

Application Note: Educational Applications in Telemedicine

Extending medical education beyond geographical limits

Distance learning of medical procedures by physicians and medical students has tremendous potential for spreading the latest techniques and best practices from leading institutions to practitioners in remote areas, as well as increasing the number of observers that can be included within a single hospital or medical school campus. In addition to expanding the potential audience able to view a procedure as it is performed, well executed distance learning technology creates an ability to capture high definition video for later reference.

In this appnote:

FR-2RU-10-2 — 2RU frame

AAV-HD-XMUX-13T -7.5dBm — HD analog audio embedder with optical transmitter

AAV-HD-DMUX-R — HD analog audio de-embedder with optical transmitter

SL-3GHD0808-R-CP — 3G-SDI router

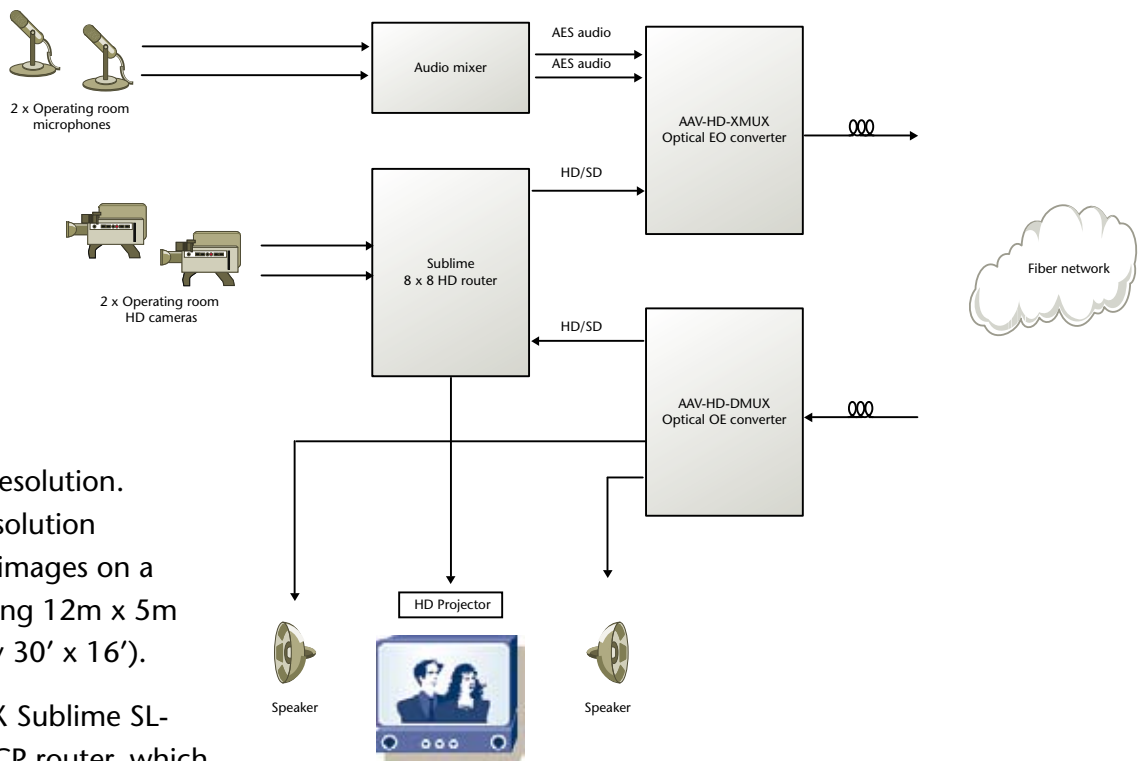
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This video transport application also involves unique and difficult technical challenges. Unlike lecture-format distance learning, remotely viewed surgical procedures require multiple camera angles and video feeds from laproscopic instruments. High quality HD-SDI signals are needed to ensure that subtle aspects of examinations can be made clear. Signals from different sources need routing as well as audio embedding and de-embedding to enable fiber transport. The combined audio and HD-SDI must be reliably transmitted over optical fiber from the operating room to the academic viewing theater.

With its low maintenance design and conveniently small form factors, Nevion's Flashlink product line can simplify network deployment and facilitate a trouble-free remote training project.

