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SIP:
Connecting the Distributed Workforce

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ITEXPO East

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today you'll learn about...

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- sip, trunking, and ucc
- the evolved PBX architecture
- distributed worker case study
  - —centralized SIP trunking, multi-site MPLS with QoS, collocation ("private cloud"), remote SIP devices, unified communications
- five tips for designing a distributed voip/uc infrastructure

Thursday, February 3, 2011

about us

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the mobile infrastructure experts

Mobile infrastructure includes the systems and tools that are used to **secure** corporate assets, remotely **manage** devices, and **enable** applications for workers who spend significant time **away** from the office.

mobile device management

offline data sync

software distribution

content management

asset tracking

configuration/pim management

remote control

data encryption

mobile development

mobile access

customers

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Pacific Gas and Electric Company

SRP

GroupHealth

E.&J. Gallo Winery

Anaheim Angels

SUNOCO

TJX The TJX Companies, Inc.

US FOODSERVICE

PIKE since 1945

COX

WILLIAMS-SONOMA

AmerisourceBergen

HAGENS BERMAN SOBOL SHAPIRO LLP

PETSMART

Dominion

DENVER WATER

Goodyear

TRADER JOE'S

MEDLINE

CUBIC

BURBERRY

OTIS

EUGENE

Innovaposte

AMGEN

CABLE ONE

Hot Topic

AVISTA

Nintendo

mobilizing uc

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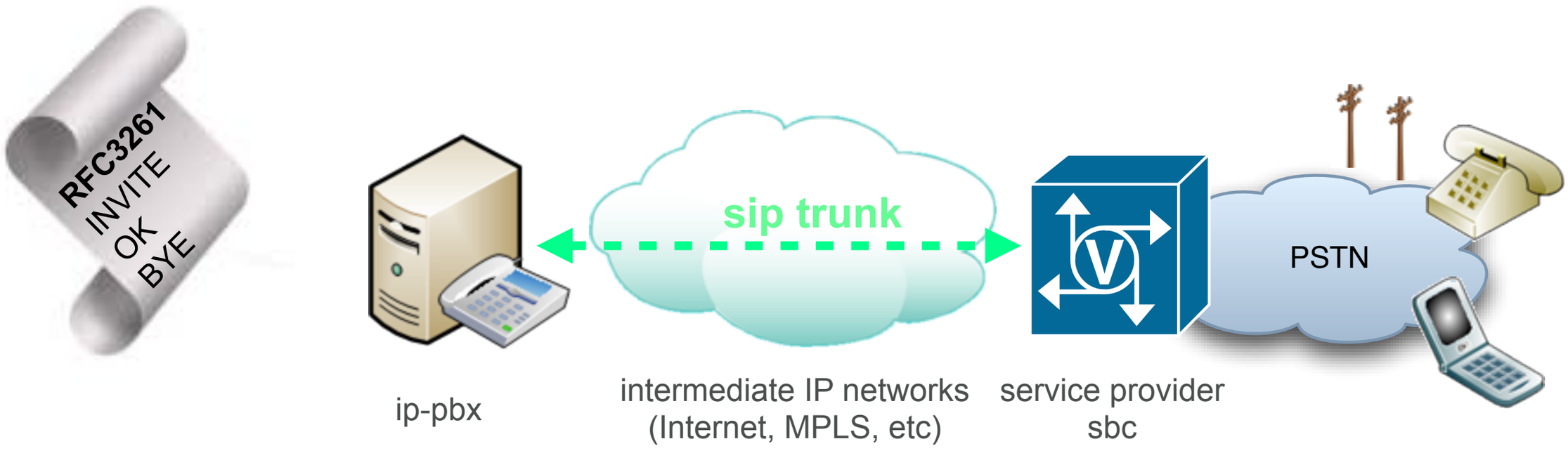
sip, trunking and ucc

sip + sip trunking

- session initiation protocol: standard defined by RFCs
- an IP-based “handshake” to set up, destroy, or modify a communications session between two systems
  - —trunking: to the PSTN (public switched telephone network)
- connects using any IP network, including internet



sip is here to stay

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- adoption and large investments by key industry players

- open standard
  - promotes innovation and interoperability

- built to support multi-modal communications

voice

video

messaging

presence

- unified communications and collaboration
  - real-time software applications that facilitate multi-modal communications and collaboration between two or more people

ucc solutions

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- all vendors have different strengths/weaknesses
  - different backgrounds, priorities, dev cycles
  - no single vendor makes the silver bullet uc solution
  - perpetuated by continuous evolution of ucc tech

	vendor 1	vendor 2	vendor 3
telephony			
im + presence			
conferencing			
desktop video			

example: lync 2010

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- new version significantly improved over OCS 2007 R2
  - simpler end-user experience, single client app
  - sharepoint and office applications integration
  - improved security certificate mechanisms
  - download-less web conference participation (silverlight)
  - dramatically improved mac support
    - voice, video, screen sharing
  - mobile client (iOS + WP7) and improved mac version "coming in 2011"

lync 2010

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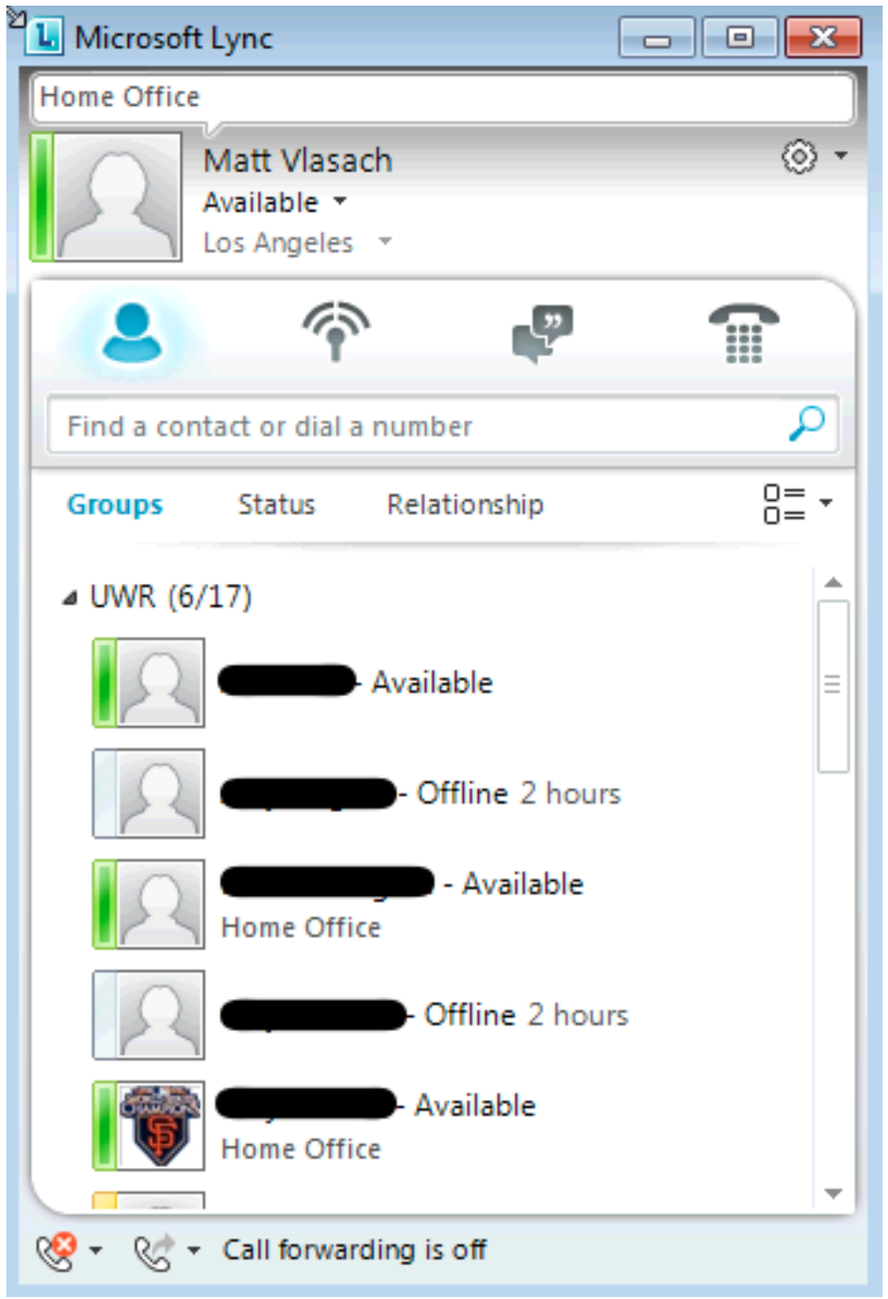
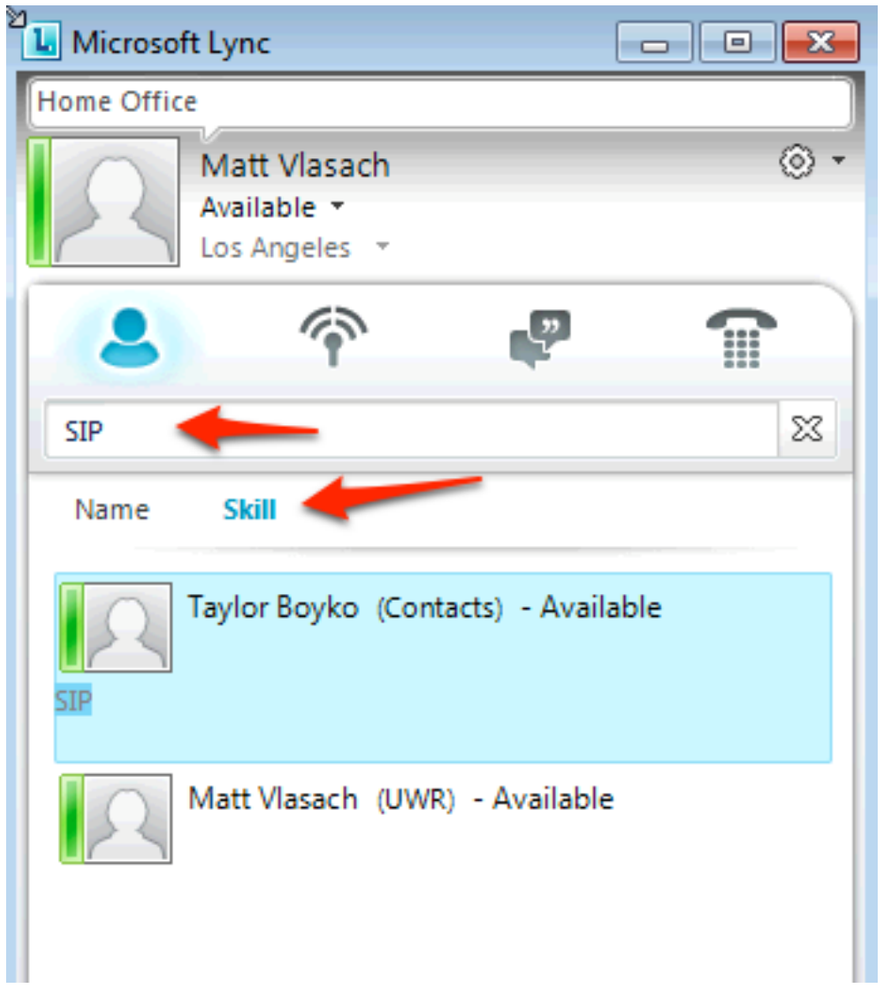


