Wireless & VoIP

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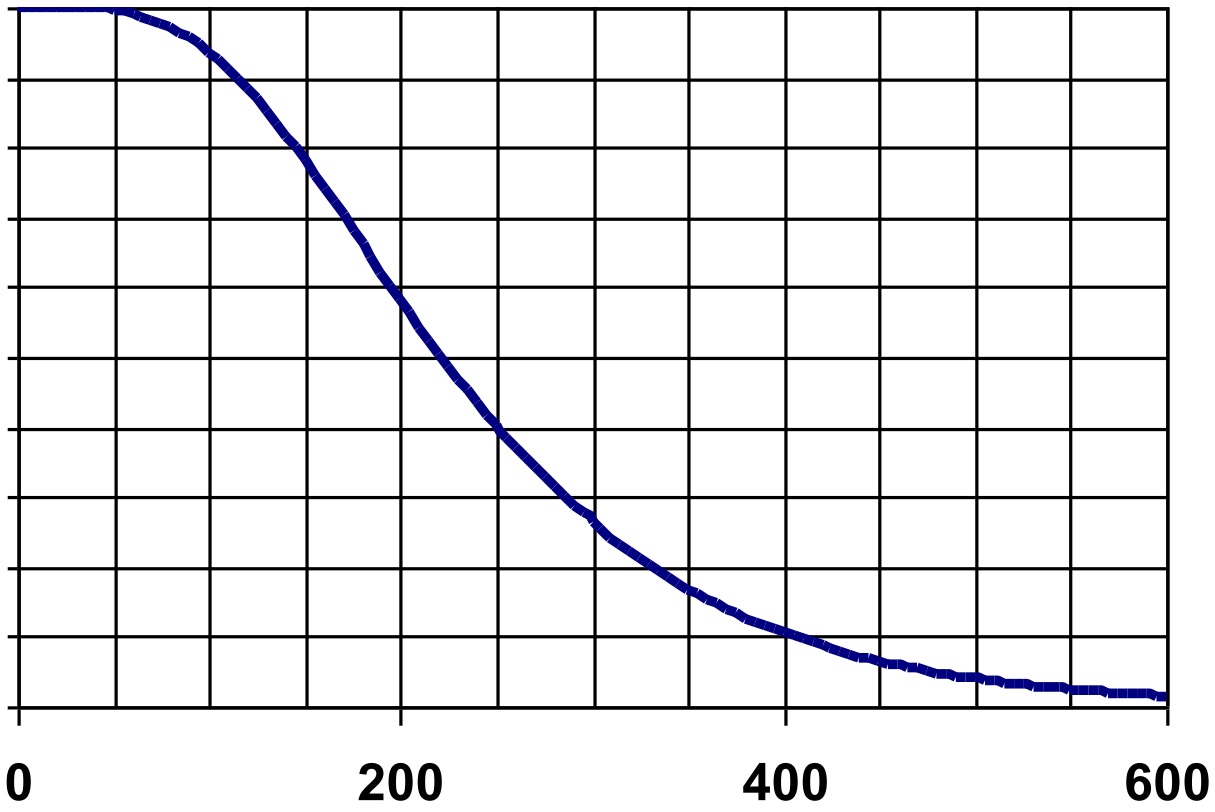
Wireless Voice over IP: 2 Questions

- Can we make it work?
  - Can we provide decent quality?
  - Can we support efficient signaling?
- Can the telcos accept it?
  - Loose control of voice?
  - Loose control on “services” ?

