CISCO Live!

#CiscoLive

The bridge to possible

Authentication, Authorization and Provision

for Cisco Collaboration - Part 1

Paulo Jorge Correia
Principal Sales Architect
@paucorre

BRKCOL-2007a

Cisco Webex App

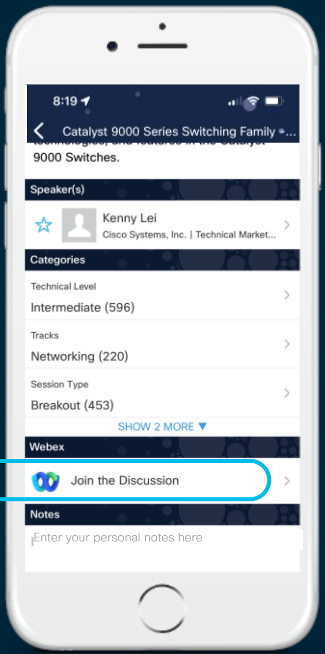
Questions?

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.



8:19

Catalyst 9000 Series Switching Family •...

9000 Switches.

Speaker(s)

Kenny Lei
Cisco Systems, Inc. | Technical Market...

Categories

Technical Level
Intermediate (596)

Tracks
Networking (220)

Session Type
Breakout (453)

SHOW 2 MORE ▼

Webex

Join the Discussion

Notes

Enter your personal notes here

https://ciscolive.ciscoevents.com/ciscolivebot/#BRKCOL-2007a

Agenda

- Introduction
- On-premise Provision
  - Azure AD
- Webex Provisioning
  - Self-Enrolment or Invite
  - People API
  - Account Linking
  - Directory Connector
  - SCIM
  - Azure Wizard
  - CUCM provision
  - SAML JIT
  - Social Login
- Conclusions and Key Takeaways

Introduction

World's Biggest Data Breaches & Hacks

interesting story

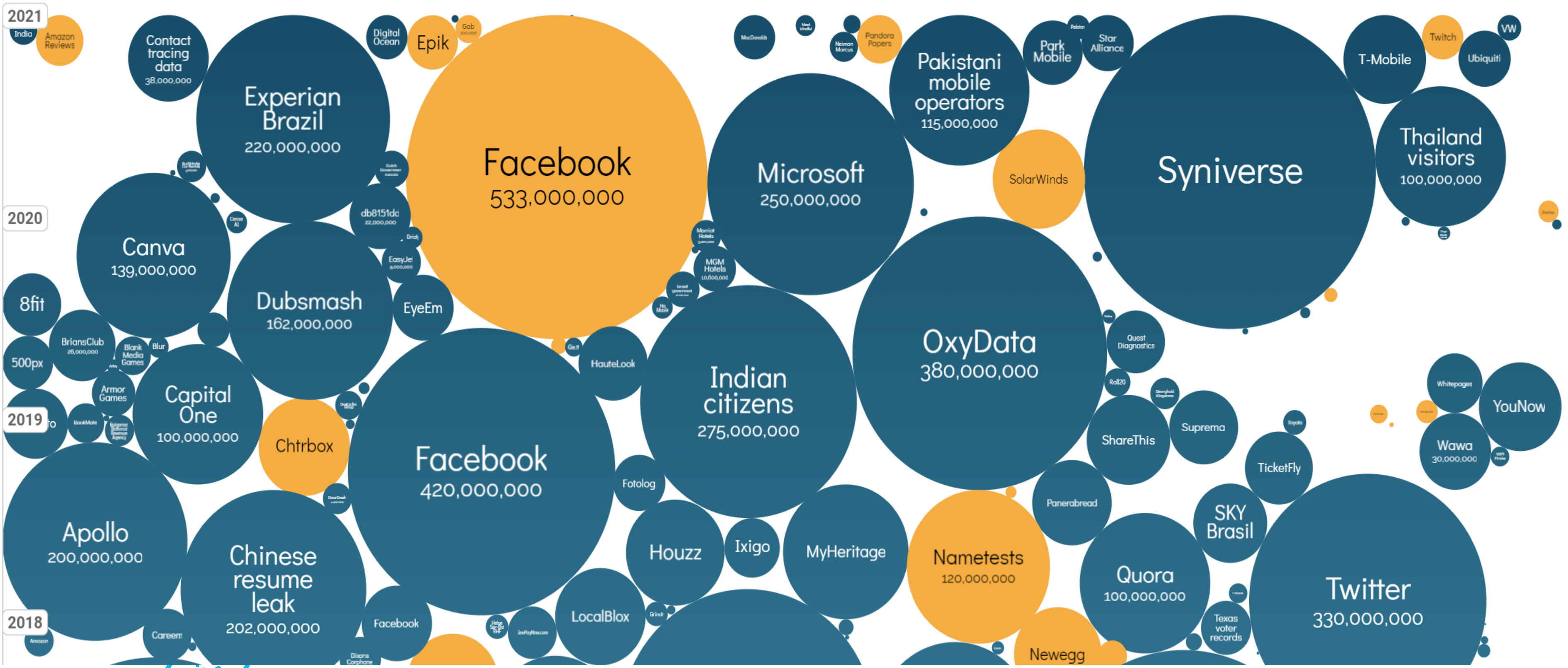
Selected events over 30,000 records

UPDATED: Oct 2021

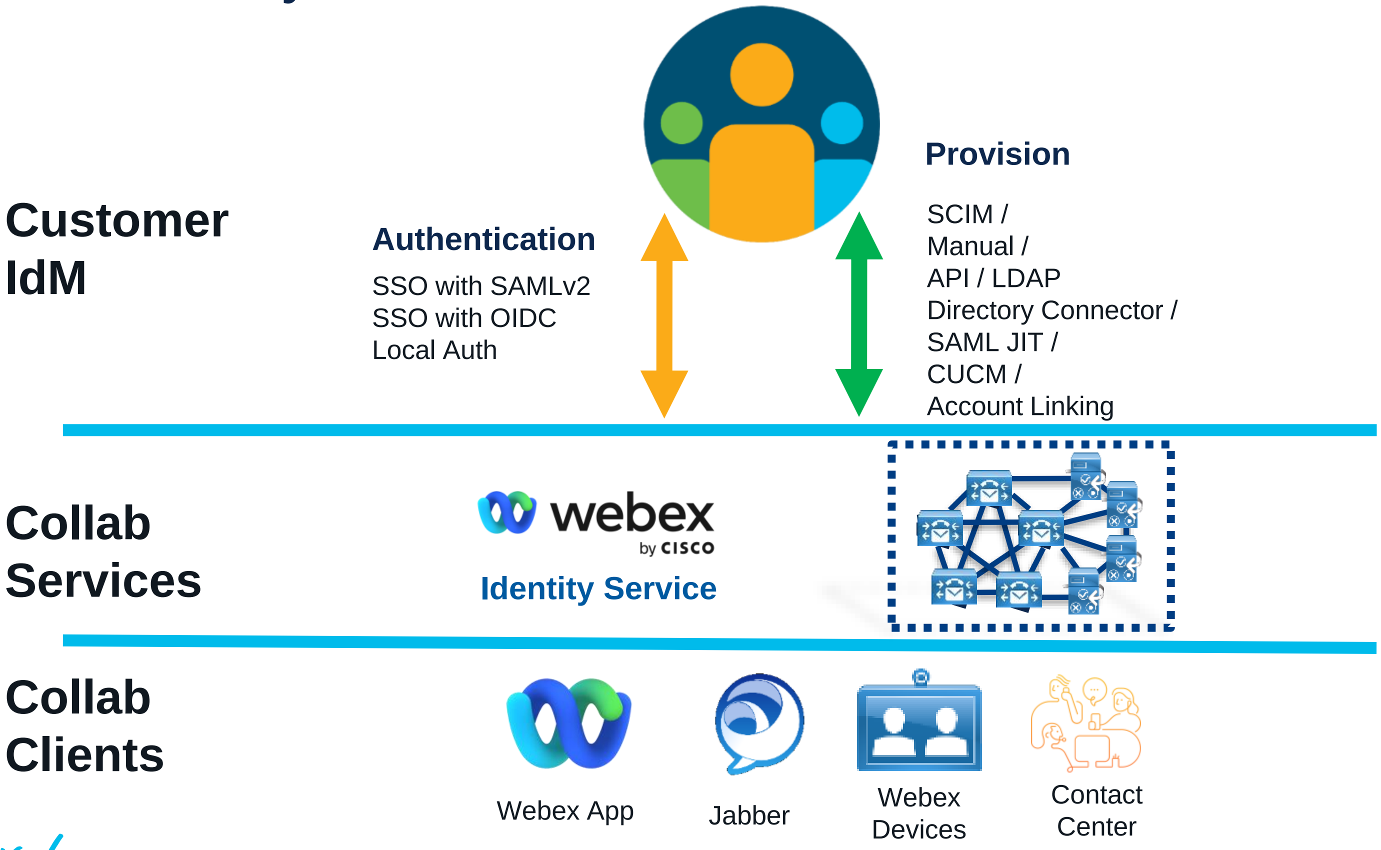
Source: https://www.informationisbeautiful.net/visualizations/worlds-biggest-data-breaches-hacks/

size: records lost **filter**

search...



Cisco Identity Architecture for Collaboration



Customer IdM

Authentication

SSO with SAMLv2
SSO with OIDC
Local Auth

Provision

SCIM /
Manual /
API / LDAP
Directory Connector /
SAML JIT /
CUCM /
Account Linking

Collab Services

Identity Service

Collab Clients

Webex App

Jabber

Webex Devices

Contact Center

Which Protocols do we see in Identity Management

SAML Security Assertion Markup Language defined under OASIS Security Services Technical Committee (SSTC) Standards.

