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Lync High Availability and Site Resilience

UNC 326

Andrew Ehrensing
Solution Architect
Microsoft Corporation

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Agenda

- Session Objectives:
  - Resiliency Architecture
  - Branch Office Resiliency
  - Data Center Resiliency
  - Lync Online resiliency

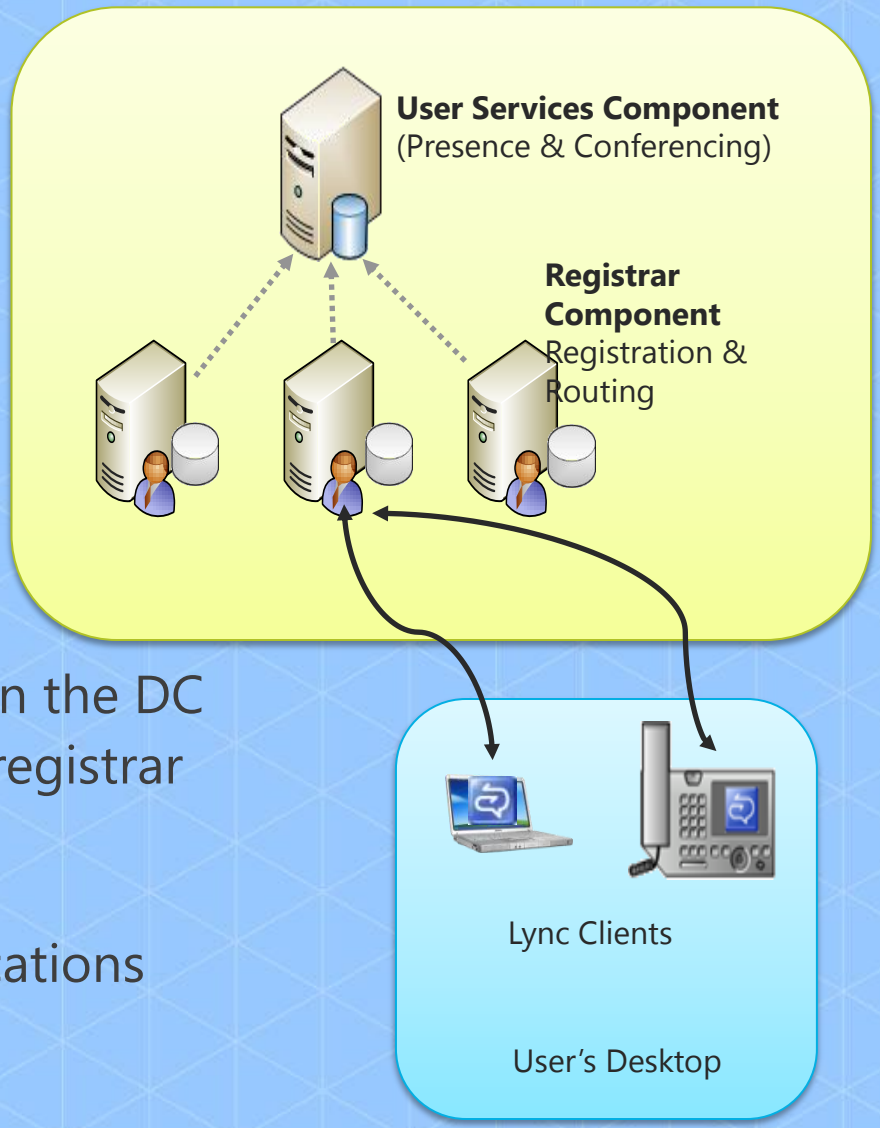
- Takeaways:
  - Microsoft Lync™ Server 2010 provides High Availability for Voice
  - Survivable Branch Appliances deliver Voice High Availability for branch users
  - Voice Data Center Resiliency delivers Voice High Availability across geo locations (DCs)
  - Metropolitan Data Center Resiliency delivers High Availability for all UC modalities across datacenters separated by high bandwidth & low latency
  - Backup and restore procedures allow for expedient service restoration
  - Understand RTO/RPO numbers for different resiliency scenarios

Agenda

- **High Availability & Resilience Architecture**
- **Branch Office Resiliency**
- **Data Center Voice Resiliency**
- **Metropolitan Data Center Resilience**

Design changes to support Voice high availability

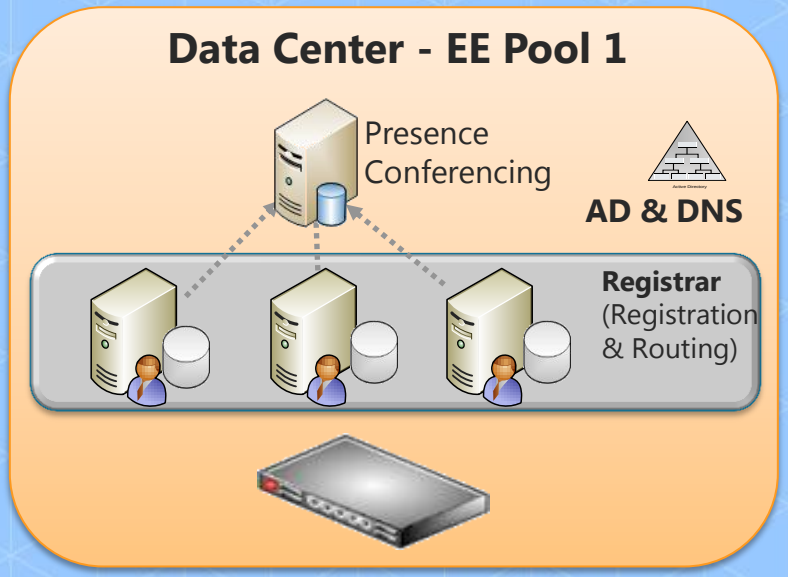
- Registrar Component
  - Registration and Routing
  - Each registrar has its SQLExpress DB
- User Services Component
  - Presence & Conferencing
- Registrar and User Services are collocated in same physical Front End in the DC
- All user end points register with same registrar
- Users are load balanced by Registrars using a Distributed Hash Algorithm
- Registrar can be installed in remote locations



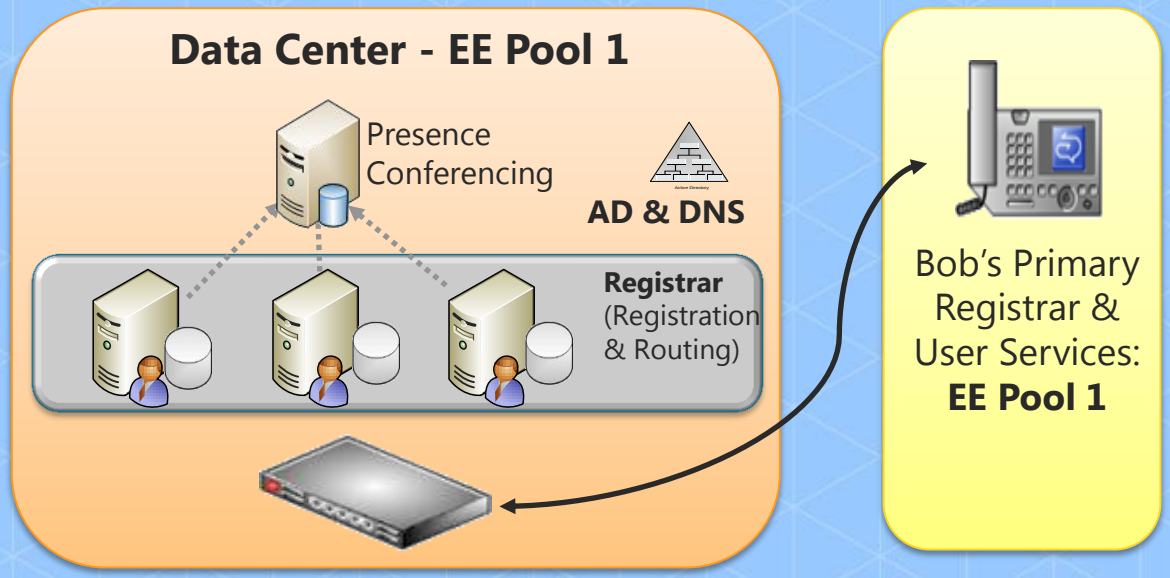
Resiliency Architecture

- Each user has a “Primary Registrar Pool”.
  - Discovers through DNS SRV. Directed to “Primary & Backup Registrar Pool”
  - For Data Center User = Data Center
  - For Branch User = Survivable Branch Appliance (SBA)
- Branch Users always register with the SBA Registrar unless it is unavailable
- Each Registrar Pool can have a “Backup Registrar Pool”
  - Backup Registrar Pool = Data Center CS Pool
- Backup Registrar heart-beats Primary Registrar.
  - If heart-beat not received within Backup starts accepting client registrations
  - Configurable Failover Interval (default = 120 sec for branch offices)

Resiliency Architecture



Resiliency Architecture



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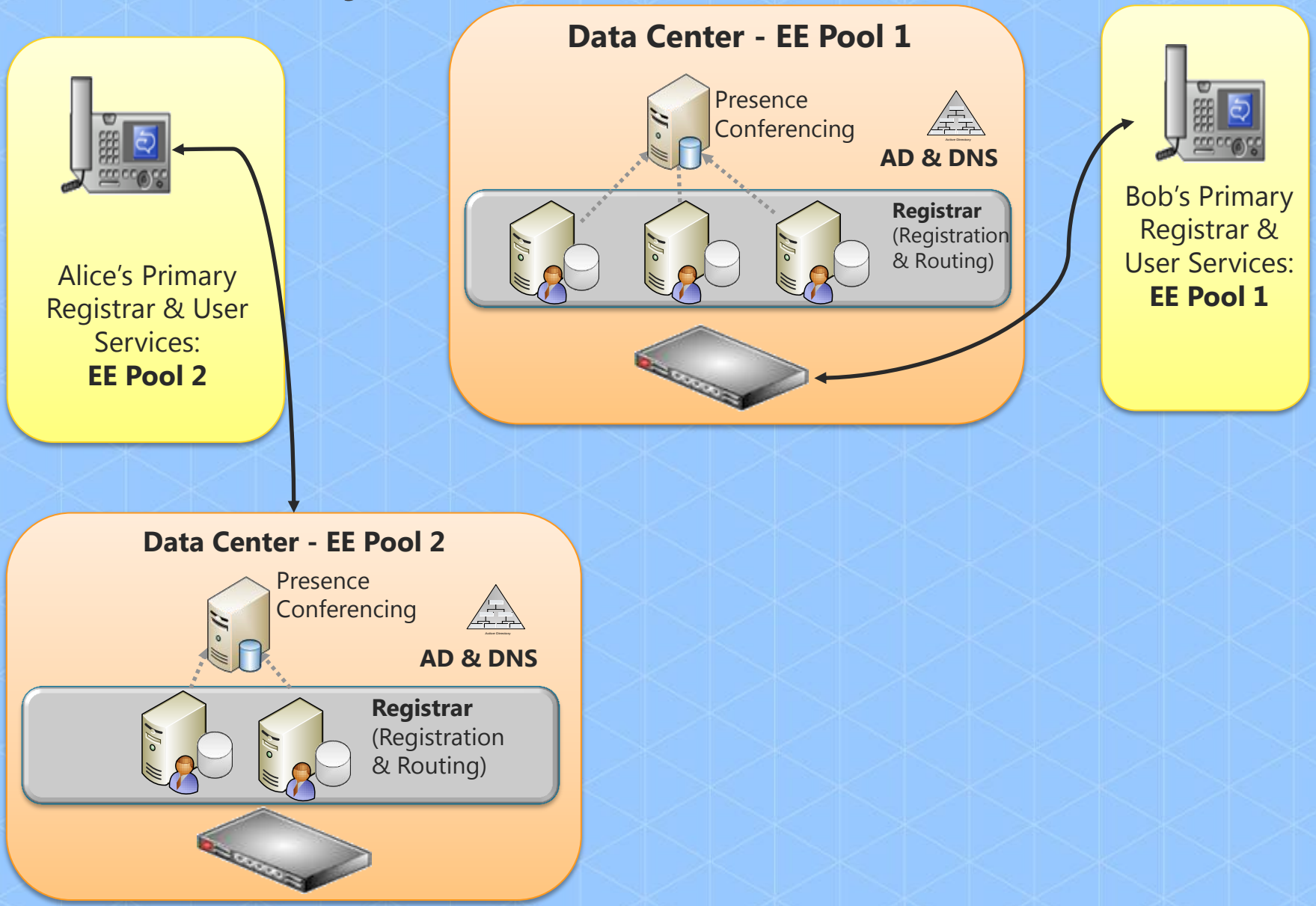
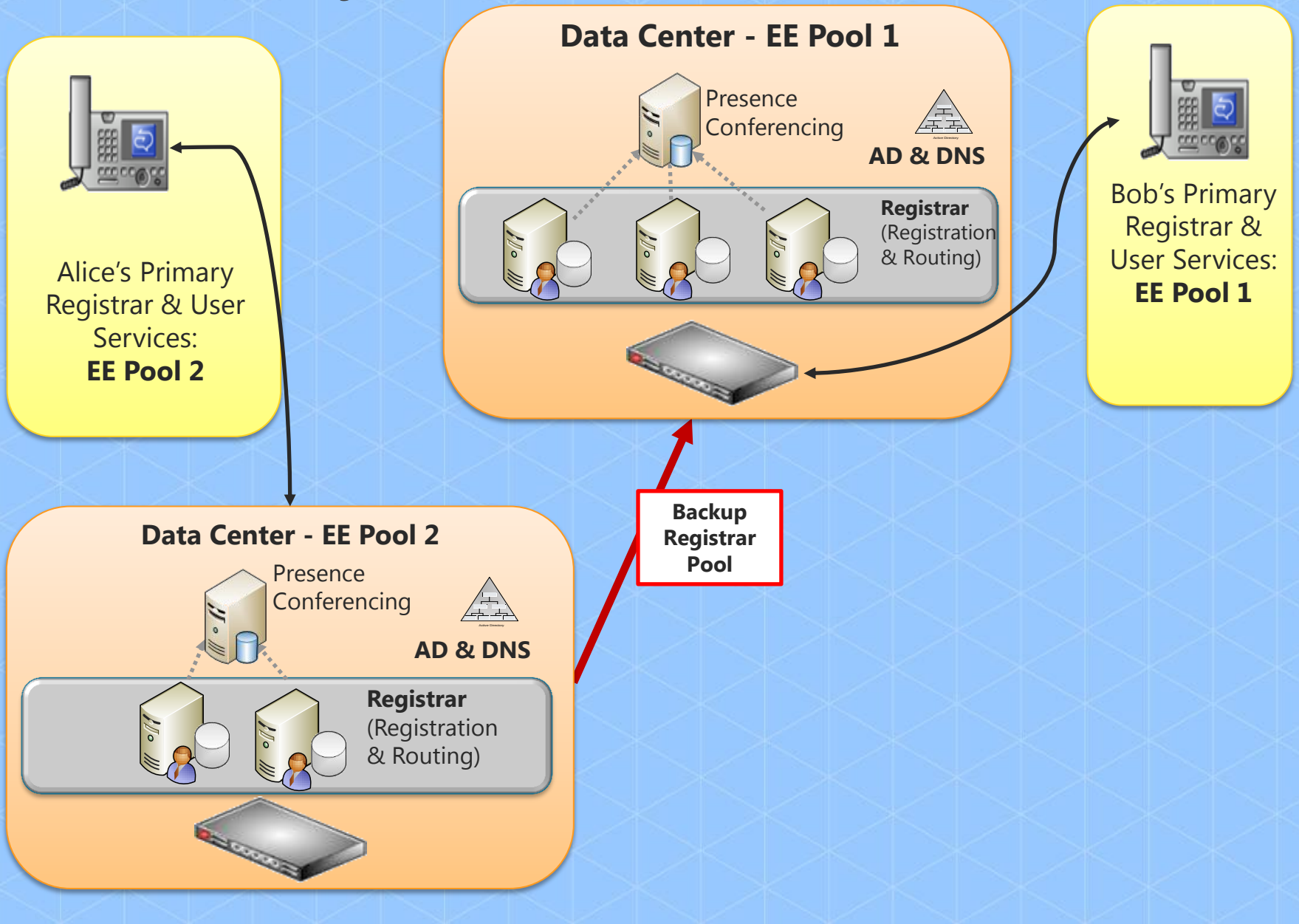
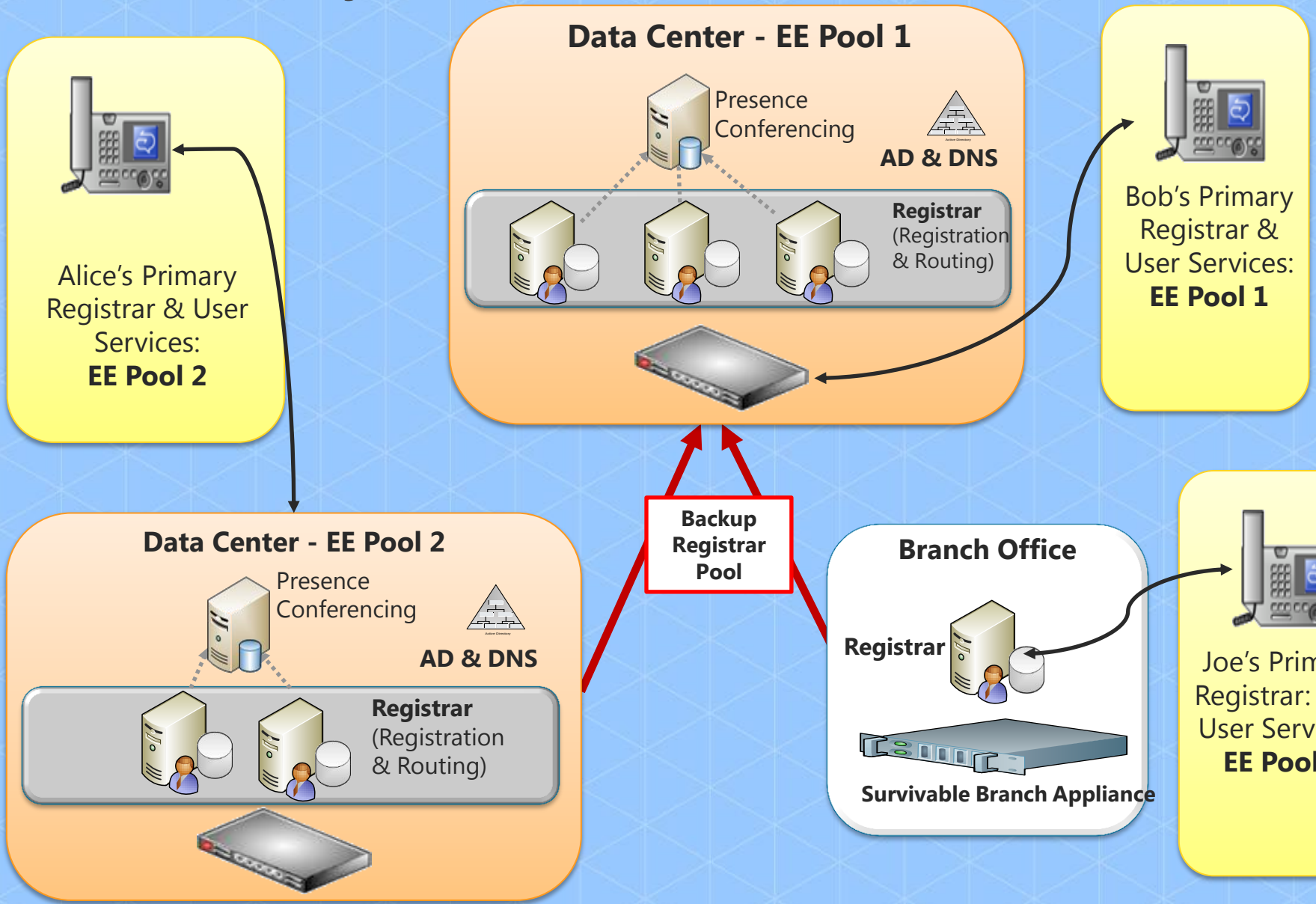


