

Wireless & VoIP

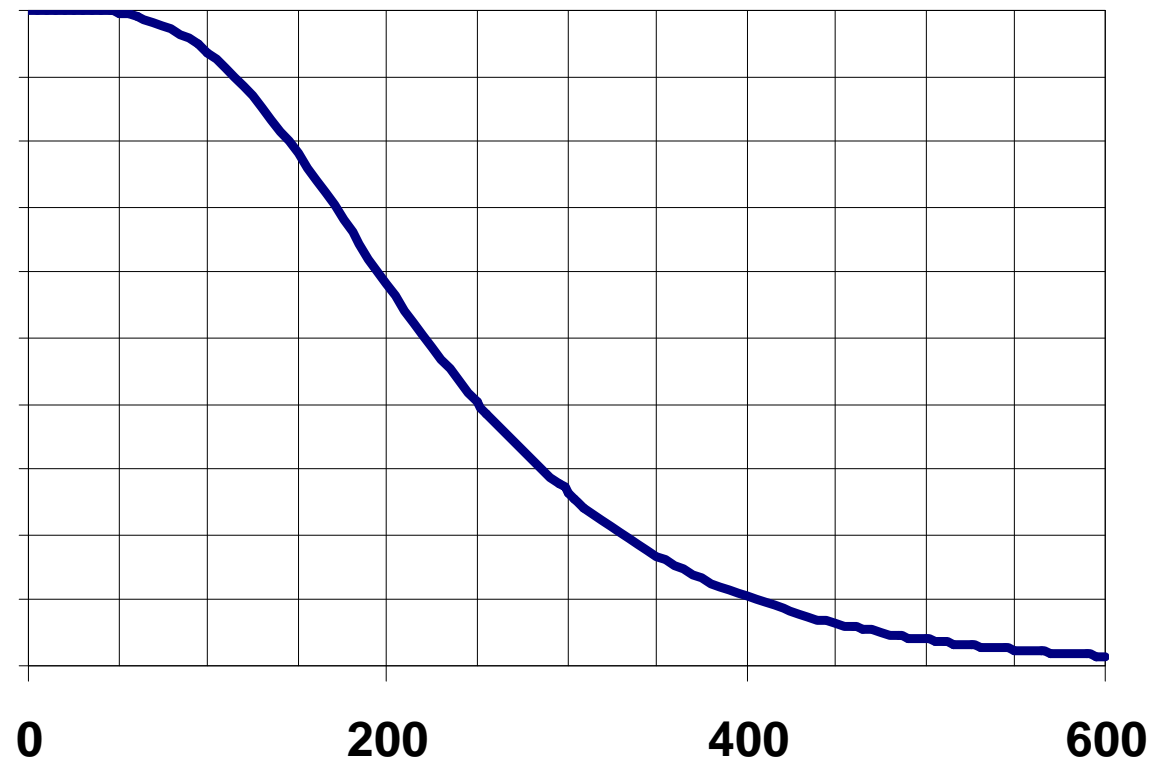
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Wireless Voice over IP: 2 Questions

