

Infinity Series H.110 MC3 Multi-chassis Interconnect & Conference Board

OPERATIONAL DESCRIPTION

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The H.110 MC3/Conference Board

1.0 Introduction

The Infinity Series H.110 MC3 Multi-chassis Interconnect & Conference Board is designed to provide a high capacity interconnect path between multiple computers using the H.110 bus to connect computer telephony boards within a *CompactPCI* chassis. This path is provided by fiber-optic links conforming to the MC3 standard and operating at the OC3 bit rate of 155 Mbps. Provisions are included for supporting dual counter rotating rings for redundancy or higher capacity. In addition to the multi-chassis function, the board is equipped with enhanced conferencing facilities for up to 42 conferences with a total of 128 participants. Enhanced features include individual DTMF detection for each conference participant, a “clamping” function to prevent conferees from hearing DTMF tones generated by other conferees, and energy detection capabilities for conference inputs. A bidirectional analog port is also provided for such functions as music on hold and monitoring. The H.110 bus was devised by the Enterprise Computer Telephony Forum (ECTF) to provide a single telecom bus for the entire industry. It is intended for add-in boards using the *CompactPCI* form factor. A variety of boards are available from a number of different vendors. The *CompactPCI* and H.110 specifications also provide for hot swap capabilities for use in high availability applications. The MC3 bus is a chassis interconnect standard promulgated by the GO-MVIP standards body.

The board is equipped with a processor that can be used to control the lower level functions of the board. The host PC controls the board using messages passed through dual-ported RAM. The board shares a common message passing and control scheme with other Infinity Series boards.

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Figure 1: H.110 MC3/Conference Board Functional Areas

1.1 Features and Capabilities

This section presents an overview of the features and capabilities of the Infinity Series H.110 MC3 Multi-chassis Interconnect and Conferencing Board.

1.1.1 H.110 Bus

The H.110 bus is a digital bus for transporting PCM (Pulse Code Modulation) signals between telephony boards. It was created by the ECTF to provide a common bus structure for future development that would end the “bus wars” between the various legacy busses such as the SCbus and the MVIP bus. PCM is a standard method of digitizing phone signals. It involves encoding each channel at an 8 kHz rate using eight bits. The signals from multiple channels are then combined into a frame. On the H.110 bus, each frame consists of 128

channels or timeslots. The bit rate of the H.110 bus is 8.192 MHZ. Thirty-two wires, also called streams, each carrying 128

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The H.110 MC3/Conference Board timeslots, are combined to form the bus, and provide a total of 4096 timeslots. Two timeslots are required for a full conversation, one for each talker. In addition to the streams, a number of other signals necessary to maintain synchronization between all the boards in the system are carried on the bus. These signals provide the clocking and framing information. Redundant clocks are provided to aid in recovery if the primary clock should fail. The H.110 bus consists of backplane connections on a 6U CompactPCI backplane that is used to interconnect the boards in the system. The CT Bus connections are made through the J4/P4 connector. The electrical and mechanical requirements of H.110 boards are tightly specified to insure the reliability and consistent performance of the CT Bus in any valid configuration of conforming boards.

1.1.2 The MC3 Bus Interface

The MC3 bus was devised by GO-MVIP as a means of providing a large number of 64 kbps channels between PC chassis using the MVIP bus for intra-chassis connections. In the interest of minimizing cost and taking advantage of existing hardware, the physical interface uses the same architecture as that used by the SONET standard operating at the OC3 bit rate of 155 Mbps. Each link consists of a full duplex fiber-optic cable that can support 2430 channels. Seven of these channels are dedicated to framing purposes. The MC3 standard arranges two of these fiber links in dual counter rotating rings. The two rings can be used to provide redundancy against ring or chassis failure or they can be used to double the capacity. Each node of the MC3 structure provides bypass, drop and insert capabilities for each of the 64 kbps channels. The Infinity Series H.110 MC3/Conference Board provides up to 1024 connections in each direction between the MC3 and H.110 busses.

