

The Internet Real-Time Laboratory

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<http://www.cs.columbia.edu/IRT>

Overview

- 13 PhD students, 2 visitors, 5 MS students, 14 project students
- goal: design & build network protocols, algorithms and software for enabling new services on the Internet
- themes:
 - Internet multimedia and telephony
 - wireless services
 - service location and directories
 - content distribution
 - security

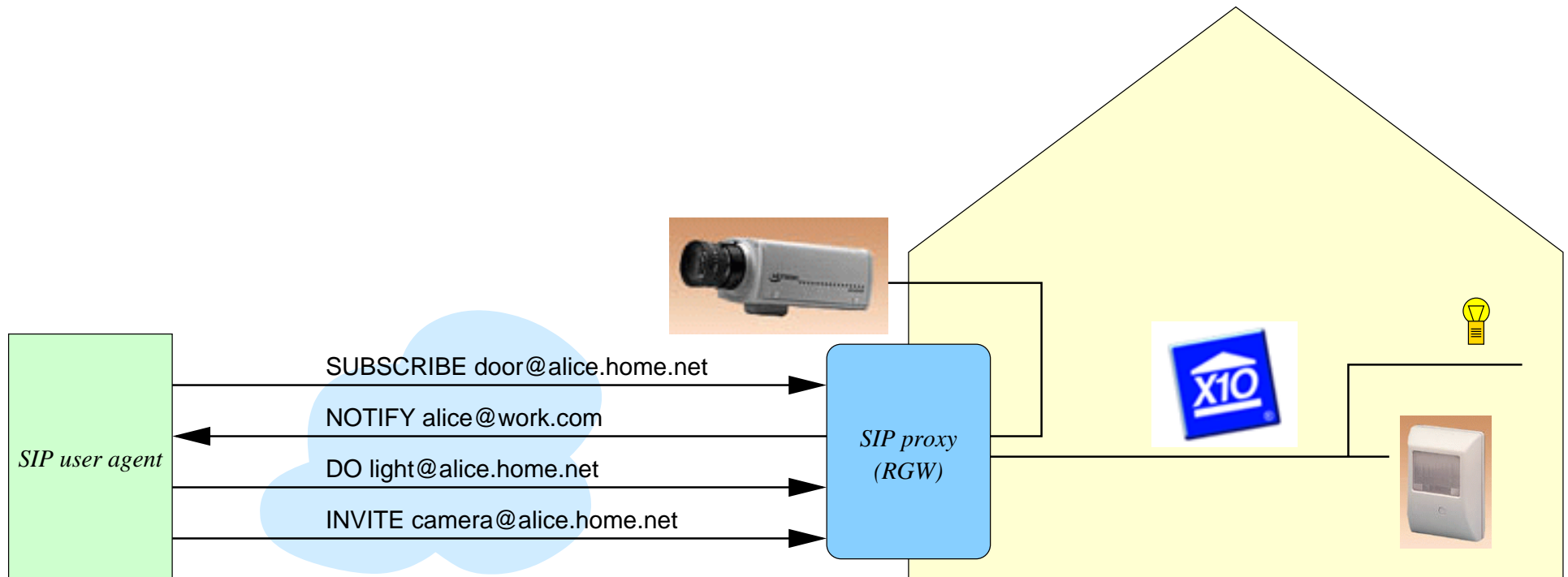
What is Internet Telephony?

- carriage of real-time voice and multimedia
- IP: private networks or public Internet
- interconnected to existing phone network
- low latency, high availability
- likely to start replacing existing phone system in \approx ten years
- landline and mobile (“third-generation wireless”)