- 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



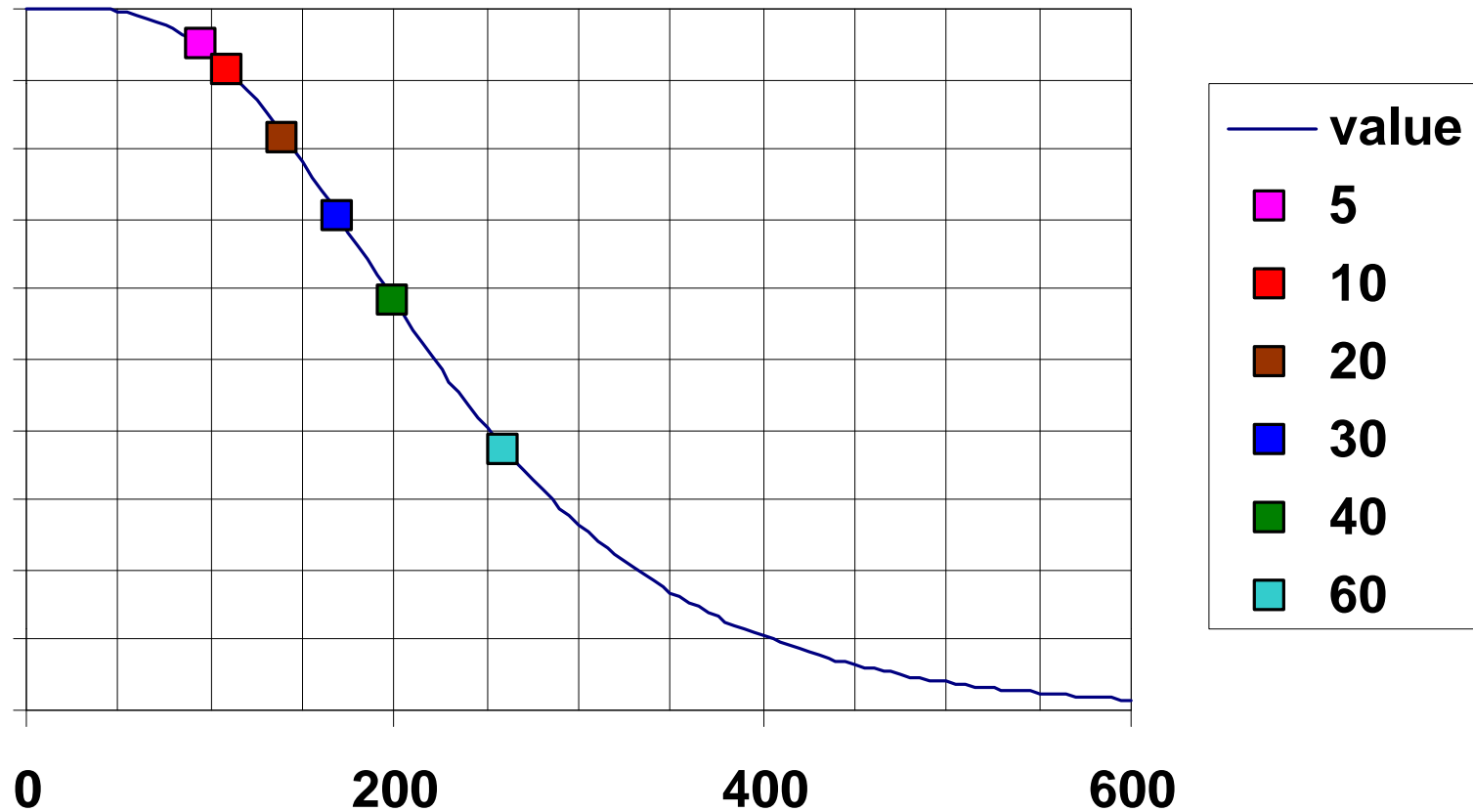
Components of delay

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

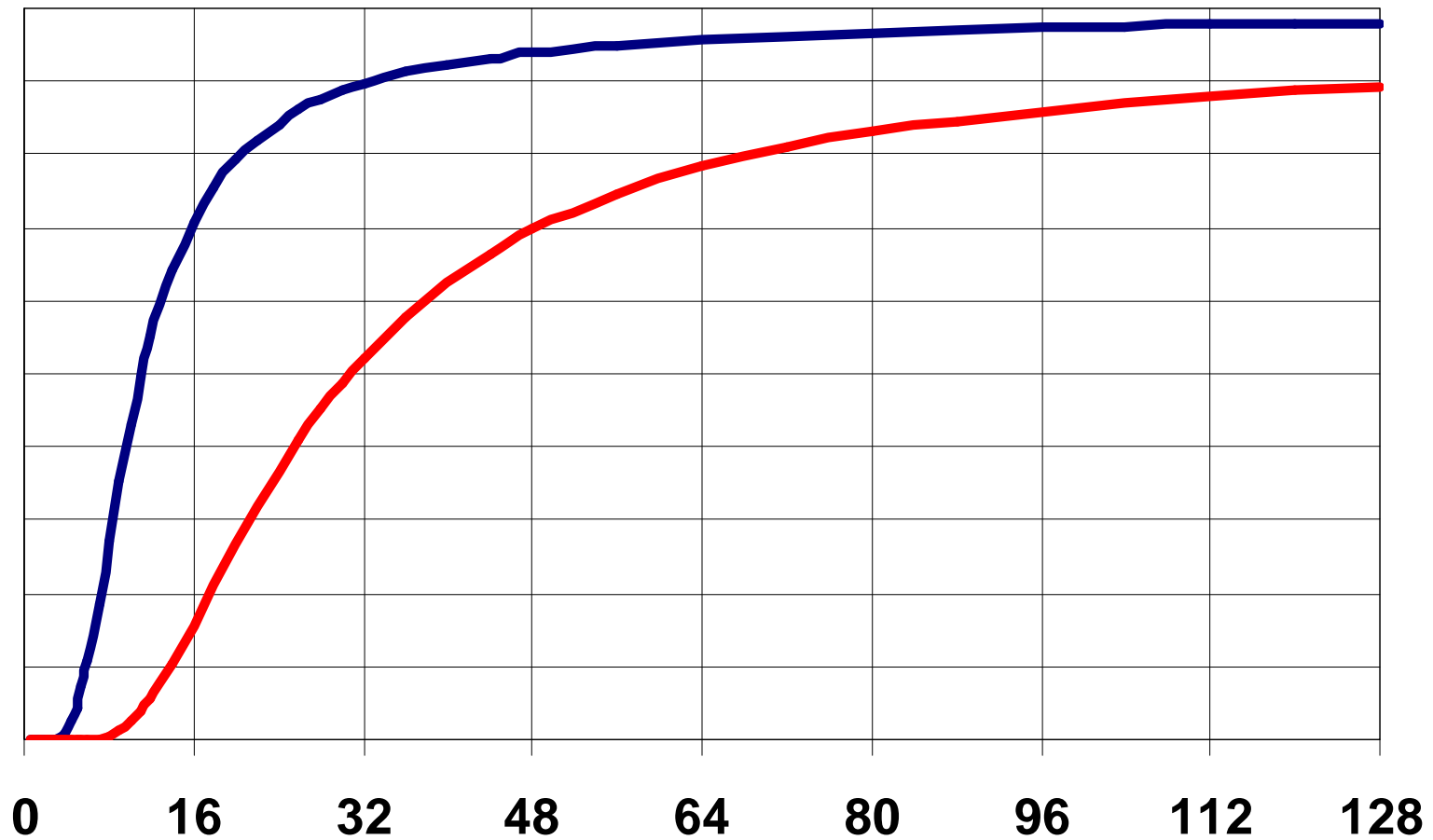
Managing the Uplink: beware of contention

