

S3 Single Chip MPEG-1 Audio/Video Decoder

4.3-02

MPEG Momentum & The Personal Computer

- **30% of all households now have PC's**
- **There are now more PC's being sold every year than TV's**
- **Most major PC OEM manufacturers will have MPEG-1 decode capable product offerings by 1996**
- **Many of those will have MPEG on the motherboard**



MPEG Momentum & the Personal Computer

- There are currently 250 (and growing) MPEG titles in circulation
- MPEG-1 encoder systems are now available and are reasonably priced
- MPEG-1 compression houses are abundant
- “Compressionism” is showing up in the marketplace



MPEG Implementation Extremes

Brute Force Hardware MPEG Implementation

- **Advantages**
 - **Appropriate for non-intelligent consumer-type devices**
- **Disadvantages**
 - **Expensive**
 - **Inflexible**
 - **Ignore the presence of a CPU in the PC**



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Software MPEG Implementation

- **Advantages**
 - **Base level performance on Pentium class CPU's**
 - **Appropriate for single task linear content display**
- **Disadvantages**
 - **Limited performance**
 - **Audio degradation**
 - **DOS playback not supported**

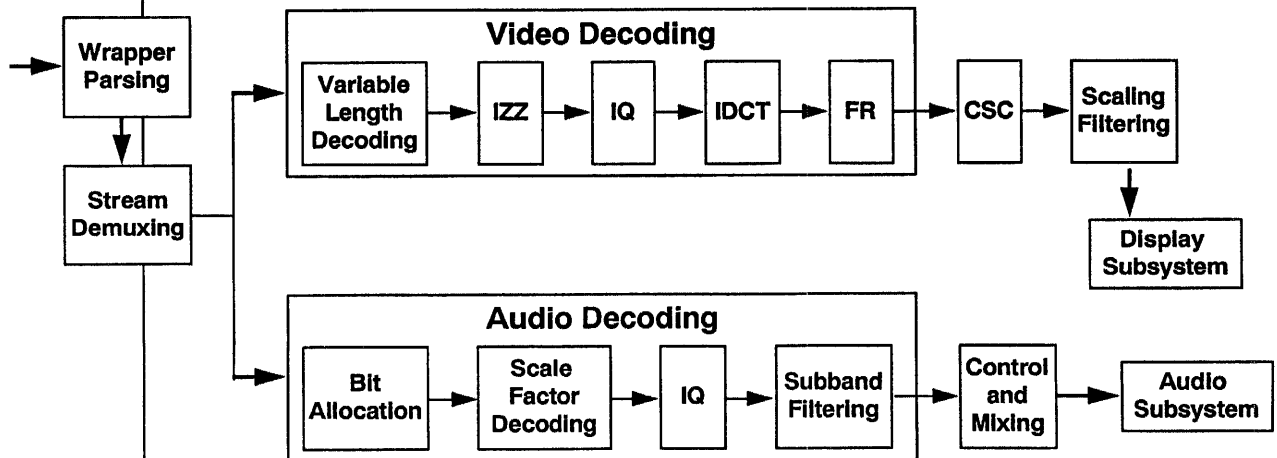


Shared MPEG Implementation

- Uniquely partition the MPEG responsibilities between the CPU and peripheral devices



The MPEG Decoding Pipeline



In the future...

Should the MPEG-1 algorithm be completely relegated to the microprocessor?

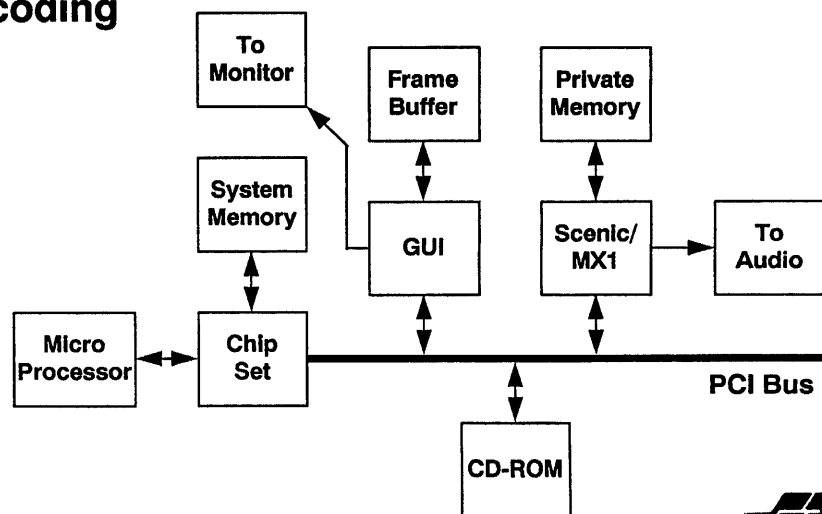
- Indeo vs MPEG
- Computational vs I/O intensive tasks
- Principle of locality



