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780 APPLICATION NOTE – HDBaseT® FUNCTIONAL TESTING

One of the more difficult aspects of installing HDMI in the home or business is extending the distance between an HDMI source and an HDMI sink. Extending HDMI has been a primary cause of interoperability issues in HDMI installations.

HDBaseT is the most reliable way of extending HDMI over long distances. HDBaseT enables a single LAN cable to replace multiple HDMI cables and connectors in the home entertainment and business environment.

It is important for A/V installers and engineers working in the lab to be able to conduct functional tests quickly and effectively on HDBaseT extenders.

Quantum Data's 780 Handheld Test Instrument for HDMI is the recommended test tool used in the CEDIA HDMI Troubleshooting course and provides the necessary tools for verifying an HDBaseT link. The 780 has several features that are invaluable for diagnosing problems related to extending HDMI in the home or business.

> *"Many failures in HDMI installations result from extending HDMI"*

CHECKING FOR "BIT EXACTNESS"

When installing HDBaseT extender solutions in the home or business, it is important to be able to verify that all the pixels are arriving properly "bit exactness" over the link. The 780 provides a feature—Repeater Test—for pre-testing the link prior to installation (see Figure 1 below).

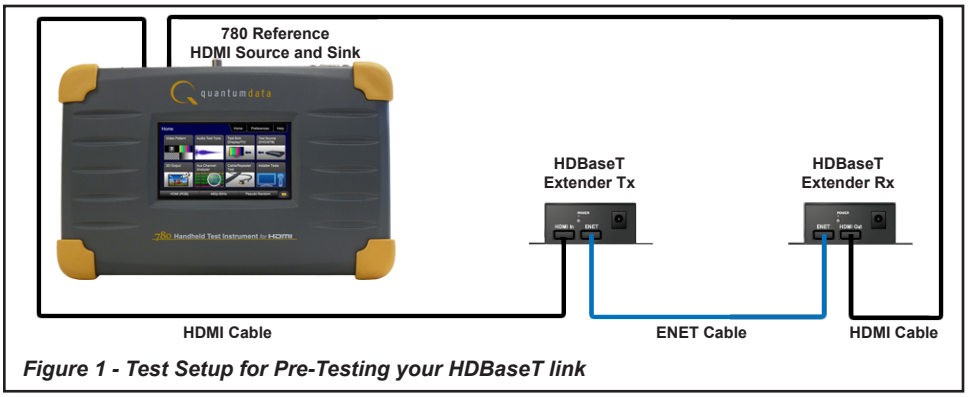

Figure 1 - Test Setup for Pre-Testing your HDBaseT link

In this application, the two ends of the link are co-located at your lab or equipment staging area. Because the 780 provides both a reference HDMI source (Tx) and a reference HDMI sink (Rx) connector you can run the Repeater test through the extender equipment which comprises the proposed link in your design. The Repeater Test checks for pixel errors at the primary resolutions with deep color enabled for 1080p. Deep color applications increase the speed of the TMDS clock which increases the likelihood of errors related to dielectric loss. The Repeater test also runs a continuity test on the DDC, +5V, HPD and CEC bus. A sample of the Repeater Test is shown in Figure 2 to the right.

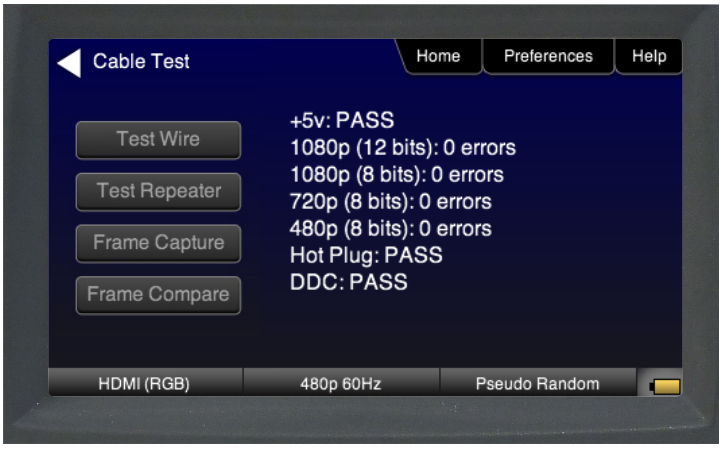

Figure 2 – Pre-Testing your HDBaseT link - Repeater Test

VERIFYING THE VIDEO AND PROTOCOLS

The 780 can run a variety of other functional tests in addition to the Repeater test for pixel errors. For example you can verify the video and the timing parameters as well as the HDCP, EDID and CEC protocols. The video verification feature enables you to view the incoming video and key video parameters even when the content is encrypted with HDCP. This provides a quick “at-a-glance” assessment of the integrity of the link. See Figure 3 for a sample screen of the video test. Figure 4 shows a check of the timing parameters and infoframes.

