Video Services Forum 2001

Mapping SMPTE 259 into ATM structure

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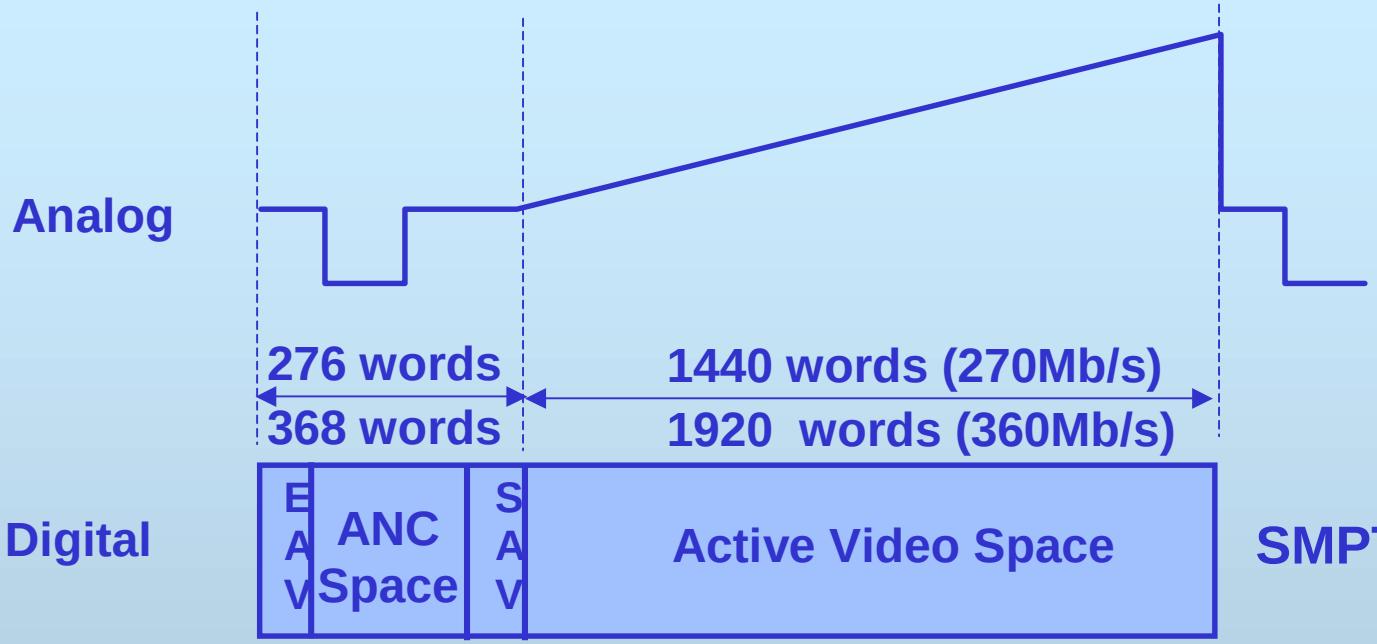
Johann Safar

Introduction

- Video and digital representation of video
- SMPTE 259 bit space
- SMPTE 259 layers
- SMPTE 259 user payload
- Signal redundancy in 259
- Net OC-3 payload
- Mapping 259 into ATM approach (wrapper)
- Layered mapped structure
- Conclusion

Analog video & Digital signal relationship



EAV	End of Active Video Marker
ANC Space	Ancillary Data Space for Embedded Signals (audio, time code) other)
SAV	Start of Active Video Marker
Active Video Space	Video Data Space