Images captured in surgery in HD-SDI can be mediated by Nevion VikinX Sublime routers

and optical transport equipment for display in a digitally-equipped cinema at 4K



(4096x2160) resolution. This level of resolution supports clear images on a screen measuring 12m x 5m (approximately 30' x 16').

Nevion's VikinX Sublime SL-3GHD0808-R-CP router, which supports SD-SDI, HD-SDI and 3G-SDI bit rates, simplifies the management and direction of multiple camera signals from their surgery-room sources to processing and display equipment. Flashlink digital audio converters are used to digitize audio from surgeons' wireless headsets to be fed

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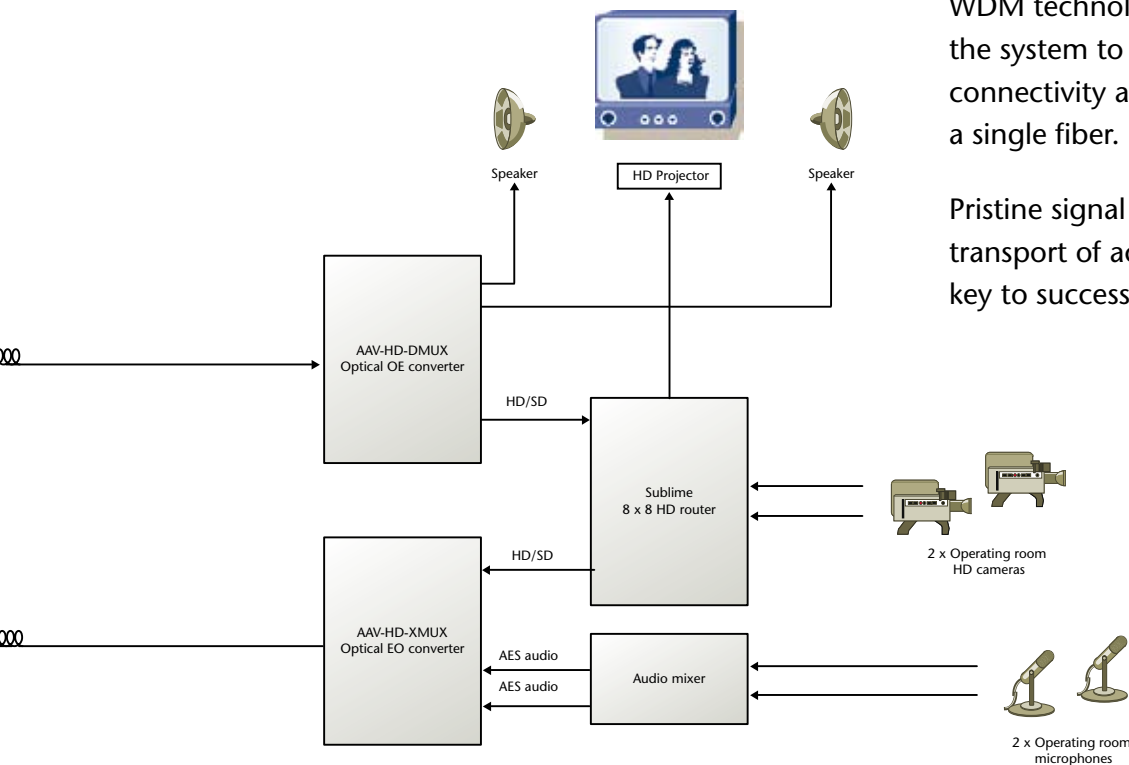
into the AAV-HD-XMUX 13T -7.5dBm and combined with the router's HD-SDI signal output. In the viewing theater, an AAV-HD-DMUX-R was placed before the HD-SDI capable projector for audio de-embedding, so audio and video could be parted for their respective reproduction.

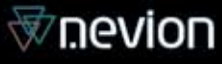
Supporting bi-directional communication

In order to support coordination between broadcasting and viewing locations, and to provide for question/answer dialogs, bi-directional audio-visual communication is needed. This increases the need for effective routing and low latency. The challenge is met using exactly the same setup as described above, on a separate fiber, to transport video and audio from the theater back to the operating room. Adding

WDM technology could easily scale the system to more sources, IP connectivity and other signals on just a single fiber.

Pristine signal quality and low latency transport of accompanying audio are key to successful remote viewing of medical procedures. These requirements correspond with the strengths of Nevision's Flashlink and VikinX lines of high definition video routing and transport products.





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