Resiliency Architecture



Resiliency Architecture



Other Resiliency enhancements

- DNS Based Load Balancing for Internal Pools
  - All traffic can be DNS Load Balanced except Client –> Server HTTP
  - Still require Hardware Load Balancer (HLB) for this traffic – Windows Network Load Balancing (NLB) not supported for production
- Draining: Ability to drain a "server" before taking the server down
- Session Dialog Resiliency for Conferencing
  - Even if the Front End goes down, User can still participate in a conference
- Client caches successful connections to Lync Server 2010
  - FQDN and IP of SIP Registrar, Media Relay & Media Relay Authentication Server
  - Reconnections are very fast

User Experiences – During Pool backend Failover

Definitions

- Let A be the Pool where the primary BE DB fails
- Affected users – users who are homed on A
- Unaffected users – users who are NOT homed on A

User Experiences

- All affected users will re-sign in in resiliency mode during failover
- Ongoing A/V sessions (P2P and Conferencing) for affected users will continue during failover
- IM & P for affected users will be disrupted during failover
- All participants shall rejoin conferences hosted on the affected Pool after failover completes

User Experiences – Pool Failover

Definitions

- Let A be the failed Pool; B be the backup Pool of A; and C be any Pool other than A or B
- Affected users – users who are homed on A
- Unaffected users – users who are NOT homed on A

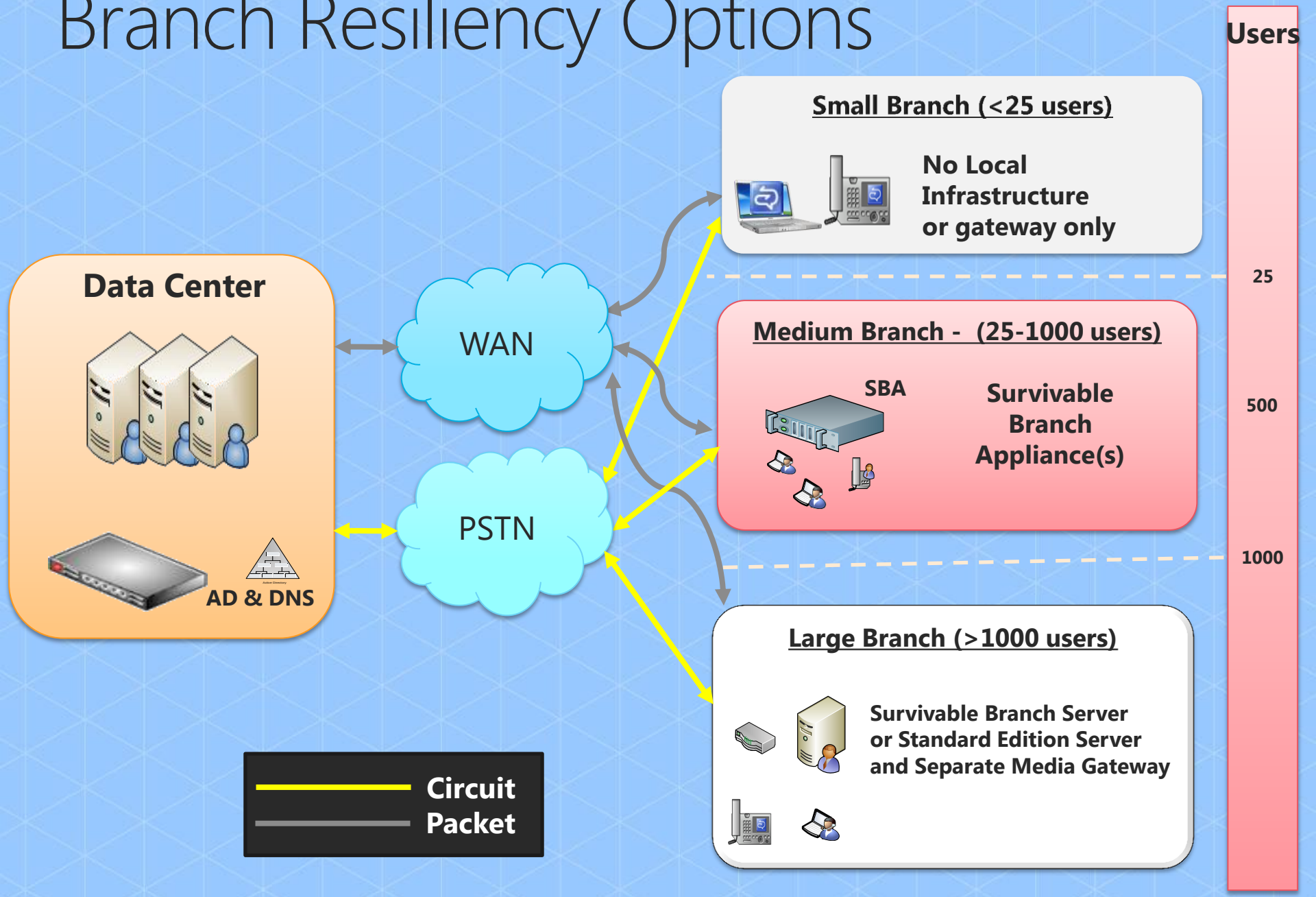
User Experiences

- All affected users will be rehomed to B – they will re-sign into B as they are being moved by failover steps
- All P2P sessions with affected users will need to be re-established
- All conference sessions hosted on A will be terminated – all participants will need to rejoin the conferences hosted in B
- All presence subscriptions to affected users will not be refreshed until they sign back into B

Agenda

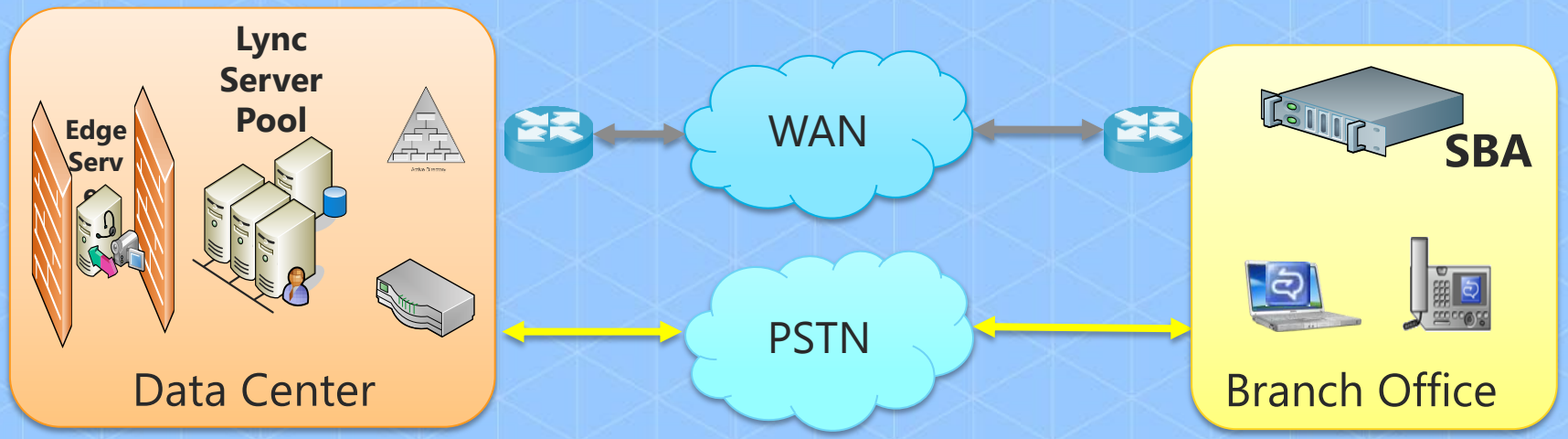
- High Availability & Resiliency Architecture
- **Branch Office Resiliency**
- Data Center Voice Resiliency
- Metropolitan Data Center Resiliency
- Lync Online resiliency

Branch Resiliency Options



Survivable Branch Appliance (SBA)

Purpose-built appliance optimized to provide resilient multi-modal communication for maximizing branch office user productivity



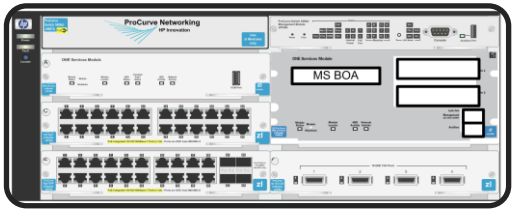
Survivable Branch Appliance (SBA)

- Voice high availability for branch offices
- Appliance form factor with Hardened Windows Server 2008 R2
- Sold and supported by UC partners
- Centrally Managed from the Datacenter

Components	Functionality	Partners

• Windows Server® 2008 R2
• Mediation Server
• Registrar
• PSTN Gateway
	• SIP Registrar
	  • Normal/Failover mode
	• SIP Proxy & Routing engine
	  • PSTN connectivity
	  • Voicemail routing
	  • PSTN re-routing
	• Centrally provisioned
	• Up to 1000 user support
		• OEM (Embedded channel)
		• Some partners:
		  • Audiocodes
		  • Dialogic
		  • Ferrari
		  • HP
		  • NET

SBA - Partner Solutions

Audiocodes	Mediant 1000 –1U, 4E1/T1, redundant power supply, MSBG-Firewall, Routing engine Mediant 2000 – 1U, redundant power supply
Dialogic	DMG 4000, 1U, 4 E1/T1, Redundant power supply
Ferrari	1U, 4 E1/T1, Redundant Power supply
HP 	SBA Module running on Procurve 54xx switch Chassis. Redundant Power supply, 8 E1/T1, Layer 2 functionality
NET	UX Series. 1U, 8 E1/T1, Redundant power supply. MSBG-Firewall, Routing engine

SBA - Partner Solutions

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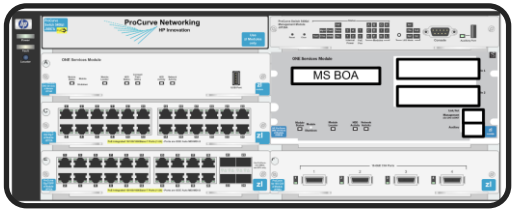
HP 	SBA Module running on Procurve 54xx switch Chassis. Redundant Power supply, 8 E1/T1, Layer 2 functionality
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Audiocodes: Existing M1k and M2k gateways can be converted to SBA

Dialogic: Existing DMG4000 Hybrid can be converted to SBA

Ferrari: Existing R2 Hybrid gateway can be converted into SBA

HP: Customers using ProCurve switches can convert it into a SBA by buying the module

NET: New HW to support SBA. Migration plan for customers wanting to move to UX platform.

SBA - Deployment

Simple, Easy, Repeatable

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Simple, Easy, Repeatable

Lync Admin (Data Center)

SBA - Deployment

Simple, Easy, Repeatable

Lync Admin (Data Center)

AD

Active Directory Computer

SBA - Deployment

Simple, Easy, Repeatable

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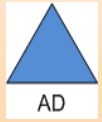

Active Directory Computer

Add SBA to the Topology.

SBA - Deployment

Simple, Easy, Repeatable

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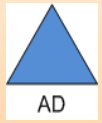

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Add SBA to the Topology.

Move Users to the SBA.

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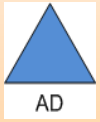

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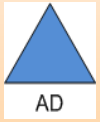

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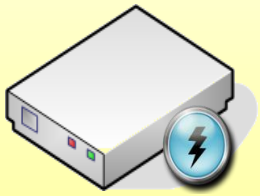

SBA Drop Shipped to Branch with Software installed

SBA - Deployment

Simple, Easy, Repeatable

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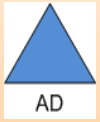

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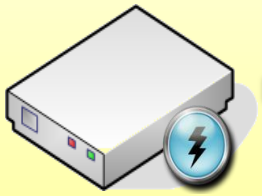

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Technician connects to WEB based GUI, IP Configuration.

SBA - Deployment

Simple, Easy, Repeatable

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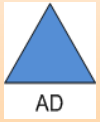

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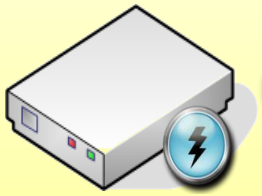

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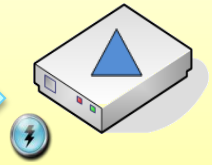
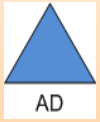


Join to Domain & complete SW configuration.

SBA - Deployment

Simple, Easy, Repeatable

Lync Admin (Data Center)



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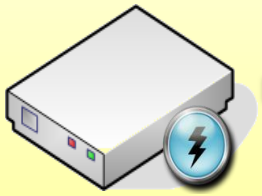

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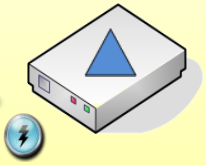

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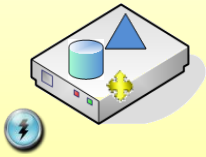
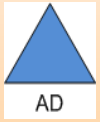


Enable CS Replication. SBA downloads topology & configuration. Request & Assign Certs.

SBA - Deployment

Simple, Easy, Repeatable

Lync Admin (Data Center)



Active Directory Computer

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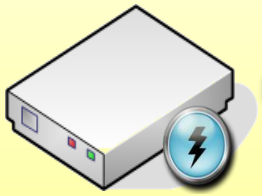

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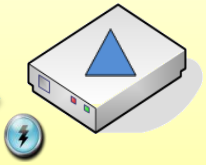

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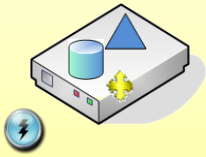


Enable CS Replication. SBA downloads topology & configuration. Request & Assign Certs.

Start CS services. Finish GW Config and test PSTN Connectivity with temp user account.

