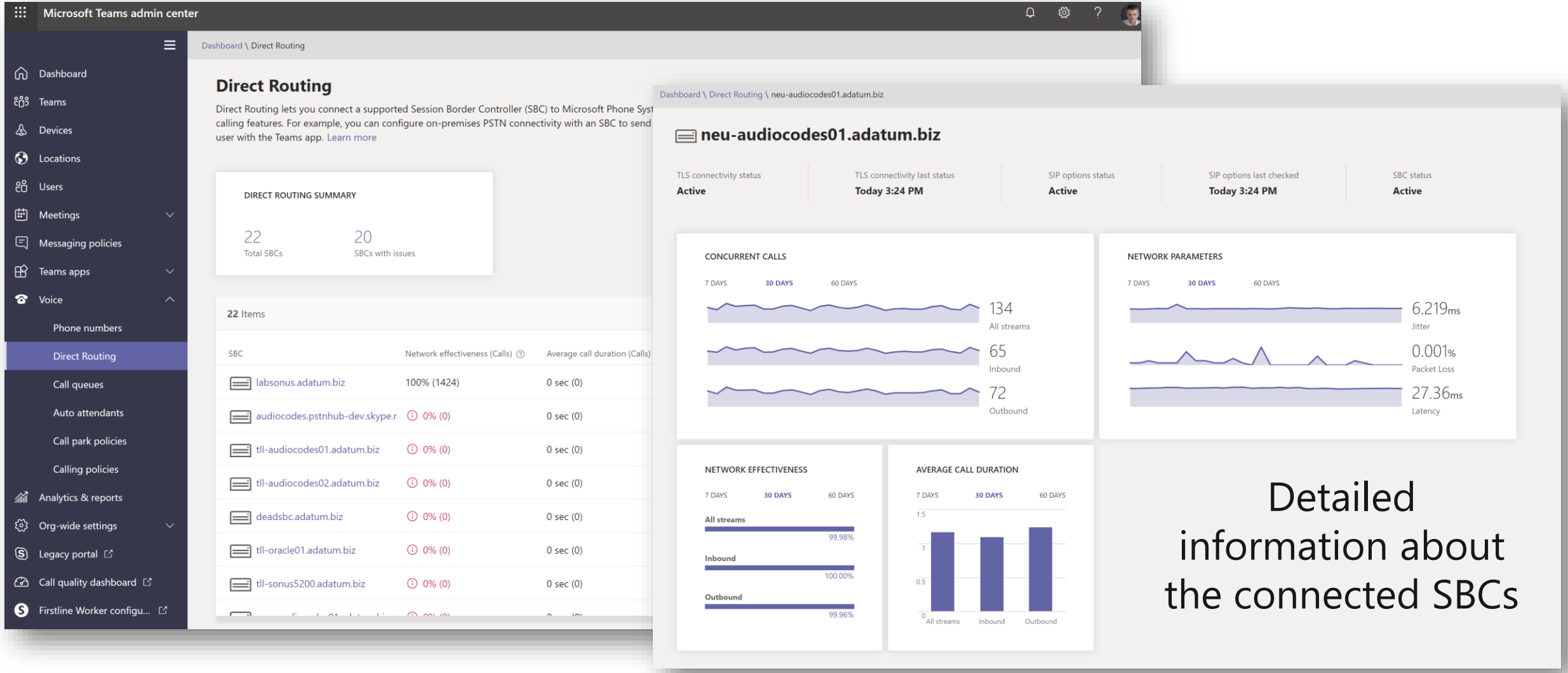
Call Analytics

Provides information about call quality and reliability for individual calls

Health Dashboard

https://aka.ms/dr-health

Overall health of the connected SBCs



Detailed information about the connected SBCs

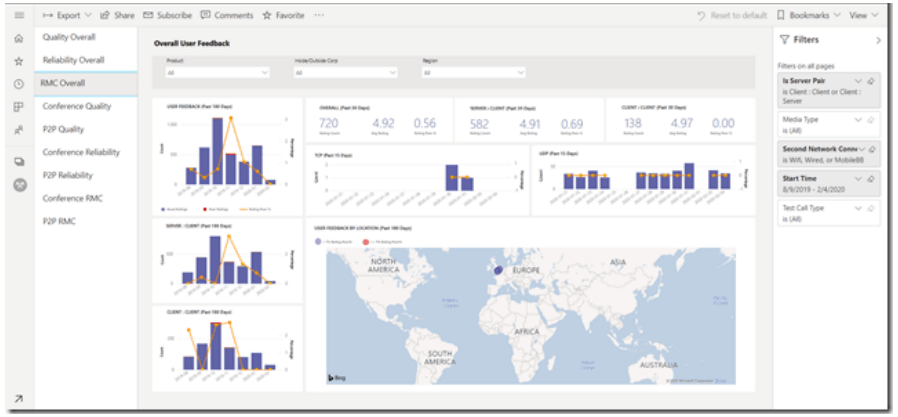
Common SBC Configuration Issues

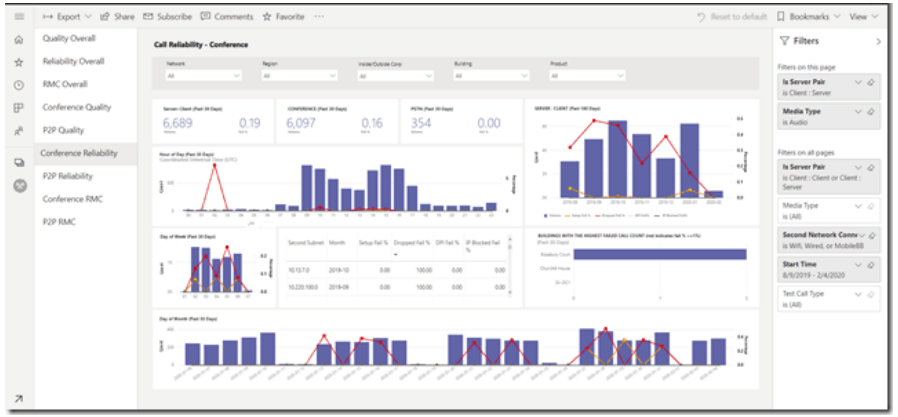
Symptom	Common solution
Missing 200 OK for options	Missing Root Certificate Chain Firewall misconfiguration
“Fail to verify peer certificate”	Missing Baltimore Root Certificate
403 Forbidden on options; “Provided trunk FQDN is not allowed”	Contact Header not defined
Transfer fails with 603 decline from SBC	Refer Support not enabled
Call connects but no audio; call disconnects shortly after	NAT traversal not configured correctly for NATed IP address
Outbound Caller ID Anonymous	ForwardPAI is set to true causing all outgoing calls to be anonymized; can be fixed with additional SBC configuration
“404 Not Found” for incoming calls	User Phone Number not configured correctly in Office 365
Outbound Calls Fail	Dial Plan includes Regex for one or more rules are invalid (even if not used for particular call)

CQD - PowerBI

Six New Power BI reports

- Summary Reports – 9 Separate Reports included
- Helpdesk Reports
- Location enhanced reports
- Mobile Device Reports
- **PSTN Direct Routing Reports**
- User Feedback





https://aka.ms/PowerBICQD

Where do you go from here?

Key takeaways

In this session, you learned how to:

- Understand the history of voice services in Microsoft products
- Identify what calling options in Microsoft Teams are right for you
- Configure your calling options in the Teams admin portal
- Monitor and use call quality tools in Teams

Explore more resources

- Adoption Site: https://Adoption.Microsoft.com — New!
- Live, online training: https://aka.ms/TeamsLiveTraining
- Self-guided how-to articles: https://support.office.com
- Overview of apps in Teams: http://aka.ms/OverviewAppsInTeams
- Add apps to Microsoft Teams: https://aka.ms/addappstoteams
- Custom apps in Microsoft Teams: https://aka.ms/teamsdev
- Teams Chalk Talks: https://aka.ms/TeamsChalkTalks
- Chalk Talk Handout: https://aka.ms/MakeCallsWithTeams — New!

Share your feedback

TeamsIT@Microsoft.com

Thank you for attending!