EEG Application Note
SCTE-104 Suite
Applies to Products: HD480, HD490, DE285, DE1285, A1450
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SCTE-104 messaging provides a valuable mechanism for signaling advertising avails, program splice points, and DRM signals for television production, broadcast and distribution. EEG's suite of SCTE-104 solutions includes VANC insertion of SCTE-104 data from LAN and GPI sources on the HD480/490 series Closed Caption Smart Encoders, monitoring on the DE285 VANC Monitor and OpenGear DE1285 VANC Monitor, and modular receiving and conversion to HTTP data on the A1450 OpenGear Receiver.

Figures 2 and 3 in this document show suggested full system configurations using the EEG tools.

Trigger Insertion

The HD480/490 encoders support an add-on module for SCTE-104 insertion into HD-SDI VANC. The encoders insert SCTE-104 packets on a user-configurable VANC line, using the 4107 DID/SDID (as per SMPTE 2010). SCTE-104 messages can either be authored using a built-in preset editor and triggered via GPI (see Figure 1), or can be sent from an external source using the SCTE-104 network protocol over TCP/IP. This function can be used separately or in tandem with closed caption encoding and other encoder functionalities.

Figure 1: SCTE-104 Trigger Insertion interface for HD480

GPI Triggering on the HD480/490

When triggering SCTE-104 presets over GPI, each of the HD480's four GPI inputs can be set to trigger a separate SCTE-104 splice request packet created using the "Preset Editor" section of the web configuration tool. Each splice request message can be configured to any of the standard insert types (Start Normal, Start Immediate, End Normal, End Immediate, or Cancel), with configurable Program ID and Break Duration fields.

Each GPI preset also has Group and Repeat settings. The repeat settings enable a single message or flag to be repeated on a periodic basis after it is first triggered, until it is cancelled, or disabled by another switch in the same group. Setting more than one switch into the same group number links those triggers so that triggering any of the messages in the group will cancel repeats of the others.

Any of the GPI switches can also be configured to "Use LAN Message" rather than "Preset" - this will cause the GPI to trigger a VANC insertion of the most recent SCTE-104 message loaded over the TCP/IP interface, rather than a message created in the Preset Editor.

TCP/IP Triggering on the HD480/490

The TCP/IP interface for sending SCTE-104 data to the HD480 is enabled through the "Allow LAN Messages" setting on the web configuration interface. When enabled, the

HD480 will listen for TCP/IP connections on a configurable port. Automation clients should connect to this port, and once the connection is accepted should begin handshaking with the "init_request_data" single operation message, as defined in the SCTE-104 standard. Once the handshake is complete, the HD480 will begin inserting all properly formatted SCTE-104 multi operation messages it receives over the network into the VANC space.

If the "Insert LAN Messages Immediately" check box is unchecked, SCTE-104 messages will only be inserted into VANC when triggered through a GPI set to "Use LAN Message". This operational mode enables timing-insensitive pre-loading of future messages over the LAN interface, followed by real-time GPI insertion triggering.

When inserting SCTE-104 messages from the LAN into VANC, the HD480 fits in the role of "SDI embedder" as shown in Figure 12-1 of the SCTE-104 specification. Since VANC embedding is a one-way communication protocol, the system design considerations found in Section 12.1 ("One Way Protocol – Automation System to Injector") regarding supported messages and time synchronization should be applied to all authoring interfaces communicating with the HD480 VANC inserter, and to the downstream SCTE-35 injector (which may be integrated into the MPEG transport encoder).

Trigger Monitoring

The DE285 VANC Monitor includes a number of useful features for SCTE-104 monitoring, including VANC packet captures, an on-screen burn-in decoder for splice requests, an XML-based log, and SNMP reporting with full message details. For full details on the operation of these features, please see the DE285 product manual.

Trigger Recovery and HTTP Post

Some widely used SCTE-35 injection tools, such as the Motorola DigiCipher Event Manager (DEM), do not accept SCTE-104 input directly from HD-SDI VANC data. In the case of the DEM, the required interface to generate SCTE-35 data uses physical GPI switches and/or virtualized GPI switches accessed through an HTTP POST interface.

