

CISCO *Live!*

Let's go

#CiscoLiveAPJC



The bridge to possible

Successfully Migrating to and deploying Webex Calling

Subtitle goes here

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“Reconciliation” - Dustin Koa Art

CISCO *Live!*

Cisco Webex App

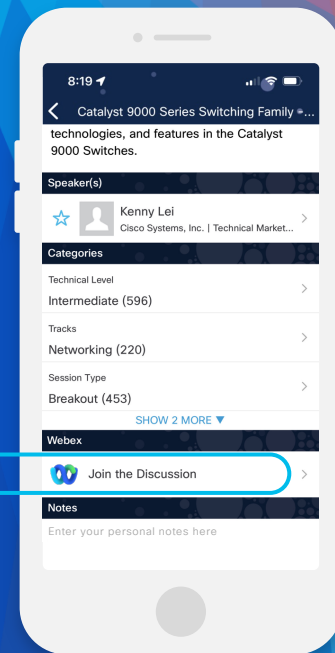
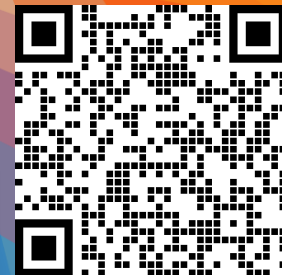
Questions?

Use Cisco Webex App to chat with the speaker after the session

How

- 1 Find this session in the Cisco Live Mobile App
- 2 Click “Join the Discussion”
- 3 Install the Webex App or go directly to the Webex space
- 4 Enter messages/questions in the Webex space

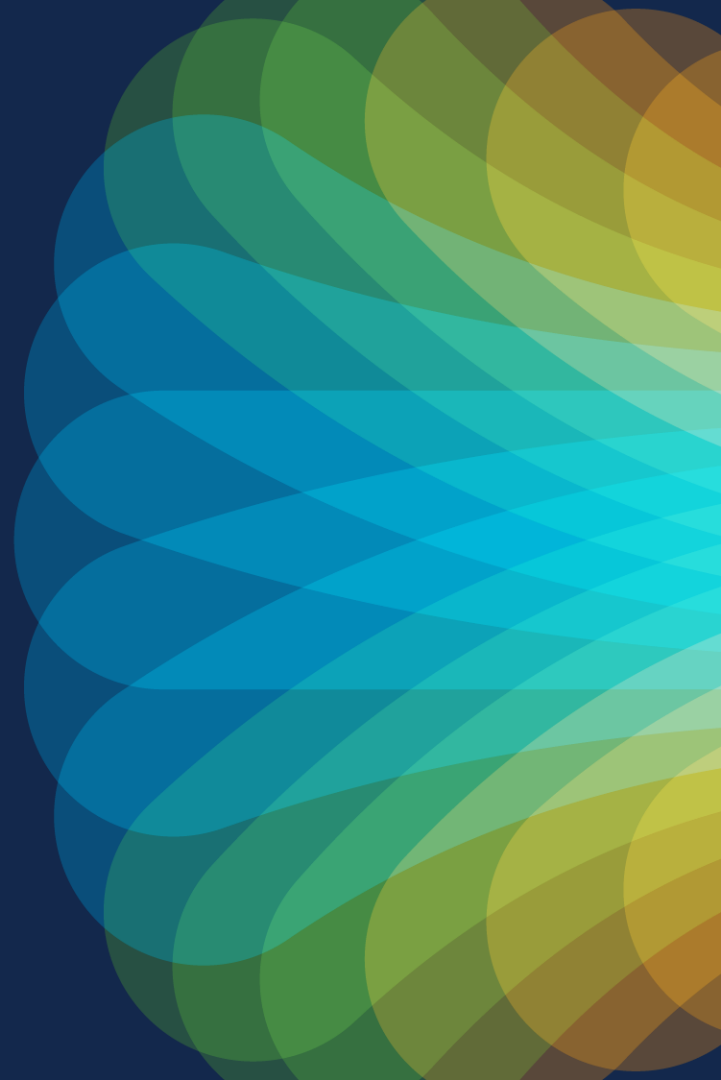
Webex spaces will be moderated by the speaker until December 22, 2023.



Agenda

- Key Decisions, Migration Readiness
- Migration Process
 - Discover
 - Design
 - PSTN options, location considerations, feature mapping, interworking w/ Unified CM, extension dialing, virtual and shared lines
 - Deploy
 - Migrate
- Closing

Key Decisions and Migration Readiness



Migration Hurdles



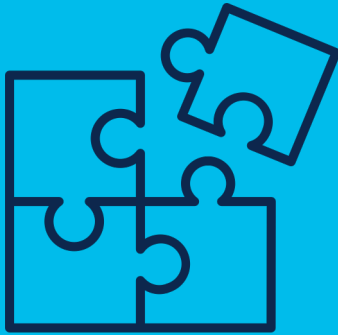
- Do I have the best offer/solution?
- What tools are available to help?
- What are the migration options/paths?
- Am I able to plan & execute migration?
- Do I have the right data?
- **Architecture decisions:**
 - Network/Peering connectivity
 - PSTN options
 - Local GW scale
 - 3rd party devices and integrations
 - Analog devices
 - Survivability

The Value to Start Now



- Enable **NEW** and **MODERN** Webex capabilities now
- Enhance Collaboration solution to **SIMPLIFY** administration and make a **BETTER** user experience
- Control Hub **CENTRALIZED** Management
- Remove **BIG** blockers that impact the flow of the migration
- Shorten the migration window for a **SMOOTHER** transition

What does “Migration Ready” Mean?



Don't wait... get “Migration Ready” TODAY!

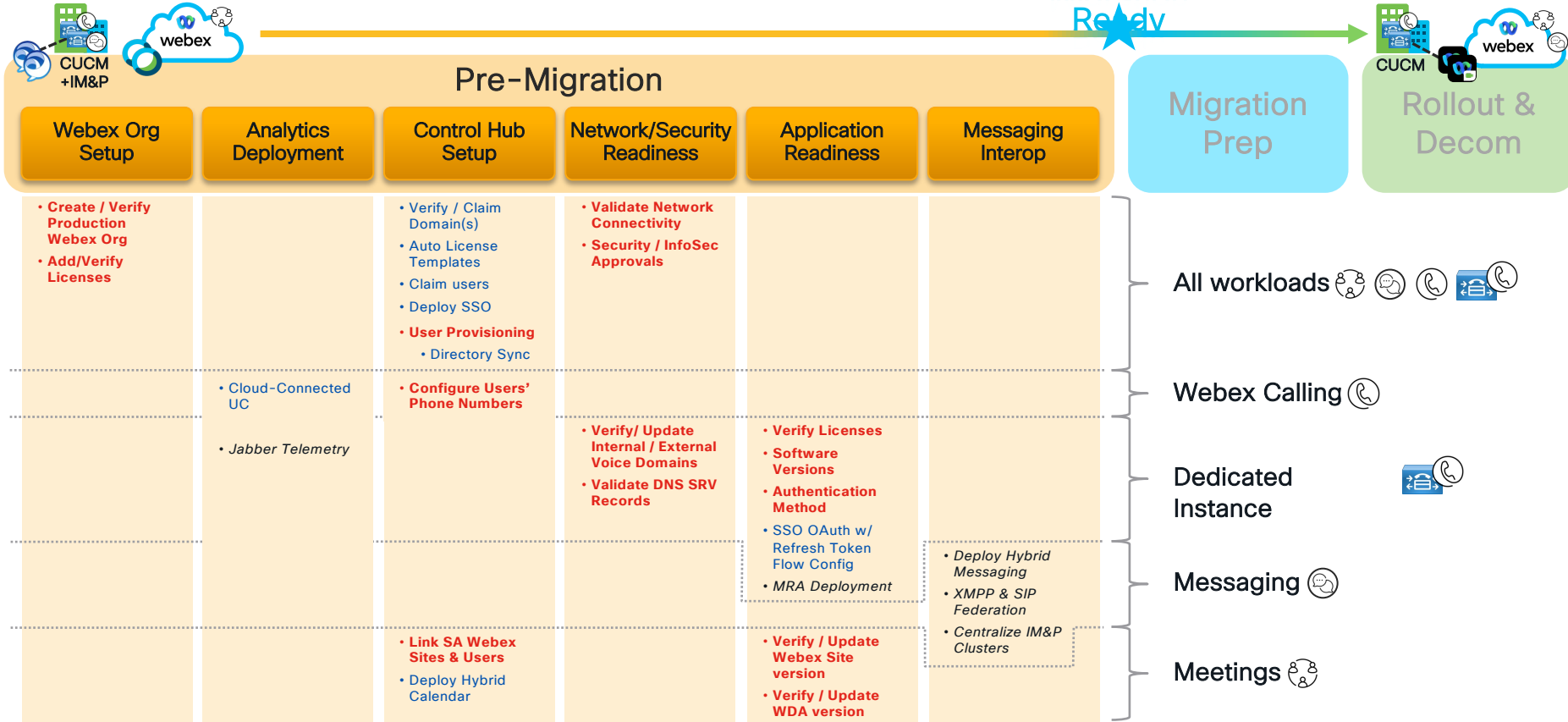
CISCO *Live!*

- There is **NO** 80/20 rule
Every customer situation is different and needs to be assessed individually
- Understand view of “**Readiness**”
The scenery will vary
 - Self discovery... understand current environment
 - Discovery... define key requirements
 - Functionality... highlight benefits
- Focus on the new architecture and activities to prepare for cloud migrations

[Prepare Your Environment for Webex Calling](#)

Pre-Migration Activities

Required Activity
Recommended Activity
Optional Activity



Migration Readiness

- Collaboration Transitions
 - Webex App Migration Readiness documents
 - Migration Readiness Guide
 - Migration Readiness Assessment
- Additional documents:
 - Transition Maps
 - Transition Deployment Guides

Migration Readiness

Before beginning any transition, it is important to evaluate the existing deployment and determine what needs to be completed before the migration can begin. Understanding migration readiness and leveraging tools like readiness assessments help to determine whether the existing environment is ready to be migrated and is critical for a successful transition.

Table 1. Migration Readiness Information

Migration	Migration Readiness Documentation
Webex Migrations <small>(Includes Jabber to Webex App & UCM to Webex Calling)</small>	Webex Migrations - Customer Journeys & Readiness As customers prepare to transition to Webex there are some pre-migration activities that may need to be completed and others that should be strongly considered to provide the best experience for administrators and end users. This document covers all the Migration Journeys from on-prem CUCM to Webex for Messaging, Meetings and Calling (Unified CM or Webex Calling) and identifies the readiness activities for each workload.
	Use this document to understand all the workload journeys, the phases of each journey and the pre-migration activities within each phase. In addition, it provides links to additional resources for the pre-migration activities. Information in this document will help the customer complete the Webex Migrations - Customer Readiness Assessment (see below).
	Webex Migrations - Customer Readiness Assessment As customers prepare to transition to Webex for Messaging, Meetings and Calling (Unified CM or Webex Calling) this assessment document will help to determine how ready they are for the migration. By answering some questions about the customer's current Webex and on-prem UC environment, deployment, and configurations, it will quickly assess the required, recommended, and optional requirements for transitioning to Webex and identify where the customer may need to take some actions before starting their migration.

Control Hub Org

Production Org & Data Residency

- Use Production Org for any migration

[Get Started with Cisco Webex Control Hub](#)

- Select the “best” Webex GEO for Data Residency during provisioning

- Org data, user identities, encryption keys, and user-generated content is stored in the Webex “geo-based” data centers

[Data residency in Webex App](#)

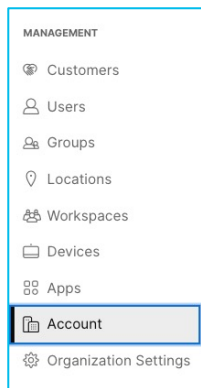
- Geos: North America/”Rest of World” or Europe
 - EU datacenters (Frankfort/Amsterdam) - EU customers
 - UK datacenters (London/Amsterdam) - still available

[Find the Data Residency Region That Maps to a Country](#)



Content Storage & Data Location

- Verify Webex Org's Data Locations (*on Account page Info tab*)



Data Type	Covered Data	Data Location
> Meetings	Recordings, transcripts, files, meeting titles, attendee names and emails, and user profiles in Webex site administration portal	United States
Messaging	Messages, files, avatars, spaces, and organization metadata	United States
Common application data	All Webex identity platform data, such as full user profiles, user groups, and other organization settings	United States

Webex Calling Region Selection

- Country of first calling location (HQ) **defines the regional platform** of the “Home” calling region
 - All signaling traffic is routed to the “Home” region
 - All calling data is stored in the “Home” region
 - Selected during Partner provisioning of a new org or when adding the first calling location to an existing org
- Country/Region **selection criteria**:
 - Where majority of the users reside (lowest delay in signaling traffic)
 - To comply with any data residency requirements
- Regional platform **cannot** be changed the after initial creation


The screenshot shows a web interface for setting up a location. At the top, there are three steps: 'Set up Location' (selected with a blue dot), 'Review', and 'Done'. Below this is the heading 'Set up your headquarter's location'. A paragraph of text explains that the country or region with the majority of users is the headquarter's location, and that calling data is stored there. It also notes that the first location is required for setup and that the address can be edited or deleted later. There are two radio button options: 'Choose from existing locations' (selected) and 'Add new'. Under 'Choose from existing locations', there is a dropdown menu labeled 'Select a Location' with a downward arrow.

Webex Calling Region Selection

Verifying “Home” Region

- Check Registrar domain of:
 - Dummy trunk
 - Existing trunk

Add Trunk



HQ-Trunk1 Successfully Created.

Visit [Route Group](#) page to add trunk(s) to a route group.
Visit [Locations](#) page to configure PSTN connection to individual locations.
Visit [Dial Plans](#) page to use this trunk as the routing choice for a dial plan.

Trunk Info

Status	Line/Port
● OFFLINE	HQ-Trunk18501_LGU@17591320.us10.bcld.webex.com
Trunk Group OTG/DTG	Authentication Information
hq-trunk13666_lgu	Record the username and password below. If you lose this information, you need to retrieve the username and reset the password.
Outbound Proxy Address	Username: <input type="text"/>
dfw09.slpcconnect-us.bcld.webex.com	Password: <input type="password"/>
Registrar Domain	
17591320.us10.bcld.webex.com	

Calling

Numbers Locations Virtual Lines **New** **Call Routing** Managed Gateways Features PSTN Service Settings Client Settings

Trunk Route Group Dial Plans Verify Call Routing Zone Trusted Network Edge

Trunk

SIP trunks provide connectivity to a customer-owned PSTN service and to an on-premises IP PBX deployment. These were previously accessed via the Local Gateway configuration page.

Name	Location	Trunk Type	In Use
HQ-Trunk1	HQ	Registration based	No

HQ-Trunk1

Trunk > Details

Status

● Offline

Trunk Type

Registration based

Device

Cisco CUBE Local Gateway

Registrar Domain

17591320.us10.bcld.webex.com

Trunk Group OTG/DTG

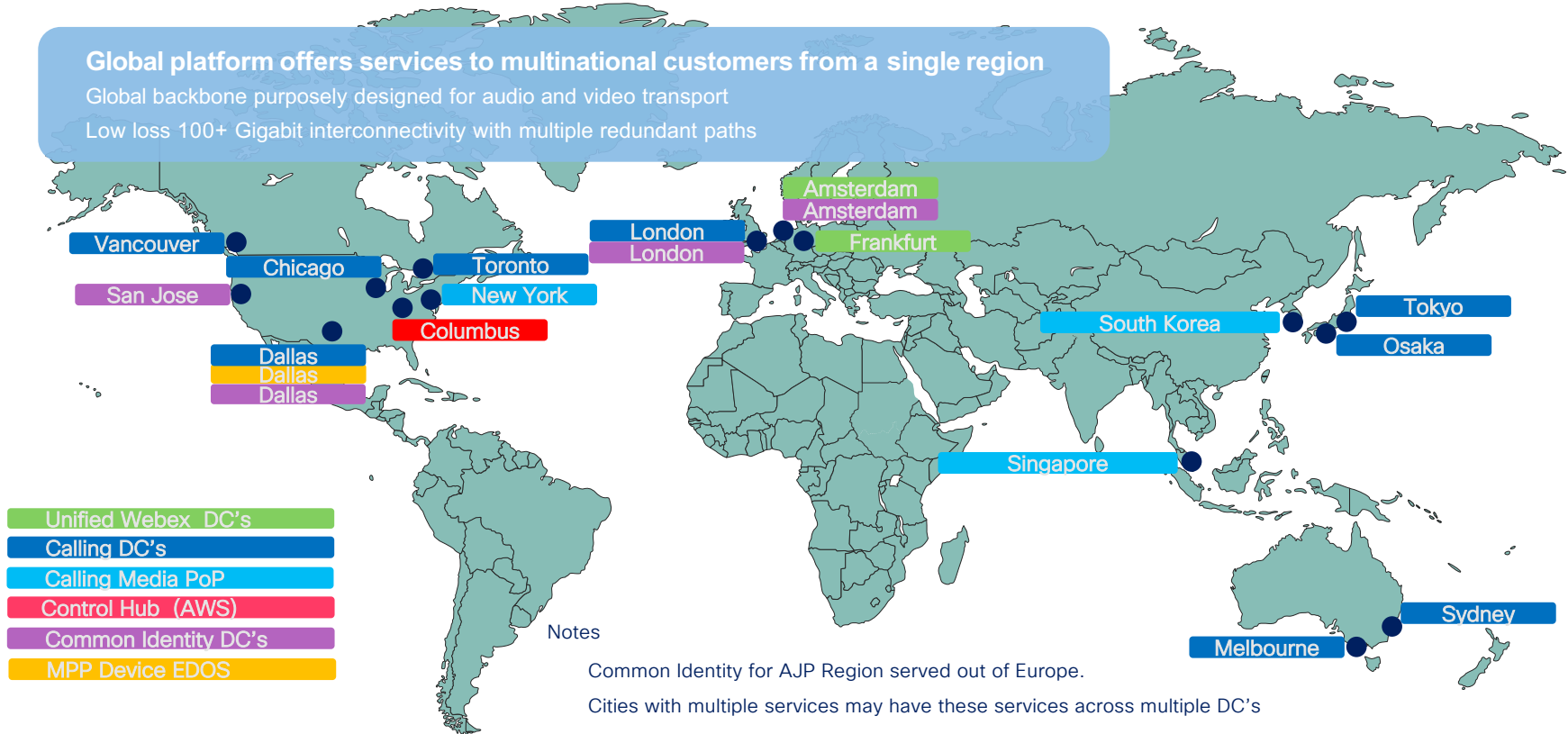
hq-trunk13666_lgu

Webex Calling global footprint

Global platform offers services to multinational customers from a single region

Global backbone purposely designed for audio and video transport

Low loss 100+ Gigabit interconnectivity with multiple redundant paths

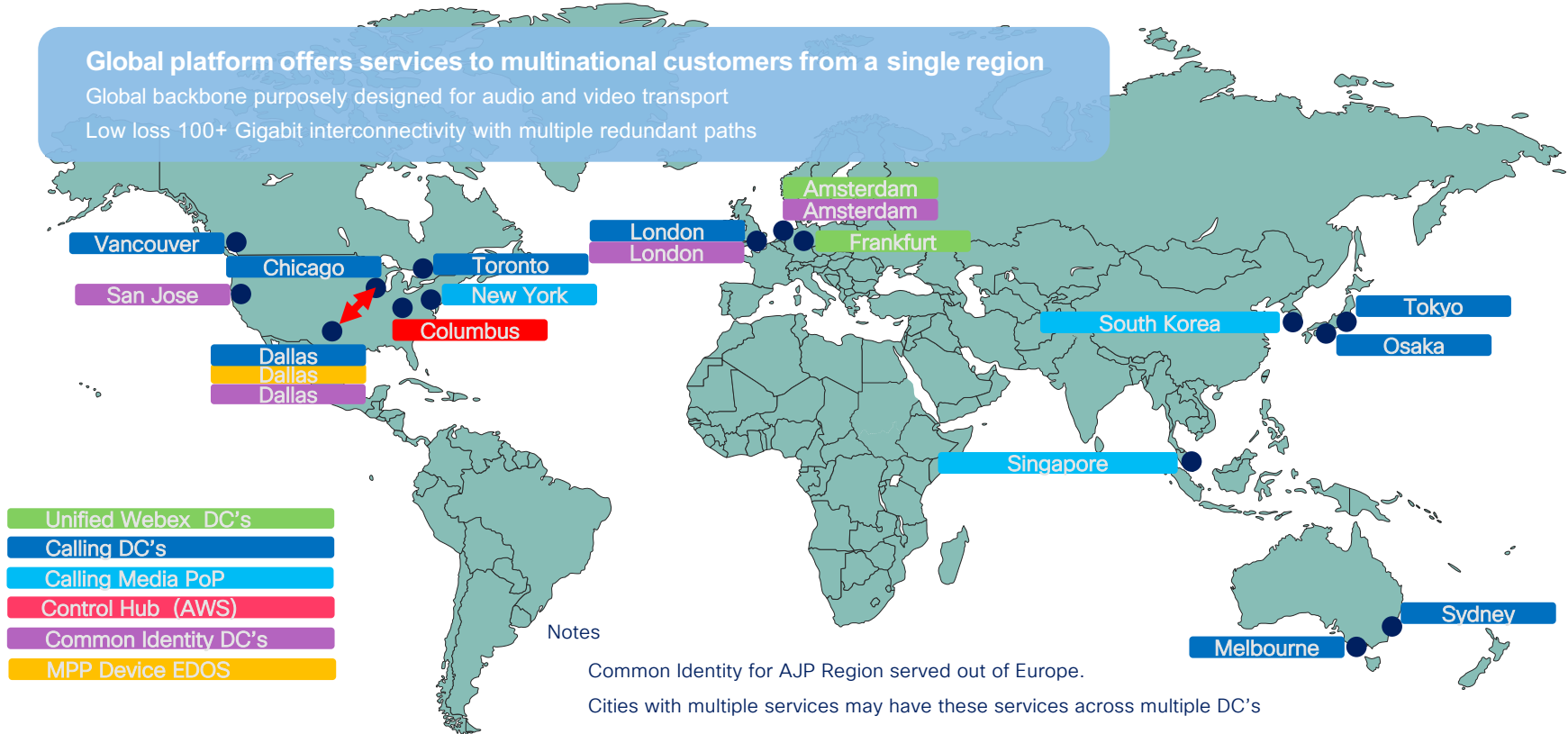


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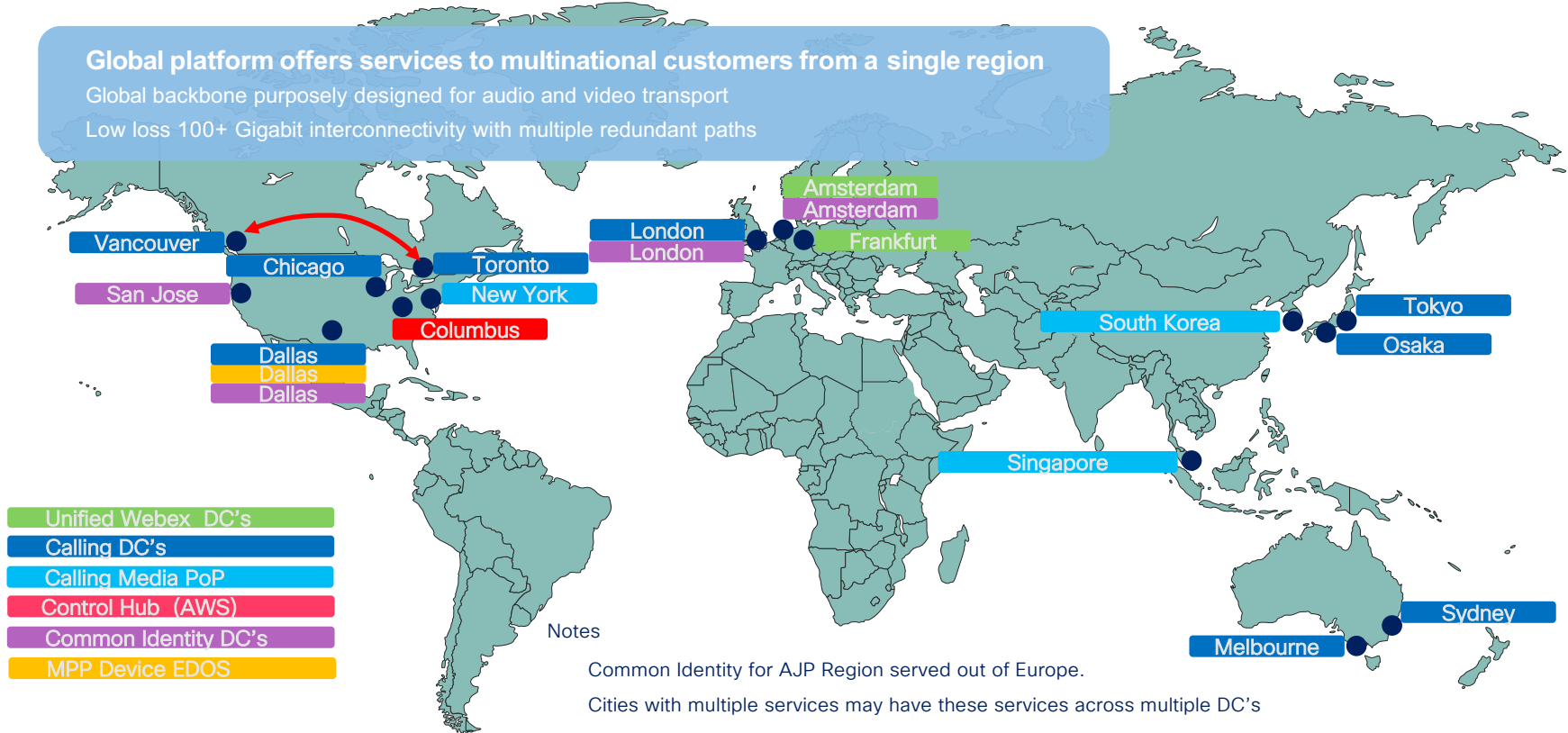


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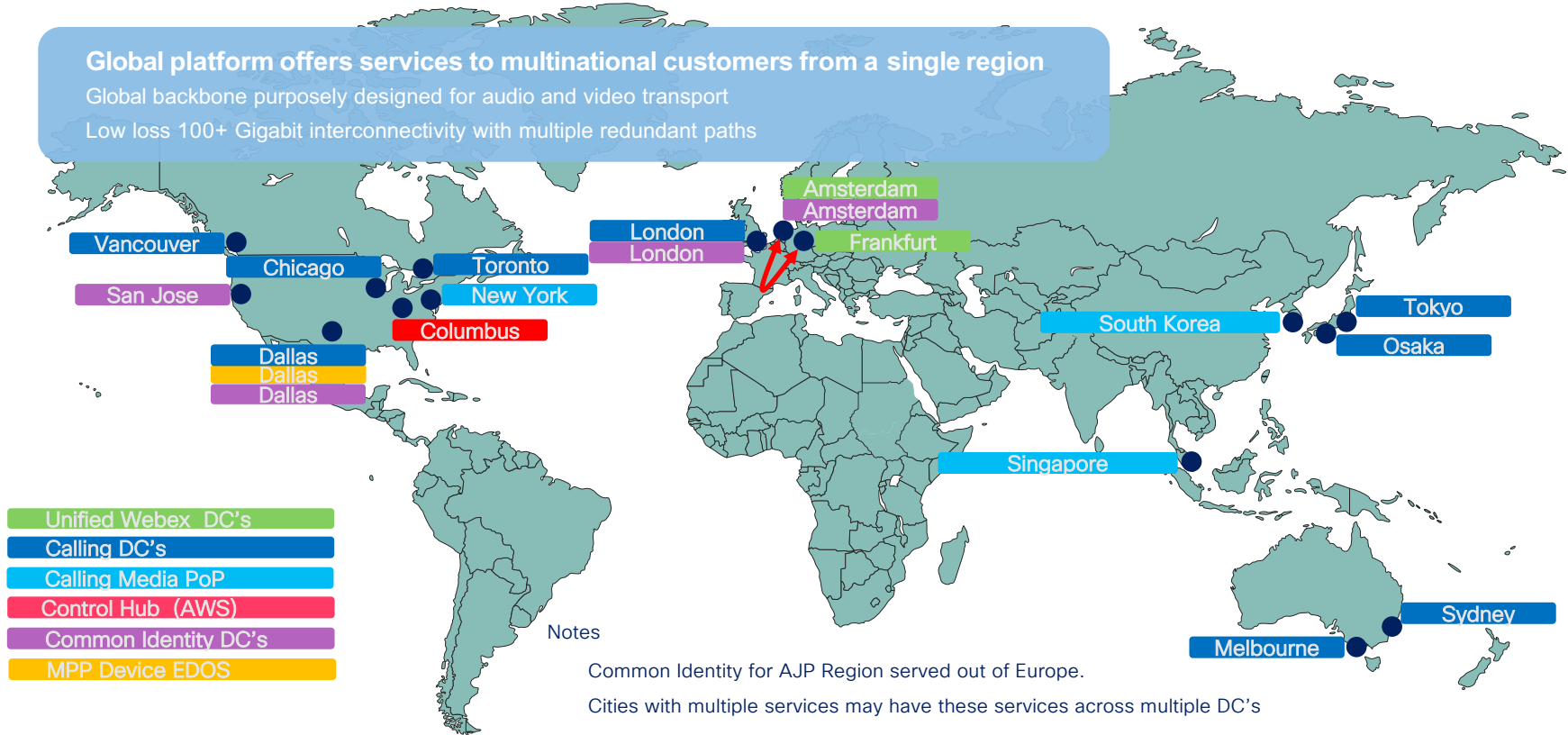


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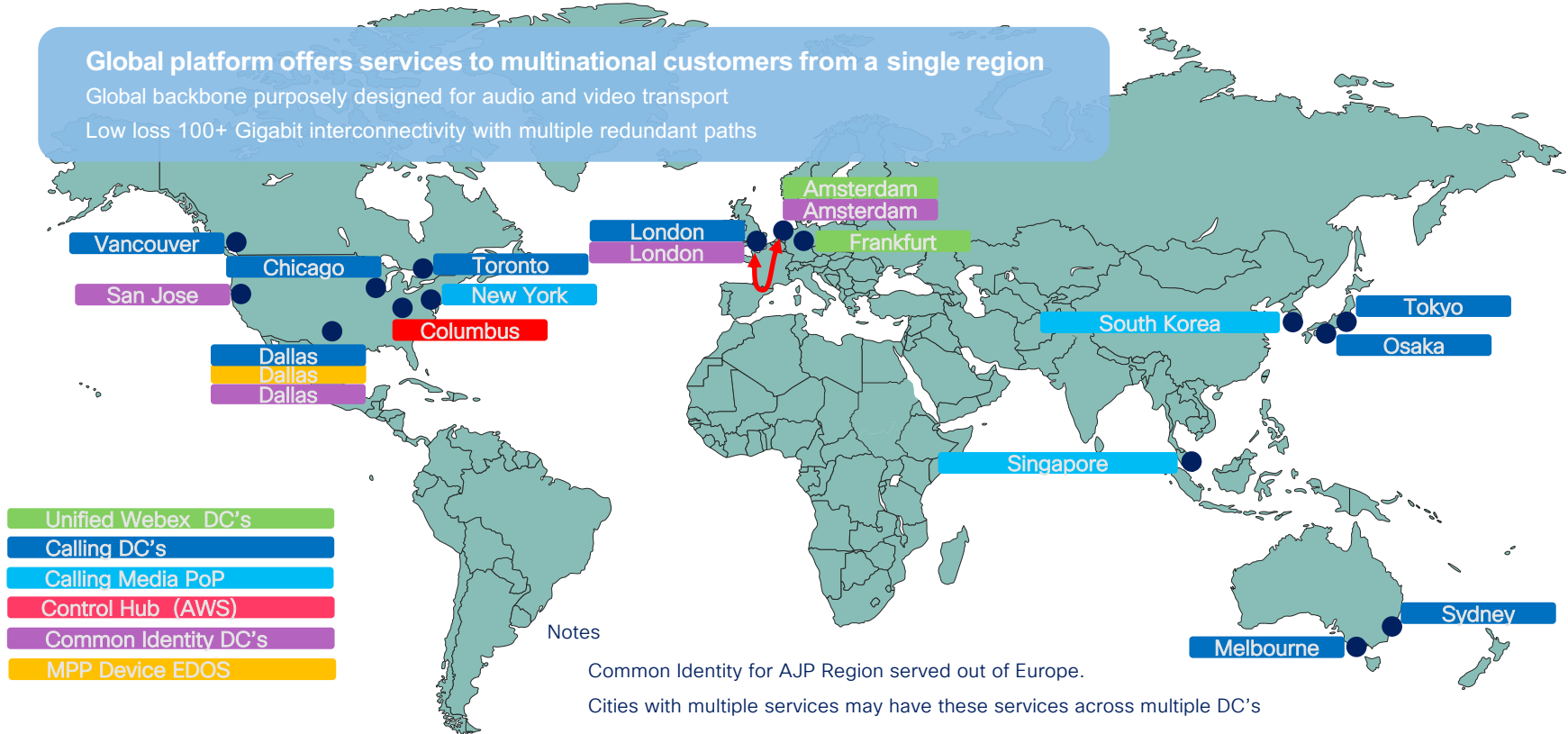


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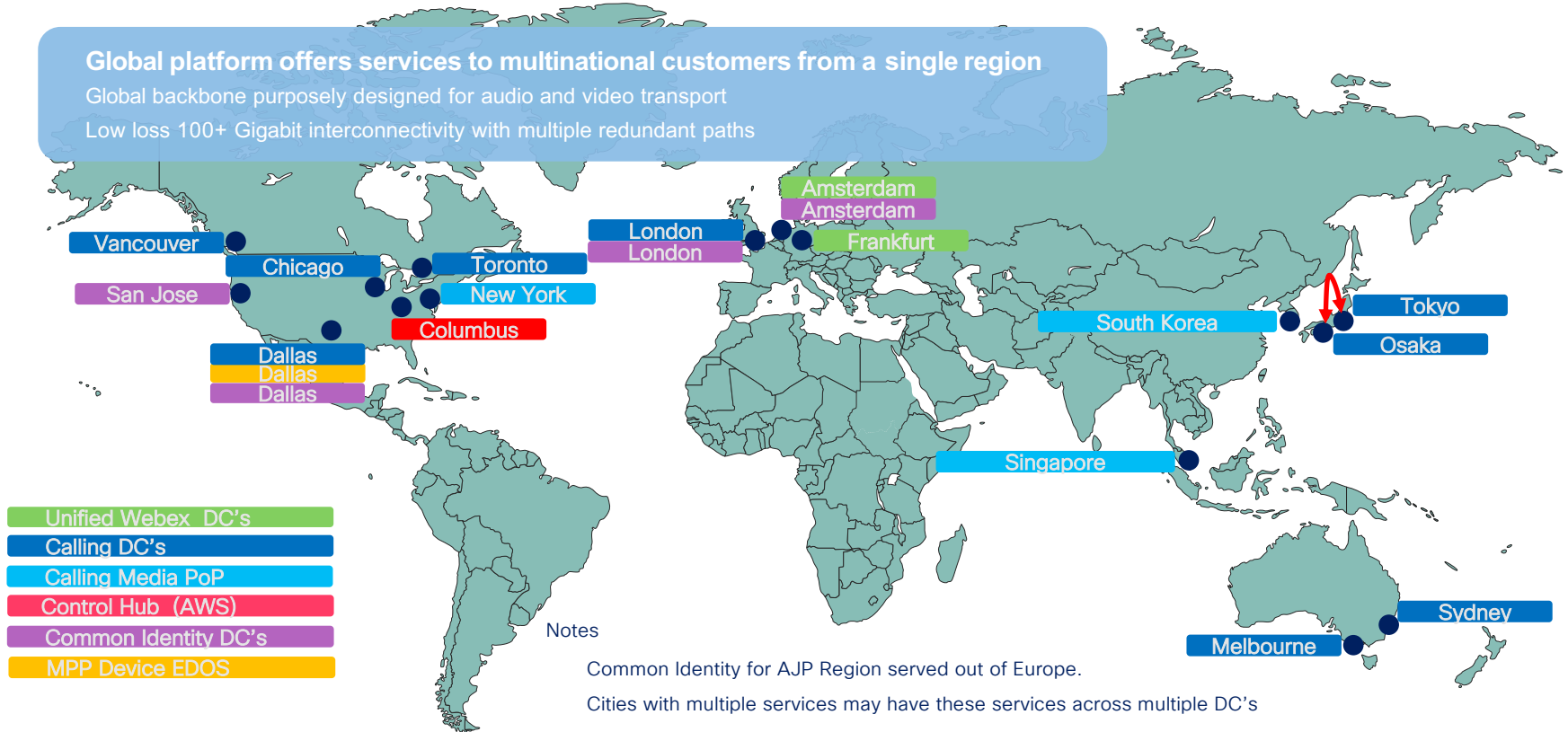


