

CISCO *Live!*



#CiscoLive



The bridge to possible

# Successful Migrations from Unified CM to Webex Calling

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BRKCOL-2481b



#CiscoLive

# Cisco Webex App

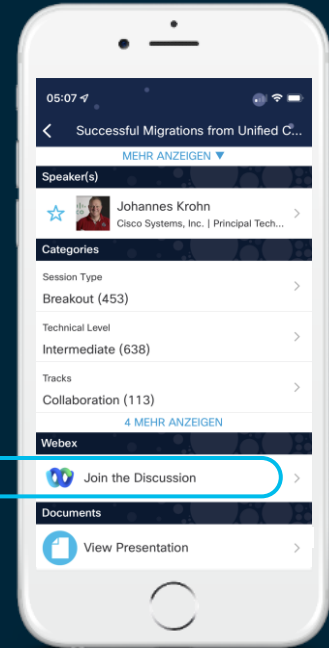
## Questions?

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 June 17, 2022.



<https://ciscolive.ciscoevents.com/ciscolivebot/#BRKCOL-2481b>



# Agenda

- General Process
- Discover
- Design
- Deploy
- Migrate

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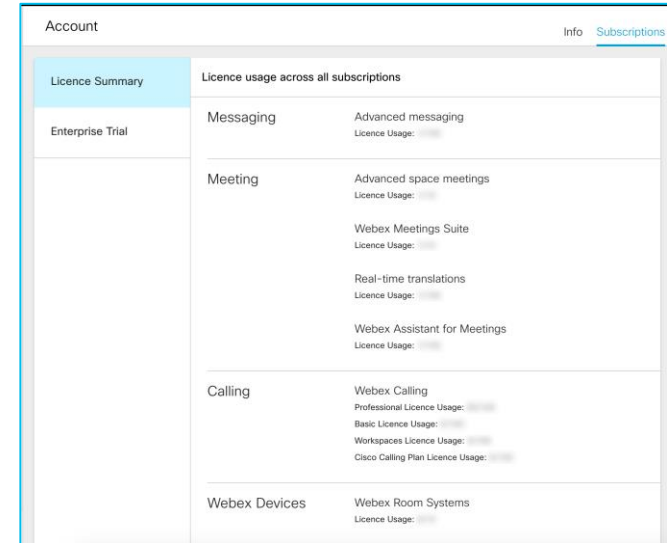
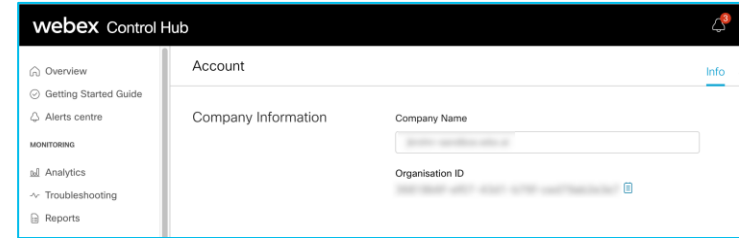
BRKCOL-2481b

... with special focus on programmability  
using Python

# 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





# User Migration/Provisioning Options

- Manual or CSV bulk operation
  - Not really scalable
  - Risk of inconsistencies
- Cloud Connected UC
  - Migration of batches
- APIs
  - Foundation for custom integrations
- Directory synchronization
  - Okta, Azure, AD
  - Foundation for SSO

Best practice

# Foundation: Identity

- Concept of “Common Identity”: same identity within the enterprise and for cloud services
- Synchronization of enterprise and cloud identity
- Benefits:
  - User Experience: users can use same identity (and credentials w/ SSO) for authentication
  - Operational Efficiency: minimized management overhead
- Foundation for all Webex services

# User Provisioning for Cloud Services

- Enterprises typically maintain user information in an enterprise directory
- Cisco Webex maintains common identity storage for user information for all cloud services
- Requirements:
  - Consistent user information in enterprise directory and cloud identity storage
  - avoid additional maintenance effort for system administrator
  - Automatic create, update, and delete of users
- Solution: directory sync

# User Provisioning Options

	<a href="#">AD sync</a>	Sync from <a href="#">Okta</a> or <a href="#">Azure AD</a>	Manual provisioning	Bulk Provisioning (CSV)	People API
Moves, Adds, Changes	++ automatic	++ automatic	-- manual	- CSV prep	o / + / ++ Depends on level of integration
Easy of use	+ Initial setup required	+ Initial setup required	++ No setup, public documentation	o Process setup (data source, data format, ..)	- Steep learning curve, development required for integration
Infrastructure requirements	Directory connector	None	None	None	Hosting if using web app
Flexibility	o some customization possible (groups, attribute mapping, ..)*	o some customization possible (groups, attribute mapping, ..)*	++	+	++

\*Some user attributes (e.g. mobile number, department, manager, title) can only be set via directory sync

