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The bridge to possible

Successful Migrations from Unified CM to Webex Calling

Johannes Krohn, Principal Technical Marketing Engineer

BRKCOL-2481a

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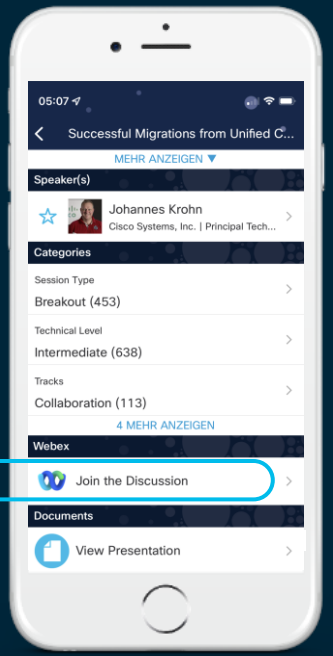

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Webex spaces will be moderated by the speaker until June 17, 2022.

Agenda

- General Process
- Discover
- Design
- Deploy
- Migrate

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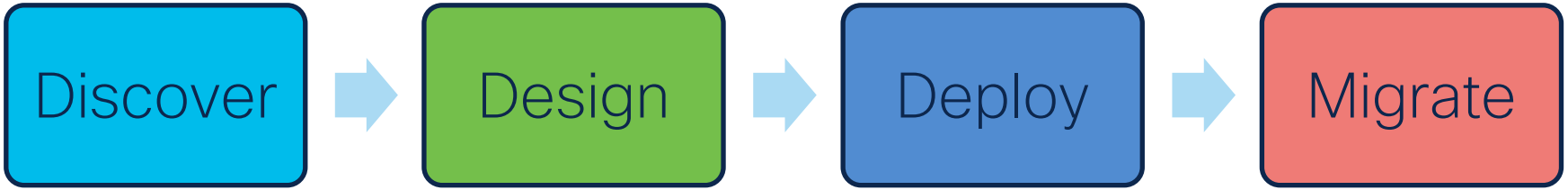
... with special focus on programmability using Python

Webex Calling Migration

General Process



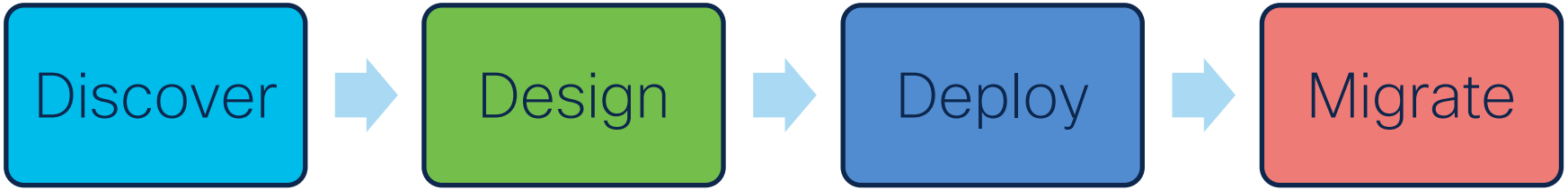
- Requirements
- Config assessment
- Inventory
  - users, devices, locations, …
- Feature utilization
- Integrations
- Validate network requirements

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

- Infrastructure setup
- Base configuration
- Interworking setup
- Licensing

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

General Process



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Discover

Analytics

- 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

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

- 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.

```
<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

```python
# Create the Zeep service binding to AXL at the specified CUCM
service = client.create_service( '{http://www.cisco.com/AXLAPIService/}AXLAPIBinding',
                                 f'https://{os.getenv("CUCM_ADDRESS")}:8443/axl/' )

# Create a simple phone
# Of note, this appears to be the minimum set of elements required
# by the schema/Zeep
phone = {
        'name': 'CSFTESTPHONE',
        'product': 'Cisco Unified Client Services Framework',
        'model': 'Cisco Unified Client Services Framework',
        'class': 'Phone',
        'protocol': 'SIP',
        'protocolSide': 'User',
        'devicePoolName': 'Default',
        'commonPhoneConfigName': 'Standard Common Phone Profile',
        'locationName': 'Hub_None',
        'useTrustedRelayPoint': 'Default',
        'builtInBridgeStatus': 'Default',
        'packetCaptureMode': 'None',
        'certificateOperation': 'No Pending Operation',
        'deviceMobilityMode': 'Default'
}

