MVA

Microsoft
Virtual
Academy

Module7a

Lync Server 2013 and Networking

MVA Jump Start

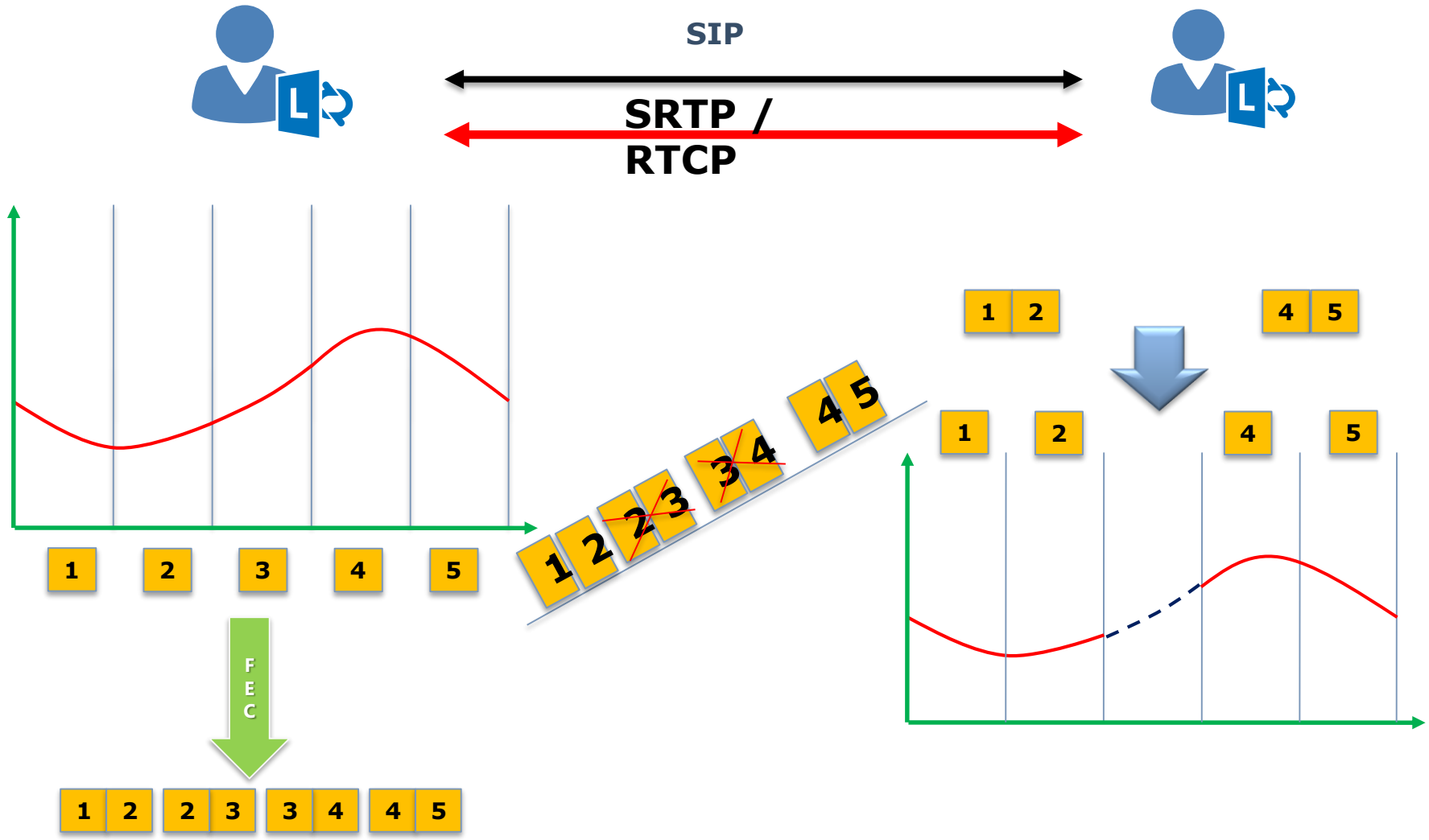
Module Overview

- Planning for Media Requirements
- Call Admission Control
- Planning for Call Admission Control
- Media Bypass

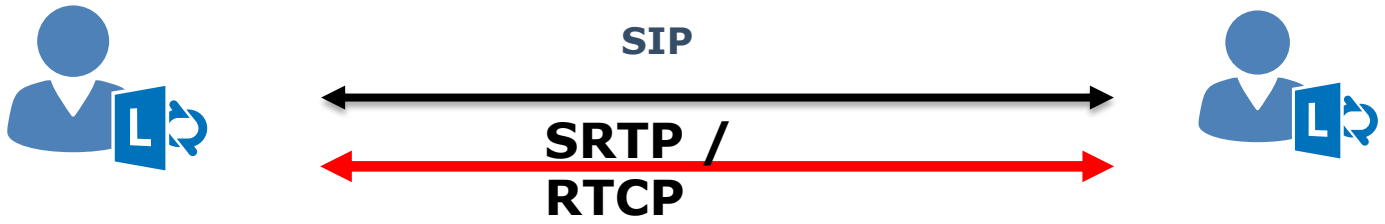
Lesson 1: Planning for Media Requirements

- Structure of a UC Session
- Network Performance Goals
- Audio Bandwidth Usage
- Bandwidth Usage - Video and Application Sharing
- Manageability: Video Bandwidth
- Set Up Quality of Service (QoS)
- Configuring Group Policy
- Network QoS – DiffServ
- VPNs and IPsec

