FPGAs Bring Needed Flexibility to Telecomm Testers

The rapid proliferation of new services and standards complicates the already challenging task of meeting the high-performance needs of the telecommunications equipment market. At **ICT Electronics** (Barcelona, Spain), a leading manufacturer of telecommunications test equipment, the flexibility of SRAM-based FPGA technology plays a key role in meeting that challenge.

Since 1989, designers at ICT Electronics have exploited the reconfigurable nature of Xilinx FPGA technology to create high-performance, cost-effective test equipment. Their systems take advantage of the reconfigurable nature of Xilinx FPGAs in two ways:

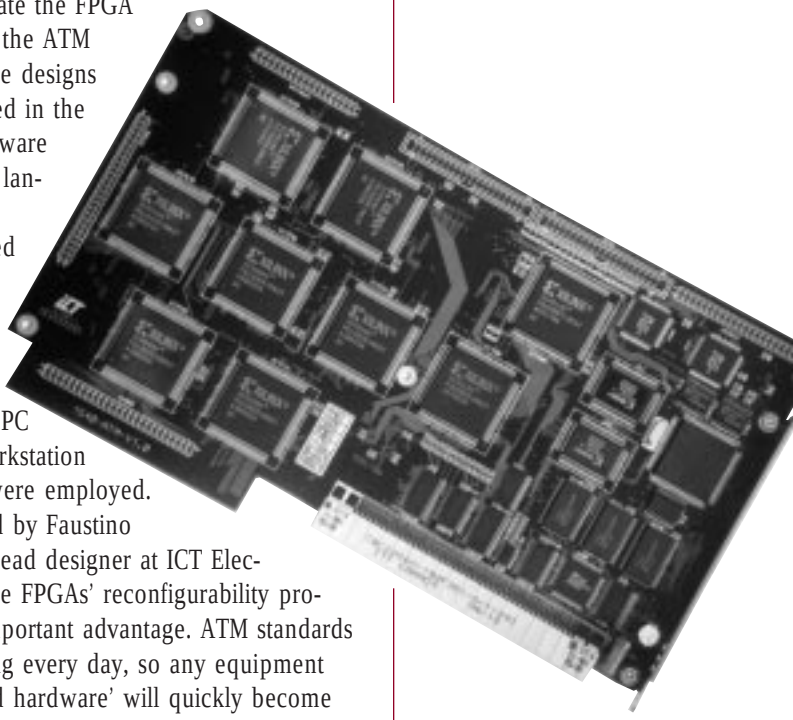
- to implement multiple operations with the minimal amount of logic.
- to enable field upgrades.

Often, multiple potential bitstreams are available for a particular FPGA device, so the FPGA is configured (and reconfigured) dependent on the user's selection of a particular command or operating mode. When the various industry organizations issue new standards or recommendations, systems can be upgraded in the field by supplying new FPGA configuration bitstreams. Typically, the FPGAs are configured using the asynchronous peripheral mode, with the configuration bitstreams stored on a hard or floppy disk within the system. Equipment can be easily updated by sending out new configuration bitstreams via floppy disk or over the Internet.

For example, the new Flexacom Analyzer/Generator for broadband ISDN digital transmission systems contains a mix of about one hundred XC3000 and XC4000 series FPGA devices in a typical system configuration. This powerful instrument allows users to work separately or simultaneously with both the Synchronous and Plesiochronous Digital Hierarchies (SDH and PDH). Optional modules support Jitter and Wander analysis and generation.

The Flexacom system's FPGA-based asynchronous transfer mode (ATM) module, pictured here, is a typical example of the use of FPGAs in the various system modules. This module can act as both an ATM cell simulator and an ATM cell monitor. The majority of the logic on the board is implemented in 11 different FPGAs, ranging from the XC4013E to the XC3042A device. The FPGAs implement a wide variety of logic functions, including finite state machines, counters, register files, multiplexers/demultiplexers, and decoders. The XC4000E architecture's on-chip memory capability is used to efficiently implement large register files and look-up tables used to identify virtual channels. The FPGA's dedicated arithmetic carry logic is key to implementing the large counters needed to simultaneously monitor up to 16 communication channels. Utilization of these devices ranges from about 65% to over 90%, and system clock speeds range from 512 KHz to 40 MHz.

Data I/O's Synario design software was used to create the FPGA designs for the ATM module. The designs were entered in the VHDL hardware description language, and implemented using the Xilinx XACT-Foundry tools. Both PC and HP workstation platforms were employed.



As noted by Faustino Cuadrado, lead designer at ICT Electronics, "The FPGAs' reconfigurability provides an important advantage. ATM standards are changing every day, so any equipment with 'closed hardware' will quickly become obsolete. Flexacom ATM can be updated easily, via floppy or remote control, helping make Flexacom the best solution for B-ISDN networks." ◆