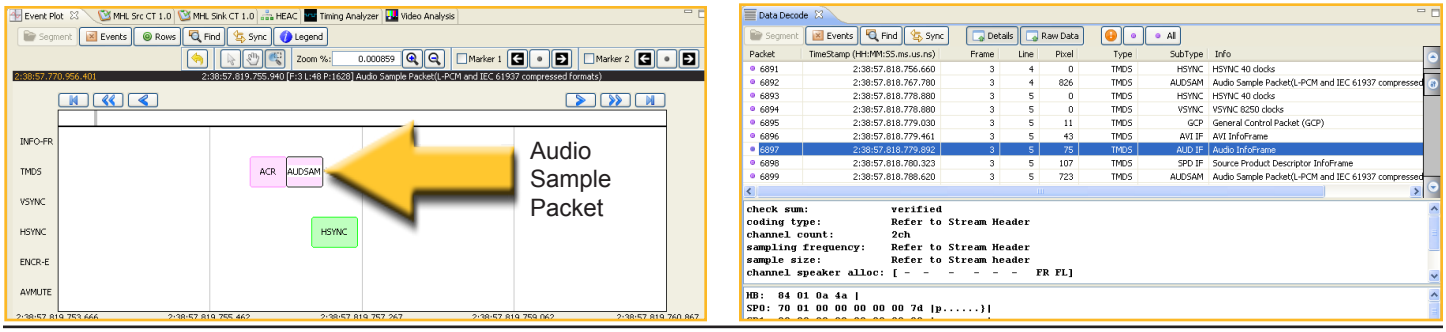
quantumdata

APPLICATION NOTE - TESTING FOR AUDIO DROP OUT IN HDMI® SYSTEMS

Audio dropout is as relatively common interoperability problem in HDMI systems. Until recently the root cause of audio dropout was difficult to diagnose because there were no HDMI analyzers that could reliably capture and decode the necessary data and assign precise timestamps to the data. Now however, the Quantum Data 980 Protocol Analyzer can provide full visibility into the HDMI protocol, control, timing and auxiliary data. Unlike competing analyzers for HDMI protocol testing, the 980 captures all audio-related data packets with accurate timestamps even when they are transmitted in rapid succession. Furthermore, the 980 can monitor the audio-related data packets as they are being transmitted between an HDMI source and an HDMI sink.

The ability to monitor HDMI data transactions between an HDMI source and an HDMI sink device is critically important because only then can you monitor the sink (audio rendering device) for audio dropout while also examining the audio-related data packets.

Figure 1: Monitoring Audio Related Data in booth the Event Plot and Data Decode Panels.

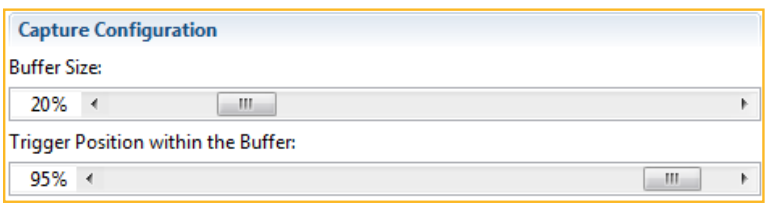


The 980 Protocol Analyzer provides two modes for monitoring data between an HDMI source and an HDMI sink device. When the HDMI source content is unencrypted you configure the 980 in the “Pass-Through” mode. If the HDMI stream is encrypted, you can use the 980 “Encrypted Link Analyzer” feature (Figure 2). The Encrypted Link Analyzer feature is a unique solution offered by Quantum Data. It enables you to monitor the audio packets transparently between an HDMI source and sink when the content is encrypted with HDCP.

Figure 2: Basic Setup for Monitoring Encrypted and Unencrypted Audio Related Data.

Part of the configuration of the capture criteria is ensuring that you capture enough of the important types of data. The manual capture is used so that you can monitor the downstream audio rendering device. When using the manual capture it is important to set the capture trigger buffer properly so that you capture the data when the audio dropout occurs (Figure 3). To do this you configure the capture trigger position buffer to the right most side using the slidebar.

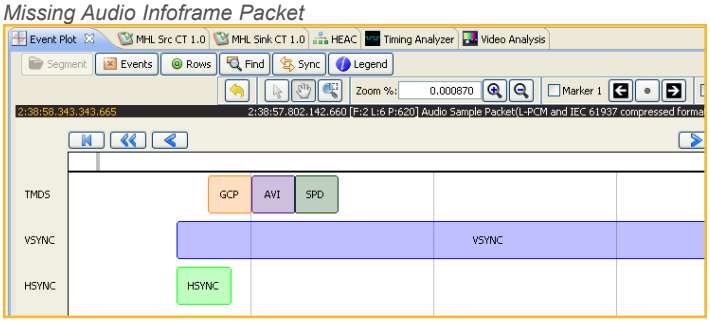
Figure 3: Settings for the capture tigger buffer



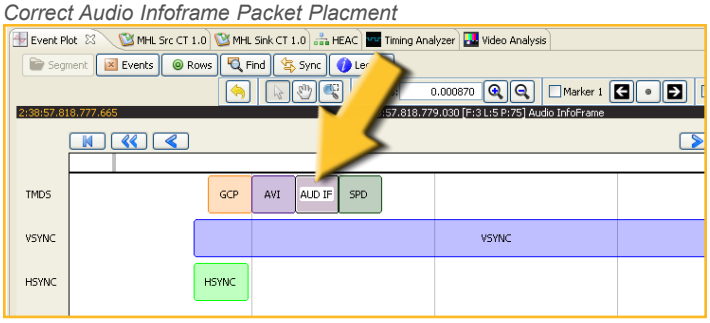
Once the data is captured you can look for specific packet transmissions that are known to be possible causes of audio dropout. There are believed to be at least a few causes of audio dropout. In some instances audio dropout can be caused by missing audio infoframe packets (Figure 4). Audio infoframe packets are required to be sent once each frame. Some HDMI receiver chips may not handle missing audio infoframes gracefully resulting in a loss of audio.