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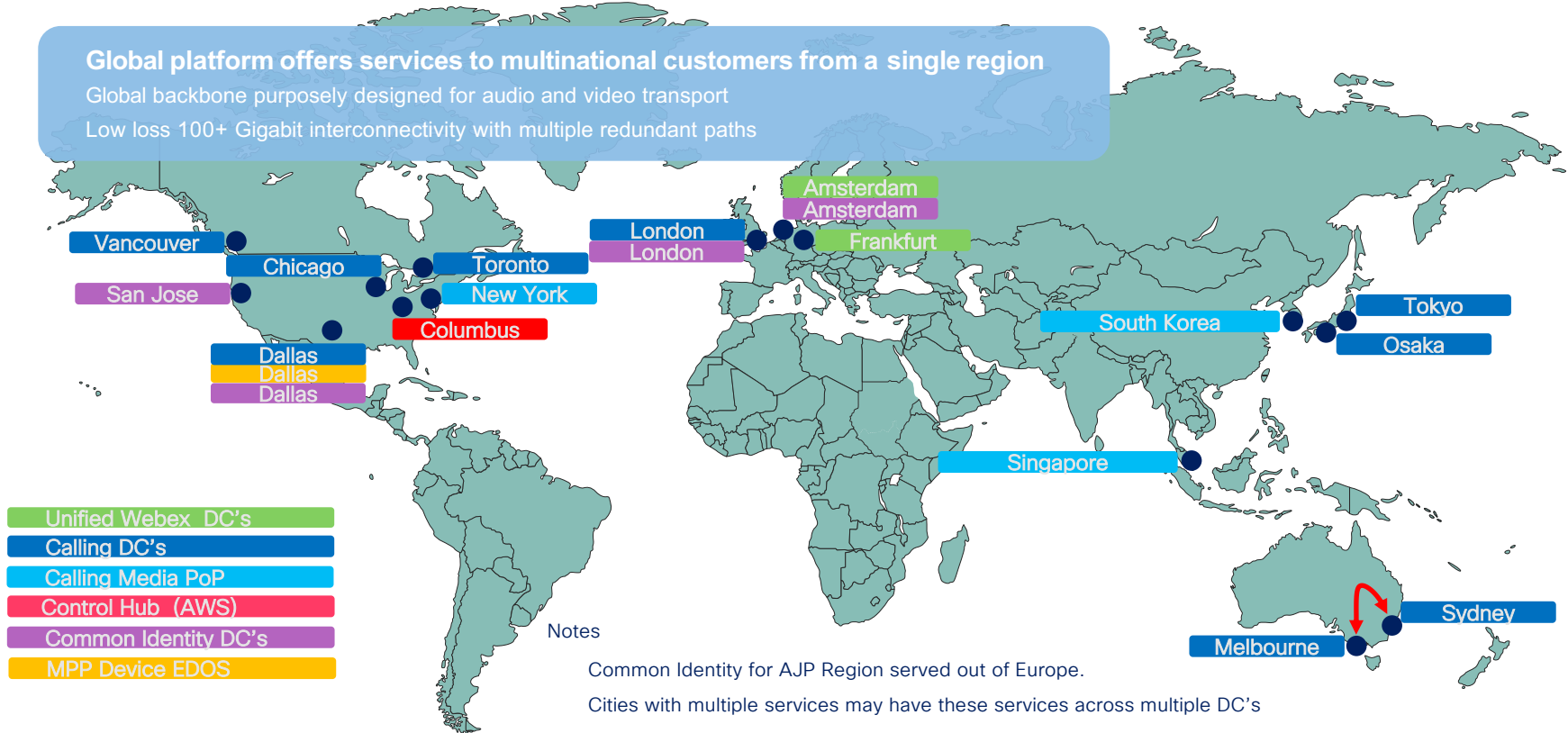


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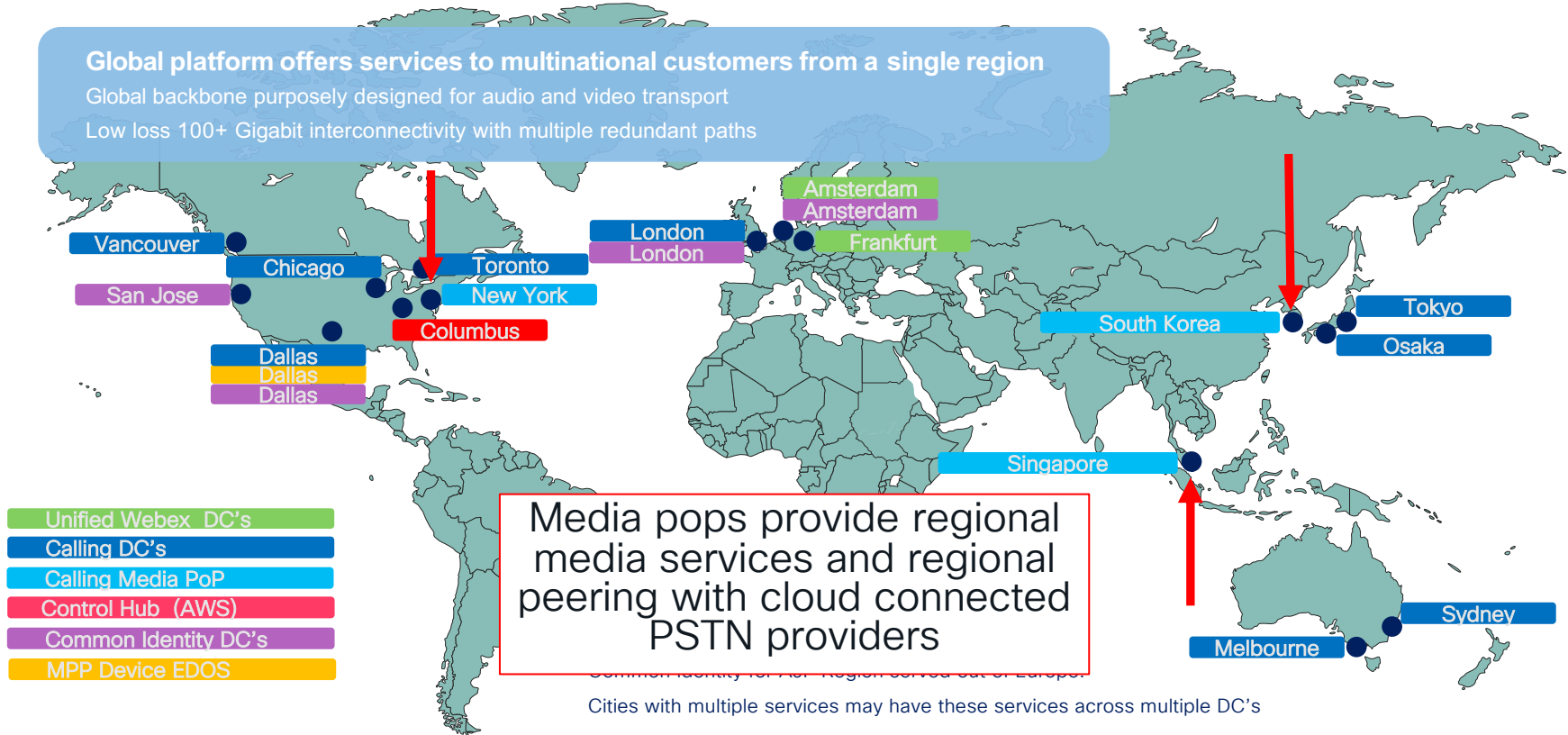


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Cities with multiple services may have these services across multiple DC's

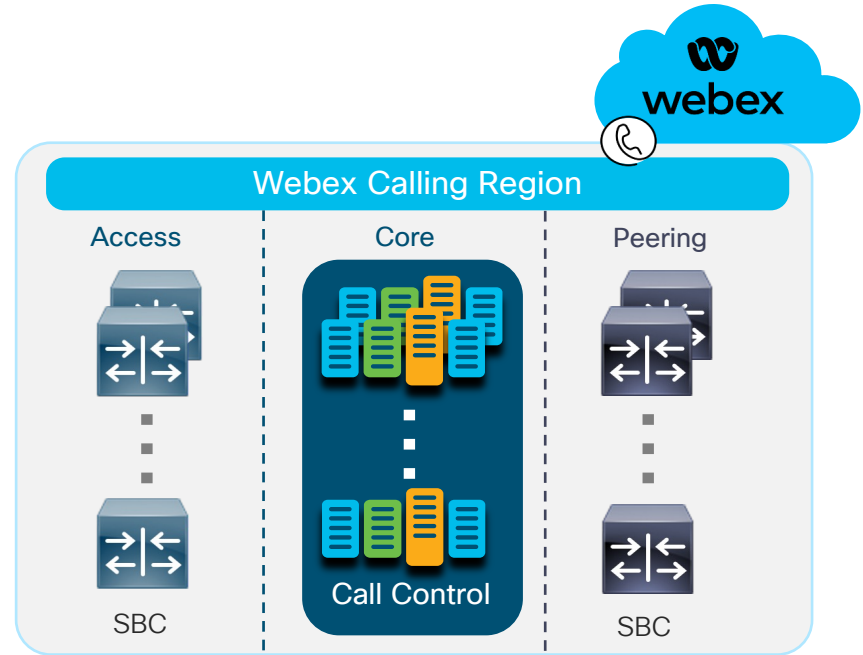
Webex Calling regional scaling

Core call control scales horizontally

- Leveraging micro services to quickly deploy/expand

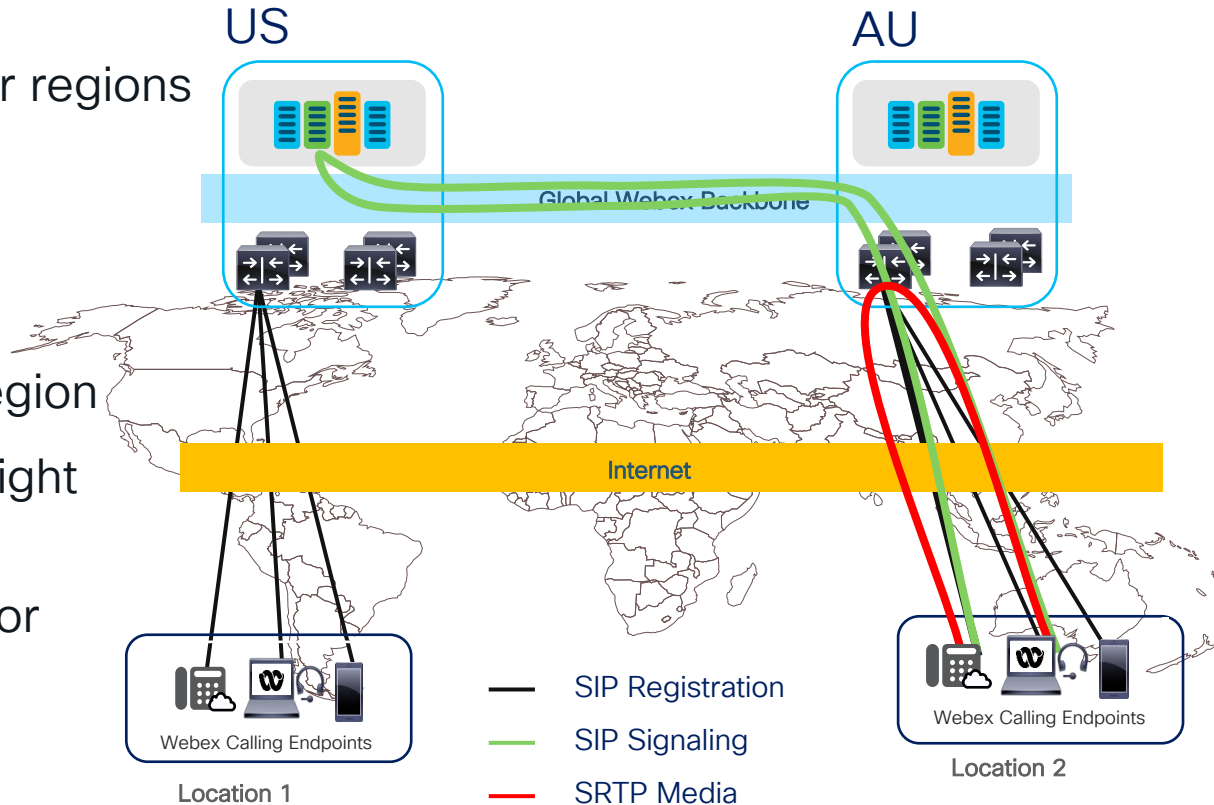
SBC Resources are separated from Access and Peering

- Access for Endpoints and Local Gateways
- Peering for CCPP integration to PSTN
- Access and Peer SBCs scale horizontally



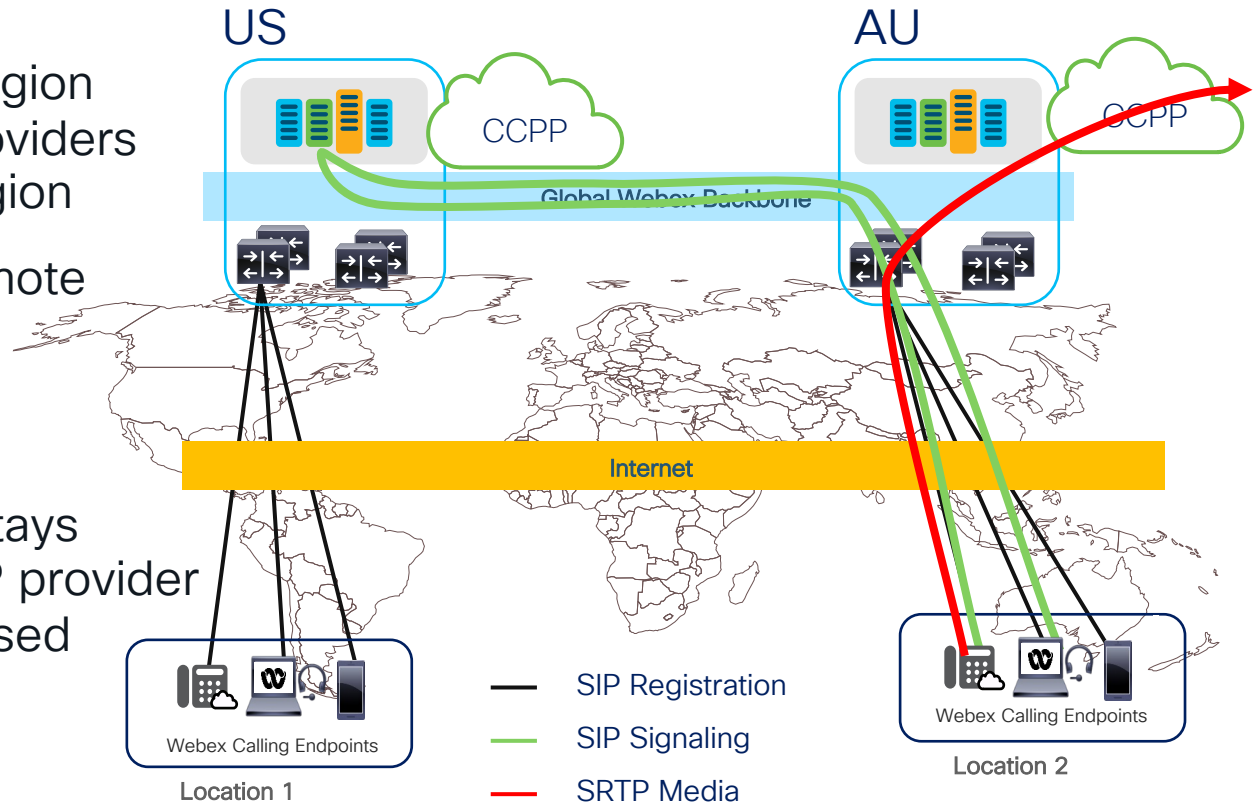
Multi-region customer: Regional media

- Access SBCs in other regions can be used
- In-region registration
- In-region media
- Signaling still inter-region
- Cut-through delay might still occur
- Media RTT not a factor



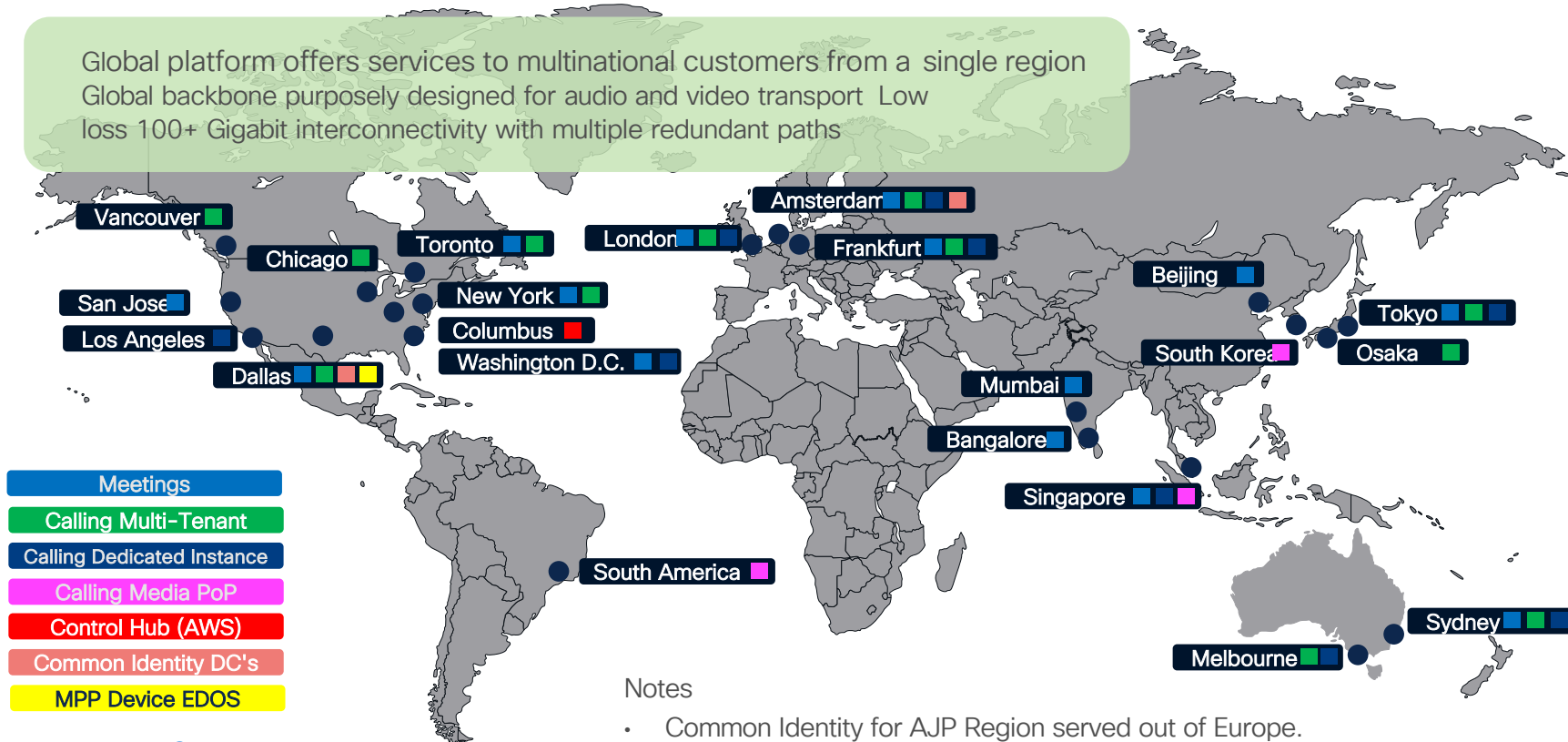
Multi-region customer: Regional media for Cloud Connected PSTN

- Locations in home region can use all CCPP providers available in home region
- New: locations in remote region can use CCPPs available in remote region
- PSTN media traffic stays within region if CCPP provider in remote region is used



Webex Global Data Center Footprint

Global platform offers services to multinational customers from a single region
 Global backbone purposely designed for audio and video transport Low loss 100+ Gigabit interconnectivity with multiple redundant paths



- Meetings
- Calling Multi-Tenant
- Calling Dedicated Instance
- Calling Media PoP
- Control Hub (AWS)
- Common Identity DC's
- MPP Device EDOS

Notes

- Common Identity for AJP Region served out of Europe.
- Cities with multiple services may have these services across multiple DC's

Learn more: [Global availability overview](#)





- MT = Webex Calling (Multi-tenant)
- DI = Dedicated Instance for Webex Calling

Webex Calling Regional Selection

Sell in countries				Webex Calling Data Centers	
Country/Region selected during Customer Org creation in Control Hub				Home region for Webex Calling customer	
• Australia	• New Zealand	• Indonesia		• AU	MT/DI: Sydney/Melbourne
• Canada				• CA	MT: Toronto/Vancouver or Dallas/Chicago/New York DI: Dallas/San Jose
<ul style="list-style-type: none"> • Austria • Bahrain • Belgium • Bulgaria • Czech Rep. • Croatia • Cyprus • Denmark • Egypt • Estonia • Finland • France • Germany 	<ul style="list-style-type: none"> • Ghana • Greece • Hungary • Iceland • Ireland • Israel • Italy • Jordan • Kuwait • Latvia • Lebanon • Lithuania • Luxembourg 	<ul style="list-style-type: none"> • Malta • Mauritius • Monaco • Netherlands • Nigeria • Norway • Oman • Pakistan • Poland • Portugal • Qatar • Reunion & Mayotte • Romania 	<ul style="list-style-type: none"> • Saudi Arabia • Slovakia • Slovenia • South Africa • Spain • Sweden • Switzerland • Turkey • UAE • Ukraine • United Kingdom 	• EMEA	(UK) MT/DI: London/Frankfurt (EU) MT: Amsterdam/Frankfurt (EU) DI: Amsterdam/Frankfurt
<ul style="list-style-type: none"> • Hong Kong • India • Japan 	<ul style="list-style-type: none"> • Malaysia • Philippines • Singapore 	<ul style="list-style-type: none"> • South Korea • Taiwan • Thailand 	• Vietnam	• JP	MT: Tokyo/Osaka DI: Tokyo/Singapore MT Media PoP South Korea

Webex Calling Regional Selection (continued)

Sell in countries				Webex Calling Data Centers	
Country/Region selected during Customer Org creation in Control Hub				Home region for Webex Calling customer	
<ul style="list-style-type: none"> • American Samoa • Anguilla • Antigua & Barbuda • Argentina • Bahamas • Barbados • Bermuda • Bolivia • Brazil • British Virgin Islands • Cayman Islands • Chile • Columbia 	<ul style="list-style-type: none"> • Costa Rica • Dominica • Dominican Republic • Ecuador • El Salvador • French Guiana • Grenada • Guadeloupe • Guam • Guatemala • Honduras • Jamaica • Martinique 	<ul style="list-style-type: none"> • Mexico • Montserrat • Nicaragua • Northern Mariana Islands • Panama • Paraguay • Peru • Puerto Rico • Saint Kits & Nevis • Saint Lucia • Saint Pierre & Miquelon 	<ul style="list-style-type: none"> • Saint Vincent & the Grenadines • Sint Maarten • Trinidad & Tobago • Turks & Caicos Islands • United States • Uruguay • US Virgin Islands 	<ul style="list-style-type: none"> • US 	<p>MT: Dallas/Chicago/New York</p> <p>DI: Dallas/San Jose</p> <p>MT: Media PoP South America</p>

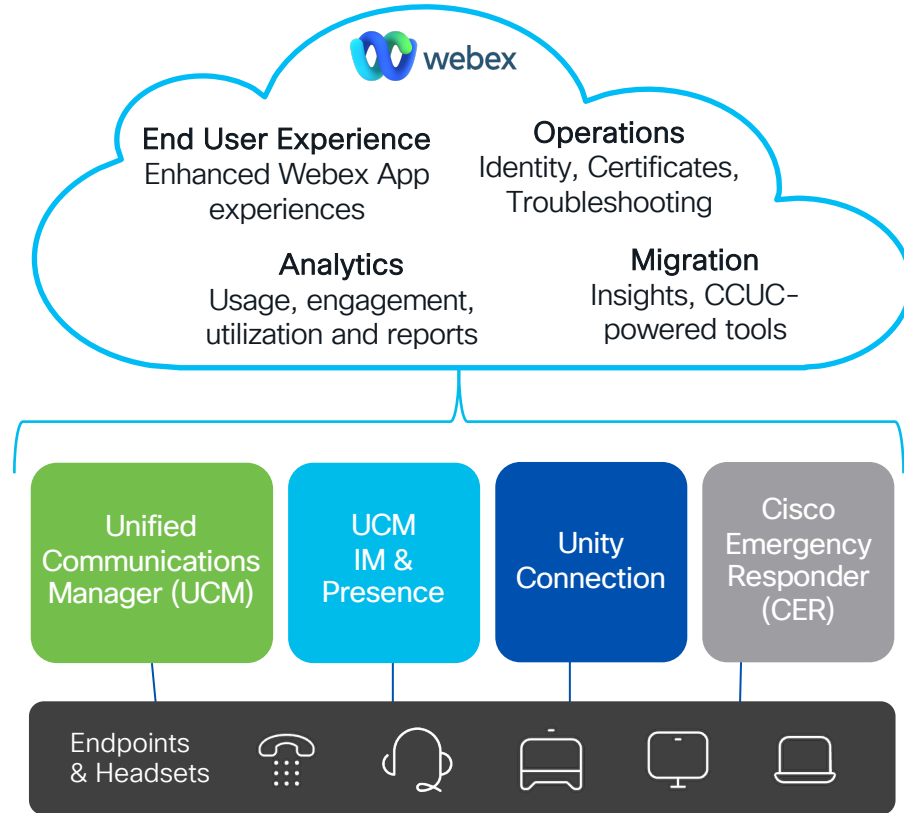
Telemetry and Deployment Insights with CCUC



Cloud Connected UC (CCUC)



- Insights into UC deployment & usage
 - Active Users, Client/OS Versions
 - Calls - Volume, Types, Experience
 - Messages - Sent, Types
 - Asset Usage
 - Call Traffic Analysis & Locations
 - Trunk Utilization
- Data for Migration planning/tools
- Analytics before/during/after migration
- Day-to-day operational capabilities



CCUC Key Features

Service Management

Changes to these settings will take a short time to take effect.

Analytics	<input checked="" type="checkbox"/>	Enabled
Directory Service	<input checked="" type="checkbox"/>	Enabled
Certificate Management	<input checked="" type="checkbox"/>	Enabled
Operational Metrics	<input checked="" type="checkbox"/>	Enabled
Webex app Provisioning for Unified CM Calling	<input type="checkbox"/>	Disabled
Deployment Insights	<input checked="" type="checkbox"/>	Enabled
Borderless CTI	<input checked="" type="checkbox"/>	Enabled
Rich Presence	<input checked="" type="checkbox"/>	Enabled

Analytics
(call quality, traffic analysis, trunk usage, device usage)

Directory Service
(UCM to WxIdentity for AzureAD etc.)

Certificate Management
(central view/distribute across apps/clusters)

Ops Dashboard with WebRTMT
(near-real-time view in CH not thick-client of last hour's call status & audio quality for top 5 UCM clusters)

Troubleshooting
(CX CSA integration for SDL logs in CH)

Also requires Webex Serviceability Connector

Touchless WxApp (auto-)provisioning
(enduser self-provision via just login to WxApp with UCM calling)

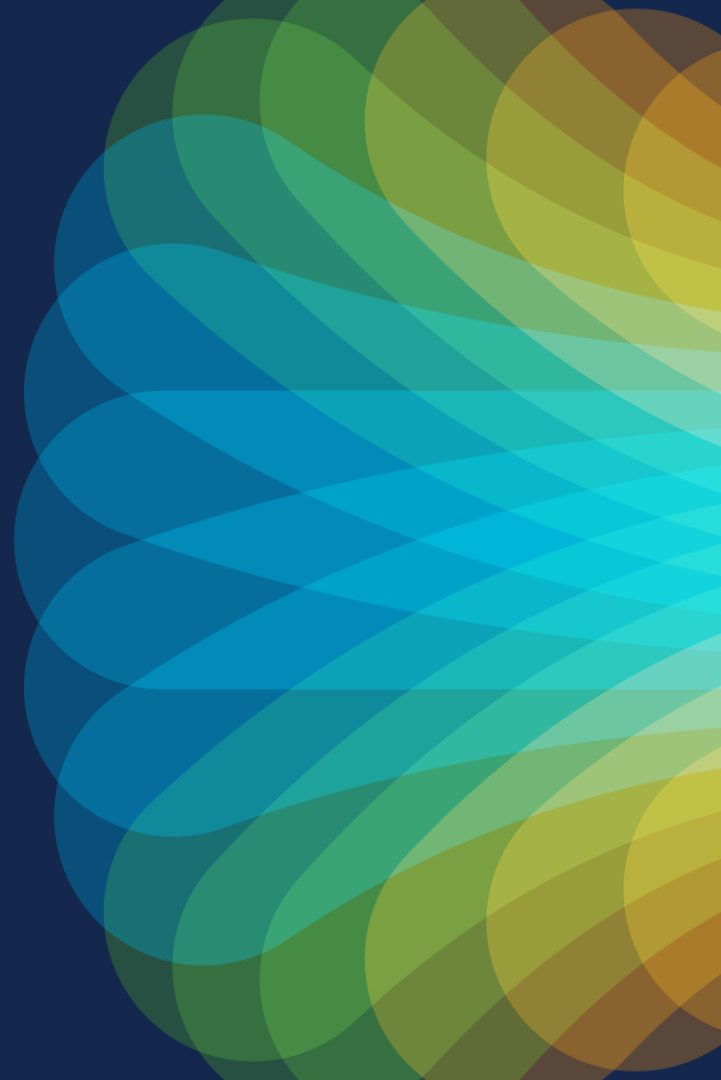
"Migration" to Webex
(understand Jabber usage, enable wizards under CH->Migration)

Borderless CTI
(enduser controls IP phone via WxApp CTI over MRA not VPN)

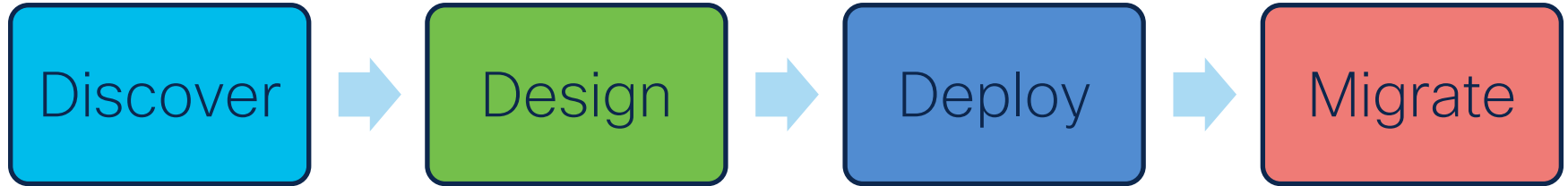
Rich Presence
(UCM-registered in-call phone status synced to WxApp presence)

- [What's New in Webex Cloud-Connected UC](#)
- [Webex Cloud-Connected UC](#)
- [Analytics for Your Webex Cloud-Connected UC](#)

Migration Process



General Process



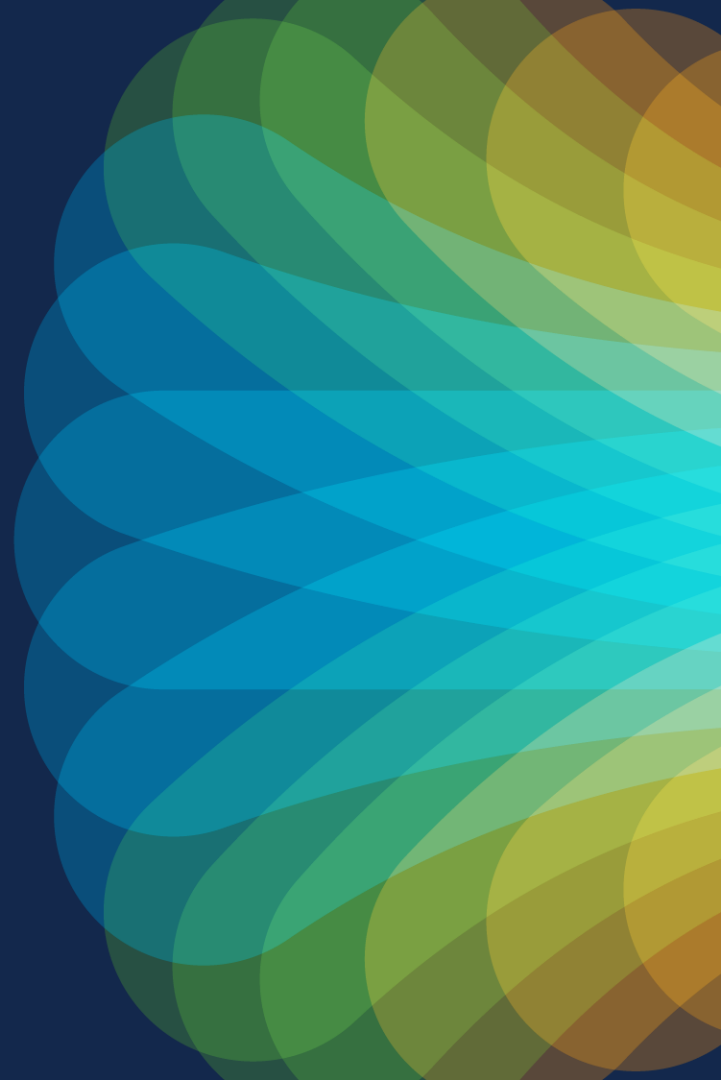
- Requirements
- Config assessment
- Inventory
 - users, devices, locations, ...
- Feature utilization
- Integrations
- Validate network requirements

- Network requirements
- Feature mapping
- Migration batches
- Integrations
- Dial plan

- Infrastructure setup
- Base configuration
- Interworking setup
- Licensing

- Users
- Devices
- Features
- PSTN porting
- Acceptance test

Discover



Analyze Existing Unified CM Setup

- Static analysis
 - Review configuration in admin GUI
 - Config export (bulk export)
 - Config export (AXL), thin/thick
 - CCUC
 - 3rd party tools
- Dynamic analysis
 - hard, based on trace analysis (SDL files)
 - UCM doesn't offer much directly
 - CCUC

Analytics – Usage Statistics

- Gather insights of existing installation
- Cloud Connected UC
 - Call volume
 - Registered endpoints
 - (CAC) locations
 - Trunk utilization
- RTMT
- ...

