HDCP Specification v1.1
Amendment for HDCP-GVIF

Revision 1.1

16 April, 2012

1. Introduction

1.1 Scope

This document describes amendment of the High-bandwidth Digital Content Protection (HDCP) specification, limiting to implementation onto GVIF (Giga-bit Video Interface). It is based on HDCP 1.1, which is a revision update to HDCP Revision 1.00 and its errata, referred to collectively as HDCP 1.0.

In HDCP 1.1, HDCP devices are limited to DVI and HDMI. But current DVI and HDMI do not fulfill the requirements from automotive industries, for instance, emission noise of DDC line or cable diameter.
GVIF-HDCP is optimal solution for secure digital transmission in automotive systems.

In most cases, terminology ‘HDMI’ in the HDCP Specification rev 1.1 can be replaced by ‘GVIF’ unless otherwise noted.

GVIF-HDCP devices shall satisfy both compliance rule and robustness rule described in the license agreement, except for interoperability with DVI devices.

Separate device keys, from Digital Content Protection, LLC, as for DVI and HDMI must be used for GVIF-HDCP in order to ensure the independence from DVI and HDMI.

1.2 Definitions

HDCP-GVIF transmitter. An HDCP transmitter which uses GVIF as physical layer.
HDCP-GVIF receiver. An HDCP receiver which uses GVIF as physical layer.

1.3 References

Standard of Japan Electronics and Information Technology Industries Association
JEITA CP-6101 Digital monitor interface GVIF, January, 2012.

2. Authentication

2.1 Overview

Authentication protocol is an exchange between an HDCP-GVIF transmitter and an HDCP-GVIF receiver to ensure the HDCP-GVIF receiver is authorized to receive HDCP content. In case of HDCP-GVIF, HDCP-GVIF channel embedded communication is used for the exchanges instead of I2C bus.

2.2 State Diagram

2.2.1 Operating Mode

HDCP specifies operation mode of DVI mode and HDMI mode, whereas GVIF-HDCP has only GVIF mode. In the state diagrams (for transmitter, receiver and repeater), HDCP-GVIF shall transit to HDMI mode state when state diagram is divided into DVI mode or HDMI mode. Hence, Bit field 12 of B-status register is always set to 1.

2.2.2 EDID ROM Reading

HDCP-GVIF does not support EDID ROM reading. GVIF-HDCP devices pass over the Read EDID state in the state diagram. EDID ROM Reading is subject to be considered to support in future modification.

2.2.3 Hot Plug Detect (HPD)

Since HDCP-GVIF embed the exchange communication onto HDCP-GVIF channel, authentication protocol shall not start until bit clock synchronization between HDCP-GVIF transmitter and HDCP-GVIF receiver is established. In order to establish bit clock synchronization, at least pixel clock, VSYNC and HSYNC shall be supplied to HDCP-GVIF transmitter at anytime when HPD is detected or when HDCP-GVIF transmitter is active.

2.2.4 Receiver Lock Detect (RLD)

Receiver Lock Detect is asserted when initialization state machine in GVIF transmitter indicates GVIF receiver synchronized to upstream GVIF transmitter. After RLD is asserted, GVIF transmitter can start the authentication protocol by request from upstream content control system.

2.3 HDCP-GVIF Port

HDCP-GVIF Port device address is not required to be 0x74, because HDCP-GVIF Port is not I2C bus but GVIF embedded communication.

HDCP-GVIF port should support additional checksum code in order to detect transmission failures for HDCP-GVIF Port Combined-Format Byte Read.

HDCP-GVIF port does not support HDCP Port Link Integrity Message Read which illustrated in Fig.2-13 in HDCP specification rev1.1. This is because of considering the time of accessing to Ri resister, loading Ri onto I2C buffer and sending read data to the transmitter.

2.4 Encryption Status Signaling

HDCP-GVIF supports only EESS mode. Hence HDCP-GVIF devices do not need to determine which mode should be used by querying its Bcaps bit 1.1_FEATURES.

3. Data Encryption

In case of GVIF-HDCP system, HDCP encryption is applied at the input to the GVIF encoder and decryption is applied at the output of the GVIF decoder rather than T.M.D.S. encoder/decoder. When transmitting auxiliary data, same GVIF encoder/decoder is also used instead of TERC4 encoding used in HDMI.

3.1 Encryption/Decryption State Diagram

3.1.1 Video data period

Video data period for GVIF-HDCP is close to DVI rather than HDMI. There is no guard band. DE shall be asserted at the first pixel of the video data period and be de-asserted at the last pixel. Also preamble by CNTx signal is not required to indicate whether next period is video data period or data island period.

3.1.2 Data Island period

In the same manner as video data period, Data Island period has neither leading nor trailing guard band. AUX shall be asserted at the first pixel of the data island period, and be de-asserted at the last pixel. Auxiliary data or audio sample can be transmitted during this period and they are not packetized. Same GVIF encoding as Video Data Period is used during Data Island Period. Also preamble by CNTx signal is not required to indicate whether next period is video data period or data island period.

3.1.3 AVMUTE

GVIF-HDCP extends CNTx signaling in order to indicate AVMUTE state. Additional CNT4 and CNT5 are used during window of opportunity described in Appendix D.

4. Authentication Error Message Report

   In the automotive entertainment system, host controller may watch the existence of authentication protocol errors in the individual HDCP-GVIF transmitter and receiver. When an authentication protocol error in either HDCP-GVIF transmitter or receiver is reported to the attached local controller, then local controller forwards the error message to the host controller via automotive network. And host controller instructs the most upstream HDCP-GVIF transmitter to execute appropriate treatment such as re-authentication.

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