



## EUROPEAN COLLABORATION SUMMIT 2018

MAINZ, GERMANY / MAY 28-30 2018 - [WWW.COLLABSUMMIT.EU](http://WWW.COLLABSUMMIT.EU)

FRANK CARIUS

Net at Work GmbH

SKYPE ONLINE, TEAMS AND PSTN



# DIAMOND, PLATINUM AND GOLD SPONSORS

**WEBCON**

**aws**

skybow®

LightningTools

Alight.

**KWizCom**  
KNOWLEDGE WORKER COMPONENTS

**Rencore**

SysKit

Sharegate



**Valo**

**K2**

SOLUTIONS  
2SHARE

**THEOBALD**  
SOFTWARE

**NINTEX**

AvePoint

Beezy

dox42

**CONVISTA**  
moving ahead

deroso  
solutions GmbH  
an KAD group company

panagenda

**implexis**  
winning solutions

**ppedv**

# Who is speaking?



- Net at Work
  - Location: Paderborn
  - founded 1995
  - 70+ employees
  - System integration and Software Development
- Scope
  - Office 365
  - Exchange, Skype for Business, Teams
  - SharePoint,
  - Infrastructure: AD, ADFS, DirSync, Network
  - Security: Mail Encryption and Signing, NoSpamProxy
- Frank Carius
  - Microsoft MVP Office Server and Services
  - Microsoft Certified Master Lync 2010
  - authoring [www.msxfaq.de](http://www.msxfaq.de) (20+ years)



# This is not a „Teams is great“ presentation



- Teams Sessions #CollabSummit
  - Dan Holme: KEYNOTE: Teamwork and collaboration in the modern workplace with innovations in Microsoft 365
  - Dan Holme: Powering Team Work with SharePoint and Microsoft Teams
  - Tony Redmond: Managing Groups and Teams with PowerShell
  - Johan Delimon: Unraveling Microsoft Teams vs Skype for Business
  - Tom Arbuthnot: Microsoft Teams, the future of collaboration in Office 365?
  - Albert-Jan Schot, Rick Van Roussel: How to build bots for your enterprise
  - **Wictor Wilén: Enriching conversations with your data in Microsoft Teams**
  - Mike Fitzmaurice: File Sharing and Collaboration with OneDrive, SharePoint and Teams
  - **Samuel Zürcher: Groupify my SharePoint and Teamify my Groups**
  - Daniel Wessels: Build-a-bot... and get your meetings scheduled
- Otherwise, there are many other sources
  - Introduction to Microsoft Teams  
<https://aka.ms/microsoft-teams-introduction>
  - Introduction to Microsoft Teams (L100)  
<https://www.youtube.com/watch?v=GPmjfqnvuG4>
  - How to Use Planner with Microsoft Teams  
<https://www.youtube.com/watch?v=JahuwoaFwMA>
  - Checkout new Samples  
<https://twitter.com/MicrosoftTeams>

Scope: Telephony/Voice

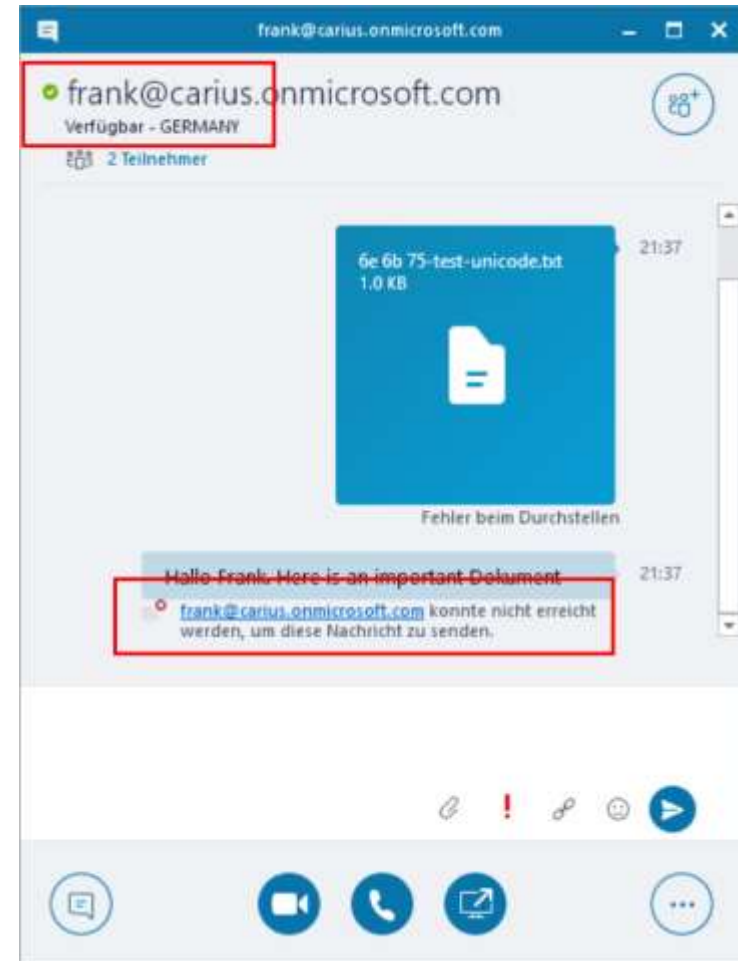
TEAMS OR SKYPE FOR BUSINESS?



# Skype is „online“, Teams is more



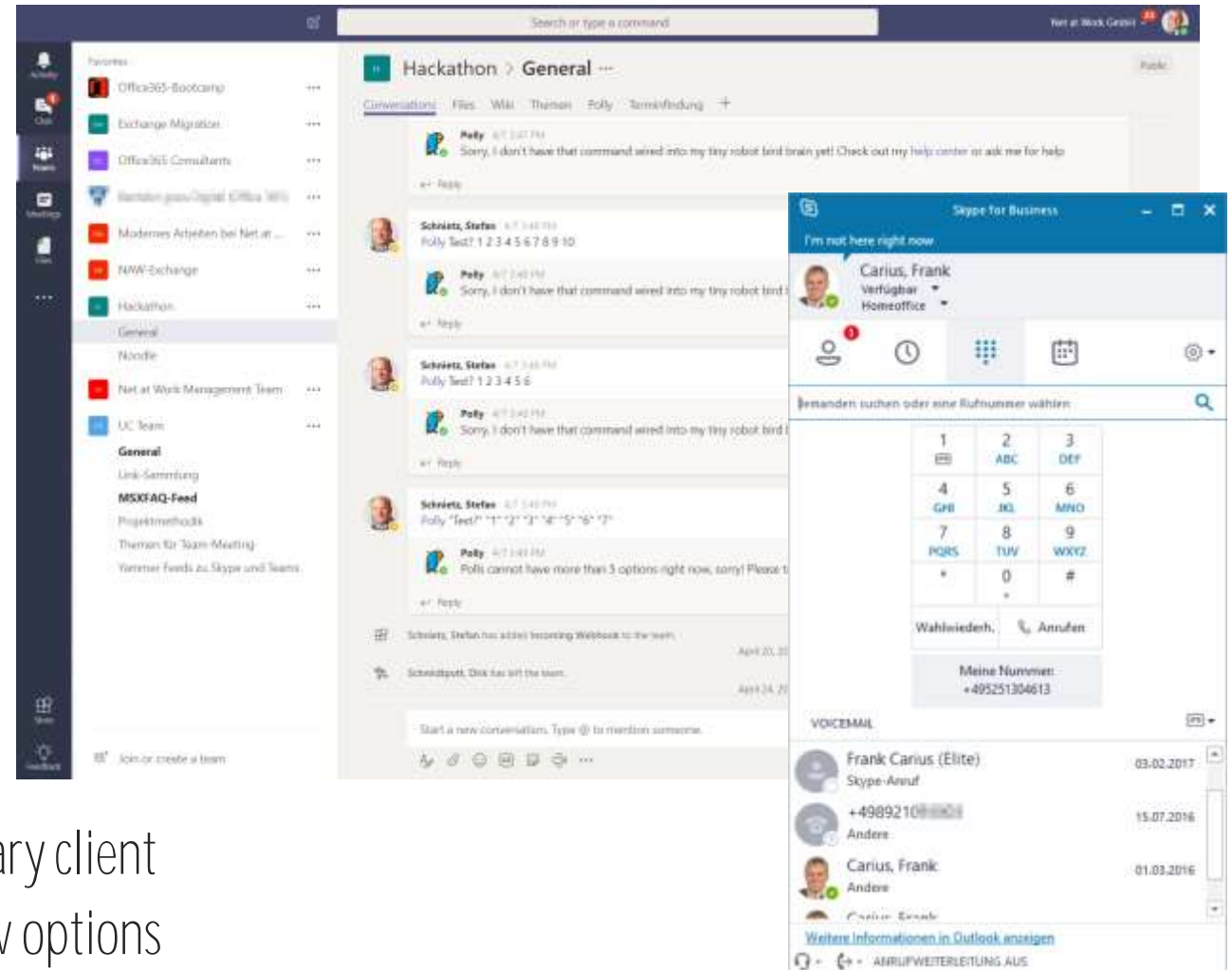
- Skype presence and Chat
  - I like to see the presence
  - I like to send messages and attachments
  - **I don't like this**
  - Persistent Chat depreciated
- Teams is „WhatsApp“ for companies
  - You can send P2P messages even if the remote Party is offline
  - Persistent but still Realtime
  - No fall back to Outlook required
- And all the other topics you already heard somewhere else



# And what's with Voice ?



- My first impression (summer 2017)
  - Teams is a „full screen application“
  - Teams it to much for „frontline workers“  
Production, blue collar
- Where is a „simple client“ for
  - Presence, IM
  - Telephony
  - Conference Join
- Discussion with peers
  - You might use 3PIP-Devices
  - Think about the Smartphone Client as primary client
  - Envision your customers to leverage the new options





# Teams is more than a Skype for Business Replacement



## Skype for Business

- Primary workload: Realtime communication
  - IM/Presence
  - Conference
  - Telephony
- Additional Workload
  - Supply Presence in Office applications



## Teams

- Primary Workload: Full Team platform
  - Discussions
  - Files & Wiki
  - Apps
  - Conferences and Calls
- Additional Workload
  - 1:1 Chat offline
  - IM/Presence is „useful“



- Skype for Business is like my Business Phone in 2010
- Teams is like a smartphone and we are just at the beginning of the journey.
- It may take some year but more and more will change



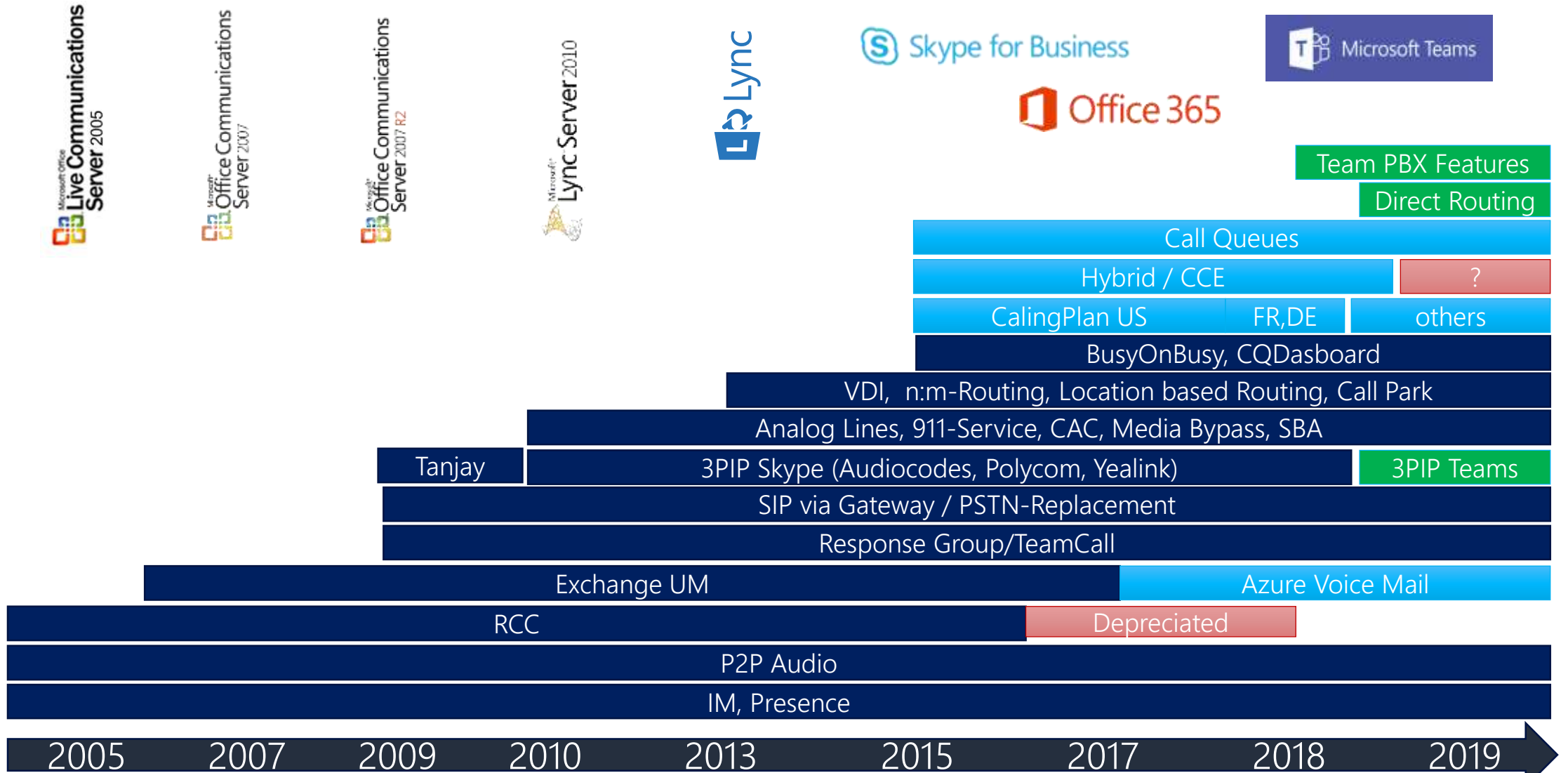


# MICROSOFT VOICE ROADMAP – PAST, NOW AND FUTURE

# Past, Now, Tomorrow



Skip: Exchange 5.5 Instant Chat Service  
Skip: Exchange 2000 Conference Service



# Skype for Business 2019



- There will be a Skype for Business Version 2019
- Preview: Mid 2018, Release: Late 2018
- **SfB 2015 mainstream support ends 2020, SfB 2019 “solves” that**
- Requirements: Windows 2016 and SQL 2016 or higher
- Site by Site Update from Lync 2013 and Skype 2015
- Cloud Backend services for SfB Server 2019
  - Voicemail Services (End of Exchange UM ?)
  - Auto Attendant
  - Call Queues (End of Response Group ?)
- No Director Role. Standard Server still available, Enterprise minimum 3 Server