Unified CM Data Extraction Options

- AXL – Administrative XML
 - SOAP based provisioning API
- BAT – Bulk Administration Tool
 - CSV based
- Config Export
 - Single file Unified CM config export
- Third party tools

AXL

- The **Administrative XML Web Service (AXL)** is an XML/SOAP based interface that provides a mechanism for inserting, retrieving, updating and removing data from the Unified Communication configuration database.
- <https://developer.cisco.com/site/axl/>
- Thick AXL – API defines specific objects that can be created, removed, queried, or updated
- Thin AXL – Provides a mechanism to perform direct SQL queries / updates

AXL Challenge: Interface, Object Deserialization

- AXL is an API → coding required
- Steep learning curve for newcomers
- SOAP defines interface signature (endpoint, parameters, return) in WSDL (Web Service Definition Language) files
- Idea: automatic interface and API layer creation based on WSDL
- Reality
 - Trying to avoid interface creation
 - Manual SOAP message templates
 - Tools like SoapUI simplify this.
 - Recommended: use SOAP client like Zeep for Python

```
<operation name="addPhone">
  <soap:operation soapAction="CUCM:DB ver=11.5 addPhone" style="document"/>
  <input>
    <soap:body use="literal"/>
  </input>
  <output>
    <soap:body use="literal"/>
  </output>
  <fault name="fault">
    <soap:fault name="fault" use="literal"/>
  </fault>
</operation>

<operation name="addPhone">
  <input message="s0:addPhoneIn"/>
  <output message="s0:addPhoneOut"/>
  <fault name="fault" message="s0:AXLError"/>
</operation>
```



Solution: Zeep – Python SOAP Client

- “A fast and modern Python SOAP client”
- Python module to easily consume SOAP APIs
- “Zeep” (Dutch) = SOAP
- Consumes AXL WSDL and creates the Python interfaces

```
92 # Create the Zeep service binding to AXL at the specified CUCM
93 service = client.create_service( '{http://www.cisco.com/AXLAPIService}AXLAPIBinding',
94                                 f'https://{os.getenv("CUCM_ADDRESS")}:8443/axl/' )
95
96 # Create a simple phone
97 # Of note, this appears to be the minimum set of elements required
98 # by the schema/Zeep
99 phone = {
100     'name': 'CSFTESTPHONE',
101     'product': 'Cisco Unified Client Services Framework',
102     'model': 'Cisco Unified Client Services Framework',
103     'class': 'Phone',
104     'protocol': 'SIP',
105     'protocolSide': 'User',
106     'devicePoolName': 'Default',
107     'commonPhoneConfigName': 'Standard Common Phone Profile',
108     'locationName': 'Hub_None',
109     'useTrustedRelayPoint': 'Default',
110     'builtInBridgeStatus': 'Default',
111     'packetCaptureMode': 'None',
112     'certificateOperation': 'No Pending Operation',
113     'deviceMobilityMode': 'Default'
114 }
115
116 # Execute the addPhone request
117 try:
118     resp = service.addPhone( phone )
119 except Exception as err:
120     print( f'\nZeep error: addPhone: { err }' )
121     sys.exit( 1 )
```

Examples: <https://github.com/CiscoDevNet/axl-python-zeep-samples>

Simple Use Case: Export Tables from Unified CM

- AXL can be used to execute SQL statements to export data from Unified CM
- Data dictionary: <https://developer.cisco.com/docs/axl/#!14-cucm-data-dictionary>

```
with AXLHelper(ucm_host=axl_host, auth=(axl_user, axl_pass), verify=False) as axl:
    r = axl.sql_query(f'select * from {args.table}')
    csv_name = f'{args.table}.csv'
    with open(csv_name, mode='w', newline='') as output:
        # take keys of 1st record as field names
        writer = csv.DictWriter(output, fieldnames=list(r[0]))
        writer.writeheader()
        list(map(writer.writerow, r))
    print(f'wrote {len(r)} records to {csv_name}')
```

AXL helper: <https://github.com/jeokrohn/ucmaxl>

Tool: <https://github.com/jeokrohn/migrationapi>

Simple Use Case: Export Tables from Unified CM

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```
migrationapi — pipenv shell ▸ zsh — 80x24
((migrationapi) jkrohn@JKROHN-M-942M migrationapi % ./export_to_csv.py numplan
wrote 663 records to numplan.csv
((migrationapi) jkrohn@JKROHN-M-942M migrationapi %
```

```
with AXLHelper(ucm_host=axl_host, auth=(axl_user, axl_pass), verify=False) as axl:
    r = axl.sql_query(f'select * from {args.table}')
    csv_name = f'{args.table}.csv'
    with open(csv_name, mode='w', newline='') as output:
        # Write 1st record as field names
        DictWriter(output, fieldnames=list(r[0]))
        output.write('header()')
        for r in r[1:]:
            output.writerow(r)
    print(f'{len(r)} records to {csv_name}')
```

AXL helper: <https://github.com/jeokrohn/ucmaxl>

Tool: <https://github.com/jeokrohn/migrationapi>

Simple Use Case: Export Tables from Unified CM

- AXL can be used to execute SQL statements to export data from Unified CM

- Data dictionary

[data-dict](#)