<https://help.webex.com/en-us/article/nj34yk2>

# 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

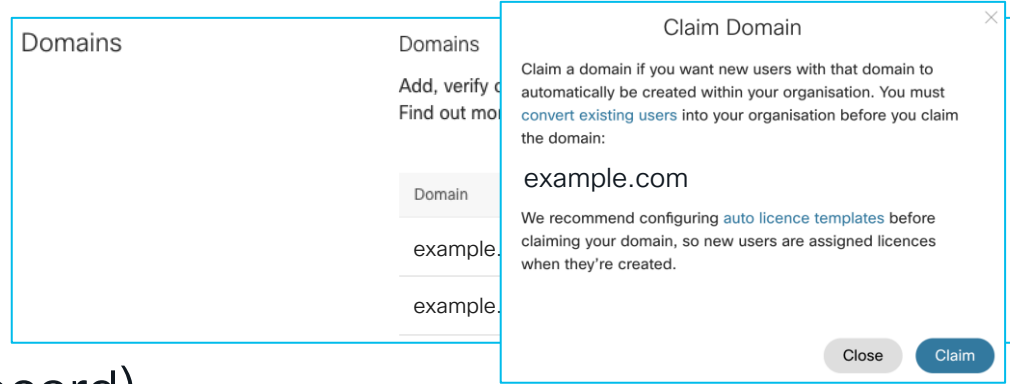
- Control hub allows to “claim” and “verify” domains
- Domains can be verified via Control Hub (DNS validation via TXT record)

Domains		
Add, verify or claim domain for added security in your organisation. Find out more about the add, verify and claim domain process <a href="#">here</a> .		
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 <sup>st</sup> , 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

# Assigning Licenses

- “Auto-Assign Template” in Control Hub determines the licenses assigned to users added via Directory Connector
- **No Webex Calling support**
- Alternative:
  - bulk update users via CSV update
  - Update services for single users

Management organisation licences assignment

Select licences for your organisation  
Select the licences that you want to provide to new users when onboarding them to your organisation.  
Note: If you select more than one Message, Teams Meeting or Call licence, only one licence will be assigned to each user.

Messaging	Meeting	Calling
Free Public Collaboration Services		
<input checked="" type="checkbox"/> Basic messaging	<input checked="" type="checkbox"/> Basic space meetings ⓘ	<input checked="" type="checkbox"/> Call on Webex (1:1 call, non-PSTN)
Subscription: Enterprise trial - 09/24/2021		

Messaging

☒ Advanced messaging assigned

☐ Jabber team mode

Services enabled for Brad Green

Messaging	Meeting	Calling
Free Public Collaboration Services		
<input checked="" type="checkbox"/> Basic messaging	<input checked="" type="checkbox"/> Basic space meetings ⓘ	<input checked="" type="checkbox"/> Call on Webex (1:1 call, non-PSTN)
Licensed Collaboration Services		
Messaging <input checked="" type="checkbox"/> Advanced messaging	Meetings <input checked="" type="checkbox"/> Advanced space meetings <input type="checkbox"/> Webex Assistant for Meetings <input type="checkbox"/> Real-time translations <input type="checkbox"/> Webex Meetings Suite	Calling <input checked="" type="checkbox"/> Webex Calling <input checked="" type="checkbox"/> Professional

CSV Add or Modify Users

Add or modify users with a CSV file.

[Export user list](#)

[View import history \(tasks\)](#)

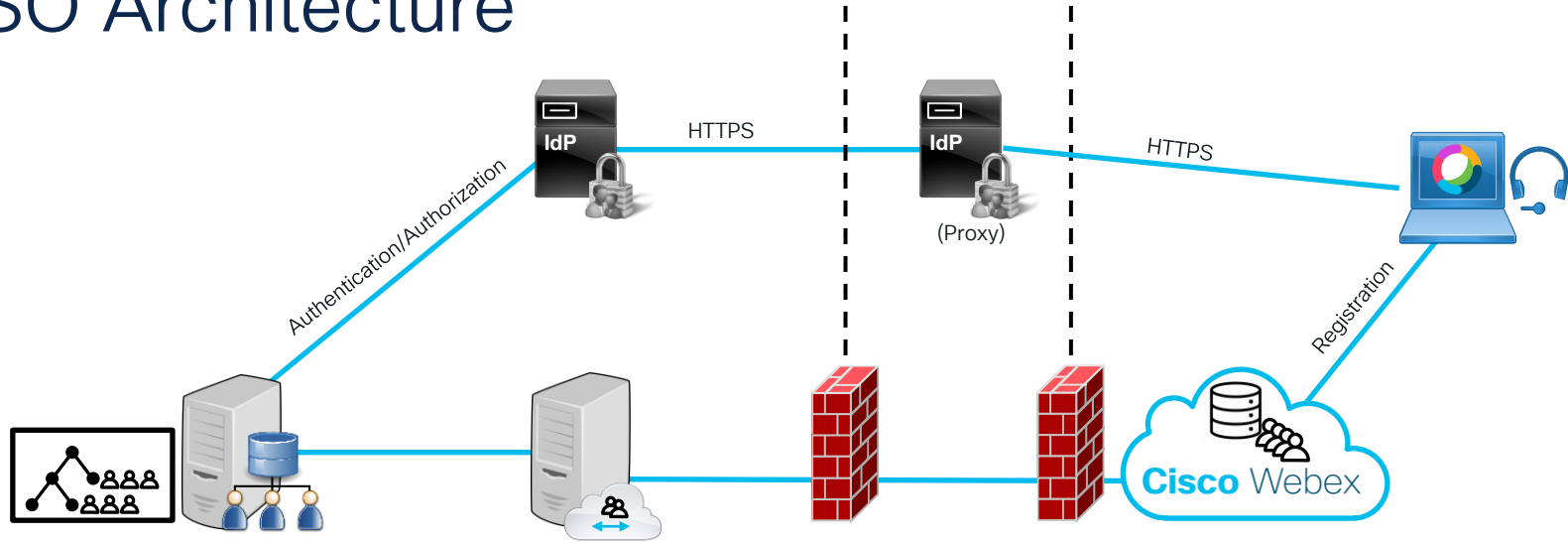
# “Auto-Assign Template”

