Wireless high-definition video: silicon consolidation that's maximal

The Wireless Gigabit Alliance's 60-GHz-based high-definition wireless-video-transport scheme may be on the way, but SiBeam's pioneering approach and multiple product generations are already on the scene (see "The quest for robust wireless high-def video connections," *EDN*, Sept 23, 2010, pg 32, http://bit.ly/92oZnS). Peer inside a SiBeam-developed reference design to see how the company accomplishes this hefty bit-rate trick, complete with support for 3-D video presentations and for equipment control and networking augmentations.

The transmitter and receiver, each measuring 9×6×1.5 in., are identical except for back-panel labels that identify them as "source" and "sink," respectively. An external ac adapter with 12V and 1.7A maximum output specifications powers each of them.

Take off the top covers of the transmitter's and receiver's enclosures, and you'll find that a USB-interface PCB takes up most of the internal space. This debugging and control board mates with PC-side software, and production-system designs won't need it. Such designs can be substantially smaller, less costly, and more power-thrifty as a result.

Behind the units' plastic front panels and underneath intermediary metal shields that block all but the transmitting and receiving antenna arrays are 22×125×6-mm PCBs containing the core circuitry for each device. In this case, too, however, some of the silicon content is exclusive to the evaluation task and won't appear in a production design. To wit, the top sides of both the transmitter and the receiver modules include Atmel AT91SAM256 microcontrollers to implement stand-alone operation. In an end-customer design, such as a Blu-ray player, a set-top box, a television, or an integrated home-theater setup, the system processor will typically manage the module, making the dedicated microcontroller unnecessary.

Source Top

Source Bottom

Sink Top

Sink Bottom
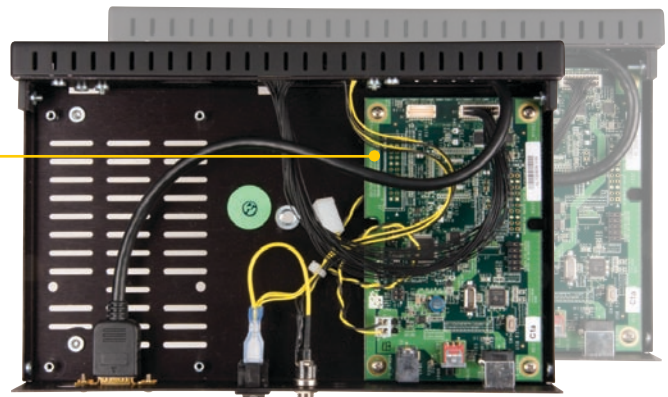
SiBeam's SB9220 HRTX WirelessHD network processor sits on the transmitter module's top side. The SB9210 HRTX RF transceiver is alongside it and underneath a ceramic microantenna-array lid. Corresponding ICs on the receiver module's top side are the SB9221 HRRX WirelessHD network processor and SB9211 HRRX RF transceiver. These latest-generation chip sets handle 1080p-resolution video at 60-Hz frame rates, with color depth as high as 4:4:4. They also comprehend HDMI's CEC feature, as well as WVAN. WVAN support provides the ability for a video source, such as a PC or a game console, to automatically be aware of (and for its user to subsequently select among) various available destination display devices and for a user (at a destination display) to select among available video sources.

A California Micro Devices ESD-protection chip clamps transients originating from the HDMI connector on the receiver module. The transmitter implements ESD protection for its TMDS lines using discrete components. In this case, the HDMI connector mounts on the module back. SiBeam also makes evaluation modules for LVDS and LVCMOS video interfaces. Also visible on both modules' backs are the power- and system-processor-control interfaces.