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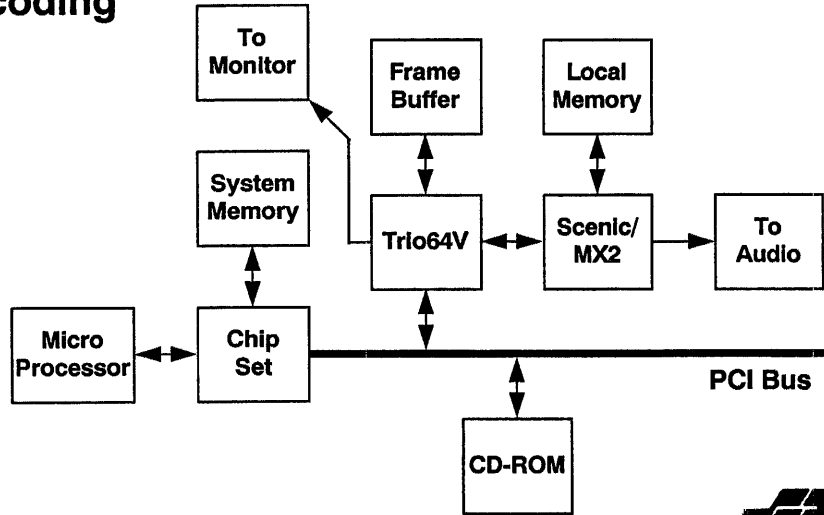
Scenic/MX1

- Audio/video decoding
- Data mastering
- Video scaling
- Stream parsing
- AIC solution
- GUI variant

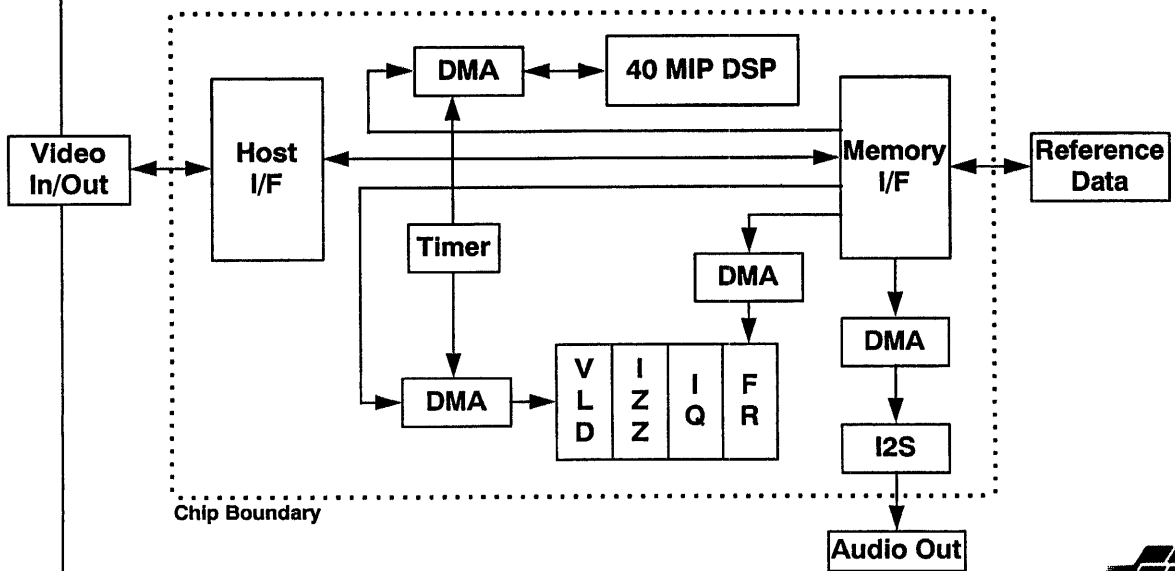


Scenic/MX2

- Audio/video decoding
- Data mastering
- Video scaling
- Stream parsing
- AIC solution
- GUI variant



A Scenic View



Scenic Details

- 128-pin PQFP
- 5-Volt .6u 3LM
- Single Chip MPEG-1 Audio/Video Decoder
- MPEG-1 level 1 or 2 audio decompression at 32, 44.1 or 48 KHz, single channel, dual channel, stereo or joint stereo
- 40MHz



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Scenic Details

- Requires 1/2 MBytes FP mode DRAM
- Hardware audio/video synchronization means
- White book, green book, OM-1 & MCI compliant
- Error detection & correction
- Designed from scratch



Design & Verification Methodology

- **Hardware**
 - IKOS NSIM
 - Quickturn Emulation

- **Software**
 - IKOS Voyager
 - IKOS FS
 - Synopsis



Milestones

- **Concept in June 1994**
- **Functioning silicon in March 1995**
- **Volume shipment in June 1995**



Bad News

- **Four outstanding patents on related issues**
 - **Audio decode mechanism**
 - **Synchronization means**
 - **Video decode implementation**
 - **Partitioning**



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Good News

- **MPEG is prolific**
- **PC's are becoming entertainment centric**
- **Accelerator companies are providing complementary (read advanced) functions above & beyond current microprocessor capabilities**



