

## 980 PROTOCOL ANALYZER APPLICATION SHEET

The 980 Protocol Analyzer (Fig. 1) is an analyzer for HDMI devices that provides full visibility into the HDMI protocol, timing, control and auxiliary data. It captures and decodes this data when the HDMI stream is encrypted or unencrypted.

The deep visibility provided by the 980 enables developers to discover the root cause of interoperability problems between HDMI sources and sinks.

Competitive “analyzers” available on the market are more limited because they utilize commercial silicon chips. The 980 uses a proprietary solution and therefore can provide much greater visibility into the protocol, timing and control data. The competitive “analyzers” support some of the 980 features but not nearly all of them. They support functional testing but not true interoperability testing.



Fig. 1

## OPERATIONAL MODES

Functional test “analyzers” often support only real time monitoring. The 980 supports capture and store as well as Real Time monitoring.

### Capture

The 980’s Capture Mode enables developers to define simple or complex triggers and pre-capture filtering to provide a more focused set of captured data. The ability to capture data for later examination provides many additional benefits. Captured data can be searched and filtered to facilitate analysis. The data can also be depicted graphically to provide more intuitive examination. (Fig. 2) Capturing and storing the data also enables developers to compare multiple streams from an HDMI source and disseminate these captures to subject matter experts at other locations. Additionally developers can run custom scripts to analyze captured data for specific interoperability issues.

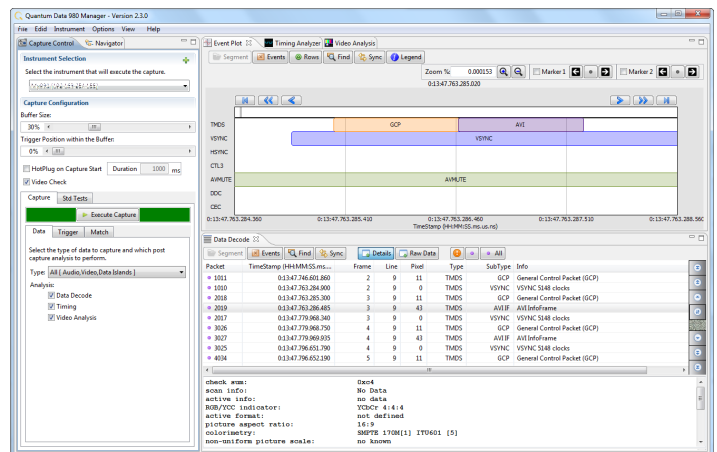


Fig. 2

### Real Time Mode

The 980’s Real Time mode feature enables users to view the incoming video in real time and select which type of data they wish to view. Inframes and other data islands, timing data, HDCP and EDID transactions can all be viewed in real time. Developers can observe changes in these data types as they initiate changes in their source device. Reference frames can be set for any data type to enable easy identification of changes. For example, users can set a reference frame on a set of values of an AVI inframe and then compare these values with subsequent frames. (Fig. 3)

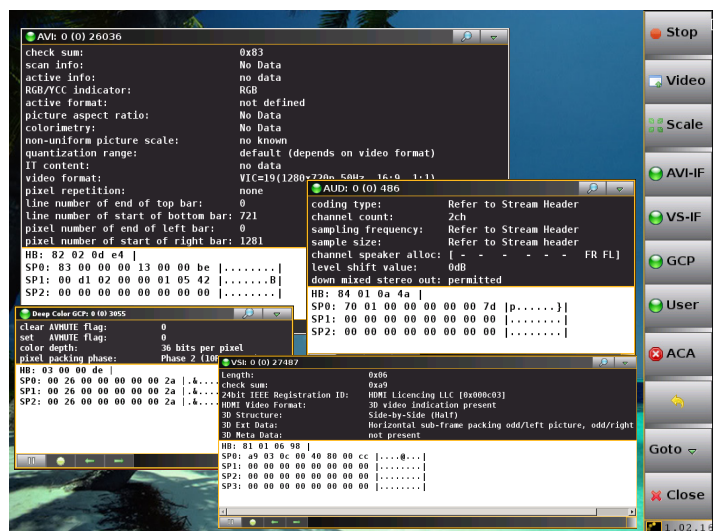


Fig. 3

## INCREASED VISIBILITY

Unlike competing functional test “analyzers” that provide limited insight into the HDMI protocol data, the 980 provides precise visibility into all the protocol, control and timing events that occur and when they occur in relation to one another. Functional test instruments cannot tell you with certainty what protocol (data islands, infoframes, audio packets), control and timing events occurred and especially not when these events occurred. In some cases, these functional test instruments will miss packets if they are transmitted in rapid succession. (Fig. 4) The timestamps assigned to packets in functional test instruments are a “best guess.”

