



Major Demonstration Highlights

- TCP/IP with no microprocessor
- Can download new hardware functionality from the Internet
- Short development cycle.
- Full MP3 decoding at only 8MHz clock rate.
- Low latency Voice over IP

Marconi MMT2000

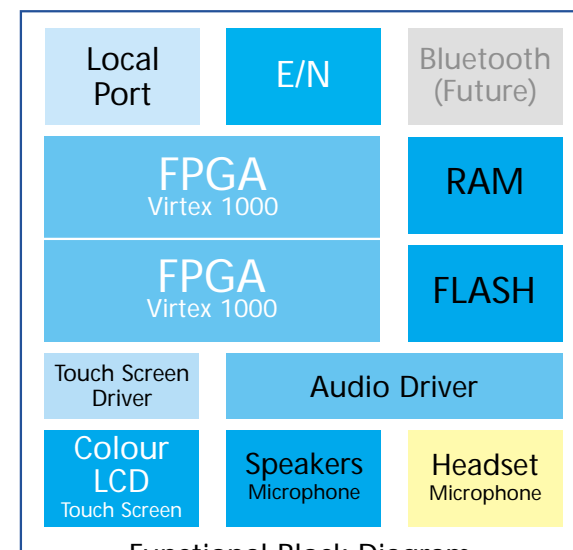
The MMT2000 is a prototype IP multimedia terminal designed to allow rapid development and testing of IP multimedia applications.

The demonstration applications have been chosen to complement the Marconi VoIP strategy. These applications are written in Handel-C and highlight the power of this design methodology in targeting flexible logic.

Demonstration Overview

What is the MMT?

The MMT 2000 is a reconfigurable Internet access device based solely on an architecture of Virtex® FPGA's. It is the result of a collaborative project between Marconi plc, Celoxica and Xilinx inc.



Functional Block Diagram

- 1 **How big is the TCP/IP stack?** About 48% of an XCV1000 (of which – 13% is on chip ram built from CLBs, 8% could be moved off chip, 5% could be moved into block rams).
- 2 **How fast does the TCP/IP stack run?** It was designed for 10Mbit Ethernet, however we are confident the design is capable of fully loading a 100Mbit Ethernet with some tweaking.
- 3 **How many simultaneous connections can the TCP/IP handle?** It was designed to handle a one TCP connection and two UDP channels simultaneously.
- 4 **How big is the MP3 decoder?** About 50% of an XCV1000, and clocks at only 8MHz because it is able to perform so many stages of the decoding in Parallel.
- 5 **How much power does the MMT take?** The supply is rated at 2.5Amps at 12Volts, however most of this is for the LCD display.
- 6 **How big are the bitfiles you download?** About 750kBytes.
- 7 **Why not use a \$5 microprocessor?** The MMT2000 is a proof of concept device, we did it in FPGAs to show how powerful the combination of Handel-C and FPGAs are, particularly as it compares what can be done with VHDL (Verilog).
- 8 **Can I download MP3 files from the internet?** Not in their present form, but with some more work – yes.
- 9 **Are you going to make this into a product?** Not in its present form, but we are working on similar product areas.
- 10 **Can I have/buy one?** We have a limited number of prototypes which are used for demonstration purposes only. If you would like to see a demonstration of the MMT 2000, please contact Celoxica at e.mail address sales@celoxica.com

Scope: To demonstrate the latest FPGA technology combined with *Handel-C*, C extended for hardware implementation that can be ported directly to reconfigurable hardware. The product's hardware function may be changed at any stage in its development or lifetime by remote download. The demonstrator has a colour LCD touch screen, handsfree (or headset), stereo sound in an IP multimedia Desktop Internet Access Device.

Technology Overview

Internet Access Devices require full flexibility in order to evolve with changing standards and as new applications are identified. This technology demonstrator uses Field Programmable Gate Arrays (FPGAs), allowing the creation of 'soft' hardware that results in none of the overheads of the microprocessor or operating systems to support applications. This form of hardware can be totally reconfigured on line by software download to provide enhancements, bug fixes, or a total change of function throughout the development and operational lifetime of the product. Combining this with the high level of abstraction, efficiency and universal capability of writing applications in software gives a powerful new computing platform.