```

((migrationapi) j
wrote 663 records
(migrationapi) j
    
```

A	B	C	D	E	F	G	H	I	J	K
pkid	fkroutepartition	dnorpattern	tkpatternusage	cfbdestination	cfndestination	fkroutefilter	tknetworklocation	fkdigitdiscardinstruction	prefixdigitsout	blockenable
00178ae9-e9d8-5e27-9af6-a7c2ee18ad14	a443a120-5f3e-eb48-59c1-f2ca41041d48	\+14085554121	2	0	0	0	0			f
011df444-a734-2706-ba84-2f61ed9fca42	a443a120-5f3e-eb48-59c1-f2ca41041d48	\+19725555004	2	0	0	0	0			f
014383f2-75bd-e3c0-7a4e-461d1649ecf6	a443a120-5f3e-eb48-59c1-f2ca41041d48	\+14085554131	2	0	0	0	0			f
02430da5-7f85-456f-3e24-fcb0316ec24f	a443a120-5f3e-eb48-59c1-f2ca41041d48	\+19725555033	2	0	0	0	0			f
026c8c5a-9ec6-0e88-ad2f-bd312c86d833	a443a120-5f3e-eb48-59c1-f2ca41041d48	\+19195551153	2	0	0	0	0			f
03186fc1-e9e0-4ea2-8ce8-646232da6197	a443a120-5f3e-eb48-59c1-f2ca41041d48	1024	2	0	0	0	0			f
0394839e-91f5-d4d4-8b81-02c637daf14	a443a120-5f3e-eb48-59c1-f2ca41041d48	\+19725555022	2	0	0	0	0			f
03a985e0-c6b4-963b-3c10-6bc9814d09cb	a443a120-5f3e-eb48-59c1-f2ca41041d48	\+19725555006	2	0	0	0	0			f
0454bfe4-6db9-d848-7d15-30c72897fa46	a443a120-5f3e-eb48-59c1-f2ca41041d48	\+19725555134	2	0	0	0	0			f
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0a021f05-c801-d28e-139d-1740a896ddb2	a443a120-5f3e-eb48-59c1-f2ca41041d48	\+14085554122	2	0	0	0	0			f

AXL helper: <https://github.com/jeokrohn/ucmaxi>

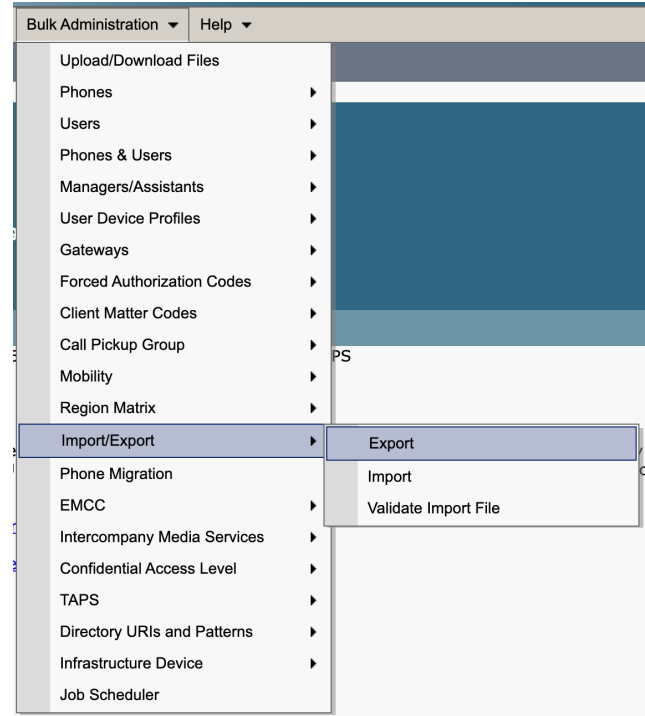
Tool: <https://github.com/jeokrohn/migrationapi>

Bulk Administration Tool (BAT)

- Main focus: simplify Unified CM provisioning
- .. but for migrations we are actually looking **for the reverse**
- Limited export capabilities: Users, Devices, User Device Profiles
- But then there is also config import/export

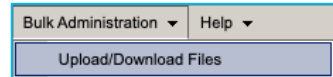
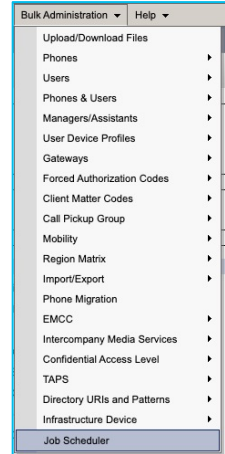
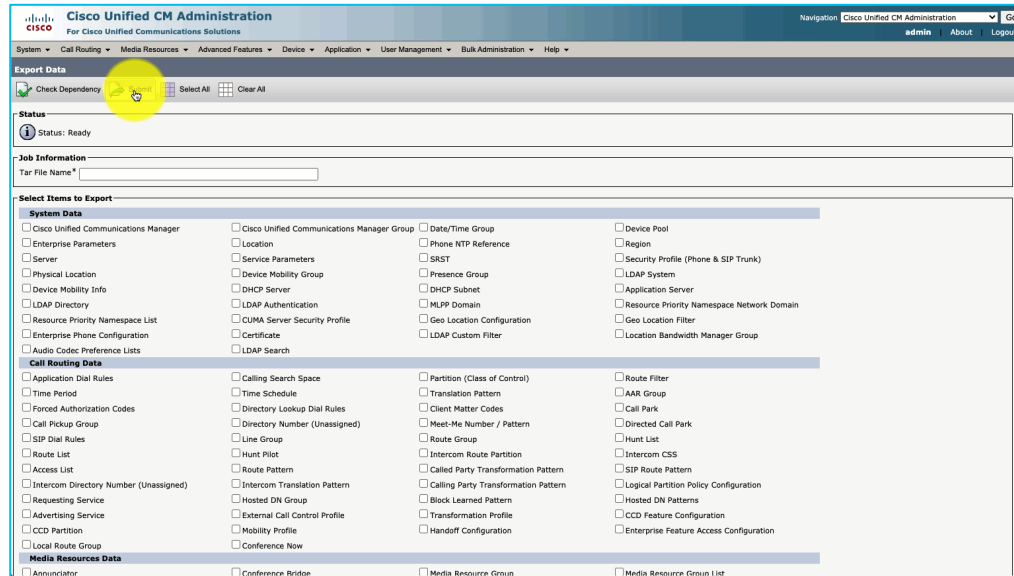
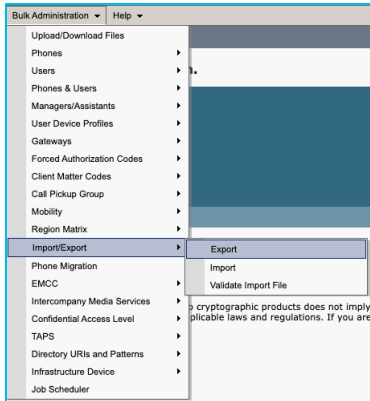
Config Export

- Specific BAT option
- Allows full or partial Unified CM config export
- Result: TAR file with 172 files
 - One CSV for each config object type
- Examples
 - callpark.csv
 - callpickupgroup.csv
 - directedcallpark.csv
 - enduser.csv
 - huntlist.csv
 - huntgroup.csv
 - ...



Unified CM Data Export

- Initiate Unified CM config export
- Wait for job to complete
- Download files



Config Export Tar and CSV Files

- Great option to get insights into Unified CM config quickly
 - Good fit for feature migration: identify shared lines, hunt pilots, call pickups, ...
- Basis for CSV based provisioning of Webex Calling
- Challenge: large column count in some CSVs
 - Flat DB schema
 - phone.csv has the same 122 columns for each line on the phone
 - ... and if there is a single phone with 11 lines then this alone leads to **1342 columns**
- Manual analysis can/will be painful
- Automation
 - Excel: import, hide columns, filter operations, ...
 - programmatic

Working with CSV Files using Python

- Csv: Python standard module
 - DictReader: parse CSV file and read into Python dictionaries
- But then, how to process the data?
 - List of dicts directly
 - Pandas: Python data analysis tool (think of it as programmatic Excel)
 - Parse CSVs into Python objects and “unflatten” CSVs (e.g. create line objects from data in phone.csv)

Example: Working with CSV Files using Python

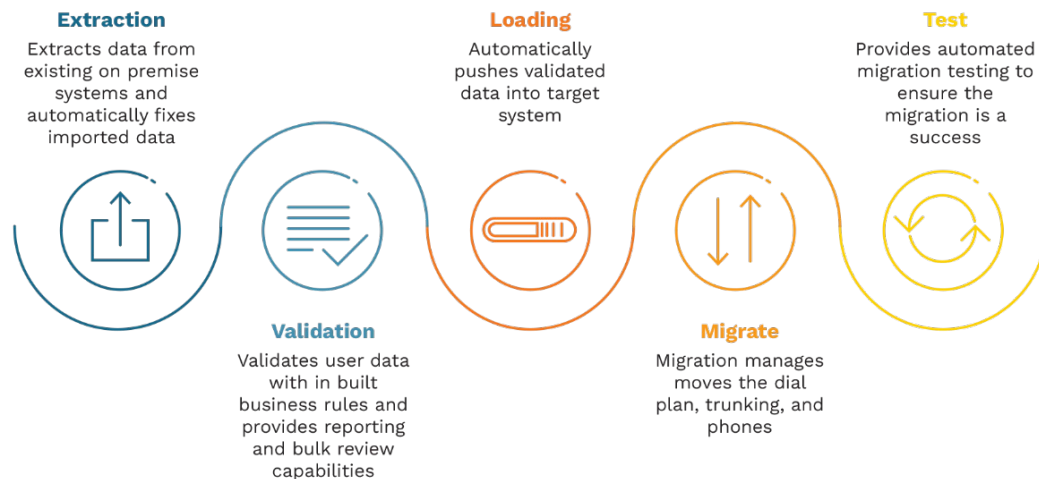
- GitHub repository: <https://github.com/jeokrohn/ucmmigration>
- ucmexport.Proxy implements "pythonic" way to access object within a tar file.
 - Not the most memory efficient 😊
 - ... but plays nicely with Python IDEs (auto completion, interactive debugger, ...)
- Proxy also has logic to determine phone ownership, map DN/partition to user, ...



Feature Summary

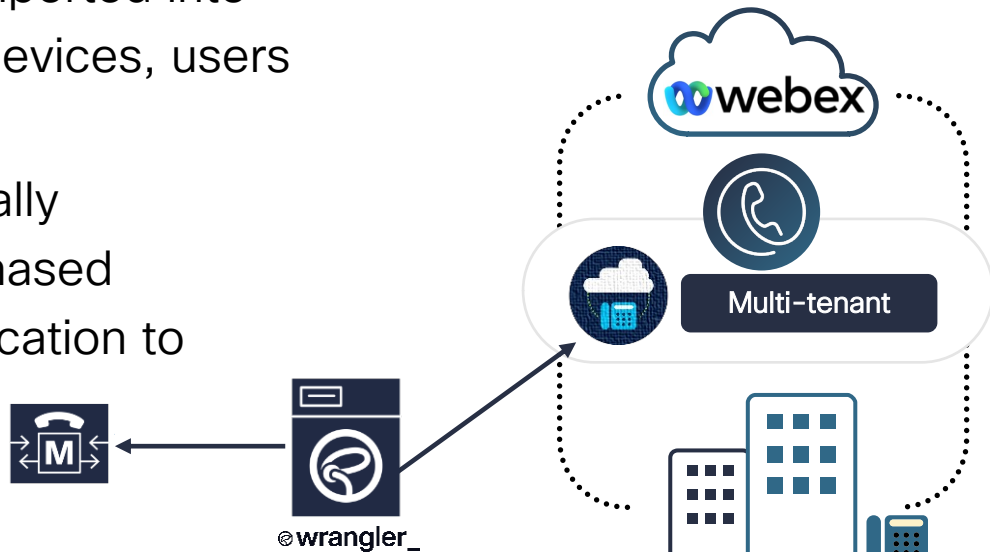
- Data extraction v10.5+ from CUCM/UCXN
- Data Validation
 - Normalization
 - Transformation
 - Correction
- Configuration mapping to WbC-MT
- Validation issues for configuration changes
- Data load via APIs
- Multiple source clusters
- Phased Migration in batches
 - Inter site dependency reporting
- Dial plan analysis and connection

Migration Process – Automated Webex Calling Migration



Data Extraction

- Configuration is imported from the source and target organisation and imported into wrangler_ including all lines, devices, users and dial plan
- Configuration can be periodically rediscovered if required for phased migrations using change notification to minimize data freezes



Tuki WxC Automated Migration

Connect

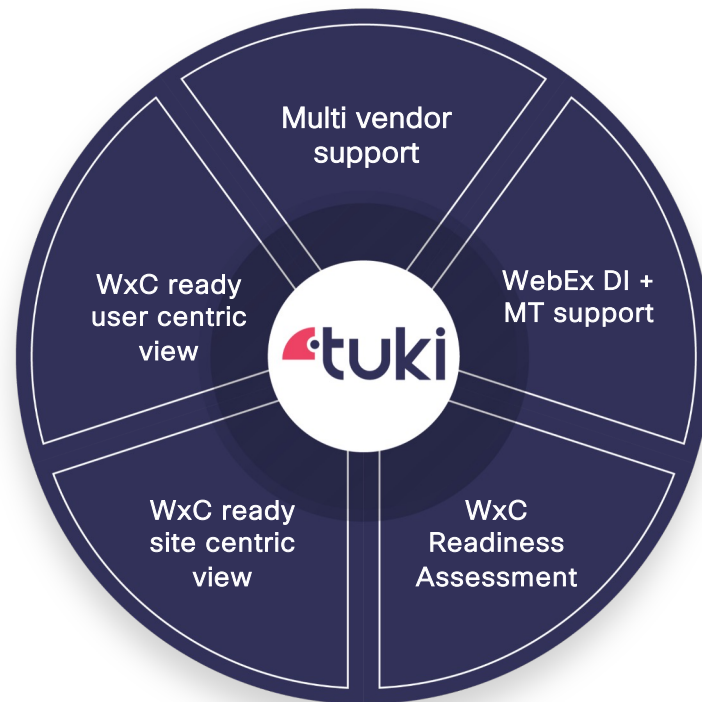
- Partner level Multi-Tenant Migration dashboard
- Online/Offline data collection options
- Multiple third-party vendor support
- Simplified customer onboarding

Map

- Webex Readiness Assessment
- WxC MT Ready User centric view
- WxC MT Ready Site centric view
- Migration rules

Migrate

- Automated User Centric Migration
- Custom batches migration
- Error handling and fixing
- Phased migration support
- UC features migration (AA, VM, Hunts, Pickups, Call Parks etc)
- Migration to Webex DI & MT

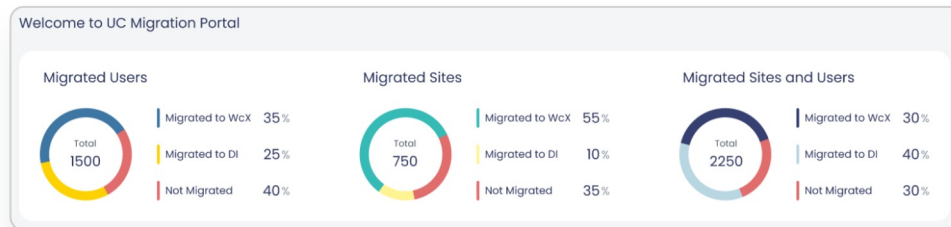


Connect

Partner level Multi-Tenant Migration dashboard

Phased Migration Support

Online/Offline data collection options

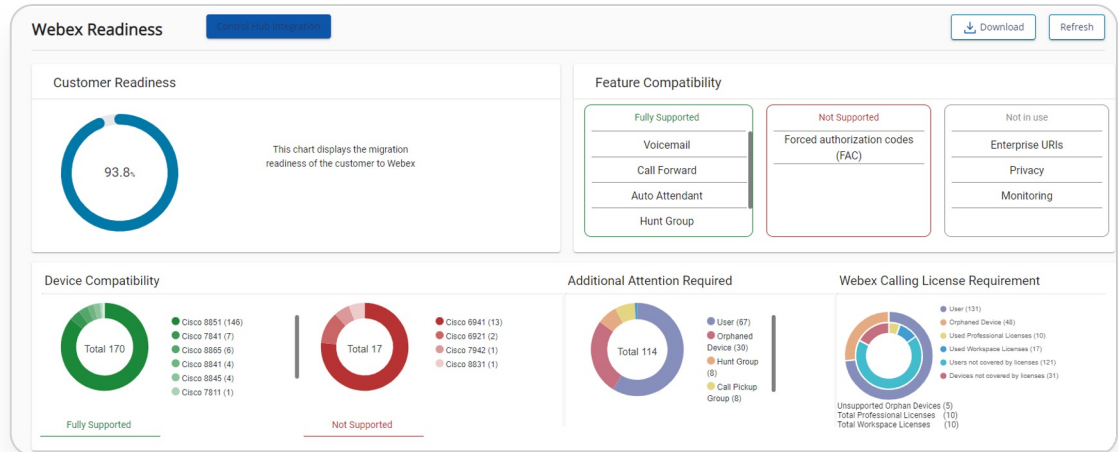


Map WebEx Readiness Assessment

WxC customer migration readiness

License requirement calculation

Customer engagement tool for migration planning



User Migration Batches

Migration Batches

Which users have to be migrated together?

Migration Batches

Which users have to be migrated together?

- Dependencies between Users
 - Monitoring each other on BLFs
 - Used in the same hunt pilot
 - Shared lines
 - Call pick-up
 - Using the same call-park numbers
 - Intercom
 - Shared DN on phones owned by different users
 - ...
- Need to make sure that users w/ dependencies are migrated together
- This information is available in the Unified CM config export
- .. But somewhat hard to extract

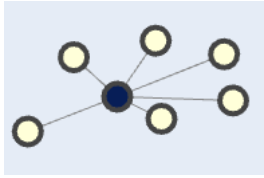
Example: User Relations based on Hunt Pilots

- Start with huntpilot.csv
- Look for "HUNT LIST 1" column; this is a reference to "NAME" in huntlist.csv table
- In huntlist.csv looks at "LINE GROUP x" columns; reference to "NAME" in linegroup.csv
- Collect DNPs from "DN OR PATTERN x" and "ROUTE PARTITION x" columns in linegroup.csv
- Find phones with these DNP in phones.csv; look at "Directory Number X" and "Route Partition X" columns
- Look at "Owner User ID" and "User ID x" columns to collect user IDs
- → Definitely needs to be done programmatically

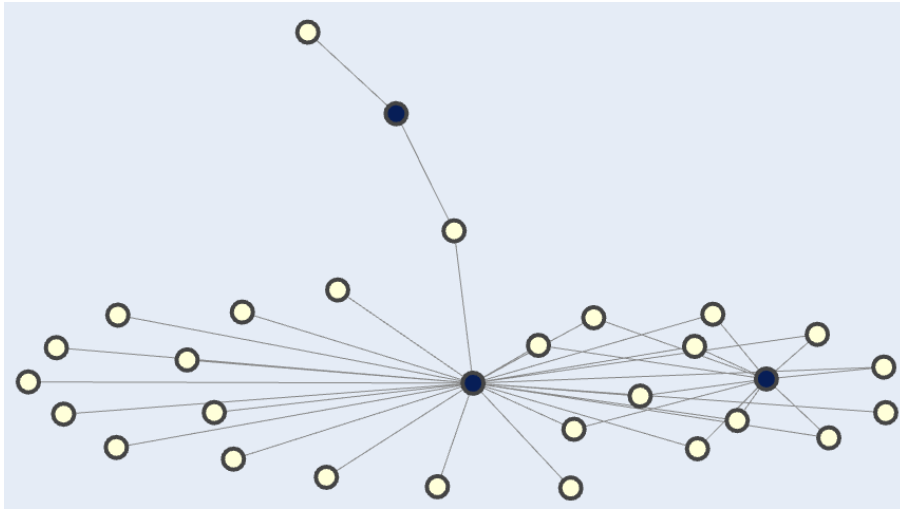
Example: User Relations based on Hunt Pilots

- Start with hunt_pilot.csv
 - Look for "HUNT LIST 1" column; this is a reference to "NAME" in huntlist.csv table
 - In huntlist.csv looks at "LINE GROUP x" columns; reference to "NAME" in linegroup.csv
 - Collect DNP from "DN OR PATTERN x" and "ROUTE PARTITION x" columns in linegroup.csv
 - Find all users with "DN OR PATTERN x" and "ROUTE PARTITION x" columns in enduser.csv
- Alternative:
- Parse DN and partition from "PRIMARY EXTENSION" in enduser.csv
 - And match these with DNPs collected from linegroup.csv
 - .. If primary extension is populated for all users

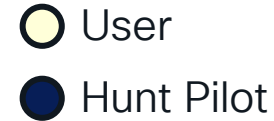
Real life examples: Hunt Pilots



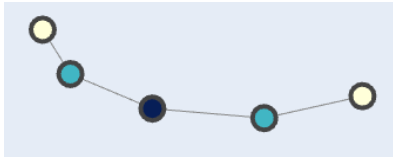
Simple



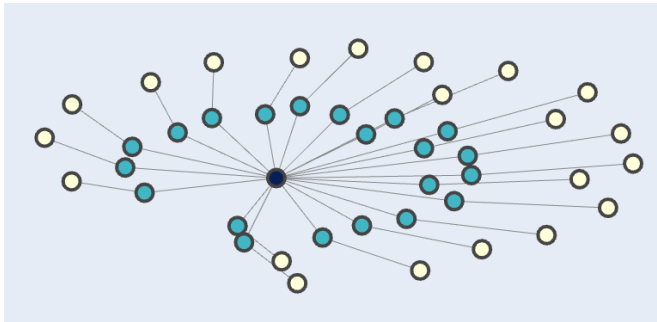
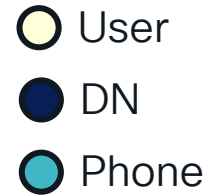
Complex



Real life examples: Shared Lines



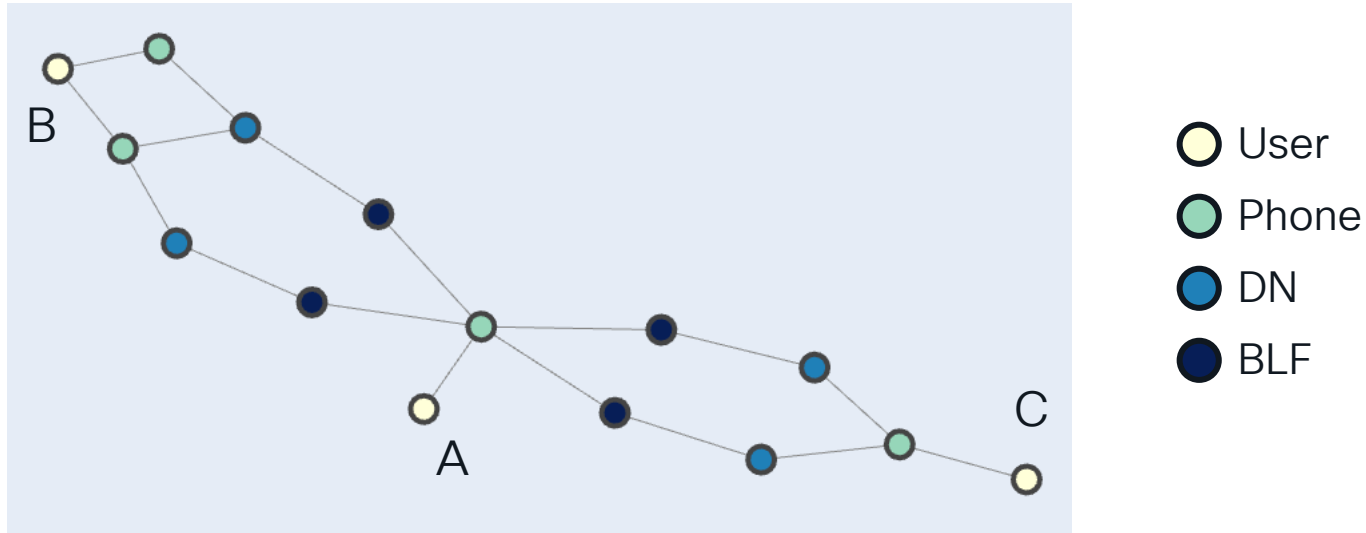
DN shared on two phones owned by two users



Single DN shared on multiple phones

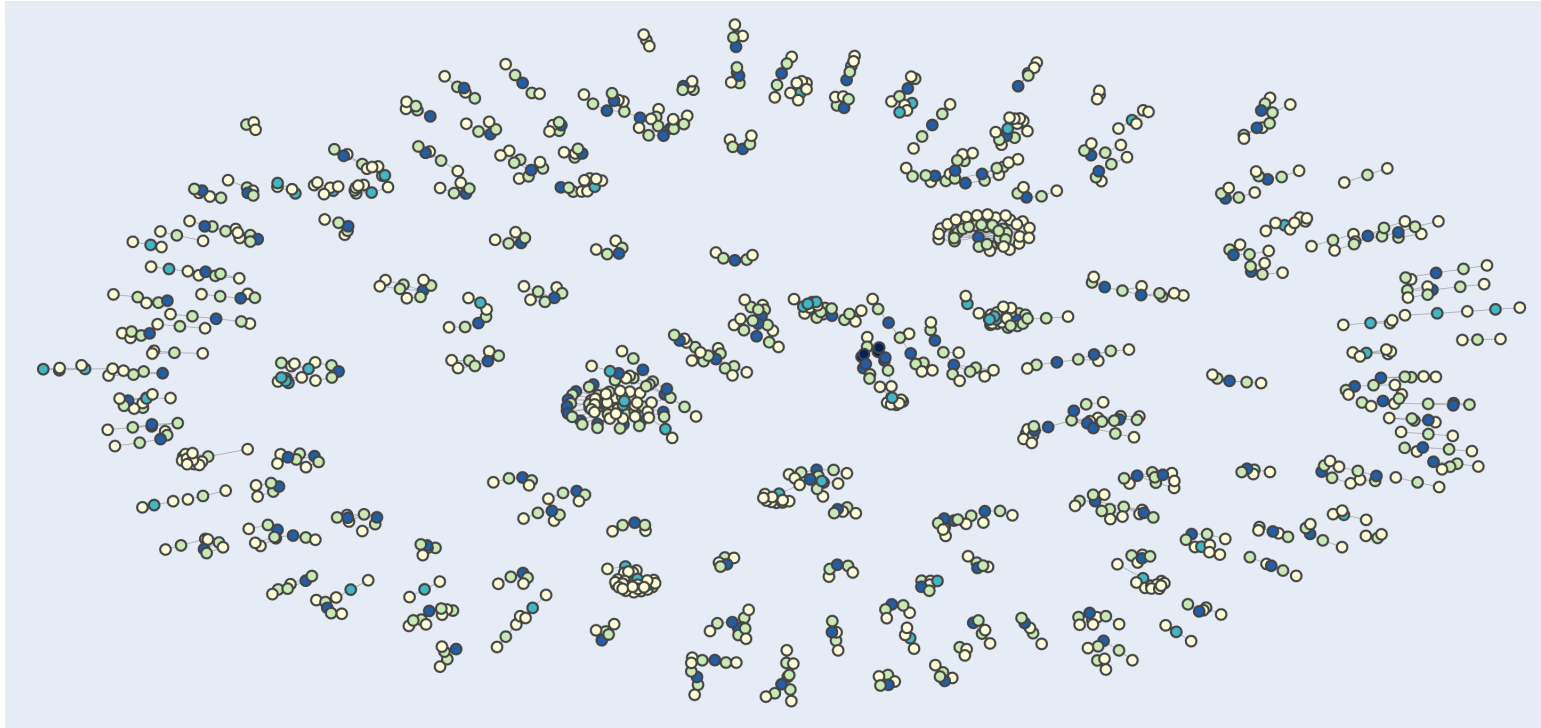
Both cases are problematic for a migration to WxC

Real life examples: BLF

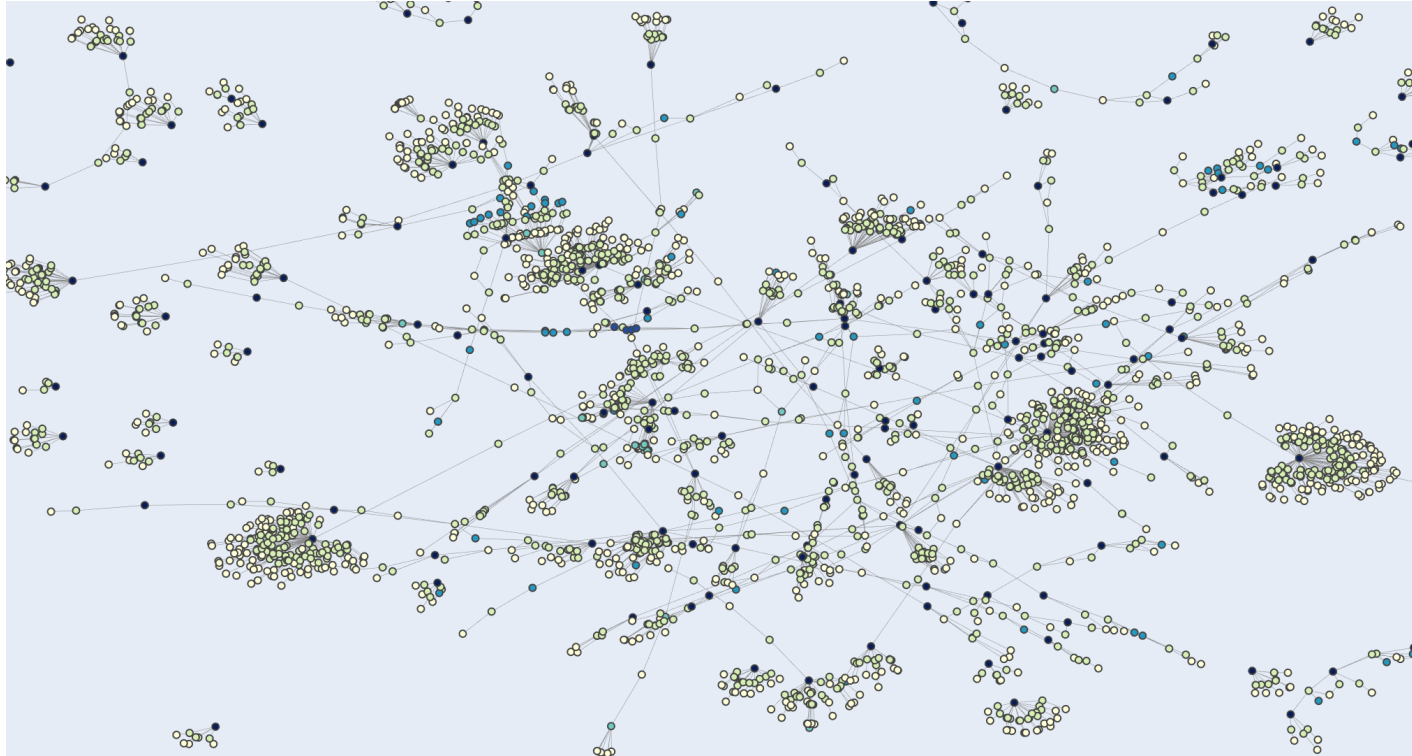


User A on one phone has four BLFs monitoring DNs on phones of two users B and C

Real life example: combined



... Or something ... “interesting”



Migration Batches

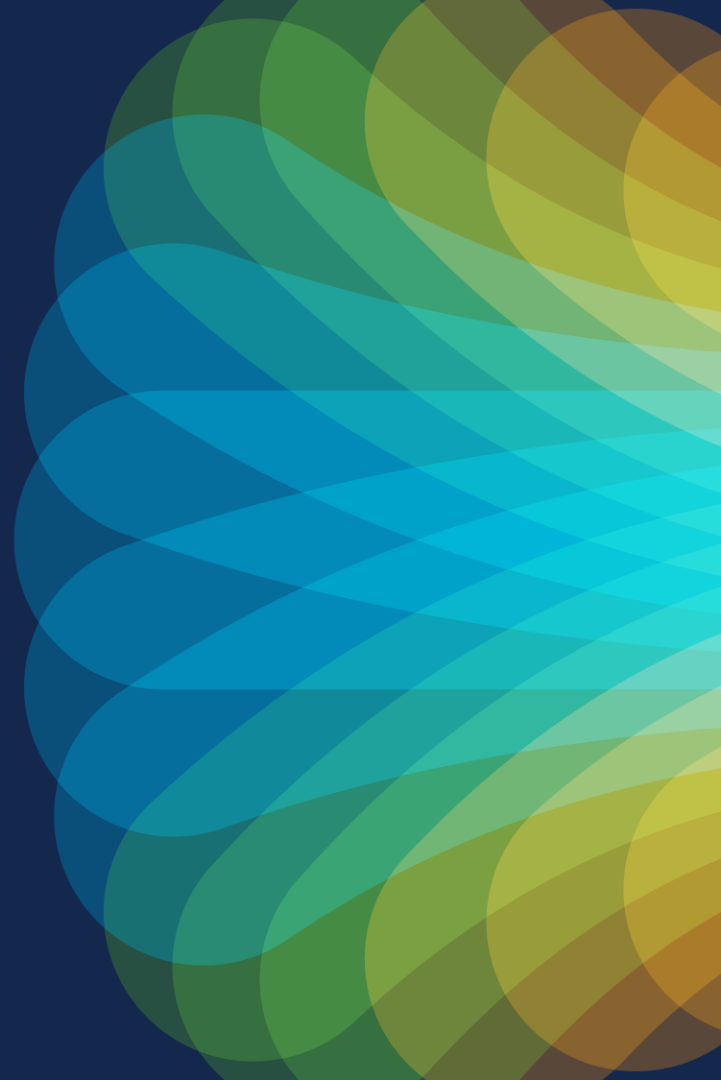
- Somewhat hard to derive from Unified CM config export
- Both, Tuki and Wrangler, have logic to
 - Determine dependencies
 - Create migration batches



Discovery Options

	AXL	BAT	Config Export	3 rd Party
Coverage	++ All feature can be read using thin or thick AXL	-- Very little coverage (built for provisioning)	++ Full DB coverage	+
Ease of use	-- Programmatic approach requires some development experience	+ UCM admin GUI	0 UCM admin GUI	++
Flexibility	++	-- Limited coverage	++	++
End-to-end (incl. provisioning)	0 Not integrated. Data can drive Webex Calling provisioning (manual, bulk, or API)	-- Limited coverage	0 Not integrated. Data can drive Webex Calling provisioning (manual, bulk, or API)	++ Integrated mapping and provisioning

Design



Challenge: DN vs User Centric Model

- Webex Calling
 - users with extension or TN (or both) have devices
 - Concept of shared lines fundamentally different to Unified CM
 - Users "live" in a calling location
- What about Unified CM?

Challenge: DNP vs User Centric Model

- Unified CM
 - DNPs (DN, partition) associated with devices, potentially owned by users, which might have a primary extension, ..
 - DNs can exist on an arbitrary number of devices in varying order
 - What is a user's extension?

Challenge: DN vs User Centric Model

- Control Hub based migration tool has heuristics to try to address this challenge
- Admin can still override the tool
- Using the tool during the design phase (w/o actually executing a migration!) can assist in identifying characteristics of Unified CM setup
- Third party migration tools also can create mapping of DNPs to users and offer flexible options to modify this mapping

What is a "Location"?

- Unified CM does not have a location concept like Webex Calling
- "Location" in Unified CM: place in the network used for enhanced location CAC
- "Location" in Webex Calling: grouping of users sharing the same geographic location (.. and extension range)
- Options to identify Webex Calling locations in Unified CM config:
 - Devices sharing the same device pool
 - Users (phones) with common DN (+E.164/ESN) prefixes (how long, what about extension only?)
 - shared CoS (how to you find users sharing equivalent CoS?)
- Probably best to define locations based on Webex Calling design requirements ...
 - ... and then think about identifying users/devices to be mapped into these locations
- ... Which also matches the typical deployment flow of Webex Calling

PSTN Options

PSTN Options for Webex Calling

Premises PSTN

Available in 110+ countries

Continue using your existing provider

Support remote branch offices

Manage phone numbers Control Hub

Cisco Calling Plans (Cisco PSTN)

Available in the U.S., Canada, Europe, Australia* and New Zealand*

Single offer through Cisco and our partners

Fully integrated and managed from Control Hub

Cloud Connect for Webex Calling

Available in over 65 countries

Select from multiple world-class Cisco-certified providers

Choose providers on a site-by-site basis

Manage numbers in Control Hub



Premises PSTN and PBX interconnect

Trunks

Represents a single SIP trunk to an on-premises device. Device can be registering (CUBE) or certificate based (CUBE + 3rd party) trunk

Must be assigned to a location. If used for PSTN the country dial plan is based on location address.

Can be included in one or more route groups or can be directly associated to a dial plan.

PSTN (SIP, ISDN, ...) decoupled



Route groups

Logical grouping of trunks (max. 10) for scale and redundancy of connections to the premises

Does not "live" in a location

Dial Plans

Dial plans allow you to route calls to on-premises destinations by use of trunks or route groups.

Specifies the routing choice (trunk or route group) for calls that match any of its dial patterns.

Dial pattern represents **on-premises extensions**; ESN/on-net numbers, +E.164 patterns, SIP URI domains.

<https://help.webex.com/en-us/article/n0xb944>

Registering vs. Cert Based Trunk

Concurrent Calls	# of users serviced	Preferred Trunk Type	Connectivity
~2000 – 6500	65000	Certificate based	Interconnect
250 – 2000	20000	Certificate based	OTT
<= 250	2500	Registering trunk	OTT

Performance limited by TCP performance to TCP/TLS transport

Connectivity specs

- OTT: max latency 100 ms, max jitter 10 ms, max packet loss 0.2 %
- Interconnect: max latency 30 ms, max jitter 5 ms, 0 packet loss

Certificate based trunk requirements

- Public IPv4, domain, SRV
- Trusted certificate
- Inbound connections through firewall

<https://help.webex.com/en-us/article/t9xctu>

<https://help.webex.com/en-us/article/n0xb944>

Certificate based trunks supported with third party SBCs (Oracle, Audiocodes, Ribbon)

Webex Calling PSTN: Cloud Connect for Webex Calling



- PSTN access through peering with a selection of Cloud Connected partners integrated into the Webex® Calling cloud
- Partner helps enterprise procure and provision PSTN
- Fully integrated option (number ordering from within Control Hub) available in the US
- Available to service providers who serve customers with locations outside of their PSTN footprint

<https://community.cisco.com/t5/collaboration-knowledge-base/cloud-connect-for-webex-calling-global-availability/ta-p/3916211>

PSTN Options - Comparison

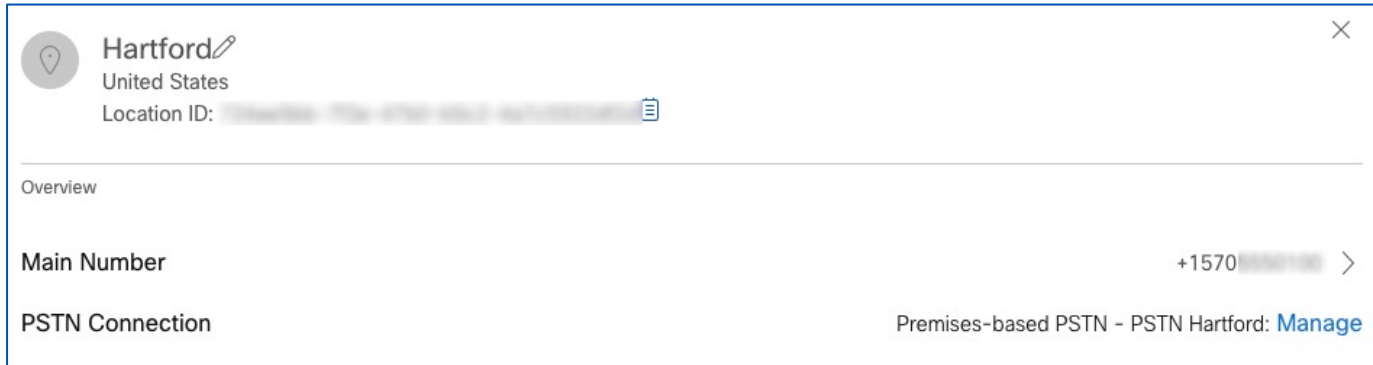
Cloud PSTN (Cisco PSTN / Cloud Connect for Webex Calling)	Premises PSTN (Trunk, Local Gateway)
No invest in on-premises GW	re-use of existing PSTN
no maintenance for on-premises GW	interconnect with PBX
No PSTN media hair-pinning*	PSTN interconnect in markets not supported by Cloud PSTN options
Number orders potentially in-band (Cisco PSTN, fully integrated CCPP**)	Number orders out of band




* calls from Webex Calling endpoint to PSTN via Local Gateway anchored on Webex Calling access; ICE media path optimization possible if ICE negotiation w/ Local Gateway host candidate succeeds

** fully integrated CCPP only available in the US (Intelepeer)


Location Considerations

PSTN Integration



Hartford 
United States
Location ID:  

Overview

Main Number +1570  >

PSTN Connection Premises-based PSTN - PSTN Hartford: [Manage](#)

- PSTN defined at the location level
- One PSTN choice per location (Cisco PSTN, CCPP, Premises PSTN)
- All PSTN calls originating from location use same PSTN
- Location main number is required for any calls to/from location.

Emergency Calling

Two options to handle emergency calls:

- ~~Enhanced emergency (E911) service~~
 - ~~Dynamic; support roaming device → Nomadic E911 service~~
 - ~~Only available in US/CAN~~
 - ~~Uses RedSky: <https://www.redskye911.com/e911-for-cisco-webex>~~
 - ~~<https://help.webex.com/en-us/article/av6003/Enhanced-Emergency-Calling-for-Webex-Calling>~~
- Emergency Callback Number (ECBN) based
 - Static configuration of ECBN per location (per user override)
 - <https://help.webex.com/en-us/article/nzqvtyq/Emergency-Callback-Number-in-Control-Hub>

Emergency Callback Number

- Set at location level
 - Can be main number
 - ... or any other assigned (and active) number in that location
- User level override
- Recommendations:
 - for users with phone number use that as ECBN
 - For users w/o phone numbers multiple ECBNs can exist within (large) locations
 - ECBNs must be live answering points (be careful with IVRs, queues, AAs, ...)

Emergency Callback Number (ECBN)
Choose which phone number will be the default ECBN for a user without a phone number.

Use location main number: +1570555 [REDACTED] (Hartford)

Use assigned number from this location

+1575555 [REDACTED] (Anita Hunt) ▼

Lester Ray
Active • jlester@lesterapjc.com • Location: Hartford

Profile General Meetings **Calling** Messaging Hybrid Services

< Calling

Emergency callback number

User's phone number: +1570 [REDACTED]

Location default ECBN: +1570 [REDACTED]

Assigned number from user's location

+1570555 [REDACTED] (Tomothy St... ▼)

Feature / Location Dependencies

Calling features are configured at the location level ... and many features still work across locations

- **Numbers/extensions** – All numbers are accessible between locations. If an extension overlap exists, site codes can be used to allow extension dialing between locations.
- **Auto Attendants** – Assigned to a location, search scopes can be defined per Location or globally
- **Hunt Groups / Call Queues** – Assigned to a location, agents can be assigned from any location
- **Single Number Reach** – Assigned to a location, user access can be defined per Location or globally.
- **Paging Group** – Assigned to a location, paging targets and originators can be assigned from any location.
- **Receptionist Client** – Assign via user, searched filter available based on location.
- **Virtual Extension** – Can be defined per Location or globally.
- **Voicemail Group** – Assigned to a location and uses location voicemail settings. Any number within the customer can forward to the voicemail if required.

Features with Cross Location Limitations

Call Park

- **Call Park Extensions** – Call Park is used for a network hold and allows a user to park a call against an available user's extension or to a Call Park Extension
 - Call Park Extensions are configured within a specific location
 - Any user from any location can unpark the parked call (provided the extension is accessible)
 - Location level parameters for recall (parking user, hunt group, user/hunt), timers and ring pattern
- **Call Park Group** – The Call Park Group service allows a defined group of users to automatically park calls against other available members of a call park group
 - The members of this group can only be from the same Location and can only be in a single group
 - Any user within the ORG can answer the parked call
 - Location level parameters for timers and ring pattern for parked calls
 - Call Park Group defines the recall options (parking user, hunt group, user/hunt)

Features with Cross Location Limitations

Call Pickup

- **Call Pickup** – Users that are added to a call pickup can answer calls when another member of the call pickup is busy.
 - A user can only be assigned to one call pickup. A location may have multiple call pickups
 - A call pickup can only have users from the same location
 - Call Pickup requires FAC for use in Webex Calling; default Pickup softkey uses Directed Call Pickup
 - Directed call Pickup works across all locations
 - Just releases: directed call pickup for monitored lines for Webex app
 - Directed call pickup for monitored lines works across locations



Per Location Scale

- Users & workspaces – 30k combined
- Numbers – No hard limits, recommended: less or equal 3 times the number of users
- Trunks – 100
- Auto Attendants – 1000
- Virtual Extension – 1000
- Hunt Group – 1000
- Call Queue – 1000
- Authorization Codes – 1000
- Call Park Extensions – 100
- Call Pickup Groups – 1000
- Receptionist Client – 500

Feature Mapping

Feature Mapping

- Calling is not about features, but about **business requirements**
 - Different call control solutions have different sets of features
 - 1:1 feature mapping not necessarily the best option
- Different ways to address the same set of business requirements
- Recommendation:
 - start from business requirements and not configured features
 - Don't confuse “existing UX” with business requirements

Example: Hunt Group

- Unified CM

- Hunt Pilot: DNP, Alerting Name
 - Call treatment: FwdNoAnswer, FwdHuntBusy, Queuing (MoH, overflow, max wait time, no agent available)
- Hunt List: list of hunt groups
- Line Group: distribution algorithm, RNA, hunt options (no answer, busy, unavailable), members (DNP)

- Webex Calling

- Basics: location, name, number/extension, caller ID
- Routing: circular, longest idle, weighted, simultaneous
- Routing settings: advance when busy, forward after set number of rings, divert when unreachable
- Agents

- DNP vs user based
 - Unified CM has DNPs in line groups
 - Webex Calling: user or workspaces as agents
- Gap: HG login/logout -> Webex Calling agents can set DND though
- OTOH: Webex Calling has way more options for selective call forwarding
- Gap: queueing .. But then there are Webex Calling call queues
 - Also allow agents to set their state to available/unavailable (for all queues though)

Dialing Habits

Unified CM (typical, best practice)

- Extensions (2-6 digits)
- Abbreviated inter-site (ESN)
- +E.164
- Country specific (PSTN) dialing habits
- .. and potentially countless variations based Unified CM “magic toolbox” → all bets are off

Webex Calling

- Extensions (2-6 digits)
- Abbreviated inter-site (ESN)
- +E.164
- Country specific (PSTN) dialing habits

- Unified CM dial plan flexibility: curse and blessing
 - Often used as workaround to address specific requirements
- Set of dialing habits in Webex Calling is fixed
- Case by case conversation
- Changing dialing habits → changing UX

Class of Service

Unified CM

- Based on CSSes, partitions and patterns
- Common: on-net, national, international
- Potentially: internal calling restrictions, Chinese walls, C-level fences
- Unified CM “magic toolbox” at its best → all bets are off

Webex Calling

- outgoing permissions (internal, local, LD international...) - based on tags in national dial plan
- Executive/Executive Assistant
- Per user: selectively accept/reject/forward calls

- Different concepts
- Keep in mind: using Unified CM “dial plan magic” to address certain requirements often has been seen as a “workaround”
- If all you have is a hammer (CSS) then everything looks like a nail (set of patterns)
- Different toolbox → different solutions

Shared Lines

Unified CM

- Phone can have multiple DNPs
- Not necessarily tied to user
- DNPs can be in different sites
- Shared line appearances ring at the same time

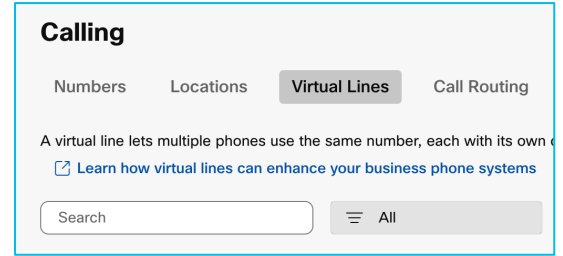
Webex Calling

- User's lines can be shared (35 devices max)
- For inbound calling: hunt groups and call queues might be the better option
- Single number reach allows to ring multiple destinations
- Virtual lines offer a lot of flexibility

- Different concepts
- Same location limitation and user centric model used to be the biggest challenge; addressed by virtual lines

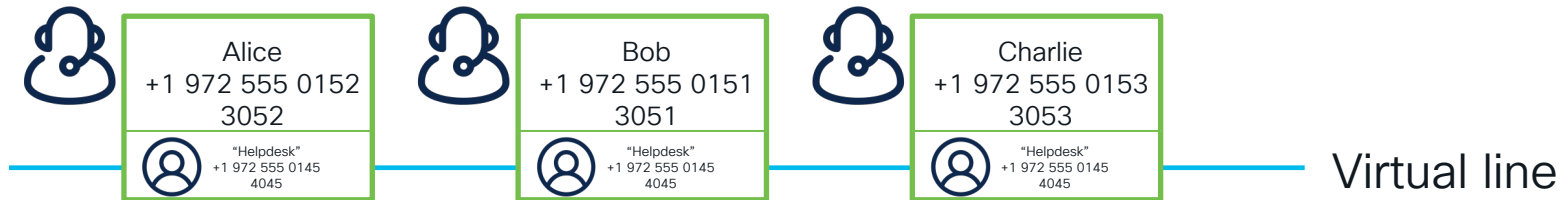
Virtual Lines

- Virtual Lines act like “dummy” users
 - Attributes: first/last/display name, TN and/or extension
 - Live in a location
 - Settings: caller ID, ECBN, incoming/outgoing permissions, intercept, barge, ...
 - ... like calling settings of a user
- Virtual lines can be added to MPPs and Webex app instances as additional lines
- Can be used for incoming/outgoing calls
- No location restriction: MPP and app can have lines from multiple locations



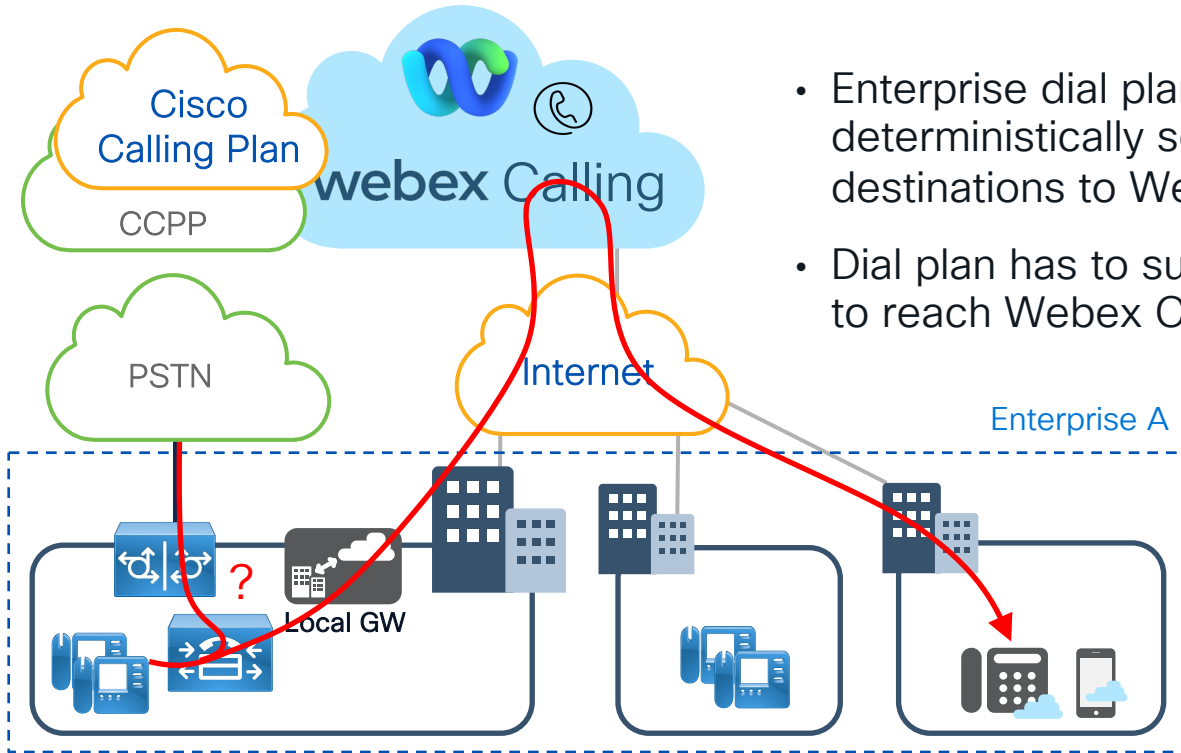
Virtual Lines vs Shared Lines

- Virtual lines don't remove the user centric concept of Webex Calling
- ... but remove a lot of the original restrictions
- For example: sharing a helpdesk line across a group of users now is really easy



Interworking Unified CM / Webex Calling

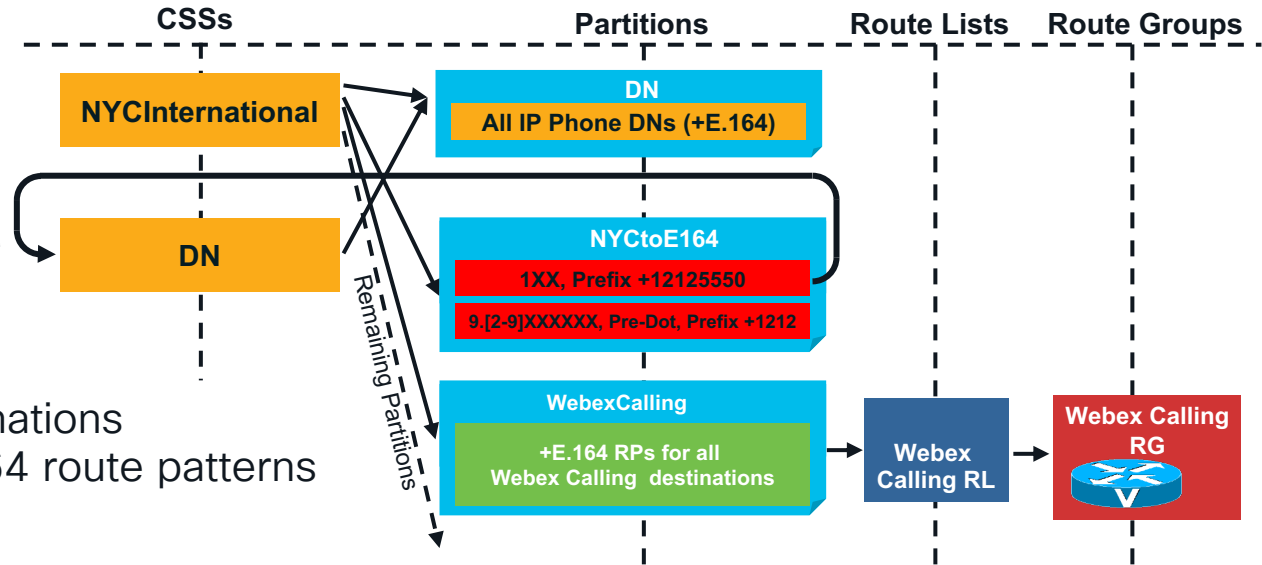
Local Gateway Dial Plan Integration



- Enterprise dial plan on Unified CM needs to deterministically send Webex Calling destinations to Webex Calling via Local Gateway
- Dial plan has to support “typical” dialing habits to reach Webex Calling destinations
- Webex Calling destinations need to be regularly updated during transition period as users move to Webex Calling

LGW Dial Plan Integration

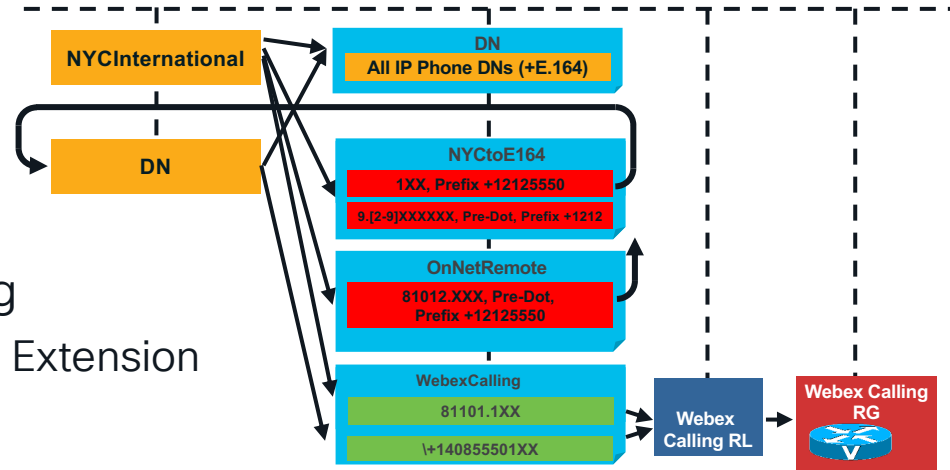
- With a single Egress LGW selection not site specific → no LRG based LGW selection required*
- Multiple LGWs in multiple locations: RL and LRG
- Can use multiple LGWs for scale and redundancy
- Webex Calling destinations provisioned as +E.164 route patterns



*For extension dialing w/ non-unique extensions site specific trunks are required so that Webex Calling can establish proper dialling context. LRG can be used for site specific egress trunk selection

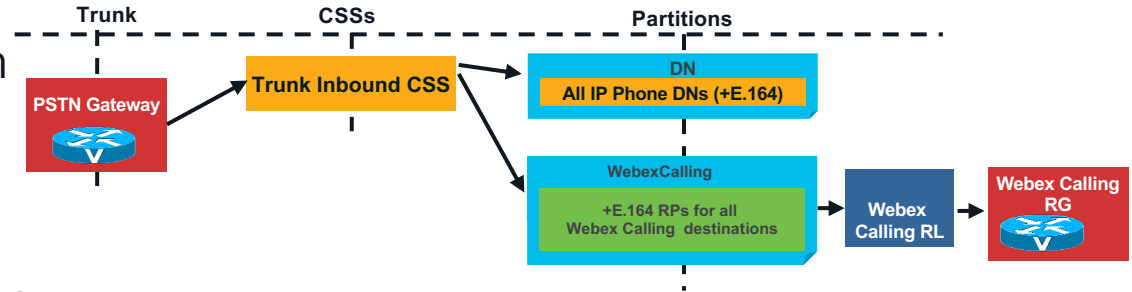
UCM to WxC – ESN Outbound Route Patterns

- Add ESN route patterns to “Webex Calling” partition
- Also works with extension only Webex Calling users
- Make sure to use consistent enterprise dialing on Unified CM and Webex Calling
 - Steering digit, Site code length, Extension length
 - Example: 8-XXX-XXXX
- Caution: ESN called party number only accepted by Webex Calling if call is classified as premises call (caller id match on dial plan pattern)



UCM to WxC – PSTN Routing to Webex Calling

- PSTN Dial Plan can utilize the same Route Patterns for +E.164 dialing as UCM users.
- Called party globalization to +E.164 required if no +E.164 received from PSTN
- Multiple ways to do on UCM:
 - Incoming Called Party Transformation Patterns (preferred)
 - Translation Pattern
 - Route Patterns



Caller ID Normalization

- Tool: Calling Party Transformation Patterns
- Can be done either
 - inbound on Trunk from Webex Calling
 - Outbound on Unified CM registered device
- Best practice: globalize on ingress, localize on egress
- ... but customer might have implemented other dial plans
- Unified CM (and CUBE) caller ID by default is based on PAI, RPID or From (in this priority)
- On dual identity trunks from Webex Calling profiles on CUBE or SIP transparency scripts (Lua) on Unified CM can be used to enable dual identities on CUBE and Unified CM
 - Easiest/best option: disable dual identity on premises trunk; Caveat: billing identity nor relayed

The screenshot shows the 'Calling Party Transformation Pattern Configuration' window. It includes a 'Save' button at the top left. The 'Status' section shows 'Status: Ready'. The 'Pattern Definition' section contains the following fields: 'Pattern*' with the value '\+12135554XXX', 'Partition' with 'CnPtLocalizeFromWxC', 'Description' with 'Localize Caller ID inbound from WxC', 'Numbering Plan' with '< None >', and 'Route Filter' with '< None >'. There are two checkboxes: 'Urgent Priority' (checked) and 'MLPP Preemption Disabled' (unchecked). The 'Calling Party Transformations' section includes 'Use Calling Party's External Phone Number Mask' (unchecked), 'Discard Digits' with '< None >', 'Calling Party Transformation Mask' with '83134XXX', and 'Prefix Digits' with an empty field.

Reference:

https://www.cisco.com/c/en/us/td/docs/voice_ip_comm/cucm/srnd/collab12/collab12/dialplan.html
<https://www.cisco.com/c/en/us/td/docs/solutions/CVD/Collaboration/enterprise/12x/120/collbcvd/control.html>

Interworking Limitations

- Local Gateway (registering) concurrent session limitations
- Integration between Webex Calling and Unified CM is pure call routing integration
 - No concept of sharing call state nor user (line) presence
- Impact on any feature relying on call state or presence:
 - Call pick-up (notifications)
 - Hunt: no way to determine state of line
 - BLF
 - ..
- Keep users of these features together on a single call control instance

Cisco UCM and Webex Calling coexistence

- Proper dial plan design (see Enterprise PA* for details) enables seamless transition of DNs from UCM to Webex Calling
 - All dialing habits are possible: ESN, DN and +E.164
- Detailed information in
 - “Transitioning from Cisco UCM to Webex Calling Deployment Guide”
https://www.cisco.com/c/dam/en/us/td/docs/solutions/PA/mcp/DEPLOYMENT_CALLING_Unified_CM_to_Webex_Calling.pdf
 - “Cisco Preferred Architecture for Webex Calling Overview”
<https://www.cisco.com/c/dam/en/us/td/docs/solutions/CVD/Collaboration/hybrid/AltDesigns/PA-WbxCall.pdf>

*<https://www.cisco.com/c/en/us/td/docs/solutions/CVD/Collaboration/enterprise/12x/120/collbcvd.html>

Bulk Dial Plan Maintenance

- Depending on the number of Webex Calling TN ranges maintaining the set of Webex Calling RPs can be complex
- Alternative: use GDPR imported catalog with set of Webex Calling TN ranges
- SIP route pattern for catalog's route string needs to be provisioned in the WebexCalling partition
- BAT File format (example):
PatternType,PSTNFailover,Pattern
pattern,2:+0,+1408555012X@example.com
pattern,2:+0,+1212555013X@example.com
pattern,0:+0,811011XX@example.com
- GDPR PSTN failover needs to be suppressed (illegal numbers) if PSTN access for Webex Calling destinations is via UCM; else: loops!

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pattern,2:+0,+1408555012X@example.com
pattern,2:+0,+1212555013X@example.com
pattern,0:+0,811011XX@example.com
```

Forcing illegal number for GDPR PSTN failover (strip/prefix). Make sure that dial plan blocks \+0! or use prefix not covered by PSTN route patterns*

+E.164 destination in Webex Calling

Abbreviated inter-site dialing to Webex Calling

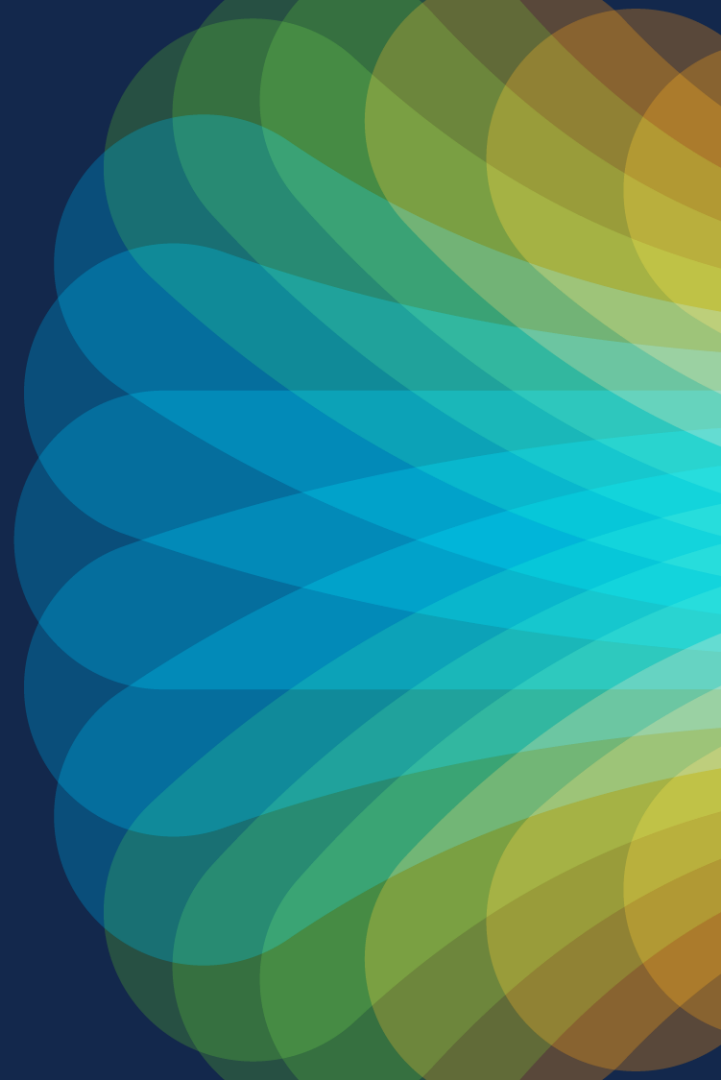
- GDPR PSTN failover needs to be suppressed (illegal numbers) if PSTN access for Webex Calling destinations is via UCM; else: loops!