Interactive voice quality, Component #1: delay



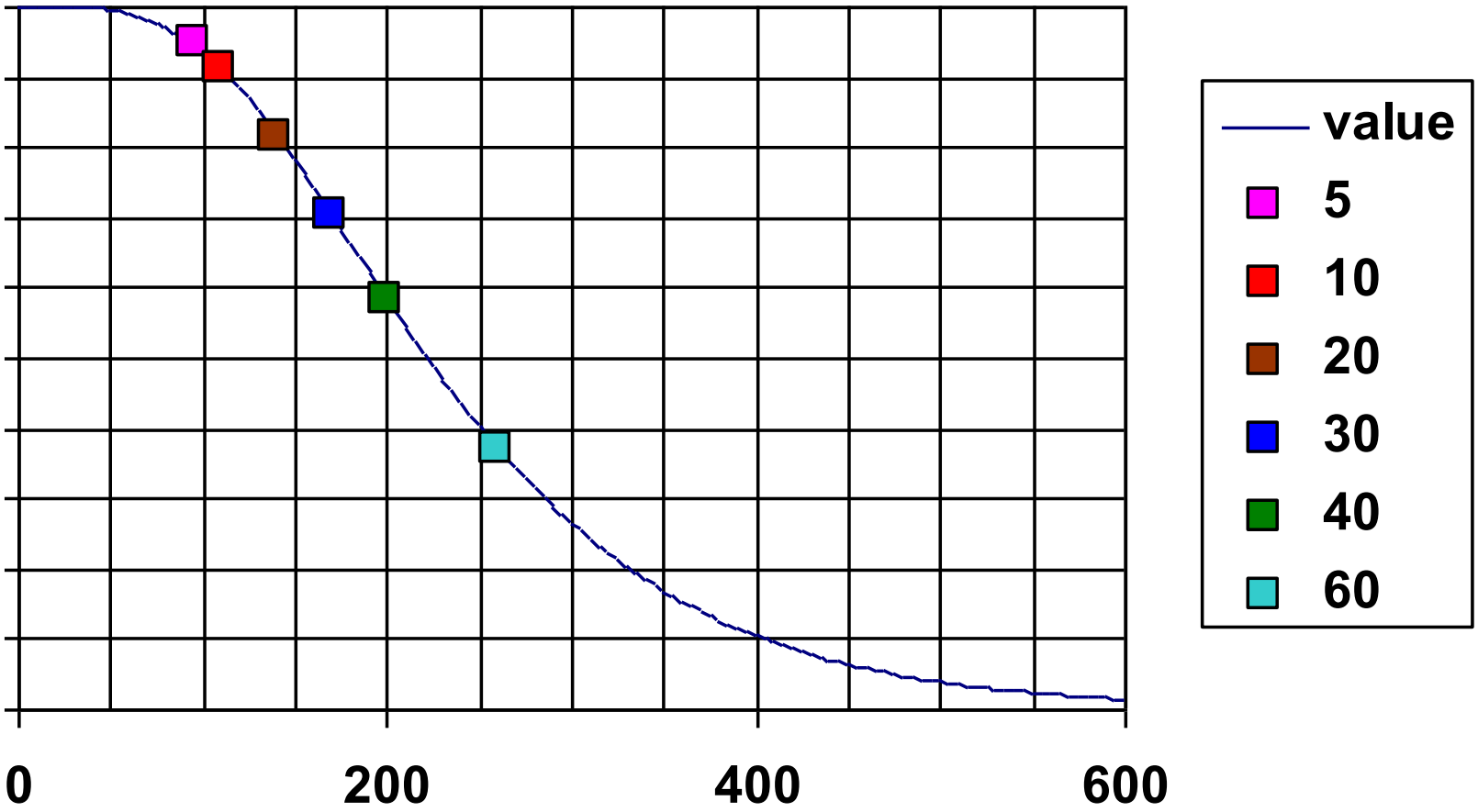
Components of delay

- Network (delay, jitter):
  - Access Network, Uplink
  - Core Network,
  - Access Network, Downlink
- Packetization, De-Packetization
- Device:
  - Acquisition, Echo control, Compression,
  - Jitter, Decompression, Playback