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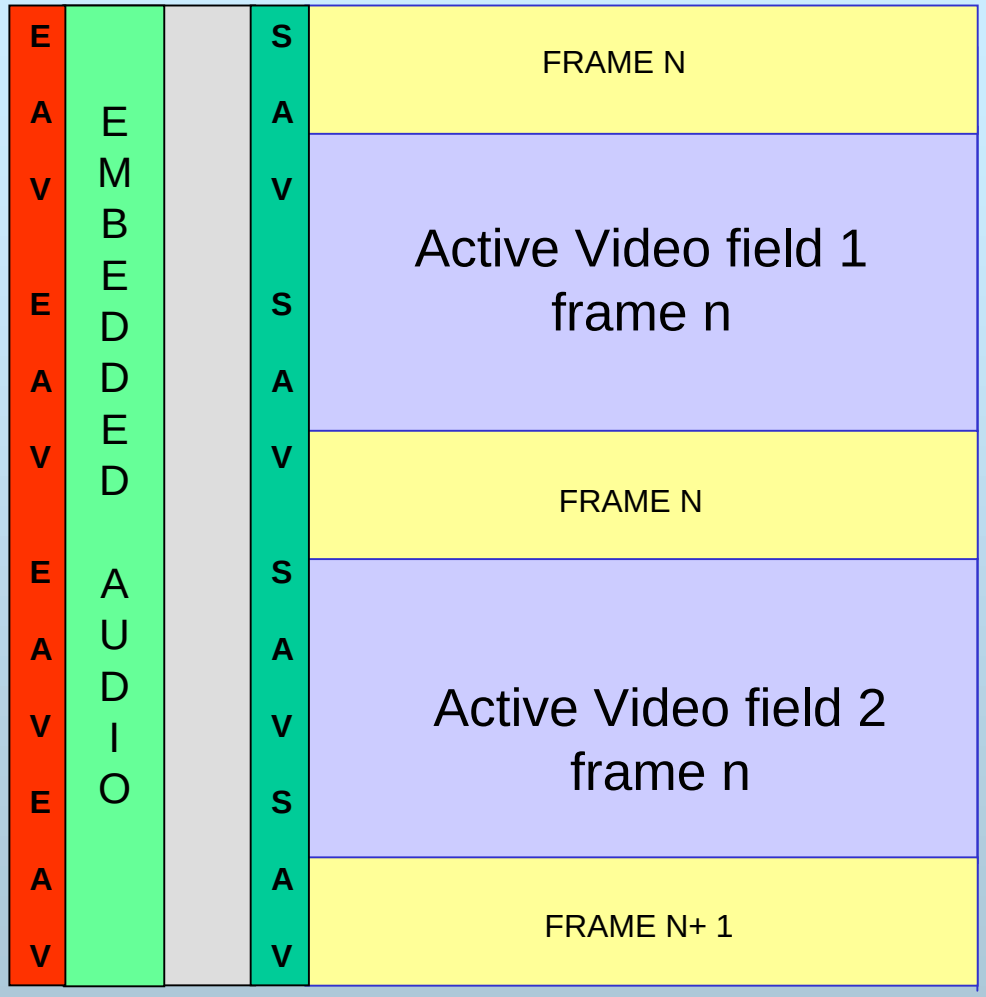
SMPTE 259 bit space



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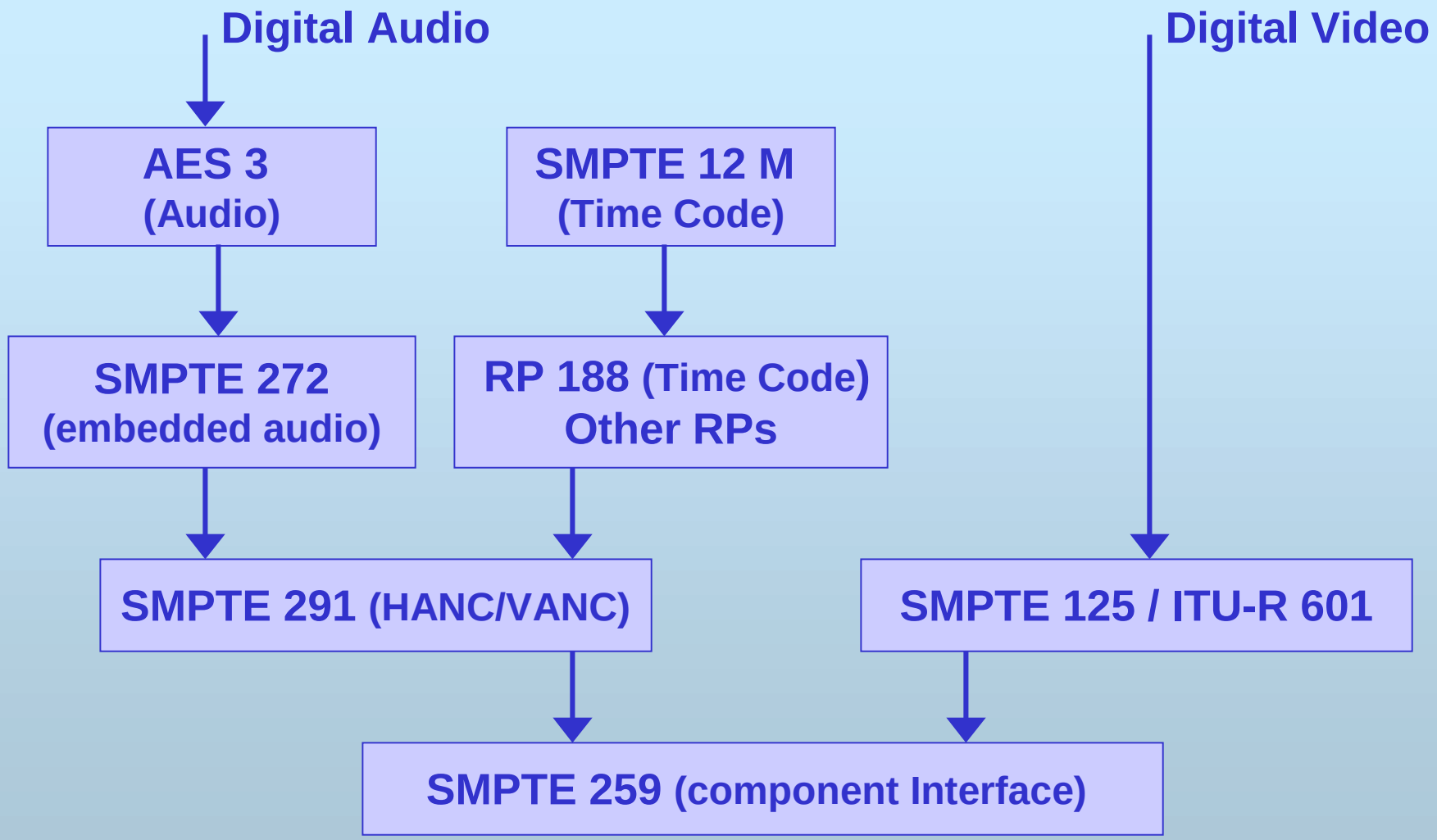
Example of a Layered SMPTE document structure