main lync user interface



sharepoint skill-based searches

lync 2010

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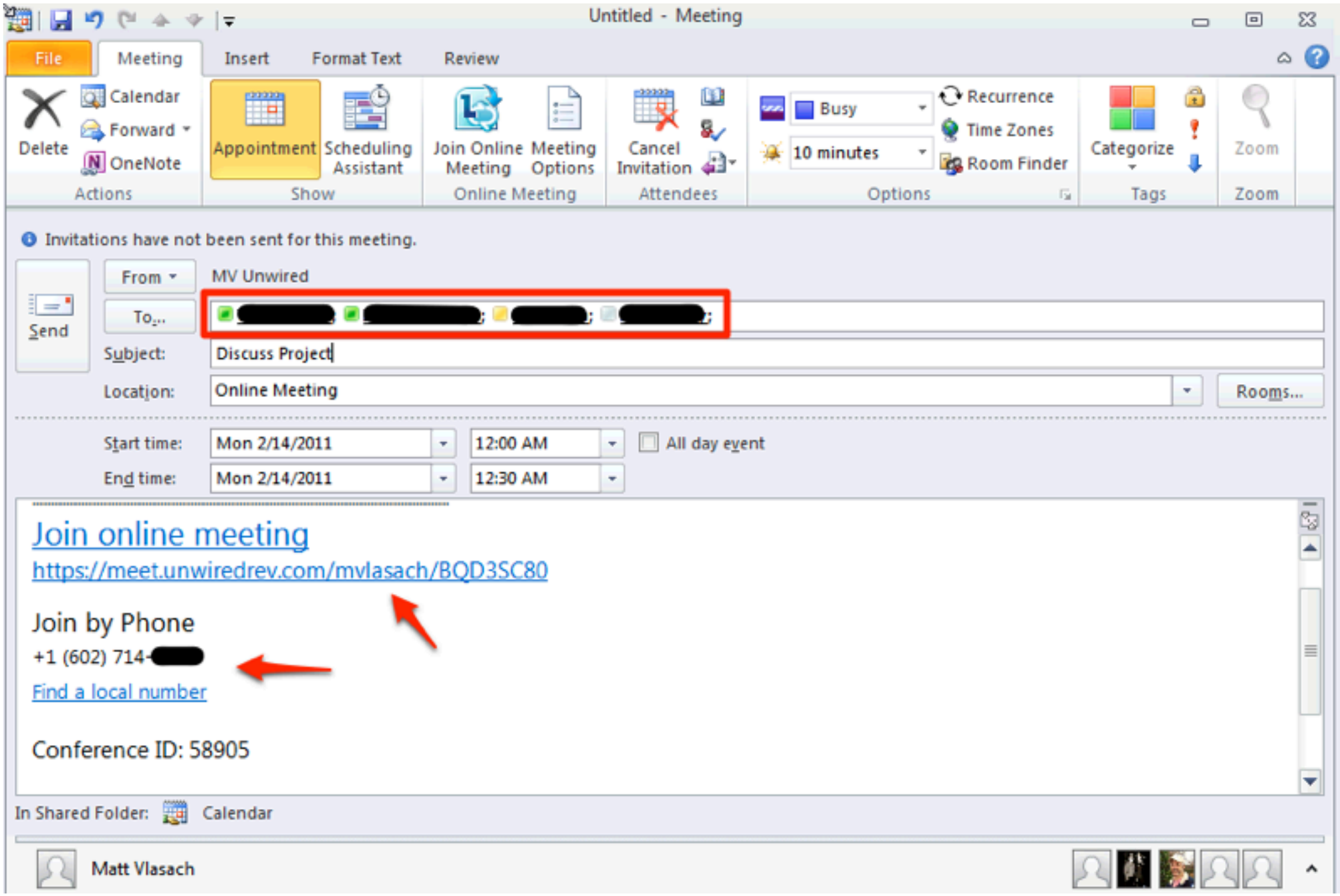