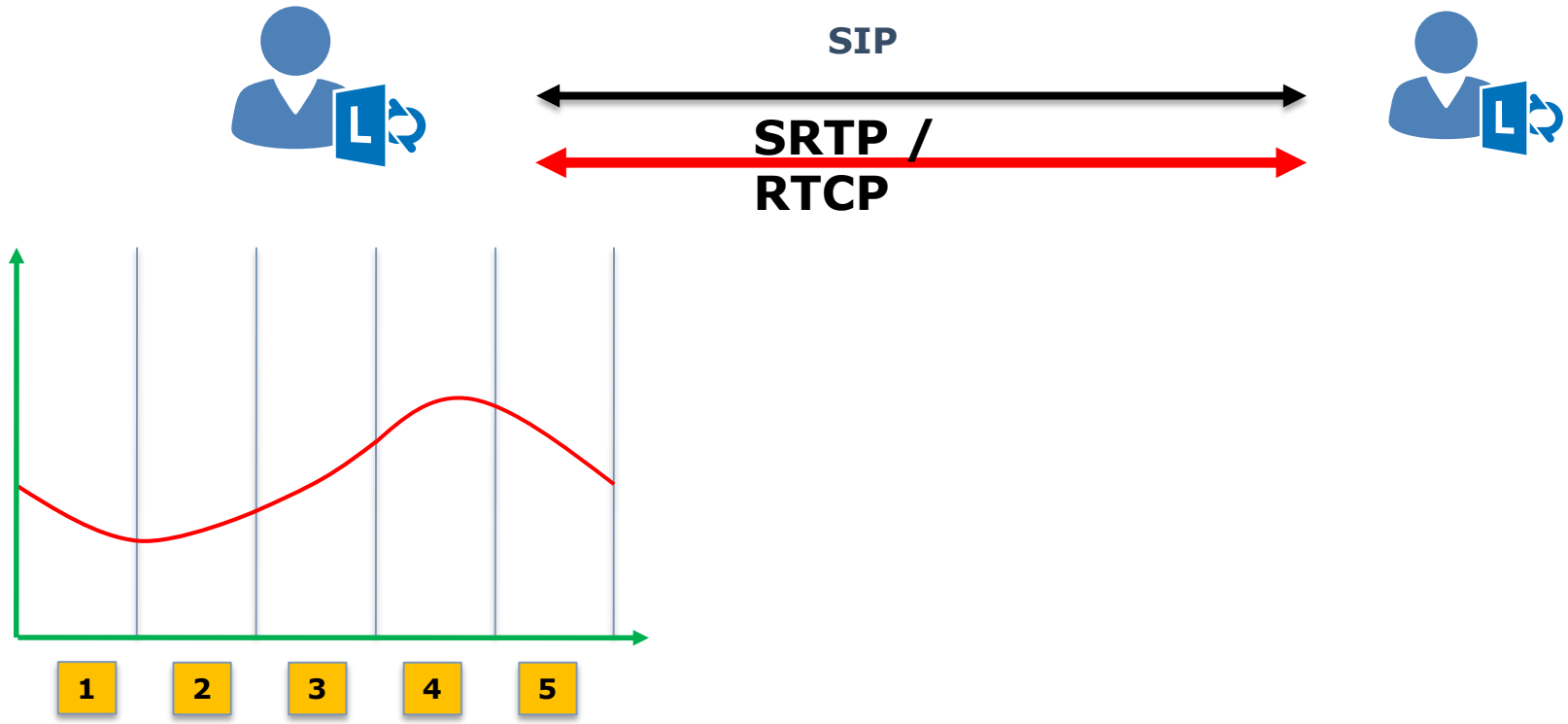
Structure of a UC Session



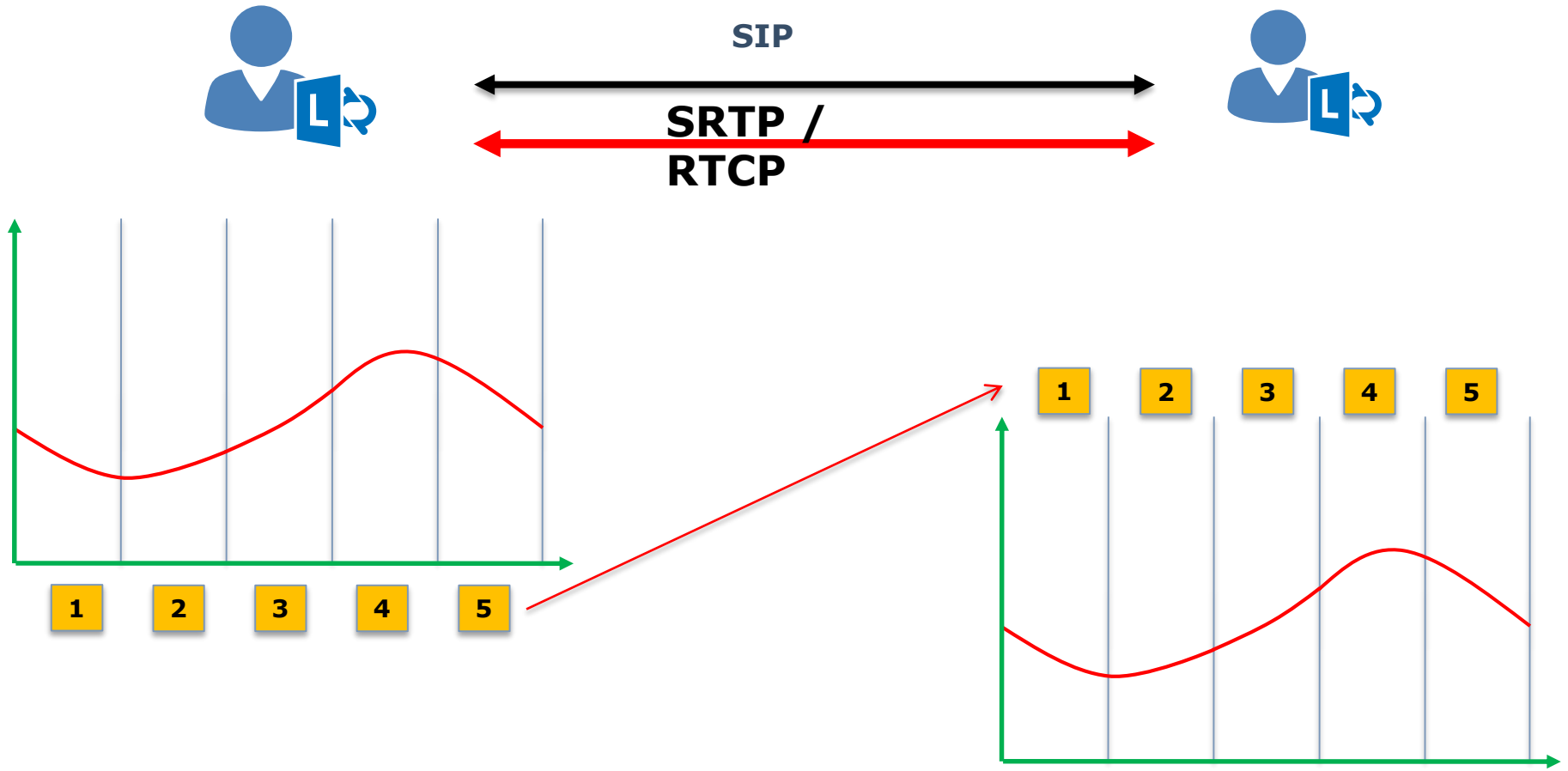
1 of 7 (Protocol Negotiation)



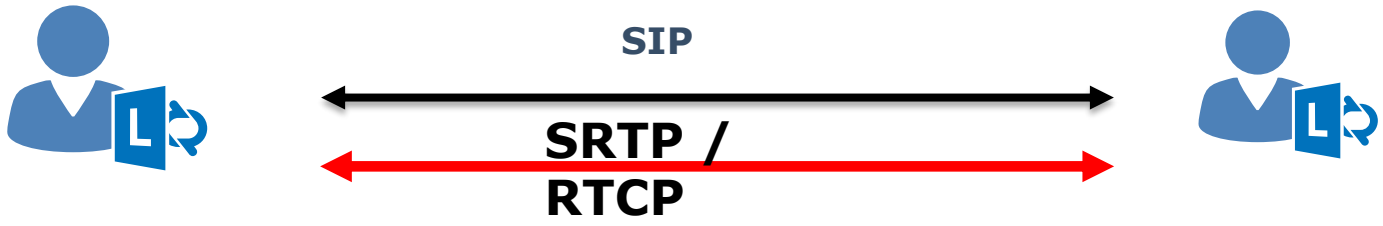
2 of 7 (Analog to Digital)

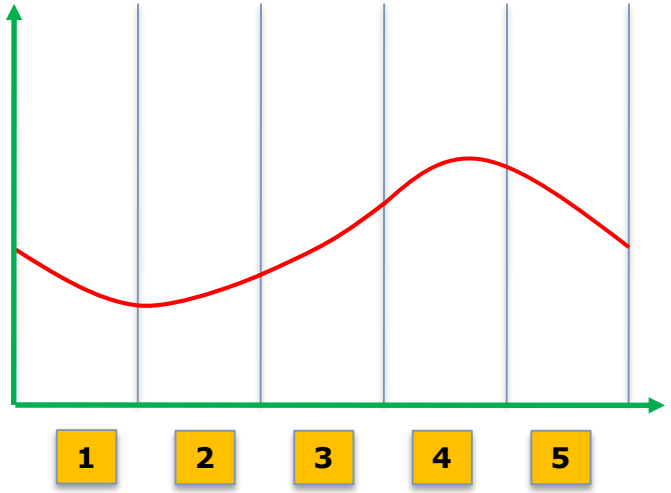


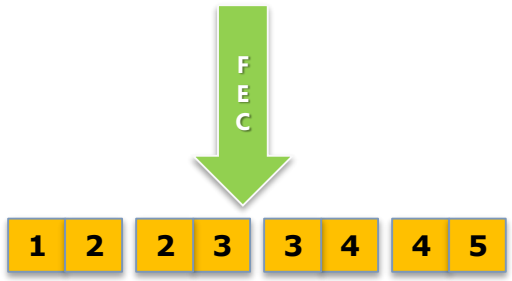
3 of 7 (Happy Transmission)



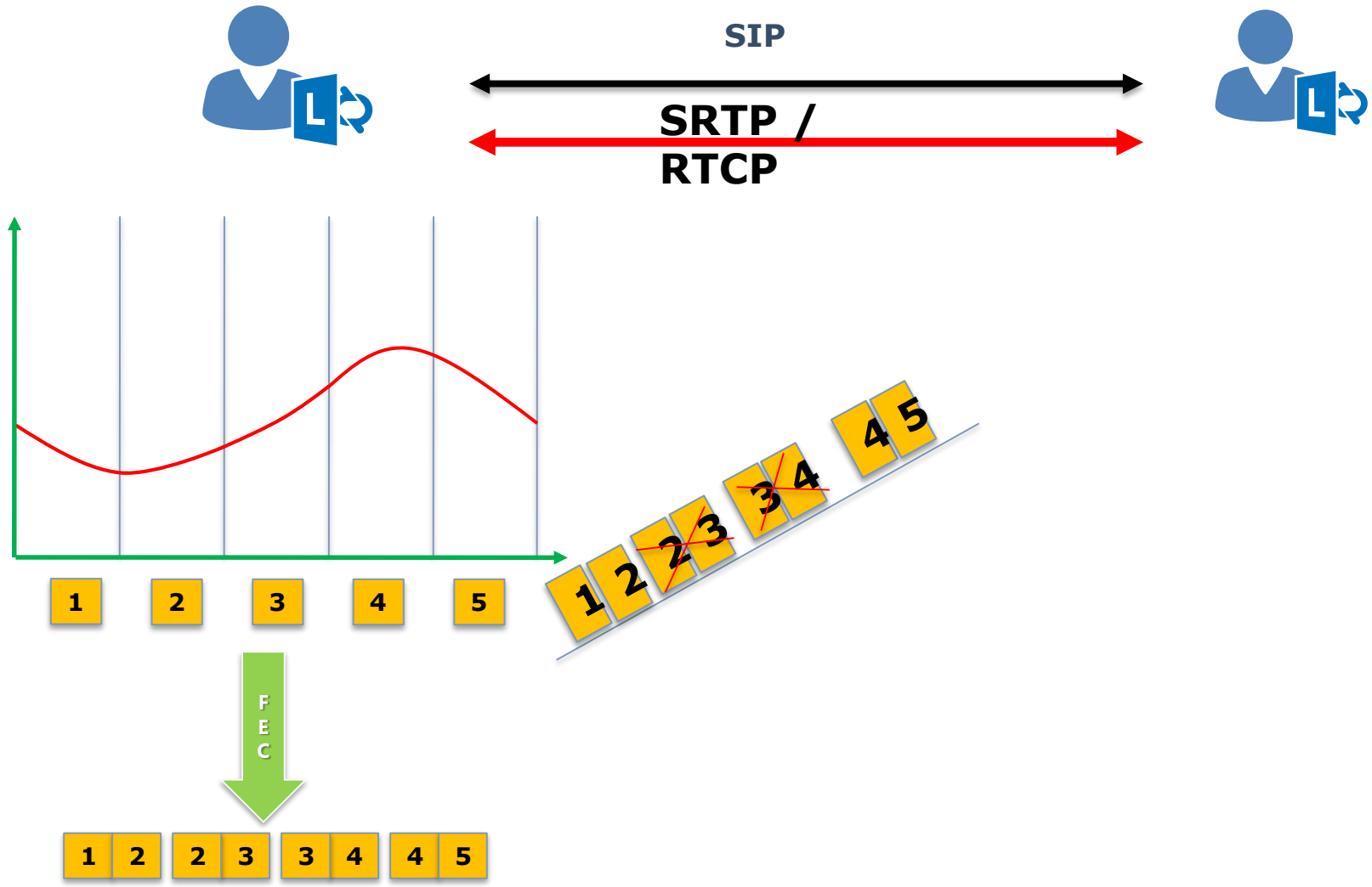
4 of 7 (FEC)