SBA - Central Management

Centralizing Move, Add, Changes

Lync Admin (Data Center)

Change Normalization Rules
Change Routing Rules
Change User Policies

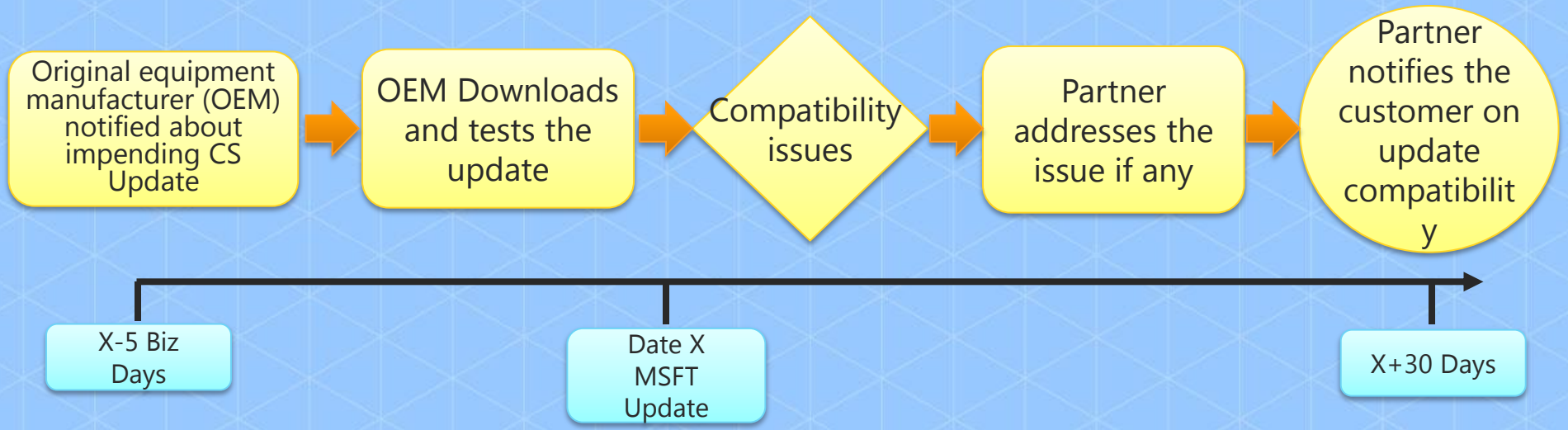
Lync Central Management Server
Store Configuration
Replicate to SBA

Replicated to the SBA

Branch Office(s)
SBA receives & processes replication

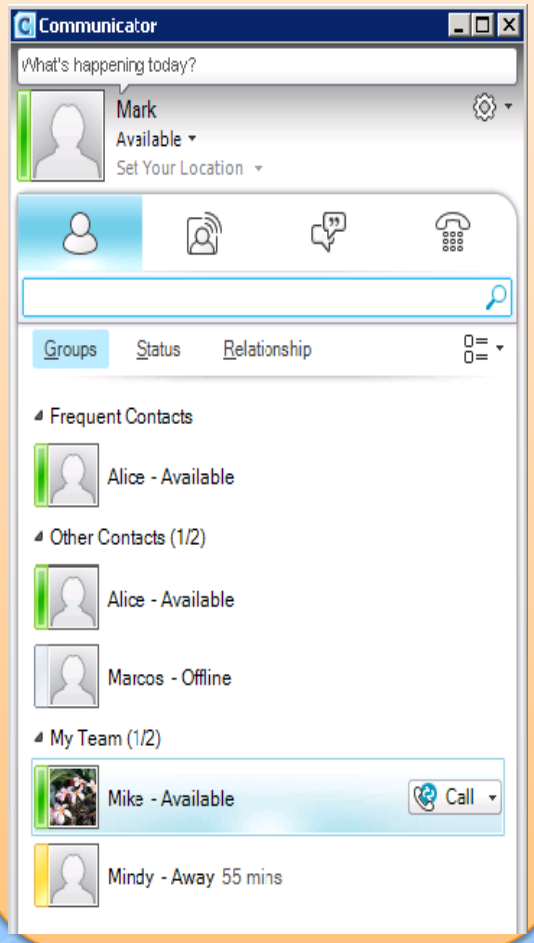
SBA - Support and Service

- SBA supported and serviced by the SBA partner
- Windows Server Updates
  - SBA partner can act as the gatekeeper OR
  - Customers can deploy updates
- Microsoft Lync Server 2010 updates
  - SBA partner will test and release product notice on whether a particular update can be applied on the SBA

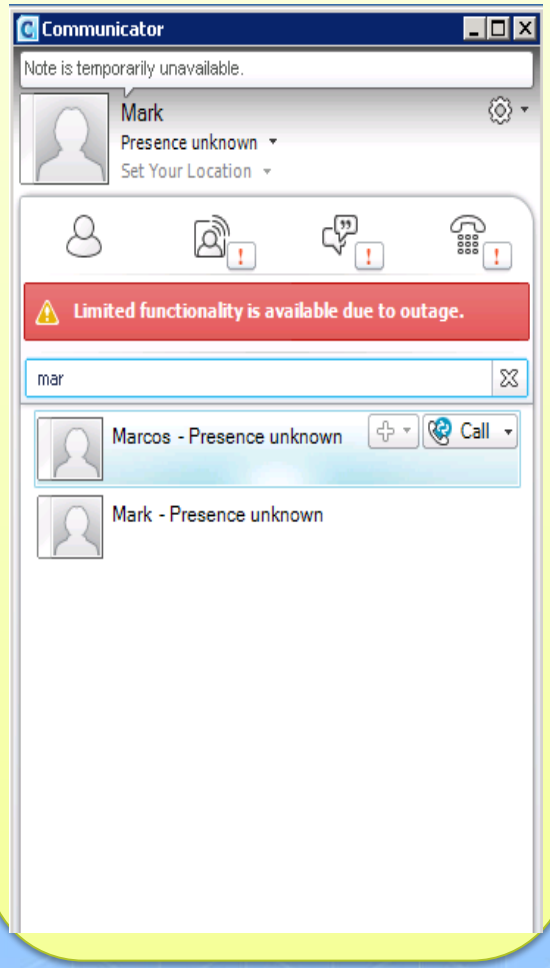


SBA - User Experience

WAN Up
All Features Available



WAN Down
Basic Voice Features Available



Features Available with WAN Down
PSTN Inbound and Outbound calls
Intra-Site calls, Inter site calls (PSTN Rerouting)
Hold, Retrieve, Transfer
Authentication, Authorization
Voicemail Deposit (Redirect to ExUM in Data Center)
Voicemail Retrieve (through PSTN)
Call Forwarding, SimulRing, Boss-Admin, Team-call
Call Detail Records (CDR)
All 2 Party Intra Site communications
Audio Conferencing through PSTN
Contact Search

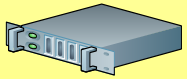
Features Unavailable
Inter-site Data (IM, App Sharing, etc.)
Conferencing (IM, Video and Web)
Presence & DND based routing
Modify Presence or Change Call Forwarding Settings
Contact List
Response Group and Call Park

Resilient Lync clients: Lync, Lync Attendant Console, Lync Phone Edition

SBA – Lync Server 2010 Discovery

Branch Office

Bob

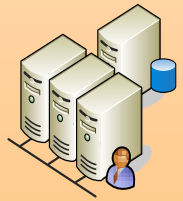


SBA

Data Center

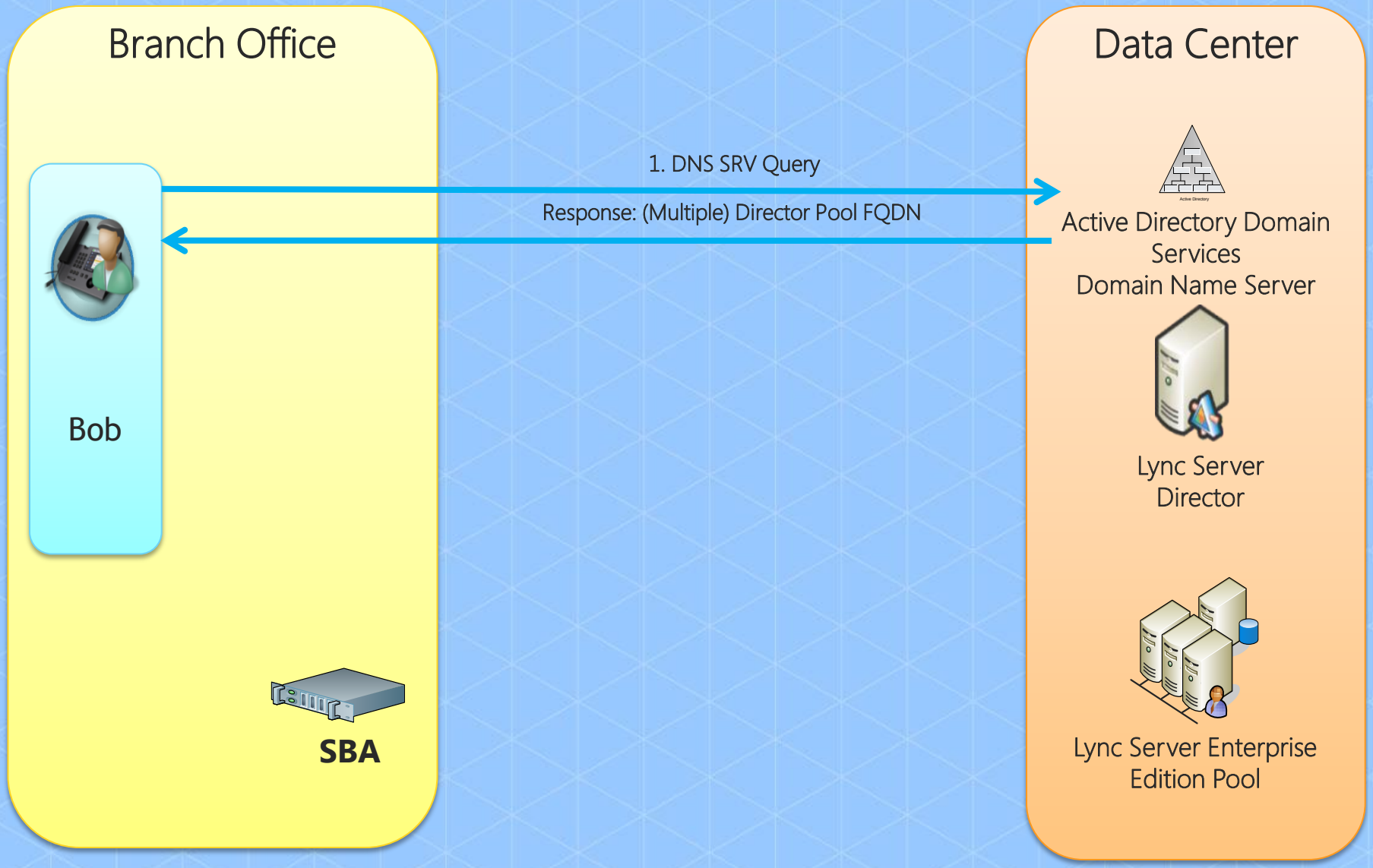
Active Directory Domain Services
Domain Name Server

Lync Server Director



Lync Server Enterprise Edition Pool

SBA – Lync Server 2010 Discovery



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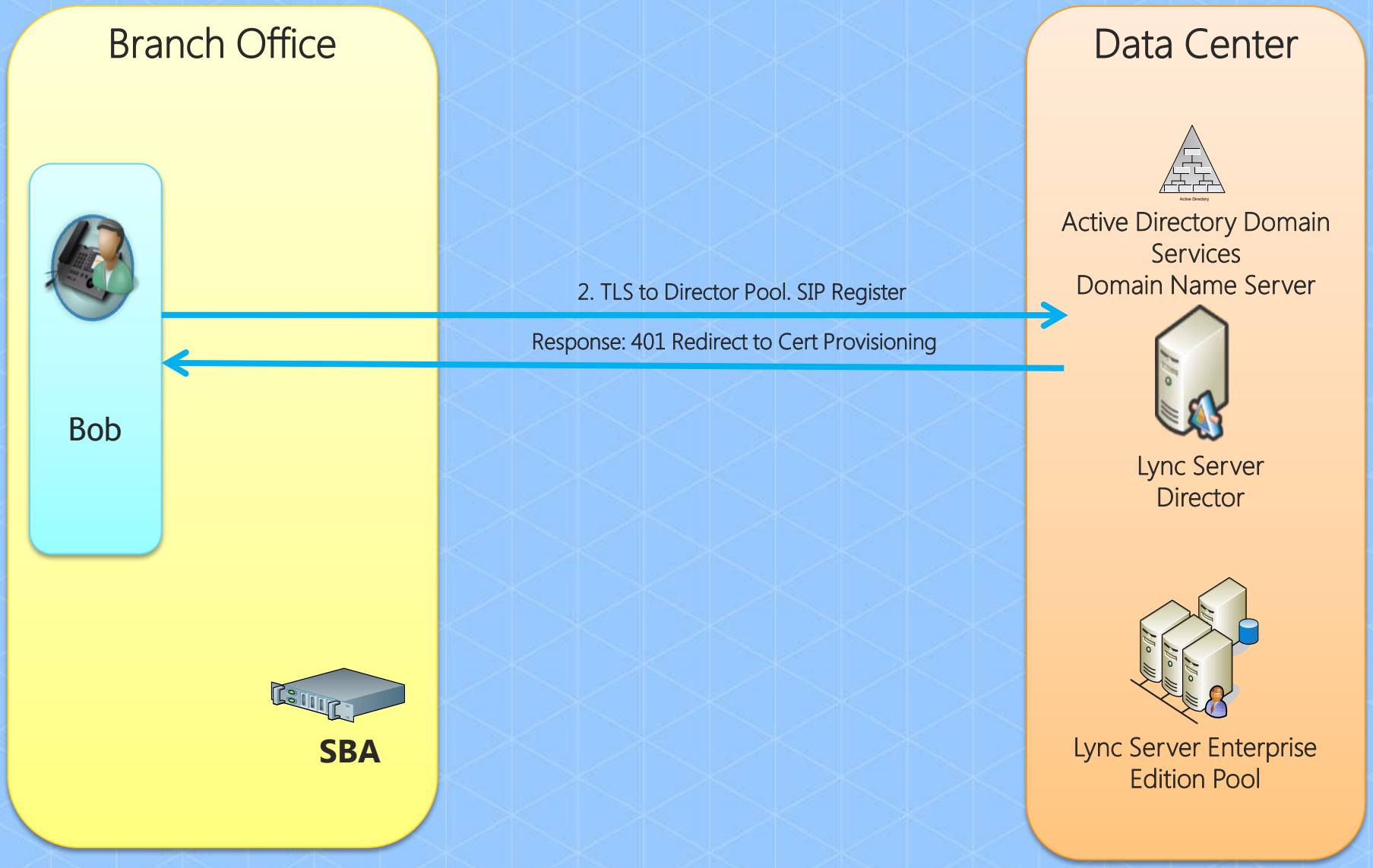

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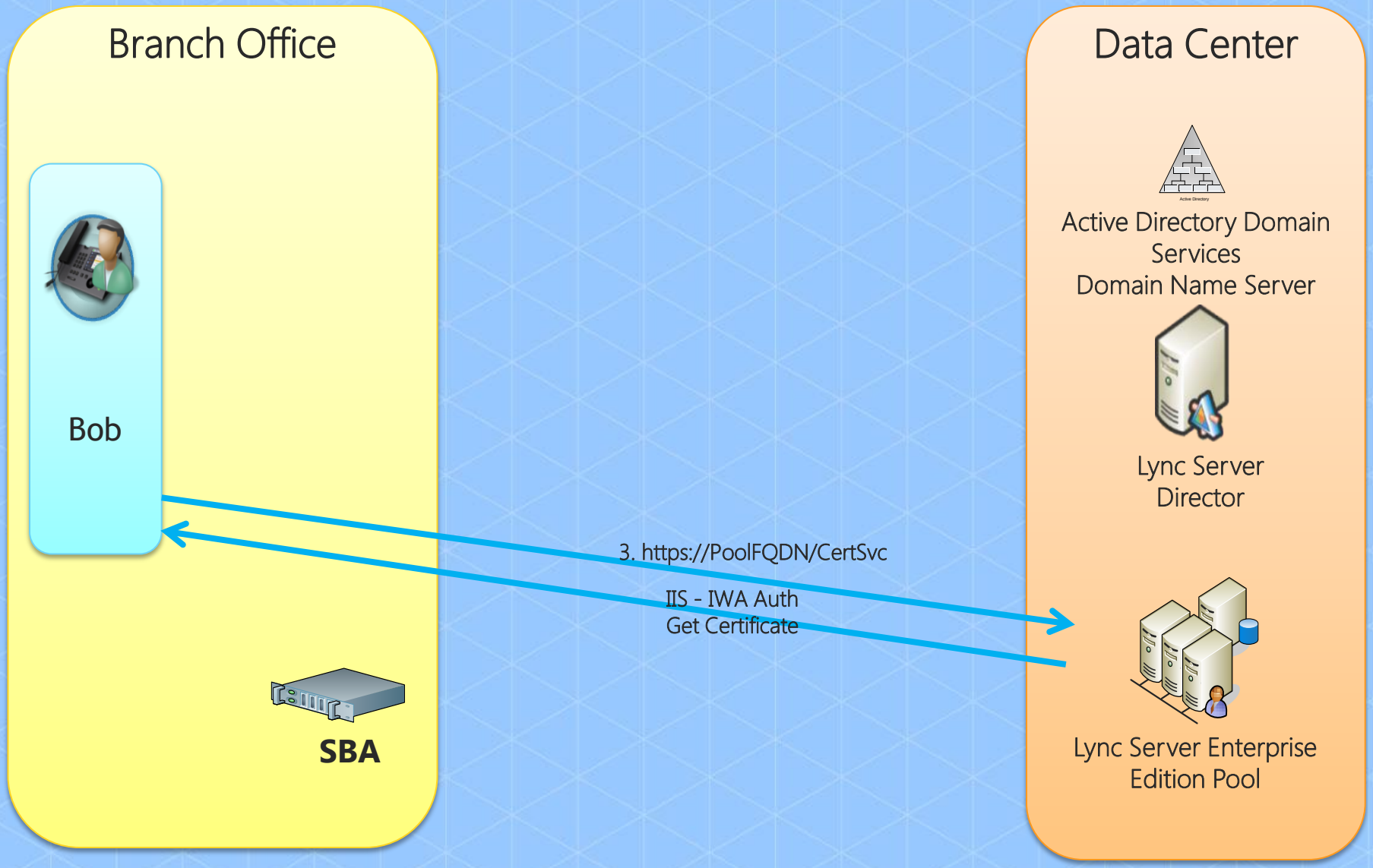
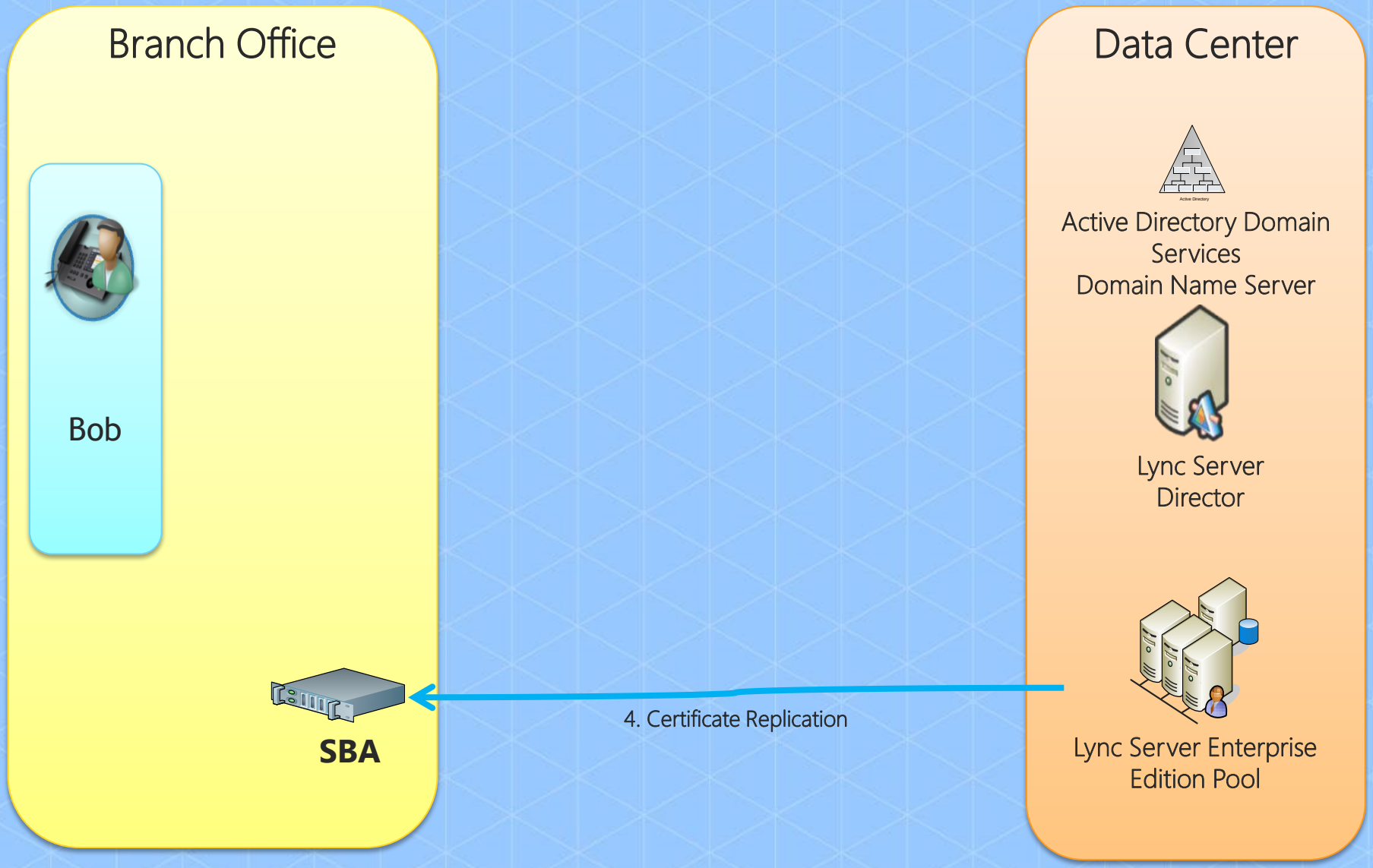