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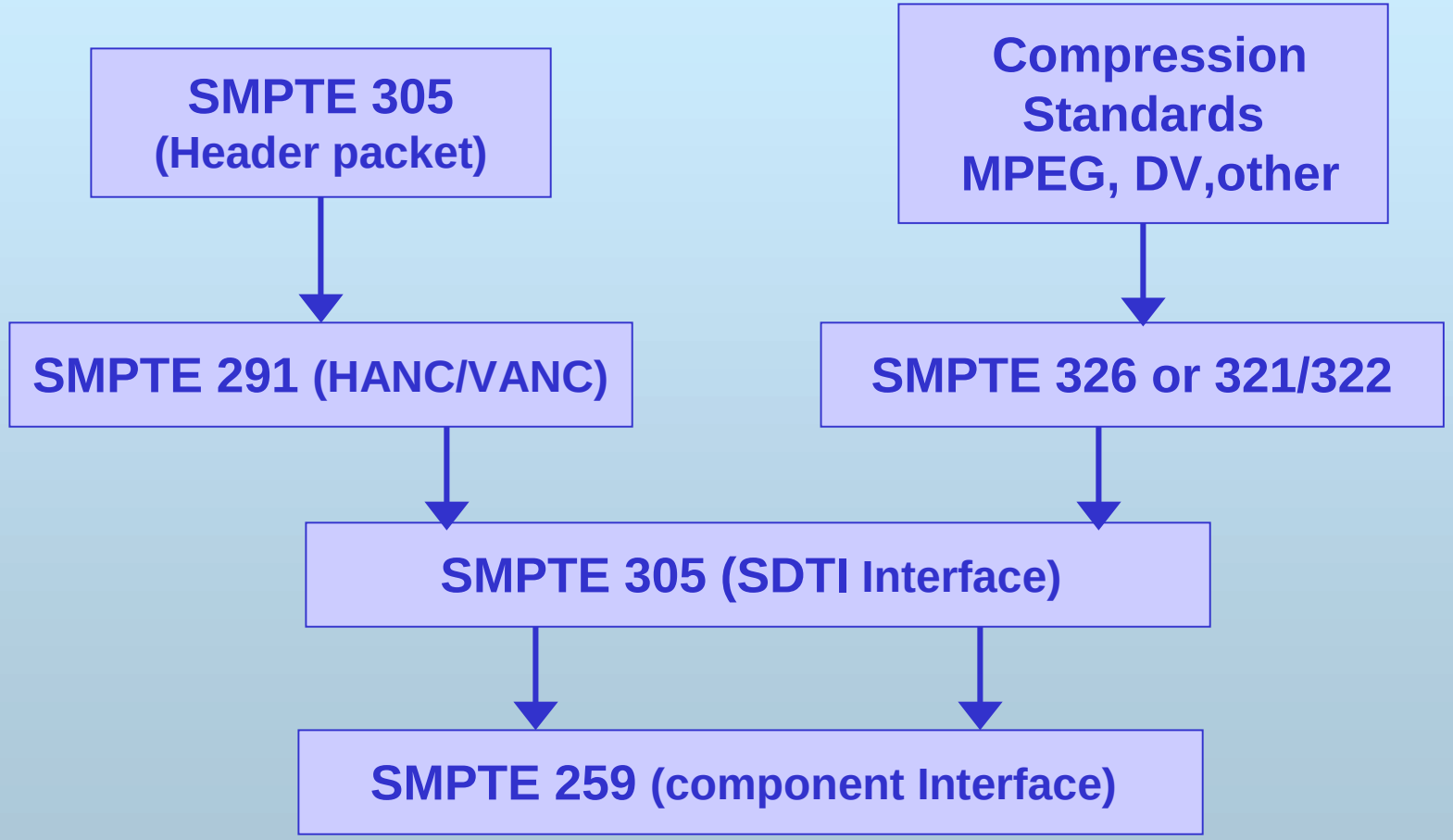
An Example of mapping Data on SMPTE 259



