



## 780 HANDHELD TEST INSTRUMENT CASE STUDY

### Diagnosing HDMI Interoperability Problems in a Major League Baseball Stadium

**Network Description:** The stadium was being equipped with several hundred new HDTVs. Some of these HDTVs were fed from a STB media player. Content was broadcasted to the STBs through existing coax infrastructure. There was some embedded content within the STB that overlaid the video from the cable/satellite broadcast. A sample portion of the network configuration for the HDTV is depicted in the illustration below.

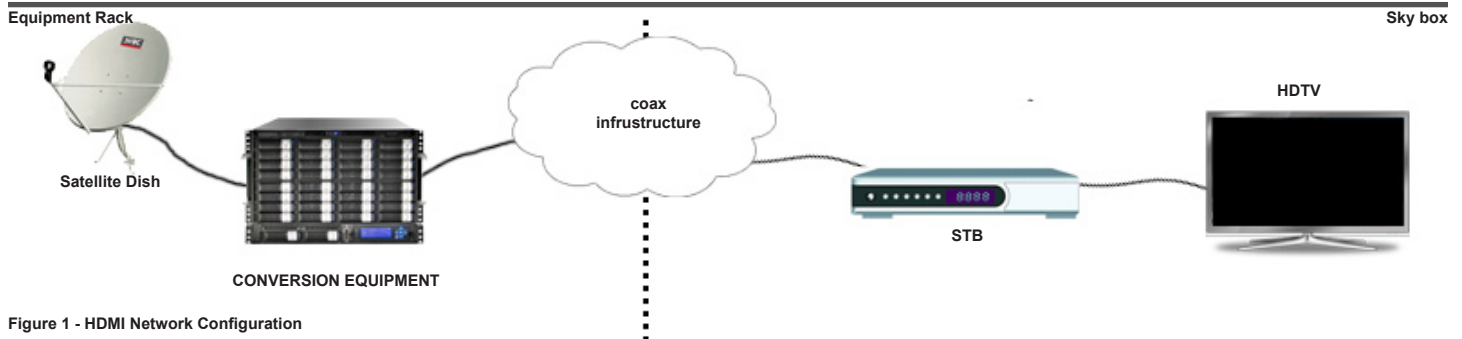


Figure 1 - HDMI Network Configuration

**Symptom:** During installation a problem was identified when a power glitch occurred. The HDMI interface would not recover without human intervention--pressing the On button on the remote. The most likely causes were locked ports on the HDTV or HDMI handshake failure in the connection sequence following power restoration.

**Diagnostic Procedure (Test #1):** The Quantum Data 780 Handheld Test Instrument was used as a reference ("known-good") source to verify that the HDTVs were operating properly. A video pattern test, EDID test and HDCP handshake test were run on selected HDTVs. A cable test was run on the HDMI cables.