Columbia Efforts in Internet Telephony

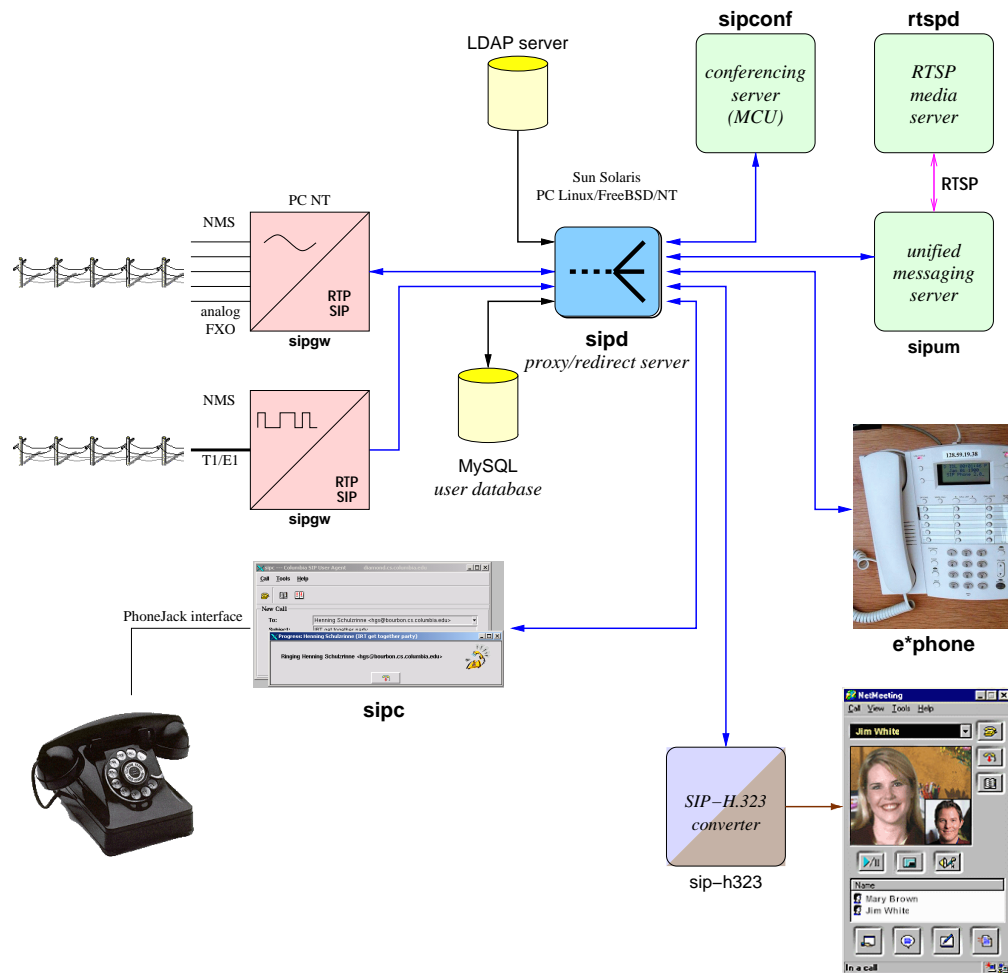
- signaling protocols: SIP + extensions (QoS, mobility, events, caller preferences, ...)
- programming languages and interfaces: CPL and sip-cgi
- software and hardware VoIP platforms → million calls/hour
- locating services and servers
- statistical packet voice characterization
- combining forward error correction (FEC) and playout delay adaptation

Events: SIP for Appliances



(Work with Telcordia)