*If Webex Calling is not using premises PSTN then GDPR PSTN failover actually is an alternative to using the Local Gateway trunk)

GDPR Imported Catalog Considerations

- Allows to share Webex Calling destinations between clusters: for example for SME deployments with centralized LGW
- Calls coming into UCM from Webex Calling need access to destinations learned from ILS/GDPR (access to remote on-net sites)
- Imported +E.164 and ESN patterns end up in the same partition (for example OnNetRemote)
- Breaking the loop: SIP route pattern for catalog's route string is in partition the trunk from Webex Calling does not have access to

GDPR Export to Populate Webex Calling Dial Plans

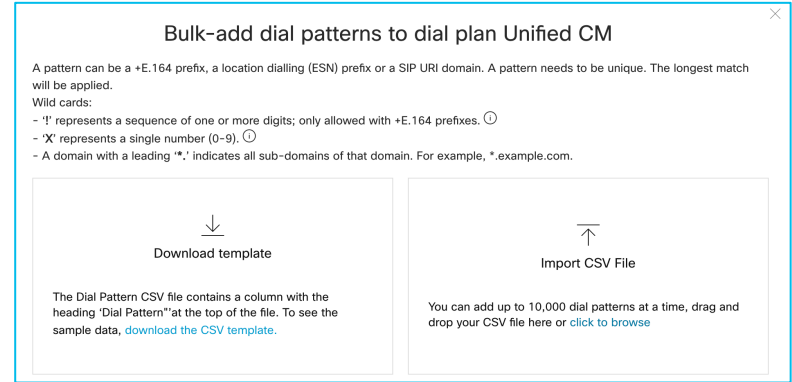


Use GDPR Information for Webex Calling Dial Plans

- Unified CM uses ILS/GDPR to exchange catalogs of routing information
- This information is stored in the **remoteroutingpattern** table in Unified CM
- We can export the learned patterns and re-use them for dial plan provisioning
- Can only be used in multi-cluster deployments (.. where GDPR is used)

Problems to Solve

- Export from Unified CM
 - Use thin AXL to read database directly
 - Need to read from multiple UCMs
- Transform
 - Only wildcard in Webex Calling dial plan patterns is “X” at the end
- Import into Webex Calling
 - Webex Calling dial plans patterns can be provisioned using CSV



<https://github.com/jeokrohn/migrationapi>

File: read_gdpr.py

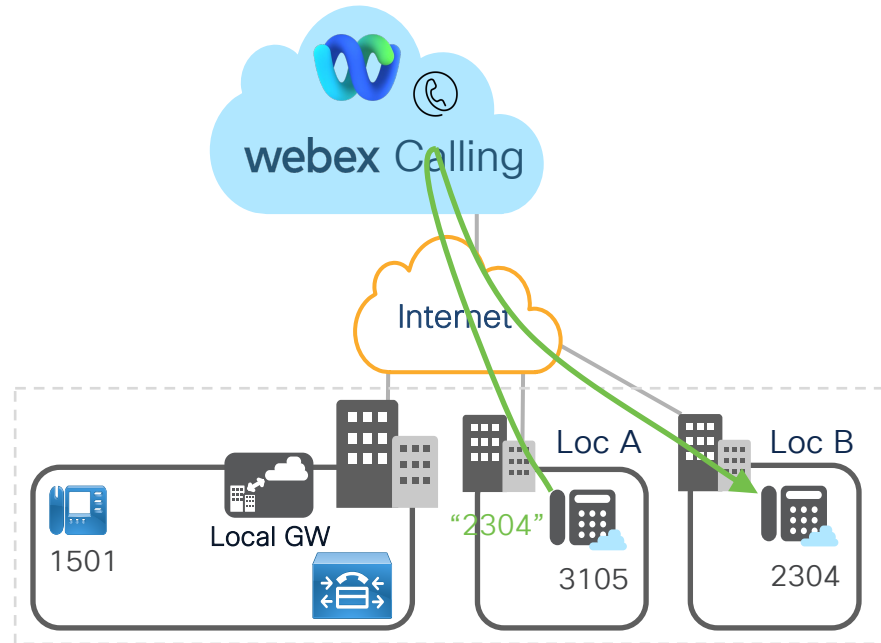
Demo: GDPR Export

```
(migrationapi) jkrohn@JKROHN-M-106P migrationapi % ./read_gdpr.py
```

Extension Dialing Considerations

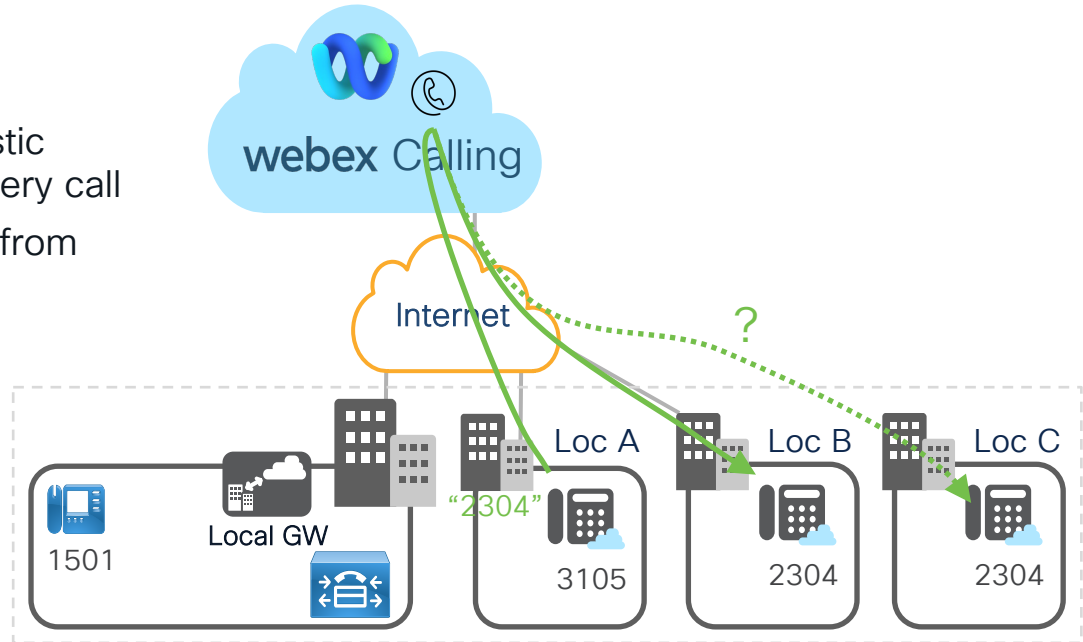
Extension Dialling Between Locations

- User A in location A can call inter-location to user B in location B by dialing “2304”



Challenge 1: Overlap on Webex Calling

- User A in location A dials “2304”, an extension that exists in multiple locations
- The call is routed to one of the extensions, Location B or C
 - Deterministic: in contrast to stochastic the same destination will ring for every call
 - Hard to predict: preference hidden from admin/customer
- If overlapping extension ranges exist then cross-location extension dialling should not be advertised to users



New: Cross-Location Extension Dialing Policy

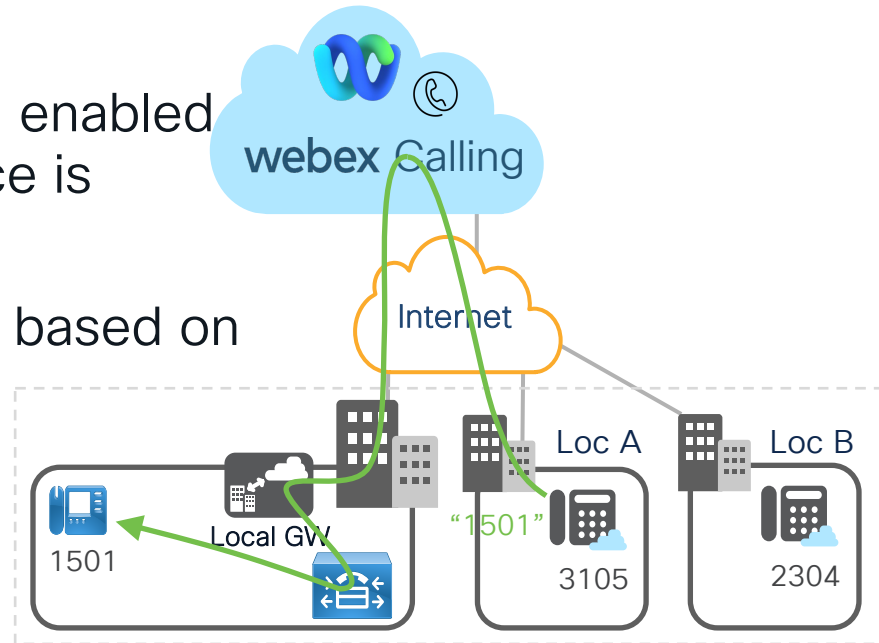
- Extension dialing between locations is configurable
- Default: enabled
- Also affects:
 - Unknown extension handling
- Addresses unpredicted cross-location extension dialing with overlapping extensions

The screenshot shows the 'Calling' configuration page in Cisco Webex. The 'Service Settings' tab is selected. Under the 'Internal Dialing' section, there are three input fields: 'Location Routing Prefix Length' (set to 4), 'Set Steering Digit in Routing Prefix' (set to 8), and 'Internal Extension Length' (set to 4). Below these is an 'Edit' button. A green box highlights the 'Allow extension dialing between locations' toggle, which is currently turned on. The text below the toggle reads: 'This option allows calling between locations within the organization by dialing an extension number. If the option is disabled, caller must dial ESN (Enterprise Significant Number) to reach users in other locations. This should be disabled when there are duplicate extensions in the organization.'

<https://help.webex.com/en-us/article/pxtu15/Configure-your-Webex-Calling-dial-plan>

Extension Dialling to Unified CM (Split Sites)

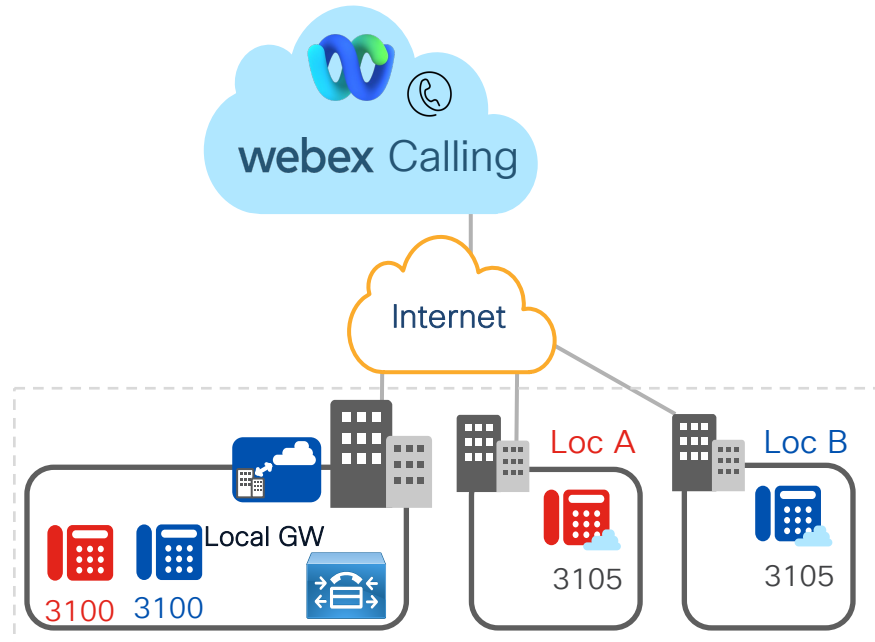
- User A in location A can call user C on Unified CM by dialing “1501”
- Unknown extension routing enabled on location A, routing choice is trunk/route group to UCM
- Unified CM dial plan routes based on extension



Special Case: Multiple Split Sites

Calling from Webex Calling to Unified CM

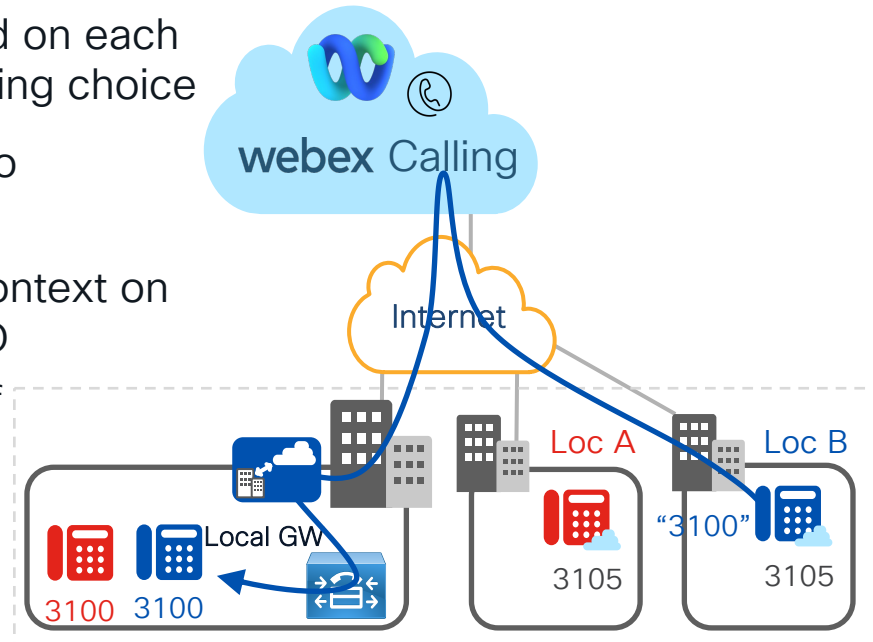
- Locations with users on UCM and WxC



Special Case: Multiple Split Sites

Calling from Webex Calling to Unified CM

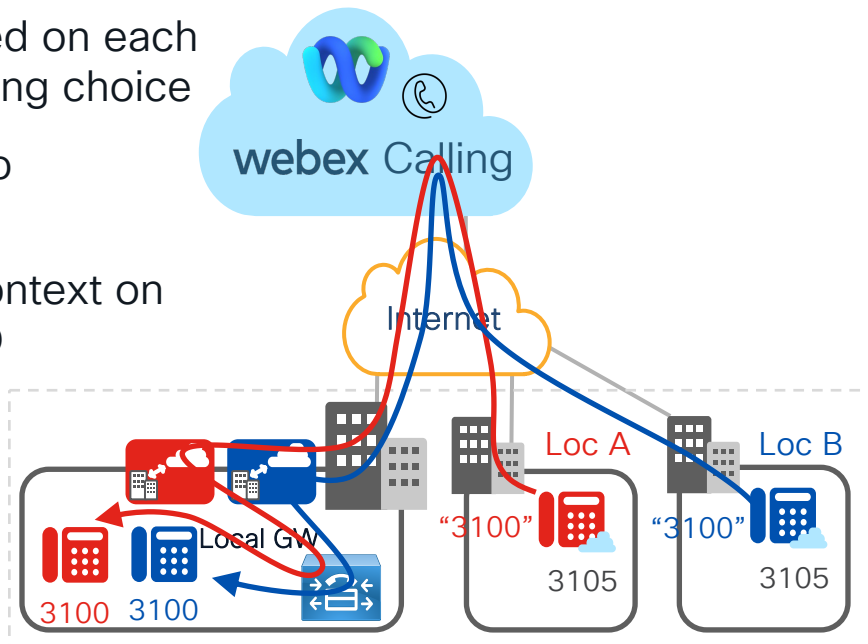
- Locations with users on UCM and WxC
- Unknown extension routing enabled on each location with location specific routing choice
- Location specific trunks on UCM to (re-)establish site routing context
- Alternative: re-establish routing context on Unified CM based on ESN caller ID
 - Possible but from the “department of dirty tricks”
 - .. and does not address the reverse direction



Special Case: Multiple Split Sites

Calling from Webex Calling to Unified CM

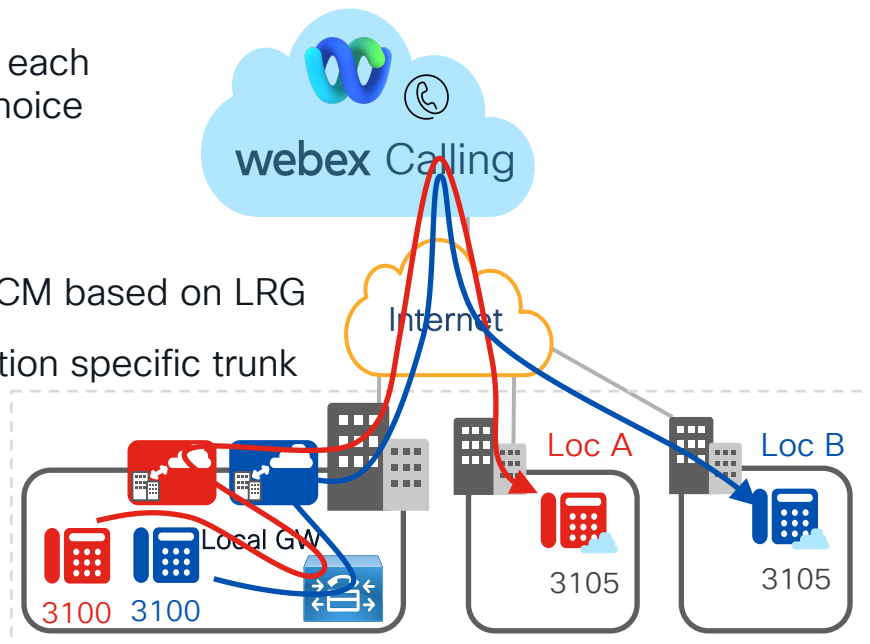
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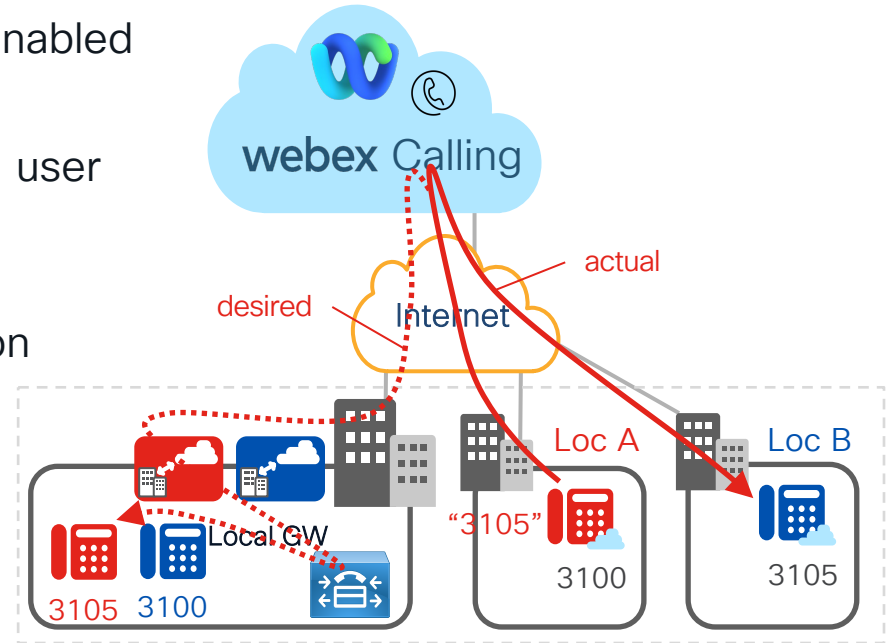
Calling from Unified CM to Webex Calling

- Locations with users on UCM and WxC
- Unknown extension routing enabled on each location with location specific routing choice
- Location specific trunks on UCM to (re-)establish site routing context
- Site specific egress GW selection on UCM based on LRG
- Routing context on WxC based on location specific trunk and pilot user
- Unified CM could also globalize the called address to ESN so that Webex Calling can route on that address



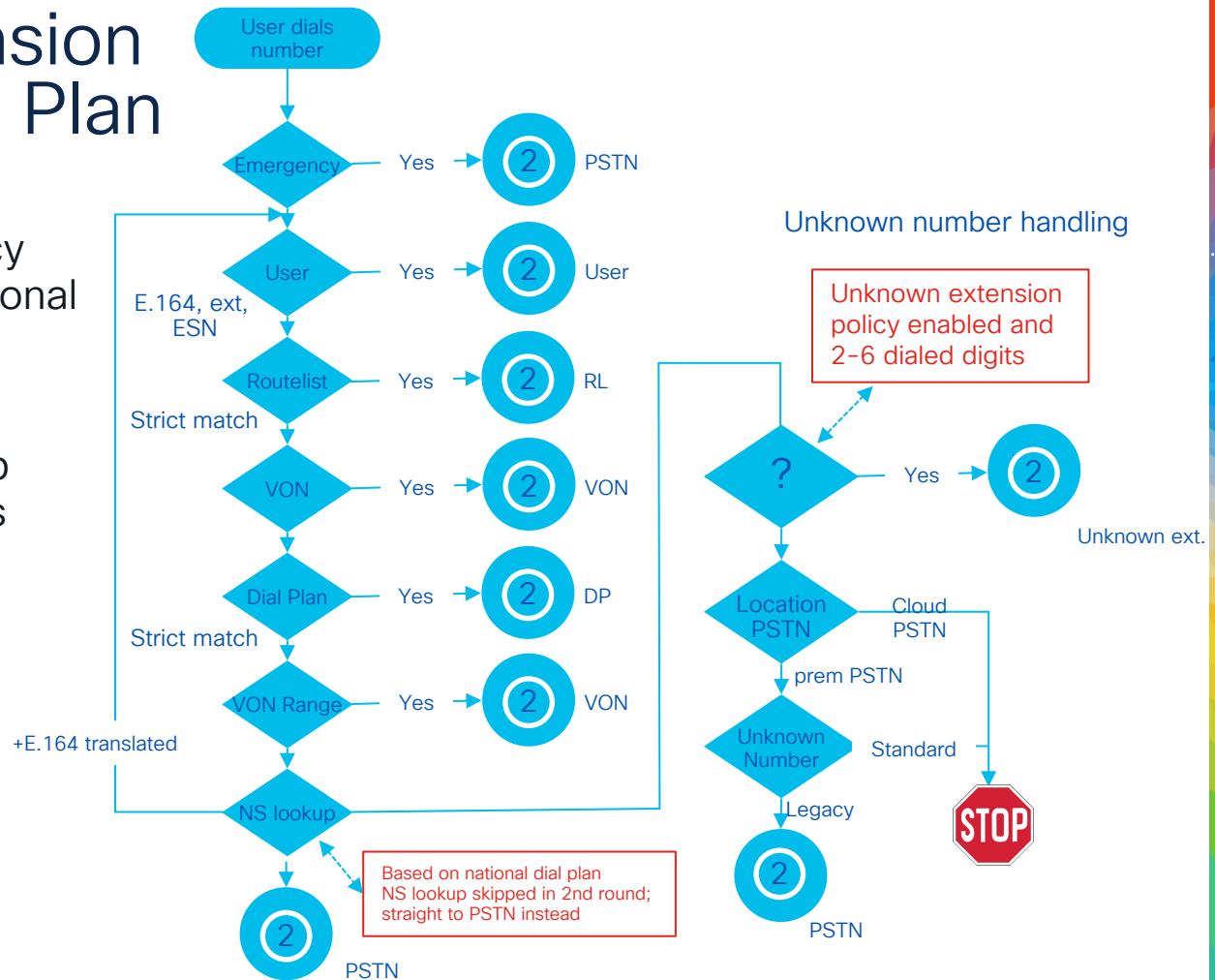
Challenge: Inter-Location Overlap between Unified CM and Webex Calling

- Locations with users on UCM and Webex Calling
- Cross-location extension dialing policy enabled (default)
- User 3100 in location A tries to call UCM user 3105
- Unknown extension policy on location A not triggered b/c there is an inter-location match for 3105 (in location B)
- Solution: disable cross-location extension dialing



Unknown Extension vs National Dial Plan

- Unknown extension policy only checked AFTER national number plan lookup
- National numbering plan trumps in case of overlap with unknown extensions



Unknown Extension vs National Numbering Plan

- Example: Germany has X{5-12} in the national dial plan for local destinations*
- Unknown 4/5/6D extensions get routed to the PSTN instead of according to unknown extension policy
- Reason: permissive national numbering plan lookup ignoring a configured outside dial digit .. by default

49	xxxxx	Local	Local
49	xxxxxxx	Local	Local
49	xxxxxxxx	Local	Local
49	xxxxxxxxx	Local	Local
49	xxxxxxxxxx	Local	Local
49	xxxxxxxxxxx	Local	Local
49	xxxxxxxxxxxx	Local	Local
49	xxxxxxxxxxxxx	Local	Local
49	xxxxxxxxxxxxxx	Local	Local
49	xxxxxxxxxxxxxxx	Local	Local

Dial plans by country

<https://help.webex.com/en-us/article/757iyo/Dial-plans-by-country>

*other affected countries include: South Korea, UK, Ireland, Netherlands

New: Enforce Outside Dial Digit

- Enforcing the outside dial digit removes the overlap between on-net dialing habits (including extensions) and PSTN destinations
- Configured per location
- ... like the outside dial digit
- Caution: not only affects direct dialing but any PSTN destinations ... for example CFwds to PSTN

The screenshot shows the CUCM configuration page for the 'Frisco' location. The 'Calling' tab is selected, and the 'Outbound Dial Digit' is set to '9'. A blue arrow points to the 'Enable Outbound Dial Digit Enforcement' toggle, which is currently turned on. A modal dialog box is open, asking 'Enforce dialing the outbound dial digit?' with 'Cancel' and 'Enable' buttons.

Summary

- Avoid multiple split sites with overlapping extension ranges
 - Disable cross-location extension dialing
- Introducing enterprise significant numbers (ESN) can be used to partly address the challenges
 - simplifies Unified CM to Webex Calling routing
 - Removes need for location specific trunks from Unified CM to Webex Calling
 - Does not address the reverse direction
- Configure outside dial digit at the location level to prevent overlaps between on-net and off-net dialing habits
 - ... and enforce the outside dial digit
- If only we had location level translation patterns on Webex Calling then...
 - We could translate unknown extensions to ESN and avoid all these troubles

Virtual and Shared Lines

Terminology “Multi Line”

Multi line

One number, multiple devices

One device, multiple numbers

Shared Line Appearance

Call Delegate mode

Shared Line Group for Group call management

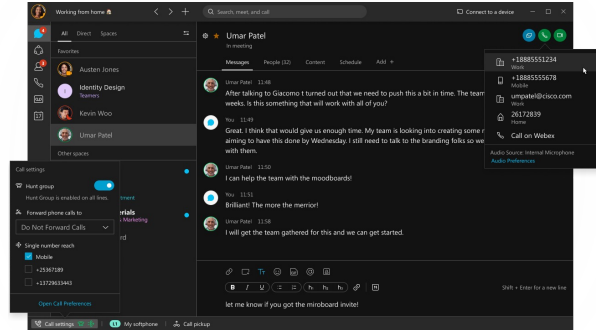
Virtual Line

Same user with multiple numbers assigned to their devices

Supported Devices



Cisco 8875



Webex App (Desktop) & Multi call window*

Version 42.12+ is required

* Multi call window is available on Windows OS only; Mac OS availability: roadmap



- Multiplatform Phones
- 840/860 Wireless Phones
- 2nd Line on DECT handset



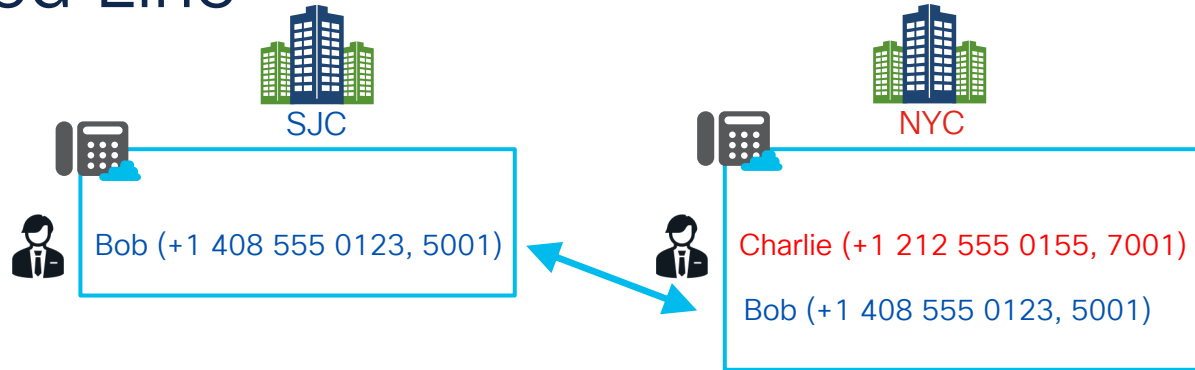
Supported Devices (Detailed)

Devices	Shared Line	Virtual Line
MPP (user)	✓	✓
Webex App	✓	✓
Wireless 840/860	✓	✓
Guest Profiles for Hot desking	✓	✓
DECT handsets	✓	✓
MPP (workspace)	✓	✗
ATA	✓	✗

Use Cases

- A contact center agent uses the primary line for normal/personal calls and uses the second line to login to a call queue or a contact center application
 - Caution: free/busy state of virtual line does not reflect whether user is engaged in call on primary line
- An employee at insurance agent's office uses/advertises a different line for each agency
- A corporate line is assigned as a shared line on multiple user devices. Users still have their primary line for normal-personal calls but can also make or receive calls from the corporate line.

Shared Line



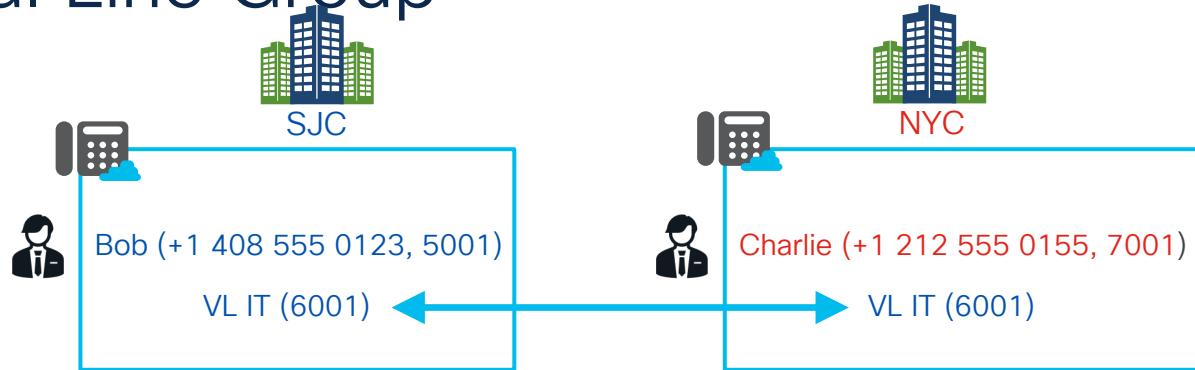
- Primary line of one user added as secondary line to another user's phone
- Charlie can place/receive calls on behalf of Bob
- **Can be across locations**
- Incoming calls to Bob's extension/TN signalled on all phones in parallel

Multiple Lines for One User



- Virtual line with addtl. extension/TN assigned to user's phone
- Can be from different location
- User can place/receive calls from/on either line
- Simple solution to enable user to assume different calling identities

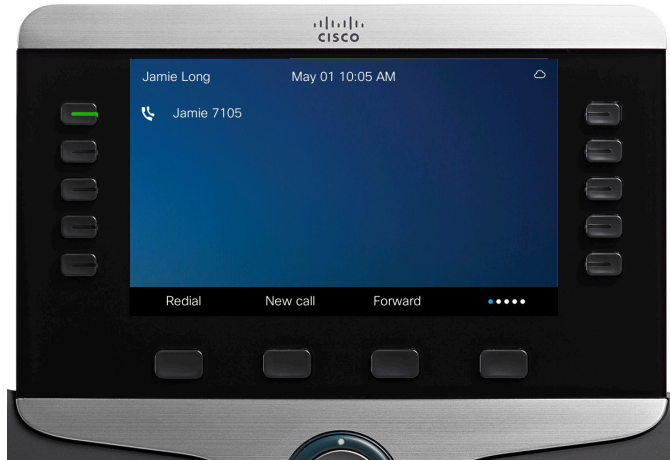
Virtual Line Group



- Same virtual line assigned as line on phone of different users
- VL has extension/TN in one location
- Can be across locations
- Incoming calls to VL extension/TN signalled on all phones in parallel
- All users can use VL to place call
- → simple/trivial group function

Shared Line Appearance

Jamie's Primary Line is configured as a Shared line on Dustin's phone



Jamie settings:

- Primary number: 7105, +1.....



Dustin settings:

- Primary number: 7103, +1.....
- Shared line appearance: Jamie's primary line is configured as shared line on Dustin's device: 7105, +1.....

Multiple Lines for User: Primary Line and Virtual Lines

The image shows a Cisco IP phone interface with a call log and a configuration window. The call log lists four lines: Dustin 7103, Dustin (Hartford), Dustin IT support (checked), and Jamie 7105. The configuration window, titled 'Configured Lines', shows a table of lines with columns for Line, Name, Location, Line Label, Number, and Extension.