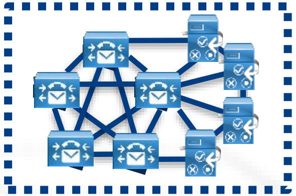
OAuth is an Authorization Framework defined by IETF under RFC 6749

SCIM System for Cross-domain Identity Management, 2.0 was release under IETF as RFC 7643 and 7644

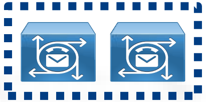
OpenID Connect 1.0 is a simple identity layer on top of the OAuth 2.0 protocol.

On-premise Provision

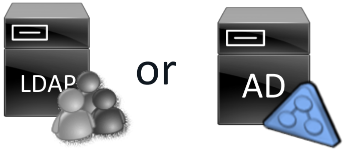
Users provision for CUCM and Connection



Manual /
AXL SOAP /
LDAP



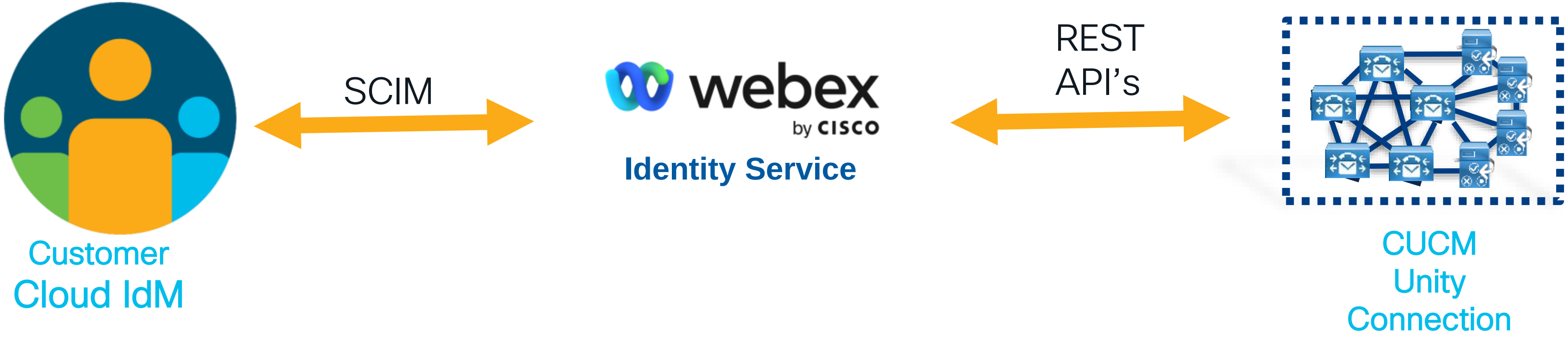
Manual /
AXL SOAP /
LDAP



- This model serve us for many years, unfortunately today we have new challenges with IDM in the cloud (IDaaS)
- LDAP was never design as a protocol to be used on the internet.
- There aren’t any Firewall vendors that inspect LDAP at an application level

Future

How to bring Cloud IdM information to CUCM



Customer Cloud IdM

SCIM

webex by cisco

Identity Service

REST API's

CUCM Unity Connection

Cisco uses the identity engine in Webex to bring all user information from Customer Cloud IdM using standard protocols like SCIM and provide that user database to Cisco On-premise components.

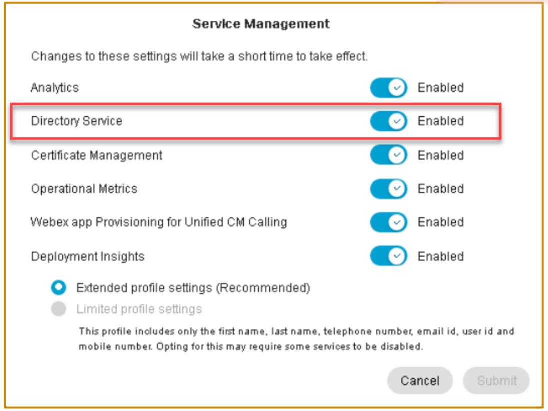
This will allow us to have a common user database for cloud and on-premise products

Future

CCUC Directory Service

What to do ?

Add CUCM cluster to Webex CH for Connected UC and enable Directory Services.



Service Management

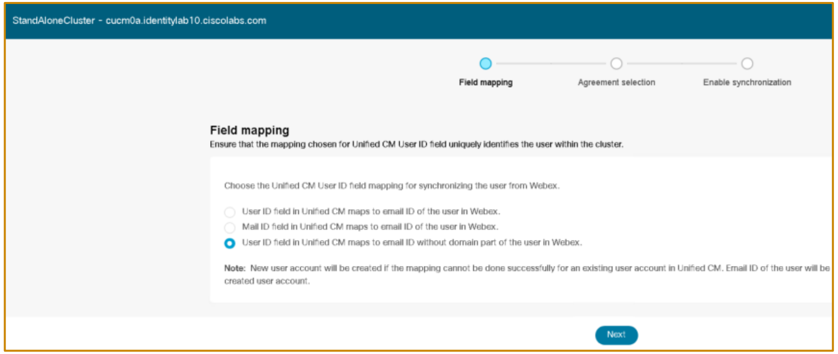
Changes to these settings will take a short time to take effect.

- Analytics — Enabled
- Directory Service — Enabled
- Certificate Management — Enabled
- Operational Metrics — Enabled
- Webex app Provisioning for Unified CM Calling — Enabled
- Deployment Insights — Enabled

● Extended profile settings (Recommended)

○ Limited profile settings

This profile includes only the first name, last name, telephone number, email id, user id and mobile number. Opting for this may require some services to be disabled.



StandAloneCluster - cucm0a.identitylab10.ciscolabs.com

Field mapping

Ensure that the mapping chosen for Unified CM User ID field uniquely identifies the user within the cluster.

Choose the Unified CM User ID field mapping for synchronizing the user from Webex.

○ User ID field in Unified CM maps to email ID of the user in Webex.

○ Mail ID field in Unified CM maps to email ID of the user in Webex.

● User ID field in Unified CM maps to email ID without domain part of the user in Webex.

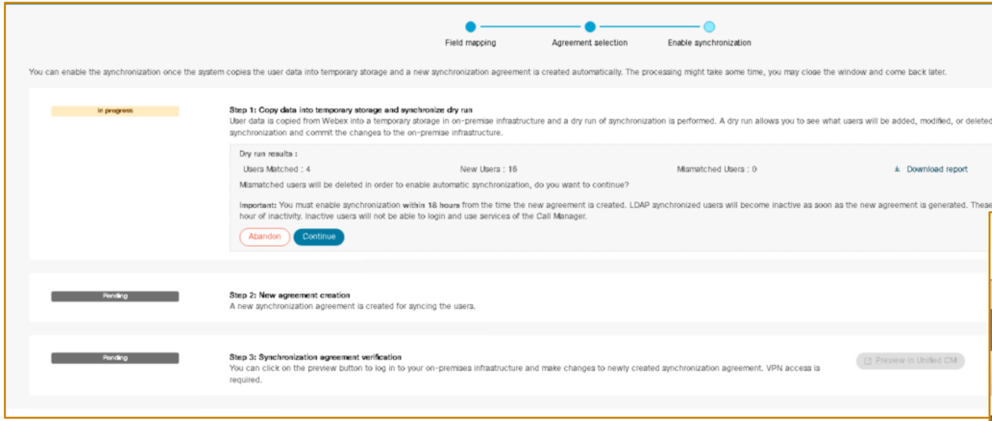
Note: New user account will be created if the mapping cannot be done successfully for an existing user account in Unified CM. Email ID of the user will be created user account.

Choose the value format that you will have for the UserID in CUCM

Future

CCUC Directory Service

What to do ?



You can enable the synchronization once the system copies the user data into temporary storage and a new synchronization agreement is created automatically. The processing might take some time, you may close the window and come back later.

In progress

Step 1: Copy data into temporary storage and synchronize dry run
User data is copied from Webex into a temporary storage in on-premise infrastructure and a dry run of synchronization is performed. A dry run allows you to see what users will be added, modified, or deleted before you run a full synchronization and commit the changes to the on-premise infrastructure.

Dry run results :

Users Matched : 4 New Users : 16 Mismatched Users : 0 Download report

Mismatched users will be deleted in order to enable automatic synchronization, do you want to continue?

Important: You must enable synchronization **within 18 hours** from the time the new agreement is created. LDAP synchronized users will become inactive as soon as the new agreement is generated. These users are removed after 24 hour of inactivity. Inactive users will not be able to login and use services of the Call Manager.

