

Voice Scenario and Integration Concepts with Teams



Agenda

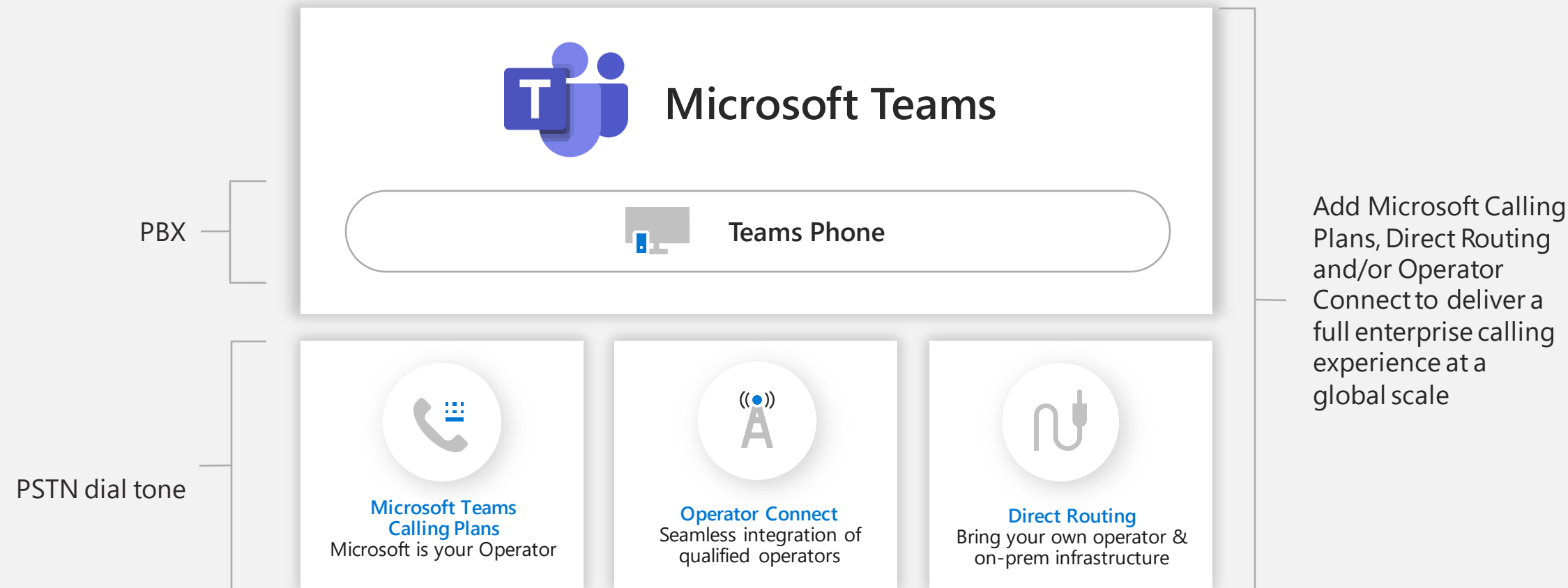
Voice Scenarios

Voice Integration Concepts

Microsoft Teams Voice Overview



Simplify Calling with Microsoft Teams



Customer Choice at the Center of Teams Phone Enablement

Microsoft meets your customers' diverse needs with flexible and simple options to bring calling to Teams. There are now three options for enabling Teams Phone.



Direct Routing

Highly customizable approach that allows customers to maintain existing service provider agreements and use on premises/hybrid hardware.

Available globally through partners.

Operator Connect

A quick and easy way to get started with calling while maintaining existing service provider agreements and leveraging the customization and flexibility of Direct Routing.

Public Preview available today through 22 partners covering over 50 markets.

Microsoft Calling Plans

A fast and simple way to setup calling without additional technical configurations. It does not require a session border controller (SBC) or 'voice trunk'.

Available in 28 markets.

Microsoft Teams Voice Capabilities

Microsoft Teams Calling Plans

Microsoft is your operator

Operator Connect

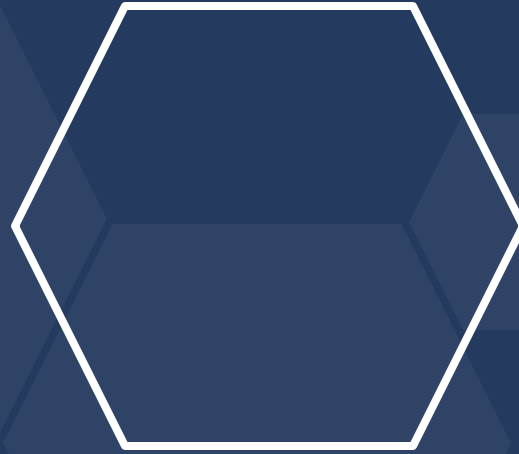
Simply and seamlessly integrate qualified operators

Direct Routing

Use your existing infrastructure, supported in >180 countries



Calling Plans



What are Microsoft Teams Calling Plans?

When combined with Microsoft Teams Phone, Calling Plans can become your complete phone system.

Calling Plans provide employees with a primary phone number (either new or existing) and lets them make and receive phone calls outside of the organization.

Users can be assigned existing phone numbers or get new ones.

Calling Plans features:

International Calling Plan

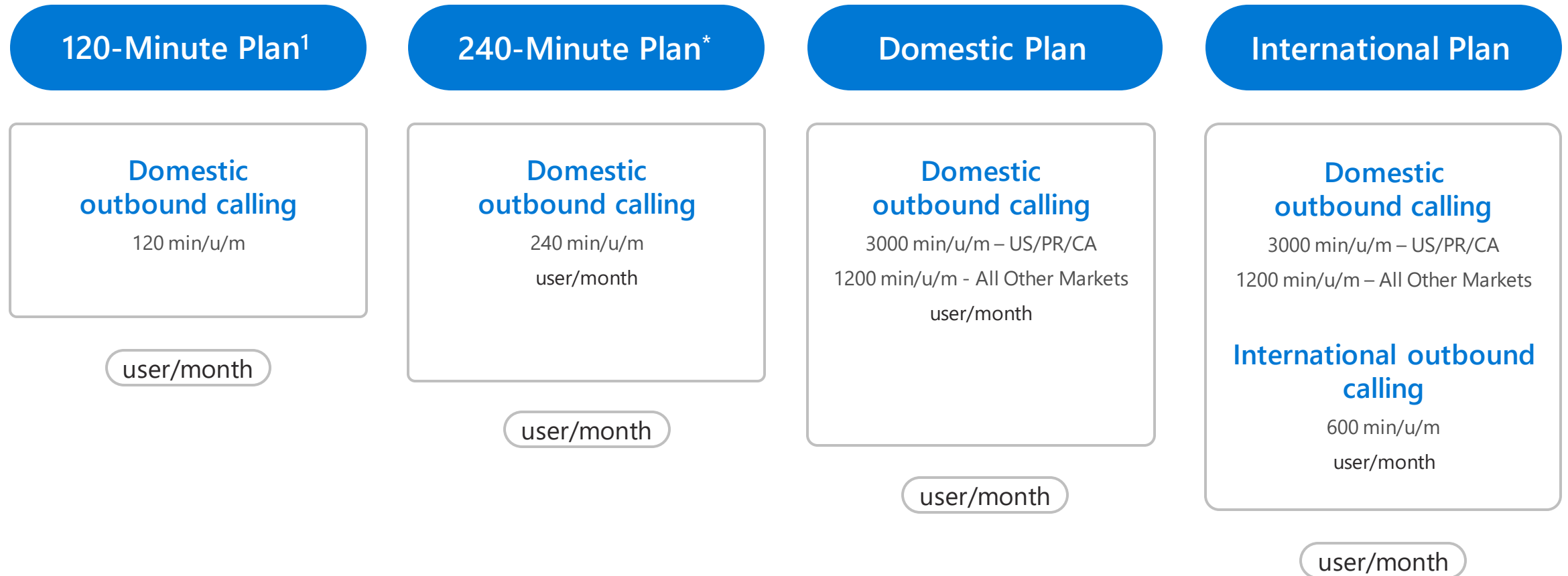
Licensed users can call out to numbers located in the country/region where they are assigned in Office 365¹ and to international numbers in [196 countries/regions](#).

Domestic Calling Plan

Licensed users can call out to numbers located in the country/region where they are assigned in Office 365¹.

¹Within select countries; see the service terms for details. Domestic Calling Plan is bundled with Business Voice in select markets.

Microsoft Teams Calling Plans



Minute limits are applied toward outbound minutes per user per month and pooled at the tenant level by plan and geography type. Only assigned licenses count towards total pooled minute limit, not the total number of purchased licenses. For more information, please see the [Which Calling Plan is right for you?](#) article.

Calling Plans : Minute Pooling Example

One plan per user. Minutes are pooled at plan and country level.

UK Domestic



 5 Users

6,000

1,200 min/u/m
X 5 users
= 6,000 minutes



Cannot share
pooled mins

US Domestic



 5 Users

15,000 mins

3,000 min/u/m
X 5 users
= 15,000 minutes



Cannot share
pooled mins

US Domestic & International



 5 Users



Whichever is
reached first

15,000
domestic
mins

3,000
international
mins

3,000 min/u/m
X 5 users
= 15,000 dom. Mins

600 min/u/m
X 5 users
= 3,000 int'l mins

*Note: Pool size is based on *assigned* licenses and not on purchased licenses.*

International Plan: Where can you call?

196 countries included in International Plan

Not included in calling plan*

| | | |
|-----------------------------|-----------------------|-----------------|
| Antarctica | Kiribati | Seychelles |
| Burundi | North Korea | Sierra Leone |
| Chad | Liberia | Solomon Islands |
| Cook Islands | Madagascar | Somalia |
| Cuba | Maldives | St. Helena |
| East Timor | Mauritania | Tokelau |
| Falkland Islands (Malvinas) | Niue | Tonga |
| Gabon | Papua New Guinea | Tunisia |
| Gambia | Samoa | Tuvalu |
| Guinea-Bissau | Sao Tome and Principe | Vanuatu |

***Calls to these countries require consumption (Communication Credits) and are billed per minute.**

For current list of available dial-in and dial-out countries, please visit our [countries list](#).



Communications Credits

Communications Credits enable additional capabilities beyond what is included in the [Audio Conferencing](#) and [Calling Plan](#) subscription plans.

Communications Credits uses a [pre-paid billing model](#) and can be enabled on any tenant licensed for Audio Conferencing or Calling Plans.

Communications Credits provides:



Audio Conferencing

- Toll free dial-in conferencing
- Dial out conferencing to pay-as-you-go countries
- Dial out conferencing to Included/zone A countries after monthly allocation of minutes has been consumed*



Calling Plan

- International outbound calling (for Domestic Calling Plans)
- International outbound to any country not included in base service plan (for International Calling Plans)
- Ability to overrun subscription plan minutes per month and pay per minute over the monthly allotment

For more information, see the [What is Microsoft Teams Communications Credits](#) article.

Porting Telephone Numbers

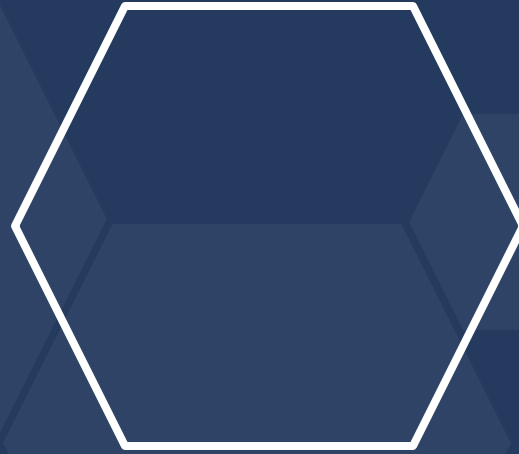
You can port or transfer numbers from your current service provider to Microsoft. This allows you to keep your existing telephone numbers and move them to the Microsoft service.

In general, you can port any phone number from a supported provider:

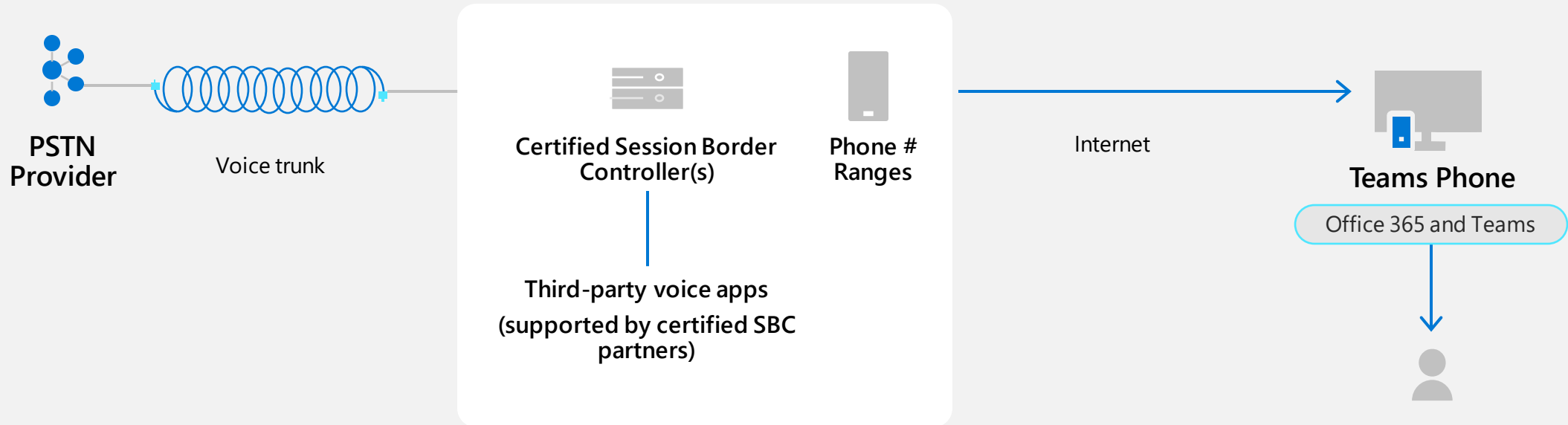
- Land lines
- Mobile numbers
- Toll phone numbers
- Toll-free phone numbers
- Service numbers and most other types



Direct Routing



Direct Routing



Directly route dial tone to Microsoft Teams users

Direct Routing in Microsoft 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. No porting required – keep your numbers.