Virtual line in different location

Virtual line, part of IT support call queue (can also be hunt group, shared line group)

Shared line, Jamie's primary line

Line	Name	Location	Line Label	Number	Extension
1	Dustin Harris	Frisco	Dustin 7103	972-0111	7103
2	Dustin Harris (Hartford)	Hartford	Dustin (Hartford)	570-0112	
3	Dustin CQ IT support	Frisco	Dustin IT support		8810
4	Jamie Long	Frisco	Jamie 7105	972-0104	7105
5					
6					

Will discuss challenges with virtual lines as agents later in this session

Webex App Multi Line Functionality

Support users who need more than one line

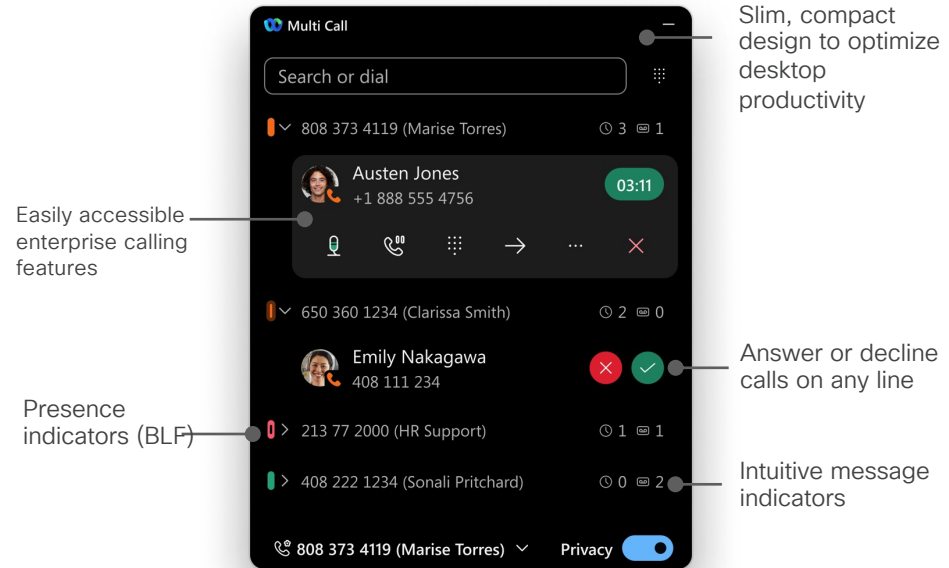
Users can select a line from any Webex Calling location

Line can be assigned to multiple devices

Each line has its own call settings, for example each line can have its unique caller id

Each line can be assigned independently to group calling functions - Call Queue, Group Call Pickup, Hunt Group, shared line groups

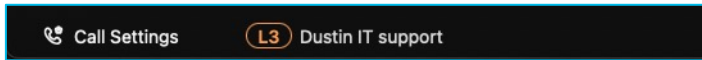
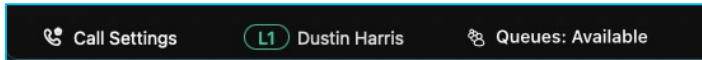
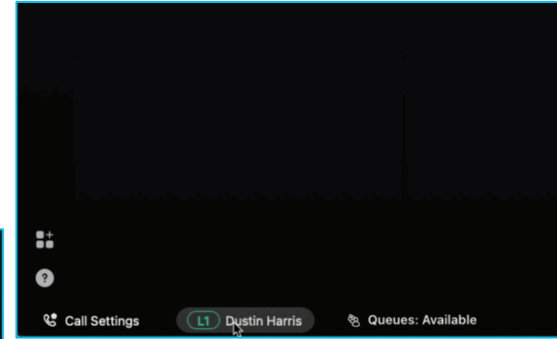
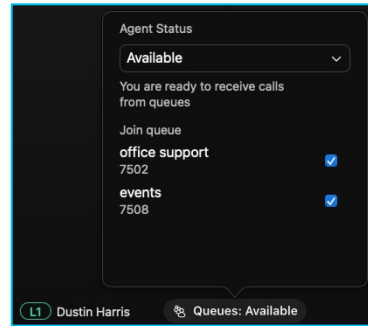
Set Unique Labels to help Identify different lines



* Not all features on Multi call window are supported with Webex calling
Multi call window available on Windows OS only; Mac OS availability: roadmap

Webex App Multi Line on MacOS

- User can select line for outbound call
 - If line is agent in a queue then (if configured) queue's caller id can be selected
- Agent state (signed in/out, available, unavailable) can be set
 - Agent state is synced with agent line on MPP
- Queues can be joined/unjoined selectively
- Agent functions (today) only available for 1st line on Webex app



Agent lines

Cisco Webex App · Dustin Harris PRIMARY

The lines available via the Webex App for this user are displayed below.

Line	Name	Line Label	Location
1	Dustin Harris	Default	Frisco
2	Dustin Harris (Hartford)	Dustin (Hartfor ✕)	Hartford
3	Dustin CQ IT support	Dustin IT suppr ✕	Frisco
4	Jamie Long	Jamie 7105 ✕	Frisco
5			

Configuring Virtual Lines

- New tab in calling section
- Virtual Lines can be added one by one or in bulk

The screenshot displays the Cisco Webex Control Hub interface. The top navigation bar includes the 'webex Control Hub' logo, a search bar, and user profile icons. The left sidebar contains navigation options: 'Apps', 'Account', 'Organization Settings', 'SERVICES', 'Updates & Migrations', 'Messaging', 'Meeting', 'Calling' (highlighted), 'Vidcast', and 'Connected UC'. The main content area is titled 'Calling' and features several tabs: 'Numbers', 'Locations', 'Virtual Lines' (with a 'New' badge), 'Call Routing', 'Managed Gateways', 'Features', 'PSTN', and 'Service Settings'. Below the tabs, a descriptive text states: 'A virtual line lets multiple phones use the same number, each with its own calling configurations.' and provides a link to 'Learn how virtual lines can enhance your business phone systems'. The interface includes a search bar, a filter dropdown set to 'All', and a location dropdown set to 'All Locations'. A '2 Virtual Lines' indicator is present. A 'Manage' dropdown menu is open, showing 'Add new' and 'Upload CSV' options. A table lists the configured virtual lines:

Name	Location	Phone number	Extension	Devices assigned	Actions
Dustin Harris	Hartford		6451	2	
Jamie Long V1	Hartford		7205	2	

Configuring Virtual Lines

- New tab in calling section
- Virtual Lines can be added one by one or in bulk

The screenshot shows the webex Control Hub interface. On the left, the 'Calling' section is selected in the navigation menu. The main content area shows the 'Virtual Lines' tab, which includes a search bar, a filter dropdown set to 'All', and a table with two entries: 'Dustin Harris' and 'Jamie Long V1', both located in 'Hartford'. A modal window titled 'CSV bulk manage Virtual line' is open on the right. It contains a dropdown menu with 'All available numbers' selected, and buttons for 'Download Data' and 'Download .csv template'. Below this, there is a dashed box for file upload with an upward arrow icon and the text 'Drag and drop a file to upload or'. At the bottom right of the modal are 'Cancel' and 'Upload' buttons.

Name	Location	Phone number
Dustin Harris	Hartford	
Jamie Long V1	Hartford	

Configuring Virtual Lines

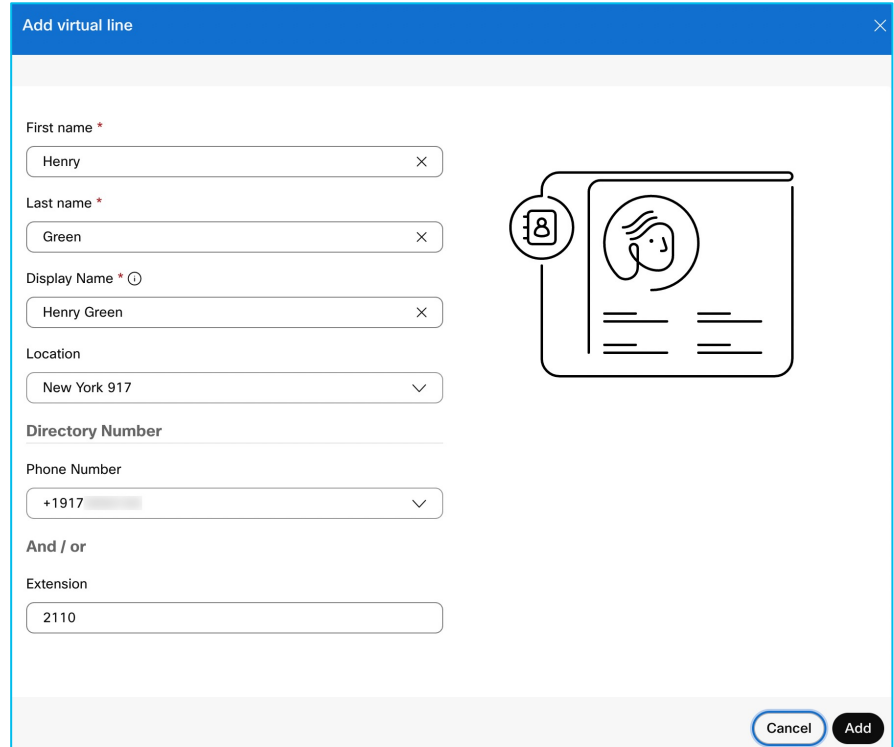
- New tab in calling section
- Virtual Lines can be added one by one or in bulk

The screenshot shows the webex Control Hub interface. The left sidebar contains navigation options like 'Apps', 'Account', 'Organization Settings', and 'SERVICES' including 'Calling'. The main content area is titled 'Calling' and has a 'Virtual Lines' tab selected. A modal window titled 'CSV bulk manage Virtual line' is open, showing a 'Download CSV data' section with a dropdown menu set to 'All available numbers' and buttons for 'Download Data' and 'Download .csv template'. Below this is a table of existing virtual lines.

First Name	Last Name	Display Name	Location	Phone Number	Extension
Dustin	Harris	Dustin Harris	Hartford		6451
Jamie	Long V1	Jamie Long V1	Hartford		7205

Adding a Virtual Line

- Name by which you can search the profile
- Assign TN and/or extension
TN cannot be toll free number
- An admin can also bulk upload using a csv file



Add virtual line

First name *
Henry

Last name *
Green

Display Name * ⓘ
Henry Green

Location
New York 917

Directory Number

Phone Number
+1917

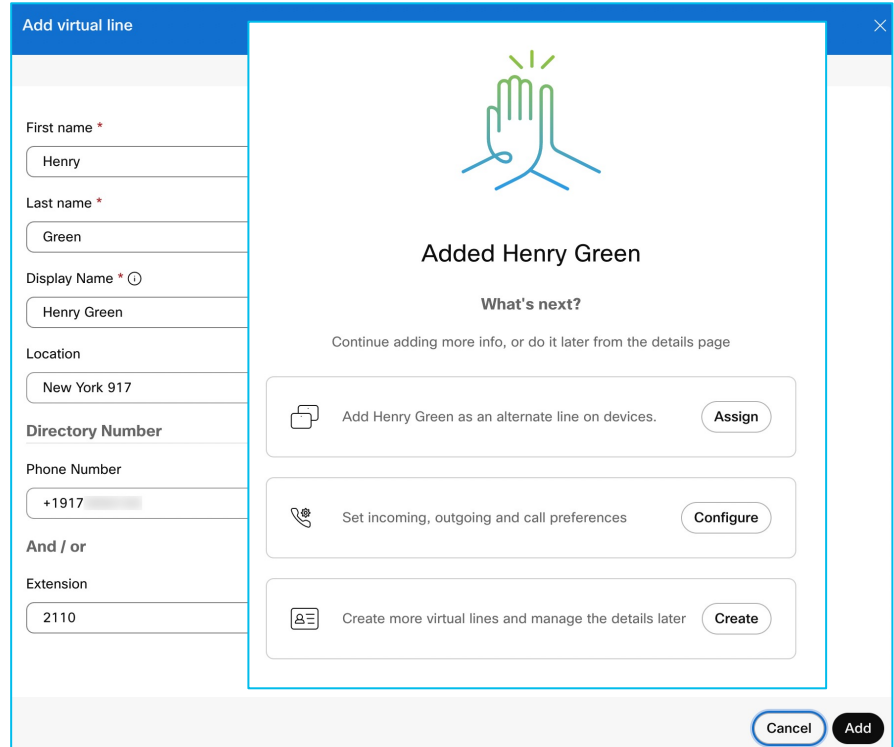
And / or

Extension
2110

Cancel Add

Adding a Virtual Line

- Name by which you can search the profile
- Assign TN and/or extension
TN cannot be toll free number
- An admin can also bulk upload using a csv file
- Next steps
 - Add virtual line as alternate (secondary) line to devices
 - Set permissions for virtual line
 - Create more virtual lines



The screenshot shows a web interface for adding a virtual line. On the left, a form is partially visible with the following fields:

- First name *: Henry
- Last name *: Green
- Display Name *: Henry Green
- Location: New York 917
- Directory Number
- Phone Number: +1917
- And / or
- Extension: 2110

On the right, a modal dialog titled "Add virtual line" is open, displaying a confirmation message:

Added Henry Green

What's next?

Continue adding more info, or do it later from the details page

Three action buttons are provided:

- Assign**: Add Henry Green as an alternate line on devices.
- Configure**: Set incoming, outgoing and call preferences.
- Create**: Create more virtual lines and manage the details later.

At the bottom of the modal, there are "Cancel" and "Add" buttons.

Virtual Line Settings

- Comprehensive set of calling settings for virtual lines
- Equivalent to user level settings

The screenshot displays the 'Calling' configuration page for a virtual line user named Henry Green. The page is organized into several sections, each with a list of settings and their current values, along with an 'Action' button for each setting.

Calling

Numbers Locations **Virtual Lines** New Call Routing Managed Gateways Features PSTN Service Settings >>

< Virtual Line

Henry Green 917 [redacted] - New York 917 Action

Overview **Calling** Devices

Numbers

- Caller ID User's phone number : 917 [redacted] >
- Emergency callback number User's phone number : +1917 [redacted] >

Voicemail, fax, announcement language and timezone

- Voicemail Enabled >
- Announcement language English >

Call handling

- Incoming call permissions Default settings >
- Outgoing call permissions Default settings >
- Call forwarding Not forwarding calls >
- Call waiting Receive another call during a call >
- Call intercept Disabled >

Between-user permissions

- Barge in Disabled >
- Call Bridging Warning Tone Enabled >
- Push-to-Talk Auto answer calls; Two-way; Allowed users >
- Privacy Allow dialed by extension, Allow dialed by first or last name, Disabled privacy >

Agent Settings

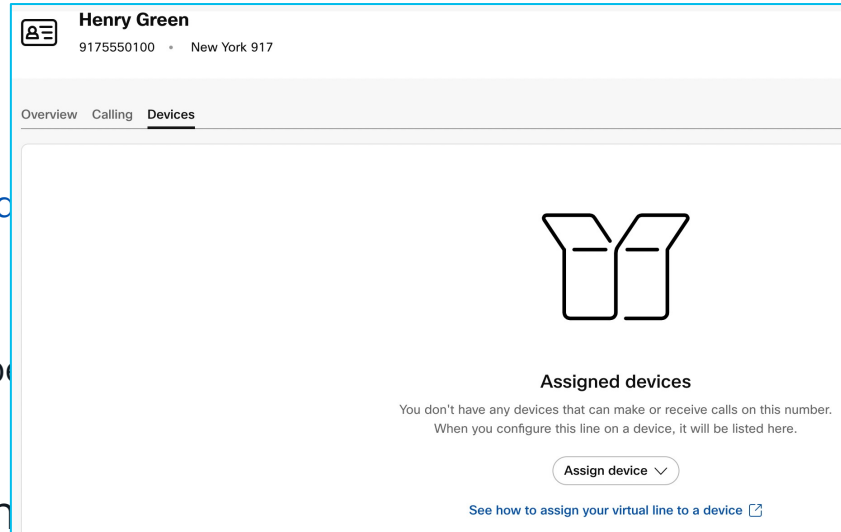
- Agent Call Queue ID >

Where/How to Use Virtual Lines

- Assign to devices
 - Assign from “Virtual Lines”
 - Select “Assign to Device”
 - Select a device from the dropdown or search for a specific user and number and assign to that user’s device
 - Assign from “Users”
 - Users/workspaces with a Webex Calling Basic license are excluded.
 - Assign to Webex app
- No cross-location limitations
- Virtual lines cannot be primary line
- No addtl. license required for virtual line

Where/How to Use Virtual Lines

- Assign to devices
 - Assign from “Virtual Lines”
 - Select “Assign to Device”
 - Select a device from the dropdown that user’s device
 - Assign from “Users”
 - Users/workspaces with a Webex app
 - Assign to Webex app
- No cross-location limitation

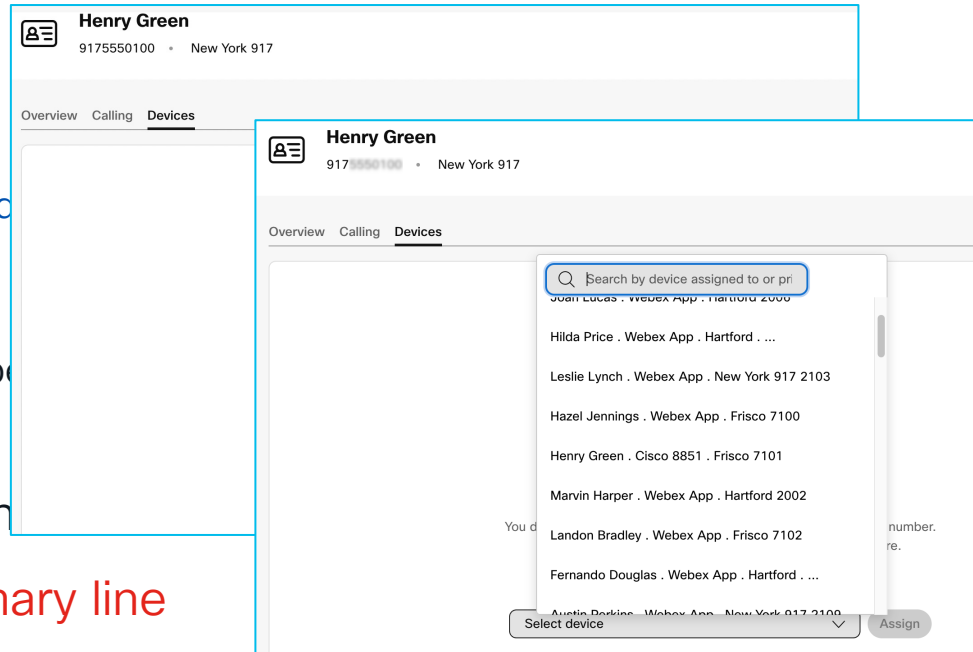


assign to

- Virtual lines cannot be primary line
- No addtl. license required for virtual line

Where/How to Use Virtual Lines

- Assign to devices
 - Assign from “Virtual Lines”
 - Select “Assign to Device”
 - Select a device from the dropdown that user’s device
 - Assign from “Users”
 - Users/workspaces with a Webex app
 - Assign to Webex app
- No cross-location limitation
- Virtual lines cannot be primary line
- No addtl. license required for virtual line



Where/How to Use Virtual Lines

- Assign to devices
 - Assign from “Virtual Lines”
 - Select “Assign to Device”
 - Select a device from the dropdown of that user’s device
 - Assign from “Users”
 - Users/workspaces with a Webex Calling device
 - Assign to Webex app
- No cross-location limitations
- Virtual lines cannot be primary lines
- No addtl. license required for virtual line

Configurable line label

Any location

Configured Lines Cisco 6851 • Elmer Lucas • Status unavailable

The users and workspaces that appear on this phone are displayed below in the order of appearance. Lines must be configured sequentially.

Configured Lines Customized Behaviors

Line	Name	Location	Line Label	Number	Extension
1	Elmer Lucas	SJC	Default	408	4880

Select User, Workspace or Virtual Line

Workspace with Webex Calling - Frisco - (Ext 1000)

Ken Alvarez - Frisco - (Ext 7108)

Jeanette Banks - New York 917 - (Ext 2106)

Carrie Bennett - Hartford - (Ext 2104)

Marlene Berry - Hartford - (Ext 2001)

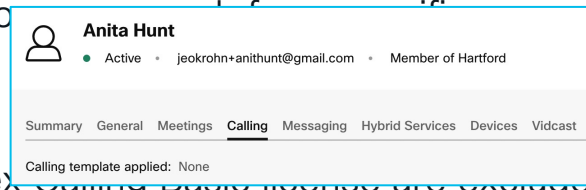
Landon Bradley - Frisco - (Ext 7102)

Glen Butler - New York 917 - (Ext 2107)

Heather Caldwell - Hartford - (Ext 2103)

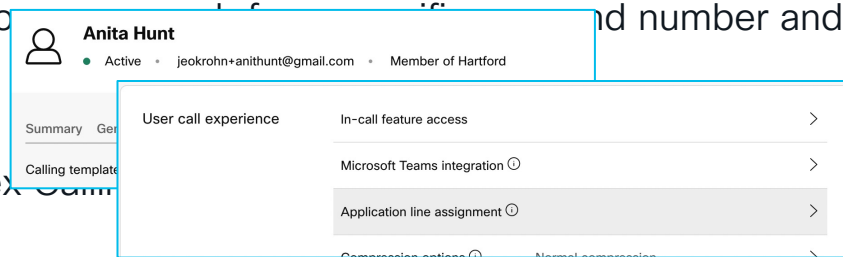
Where/How to Use Virtual Lines

- Assign to devices
 - Assign from “Virtual Lines”
 - Select “Assign to Device”
 - Select a device from the dropdown menu and assign to that user’s device
 - Assign from “Users”
 - Users/workspaces with a Webex Calling Basic license are excluded.
 - [Assign to Webex app](#)
- No cross-location limitations
- **Virtual lines cannot be primary line**
- **No addtl. license required for virtual line**



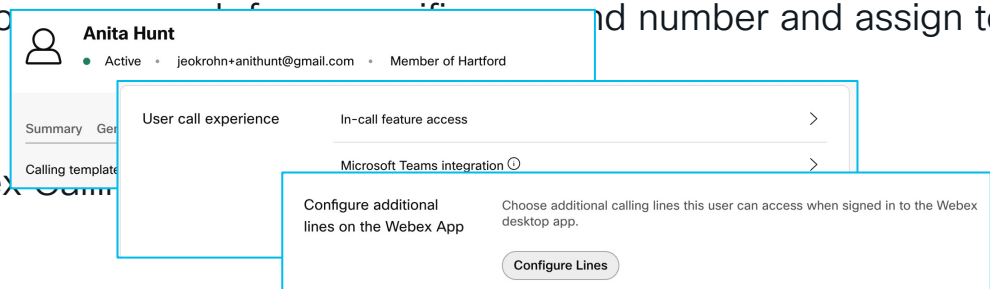
Where/How to Use Virtual Lines

- Assign to devices
 - Assign from “Virtual Lines”
 - Select “Assign to Device”
 - Select a device from the dropdown and number and assign to that user’s device
- Assign from “Users”
 - Users/workspaces with a Webex Summary Card
- [Assign to Webex app](#)
- No cross-location limitations
- Virtual lines cannot be primary line
- No addtl. license required for virtual line



Where/How to Use Virtual Lines

- Assign to devices
 - Assign from “Virtual Lines”
 - Select “Assign to Device”
 - Select a device from the dropdown and number and assign to that user’s device
 - Assign from “Users”
 - Users/workspaces with a Webex Summary Card
 - [Assign to Webex app](#)
- No cross-location limitations
- Virtual lines cannot be primary line
- No addtl. license required for virtual line



Where/How to Use Virtual Lines

- Assign to devices
 - Assign from “Virtual Lines”
 - Select “Assign to Device”
 - Select a device from the dropdown and number and assign to that user’s device
 - Assign from “Users”
 - Users/workspaces with a Webex Summary Page
- Assign to Webex app
- No cross-location limit
- Virtual lines cannot be
- No addtl. license required for virtual line

Configured Lines

Cisco Webex App · Anita Hunt PRIMARY

The lines available via the Webex App for this user are displayed below.

Line	Name	Line Label	Location	Number	Extension	Call Decline
1	Anita Hunt	Default	Hartford	575	2010	Decline on all devices
2						

Configurable line label

Any location

Where/How to Use Virtual Lines

- Assign to devices
 - Assign from “Virtual Lines”
 - Select “Assign to Device”
 - Select a device from the dropdown that user’s device
 - Assign from “Users”
 - Users/workspaces with a Webex Summary Card
 - Assign to Webex app
- No cross-location limit
- Virtual lines cannot be assigned to devices
- No addtl. license required for virtual line

The lines available via the Webex App for this user are displayed below.

Line	Name	Line Label	Location
1	Anita Hunt	Default	Hartford
Find by name or number			
Q			
Jeanette Banks - New York 917 - (Ext 2106)			
Carrie Bennett - Hartford - (Ext 2104)			
Marlene Berry - Hartford - (Ext 2001)			
Landon Bradley - Frisco - (Ext 7102)			
Glen Butler - New York 917 - (Ext 2107)			
Heather Caldwell - Hartford - (Ext 2103)			
Gwendolyn Chapman - Sacramento 916 - (Ext 1400)			
Hilda Chaoman - Hartford - (Ext 2008)			

Where/How to Use Virtual Lines

- Assign to devices
 - Assign from “Virtual Lines”
 - Select “Assign to Device”
 - Select a device from the dropdown or search for a specific user and number and assign to that user’s device
 - Assign from “Users”
 - Users/workspaces with a Webex Calling Basic license are excluded.
 - Assign to Webex app
- No cross-location limitations
- Virtual lines cannot be primary line
- No addtl. license required for virtual line

Features with Virtual Line Support

- Hunt Group: virtual lines can be assigned as agents
- Call Queue: virtual lines can be assigned as agents and supervisors
- Paging Group: virtual lines can be paging targets and originators
- Call Park Group: virtual line can park/retrieve and calls can be parked on virtual line
- Call Pickup Group: virtual line can pick up call to line that is member of the group; any line member of the group can pick up call to virtual line
- Virtual lines can be referenced for Auto Attendant menu options, ECBN, caller id

Limitations

- Unified call history: call history should appear on all devices that have a shared line appearance
- Call presence consistency: need to transition from lines based presence concept to “is the user on a call” (independent of device/line)
- DND consistency
 - user can set DND per line appearance on a phone
 - DND state set on shared line affects DND of “owner”
 - Owner and sharing user play ping-pong
 - Need to move to a user based DND concept

Emergency Calling Considerations

- Emergency calls depend on line context
 - Line's or virtual line's location determines routing of call
 - RedSky for RedSky enabled locations
 - Else location PSTN
- HELD/HELD+ is device specific; no line dependency
 - Whether call is routed to RedSky still depends on location (is location RedSky enabled?)
- ECBN selection depends on line or virtual line used to place the call
 - Virtual line TN
 - Location's default ECBN
 - TN of another virtual line or user in same location

Emergency callback
number

- User's phone number: +19175550100
- Location default ECBN: +19175550100
- Assigned number from user's location

Assigning Virtual Lines to Call Queue

Dedicated extension for Agent and Supervisor functions in Call Queue

Virtual lines can be defined as agents on specific call queues or can be defined as supervisors with a specific list of agents

Agents can sign-in/out and set their availability state to available/unavailable/wrap-up. Agents can also elect to join/unjoin an assigned call queue (if permitted). Calls to a call queue ultimately get distributed to agents that are available and joined. Agents can set their availability state using a soft-key on a desk phone. The agents can also use the Webex App to set the availability status or join/unjoin a call queue when the virtual line is assigned to the App

Supervisors can use FACs from the virtual line to invoke supervisory functions such as monitoring, coaching, barge-in

Name	Phone Number	Extension	Joined
Bob DemoTest2 (Ext 5077)			
Bob Smith (+17035551233, Ext 9773)			
Charlie Smith	9198871061	1061	<input checked="" type="checkbox"/>
Sanjay Sinha	9198871109	1035	<input checked="" type="checkbox"/>

Supervisor Name	Number of Assigned Agents	Primary Number	Extension	Actions
Sanjay Sinha (Supervisor)	3	+19198871061	1061	
Bob DemoTest2			5077	
Demo Test2Account			1644	
Demo TestDemo		+19198871117	1117	

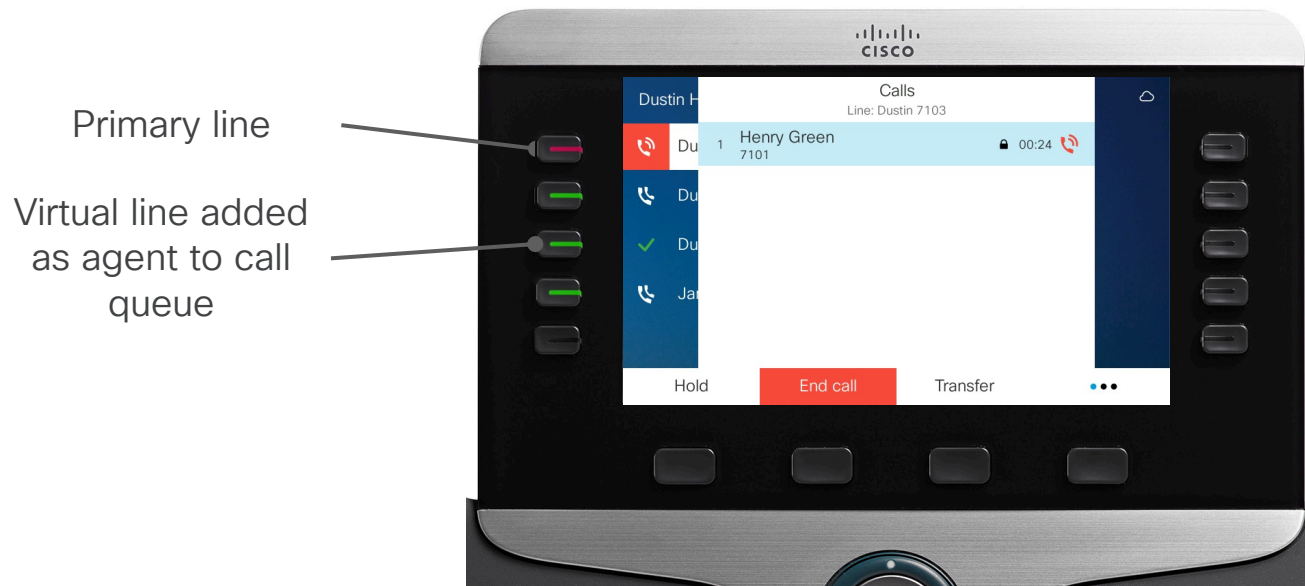
Virtual Line as Agent Line

Agent Availability



Virtual Line as Agent Line

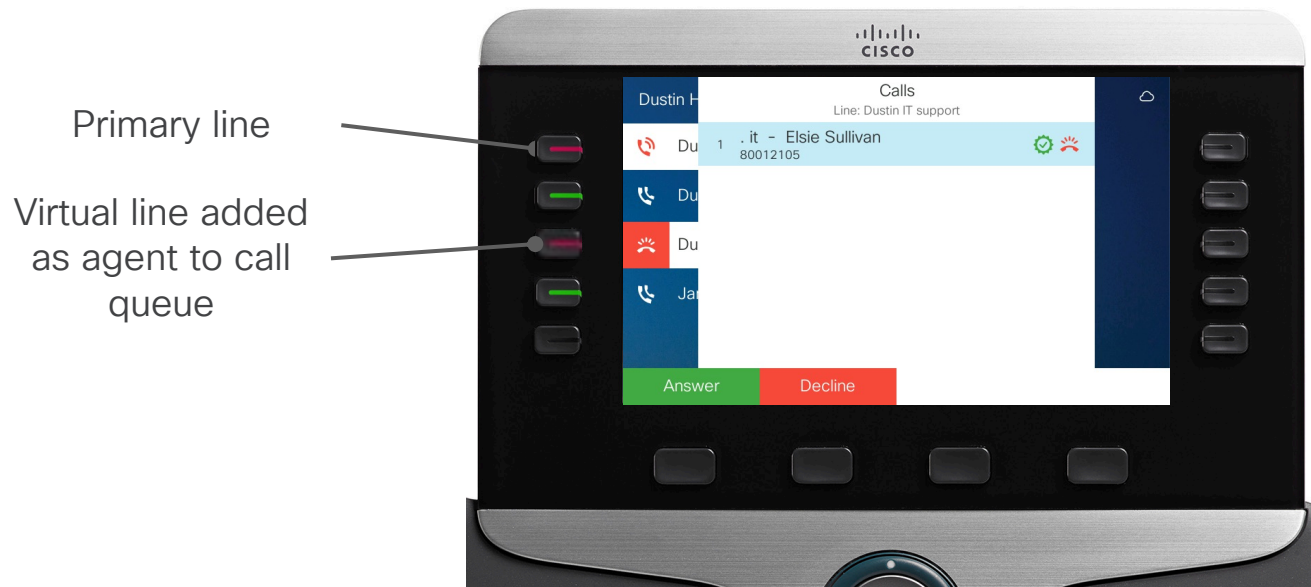
Agent Availability



Dustin is in a call on the primary line

Virtual Line as Agent Line

Agent Availability



Incoming call to call queue is still presented (silently); moved to next agent in queue if declined. Active call placed on hold if answered.