outlook integration, meeting scheduling

lync 2010

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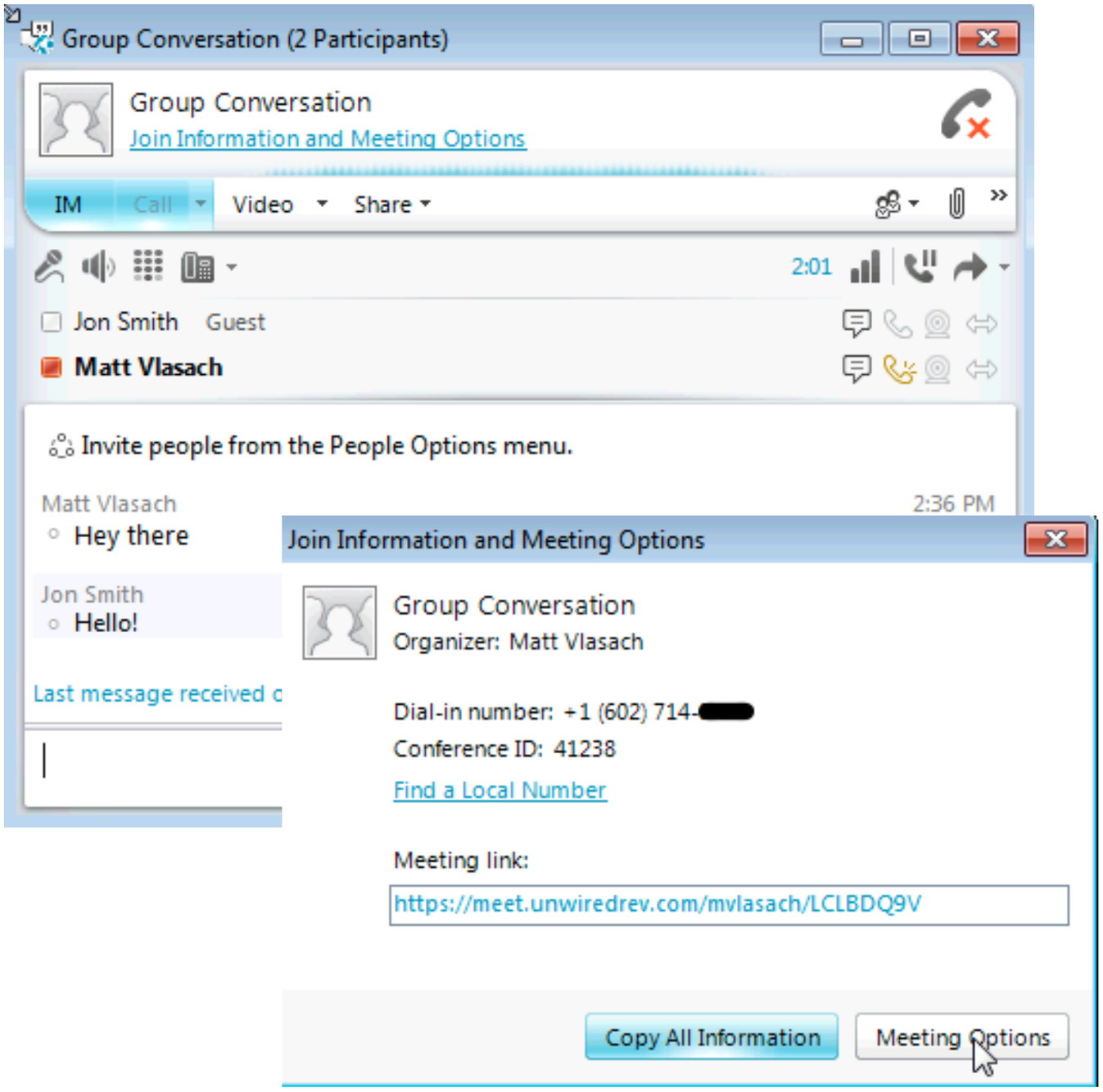
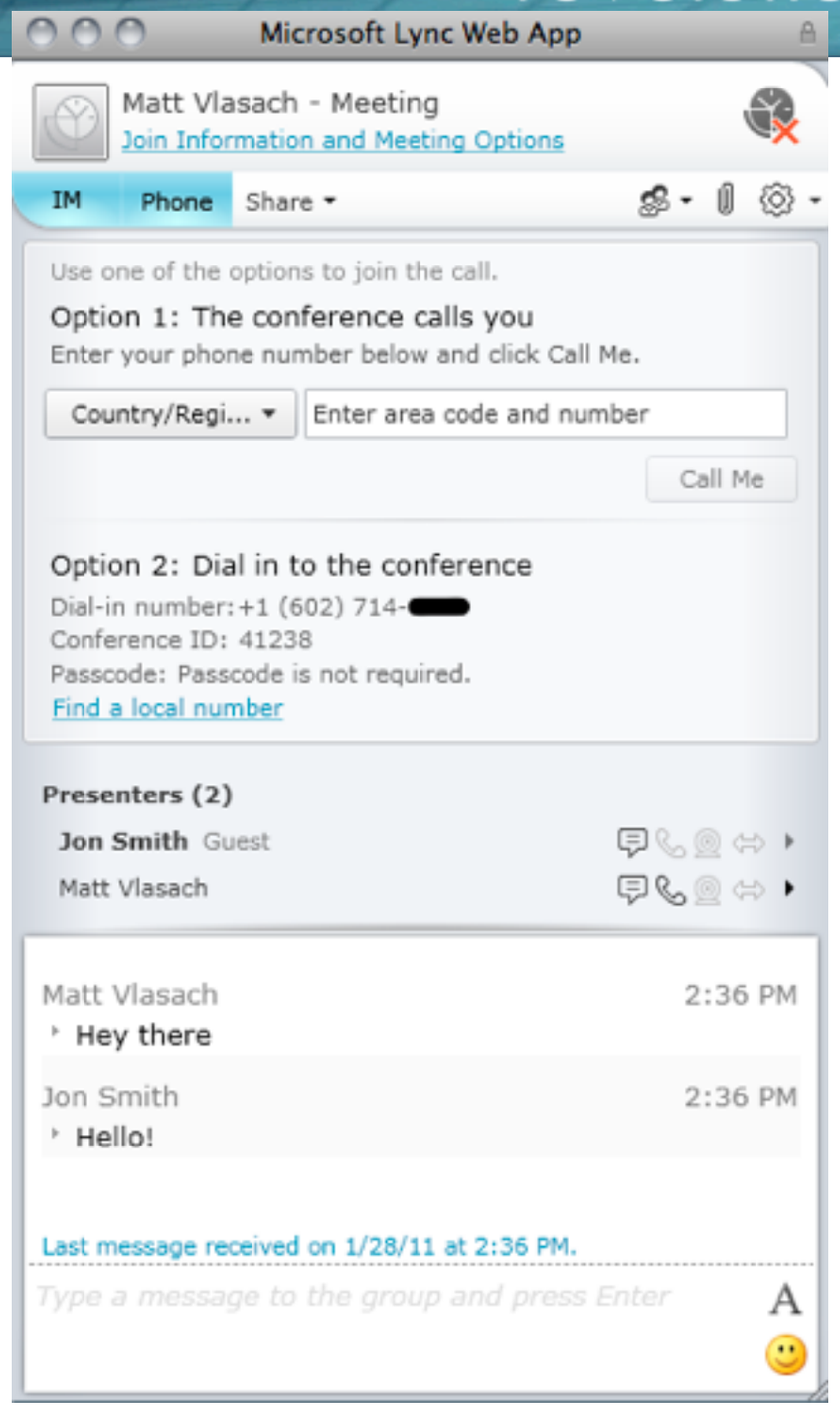


lync “conversation” window



“lync web app” silverlight viewer

lync 2010

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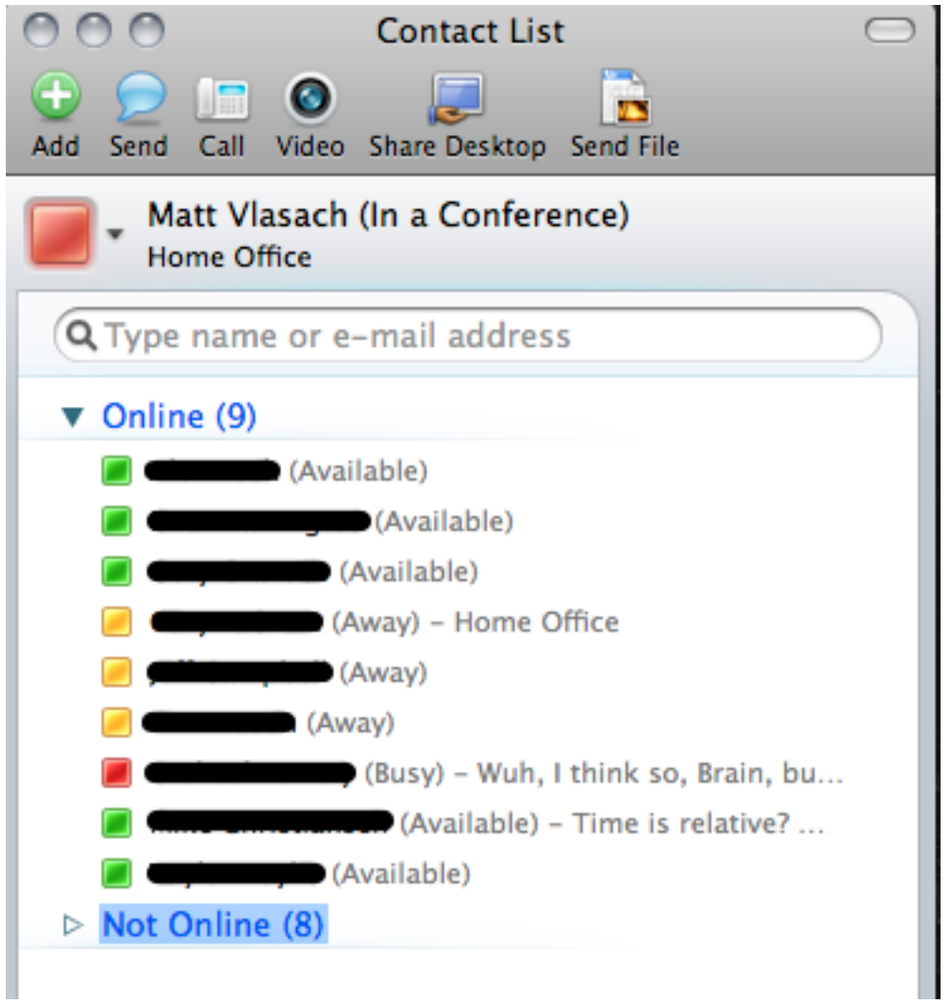