SBA – Lync Server 2010 Discovery



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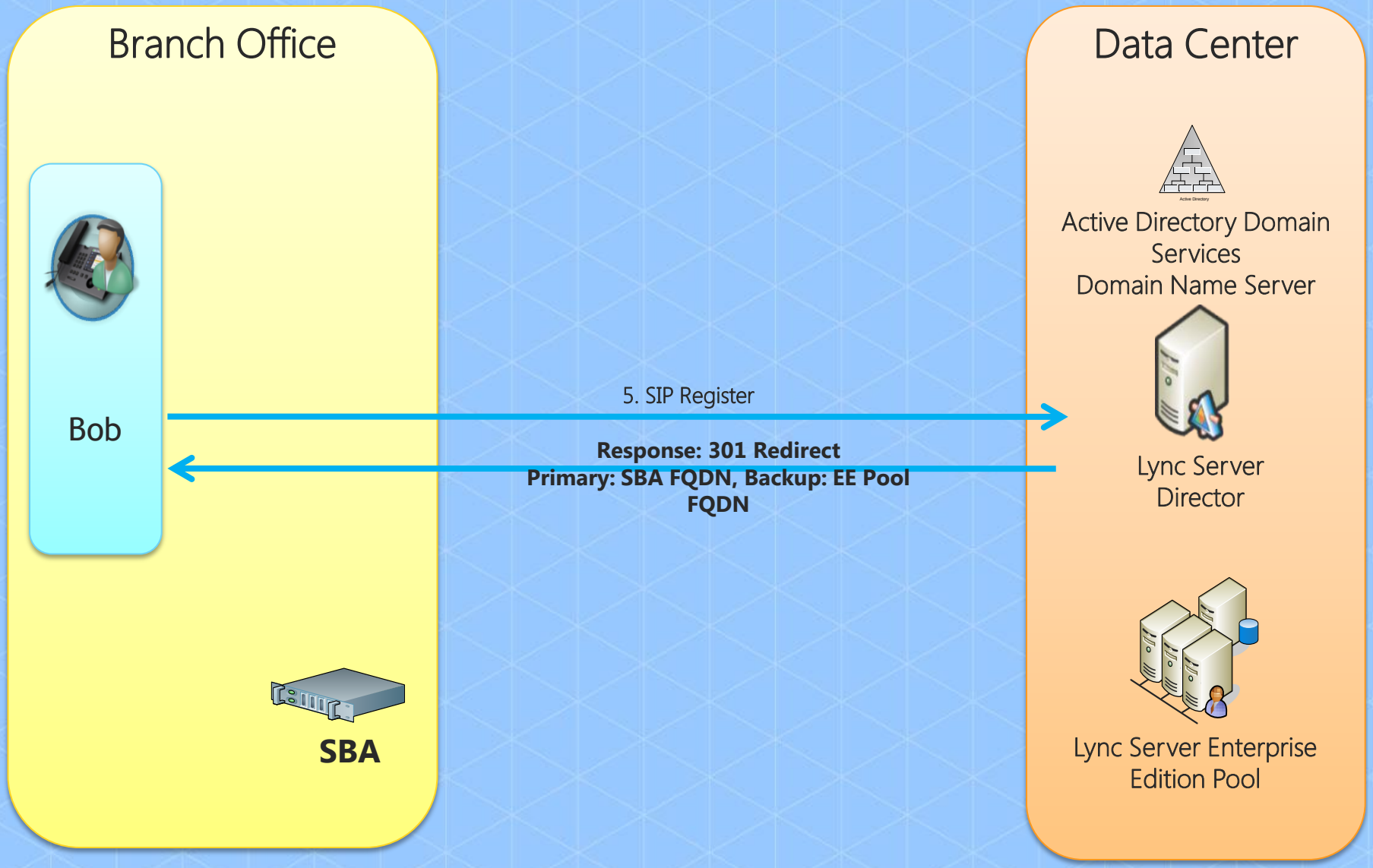
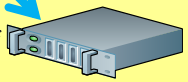


SBA – Lync Server 2010 Discovery

Branch Office

Bob

6. SIP-TLS* Register
200 OK
(Cert Auth)
Client caches SBA FQDN**
And IP Address

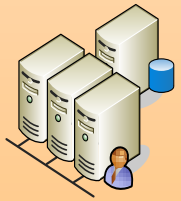


SBA

Data Center

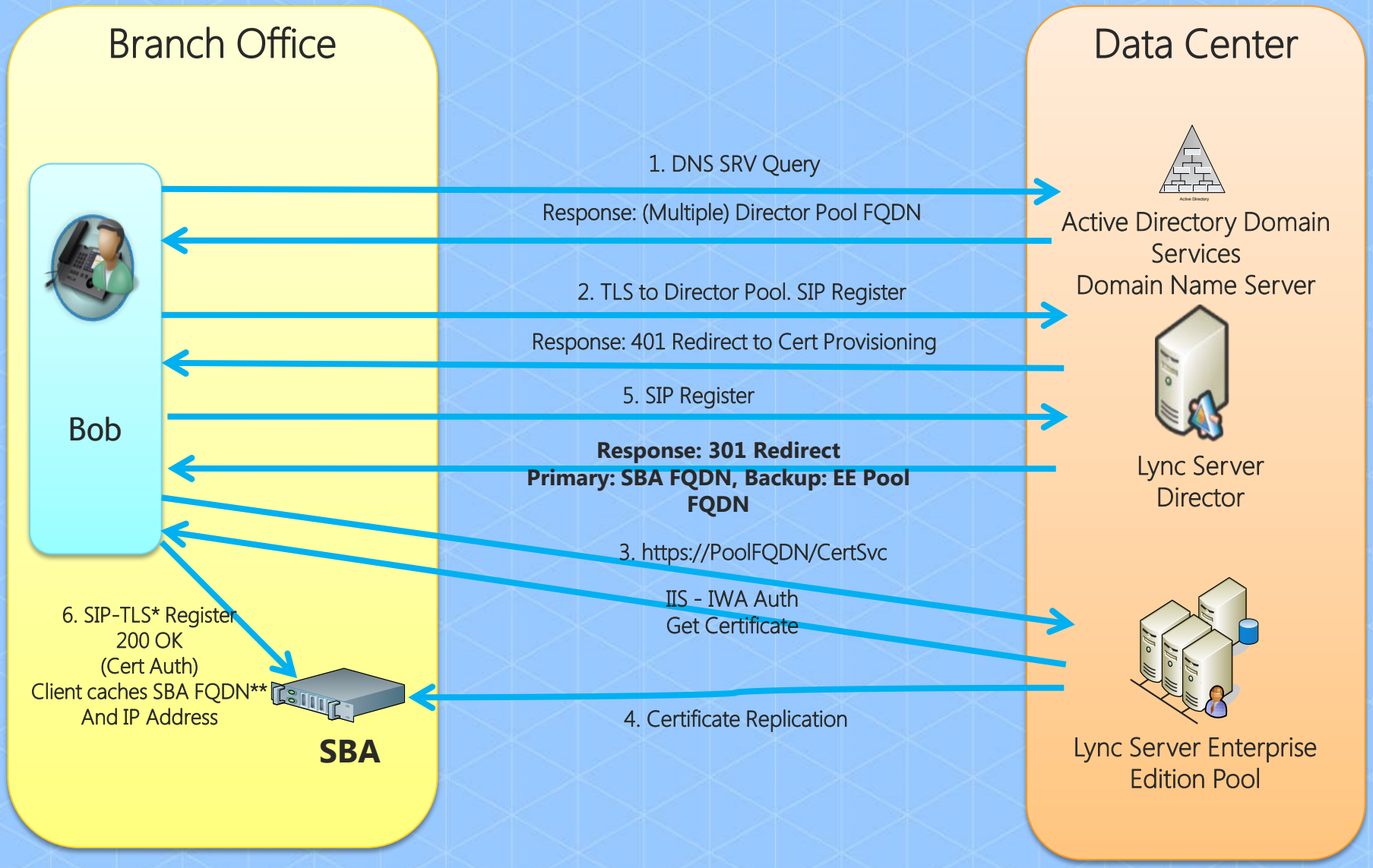
Active Directory Domain Services
Domain Name Server