## Skype for Business Server 2019

Continuing commitment to –  
on-premise and hybrid  
customer needs

Refreshed Mainstream Support  
Quality, Security and Performance Fixes  
Refreshed Skype for Business Clients

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IT Pro and Voice Centric release  
Cloud Connected Analytics and Voice Apps  
Improved Teams Interop

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Targeting Late 2018

# Teams Roadmap: Calling





	Available today	Coming in Q2 CY2018 (end of qtr)	Coming in Q4 CY2018 (end of qtr)
 <b>Enterprise grade</b>	<ul style="list-style-type: none"> <li>✓ Blind Transfer</li> <li>✓ Call Blocking</li> <li>✓ Call Forwarding</li> <li>✓ Caller ID Masking</li> <li>✓ e911 Support</li> <li>✓ Enable Existing Calling Plan Support</li> <li>✓ Extension Dialing</li> <li>✓ Hold</li> <li>✓ Multi-call Handling</li> <li>✓ Safe Transfer</li> <li>✓ Simultaneous Ringing</li> <li>✓ Speed Dial</li> <li>✓ Suggested Contacts</li> <li>✓ Transfer to PSTN Call</li> <li>✓ Translate user input to standard phone format</li> <li>✓ Voicemail</li> <li>🕒 Out of Office Support</li> </ul>	<ul style="list-style-type: none"> <li>• 1:1 to Group Call Escalation with Teams, Skype for Business, and PSTN participants</li> <li>• Boss and Delegate Support</li> <li>• Call Queues</li> <li>• Consultative Transfer</li> <li>• Distinctive Ring</li> <li>• Do not Disturb breakthrough</li> <li>• Forward to Group</li> <li>• Direct Routing (Hybrid connection to Teams)</li> <li>• Organizational Auto-Attendant</li> </ul>	<ul style="list-style-type: none"> <li>• Call Park</li> <li>• Group Call Pickup</li> <li>• Location-Based Routing</li> <li>• Shared Line Appearance</li> </ul>
 <b>Skype for Business interop &amp; fed</b>	<ul style="list-style-type: none"> <li>✓ SfB-Teams Calling</li> </ul>		
 <b>Platform and devices</b>	<ul style="list-style-type: none"> <li>✓ TTY Support</li> <li>✓ Windows, Mac, Edge, iOS, Android</li> </ul>	<ul style="list-style-type: none"> <li>• Support for existing certified SIP Phones*</li> <li>• USB HID</li> </ul>	
 <b>IT Pro</b>	<ul style="list-style-type: none"> <li>✓ Call Quality Diagnostic Portal</li> <li>✓ SfB-Teams Interop Policies</li> </ul>	<ul style="list-style-type: none"> <li>• eDiscovery Enhancements</li> </ul>	

<https://aka.ms/skype2teamsroadmap>

<https://skypeandteams.blob.core.windows.net/artefacts/Skype%20for%20Business%20to%20Teams%20Capabilities%20Roadmap.pdf>

# Teams Roadmap: Meeting



	Available today		Coming in Q2 CY2018 (end of qtr)
 <b>Enterprise grade</b>	<ul style="list-style-type: none"> <li>✓ Schedule in Outlook &amp; Teams</li> <li>✓ Private and Channel Meetings</li> <li>✓ User Facing Diagnostics</li> <li>✓ 80 users in a meeting</li> <li>✓ Audio Conferencing (preview)</li> <li>✓ Participant Management</li> <li>✓ Improved Device Selection</li> </ul>	<ul style="list-style-type: none"> <li>✓ Audio Conferencing in over 90 countries</li> <li>✓ Anonymous Join</li> <li>✓ Interactive Troubleshooting</li> <li>✓ Lobby Support</li> <li>✓ Mute Other Participants</li> </ul>	<ul style="list-style-type: none"> <li>• Broadcast Meetings</li> <li>• Cloud Recording</li> <li>• Federated Meetings</li> <li>• Large Meeting Support (~250)</li> <li>• Lobby for PSTN callers</li> <li>• Outlook meeting schedule from other platforms (OWA, OLK, mobile)</li> <li>• PSTN Fallback</li> </ul>
 <b>Collaborative meetings</b>	<ul style="list-style-type: none"> <li>✓ Enable Meeting Lifecycle with Pre/During/Post</li> <li>✓ Desktop sharing</li> <li>✓ Conversations</li> <li>✓ Immersive Meeting Experiences</li> </ul>	<ul style="list-style-type: none"> <li>✓ Application Sharing</li> <li>✓ Give and Take Control in sharing</li> </ul>	<ul style="list-style-type: none"> <li>• PowerPoint Load and Share</li> <li>• Whiteboard and Meeting Notes</li> </ul>
 <b>Platform and devices</b>	<ul style="list-style-type: none"> <li>✓ Windows, Mac</li> <li>✓ Mobile: iOS and Android Meetings</li> </ul>	<ul style="list-style-type: none"> <li>✓ Edge, Chrome Browser Support for meetings</li> </ul>	<ul style="list-style-type: none"> <li>• Enable VTC Interop Services*</li> <li>• Skype Room Systems Support*</li> <li>• Surface Hub Support</li> <li>• Trio 1 Touch Teams Meeting Join*</li> </ul>
 <b>IT Pro</b>	<ul style="list-style-type: none"> <li>✓ Call Quality Diagnostic Portal</li> <li>✓ Tenant Policies</li> </ul>	<ul style="list-style-type: none"> <li>✓ Enable Call Quality Analytics (Preview)</li> </ul>	<ul style="list-style-type: none"> <li>• User-Level Meeting Policy</li> <li>• eDiscovery enhancements</li> </ul>

<https://aka.ms/skype2teamsroadmap>

<https://skypeandteams.blob.core.windows.net/artefacts/Skype%20for%20Business%20to%20Teams%20Capabilities%20Roadmap.pdf>

# LICENSING



# Licensing



## On Premises

- Skype for Business Server License
  - Per Frontend
  - Not for Edge, Mediation
  - SQL-Server (Enterprise Pool)
- Skype for Business CAL
  - Standard CAL
  - Enterprise CAL (Add-on)
  - Plus CAL (Add-on)
- Client
  - Full Windows Client (Office License)
  - Skype Basic Client (free)
  - Mobile Clients (free)
  - 3PIP-Devices

## Office 365

- Plan (per User)
  - Skype for Business Plan 1 (Part of E1)
    - IM/Presence/P2P Calling/Federation
    - Conference Attendee
    - No Full Client included
  - Skype for Business Plan 2 (Part of E3/E5)
    - All conference services
- Additional Licensing
  - Phone System (Part of E5)
    - Configure Phone numbers
    - Not with Office 365 Business
  - Audio Conference (sometimes in E5)
    - Allow Dial in from Phone using Microsoft numbers
  - Calling Plan (additional)
    - minutes national/international
  - Consumption Billing
    - Pay per Use



# Skype for Business Online Licensing



Office 365 Lizenz	ProPlus	E1 6,70€	E3 19,70€	E5 34,40€
Office 365 Professional Plus up to 5 PCs, 5 Smart-Devices	✓	✗ No	✓	✓
OneDrive	1TB	1TB	1TB	1TB
Exchange Online Mailbox	✗ No	50GB	∞	∞
Skype for Business Online CAL	✗ No	✓	✓	✓
Skype for Business Windows Client	✓	✗ Basic	✓	✓
Meeting Broadcast	✗ No	✓	✓	✓
Audio Conference (DialIn) 3,40€ , DialOut pay per User	✗ No	✗ +	✗ +	✓
Phone System (6,70€)	✗ No	✗ +	✗ +	✓
Calling Plan (10,10€ or 20,24€)	✗ No	✗ + x	✗ + x	✗ + x
Data Loss Prevention, Encryption	✗ No	✗ No	✓	✓
PowerBI Pro, Delve Analytics, Equivio eDiscovery, Secure Attachment and URLs, ...	✗ No	✗ No	✗ No	✓



# VOIP – COMPONENTS

# VoIP Components



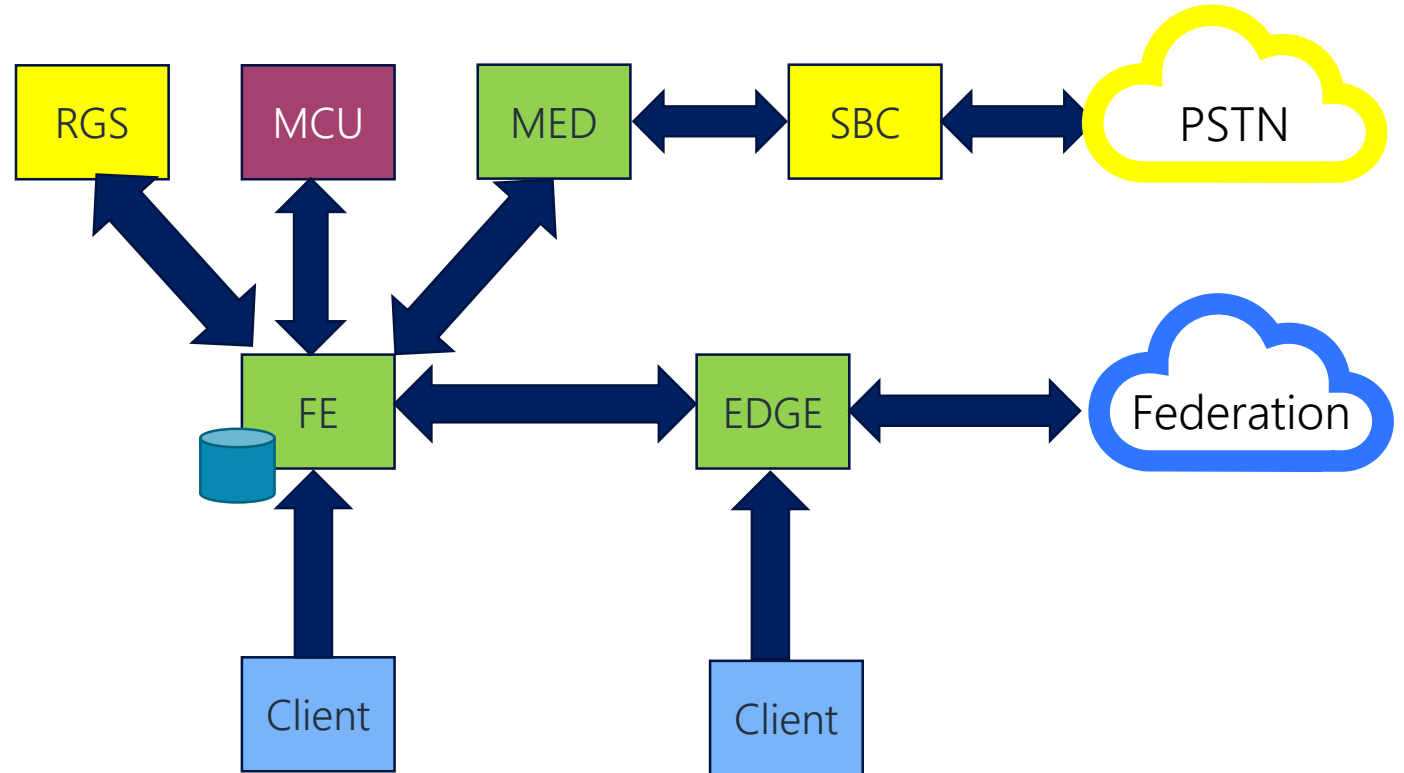
Client	Client	People are using their Endpoint, Windows, Mac, Mobile, Browser
Registrar	FE	Registrar to handle User communication, status information and configuration
Media Relay	EDGE	Helps to connect between non routable IP-networks (NAT, Firewall, Proxy)
Mediation	MED	Connect the "Microsoft VoIP" with VoIP. Transcoding G.711, translating „phone numbers“
PSTN Service	SBC	PSTN Service are connecting the PSTN-World with the Skype/Teams World. Gateway: connectE1/T1/POTS to SIP. Session Border Controller (SBC) connect IP to IP
Conference MCU	MCU	Mixing Audio/Video, Endpoint for Conference Dialin/DialOut
Enhanced	RGS	Response Group, Bots, Call Queues, Unified Messaging, etc.
PSTN-Service	PSTN	The "old" telephony system with numbers, country codes, analog phones, etc.



