New ATSC Encoding Features Provide New Opportunities, and New Workflows

"What if we don't change at all ...
and something magical just happens?"

Heartland Video Systems

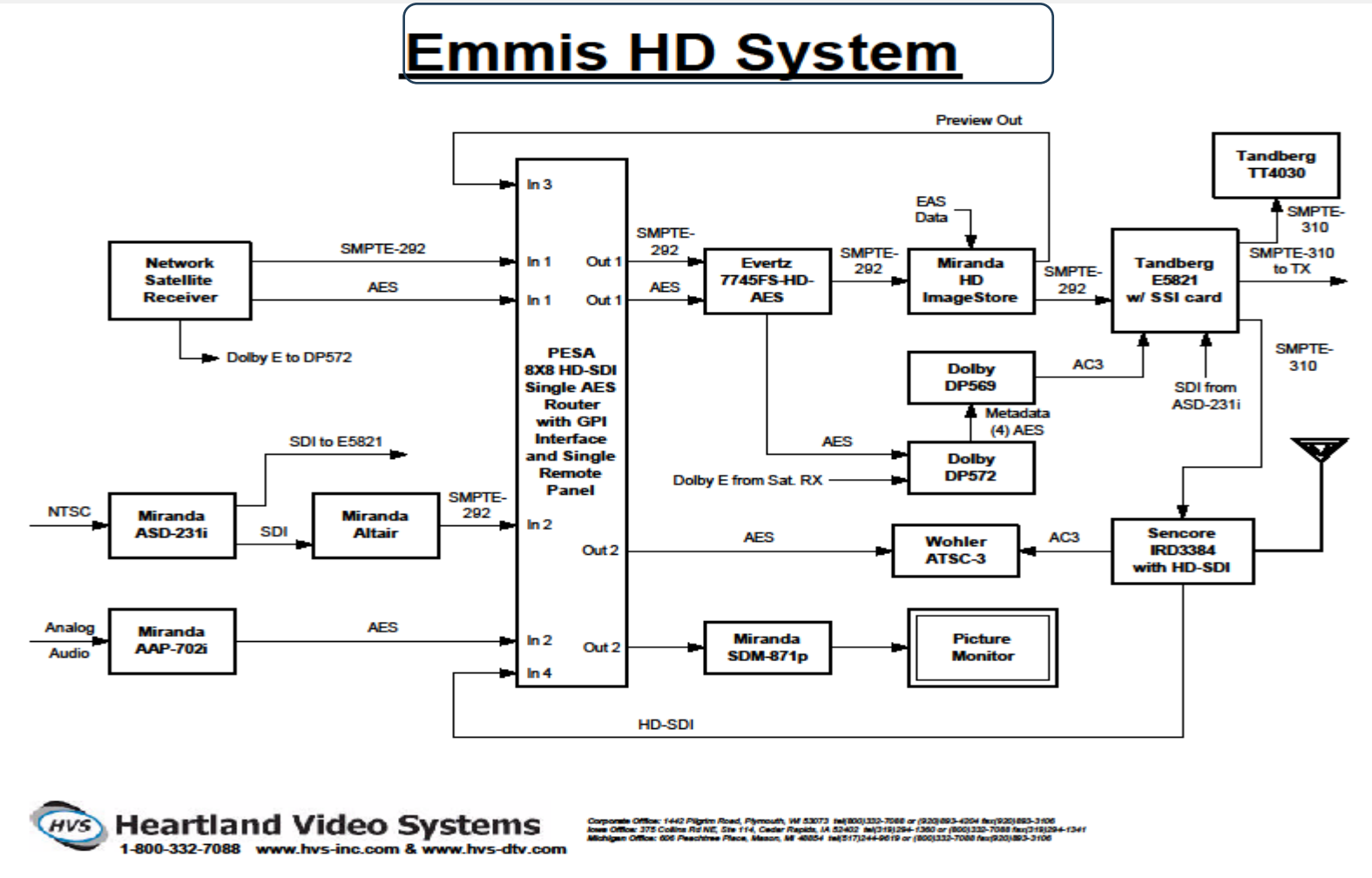
Overview

- First goals of compression and encoding for ATSC 1.
- Progression over time of performance and features.
- Virtualization of our compression systems.
- New features and functions you may not be familiar with.
- ATSC 1 and ATSC 3 encoding common features, and differences.
- System design changes with these new features.
- Cloud and on-premise considerations.