# Execute the addPhone request
try:
    resp = service.addPhone( phone )
except Exception as err:
    print( f'\nZeep error: addPhone: { err }' )
    sys.exit( 1 )
```

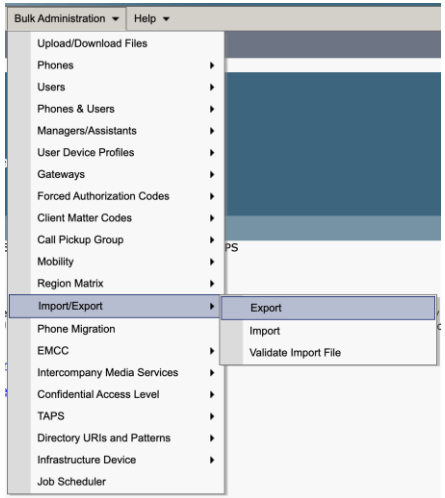
Examples: https://github.com/CiscoDevNet/axl-python-zeep-samples

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

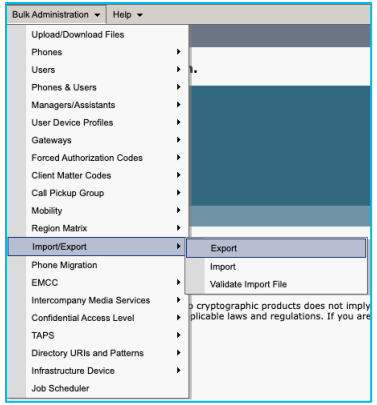
Config Export

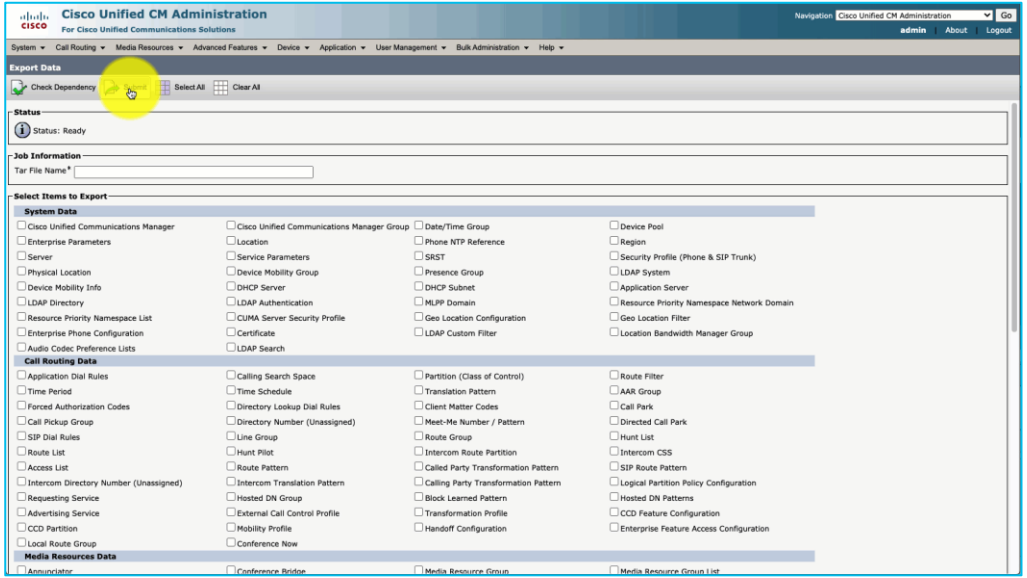
- Specific BAT option
- Allows full or partial Unified CM config export
- Result: TAR file with 172 files
  - One CSV for each config object type
- Examples
  - callpark.csv
  - callpickupgroup.csv
  - directedcallpark.csv
  - enduser.csv
  - huntlist.csv
  - huntgroup.csv
  - …