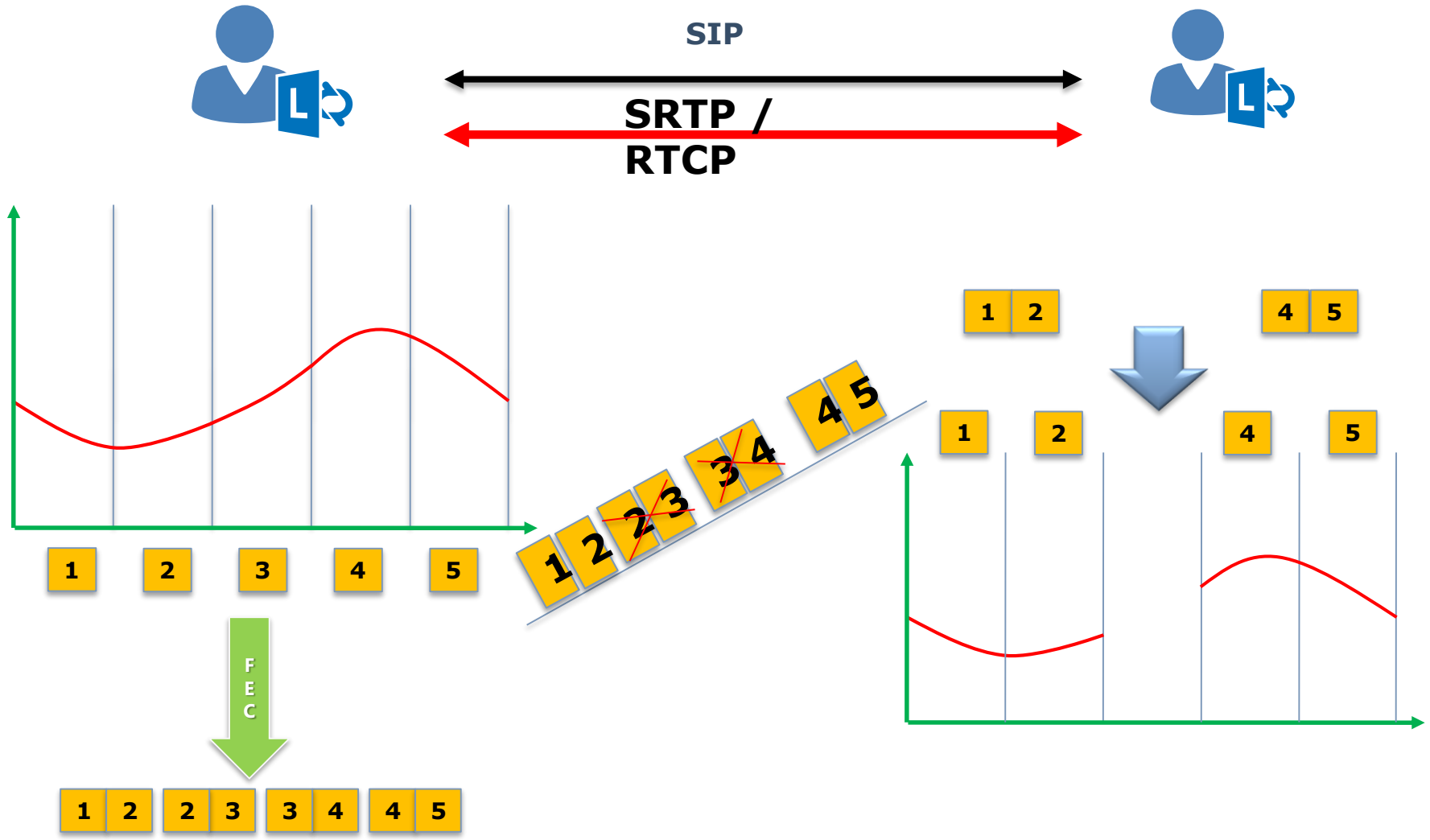




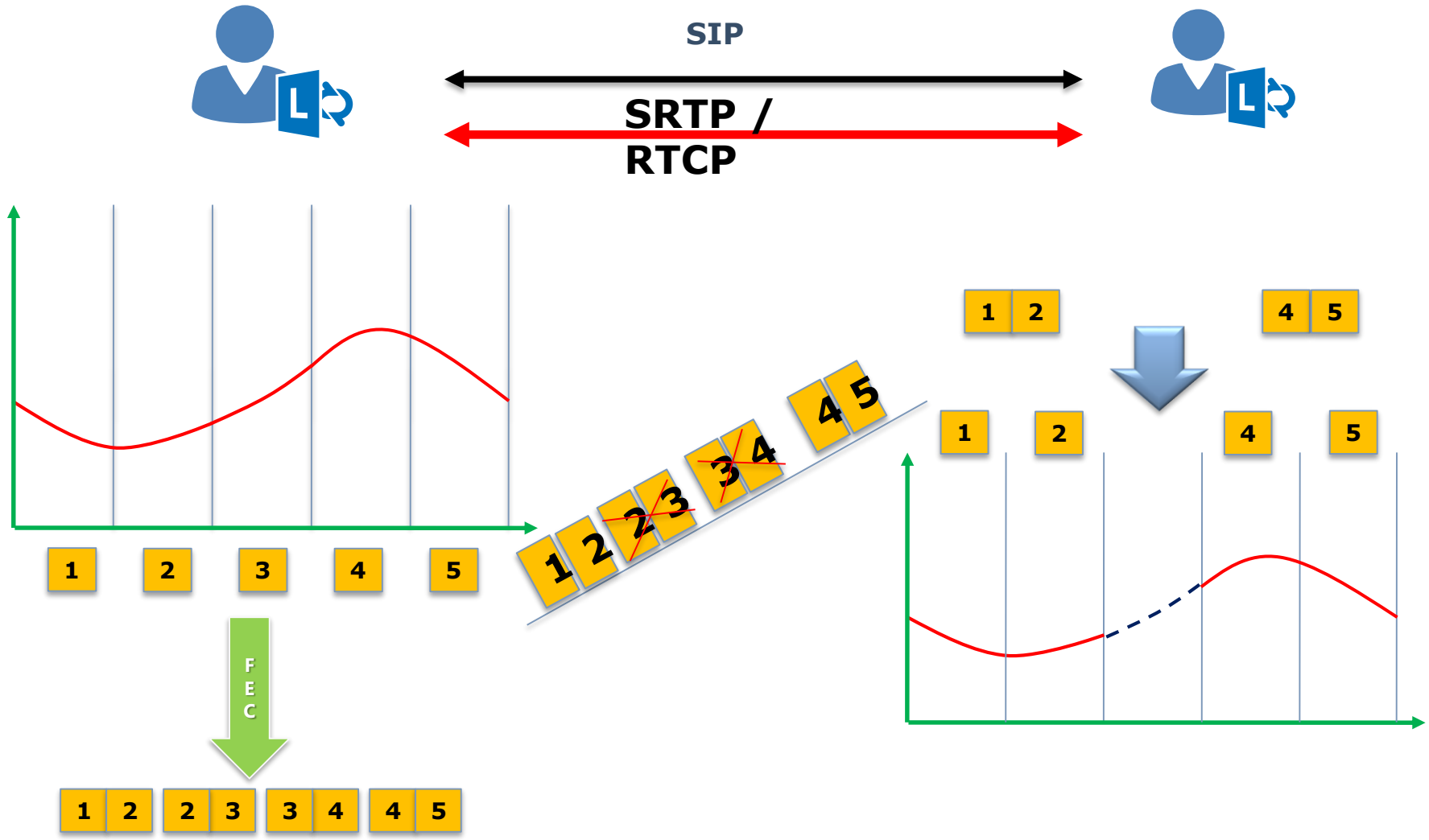
5 of 7 (FEC with loss)



6 of 7 (FEC with Loss)



7 of 7 (Concealer Utilized)



Network Performance Goals

- The further performance deviates from these goals, the more likely that users will experience poor voice quality
- For great voice quality, pair good network performance with:
  - UC Logo–certified devices and gateways
  - Server roles running on recommended specification hardware

Network conditions	Guidance		
	Good	Poor	Bad
Latency	<150ms	>150ms	>250ms
Jitter (average)	<20ms	>30ms	>45ms
Packet loss rate (average)	<3%	>7%	>10%

Audio Bandwidth Usage

- For planning in a well managed, right-sized network, use Max BW without FEC
- If the network will be constrained and you want to preserve quality, use Max BW with FEC
- When understanding how much bandwidth at any given time is being used, use the typical BW numbers:
  - Not for planning, as usage will be greater at times

Media	Modality	Codec	Typical BW	Max w/o FEC	Max w/FEC
Audio	Peer to Peer	RTA-W	39.8	**62**	91
Audio	Peer to Peer	RTA-N	29.3	44.8	56.6
Audio	PSTN	RTA-N	30.9	44.8	56.6
Audio	PSTN	G.711	64.8	**97**	161
Audio	Conferencing	G.722	46.1	**100.6**	164.6
Audio	Conferencing	Siren	25.5	52.6	68.6

Time in milisecs

Bandwidth Usage - Video and Application Sharing

Peer-to-peer

Media	Codec	Typical stream bandwidth (Kbps)	Maximum stream bandwidth
Main video when calling Lync 2013 endpoints	H.264	460	4010 (for maximum resolution of 1920x1080)
Main video when calling Lync 2010 or Office Communicator 2007 R2 endpoints	RTVideo	460	2510 (for maximum resolution of 1280x720)
Panoramic video when calling Lync 2013 endpoints	H.264	190	2010 (for maximum resolution of 1920x288)
Panoramic video when calling Lync 2010 or Office Communicator 2007 R2 endpoints	RTVideo	190	510 (for maximum resolution of 960x144)

Conferences

Media	Typical codec	Typical stream bandwidth (Kbps)	Maximum stream bandwidth
Main video receive	H.264 and/or RTVideo	260	8015
Main video send	H.264 and/or RTVideo	270	8015
Panoramic video receive	H.264 and/or RTVideo	190	2010 (for maximum resolution of 1920x288)
Panoramic video send	H.264 and/or RTVideo	190	2515 (for sending bitstreams using multiple resolutions/codecs

Manageability: Video Bandwidth

Control maximum send/receive video bitrate instead of maximum resolution:

- Allows media stack to choose the best resolution for a given bitrate based on video content
- Allows per user control vs. per site control in Lync Server 2010

Call-admission control (CAC):

- Control video bandwidth between different sites for P2P and conference calls
- Maximum video send/receive bandwidth per call and for total number of calls
- Analogously applies to combined simulcast streams (send) and multi-view streams (receive)

