HDMI
HIGH DEFINITION MULTIMEDIA INTERFACE

presented by-
The HDMI Working Group
Hitachi, Panasonic, Philips, Silicon Image, Sony, Thomson, Toshiba
Primary Goal

Add value to existing interface

DVI – EIA/CEA-861 – Intel HDCP

- Maintain full backward-compatibility
- Add features important to A/V products
- Ensure migration path for PC products
HDMI-related Acronyms

- **DVI**
  Digital Visual Interface for computers

- **HDCP**
  Intel link encryption for DVI (and soon, HDMI)

- **EIA/CEA–861**
  Standard adapting DVI to DTV formats

- **DVI-HDTV**
  $DVI + 861 + HDCP$

- **HDMI**
  $= \text{High Definition Multimedia Interface}$
DVI Evolution

Computer cable
- Computer
- Computer cable DVI
- Set-top box
- Video cable DVI-HDTV
- Set-top box

Video cable
- DVI
- DVI-HDTV
- Computer monitor
- HDMI
- Video monitor
- Multimedia cable
- Audio/video monitor
Cable History

RF
- Beta
- TV (Ch 3)

Composite
- VHS
- TV (Video 1)

S-Video
- S-VHS
- TV (SVHS 1)

Component
- DVD
- HDTV (HDTV 1)

DVI-HDTV
- HD-STB
- HDTV (DVI-HDTV 1)

HDMI
- HD-STB
- HDTV (HDMI 1)
HDMI vs. DTVLink

STB \[\text{HDMI}\] \rightarrow \text{HDTV}

DTVLink*

Lyra  \quad DVD  \quad \text{Bedroom TV}  \quad \text{Family room HDTV}  \quad \text{IP phone}

*DTVLink = 1394 carrying DTV
HDMI ≠ DTVLink

HDMI = digital AV patch cable
DTVLink = integrated AV network

patch cable ≠ integrated AV network
HDMI ≠ DTVLink

Different solutions for different applications.
Combination Adds Value

- DVD Player
- D-VHS recorder
- Set Top Box
- Camcorder
- Cable, Satellite, Terrestrial

Connections:
- HDMI
- DTVLink

DTV Link
DTV Monitor
Quality Advantages

- **Fast**
  - 5Gbps available
  - Transmits HDTV at 2.2Gbps

- **High Resolution**
  - 24 bits/pixel
  - 165MHz capacity clock

- **Digital** – No unnecessary A/D conversions

- **Uncompressed** – Lossless medium

- **Secure** – Strong content protection
Primary HDMI Formats

- **HDTV**
  - 1280 x 720p
  - 1920 x 1080i

- **EDTV**
  - 640 x 480p
  - 720 x 480p
  - 720 x 576p (Europe)

- **SDTV**
  - 720 x 480i
  - 720 x 576i

Other:
- VGA
- DVD
- NTSC
- PAL
Aspect Ratio

- HDTV sent as 16x9
- SDTV sent as 4x3
- TV chooses DVD picture (16x9 or 4x3)

Send me 16x9

DVD
The Right Format...Every Time

- Sends native DTV format
  - No unnecessary conversions
  - No customer intervention
- Sends proper aspect ratio
  - Reduces postage stamp effects

Better Picture, Easier to Use
New HDMI Features

- Audio
- Connector
- Remote control
The Talkies are Here to Stay

- CD-quality audio always provided
  - 16 bit
  - 32, 44.1, 48kHz
- Higher quality available
  - Eight channels
  - 192kHz
New Connector

- Pin-to-pin compatible with DVI
- Better for AV applications
  - Smaller
  - Easier to use
- Visual cue of audio capabilities

Dimensions:
- 20.9mm
- 39.5mm
Remote Meets European Standards

- AV.link capabilities, similar to SCART
- Replaces infrared repeaters
- Allows one remote control for system
Eliminates Maze of Cables

10 audio + 9 video cables → 3 HDMI cables
38 connectors → 6 HDMI connectors
Eliminates Maze of Cables

10 audio + 9 video cables → 3 HDMI cables
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Also, no need for infrared repeaters dangling on various components.
Future Compatible

- Accommodates all ATSC DTV formats
- Supports 8-channel audio
- Bandwidth to spare for future requirements

$5 \text{ Gbps}$

$5\text{ Gbps} = 2.2 \text{ Gbps}$

55% remaining
Features Benefit Everyone

- Uncompressed video
- Audiophile sound
- Convenient package
  - Important high-end features
  - Strong niche market

- Too fast to record
  - No threat to studios
  - No threat to DTVLink
  - More HD opps.
  - HDTV reaches mass market

- HDCP prevents future recording
  - Stable feature allows long-term business plans
  - HDTV market grows
Customers Win with HDMI

- **Premium A/V quality**
- **Better connection**
  - Fewer cables
  - Smaller connector
  - More portable
- **New user experience**
  - Single remote control
  - Intelligent DTV
- **PC interface potential**
Studios Support HDMI

- Allows controlled release of HD content
- Provides optimal audio/video quality
- Future compatible
System Operators Support HDMI

- Has support of content providers
- Allows delivery of secure content
- Enables high-resolution overlays

DirecTV
Manufacturers Support HDMI

- Meets quality and architecture needs
- Easy to design into products
- Fewer cables
- Small connector for portable products
- Provides features customers want
Main Points

- Adds value to DVI-HDTV
  - Remote Control
  - Connector
  - Audio
- One cable replaces up to 9 RCA cables
- Stable business model
- Digital, Uncompressed, High-Speed
- Offers more value to customers
HDMI Schedule

- **June CPTWG**
  - Offer spec (v0.9) for public comment
  - Introduce licensing agreement

- **Summer**
  - HDCP available for HDMI
  - Release final specification (v1.0)

- **Fall**
  - Interoperability testing program
HDMI
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