# How it works together: Signalling



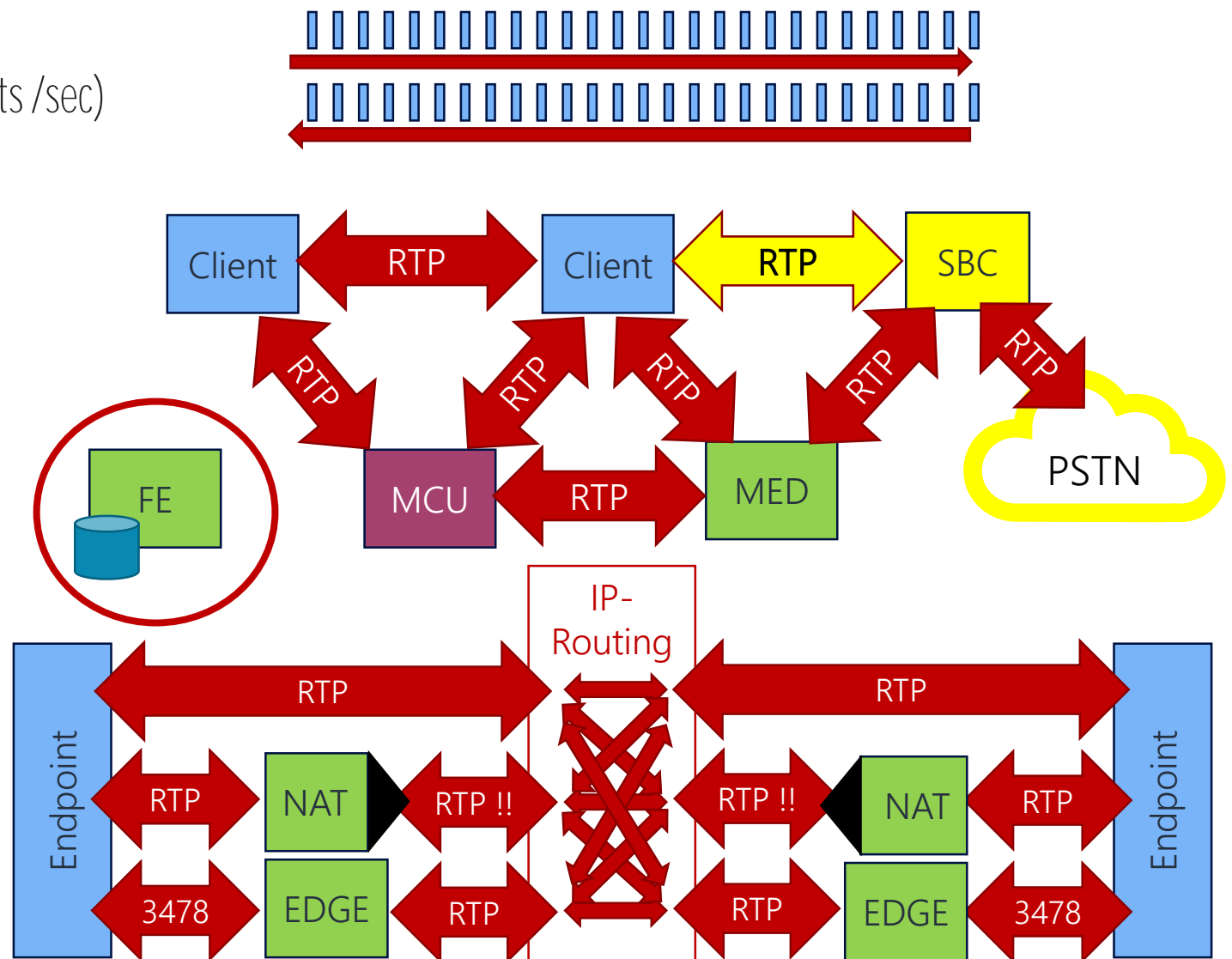
- Frontend
  - Authentication
  - Manage Presence
  - Know, who is where
  - Maintain Buddy list
  - **“MTA” for Signalling messages**
- Clients and Signalling
  - VoIP Client to Registrar
  - VoIP via Edge-Relay
  - **TCP/TLS, not “Realtime”**
- Services
  - Conference MCU
  - Response Groups
  - Bots/Trusted Apps
  - Mediation/SBC
  - Federation



# How it works together: Audio/Video



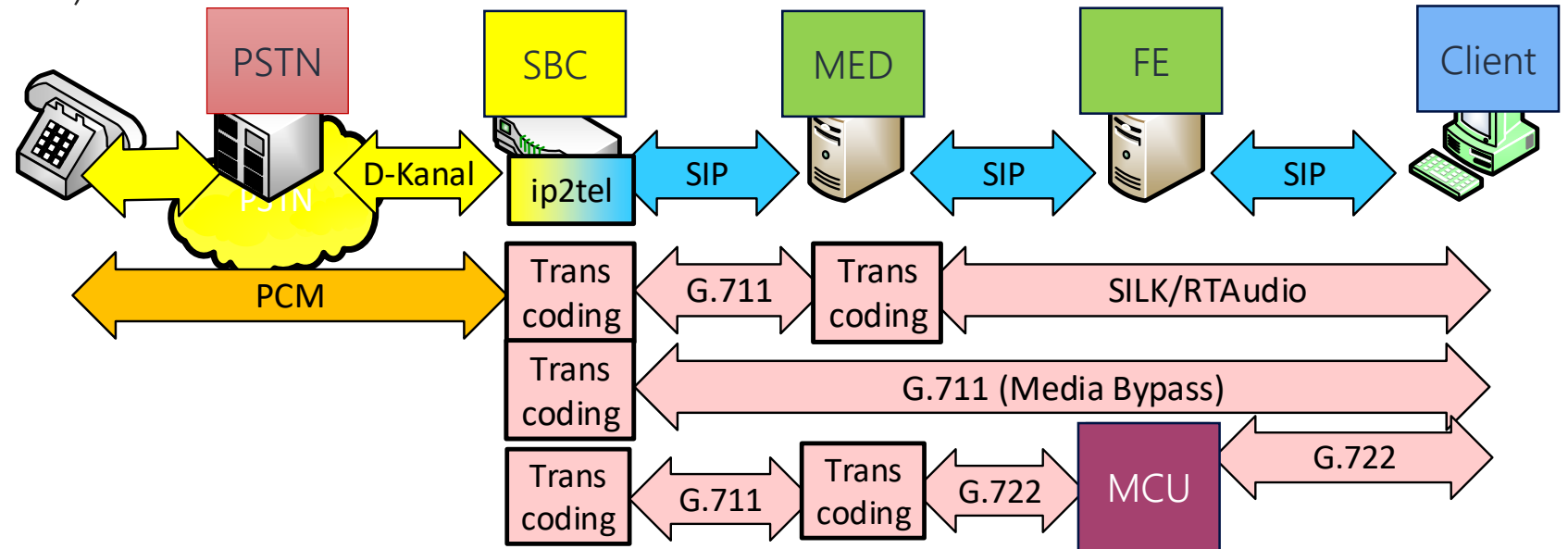
- RTP = Real Time Protocol
  - Many small packets (Audio: 50 packets /sec)
  - **Always 1:1, no "IP-Multicast"**
  - Details later
- Endpoints
  - Clients P2P, ExUM, etc
  - Conference MCU
  - Mediation (User and Conference)
  - SBC, Gateway (**bypass**)
  - Registrar is passive
- Media Path
  - Direct
  - STUN
  - TURN
  - per direction, per modality



# How it works together: Translation



- Signalling
  - SIP-Adress ([frank.carius@netatwork.de](mailto:frank.carius@netatwork.de))
  - Phone number +49(5251)304613
  - SIP vs. ISDN
- Audio/Video
  - Codec
  - Media Bypass
  - Video Resolution





NETWORK: THE KEY FOR SUCCESS

# Network: The key to success



- Signalling (SIP and https)
  - Port 5061/443
  - 5-10 kbit/User/sec
  - **Not „Real“-time**
- Audio/Video (RTP) requirements
  - <https://aka.ms/sof-media-quality>
  - Audio: 100kbit/sec
- Protocol: UDP preferred
  - Port 50.000-50059
  - Port 3478-3481
  - Worst cast: TCP or https-Tunnel or VPN

Property	Client to Office 365 Edge
Burst Packet loss	< 1% during any 200ms interval
Packet loss	<0,1% during any 15s interval
RTT OneWay	<50ms
RTT Latency	<100ms
Jitter	<15ms during any 15s interval
Packets reorder	<0.01% out-of-order packets

You can loose/drop few single RTP-Packets  
But there is no „retransmit“.  
Voice/Pictures are lost -> quality reduction



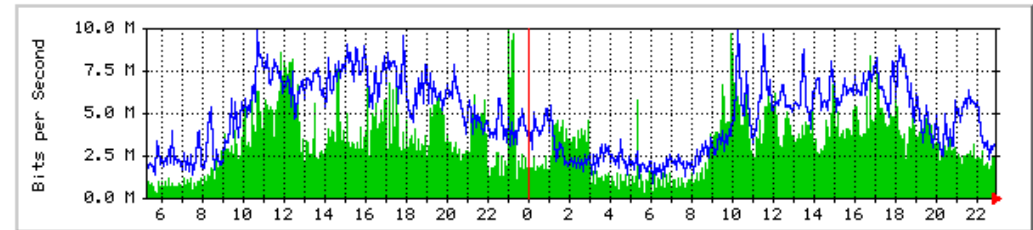


# Network: Traffic Monitoring vs. Quality Monitoring



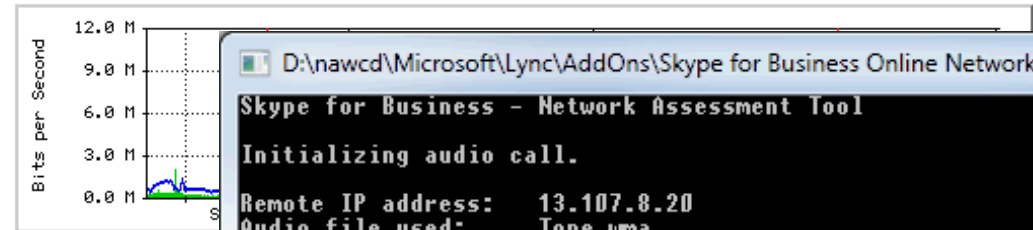
- SNMP-Monitoring
  - „Standard Monitoring“ for Networks
  - Limited usage for VoIP
  - Read „Packets In/Out“ every minute
  - Read „Bytes In/Out“ every minute
  - Every Minute, not every 100ms
  - Resolution not granular enough
- Better Monitoring
  - Better monitoring with synthetic Voice-Tests
  - Modelling and Load Simulation
  - Collect Call Quality metrics

Daily' Graph (5 Minute Average)



Max In: 9938.0 kb/s (9.9%)    Average In: 3403.8 kb/s (3.4%)    Current In: 1900.5 kb/s (1.9%)  
Max Out: 9946.0 kb/s (9.9%)    Average Out: 4820.8 kb/s (4.8%)    Current Out: 3306.9 kb/s (3.3%)

Weekly' Graph (30 Minute Average)



Max In: 11.4 Mb/s (11.4%)  
Max Out: 8678.4 kb/s (8.7%)

```
D:\nawcd\Microsoft\Lync\AddOns\Skype for Business Online Network Assessment Tool
Skype for Business - Network Assessment Tool
Initializing audio call.
Remote IP address: 13.107.8.20
Audio file used: Tone.wma
Audio call duration: 17 s
Received audio file: ReceivedAudioFile.wma
Num iterations: 1
Call interval: 5 s
Results File: results.tsv

*****
Starting new call
Iteration 1 / 1

Audio call started. Waiting for call to end...
Call should end shortly after configured duration of 17 s.
```



# Network Assessment Tool: communication



Prozesse mit Netzwerkaktivität					
<input checked="" type="checkbox"/> Prozess	PID		Senden (B/s)	Empfangen (...)	Gesamt (B/s)
<input checked="" type="checkbox"/> NetworkAssessmentTool.exe	16400		8.670	8.807	17.477

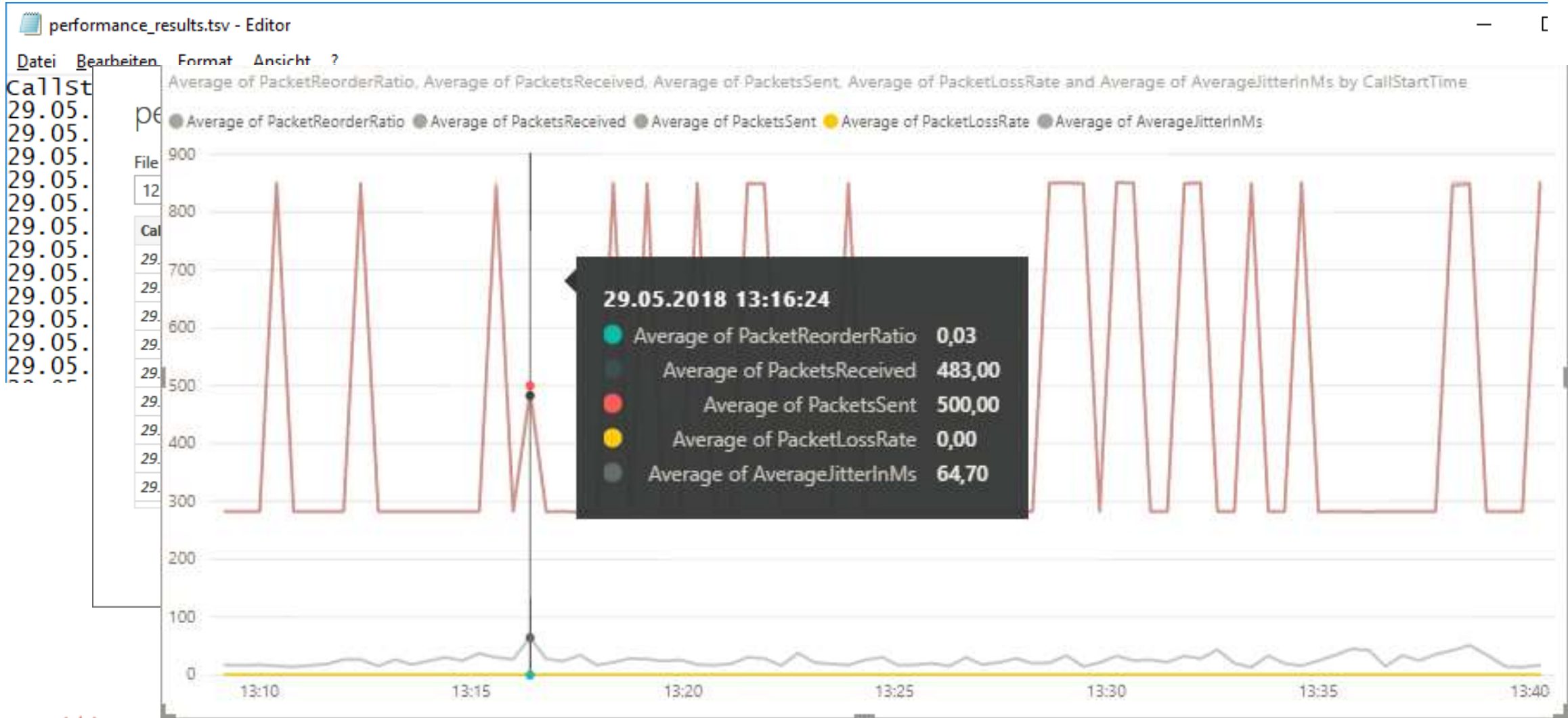
  

Netzwerkaktivität		94 KBit/s Netzwerk-E/A	0% Netzwerklast
-------------------	--	------------------------	-----------------