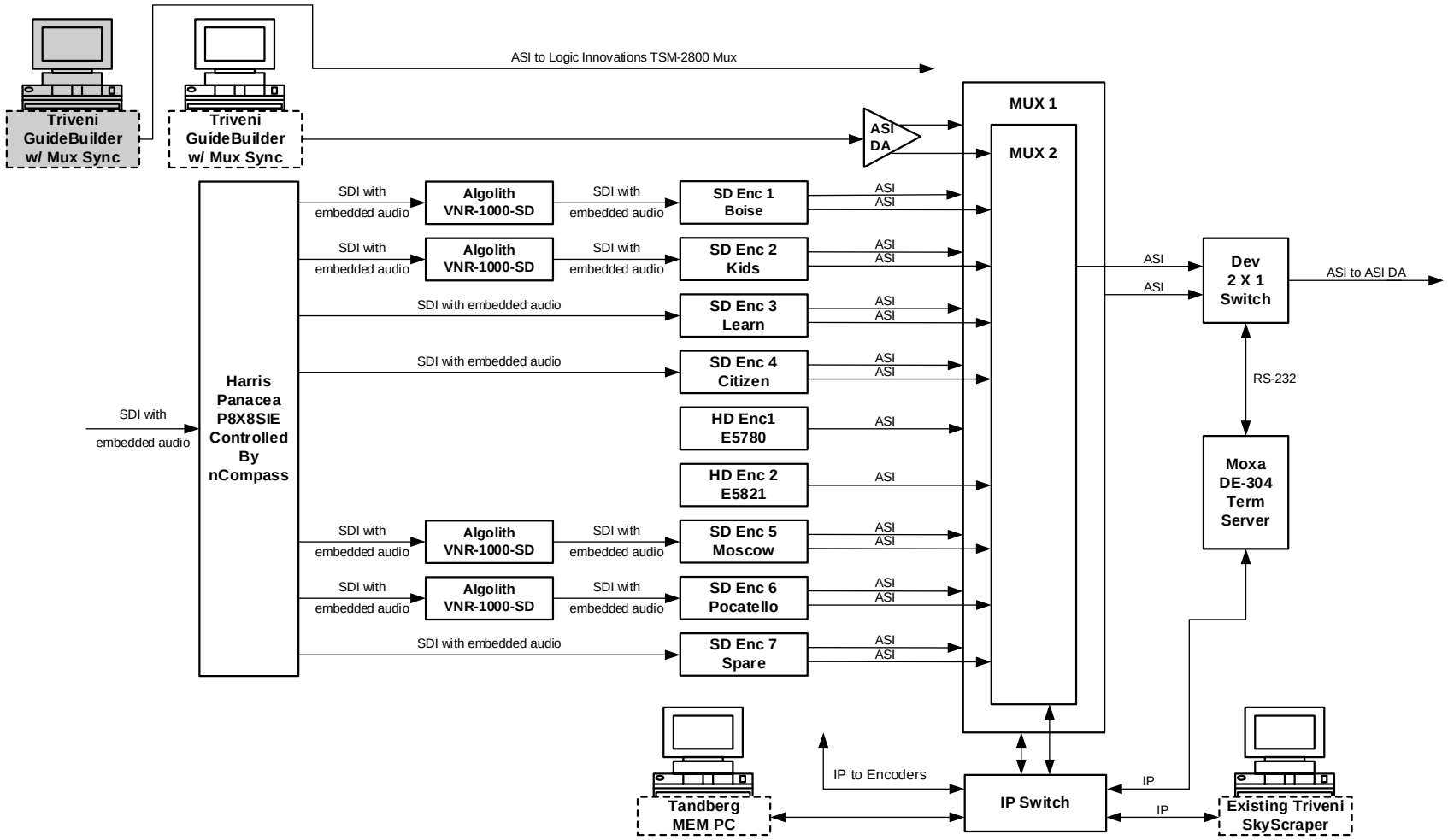
First Encoding Requirements

- Back in the late 1990's compressing a 1.5Gbit HD video into a 19Mbit stream with audio and guide data seemed overwhelming.
  - Electronic equivalent of taking a wall with 1500 bricks and remove all but 19, and keep the Jenga still standing!
  - MPEG 2 compression using just the basic features.
- A single processor at that time was not capable of handling HD video in real time, so either multiple processors or encoders were used.
- Our first encoders for single HD were well over $100K, multicasting was not yet a reality.