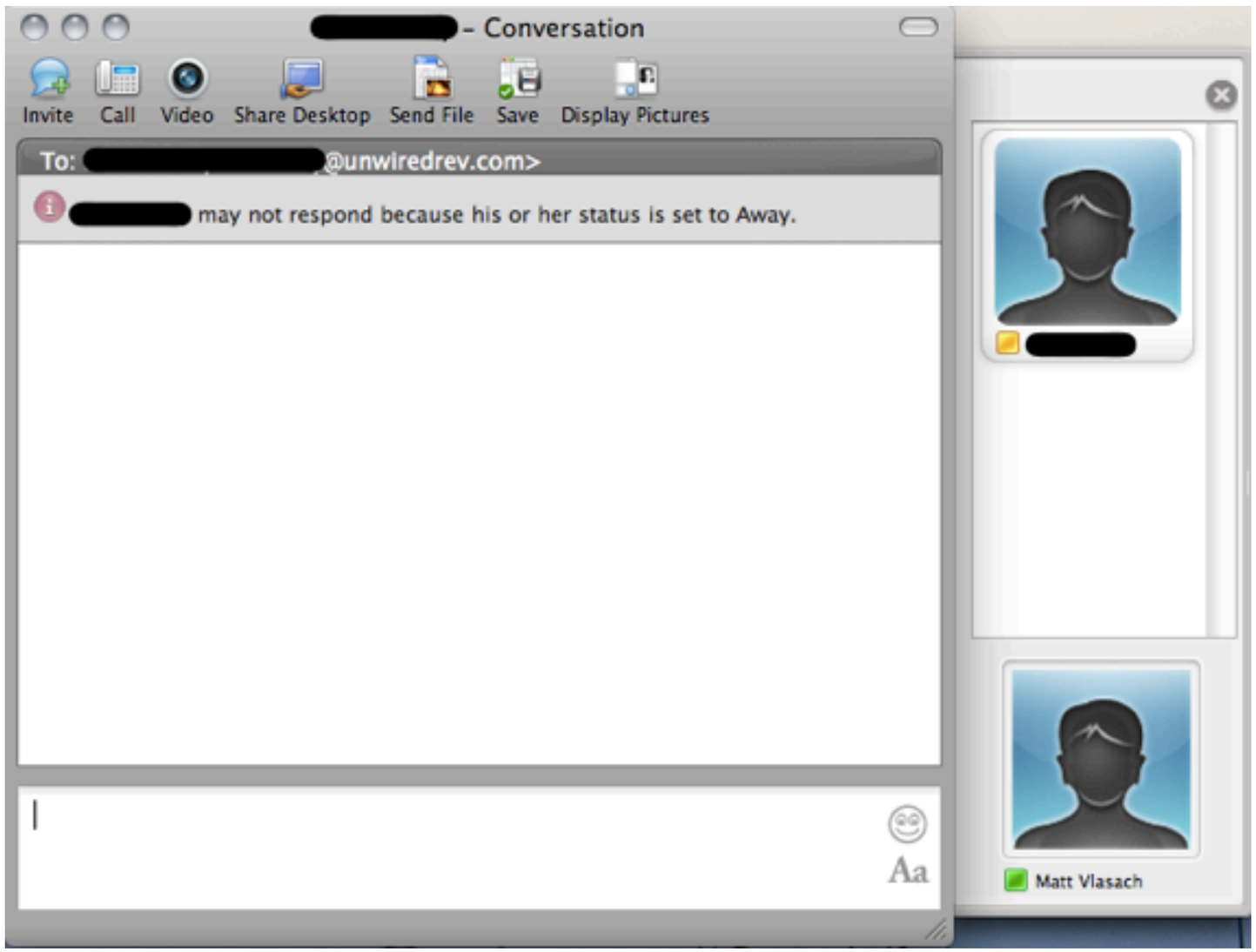

mac communicator

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the **evolved** pbx architecture

legacy architecture

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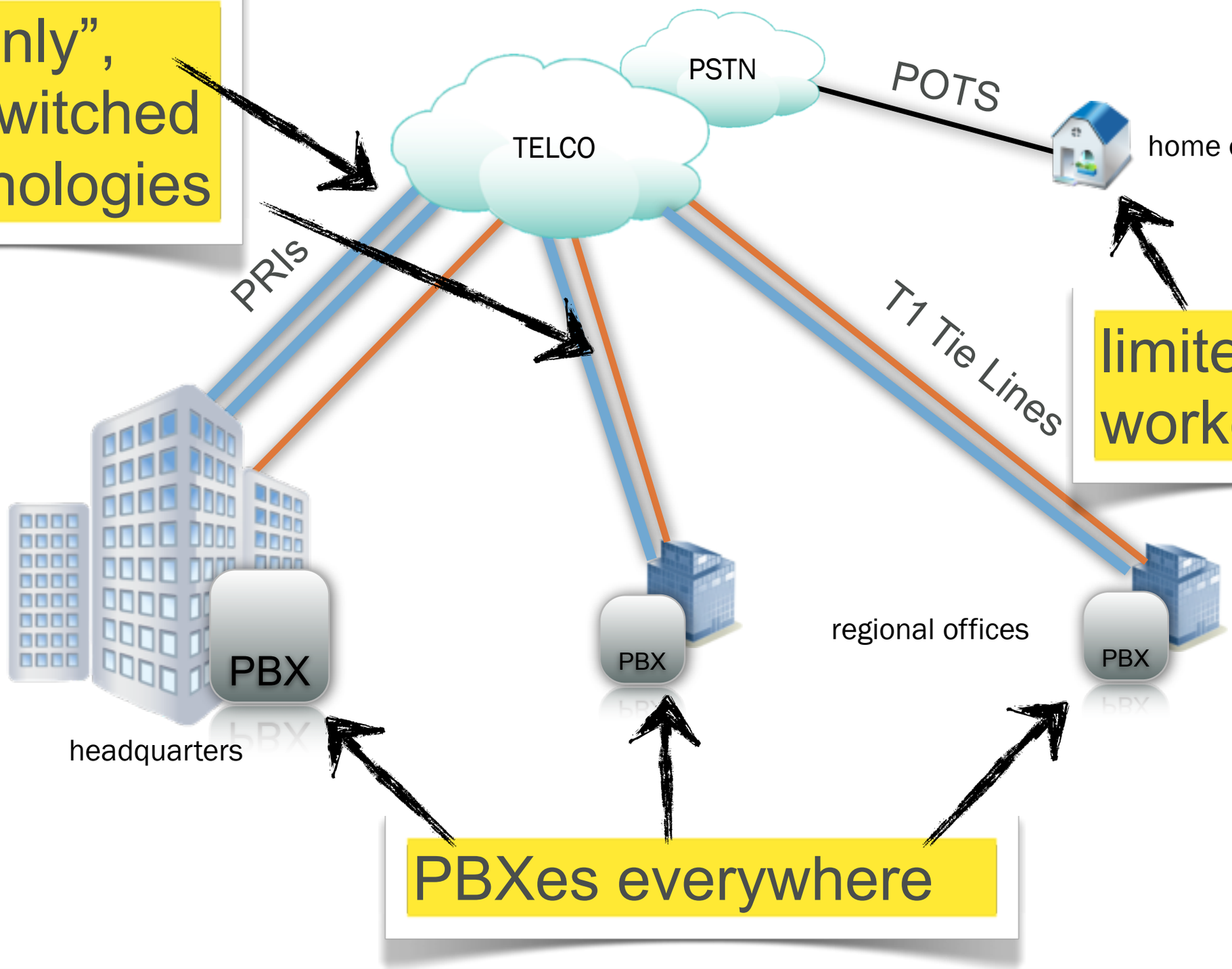
"voice-only", circuit-switched $$ technologies



limited home workers

PBXes everywhere

a decade of evolution

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element	trend
broadband + mobile	faster, cheaper, more reliable, 'ubiquitous'
convergence	MPLS installations, multi-modal comm. with QoS
recession	cost cutting, real-estate reduction, staff cuts
cloud	public SaaS adoption, private datacenter
outsourcing	increasing domestic and global reach

highly distributed & collaborative workforce

elements of the evolved pbx

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- ✓ support for multi-modal communications
- ✓ utilizes IP network investments (eg MPLS)
- ✓ highly reliable, no single point of failure
- ✓ centralized management
- ✓ support for mobile and home workers
- ✓ user-friendly and business process integrated
- ✓ cost effective management and support

the evolved pbx architecture

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centralized, highly-available, server-based core

scalable network access

secure access from anywhere

IP-PBX +
UCC +
Data Servers

datacenter

PSTN

Service Provider

Internet

3G/4G

mobile workers

home broadband

home offices

QoS IP Circuits

regional offices

headquarters

all connected by sip!