There are several key benefits to the greater visibility and precision provided by the 980 in comparison to functional test instruments. The HDMI and HDCP specification have provisions that restrict when various packets can and cannot occur in an HDMI frame and when they can occur in relation to one another. There are provisions in the HDMI and HDCP specification that restrict when various packets can and cannot occur in an HDMI frame and when they can occur in relation to one another. Interoperability issues can arise, and are likely to arise, when these restrictions are violated. But functional test “analyzers” are not capable of providing the necessary visibility into the HDMI protocol to enable developers to determine the root cause of these types of interoperability problems.

For example, whereas the 980 can tell developers with certainty if there are packets located in the keep-out region, a functional test instrument cannot. The 980 can provide a precise time stamp and location of the encryption enable pulse and can show exactly when it occurred within the frame and in relation to other packets. Functional test instruments cannot. The 980 can tell developers precisely if multiple GCP with AVmute set/clear events occurred and if they occurred within the required window. Functional test instruments cannot. The 980 provides developers with a view into the rate, precise position and frequency of audio sample packets in the vertical and horizontal blanking. (Fig. 6) Visibility into the audio samples is important both for developers of source devices and also for silicon makers for displays who need to know how to buffer the incoming stream of audio samples. Functional test instruments do not offer these valuable insights. These are just a few examples.

## HDMI SOURCE COMPLIANCE TEST

For these same reasons, the 980 can support all of the HDMI source protocol compliance tests in section 7.4 of the CTS. Functional test instruments cannot. For example, the 980 supports all the Protocol tests in Test 7-17 related to control periods, preamble and guard bands. (Fig. 7) Also, the 980 can measure the audio sample rate precisely and therefore measure audio jitter correctly. Functional test instruments cannot support these tests correctly.