An Early 2000's System Roughly $200K



Next Step Was Distributed Archetecture



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Integrated HW Platforms Became Popular

ASI, IP and RF inputs with FLEX decoder

Integrated Pre-processing

Additional audio channels & encoding options

3-Pass Hierarchical LookAhead

Electra 9200 Video & Audio

AVC HD, AVC SD, MPEG-2 HD, MPEG-2 SD

CBR & VBR Integrated Statmux & over IP LAN/WAN

Second output: low resolution (PIP) to full HD

DiviTrackIP over LAN/WAN

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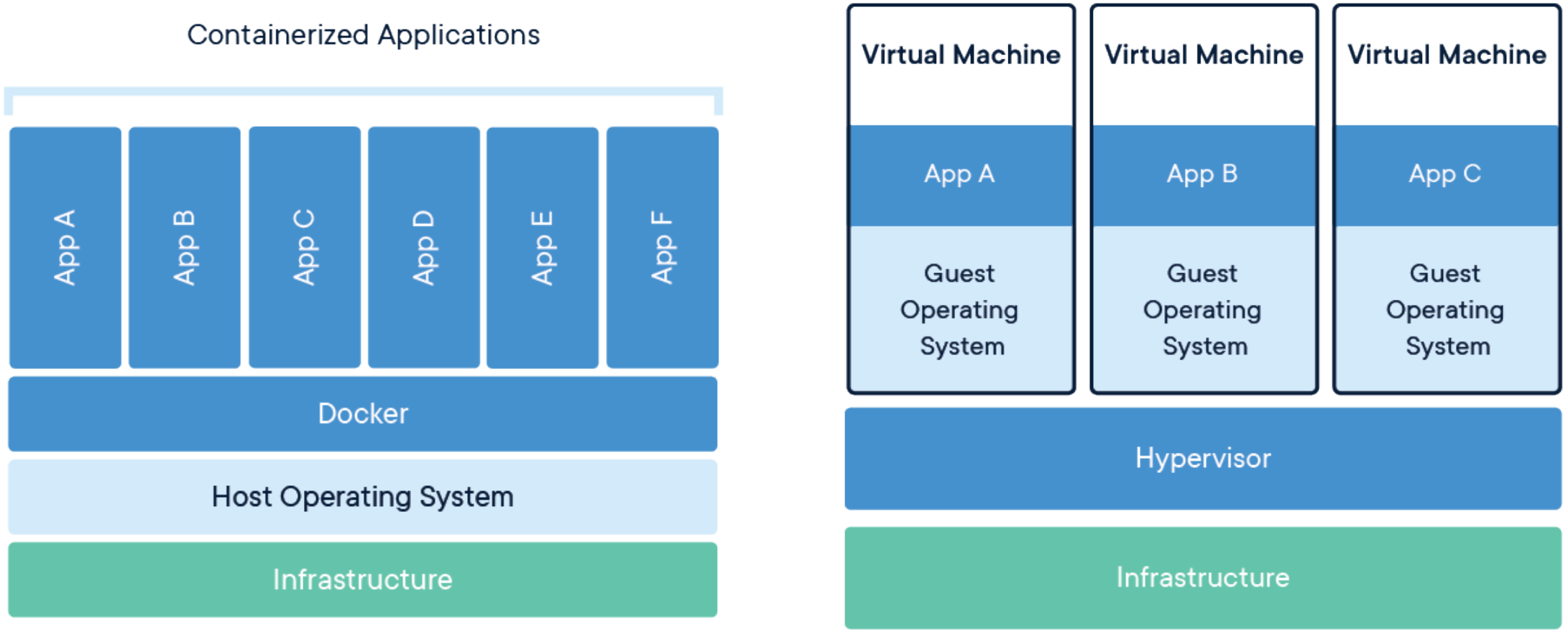
Less than 10 Years Ago we Moved to Virtualization

- We were at a point in which standard IT servers were powerful enough to accommodate the burden of ATSC encoding.
- Motivations to Virtualize
  - Hardware design was expensive and time consuming
    - Once 3D was designed into encoding processors, it was there if we used it or not.
    - It is difficult to add a new codec to an existing circuit-such as MP4.
  - Number of functions/services is limited only by platform processing-not fixed as in HW designs.
  - Encoding software can be treated as a software module to make it mobile to other products (transcoders, servers), as well as transcend HW platforms.

