LYNXTechnik **AG**®

Broadcast Television Equipment

Application Note

3G SDI Interfaces

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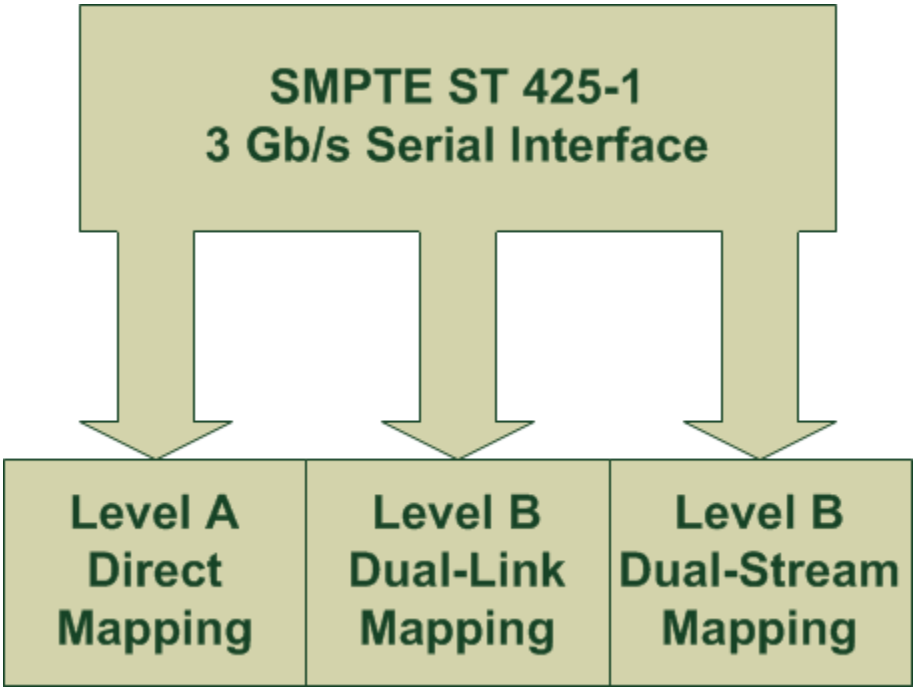

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1 Overview

When we talk about 3G-SDI we have to be more precise in order to avoid misunderstandings. E.g. when sending a 1080p50 signal from one device to another, it is not ensured that the transmission will be successful, although both devices can handle 3G-SDI signals.

The reason for this is the option of different mapping schemes for transporting video signals over the serial digital interface.
In this Application Note the three SMPTE ST 425-1mapping schemes **Level A**, **Level B Dual-Link**, and **Level B Dual-Stream** of *fast progressive formats* (YCbCr 4:2:2 10Bit 60p 59p 50p) will be discussed.

2 Payload ID (VPID)

Because of the numerous video formats a (physical) 3G serial digital interface can carry, the use of a Payload Identifier is mandatory. Without a VPID the receiving device is not able to correctly decode the incoming signal.

SMPTE ST 352 *“Payload Identification Codes for Serial Digital Interfaces”* describes this 4-byte identifier.

SDI-Analyzers, supporting 3G SDI, also need a VPID to correctly decode the signals. It is displayed for example in the “Video Session” display of Tektronix WFMs (see Figure 2,Figure 4, and Figure 6).

3 Level A Direct Mapping

Figure 1 shows the transmission of a 1080p50 signal over 3G serial interface using 3G Level A Direct Mapping.

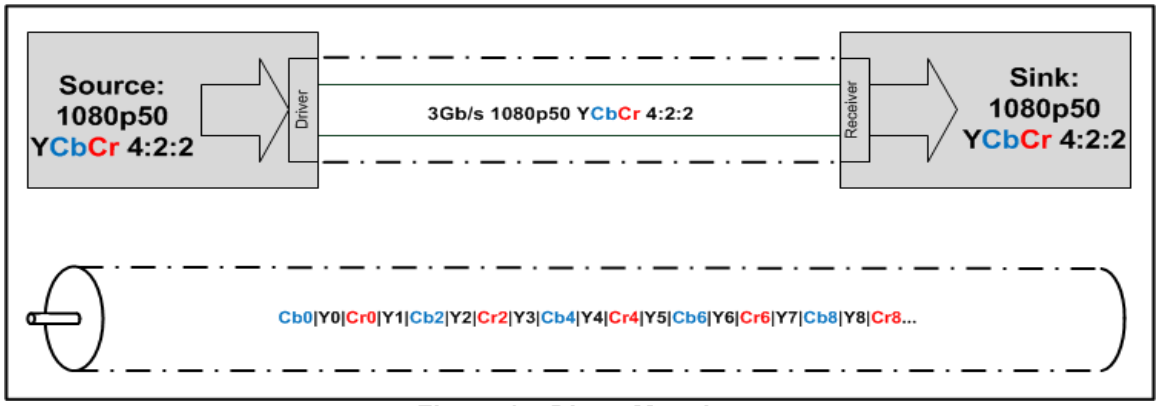

Figure 1 – Direct Mapping

This mapping is well known as it is the same as already used for 1.485 Gb/s HD-SDI.

