Technical Bulletin

Confidential

Frame Synchronisers

Unlike standard synchronisers processing linear PCM audio, frame synchronisers that are compatible with Dolby® E are required to process the audio using a different method, more similar to the process used to synchronise video signals.

Requirements:

1. Output AES3 signals containing Dolby E frames should be locked to a 48kHz clock derived from video reference. As with all frame synchronisers, the output Dolby E signal should be sample locked to a 48kHz signal derived from video reference.

2. Dolby E frames should be phase locked to video reference. The output Dolby E signal should be correctly phase aligned with the video reference (and by definition with the output video). The exact start line of the Dolby E data burst will depend on the video frame rate.

3. Audio/video sync should be correctly timed and static when locked input signals are present. Although the synchroniser may delay audio and video signals by a different amount in order to correct for offsets applied since Dolby E encoding (such as that introduced through an SDI embedding/disembedding process), the synchroniser should maintain a constant A/V sync value for steady state input signals.

Figure 1 shows an example of the process of synchronising Dolby E signals. Although the steps shown are likely to be combined in a synchroniser, they are portrayed in the diagram as separate steps for the sake of simplicity.

Note: This method of frame synchronisation will correct alignment errors to the nearest frame boundary. Although in occasional cases where the incoming alignment error is greater than 0.5 frames, the offset may increase following synchronisation. This process will reduce the occurrence of errors incurred by the misplacement of the Dolby E guard band in downstream equipment.

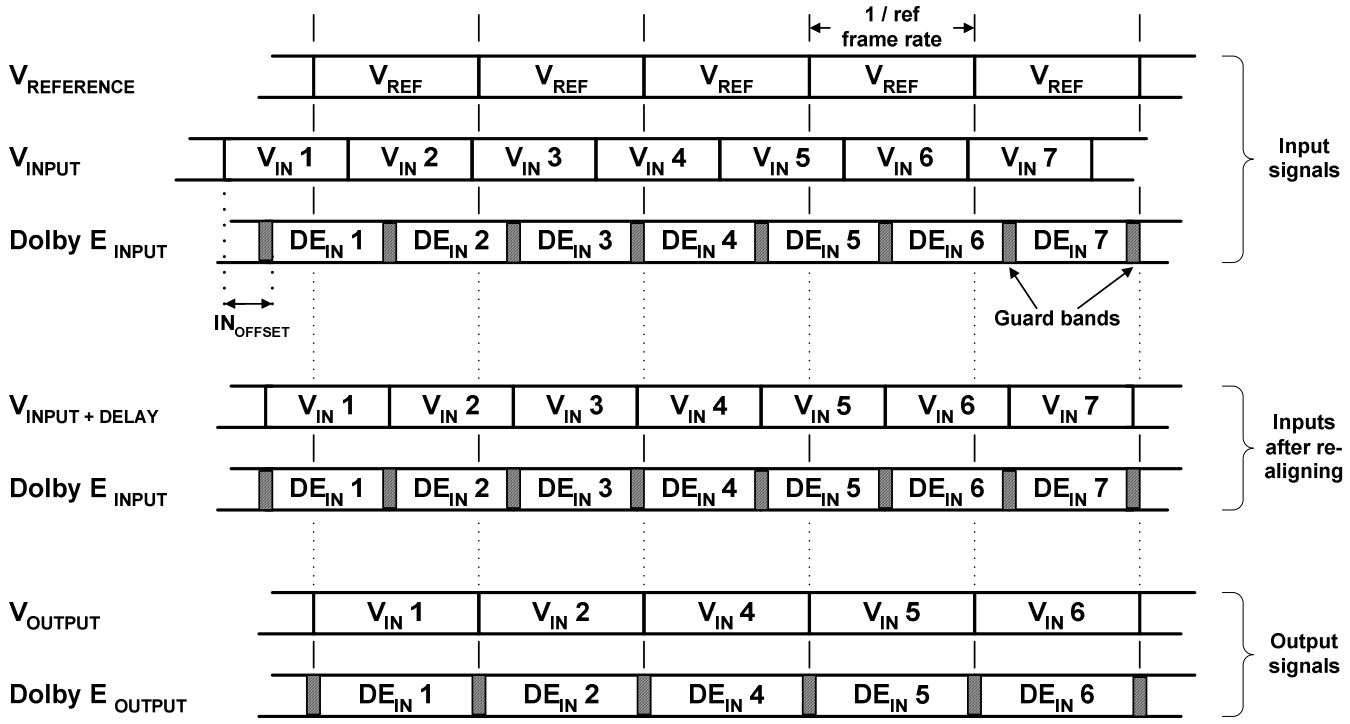

Figure 1: Example of frame synchronisation with Dolby E

Firstly it is necessary to re-align the input video and Dolby E frames. In order to do this, the offset between the input video and Dolby E frames needs to be measured. The position with respect to the input video at the start of the SMPTE337M data burst containing Dolby E should be obtained. This should then be compared to the reference position for the relevant frame rate in order to calculate the offset between the input signals (IN_{OFFSET} in Figure 1).

The value of IN_{OFFSET} will be between +/-0.5 frames. An equivalent offset should be added to the read pointer for either the video or Dolby E, depending on the sign of the offset. In order to perform this process, an additional 0.5 frames of buffering will need to be available for the audio and video signals.

Note: For products that process MPEG TS, the PTS values should be used to initially re-align the video and Dolby E frames. However, the process as described above should also be followed to account for any offset that occurred prior to the MPEG encoder.

Following the re-alignment of the input signals, it is necessary to drop/repeat complete frames of video and Dolby E. As the start of the Dolby E frame is now correctly aligned, the audio buffer drop/repeats can copy the drop/repeats that are applied to the video signal. Dropping and repeating of complete Dolby E frames will not cause glitches in the audio due to the crossfade applied in the Dolby E decoder (see section 3.1.6 of the document entitled *Third Party Compatibility with Dolby E Bitstreams*).