We Started on the Right with Virtual Machines using VMWare, and Have Now Moved to Docker Container Based Applications



Why the Move From VMWare to Docker

- Docker is the structure of data centers, so designing around this allows one software package to work on premise, or at a data center.
- Removing the Windows or Linux OS is an advantage
  - Security issues with OS are not present.
  - OS Upgrades not required.
  - More processing power utilized for processing as opposed to overhead.
- Initial cost and ongoing support.

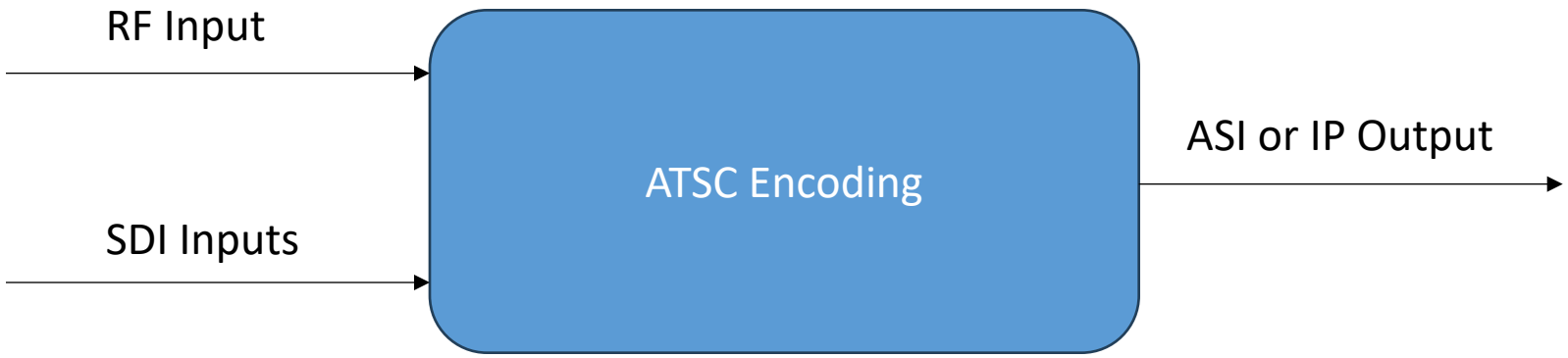
General Features of Virtualized Encoding as of 2020 to Current With All Current Vendors

- Encoding efficiency has improved
  - 1HD/6SD WGBA, WTMJ, WBAY and WFRV
  - 2HD/5SD WXYZ, 2HD/3SD KSEE, 2HD/2SD WVTV
- Single RU encoding with ability to internally statmux and carousel PSIP.
- IP or SDI inputs-providing a mix of encoding and transcoding.
- ASI and IP outputs.
- Up/Down/Cross Conversion
- Adaptive pre-processing (previous versions were called auto-concatenation, and noise reduction).
- Redundant systems are generally completely isolated, and an intelligent switch determines the output to the STL or exciter.

Function Collapse. Encoding Vendors are Working to Gain/Keep Customers by Adding Features

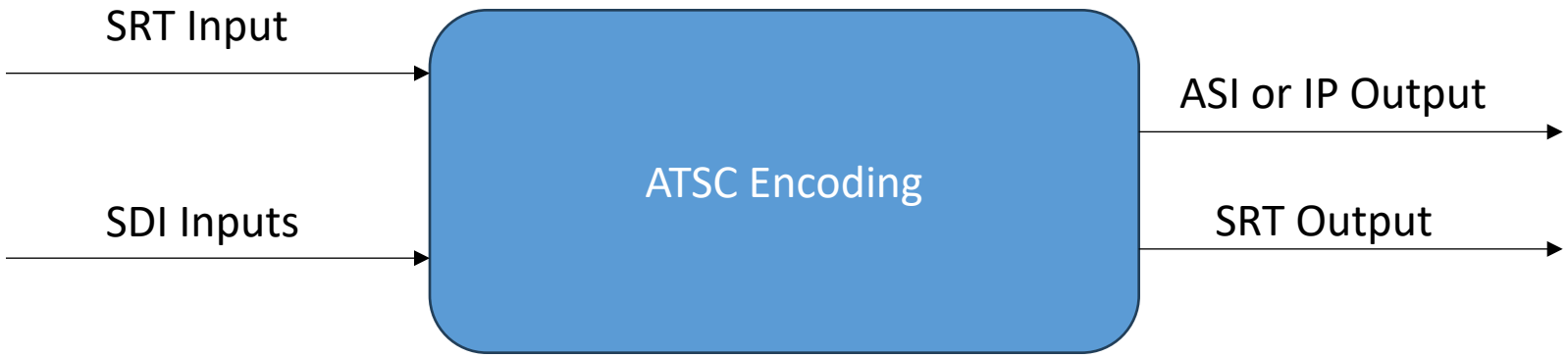
- Audio Leveling.
- Nielsen audio watermarking.
- Satellite and Off Air Inputs.
- SRT Input and Output.
- PSIP Fetch from Source.
- EAS Insertion.
- Mixed ATSC 1 and ATSC 3 Operation.
- PSIP Edit.