Lync Server Director

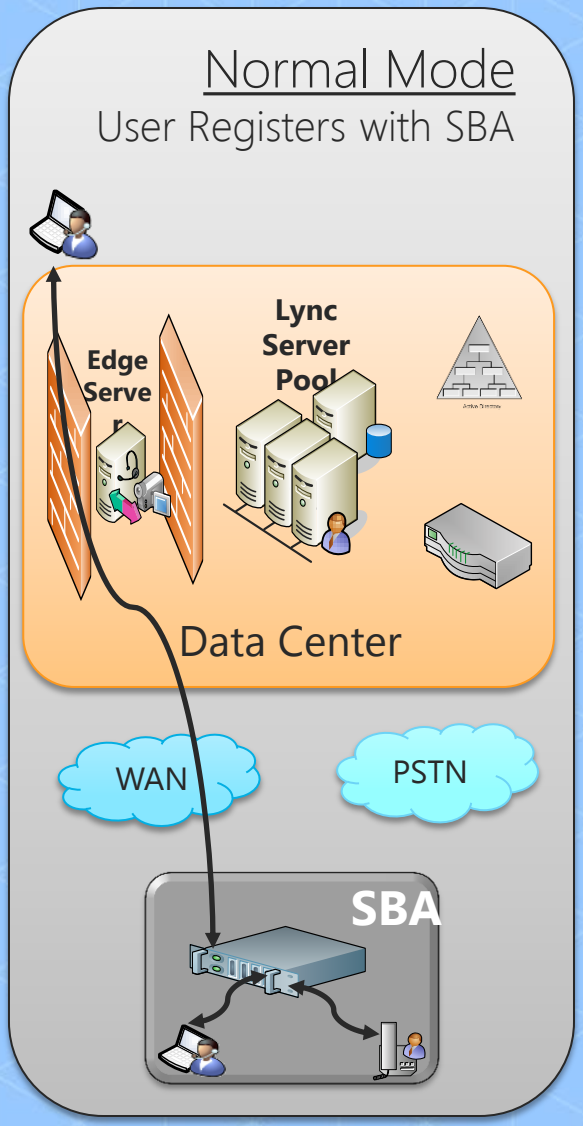


Lync Server Enterprise Edition Pool

SBA – Lync Server 2010 Discovery



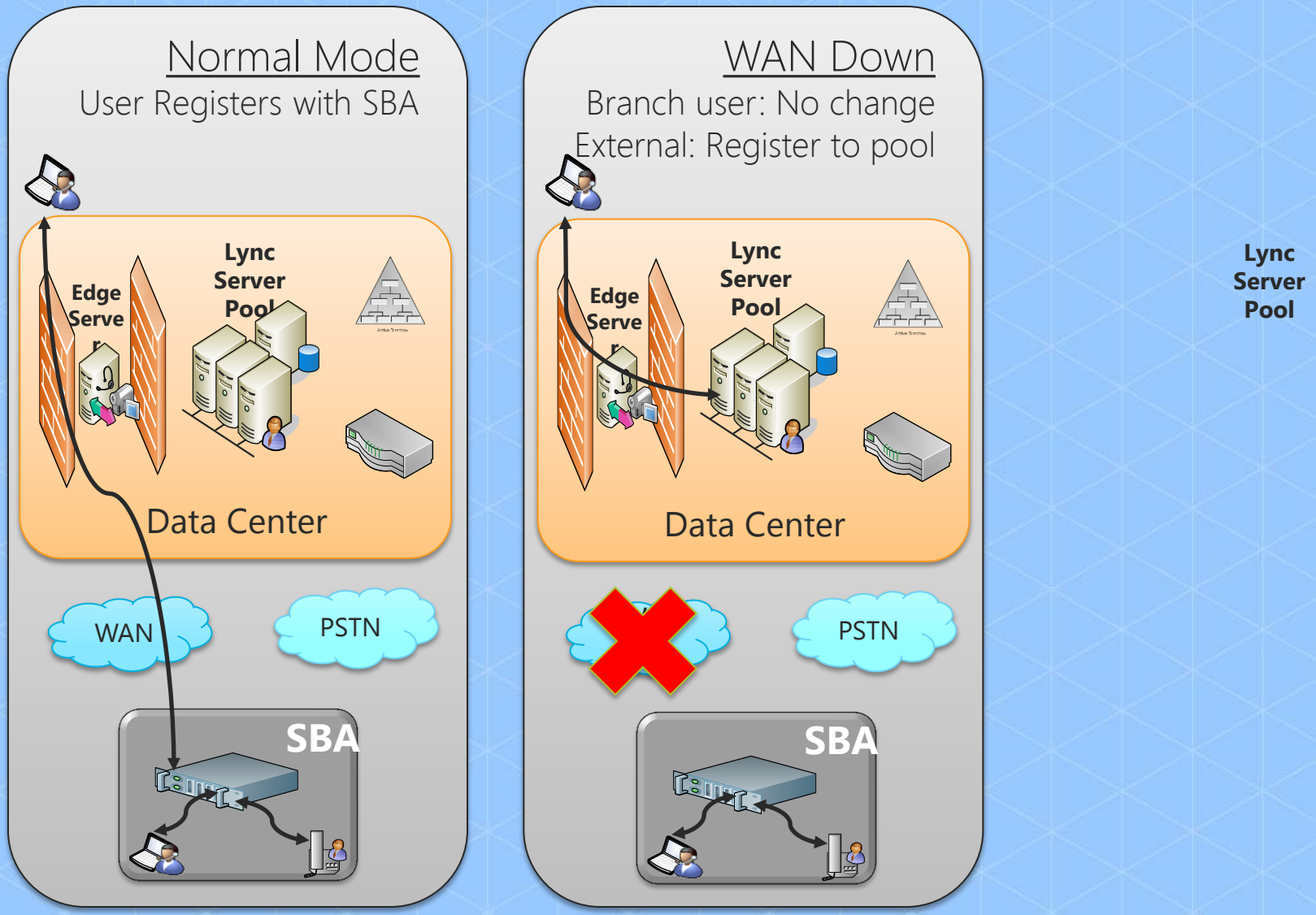
Branch Client Registration Scenarios



Lync Server Pool

Lync Server Pool

Branch Client Registration Scenarios



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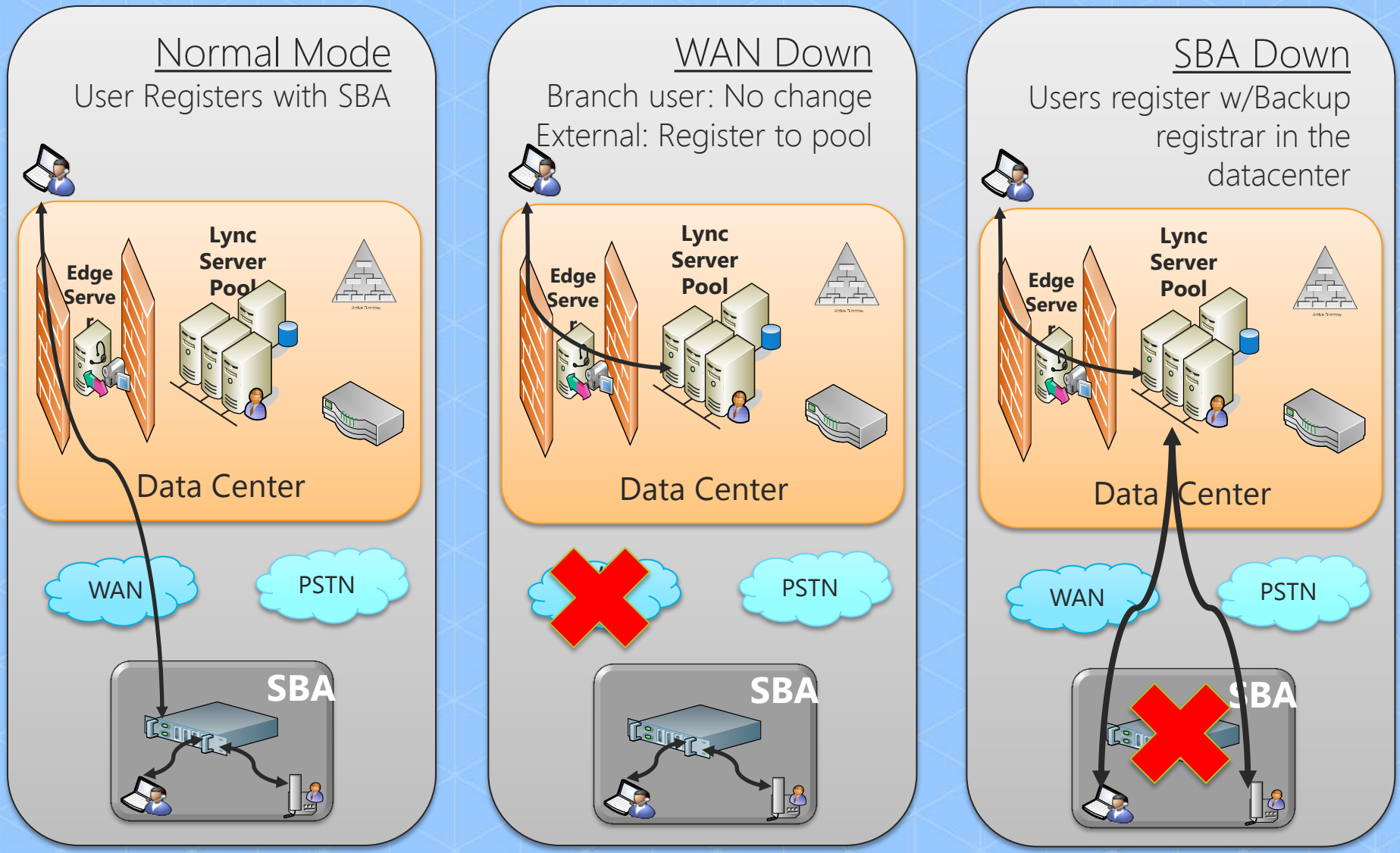
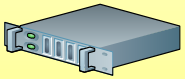


Branch Office: Server Connectivity when WAN down

Branch Office

Bob

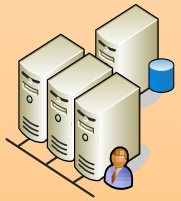
SBA



Data Center

Active Directory Domain Services
Domain Name Server

Lync Server Director



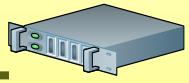
Lync Server Enterprise Edition Pool

Branch Office: Server Connectivity when WAN down

Branch Office

TLS to cached FQDN and IP
SIP Register
(Cert Auth)