Set Up Quality of Service (QoS)

- Windows Vista and later, Windows Server 2008 and later:
  - Configure port ranges
  - Configure GPOs
- Windows XP, Windows Server 2003:
  - Set Lync policy to allow Lync to set markings
    - Set-CsMediaConfiguration –EnableQoS $True
  - Install packet scheduler
  - Configure DHCP values:
    - GUARANTEED is used for audio
    - CONTROLLEDLOAD is used for video

Configuring Group Policy

Edit Group Policy to apply “Policy-based QoS”:

- Computer configuration -> Windows Settings -> Policy-based QoS
- For server:
  - Create one policy for each of the server media-handling executables: AVMCUSvc.exe, MediationServerSvc.exe, and OcsAppServerHost.exe
  - Specify the UDP port range you configured for those applications
- For client:
  - Create a policy for either communicator.exe (Lync 2010 and earlier) or lync.exe (Lync Server 2013)
  - Specify the UDP port range you configured in the conferencing configuration

Network QoS – DiffServ

Media type	Per-hop behavior	Queuing and dropping	Notes	DSCP value (default)
Audio	EF	Priority Queue	• Low loss, low latency, low jitter, assured bandwidth • Pair with WAN bandwidth policies on constrained links	46
Video	AF41	BW Queue + DSCP WRED	• Class 4; low drop priority • Pair with WAN bandwidth policies on constrained links	34
SIP signaling	CS3	BW Queue	• Class 3 • Bandwidth allocation should be sufficient to avoid drops	24
App sharing	AF21	BW Queue + DSCP WRED	• Class 2; low drop priority • Pair with end user policy caps	18
File transfer	AF11	BW Queue + DSCP WRED	• Class 1; low drop priority • Pair with end user policy caps	10

VPNs and IPsec (Supported but NOT Recommended)

VPN infrastructure needs to meet same network performance goals:

- Many VPNs are not designed with real-time performance in mind
- A split-tunnel approach for Microsoft UC traffic over the Internet to Edge servers:
  - Reduces VPN load
  - Improves UC performance
  - Is secure by design (authenticated users, encrypted sessions, and so on)

If IPsec is used to secure machine-to-machine connections on internal networks, we recommend using policy exemptions because:

- Initial IPsec handshake delays can cause call setup failures and mid-call drops.
  To avoid this:
  - Define media port range in policy that is exempt from IPsec
  - Exempt client connections to IP addresses of media terminating servers
  - Do not run IPsec (or exempt processes) on media terminating servers

Lesson 2: Call Admission Control

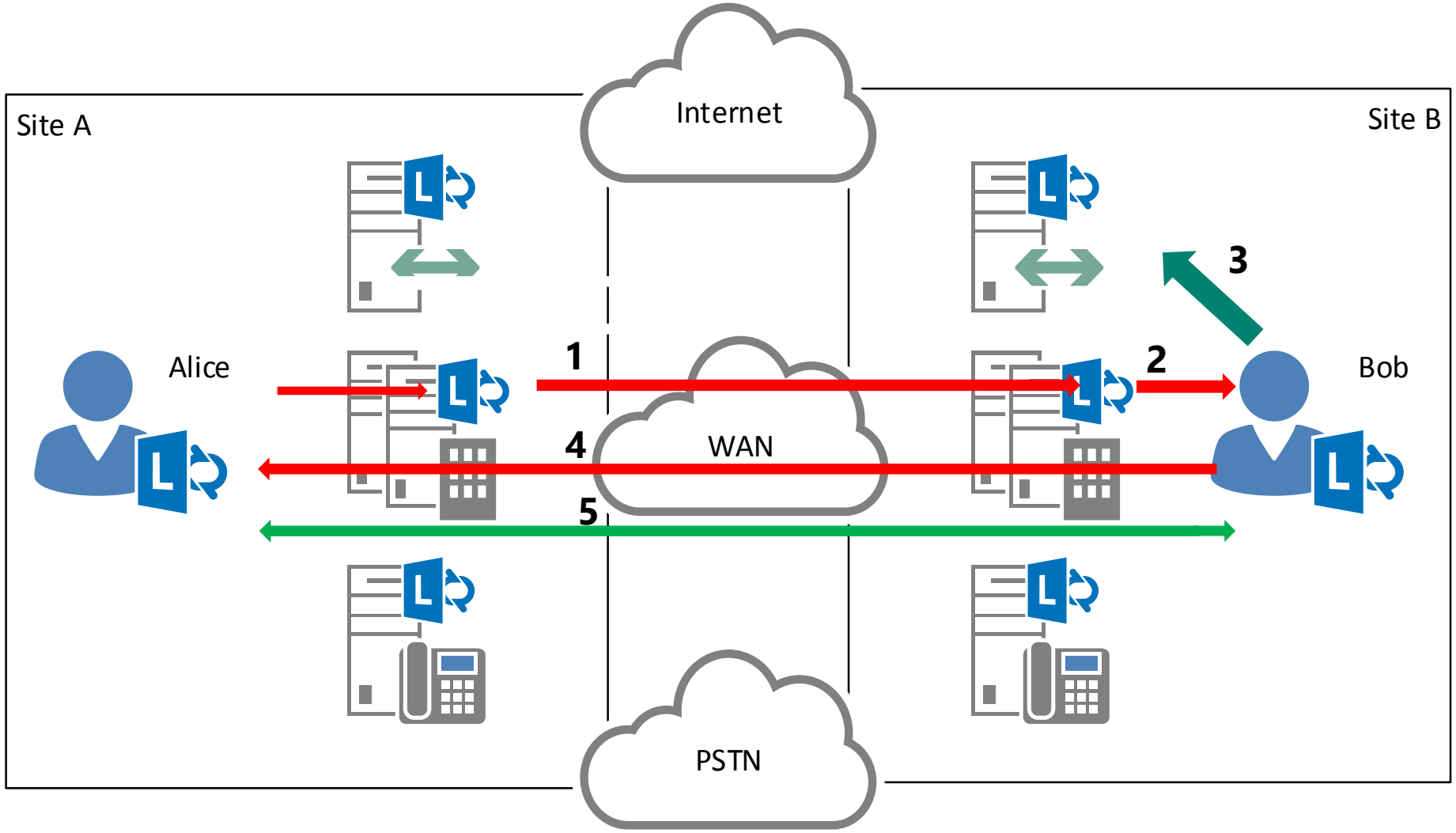
- What Is Call Admission Control?
- Call Established Over WAN
- Call Rerouted Over PSTN
- Media Endpoint Requirements

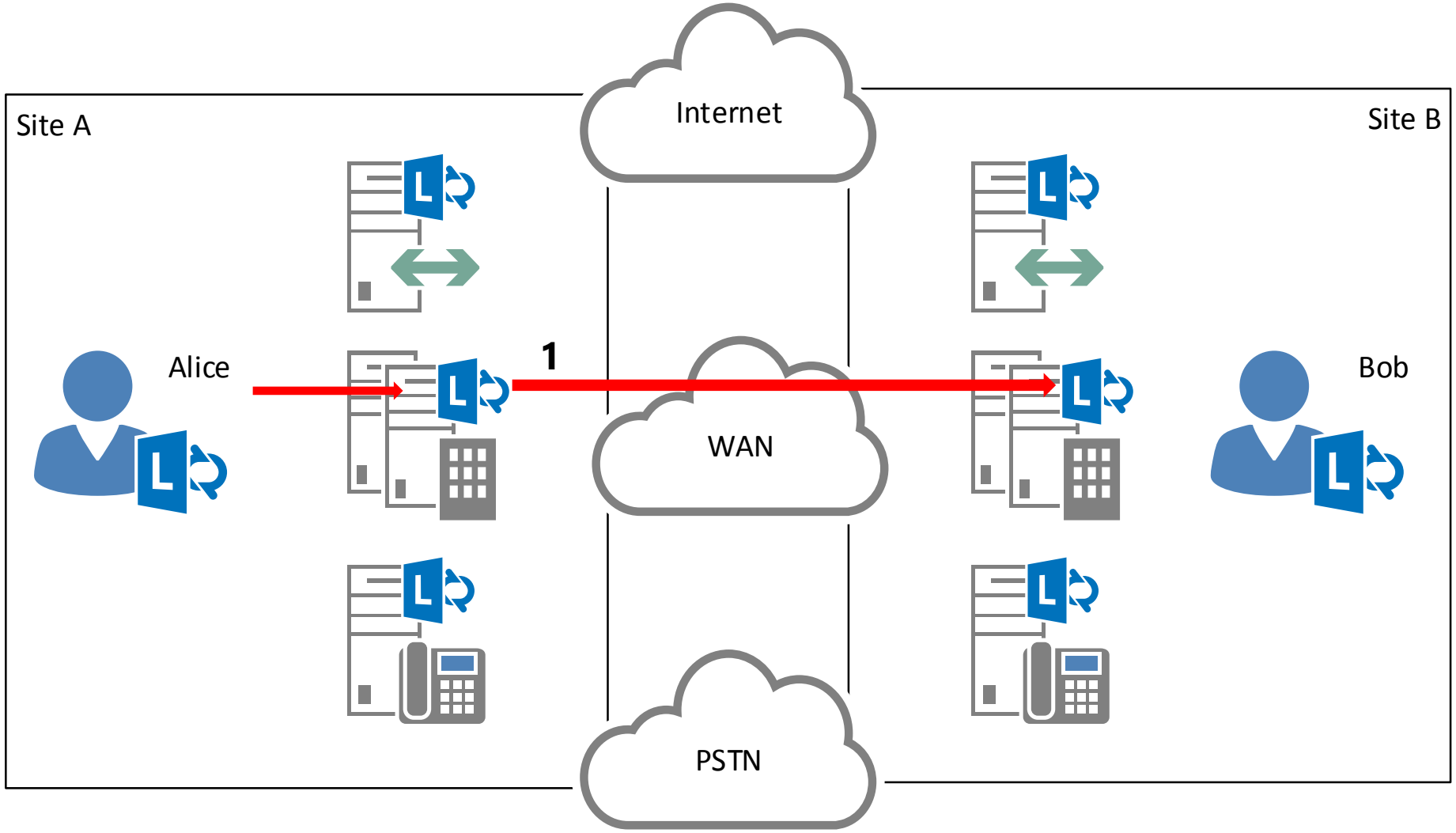
What Is Call Admission Control?

