



Live Closed Captioning and Subtitling in SMPTE 2110

2110-40 Workflows and Interoperability Progress



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Speaker Introduction

Bill McLaughlin is VP of Product Development at EEG, a US-based company that has been a global leader in closed captioning, subtitling, and ancillary data workflows since 1982.

Bill was the architect of iCap™, a secure networking system for live caption transmission that continues to manage over 1 million hours of programming annually and was honored with a Technology Emmy® award in 2015.

He is currently the product manager for EEG's IP Video products including the "Alta" 2110 product line.



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Goals of this Talk

1. How does the 2110-40 ancillary data standard work?
2. Understand how live captioning in 2110-40 is (and isn't) different from SDI
3. What improvements does 2110-40 present for ancillary data chains?
4. What do I need to understand to implement live captioning as part of a facility wide IP transition?
5. What is the status of industry adoption on 2110-40?

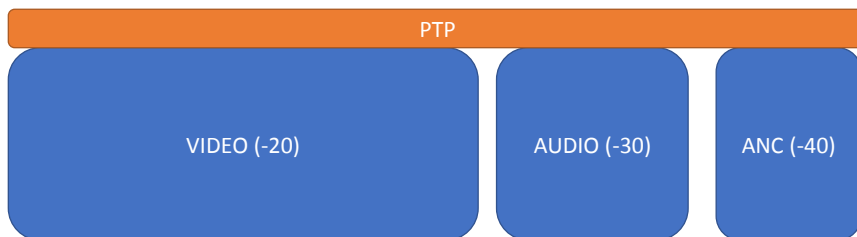


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2110 Media Flows

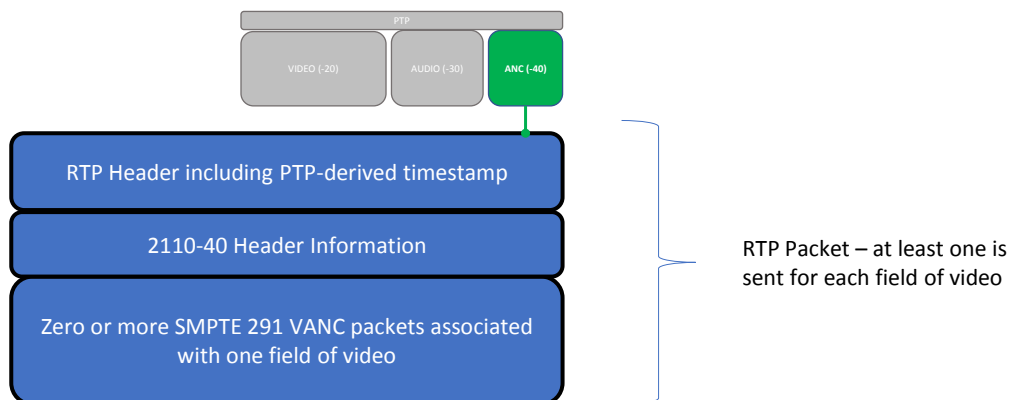
- ✓ Video, audio, and data are **three separate RTP multicasts**
- ✓ Streams are synchronized with PTP timestamps in each packet



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Ancillary Data in 2110-40



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Ancillary Data in 2110-40

Live subtitling still carried in same "Inner" formats as in SDI VANC

- **USA/NTSC:** SMPTE 334 VANC packet, CEA-708 payload
- **EU/UK/PAL:** OP-47 VANC packet, Teletext payload
- **Japan/Brazil/ARIB:** ARIB B37 VANC packet, or SMPTE 334

Conversion between SDI and IP is simple and does not require generic gateways to have deep subtitle format knowledge.

