APPLICATION NOTE

## PRECISE MEASUREMENT OF HD-SDI SIGNAL LATENCY USING THE 6980G-HD

The ITS 6980G-HD SDI Video Inserter has an integral GPS receiver that synchronizes to the GPS time mark within 100 nanoseconds when operated in a fixed location. The SDI inserter also will capture time to within 5 µseconds of each vertical sync detected. For progressive scan formats (720p, 1080p), time would be captured at the frame rate, for interlaced formats (e.g. 480i, 1080i), time is captured at the field rate.

The time captured can be overlaid onto the source video, but more importantly, time can be recorded in the VANC of every field or frame. The data is recorded as microseconds from the Unix epoch of January 1st, 1970. This data is enclosed in a packet that is compliant with standard 605.3 of the Motion Imagery Standards Board (MISB) which also adopted the NATO standard STANAG 4609.

The 6980G-HD can also read the time recorded in the VANC of each field/frame that is packetized in accordance with MISB 605.3. One can measure the latency to a resolution of 1µsec in real time frame/field to frame/field of any SDI > transport system > SDI video stream by using two 6980G-HDs. The measurement is accomplished by placing one 6980G-HD at the video source and one at the destination (e.g. a display at the other end of a transmission path). A sample configuration is shown below:
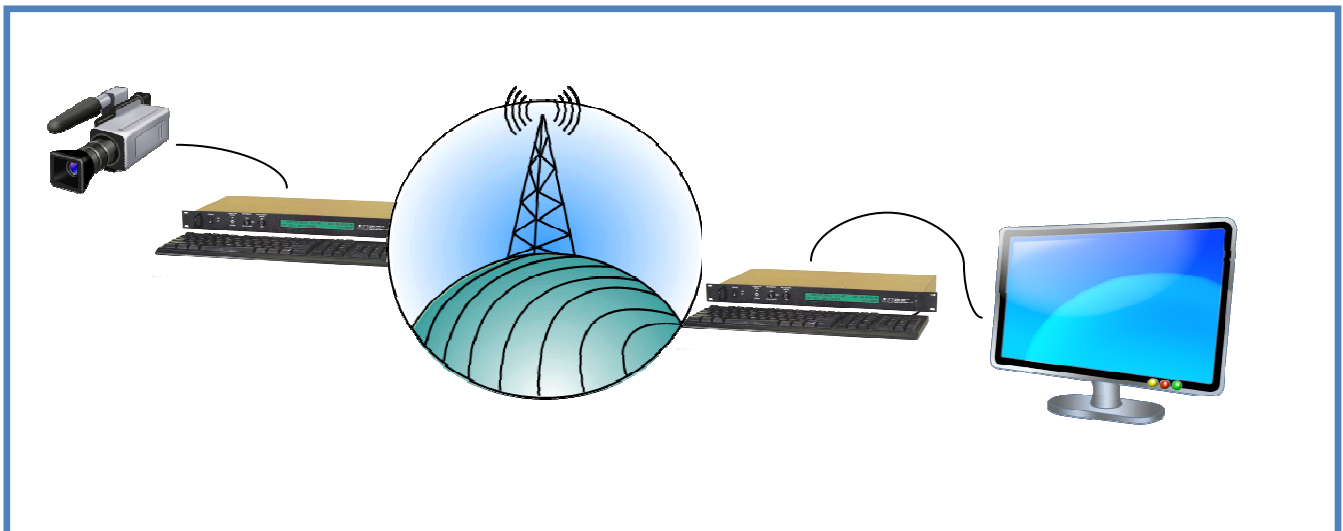
Both inserters must have a GPS antenna and be locked to GPS. The unit at the video source must be set to record time in the metadata (Metadata Write) and the destination end (where display is shown) must be set to read metadata (Metadata Read). At the destination, set the 6980G-HD to overlay the metadata time (see the command structure of the operations manual, or use the GUI supplied with the

unit). Using the keyboard supplied with the 6980G-HD connected directly to the unit, press the F12 then 4 key. At approximately row 4, pixel 2 the word "diff" will appear followed by a number. The number is the difference between the time recorded in the metadata by the 6980G-HD at the source and the time captured by the 6980G-HD which is synchronized to GPS at the vertical sync of the incoming stream.   Since both 6980G-HDs are synchronized to GPS time to within 100 nanoseconds, time is recorded on the VANC of the field/frame to within 5 µsec at the source, the time recorded on the metadata is within 5-6 µsec of GPS time. At the destination end, GPS time is captured to within 5 µsec of vertical sync of the incoming video stream. When this local GPS time is compared with the recorded metadata time in this manner, the time difference is the latency between the two 6980G-HDs with an uncertainty of ±5.2 µsec. This measurement is made at each vertical sync and may be displayed using this special "F12" test feature dynamically and in real time.

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