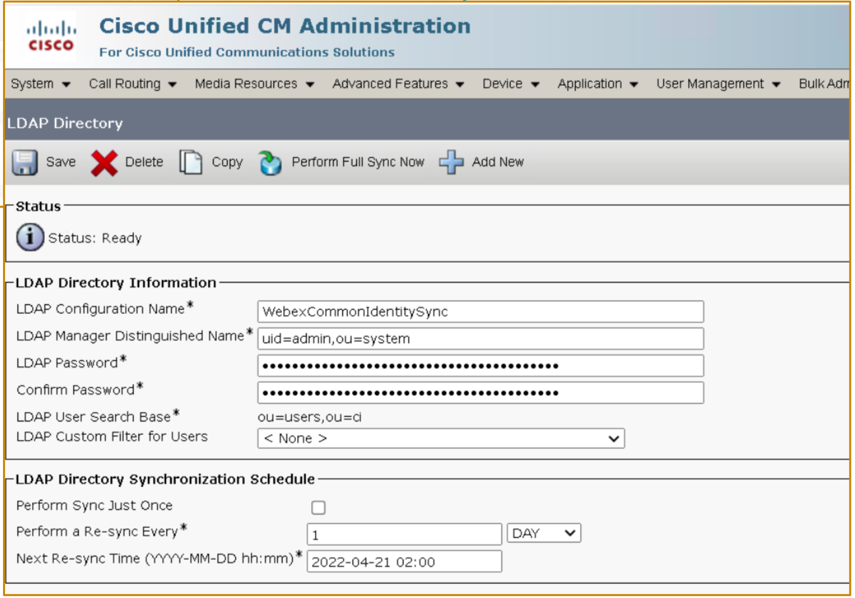
Pending

Step 2: New agreement creation
A new synchronization agreement is created for syncing the users.

Pending

Step 3: Synchronization agreement verification
You can click on the preview button to log in to your on-premises infrastructure and make changes to newly created synchronization agreement. VPN access is required.

You will see a Dry Run result, and if everything looks good you can enable the Synchronization.



Status

Status: Ready

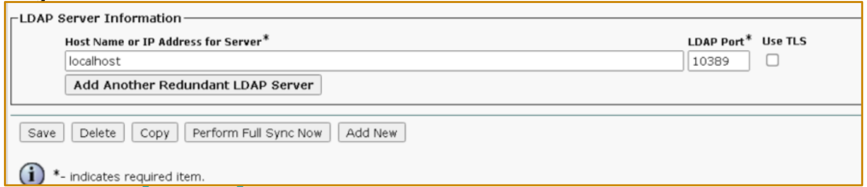
LDAP Directory Information

LDAP Configuration Name*	WebexCommonIdentitySync
LDAP Manager Distinguished Name*	uid=admin,ou=system
LDAP Password*	••
Confirm Password*	••
LDAP User Search Base*	ou=users,ou=ci
LDAP Custom Filter for Users	< None >

LDAP Directory Synchronization Schedule

Perform Sync Just Once	☐	
Perform a Re-sync Every*	1	DAY
Next Re-sync Time (YYYY-MM-DD hh:mm)*	2022-04-21 02:00	

At this point you will have a LDAP synchronization created in CUCM, that will sync from Webex to CUCUM


LDAP Server Information

Host Name or IP Address for Server*	LDAP Port*	Use TLS
localhost	10389	☐

*- indicates required item.

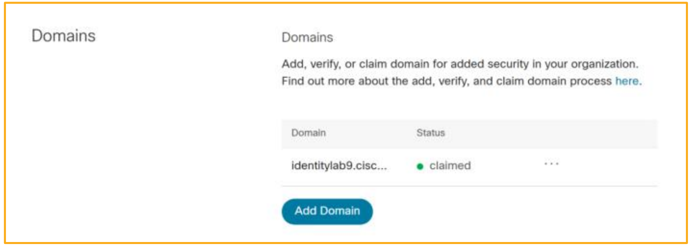
Webex Provision

Webex User Account CRUD Operations

Manual or CSV	User Self-Enrollment or Invite	Directory Connector
SCIM Azure AD Wizard	People API	Account Linking
CUCM Provision	SAML JIT	Social Login

CRUD – Create, Read, Update and Delete

User Self-Enrollment or Invite

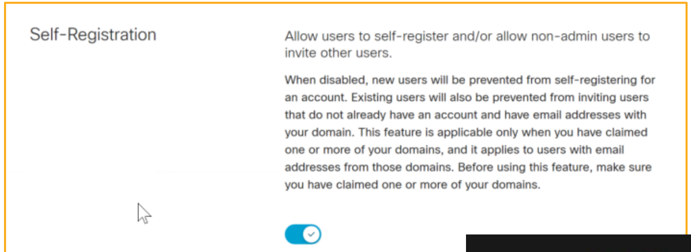


Domains

Domains

Add, verify, or claim domain for added security in your organization. Find out more about the add, verify, and claim domain process here.

Domain	Status
identitylab9.cisc...	● claimed

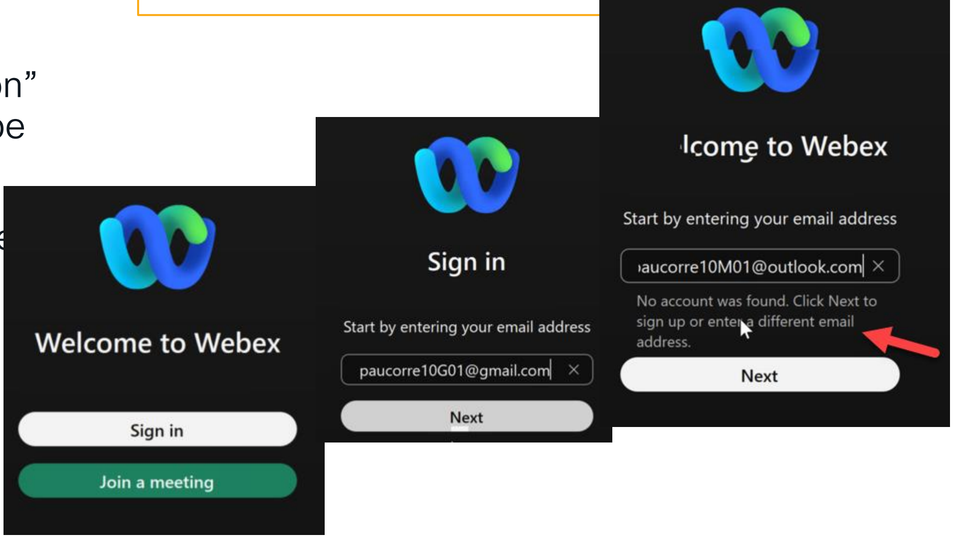


Self-Registration

Allow users to self-register and/or allow non-admin users to invite other users.

When disabled, new users will be prevented from self-registering for an account. Existing users will also be prevented from inviting users that do not already have an account and have email addresses with your domain. This feature is applicable only when you have claimed one or more of your domains, and it applies to users with email addresses from those domains. Before using this feature, make sure you have claimed one or more of your domains.

- In all Webex ORG’s by default “Self-Registration” is turned on, if a domain is claimed, users will be automatically created.
- Self Enrollment will create a user with the Webe ID with the email address provided.



Welcome to Webex

Sign in

Start by entering your email address

paucorre10G01@gmail.com

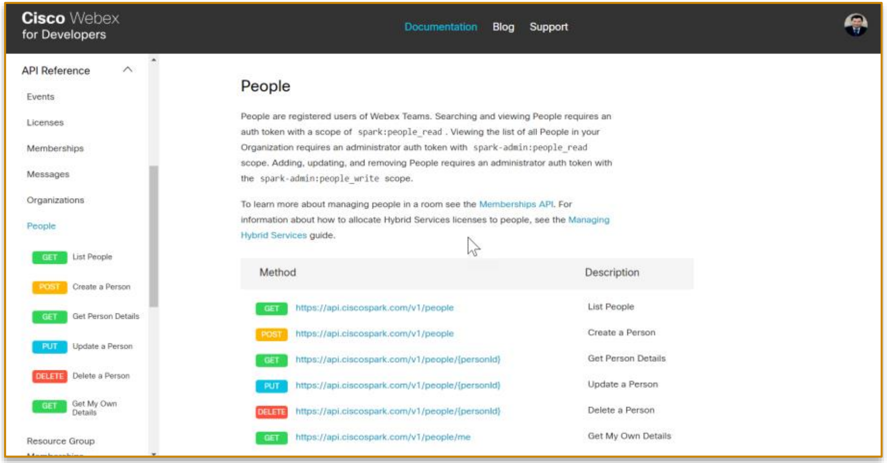
lcome to Webex

Start by entering your email address

ıaucorre10M01@outlook.com

No account was found. Click Next to sign up or enter a different email address.