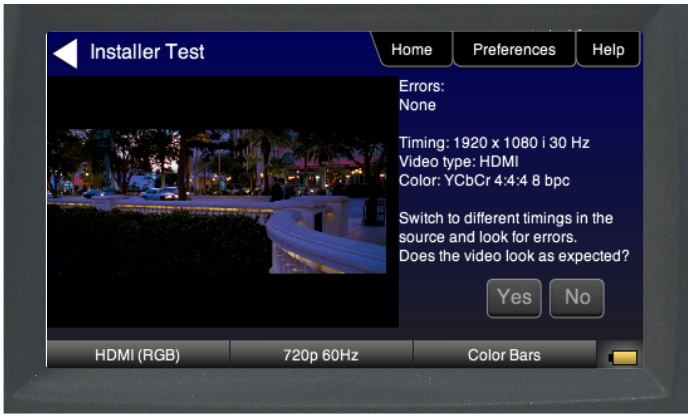

Figure 3 – Checking the video parameters

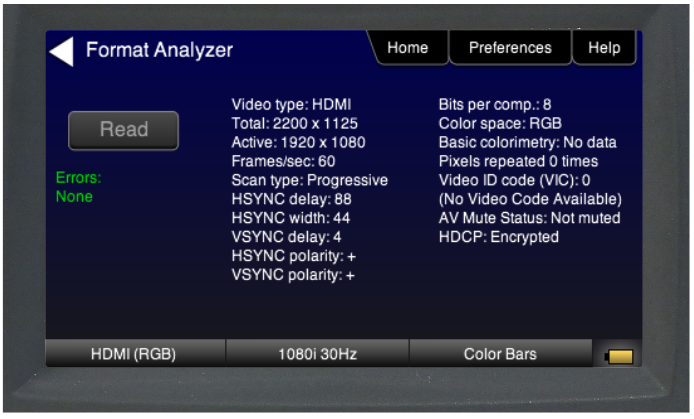

Figure 4 – Checking the timing parameters and infoframe values

The DDC channel is subject to physical layer bit errors as the HDMI is extended over greater distances. Bit errors on the DDC channel result in HDCP and EDID transaction failures which disrupt viewing. HDCP authentication failures are a common cause of interoperability problems in installed systems especially with extenders. The 780 enables you to run functional tests on the HDCP, EDID and CEC protocols using the 780 as a known-good HDMI source (TX) and sink (RX). Figure 5 depicts an HDCP functional test. Figure 6 shows a sample of an EDID tests.

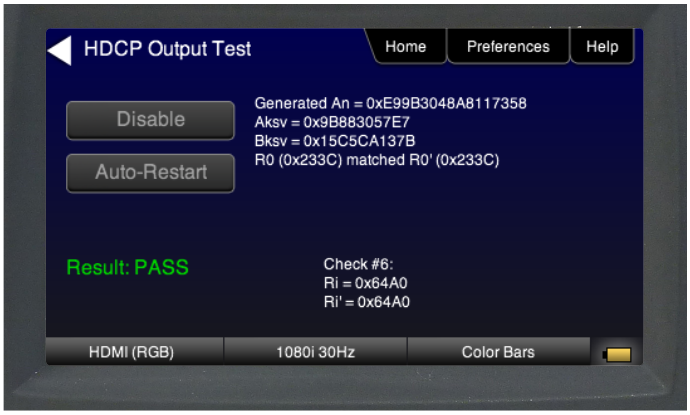

Figure 5 – Checking the HDCP Protocol through the HDBaseT link

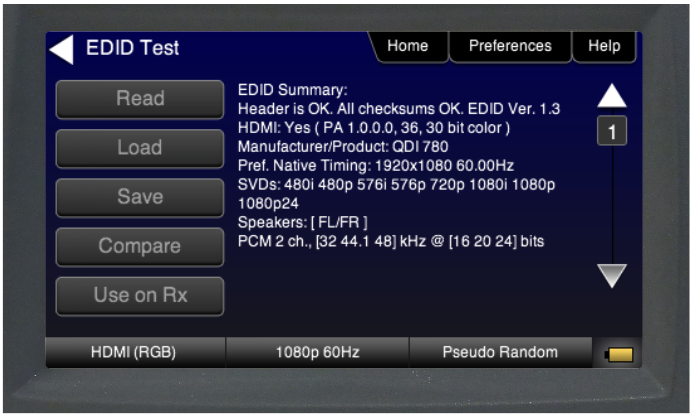

Figure 6 – Checking the EDID Protocol through the HDBaseT link

For greater insight into an HDCP authentication problem you can view the HDCP and EDID transactions occurring over the HDBaseT link (Figure 7 below).