- Pro: New users are automatically enabled for services
- Con: Licenses required for all users synced by Directory Connector
- Alternative 1: selective sync of users (for example based on AD group membership)
  - Pro: users added to group in AD are automatically enabled for services
  - Con: incomplete user search; **No sideboarding!**
- Alternative 2: full sync of all users & manual license assignment (CSV, ...)
  - Pro: New users automatically get licenses according to Auto-Assign Template
  - Con: initial (full) sync might lead to license starvation; can be avoided by doing the initial full sync w/ an empty Auto-Assign Template
  - Continuous license management required if not enough licenses for all users

# Single Sign-On

- Directory Connector only syncs user data
- On-prem vs. cloud authentication
- Issues:
  - Bad user experience: maintain multiple credentials
  - Security: multi-factor authentication, account lock-out, other policies, etc.
  - All new users receive email invitation; can only be turned off with SSO enabled
- SSO is the solution
  - Webex authentication linked back to enterprise

# SSO Architecture



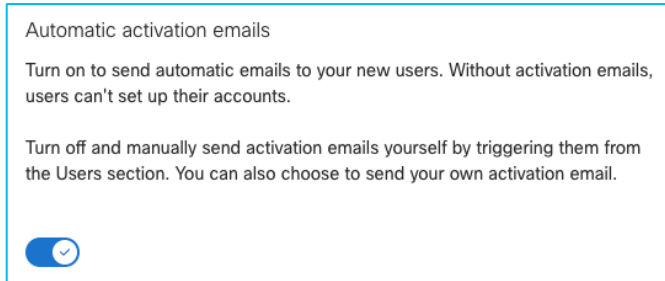
- With SSO enabled Webex Teams application during registration gets redirected to IdP configured for Webex Organization
  - form based SAML 2.0 REDIRECT/POST authorization code authorization flow
- Redirection to IdP instance (actually a HTTPS reverse proxy) in the customer's DMZ
- IdP handles authentication/authorization with AD backend

# Single Sign On (SSO)

- Required building block for best user experience
- SAML 2.0 based (SP initiated form based REDIRECT/POST authorization code authorization flow)
- Validated configuration guides for:
  - Active Directory Federation Services (ADFS)
  - Duo
  - F5 Big-IP
  - Google Apps
  - Microsoft Azure <https://collaborationhelp.cisco.com/article/en-us/lfu88u>
  - OKTA
  - PingFederate
  - Shibboleth
  - SimpleSAML

# Validation (Invite) Emails

- New users receive validation email
  - Validate user activation
  - Initial password
  - User details
- Validation of user activation not required if domain is associated with given organization (domain is verified)
- Password setting not required with SSO
- User details not required with Directory Connector
- Directory Connector + SSO + disable automatic activation emails
  - new users automatically activated w/o user intervention



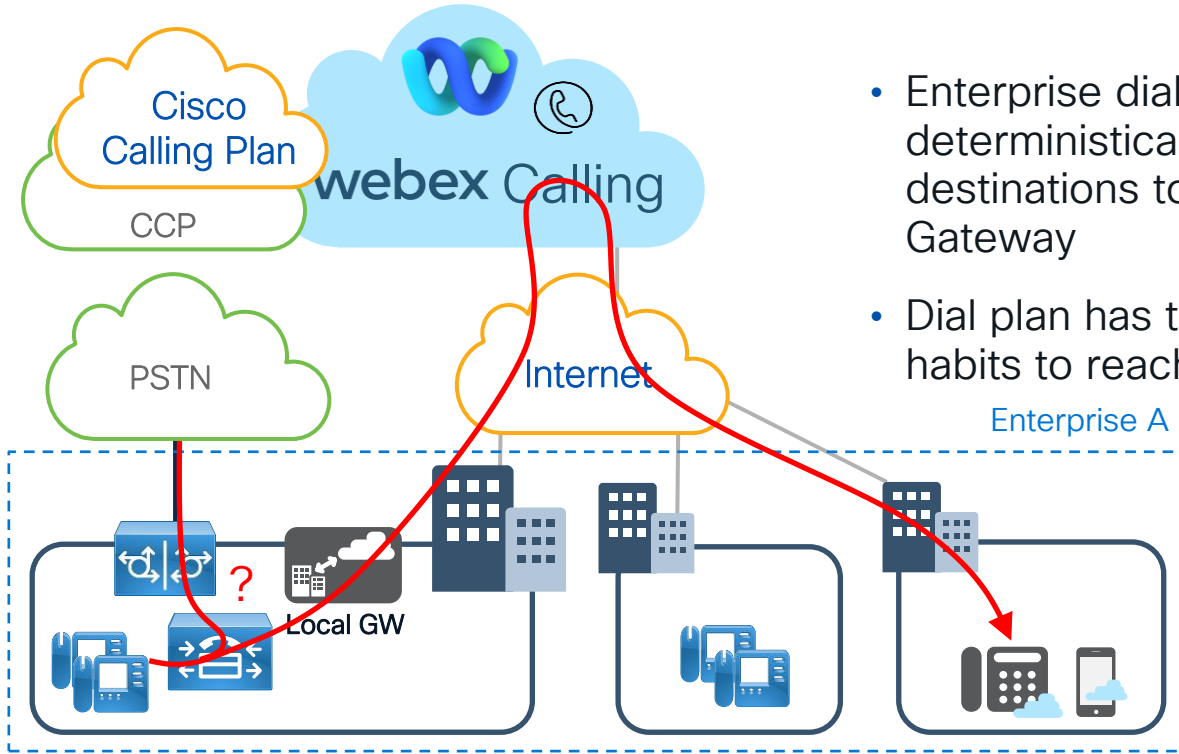
<https://help.webex.com/en-us/article/nqj88gt/Control-of-activation-emails-in-Control-Hub>