Manage People API



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
GET https://api.ciscospark.com/v1/people/me	Get My Own Details

https://develop.webex.com/resource-people.html

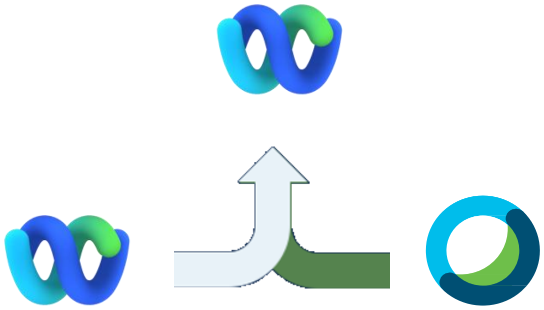
Benefit:

- Manage users and licensing via an API to control exactly who has access to specific services and provide better security

Key Capabilities

- Create a person dynamically with the right license and entitlement to the right services
- Delete a person to ensure there access is revoked to meet compliance rules
- Update a person in case their phone, address or profile has changed because of a promotion
- List people so you can be in the know about the people in your organization
- Get Me details so you can make sure your details are up to date

Benefits of Linking

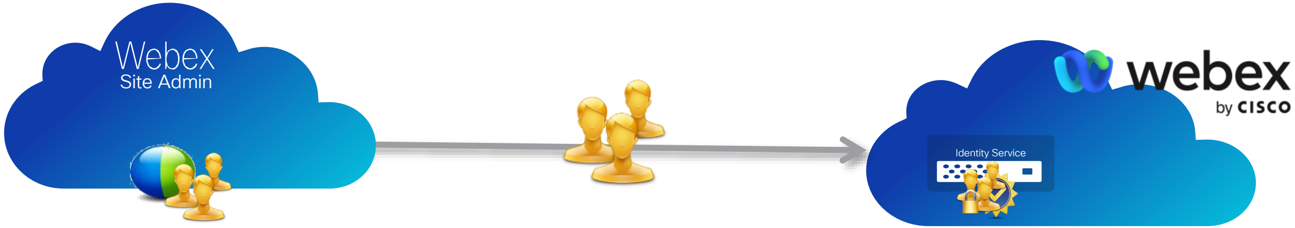


- Get WebEx Analytics and Troubleshooting
- Delivers Webex Teams
- Webex Device register in Cloud
- People Insights for Meetings, Better Pre & Post Meeting Experience

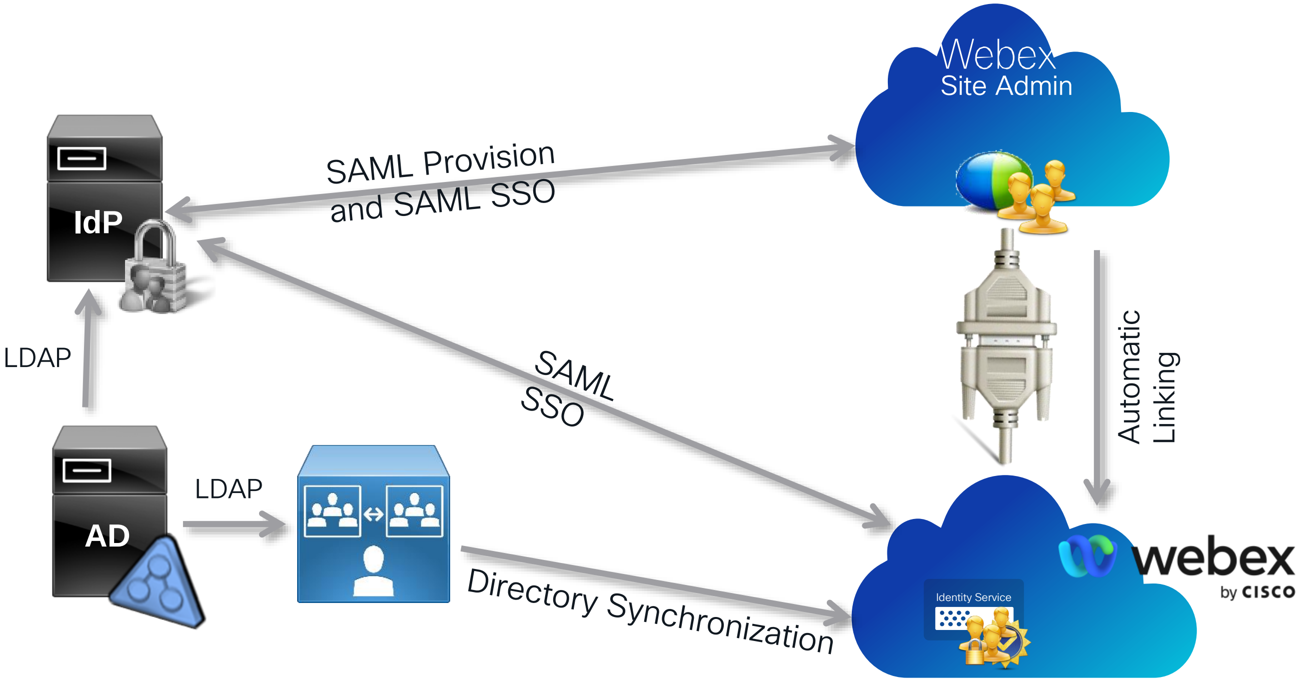
https://help.webex.com/en-us/341eud/Link-Cisco-Webex-Sites-to-Control-Hub

Automatic Linking of Sites/Users to Cisco Webex Control Hub

- **All sites and users** are automatically linked with Cisco Webex Control Hub.
- Automatic user synchronization **done twice a day.**

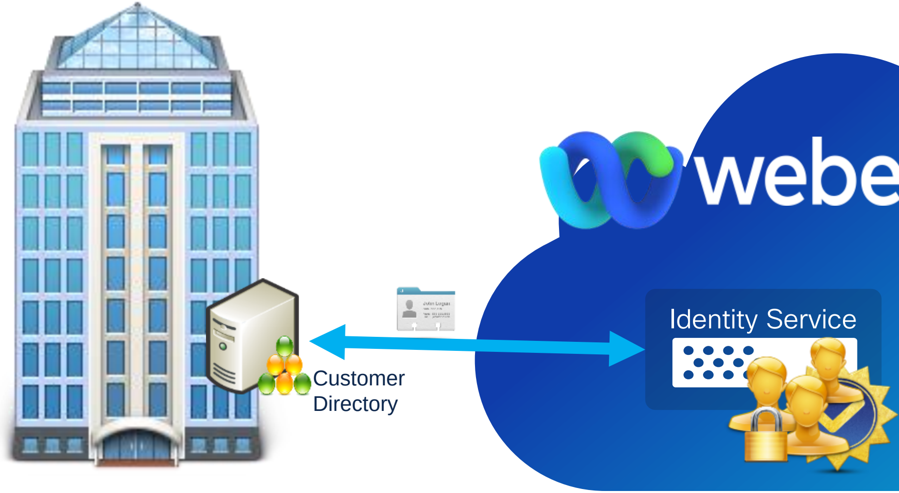


Provision flows for Site/Account Linking

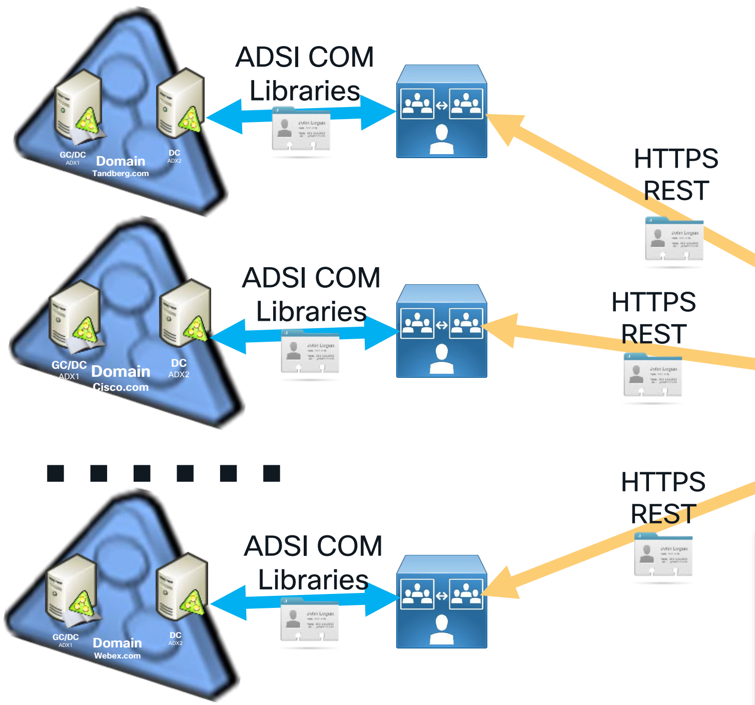


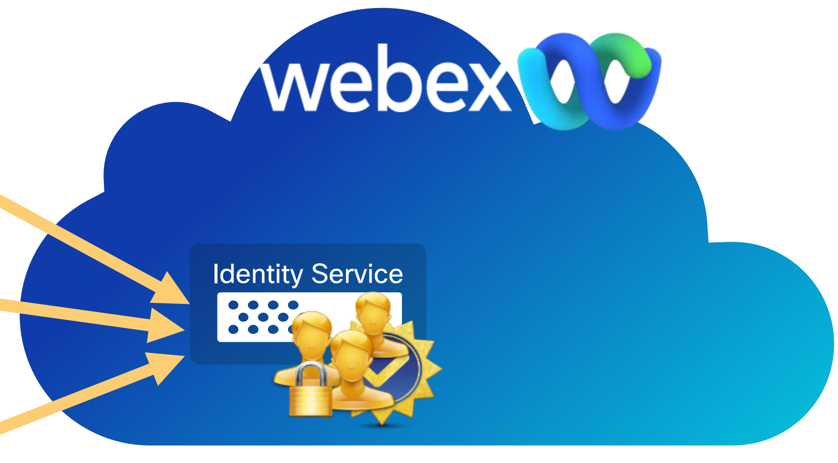
Directory Connector

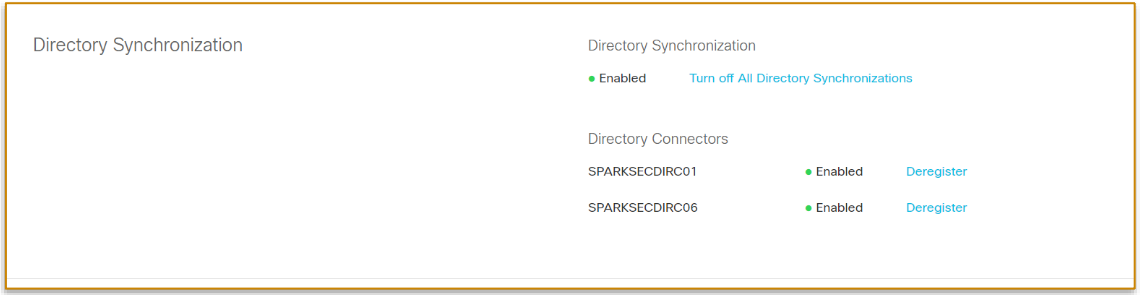
- Full synchronization and incremental synchronization
- Scheduled synchronization
- Multiple Domains/Forests supported
- LDAP filters
- Dry Run
- User Attribute Mapping and modifications
- Using Service Account or User Account
- Avatar Sync
- Troubleshooting
- Auto-upgrade
- High Availability (HA)



