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VIDEO SERVICES FORUM

Building a Large OB-Truck Using SMPTE ST 2110

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IP SHOWCASE THEATRE AT IBC2019 : 13–17 SEPT 2019

Agenda

- The Customer
- The Task
- The Decision
- The Challenge
- The Conclusion

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The Customer

Österreichischer Rundfunk - ORF

- Public Broadcaster in Austria
- 8 million Viewers in Austria
- 4 TV Channels 24x7
- 9 Regional Channels
- 12 Radio Channels

The Task

Building a new OB-truck for sports, music and entertainment

- Cost-effective solution
- Some equipment needs to be reused
- Workflows for operators shouldn‘t change
- Needs to work with the existing infrastructure at ORF headquarters (which is still SDI-based)
- The design and technologies need to be scalable to serve as a blueprint for larger systems
- Use standard products, no custom development

The Decision

- Three different designs were evaluated:
  - Based on an SDI router
  - Based on a proprietary network technology
  - Based on IP
- Decision Criteria
  - Must be economically viable
  - Functionality
  - Must have a certain maturity
  - Gaining experience with new technology (for upcoming larger projects)
  - Flexibility (Ease of upgrade to UHD, ability to change/add functionality)

The Decision – Go for IP!

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The Challenges

You need SDI-IP-Converters

- Converters often include needed processing equipment
- As more and more devices add native IP interfaces, you will need less and less of Converters:
  Between “Contract Award” and “Design Freeze”, the number of converters was reduced by 1/3 due to changing to newer devices with native IP interfaces.
- A good broadcast control system can provide a seamless experience

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The Challenges

Devices keep evolving rapidly!

- New IP-capable Boards
- New IP-capable Device Generations
- New Software Versions with new (required) features
- New Control Interfaces (NMOS!)

=> You have to freeze your design at some point!

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The Challenges

Defining “Software defined Hardware” I

- Several vendors have developed FPGA-based flexible processing hardware that can change its internal structure based on the software loaded on the box and/or the configuration applied.
- There is a trade-off between flexibility and complexity of configuration.
- Because flexibility was one of the decision criteria, the device chosen has complex configuration options.

The Challenges

Defining “Software defined Hardware” II

- Essentially you have a “Subsystem in a Box” with router(s), frame synchronizers, de-/embedders, delays, color correction etc. which you have to design and configure yourself.
- We tried to keep the number of different configurations low and started with only three “types”
- During the course of the implementation we had to implement a lot more variants to overcome shortcomings in some devices.

The Challenges

IP Address Management

- Currently a manual Task
- Requires a lot of management and configuration effort
- Needs to be automated for larger projects
  (ideally using DHCP and IS-05, see JT-NM TR-1001-1)

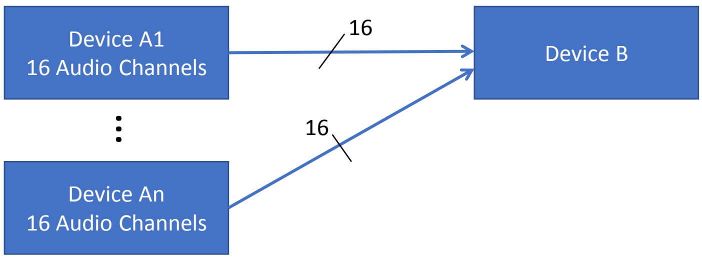
The Challenges

Audio Channel Management

- How many audio channels per stream?
  - =1: Many multicast streams
  - >8: exceeds ST 2110-30 Level A (minimum requirement for standard compliance)
- Balance limits of stream receivers vs. channels on devices
- Standard audio stream width was chosen to be 8 channels

Stream Receivers vs. Audio Channels

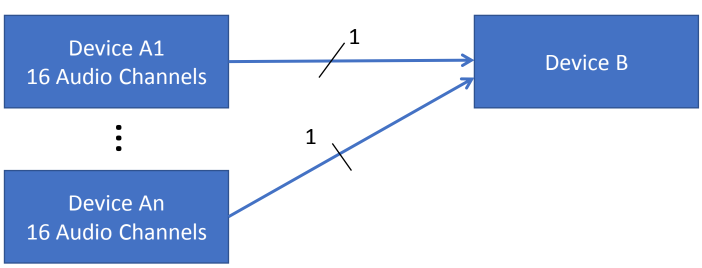
1 audio channel per stream



Needs n x 16 Receivers, which can exceed the device's capabilities for relatively small n