- 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



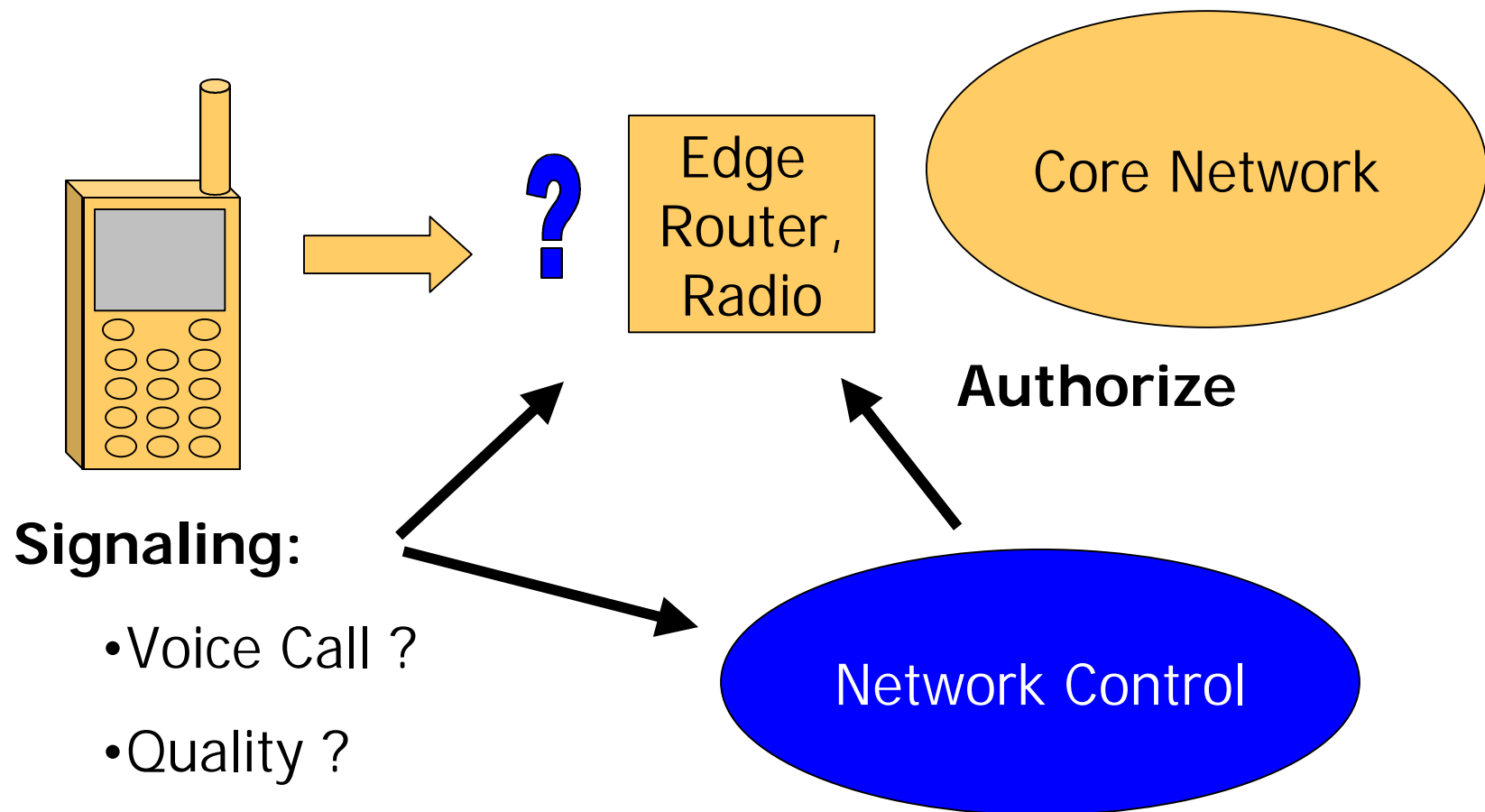
Bandwidth => Quality
Delay => Header/Payload ratio