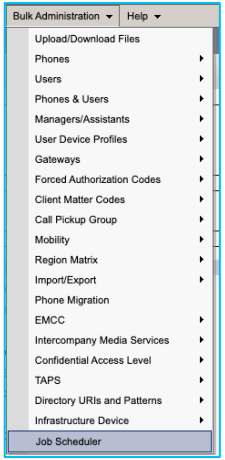


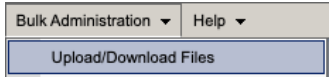
Unified CM Data Export

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









Working with Config Export Tar and CSV Files

- 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, …

User Migration Batches

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 DNPs 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

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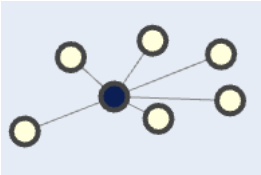
- Collect DNPs from “DN OR PATTERN x” and “ROUTE PARTITION x” columns in `linegroup.csv`
- F and “P
- L
- → Definitely needs to be done programmatically

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

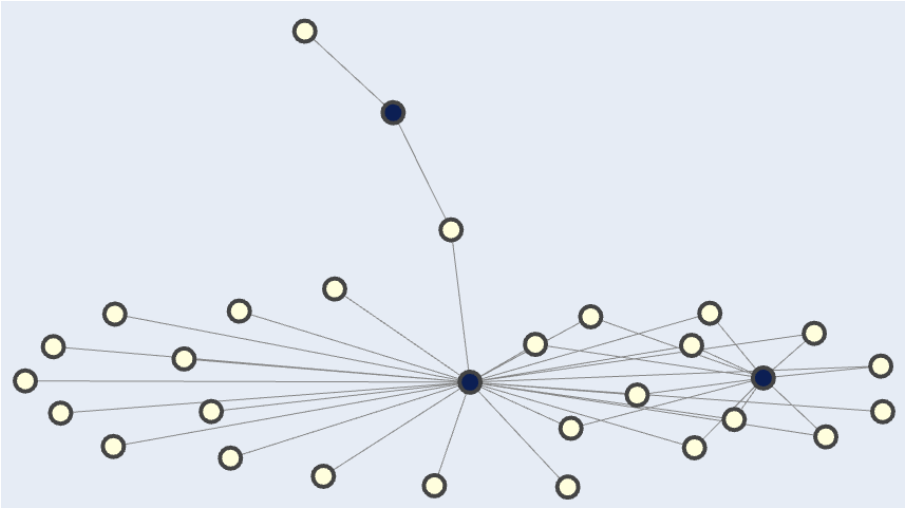
Real life examples: Hunt Pilots



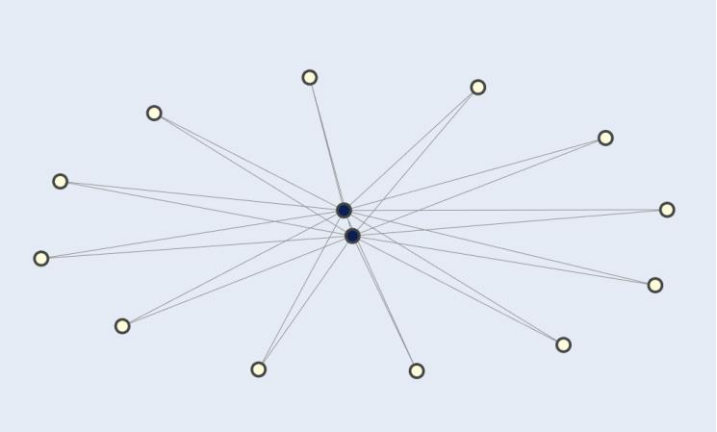
Simple

User

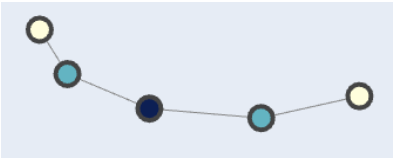
Hunt Pilot



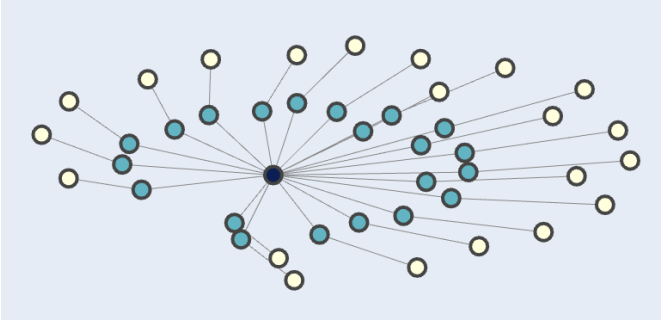
Complex



Real life examples: Shared Lines



DN shared on two phones owned by two users

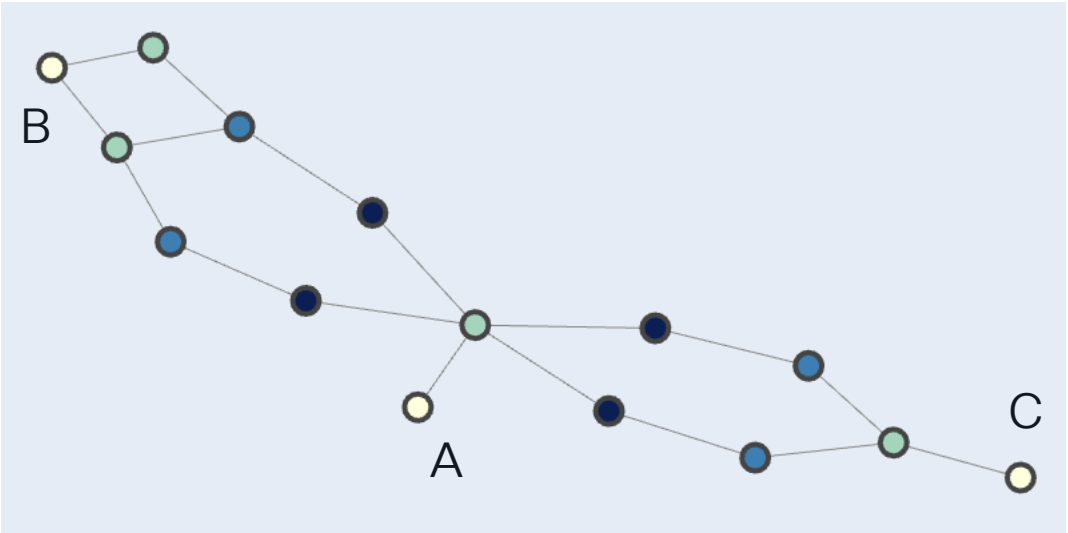


Single DN shared on multiple phones

- User
- DN
- Phone

Both cases are problematic for a migration to WxC

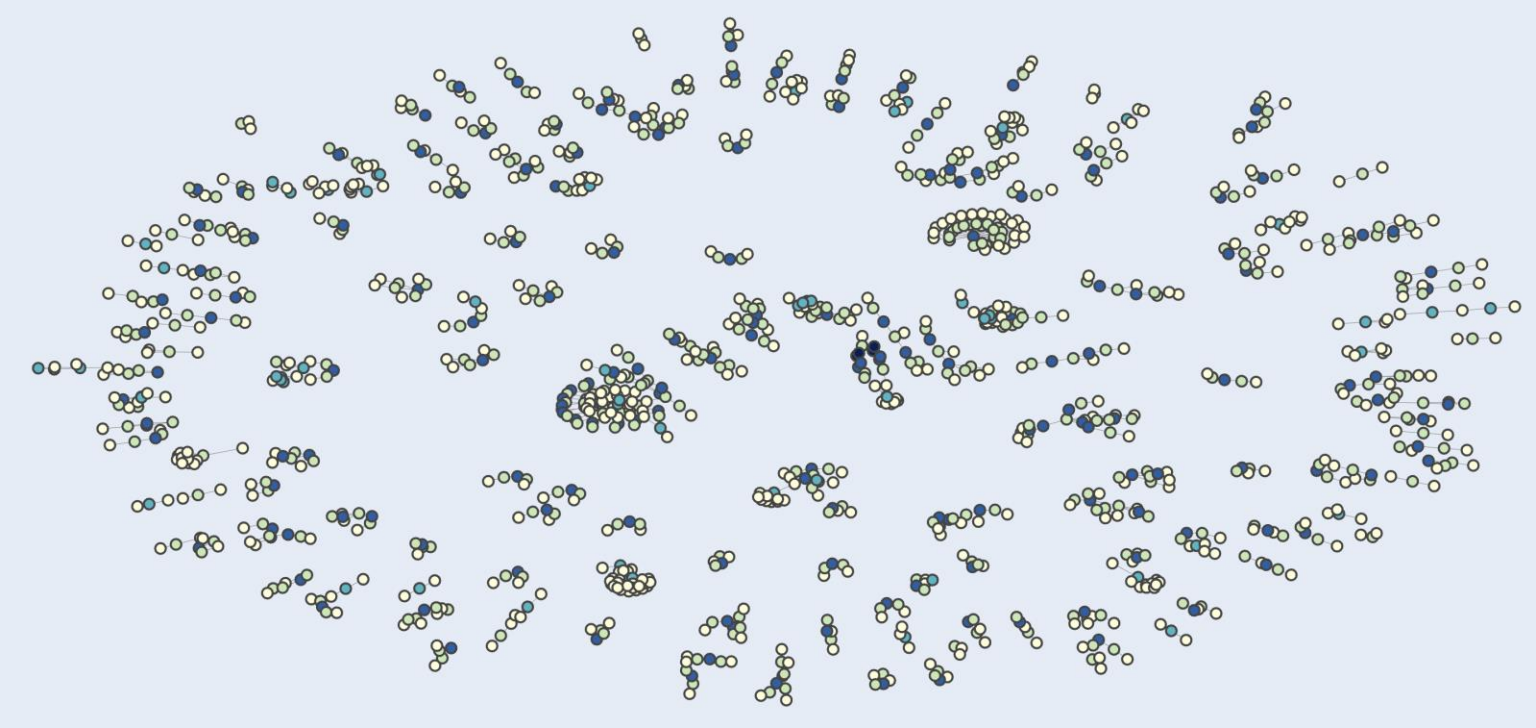
Real life examples: BLF



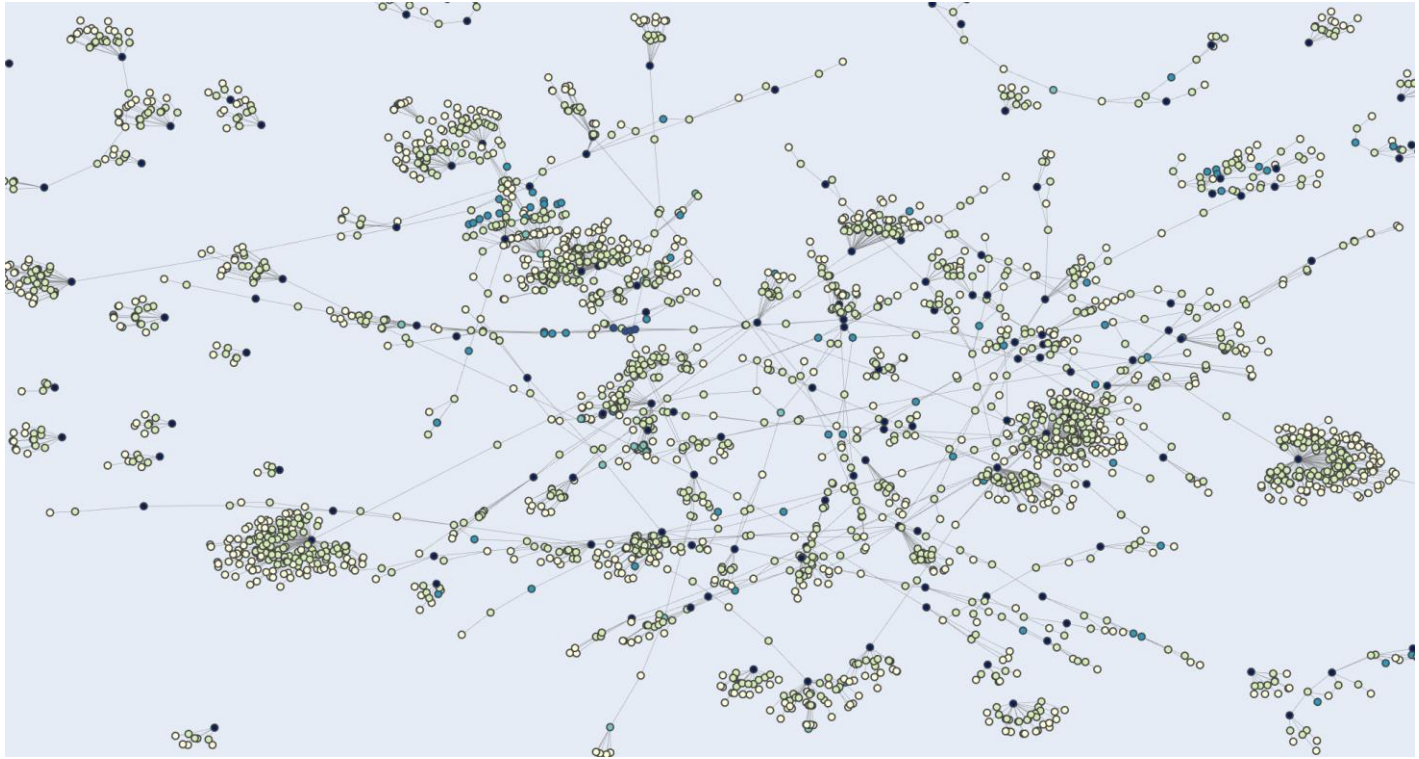
User
Phone
DN
BLF

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

Real life example: combined

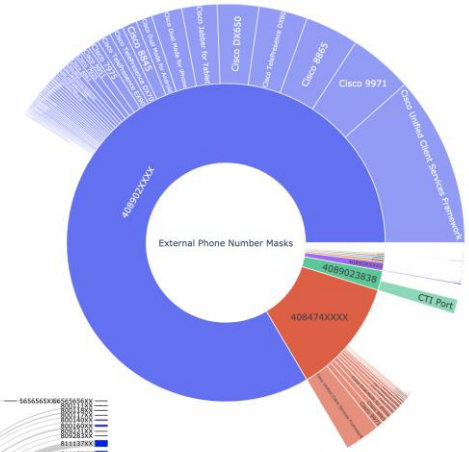