Stream Receivers vs. Audio Channels

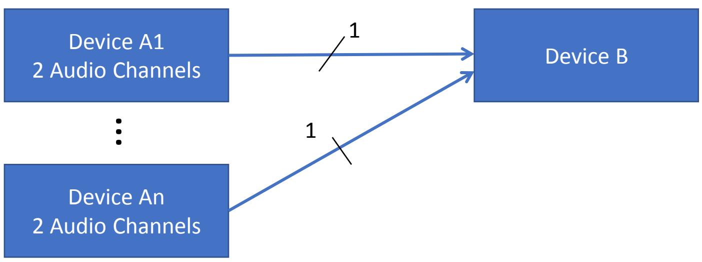
16 audio channels per stream



Needs n x 2 Receivers, making more efficient use of the receiver ressources

Stream Receivers vs. Audio Channels

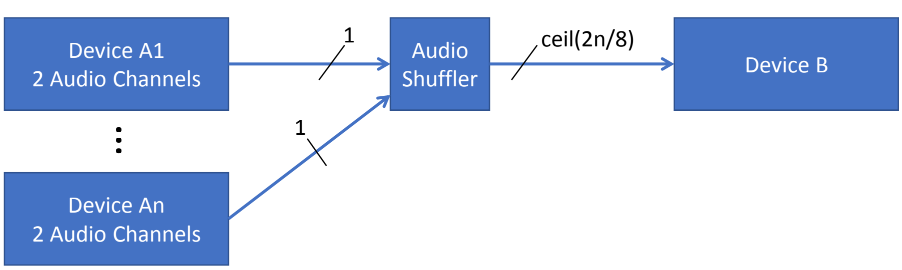
16 audio channels per stream



Has to allocate n x 16 audio input channels, which might waste limited ressources

Stream Receivers vs. Audio Channels

8 audio channels per stream

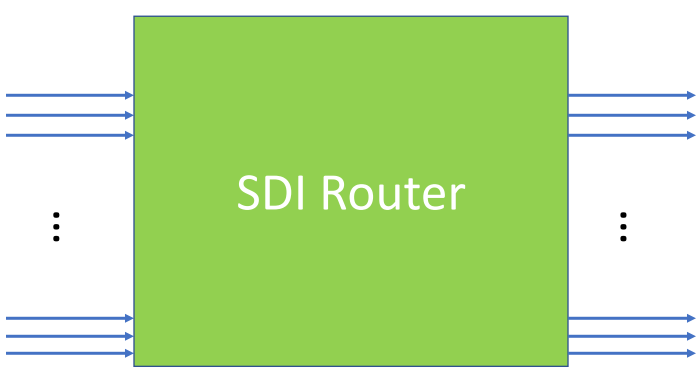


Optimum usage of receivers and audio input channels

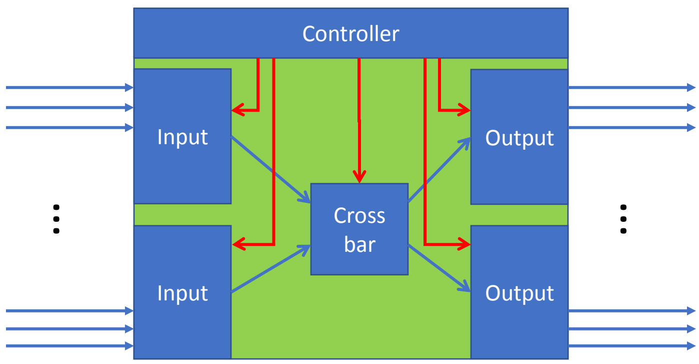
The Challenges

How to switch on and off

How to Switch on and off



How to Switch on and off



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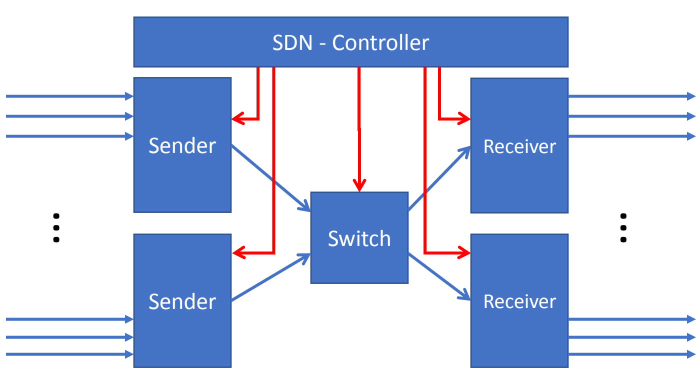

The Challenges

Training

- New topics
- Even some fundamentals are new
- There is a lot of uncertainty because people are unfamiliar with the technology.
- Troubleshooting procedures are different

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The Challenges

Synchronization

- PTP requires more configuration effort than Blackburst
  - JT-NM TR-1001-1 addresses this to a certain extend through a central system resource
- Syncing PTP and Blackburst
  - Operation with external Blackburst is well defined (EG 2059-10), but there are devices that operate differently
  - Redundancy mechanisms for PTP and BB operate independently and might produce undesired results.