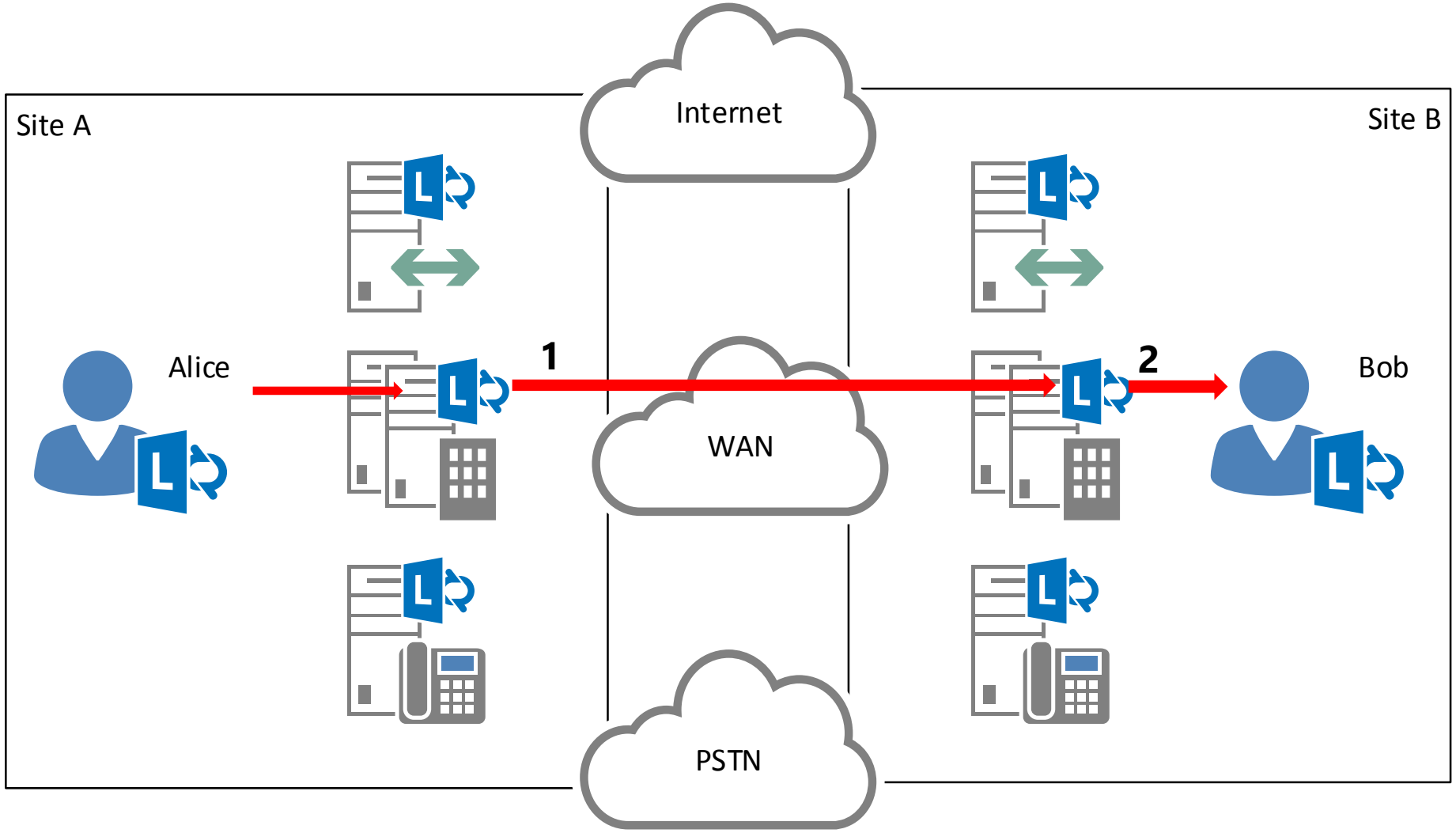
Limit the number of calls:

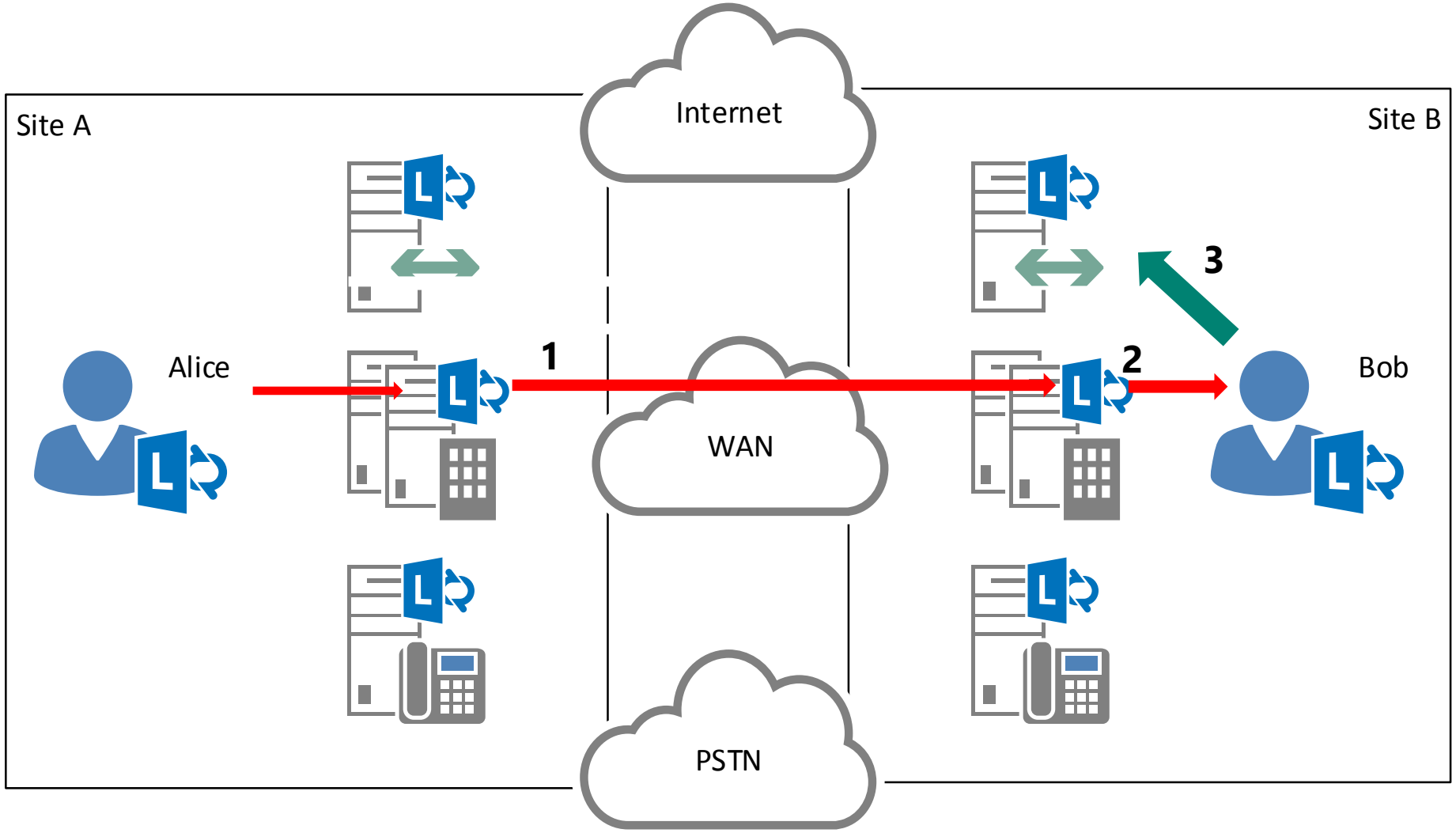
- Provide a better user experience
- Manages bandwidth for audio and video
- Based on subnet of endpoint:
  - Enforce policies on links between sites
  - Provide seamless support for roaming users of Lync Server 2013 who are moving between different sites
- Rerouting behavior when bandwidth limited exceeded