Interoperability with third-party systems

Direct Routing allows customers with users in the Microsoft cloud to continue using third-party systems such as PBXs, call center, and analog telephony adaptors (ATA) helping preserve key investments.

Session Border Controllers (SBCs) certified for Direct routing

Microsoft partners with selected Session Border Controllers (SBC) vendors to certify that their SBCs work with Direct Routing

Microsoft works with each vendor to:

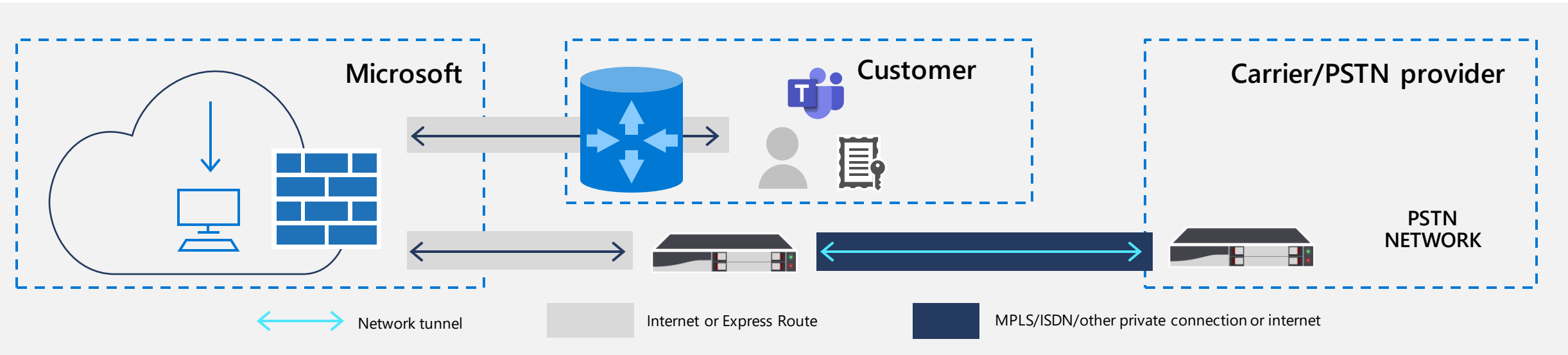
- Jointly work on the SIP interconnection protocols.
- Perform intense tests using a third-party lab. Only devices that pass the tests are certified.
- Run daily tests with all certified devices in production and pre-production environments. Validating the devices in pre-production environments guarantees that new versions of Direct Routing code in the cloud will work with certified SBCs.
- Establish a joint support process with the SBC vendors.
- SBCs can be physical appliances, or deployed in the cloud.
- List of supported SBCs: <https://aka.ms/dr-sbc>



Session Border Controllers certified for Direct Routing



Notional Direct Routing Deployment Model



Requirements to each involved party:

| Microsoft | Customer | Carrier |
|--|---|----------------------------|
| Teams Phone Teams client Support (including incident transfers been Microsoft and SBC vendors) Configuration guidance/documentation | "E5" or "E3 + Microsoft Teams Phone licenses" Contract with carrier The supported SBC (including the support contract) Access to the SBC from the Office 365 Public IP FQDN Certificate Configuration of SBC with Office 365 and carrier | Telephony trunk Support |

Configuration and support includes interaction between four entities: Microsoft, SBC vendor, customer support and consultants, carrier

Survivable Branch Appliance with Direct Routing

A Survivable Branch Appliance (SBA) provides the ability to survive telephony connectivity for Microsoft Teams clients in case the connection between Microsoft and the customer premises is not available

Components of an SBA

- | | |
|-------------------------------|----------------------------|
| Tenant data sync service | Registrar |
| Keep alive interface | Lightweight routing engine |
| Router | CDR service |
| NGC to SIP protocol converter | |

Supported vendors

- | | |
|------------|--------|
| Audiocodes | Oracle |
| TE-Systems | Ribbon |

Survivable Functionality when in Offline Mode



Available

- Inbound PSTN call
- Outbound PSTN call
- Mute/Unmute
- Hold/Unhold
- DTMF
- Call history during outage updated once online
- Up to 24-hour limit for offline mode



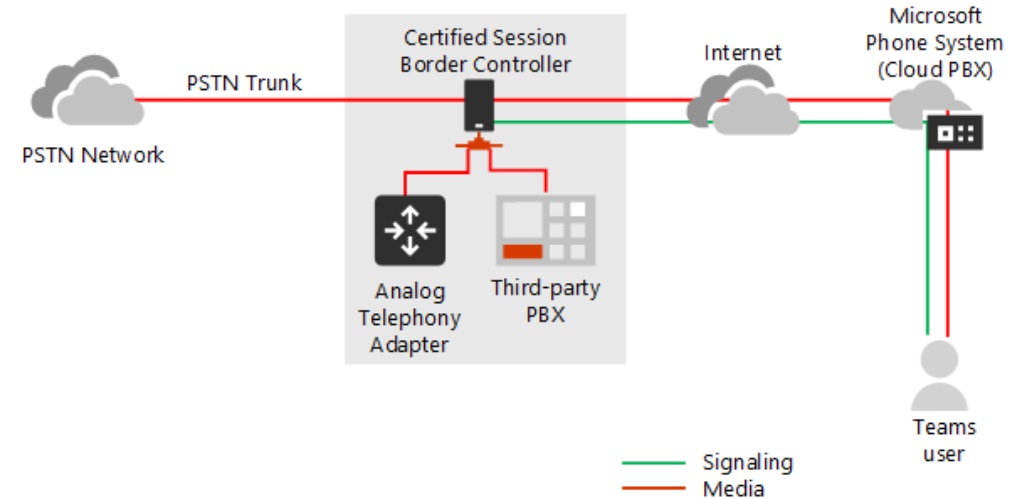
Not Available

- VOIP calls
- UX features: Add/Remove contact, Search, Add/Remove to speed-dial, voice mail
- In Call: call escalation to multiparty
- Complex enterprise features: Call forwarding, call queue, merge, consult transfer, delegation, call queues, and auto attendants
- More than 24-hours outage

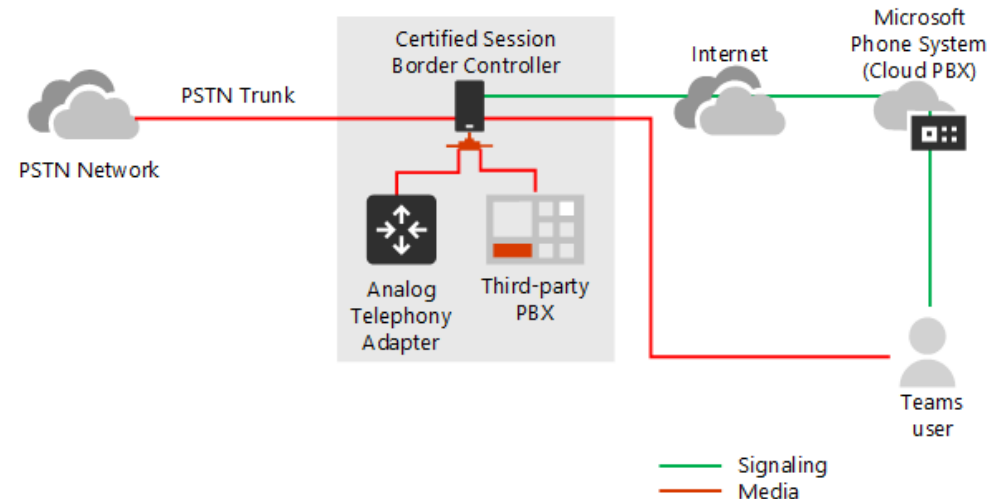
Direct Routing with Media bypass:

- Teams user needs access to the public IP address of the SBC (even from internal) unless utilizing local media optimization
- Recommended when user is in the same physical building/network as the SBC
- Signaling (SIP/TLS) is always through the Microsoft cloud

Call flow without media bypass



Call flow with media bypass



Direct Routing with Local Media Optimization:

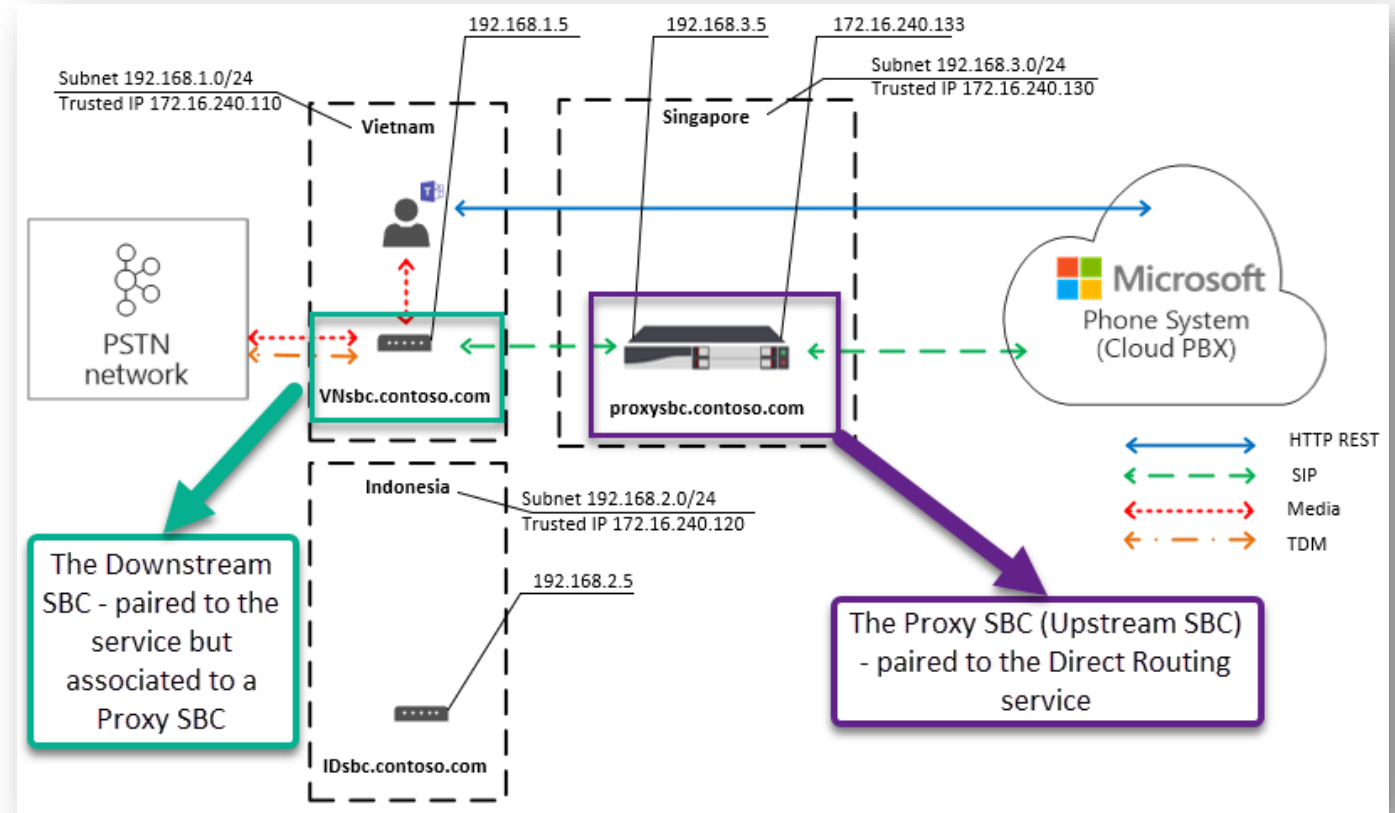
Proxy SBC

- Has a public IP address
- Deployed in the same manner as any SBC for Direct Routing
- Can be targets of Online Voice Routes

Downstream SBC

- Does not have a public IP address assigned
- Paired to the service with association to Proxy SBC
- Can be targets of Online Voice Routes

Call flow with Local Media Optimization

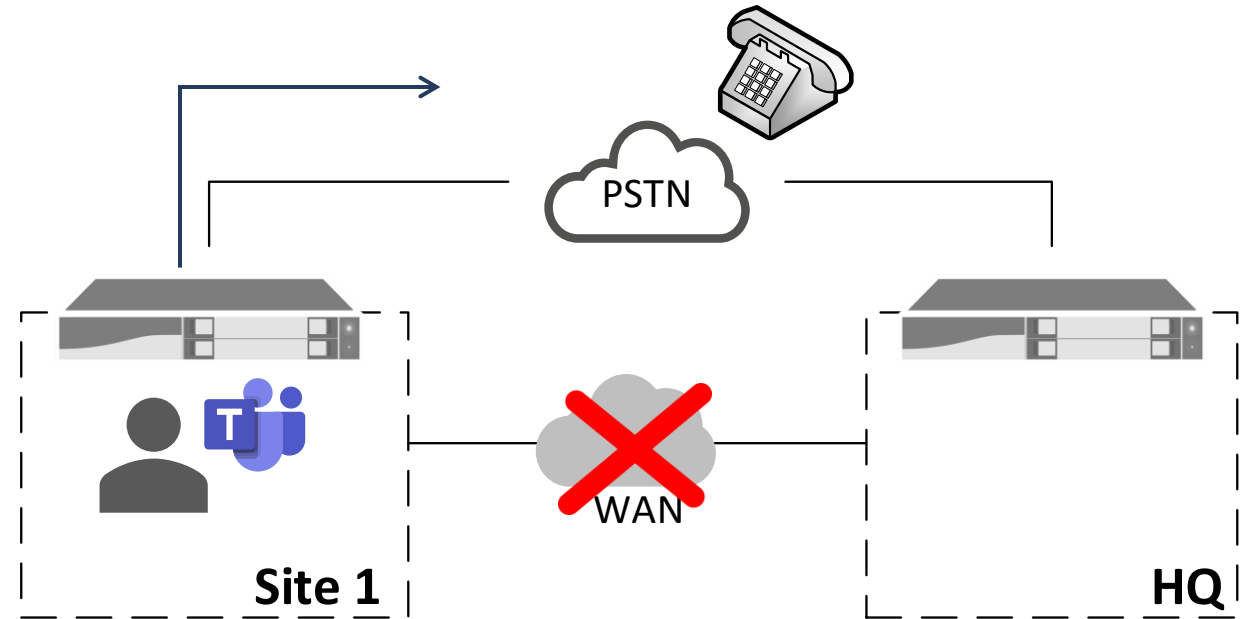


For additional details please refer to: <https://docs.microsoft.com/en-us/microsoftteams/direct-routing-media-optimization>

Direct Routing with Location-based Routing:

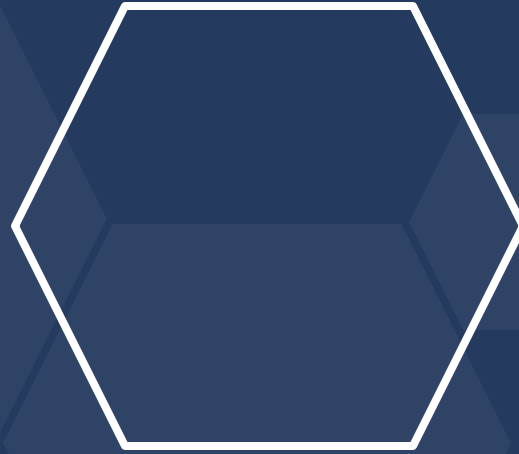
- In some countries and regions, it's illegal to bypass the Public Switched Telephone Network (PSTN) provider to decrease long-distance calling costs.
- Location-based routing is a feature that lets you restrict toll bypass based on policy and the user's geographic location at the time of an inbound or outbound PSTN call.
- Location-based routing is intended to provide a mechanism to prevent toll bypass.
- It shouldn't be used as a mechanism to dynamically route PSTN calls based on the location of the user or unintended consequences may result.

