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The Internet, voice and quality of service

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Today's agenda

- ⇨Traditional approach to speech coding for VoIP applications
- ⇨New paradigm
- ⇨Summary

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TRADITIONAL APPROACH - CELP SPECIFICS

- Current low bit rate codecs: ITU G.729, G.723.1, GSM-EFR, and 3GPP-AMR were developed for circuit switched & wireless telephony and are all based on the CELP (Code Excited Linear Prediction) paradigm.
- CELP coders are stateful, they have memory, error propagation results from lost or delayed packets.
- Long time is needed to resynchronize coder and decoder (often 70-100 ms)

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New Approach – Paradigm shift

We need holistic view/approach for both

- Horizontal (end-to-end) QoS perspective
- Vertical (top-down) QoS perspe

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Vertical (Top Down) Perspective

Presentation	**Speech Codecs/…**
Session	**SIP/H.323**
Transport	**RTP/UDP/RSVP**
Network	**IP/WFQ/IP-prec**
Link	**MLPPP/FR/ATM AAL1**
Physical	

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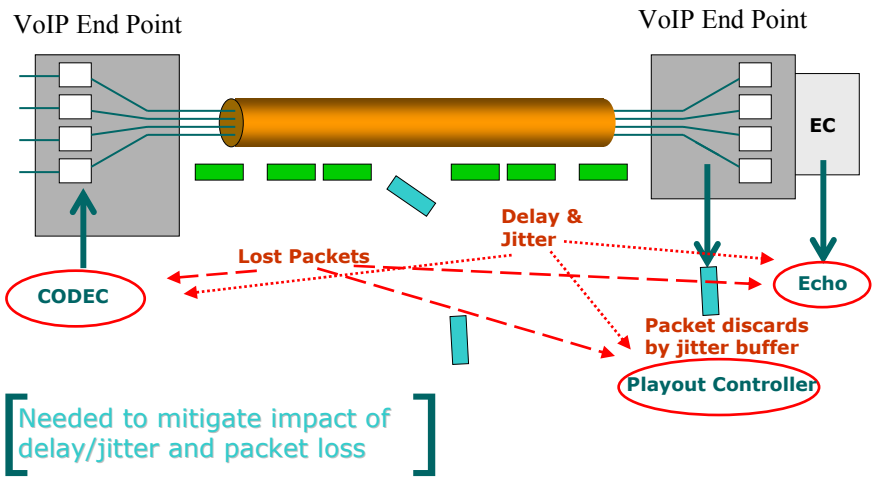
What impacts perceived quality?



Needed to mitigate impact of delay/jitter and packet loss

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Design principles

- High basic quality
- Robustness (e.g. for codec no inter-frame dependency, MDC)
- Low complexity
- …
- Realistic test methodology and tools during design phases

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What can be improved?

- One side solutions:
  - Advanced Playout Controller
  - AEC, NEC with right design, AGC (Skype)
- Both end solution:
  - Codec

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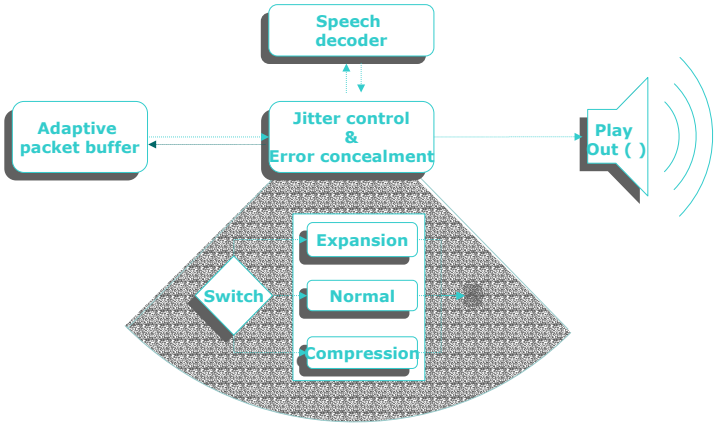
Adavced jitter buffer structure



