



Live Closed Captioning and Subtitling in SMPTE 2110

2110-40 VANC standards, Transitional How-To, and New IP Workflows



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Speaker Introduction

EEG has been the leading U.S. brand in closed captioning insertion products and remote transcription technologies for over 30 years.

Today, the company provides a global customer base with captioning and subtitling solutions focused on live video workflows.

Bill McLaughlin is VP of Product Development at EEG and has been with the company in various technical roles since 2007. Bill is the architect of iCap™, a secure networking system for live caption transmission that manages over 1 million hours of programming annually and was honored with a Technology Emmy® award in 2015.



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Goals of this Talk

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

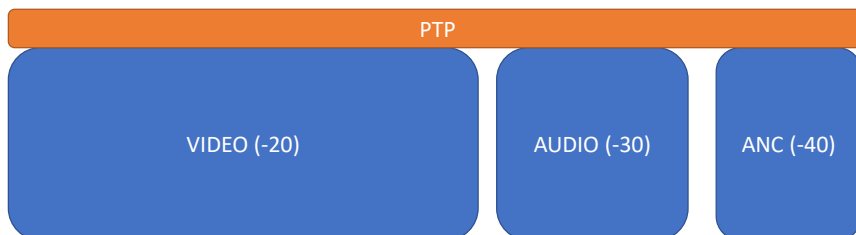


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2110 Media Flows

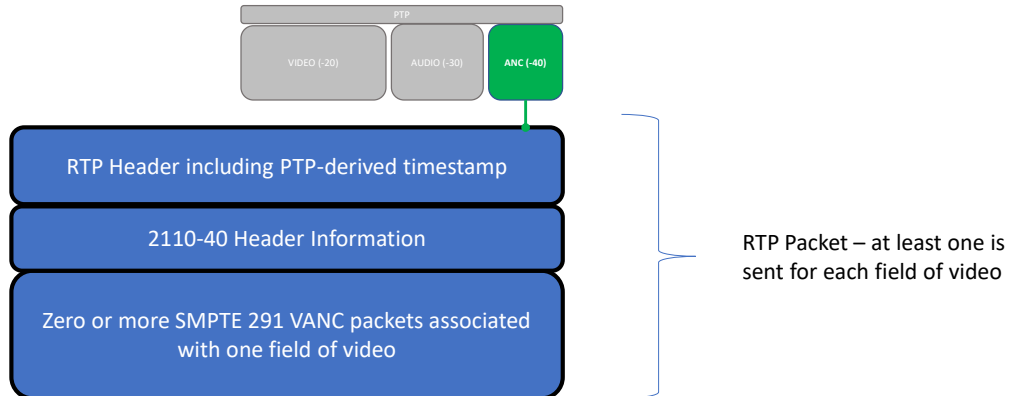
- ✓ Video, audio, and data are **three separate RTP multicasts**
- ✓ Streams are synchronized with PTP timestamps in each packet



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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.

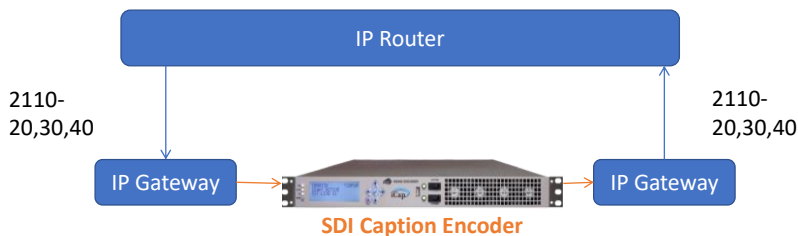


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Transitional IP Subtitle Workflow

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

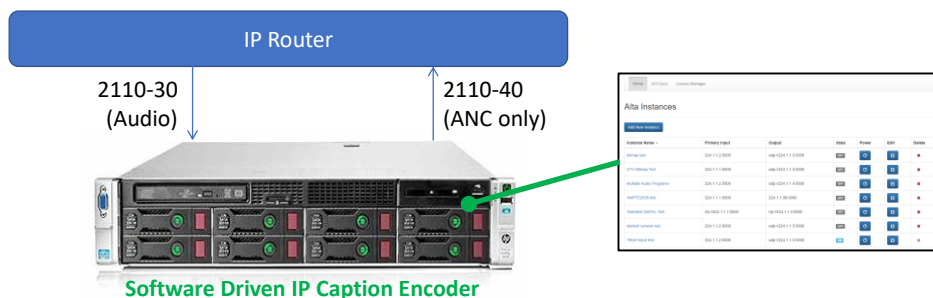


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Native 2110 Subtitle Generation

Offers simplification and dramatic reduction in bandwidth



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Advantages of Native 2110 Subtitle Generation vs. SDI Insertion