# Interworking Unified CM / Webex Calling





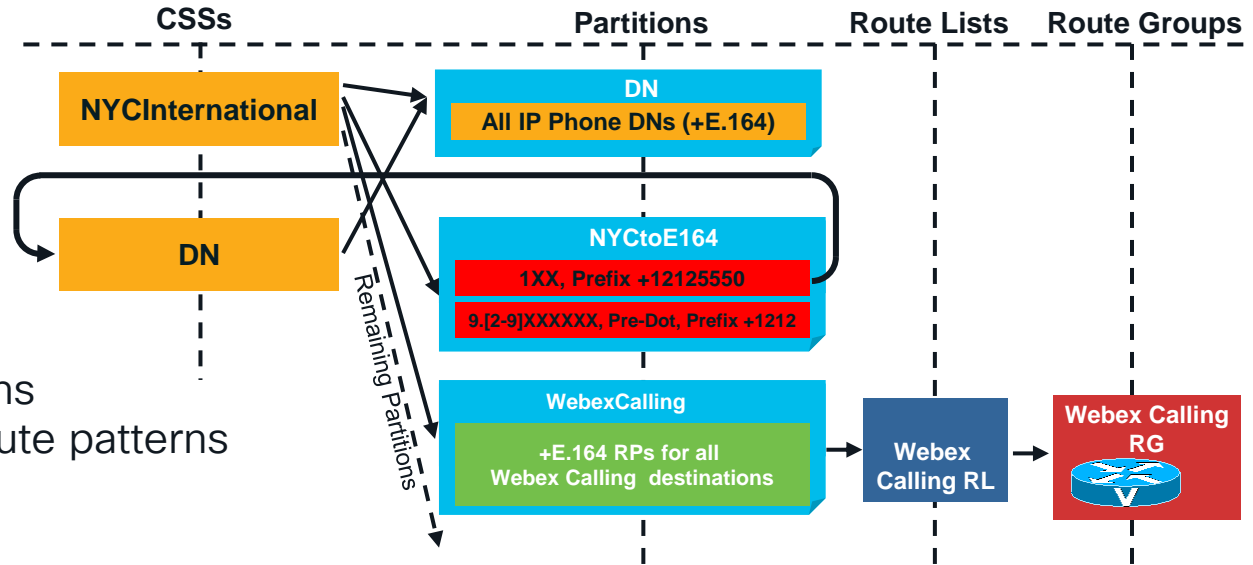
# Local Gateway Dial Plan Integration



- 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” dialling 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



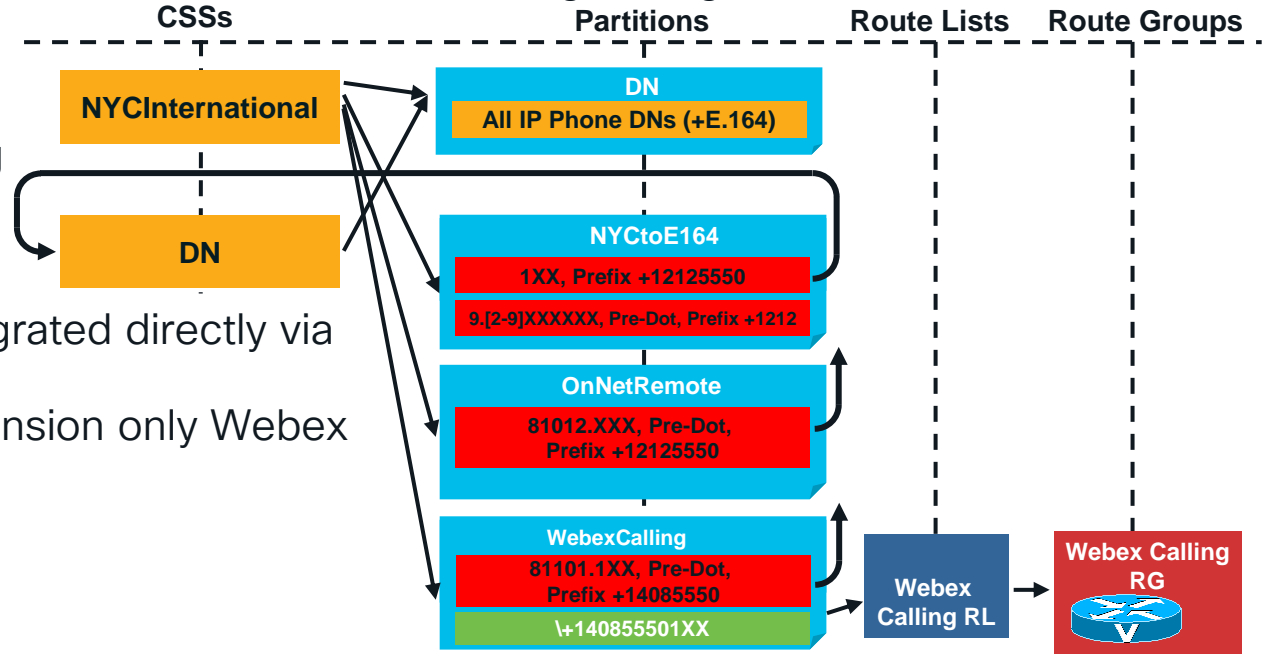
\*For extension dialling w/ non-unique extensions site specific trunks are required so that Webex Calling can establish proper dialling context. LRG can be used for site specific egress trunk selection

# Abbreviated Inter-site Dialing to Webex Calling

- Any dialing habit can be transformed to +E.164 using dialing normalization translations

- Same partition as used for Webex Calling routes

- Webex calling dialing habits can also be integrated directly via route patterns  
→ also works with extension only Webex Calling devices



# 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!

# Dial Plan Maintenance

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PatternType, PSTNFailover, Pattern
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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!