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SMPTE 259 bit space

- 259 signal consist of following data:
  - SMPTE 259 system use either
    - 59.94 frames/sec - 525 lines
    - 50 frames/sec - 625 lines
  - each line has 1716/1728 words
    - 1440 words/line - Active video space
    - 276/288 words/line - Ancillary space (HANC space)
  - synchronization signals EAV, SAV
    - each 4 words, total 8 words/line
- Total bit rate of SMPTE 259 signal (10bit)
  - 1716*525*10*29.97=269.999Mb/s (215.99Mb/s@8-bit)
  - 1728*625*10*25= 270.00Mb/s (216.00Mb/s@8-bit)

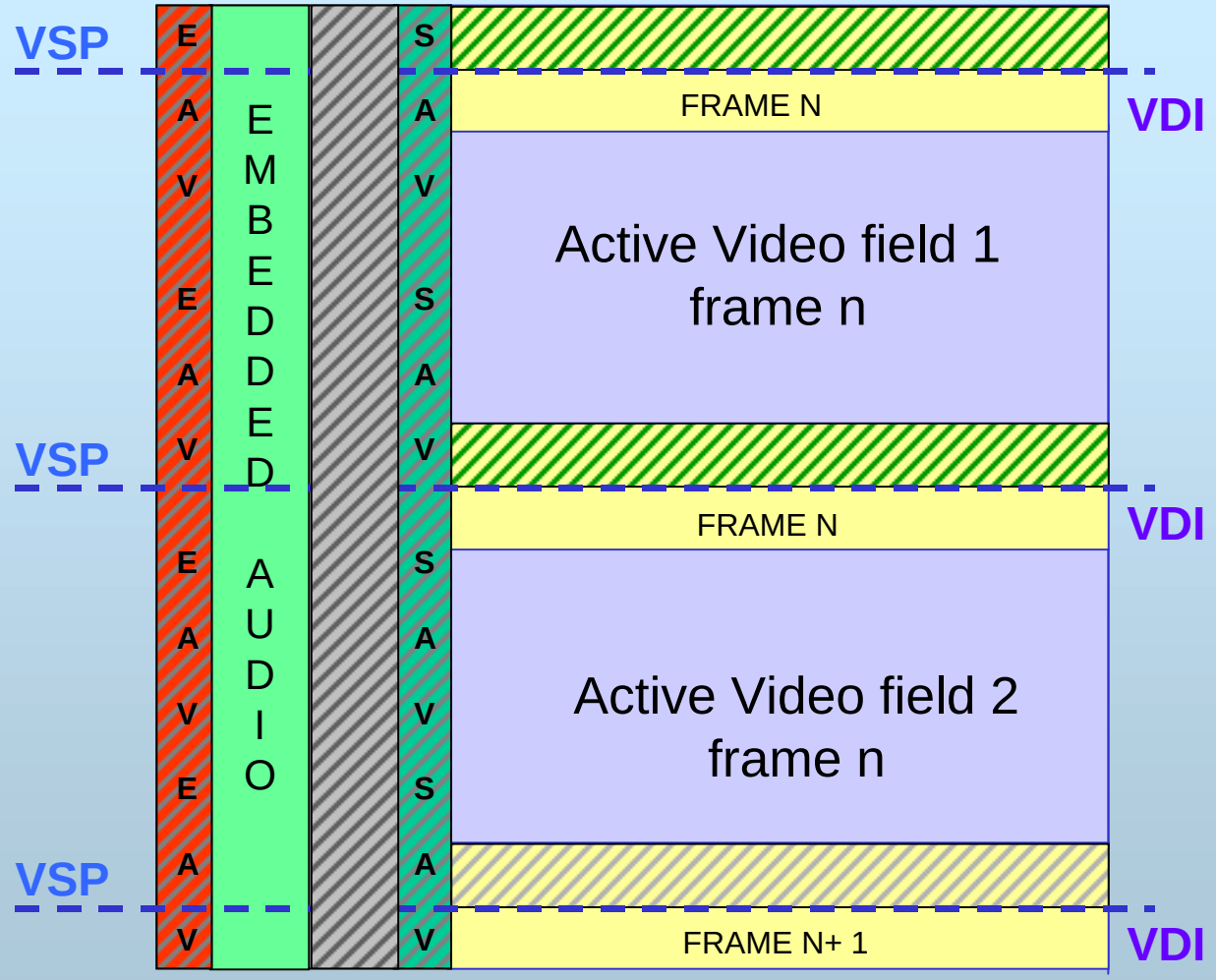
Net user payload in SMPTE 259

- Video (10-bit)
  - 1440*505*10*29.97= 217.94Mb/s (525 system)
  - 1440*605*10*25= 217.8Mb/s (625 system)
- AES Audio
  - defined as 8008 audio samples / 5 video frames
    - [(4 * 8008 * 32) / 5] * 30/1.001 = 6.14400Mb/sec
  - embedded audio (SMPTE 272)
    - packed audio for 4 channels is ~ 6.86Mb/s
- additional HANC data
  - estimated in range of about 100kb/s
- required net payload space: 224.9Mb/s

Redundant SMPTE 259 bit space

- Some information in SMPTE 259 is redundant and can be omitted:
  - Video image size is not always 525/625 lines high
    - part of Vertical Blanking Interval
  - Ancillary space is not fully occupied (do not transport empty space)
    - two ANC spaces - HANC & VANC
    - usually only 4 audio channels are carried in HANC
  - Synchronization EAV, SAV area
  - if frame timing information is provided, EAV, SAV can be reproduced on a receiver end

Redundancy in SMPTE 259



VSP
Vertical
Switch
Point

VDI
Vertical
Data
Interval

Note: Shaded area not transmitted

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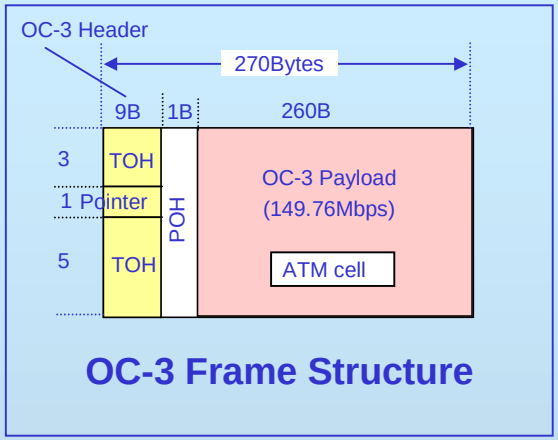
OC-3 user payload capacity

- OC-3 = 155.52Mbps (ITU)
- OC-3 payload data-rate
  155.52*(260/270) = 149.76Mb/s
- Maximum peak cell rate
  317 886 cells/sec (cell= 53 bytes)
  8 bits* 53* 317 886 = 134.783664Mb/s
- Maximum AAL1 payload over OC-3
  RS (124,128) FEC of AAL1, 6 Byte header in 53 Bytes
  134.783664 * (124/128) * (47/53) = 115.789755Mb/s
- User payload capacity over dual OC-3: 231.56Mb/s