Columbia Internet Extensible Multimedia Architecture



Columbia e*phone

DSP-based, single-processor Ethernet phone; being commercialized

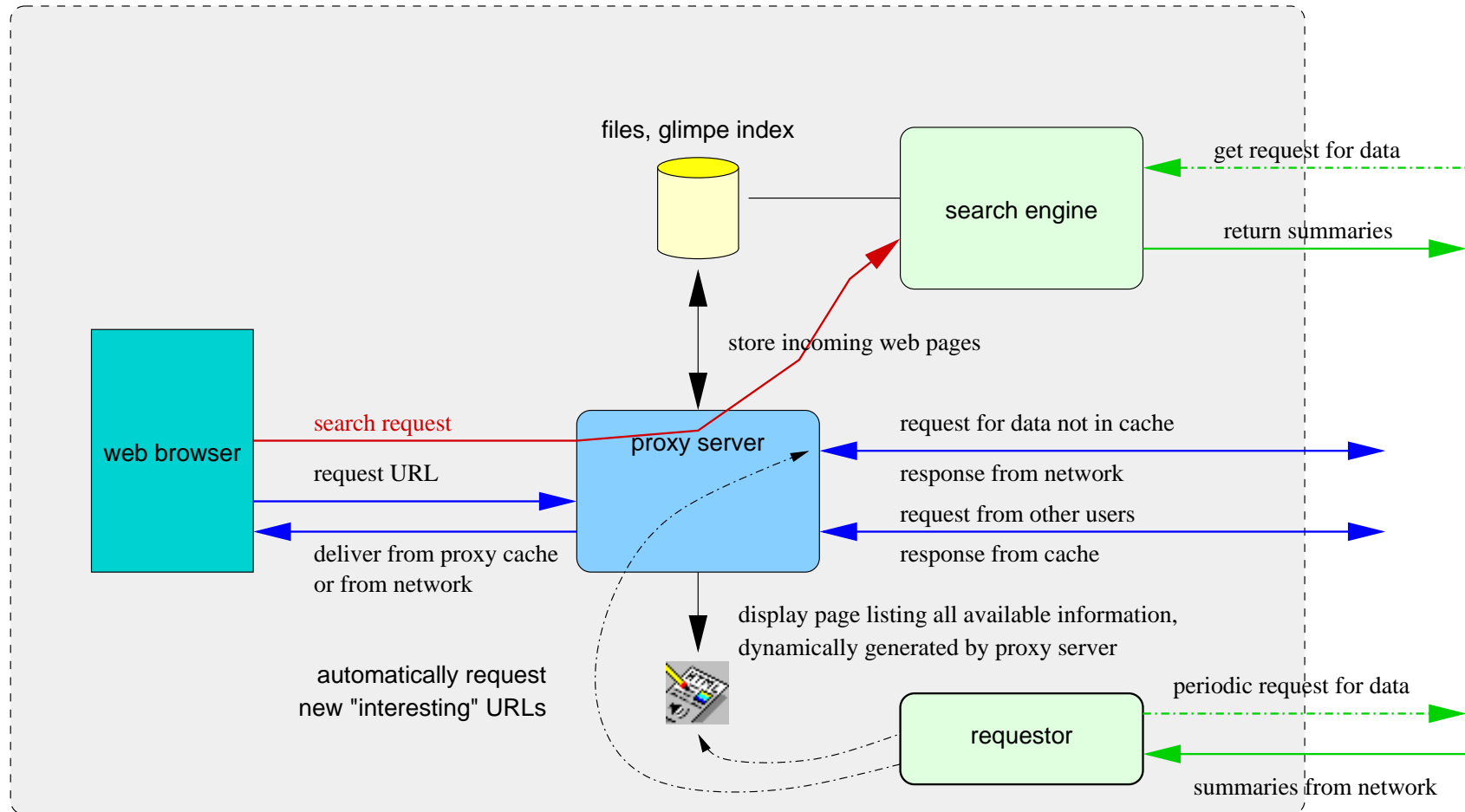


Ad-Hoc Wireless Networks

- meet people
 - walking
 - subway
 - airports, train stations, ...

and exchange data wirelessly – web pages, music, images, applets, ...

- “Napster without wires”
- information spreads rapidly in dense urban areas
- searchable by type, URL and content



- UDP multicast
- _____ UDP
- _____ HTTP over TCP

Quality of Service

- make sure important Internet traffic get through
- need *resource reservation* protocols → YESSIR, BGRP, RNAP
- QoS pricing for adaptive multimedia services
- need management infrastructure

Examples of Spring 2001 Projects

- Linux device driver enhancements for wireless networks;
- speech recognition for Internet telephony;
- shared web browsing;
- mobility proxy;
- virtual reality conferencing system;
- audio delay and quality measurements;
- anonymizer for Internet telephone calls;
- pricing network resources;
- Internet radio station;

<http://www.cs.columbia.edu/~hgs/teaching/project/spring01.html>