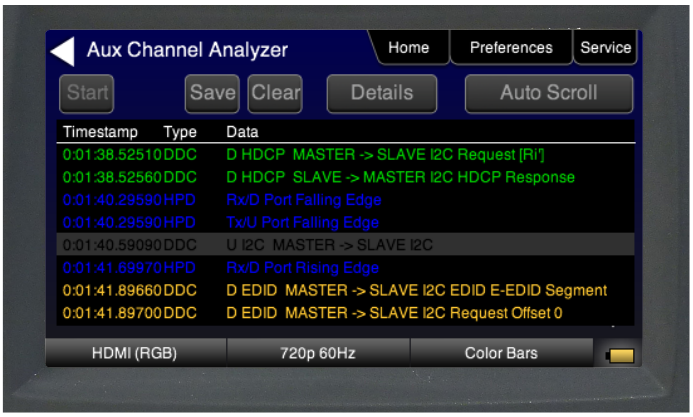

Figure 7 – Checking the HDCP and EDID transactions

VERIFYING AN HDBASET INSTALLED LINK

Once the HDBaseT link is installed on-site you can run the protocol tests as described above. However, in this case, since the HDMI source and HDMI sink are not collocated, you use the 780s reference sink (HDM Rx) and verify the video, timing and protocol output from the installed HDMI source device as depicted in Figure 8.

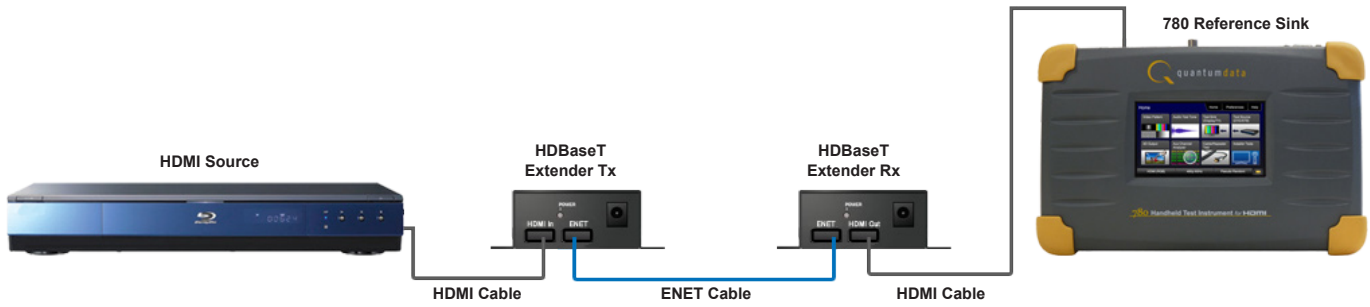

Figure 8 – Diagram showing installed system

In order to test for "bit exactness" in an installed link you use the 780's Frame Compare feature. The Frame Compare feature captures a reference frame from the upstream HDMI source and then compares it to the pixels in subsequent frames received. The feature calculates the number of pixel errors over the received frames (see Figure 9 below).

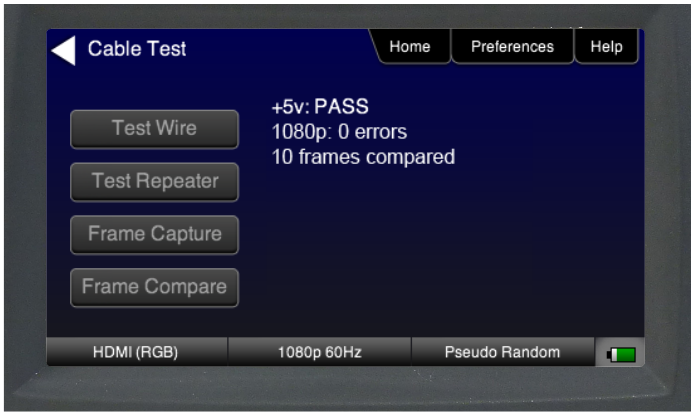

Figure 9 – Frame Compare Test

The 780 Handheld Test Instrument – A versatile solution for HDBaseT testing at an attractive price.

Visit the 780 page on the Quantum Data website www.quantumdata.com/780.asp for more information on the features and functions of the 780 Handheld Test Instrument for HDMI.