OC-3 Frame Structure

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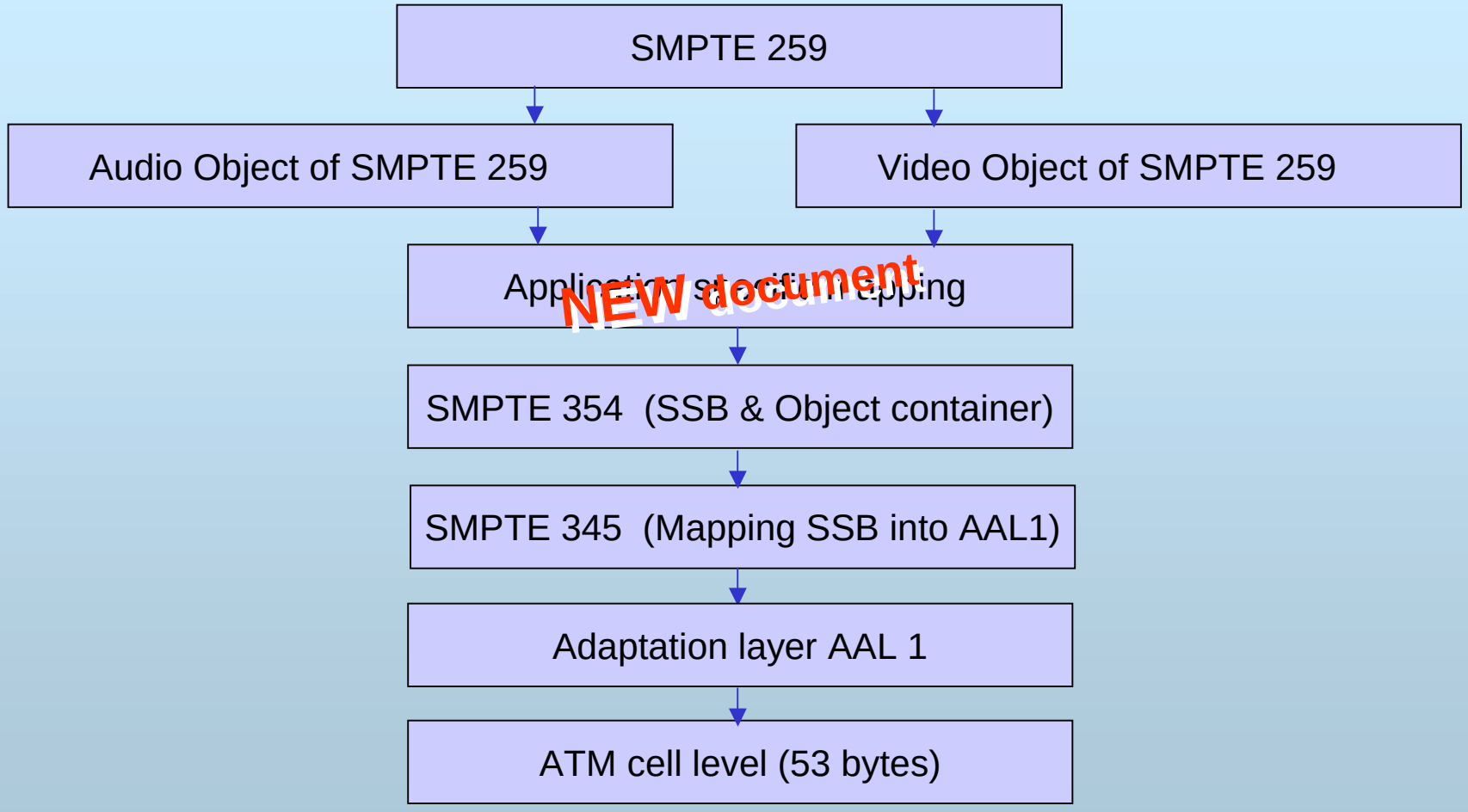
Mapping SMPTE 259 into ATM (AAL1)



