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# What is Internet telephony?

- The provision of telephone-like services over the Internet.
- Voice, video, and data over a common packet infrastructure.
- Components:
  - End systems
  - Gateways
  - Signalling servers
- The next stage of development of the telephone network?

## **How is Internet telephony different?**

- End-to-end connectivity
- Smart end systems
- Heterogeneous provider environment
- User programmability
- "Cheap" addressing
- Protocols designed from scratch

### **End-to-end connectivity**

- Any IP device can talk to any other
- Low-level routers just forward packets; normally unaware of their semantics
- No centralized switches at which policy can be enforced

#### **Smart end systems**

- Much more intelligence goes into end systems
- Services can be deployed there
- Network devices don't necessarily know end systems' state; many decisions can only reliably be made by the end

## **Heterogeneous provider environment**

- One provider's Internet telephony devices talk to all the others'
- Everyone can implement services
- Users can have third parties implementing their services
- No central body designs services or resolves conflicts
- No central body enforces policy, provides security guarantees



# "Cheap" addressing

- Getting a block of numbers in the PSTN is hard
  - Typically assigned by a national body
  - Limited number of them; adding more is painful
- Getting a domain name in the Internet is very easy
  - \$50 from a registrar
  - Essentially limitless; adding more is (technically) trivial
- Internet telephony addresses based on domain names
  - PSTN phone numbers mean many different things: devices, users, meta-addresses, routes
  - These can be different in the Internet
- "Throw-away" addresses possible





- One location is forwarded to voicemail
- Voicemail picks up first, other branch is canceled
- Caller never reaches human
- Worse: what if the fork isn't "voicemail and human," but rather "intended destination and answering service"?

#### **Some adversarial Internet telephony interactions**

Different parties have different desires, or want to subvert others' features

- Called party wants to block calls from a telemarketer; telemarkerer uses "polymorphic" calling identities.
- Called party wants to have reliable caller-ID; calling party wants to be anonymous.
- Calling party's administrator wants to block calls to certain addresses (and enforces this with a firewall which forces calls to go through his proxy server); calling party and called party collude to set up call forwarding so the called party has a new address.

# Solution techniques that don't work well in Internet telephony

- Global descriptions of services
  - Interactions may occur between several different providers
- Manual consideration of possible interactions
  - Programmable services mean you can't list all possible services
  - Services may be created by naive users



## Conclusion

- Internet telephony brings many new issues to feature interaction
- Some existing work caries over; some does not
- Many new avenues for research
- Further work needed