Directory Connector







Directory Synchronization

Directory Synchronization

● Enabled Turn off All Directory Synchronizations

Directory Connectors

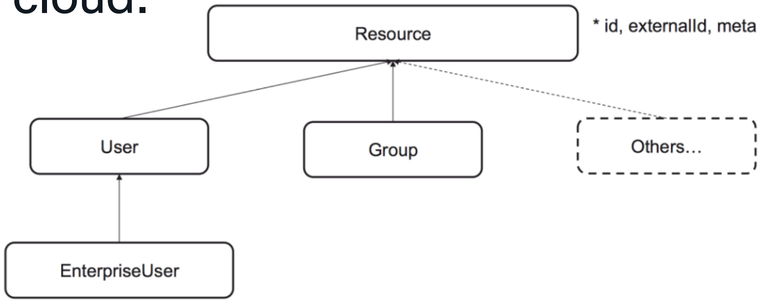
SPARKSECDIRC01	● Enabled	Deregister
SPARKSECDIRC06	● Enabled	Deregister

What is SCIM ?

The System for Cross-domain Identity Management (SCIM) specification is designed to make managing user identities in cloud-based applications and services easier.

Its intent is to reduce the cost and complexity of user management operations by providing a common user schema and extension model, as well as binding documents to provide patterns for exchanging this schema using standard protocols. In essence: make it fast, cheap, and easy to move users in to, out of, and around the cloud.

Normally we will see a Model like :



http://www.simplecloud.info/

Example of a user object passed by the IdM to Cisco Webex as we support it today

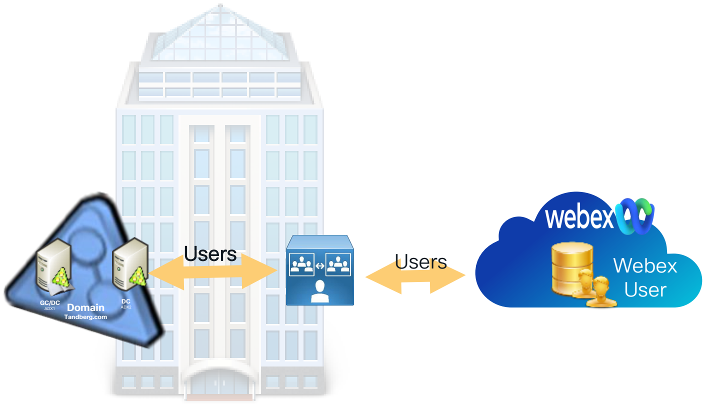
```
{
 "schemas":["urn:scim:schemas:core:1.0"],
 “externalId”:”a54028dd-f9ab-4c02-9526-a27bc158b04d”,
 "userName": “paucorre@cisco.com",
 "name":{
  "givenName":“Paulo Jorge",
  "familyName":“Correia"
 },
 "displayName": “Paulo Jorge Correia",
 "phoneNumbers":[
  {
   "value": "+351253123456",
   "type": "work"
  },
  {
   "value": "+351911234567",
   "type": "mobile"
  }
  {
   "value": "+351253234567",
   "type": “fax"
  }
 ],
 "addresses": [
  {
   "type": "work",
   "streetAddress": “Av. 31 Janeiro, 111",
   "locality": “Braga",
   "region": “Minho",
   "postalCode": “4700-411",
   "country": “PT"
  }
 ],
 "title": “Principal Sales Architect",
 “active": True,
}
```

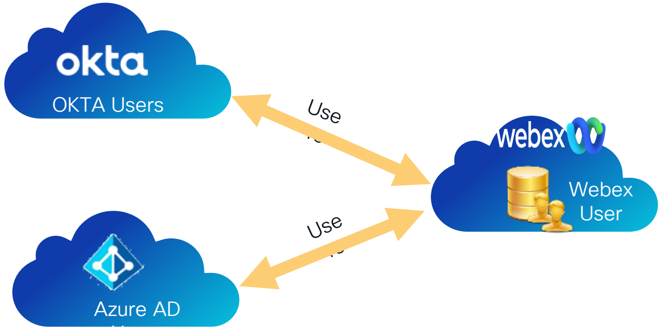
SCIM

When Comparing with Directory Connector

	SCIM	Directory Connector
Create, Delete and Update	✓	✓
Allows local Webex Users Creation	✓	✗
Attributes Synchronize	✓ (15)	✓ (27)
Room Systems	✗	✓
Groups	✓ *	✓
Force re-auth when user change password	✗	✓
Dry-Run	✗	✓
Soft-Delete	✗	✓
Avatars	✗	✓

* Near Future

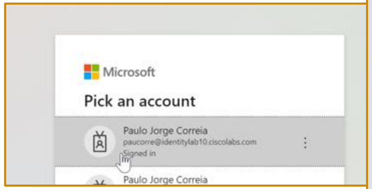




SCIM

Azure AD Wizard

Uses Graph API to configure Azure portal

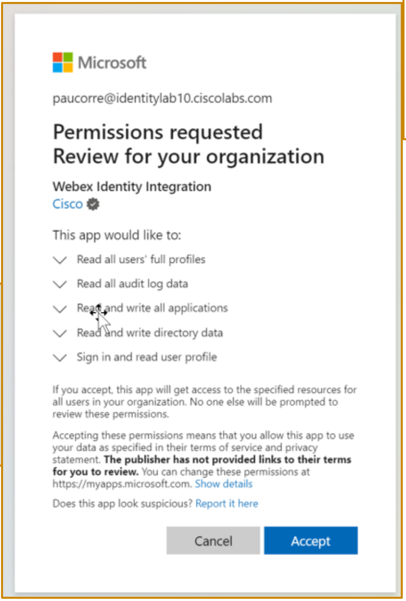


Microsoft

Pick an account

Paulo Jorge Correia
paucorre@identitylab10.ciscolabs.com
Signed in

Paulo Jorge Correia



Microsoft

paucorre@identitylab10.ciscolabs.com

Permissions requested
Review for your organization

Webex Identity Integration
Cisco

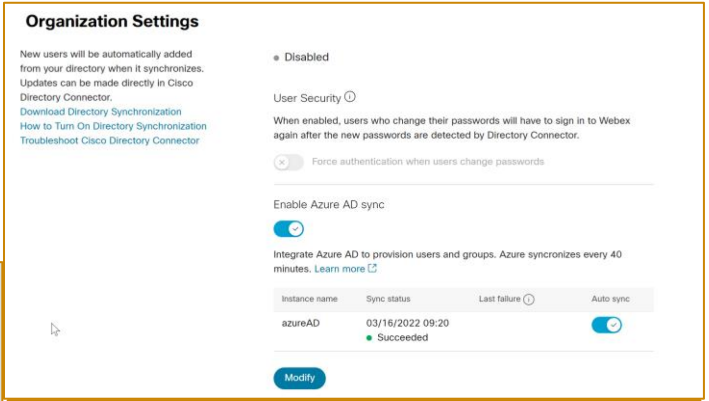
This app would like to:

- Read all users' full profiles
- Read all audit log data
- Read and write all applications
- Read and write directory data
- Sign in and read user profile

If you accept, this app will get access to the specified resources for all users in your organization. No one else will be prompted to review these permissions.

Accepting these permissions means that you allow this app to use your data as specified in their terms of service and privacy statement. **The publisher has not provided links to their terms for you to review.** You can change these permissions at https://myapps.microsoft.com. Show details

Does this app look suspicious? Report it here



Organization Settings

New users will be automatically added from your directory when it synchronizes. Updates can be made directly in Cisco Directory Connector.
Download Directory Synchronization
How to Turn On Directory Synchronization
Troubleshoot Cisco Directory Connector

● Disabled

User Security

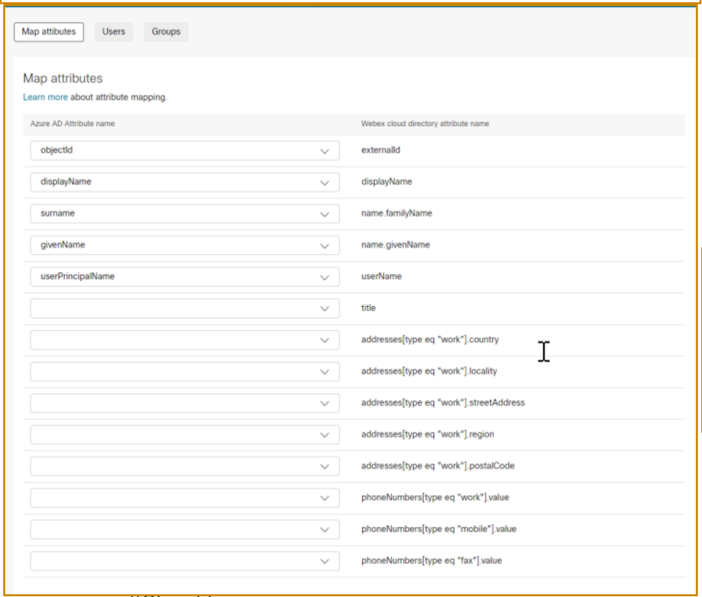
When enabled, users who change their passwords will have to sign in to Webex again after the new passwords are detected by Directory Connector.

