

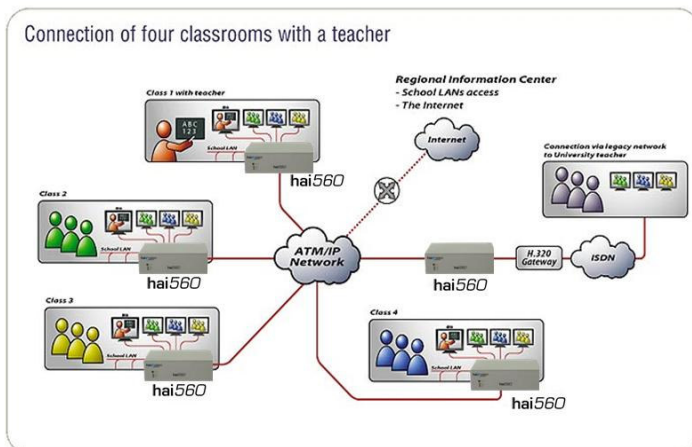
HaiVision provides a critical technology for distance education where students are considered first and foremost.

Distance education projects must provide an environment in which participation is actually stimulated. The most successful deployments have overcome technologic hurdles with respect to the environment and the effective incorporation multiple locations. They have addressed the tough issues of acoustics and lighting. They have provided systems that are user friendly for educators. They have focused on eliminating poor picture quality, bad lip synch, and transmission delays to assure the student's continuous attention. And finally, they have provided a telecom grade system that is configured, initiated, and terminated every hour, every day, every session, without failure, providing consistent performance. These projects bank on HaiVision's network video technology.

HaiVision is at the core of distance education deployments at high schools, continuing education, and universities in many states. In particular, the following are highlights of our installations that have been integrated by our long standing partners, including telecom providers such as Verizon, SBC, and Qwest as well as regional integrators such as United Companies and Ahead Communications:

- The University of Maine
- The State of Maine School System (80+ sites, integrated, 1x3 configuration typical)
- New York State: Albany NERIC, Cayuga-Onondaga BOCES, Broome-Tioga BOCES, OCM BOCES, Jefferson-Lewis BOCES, Oneida BOCES, St Lawrence-Lewis BOCES (100+ sites, integrated, 2x3 configuration typical)
- Pace University (New York)
- Other US: Nebraska, East Texas, Indiana, Colorado, Utah, Maryland, North Dakota
- Canada: TELUQ Universite de Quebec
- Germany: Ludwig-Maximilians-Universität Munich (Medical)

These deployments are not rolling carts, nor are they video telephones. They are based on distance education rooms, usually heavily integrated, possibly resembling broadcast centers to the untrained eye. Typically a primary room will have a camera focused on the educator, another which automatically zooms to the head of a local student questioner, and perhaps three large displays showing the possible questioners from cooperating rooms hundreds of miles away. This is what is referred to as a 2x3 configuration – 2 cameras with encoders and 3 decoders with dedicated displays. Displays are driven directly from a remote site to achieve continuous presence – quad splits are rarely used as they dramatically diminish the experience.



HaiVision's **hai1000** series was designed for the requirements of distance education. Specifically, the features that have made the **hai1000**, and its predecessor the **hai500**, the most successful distance education network video system include:

- At a basic level, the system is based on a frame and blade architecture, supporting multiple encoders and decoders within one chassis. This eases management and support, and is most appropriate for the 1x3 and 2x4 continuous presence configurations most widely adopted.
- For continuous interaction between participants, the **hai1000** has the lowest encoder delay in its class – an amazing 70-90 milliseconds. Today's networks typically deliver data within the 50-80 ms range which needs to be added to the encode/decode delay. To put this in perspective, it is widely agreed (and dictated in some telecom specs) that in order to sustain an interactive communication end to end signal delay must be no more than 200 ms – two tenths of one second. If the delay is greater than this, participant attention is affected very quickly, seriously reducing the ability to communicate – especially in sessions over a few minutes in duration. Most videoconferencing devices have encode/decode performance of well above 200 ms.
- Latency between the audio and video channels (lip sync) can be equally damaging. Many products might deliver acceptable lip sync, but at the cost of overall video latency. Other products have a variable performance – sometimes good, sometimes not so good, depending on how long they have been turned on for or “in session”. If the audio lags or precedes the video by just a few frames, long term attention is impossible. The **hai1000** delivers less than 20 ms drift between audio and video – what can be considered perfect synchronization – from the moment it is turned on and after years of continuous use.
- That leads to another remarkable feature of the **hai1000**, its high level performance does not vary over time – it is 100% predictable. Deterministic. Many of **hai500** and **hai1000** systems have been in use for years, never forced to be rebooted, always returning to a known and connected state after network failure or power failure, and upon resumed operation, operating without affect.
- The **hai1000** as well has remarkable audio and video characteristics. The systems matches high resolution DVD quality video (720x576) with super wide band audio - support for audio response of up to 20Hz to 22kHz. Such performance is necessary to host remote music instruction, or language instruction (the European Commission has selected the **hai1000** as the only system qualified for remote simultaneous interpretation).
- HaiVision has recently introduced the **MAKO-HD** specifically to address the emerging needs for high definition. The **MAKO-HD** supports resolutions from standard definition all the way to 1080p high definition. In addition, the **MAKO-HD** can accept up to WXGA computer input (RGBHV) and transmit the computer signal within industry standard streams at guaranteed frame rates up to 60 frames per second (Hz). This is the ideal product for sharing computer media between classrooms in addition to the continuous presence student teacher environment.
- The **hai1000** is based on the industry standard for video transmission and conferencing – H.264 also known as MPEG-4 AVC. Being 100% H.264 compliant yields huge benefits when considering educational deployments. H.264 is native within Apple's QuickTime, QuickTime Stream Server, iPod and Podcast products making the **hai1000** an ideal contributor to such infrastructures. Further, H.264 allows interoperability with traditional video conferencing systems so high performance continuous presence does not mean isolation with participants on less powerful platforms free to contribute. Further, should the school have a requirement for low cost video distribution, the H.264 of the **hai1000** is 100% compatible with very low cost set top box appliances that can be used to monitor classes at any point on the network.