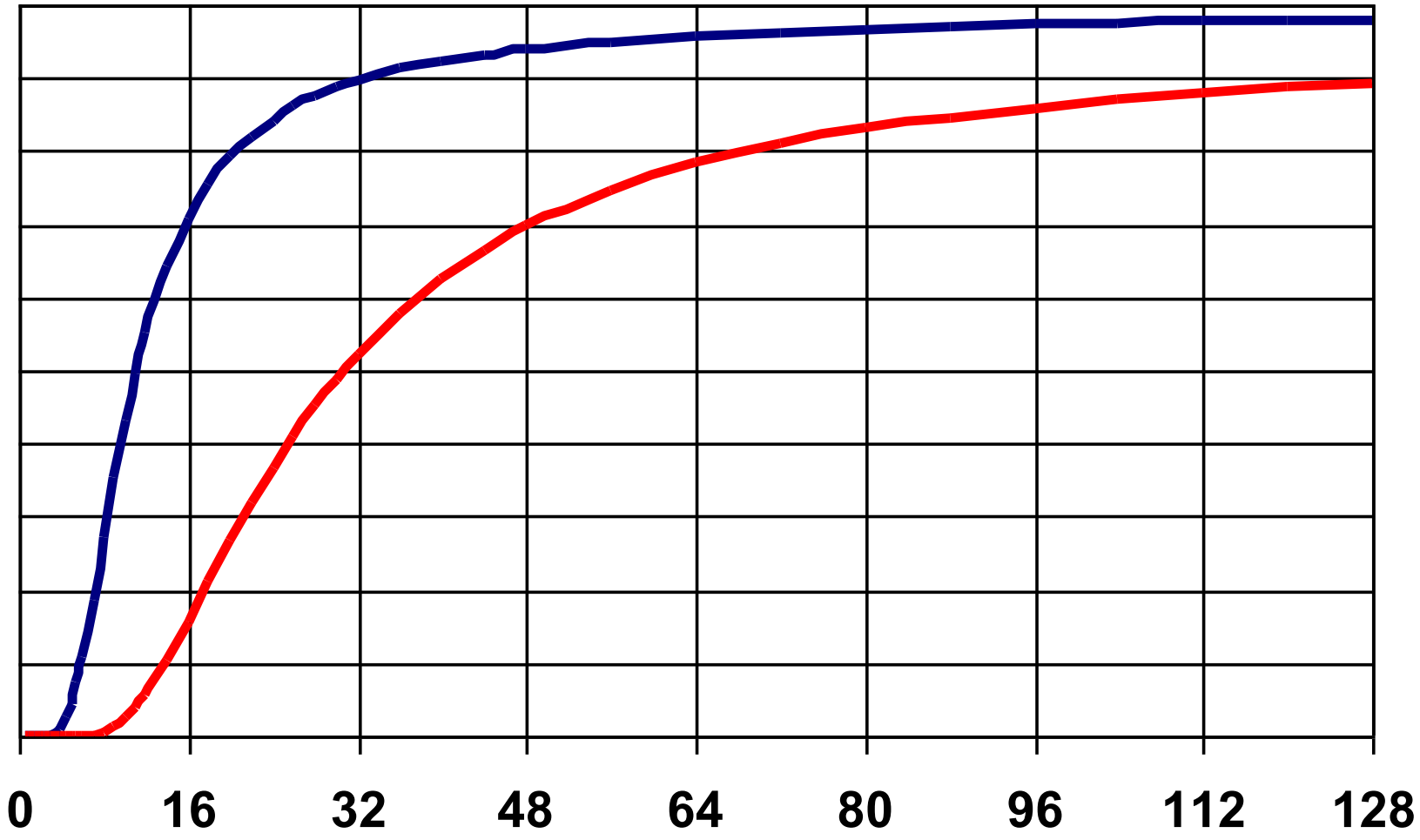
Managing the Uplink: beware of contention

- Data Usage emphasizes "load"
  - Highly variable sources,
  - Contention access fits best (CSMA, TDMA-DA, slot request, etc.)
- Contention access unfit for voice
  - Generates "large deviation"
  - Deviation => jitter => delay.
- … Unless very low load factor