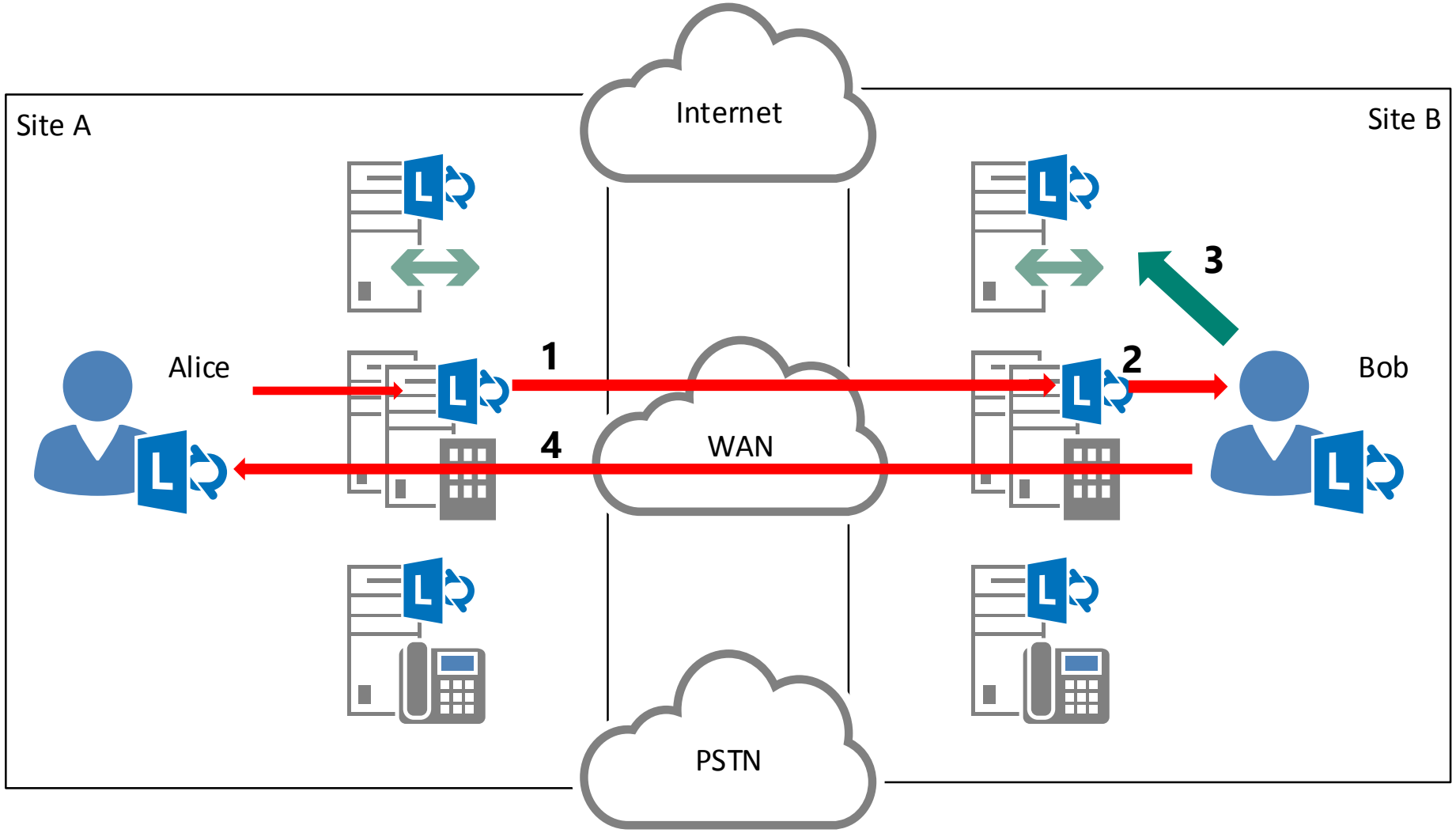
Call Established Over WAN

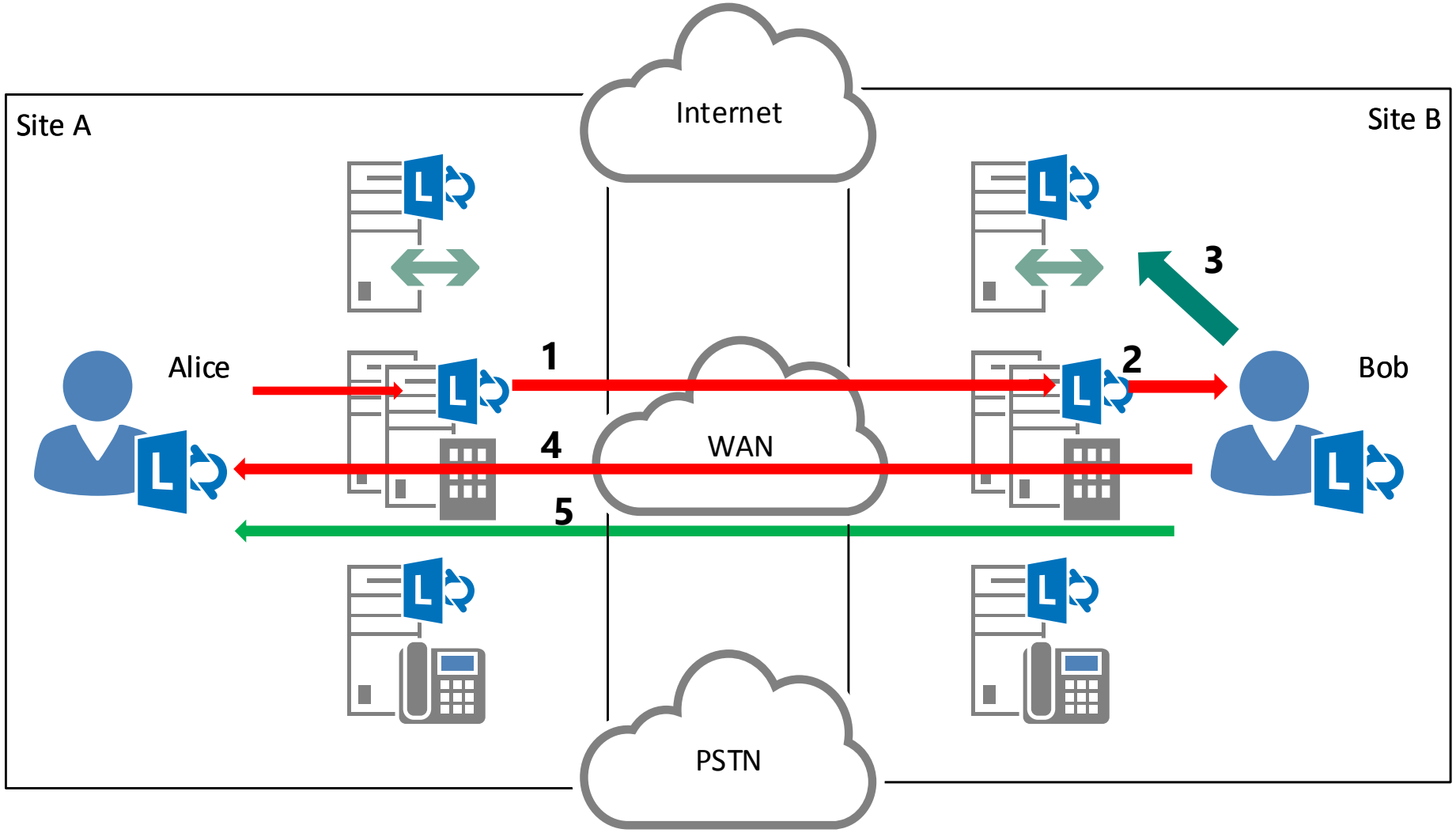



Site A
Internet
Site B
Alice
1
WAN
Bob
PSTN


Site A
Internet
Site B
Alice
1
WAN
2
Bob
PSTN


Site A
Internet
Site B
Alice
1
WAN
2
3
Bob
PSTN


Site A
Internet
Site B
Alice
1
2
3
4
WAN
Bob
PSTN


Site A
Internet
Site B
Alice
1
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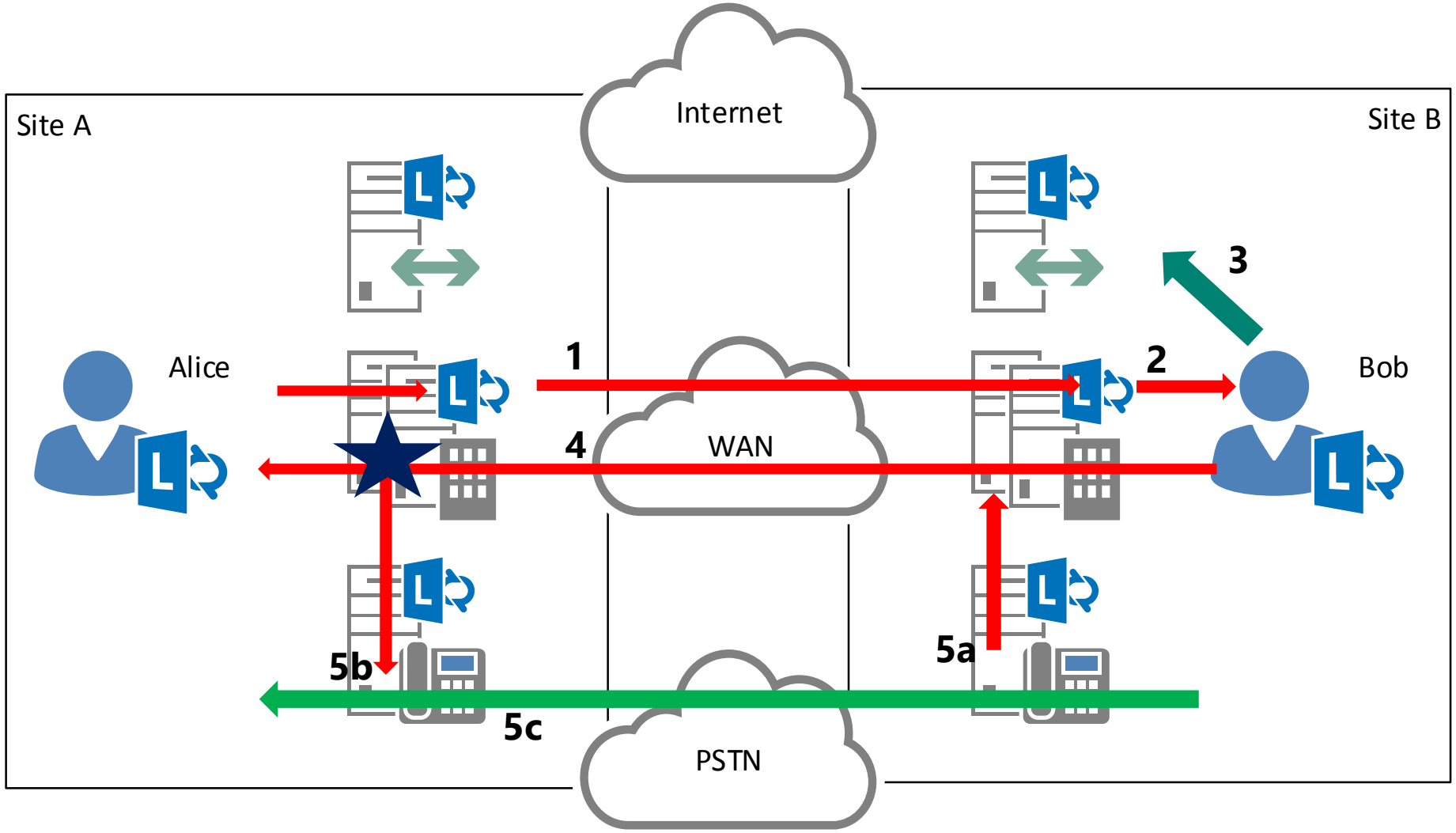