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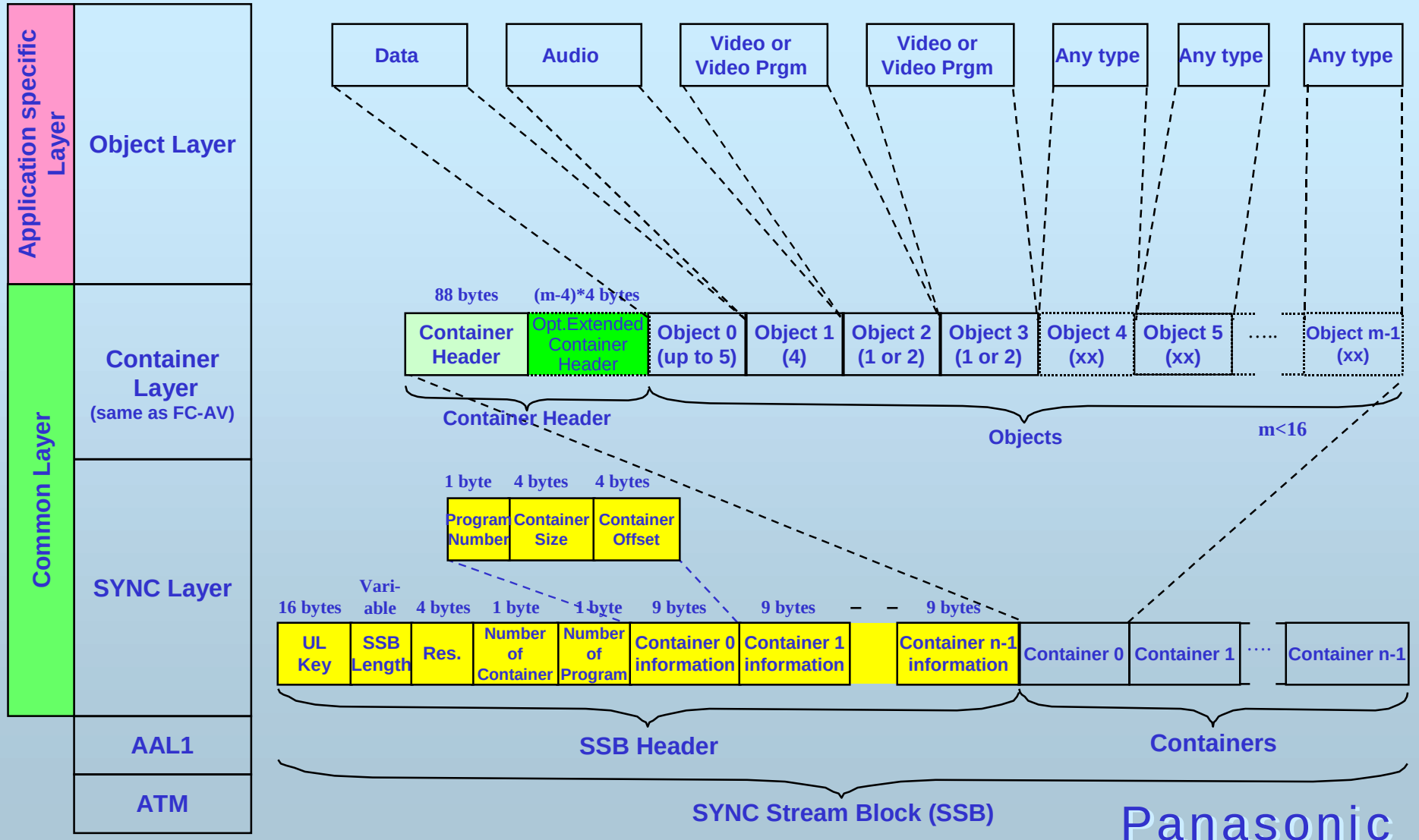