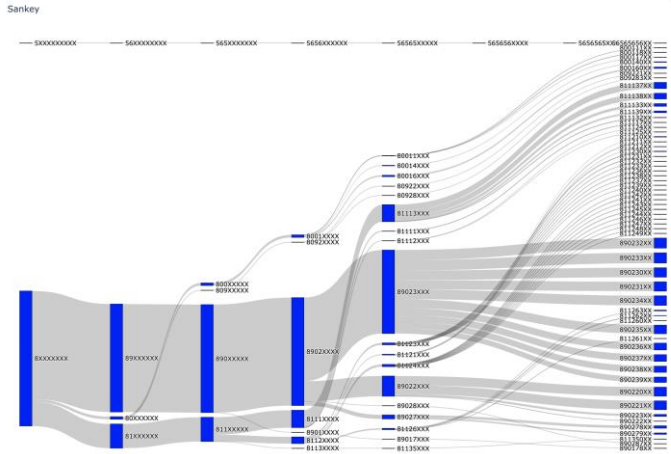
.. Or something … “interesting”



Migration Batches … and other analysis

- https://github.com/jeokrohn/ucmmigration
- Uses Python 3.9
- Read and analyse Unified CM data exports
- Work in progress…
- Use as is





Demo

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?
  - What is a location?
    - Common extension range
    - common +E.164 prefix (how long, what about extension only)
    - same device pool
    - shared CoS (how to you find users sharing equivalent CoS?)
    - ...

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

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

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)