Call flow with Local Based Routing



For additional details please refer to: <https://docs.microsoft.com/en-us/microsoftteams/location-based-routing-plan>

Operator Connect



Operator Connect for Microsoft Teams

Simply and seamlessly enable calling in Microsoft Teams using your existing telecom operator

Bring your own telecom operator

Maintain your operator contracts and relationships, while providing users a modern calling experience in Teams.

Setup in minutes; simplify provisioning and management

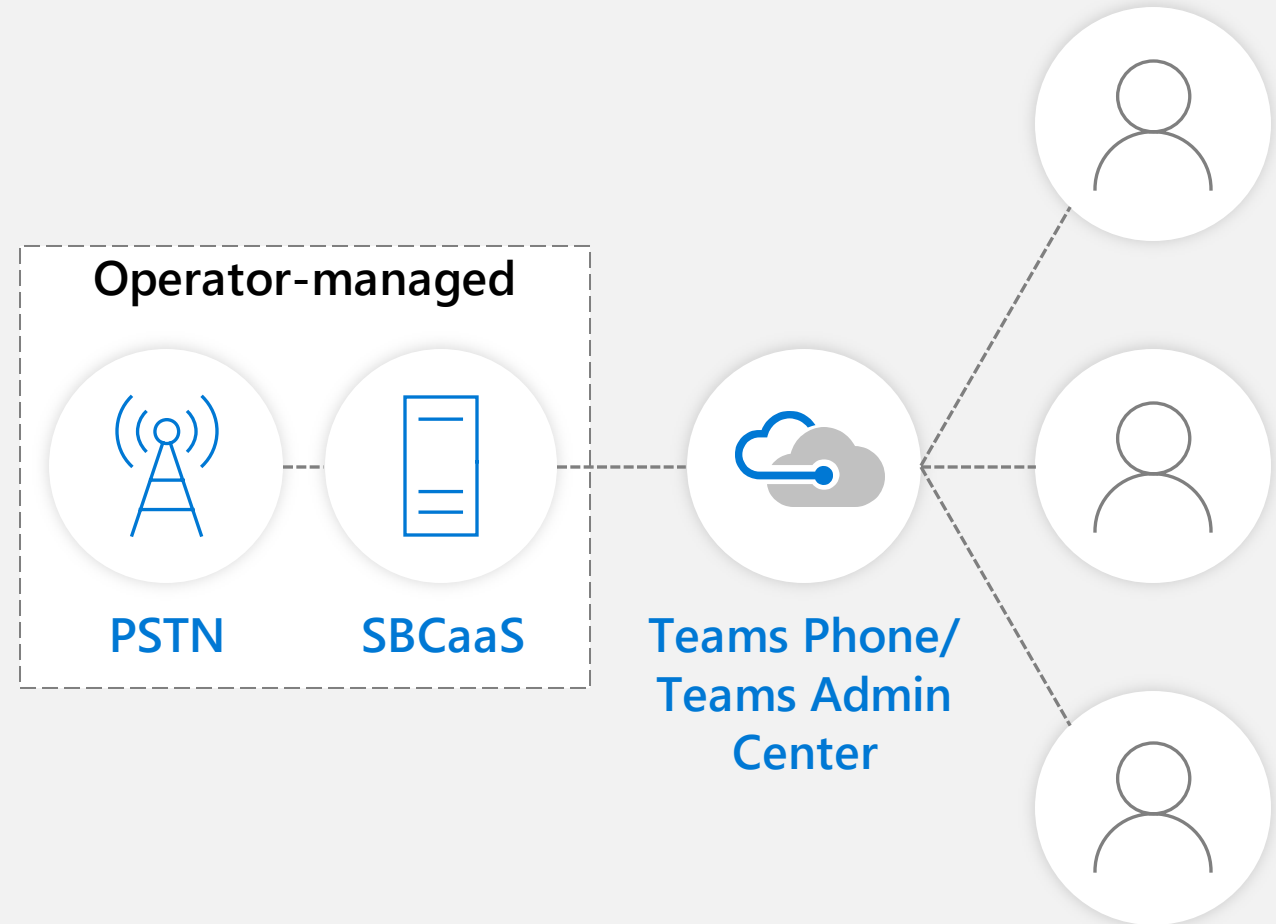
Establish the connection to your operator, provision users, and assign phone numbers from the Teams admin center.

Save on infrastructure purchase and management

Manage call control in the cloud with Teams Phone, eliminating need to purchase and maintain equipment.

Feel confident with enterprise-grade reliability and support

Operators provide technical support and service level agreements, and direct peering powered by Azure creates a 1:1 network connection to enhance resilience.



Operator Connect Conferencing

Add telecom operator dial-in numbers to a Microsoft Audio Conferencing bridge

Bring your own telecom operator

Maintain your preferred telecom operator contracts and relationships as you migrate to the cloud

Variety of telecom operators available at your fingertips

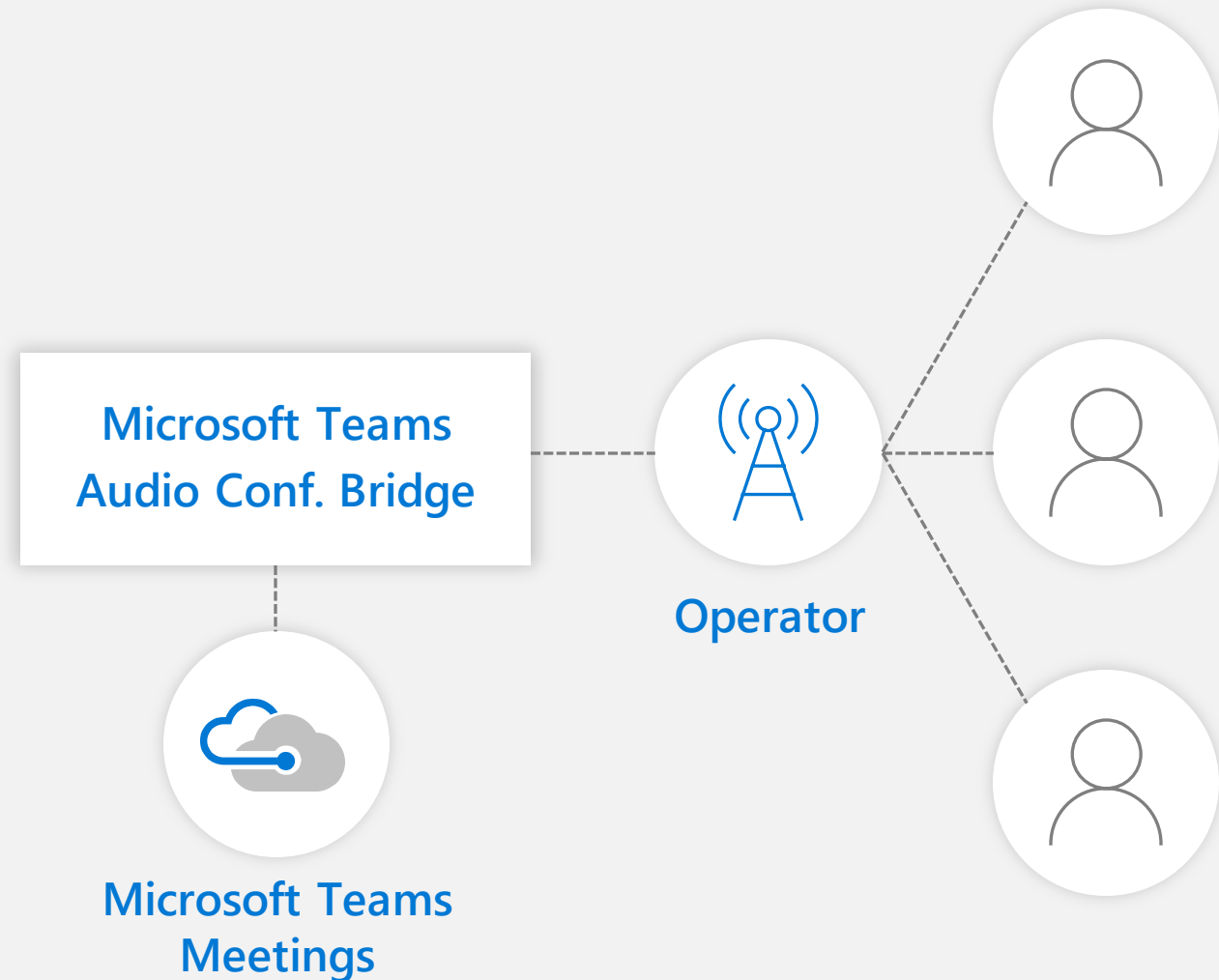
Establish the connection to your operator, provision users, and assign phone numbers from the Teams admin center

Expanded geographic dial-in coverage

Manage call control in the cloud with Phone System, eliminating need to purchase and maintain equipment

Feel confident with enterprise-grade reliability & support

The tight partnership with operator partners provides enhanced technical support and service-level agreements to address reliability



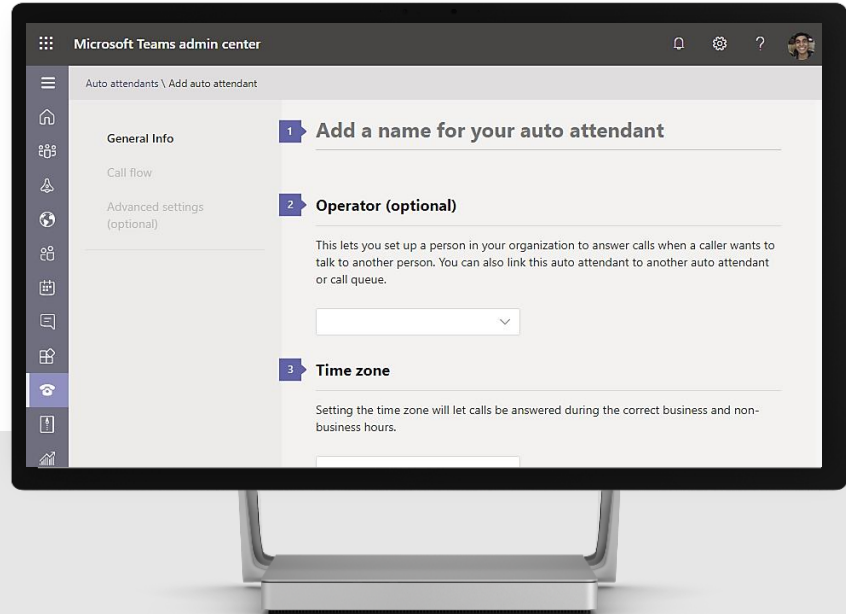
Operator Connect: Enhancements

| | | |
|-----------------------------|---|---|
| Interconnection | > | Direct peering through Microsoft Azure Peering Service (MAPS) Provisioning APIs and an operator portal for setting up trunk to Microsoft Teams |
| Number provisioning | > | Upload (using API or portal) phone numbers/DID's to the Teams admin center Display and assign phone numbers/DID's to tenants in the Teams admin center |
| Management | > | Seamless customer provided access (by geography) to operator for management of voice tenant Operator management portal for customer tenants |
| Reporting | > | API's and reporting for sharing CDR, QoE, telephone numbers, and SLA Joint customer admin reporting (CQD / CDR) |
| GTM | > | Operator presence in Microsoft Teams admin center, by geography and service Assignment/management experience for operator numbers and plans embedded in the portal |
| Operations & communications | > | Regular communications for service interface changes and product updates Regular communications around network SLA and call quality |
| Support | > | Joint back-to-back support model, support-to-support, and engineering-to-engineering Proactive diagnostic/alerts for trunk setup and health |

Auto Attendants and Call Queues

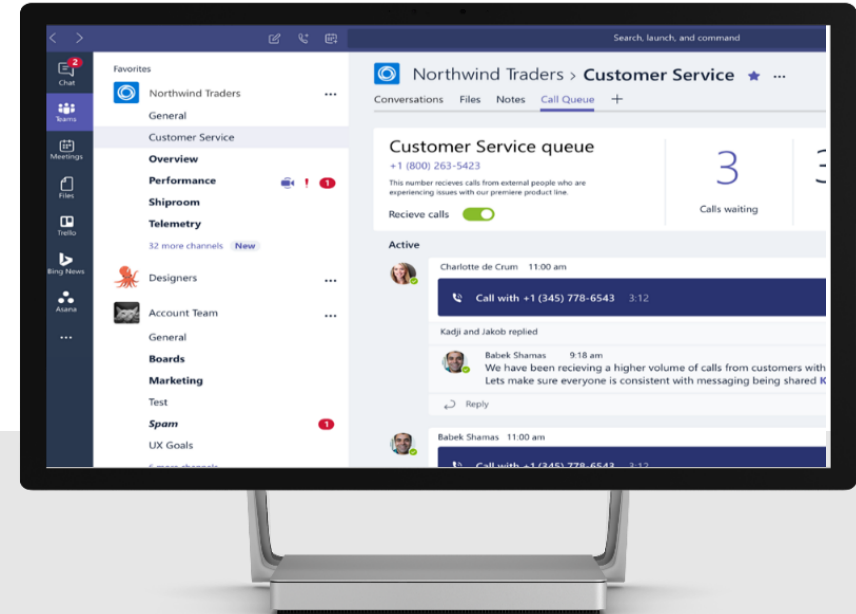


Auto Attendant and Call Queues



Auto attendant

- Toll-free and local service numbers
- Dial-by-name directory search
- Custom greetings and menus
- Operator option
- Speech recognition in 14 languages
- Admin portal UI and PowerShell cmdlets



Call queues

- Coordinate teams of people working together in a channel
- Boost collaboration and efficiency with chat and call queues
- Enjoy role-based for supervisor / agents and agent sign-in/out
- Use supervisor listen, whisper, and barge with integrated chat for cross-agent support and teaming

Call queues and auto attendant prerequisites

To configure auto attendants and call queues, you need the following resources:

A resource account for each auto attendant and each call queue

Phone System Virtual User license for each resource account

At least one Microsoft service number, Direct Routing number, or a hybrid number for each resource account that you want to be directly dialable. The service number may be a toll or toll-free number.