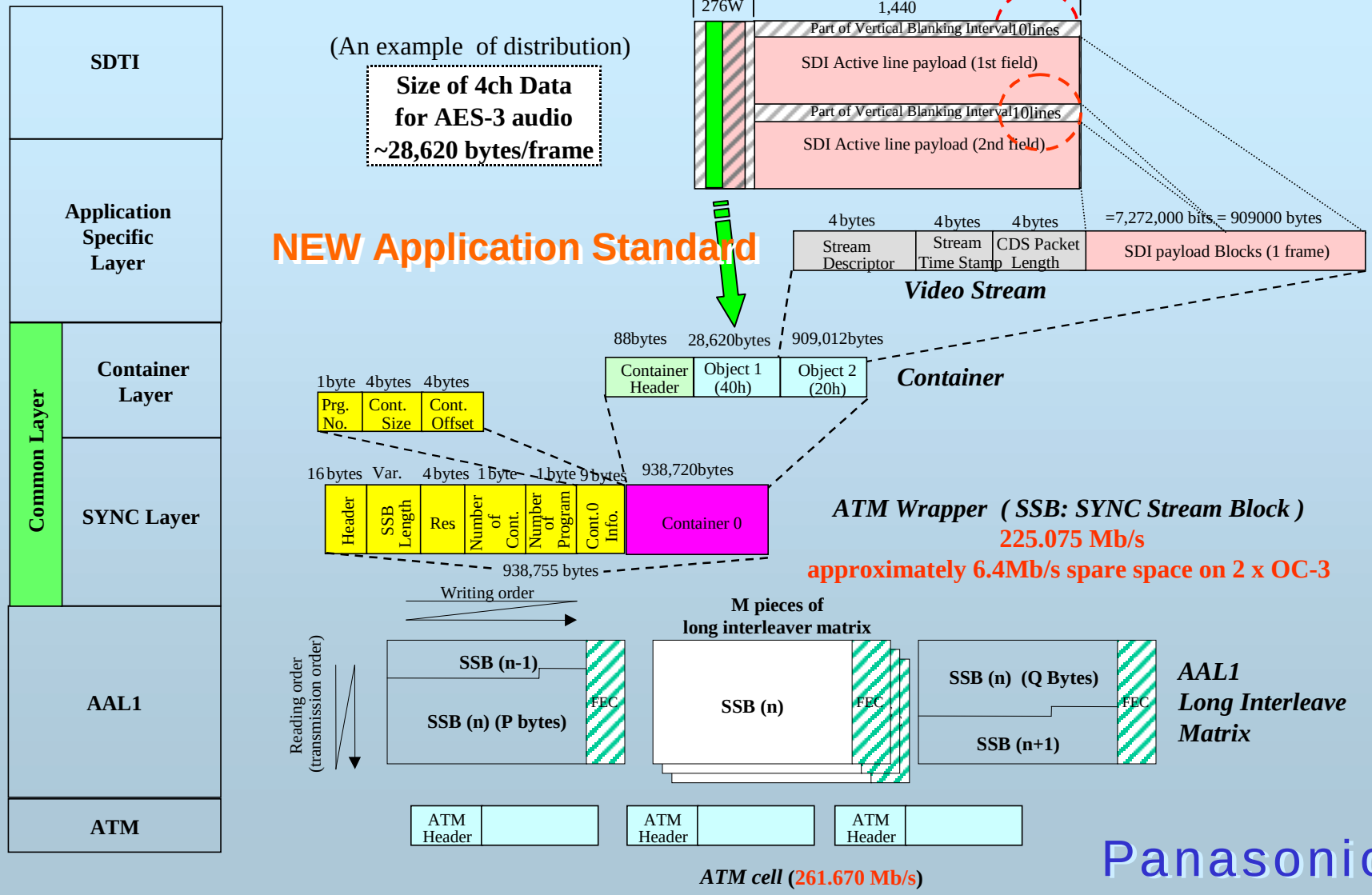
SMPTE 354 wrapper for mapping data into ATM