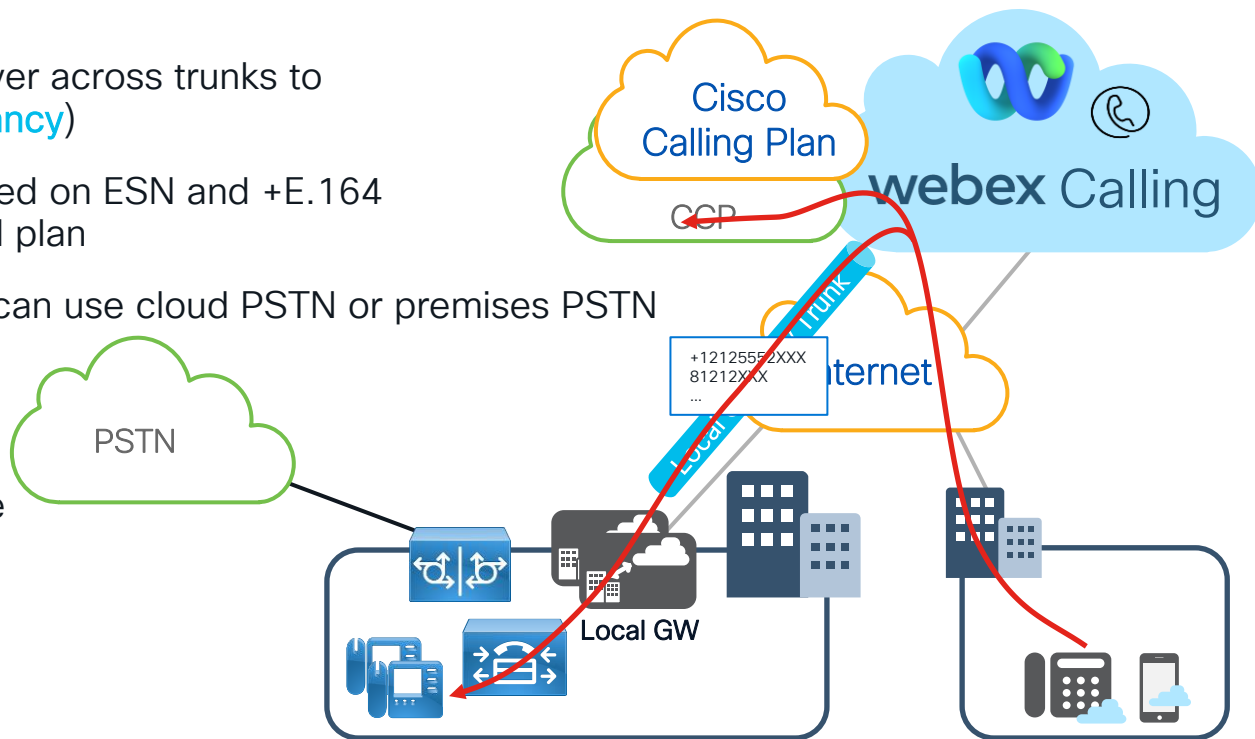
\*If Webex Calling is not using premises PSTN then GDPR PSTN failover actually is an alternative to using the Local Gateway trunk)

# 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

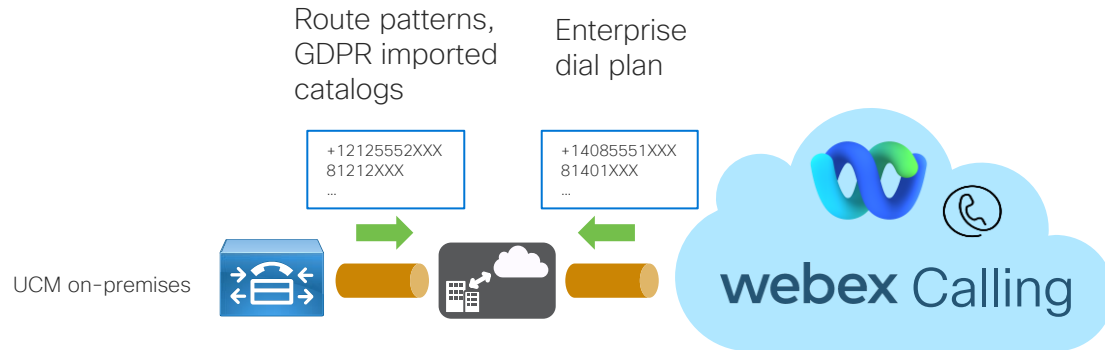
# Routing from Webex Calling to Unified CM Enterprise Dial Plans

- Load balancing and failover across trunks to premises (**scale, redundancy**)
- Deterministic routing based on ESN and +E.164 patterns in enterprise dial plan
- Webex Calling locations can use cloud PSTN or premises PSTN
- Porting numbers from premises PSTN to cloud can happen as users move or at the end of the migration



