

# Flexilink

## for designers of audio-visual equipment

### All the advantages of networking without the disadvantages of IP

Manufacturers of audio and video equipment are increasingly being asked for network-connected versions, but Internet Protocol, which was developed by and for IT people, is intended for a rather different environment than the FPGAs and DSPs which are commonly used in digital AV equipment. Generic implementations of interfaces and protocol stacks usually concentrate on storing packets in memory, where they can be worked on by software, whereas AV equipment is more likely to require a flow-through architecture, delivering a stream of audio samples or pixel values without having to compete with other processes for memory bandwidth or CPU cycles.

Flexilink provides a "synchronous" service for AV and other time-critical packets, with guaranteed throughput and latency, as well as its "asynchronous" service for IT packets, which uses all the capacity not occupied by AV packets. It uses conventional Ethernet physical layers, and switch ports also support legacy IP over Ethernet. The MAC layer has separate interfaces to the rest of the system for the two services; in most cases, the asynchronous service will have a conventional DMA interface into computer memory and the synchronous service will interface directly to digital media channels. The Flexilink network also carries timing information which is accurate enough to be used to distribute a "word clock" for audio synchronisation as specified in AES11.

The implementation on our Aubergine platform is available as VHDL code for a Spartan-6 FPGA; it supports several of the standard interfaces to Ethernet PHYs, and is readily adaptable to other platforms. It can include conversion between packet streams and raw data formats such as I<sup>2</sup>S. A configuration signal selects either the Flexilink format or standard Ethernet; in the latter case the packets are delivered through the asynchronous service interface, and the synchronous service interface is not used.

A simplified version, omitting the asynchronous service and the standard Ethernet mode, can also be used. With this version, all the network protocols are handled by the switch. In place of the asynchronous packets, the transmit side repeatedly sends information about the media flows that are connected to the interface; this can include names, etc, read from a small local EEPROM or loaded by a microcontroller.

<http://ninetiles.com/IBC2014.html>

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