Agent prerequisites

Agents who receive calls from the call queues must be Enterprise Voice enabled online or on-premise users

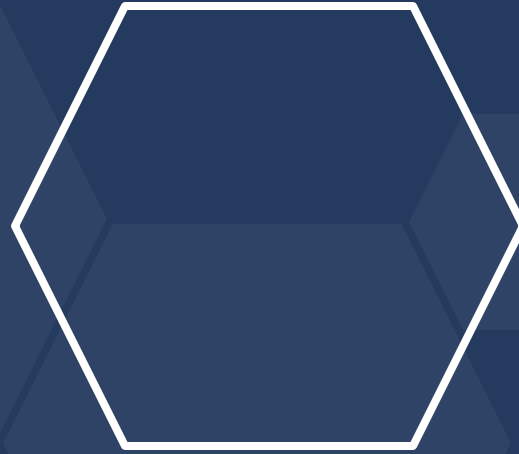
In addition, if the call queues are using Direct Routing numbers, agents who need to conference or transfer calls also require:

1. An online voice routing policy assigned if the call queue uses transfer mode
2. An Audio Conferencing license or online voice routing policy assigned if the call queue uses conference mode

If your agents are using the Microsoft Teams app for call queue calls, they need to be in Teams Only mode



Dynamic Emergency Calling



Overview: Dynamic Emergency Calling

Route emergency calls based on the known location of the Teams client



Call Routing Service included for Calling Plan Users



Direct Routing users must obtain additional service [Emergency Routing Service Providers – see <https://aka.ms/dr-sbc>]

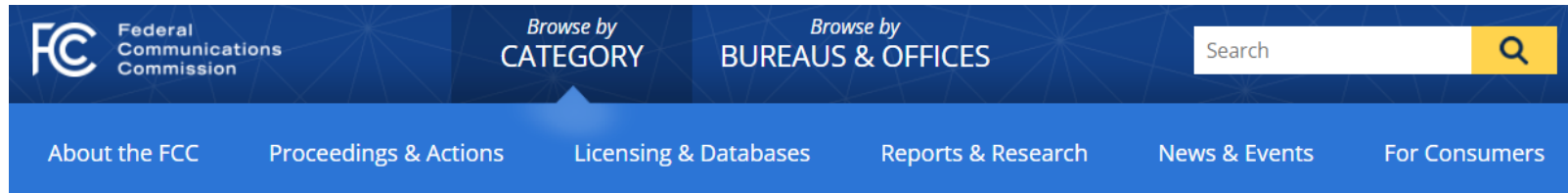


Direct Routing can also leverage Emergency Location Identification Number [ELIN] gateways [upcoming support – see <https://aka.ms/dr-sbc>]



Configure security desk notifications

Legislation: Dynamic Emergency Calling (source FCC)



Home / Public Safety / Policy and Licensing Division / 911 Services /

Multi-line Telephone Systems – Kari’s Law and RAY BAUM’S Act 911 Direct Dialing, Notification, and Dispatchable Location Requirements

911 Services

[Annual 911 Fee Reports](#)

[911 Strike Force](#)

[911 Master PSAP Registry](#)

[Dispatchable Location](#)

[PSAP Text-to-911 Readiness and Certification Form](#)

[Task Force on Optimal Public Safety Answering Point Architecture \(TFOPA\)](#)

[Indoor Location Accuracy Timeline and Live Call Data Reporting](#)

In August 2019, the Commission adopted rules implementing two federal laws that strengthen emergency calling: Kari’s Law and Section 506 of RAY BAUM’S Act.

Kari’s Law – Direct Dialing and Notification for MLTS

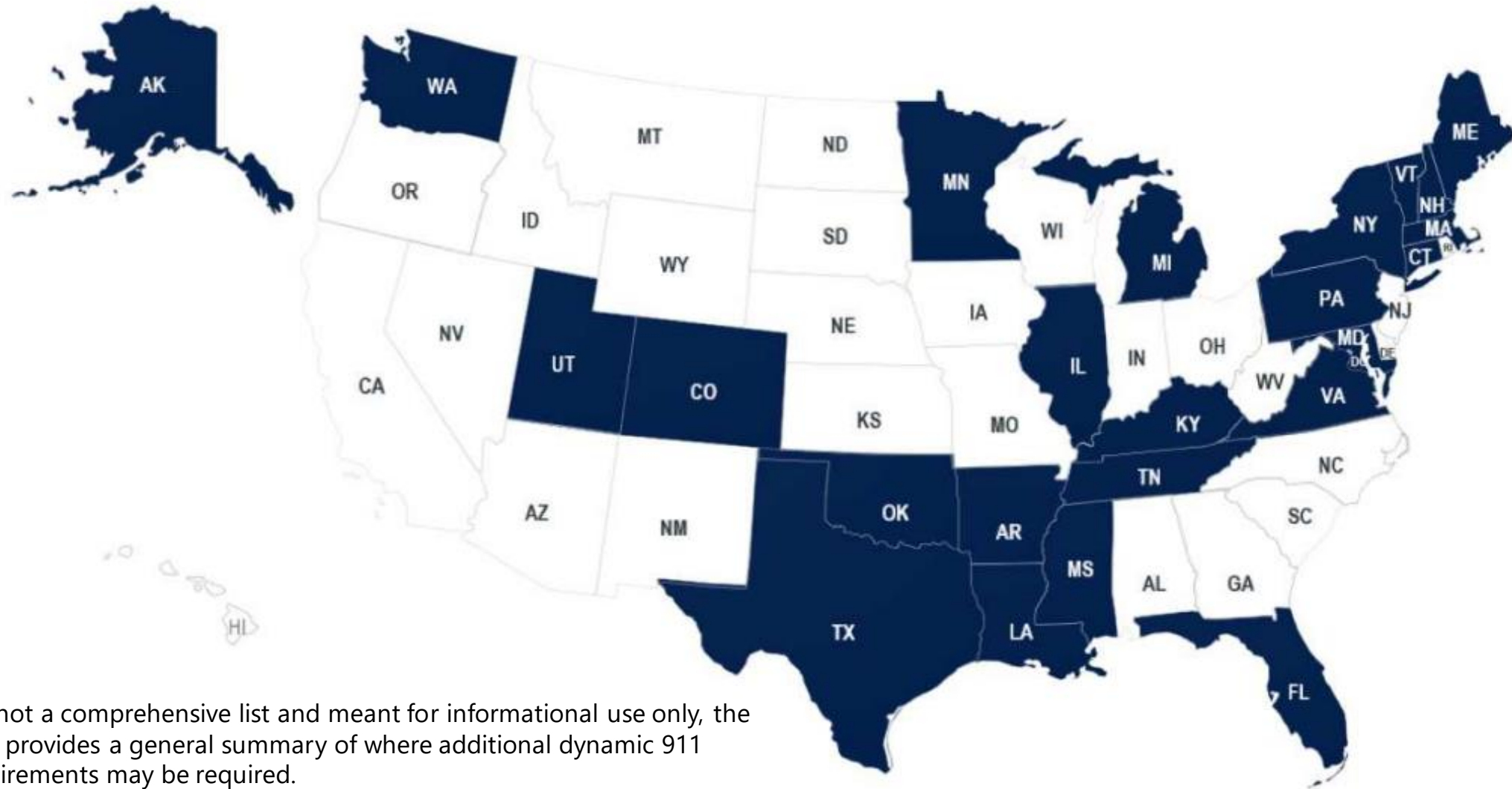
Kari’s Law is named in honor of Kari Hunt, who was killed by her estranged husband in a motel room in Marshall, Texas in 2013. Ms. Hunt’s 9-year-old daughter tried to call 911 for help four times from the motel room phone, but the call never went through because she did not know that the motel’s phone system required dialing “9” for an outbound line before dialing 911.

Congress responded by enacting Kari’s Law in 2018. Kari’s Law requires direct 911 dialing and notification capabilities in multi-line telephone systems (MLTS), which are typically found in enterprises such as office buildings, campuses, and hotels. The statute provides that these requirements take effect on February 16, 2020, two years after the enactment date of Kari’s Law. In addition, Kari’s Law and the federal rules are forward-looking and apply only with respect to MLTS that are manufactured, imported, offered for first sale or lease, first sold or leased, or installed after February 16, 2020.

Under the statute and the Commission’s rules, MLTS manufacturers and vendors must pre-configure these systems to support direct dialing of 911—that is, to enable the user to dial 911 without having to dial any prefix or access code, such as the number 9. In addition, MLTS installers, managers, and operators must ensure that the systems support

For additional details please refer to: <https://www.fcc.gov/mlts-911-requirements>

Example: Dynamic 911 Considerations

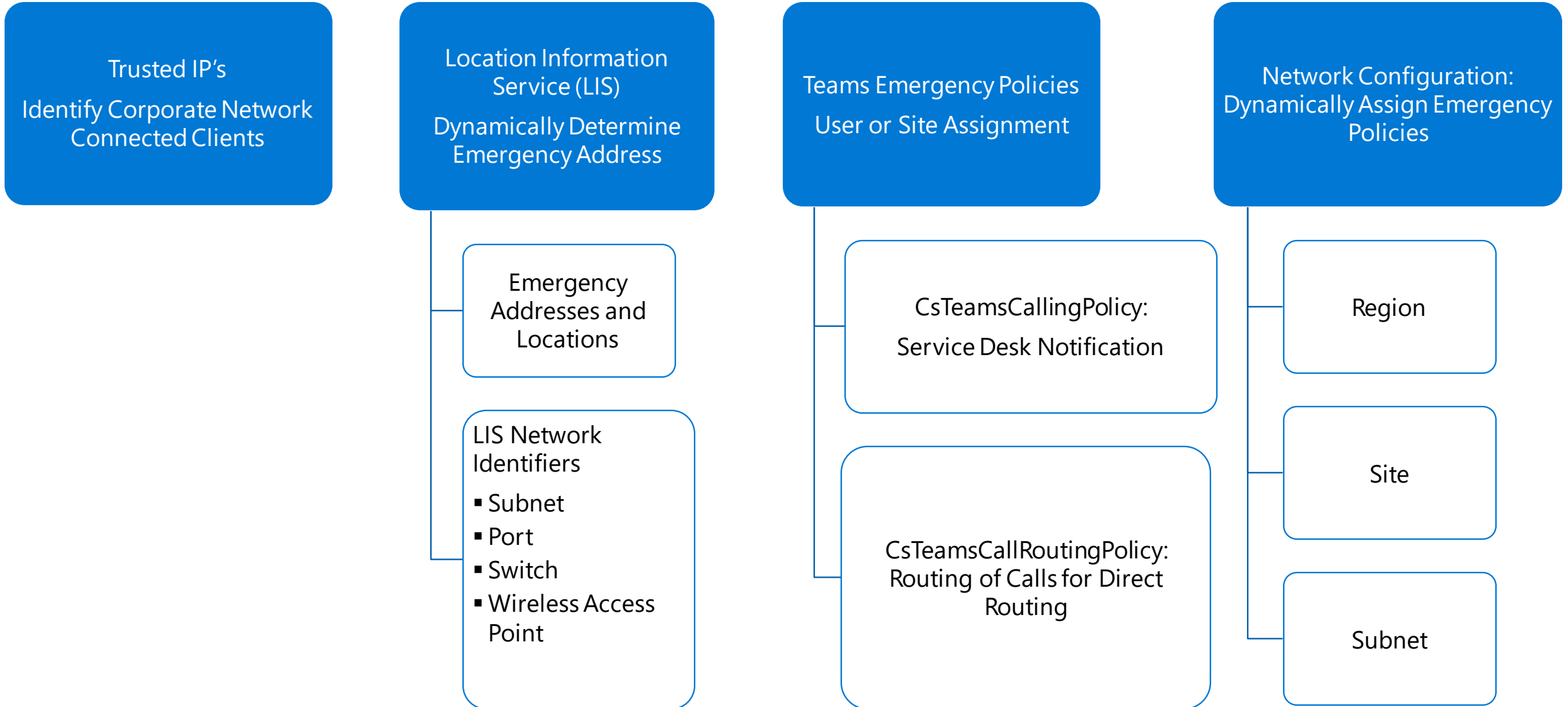


Note: Though not a comprehensive list and meant for informational use only, the example above provides a general summary of where additional dynamic 911 regulation requirements may be required.

To support deploying Teams voice, please review with your internal legal and regulatory advisement teams to understand how dynamic 911 laws and regulations will impact US locations where organizational corporate sites operate.