Chrominance- and luminance-pixels are transmitted alternately. As it is a 4:2:2 format, even luminance pixels are accompanied by chrominance pixels, odd luminance pixels are transmitted solely.

Figure 2 shows a screenshot of the upper half of WFM's Video Session with a VPID for Level A Direct Mapping.

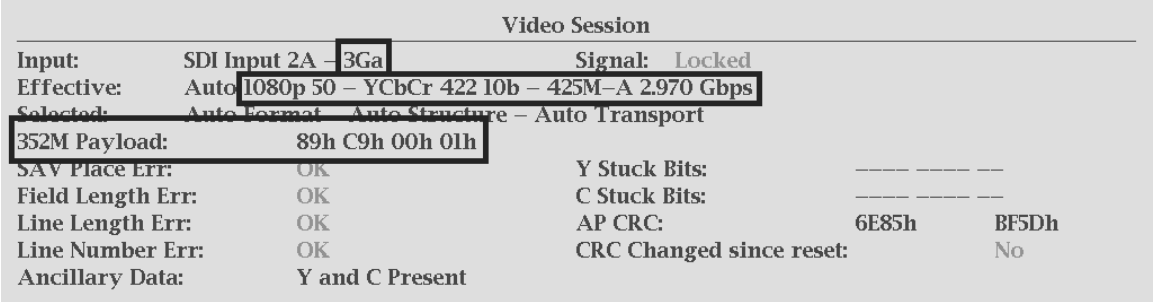

Figure 2 – VPID Level A Direct Mapping

4 Level B Dual-Link Mapping

Figure 3 shows the transmission of a 1080p50 signal over a 3G serial interface using 3G Level B Dual-Link Mapping.

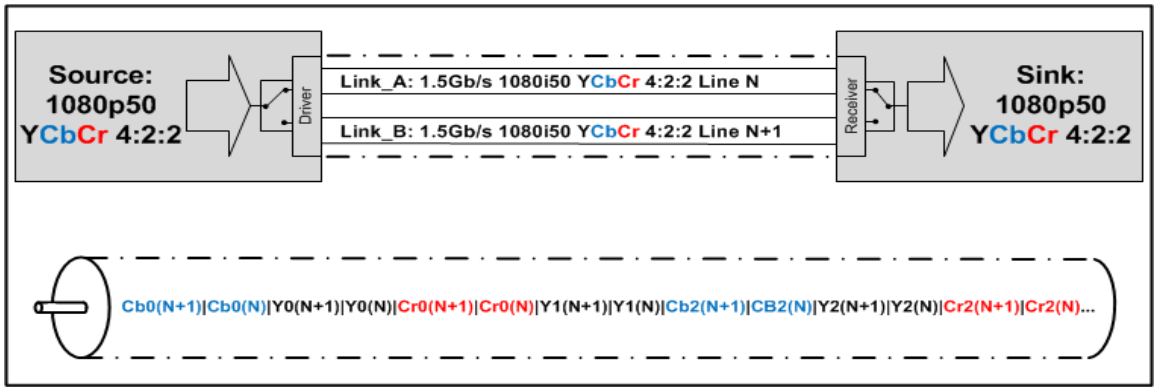

Figure 3 – Dual-Link Mapping

For this mapping, luminance and chrominance is multiplexed inside each link alternately in the usual 4:2:2 10 bit scheme. Succeeding lines (N, N+1) will be mapped between Link_A and Link_B as well.
Even though the original image is progressively scanned, it is split line by line between the two links according to SMPTE ST 372.

Two succeeding 1080p frames are packed into the two fields of the 1080i transport format.

Link_A and Link_B exist only virtually. They are multiplexed into one data-stream and transmitted over one single cable as shown in the lower part of Figure 3.

Figure 4 shows a screenshot of the upper half of WFM's Video Session with a VPID for Level B Dual-Link Mapping.