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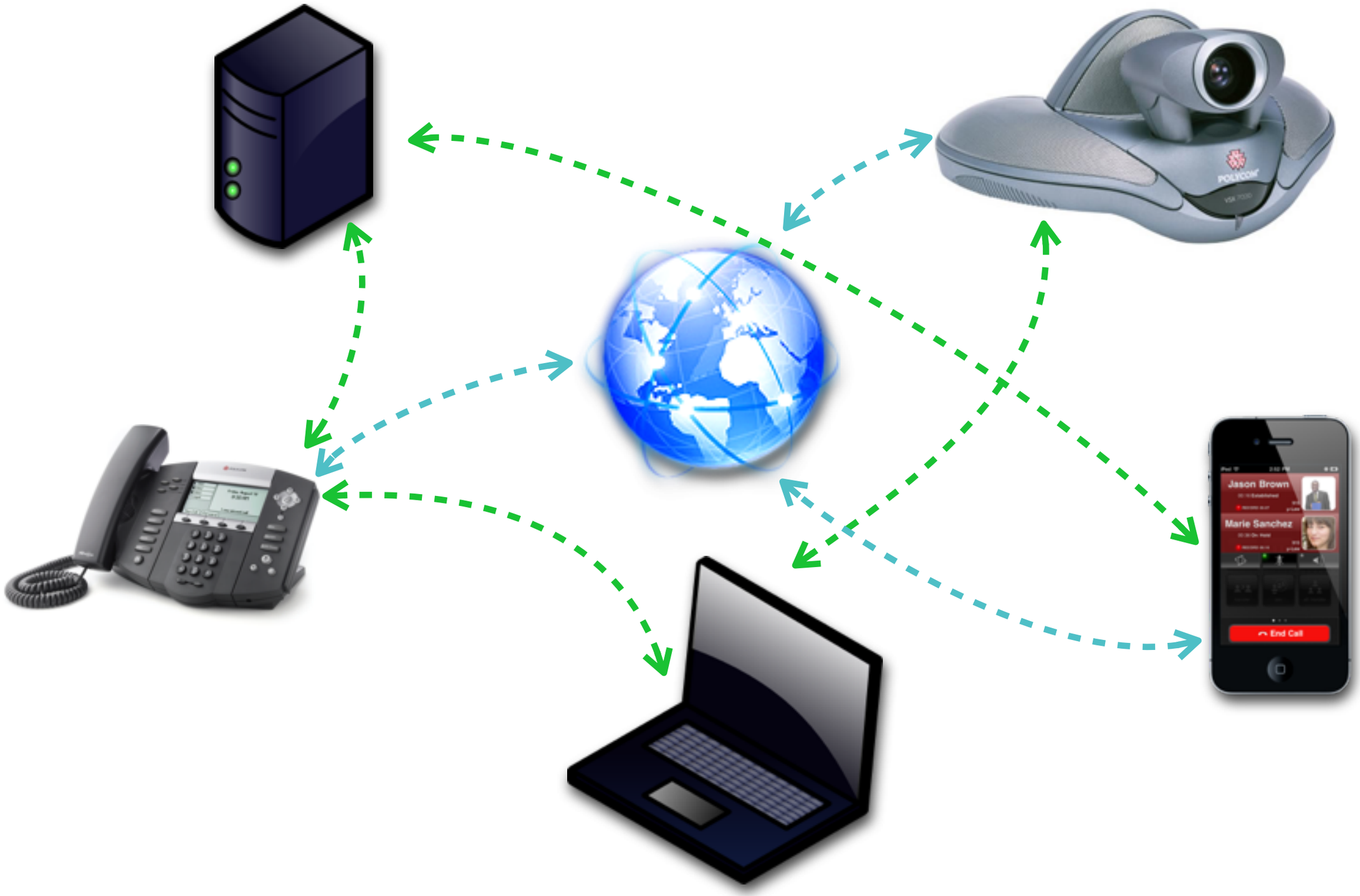

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case study

partner engineering and science, inc.

about partner esi

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PARTNER
Engineering and Science, Inc.

- nationwide environmental and building assessment company
- 6 company offices, 115+ endpoints
- 50 (~43%) workforce remote / mobile
- mostly knowledge workers
  - on-site data collection
  - highly collaborative
  - report generation
- uses microsoft office suite as primary productivity software

business requirements

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audio conferencing

im + presence

on-net dialing

application/screen sharing

it infrastructure requirements

centralized trunking

"find me"

user applications and services

high availability

scaleable

fixed-remote voip

solution components

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PAETEC | ShoreTel | inGate | Microsoft Office Communications Server 2007 R2 (Lync 2010) | POLYCOM

on-net SIP trunking	voip telephony + unified messaging	sip trunking interoperability	im + presence	SIP-compliant endpoints
mpls network with qos	find me / mobility support	remote SIP device (NAT fixup)	office integration with click-to-call	centralized provisioning support
colocation with ethernet handoffs	high availability via distributed architecture	SIP + IP firewall / edge	internal audio / web conferencing	hd voice (g722)
direct internet access	centralized management	transport transcoding (TCP<->UDP)	application and screen sharing	background noise suppression

solution design

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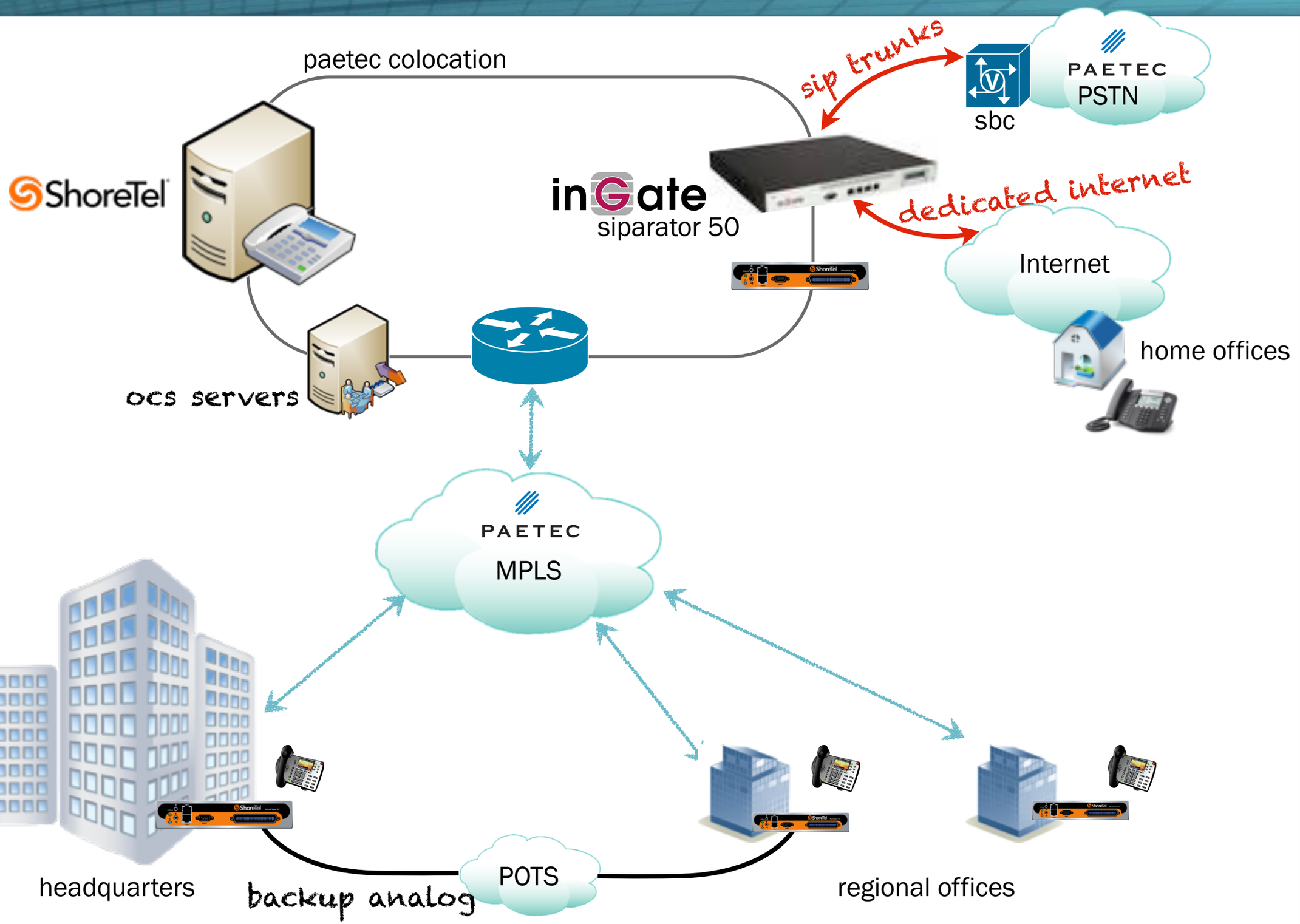

“the glue”