Figure 4: Missing Audio Infoframe Packet

Missing Audio Infoframe Packet

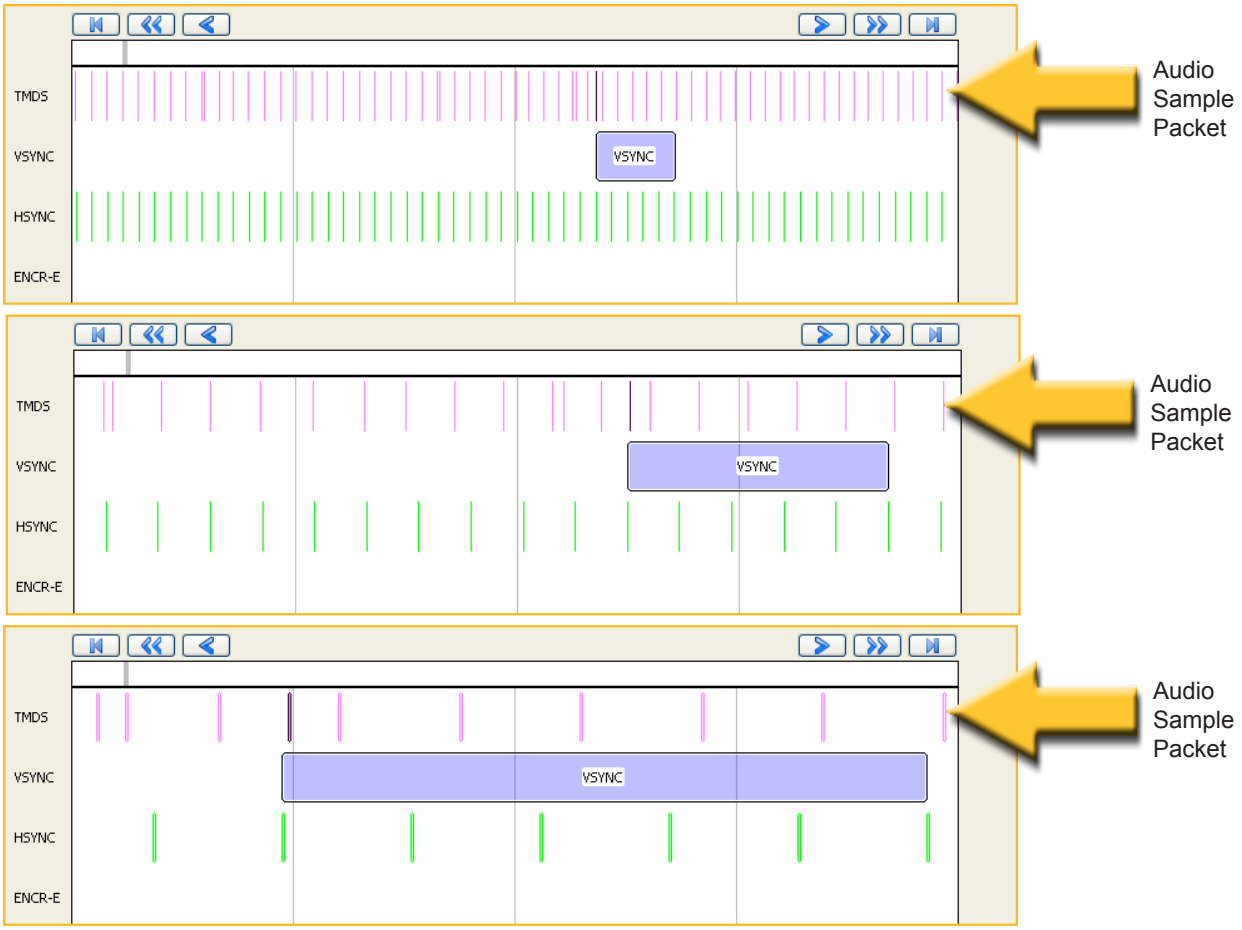


Correct Audio Infoframe Packet Placment



In other cases, audio dropout can occur when the transmitter sends audio packets in a cadence that the receiver chip cannot accept. The 980 enables you to examine the precise placement of the audio packets in the blanking intervals. You can zoom in and out and pan across the capture data to examine the arrangement of audio packets in the blanking in proximity to the occurrence of the audio dropout (Figure 5).

Figure 5: Examine the precise placement of the audio packets



These are just a couple of the primary causes of audio dropout. Because the 980 Protocol Analyzer can capture all audio related packets between a source and sink and assign precise timestamps, other causes of audio dropout can be isolated as well.