SBA



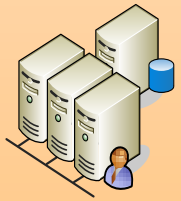
200 OK

Bob

Data Center

Active Directory Domain Services
Domain Name Server

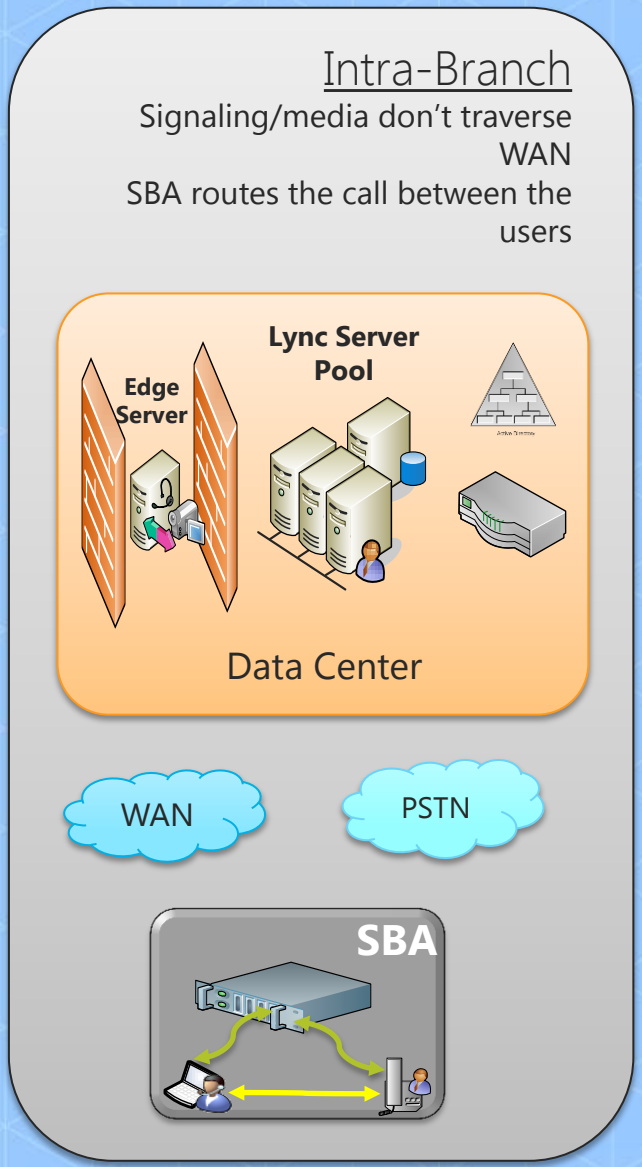
Lync Server Director



Lync Server Enterprise Edition Pool

Branch Client Media and Signaling Paths

WAN Available



Branch Client Media and Signaling Paths

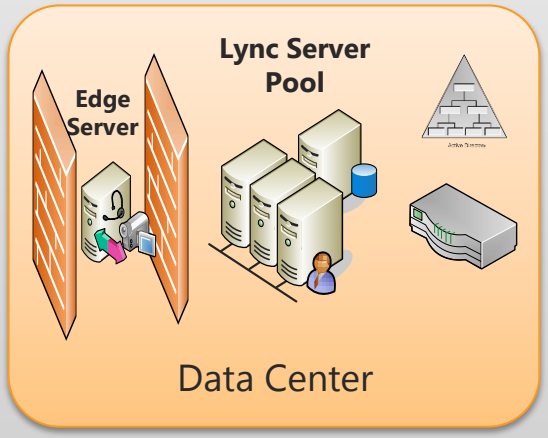
WAN Available

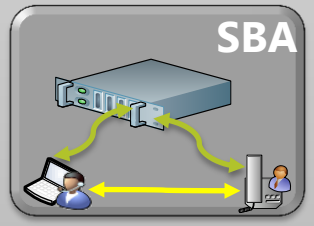
Media
Signaling

Intra-Branch

Signaling/media don't traverse WAN

SBA routes the call between the users

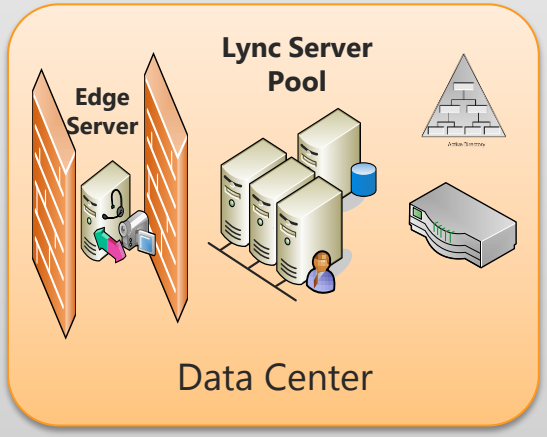


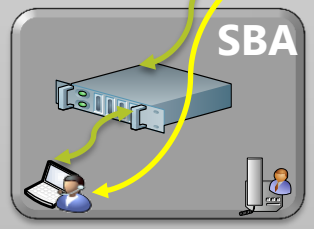


Branch PSTN Calls

SBA sends call to the PSTN

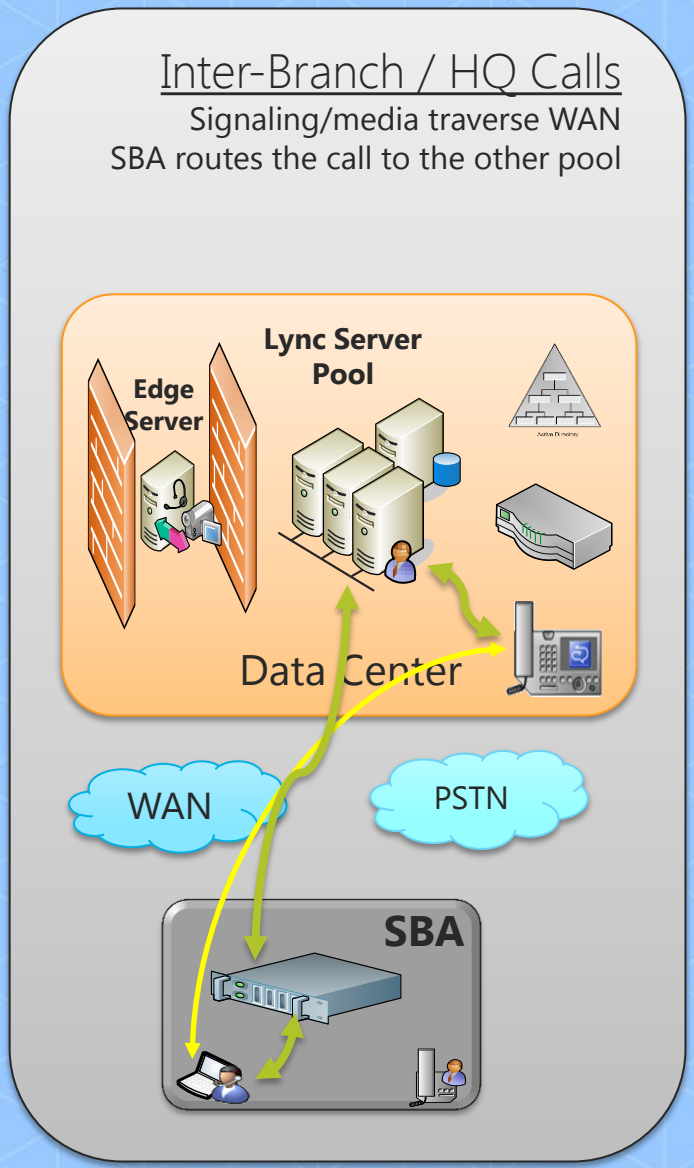
No WAN involved





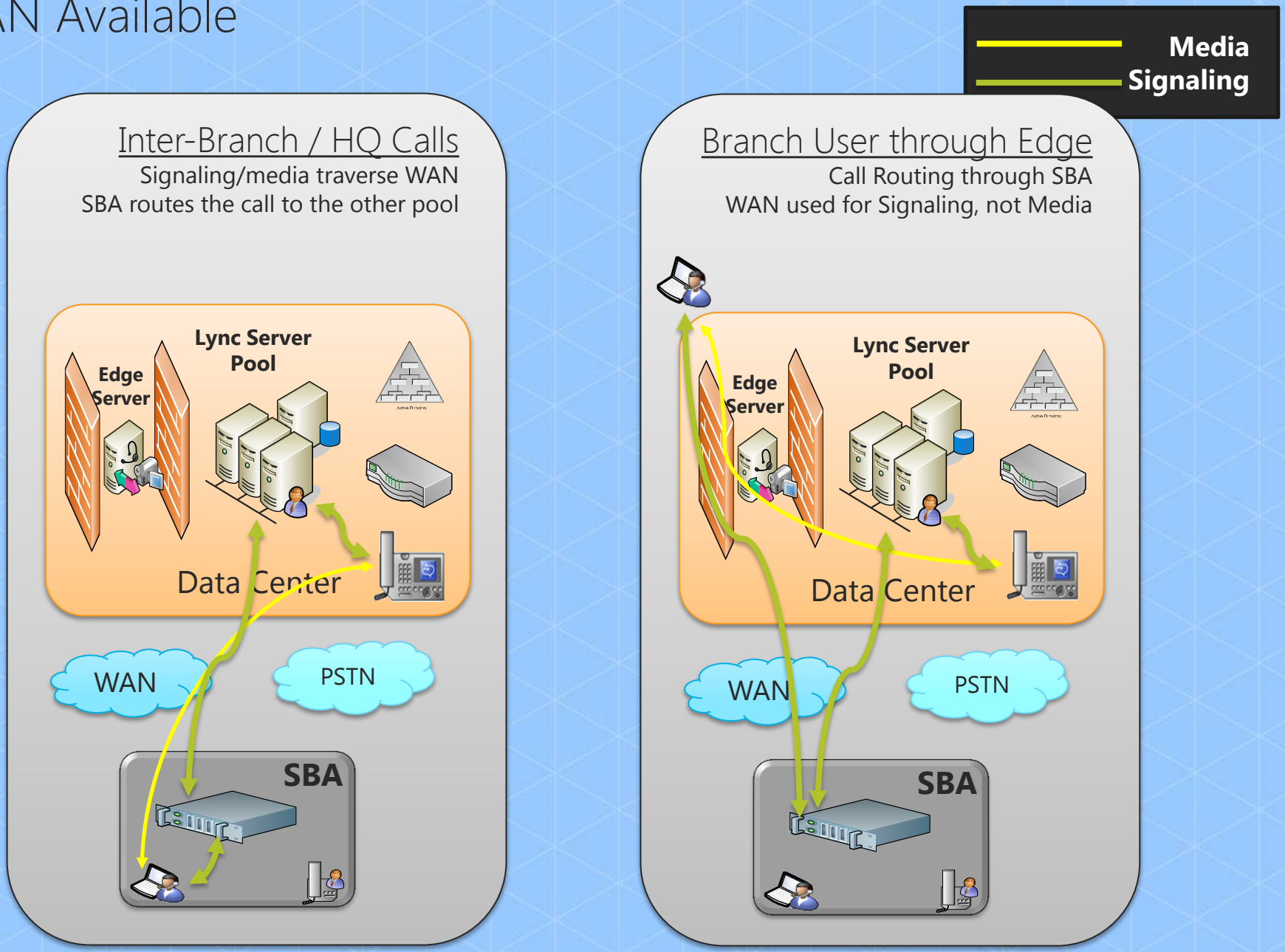
Branch Client Media and Signaling Paths

WAN Available



Branch Client Media and Signaling Paths

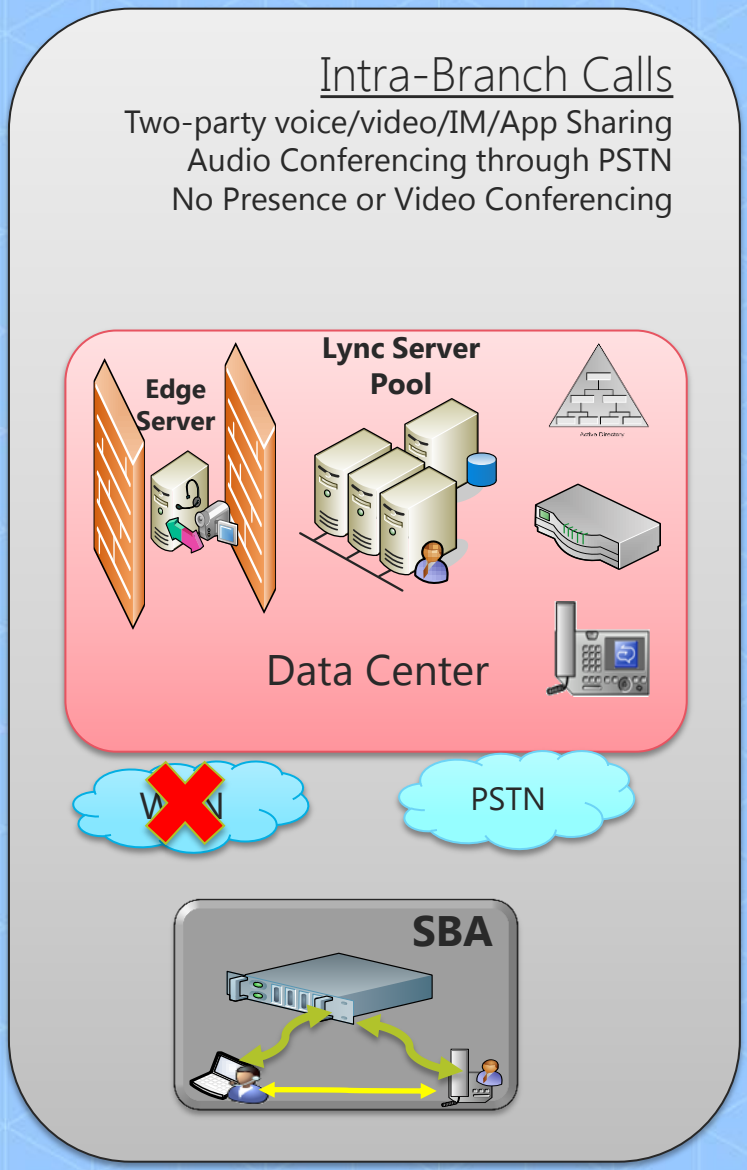
WAN Available



Branch Client Media and Signaling Paths

Key Failure Scenarios: WAN Down

Media
Signaling



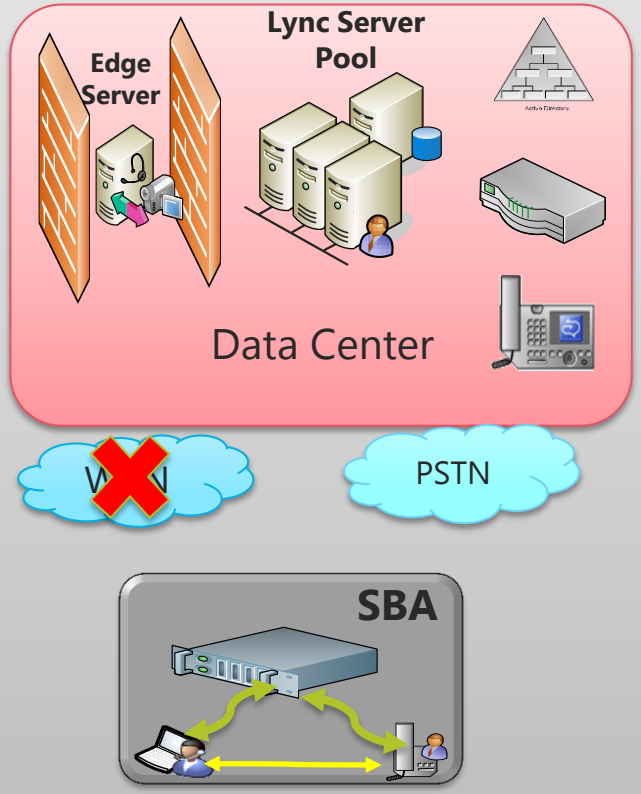
Branch Client Media and Signaling Paths

Key Failure Scenarios: WAN Down

Media
Signaling

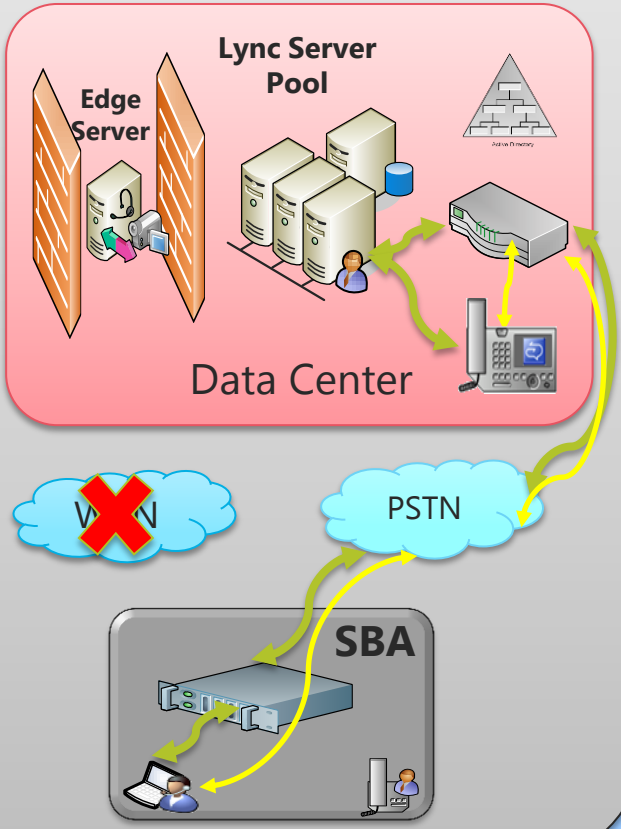
Intra-Branch Calls

Two-party voice/video/IM/App Sharing
Audio Conferencing through PSTN
No Presence or Video Conferencing



Inter-Branch/HQ Calls

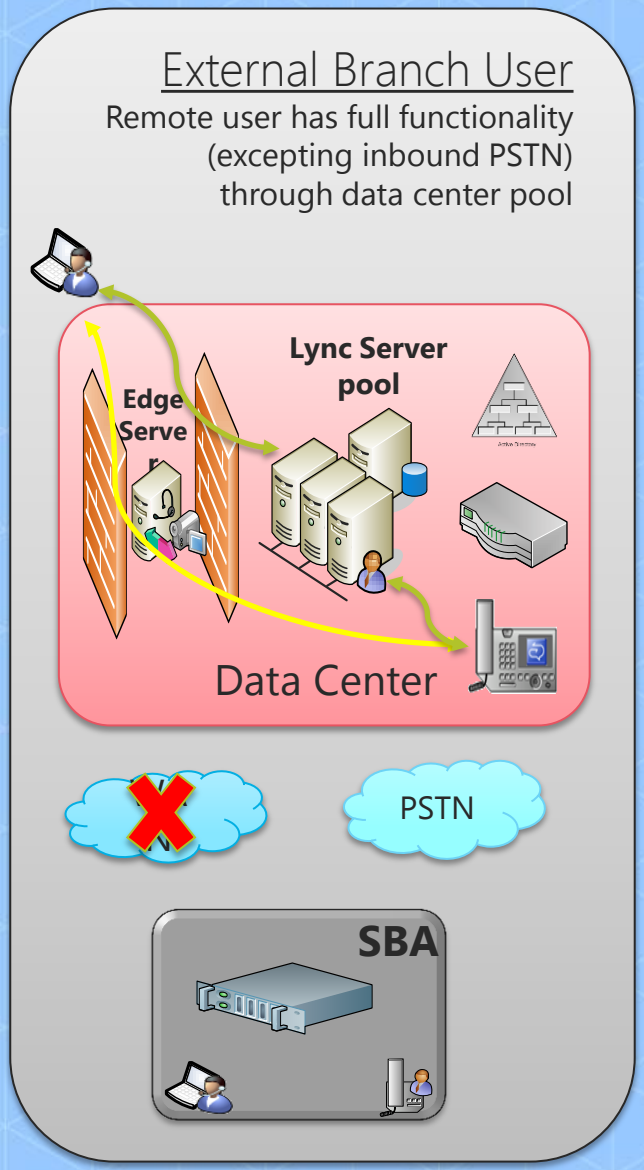
SBA Initiates PSTN Rerouting
Media is over PSTN (Voice Only)



Branch Client Media and Signaling Paths

Key Failure Scenarios: Edge User & SBA Down

Media
Signaling

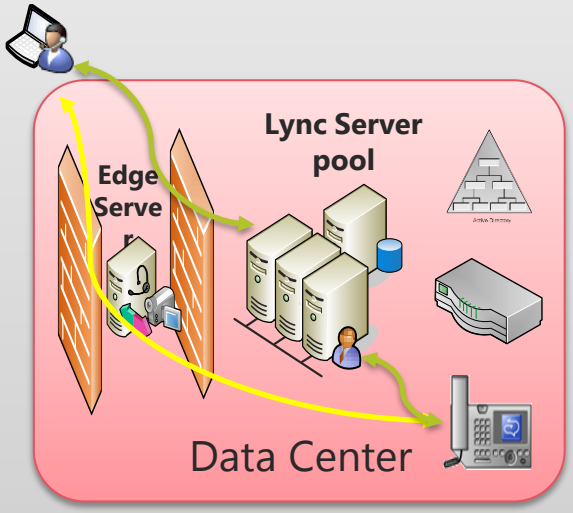


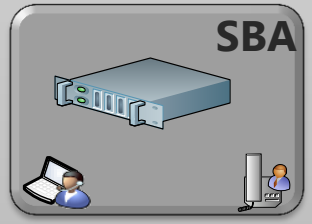
Branch Client Media and Signaling Paths

Key Failure Scenarios: Edge User & SBA Down

External Branch User

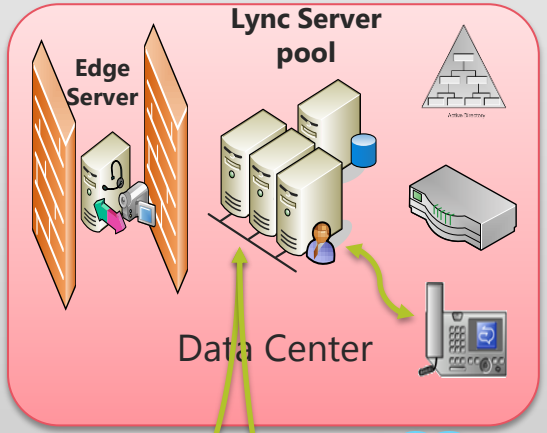
Remote user has full functionality (excepting inbound PSTN) through data center pool

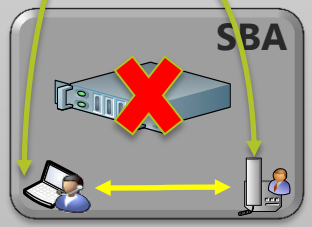




SBA Down

Clients register w/Backup Registrar in DC
Functionality driven by pool over WAN No functionality loss





Agenda

- High Availability & Resiliency Architecture
- Branch Office Resiliency
- **Data Center Voice Resiliency**
- Metropolitan Data Center Resiliency
- Lync Online resiliency

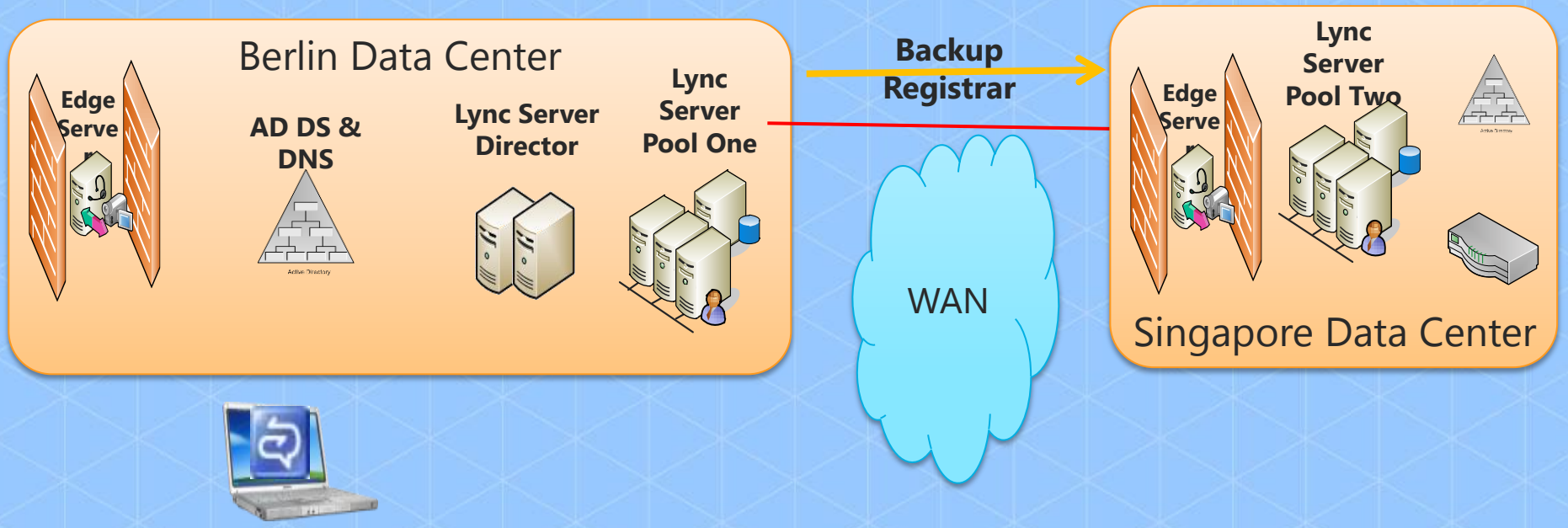
Data Center Voice Resiliency

Failover to Backup Data Center

- Lync Server pools operate as separate systems.
- Client DNS SRV request discovers one or multiple Lync Server Pools. That Lync Server Pool directs client to primary and backup SIP registrar.
- Client connects to Backup if connecting to Primary Registrar Pool fails.
  - Limited feature set available on failover.
  - Enable/Disable automatic failover, configurable failover interval.
  - Automatic Failback, configurable failback interval.
- If Primary Data Center cannot be restored:
  - Restore Central Management Server in backup datacenter.
  - Restore other services including Presence, Conferencing by “moving” users to other Pool.

Data Center Voice Resiliency

Failover to Backup Data Center (Discovery)



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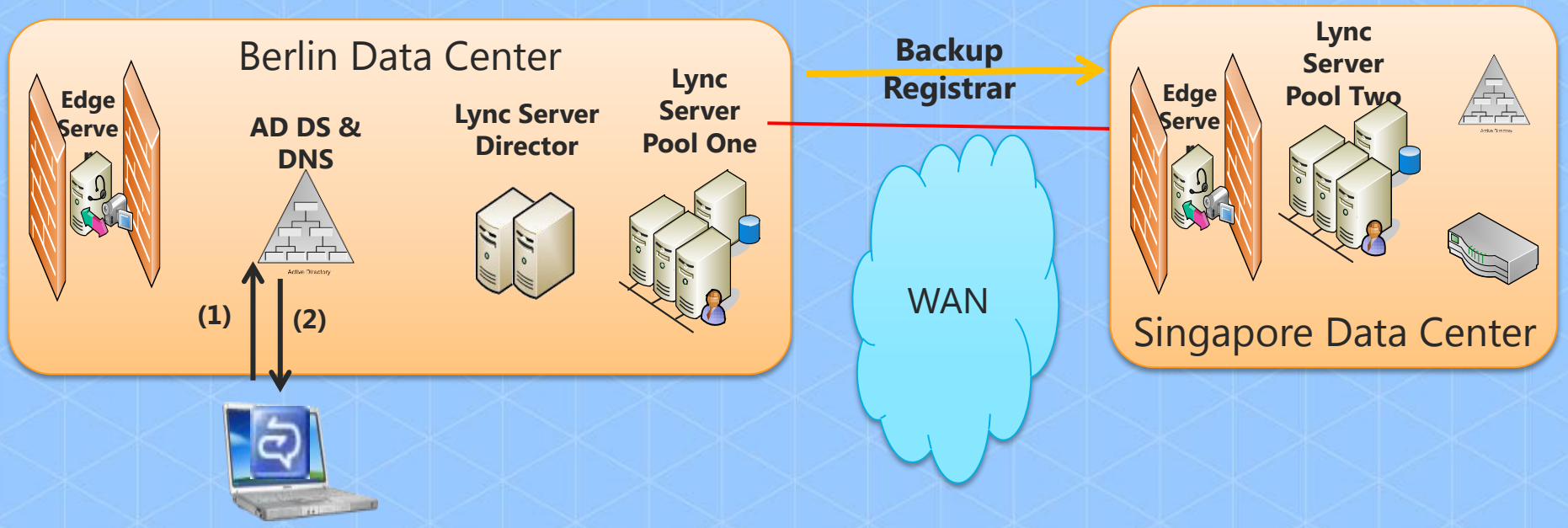
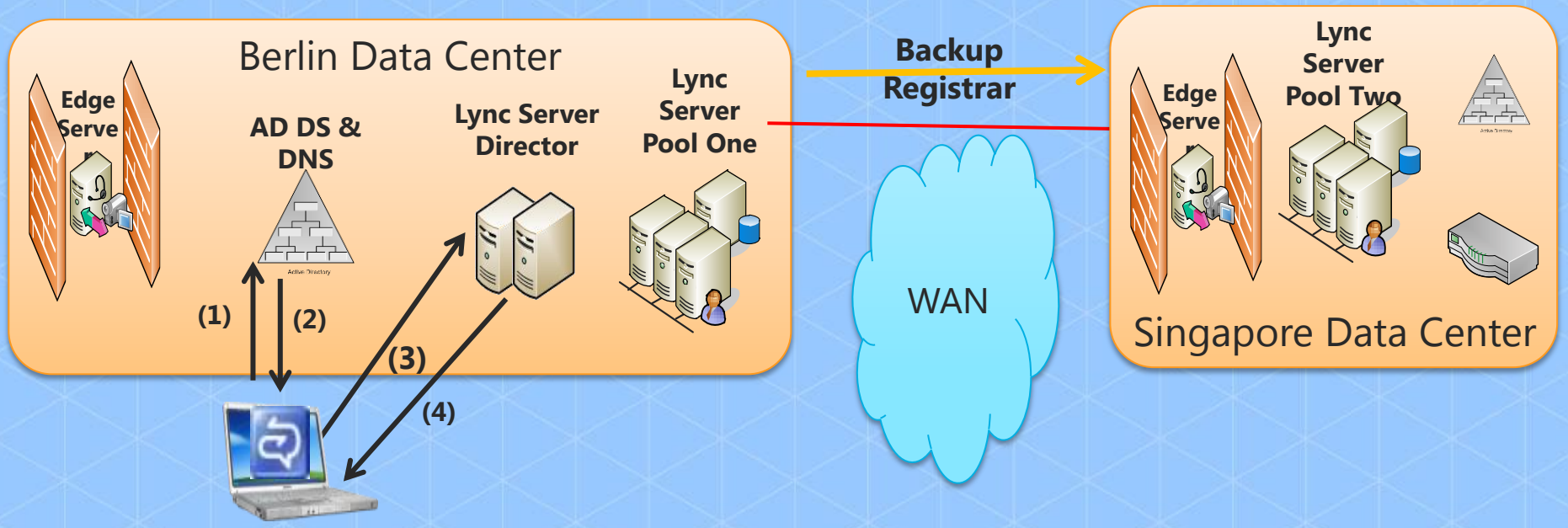