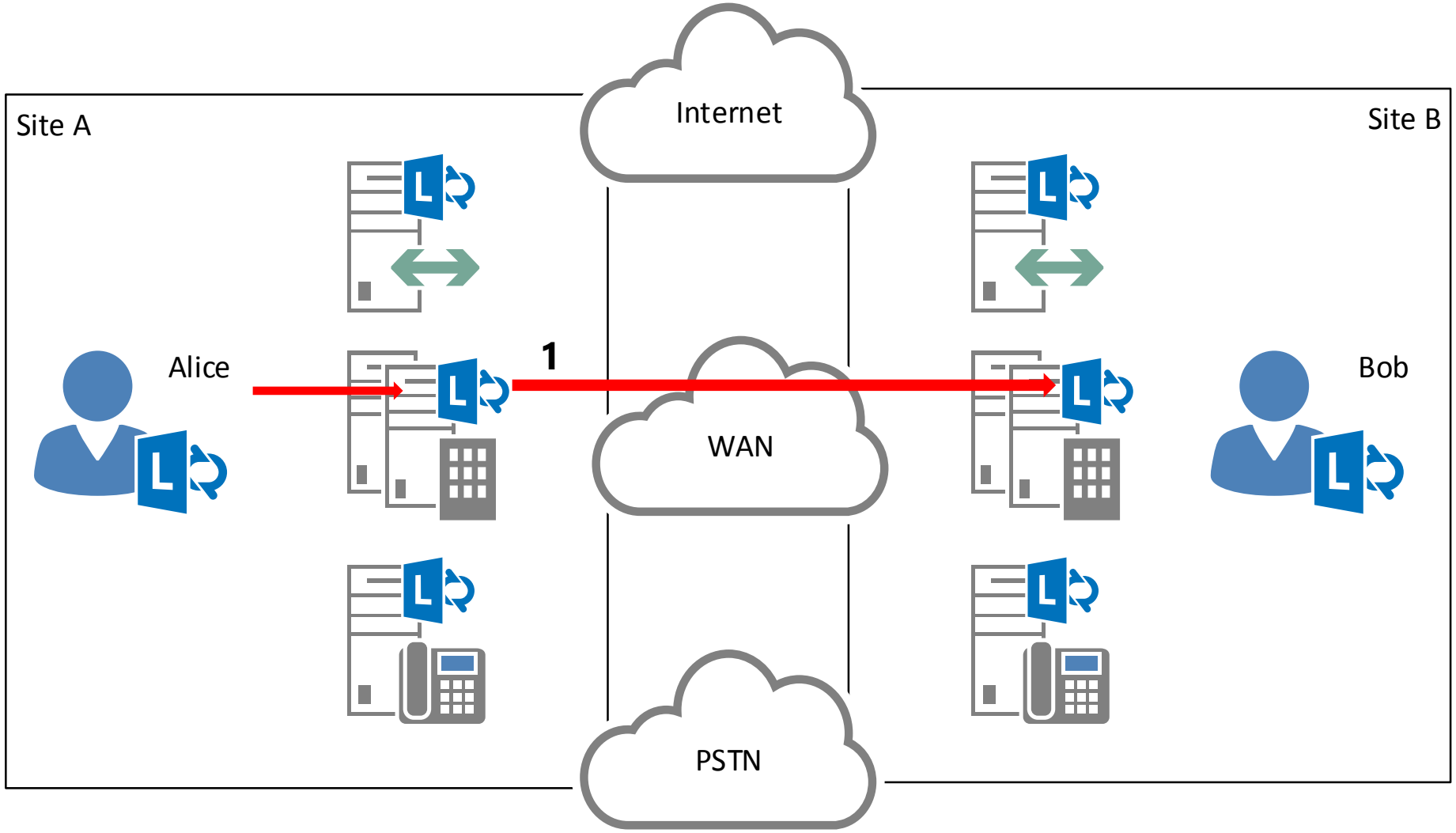
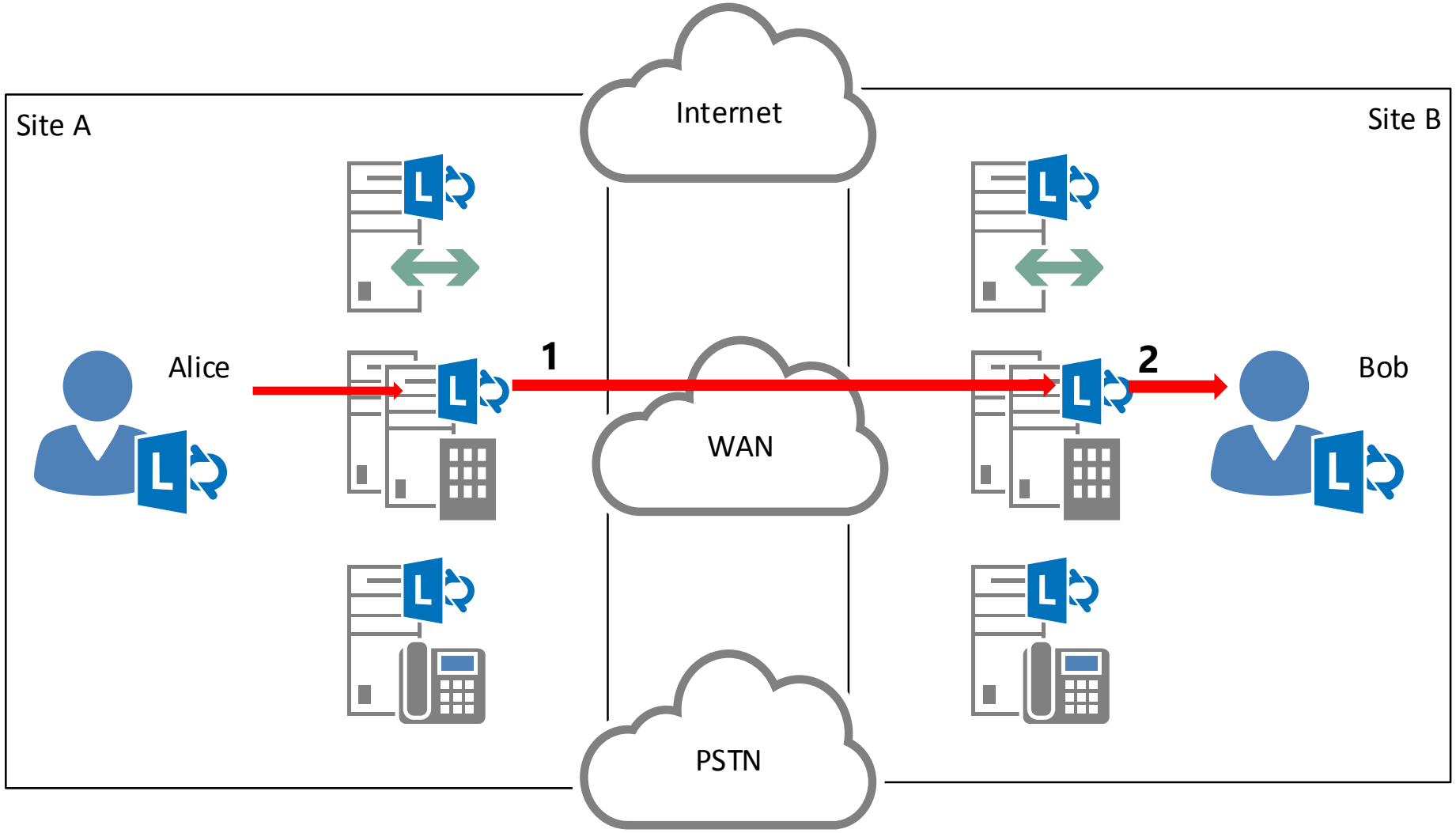
Bob
4
WAN
5
PSTN

Call Rerouted Over PSTN




Site A
Internet
Site B
Alice
1
WAN
Bob
PSTN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Site B
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WAN
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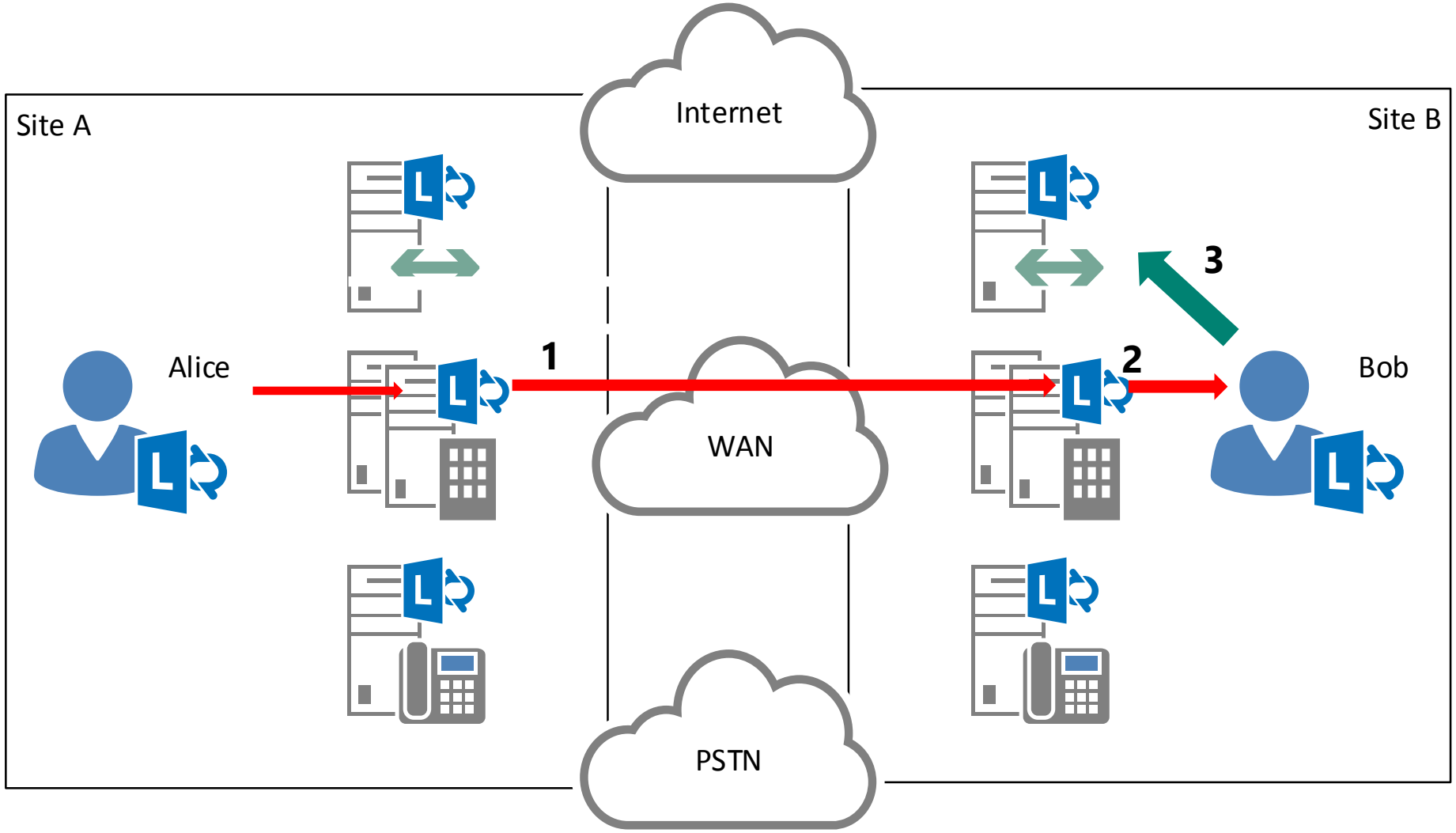
Bob
PSTN