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1.1.3 Conferencing

In addition to support for the MC3 bus, the H.110 MC3/Conference Board also includes enhanced conferencing facilities. Up to 42 simultaneous conferences can be supported with a total of 128 participants. The transmit and receive attenuation of each conferee can be controlled independently improving audio quality and making larger conferences practical. As a separate resource connected directly to the H.110 bus the conference facilities can connect to sources both within and external to the PC. When enabled, the conference facilities reduce the MC3 connectivity by 128.

1.1.4 DSP Functions

The H.110 MC3/Conference Board is equipped with four DSP's associated with the conferencing facilities. A DTMF detector is available for each potential conferee. The DSPs also provide a "clamping" feature which when enabled will temporarily interrupt a connection when a DTMF digit is detected. This can be used to prevent other members of a conference from hearing a DTMF tone generated by a conferee. There is also an energy detection capability that can be used to detect the loudest talkers in a conference. In addition to DTMF tone detection, the DSPs can be used to generate and detect 2 kHz. tones which are used for performing continuity checks for Signaling System 7.

1.1.5 Analog Audio Port

The H.110 MC3/Conference Board also provides a bidirectional analog port that can be used for such purposes as providing music on hold or monitoring.

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1.1.6 Clock Modes

The H.110 MC3/Conference Board can operate in a variety of clock modes. Modes are available so that the master clock can either be derived from the H.110 bus, one of the MC3 rings, or be generated internally on the MC3/Conference Board. The clock redundancy and clock fallback functions of the H.110 bus are also supported so that the H.110 MC3 Board can be set to provide a clock to the H.110 bus if the master clock on that bus should fail.

1.1.7 Hot Swap Capability

The H.110 Specification includes "hot swap" capability. This capability allows for the insertion and removal of boards from a live system. Not only are there provisions for controlling the electrical signals to prevent disruption when inserting and removing boards, but also for informing drivers and applications so that the board resources can be managed as they are added or deleted. Each H.110 board is provided with a blue LED that is used to inform an operator when it is safe to insert or remove a board.

1.1.8 Message Passing

The board occupies 8K of memory space on the host PC. This 8K may reside anywhere within the PC's address space. As a *CompactPCI* board, the address and interrupt of the board is assigned at boot time. The message passing scheme used by the Infinity Series H.110 MC3/Conference Board is identical to that of the other Infinity Series H.110 boards, allowing for the easy combination of a variety of Infinity Series H.110 boards in a single system. The message passing scheme and message syntax of Infinity Series H.110 boards is similar to that of the older XDS series of MVIP and Scbus boards. This

facilitates the easy migration from ISA and PCI systems to designs using *CompactPCI* boards.

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1.1.9 Flash EAROM for Firmware

The firmware for both the main processor and for the DSP's is contained in Flash EAROM. This allows for easy upgrades of the firmware on the board in the field without requiring time consuming downloads every time a system boots. Once reprogrammed, the new firmware is retained even when the power is removed. The original, factory programmed firmware is also retained on board and can be accessed by installing a jumper.

1.2 How to Use This Manual

The first five sections in this manual are organized in the order you should read and use them to get started with your H.110 MC3/Conference Board. We recommend that you begin with these three steps.

1. Follow the instructions in section 2.0 (Quick Start) and 3.0 (Installation). These sections will tell you if your board is operating correctly within your system. You don't need to be familiar with the board's command set to complete this step.
2. Read section 4.0 (Initialization) to initialize the board within your system. Your application must perform these initialization procedures whenever the computer is powered-up in order for the board to communicate with the application.
3. Read section 5.0 (Communications with the Computer) for an overview of how to communicate with the H.110 MC3/Conference Board. Section 5.0 includes a summary of the commands for constructing your application and details concerning system interrupts.

Before you can actually build your application, read section 6.0 (The H.110 bus, MC3 Bus and Clock Modes), 7.0 (Using the MC3 bus), 8.0 (H.110 Bus Switching) and 9.0 (Conferencing). These sections explain, with practical examples, how the H.110 MC3/Conference Board operates and

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The H.110 MC3/Conference Board how to use the command set to achieve the desired results. Section 10.0 explains diagnostic and error messages that may occur. The Appendix contains diagnostic information that will be helpful if you have problems installing your H.110 MC3/Conference Board.