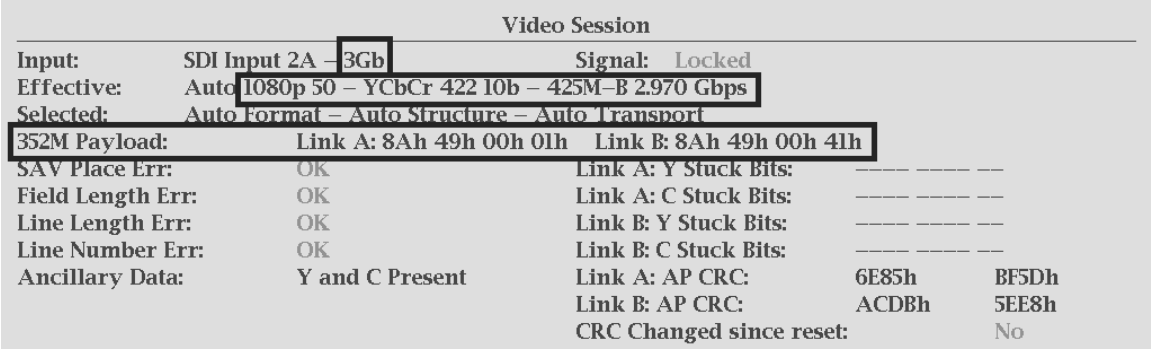

Figure 4 – VPID Level B Dual-Link Mapping

Both links contain VPIDs that differ in the last byte to identify Link_A and Link_B of the Dual-Link signal.

5 Level B Dual-Stream Mapping

Figure 5 shows the transmission of **two independent** 1080p24 signals over a 3G serial interface using 3G Level B Dual-Stream Mapping.

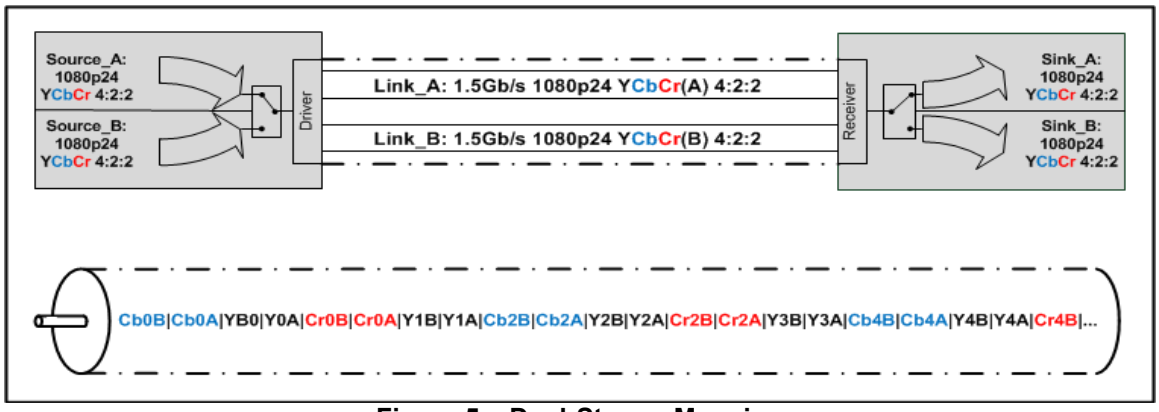

Figure 5 – Dual-Stream Mapping

This mapping scheme is typically used for the transmission of stereoscopic signals. In this application, Source_A represents the left-eye signal and Source_B is the right-eye signal of the 3D-image.

Again, luminance and chrominance is multiplexed inside each link alternately in the usual 4:2:2 10 bit scheme. Link_A carries Source_A pixels and Link_B carries Source_B pixels respectively.

Link_A and Link_B exist only virtually. They are multiplexed into one data-stream and transmitted over one single cable as shown in the lower part of Figure 5.

Figure 6 shows a screenshot of the upper half of WFM's Video Session with a VPID for Level B Dual-Stream Mapping.

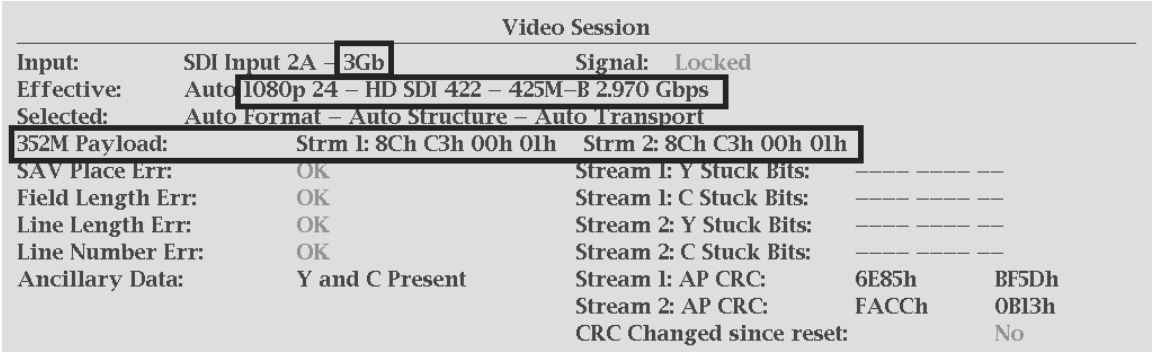

Figure 6 – VPID Level B Dual-Stream Mapping

Both links contain identical VPIDs therefore Link_A (Stream 1) and Link_B (Stream 2) are identified only through their position in the multiplexed data-stream.