Introduction to VOIP Stephen Okay

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Intro to VOIP

- Classic Telephony
- Data Networks(Review)
- VOIP
 - What it is
 - Protocols
 - Hardware
 - Software
 - Examples
- Web Links

Classic Telephony in 1 slide

Classic Telephony

- Calls happen by electro-mechanical manipulation of voltage levels between the telco network and end-user phones.
- voice "payload" and transport signals must be sent together over the same line/circuit.
- "Modern" equipment is electronic, but must work w/ older equipment.
 - This makes upgrades and enhancements difficult and expensive.

VOIP in 1 slide

- Manipulate bits not volts
 - everything can now happen inside a PC
- Can be all-digital or a mix of digital and analog equipment
- Telephone Company/PTT not required
- Can use low-power, commodity hardware instead of expensive, dedicated gear



Intro to VOIP

- Review of TCP/IP
- "voice chat over IP" applications vs.
 VOIP protocols
- VOIP protocols
 - H323
 - SIP
- VOIP hardware

TCP/IP Review

- 4-layer stack
- Packet-switched
- Error correcting
- Reliable delivery
- Designed in 1960s/1970s for use over slow, unreliable analog phone networks
- Application layer key to VOIP and other commonly used protocols

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"Voice chat"

- point-to-point or server-based.
- works even with very low bandwidth
- often proprietary, closed systems run as a business rather than a public utility.
- Often no routing between PSTN or other networks.
 - Profit motive can hamper scalability, availability and end-users



"Voice Chat"

- Examples:
 - Skype
 - iChatAV
 - Yahoo!IM
 - MBONE vic/vat tools

VOIP

- Uses formal protocol suites to provide:
 - Call routing, forwarding, voicemail, etc.
 - Compatibility w/ legacy PSTN/POTS systems
 - Quality of Service(QOS)
- Done mostly w/ software
- Can still do point-to-point calls

Major VOIP benefits

- It's all just bits.
 - VOIP is just another application running over a data network(usually TCP/IP)
 - Service expansion/integration often just a matter of writing the code, not tearing down a switching center.
- Per-call costs very low, often free
- Equipment is often commodity priced

VOIP Concerns

- Regulatory issues
- Tax revenue issues
- Market exploitation and control
- Quality & Reliability of Infrastructure

VOIP Protocols

- H.323
- SIP
- MGCP
- IAX
- Others



H.323

- Specification defined by ITU
- Wide support among all telecom providers & manufacturers all over the world.
- Industry moving away from using it in new products.
- Meant to provide gateway for telephony devices into the PSTN



SIP

- "Session Initiation Protocol"
- Designed by Cisco Systems, Inc.
- Stand-alone computer-to-computer protocol
 - Does not presume a PSTN
- Calls routed/managed by a SIP Server
- No real "official" version, so there are lots of different implementations.
- Rapidly becoming dominant protocol

Protocol details

- Most VOIP protocols split signalling from voice data, unlike POTS
 - potential firewall issues
- QOS/capacity checked before calls are initiated



VOIP Hardware

- PSTN Gateways
- Telephone adapters
- Handsets
- Softswitch/PBX
- (Much of this can actually be done on a PC)



PSTN Gateways PCI Card

Office/Telecom System





• Provides a bridge between VOIP networks and the PSTN.



Analog Telephone Adapter



- Lets you use regular phone on VOIP network
- Avoid dedicated or "locked" adapters if possible
- \$50-200 US

VOIP Phones



- Looks / acts like regular phone, but really an embedded computer with VOIP client software
- Ethernet or wireless(802.11b) models available

Soft Phones

- Telephony functions completely in software
- Run on desktop, laptop and embedded systems.
- Some common softphone clients
 - SJPhone
 - XLite
 - KPhone
 - OhPhone

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VOIP Networks

- Examples
 - PC-to-PC
 - PC-to-PSTN
 - VOIP-based POTS replacement
 - VOIP PBX using Asterisk



Asterisk

- Open Source GPL-Licensed PBX
- Runs under most popular versions of UNIX (Linux, BSD, OS X)
- Can replace a traditional office PBX
- Supports soft phones, SIP handsets, wireless phones and

PC-PC VOIP Network with Analog phones



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Local Village Wireless Network w/ SIP clients and Asterisk Server



Multi-Village Network w/ connection to



VOIP Vendors/Services

- Skype
- Vonage
- FreeWorldDialup
- LOTS of small, "microbrew" VOIP startups popping up all over the world
- You??

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Open Source VOIP projects

- Asterisk(SIP-based PBX)
 - www.asterisk.org
- OpenH323(H.323)
 - www.openh323.org
- VOCAL (H.323,SIP, MGCP)
 - www.vovida.org

VOIP Information Links

- VOIPInfo www.voipinfo.org
- Voxilla www.voxilla.org

