

PROPOSED SMPTE RECOMMENDED PRACTICE

Format for Transmission of HD-D5 Compressed Video and Audio Data over 360 Mb/s Serial Digital Interface

1 Scope

This practice defines the data stream used for synchronous transmission of HD-D5 compressed video and audio data over 360 Mb/s serial digital interface (SDI) for the 525/60 system as defined in ANS/SMPTE 259M.

This practice does not define data stream structure applicable for transmission over the serial data transport interface (SDTI), SMPTE 305M.

2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this practice. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this practice are encouraged to investigate the possibility of applying the most recent edition of the standards indicated below.

ANSI/SMPTE 259M-1997, Television — 10-bit 4:2:2 Component and 4/3 Composite Digital Signals — Serial Digital Interface

ANSI/SMPTE 272M-1994, Television — Formatting AES/EBU Audio and Auxiliary Data into Digital Video Ancillary Data Space

SMPTE 342M, Television — HD-D5 Compressed Video — 1080i and 720p Systems — Encoding Process and Data Format

3 DIF block mapping

HD-D5 compressed digital video data, assembled as a DIF block stream, are mapped onto an SDI video field for transmission.

3.1 DIF block and DIF slice

One field of 1080i/60 or one frame of 720p/60 compressed video is represented by 5760 DIF blocks defined in SMPTE 342M as shown in figure 1.

5760 DIF blocks are divided into 480 DIF slices, each DIF slice comprising 12 DIF blocks. DIF blocks in one field (1080i) or one frame (720p) of video are numbered from 0 through 5759. Likewise, DIF slices are numbered from 0 through 479.

The relationship between the DIF block number (BN) and the DIF slice number (SN) within the video field or frame is as shown below.

$$SN = \text{int} (BN / 12) \text{ where } BN = 0 \text{ to } 5759$$

DIF slice structure is shown in figure 2.

3.2 Mapping of DIF blocks over SDI

DIF blocks shall be mapped into 360 Mb/s SDI that is specified in ANSI/SMPTE 259M. One 1080i field or one 720p frame of 5760 DIF blocks, containing 489,600 words, are mapped into a rectangular area of 1920 word columns (from sample number 0 to 1919 horizontally) by 255 word rows (from line number 9 to 263 in the first field or from line number 271 to 525 in the second field vertically) on SDI. In the case of 1080i, DIF blocks of the first field compressed video data shall be mapped into the first field of SDI and DIF blocks of the second field compressed video data shall be mapped into the second field of SDI, respectively.

One slice contains 480 slice cells. One slice cell is composed of 4 word columns by 255 word rows. The slice cell structure over SDI is shown in figure 3.