The main functionalities of NetEQ Advanced Playout Controler

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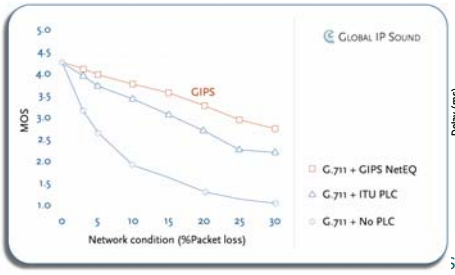
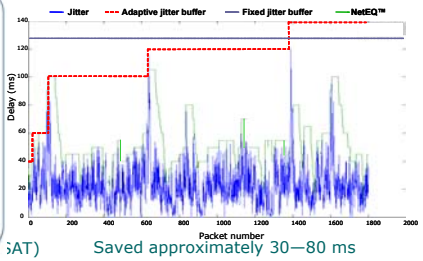
Improvements for “one-side” solutions





Sou ;AT)

Saved approximately 30—80 ms

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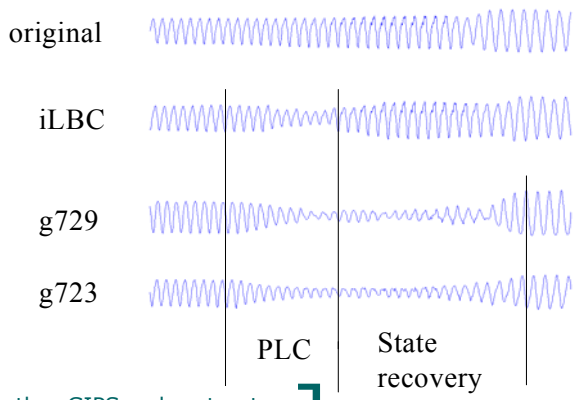
Improvements for ”two sides” solutions



iLBC, like other GIPS codecs treats every packet individually, making it suitable for packet communications.

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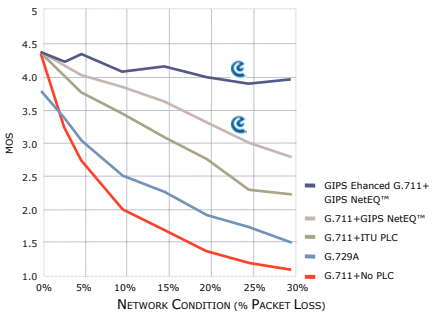
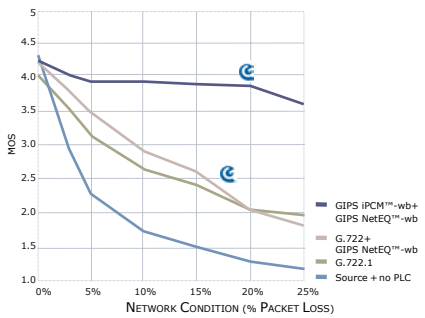
Improvements with two side solutions

Telephony band
sound quality



Wide band
sound quality – Better then PSTN



Source Lockheed Martin global Telecommunication (comsat)

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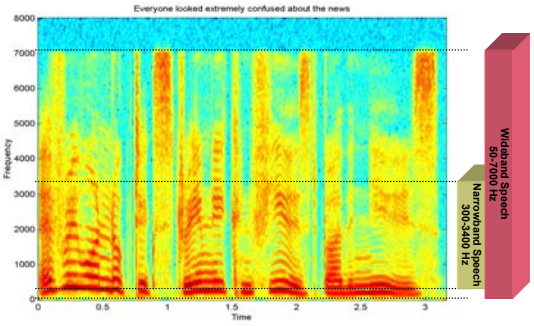
What else to improve – usage of wideband coders

- Current wireless systems and wireline telephone networks offer **only narrowband** speech services (300 ~ 3400 Hz)
- Recent advances in speech coding have made wideband coding feasible for use in real life packet networks and in bit-rates applicable to mobile systems in first
- Wideband provides **superior quality** over narrowband telephony



- Increased naturalness (low end)
- Better fricative differentiation (high end)
  → higher intelligibility
- Increased presence
  → feeling of transparent communication
- Increased comfort
- Easier speaker recognition

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Summary

- **By using realistic QoS enhancements and solutions that are already available it is possible to accelerate deployment of VoIP technology.**
- **VoIP endpoints, focus on both: single side improving solutions and both end improving solution.**
- **Broadband ITSP's have unique opportunity to capitalize a numerous advantages of Internet as a next generation transport network without sacrificing on quality**
- **Broadband ITSP's are moving perceived quality levels of end user to the new bars and dimensions by start of wideband codecs deployment**

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Future

"The future is here, it's just not evenly distributed yet."

-- William Gibson

Thank You!

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