Virtual Line as Agent Line

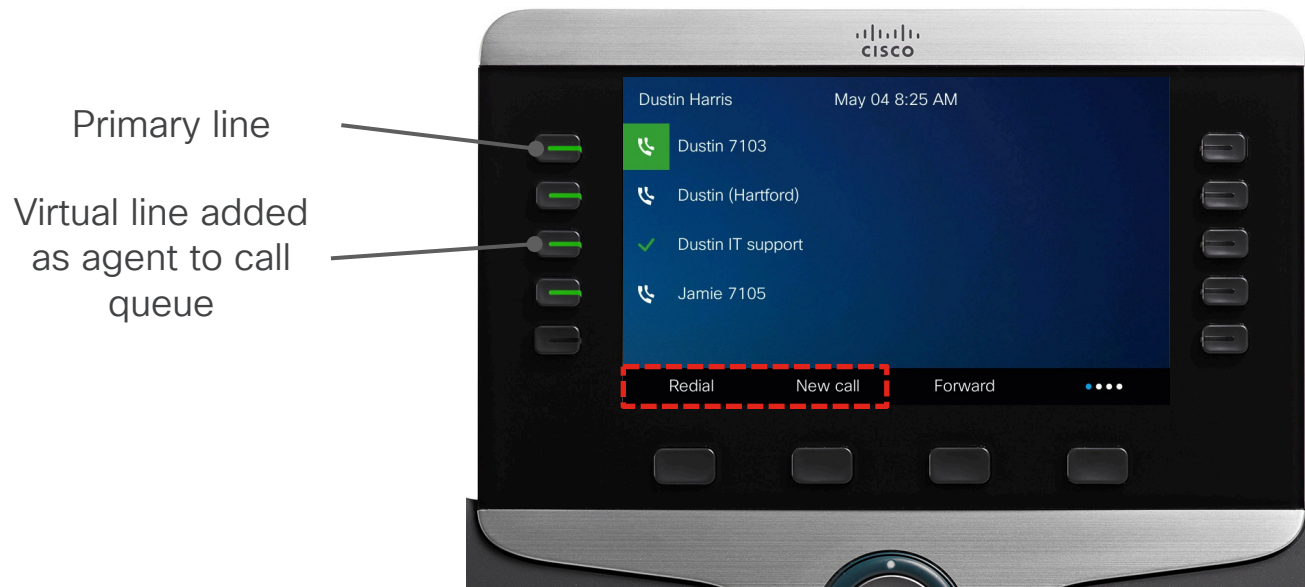
Agent Availability

- Active call on different line on a phone not considered for agent availability of different (virtual) line on same phone
- With multiple virtual lines on the same phone in different queues this can easily become confusing
- → recommendation: avoid multiple virtual agent lines on one phone



Virtual Line as Agent Line

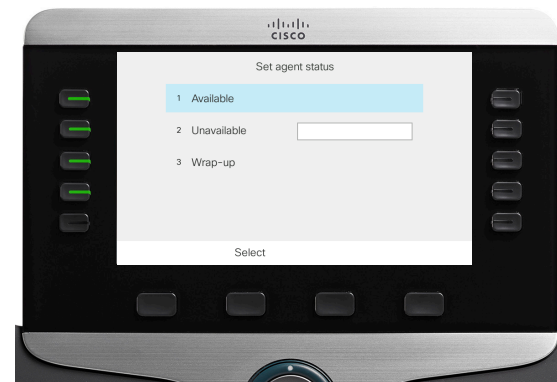
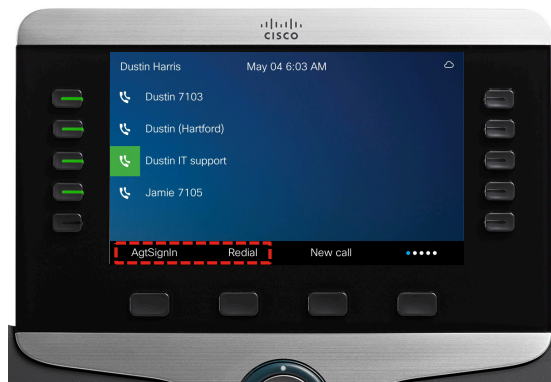
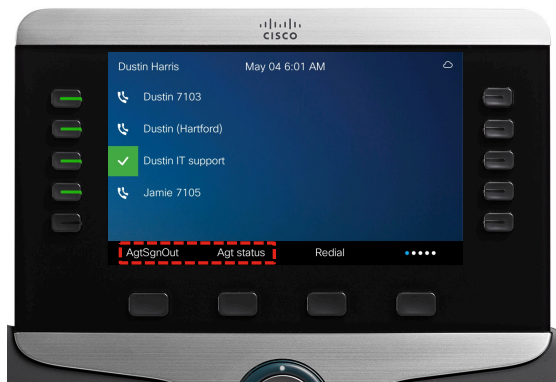
ACD softkeys per line



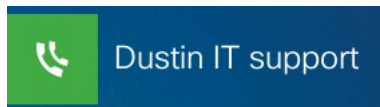
Agent softkeys appear when an agent line is selected

Virtual Line as Agent Line

ACD softkeys per line

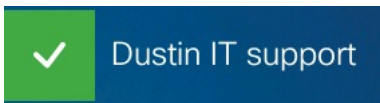
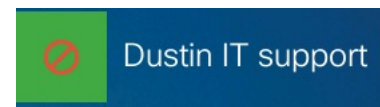


Can sign in/out and set status



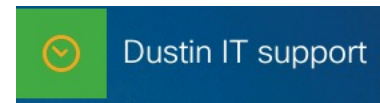
Not signed in

Signed in, unavailable



Signed in, active

Signed in, wrap-up

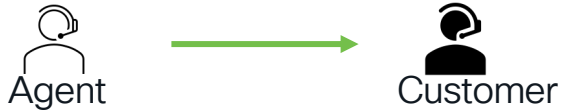


Design Considerations: Virtual Lines in Queues

- Availability of a virtual line “agent” solely based on whether the line is engaged in a call
 - Not whether the user is busy talking on a different line on the phone
- If the virtual line is in a call on any phone no further calls from call queue get extended to that agent virtual line
 - ... Even if the virtual line is shared across multiple phones
- Agent sign in/out and agent status softkeys on phones work per line
 - MPP agent can sign in/out and set status per line
 - .. MPP agent can't join/unjoin queues

Proper callback number for outbound call support

Allows agents to make outgoing calls using CLID of a call queue

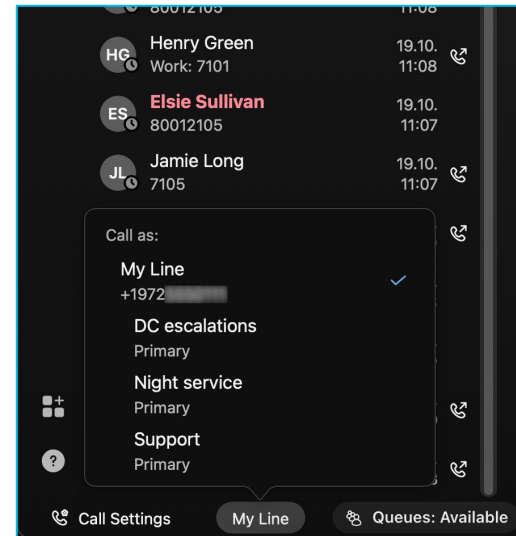


For customer callbacks, staff can present the business CLID of their call queue

- If you don't want the customer to call staff directly
- And want the customer to have the ability to reach an available, qualified staff member

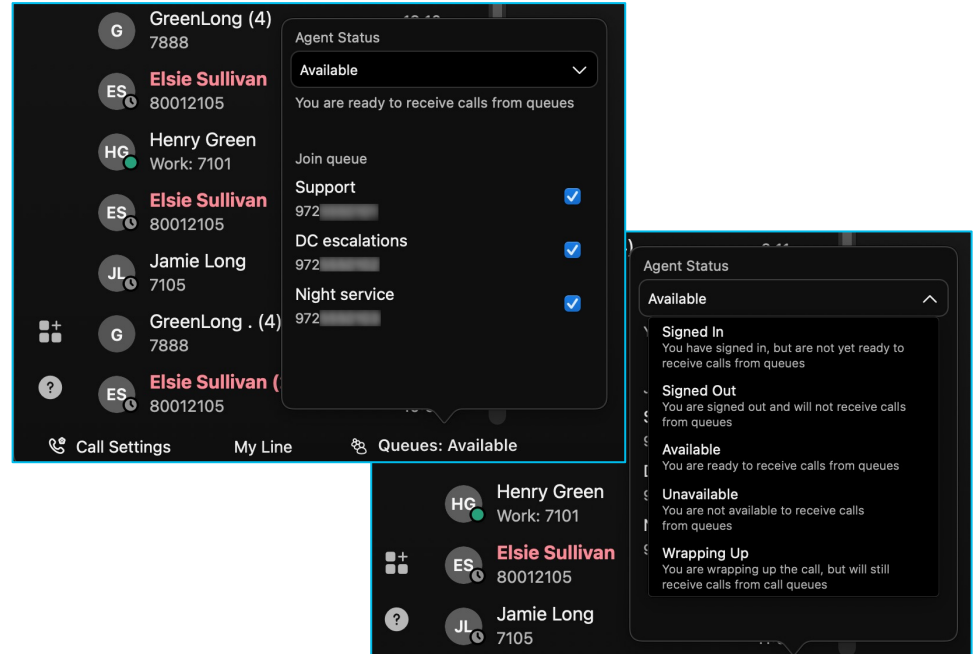
FAC codes

Agent uses FAC Code to “override” the persistent configuration or input the queue CLID desired to be sent.



Agent Join/Unjoin for specific call queues

- Allows agents to indicate which queues to receive / not receive a call from
- Administrators configure in Control Hub
- Agents may configure in App
- Improves user experience for agents



Agent: Phone vs. Webex App

MPP	Webex App
Multiple agent lines “challenging”	Multi line only available on Windows .. for now
Agent can only set state (sign in/out, available, unavailable) per line; affects all queues	With multiple queues on one line agent can selectively join/unjoin queues*
Queue caller id selection w/ FAC codes only	Queue caller ID selectable**

*MacOS: only 1st line

**MacOS: queue caller id can only be selected for agent line on 1st line

API Support

- Existing endpoints for queues, hunt, ... extended members
- Including endpoints to get available members

Update a Call Park

Update the designated Call Park.

Call Park allows call recipients to place a call on hold so that it can be retrieved from another device.

Updating a call park requires a full administrator auth token with a scope of `spark-admin:telephony_config_write`.

NOTE: The Call Park ID will change upon modification of the Call Park name.

```
PUT /v1/telephony/config/locations/{locationId}/callParks/{callParkId}
```

agents

array[string]

Array of ID strings of people, workspaces and virtual lines that are added to call park.

Get Details for a Call Park

Retrieve Call Park details.

Call Park allows call recipients to place a call on hold so that it can be retrieved from another device.

Retrieving call park details requires a full or read-only administrator auth token with a scope of `spark-admin:telephony_config_read`.

NOTE: The Call Park ID will change upon modification of the Call Park name.

```
GET /v1/telephony/config/locations/{locationId}/callParks/{callParkId}
```

agents

array[GetPersonPlaceVirtualLineCallParksObject]

People, workspaces and virtual lines that are eligible to receive calls.

type

enum

Type of the person, workspace or virtual line.

PEOPLE

string

Indicates that this object is a user.

PLACE

string

Indicates that this object is a place.

VIRTUAL_LINE

string

Indicates that this object is a virtual line.

API Support

- New endpoint to list existing virtual lines
- Missing:
 - Endpoints to create/update virtual lines
 - Endpoints for virtual line calling settings

Read the List of Virtual Lines

List all Virtual Lines for the organization.

Virtual line is a capability in Webex Calling that allows administrators to configure multiple lines to Webex Calling users.

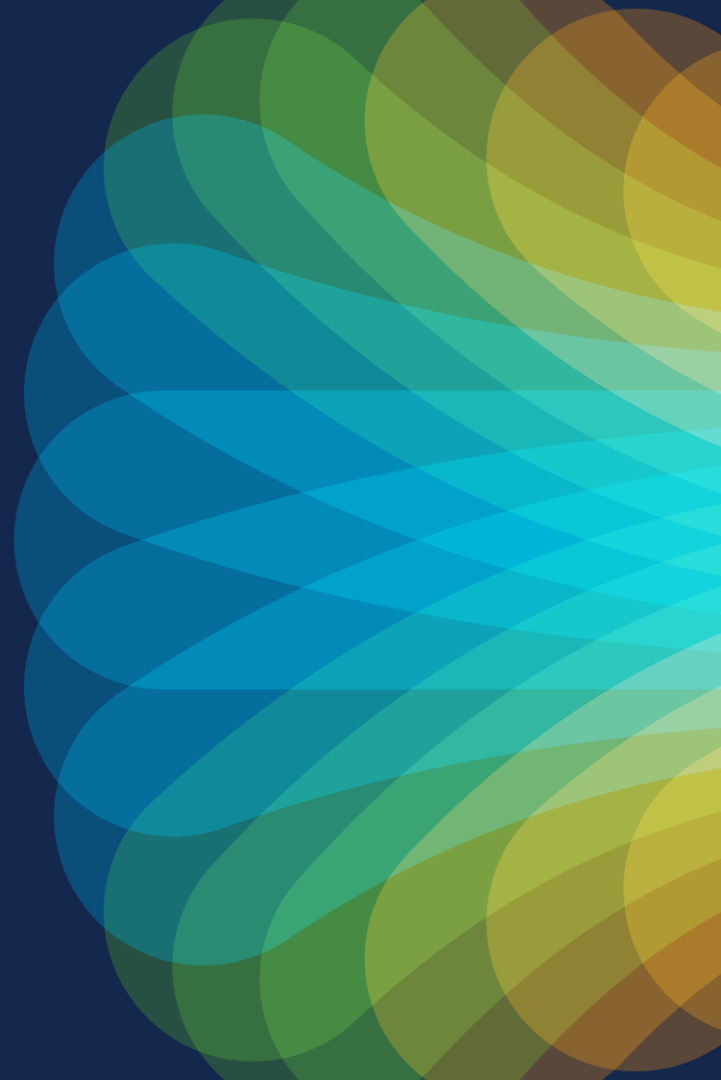
Retrieving this list requires a full or read-only administrator auth token with a scope of `spark-admin:telephony_config_read`.

GET `/v1/telephony/config/virtualLines`

Additional resources available

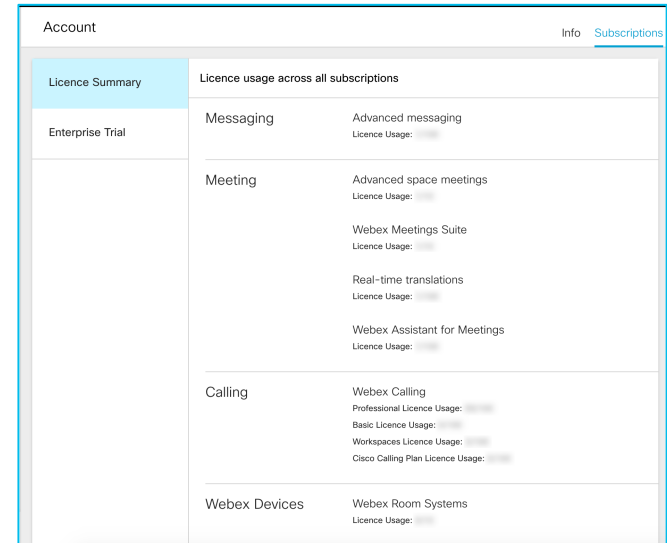
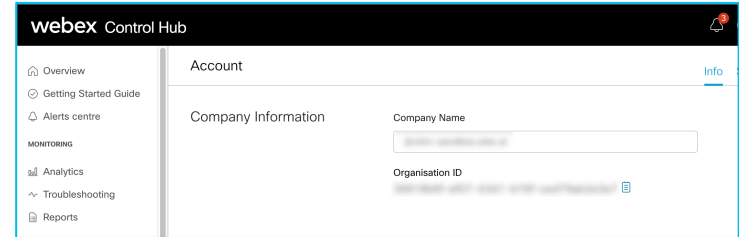
- [Configuration of shared lines and virtual lines across locations](#)
- [Comparison of call routing methods](#)

Deploy



Webex Org

- Create production Webex Org (or verify)
- Check licenses (add if required)
 - Make sure that required licenses are available
 - Requires prior assessment ... and potentially re-assessment during discovery phase
 - Check expiration (if starting as trial)



Setup prior to Calling Migration

- Domain verification/claim
- License templates
- User provisioning
 - Directory Connector, SCIM, CCUC, CSV, manual, API
- SSO

User Migration or Provisioning

Webex User Provisioning

- Users **must** be in Webex Control Hub to consume Webex services
- Users **must** be in the Webex Directory service to be searchable
- **Maintain** an up-to-date and accurate Webex user directory
 - ❖ User provisioning is **CRITICAL** for the correct user experience of the Webex App
- Reference Links:

[Ways to add users to your Control Hub organization](#)

[Add Users Manually in Control Hub](#)

[Edit Service Licenses in Control Hub for Individual Users](#)

[Add Multiple Users in Control Hub with the CSV Template](#)

[Modify Users in Control Hub with the CSV Template](#)
[People API](#)

License Management

- Assign licenses to users for each workload

Messaging

Modify organization licenses assignment
Select the license you want to assign to your users.

- Messaging 2
- Meeting 4
- Calling 1
- Contact Center 0
- Hybrid Services 1

Subscription: Basic Messaging
 Basic Messaging

Subscription: Enterprise Trial
 Advanced Messaging
511 of 1000 assigned

Meetings

Modify organization licenses assignment
Select the license you want to assign to your users.

- Messaging 2
- Meeting 2
- Calling 2

Subscription: Basic Space Meetings
 Basic Space Meetings
Obsolete

Subscription: Enterprise Trial

Webex space meeting

Advanced Space Meetings
8 of 50 assigned
Obsolete

Webex Assistant for Meetings
8 of 50 assigned

Real-Time Translations
0 of 50 assigned

cb14301a.webex.com

Webex Meetings Suite
 Webex Meetings Suite
8 of 50 assigned

Calling

Modify organization licenses assignment
Select the license you want to assign to your users.

- Messaging 2
- Meeting 2
- Calling 2

Subscription: Call on Webex (1:1 call, non-PSTN)
 Call on Webex (1:1 call, non-PSTN)

Subscription: Register to Unified Communications Manager (UCM)
 Register to Unified Communication Manager (UCM)

Subscription: Enterprise Trial

Webex Calling 1

Professional

License Management

License Assignment options:

- Entire Org and/or
- By Groups
- By User
(will override Org
or Group based license
assignments)

The screenshot shows the 'Users' management page with the 'Licenses' tab selected. Under 'License assignments', there are two main options:

- Organization-based licenses:** Assign licenses to your entire organization. You'll assign all new and existing users with services required for your organization. A 'Set up' button is visible.
- Group-based licenses:** Assign groups of users with specific collaboration services. **Users in groups can combine organization and group-based as a union of licenses.** For more help, see [how do license assignments work](#). A 'Manage' button is visible.

Below these options, there is a toggle for 'Preserve licenses for users joining another group' which is currently turned on. A note states: 'In addition to their new licenses, users that joined different groups will keep their previous group licenses.'

The screenshot shows the user profile for 'Allison Andrews' with the 'Licenses' tab selected. The user's assigned licenses are listed as follows:

License Category	Assigned Licenses
Messaging	Basic Messaging Advanced Messaging
Meeting	Basic Space Meetings Advanced Space Meetings Webex Meetings Suite sfly-gasandbox.webex.com Host Account
Calling	Call on Webex (1:1 call, non-PSTN)

An 'Edit Licenses' button is located at the bottom of the page.

Auto License Templates

Use License Templates to “**auto**” assign the collaboration services to users

- Automates & simplifies user onboarding and license management
 - New user accounts automatically licensed for selected services

• License updates/changes can be for:

- New users only
 - or --
- New and existing users

Management > Users >

Licenses

Apply scope

- Future users
- Existing users
- Preserve licenses for existing users
When enabled, existing users will keep the assigned licenses from the previous assignment.

• Reference Links:

- [Set Up Automatic License Assignment Templates in Cisco Webex Control Hub](#)

Auto License Templates

For Webex Calling Users

- To “auto” assign a Webex Calling license to a user, the user’s E.164 work phone number **must first** be:
 - Added to Control Hub
 - Assigned to the correct location
 - Not assigned to another user or service
 - Active
- Users can be updated after provisioning to add Webex Calling licenses using the template or manually

[Set up automatic license assignment templates for Webex Calling users](#)

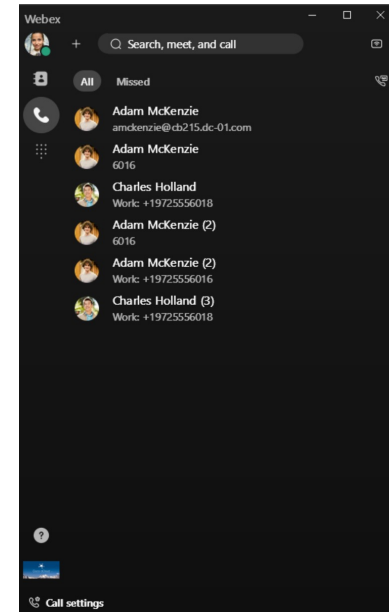
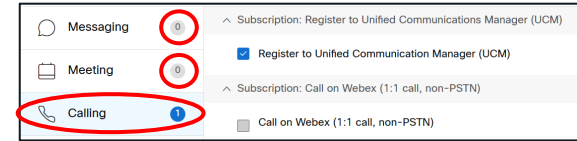
The screenshot shows the Cisco Control Hub interface for the 'Calling' section. The 'Numbers' tab is selected, displaying a table of phone numbers. The table has columns for Phone Number, Extension, Location, Assigned to, and Status. Two phone numbers are listed: +1325551315 and +14695771380, both with the location 'RCDN' and status 'Active'.

Phone Number	Extension	Location	Assigned to	Status
+1325551315		RCDN		Active
+14695771380		RCDN		Active

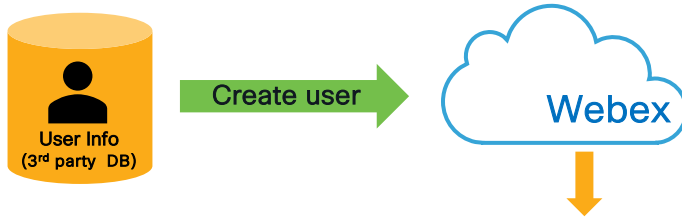
Service Entitlement

- Check/uncheck licenses within each service
 - **Calling ONLY client** - remove the messaging and meetings services
 - **Meetings ONLY client** - remove the messaging and calling services
- **BEWARE!**
 - Removing messaging will also remove space meeting functionality (e.g. scheduling)
 - Users existing messages/files will be retained as per your orgs retention policy

Calling Only Client



Webex User Provisioning



The screenshot shows the 'webex Control Hub' interface. The 'Users' section is active, displaying a list of users with columns for 'First / Last name', 'Email', and 'Status'. The list includes Adam McKenzie, Anita Perez, Charles Holland, Eric Steele, and Kellie Melby. A search bar and filter options are visible above the list.

First / Last name	Email	Status
Adam McKenzie	amckenzie@cb143.dc-01.com	Verified
Anita Perez	aperez@cb143.dc-01.com	Active
Charles Holland	cholland@cb143.dc-01.com	Active
Eric Steele	esteele@cb143.dc-01.com	Active
Kellie Melby	kmelby@cb143.dc-01.com	Active

Webex User Attributes

- **avatar**
- buildingName
- c
- departmentNumber
- **displayName**
- ds-pwp-account-disabled
- employeeNumber
- employeeType
- externalID
- facsimileTelephoneNumber
- **givenName**
- jabberID
- l
- locale
- **manager**
- **mobile**
- o
- ou
- phoneNumbers;type-work_extension
- physicalDeliveryOfficeName
- **postalCode**
- preferredLanguage
- pronoun
- sipAddresses;type-enterprise
- sn
- **st**
- **Street**
- **telephoneNumber**
- timezone
- **title**
- **uid***

* = Required
Bold = Recommended



★ = Recommended

Webex User Provisioning Options

	Method	Description
★ Microsoft Environments	Directory Connector	Automatic method for creating, updating and deactivating user accounts and groups via Active Directory or AD LDS
	Azure AD Wizard	Automatic method for creating, updating and deactivating user accounts via Azure AD
★ Non-Microsoft Environments	SCIM (Okta, Azure AD App)	Automatic method for creating, updating and deactivating user accounts using SCIM-based IDPs
	CUCM User <u>Sync</u> ¹ /Import	Create Webex user accounts based on CUCM end-users
Secondary Considerations	CSV file	Admin can create and update users by importing a CSV file into Control Hub. Bulk user management.
	API	Admin can create, update delete and list users by using Webex API's. Use own or 3 rd party scripts/tools for user management
	SAML JIT	Automatic account creation based on SSO login
Additional Options	Manual	Admin can use Control Hub to manage individual user accounts
	Self Registration	User can self register to create their Webex account in a claimed org
	Social Login	Automatic account creation via sign in to third party service for claimed domain (Apple, Google, Facebook, Microsoft)
	Meetings Site User Linking	Automatically link Site Admin user accounts to Control Hub

Webex User Provisioning - Comparison

Other Options

	Manual Provisioning	Control Hub Tool	Bulk Provisioning (CSV)	API
Moves, Adds, Changes	-- Users one-by-one	o Multiple users	+ Multiple users	++ Multiple users (based on integration)
Ease of use	++	+ Initial setup to configure	o Process setup (data source, data format, ..)	-- Learning curve, requires DevOps to integrate
Infrastructure Requirements	++ None	o CCUC	+ CSV files	-- Servers for coding and integration
Flexibility	++	o Customization possible (users, groups & org contacts)	+ Managing CSV file	++ Increased API for more options
Integration into business processes	None	None	Possibly limited integration via customized data export/import	Tight integration possible

++ Highly Positive Impact
+ Positive Impact

o Neutral Impact

- Negative Impact
-- Highly Negative Impact

Webex User Provisioning - Comparison

Directory Sync Options

	Sync from On-prem AD Director Connector	Sync from Azure AD Azure AD Wizard *	Sync from Azure AD Azure AD App (SCIM)	Sync from Okta Directory Okta (SCIM)
Moves, Adds, Changes	++ Automatic - Based on sync schedule	++ Automatic - Immediate in Control Hub	++ Automatic - Immediate in Control Hub	++ Automatic - Immediate in Control Hub
Ease of use	- Initial setup required with on-prem Windows Server	++ All configurations done in Control Hub	+ Setup in Control Hub and Azure AD	+ Setup in Control Hub and Okta tenant
Infrastructure Requirements	o Directory Connector	++ None	++ None	++ None
Flexibility	+ Customization possible (groups, avatars, attribute mapping)**	+ Customization possible (groups, avatars, attribute mapping)	o Limited attributes (attribute mapping; no groups or avatars)	- Minimum attributes possible (~8 attributes; no attribute mapping, groups or avatars)
Integration into business processes	Yes, if users are managed by Active Directory	None	None	None

++ Highly Positive Impact
 + Positive Impact

o Neutral Impact

- Negative Impact
 -- Highly Negative Impact

Converting Users

- Admin can convert users belonging to other orgs (including free org) to org users
- Based on email address domain
 - Requires email domain verification (or claim)
- Immediate or delayed claim
- Claim only possible if directory sync is not enabled
- License assignments checked/updated as part of the conversion process

[https://help.webex.com/en-us/article/nceb8tm/Claim-users-to-your-organization-\("convert"-users\)](https://help.webex.com/en-us/article/nceb8tm/Claim-users-to-your-organization-()

<https://help.webex.com/en-us/article/e4ektc/Disable-Delayed-Claim-for-Your-Organization>

“Claimed” and “Verified” Domains

- Control hub allows to “claim” and “verify” domains
- Domains can be verified via Control Hub (DNS validation via TXT record)

Domains

Domains

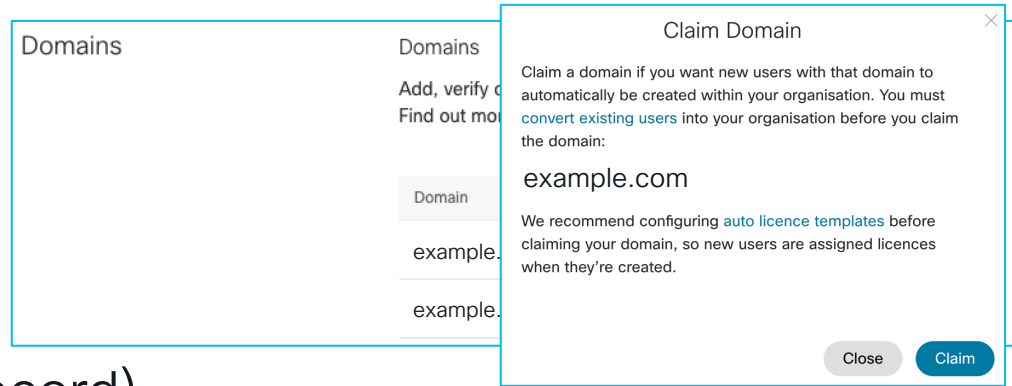
Add, verify or claim domain for added security in your organisation. Find out more about the add, verify and claim domain process [here](#).

Domain	Status	
example.com	● claimed	...
example.org	● verified	...

<https://help.webex.com/en-us/article/cd6d84/Manage-your-domains>

“Claimed” and “Verified” Domains

- Control hub allows to “claim” and “verify” domains
- Domains can be verified via Control Hub (DNS validation via TXT record)
- Domain claim requires that domain has been verified before



<https://help.webex.com/en-us/article/cd6d84/Manage-your-domains>

”Claimed” and “Verified” Domains

- Verified domain
 - Users w/ email addresses from verified domains can be converted to licensed users from consumer organization
 - To avoid “pending” users domain (at least) needs to be verified
- Claimed domain
 - New users with email addresses w/ that domain can only be added to organization for which the domain has been claimed
 - Users existing before claim are not affected
 - Make sure to convert* existing users
 - Automatic user activation requires claimed domain (and SSO)

[https://help.webex.com/en-us/article/nceb8tm/Claim-users-to-your-organization-\(%22convert%22-users\)](https://help.webex.com/en-us/article/nceb8tm/Claim-users-to-your-organization-(%22convert%22-users))

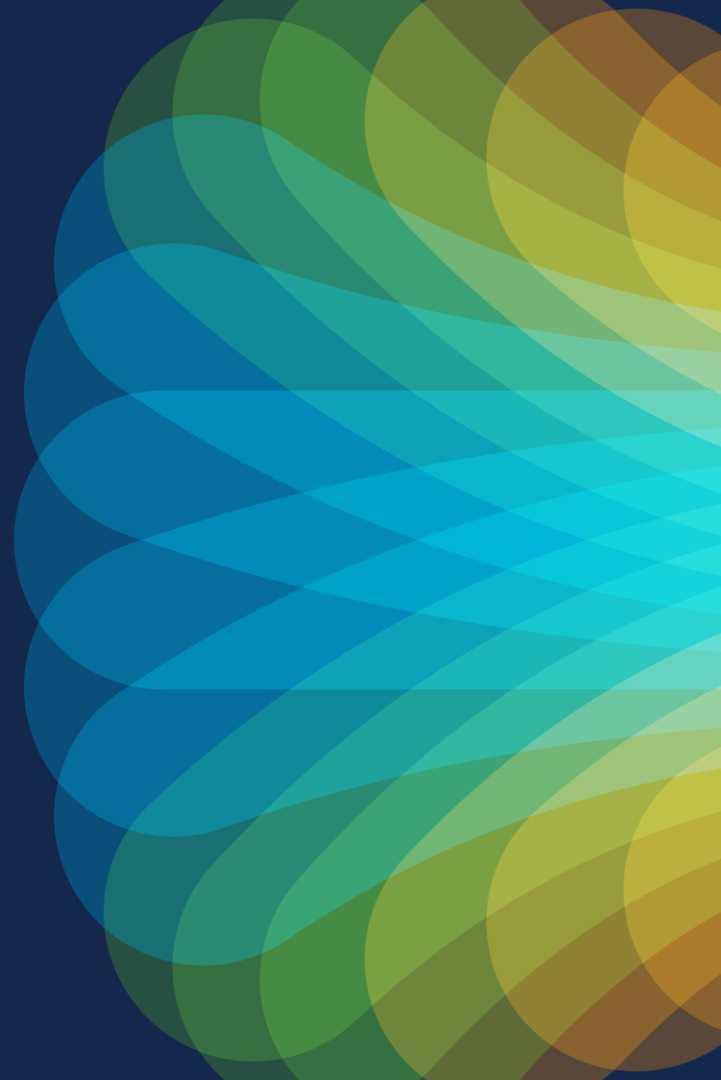


“Claimed” vs “Verified”

	Verified Domain	Claimed Domain
Process	Control Hub, DNS based validation (TXT record)	Verify 1 st , then claim
Exclusive	Domain users can exist in and can be added to other organizations	Domain users can not be added to other organizations Domain users existing prior to claim are not affected
Sideboarding	Domain users can be sideboarded into consumer organization	into customer organization, can be disabled* w/ Directory Connector: no sideboarding!
Conversion	Domain users can be converted from consumer organization Delayed conversion if email domain is not verified nor claimed	
Directory Connector	Can add users from domain	Can add users from domain

*<https://help.webex.com/en-us/article/nfiu0ed/Prevent-Users-from-Self-Registering-with-your-Domain>

Migrate



Migrate UCM to Webex Calling: Tools

CCUC-powered

I want to explore Webex...

User + Org Contact Migration

Provision End Users and Org-level Contacts in Webex Identity and Contacts Service.

- UCM BAT CSV to Control Hub (enduser data)
- Control Hub – new Bulk Admin for Org Contacts
- (beta) CCUC agent sync to Webex backend

CCUC-powered

I'm ready to use the Webex App...

Jabber to WxApp Migration

Stay on-premises UCM, migrate Jabber's messaging, meetings to the cloud.

- Control Hub - basic Jabber deployment insights
- UCM BAT CSV to Control Hub (Jabber config)

I want to personalize my Webex app...

Personal Contact Migration

Make personal contacts from Jabber available in Webex App.

- IMP BAT CSV to Control Hub (custom contacts)

I'm ready to move to Webex Calling!

UCM to WxCalling Migration

Entitle users, devices, locations and phone numbers from UCM in Webex Calling.

- UCM BAT CSV to Control Hub (UCM config)

I want to use my Cisco device for Webex Calling...

Phone Firmware Migration

Migrate Cisco IP phone enterprise firmware to the Webex Calling-ready MPP firmware.

- Simplified experience via Control Hub

I want to configure detailed Webex Calling services...

APIs, CSV, Bulk Admin

Take advantage of multiple tools available to customize your Webex experience.

- Webex Calling – new Provisioning APIs
- Control Hub – new Bulk Admin CSV options

Tools Supporting Migrations

- Control Hub migration tools: users, numbers, devices
- Webex API support
- Batch operations

People

People are registered users of Webex Teams. Searching and viewing People requires an auth token with a scope of `spark:people_read`. Viewing the list of all People in your Organization requires an administrator auth token with `spark-admin:people_read` scope. Adding, updating, and removing People requires an administrator auth token with the `spark-admin:people_write` scope.

To learn more about managing people in a room see the [Memberships API](#). For information about how to allocate Hybrid Services licenses to people, see the [Managing Hybrid Services](#) guide.

Method	Description
GET https://api.ciscospark.com/v1/people	List People
POST https://api.ciscospark.com/v1/people	Create a Person
GET https://api.ciscospark.com/v1/people/personId	Get Person Details
PUT https://api.ciscospark.com/v1/people/personId	Update a Person
DELETE https://api.ciscospark.com/v1/people/personId	Delete a Person

Bulk Add Devices

Export the current user attributes (optional), download and edit the CSV file, and then import the edited version to bulk add devices.

Export
Export user attributes or download CSV template

File ready for import
add 2 phones activation code.csv
Remove File

```

1 {
2   "id": "Y2lyZjZscGFyZzovL3VlL1BFT1R9S0R0TlMhTGJlNCJlTkd1LTZkZmY1YThNS0h0MEJkx1ZTYyYTYg",
3   "email": {
4     "j.krohn@cisco.com"
5   },
6   "phoneNumbers": [
7     {
8       "type": "work",
9       "value": "9195555555"
10    }
11  ],
12  "displayName": "Johannes Krohn",
13  "nickName": "Johannes",
14  "firstName": "Johannes",
15  "lastName": "Krohn",
16  "orgId": "Y2lyZjZscGFyZzovL3VlL1BFT1R9S0R0TlMhTGJlNCJlTkd1LTZkZmY1YThNS0h0MEJkx1ZTYyYTYg",
17  "roles": [
18    "Y2lyZjZscGFyZzovL3VlL1BFT1R9S0R0TlMhTGJlNCJlTkd1LTZkZmY1YThNS0h0MEJkx1ZTYyYTYg"
19  ],
20  "licenses": [
21    "Y2lyZjZscGFyZzovL3VlL1BFT1R9S0R0TlMhTGJlNCJlTkd1LTZkZmY1YThNS0h0MEJkx1ZTYyYTYg",
22    "Y2lyZjZscGFyZzovL3VlL1BFT1R9S0R0TlMhTGJlNCJlTkd1LTZkZmY1YThNS0h0MEJkx1ZTYyYTYg",
23    "Y2lyZjZscGFyZzovL3VlL1BFT1R9S0R0TlMhTGJlNCJlTkd1LTZkZmY1YThNS0h0MEJkx1ZTYyYTYg",
24    "Y2lyZjZscGFyZzovL3VlL1BFT1R9S0R0TlMhTGJlNCJlTkd1LTZkZmY1YThNS0h0MEJkx1ZTYyYTYg"
25  ],
26  "created": "2018-04-03T18:20:43.092Z",
27  "lastModified": "2018-04-27T13:33:40.430Z",
28  "lastActivity": "2018-04-27T13:33:40.430Z",
29  "status": "inactive",
30  "invitePending": false,
31  "loginEnabled": true,
32  "type": "person"
33 }
  
```

Manage Users

Active Directory: Directory Synchronization, timevaldate.com

Licenses: Auto-Assign Licenses, Activated

Modify Users: Before continuing with assigning call service to users, make sure that you have enough licenses available for provisioning at each location. Otherwise, you cannot add users. Visit the [Locations](#) page to manage and add more licenses.