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

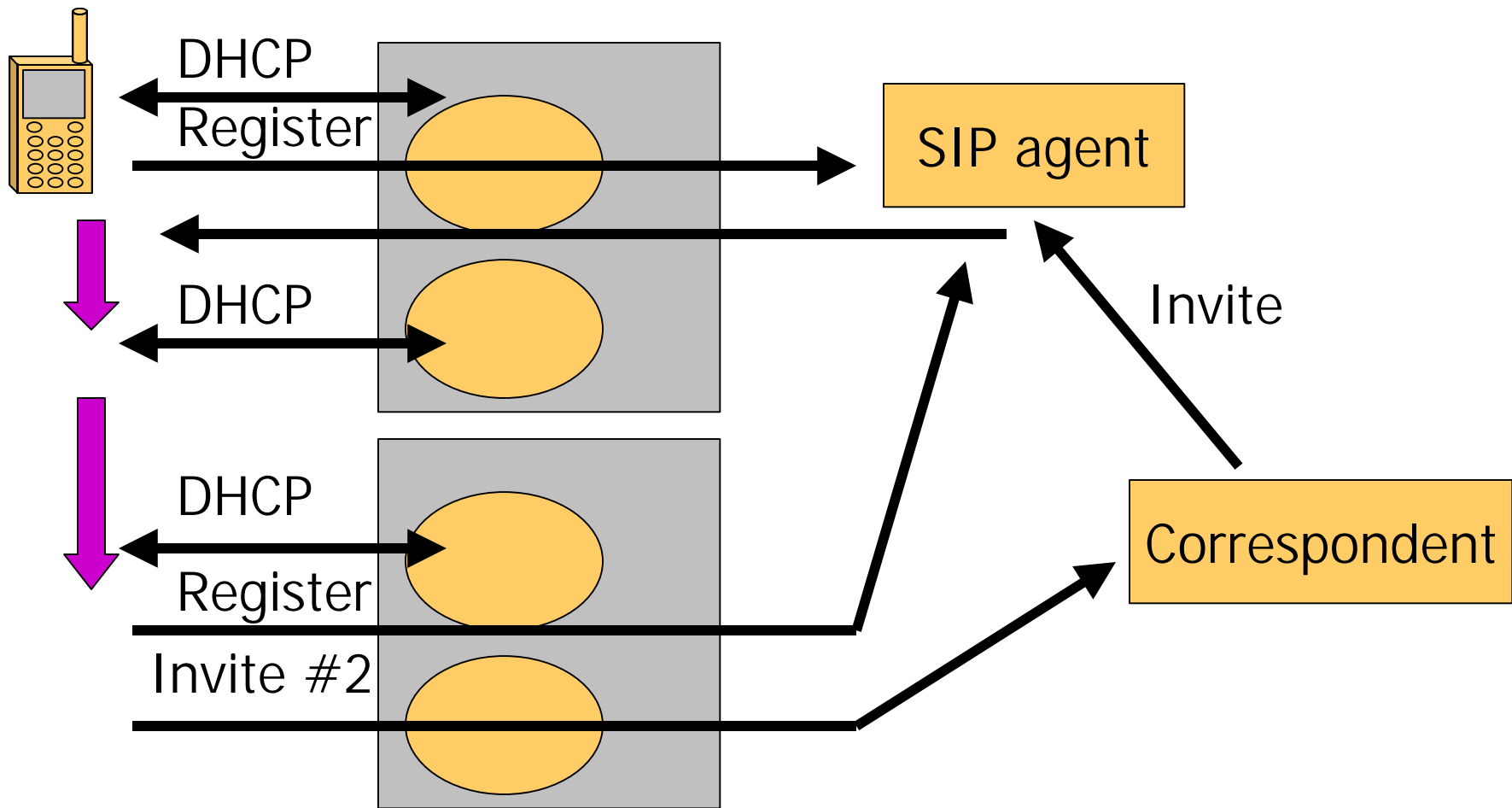
- Classic telephony approach:
 - HLR (home) /VLR (visitor)
 - Based on phone number
 - Number = Transport + User identity.
- VoIP separates network, service
 - Network: IP address
 - Service: DNS name, e-mail, URL
- Need clean architecture