Internet Reconfigurable Logic

Product's market share and profitability can be dramatically improved through use of Internet Reconfigurable Logic or IRL™ technology. IRL™ enables the product's manufacturer to electronically access and change their hardware design anywhere in the world and at any time, via a network connection. The FPGA is manufactured using CMOS SRAM technology. It consists of an array of parallel logic elements that can be configured, via software download, to perform a variety of high-density high performance logical functions. The FPGA SRAM technology has developed rapidly as vendors have pushed process technology to keep up with the pace defined by the famous 'Moore's Law.' Devices of up to 3.2 million



programmable gates are available today and are manufactured using a 0.18 um, six-layer metal silicon process. Up to 10 million programmable gates will be available in 2001. The MMT2000 is supplied with Xilinx Virtex® XCV1000 parts. For more information go to www.xilinx.com.

Handel-C

Handel-C is a CASE (Computer Aided Software Engineering) design environment, which enables application designers to target directly an FPGA (Field Programmable Gate Array), without recourse to hardware description languages.

Handel-C technology is available from Celoxica Ltd. For more information go to www.celoxica.com.

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Capability

Applications: IP phone designed to H323 FastStart subset including H225 and Q931, short code IP addressing, set-up screen.

Reconfigurable as: – MP3 player – games console – graphics display.

Platform: 'C' software programmable FPGA, remote download. Soft key touch screen high resolution colour LCD, 10M Ethernet (DIX), TCP/IP stack UDP/RTP compiled in FPGA. Stereo audio 2+2w, headset socket, parallel interface, serial port, mains powered.

Possible Future enhancements

Applications (downloadable): Browser/e-mail, SIP (Session Invitation Protocol), Streaming Audio/Video. Support for CODECs G.723.1, G.729a, G.726 or G.728. MGCP and H.248 (H.GCP). Standard IP access support with full user id, password. DHCP/TFTP protocol for automatic IP configuration, Calendar, user friendly online help via a soft configurable touch screen. Speech recognition.

Platform: Bluetooth wireless interface, USB, 100M Ethernet Other form factors and styles can be easily introduced, as the 'code' is fully portable to all sizes and sources of FPGA. All applications are Internet reconfigurable with an open applications interface.

About Celoxica

Celoxica is dedicated to providing technology that will enable increased profitability and the reduction of risk in bringing new electronic products to market. Its technology enables product specialists to perform hardware design in a fraction of the time required by traditional methods.

Celoxica was founded under the name Embedded Solutions Limited, in 1996 by Isis Innovation Limited, the Oxford

University technology transfer organisation that manages the formation of new spin-off companies leveraging its intellectual property. The company has 90 staff with offices in Abingdon and London, UK and Silicon Valley, California. Additional information about Celoxica can be found at www.celoxica.com

About Marconi plc

Marconi plc is a global communications and IT company with around 49,000 employees worldwide and sales in over 100 countries. It supplies advanced communications solutions and the key technologies and services for the Internet. Marconi plc is listed on the LSE(MONI) and NASDAQ(MONI).

Additional information about Marconi plc can be found at www.marconi.com.

For more information contact Stuart Barratt via e.mail – stuart.barratt@marconi.com

About IRL™ and Xilinx Online

The Xilinx Online program enables, identifies, and promotes field upgradable applications based upon the award winning Internet Reconfigurable Logic (IRL) technology from Xilinx. These field upgradable applications are defined as being connected to a private or public network with the ability to be updated, fixed, or modified after they have been deployed in the field. Xilinx Online field upgradable applications are currently being used in network equipment, such as ATM switches, cellular base stations, and satellite communications systems. Additionally the program targets emerging markets such as network appliances, multi-use set top boxes, and mobile network devices. Additional information about Xilinx can be found at www.xilinx.com