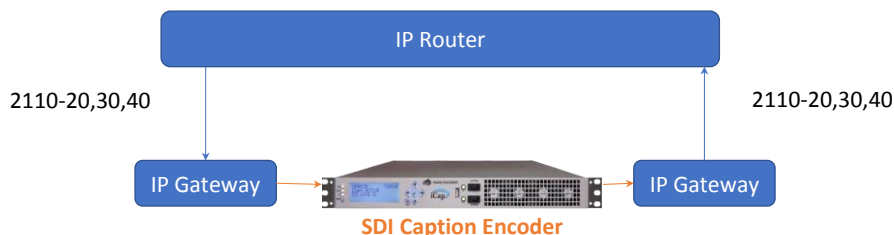


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Transitional IP ANC Workflow

Existing SDI VANC caption encoding equipment CAN be used with IP Gateways

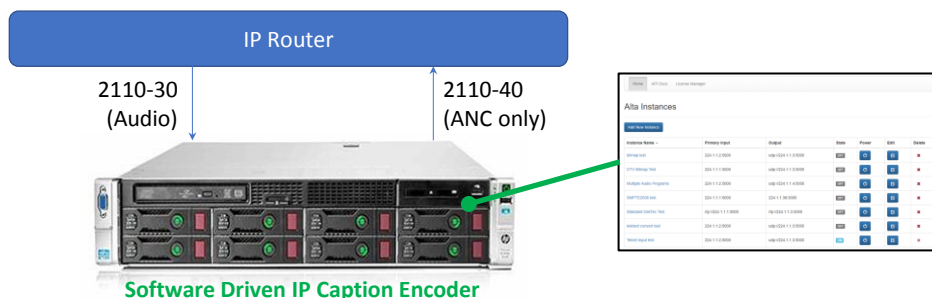


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Native 2110 Caption Generation

Offers simplification and dramatic reduction in bandwidth



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Advantages of Native 2110 Caption Generation vs. SDI Insertion

	SDI CC Insertion	2110 CC Insertion
Virtualization Friendly?	No	Yes
External Hardware	2 IP Gateways	None
Bandwidth Per Port	Up to 10 Gb/s, more for UHD	Less than 1 Mb/s, all standards
Density	1-2 unique video channels per 1 RU	100 or more video channels per 1 RU



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How do Live Captions enter the 2110 media network?

- An external stenographer or ASR system receives audio reference
Originally sourced from 2110-30, but likely mixed down and compressed
- Transcription text is returned to the caption encoder on a word or phrase basis
At this stage text is asynchronous to 2110 media clocks / alignment points
- A caption encoder product will chunk the text into ANC packets and emit them synchronized to the 2110/PTP frame alignment points



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Caption/ANC Routing is simpler with 2110

A Single 2110-40 multicast of captions or other ANC data can be associated with multiple video streams using NMOS Connection Management

Video: 239.20.**101.1**
 Audio: 239.30.**101.1**
 Ancillary: 239.40.**101.1**

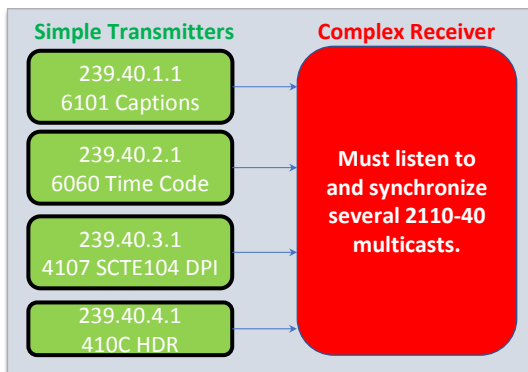
Video: 239.20.**201.1**
 Audio: 239.30.**201.1**
 Ancillary: 239.40.**101.1**



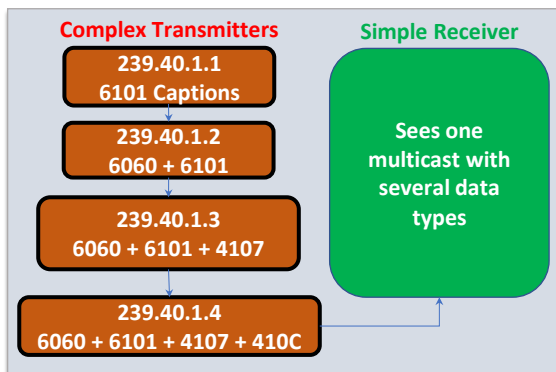
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2110-40 Sender/Receiver Architectures