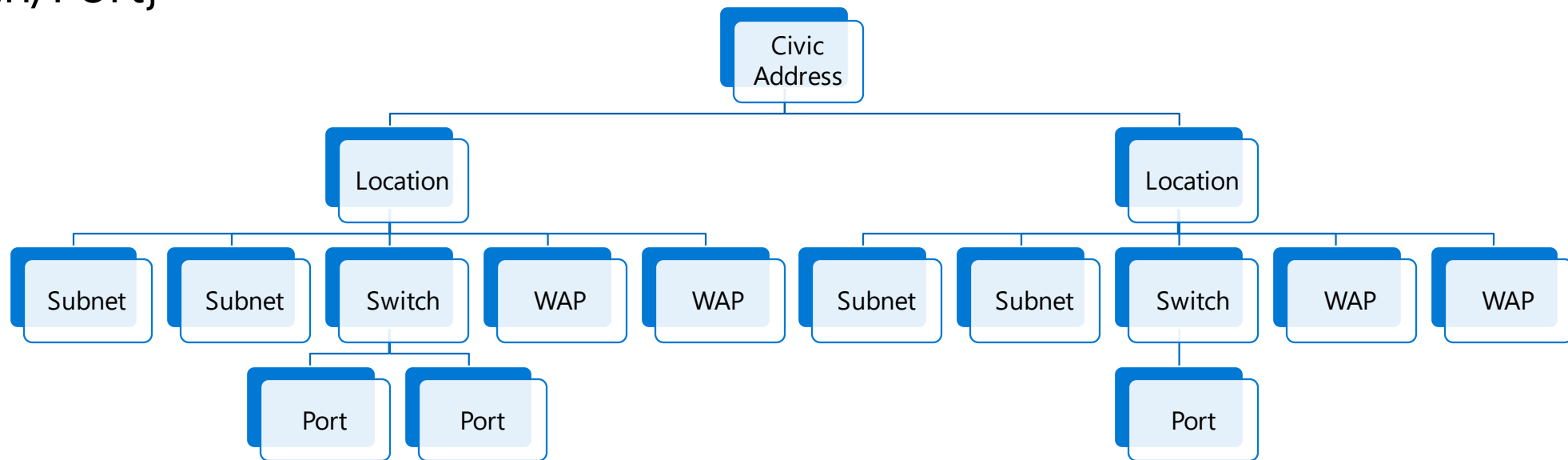
**source Intrado: <https://www.intrado.com/sites/default/files/2021-07/State-E911-Legislation-Summary.pdf>

Dynamic Emergency Calling Configuration Components



Defining Dynamic Emergency Calling Locations (LIS)

- Hierarchy and information should be detailed enough to allow emergency responders to easily locate a person.
- Civic Address → specific building
- Location (also called Places) → for example, a floor in the building
- In each location → one (or more) network elements {subnet, Wireless Access Point, Switch/Port}



Dynamic Emergency Calling Considerations: Microsoft Calling Plans

Automatic routing to PSAP (Public Safety Answering Point) is country dependent.

United States**

Client within a tenant-defined dynamic emergency location (including geo codes): call will be automatically routed to PSAP.

Client not located in a tenant-defined dynamic emergency location: call will be screened by a national call center [ECRC] to determine caller's location.

If the caller is unable to update their emergency location with the ECRC, transfer to PSAP serving the caller's registered address.

Outside of the United States [dynamic routing not applicable here]**

Canada, Ireland, UK: Emergency calls are routed to Tier 1 screening center, equivalent behavior in US without registered address.

Germany, France Spain: Emergency calls are routed directly to the PSAP serving the emergency address associated with the number regardless of the location of the caller. When adding emergency locations for users in these locations, address must map to the phone number based on emergency address mapping in region.

Netherlands: Emergency calls are routed directly to the PSAP for the local area code of the number regardless of the location of the caller.

Australia: Emergency addresses are configured and routed by the carrier partner.

Japan: Emergency calling is not supported.

**Similar considerations for Operator Connect, however implementation will vary by carrier

Dynamic Emergency Calling Considerations: Direct Routing

For Direct Routing, an Emergency Routing Service Provider is required for integration so that emergency calls with a dynamically acquired location will be automatically routed to the Public Safety Answering Point (PSAP) serving that location.



With Direct Routing, you must further define:

- Emergency calling policy**
- Emergency call routing policy
- Dialplan supporting emergency number routing
- Additional configuration as required for routing emergency calls with certified 911 Provider

Certified 911 Providers for Direct Routing

- [Bandwidth Dynamic Location Routing](#)
- [Intrado Emergency Routing Service \(ERS\)](#)
- [Intrado Emergency Gateway \(EGW\)](#)
- [Inteliquent](#)

Dynamic Emergency Work From Home Considerations

Calls

Phone

Contacts

Type a name or number

1

2
ABC

3
DEF

4
GHI

5
JKL

6
MNO

7
PQRS

8
TUV

9
WXYZ

*

0
+

#

Call

Work number: +1 425-704-7160

Parked calls

📍 3434 Monteith Avenue, Cincin... ▾

🔄 Don't forward ▾

📶 Zone Wireless ▾

Calls

Phone

Contacts

Type a name or number

1

2
ABC

3
DEF

4
GHI

5
JKL

6
MNO

7
PQRS

8
TUV

9
WXYZ

*

0
+

#

Call

Work number: +1 425-704-7160

Parked calls

Your current emergency location

✎ Edit your address

✓ Confirm your address

📍 3434 Monteith Avenue, Cincin... ▾

🔄 Don't forward ▾

📶 Zone Wireless ▾

Edit your current location

(All fields are required.)

3434

Monteith Avenue

Cincinnati

OH

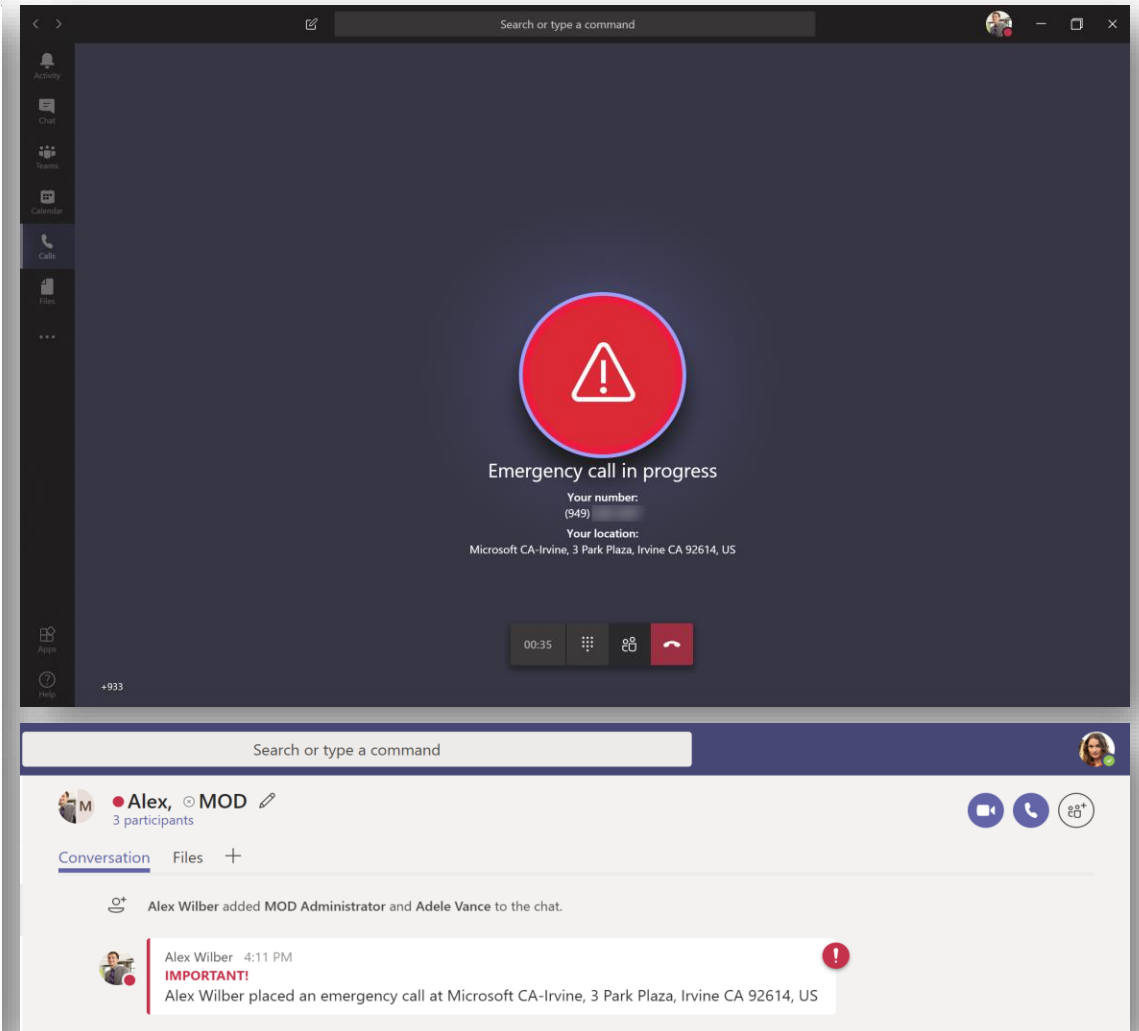
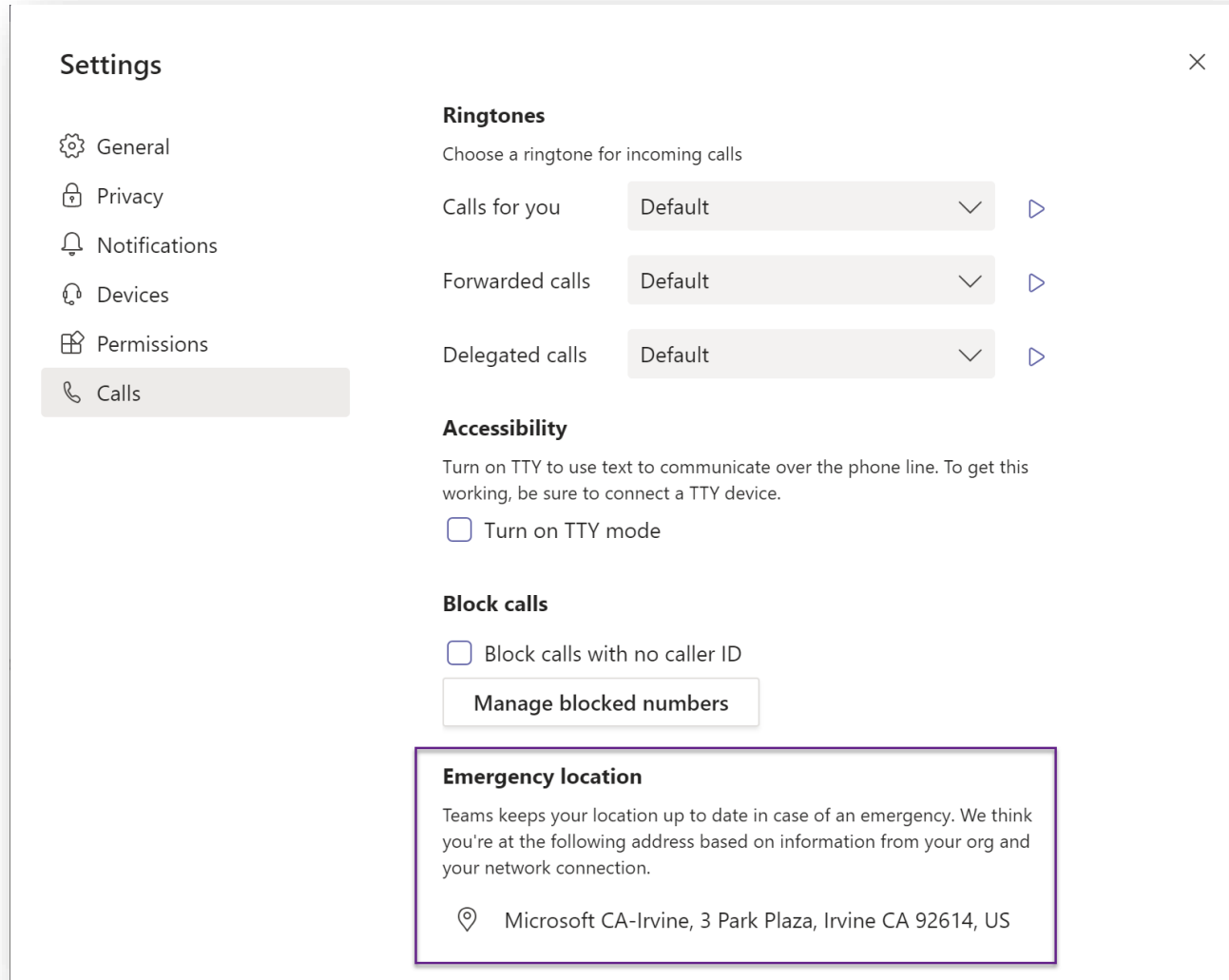
45208

US

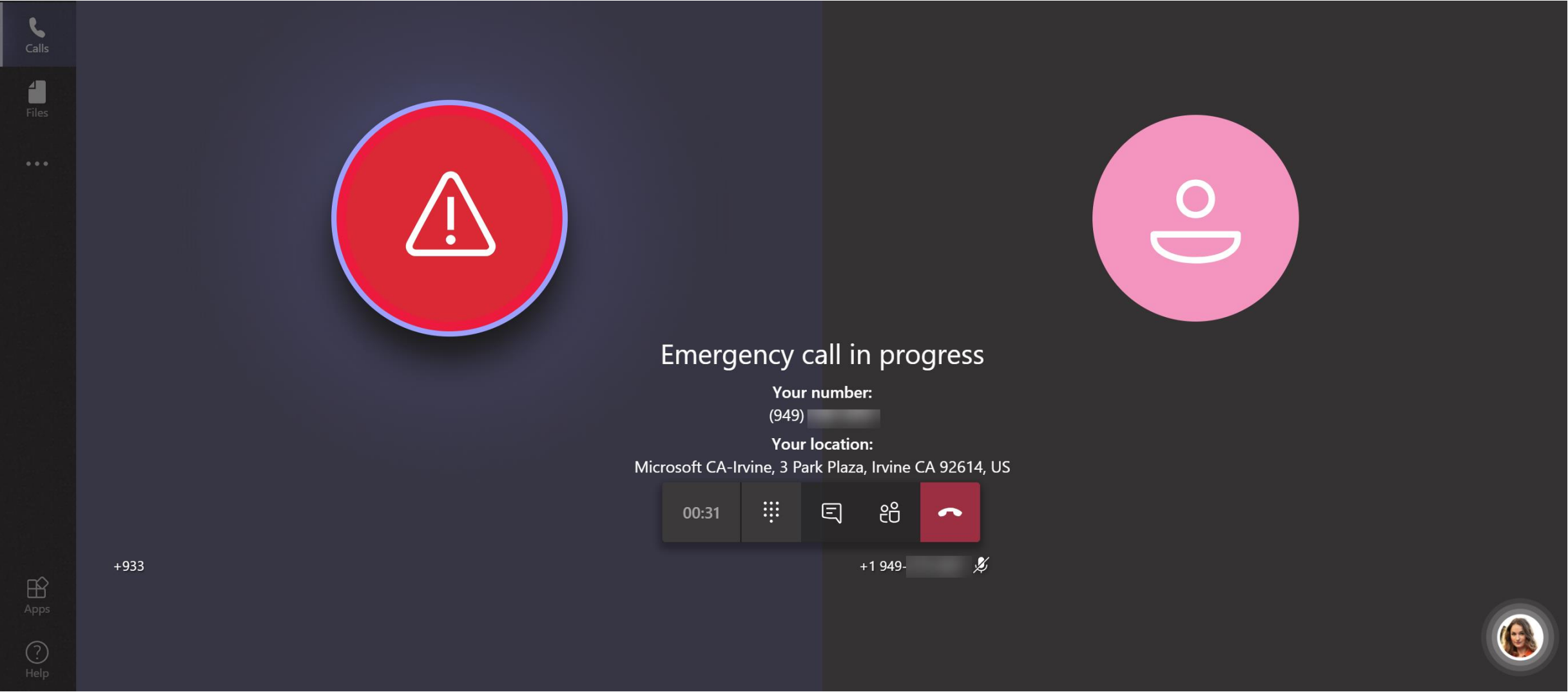
Cancel

Confirm

Dynamic Emergency Calling User Experience



Dynamic Emergency Calling Security Desk Notification (e.g. Conferenced in, but muted)