Satellite or RF Inputs in Addition to SDI



Utilized for redundant inputs, subchannels, monitoring, and use your imagination!

SRT Input and Output For IP Interconnection

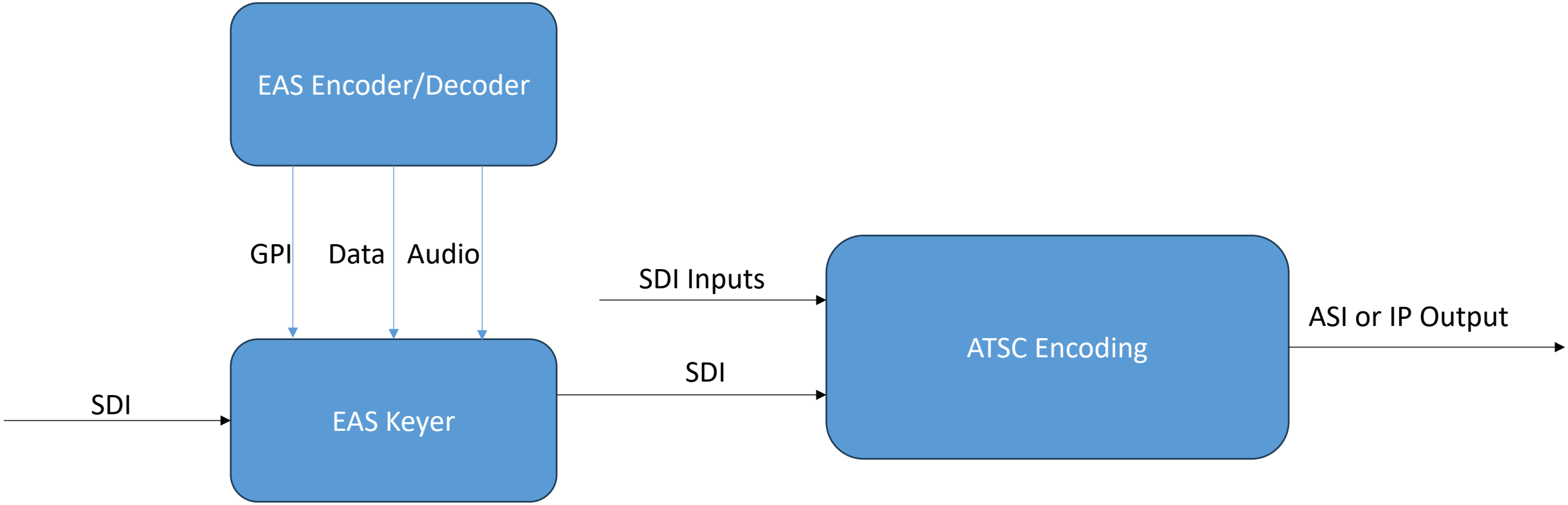


Utilized for connection to other sites via IP connection.
SRT was first, RIST is expected as it is required.