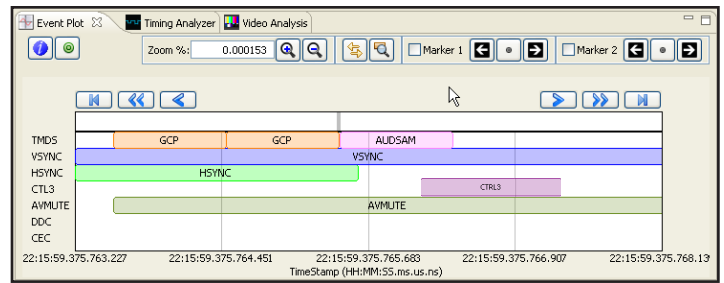


Fig. 4

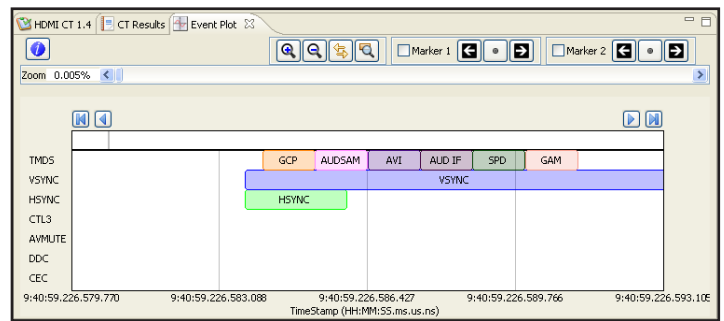


Fig. 5

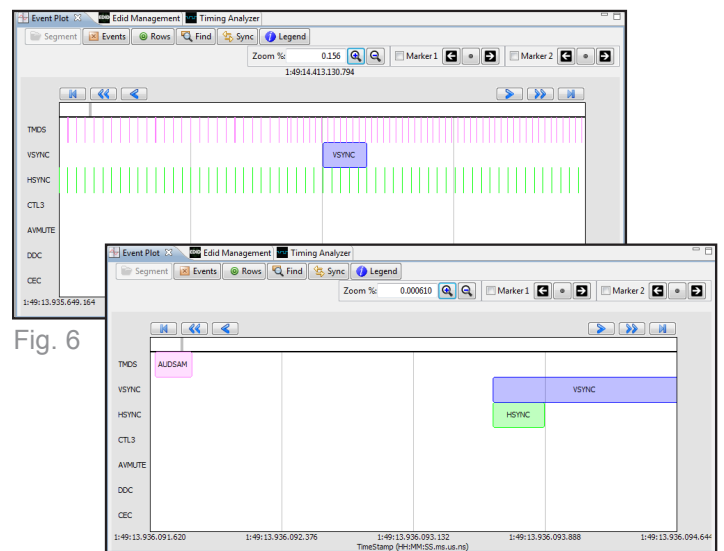


Fig. 6

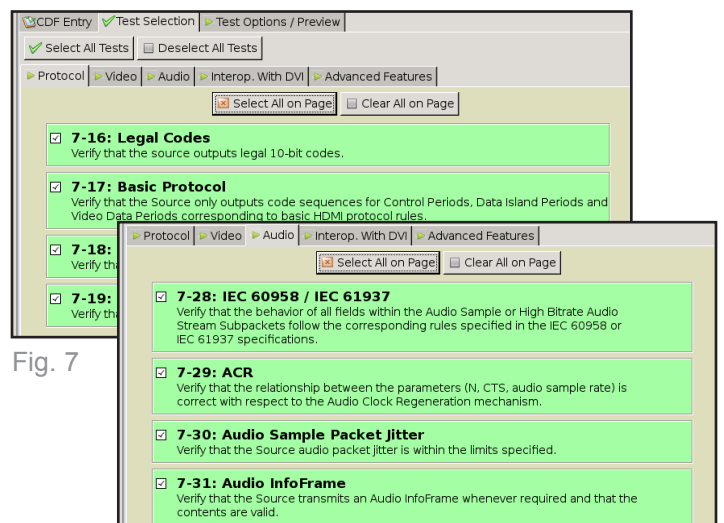


Fig. 7

**ENCRYPTED LINK ANALYZER  
ONLY ON THE 980**

The 980 supports a passive monitor mode for analyzing unencrypted content between HDMI source and sink devices. (Fig. 8) Functional test instruments can support this functionality as well but with the limitations discussed above. The “pass-through” mode enables developers to monitor the protocol, control and timing events and DDC transactions passively between an HDMI source and an HDMI sink device when the content is unencrypted.



Fig. 8

The 980’s **new** Encrypted Link Analyzer is a unique test application that enables developers to monitor and analyze HDCP encrypted protocol data transmitted between an HDMI source device and sink device. This enables developers to investigate HDMI interoperability while the content is encrypted by viewing the protocol, control, and timing data as well as the DDC data in real time and observing the behavior of the downstream sink device. The Encrypted Link Analyzer uses a proprietary solution to emulate a single HDCP session between your source and sink devices. This solution enables the 980 to have visibility into the encrypted data with the greatest degree of transparency.

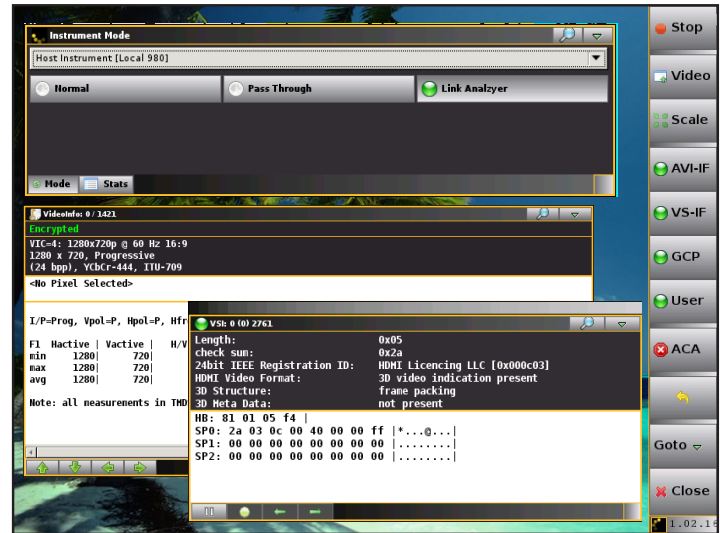


Fig. 9

In addition to real time monitoring (Fig. 9), the Encrypted Link Analyzer enables developers to capture the encrypted protocol and control data for detailed analysis. With the capture operation, developers can monitor the downstream HDMI sink device for particular symptoms and then initiate a capture when the symptoms exhibit themselves. This ensures that the relevant data—data related to interoperability—is captured.

**SUMMARY**

The 980 Protocol Analyzer provides functions beyond those offered by competitive functional test HDMI “analyzers”. The 980 is a true interoperability test instrument and can reveal the root cause of HDMI interoperability issues. And, importantly, the 980 can support all of the HDMI Source Protocol compliance tests.

**THE 980 PROTOCOL ANALYZER — A UNIQUE AND SUPERIOR ANALYZER FOR HDMI SOURCE DEVICES.**