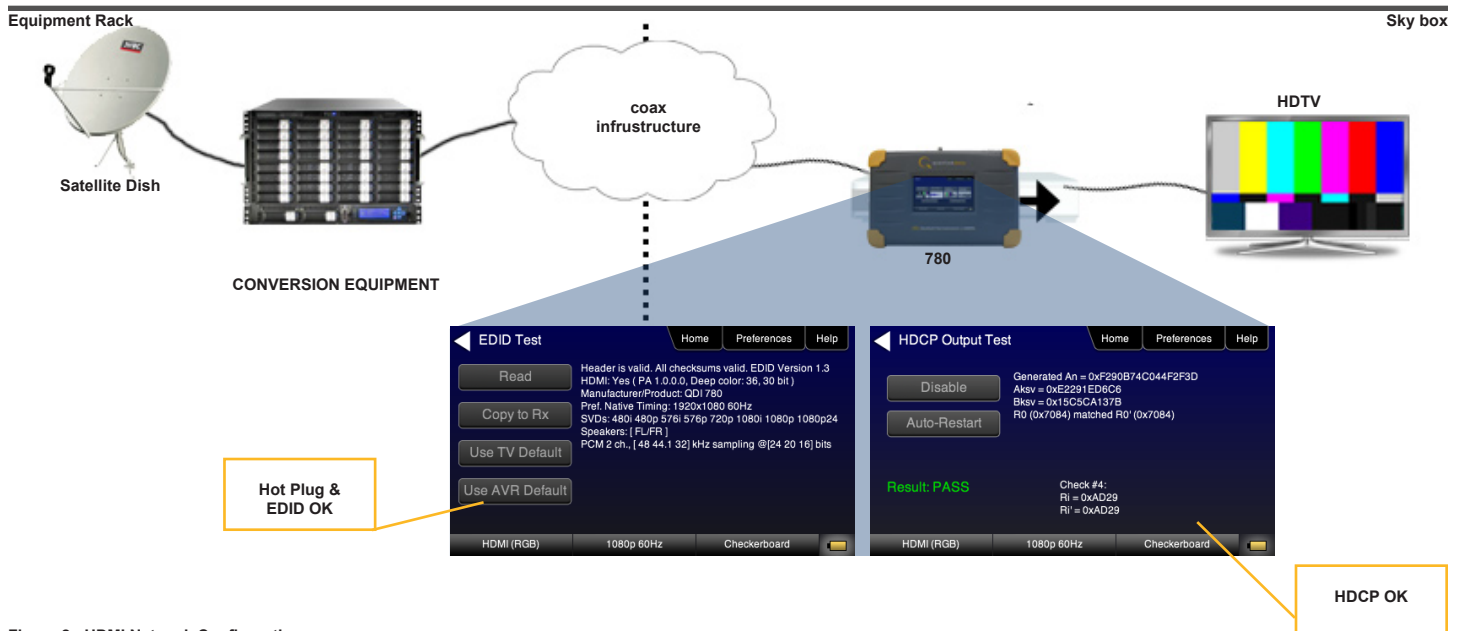


Figure 2 - HDMI Network Configuration

**Results (Test #1):** The results indicated that the HDTVs were operating properly. They were issuing a proper hot plug signal, had valid EDIDs, were responding properly to HDCP authentication and were able to render test patterns at all resolutions and color types. The HDMI cables did not show any failures.

**Diagnostic Procedure (Test #2):** The Quantum Data 780 Handheld Test Instrument was then used to verify the STBs at the HDTV (it replaced the HDTVs as a "known-good" sink). The EDID and HDCP transactions were monitored on the 780 using the Auxiliary Channel Analyzer feature during power cycle.