PSIP Fetch Function

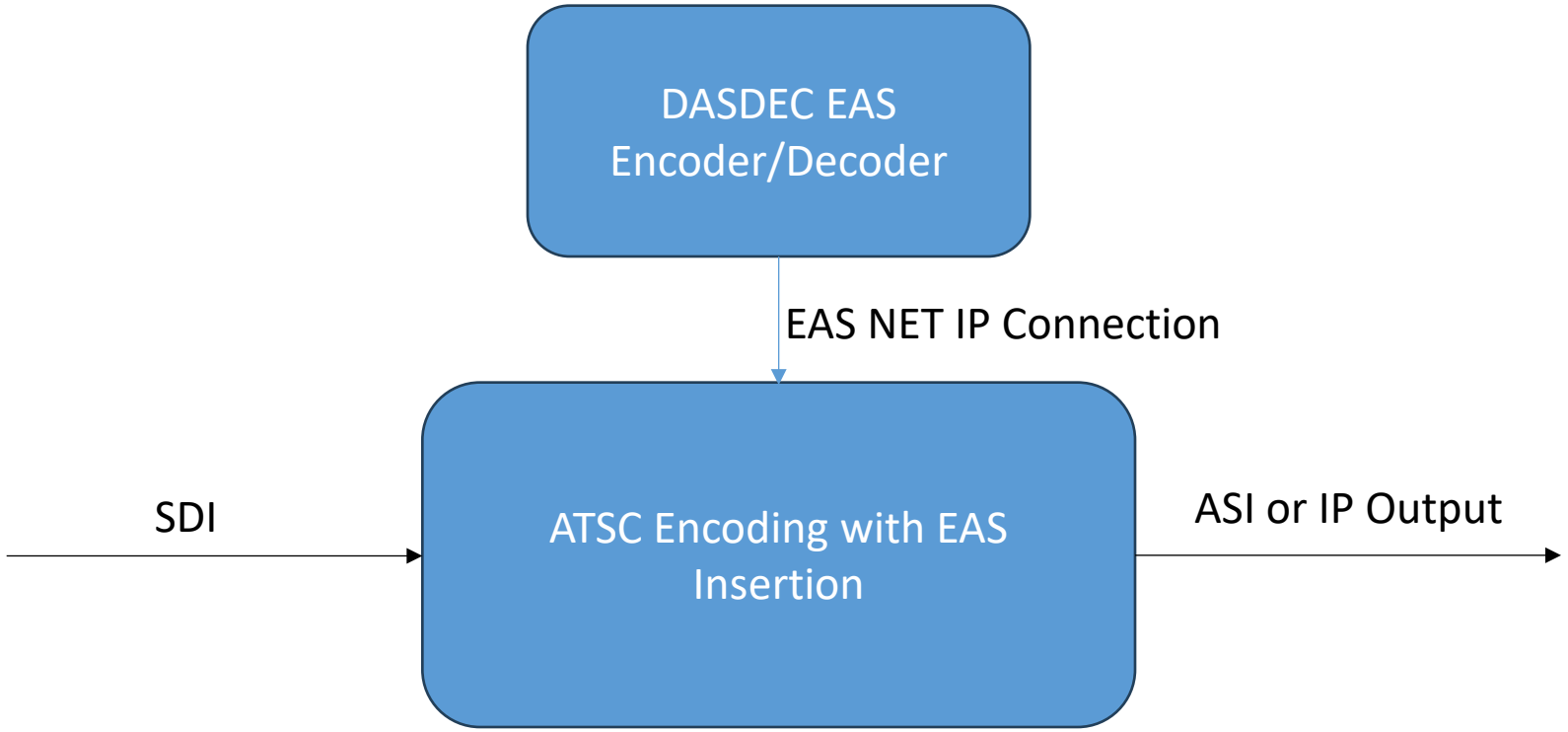
- PSIP (Guide) information typically comes from a PSIP aggregator or traffic (mainly public TV stations).
- Normally PSIP has been collected by a PSIP system, and a PSIP file sent to the encoder for a carousel output. If the connection was lost, the encoder continued to carousel the last PSIP it received.
- There are also standalone PSIP devices that were downstream of the encoding systems-most commonly the Nevion CP505.
- Encoding PSIP fetch allows the encoder to fetch the PSIP directly from the source, and carousel the output.
- Encoding PSIP fetch is basic functionality.
  - Does not provide ability to utilize multiple sources of PSIP.
  - Does not provide ability for day of air changes.

