Efficient Verification Framework for Audio/Video Interfaces

Noha Shaarawy







Agenda

- Introduction
- Proposed Verification Framework.
- HDMI 2.0 Verification Environment.
- Verification Environment for an HDMI TX and RX.
- Experimental Results.







Introduction













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Target

Verifying such interfaces is a big Challenge.

Minimize Development Time



CHALLENGES

AHEAD



Target

Verifying such interfaces is a big Challenge.

Minimize Development Time Reusability



CHALLENGES

AHEAD





Target

Verifying such interfaces is a big Challenge.

Minimize Development Time

Reusability Configurable







CHALLENGES

AHEAD



Proposed Verification Framework







DESIGN AND VERIFIC

Proposed Verification Framework



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SYSTEMS INITIATIVE

JRDE

Proposed Verification Framework

VIP components is divided into six regions:

Common Regions between Protocols:

- Hot Plug
- Data
- Video
- Streaming

Different Regions between Protocols :

- Auxiliary Channel
- Control







HDMI 2.0 Verification Environment

 HDMI 2.0 receiver and transmitter VIPs are developed based on:







HIGH-DEFINITION MULTIMEDIA INTERFACE







HDMI 2.0 Verification Environment

 HDMI 2.0 receiver and transmitter VIPs are developed based on





HIGH-DEFINITION MULTIMEDIA INTERFACE







HDMI 2.0 Source VIP





HDMI 2.0 Source UVM Environment







HDMI 2.0 Sink VIP





CONFERENCE AND EXHIBITION

HDMI 2.0 Sink UVM Environment





design and verification

CONFERENCE AND EXHIBITION

Reusability

Block Name	HDMI	DisplayPort
Video Processor	Customized	Customized
Video Agent	Reusable	
Audio Processor	Customized	Customized
Audio Agent	Reusable	
I2S Audio Interface	Reusable	
SPDIF Audio Interface	Reusable	
I2C Interface	Reusable	
Framer	Customized	Customized
Deframer	Customized	Customized
Authentication	Customized	Customized
Auxiliary Processor	Customized	Customized
Controller	Customized	Customized
HotPlug Responser	Reusable	





Experimental Results

HDMI Transmitter coverage result

115 test cases.

6.5%

8.9%

22.7%

Total coverage = 96.50%

HDMI Receiver coverage result

90 test cases.

Total coverage = 94.00%







61.9%

Experimental Results

The performance results for **10** frames sent to HDMI receiver.

Video Format	CPU Time (in Seconds)
720*480	349
2560*1080	2305
4096*2160 (4K)	8908









Questions