Force authentication when users change passwords: off

Enable Azure AD sync: on

Integrate Azure AD to provision users and groups. Azure syncronizes every 40 minutes. Learn more

Instance name	Sync status	Last failure	Auto sync
azureAD	03/16/2022 09:20 ● Succeeded		on



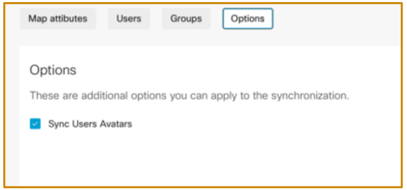
Map attributes

Learn more about attribute mapping.

Azure AD Attribute name	Webex cloud directory attribute name
objectId	externalId
displayName	displayName
surname	name.familyName
givenName	name.givenName
userPrincipalName	userName
	title
	addresses[type eq "work"].country
	addresses[type eq "work"].locality
	addresses[type eq "work"].streetAddress
	addresses[type eq "work"].region
	addresses[type eq "work"].postalCode
	phoneNumbers[type eq "work"].value
	phoneNumbers[type eq "mobile"].value
	phoneNumbers[type eq "fax"].value

All admin tasks for the integration with Azure AD will be done from Webex control Hub.

Some tasks that are not possible with SCIM are done by using MSFT graph API



Options

These are additional options you can apply to the synchronization.

☑ Sync Users Avatars

SCIM

Comparing SCIM with Azure AD Wizard

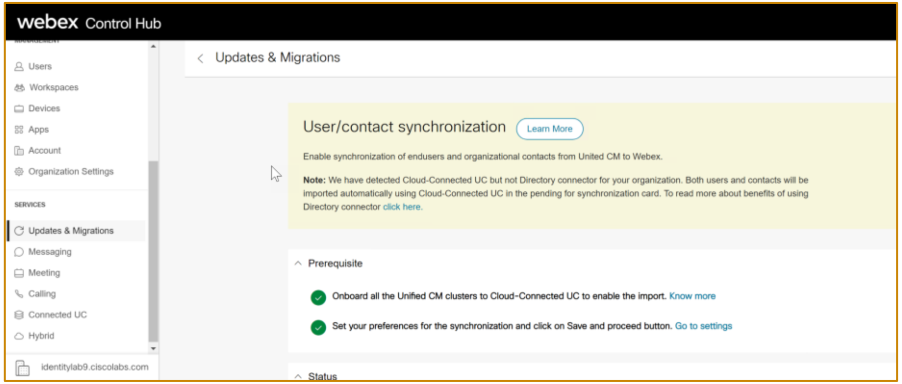
	SCIM	Azure AD Wizard
Create, Delete and Update	✓	✓
Allows local Webex Users Creation	✓	✓
Attributes Synchronize	✓ (15)	✓ (15)
Room Systems	✗	✓ *
Groups	✓ *	✓ *
Force re-auth when users change password	✗	✗
Dry-Run	✗	✓ *
Soft-Delete	✗	✗
Avatars	✗	✓
Domain Verification	✗	✓
SSO Configuration	✗	✓ *

* Near Future

CUCM Provision

Sync Contacts and/or Users

- Mainly created to synchronize contacts from customers that create Corporate directories with CUCM.
  - Contacts can be imported from CUCM user database
  - Contacts can be imported from an LDAP source
- Can also be used to synchronize Users in the process to migrate them to the Webex Cloud.



Updates & Migrations

User/contact synchronization Learn More

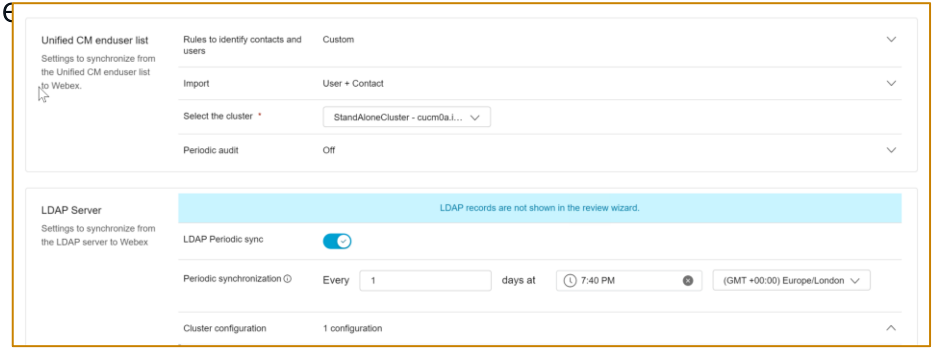
Enable synchronization of endusers and organizational contacts from United CM to Webex.

Note: We have detected Cloud-Connected UC but not Directory connector for your organization. Both users and contacts will be imported automatically using Cloud-Connected UC in the pending for synchronization card. To read more about benefits of using Directory connector click here.

Prerequisite

- ✓ Onboard all the Unified CM clusters to Cloud-Connected UC to enable the import. Know more
- ✓ Set your preferences for the synchronization and click on Save and proceed button. Go to settings

Status



Unified CM enduser list

Settings to synchronize from the Unified CM enduser list to Webex.

Rules to identify contacts and users: Custom

Import: User + Contact

Select the cluster *: StandAloneCluster - cucm0a.i...

Periodic audit: Off

LDAP Server

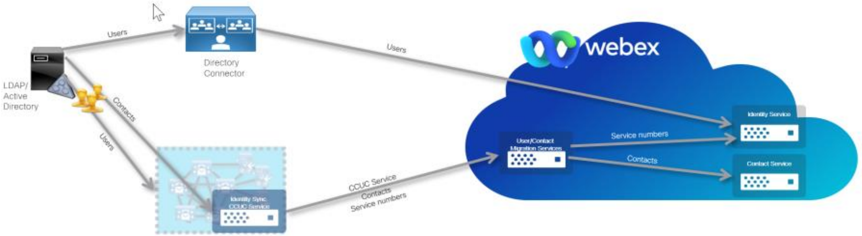
Settings to synchronize from the LDAP server to Webex

LDAP records are not shown in the review wizard.

LDAP Periodic sync: ●

Periodic synchronization ⓘ Every 1 days at 7:40 PM (GMT +00:00) Europe/London

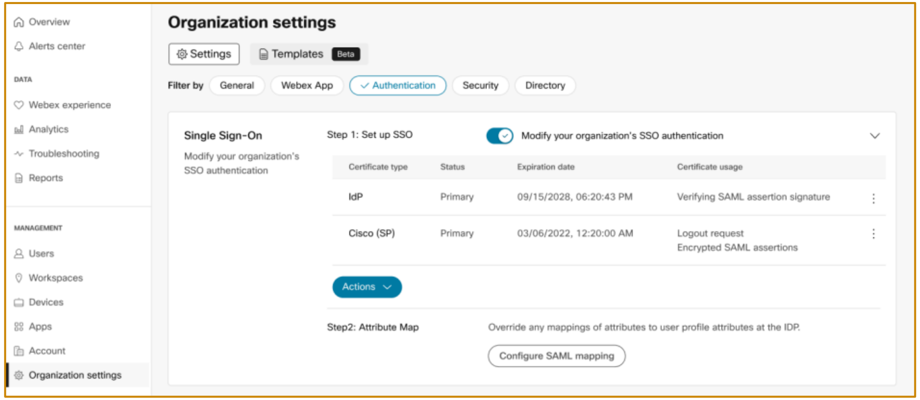
Cluster configuration: 1 configuration



Future

SAML JIT

- Updating user attributes based on SSO process.
- If used with Domain Claim can be very similar to what we had in Webex Meeting in Site Admin with AAC and AAU.
- Perfect for customers that have an on-premise IdP and don't have Active Directory.



Organization settings

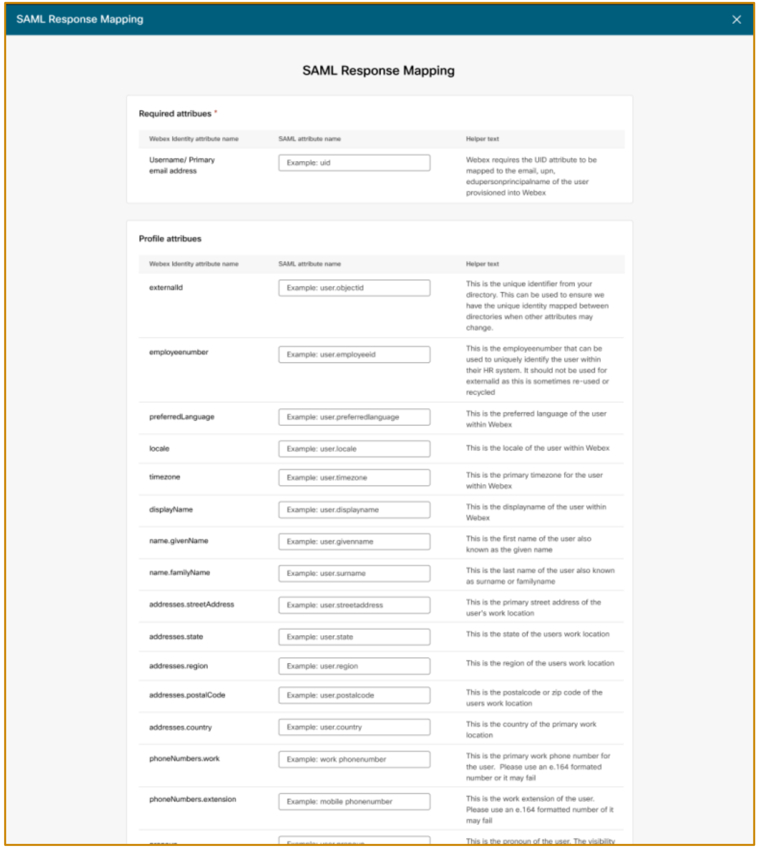
Settings
Templates Beta
Filter by General Webex App Authentication Security Directory

Single Sign-On
Modify your organization's SSO authentication

Step 1: Set up SSO — Modify your organization's SSO authentication

Certificate type	Status	Expiration date	Certificate usage
IdP	Primary	09/15/2028, 06:20:43 PM	Verifying SAML assertion signature
Cisco (SP)	Primary	03/06/2022, 12:20:00 AM	Logout request Encrypted SAML assertions

Step2: Attribute Map — Override any mappings of attributes to user profile attributes at the IDP.