Teams Voice Devices



Teamwork across spaces and devices

United by Microsoft Teams



Individual workspaces

Individual office or dedicated workspace

On the go or in transit at home



Group workspaces

Small, medium and large meeting rooms

huddle/focus spaces and touchdown spaces

collaboration workspaces



Personal devices



Audio & video
peripherals



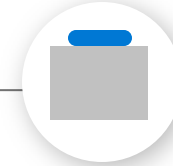
PCs and
Mobile



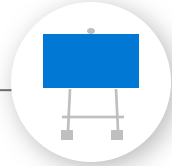
Phones



Conference
phones



Teams
Rooms



Surface
Hub

3PIP Gateway (Available today)

EoL: **July 31st 2023**

Features **Supported**

| Authentication |
|---|
| Sign in with user credentials/Web Sign-in |
| Modern Authentication |
| Phone lock/unlock |
| Hot Desking Support |
| Calling |
| Incoming/Outgoing P2P calls from/to Teams users |
| In-call controls via UI (Mute/unmute, hold/resume, blind transfer, end call) |
| PSTN calls |
| Visual Voicemail |
| Basic911 support (e.g. Dynamic911 not supported) |
| Device Update and Management |
| Device Update |
| In-band provisioning |
| QoE & Log Upload |
| Common Area Phone Support |

| Meetings |
|---|
| One-click Join for Pre-Scheduled Teams Meeting |
| Meeting Call controls (Mute/unmute, hold/resume, hang up, Add/remove participant) |
| Meeting Reminders |
| Add Skype for Business participant to ongoing meeting |

| Calendar and Presence |
|-------------------------------------|
| Calendar Access and Meeting Details |
| Presence Integration |
| Exchange Calendar Integration |
| Contact Picture Integration |
| Corporate Directory Access |
| Visual Voicemail |

Features **Not-Supported**

| Native Teams Device Features (e.g. Examples) |
|---|
| Call forwarding* |
| Setting presence |
| DND (calls will still land on 3PIP) |
| Anything not listed as supported is unsupported |

SIP Gateway (Coming soon)

Leverage your existing SIP phone investments

User authentication

Core calling features

- Inbound / outbound calls to Teams or PSTN (hold/resume with music, mute/unmute, DTMF)
- Call transfer (single step/blind, consulted transfer)
- Dial in/out from a meeting (audio conferencing)
- Device-only "do not disturb"
- Voicemail and message waiting indicator

Integrated into Teams routing policies/regulations

Device inventory management in Teams admin center

Static emergency calling, static emergency location support with security desk notifications

Compatible SIP phones



Cisco IP Phones with MPP firmware (6821, 6901, 7800 series, 8800 series)



Polycom SIP phones (V VX series 100, 200, 300, 400, 500, 600 etc.)



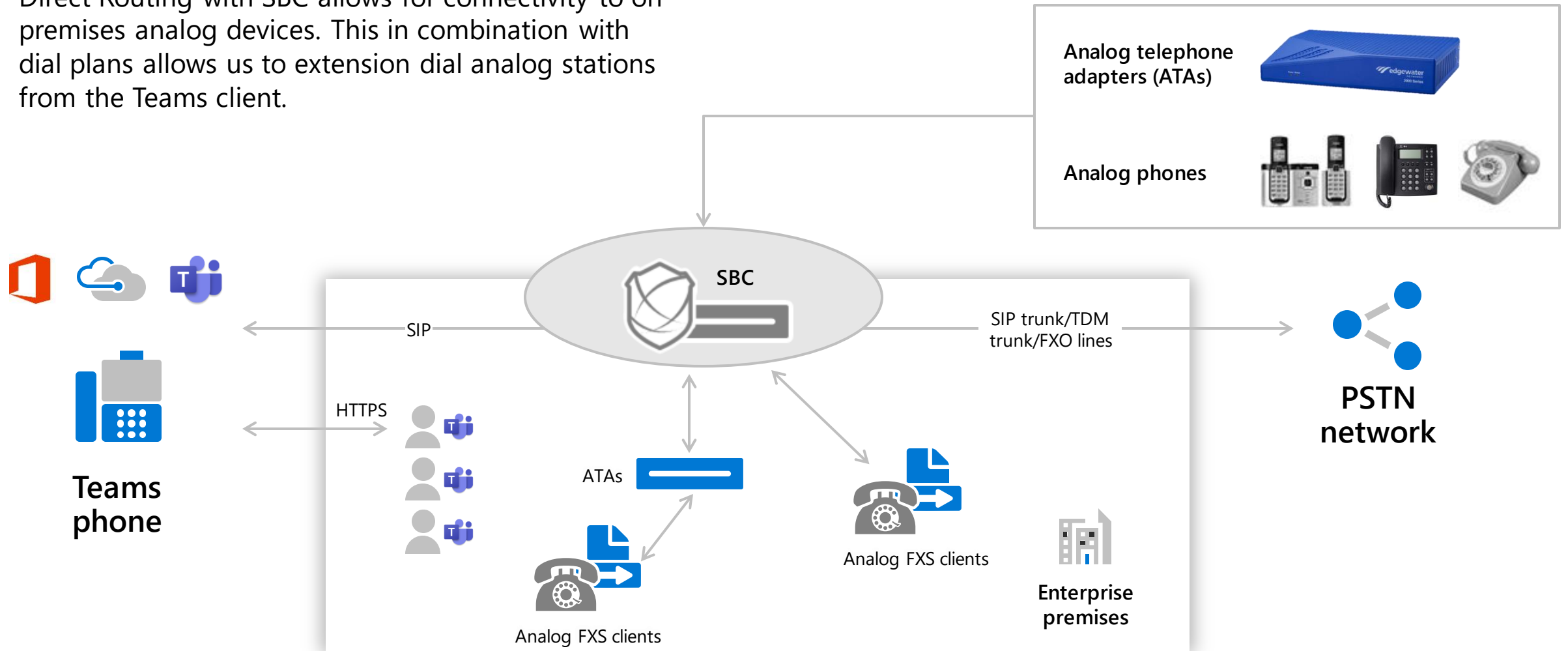
Yealink (T20 series, T30 series, T40 series, T50 series)



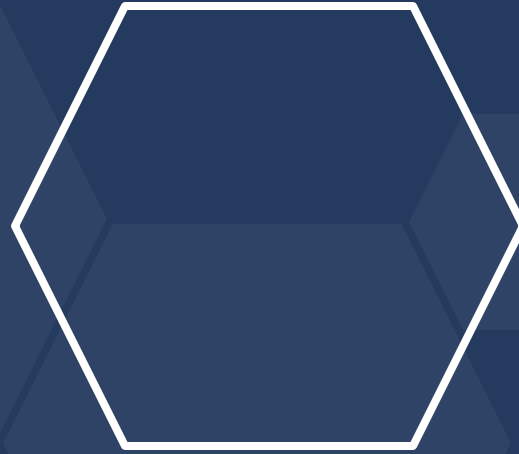
AudioCodes 400 HD series

Analog device interoperability certification

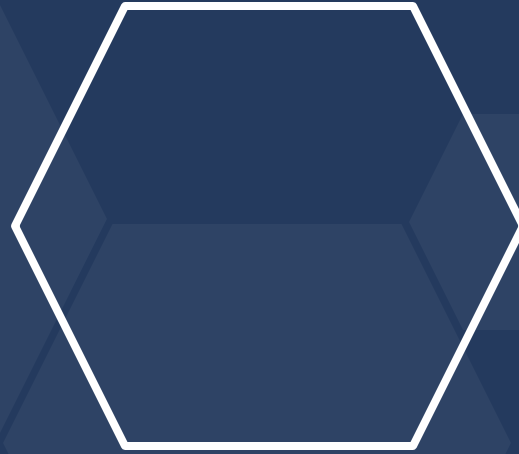
Direct Routing with SBC allows for connectivity to on premises analog devices. This in combination with dial plans allows us to extension dial analog stations from the Teams client.



Voice Integration Concepts



Deploying Calling Plans



Assigning telephone numbers

When you're setting up users to make and receive phone calls, you must first use the Microsoft Teams admin center and assign the phone number. You can change or remove the phone number if needed.

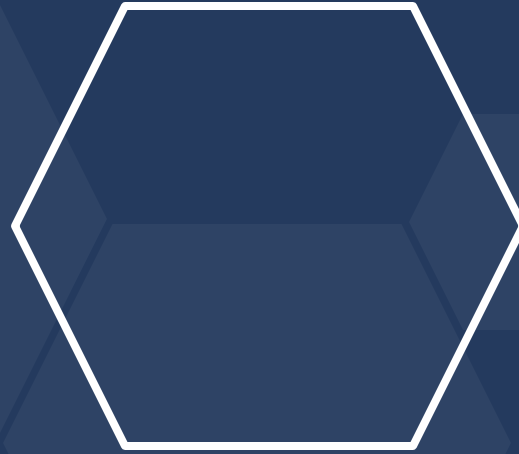
From the Microsoft Teams admin center, you can see the Phone numbers, Location, Number type and Status.

| Numbers | | | | |
|-------------------------|-----------------|----------------------|-------------|----------|
| Order history | | | | |
| + Add ↓ Port ✎ Edit | | | | |
| ✓ | Phone number | Location | Number type | Status |
| ✓ | +1 231 282 9183 | Grant, United States | Service | Assigned |
| | +1 231 282 9190 | Grant, United States | Service | Assigned |
| | +1 231 282 9196 | Grant, United States | Service | Assigned |
| | +1 231 674 5319 | Grant, United States | Users | Assigned |

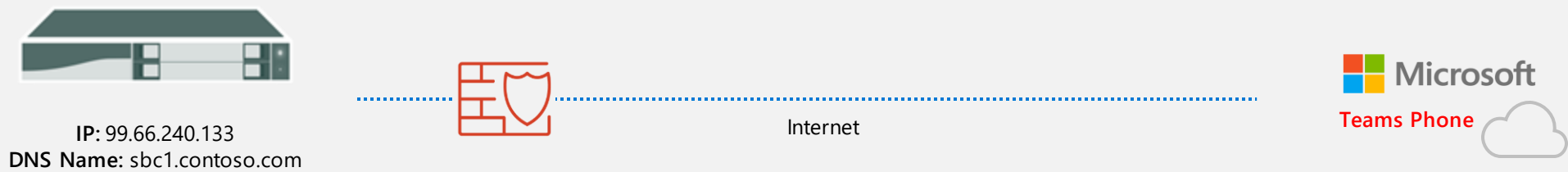
Deploying Operator Connect



Deploying Direct Routing



Direct Routing SBC FQDN Requirements



| DNS name registered in Office 365 tenant | Can be used for SBC FQDN | Department |
|--|--------------------------|--|
| contoso.onmicrosoft.com | | Executive leadership |
| contoso.com | | <p>Valid names:</p> <p>sbc1.contoso.com;</p> <p>ussbcs15.contoso.com;</p> <p>europe.contoso.com</p> <p>Non-valid name:</p> <p>sbc1.europe.contoso.com (requires registering domain name europe.contoso.com in "Domains" first)</p> |

Direct Routing SBC Certificate Requirements



IP: 99.66.240.133
DNS Name: sbc1.contoso.com

Validate identity of trusted SBC

Supported certificate root authorities

<https://aka.ms/sbc-cert>

| | 1 | 2 | 3 |
|--------------|--|---|--|
| | Scenario Minimize certificate cost | Scenario Balance the cost and security | Scenario Maximize security |
| Description | This scenario is for companies that want to pair many SBCs or change them frequently | This scenario is good for companies that do not change the gateways frequently. In the example below, a company has four SBCs (gw1.contoso.com; gw2.contoso.com; gw3.contoso.com; gw4.contoso.com). | In this scenario the company assigns a certificate to each gateway. There is only one certificate for every gateway. |
| Subject name | gw1.contoso.com | gw1.contoso.com | gw1.contoso.com |
| SAN | *.contoso.com | gw1.contoso.com gw2.contoso.com gw3.contoso.com gw4.contoso.com | gw1.contoso.com |

Direct Routing Required IP Ports and Ranges

SBC requirements are different from client requirements

Check SBC vendor guidance if NAT can be used

Media ports (UDP/SRTP)

| From IP | To IP | Source port | Destination port |
|-----------------|-----------------|--------------------|--------------------|
| Media processor | SBC | 49,152 – 53,247 | Defined on the SBC |
| SBC | Media processor | Defined on the SBC | 49,152 – 53,247 |

SIP signaling ports (TLS/SIP)

| From IP | To IP | Source port | Destination port |
|-----------|-----------|--------------------|--------------------|
| SIP proxy | SBC | 1,024 – 65,6536 | Defined on the SBC |
| SBC | SIP Proxy | Defined on the SBC | 5061 |

