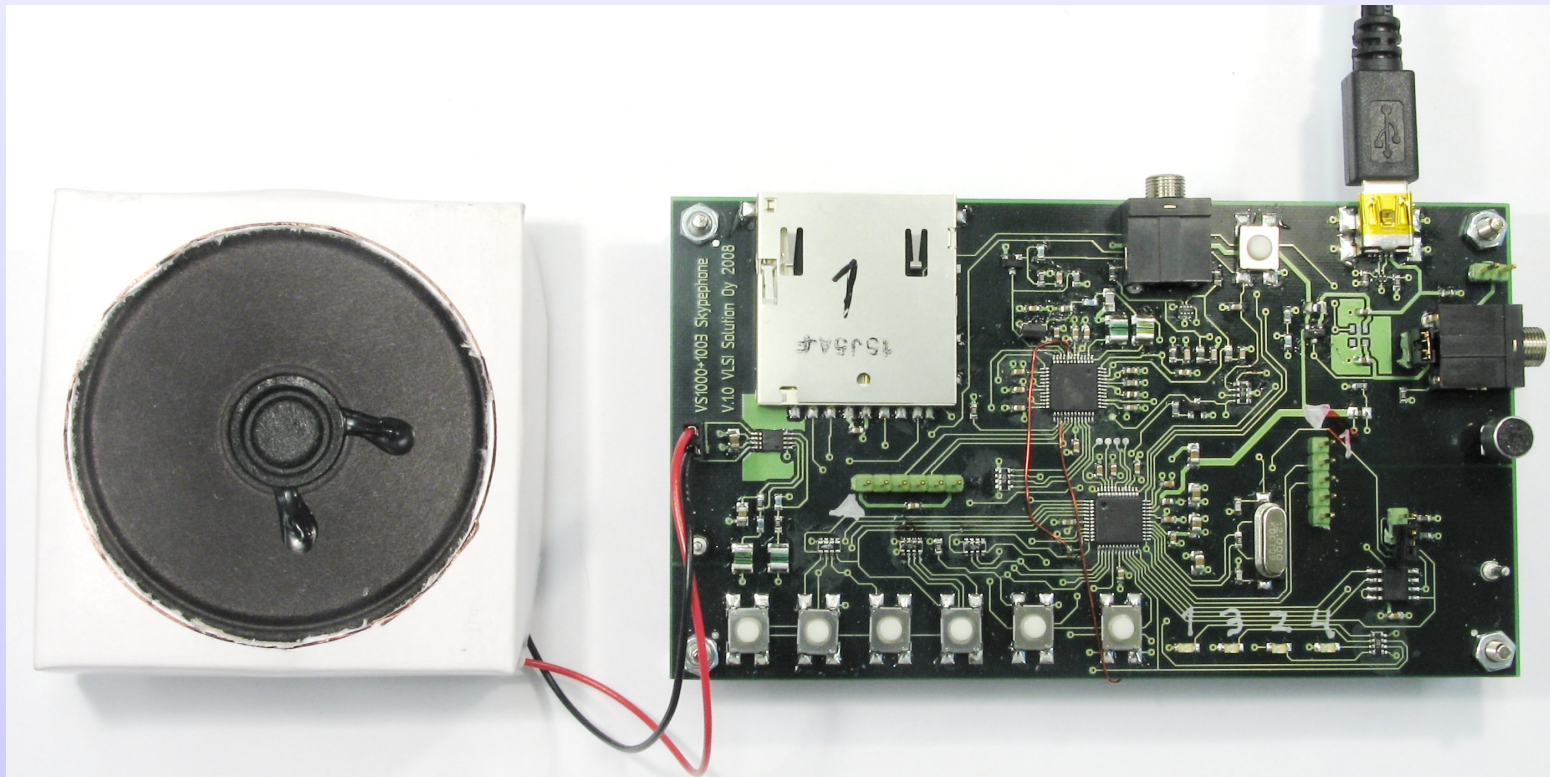


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VLSI
Solution 

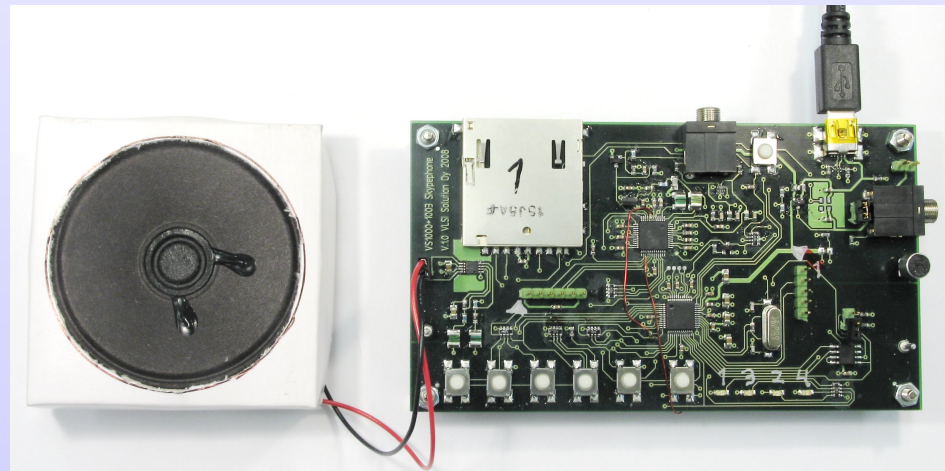
VoIP Speaker Phone with Acoustic Echo Cancellation