# Interworking: Webex Calling and Unified CM

- Interworking between Webex Calling and Unified CM requires
  - Trunk, Local Gateway
  - Dial plan configuration
  - .. Both on Unified CM and on Webex Calling





# 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 the “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](https://www.cisco.com/c/dam/en/us/td/docs/solutions/PA/mcp/DEPLOYMENT_CALLING_Unified_CM_to_Webex_Calling.pdf)

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

# GDPR Export to Populate Dial Plans

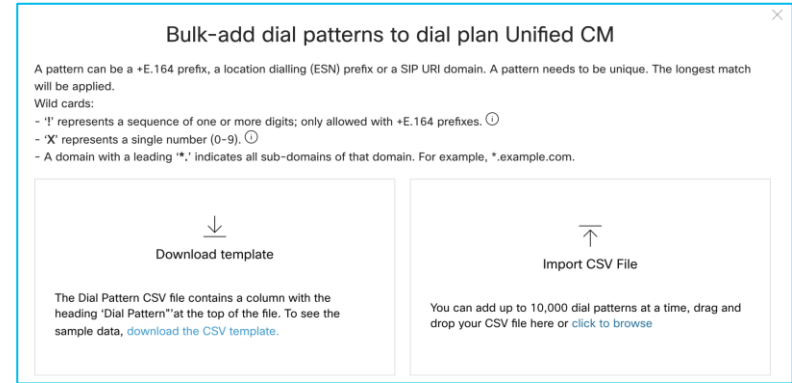


# Use GDPR Information for Webex Calling Dial Plans

- 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

# 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@JKR0HN-M-106P migrationapi % ./read_gdpr.py
```

# 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

# Migration Options - Comparison


	Manual Provisioning	Control Hub Tool	Bulk Provisioning (CSV)	API
Ease of use	0 initial training	++	- Process setup (data source, data format, ..)	-- Steep learning curve, development required for integration
Flexibility	++	0 limited to devices, users, numbers	+ limited coverage	++ increasing API coverage
Integration into business processes	None	None	Possibly limited integration via customized data export/import	Tight integration possible
Speed	--	+	+	++




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

## 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.

 A minimum firmware version of 11-2-3MSR1-1 is required to onboard a device via activation code. To upgrade the firmware for a device, go to [upgrade.cisco.com](#).



Export

[Export user attributes](#) or [download CSV template](#)

File ready for import

add 2 phones activation code.csv

[Remove File](#)

The screenshot shows the 'Manage Users' interface. At the top, there's a header 'Manage Users'. Below it, there are three main sections:

- Active Directory**: Contains 'Directory Synchronization' with a status indicator '...' and a link 'tmevaldate.com'.
- Licenses**: Contains 'Auto-Assign Licenses' with a status indicator '...' and a green dot indicating 'Activated'.
- Modify Users**: A section with a warning icon and text: '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.'

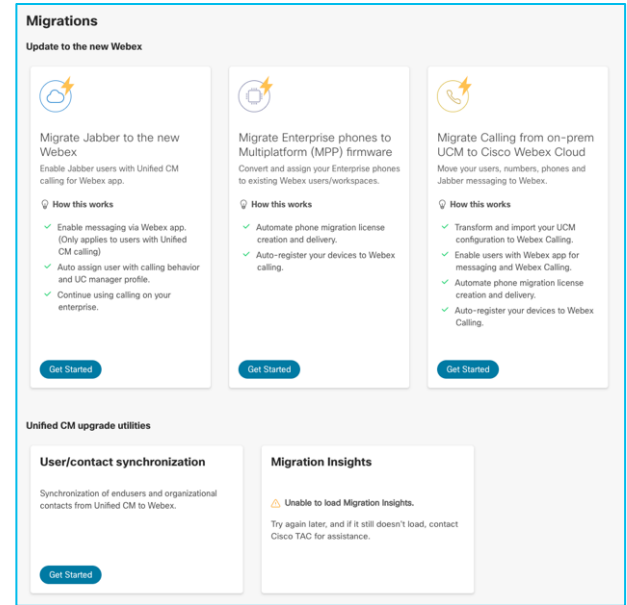
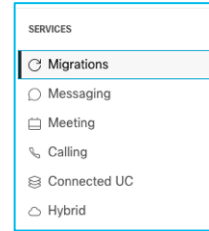
Below the 'Modify Users' section, there are three cards:

- Manually Add Users**: Includes the text 'Add up to 25 users.'