IP ranges

SIP proxy

- Americas:**
Traffic Manager FQDN [sip-du-a-us.pstnhub.microsoft.com](#)
Datacenter FQDNs and IPs
- sip-du-a-uswe2.pstnhub.microsoft.com - 52.114.148.0
 - sip-du-a-usea.pstnhub.microsoft.com - 52.114.132.46

- Europe:**
Traffic Manager FQDN [sip-du-a-eu.pstnhub.microsoft.com](#)
Datacenter FQDNs and IPs:
- sip-du-a-euwe.pstnhub.microsoft.com - 52.114.75.24
 - sip-du-a-euno.pstnhub.microsoft.com - 52.114.76.76

- Asia:**
Traffic Manager FQDN [sip-du-a-as.pstnhub.microsoft.com](#)
Datacenter FQDNs and IPs:
- sip-du-a-asea.pstnhub.microsoft.com - 52.114.7.24
 - sip-du-a-asse.pstnhub.microsoft.com - 52.114.14.70

| | |
|------------------|--|
| Media processors | 52.112.0.0/14 (first IP address 52.112.0.1, last IP address 52.115.255.254) |
|------------------|--|

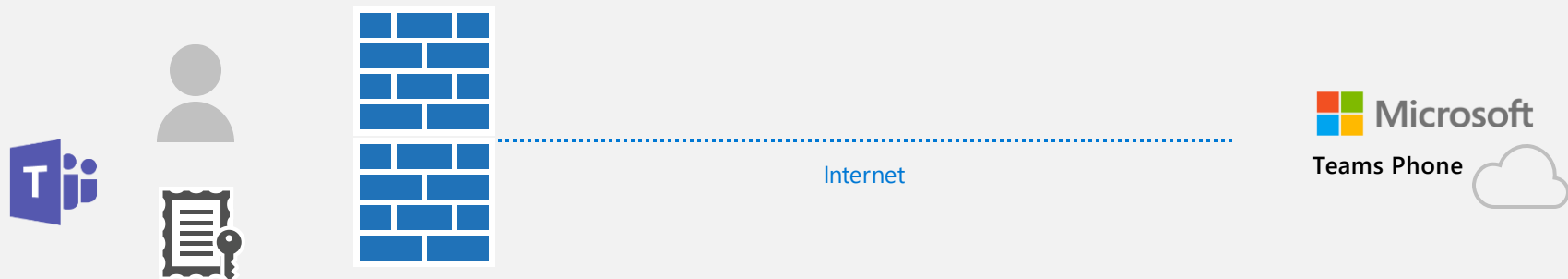
Registering an SBC for Direct Routing Integration

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

```
PS C:\windows\System32\WindowsPowerShell\v1.0> New-CsOnlinePSTNGateway -Identity sbc1.contoso.com SipSignallingPort 5068  
-ForwardCallHistory $true -ForwardPai $true -MaxConcurrentSessions 140
```

```
Identity           : sbc1.contoso.com  
Fqdn                : sbc1.contoso.com  
SipSignallingPort   : 5068  
ForwardCallHistory  : True  
ForwardPai          : True  
SendSipOptions      : True  
MaxConcurrentSessions : 140  
Enabled             : True
```

User Provisioning for Direct Routing



| | Direct Routing only | Mixed Microsoft Calling Plan and Direct Routing |
|--------------------|--|--|
| Licenses required | Skype for Business Online (Plan 2) Microsoft Teams Phone Microsoft Teams | Skype for Business Online (Plan 2) Microsoft Teams Phone Microsoft Teams Microsoft Calling Plan |
| Number provisioned | In on-premises or Azure Active Directory | Acquired from Microsoft or ported to Teams Phone |
| Routing | 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. |

Defined Direct Routing Dialplan

Online PSTN Gateway

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

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

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)

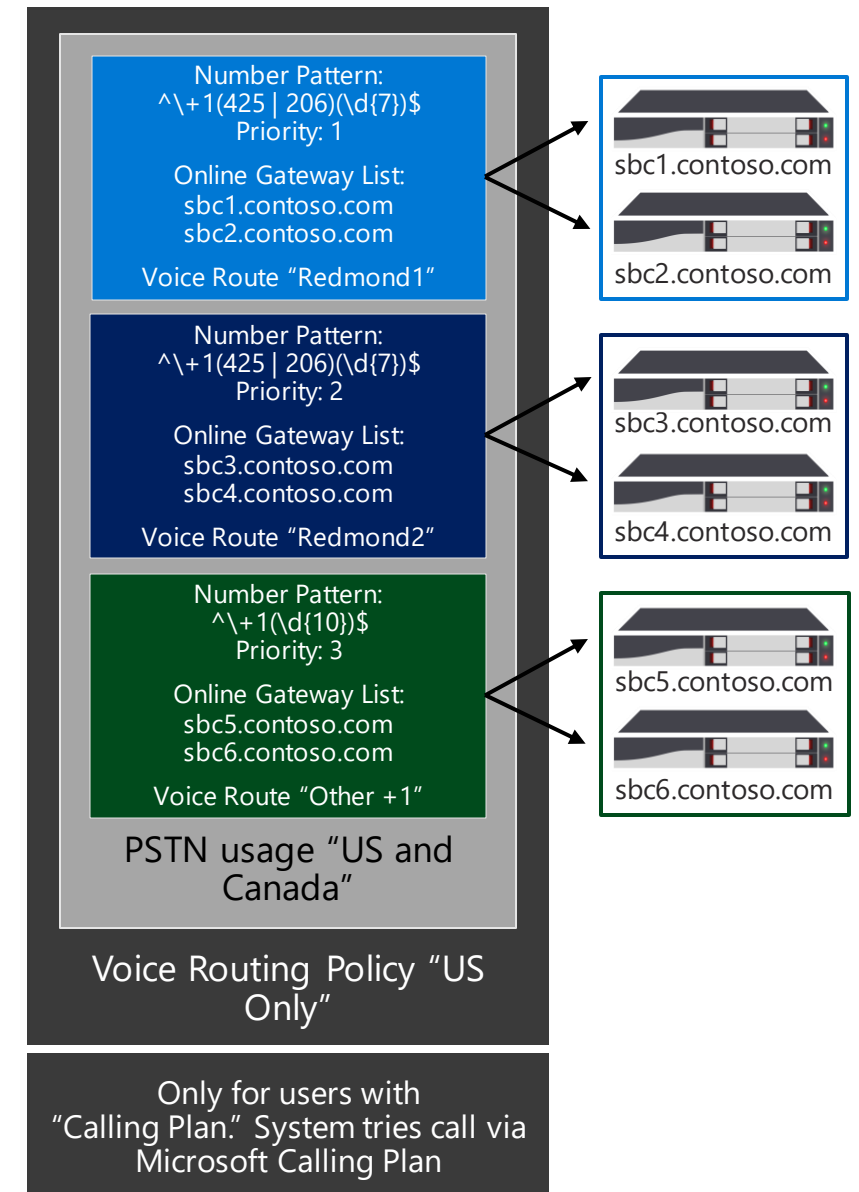
New-CsOnlineVoiceRoute -Identity "Redmond 2" -NumberPattern "\+1(425|206)(\d{7})\$" -OnlinePstnGatewayList sbc3.contoso.com, sbc4.contoso.com -Priority 2 -OnlinePstnUsages "US and Canada"

Route for other calls:

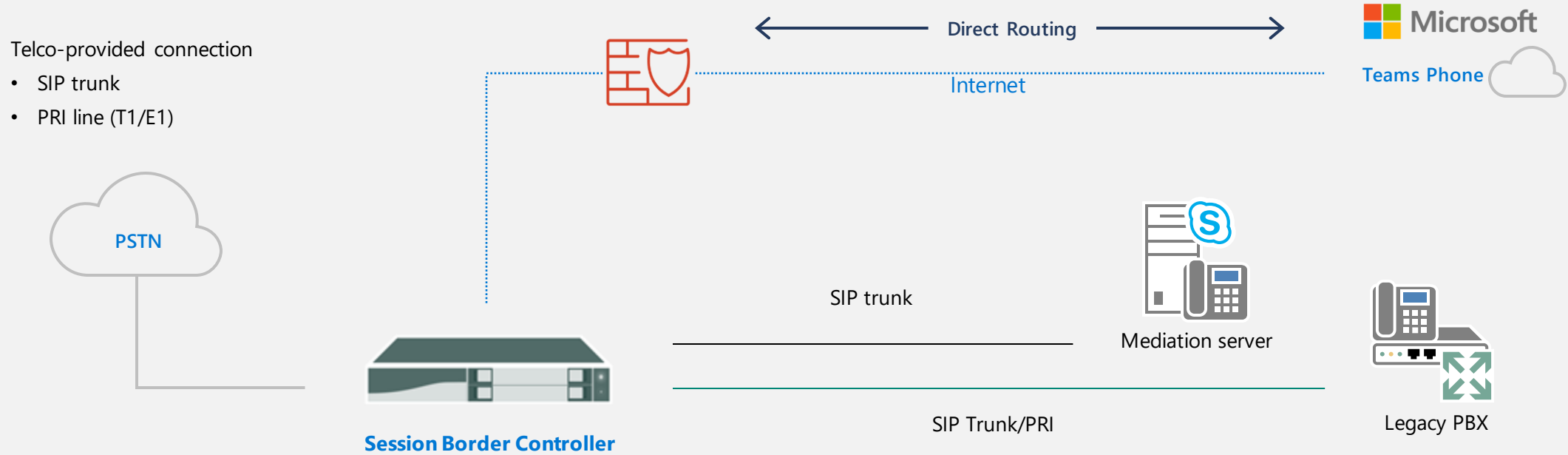
New-CsOnlineVoiceRoute -Identity "Other +1" -NumberPattern "\+1(\d{10})\$" -OnlinePstnGatewayList sbc5.contoso.com, sbc6.contoso.com -OnlinePstnUsages "US and Canada"

Voice Routing Policy

New-CsOnlineVoiceRoutingPolicy "US Only" -OnlinePstnUsages "US and Canada"
Grant-CsOnlineVoiceRoutingPolicy -Identity "Spencer Low" -PolicyName "US Only"



Migrating Existing Voice to Direct Routing



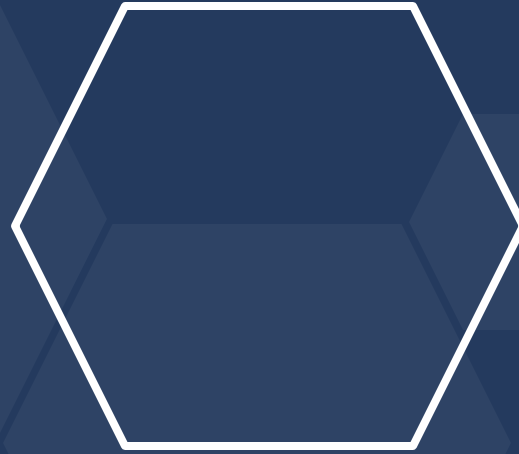
Session Border Controller is key

Recommend to place the SBC at the “front of the line”

Routing logic is anchored on the SBC

Option for directory-based lookups

Deploying Dynamic Emergency Calling



Defining Network Trusted IPs

Contoso Electronics

Microsoft Teams admin center

Dashboard

Teams

Devices

Locations

Reporting labels

Emergency addresses

Network topology

Users

Meetings

Messaging policies

Teams apps

Voice

Policy packages

Network topology

You can use network topology to define the network regions, sites, and subnets that are used to determine the emergency call routing and calling policies that are to be used for a given location. [Learn more](#)

NETWORK TOPOLOGY SUMMARY

1 Network site1 Trusted IP

Network sites

Trusted IPs

+ Add

Edit

Delete

1 Item

| ✓ | Trusted IP ↑ ⓘ | Description | Network range ⓘ | IP version |
|---|----------------|-------------|-----------------|------------|
| | 68. | | 32 | IPv4 |

Add trusted IP address

Trusted external IP addresses are the external IP addresses of the enterprise network and are exempt from certain designated security options.

IP version

IPv4

IP address

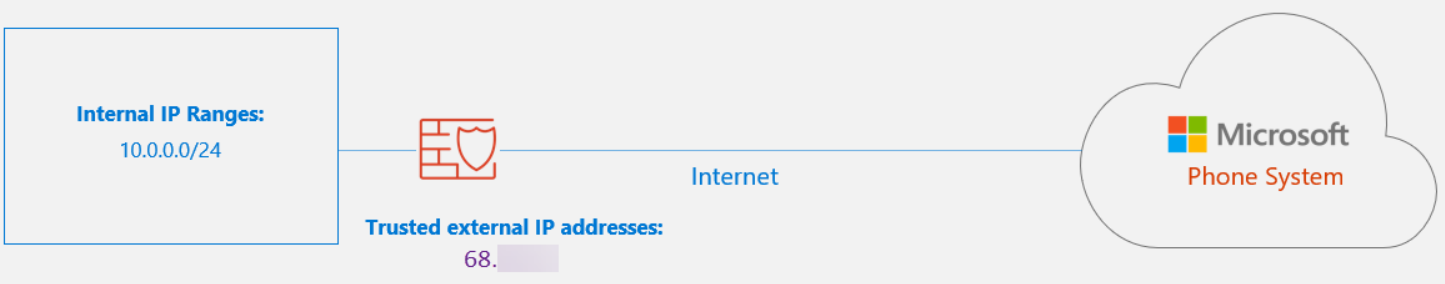
68.

