Multi-way Video Conferencing System

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System Design Goal

- Maximize user experience
- Energy efficient
- Low bandwidth requirement
Maximize User Experience

- Primary/Secondary View Design
- Automatic view management
- Flexibility and user preference support
Energy Effect—Codec Choice

- Video Codec
  - JPEG vs. JPEG2000, MPEG, MPEG4
  - 2KB/frame for 160x120
  - 1KB/frame for 80x60

- Audio Codec
  - ADPCM vs. MP3
  - 32Kbps (4KB/s) after encoding
Energy Efficient—Customized Optimization

- Low level efficient hardware access
- Hand coded zoom in/out routines
- Skip JPEG header (~700 bytes/frame)
- Choose YUV over RGB
- Dynamic video frame skip with leaky buffer management
- High performance event driven engine
Low Bandwidth Requirement

- **Video**
  - Fast Mode: $2\text{KB} \times 15 \times 4 = 120\text{KB/s} = 960\text{ Kbps}$
  - Slow Mode: $1\text{KB} \times 5 \times 4 = 20\text{KB/s} = 160\text{Kbps}$

- **Audio**
  - $4\text{KB/s} \times 4 = 16\text{KB/s} = 128\text{Kbps}$
System Architecture

View Manager

Peer Manager

Config Manager

Timed Event Driven Engine

ADPCM Codec
JPEG Decoder
JPEG Encoder

Audio
LCD
Camera
Network
Touch Screen