Internet Applications – Internet Telephony and Beyond

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Overview

- current applications
- from “CB Radio” to commercial and consumer applications
- intranet applications: replacing the PBX?
- more than voice: telephony CSCW
- hybrids: visible and invisible Internet telephony
- WWW as the phone system user interface

Current Applications: Commercial

- mostly Windows (3.1, 95, NT) only, some Mac
- proprietary encodings, protocols ➠ standards (G.72x, RTP, H.323)
- audio only
- point-to-point

Current Applications: Commercial

Vendor	product	network protocols	special
Netscape	CoolTalk	proprietary (RTP)	cross-platform
Microsoft	NetMeeting	H.323	app. sharing
Vocaltec	Internet Phone	proprietary	user base
CUSeeMe	WhitePine	proprietary	+ video

Differentiation: voice mail, user location, drawing programs, …

Current Applications: Research

- MBONE tools: ivs, NeViT, NeVoT, vat, vic, wb
- standards-based: RTP, G.7xx, H.26x, MPEG, JPEG
- mostly Unix, some ports to Windows 95
- unicast and multicast
- video and audio
- integration with resource reservation (RSVP) in progress: vic, NeViT, NeVoT

Problems with Internet Telephony Applications

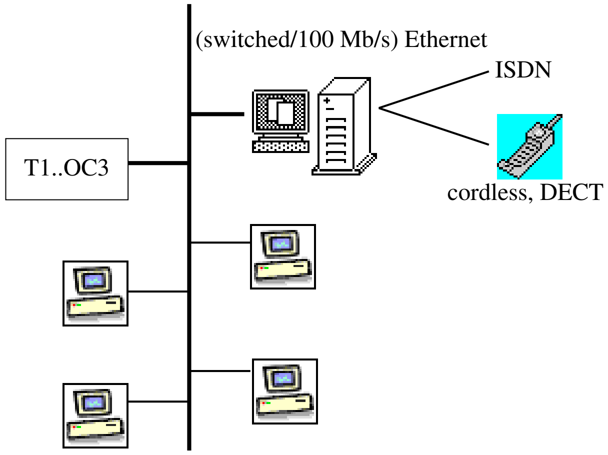
- interoperability = user location + signaling + transport + coding
- audio coding: need 2.4 kb/s …16 kb/s ➠ G.723 (5.3 and 6.3 kb/s), G.279 (CELP), GSM (14 kb/s), G.726 (16 kb/s and up), DVI (24 and 32 kb/s)
- need software codecs (or soundcard vendors…)
- transport: IP + UDP + RTP (also for H.323), but need compression to reduce header overhead ($\geq$ 40 bytes!)
- signaling: H.323 (like ISDN signaling)
  IETF efforts: SIP and SCIP
- user location (no fixed IP address): Microsoft ULS, LDAP

The CB Radio Stage

- look in directory for connected users, then “raise”
- arrange time to be on-line together and then exchange IP addresses (maybe using directory)
- must have same audio application
- difficult to configure (on top of ISDN…)
- no cordless phones
- audio quality is poor: break-ups, delay, push-to-talk
- does not work (well) with firewalls
- no CO power

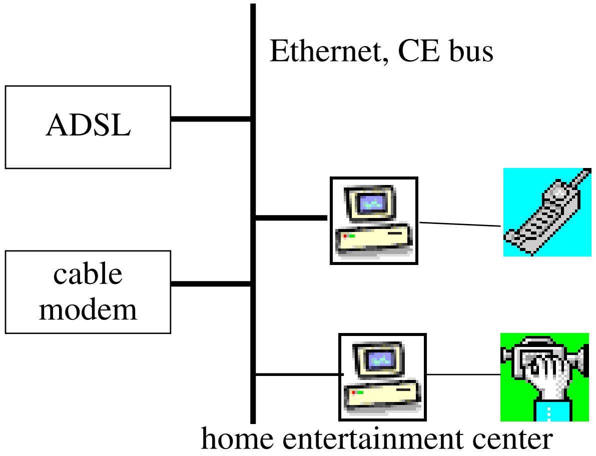
- callback services are bigger danger…
- not technology, but infrastructure/implementation problems!

Office Architecture



- switched Ethernet can handle voice (+ some video) just fine
- PCs already on network all day
- need Pentium-class PCs
- switched Ethernet (or ATM)
- single workstation can handle E1/T1 outgoing line

Home Architecture



- avoid explicit call set-up
- instant-on PCs
- need in-house wiring

Intranet Applications

- easier to add voice to Ethernet than data to PBX
- incremental cost ≈ 0
- improved functionality (voice mail integrated with email)
- easier to use: not just 2-line LCD
- integrate with WWW (directories, database)
- a lot simpler than CTI
- better than voice/data MUXes for leased lines
- easier to integrate video and multi-party calls
- use ISDN/POTS for outside lines (telecommuting!)

Consequences for Central Office

- holding times for local calls $\uparrow$
- most ISDN calls local, bit pipe
- ADSL, HDSL more like office architecture

Next-Generation Services

- white board ➠ application sharing, shared editing
- video (view objects, sketches; family)
- integration with WWW:
  - Ubique *Virtual Places*: meet in 2D/3D space
  - use WWW pages instead of voice menues

Internet Telephony Hybrids

- tail-end hop off: Internet to local net, then POTS/ISDN:
  - PC – Internet – PC
  - PC – Internet – gateway - (POTS/ISDN) - phone (THO)
  - phone – gateway – Internet – gateway – phone
- ➠ Internet may not be visible (but audible?)
- examples: Vienna Systems, Ericsson, Global Exchange Carrier, …

WWW as a Telephony Interface

- user interface of (office) telephones is archaic
- ➠ program features using WWW
- POTS: program call blocking, call handling, forwarding
- view call details (cheaper than printing…)
- BT experiments

Threats

- packet switching cheaper ($0.40/kb) than circuit switching ($1.50/kb)
- reduced bit rate, silence suppression
- USA:
  - no “kickbacks” to local phone company
  - unmeasured local service
  - Internet access at $1/hour or ISDN at $0.01/minute
  - resource reservation (RSVP) coming this fall
  - greater separation of families
- AIN services much easier, cheaper on Internet platform

Opportunities

- packetized services are the destination
- may *not* be (all) ATM
- near-term: increase sale of ISDN, cable modems, …
- near-term: forward calls to PC if on-line (Ericsson) ➠ telecommuting