Network range ⓘ

32

Description

Irvine Office



Defining Regions, Sites, and Subnets

Network Region

- Interconnects various parts of a network across multiple geographic areas
- Collection of Network Sites

Network Site

- Represents a location where the organization has a physical location
- Collection of unique IP subnets

Network Subnets

- Internal IPv4/IPv6 subnets assigned to Network Sites; IPv4 takes precedence
- Multiple subnets may be associated with the same network site, but multiple sites may not be associated with a same subnet

Network Configuration Service (NCS) has a 2-hour cache; newly created Tenant Network configuration items won't be available for ~2 hours post creation

Defining Locations with Civic Address and Geo Coordinates [Teams Admin Center]

Contoso Electronics Microsoft Teams admin center

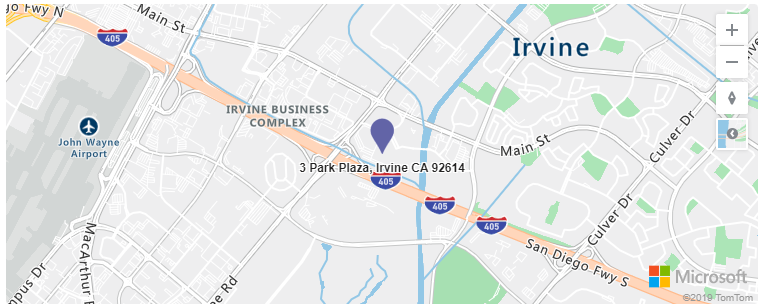
Locations \ Add location

Microsoft CA-Irvine

Corporate office in Irvine, CA

Country or region
United States

Address
3 Park Plaza, Irvine, CA 92614



Edit the address manually ☐ Off

| | | |
|---|---------------------------|-------------------|
| Street number 3 | Street name Park Plaza | |
| City Irvine | State California | Zip code 92614 |
| Emergency Location Identification Number (ELIN) <input type="text"/> | | |
| Latitude 33.67694 | Longitude -117.83925 | |

Save **Cancel**

Contoso Electronics Microsoft Teams admin center

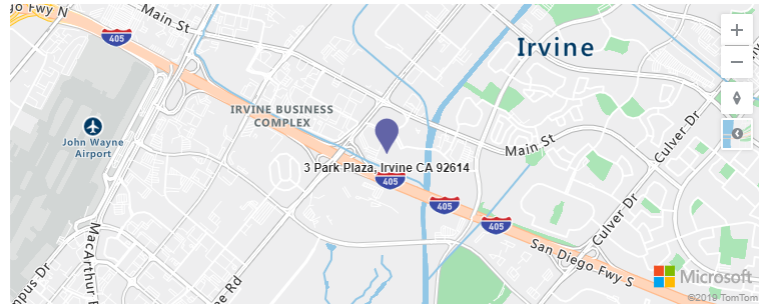
Locations \ Add location

Microsoft CA-Irvine

Corporate office in Irvine, CA

Country or region
United States

Address
3 Park Plaza, Irvine, CA 92614



Edit the address manually ☒ On

| | | |
|---|---------------------------|-------------------|
| Street number 3 | Street name Park Plaza | |
| City Irvine | State California | Zip code 92614 |
| Emergency Location Identification Number (ELIN) <input type="text"/> | | |
| Latitude 33.67694 | Longitude -117.83925 | |

Save **Cancel**

Defining and Associating Places to Locations [Teams admin center]

The screenshot displays the Microsoft Teams admin center interface for 'Contoso Electronics'. The left-hand navigation pane includes sections for 'Locations', 'Reporting labels', 'Emergency addresses', 'Network topology', 'Users', 'Meetings', 'Messaging policies', 'Teams apps', 'Voice', 'Phone numbers', and 'Emergency policies'. The 'Emergency addresses' option is currently selected. The main content area is titled 'Locations \ Microsoft CA-Irvine' and features a card for 'Microsoft CA-Irvine'. This card includes a green building icon, the address '3 Park Plaza, Irvine CA 92614, US', a 'Validated' status with ID 'd92b4328-', and summary statistics: 'Description: Microsoft CA-Irvine', 'Places: 1', and 'Voice users: 1'. Below the card, there are two tabs: 'Places' (active) and 'Voice users'. The 'Places' tab contains a table with columns for 'Place' and 'Voice users', showing one entry: 'Building 3, Floor 16' with 1 voice user. Above the table are '+ Add', 'Edit', and 'Delete' actions.

Contoso Electronics Microsoft Teams admin center

Locations \ Microsoft CA-Irvine

Microsoft CA-Irvine

3 Park Plaza, Irvine CA 92614, US

Validated
ID: d92b4328-

Description
Microsoft CA-Irvine

Places
1

Voice users
1

Places Voice users

| ✓ | Place | Voice users |
|---|----------------------|-------------|
| | Building 3, Floor 16 | 1 |

Assigning a Civic Address/Location

- To assign a phone number, an emergency location is required
- Can re-assign a new Civic Address/Location; not required

The screenshot shows the Microsoft Teams admin center interface for Contoso Electronics. The main section is titled 'Phone numbers' and contains a table of assigned numbers. The table has columns for 'Phone number', 'Location', and 'Number type'. One row is highlighted with a checkmark in the first column.

| Phone number | Location | Number type |
|--------------|-----------------------|-------------|
| +1 949 | Irvine, United States | Service |
| +1 949 | Irvine, United States | Users |
| +1 949 | Irvine, United States | Users |
| +1 949 | Irvine, United States | Users |
| ✓ +1 949 | Irvine, United States | Users |
| +1 949 | Irvine, United States | Users |
| +1 949 | Irvine, United States | Service |
| +1 949 | Irvine, United States | Service |

On the right side, the 'Edit' section shows the number '+1 949' with status 'Assigned' and type 'Users'. The 'Assigned to' section shows 'Alex Wilber' (AW) as the assigned user. A purple arrow points from the 'Emergency location' section to the 'Assigned to' section.

Emergency location

Select a location within the country or region where emergency services must arrive when a call comes from this phone number. Add an emergency location if you want to create a one.

Search by city

Irvine

- Microsoft
3 Park Plaza, Irvine CA 92614, US
↳ Building 3, Floor 16
- Microsoft CA-Irvine
3 Park Plaza, Irvine CA 92614, US
↳ Building 3, Floor 16

Defining Dynamically Assigned Locations

Use LIS network elements to dynamically assign locations Subnet

- Configure Network Subnet ID
 - Must match client computed root network ID based on client IP/CIDR
- Set-CsOnlineLisSubnet cmdlet (associate to location with LocationID)
- Must be unique within the tenant

Wireless Access Point (WAP) BSSID

- BSSID is entered in the form of a MAC address (##-##-##-##-##-##, or as ##:##:##:##:##) – should match what the client sees when connected
- Verify on PC: netsh wlan show interfaces
- Set-CsOnlineLisWirelessAccessPoint cmdlet (associate to location with LocationID)

Network Switch/Port (Support pending)

- Client/Switches must be configured to support LLDP
- Set-CsOnlineLisSwitch cmdlet -> MAC address used for the Chassis ID (##-##-##-##-##-##)
- Set-CsOnlineLisPort cmdlet -> associate to switch using Switch ID (find with Get-CsOnlineLisSwitch)

```
PS C:\Users\bryan> netsh wlan show interfaces

There is 1 interface on the system:

Name                : Wi-Fi
Description          : Marvell AVASTAR Wireless-AC Network Controller
GUID                : 08ee686e-
Physical address     : b4:ae:
State                : connected
SSID                :
BSSID               : a0:04:
Network type        : Infrastructure
Radio type          : 802.11ac
Authentication       : WPA2-Personal
Cipher              : CCMP
Connection mode      : Auto Connect
Channel             : 48
Receive rate (Mbps) : 468
Transmit rate (Mbps) : 468
Signal              : 90%
Profile              :
Hosted network status : Not available
```

Defining Security Desk Notification

Applicable to Calling Plans, Direct Routing and Operator Connect

CsTeamsEmergencyCallingPolicy cmdlets

- **NotificationMode** – this defines how the notification should be done. The values can be:
 - NotificationOnly – this means that a Teams chat is created with all the members of the NotificationGroup and the chat contains the notification of the ongoing emergency call
 - ConferenceMuted – this means that all members of the NotificationGroup are added to the emergency call in a muted state and that they can't unmute themselves
 - ConferenceUnMuted – this means that all members of the NotificationGroup are added to the emergency call in an unmuted state and they can't mute themselves
- **NotificationGroup** – this is a mail-enabled security group or distribution list that will be notified of the emergency call
- **NotificationDialOutNumber** – this is an E.164 formatted phone number that will be notified of the emergency call

Can be assigned to

- Users with *Grant-CsTeamsEmergencyCallingPolicy* (or use the Global)
- Sites with *Set-CsTenantNetworkSite*

Also available through Teams admin center

Defining Emergency Call Routing Policy

**Applicable to Direct
Routing Only**

Tenant Admin **must** configure:

Emergency Number: define the phone number to reach emergency services

- *New-CsTeamsEmergencyNumber* cmdlet, Teams Admin Center
- **EmergencyDialString** – this is the actual number for emergency services. In the US it is 911 in many countries in Europe it is 112
- **EmergencyDialMask** – this is a semicolon separated list of other phone numbers that should be translated into the emergency number specified in EmergencyDialString.
- **OnlinePSTNUsage** – this is the OnlinePSTNUsage that should be used for routing of the emergency call via Direct Routing using OnlineVoiceRoute

Defining Emergency Call Routing Policy

Applicable to Direct
Routing Only

Tenant Admin **must** configure:

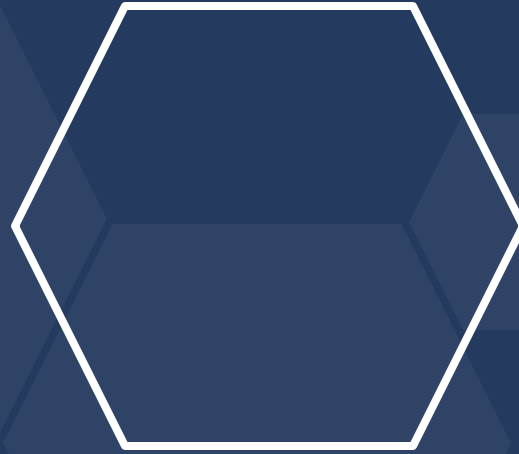
Emergency Call Routing Policy: ties the defined emergency numbers defined to a PSTN Usage

- *New-CsTeamsEmergencyCallRoutingPolicy* cmdlet, Teams Admin Center
- **EmergencyNumbers** – an array of emergency numbers defined by using *New-CsTeamsEmergencyNumber*
- **AllowEnhancedEmergencyServices** – this controls whether the feature is enabled and whether a call made to an emergency number is treated as an emergency call
- Assign to users using *Grant-CsTeamsEmergencyCallRoutingPolicy* cmdlet (explicitly) or through network site discovery

PSTN Gateway: enable the defined trunk for Emergency Calling

- *Set-CsOnlinePSTNGateway -Identity sbc1.contoso.com -PidfloSupported \$true*

Deploying Devices



Microsoft Teams phone device management features



Inventory management

Single portal for managing all Teams devices



CA policy enforcement

User-based and device-based policy enforcement



Configuration management

Reusable configuration profiles



Zero-touch enrollment

Enrollment without user intervention



Software update framework

Comprehensive pipeline for updating firmware and applications



Health monitoring and management

Heartbeat, ping, restart and factory reset

Managing Teams devices

- Inventory summary of all devices
- Apply configurations and tags
- Update firmware

Devices summary

7

Devices

0

Critical

5

Non-Urgent

1

Offline

All phones


User phones

Common area phones

Conference phones

Configuration profiles

 Edit  Assign configuration  Manage tags  Update  Upgrade  Restart  Remove | Showing 7 devices

 Search by device name



| ✓ | Display name | Username | Device name | Health status ⓘ | Manufacturer | Model | Action | IP address |
|---|----------------------------|--------------------------|-----------------------------|-----------------|--------------|--------|--------------------|------------|
| | Zurich Lobby 2 Common A... | CAP-ZRH-Lobby2@teamsr... | audiocodes-c470hd ws131... | ⚠ Non-Urgent | AudioCodes | C470HD | 1 Update available | 192.16... |
| | Bournemouth Lobby 2 Co... | CAP-BOU-Lobby2@teams... | poly-ccx500 64167fe160ea | ⚠ Non-Urgent | Poly | CCX500 | 1 Update available | 192.16... |
| | Bournemouth Lobby 1 Co... | CAP-BOU-Lobby1@teams... | yealink-t58a 81585190275... | Offline | Yealink | T58A | 1 Update available | 192.16... |

Remote provisioning

- Remotely provision and sign into a Microsoft Teams device using the Teams admin center
- Add an individual device via MAC address or upload a csv file to add devices in bulk

Add MAC addresses

| MAC address | Location |
|-------------------|----------|
| 80-5E-0C-14-0F... | Townview |

+

Add more

| | A | B |
|---|-------------------|----------|
| 1 | MAC Id | Location |
| 2 | 02-00-00-00-00-00 | Townview |
| 3 | 51:C7:DE:61:5C:DC | Townview |
| 4 | 79:87:7A:7B:7A:70 | Avanti |
| 5 | BA:E9:02:E9:70:8D | Townview |
| 6 | C1:70:64:53:57:15 | Avanti |
| 7 | 4E:FD:C2:26:F7:8D | Avanti |
| 8 | CC:1A:A4:5C:F4:FE | Townview |

Actions

+ Provision new devices

All device tags

Remote sign-in

- Microsoft Teams admin center

Y8

80-5e-c0-78-36-41 (MAC address)
Townview

--

Townview

To remotely sign in the user to that selected device, follow the steps below.

1. Open this URL.
<https://microsoft.com/devicelogin>

2. Copy and paste this code.

FPLGJZYH

 Refresh the code

3. Select the user.
When you select the user, we'll remotely sign them in to this device.

4. Return to the Microsoft Teams admin center.
You're all set.

Waiting on activation

Waiting for sign in

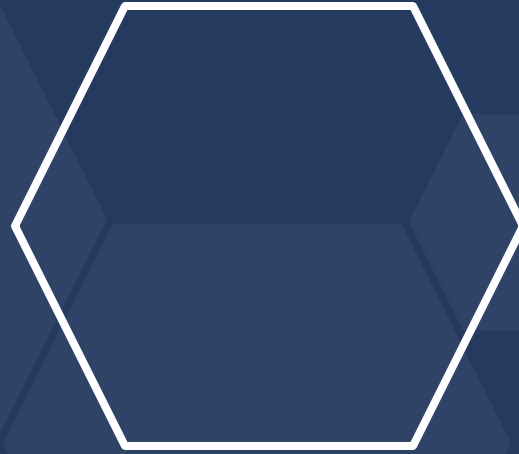
Sign in a user

1 item

| | MAC address | Location | Device user |
|-------------------------------------|-------------------|----------|-------------|
| <input checked="" type="checkbox"/> | 80-5e-c0-78-36-41 | Townview | Signed out |

Close

Questions and answers





Thank you.