Gefiltert von "NetworkAssessmentTool.exe"					
Prozess	PID	Adresse	Senden (B/s)	Empfangen (...)	Gesamt (B/s)
NetworkAssess...	16400	52-114-124-167.relay.teams.microsoft.com	8.937	0	8.937
NetworkAssess...	16400	172.17.4.38	0	8.364	8.364
NetworkAssess...	16400	52-114-124-168.relay.teams.microsoft.com	1.556	0	1.556
NetworkAssess...	16400	3472:7c14:1a00:0:60:d1a4:1a00:0	20	176	196
NetworkAssess...	16400	d6b:802:45f0:d301:2000::	9	133	142
NetworkAssess...	16400	52-114-124-59.relay.teams.microsoft.com	8	8	16
NetworkAssess...	16400	global.tr.skype.com	6	5	12

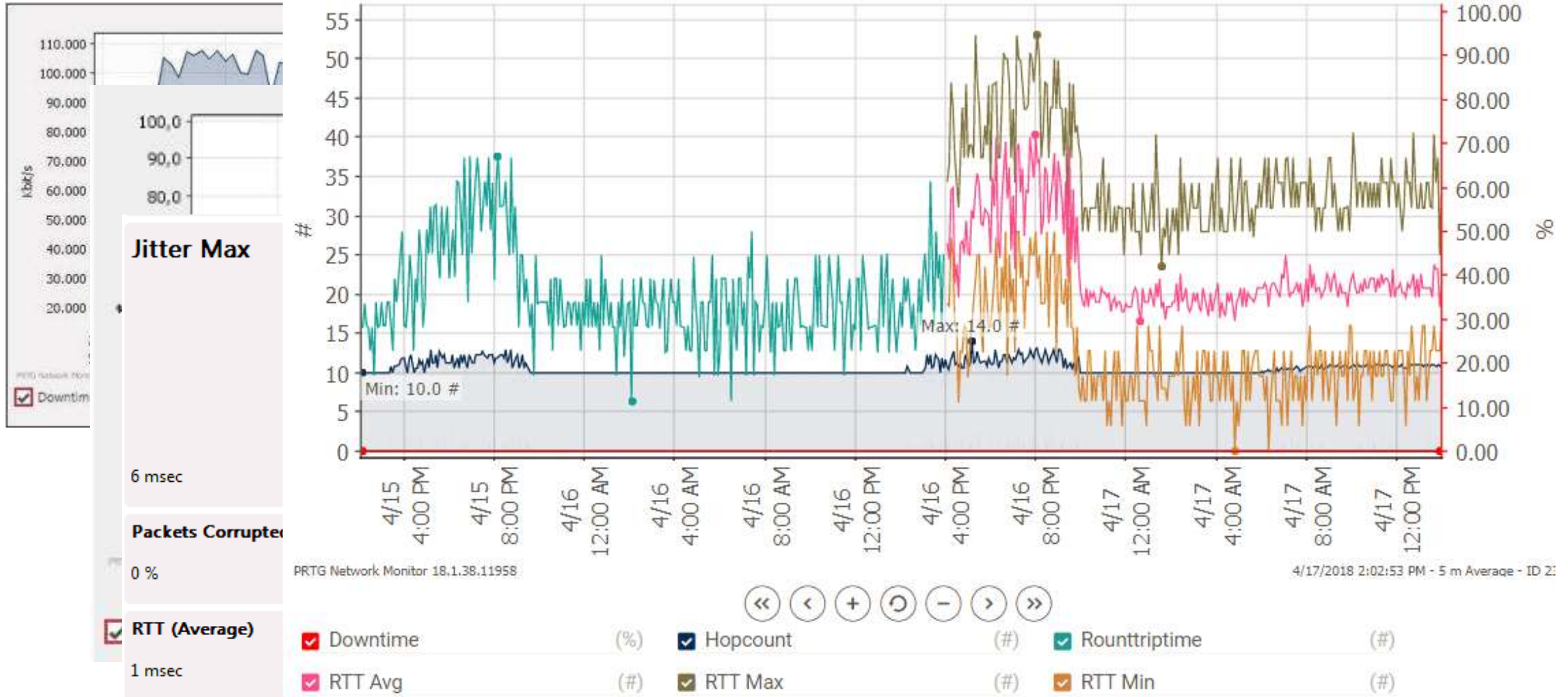
# Network Assessment Tool: Results



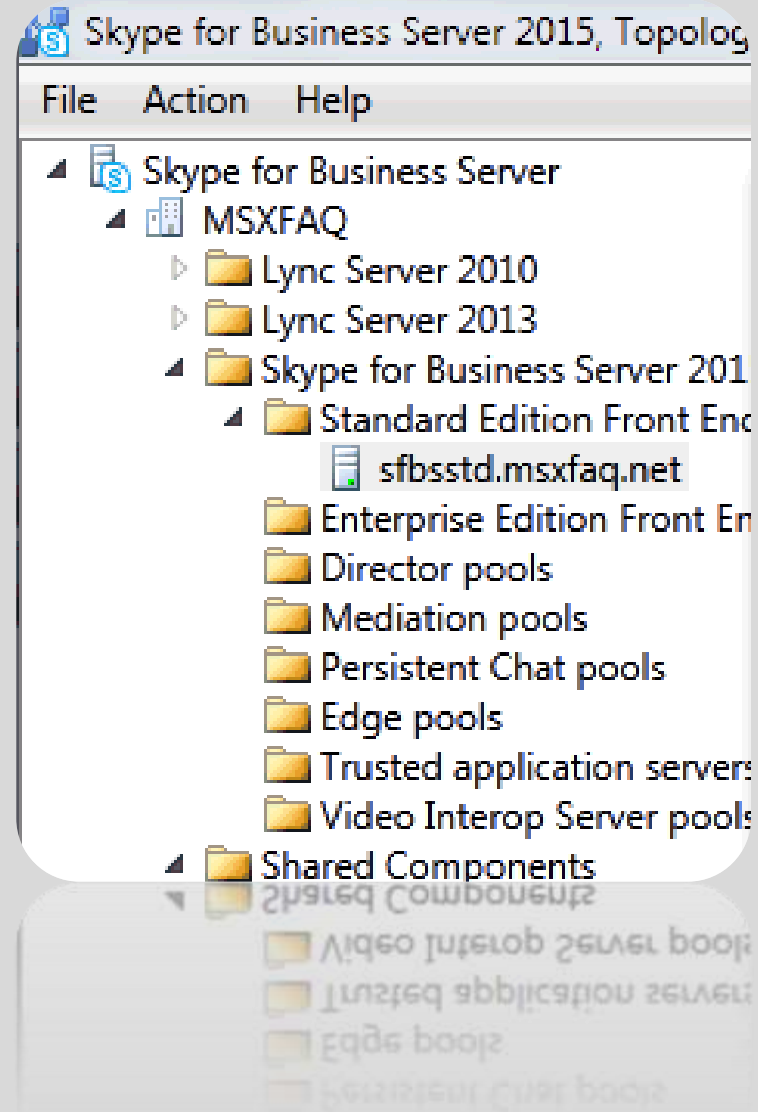
# Network: Samples



Sensor: 0365 3478 udp (2 days)  
Internet Dienste / 0365 STUN 3478



# VOICE TOPOLOGIES



# Topologies - Overview



Scenario	Registrar Userservice	Media Relay TURN	PSTN Service	Mediation	Conference MCU/DialIn	Enhanced
On Premises						RGS
CCE (not with Hybrid)						Call Queue
OPCH (Hybrid)						Call Queue
Direct Routing (Teams)						Call Queue
Calling Plan						Call Queue

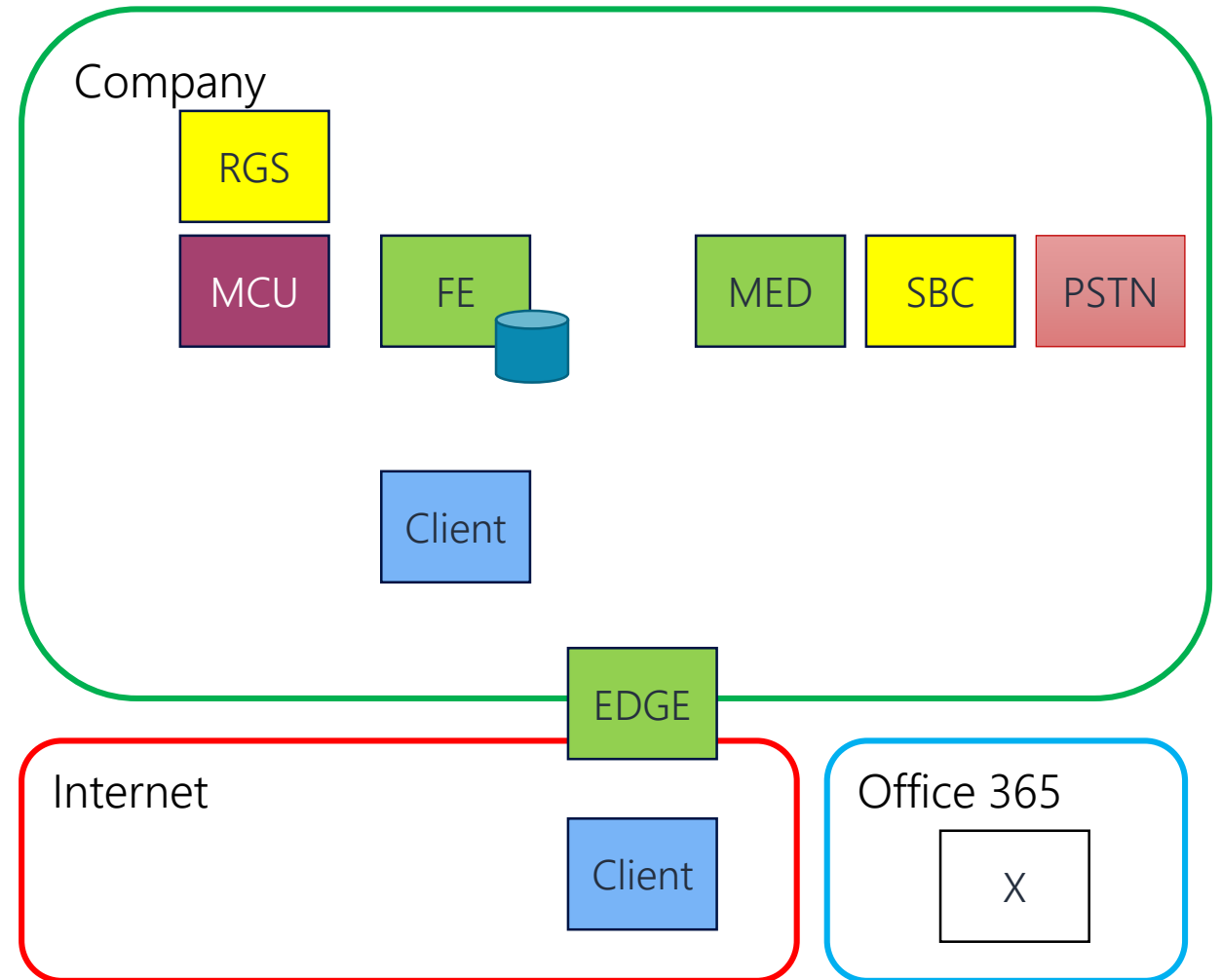


TOPOLOGY: ON PREMISES

# On Premises



- Requirements
  - Servers and Licenses
  - PSTN-Link and Gateway/SBC
  - **And more...**
- Great for
  - „Cloud haters“
  - Features not available in Cloud
    - CAC, internal MCU
    - Coexistence with large legacy PBX