- Limited to a single location
- For inbound calling: hunt groups and call queues might be the better option
- Single number reach allows to ring multiple destinations
- Executive assistant feature might address some use cases (exec and assistant can be in different locations)

- Different concepts
- Same location limitation seems to be the biggest challenge*

*Roadmap item

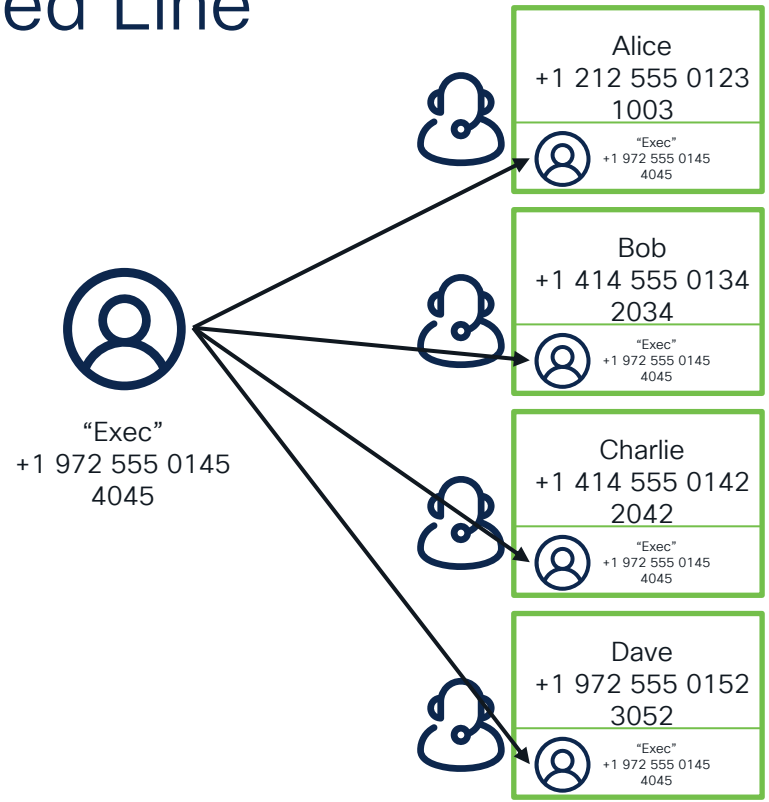
”Executive” as Flexible Shared Line

- Create ”dummy” exec

“Exec”
+1 972 555 0145
4045

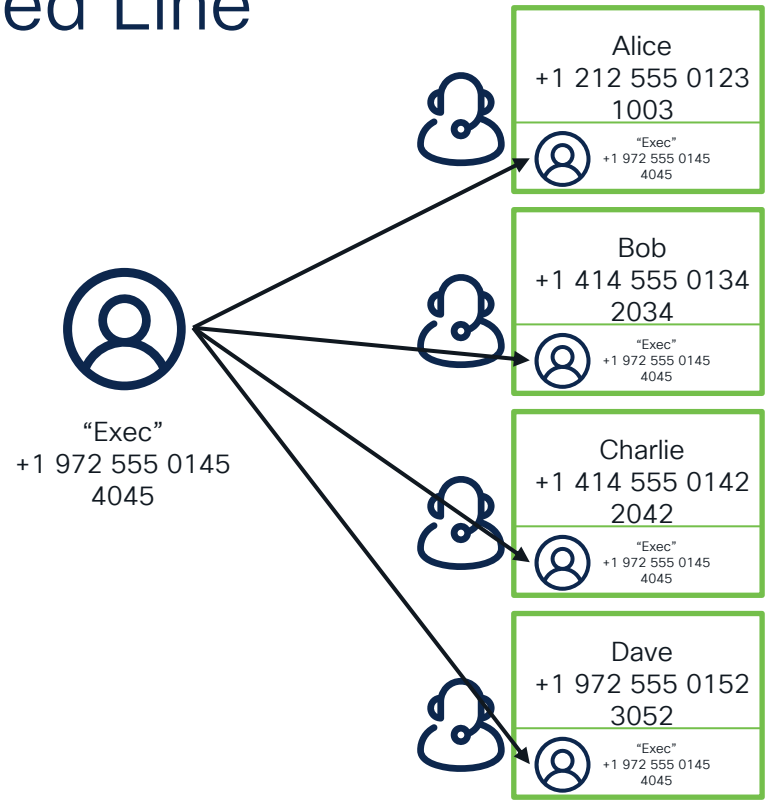
”Executive” as Flexible Shared Line

- Create ”dummy” exec
- .. and assign a bunch of assistants



”Executive” as Flexible Shared Line

- Create ”dummy” exec
- .. and assign a bunch of assistants
- Assistants can place calls on behalf of Executive
- Assistants get notification for incoming calls to Executive
  → can answer calls
- Exec and assistants don’t need to be in same location



Closing

Summary

- Covered in this session
  - Migration Process
  - Discovery
  - Design
- Foundation for deployment and migration
  → covered in BRKCOL-2481b

Key Takeaways

- Programmatic approach to extract/analyze data
- User batched based on dependencies between users
- Unified CM and Webex Calling are different ☺
- Focus on business requirements instead of 1:1 feature mapping

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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