Version 2.00, 2008-04-25



VoIP Speaker Phone: Interface

- Uses VS1000 and VS1003
- Microphone
- Mono speaker / stereo earphones
- MMC/SD/SDHC media card slot
- Full-speed USB
- Five buttons
- Four LEDs



VoIP Speaker Phone: 5 in 1

- Applications:
 - VoIP speaker / earphone telephone
 - Media player
 - Voice and phone conversation recorder
 - USB Mass storage device
 - Sound card

Application: VoIP Speaker Phone

- A speaker phone is often more convenient than headset
- **Automatic acoustic echo cancellation**
- Easy to install: **no software drivers needed!**
- Standard USB Audio device:
 - 32 kHz stereo playback
 - 8 kHz mono recording
- USB-powered, needs no external power
- Compatible with Windows XP / Vista and Mac OS X
- Automatic Li-Ion 3.7V battery charging logic

Application: Media player

- Media player can play several formats from media card:
 - .MP3: MPEG 1 layer III
 - .OGG: Ogg Vorbis
 - .WMA: Windows Media Audio
 - .MID: Midi
 - .WAV: RIFF IMA ADPCM and PCM WAV

Application: Voice recorder

- When in Media Player or Speaker Phone mode, one-touch recording can be used to activate dictation recorder
- Recording parameters:
 - Mono 16-bit PCM WAV
 - 8 kHz
 - 128 kbit/s (1 GB memory card offers over 17 hours recording time)
 - Recording length limited by size of memory card

Application: USB Mass storage device

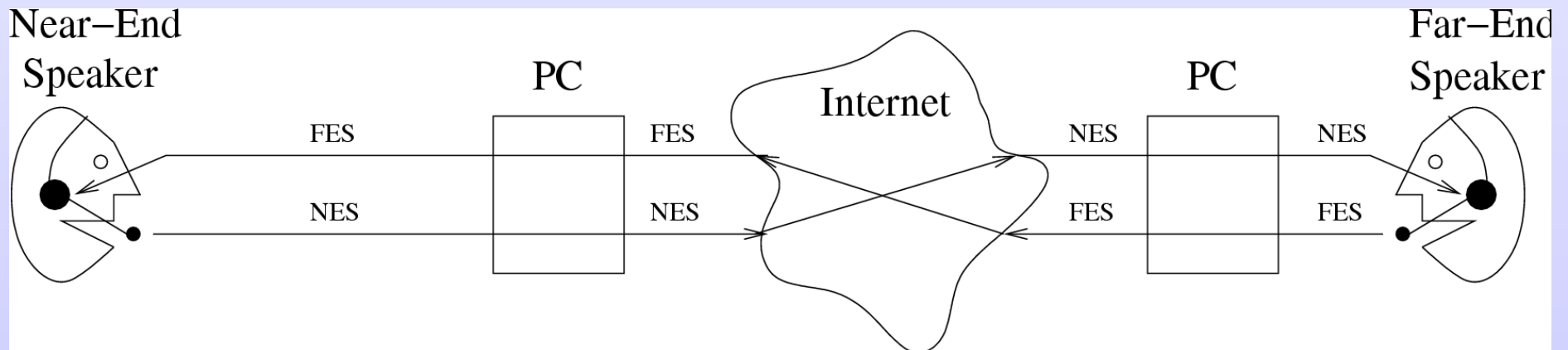
- USB Mass Storage Device lets the user transfer programs, files and settings along with him/her
- Full-speed USB supported
- SDHC cards with over 4 GB capacity supported

Application: Sound card

- When not engaged in a VoIP conversation, the VoIP Speaker Phone can be used as an external USB sound card for the computer
- Supports 32 kHz stereo for playback
- Supports 8 kHz mono for recording

