Four 4Kp60 video streams over one 10GbE cable

Parretto's real-time JPEG encoders in an Altera Agilex 5 FPGA compress four 4Kp60 video inputs as they arrive and send them over NVIDIA Holoscan Sensor Bridge to an NVIDIA Jetson AGX Orin. 48 Gbit/s of video becomes about 2 Gbit/s on a single 10GbE link, leaving room for more sensors on the same cable.



The demo running: four NUC mini PCs play 4Kp60 video into the Agilex 5 board. The Jetson AGX Orin decodes all four JPEG streams and shows them live at 60 fps, with the 10GbE link load in the corner.

48 → 2 Gbit/s

Four uncompressed 4Kp60 streams need 4 × 12 Gbit/s. With JPEG we measure about 2 Gbit/s on the link.

4 × 4Kp60

Two HDMI and two DisplayPort inputs, 3840 × 2160 at 60 frames per second each.

JPEG

High-quality encoding (q90), one real-time encoder per input in the FPGA.

Video content on screen: Meridian, Sparks and Chimera © Netflix, Inc., CC BY 4.0.
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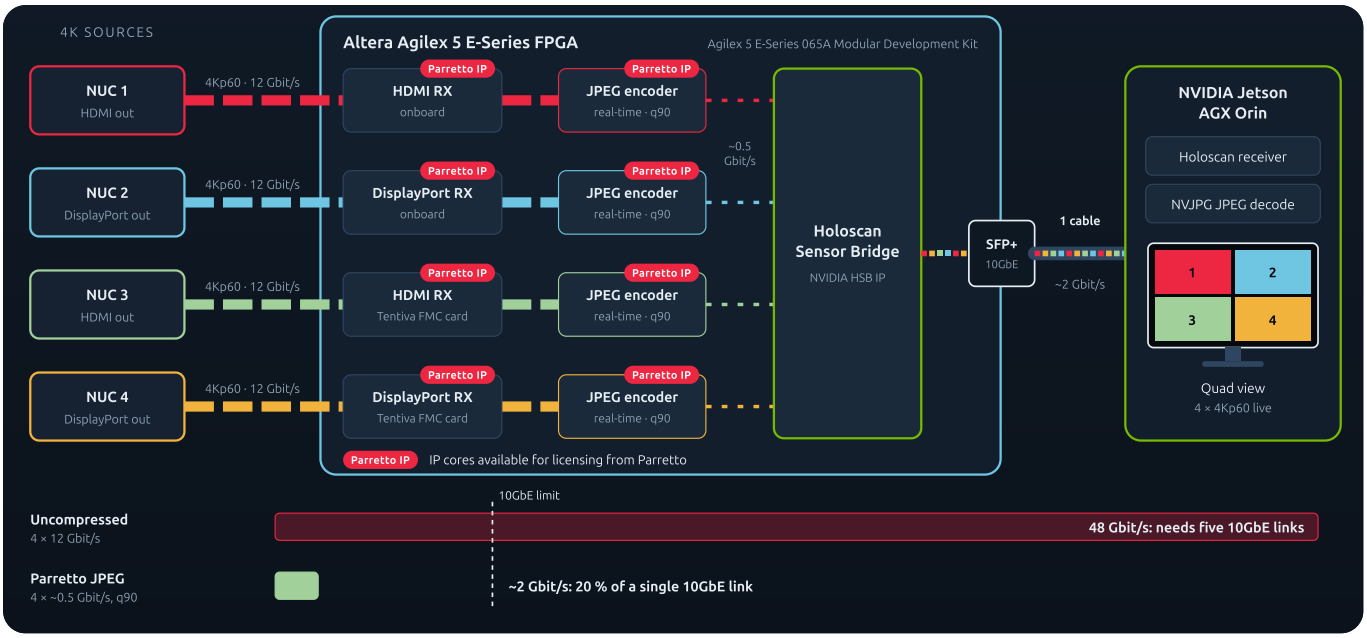


Receive

Parretto HDMI and DisplayPort receiver IP cores take in four 4Kp60 sources.

Compress

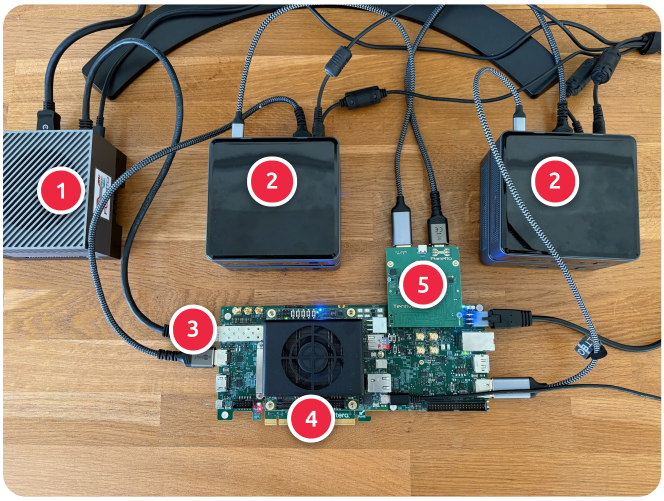
A Parretto JPEG encoder IP core per input cuts each 12 Gbit/s stream to about 0.5 Gbit/s at quality 90.

Bridge

The NVIDIA Holoscan Sensor Bridge packs the four streams into one 10GbE link through the SFP+ cage.

Decode

The Jetson AGX Orin receives the streams with Holoscan, decodes them in hardware and shows a live quad view.



1. **NVIDIA Jetson AGX Orin**
   Holoscan receiver, JPEG decode and display.
2. **Four NUC mini PCs**
   Stacked in pairs, each playing 4Kp60 video over HDMI or DisplayPort.
3. **SFP+ 10GbE**
   One cable to the Jetson carries all four streams.
4. **Agilex 5 E-Series 065A Modular Development Kit**
   Onboard HDMI and DP inputs, receivers, encoders and Holoscan Sensor Bridge.
5. **Parretto Tentiva FMC board**
   On the FMC+ connector; adds the third and fourth inputs with an HDMI RX and a DP RX card.

Demo specifications

FPGA	Altera Agilex 5 E-Series A5ED065
Inputs	2 × HDMI 2.0, 2 × DisplayPort, 4Kp60 each
Compression	High-quality JPEG (q90), one encoder per input
Link	10GbE SFP+, NVIDIA Holoscan Sensor Bridge
Link load	~2 Gbit/s for 4 × 4Kp60 (48 Gbit/s raw)
Host	NVIDIA Jetson AGX Orin, hardware decode
FPGA use	44 % ALMs, full design incl. HPS

Parretto IP cores and boards

- **HDMI receiver IP core**, HDMI 2.0, 4Kp60
- **DisplayPort receiver IP core**, 4Kp60, HBR2 / HBR3
- **Real-time JPEG encoder IP core** for FPGA video
- **Tentiva** FMC boards with HDMI and DP cards

All three IP cores are available for licensing. Contact us for an evaluation or a live demo at www.parretto.com.

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