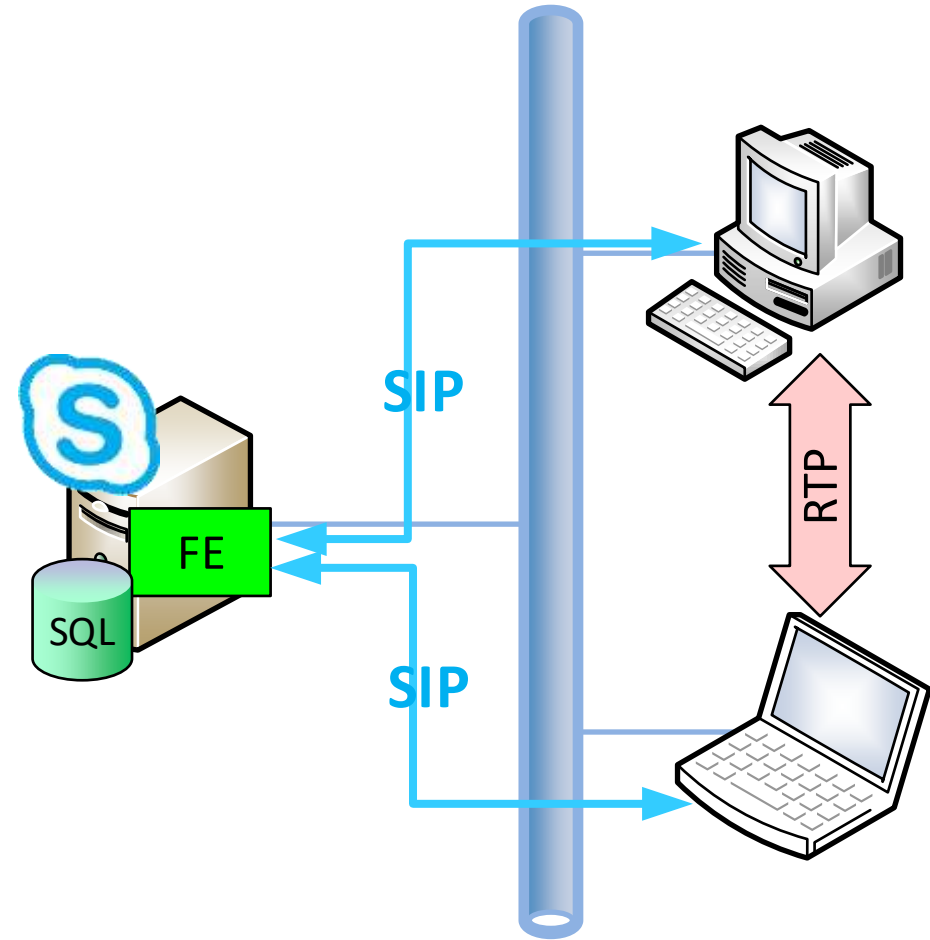




# Skype for Business OnPremise



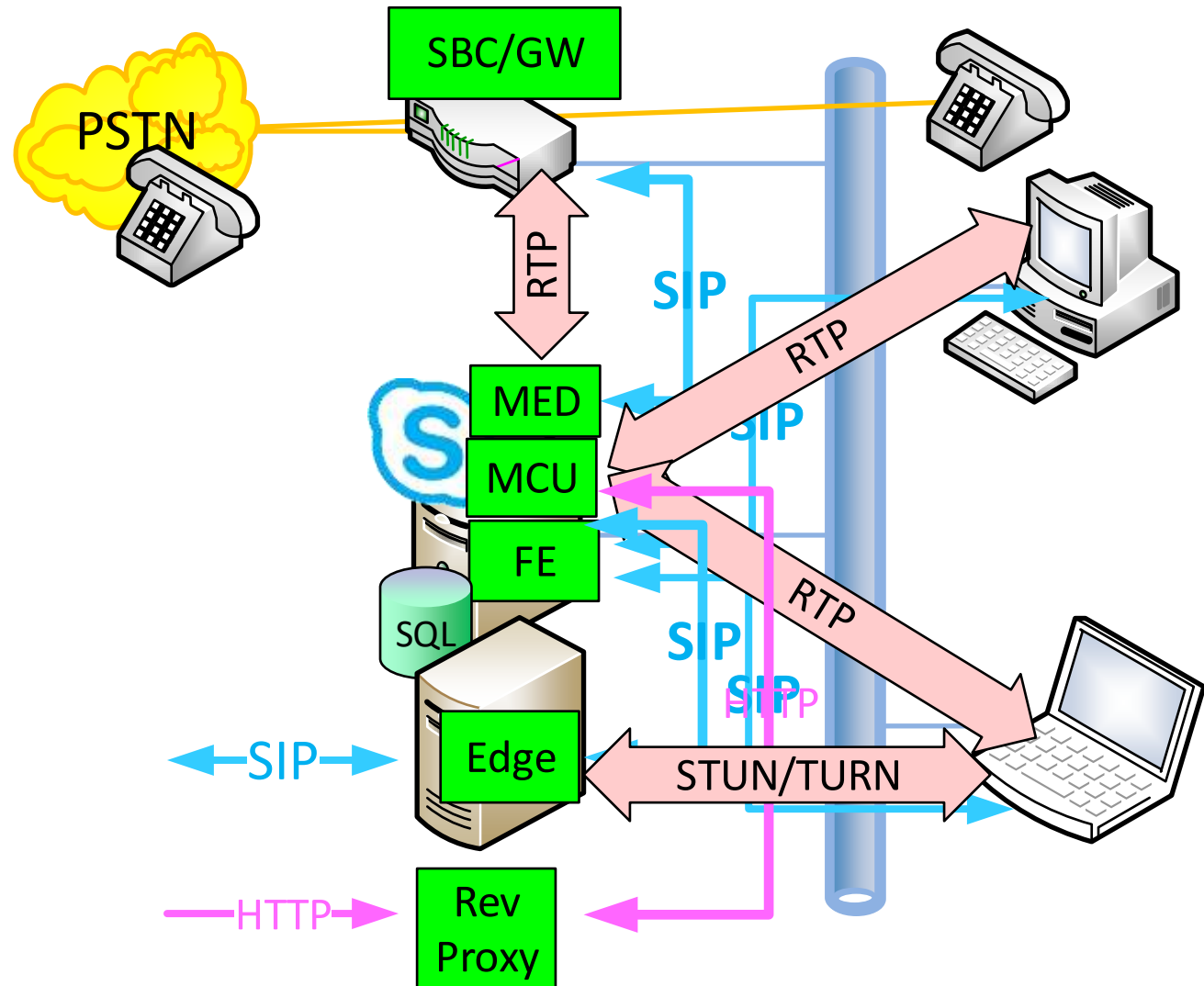
- Baseline
  - IM/Presence
  - Internal P2P Audio



# Skype for Business OnPremise



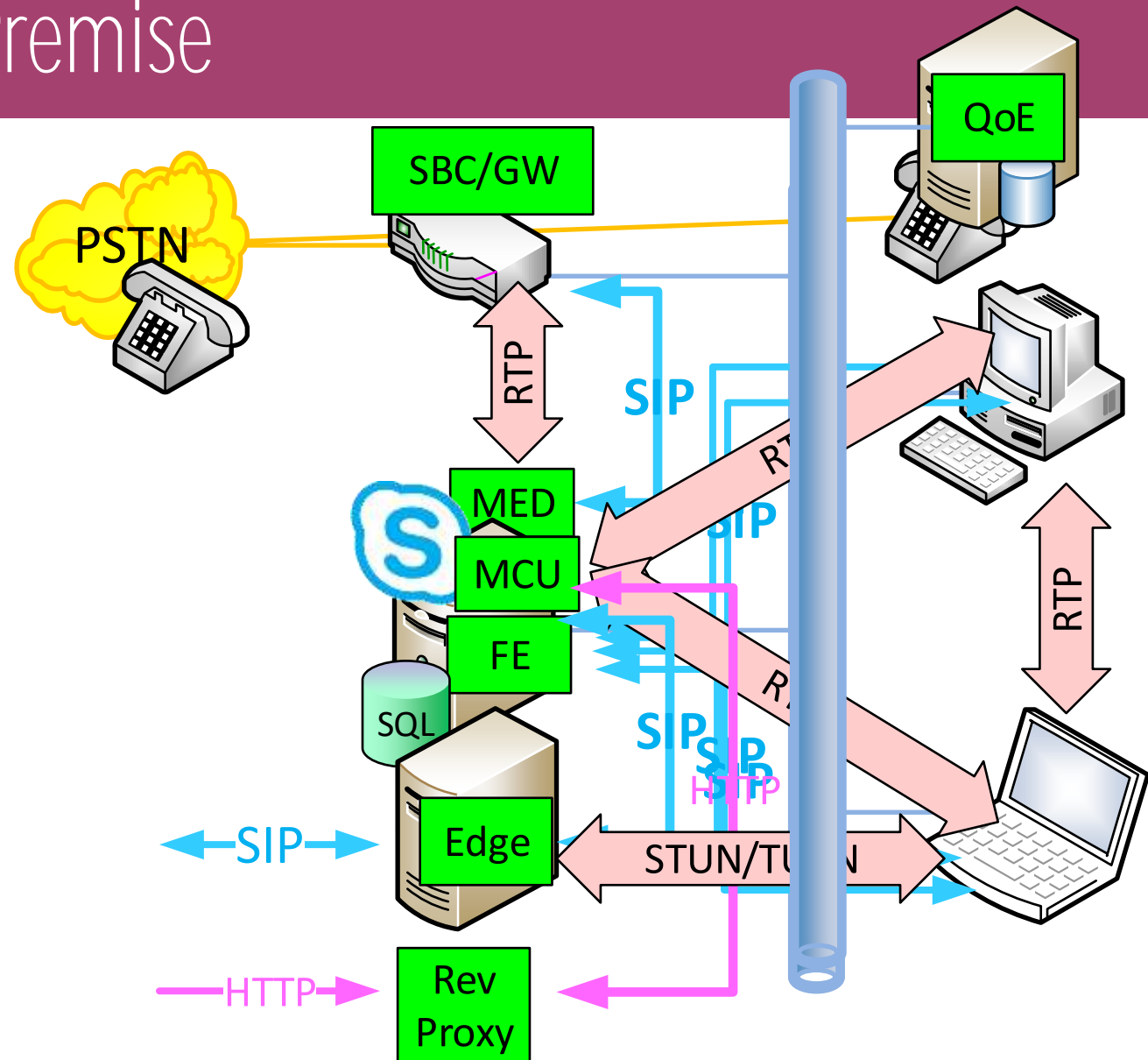
- Baseline
  - IM/Presence
  - Internal P2P Audio
- Conference
  - MCU Audio/Video
  - Dial-In via Gateway
  - External Access via Edge
  - External attendees



# Skype for Business OnPremise



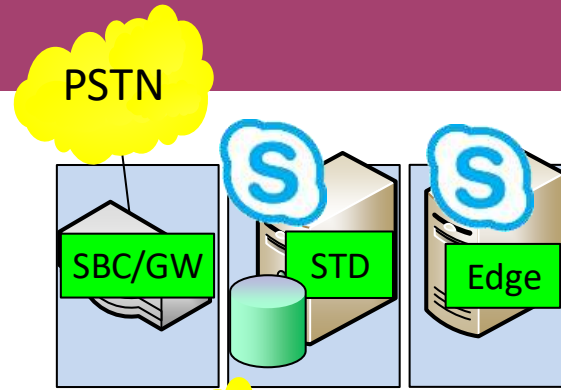
- Baseline
  - IM/Presence
  - Internal P2P Audio
- Conference
  - MCU Audio/Video
  - Dial-In via Gateway
  - External Access via Edge
  - External attendees
- Telephony
  - User with DID Number
  - Optional exchange UM
  - QoS/QoE/CDR



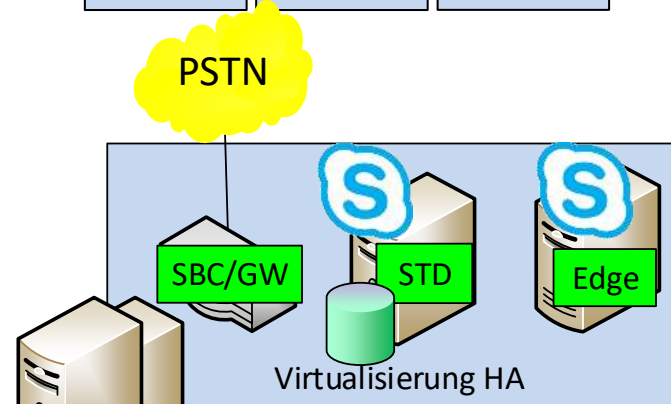
# Availability: Page 1



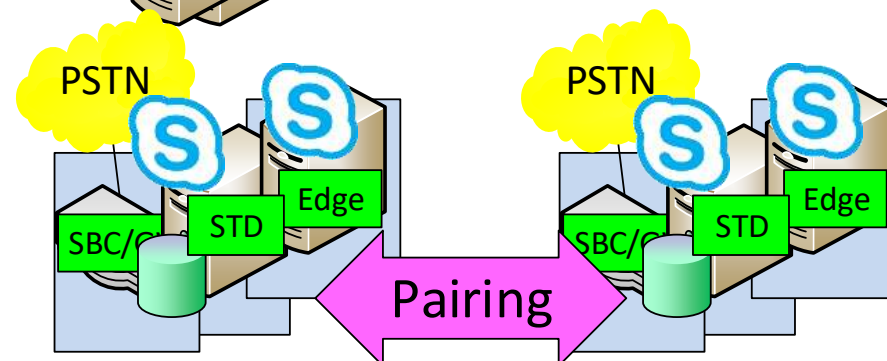
- Single Standard Pool
  - No HA
  - Small Environment only
- Hyper-V
  - Reduces hardware dependencies
  - Hyper-V replication allowed DR
  - Still Downtime and no real HA
- Pool Pairing
  - Failover for basic functions
  - Manual DR-switchover
  - Site Resiliency



	Patchen	HW Fail	RZ Fail
IM	●	●	●
Konf	●	●	●
Tel	●	●	●



	Patchen	HW Fail	RZ Fail
IM	●	●	●
Konf	●	●	●
Tel	●	●	●



	Patchen	HW Fail	RZ Fail
IM	●*	●	●
Konf	●*	●	●
Tel	●*	●	●

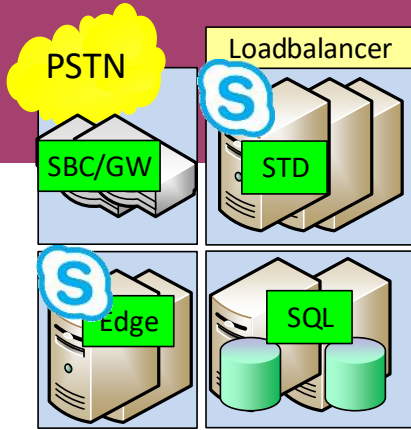
add Loadbalancer, Office Online Server, Exchange-UM, Reverse Proxy



# Availability: Page 2

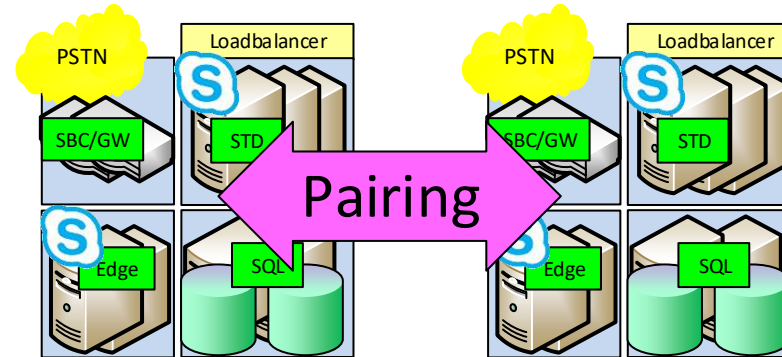


- Frontend Pool
  - Scale-Out (up to 80.000 User)
  - „Real“ HA
  - Additional SQL-Cluster + License



