HDTV Overview

ECE 542
Rice University

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History of HDTV

• FCC created a committee to study feasibility of delivering advanced television in 1987.
• Committee asked leading companies to submit proposals.
  – General Instrument (now Motorola) and MIT, DCT, interlace, 16/32 QAM
  – Zenith and AT&T, DCT, progressive, 2 & 4 level VSB
  – Sarnoff, Thompson, Philips and NEC, DCT, interlace, 32 QAM
History of HDTV

- There were many debates and no system was a clear winner so FCC decided to form a Digital HDTV Grand Alliance in 1993 (AT&T, Sarnoff, GI, MIT, Philips, Thompson, and Zenith).

- The first prototype of HDTV system came from the following companies
  - Video encoder – AT&T and GI
  - Video Decoder – Philips
  - Audio – Dolby
  - Transport – Sarnoff and Thompson
  - Transmission - Zenith
FCC Testing of HDTV

- Objective quality tests (resolution and transient response)
- Subjective quality tests (different scenes, experts, non-experts, formats, etc.)
- Transport (MPEG compatibility, robustness, etc.)
- Interference (co-channel interference, ghosts, etc.)
- Field testing in 1994
- Final FCC approval in 1994
HDTV Standard

- Progressive and interlace scanning formats
- MPEG-2 video compression and decompression
- Dolby AC-3 audio compression and decompression, 5.1 channels, 384 kbps
- MPEG-2 transport stream, 188 bytes per packet
- 8-level VSB for broadcast and 16-level for high data rate such as cable

![Diagram showing 188 bytes + 20 bytes RS parity]
HDTV Standard

• VSB Frequency Spectrum

Symbol rate for all VSB modes is 10.762MHz
HDTV Standard

• Picture formats supported:
  – 1920x1080, 16:9, 60I, 30P, 24P
  – 1280x720, 16:9, 60P, 30P, 24P
  – 704x480, 16:9 and 4:3, 60P, 60I, 30P, 24P
  – 640x480, 4:3, 60P, 60I, 30P, 24P
HDTV Standard

• HDTV summary
  – FCC mandated top 10 markets to be broadcast HDTV in May 1999
  – Network affiliates must broadcast HDTV in November 1999
  – Space shuttle HDTV broadcast by KHOU in 1999
  – Compaq and KHOU did field tests in 1999

KHOU
Houston Antenna Facility

HDTV Lab at Compaq