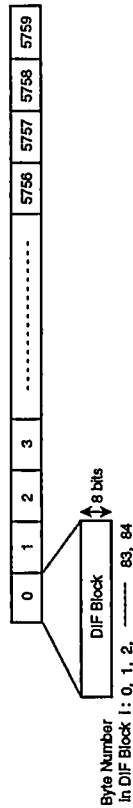


Figure 1 — DIF block

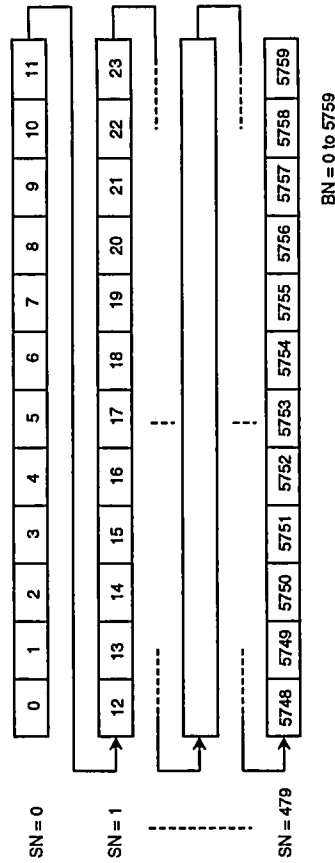


Figure 2 — DIF slice structure

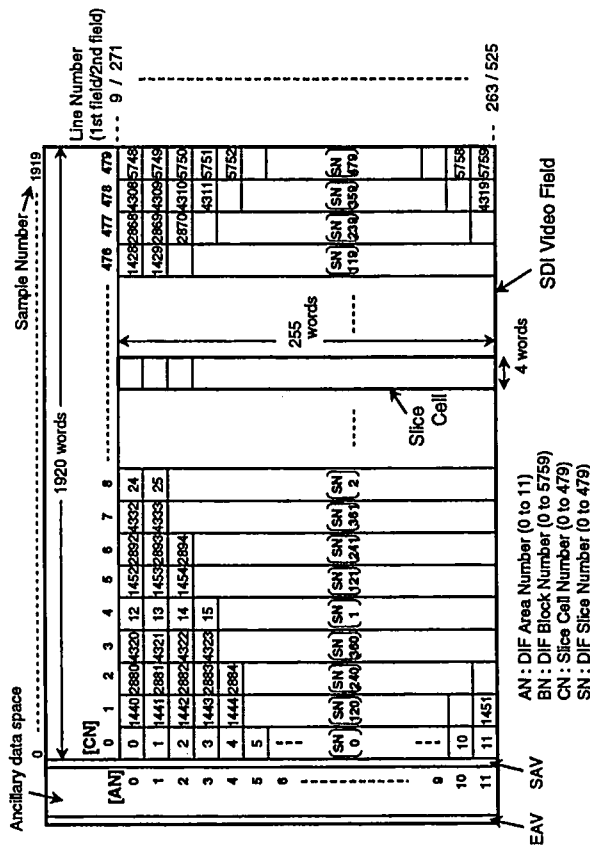


Figure 3 - Slice cell structure over SDI

Each DIF slice (see figure 2) is allocated into each slice cell according to the following expression:

$$CN = (SN \times 4) \bmod 480 + \text{int}(SN / 120) \text{ where}$$

SN: DIF slice number
CN: slice cell number

Each slice cell is divided into 12 DIF areas. The DIF area, consisting of 85 words, has four different area configurations; i.e., type A through D as shown in figure 4. Each DIF area is identified by a DIF area number (AN). The DIF block number (BN), DIF area number (AN), and slice cell number (CN) are related through the following expressions:

$$CN = (\text{int}(BN / 12) \times 4) \bmod 480 + \text{int}(BN / 1440)$$

$$AN = BN \bmod 12 \text{ where } BN = 0 \text{ to } 5759$$

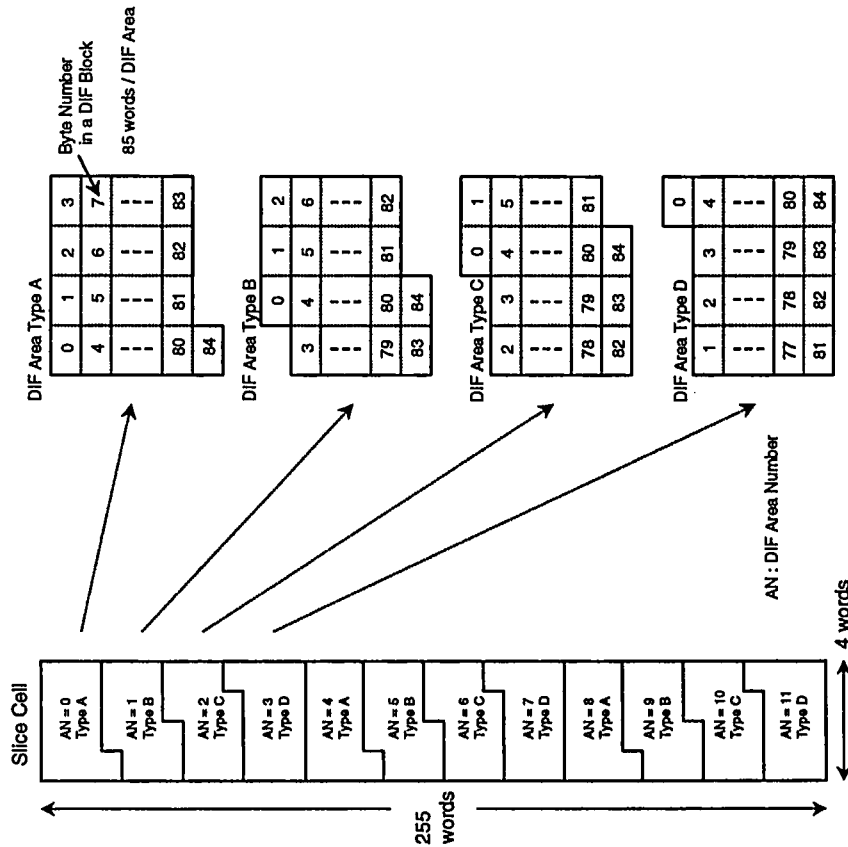


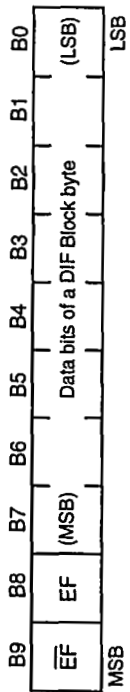
Figure 4 - DIF area type and byte allocation of DIF blocks

3.2.1 Bit allocation
Data bits of a DIF block byte are placed into an SDI data word (see figure 5) as follows:

- Data bits of a DIF block byte: B7 through B0 of SDI bit
- B7: MSB of DIF block byte
 - B0: LSB of DIF block byte
 - B6 is error flag (EF) for B7 through B0
 - B9 is the complement of B8
 - (EF = 0: No error exists in B7 through B0)
 - (EF = 1: Error exists in B7 through B0)

4 Audio data

The audio data format and transmission format shall conform to ANS1/SMPTE 272M.



EF : Error Flag
 EF̄ : Complement of Error Flag

Figure 5 – Bit allocation

Annex A (informative)
Bibliography

SMPTE 305M-1998, Television — Serial Data Transport Interface



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