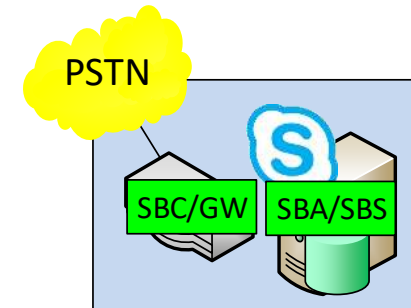
	Patchen	HW Fail	RZ Fail
IM	●	●	●
Konf	●	●	●
Tel	●	●	●

- FE Pool + Pool Pairing
  - Adds Site Resiliency



	Patchen	HW Fail	RZ Fail
IM	●	●	●
Konf	●	●	●
Tel	●	●	●

- SBA
  - Reduced availability for Voice in remote locations
  - Hint: Spend more money in reliable WAN connections



	Patchen	HW Fail	RZ Fail
IM	●	○	○
Konf	○	○	○
Tel	●	○	○

add Loadbalancer, Office Web Apps, Exchange-UM, Reverse Proxy

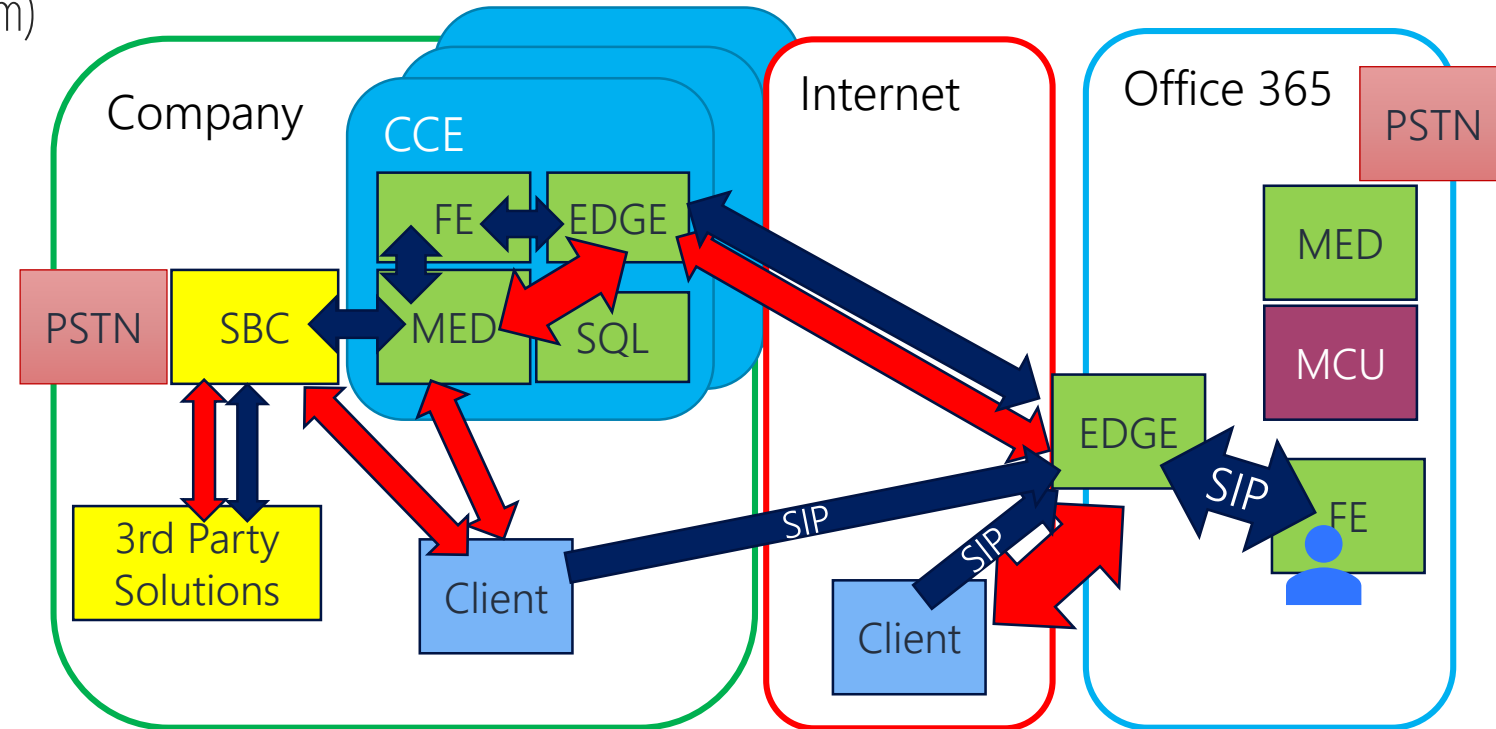


TOPOLOGY: CCE

# Cloud Connector Edition



- Hardware provided On Premises
  - Hyper-V-Server (12 Core, 2,5GHz, 64GB Ram)
  - Win 2012R2 Datacenter
  - PSTN-Service via SBC/GW
- CCE Installation
  - PowerShell + INI-File
  - 4 VMs (DC, Store, Edge, Mediation)
- ScaleOut / HA
  - Multiple CCE per Site
  - Multiple SIP-Trunks per CCE
  - CCE in different locations
- „Appliances“ from Partners
  - Audiocodes, Ribbon, Ferrari, TESystem, etc.
  - ThinkTel (Hosting in Canada)
- Conference Dial in only Cloud



Not With Hybrid !



TOPOLOGY: HYBRID / OPCH



# Hybrid / OPCH



- Requirements

- Office 365 Tenant with Phone System License
- Skype for Business OnPremises Deployment with Edge and PSTN-Connection
- Hybrid Setup (With AADConnect etc.)

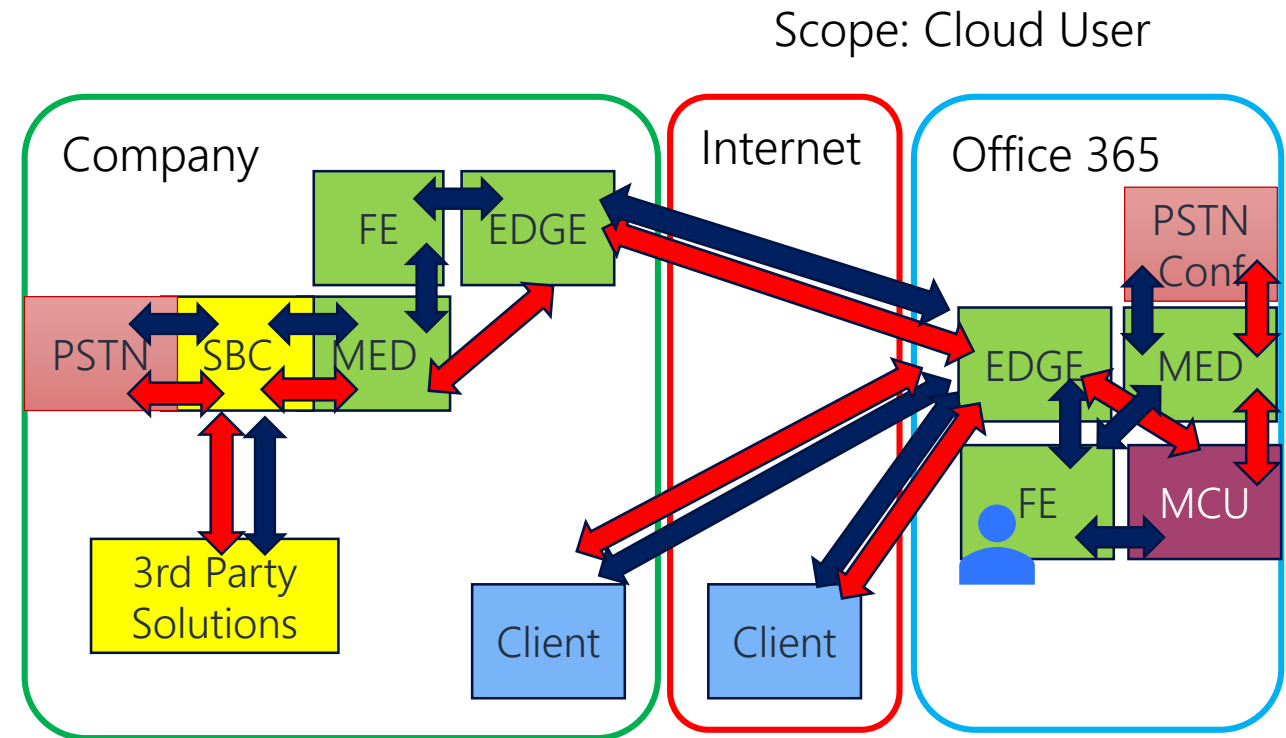
- Operation

- Local AD

- User in local AD
- Phone number in local AD + AADConnect
- Host user in Office 365 (HostingProxyFQDN)
- Voice Policy to control calling permission

- Office 365

- Dialplan optional
- Office 365: Grant-CsVoicePolicy -Identity opchuser1@uclabor.de -PolicyName Tag:HybridVoice

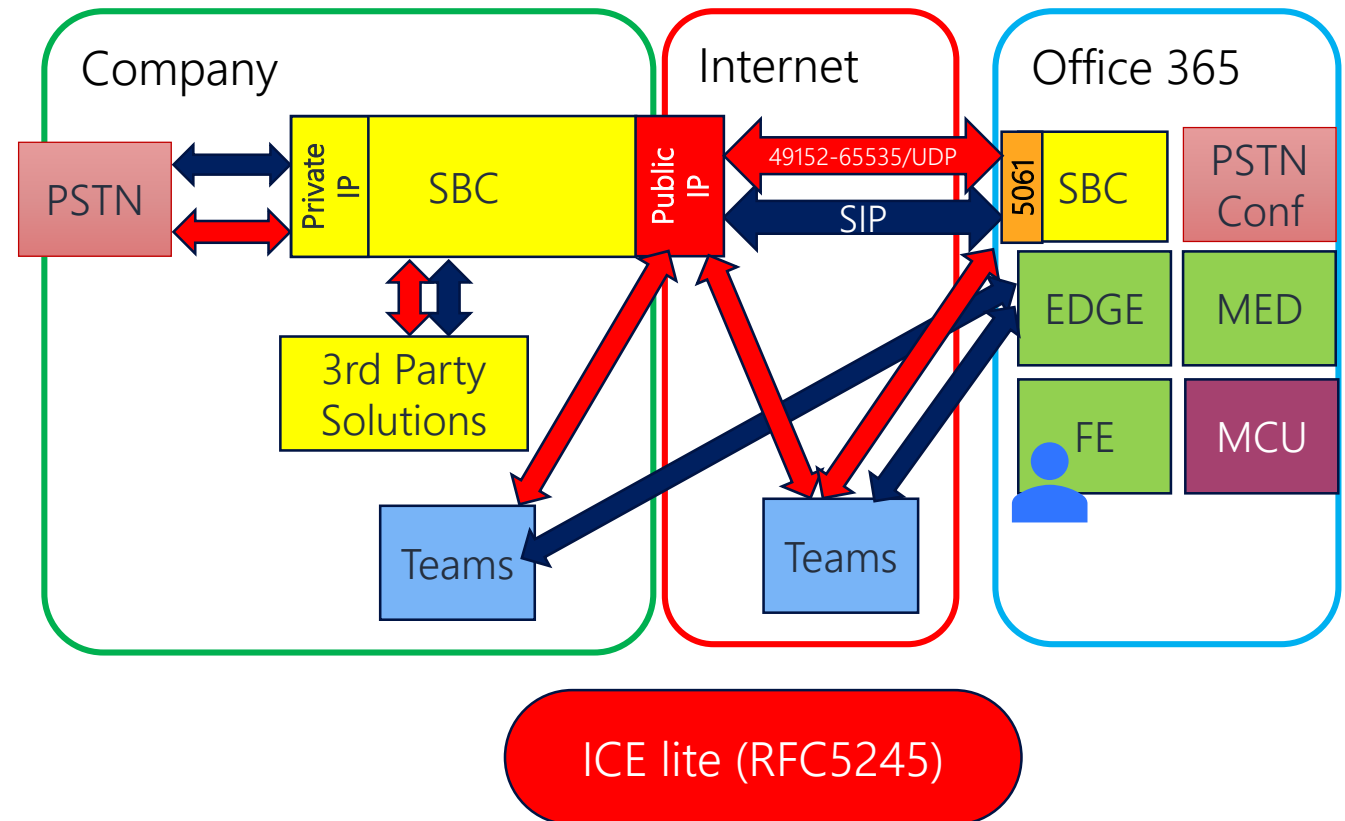


# TOPOLOGY – DIRECT ROUTING

# Direct Connection with Microsoft Teams



- Only with Teams
- Local SIP-Trunk
- Office 365 SBCs in 3 regions
- Local SBC can offer
  - Rerouting to Callcenter
  - Rerouting to Fax
  - Support for analog device
- Media Bypass
  - **Client connects to “public IP” of SBC**
  - Or uses Office 365 TURN-Service
  - Client RTP Source 50.000-50019
- SIP-Trunk offered by Carriers possible



# Office 365 Endpoints



- Three geographical regions
  - NA
  - EMEA
  - APAC
- DNS-Names
  - sip-all.pstnhub.microsoft.com
  - sip.pstnhub.microsoft.com
  - sip2.pstnhub.microsoft.com
  - sip3.pstnhub.microsoft.com
- **Office 365** „answers“ with the right address

```
C:\>nslookup sip-all.pstnhub.microsoft.com
Name:   sip-all.pstnhub.akadns.net
Addresses: 52.114.76.76
          52.114.148.0
          52.114.132.46
          52.114.14.70
          52.114.7.24
          52.114.75.24
Aliases: sip-all.pstnhub.microsoft.com
```