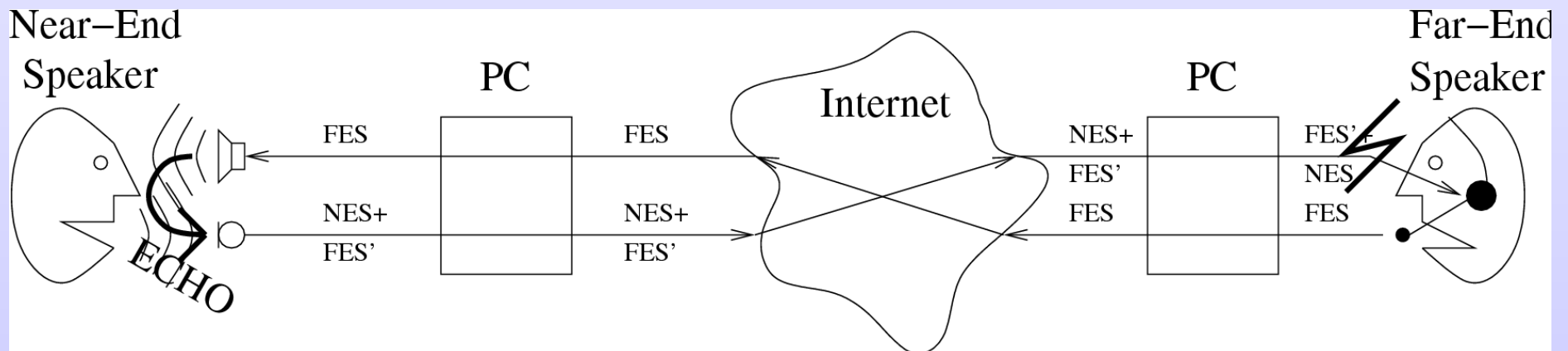
Why echo cancellation? (1/3)

- When two people are speaking with headsets, there is no problem because signals that come to the earphones don't significantly leak to the microphone.



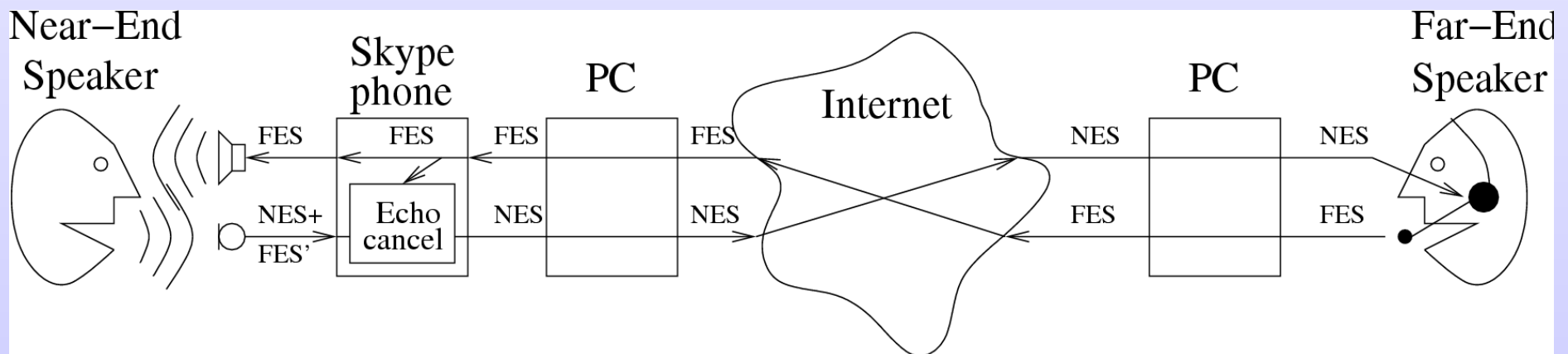
Why echo cancellation? (2/3)

- When Near-End Speaker uses speaker phone set without echo cancellation, Far-End Speaker's voice is picked up by the Near-End mic and is echoed back to him/her.
- Echo makes it difficult for the Far-End Speaker to talk to you because (s)he hears his/her own voice delayed.



Why echo cancellation? (3/3)

- Echo cancellation uses an adaptive filter to remove the Far-End Signal from the Near-End Speaker's microphone signal.
- Now the Far-End Speaker doesn't hear his own voice echoed and conversation is easier.



How echo cancellation works (1/2)

- Echo cancellation is **not** on your phone to help **you**, it is there to **help the speaker on the other end!**
- Echo cancellation analyzes the microphone signal and creates a model of the room's acoustic response. This model can be used to cancel the Far-End Speaker's signal from the microphone input

How echo cancellation works (2/2)

- If **you** hear excessive amounts of echo during a VoIP or telephone call, it is because **the other end** doesn't have working echo cancellation
- Echo cancellation has to learn about the room, so it takes a few seconds before cancellation fully works
- Echo cancellation is mandatory on GSM phones:
 - When placing a GSM call, you can often hear your own sound for a few seconds. This is the echo cancellation training period.

VoIP Speaker Phone Summary

- Convenient device that allows conference calls or single-person hands-free calls with high audio quality
- Media player with many supported formats
- Voice and phone conversation recorder
- Mass storage device for storing files
- External USB audio card
- No drivers needed. No hidden costs. **It just works!**

Technical support

- Technical support is helping you at support@vlsi.fi . From this address you can request:
 - Schematics and user instructions
 - Demonstration boards
 - More information