The EEG A1450 OpenGear SCTE-104 Receiver can be used to disembed SCTE-104 data from an HD-SDI video signal. When messages are received, the A1450 will post program ID data or other selected fields from the SCTE-104 message into the DEM to trigger the creation of SCTE-35 messages.

The A1450 also supports configurable GPO tallies in response to SCTE-104 data, enabling an additional option for communication with the DEM or other SCTE-35 injection or monitoring equipment.

System Block Diagrams

Figure 2 shows insertion of SCTE-104 data from a variety of sources into HD-SDI VANC using the HD480 encoder. A DE285 is used for monitoring of the encoded data, while the master video chain is routed through an MPEG transport encoder that reads the embedded SCTE-104 data and translates it into SCTE-35 splice cues.

Figure 3 shows a system where the A1450 Receiver card is used to disembed SCTE-104 from HD-SDI VANC, and to POST the message data to a standalone Motorola DEM SCTE-35 injector.

Figure 2

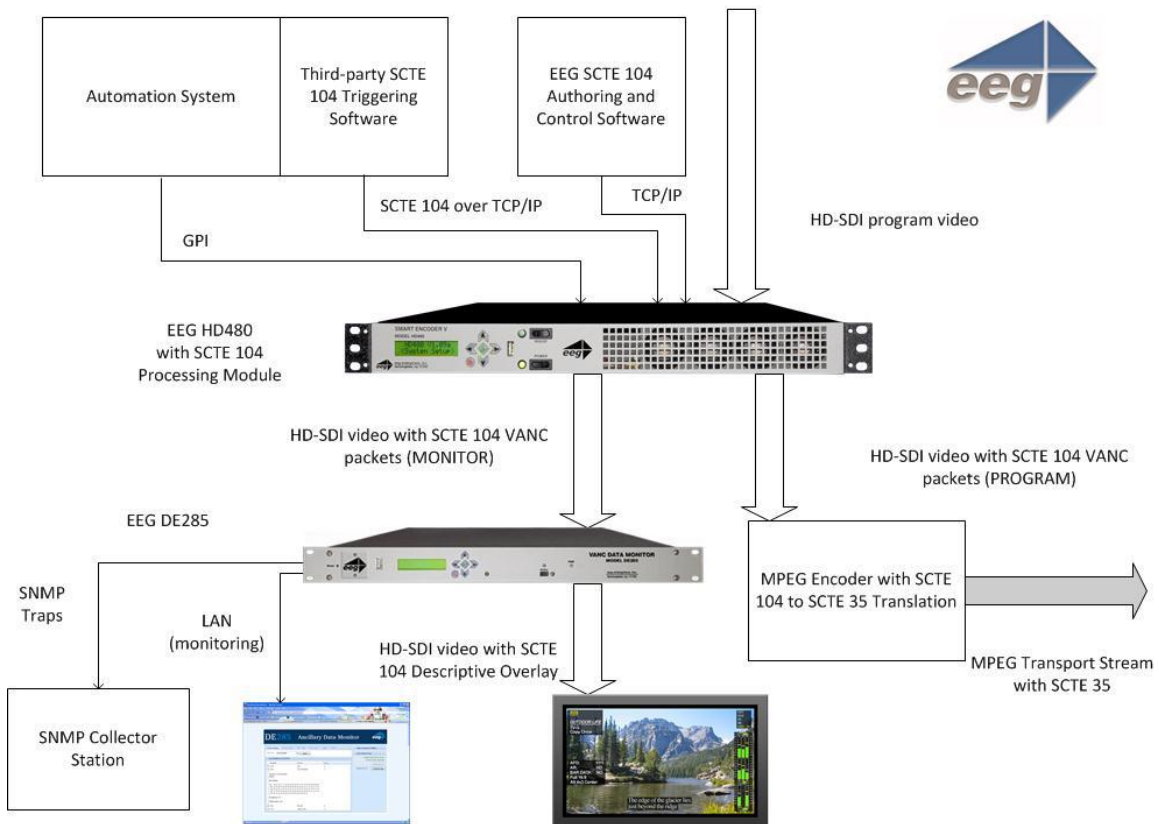SCTE 104 Embedding and Monitoring System with EEG HD480 and DE285

Figure 3
SCTE 104 Embedding, Recovery, and HTTP Posting System with EEG HD480 and DE285/A1450