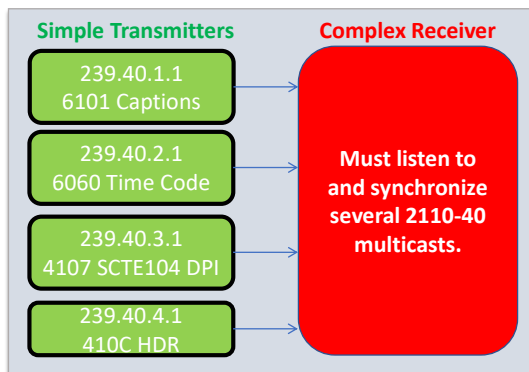
	SDI CC Insertion	2110 CC Insertion
Virtualization Friendly?	No	Yes
External Hardware	2 IP Gateways	None
Bandwidth Per Port	Up to 10 Gb/s, more for UHD	Less than 1 Mb/s, all standards
Density	1-2 unique video channels per 1 RU	100 or more video channels per 1 RU



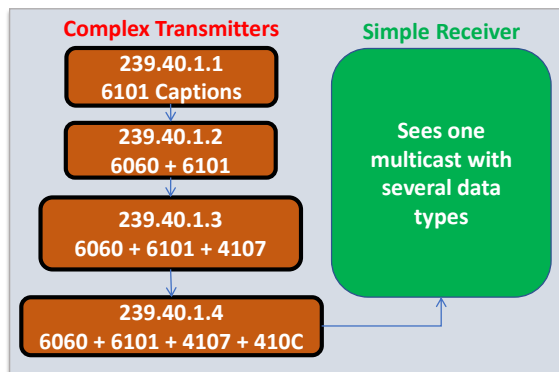
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2110-40 Sender/Receiver Architectures



Parallel Approach



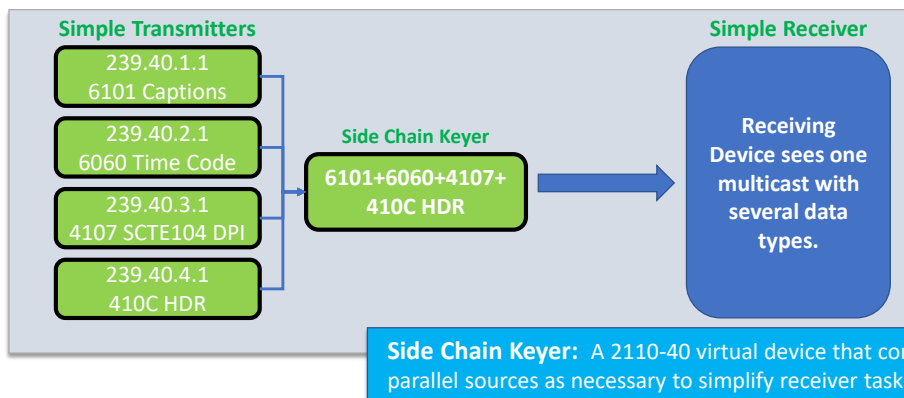
Serial Approach



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2110-40 Sender/Receiver Architectures



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How do Live Subtitles Enter the 2110 media system?

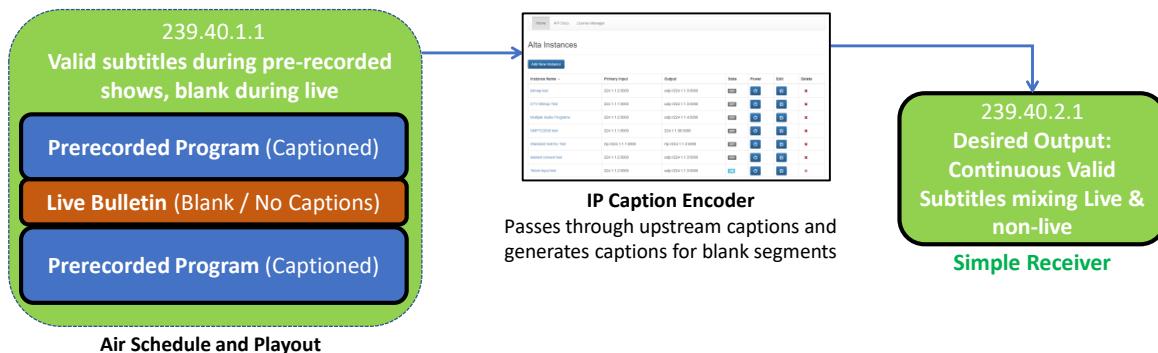
- A stenographer or ASR system receives audio reference
- Text data is returned to the caption encoder in real-time
- Return data is synchronized back to 2110-40 frames with PTP



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Combining Recorded and Live Subtitles



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Subtitle Routing is simpler with 2110

A Single 2110-40 multicast can be associated with multiple videos 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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Current Risks in 2110-40 Transition

Considering the standard was only officially accepted in Spring 2018:

- Limited analysis available in test & measurement tools
- Many bugs still being observed in commercial IPGs and playout systems
- Despite low data rate, relatively tight transmission timing still required for frame-accurate metadata
- Very limited set of products support viewing OP-47 EBU live subtitles from 2110-40 packets



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Adoption of 2110-40 Provides the Industry With:

- ✓ **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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