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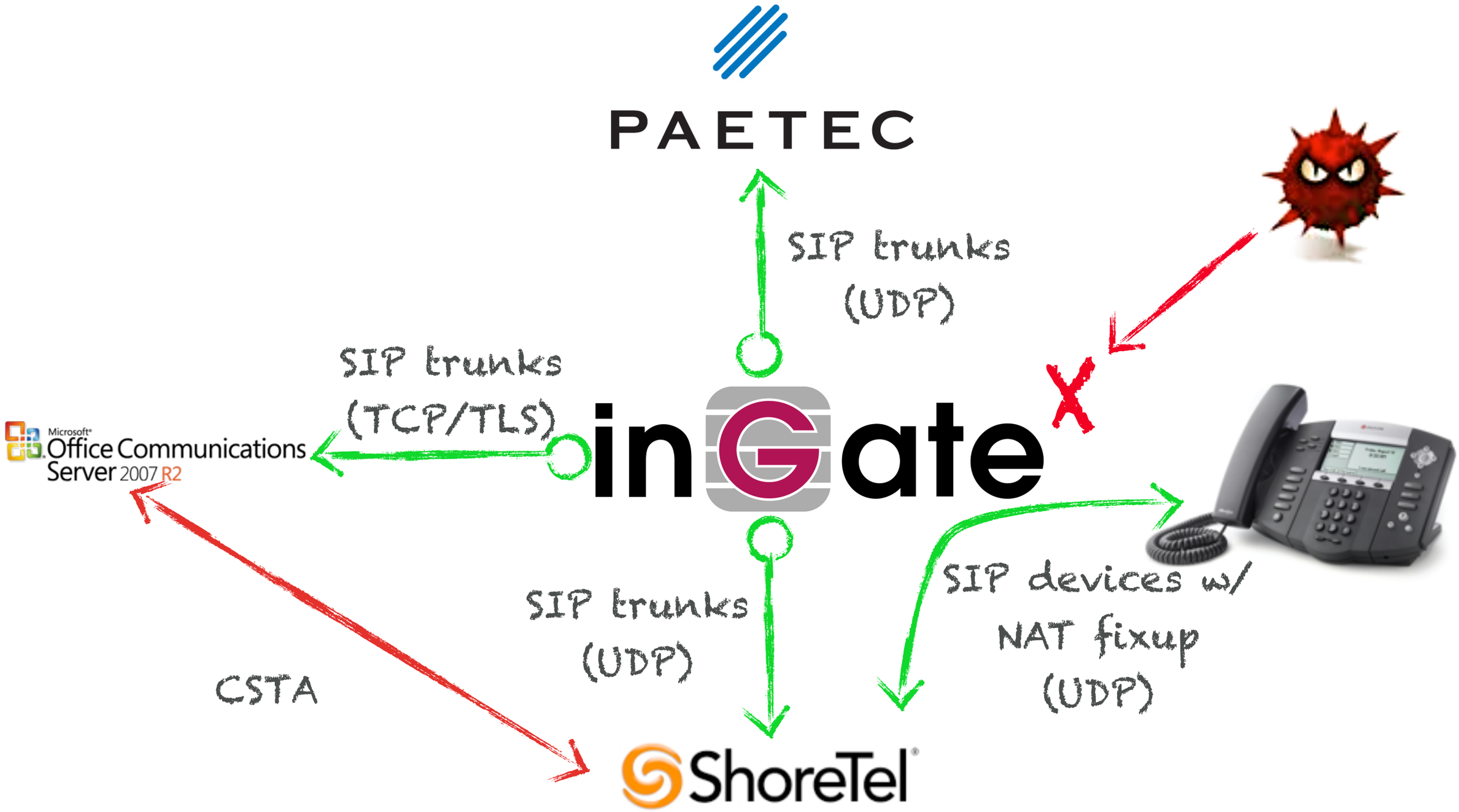

benefits

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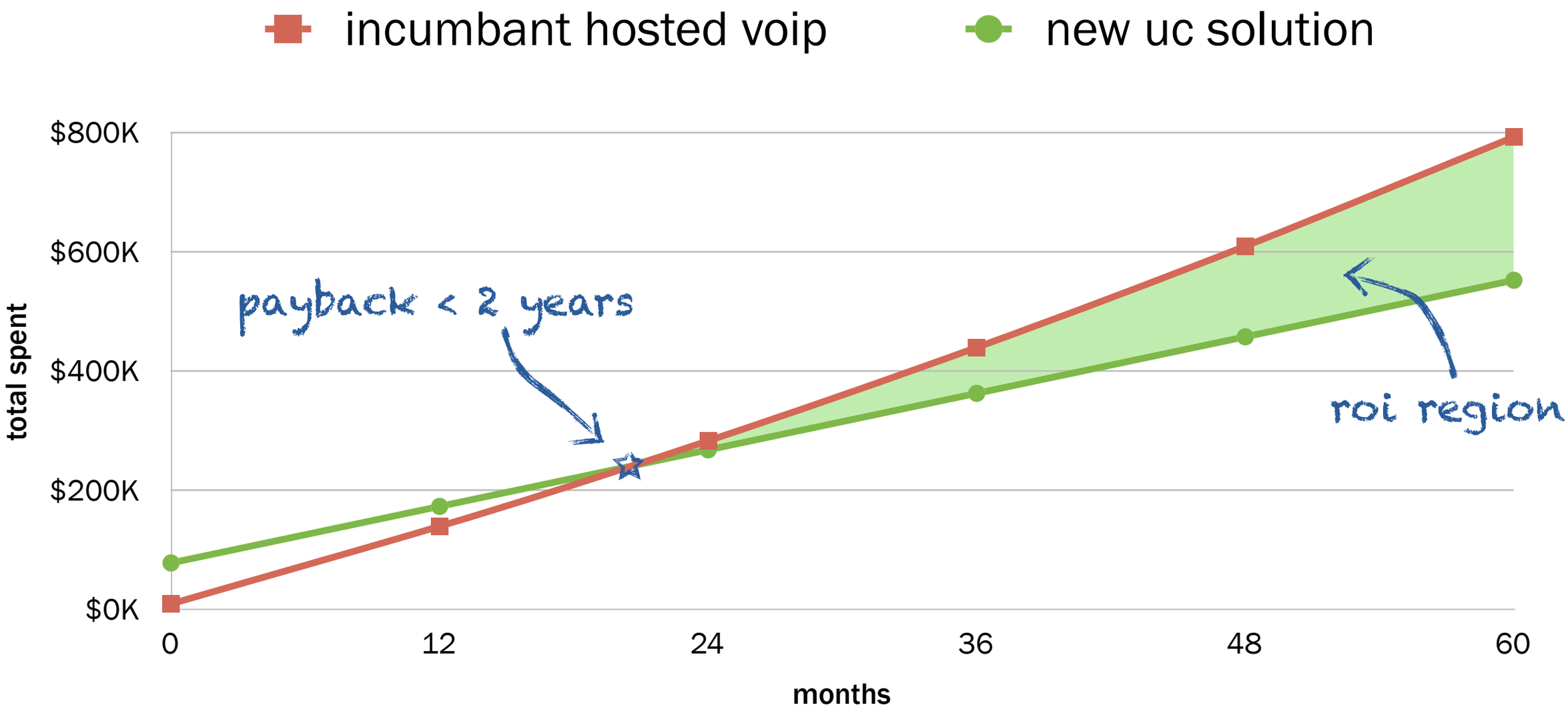
improved ad-hoc collaboration	
scaleable and reliable platform	
increased customer satisfaction	
communications cost savings	

roi / tco analysis



each price includes

- ➡ MRC network and voice PSTN charges
- ➡ NRC costs for addition of 24 users/yr.

each price does NOT include

- ➡ “soft-cost” productivity gains
- ➡ travel savings impact

future plans

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- crm integration
  - click-to-call and screen pop for sales team

- mobile voip (FMC)
  - SIP, VoWiFi, eventually Vo3G/Vo4G
  - use of smartphones as primary office extension
  - field testing a couple of different solutions

- communications enabled business processes
  - context-aware IM, voice, contact list (presence)
  - field workers have quick access to knowledge workers via multiple communication methods