1.Client DNS SRV request. Example: DNS SRV for _sipinternaltls._tcp.contoso.com
2.DNS SRV Response includes:
Lync Director Pool.contoso.com:5061, Priority=0, Weight=10,
LSPool2.contoso.com:5061, Priority=1 , Weight=10

Data Center Voice Resiliency

Failover to Backup Data Center (Discovery)



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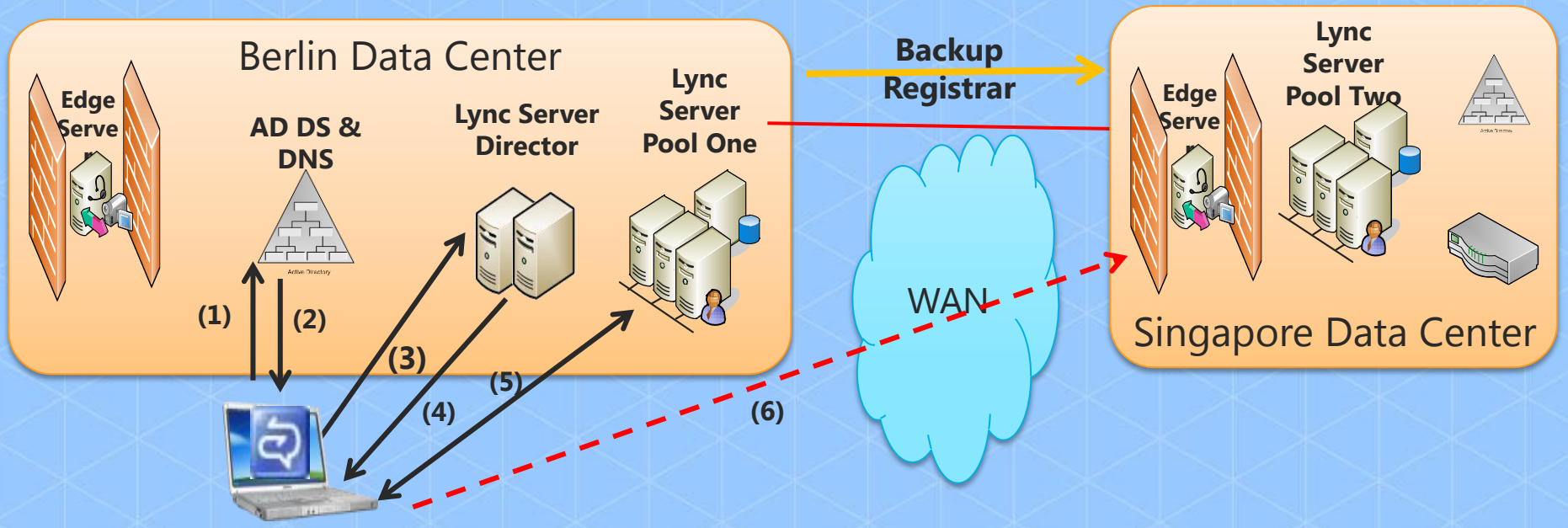
4.Lync Server Director Pool redirects client. SIP 301 includes Primary & Backup Registrar pool

Data Center Voice Resiliency

Failover to Backup Data Center (Discovery)



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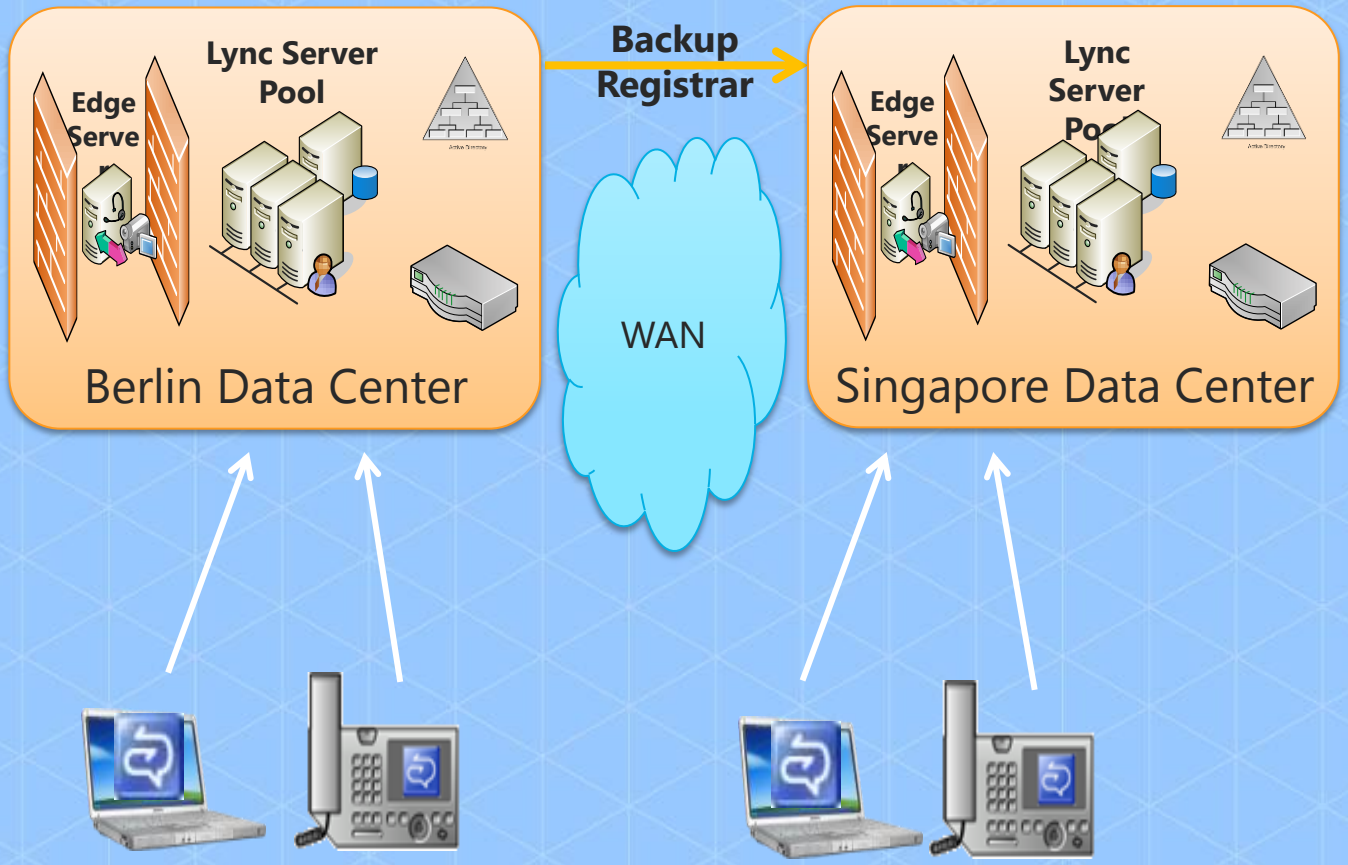
4.Lync Server Director Pool redirects client. SIP 301 includes Primary & Backup Registrar pool
5.If Primary Registrar Pool is available, client connects and registers with it
6.If unavailable, client connects and registers with Backup Registrar Pool (Lync Pool 2)

Data Center Voice Resiliency

Failover to Backup Data Center



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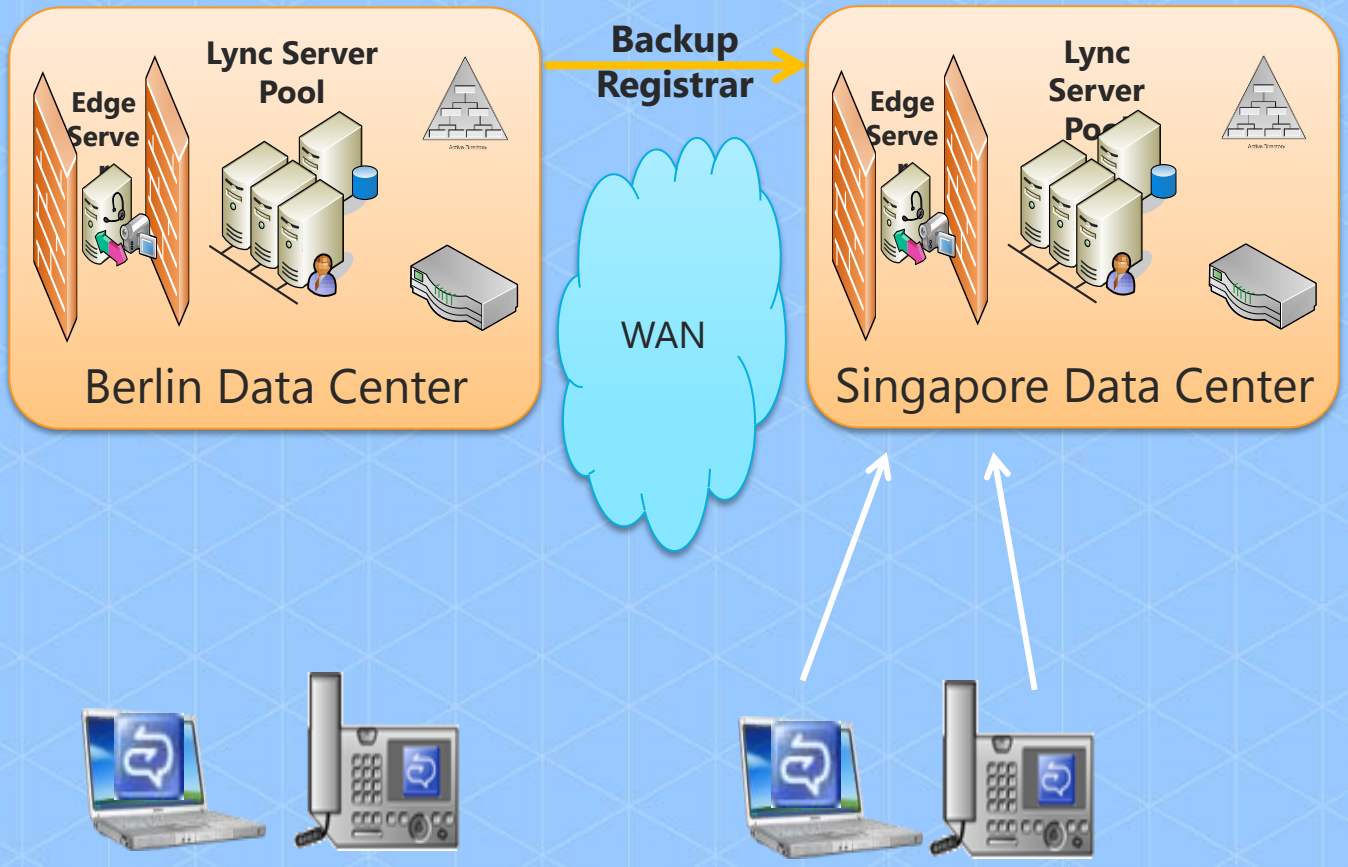
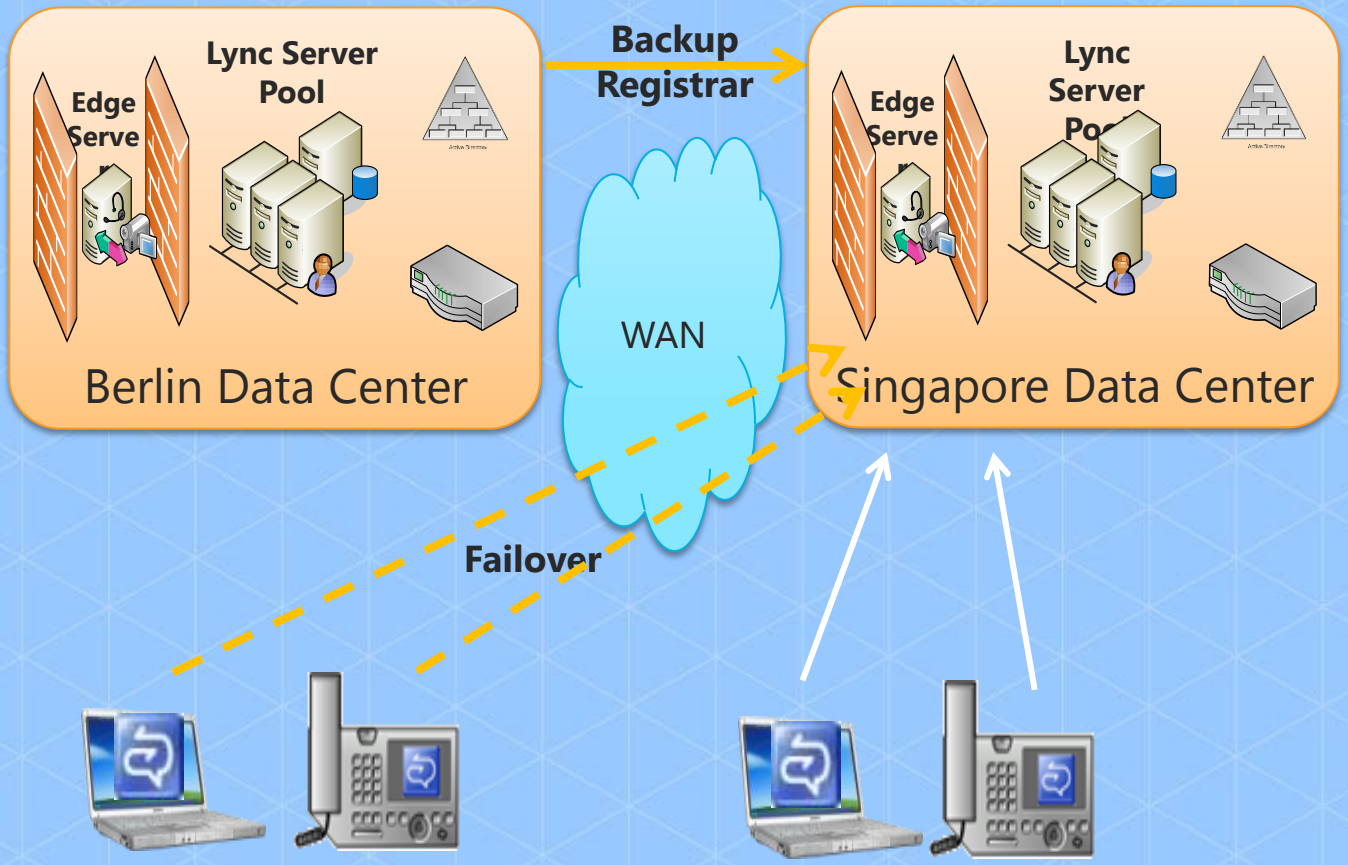
Failover to Backup Data Center



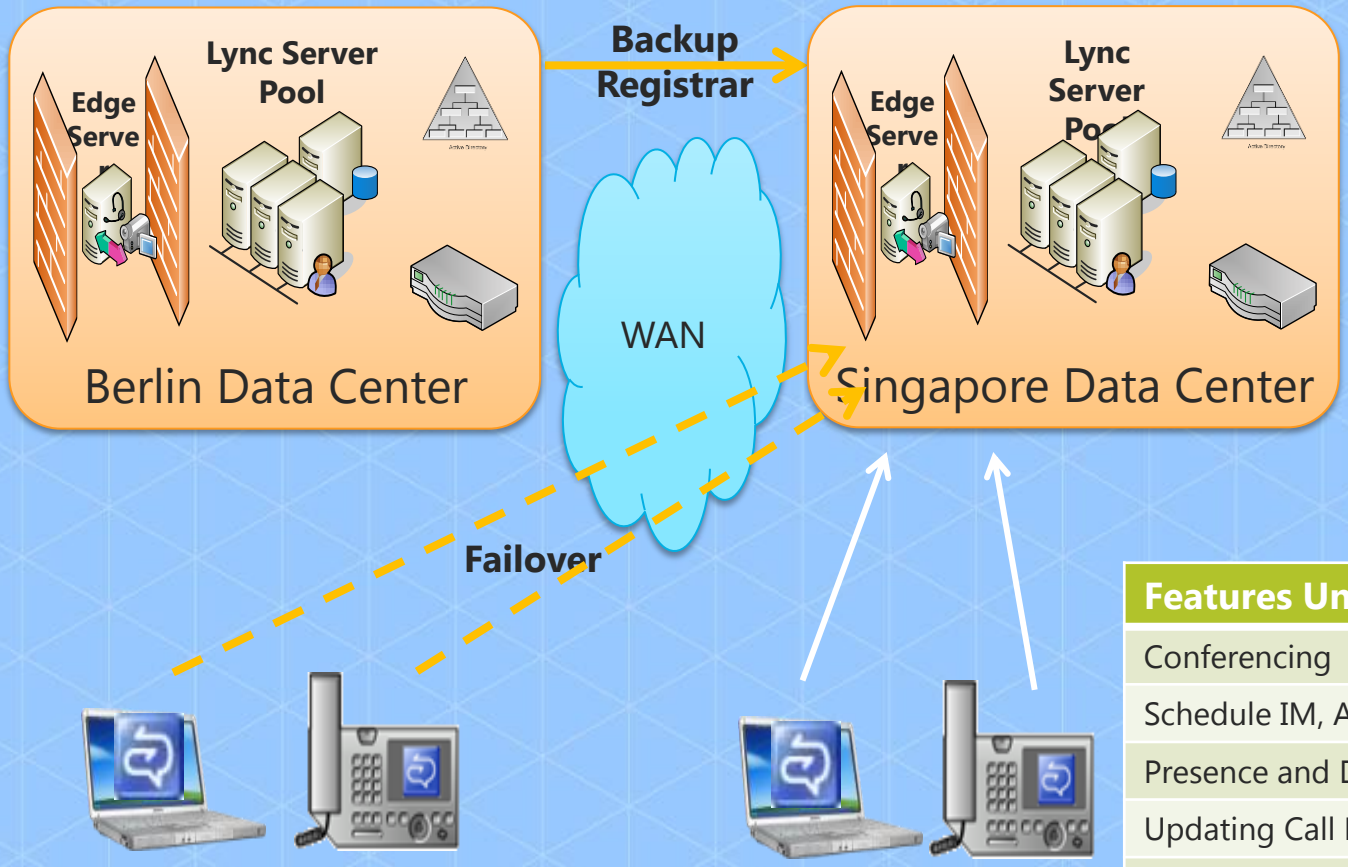
Data Center Voice Resiliency

Failover to Backup Data Center



Data Center Voice Resiliency

Failover to Backup Data Center



Features Available to Users In Case of Data Center Disaster
PSTN Inbound calls (carrier provided)
PSTN Outbound calls
Intra-Site calls and Inter site calls
Hold, Retrieve, Transfer
Authentication, Authorization
2 Party Intra Site Instant Messaging (IM) and Audio/Video (A/V)
Call Detail Records (CDR)
Call Forwarding, Simultaneous Ringing, Delegation, Team-call
Join conferences scheduled by users homed on other pool