Packetization frequency: Size => Delay => Quality



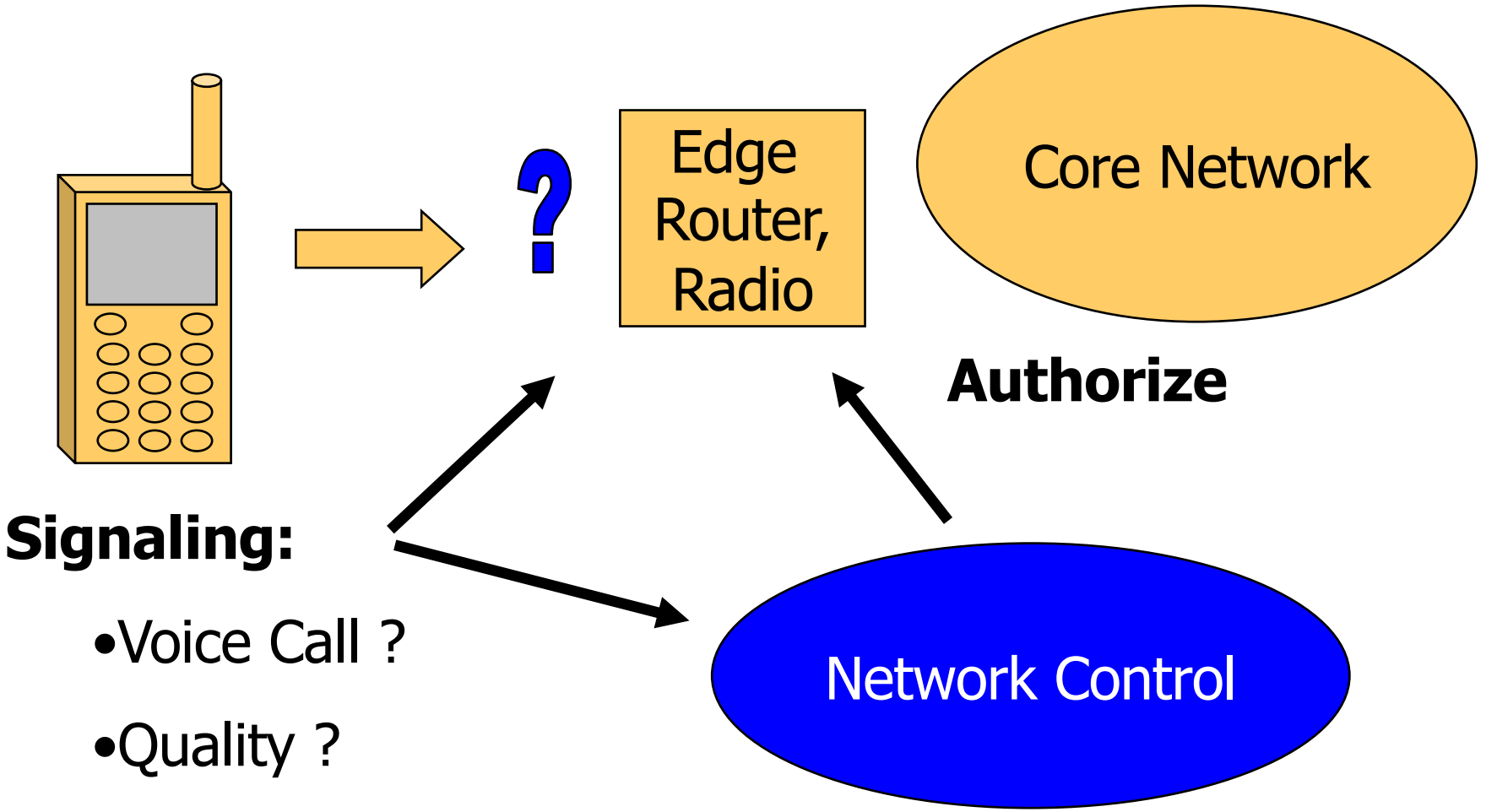
Bandwidth => Quality
Delay => Header/Payload ratio



Voice Quality: Effects of Packet Losses

- Loss effect aggravated by “fractal” distribution.
- Moderate losses (1%) can be concealed.
- Higher losses require redundancy: (standard in RTP):
  - Affects bandwidth (split / N packets)
  - affects delay (N packets) => quality…