An example of SMPTE 259 mapping into ATM



Conclusion

- Video shall be mapped starting at VSP
  - VBI mapped only to
- Support for 10 bit component video
- Support 4 channels of Embedded audio
  - possible up to 6 audio channels
- Support Data (HANC & VANC) transmission
  - mapped HANC space at least 100kb/s
  - mapped VANC space approximately 8.631Mb/s
- Mapping of SMPTE 259
  into 2 x OC-3 is possible

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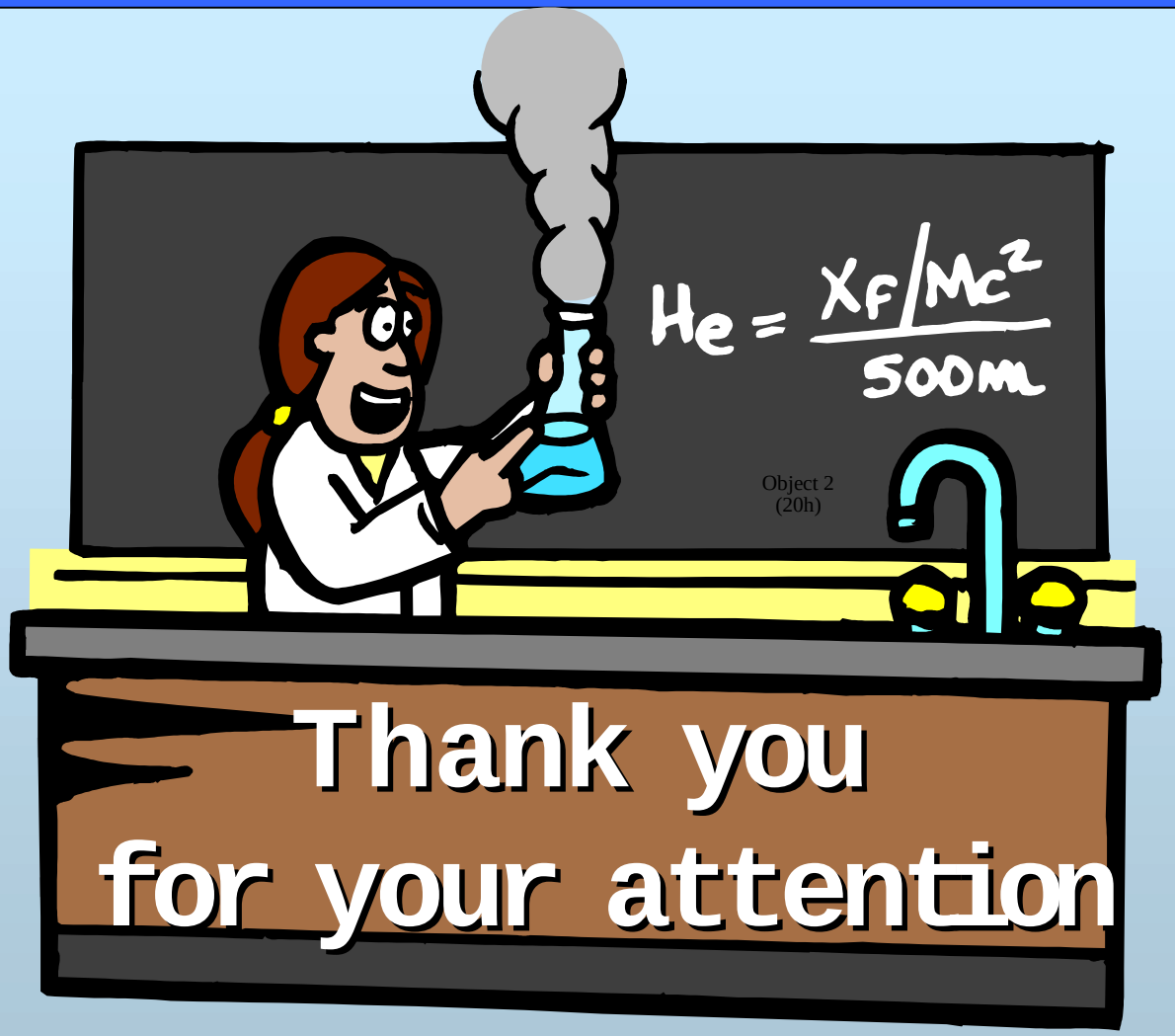
Any Questions?



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