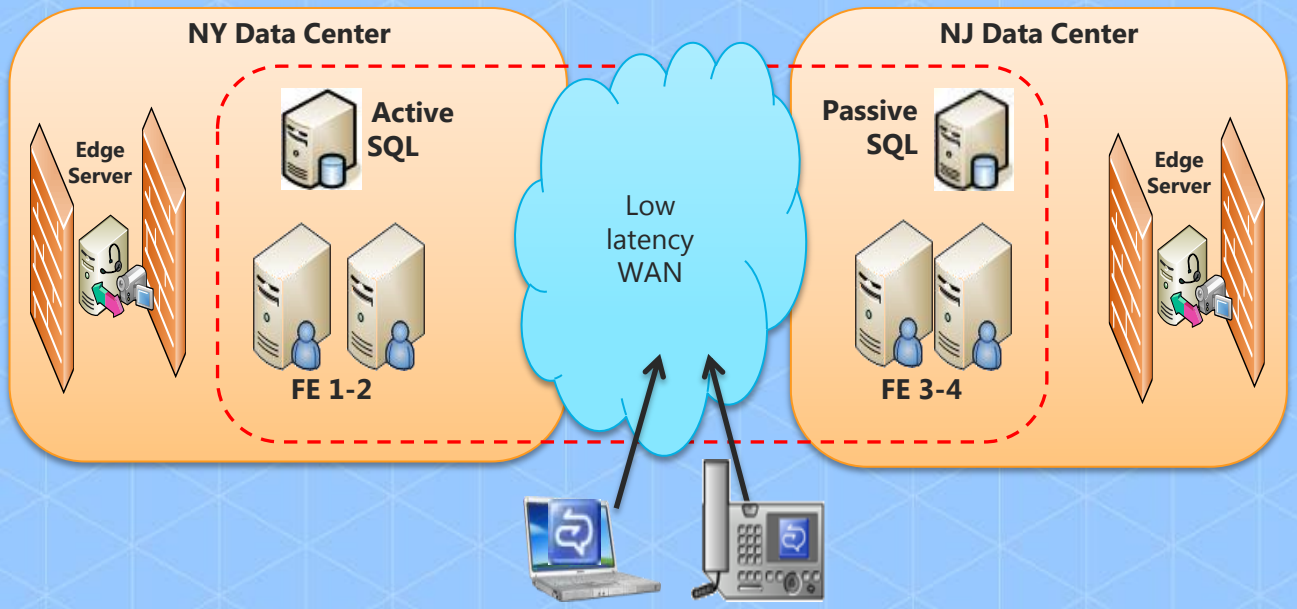
Features Unavailable
Conferencing Auto Attendant (AA) (through PSTN)
Schedule IM, A/V & Web Conferences
Presence and Do Not Disturb (DND) based routing
Updating Call Forwarding settings
Response Group Service & Call Park
Voicemail Deposit (Redirect to Exchange UM in the DC)
Voicemail Retrieve (through PSTN)

Agenda

- High Availability & Resiliency Architecture
- Branch Office Resiliency
- Data Center Voice Resiliency
- **Metropolitan Data Center Resiliency**
- Lync Online resiliency

Metro Data Center Resiliency

Lync 2010 Pool Extended Across Two Data Centers

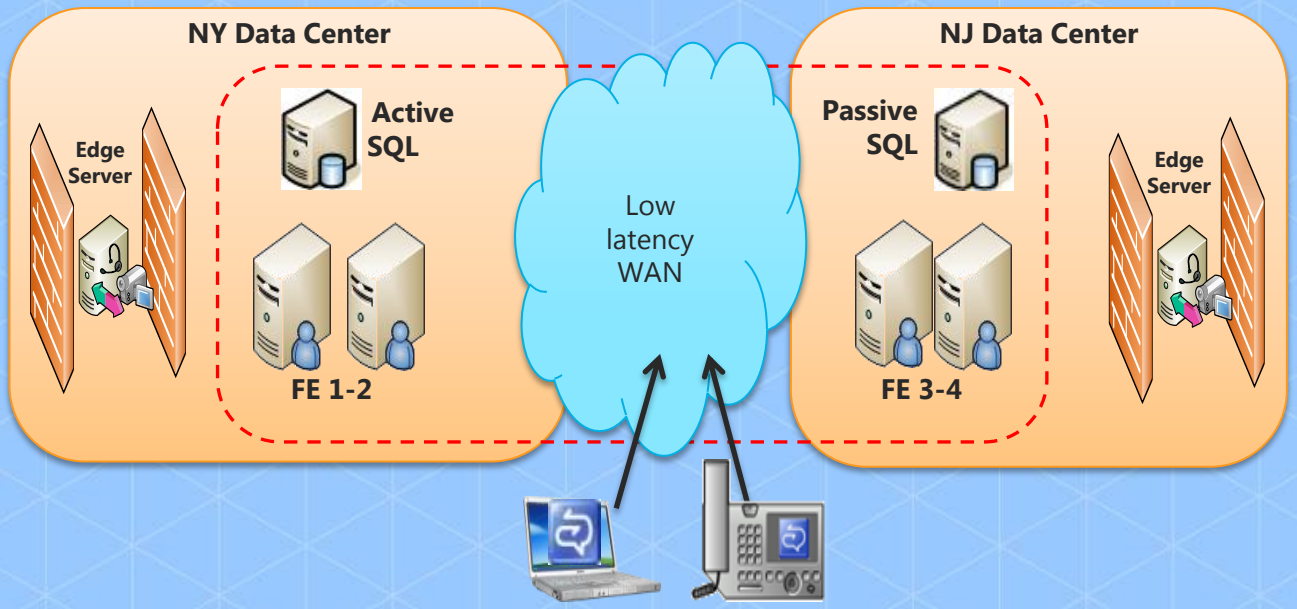


- Lync server pools operate as one logical system
  - Split Front End pool across two datacenters (all FEs active)
  - SQL Geo cluster for backend (Stretched Virtual Local Area Network (VLAN))
  - Data replication is done by storage arrays (Ex: EMC SRDF, HP CLX EVA)
  - Requires low latency WAN (20 milliseconds)
- In one site is down, clients are serviced by FEs in other site
- Nearly all features available
  - PSTN termination may affect inbound calls

http://technet.microsoft.com/en-us/library/gg670905.aspx

Metro Data Center Resiliency

Lync 2010 Pool Extended Across Two Data Center



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2 Party Intra Site IM and A/V
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Call Forwarding, SimulRing Boss-Admin, Team-call
Voice Apps (CAA, Response Group, Call Park)
Conferencing (IM, A/V and Web)
Presence and DND based routing
Updating Call Forwarding settings

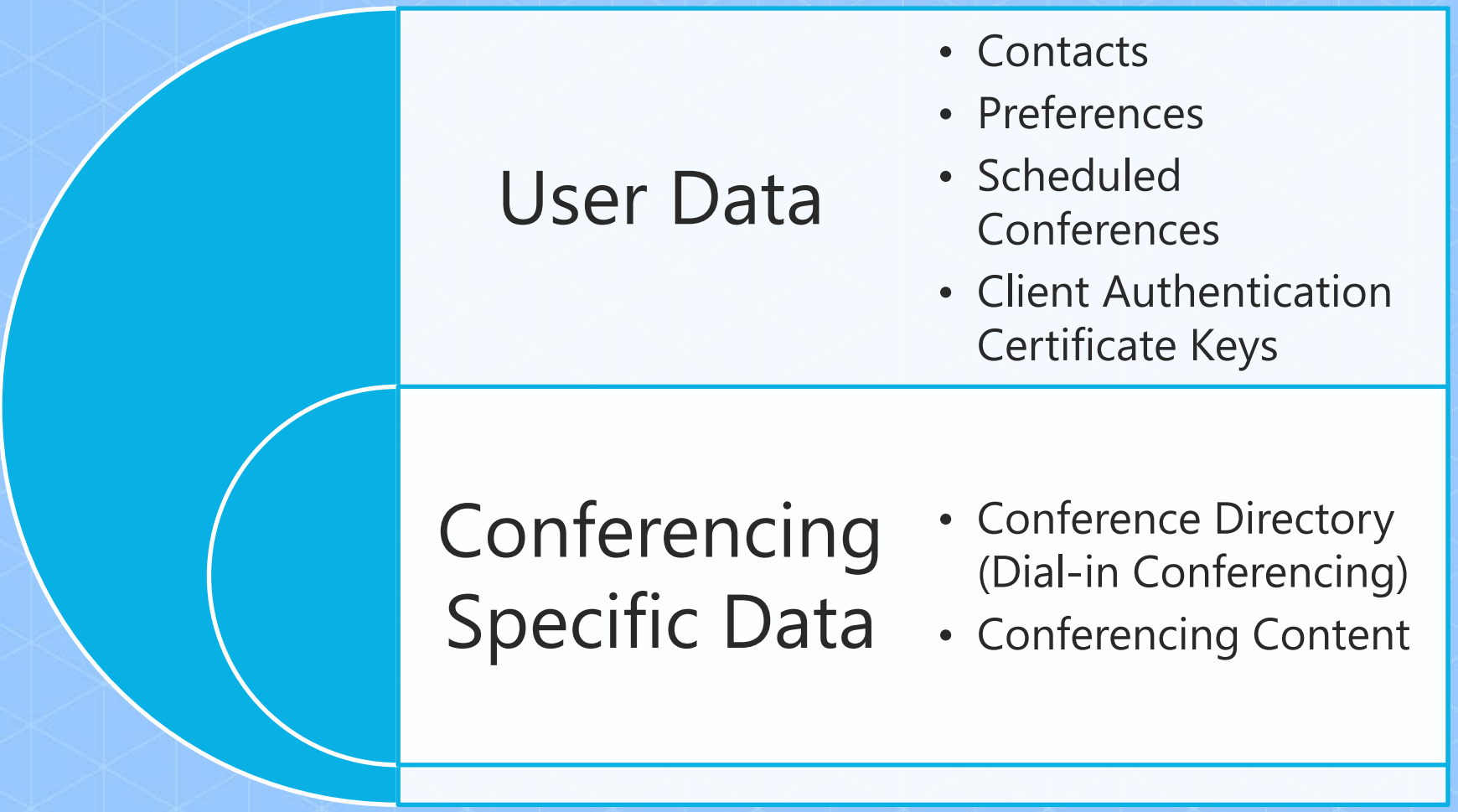
Features Available Depending on Exchange UM Deployment
Voicemail Deposit
Voicemail Retrieve

Backup and Restore

- The Backup and Restore document covers the following:
  - Strategy and best practices to help in planning and prepping for backup and restore – that fit individual customer needs.
  - Backing up all relevant Server Roles, Lync Databases and data stores (core data and settings, Arch/Mon databases, File stores)
  - Restoring Lync servers based on server and failure types.
    - Restoring Lync Servers (standard and enterprise), Central Management Store, Backend, RGS settings,
    - Procedures when backend fails, when entire pool fails

http://technet.microsoft.com/en-us/library/gg398616.aspx

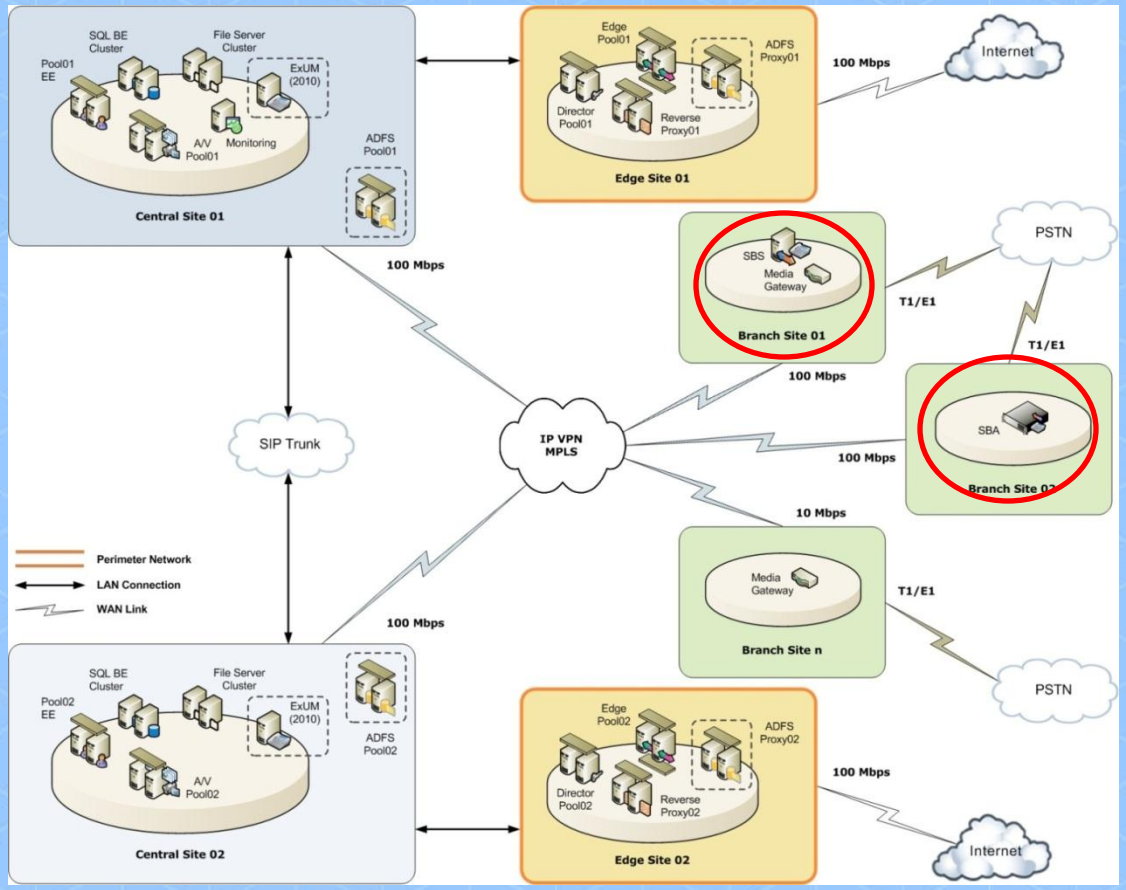
User Recovery – Backup Planning



Backup – DBImpExp.exe

- Used to import/export user and conference directory information from the pool database
- Contains
  - Contacts
  - Preferences
  - Scheduled Conferences
  - Authentication Certificates
  - Conference Directories
- Exports all information to a single XML file

SBA Users?

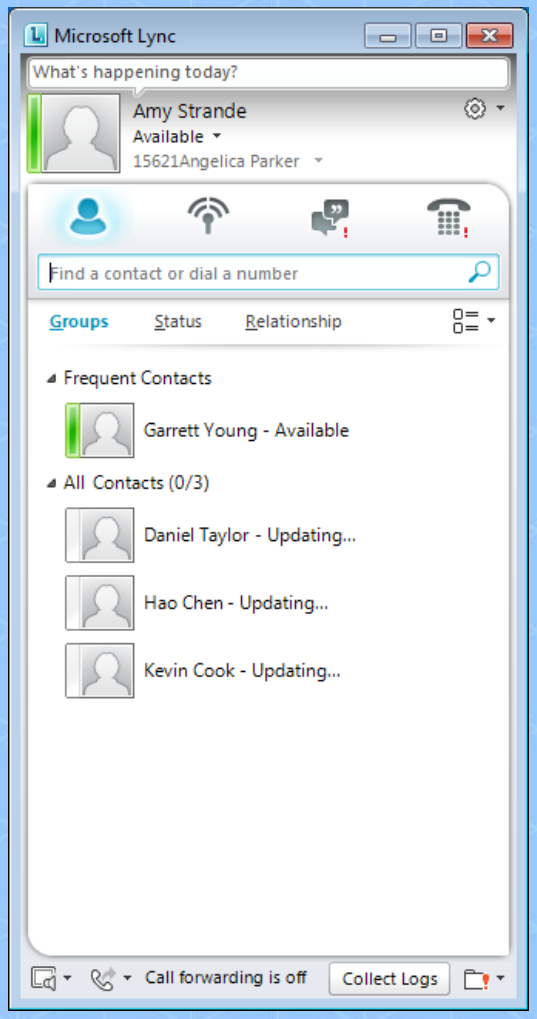


- Move users to target pool
- Change backup registrar in TB and publish
- Move users back to SBA

User Data Restore Process

- Import Users' contacts, conferences and settings

```
DBImpExp.exe
  /import
  /hrxmlfile:C:\data.xml
  /restype:user
  /sqlserver:sql\pool2
```



Questions?

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