- CSV Add or Modify Users**: Includes the text 'Add or modify users with a CSV file.', a link 'Export user list', and a link 'View import history [tasks]'.
- Claim Users**: Includes the text 'Search for users who have signed up on their own for Cisco Webex Teams and claim them into your company.'

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# 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

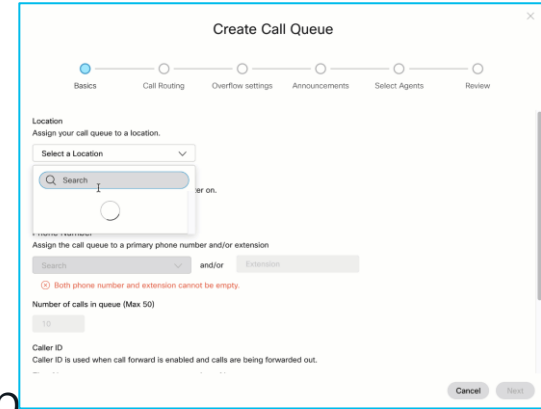


# Bulk Operations

- API 1<sup>st</sup> strategy: build API support 1<sup>st</sup>, CSV bulk operations follow
- CSV based bulk administration for:
  - 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



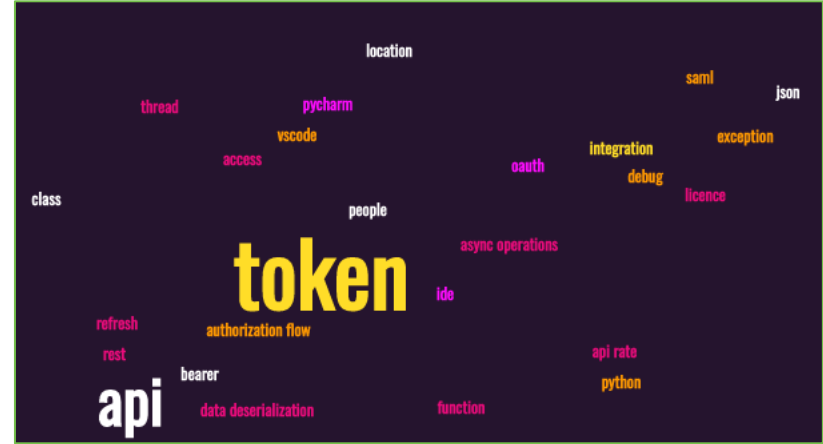
The screenshot shows the 'Create Call Queue' wizard interface. At the top, there is a progress bar with six steps: Basics, Call Routing, Overflow settings, Announcements, Select Agents, and Review. The 'Basics' step is currently active. Below the progress bar, the 'Location' section is visible, with the instruction 'Assign your call queue to a location.' and a 'Select a Location' dropdown menu. A search bar is present below the dropdown. The 'Assign the call queue to a primary phone number and/or extension' section is also visible, with a search bar and a note: 'Both phone number and extension cannot be empty.' The 'Number of calls in queue (Max 50)' section has a value of 10. The 'Caller ID' section has a note: '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 APIs

- Coverage
  - Users (incl. calling entitlements), locations (r/o), call pickups, call queues, hunt groups, auto attendant, call parks, schedules, voice messaging settings
  - person settings: barge, call forwarding, call intercept, call recording, caller ID, voicemail settings
- Currently new API endpoints added on a monthly basis
- Foundation for flexible automation .. not only during migrations
- Reference: <https://developer.webex.com>

# 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”
- <https://pypi.org/project/webex-teamssdk/>: great framework, but no support for Webex Calling specific provisioning



# 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()

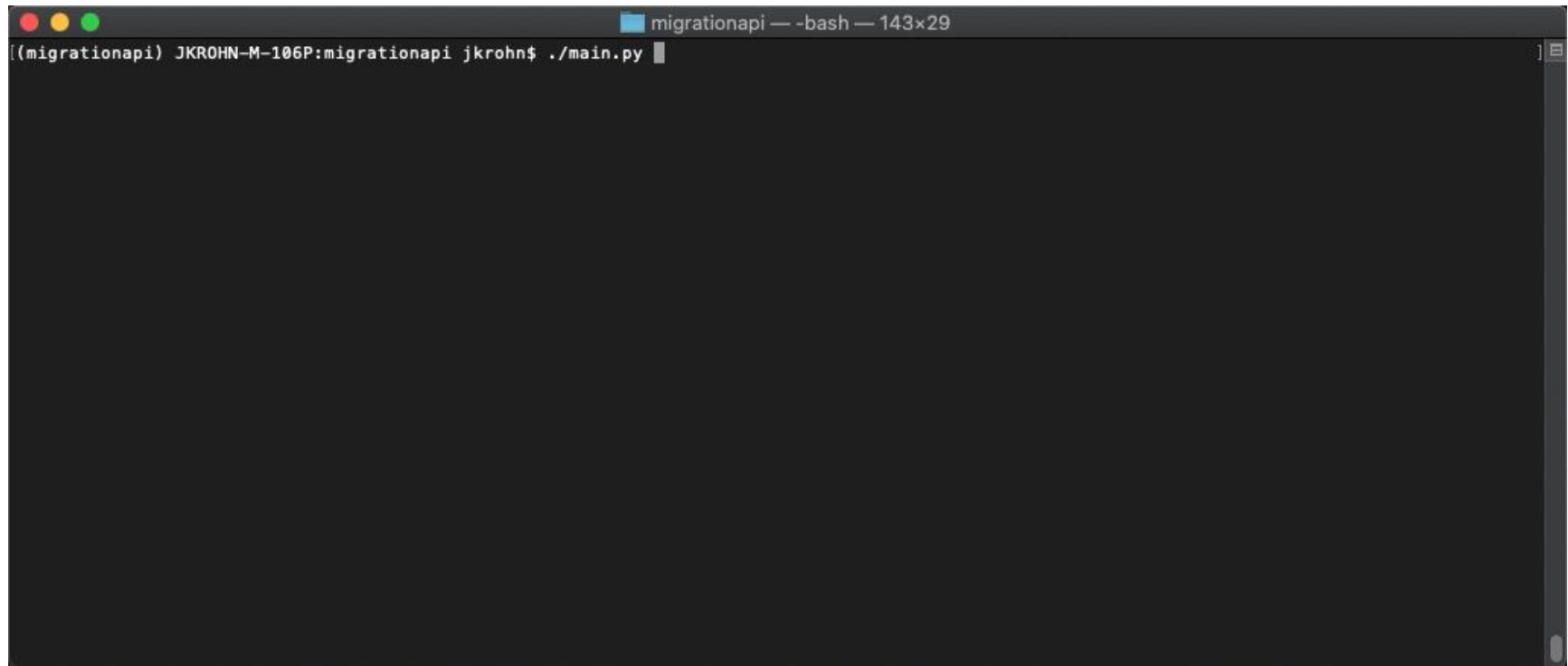
calling_users = [user for user in api.people.list(calling_data=True)
                  if user.location_id]
print(f'{len(calling_users)} users:')
print('\n'.join(user.display_name for user in calling_users))
```