# Direct Connection in Office 365



- Setup local SBC and Firewall
  - Public IP
  - Public Certificate
  - Portranges
    - 49152-65535 / UDP
    - 5067
- Create Gateway in Office 365
- Enable PAI and CallHistory
- Add PSTN-Usages to Voice Routes
- Create Voice Routes with PSTNUsage
- Add Voice Routing Policy and assign to User

```
New-CsOnlinePSTNGateway `
  -Fqdn sipgw.uclabor.de `
  -SipSignallingPort 5067 `
  -MaxConcurrentSessions 5 `
  -Enabled $true

Set-CsOnlinePSTNGateway `
  -identity sipgw.uclabor.de `
  -ForwardPAI $True `
  -ForwardCallHistory $True

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

New-CsOnlineVoiceRoute `
  -Identity DE-PB-NATIONAL `
  -Priority 4 `
  -NumberPattern "^(\\+49\\d*)$" `
  -OnlinePstnGatewayList sipgw.uclabor.de `
  -OnlinePstnUsages DENATIONAL

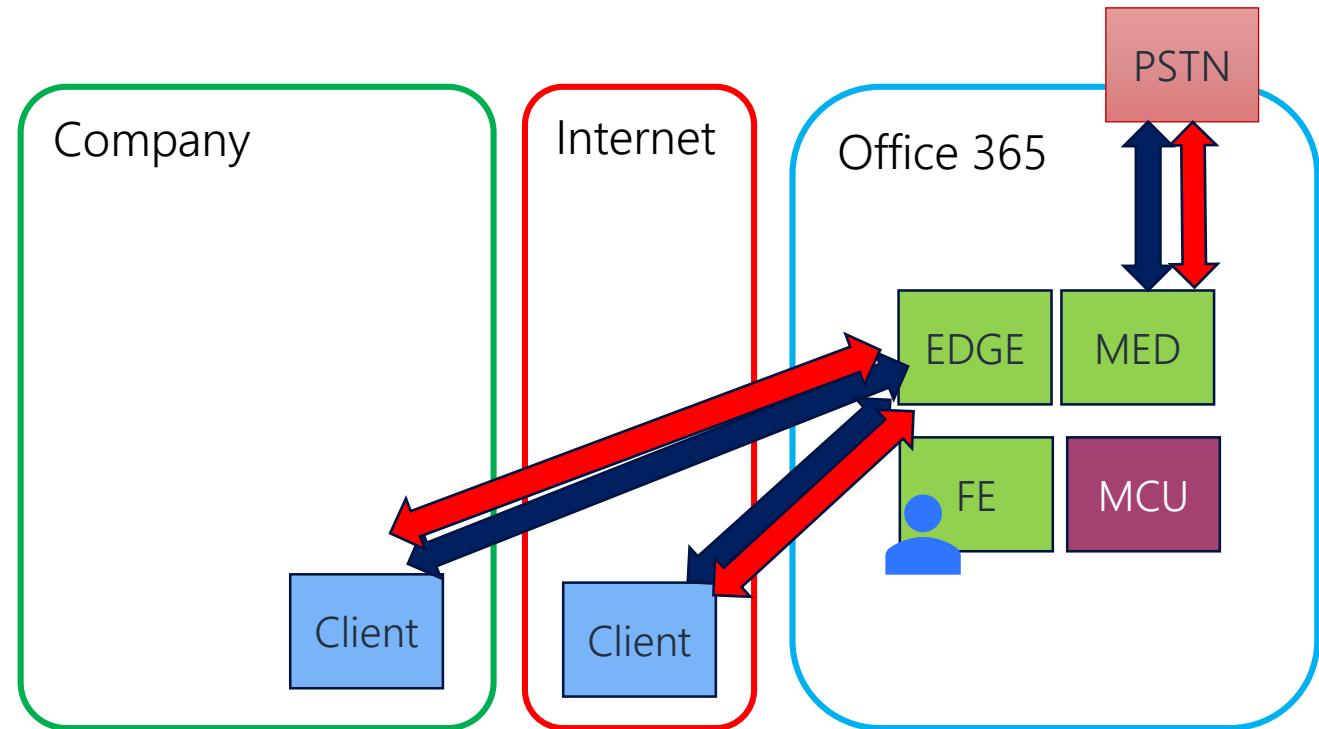
New-CsOnlineVoiceRoutingPolicy "DEStandard" `
  -OnlinePstnUsages "DENATIONAL"
```

TOPOLOGY: CALLING PLAN

# Skype for Business Online



- Requirements
  - Office 365 Tenant
  - SfB Plan 1 or 2
  - PSTN Calling AddOn (or E5)
  - Calling Plan and Country
- Key Points
  - Everything in Office 365
  - No local servers, gateways, trunks
- Easy Setup



# Microsoft PSTN-Services



- Calling Plan

- 11 Countries with Calling Plan (Australia, Belgium, Canada, France, Germany, Ireland, Netherlands, Spain, United Kingdom (U.K.), United States (U.S.) & Puerto Rico)
- 197 Countries can be reached  
North Korea missing

- VoiceMail

- Recording sent to Exchange Mailbox
- Voicemail Transcription  
Chinese, English, French, German, Italian,

Portuguese, Spanish

- Audio Conferencing

- 87 countries can use Audio Conference Dial in
  - 23 Toll Free Only
  - 12 Toll only
- 68 countries with communication credit

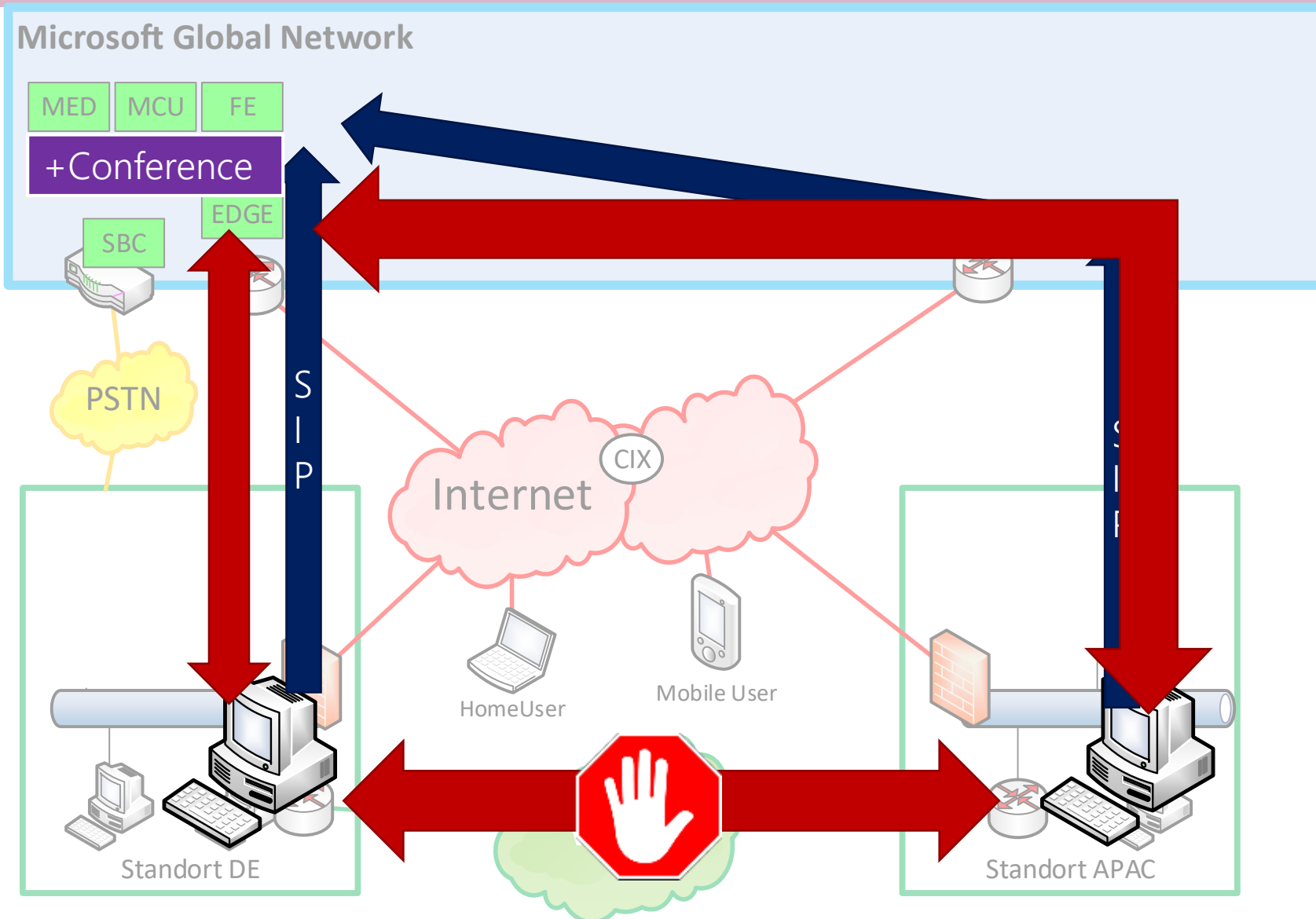
Country and region availability for Audio Conferencing and Calling Plans

<https://docs.microsoft.com/de-de/SkypeForBusiness/country-and-region-availability-for-audio-conferencing-and-calling-plans/country-and-region-availability-for-audio-conferencing-and-calling-plans>

<https://docs.microsoft.com/de-de/SkypeForBusiness/country-and-region-availability-for-audio-conferencing-and-calling-plans/availability-in-germany>

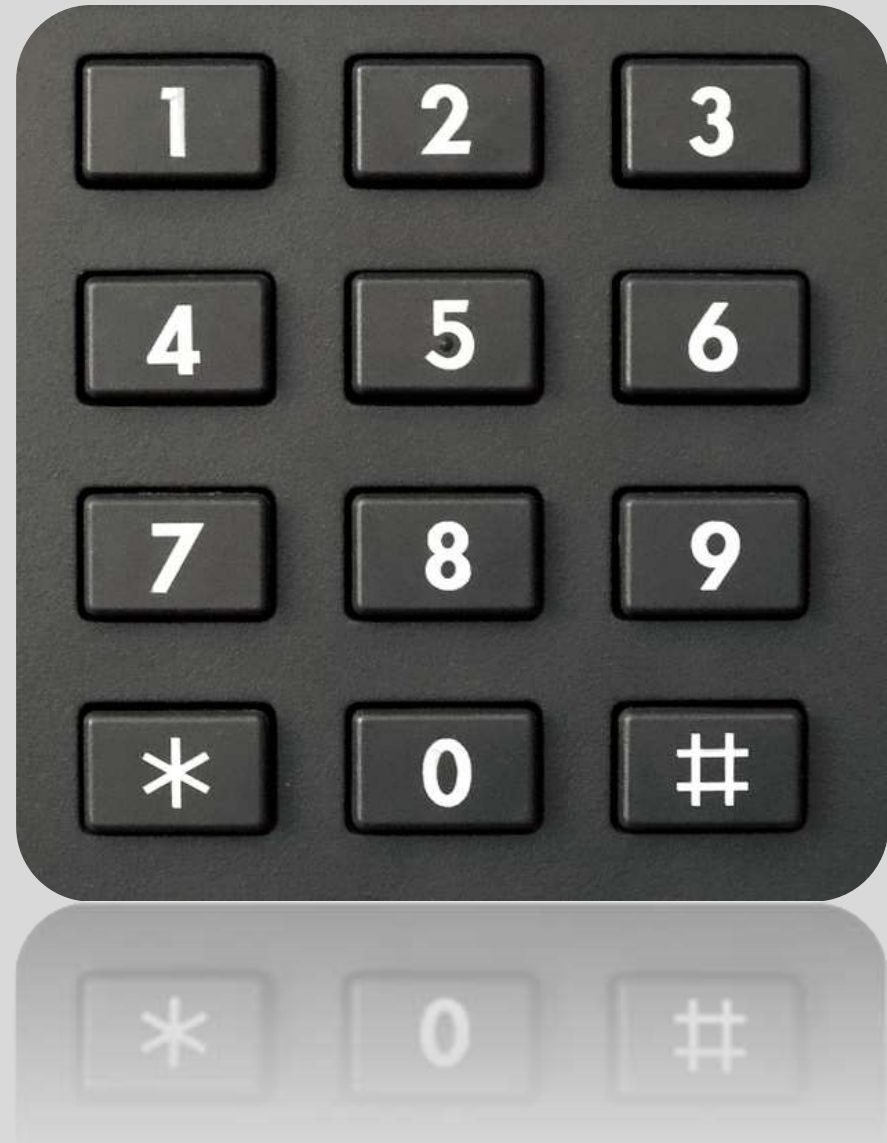


# CloudPBX and RTP



- Minimize latency
  - Local breakouts
  - Short path to MGN
  - Local DNS resolution
  - Bypass http-proxy
  - **Bypass “deep inspection”**
- Firewall open for:
  - 443/TCP
  - 3478-3481/UDP
  - Reject instead of drop

NUMBERS



# Getting DID numbers



- Request DID number
  - US, F, UK: Online
  - DE: fill out PDF-Form
- Numbering blocks
  - Blocks of 10 or 100
  - Depends on the number of licenses
  - $(10 + \text{CALs}) * 1,1$
  - Continuity not guaranteed with later requests
- Two type of numbers
  - Extension for individual users
  - Service numbers (Call Queues, Auto Attendant)
- Portability
  - Depends on the current PSTN-Carrier

Licenses	calculated	Effektive
10	22	30
50	66	70
100	121	200 (?)
1000	1210	1300 (?)

# The Process

- Create emergency location
  - Important for 911/110-calls
- Request Number
  - Germany: see link
- Wait for configuration
- Assign numbers to users
- Optional
  - Create Dialplan
  - Assign Policies
- That's it
- Portability: Check the address first!

<https://docs.microsoft.com/de-de/SkypeForBusiness/what-are-calling-plans-in-office-365/get-new-user-phone-numbers-request-forms>

The screenshot displays the Skype for Business admin center interface. At the top, there are buttons for 'Speichern' (Save) and 'Verwerfen' (Discard). Below this is a 'Skype for Business' header and a section titled 'Anforderung neuer Telefonnummern' (Request for new phone numbers). The text below explains that the user has been selected as a service provider and that the form must be filled out and submitted to receive new numbers. A 'WICHTIG' (Important) notice is also present.

