
Impact of enum and IP telephony

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The Internet as Global Telephone Co.

- ◆ key Internet concept: end-to-end (e2e)
 - hosts connected to Internet can communicate without network knowing applications in use
- ◆ web development was enabled by e2e
 - no need to get carrier permission for each application
- ◆ same can be true for Internet telephony
 - individual users can run telephony over Internet
 - no carrier involvement
- ◆ the Internet is a phone company with out knowing it also record company, postal service, etc

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Internet Telephony Basics

- ◆ call originator sends control signals towards receiver
 - could be through local proxy at originator end
 - could be to local proxy at receiver end
- ◆ signals used to setup voice call
- ◆ voice stream flows between end points
 - not through proxies
 - end point could be gateway to old phone network
- ◆ note: carrier not involved
 - signals and data are just more Internet data
 - carrier can not tell if calls are happening
 - email with voice attachment can also be used

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Services in Internet Telephony

- ◆ putting phones on Internet will mean many new services
- ◆ service provided by 3rd parties - not only by carriers
 - for example, message waiting, call-back
 - different from phone world
- ◆ a quote from Sunday 16 Apr 2000

Hi Roy,
I still don't understand why it is a "users" choice where the "services" are executed - I would have thought that this would be networks choice

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Issues

- ◆ accounting
- ◆ authorization
- ◆ authentication
- ◆ regulatory
 - e.g. wiretap requirements
- ◆ QoS
 - phone company mindset
- ◆ scale
 - telephone network supports ~ 1B phones

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IP Telephony, contd.

- ◆ QoS seen as a real issue
 - latency in particular
 - should be < 300 msec round trip time
 - small amount of packet loss not a significant issue
- ◆ is “toll quality” a requirement?
 - is it the only option?
 - remember the cell phone!
- ◆ Windows XP will have extensive Internet phone support

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Convergence and Architecture

- ◆ one big issue in telephone/Internet convergence are the architectural assumptions in each camp
- ◆ Internet:
 - stupid network
 - smart edges
 - applications on 3rd party servers or in end nodes
- ◆ telephone network
 - smart network (Intelligent Network - IN)
 - dumb edges
 - applications in service provider network

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Addressing People

- ◆ phone world uses phone numbers to address connections
- ◆ Internet world uses domain names
- ◆ Internet phone can use domain names
 - may be good long term way
 - human-friendly method
- ◆ but people already have phone numbers
 - would be good to also be able to use them

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Telephone Names in the Internet

- ◆ reaching someone when all you have is a phone number
- ◆ note: many phone numbers becoming names
 - free-phone (800) numbers already are
 - number portability means the same for more numbers
 - name translated to actual address
 - in the Internet this is done with domain name system DNS
 - domain name to IP address translation
 - also IP address to domain name translation

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DNS Name or POTS # Lookup

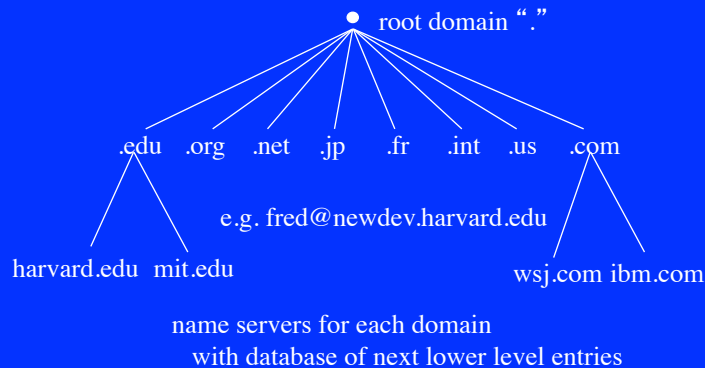
- ◆ coming from Internet - destination could be
 - in the traditional phone network
 - in the Internet
 - non-existent
- ◆ answer could be different based on type of call
 - e.g., email, web, fax, or voice
- ◆ different answers for each type of call
 - destination node itself
 - gateway serving destination number
 - web server

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IETF enum Protocol

- ◆ translate phone numbers into URLs with Domain Name System (DNS)
- ◆ DNS is a hierarchical set of distributed databases



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DNS Resolution of Phone Numbers

- ◆ create special domain names from phone numbers
+886 2 8369 1155 would be
5.5.1.1.9.6.3.8.2.6.8.8.e164.arpa
- ◆ program, not human created, pseudo domain name
- ◆ process from right to left
just like other domain names
but knows about country codes
1st goes to server for the .arpa domain
then to the server for the e164.arpa domain
then to server for 6.8.8.e164.arpa domain
which is in Taiwan

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Phone Names, contd.

- ◆ each level has information for its subdomains
 - e164.arpa has database of country code servers
 - subdomain servers have database of next level etc
- ◆ many issues
- ◆ e.g. who runs servers?
 - what area do servers cover?
 - how are they loaded/maintained?
 - individual and corporate control of information
 - restraint of trade opportunity
 - do they have to follow current number ownership tree?
 - incentive for carriers to cooperate?

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Getting enum Running

- ◆ government need to designate a Taiwanese enum operator
- ◆ government needs to tell enum root operator what enum servers to point to in Taiwan for country code 886
- ◆ process still undefined
 - Internet Engineering Task Force (IETF) working with ITU-T to define process
 - IETF developed enum specification

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Summary

- ◆ Internet facilitates end-to-end applications
easy innovation without needing carrier support
- ◆ Internet telephony is such a service
- ◆ Internet telephony is coming (e.g. Windows XP)
- ◆ Internet telephony will offer many new services
- ◆ Internet telephony will challenge regulators
- ◆ enum supports use of phone numbers to reach
Internet services
- ◆ government involvement needed for enum
regulation may also be needed

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