Uplink Starvation => Control Bandwidth, Packet Rate



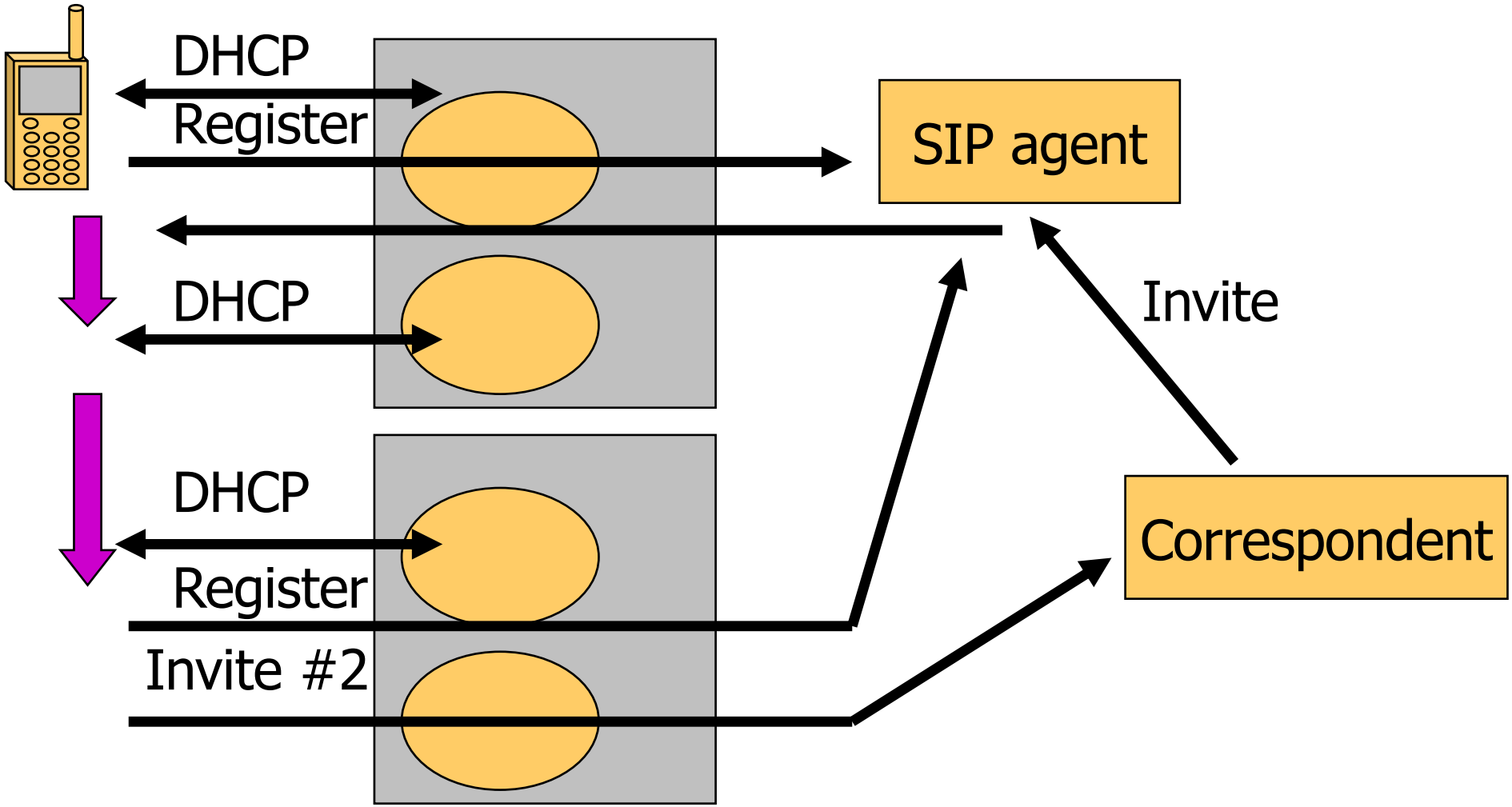
Can we do efficient signaling? Wireless VoIP => Mobility

- Classic telephony approach:
  - HLR (home) /VLR (visitor)
  - Based on phone number
  - Number = Transport + User identity.
- VoIP separates network, service
  - Network: IP address
  - Service: DNS name, e-mail, URL
- Need clean architecture

