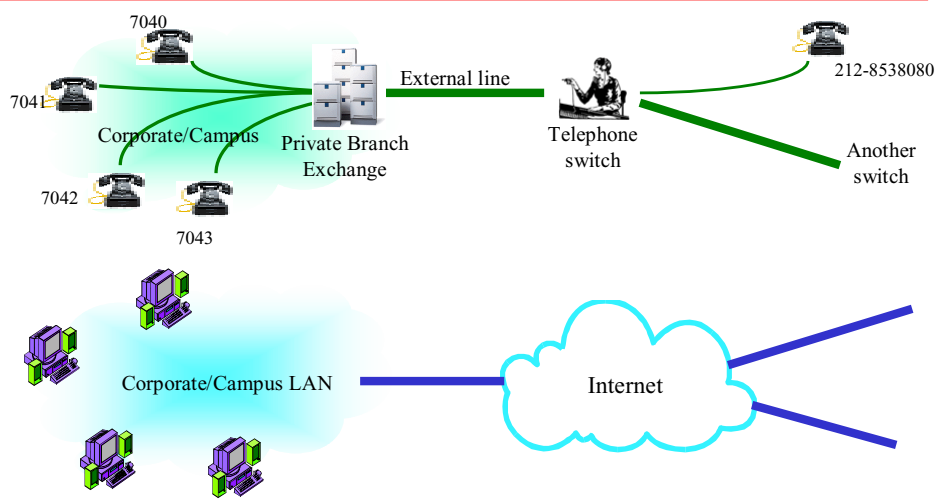


Towards Junking the PBX: Deploying IP Telephony

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We describe our departmental IP telephony installation

What is a PBX ?

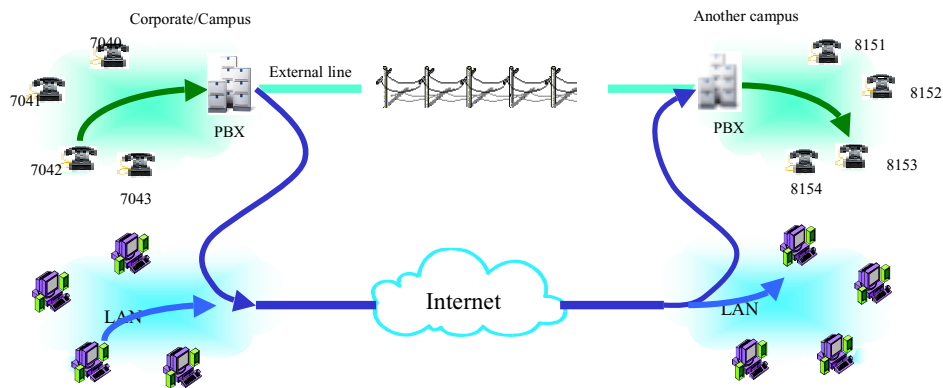


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2

What is IP Telephony ?



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3

IP Telephony Protocols



Session Initiation Protocol - SIP

- Contact "office.com" asking for "bob"
- Locate Bob's current phone and ring
- Bob picks up the ringing phone

Real time Transport Protocol - RTP

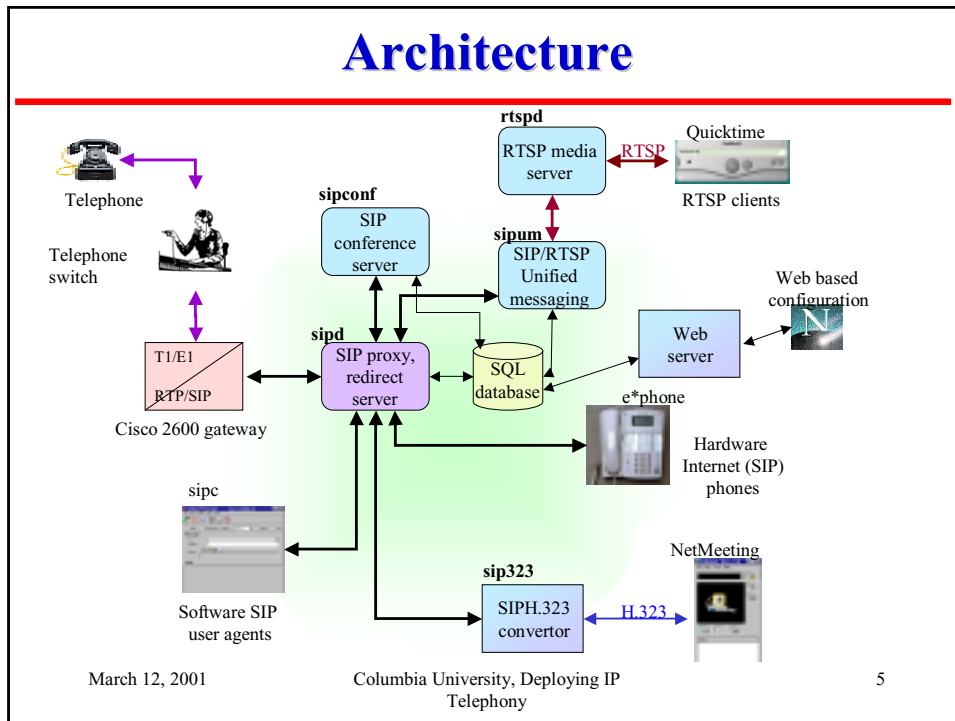
- Send and receive audio packets

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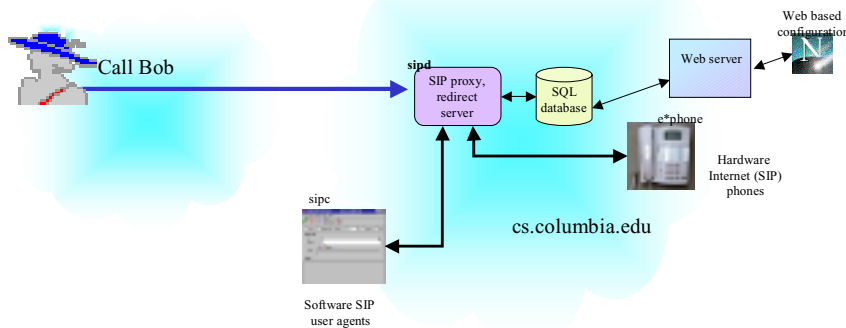
4