Parallel Approach



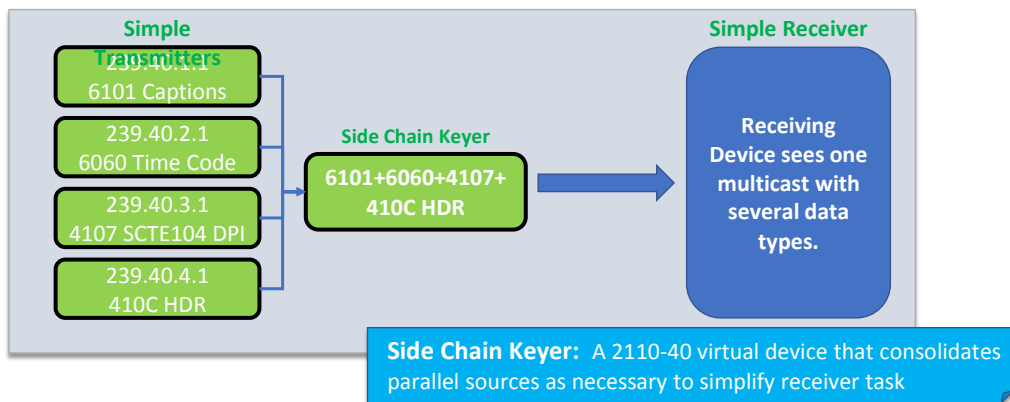
Serial Approach



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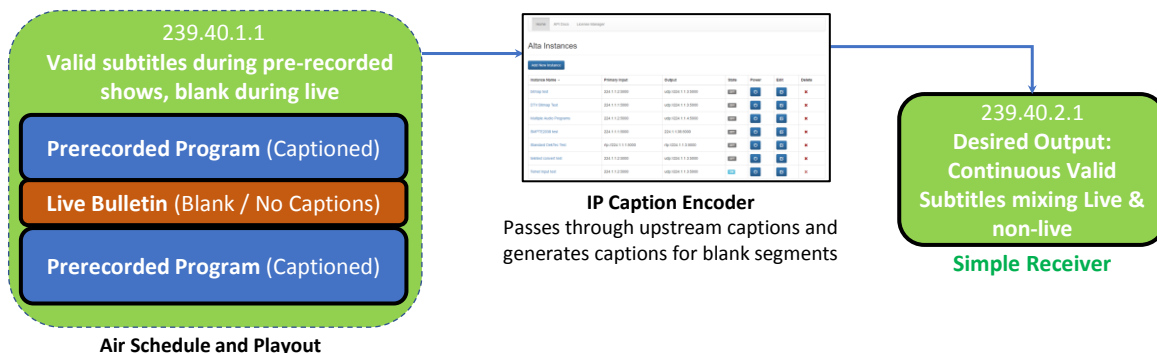
2110-40 Sender/Receiver Architectures



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Combining Recorded and Live Captions



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2110-40 Adoption Overview

- Standard finalized March 2018
- Recent “JT-NM Tested” Event : 27 products passed 2110-40 Transmitter Validation, and 29 products demonstrated 2110-40 Reception
- Most leading 2110 multiviewer/analyzer products now displaying captioning, subtitling, and timecode from 2110-40 streams
- Commercial adoption of native 2110-40 live captioning beginning in early 2019, strong interest for 2020 planned IP build-outs



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Continued Adoption of 2110-40 Provides

- ✓ **Continuity in all major global captioning and subtitling production standards**
- ✓ **Higher density, and lower switch bandwidth utilization** for live subtitling and any other standalone expert ANC processing systems
- ✓ **Continued momentum towards virtualization and IT security** when dealing with remote live subtitling
- ✓ **New routing options for live subtitles and other ancillary data**



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Thank You!

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