SAML Response Mapping

Required attribues *

Webex Identity attribute name	SAML attribute name	Helper text
Username/ Primary email address	Example: uid	Webex requires the UID attribute to be mapped to the email, upn, edupersonprincipalname of the user provisioned into Webex

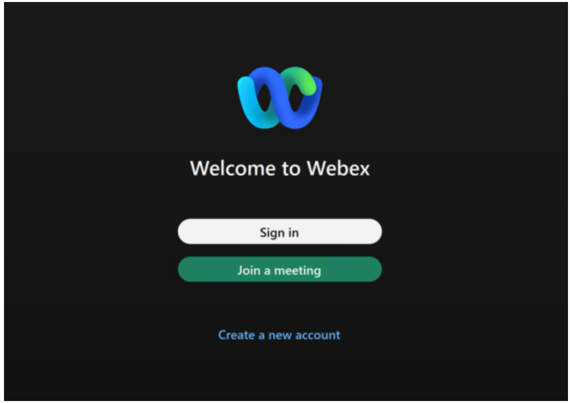
Profile attribues

Webex Identity attribute name	SAML attribute name	Helper text
externalId	Example: user.objectid	This is the unique identifier from your directory. This can be used to ensure we have the unique identity mapped between directories when other attributes may change.
employeenumber	Example: user.employeeid	This is the employeenumber that can be used to uniquely identify the user within their HR system. It should not be used for externalid as this is sometimes re-used or recycled
preferredLanguage	Example: user.preferredlanguage	This is the preferred language of the user within Webex
locale	Example: user.locale	This is the locale of the user within Webex
timezone	Example: user.timezone	This is the primary timezone for the user within Webex
displayName	Example: user.displayname	This is the displayname of the user within Webex
name.givenName	Example: user.givenname	This is the first name of the user also known as the given name
name.familyName	Example: user.surname	This is the last name of the user also known as surname or familyname
addresses.streetAddress	Example: user.streetaddress	This is the primary street address of the user's work location
addresses.state	Example: user.state	This is the state of the users work location
addresses.region	Example: user.region	This is the region of the users work location
addresses.postalCode	Example: user.postalcode	This is the postalcode or zip code of the users work location
addresses.country	Example: user.country	This is the country of the primary work location
phoneNumbers.work	Example: work phonenumber	This is the primary work phone number for the user. Please use an e.164 formated number or it may fail
phoneNumbers.extension	Example: mobile phonenumber	This is the work extension of the user. Please use an e.164 formatted number of it may fail
[illegible]	[illegible]	This is the pronoun of the user. The visibility

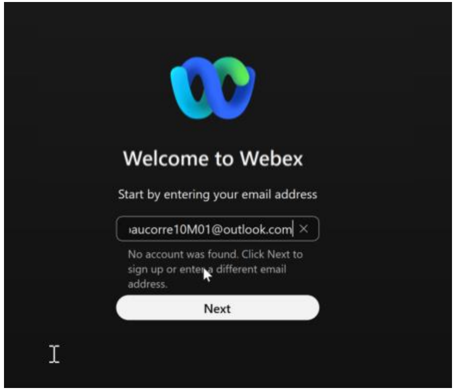
Social Login

Freemium Account

- If the account has an email address that has not been claimed by any Webex ORG.
- The user will be provided with the option to Sign in with one of those accounts:
    - Webex
    - Apple
    - Facebook
    - Google
    - Microsoft
- User can create also a password in Webex, after the initial creation, if in the future he doesn't want to AuthN with the Social credentials



Welcome to Webex

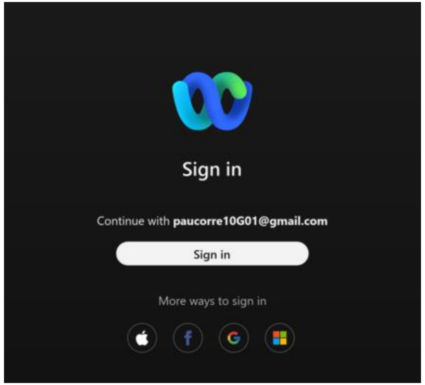


Welcome to Webex

Start by entering your email address

aucorre10M01@outlook.com

No account was found. Click Next to sign up or enter a different email address.



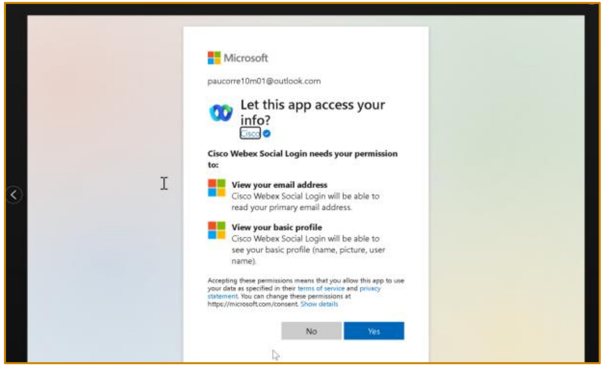
Sign in

Continue with **paucorre10G01@gmail.com**

Social Login

Freemium Account

- We use the OpenID Connect to be able to authenticate, using the ID token we provision the user in Webex. It will look like OAuth consent for sharing the attributes.
- In Microsoft and Google OIDC will gather the following attributes from the user:
  - given_name
  - family_name
  - name
  - locale
  - phone_number



Microsoft

paucorre10m01@outlook.com

Let this app access your info?

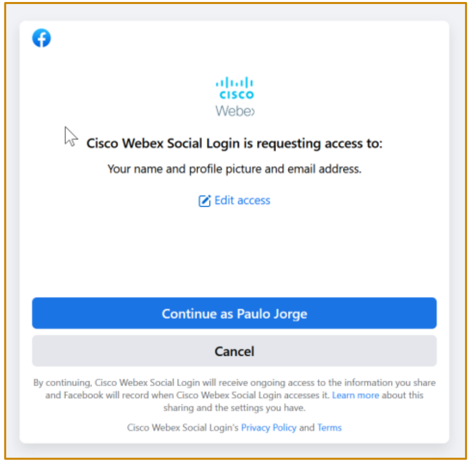
Cisco

Cisco Webex Social Login needs your permission to:

View your email address
Cisco Webex Social Login will be able to read your primary email address.

View your basic profile
Cisco Webex Social Login will be able to see your basic profile (name, picture, user name).

Accepting these permissions means that you allow this app to use your data as specified in their terms of service and privacy statement. You can change these permissions at https://microsoft.com/consent. Show details

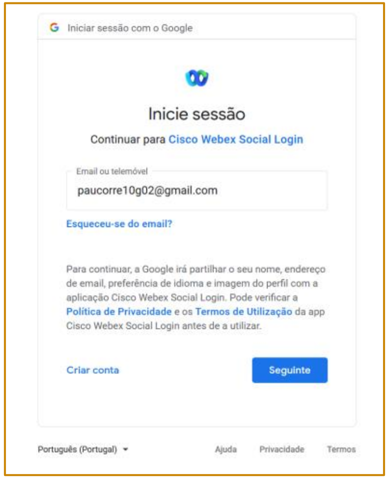


Cisco Webex Social Login is requesting access to:

Your name and profile picture and email address.

By continuing, Cisco Webex Social Login will receive ongoing access to the information you share and Facebook will record when Cisco Webex Social Login accesses it. Learn more about this sharing and the settings you have.

Cisco Webex Social Login's Privacy Policy and Terms



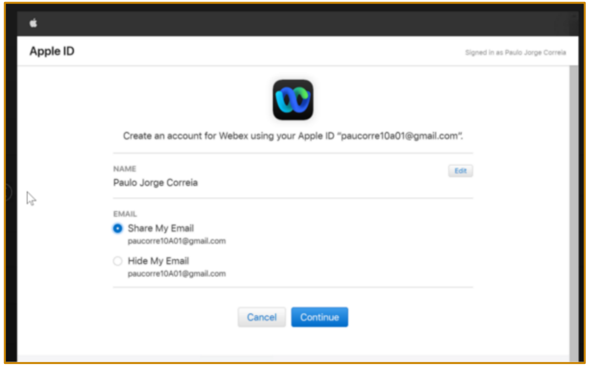
Iniciar sessão com o Google

Inicie sessão

Continuar para Cisco Webex Social Login

Email ou telemóvel: paucorre10g02@gmail.com

Para continuar, a Google irá partilhar o seu nome, endereço de email, preferência de idioma e imagem do perfil com a aplicação Cisco Webex Social Login. Pode verificar a Política de Privacidade e os Termos de Utilização da app Cisco Webex Social Login antes de a utilizar.