The VoIP Protocol Soup
More than one choice…

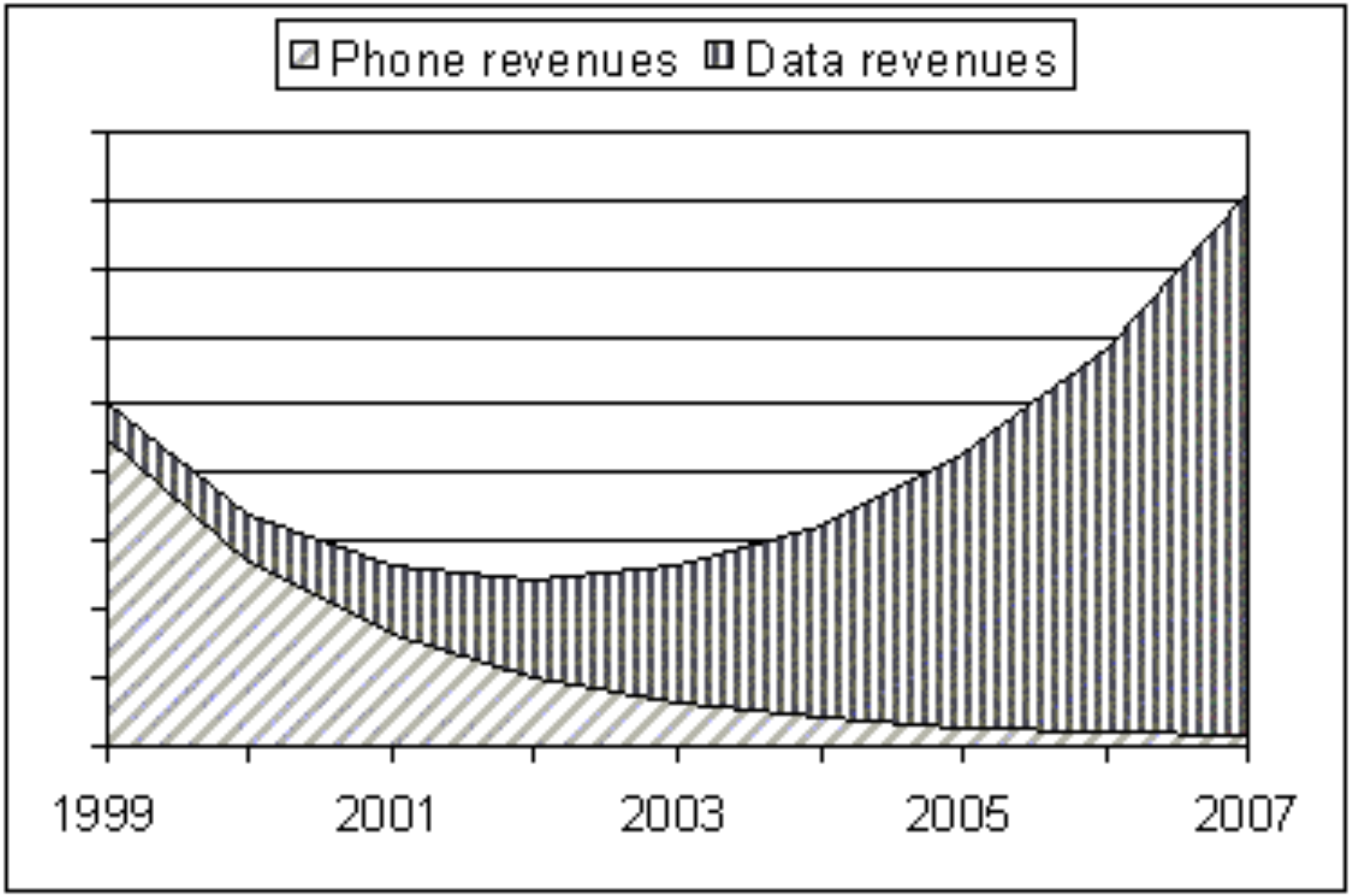
- H.323
  - ITU standard, implementations
  - Complex, heavy, hard to evolve
- MGCP
  - Client server, “telephony device”
  - Used in Cable networks
  - Not really adequate for mobility support
  - MGCP / Megaco / H.248 debacle
- SIP
  - Clean end-to-end architecture

Signaling & Mobility: Combine "Mobile IP", SIP



Can the telcos accept VoIP? Wireless VoIP?

- Special price for voice, data:
  - Wire line: price of voice is 10 x data bit
  - Wireless: data is “special service.”
- Bundling of services:
  - Caller-ID, Call-Waiting,
  - Voice Mail,
  - 3000 “IN” services
  - 911, etc.


Phone revenues
Data revenues
1999
2001
2003
2005
2007

Wireless VoIP: loosing control of voice?

- In the short term, QoS issues
  - Contention on the uplink,
  - Telco can control “voice quality IP”,
  - But “real time” is more than voice (video, games, monitoring.)
- The end of uplink starvation?
  - High speed wireless LAN, 3GIP?
  - Need adequate “sharing” procedure.

Wireless VoIP: becoming "the" infrastructure

- Need to be always on, meet the classic 99.999% requirement,
- Deal with societal issues, such as wiretap, in an end-to-end environment,
- Provide 911 like services:
  - Special signaling, no hang-up,
  - Location services, route to local 911,
  - "Emergency" level for QoS.

Wireless VoIP: loosing control of services

- IP signaling is end to end
  - SIP agent "outside" the network,
  - Service independent of transport.
- State is kept in the device:
  - Local implementation of services,
  - Call waiting, multiparty call in device.
- Empower users, unleash creativity

Wireless VoIP Roadmap

- Solve the uplink issue:
  - QoS on "first hop", not end-to-end,
  - Independent of payload type (voice, etc.)
  - Security, authorization (DHCP, QoS).
- Encourage competition:
  - "Secure Wireless DHCP," Roaming
- Concentrate signaling work on SIP:
  - Forget the ITU!