Below the notice is an email window titled 'RE: Phone Number Request fcarius.onmicrosoft.com - Nachri...'. The email is from the 'EU Number Porting Team <PTNEU@microsoft.com>' and contains the following text:

Hi,  
Good news! Your number order completed successfully!

The bottom part of the screenshot shows the 'Skype for Business admin center' with the 'phone numbers' tab selected. A table lists available numbers with columns for 'Number', 'Number Location', 'Assigned', 'Number Type', and 'Number Status'. The number '+49 5257 945904' is highlighted, and an 'Assign' button is visible next to it. A sidebar on the left contains navigation options like 'dashboard', 'users', 'organization', 'voice', 'call routing', 'audio conferencing', 'online meetings', 'tools', and 'reports'.

Number	Number Location	Assigned	Number Type	Number Status
+49 5257 945904	Hövelhof, Germ	Unassigned	User	Activated
+49 5257 945904	Hövelhof, Germ	Unassigned	User	Activated
+49 5257 945904	Hövelhof, Germ	Unassigned	User	Activated
+49 5257 945904	Hövelhof, Germ	Unassigned	User	Activated
+49 5257 945904	Hövelhof, Germ	Unassigned	User	Activated
+49 5257 945904	Hövelhof, Germ	Unassigned	User	Activated
+1 832-856-474	Houston, Unitec	Conference Brid	Service	Activated
+33 3 69 24 89	Strasbourg, Fran	Call Queue	Service	Activated
+33 3 69 24 89	Strasbourg, Fran	Auto Attendant	Service	Activated
+1 425-526-344	Seattle, United S	User	User	Activated
+1 425-526-344	Seattle, United S	User	User	Activated



# Dialplan



- Not required
  - Office 365 has preloaded dialplans
  - **Based on the „Country“-Setting**
- Manual configuration possible
  - „Convert“ number to E.164
- Assign
- Test

```
PS C:\> (Get-CsDialPlan -Identity "Tag:DE").normalizationrules

Description      : DE International Dialing Rule
Pattern          : ^00(\d+)$
Translation      : +$1
Name             : DE Intl Dialing

New-CsTenantDialPlan `
  -Identity "UCLabor495251304" `
  -Description "DialPlan UCLabor" `
  -ExternalAccessPrefix 0 `
  -SimpleName "UCLabor495251304"

$Rule1 = New-CsVoiceNormalizationRule `
  -Identity Global/UCLabor495251304 `
  -Description "DE Paderborn Intern" `
  -Pattern '00(\d+)$' `
  -Translation '+$1' `
  -Name 'DE Intl Dialing'

Grant-CsTenantDialPlan `
  -Identity user1@uclabor.de `
  -DialPlan UCLabor495251304
```

```
Get-CsEffectiveTenantDialPlan `
  -Identity user1@uclabor.de `
| Test-CsEffectiveTenantDialPlan `
  -DialedNumber 12345

RunspaceId : 0a206064-279a-4cef-a2c3-92d45cf210dc
TranslatedNumber : +49525112345
MatchingRule : Description=DE Paderborn
Local;Pattern=^(\d{2}\d+)$;Translation=+495251$1;Name=UCLabor495251;IsInternalExtension=False
```

# Administration



## Skype for Business admin center

dashboard

users

organization

voice

call routing

audio conferencing

online meetings

tools

reports

phone numbers port orders **voice users** emergency locations on premises PSTN

Active users Enabled **number assigned**  

<input type="checkbox"/>	Display name	Number	Number Status	PSTN Connectivity
<input checked="" type="checkbox"/>	adm-fcarius	+49 5251 304775		On-premises
<input type="checkbox"/>	CloudDE 3			Online
<input type="checkbox"/>	Demo1 Cebit	+1 425-526-3442	Activated	Online
<input type="checkbox"/>	DirectCallUser1	+49 5251 304795		On-premises
<input type="checkbox"/>	EV Testuser Fr	+33 1 73 01 07 50	Failed	Online
<input type="checkbox"/>	Frank Carius (farius A	+49 5257 9459901	Activated	Online
<input type="checkbox"/>	Stefan Junghahn (AD	+49 5251 304797		On-premises
<input type="checkbox"/>	Zweers, Marco ADM	+1 425-526-3644	Activated	Online

adm-fcarius

Assigned number

+49 5251 304775 [Change](#) | [Remove](#)

International calling

Disabled [Change](#)





## Skype for Business admin center

dashboard

users

organization

voice

call routing

audio conferencing

online meetings

tools

reports

phone numbers **port orders** voice users emergency locations on premises PSTN

## How to transfer your phone numbers to Skype for Business

We offer two ways to transfer your phone numbers. Take a look at the options below and choose the one that's right for you.

### Take the helm (recommended)

If you have up to 999 phone numbers in the U.S. to transfer, we encourage you to create a port order on your own using our wizard.

Please note that sometimes it takes a long time to transfer phone numbers in bulk (referred to as project port) and it is dependent on your current service provider. If you have multiple bulk orders, open a support ticket and let us help you through the process. Before you begin, gather the following information:

- account number
- account service address
- list of numbers to transfer
- Signature authority on the account

### Let us help you

If you have...

- More than 999 phone numbers
  - Service numbers (like for conference bridges)
  - Numbers in the U.K.
  - Toll-free numbers
  - Porting numbers is just not your thing
- ...we'd love to lend a hand.

Using a service request, we'll track and manage your port order and answer any questions along the way. To learn how to open a service request, follow the instructions in the link below.

[How to open a service request](#)



# Call Queues

- Up to 50 agents and 200 concurrent calls
- Individual announcements and MoH
- Call distribution
  - Parallel: all agents are ringing
  - Seriell: one after one
- Current status is honored (Offline/DND/InCall)
- Work in progress 😊

SAVE CANCEL

## Edit call queue

Name \*

CallQueue1

Call agents

Search for an O365 group, distribution list or security group

Type at least 3 characters to start searching

Maximum 50 agents

Maximum calls in the queue \*

50 calls

Maximum 200 calls

When the maximum number of calls is reached \*

Disconnect with busy signal

How long a call can wait in the queue \*

20 minutes 0 seconds

Maximum 45 minutes

When a call times out \*

Disconnect

ADDITIONAL SERVICES

# What else do you have to evaluate



Feature	On Premises	CCE	OPCH	Direct Routing	Microsoft PSTN
Topology	Large local Site with local meetings	Some remote locations with local Trunk	Requires Hybrid	Flexible but only Teams	-
PSTN Coexist	++	O	++	+	-
Call Center	++	+			+
Fax	SBC+Service	SBC+Service	SBC+Service	SBC+Service	Separate
DECT/Analog	Yes	Partial via SBC	Partial via SBC	Partial via SBC	Separate
3PIP	Yes	Yes	Yes	Update	Yes
Simple	-	+	-	++	++
Worldwide	Yes	Yes	Yes	Yes	11 countries
Conference Dialin	Private	Office365	Office365	Office365	Office365
"Hunt Groups"	RGS	CallQueues	CallQueues	CallQueues	CallQueues
UCMA	Yes	No	OnPrem Users	No	No

# BILLING AND REPORTING

# Reporting: PSTN usage details



## Skype for Business admin center

dashboard

users

organization

voice

call routing

audio conferencing

online meetings

tools

reports

PSTN usage details PSTN minute pools users blocked session details (preview)

Export to Excel

To group by a particular column, drag and drop the column header here.

...	User Id	Phone Number	Caller ID	Call Type	...	...	...	Start Time ↓	...	...	...
Ger...	fcarius.admin...	+495257945...	+491609...	☛ pstn_in	Do...	Ger...	User	2018/05/...	00:...	0.00	USD
Ger...	fcarius.admin...	+491609061...	+495257...	☚ pstn_out	Do...	Ger...	User	2018/05/...	00:...	0.00	USD
Ger...	fcarius.admin...	+491609061...	+495257...	☚ pstn_out	Do...	Ger...	User	2018/05/...	00:...	0.00	USD
Ger...	fcarius.admin...	+495257945...	+495257...	☛ pstn_in	Do...	Ger...	User	2018/05/...	00:...	0.00	USD
Ger...	fcarius.admin...	+495257945...	+495257...	☛ pstn_in	Do...	Ger...	User	2018/05/...	00:...	0.00	USD
Ger...	fcarius.admin...	+495257945...	+491609...	☛ pstn_in	Do...	Ger...	User	2018/05/...	00:...	0.00	USD

# Reporting: PSTN minutes pools



## Skype for Business admin center

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online meetings







tools

reports

PSTN usage details **PSTN minute pools** users blocked session details (preview)

 Export to Excel

To group by a particular column, drag and drop the column header here.

Capability 	Capability Description 	Country Minute Pool 	Used Minutes 	Total Minutes 	Percent Used 
MCOPSTN2	Office 365 Calling Plan Domestic Pool	United States - Puerto Rico	0	18000	0.0 %
MCOPSTN2	Office 365 Calling Plan International Pool	United States - Puerto Rico	0	3600	0.0 %
MCOPSTN2	Office 365 Calling Plan Domestic Pool	France	0	1200	0.0 %
MCOPSTN2	Office 365 Calling Plan International Pool	France	0	600	0.0 %
MCOPSTN2	Office 365 Calling Plan Domestic Pool	Germany	0	7200	0.0 %

# Call Quality Dashboard <https://cqd.lync.com/spd/>



Microsoft-Anrufqualitäts-Dashboard Zusammenfassende Berichte ⚙️ ? fcarius.admin@fcarius.onmicrosoft.com Abmelden

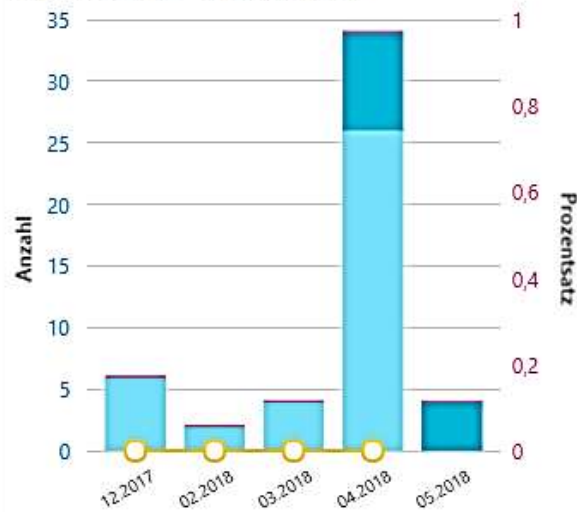
Produktfilter

Gesamtanrufqualität **Server – Client** Client – Client SLA zur Sprachqualität

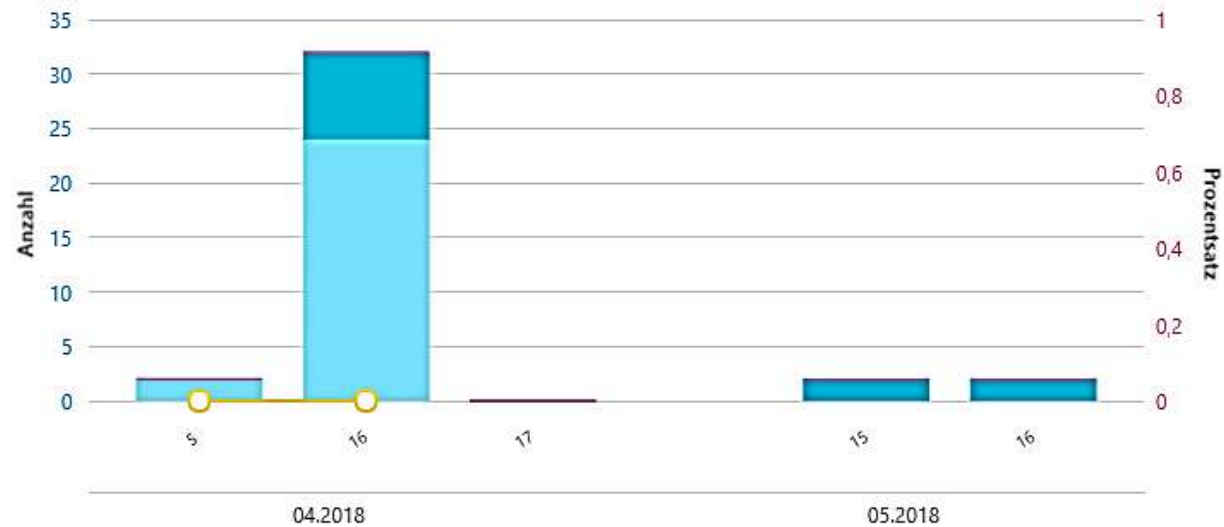
● Gut ● Nicht klassifiz. ● Schlecht ○ Schlecht %

Bearbeiten

### Audiostreams – Monatstrend



### Tagestrend



# Portal <https://admin.teams.microsoft.com>



Office 365 | Microsoft Teams & Skype for Business Admin Center

Benutzersuche / Frank Carius (farius ADM)

Frank Carius (farius ADM)

E-Mail-Adresse  
[admin@uclabor.de](mailto:admin@uclabor.de)

Verzeichnisstatus  
In der Cloud gehostet

WÖCHENTLICHE QUALITÄT

■ Gut ■ Schlecht ■ N. verfügbar

WÖCHENTLICHE AKTIVITÄT

0  
Besprechungen

16  
Anrufe

### Anrufprotokoll

Startzeit ↓	Wann	Von/An	Dauer	Client	Audioqualität
29. MAI 2018 13:32 MESZ	vor 4 Stunden	+4916090613955	K.A.	Microsoft Teams	N. verfügbar
29. MAI 2018 13:32 MESZ	vor 4 Stunden	+4916090613***	0:00:52	Unbekannt	Gut *
29. MAI 2018 13:32 MESZ	vor 4 Stunden	+4916090613***	K.A.	Skype for Business	N. verfügbar
29. MAI 2018 13:32 MESZ	vor 4 Stunden	+4916090613955	0:00:28	Microsoft Teams	N. verfügbar
29. MAI 2018 13:32 MESZ	vor 4 Stunden	+4916090613***	0:00:28	Unbekannt	Gut *





thank you



questions?



@MSXFAQ



[HTTPS://WWW.MSXFAQ.DE](https://www.msxfaq.de)