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5 tips for building a distributed uc/sip architecture

five evolved pbx tips

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1

- make sure your LAN and WAN is voip/uc ready
  - —understand the (significant) infrastructure requirements that are necessary to support uc
  - —LAN: architecture, duplex, capacity
  - —WAN: QoS, adequate bandwidth for growth, low latency, jitter, packet loss
    - Make sure it actually works (tested!)
  - —network is number one culprit of poor uc performance and adoption

network assessment

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- PathViewCloud by Apparent Networks
  - SaaS network monitoring / assessment
  - uses one or more “sequencers” on LAN
- continuous testing of VoIP-sensitive network metrics
  - jitter
  - packet-loss
  - latency
  - QoS tagging and integrity
- test MPLS and internet destinations
  - verify network readiness *before* deployment
  - monitor capacity *after* installation (sp always changing)

network assessment

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Group: VoIP (15 paths) — 15

Name	Network Type	Target Type	Importance	Last Diagnostic	Violations Today / Past 7 Days	Action
Colo SG220 (Remote Polycoms) (192.168.200.4)	LAN	Voice Server: Shoretel	8	01/13/2011 17:33	0 / 0	
Colo SG90 (SIP Trunks) (192.168.200.5)	LAN	Voice Server	8	01/13/2011 17:34	0 / 0	
Colo VoIP Internet Edge ([redacted])	WAN	Voice WAN	8		0 / 39	
Corona SG50 (192.168.8.20)	WAN	Voice WAN	8	01/27/2011 07:02	0 / 1	
El Seg to Colo MPLS (no QoS) (192.168.200.80)	WAN	Voice Server: Shoretel	8		0 / 2	
El Segundo SG90 (192.168.5.2)	WAN	Voice WAN	8	01/17/2011 19:20	0 / 0	
Frank Romeo (NJ ext 220) ([redacted])	WAN	Voice WAN	5	01/30/2011 20:33	0 / 2	
Laguna SG50 (192.168.11.20)	WAN	Voice WAN	8	01/17/2011 19:19	0 / 0	
MELLISA DAHL ([redacted])	WAN	Voice WAN	5	01/30/2011 20:21	0 / 3	
New Jersey SG50 (192.168.9.20)	WAN	Voice WAN	8	01/17/2011 18:49	0 / 0	
New York Office (ext 303) ([redacted])	WAN	Voice WAN	5	02/02/2011 10:08	4 / 17	
North Carolina SG50 (192.168.12.20)	WAN	Voice WAN	8	01/22/2011 06:00	0 / 0	
Plano SG50 (192.168.10.20)	WAN	Voice WAN	8	01/31/2011 09:29	1 / 9	
SIParator (internal) (192.168.200.10)	LAN	Voice Server	8	01/13/2011 17:09	0 / 0	
SIParator (Internet Edge) ([redacted])	WAN	Voice WAN	7	02/01/2011 13:50	0 / 37	

network assessment

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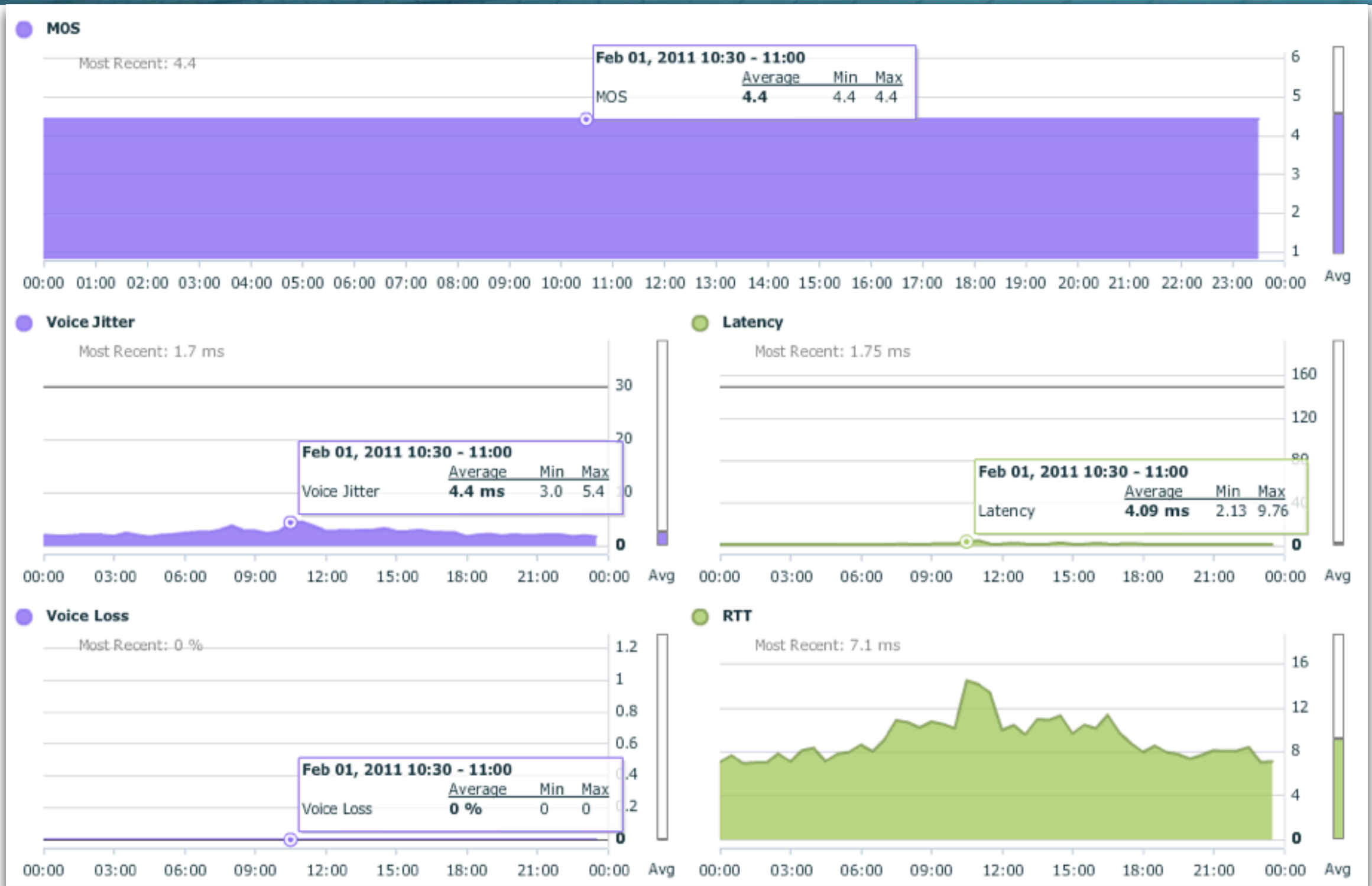

network assessment

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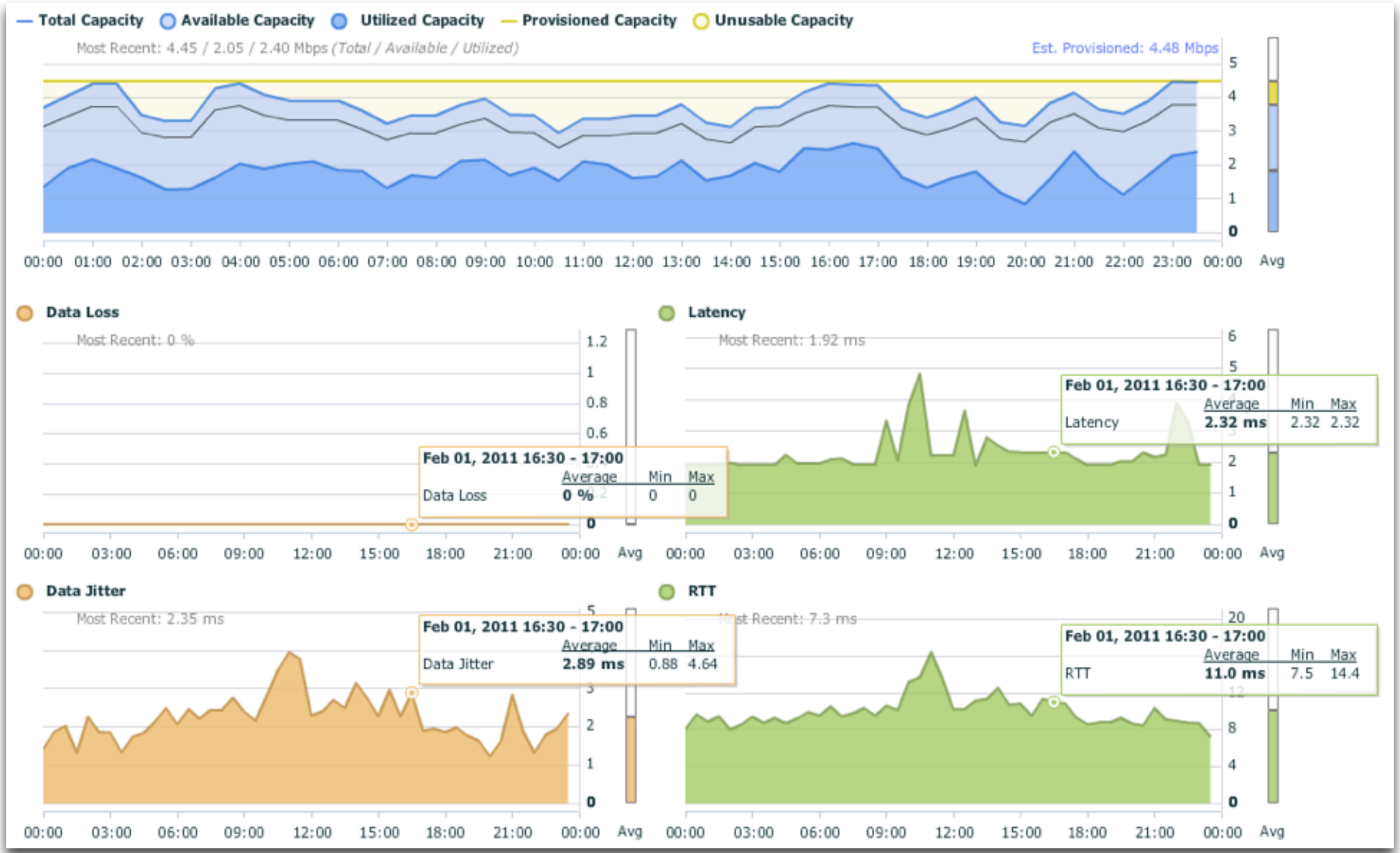