Site A
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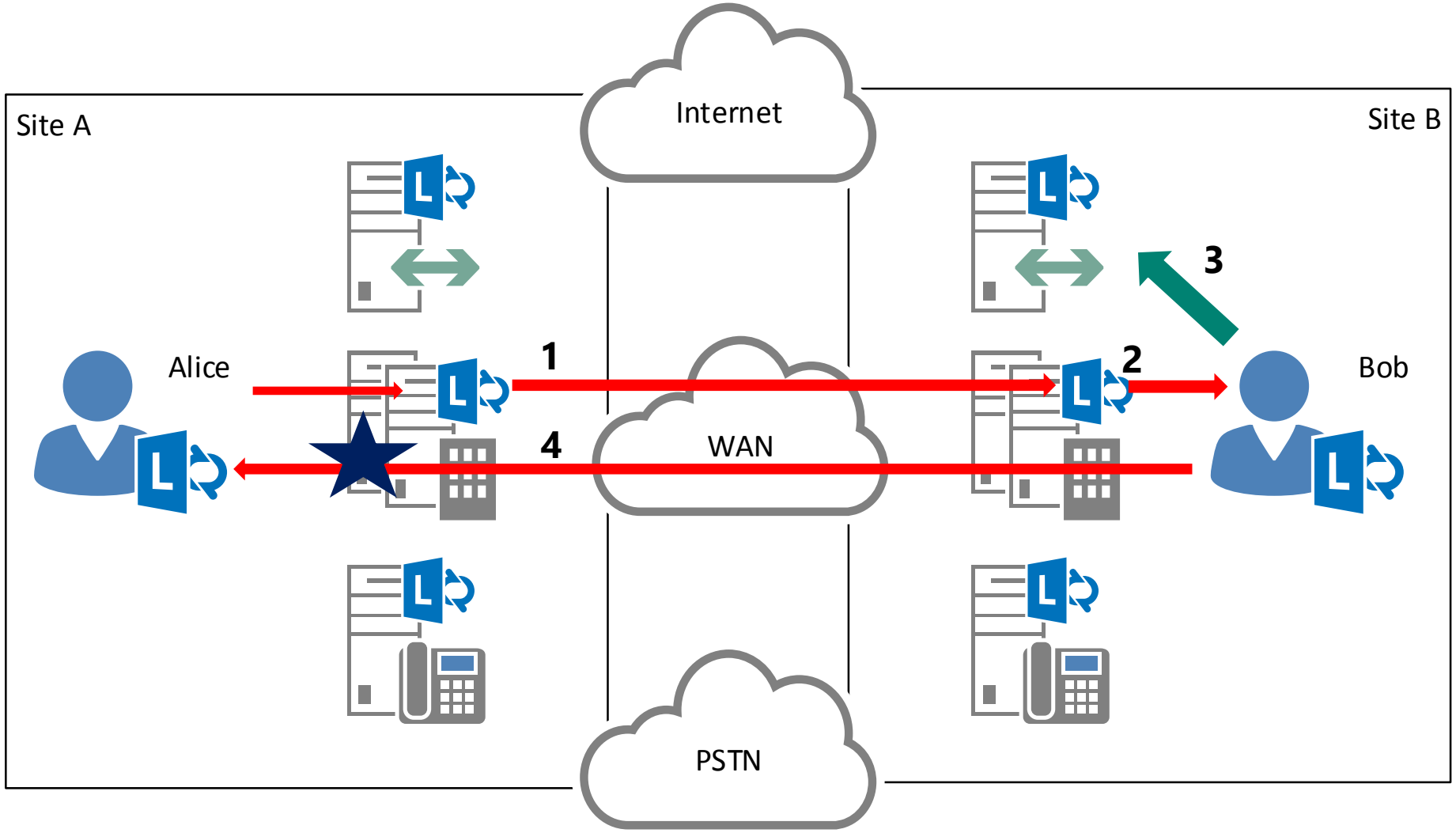
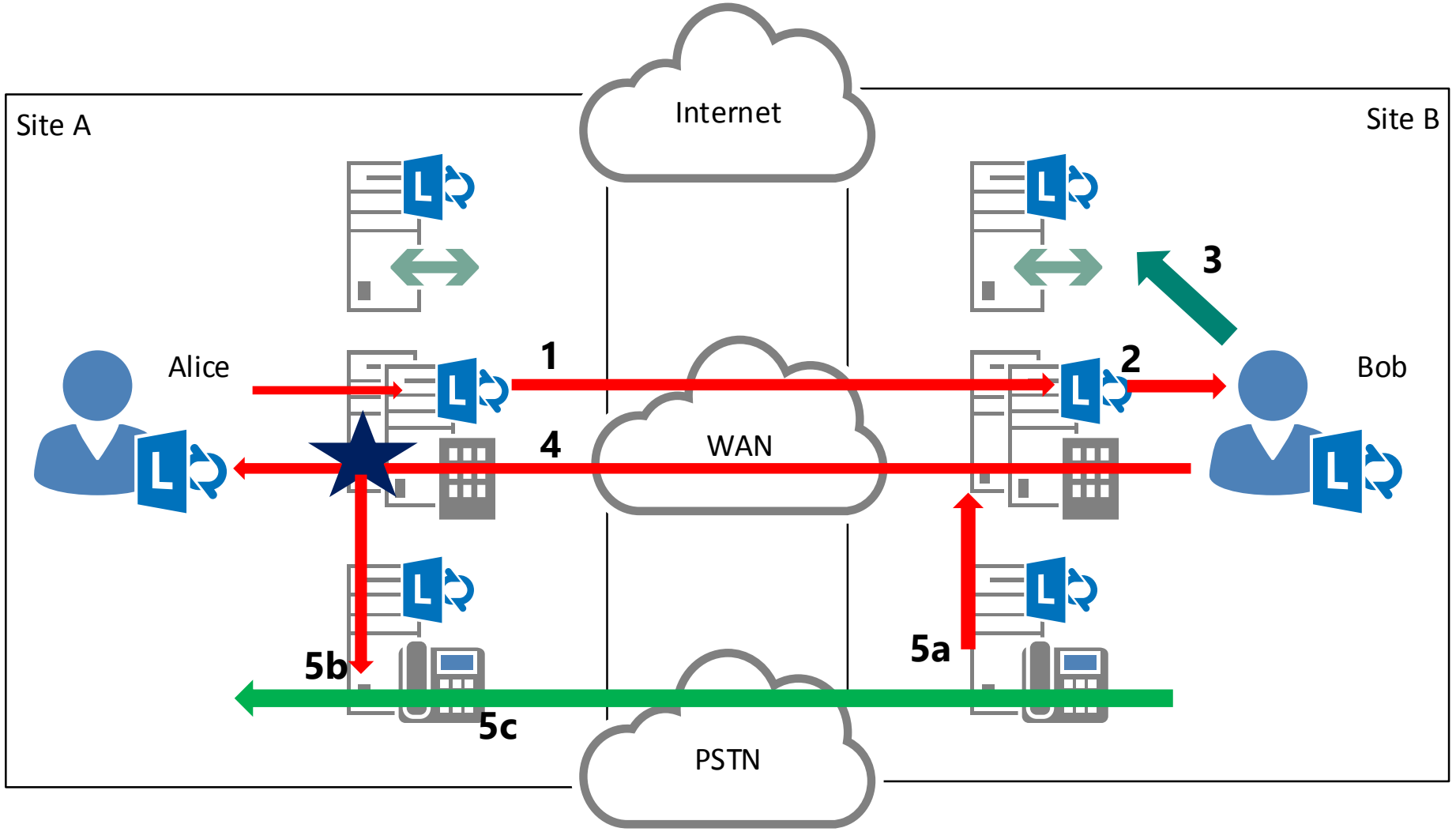
Site B
Alice
1
WAN
2
3
Bob
PSTN


Site A
Internet
Site B
Alice
1
2
3
4
WAN
Bob
PSTN


Site A
Internet
Site B
Alice
Bob
1
2
3
4
WAN
5a
5b
5c
PSTN

Media Endpoint Requirements

- CAC bandwidth policy check is performed by called endpoint
- Call to legacy client will ignore CAC:
  - Will always be established
  - Bandwidth will not be managed

Module Review and Takeaways

- Review Question(s)
- Real-world Issues and Scenarios
- Tools

Microsoft