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

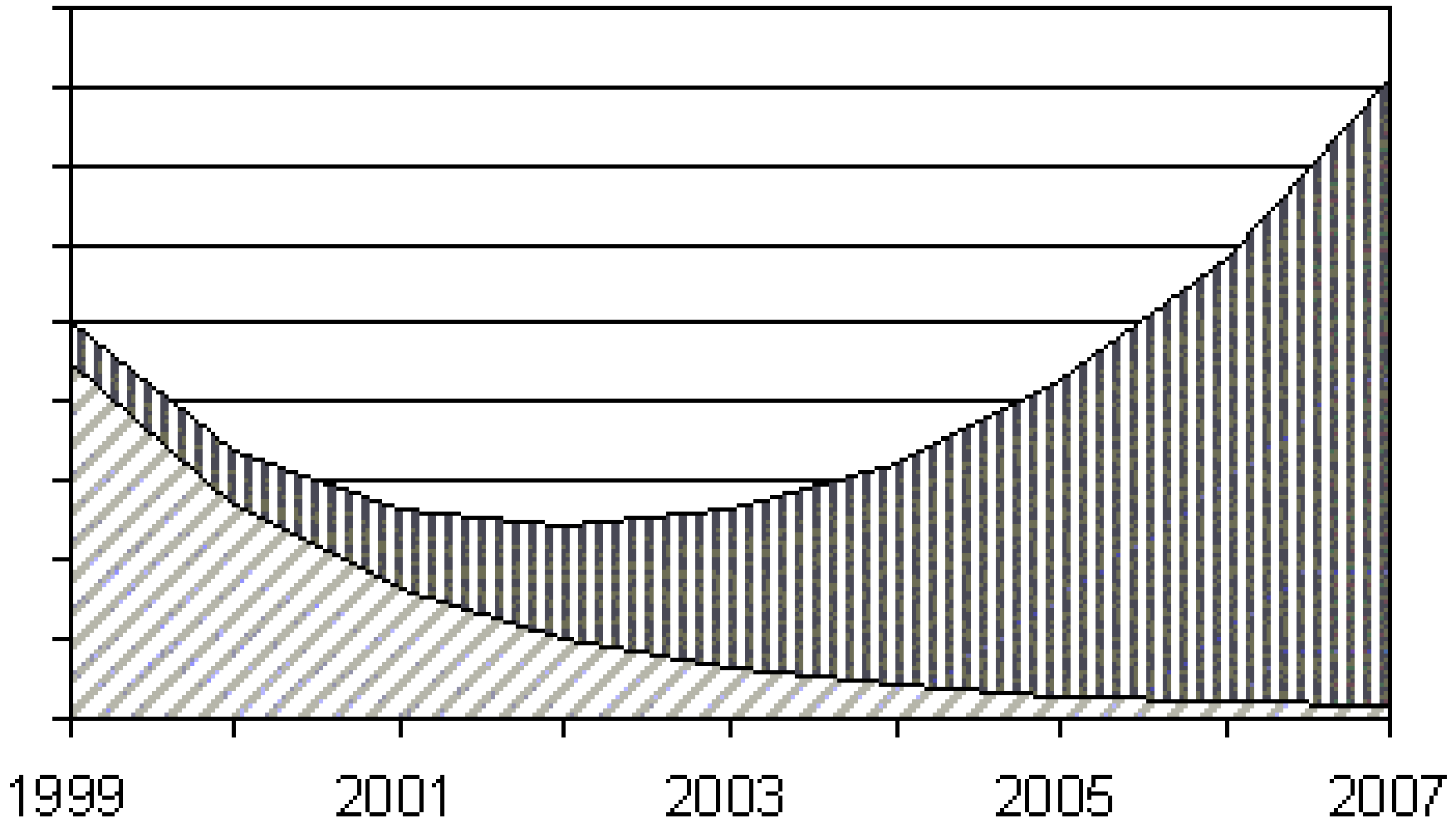
Signaling & Mobility: Combine "Mobile IP", SIP



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



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!