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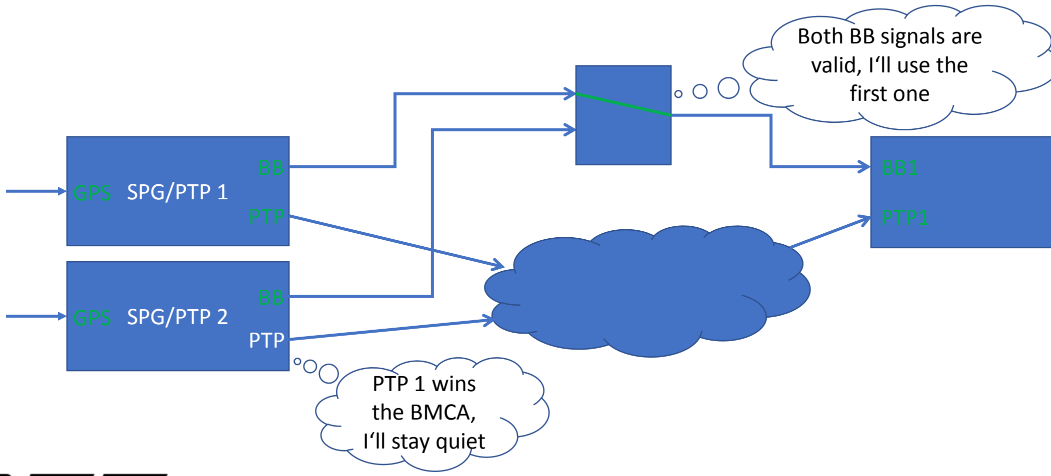
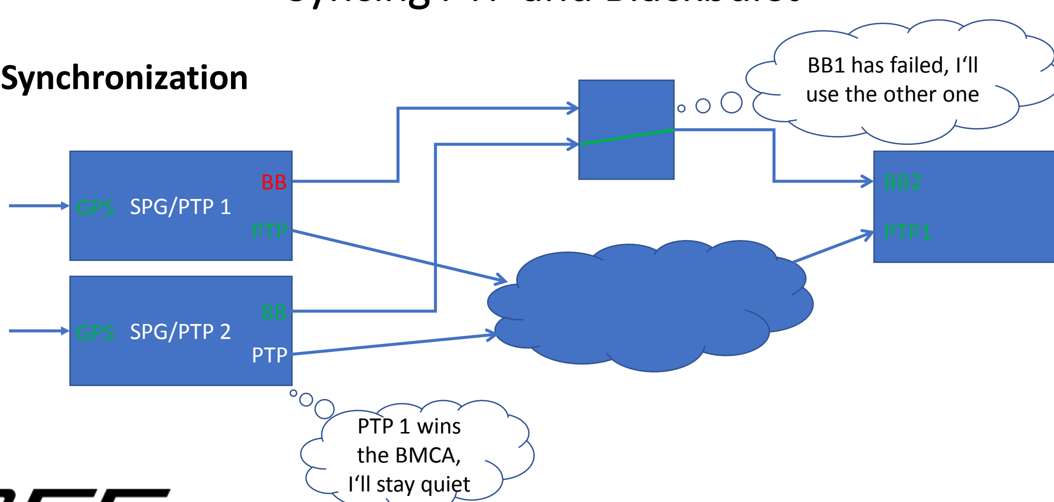
Syncing PTP and Blackburst

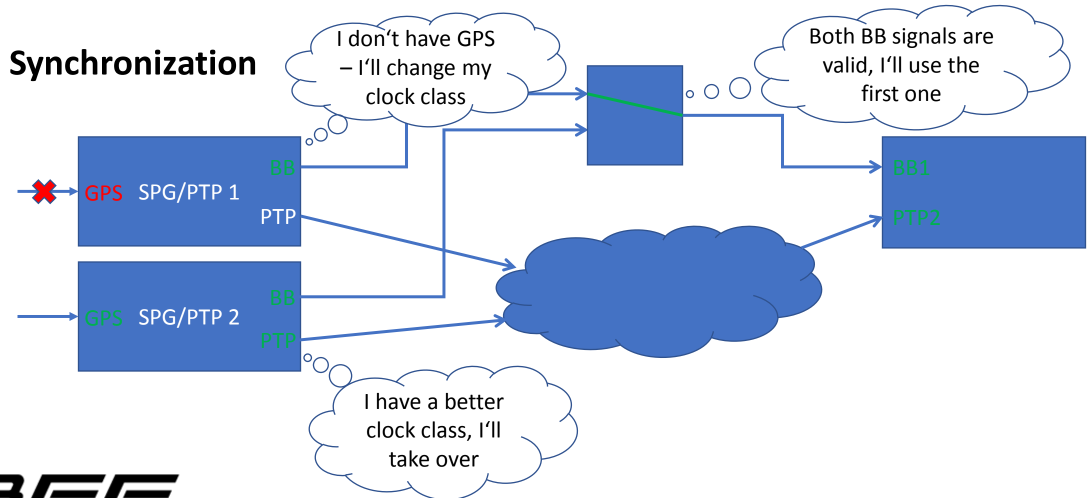


Syncing PTP and Blackburst

Synchronization



Syncing PTP and Blackburst



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Syncing PTP and Blackburst

- Solution #1 (from vendor!): Buy two more SPGs and separate PTP generation from PTP to BB conversion (pair#2 will always generate the BB from the PTP GM)
  (additional money and space required)

- Solution#2: Have an external control system manipulate PTP priority to follow BB change over unit.

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The Conclusion

- We are in a transitional period
- IP based production systems are viable, however need careful design
- Adaption and some work arounds are still needed while technology matures
- It is essential to build knowledge of the new technology on all levels

Thank you

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