# 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](https://developer.cisco.com)



# Demo



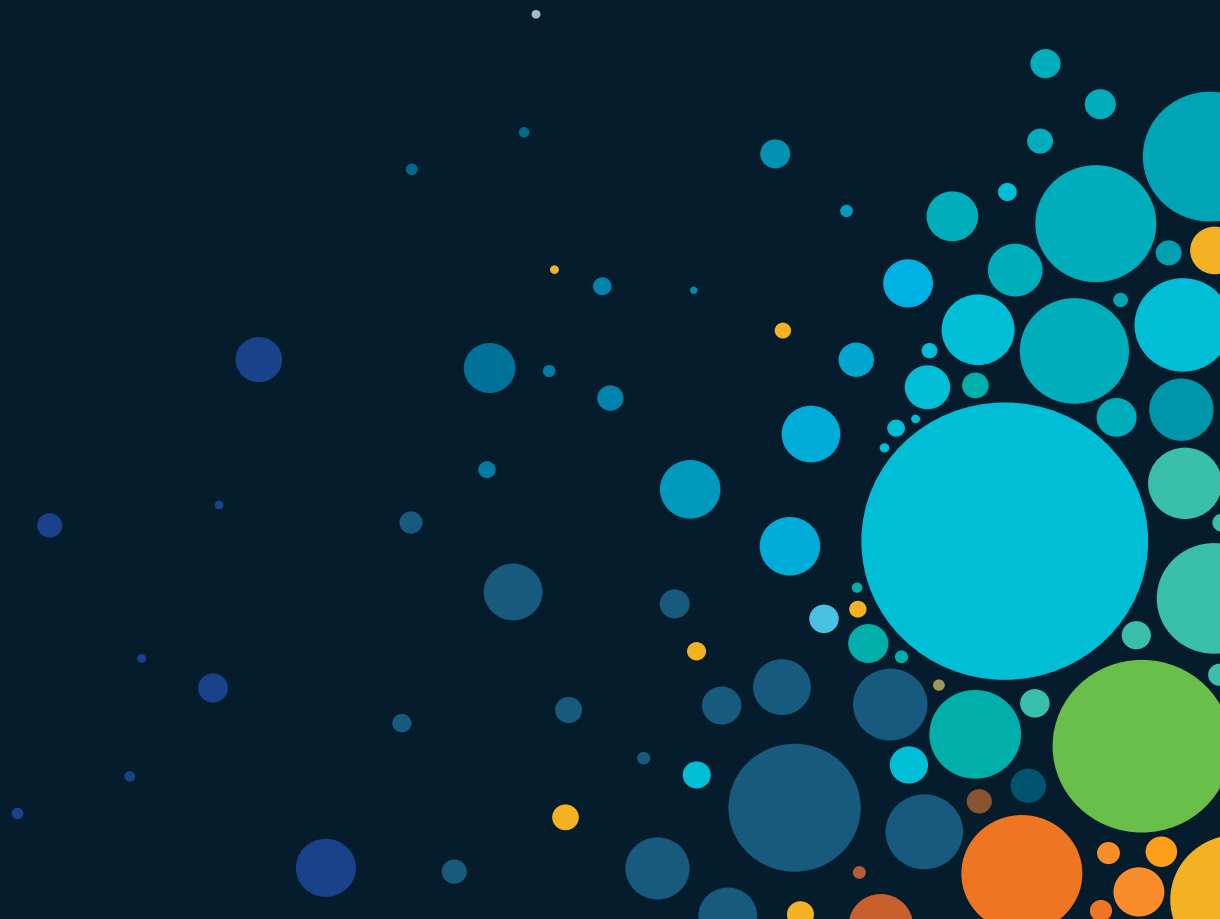
A terminal window titled "migrationapi — -bash — 143x29" is shown. The prompt is "(migrationapi) JKROHN-M-106P:migrationapi jkrohn\$". The command being executed is "./main.py". The terminal output is currently empty.

```
(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

# Closing



# Summary

- Covered in BRKCOL-2481a
  - Migration Process
  - Discovery
  - Design
- Covered in this session
  - Deployment
  - Migration

# Key Takeaways

- User provisioning: foundation for all Webex services
- Directory integration and SSO provides best user experience
- Interworking between Unified CM and Webex Calling during transition period
  - Dial plan maintenance is key
- Migration options: tools, bulk operations, APIs
- APIs provide greatest flexibility and allow for tight integration in business logic

# References

- Analyze Unified CM config exports:  
<https://github.com/jeokrohn/ucmmigration>
- API supported migration from Unified CM to Webex Calling and GDPR export:  
<https://github.com/jeokrohn/migrationapi>
- Python SDK for Webex Calling provisioning:  
<https://pypi.org/project/wxc-sdk/>

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# Thank you

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