Manually Add Users: Add up to 25 users.

CSV Add or Modify Users: Add or modify users with a CSV file. Export user list. View import history (tasks).

Claim Users: Search for users who have signed up on their own for Cisco Webex Teams and claim them into your company.

Migrations

Update to the new Webex

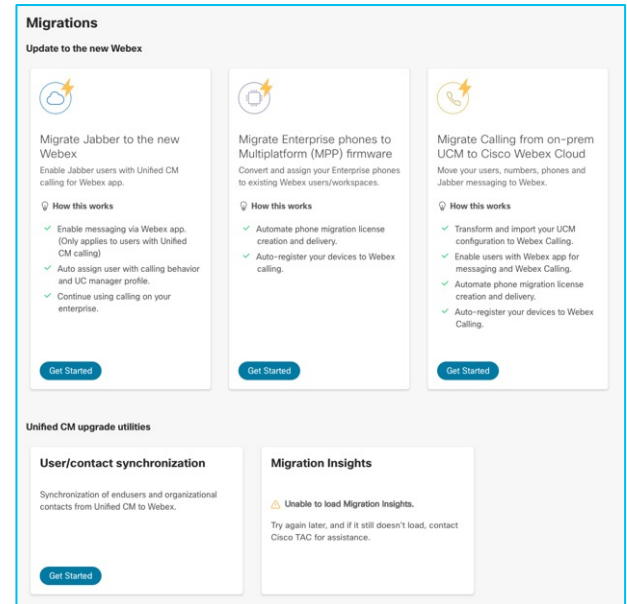
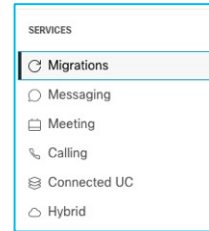
- Migrate Jabber to the new Webex**: Enable Jabber users with Unified CM calling for Webex app.
 - How this works: Enable messaging via Webex app (Only applies to users with Unified CM calling). Auto assign user with calling behavior and UC manager profile. Continue using calling on your enterprise.
 - Get Started
- Migrate Enterprise phones to Multipatform (MPP) firmware**: Convert and assign your Enterprise phones to existing Webex users/workspaces.
 - How this works: Automate phone migration license creation and delivery. Auto-register your devices to Webex calling.
 - Get Started
- Migrate Calling from on-prem UCM to Cisco Webex Cloud**: Move your users, numbers, phones and Jabber messaging to Webex.
 - How this works: Transform and import your UCM configuration to Webex Calling. Enable users with Webex app for messaging and Webex Calling. Automate phone migration license creation and delivery. Auto-register your devices to Webex Calling.
 - Get Started

Unified CM upgrade utilities

- User/contact synchronization**: Synchronization of endusers and organizational contacts from Unified CM to Webex.
 - Get Started
- Migration Insights**: Unable to load Migration Insights. Try again later, and if it still doesn't load, contact Cisco TAC for assistance.
 - Get Started

Calling Migration Tool

- Launched from Control Hub
- Use Unified CM configuration export (TAR)
- Data validation
- Extract/validate numbers, users, device associations
- Identify compatible devices
- Migration in batches
- Direct provisioning; not based on Webex Calling batch provisioning

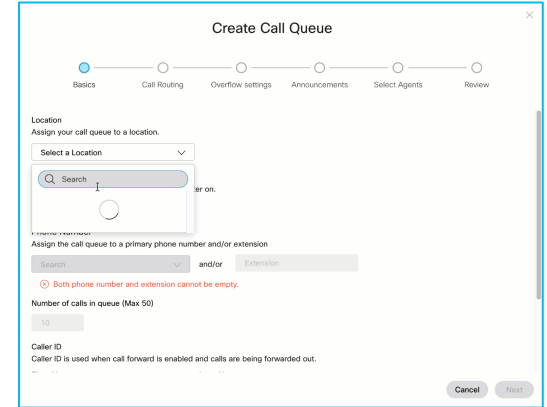


Bulk Operations

- API 1st strategy: build API support 1st, CSV bulk operations follow
- CSV based bulk administration includes:
 - Users
 - Devices
 - Call pickups
 - Call queues
 - Hunt groups
- Provisioning of call pickups, call queues, and hunt groups w/o bulk operation can account for a significant portion of time in migration projects
 - # of instances
 - # of parameters

Bulk Provisioning Time Savings

- Each call pickup, call queue, hunt group instance requires populating a wizard with many parameters
- Example: call queue wizard with six pages and dozens of parameters
- Estimate: up to 10 min to create a single hunt group
- Causes redundant work if many instances need to be created with same/similar settings
- Repetitive tasks are likely to cause errors
- CSV support reduces effort for deployment and migrations



The screenshot shows the 'Create Call Queue' wizard interface. At the top, there is a progress bar with six steps: Basics (selected), Call Routing, Overflow settings, Announcements, Select Agents, and Review. Below the progress bar, the 'Location' section is active, with the instruction 'Assign your call queue to a location.' A dropdown menu labeled 'Select a Location' is open, showing a search bar and a list of options. Below this, there is a section for 'Assign the call queue to a primary phone number and/or extension' with search fields for 'Search' and 'Extension', and a radio button for 'and/or'. A red error message states: 'Both phone number and extension cannot be empty.' Below that, there is a field for 'Number of calls in queue (Max 50)' and a 'Caller ID' section with the text 'Caller ID is used when call forward is enabled and calls are being forwarded out.' At the bottom right, there are 'Cancel' and 'Next' buttons.

Webex Calling Provisioning APIs

Comprehensive Set of Provisioning APIs

- Locations, People
- Organisation Settings
 - announcement language, auto attendants, call parks, call park extensions, call pickups, call queues, call recording settings, hunt groups, location intercept, location internal dialing, location incoming/outgoing permissions, paging groups, phone numbers, schedules, voicemail settings, voice portal, MoH, voicemail groups, dial plans, trunks, route groups, route lists
- Person Settings
 - calling behaviour, barge settings, call forwarding, call intercept, recording, caller id, DND, voicemail, schedules, monitoring, phone numbers, privacy, executive assistant, PTT, hoteling, incoming/outgoing permissions, call queue caller id
- Voice Messaging

Reference: <https://developer.webex.com>

Webex Calling APIs Overview

PROVISIONING

CALL CONTROL

ANALYTICS & REPORTING

Customer Journey

Setup, Onboard, Manage

Call, Meet, Collaborate

Achieve Customer Success

- Manage users, phone #s, locations, & services
- Assign licenses
- Create and manage location features

- Place, answer, hang up calls
- Stop / start / pause recording
- Transmit DTMF digits
- List active calls / get history

- Detailed call records
- Onboarding, usage, & quality reporting
- Automated reporting setup

- Installation, activation, & onboarding
- Ongoing services management & care
- Self-service via partner portal

- Custom enterprise calling integrations
- Cloud business platform integration
- Custom app development

- User training & adoption services
- Business process design & optimization
- Vertical solutions design & oversight

Representative Tasks

Sample Solutions

Using Webex APIs

- Documentation at: <https://developer.webex.com/>
- But: Steep learning curve
- A lot of concepts to master
- SDK helps to abstract from the “dirty details”



wxc_sdk: SDK for Webex Calling APIs

- PyPi: <https://pypi.org/project/wxc-sdk/>
- Documentation: <https://wxc-sdk.readthedocs.io/en/latest/>
- Simple SDK to work with Webex APIs
 - Focus on Webex Calling specific endpoints
- Takes care of all the “ugly” stuff
 - JSON (de-)serialization, authentication, 429 retries,
 - Pagination, ...
- Python objects for all API objects
 - Tab completion → efficient coding
- Actively maintained
 - New API endpoints will be added
- Foundation for your migration/provisioning automation and other projects around Webex Calling

```
"""
Example script
Get all calling users within the org
"""

from dotenv import load_dotenv

from wxc_sdk import WebexSimpleApi

load_dotenv()

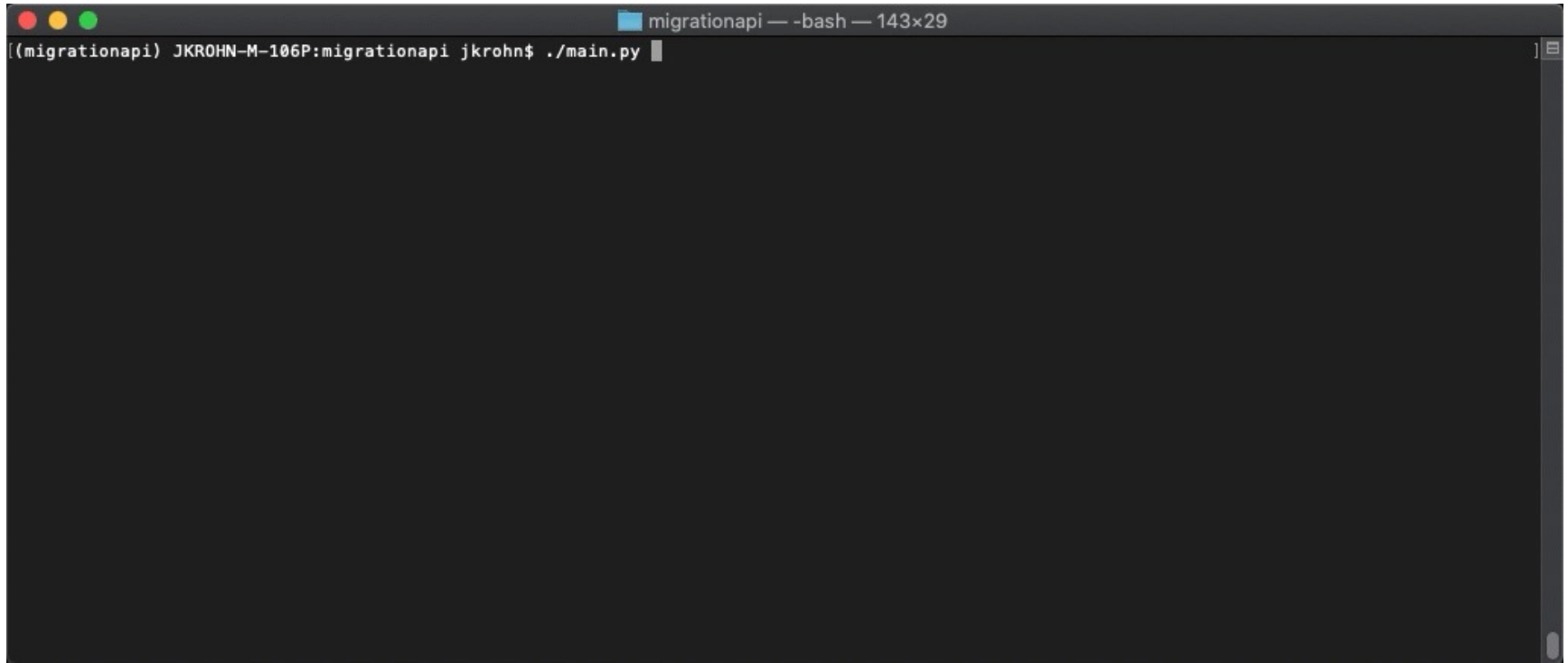
api = WebexSimpleApi()

calling_users = [user for user in api.people.list(calling_data=True)
                 if user.location_id]
print(f'{len(calling_users)} users:')
print('\n'.join(user.display_name for user in calling_users))
```

Demo Framework

- <https://github.com/jeokrohn/migrationapi>
- Read users from Unified CM via AXL
- Select users with phone numbers in a specific range
- Provision these users for Webex Calling and assign their extension
 - Async calls b/c Webex Calling provisioning calls are slow
 - Async code allows concurrent execution of multiple REST API calls
- Access Token for Webex API has to be obtained from developer.cisco.com

Demo



```
migrationapi — -bash — 143x29  
[(migrationapi) JKROHN-M-106P:migrationapi jkrohn$ ./main.py
```

Observations

- Each Webex Calling provisioning request takes multiple seconds to complete
- Concurrent execution of requests helps to speed up the provisioning

Calls APIs

v1/telephony/calls API

- Click to **Dial**
- **Answer** a call
- **Divert** a call (voicemail)
- **Reject** or **Hangup**
- **Hold** and **Resume**
- **Transfer** (connected call)
- **Park** connected call and **Retrieve**.
- Group **Park**
- **Recording** (Start, Stop, Pause, Resume) on a call

/calls retrieval

- **Get Call Logs** – missed, placed and received calls (user scope)
- **Get Active Call Details** with a call id

The screenshot displays the Cisco API Explorer interface for the 'Dial' endpoint. On the left, a sidebar lists various call control actions, each with a 'POST' button: Dial, Answer, Reject, Hangup, Hold, Resume, Divert, Transfer, Park, Retrieve, Start Recording, Stop Recording, Pause Recording, Resume Recording, Transmit DTMF, and Push. The main area shows the 'Dial' endpoint details, including its description, the request body parameters (destination), and response properties (callId and callSessionId). On the right, a dark-themed preview pane shows the request and response details. The request is a POST to /v1/telephony/calls/dial with a Bearer token. The response body shows a callId and a destination.

```
POST /v1/telephony/calls/dial
```

Header

Content-Type: application/json

Authorization: Use personal access token

Bearer: [redacted]

Body

```
{
  "destination": "e.g. +12223334444"
}
```

Calls Event APIs

/v1/webhooks

Real time event via Webhooks

User Level Events

originating	originated	received
answered	held	resumed
disconnected	recordingStarting	recordingStarted
recordingPaused	recordingResumed	recordingStopped
transferred	bargedIn	Retrieved
pickedUp	forwarded	updated

```
{
  "id": "Y21zY29zcGFyazovL3VzL1dFQkhPT0svMDU5NDQ4ZmEtNjESYS00YmZlL1lyZktEjExMDUyZmY4ZTYy",
  "name": "Y21zY29zcGFyazovL3VzL1JPT00vOD1kODc3ZTAeMGUzNi0xMmVlL1k0YTYeMDMzNGExY2M5YTUz",
  "targetUrl": "https://a4xtap2zj7.execute-api.us-east-1.amazonaws.com/calls/",
  "resource": "telephony_calls",
  "event": "deleted",
  "orgId": "Y21zY29zcGFyazovL3VzL09SR0F0SvpBVElPTi9hMjQ3MjNlMS1iOWM5L1RlbnQyYjZlOC05NDZhdD1mMmU3MGI",
  "createdBy": "Y21zY29zcGFyazovL3VzL1BFT1BMR584MWNhZjUzOC1jODQwLTQ0OWIeYmQ3Zi1hYTRhbjJmYWY4MmU",
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  "zNGlY0G15MDNjZTlhYTZjZGNmMWFm",
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  "status": "active",
  "created": "2020-10-14T18:03:25.829Z",
  "actorId": "Y21zY29zcGFyazovL3VzL1BFT1BMR584MWNhZjUzOC1jODQwLTQ0OWIeYmQ3Zi1hYTRhbjJmYWY4MmU",
  "data": {
    "eventType": "disconnected",
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    "eventTimestamp": "2020-10-15T18:06:20.781Z",
    "callId": "Y21zY29zcGFyazovL3VzL0NBTEwvY2FsbGhhbGYeYmQ3Zi1hYTRhbjJmYWY4MmU",
    "callSessionId": "0G03YzhkNzgtZjIxZi00YjU1L1ThkNDEeYTYlHNDFlNmFkYTM2",
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    "state": "disconnected",
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      "privacyEnabled": false,
      "callType": "location"
    },
    "created": "2020-10-15T18:06:10.269Z",
    "answered": "2020-10-15T18:06:17.211Z",
    "disconnected": "2020-10-15T18:06:20.781Z"
  }
}
```

Webex Calling API References



Reference

- Webex API documentation
<https://developer.webex.com/>
- Postman Collection – Call Control
<https://github.com/webex/postman-webex-calling>
- Webex Calling provisioning SDK
https://github.com/jeokrohn/wxc_sdk
- TME Video Library (Webex Calling playlist)
<https://www.youtube.com/c/CiscoCollaborationTechnicalMarketing>
- Zeep documentation
<https://docs.python-zeep.org/en/master/>
- Zeep examples
<https://github.com/CiscoDevNet/axl-python-zeep-samples>
- csv module
<https://docs.python.org/3/library/csv.html>
- Pandas
<https://pandas.pydata.org/>
- Features available by license type for Webex Calling
<https://help.webex.com/en-us/article/n1qbbp7/Features-available-by-license-type-for-Webex-Calling>

Webex Calling Provisioning Methods

	Control Hub	CSV	API
Ease of Use	+++	++	+
Speed	+	+++	+++
Customization		+	+++

Third Party Tools

Tuki WxC Automated Migration

Connect

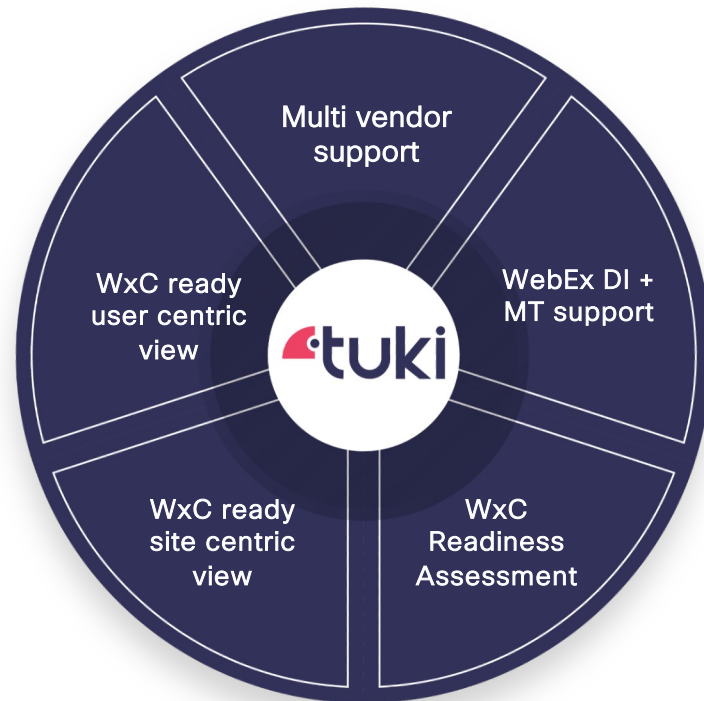
- Partner level Multi-Tenant Migration dashboard
- Online/Offline data collection options
- Multiple third-party vendor support
- Simplified customer onboarding

Map

- Webex Readiness Assessment
- WxC MT Ready User centric view
- WxC MT Ready Site centric view
- Migration rules

Migrate

- Automated User Centric Migration
- Custom batches migration
- Error handling and fixing
- Phased migration support
- UC features migration (AA, VM, Hunts, Pickups, Call Parks etc)
- Migration to Webex DI & MT

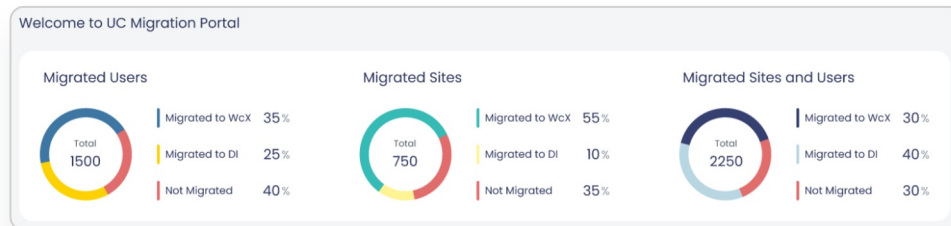


Connect

Partner level Multi-Tenant Migration dashboard

Phased Migration Support

Online/Offline data collection options

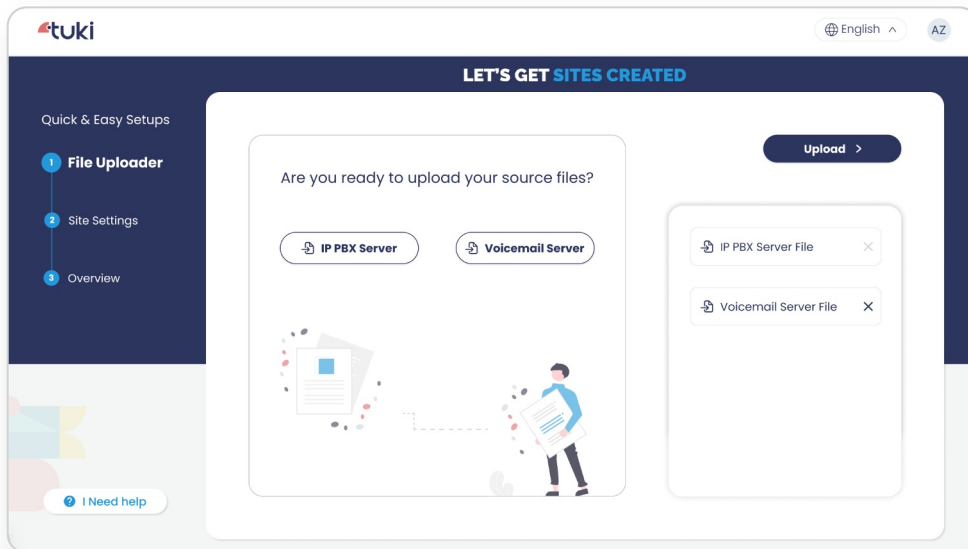


Connect

Multiple third-party vendor support



Simplified customer onboarding

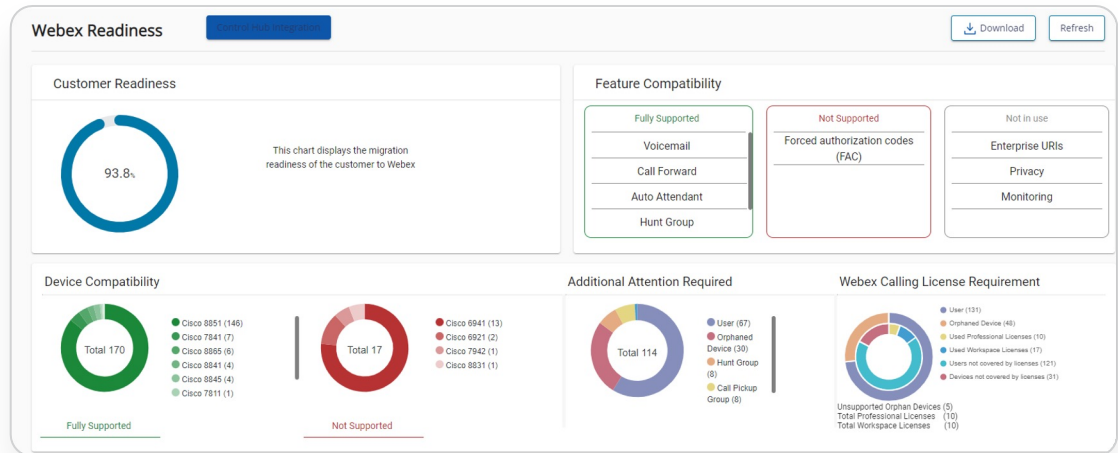


Map WebEx Readiness Assessment

WxC customer migration readiness

License requirement calculation

Customer engagement tool for migration planning



Map

WxC MT Ready **Site** centric view

WxC MT Ready **User** centric view

<input type="checkbox"/> Select all	Site	User ID	Name	Email	Extension	Devices	Migrated to Cloud
<input type="checkbox"/>	Paris	andy.grey	Andy Grey	andy.grey@mail.com	621006	<ul style="list-style-type: none"> Cisco 6941 - SEP987987987987 Cisco 8851 - SEP0005F8691031 Cisco Dual Mode for Android - BOTSIMPSONC Cisco Unified Client Services Framework - CSFSIMPSONC 	
<input type="checkbox"/>	Paris	Christopher.Simpson	Christopher Simpson	Christopher.Simpson@mail.com	621032	<ul style="list-style-type: none"> Cisco 8851 - SEP0005F8691062 Cisco 8851 - SEP0005F8691044 Cisco Dual Mode for Android 	
<input type="checkbox"/>	Paris	Dustin.Cummings	Dustin Cummings	Dustin.Cummings@mail.com	621014 621063		
<input type="checkbox"/>							



WxC driven transformation rules

Original Device Type	Cisco 7960	Protocol	Protocol * SCCP	New Device Type	Cisco 7841
Original Device Type	Cisco 6961	Protocol	Protocol * SCCP	New Device Type	Cisco 7841
Original Device Type	Cisco 7941	Protocol	Protocol * SIP	New Device Type	Cisco 7841

Migrate

- ✓ Data manipulation without affecting the source live environment
- ✓ Error Handling / Fixes

Please fix, remove or accept the site errors that were found during the validation

Type	Name	Status	Error Description
Orphaned Device	0005F869B004	invalid	Error occurs while validating mac 0005F869B004: Mac Address already exist.
User	Stuart.Dorsey	invalid	Person does not have neither extension nor phone number Call recording option should not be null
User	aaron.pearson	valid	
Orphaned Device	0005F869B002	valid	
User	Kelsey.Smith	valid	
User	Dustin.Cummings	valid	

Configure A New Line

Position *

Directory Number

Route Partition
Paris_Internal_PT

CSS
Paris_International_CSS

Description

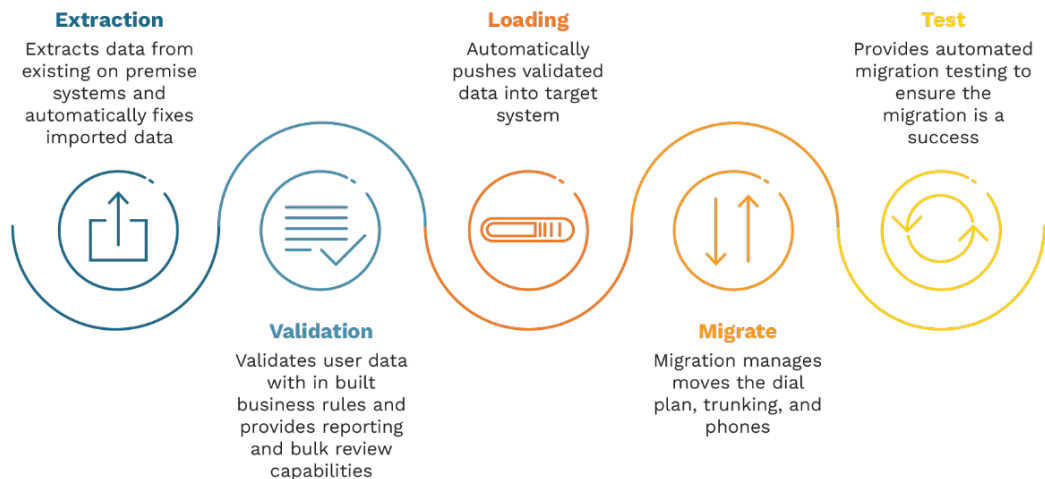
Person does not have an extension or phone number

- ✓ Automated complete migration of user features: VM, IM&P, SNR, Phones, Lines.
- ✓ Voicemail Features Migration: Auto Attendant and Voicemail migration
- ✓ UC Features Migration: Hunts, Queues, Pickup, Call Park

Feature Summary

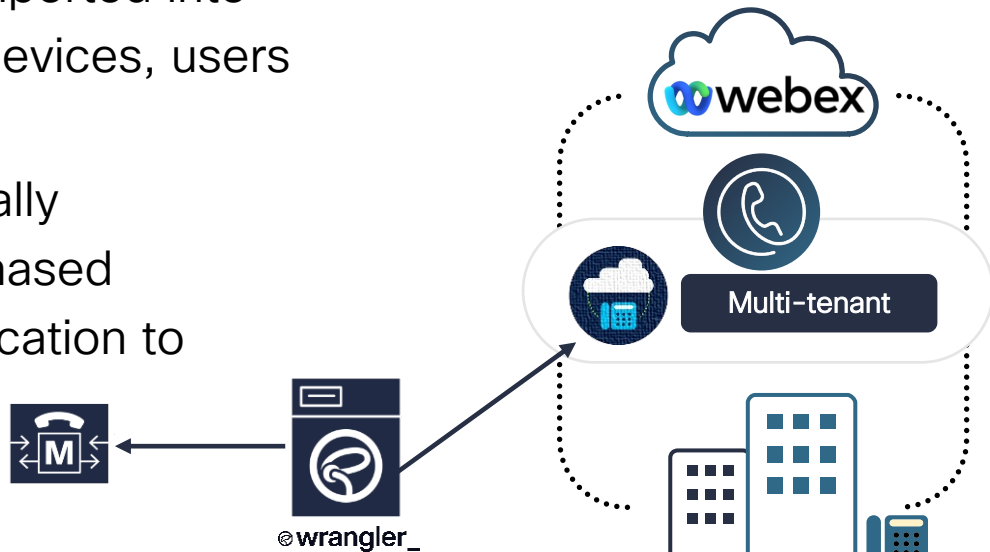
- Data extraction v10.5+ from CUCM/UCXN
- Data Validation
 - Normalization
 - Transformation
 - Correction
- Configuration mapping to WbC-MT
- Validation issues for configuration changes
- Data load via APIs
- Multiple source clusters
- Phased Migration in batches
 - Inter site dependency reporting
- Dial plan analysis and connection

Migration Process – Automated Webex Calling Migration



Data Extraction

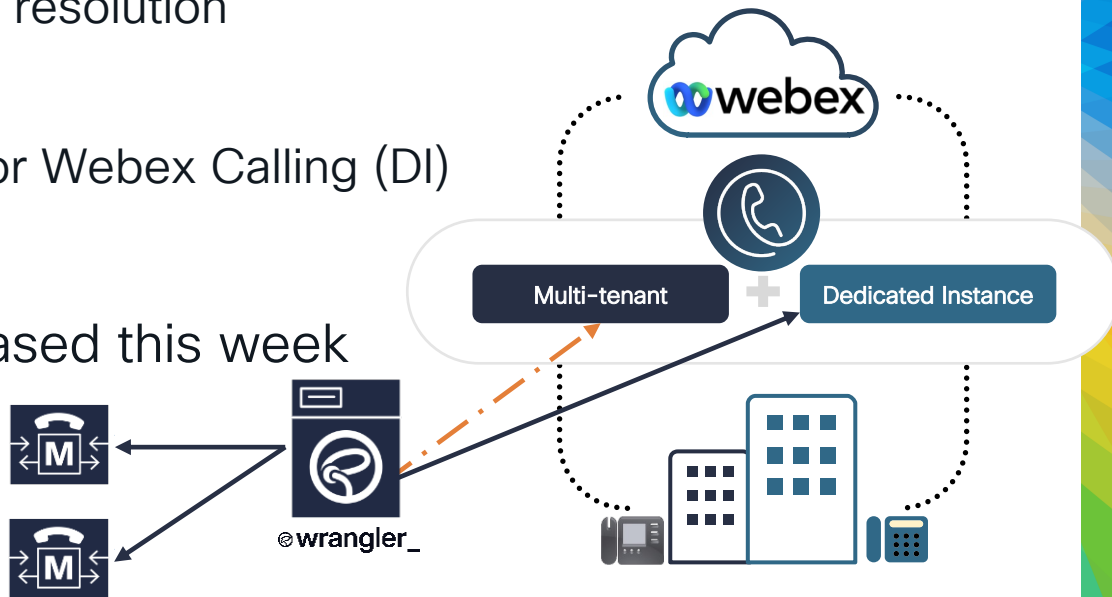
- Configuration is imported from the source and target organisation and imported into wrangler_ including all lines, devices, users and dial plan
- Configuration can be periodically rediscovered if required for phased migrations using change notification to minimize data freezes



Hybrid Migrations

Dedicated Instance and Multi-Tenant

- Multi Cluster consolidation
 - Duplicates identification and resolution
- Cluster separation
 - Megacluster redistribution for Webex Calling (DI)
- Phased migration
- Webex Calling (MT) – released this week
 - CUCM -> WxC-MT
 - CUCM -> WxC-DI + MT



<https://www.yarnlab.io/blog/part-7-wxc-mt-transformation-migration-early-preview>

Migration Options - Comparison

	Manual Provisioning	Control Hub Tool	Bulk Provisioning (CSV)	API	3 rd Party
Ease of use	○ initial training	++	- Process setup (data source, data format, ..)	-- Steep learning curve, development required for integration	+ Needs some training due to breadth of coverage
Flexibility	++	○ limited to devices, users, numbers	+ limited coverage	++ increasing API coverage	++ uses Webex APIs
Integration into business processes	None	None	Possibly limited integration via customized data export/import	Tight integration possible	Primarily intended as standalone tool Other tools available supporting day to day operations
Speed	--	+	+	++	++

Closing

Summary

- Migration Process
- Discovery
- Design
- Deployment
- Migration

Summary (Design Aspects)

- Webex Calling PSTN options
- Regional footprint, design considerations
- Location considerations
- Interworking between Unified CM and Webex Calling
- Virtual and Shared Lines
- Extension Dialing Considerations
- Provisioning APIs

Key Takeaways (Migrations)

- User batches based on dependencies between users
- Unified CM and Webex Calling are different 😊
- Focus on business requirements instead of 1:1 feature mapping
- User provisioning: foundation for all Webex services
- Interworking between Unified CM and Webex Calling during transition period
 - Dial plan maintenance is key
- Migration options: tools, bulk operations, APIs, third party tools
- APIs provide greatest flexibility and allow for tight integration in business logic
- 3rd party migration tools cover all migration project phases → support easy migrations

References

- Analyze Unified CM config exports:
<https://github.com/jeokrohn/ucmmigration>
- API supported migration from Unified CM to Webex Calling, GDPR export, CSV export:
<https://github.com/jeokrohn/migrationapi>
- Python SDK for Webex Calling provisioning:
<https://pypi.org/project/wxc-sdk/>
- Yarnlab:
<https://www.yarnlab.io/>
- Tuki:
<https://tuki.io/>

3rd Party Migration Tools

- [Yarnlab](#)

Cisco Live contact: <https://ciscolive.yarnlab.io/>

- Pre-assessment - <https://www.yarnlab.io/preyarn>
- Wrangler for DI - <https://www.yarnlab.io/wrangler>

- [Kurmi](#)

- UC Provisioning and Migrations - <https://www.kurmi-software.com/en/enterprises/kurmi-migration-tool/>

- [Tuki](#) (Correnet)

- UC Migrations - <https://tuki.io/uc-migration/>

- [MIT](#)

- Voice and UC Migrations - <https://www.mit-tech.co.uk/ucentric-voice-migration/>

- [Akkadian Labs](#)

- UC Communications Provisioning - <https://www.akkadianlabs.com/tool-to-simplify-nec-to-cisco-uc-migration/>

- [Voss](#)

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