Existing EAS Systems



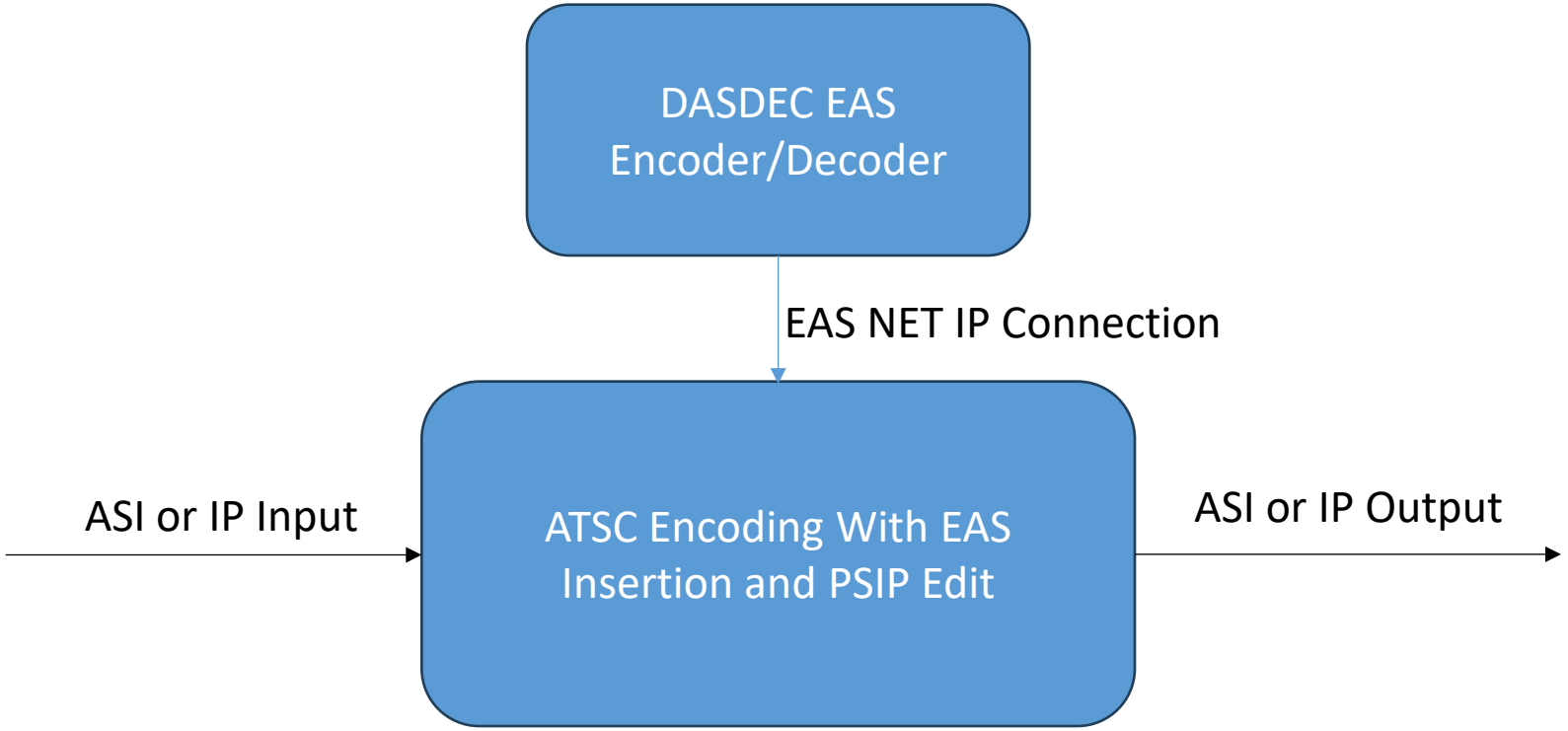
EAS Keyer required for each service, and most cards require serial data, GPI and audio from EAS unit.

Utilizing EAS Feature in ATSC Encoding



Single IP connection for EAS trigger, data and audio for one, some or all services. Does require DASDEC EAS-NET license.

PSIP Edit and EAS at Transmitter Sites



For state networks (most common in public television), provides a single box solution for multiple functions.

Combined ATSC 1 and ATSC 3 Encoding

- Encoding is now licensed by resolution, not by codec. This allows a channel license to be used for either MPEG 2 or HEVC (or AC3 or AC4).
- COTS servers are continuing to improve performance vs. price for the ability to run more applications on a single device.
- Single input can be used for multiple encodes-this saves on cabling requirements.
  - ATSC 1
  - ATSC 3
  - Output feeds to CATV.

Questions?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We don't have hurricanes!
We don't have hurricanes!"


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Experts in TV technology partnering with our customers to provide creative solutions.