A Quick Introduction to Voice over Internet Protocol (VoIP)

PURC Annual Conference 2004

Chuck Jackson
Roadmap

- Basics of packet communications as used in the Internet
- How voice is transmitted over packet networks such as the Internet.
- Examples of VoIP uses and systems
- Concluding thoughts
Internet Basics

• The basic building block of networks is the IP datagram.

• Analogy to datagrams—a postcard with
  – Destination address
  – Return address
  – A small amount of text

• A postcard might inform you of a friend’s holiday travels or remind you of a dentist’s appointment.

• The postal service doesn’t care which application (friend or dentist) sent the postcard—it just carries processed wood pulp with black marks.
Protocol Layering

Applications (e.g., email, web pages)

TCP

UDP

IP (Internet Protocol)

Physical Transport (e.g., Cable Modem)

A Typical IP Datagram

IP Header (20 bytes)  TCP Header (20 bytes)  Email Data (1000 bytes)
The Hourglass Figure

Source: Steve Deering, IETF 51
Voice—Another Application over IP

- Voice requires about 10,000 to 100,000 bits per second.
- Can send those bits over IP—just as we send web pages or email.
Alternative VoIP Architectures

• PC to PC
Alternative VoIP Architectures

- Phone to Phone via the Internet
Alternative VoIP Architectures

- Phone to Internet to Gateway to PSTN
Alternative VoIP Architectures

- PSTN to Gateway to Internet to Gateway to PSTN
VoIP Examples

- Xbox Voice
- Windows messenger
- AOL Instant Messenger
- Motorola Phone Adapter (Vonage)
- Cisco Phone
- Cox Cable in Hampton Roads, Virginia
Get Xbox Live!

The new Xbox Live Starter Kit is here! So if you’re not a subscriber, now’s the time to make your move and join the ultimate gaming arena!


Taunt your opponents, verbally high-five your teammates, groan in despair, and exult with a war cry! It's all in real time, and unless you've experienced it before—those who've played games over a LAN when you can hear the trash talk from the next cubicle (oops, did we imply people are playing at work?) know exactly what we mean—you have no idea how unbelievably cool it is. You have to try it. You'll see.
Microsoft Windows Messenger
AOL Instant Messenger
The Motorola Box Used by Vonage
Vonage Uses this Architecture

- Phone to Internet to Gateway to PSTN
Motorola Box in Vonage Architecture
Cisco 7970 IP Phone
Cox Cable in Hampton Roads, Virginia

COX VIRGINIA TELCOM, INC.

VA S.C.C. TARIFF NO. 1
FIFTH REVISED PAGE NO. 53

LOCAL EXCHANGE SERVICE

SECTION 3 - Service Descriptions

3.1 Hampton Roads Market Area Local Exchange Service (T)

3.1.1 Hampton Roads Service Areas/Calling Area (T)

Where facilities are available, Cox exchanges are defined by the following areas which are equivalent to similarly named Verizon Virginia, Inc. and Verizon South, Inc. Exchanges and Zones:

Cox Hampton Roads Exchanges (T)

- Franklin
- Great Bridge
- Gloucester
- Hampton
- Hickory
- Newport News
- Norfolk/Virginia Beach
- Peninsula
- Poquoson
- Portsmouth
- Princess Anne
- Richmond
- Smithfield
- Suffolk
- Surry
- Toano
- Whaleyville
- Varina
- Williamsburg

3.1.1.1 Local Calling Areas

<table>
<thead>
<tr>
<th>Cox Exchange</th>
<th>Exchanges included in Local Calling Area*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Franklin</td>
<td>Boykins, Chuckatuck, Courtland, Crittenden, Great Bridge, Hickory, Holland, Ivor, Norfolk/Virginia Beach, Portsmouth</td>
</tr>
</tbody>
</table>
Concluding Thoughts

- VoIP is one of many higher-level communications capabilities among devices connected to the Internet.
- VoIP is not an application.
- VoIP is a capability that is part of many applications.
- VoIP capabilities are already pervasive.
  - Microsoft Windows Messenger (part of XP)
  - AOL Instant Messenger
  - Xbox and Sony Playstation