network assessment

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Summary | Voice Detail

Hide Diagnostics

Hop	Severity	IP Address	Host Name	Voice Loss (%)	Measured MOS	Best MOS	Worst MOS	Latency (ms)	Voice Jitter (Avg/Max, ms)	RTT (Min/Avg/Max, ms)	QoS (Set/Measur
1	✓	192.168.200.1	192.168.200.1	0	4.4	4.4	4.4	0.31	0.20 / 4.51	0.63 / 0.80 / 1.40	
2	!	[redacted]	[redacted].ip.mcleodusa.net	0	4.3	4.3	3.8	0.25	3.63 / 106	0.50 / 7.23 / 118	
	Frequency	Observation									
	! -	Inconsistent handling of voice packets detected [Under network load, voice applications may experience excessive jitter] [Check for tendency toward decreasing MOS with increasing call load]									
3	✓	66.251.35.210	gi-4-0-0-13.core02.anhmca01.paetec.net	0	4.4	4.4	4.4	0.19	0.08 / 0.87	0.39 / 0.50 / 1.02	
4	✓	64.80.253.213	po-3-0-0.core01.lsajca01.paetec.net	0	4.4	4.4	4.4	1.81	0.07 / 0.26	3.61 / 3.73 / 3.97	
5	✓	66.251.30.5	gi-2-0-4.gw02.lsajca01.paetec.net	0	4.4	4.4	4.4	1.84	0.09 / 0.48	3.67 / 3.79 / 4.11	
6	✓	207.138.128.165	ge-5-2-0.406.ar3.lax1.gblx.net	0	4.4	4.4	4.4	1.93	2.17 / 107	3.87 / 3.97 / 4.24	
7	✓	64.208.17.198	comcast-ip-services-llc.tengigabitethernet3-4.ar4.lax2.gblx.net	0	4.4	4.4	4.4	39.2	0.43 / 8.76	78.4 / 79.0 / 80.0	
8	i	68.86.85.142	pos-0-14-0-0-cr01.dallas.tx.ibone.comcast.net	0	4.4	4.4	4.4	20.2	0.23 / 10.9	40.5 / 40.8 / 60.4	
	Frequency	Observation									
	i 21%	Packet reordering detected [Relatively low levels should not affect network performance]									
9	i	68.86.85.222	pos-0-11-0-0-cr01.atlanta.ga.ibone.comcast.net	0	4.4	4.4	4.4	27.8	0.31 / 17.1	55.7 / 56.0 / 56.9	
	Frequency	Observation									
	i 11%	Packet reordering detected [Relatively low levels should not affect network performance]									
10	✓	68.86.87.193	pos-1-9-0-0-cr01.ashburn.va.ibone.comcast.net	0	4.4	4.4	4.4	38.6	0.14 / 5.13	77.2 / 77.4 / 77.9	
11	i	68.86.95.158	68.86.95.158	0	4.4	4.4	4.4	40.9	1.66 / 28.1	81.8 / 82.1 / 111	
	Frequency	Observation									
	i 9%	Packet reordering detected [Relatively low levels should not affect network performance]									
12	i	68.85.62.189	te-0-6-0-6-ar01.audubon.nj.panjde.comcast.net	0	4.4	4.4	4.4	41.0	0.23 / 1.22	82.0 / 82.5 / 83.5	
	Frequency	Observation									
	i 13%	Packet reordering detected [Relatively low levels should not affect network performance]									
13	✓	68.85.35.10	te-9-8-ar01.absecon.nj.panjde.comcast.net	0	4.4	4.4	4.4	41.8	0.77 / 28.6	83.6 / 84.5 / 99.7	

network assessment

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14		68.85.159.14	te-2-1-ar01.eatontown.nj.panjde.comcast.net	0	4.4	4.4	4.4	41.3	1.77 / 22.6	82.5 / 85.6 / 94.9	- / -

Frequency	Observation
24%	Packet reordering detected [Relatively low levels should not affect network performance]

15		68.86.210.154	te-1-1-ur01.middletown.nj.panjde.comcast.net	0	4.4	4.4	4.4	41.5	1.54 / 11.4	83.0 / 86.0 / 89.4	- / -

Frequency	Observation
32%	Packet reordering detected [Relatively low levels should not affect network performance]

16		68.87.214.214	68.87.214.214	0	4.4	4.4	4.4	41.5	1.51 / 3.17	82.9 / 86.2 / 88.8	- / -

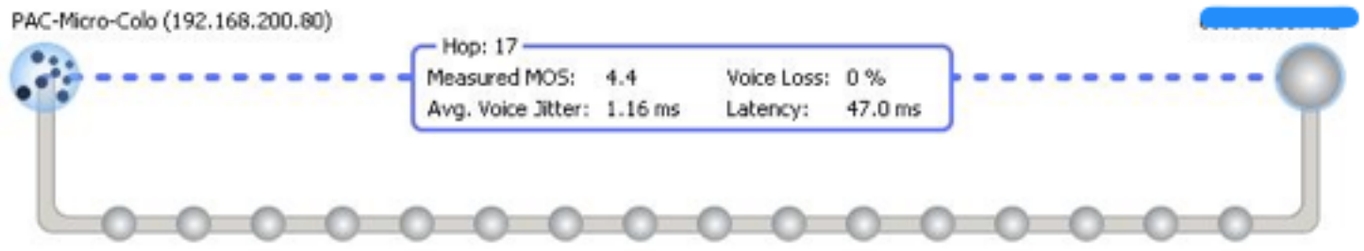
Frequency	Observation
28%	Packet reordering detected [Relatively low levels should not affect network performance]

17		69.141.187.42	[redacted]	0	4.4	4.4	4.4	47.0	1.16 / 12.3	94.1 / 97.0 / 130	- / -

Frequency	Observation
33%	Packet reordering detected [Relatively low levels should not affect network performance]

MELLISA DAHL

Target Type: Voice WAN
Sequencer: PAC-Micro-Colo
Target: [redacted]
Last Diagnostic: 02/02/2011 10:46



five evolved pbx tips

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2

- use sip trunking unless you have a good reason not to
  - —pre-qualify pbx and service provider for interoperability
  - —shoot for native SIP, but use SIP to TDM gateway if you must to get by for now
  - —foundation for next decade of communications
  - —be careful about OTT ITSPs due to unpredictable links
  - —plan for a learning curve…

five evolved pbx tips

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3

- understand how your business departments and users communicate and collaborate
  - —be methodical and as objective as possible
  - —use surveys, evaluate IT/IS systems, user categorization
  - —take quantitative measurements of task efficiencies (create a baseline)
  - —determine “hot spots” where improved communication can make a measurable difference

five evolved pbx tips

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4

- evaluate multiple uc vendors
  - attend seminars, watch demos, read white papers
  - rate strong and weak points of each
  - determine how well each delivers on your “hot spots”
  - generally the larger the organization, the more vendors required to build solution

five evolved pbx tips

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5

- phase-in the deployment of your uc systems
  - —consider implementation specialists
  - —highest value at least cost pieces first
  - —pilot and test each phase as much as possible
  - —provide end-user training
  - —test test test before rollout
  - —don’t forget security

sip + inGate

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- sip trunking is the glue of the evolved pbx/ucc
  - —inGate SIParator is the tube

today
ties together uc components

tomorrow
ties together uc systems

wrap up

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- business is evolving, so must your communications infrastructure
  - —TDM won't cut it in the long term…
- the evolved pbx uses SIP for trunks AND endpoints
- the network is more fragile than uc systems / components themselves
- "full uc" is non-trivial, usually involves multiple vendors and phases
- an integration partner is very valuable, in many cases, a must

thank you!

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- question & answer
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