Apple ID

Signed in as Paulo Jorge Correia

Create an account for Webex using your Apple ID "paucorre10a01@gmail.com".

NAME: Paulo Jorge Correia

EMAIL

● Share My Email
paucorre10A01@gmail.com

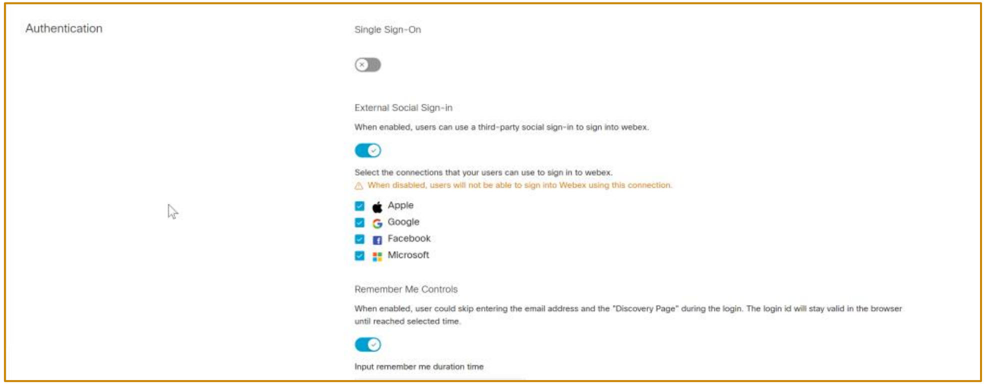
○ Hide My Email
paucorre10A01@gmail.com

Social Login

Customer ORG Account

- If the DNS domain of the email address of the user has been claimed by a Webex ORG, the Administration can in CH choose which social networks to allow.
- User will be provisioned and pick the ORG default license template

Note: Single Sign-On and Social Login are mutually excluded



Authentication

Single Sign-On

○

External Social Sign-in

When enabled, users can use a third-party social sign-in to sign into webex.

●

Select the connections that your users can use to sign in to webex.

⚠ When disabled, users will not be able to sign into Webex using this connection.

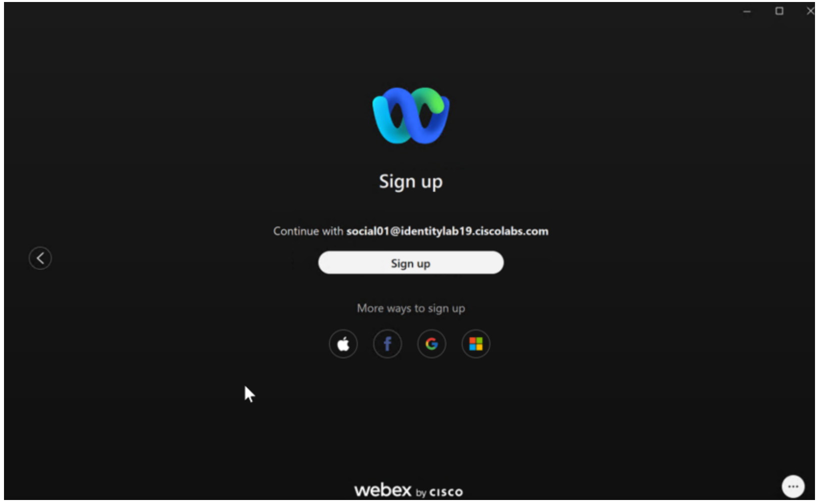
☑ Apple
☑ Google
☑ Facebook
☑ Microsoft

Remember Me Controls

When enabled, user could skip entering the email address and the "Discovery Page" during the login. The login id will stay valid in the browser until reached selected time.

●

Input remember me duration time



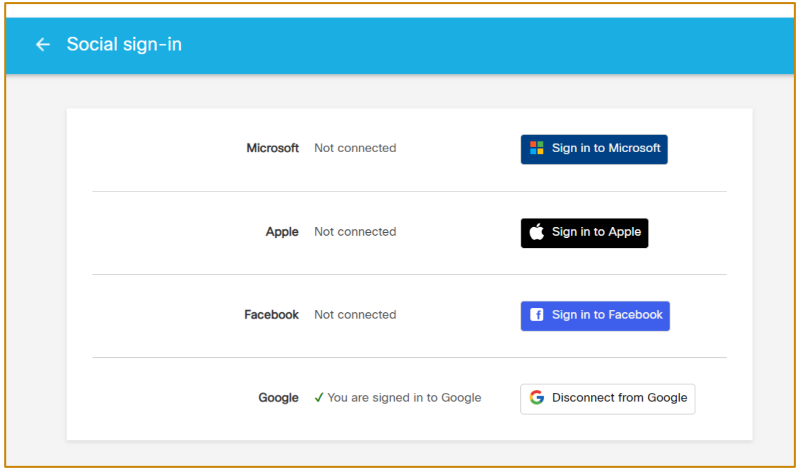
Sign up

Continue with **social01@identitylab19.ciscolabs.com**

Social Login

Changing Social Sign-in

- In the User Account Settings any one can change the Social network without losing any Webex history (https://idbroker-eu.webex.com/idb/profile#/)



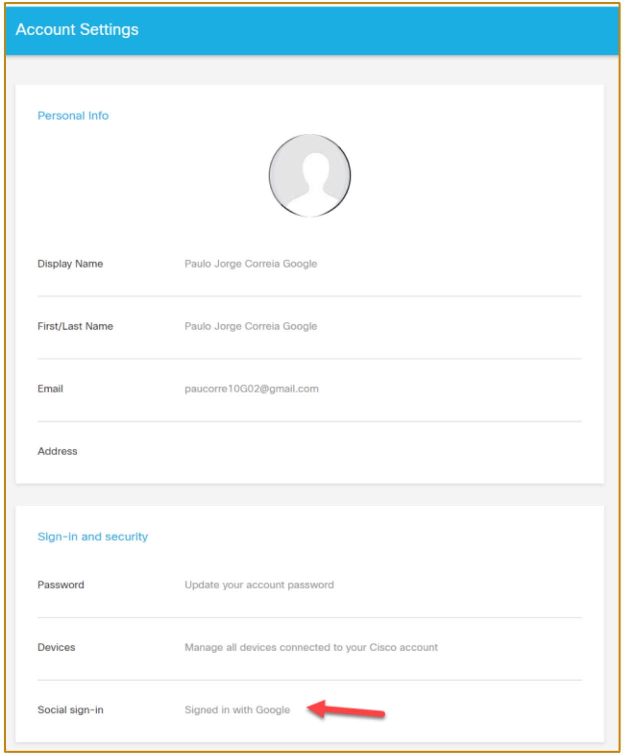
← Social sign-in

Microsoft Not connected Sign in to Microsoft

Apple Not connected Sign in to Apple

Facebook Not connected Sign in to Facebook

Google ✓ You are signed in to Google Disconnect from Google



Account Settings

Personal Info

Display Name Paulo Jorge Correia Google

First/Last Name Paulo Jorge Correia Google

Email paucorre10G02@gmail.com

Address

Sign-in and security

Password Update your account password

Devices Manage all devices connected to your Cisco account

Social sign-in Signed in with Google

Conclusions and Key Takeaways

Conclusions and Key Takeaways

- Webex Identity Services are used by all our Cloud and On-premise Collaboration Workloads
- Today Webex Identity Service allows us to get user information from many sources, addressing all our customer requirements.
- No other competitor, in Collaboration space, can offer so many options

Technical Session Surveys

- Attendees who fill out a minimum of four session surveys and the overall event survey will get Cisco Live branded socks!
- Attendees will also earn 100 points in the Cisco Live Game for every survey completed.
- These points help you get on the leaderboard and increase your chances of winning daily and grand prizes.

Cisco learning and certifications

From technology training and team development to Cisco certifications and learning plans, let us help you empower your business and career. www.cisco.com/go/certs

Pay for Learning with Cisco Learning Credits

(CLCs) are prepaid training vouchers redeemed directly with Cisco.

Learn

Cisco U.
IT learning hub that guides teams and learners toward their goals

Cisco Digital Learning
Subscription-based product, technology, and certification training

Cisco Modeling Labs
Network simulation platform for design, testing, and troubleshooting

Cisco Learning Network
Resource community portal for certifications and learning

Train

Cisco Training Bootcamps
Intensive team & individual automation and technology training programs

Cisco Learning Partner Program
Authorized training partners supporting Cisco technology and career certifications

Cisco Instructor-led and Virtual Instructor-led training
Accelerated curriculum of product, technology, and certification courses

Certify

Cisco Certifications and Specialist Certifications
Award-winning certification program empowers students and IT Professionals to advance their technical careers

Cisco Guided Study Groups
180-day certification prep program with learning and support

Cisco Continuing Education Program
Recertification training options for Cisco certified individuals

Here at the event? Visit us at **The Learning and Certifications lounge at the World of Solutions**

Continue your education

- Visit the Cisco Showcase for related demos
- Book your one-on-one Meet the Engineer meeting
- Attend the interactive education with DevNet, Capture the Flag, and Walk-in Labs
- Visit the On-Demand Library for more sessions at www.CiscoLive.com/on-demand

cisco Live!

The bridge to possible

Thank you

cisco Live!

#CiscoLive