VoIP Quality

Matching PSTN Quality
Telephony Bandwidth Speech Test Result

Source: Lockheed Martin Global Telecommunication (COMSAT)

MOS

GIPS Enhanced G.711+
GIPS NetEQ

G.711+GIPS NetEQ

G.711+ITU PLC

G.729A

G.711+No PLC

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Mobile VoIP & Technology Trends

• **Greater accessibility and affordability**
  - Network operators are introducing new pricing models
  - Handset prices declining

• **Increased smart phone adoption**
  - Mobile phone increasingly perceived as a computer
  - MIDs and iPAD like devices add capabilities
  - Users expect to access the same applications available across multiple platforms

• **Migration from legacy cellular to next-gen networks**
  - Allows for faster data connection

• **Development of 3rd party applications**
Technology & Business Drivers for Mobile VoIP

• Technology Drivers
  – Communication is rapidly migrating to IP networks
  – Introduction of 4G/LTE on mobile networks
  – Networks and devices support HD Voice
  – High quality, two-way video becoming pervasive
  – HD Video requires HD Voice

• Business/Cultural Drivers
  – Unified Communications
  – It is becoming easier to be green
  – Globalization
What’s HD Voice?

- **GIPS HD Voice**
- **GIPS Improved Telephone Quality**
- **Standard HD Voice**

- **Standard Telephone Quality (PSTN)**
  - 200 - 3400 Hz

- **Frequency Ranges**
  - 3.4 kHz
  - 4 kHz
  - 6.4-7.0 kHz
  - 8-16 kHz
  - 22.1 kHz

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Why HD Voice is necessary for Mobile VoIP?

- Where audio bandwidth is currently most constrained
- Where intelligibility is most difficult
- Where environmental factors (background noise, echo) further impair quality

*Best quality means clean, or perfect conditions

Mobile telephony is the most in need of a quality upgrade.
HD Voice Design Considerations

Speech Codec

Coping with Network Degredation

Echo Cancellation

Additional Voice Processing Components

Codec

Network

Hardware

VoIP Design Challenges

Power

Environment

Voice

Echo

Cost

Hardware Issues (Processor, OS, Acoustics, etc.)

Power Consumption

Environment – Background Noise, Room Acoustics, etc.

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Two-Way Video Will Soon Be Everywhere
– HD Voice is required

Collaboration Applications

Desktop Conferencing

Video Chat Applications

Mobile Devices
Tablets: Changing the Definition of Mobile Devices

- Fewer hardware limitations
  - Larger screen displays more participants
  - Greater CPU
- Adoption in verticals seeking video conferencing
  - Telemedicine will be $3.6 billion annual market in next 5 years (Pike and Fischer)
- Major smartphone players entering market
  - Apple
  - Google
  - Microsoft

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Mobile Video Challenges

Many Technical Limitations Have Been Overcome:

- **Software to handle poor networks**
  - Can manage delay, packet loss, jitter
- **H.264 SVC delivers much better conferencing experience**
  - Layered approach tailors video for each participant and device

The Question Remains:

- **Do people want it?**
  - Screen size limits number of visible participants
  - Non-mobile users get lower resolution from mobile users
  - Social norms restrict usage

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Mobile Quality Issues

• Network Deficiencies
  – Low signal strength
  – Wi-Fi/3G bottlenecks
  – Additional delay, jitter and packet loss in IP network

• Device Limitations
  – Limited processing power and battery life
  – OS limiting access to real-time VoIP

• Environmental disturbances
  – Acoustic Echo
  – Background noise
Case Study

Toktumi–Line2

**Toktumi/Line2**

- Be productive anywhere
- Go mobile
- Save Money

Offloads to the Wi-Fi network to make cost savings for enterprise

Line2 combines the best elements of Skype and Google Voice and adds business grade features, reliability

Dual mode cell phones required

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Question & Answers

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