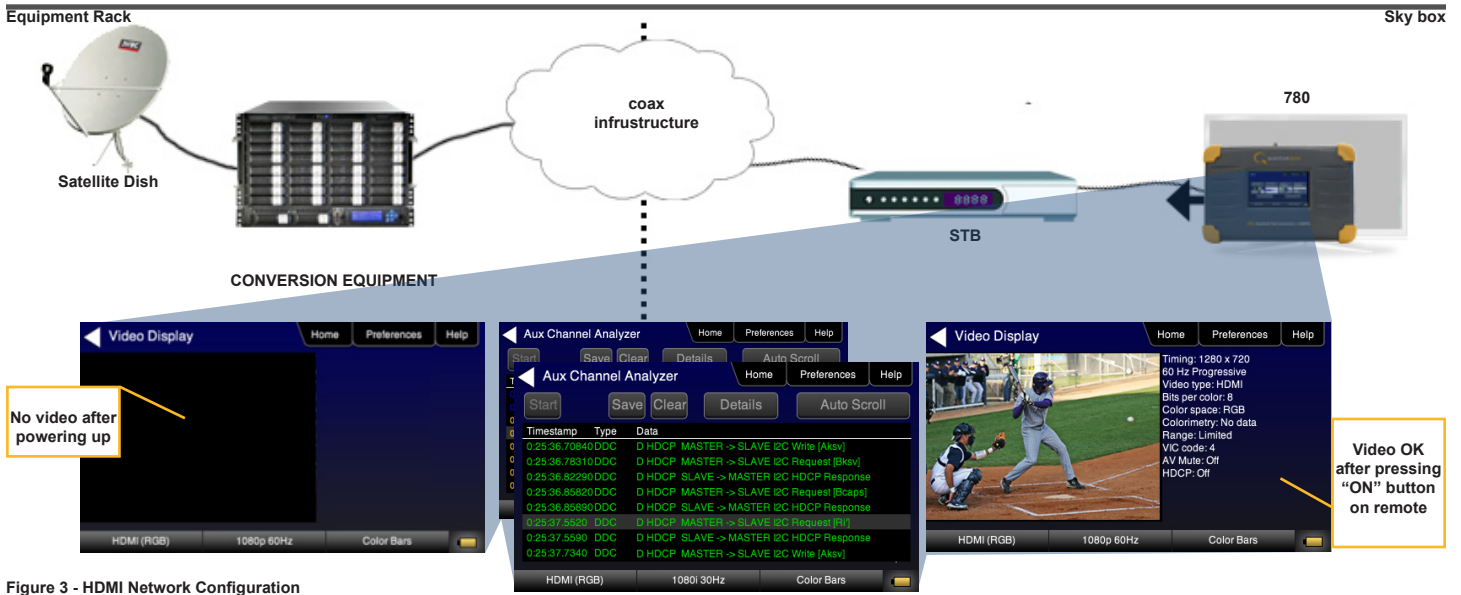


Figure 3 - HDMI Network Configuration

**Results (Test #2):** The results showed that when power was reapplied to the STB, the hot plug was exchanged and the 780's EDID was read by the STB, but HDCP authentication was not initiated unless the On button on the STB remote was pressed by an operator.

**Diagnostic Procedure (Test #3):** The Quantum Data 780 Handheld Test Instrument was then used to passively monitor the EDID and HDCP transactions between the STB and the HDTV. The HDCP transactions were monitored on the 780 using the Auxiliary Channel Analyzer feature during power cycle.

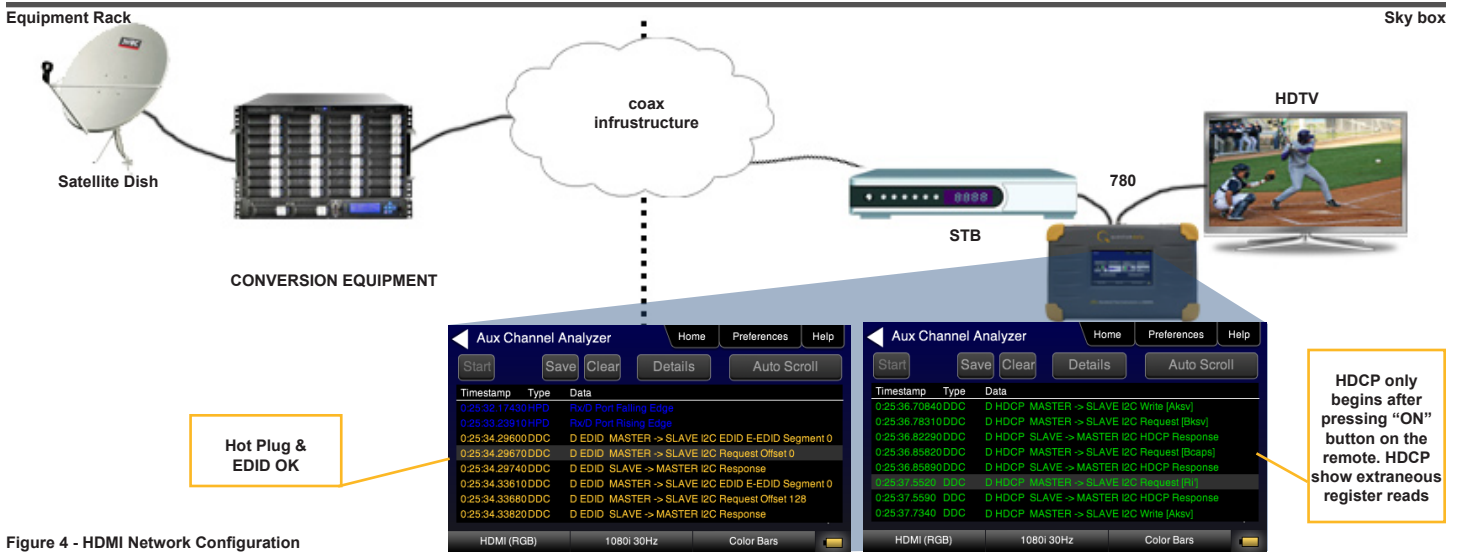


Figure 4 - HDMI Network Configuration

**Results (Test #3):** The results again showed that when power was reapplied to the STB, the hot plug was exchanged and the HDTV's EDID was read by the STB, but HDCP authentication was not initiated unless the On button on the STB remote was pressed by an operator.

**Summary:** The root cause of the problem was related to bug in the STB which did not initiate HDCP in response to a hot plug and following the EDID read during the connection sequence. The 780 was used to determine the following:

- Demonstrated that the HDTVs were operating properly.
- Verified that the cables were operating properly.
- Verified that the HDMI connection sequence failed because the STB would not initiate HDCP authentication following a hot plug and EDID exchange.
- Verified that HDCP authentication and encryption did occur but there were many extraneous HDCP register reads made by the STB that could cause problems on other HDTVs.