Internet Telephony

Helen J. Wang

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References

- Internet Telephony: Architecture and Protocols, an IETF Perspective (Schulzrinne, Rosenberg)
- A Comprehensive Multimedia Control Architecture for the Internet (Schulzrinne)
- A Comparison of SIP and H.323 for Internet Telephony (Schulzrinne, Rosenberg)

Vision

- Future network: IP core network with heterogeneous access networks, a global multimedia communication system.
- Internet Telephony: telephone -style applications on Internet, sharing all the underlying protocol infrastructure. Want to leverage the advantages of Internet over telecommunication networks.

Questions in Mind

- What infrastructure support do we need in the IP core network?
- What (telephony) service model?
- Heterogeneity
- Mobility
- Avoid porting AIN to the Internet.

Problems with Traditional Telephony

- Telecommunication network
  - Engineered for voice only, not appropriate for other data (IP: media independent)
  - Circuit switched network, not bandwidth efficient (IP:packet switched)
- Vertical integration: one size fits all; service creation clumsy.
  - e.g., signaling: routing, resource reservation, call admission, address translation, call establishment, call managementand billing

Why the current Internet is not enough?

- Internet Telephony differs from Internet Multimedia Streaming primarily in the need of control and establishment of sessions (call setup and control and mobility) -- "signaling"

Signaling

- Name translation and user location
- Feature negotiation (media, codec)
- Feature changes
- Call participant management

Session Initiation Protocol (SIP)

- Goals of session initiation: locate terminal; media/codec negotiation; whether called party wants to be reached
- SIP Servers: proxy (forward), redirect (inform caller), user agent (IAP)
- Application level reliability
- Texual, re-use HTTP headers & status codes
- INVITE, BYE, OPTIONS, REGISTER...

Personal Mobility

- Naming + redirection + call forwarding
  - Naming: e-mail like ID, a number of name resolutions possible
- Use HTTP transparent content negotiation with a SIP server on what media to use, what terminal to reach at a given time
- REGISTER location and preferences (upload policy)

Service Model

- Through SIP headers and methods: ALSO (connect to a party), REPLACE (disconnect), STATUS (current call processing status)
- Implement services from a few well defined basic service features (AIN approach)
- Already implemented all AIN service features and services.

H.323 Vs. SIP

- Complexity
- Extensibility
- Scalability
- Service

H.323 Vs. SIP Complexity

- H.323: complex due to vertical structure
  - no clean separation of the component protocols.
  - Many options for doing a single task.
  - Duplication of functionalities on different parts.
- SIP: simple, has horizontal structure, protocols with different functionalities are orthogonal with one another

H.323 Vs. SIP Extensibility

- SIP:
  - Register feature name with IANA; REQUIRE header on extension negotiation;
  - Use SDP to convey what codec to use.
  - Compatibility maintained across different versions.
  - Texual encoding self describing.
  - Modular (component based)

H.323 Vs. SIP Extensibility

- H.323: also extensible, but
  - requires full backwards compatibility
  - each codec is centrally registered and standardized.
  - less modular: vertically integrated protocol for a single application.

H.323 Vs. SIP
Scalability

- H.323:
  - Originally for LAN, WAN addressing and location were not a concern
  - On top of TCP (stateful).
  - Require "gatekeeper" to keep call state for the entire duration of the phone call.
  - Central control for conference

H.323 Vs. SIP
Scalability

- SIP:
  - server stateless or stateful, on either TCP or UDP
  - lightweight conference control: fully distributed, SIP support native multicast signaling

H.323 Vs. SIP
Service

- Both offer equivalent services
- SIP:
  - personable mobility services;
  - supports multi-hop "searches",
  - server can proxy the request to one or more additional servers.
  - preference uploading.
  - no conference control, rely on other protocol

H.323 Vs. SIP
Service

- H.323:
  - cannot express preferences
  - also supports forwarding, but no loop detection
  - cannot proxy
  - various conference control (not necessary!)

Conclusions

- Horizontal approach a must, in line with Ninja run-time system.
- Need a simple common denominator signaling protocol. H.323 seems not ideal.
  - Call establishment and control only?