Architecture



Example Call

- Bob signs up for the service from the web as “bob@cs.columbia.edu”
- He registers from multiple phones
- Alice tries to reach Bob
INVITE sip:Bob.Wilson@cs.columbia.edu
- sipd canonicalizes the destination to sip:bob@cs.columbia.edu
- sipd rings both e*phone and sipc
- Bob accepts the call from sipc and starts talking



Other Services

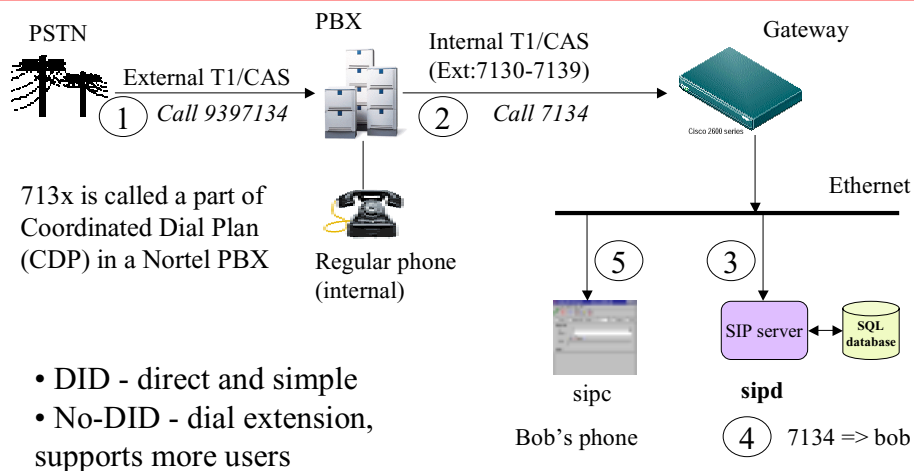
- Programmable servers
 - Time-of-day, caller identification
 - CPL, SIP CGI
- Unified messaging
 - Centralized voice mail and answering machine
 - SIP, RTSP
- Conferencing
 - Dial-in bridges; centralized audio mixing
 - Audio, video and chat

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7

PSTN to IP Call



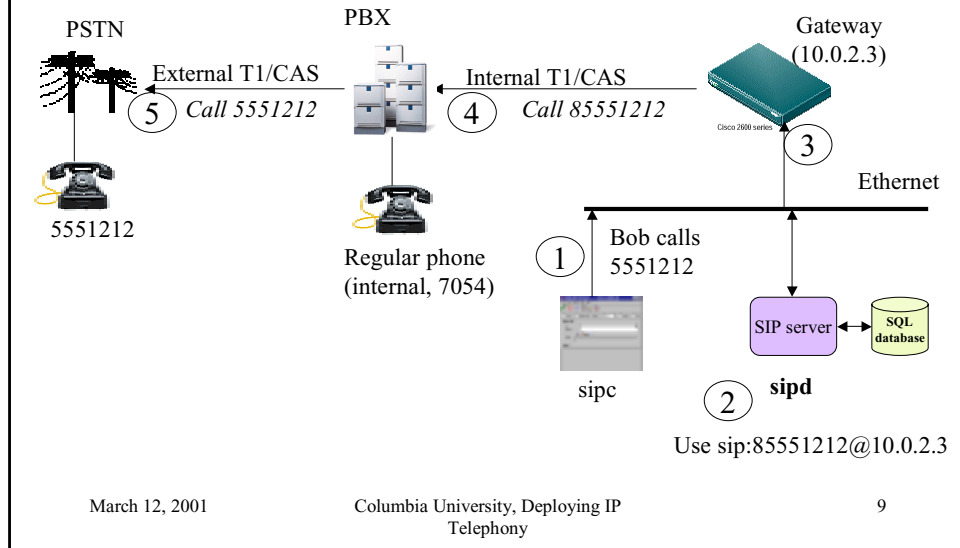
- DID - direct and simple
- No-DID - dial extension, supports more users

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8

IP to PSTN Call



T1 Line Configuration (From the PBX Side)

- Electrical/physical settings
 - T1 type: **Channelized**, PRI
 - Characteristics: line coding - AMI, **B8ZS**; framing - D4, **ESF**
- Trunk type: DID, **TIE**
- Channel type: Data, **Voice-only**, Data/Voice
- Access permissions: adjust NCOS for internal T1 trunk and CDP routing entry (713x)

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10

Security

- Prevent unauthorized users from making certain (e.g., long-distance) calls
- IOS access control
- SIP authentication

Future:

- PIN numbers for telephone users
- Automated, electronic billing

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11

Conclusion and Future Work

- Initial field test experience with deploying IP telephony in a campus environment
- The architecture and installation experience can be used at other organizations

Future Work:

- Additional services, e.g., instant messaging, VoiceXML
- Performance and scalability: sipd, rtspd, sipconf
- Firewall/NAT, SNMP

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12