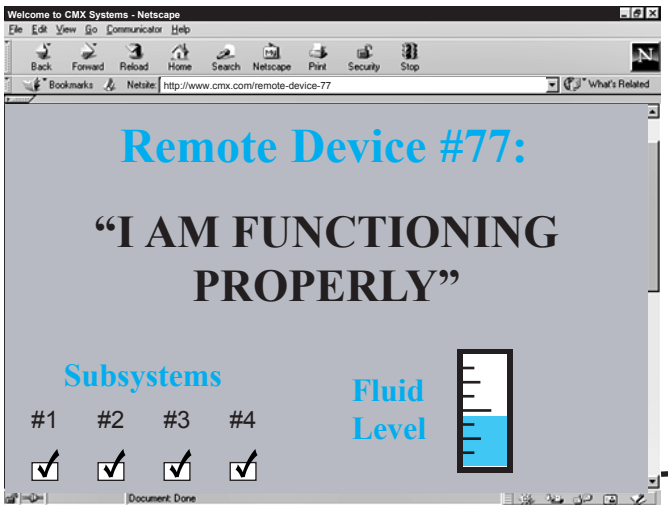
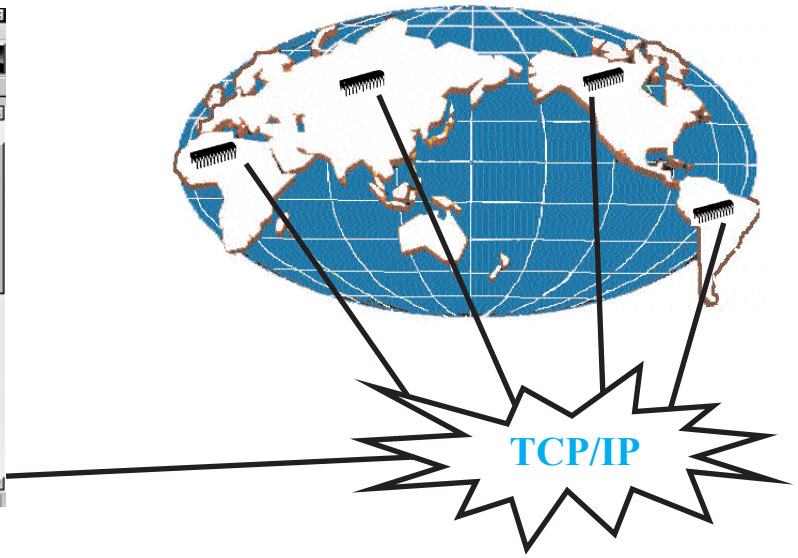
COMPLETE EMBEDDED SOLUTIONS

CMX-MicroNet™

True TCP/IP Networking on 8-, 16- and 32-Bit Processors!





Rom Specifications: **5K-32K bytes**

Depending upon processor, protocols used and options selected

Finally, the *Right* Connectivity Solution for Your 8-bit, 16-bit and 32-bit Embedded Processors

CMX-MicroNet has been developed by the company that is famous for providing complete, elegant solutions to the embedded community - CMX! Our developers have the expertise and hands-on experience to satisfy the most stringent real time demands that the 8-, 16- and 32-bit community deals with every day. When we set about the task of creating the first true TCP/IP stack for these popular processors, we knew that it had to have:

Only Industry Standard Protocols. Of what benefit are closed, proprietary protocols that constrain and confuse your development team? CMX-MicroNet offers only industry standard protocols running right on your target processor and we provide full source code with every sale!

Use your Current Processor. Why should you have to upgrade your current processor, or, worst yet, add another processor just for TCP/IP? Those hardware costs can really add up! CMX-MicroNet allows you to work with your current design and still implement the networking connectivity you need.

An Affordable Pricing Structure. CMX-MicroNet offers a low, one-time fee and no royalties on deployed products. And you get the entire source code for free with every purchase!

Supported Protocols

- **TCP**
- **PPP**
- **UDP**
- **SLIP**
- **IP**
- **HTTP Web Server**
- **DHCP**
- **FTP**
- **TFTP**
- **SMTP**
- **SNTP**
- **POP3**
- **DNS**
- **SNMP**
- **SSL/TLS**

Connectivity

- **Ethernet**
- **Wireless Ethernet**
- **Dial Up**
- **Direct**

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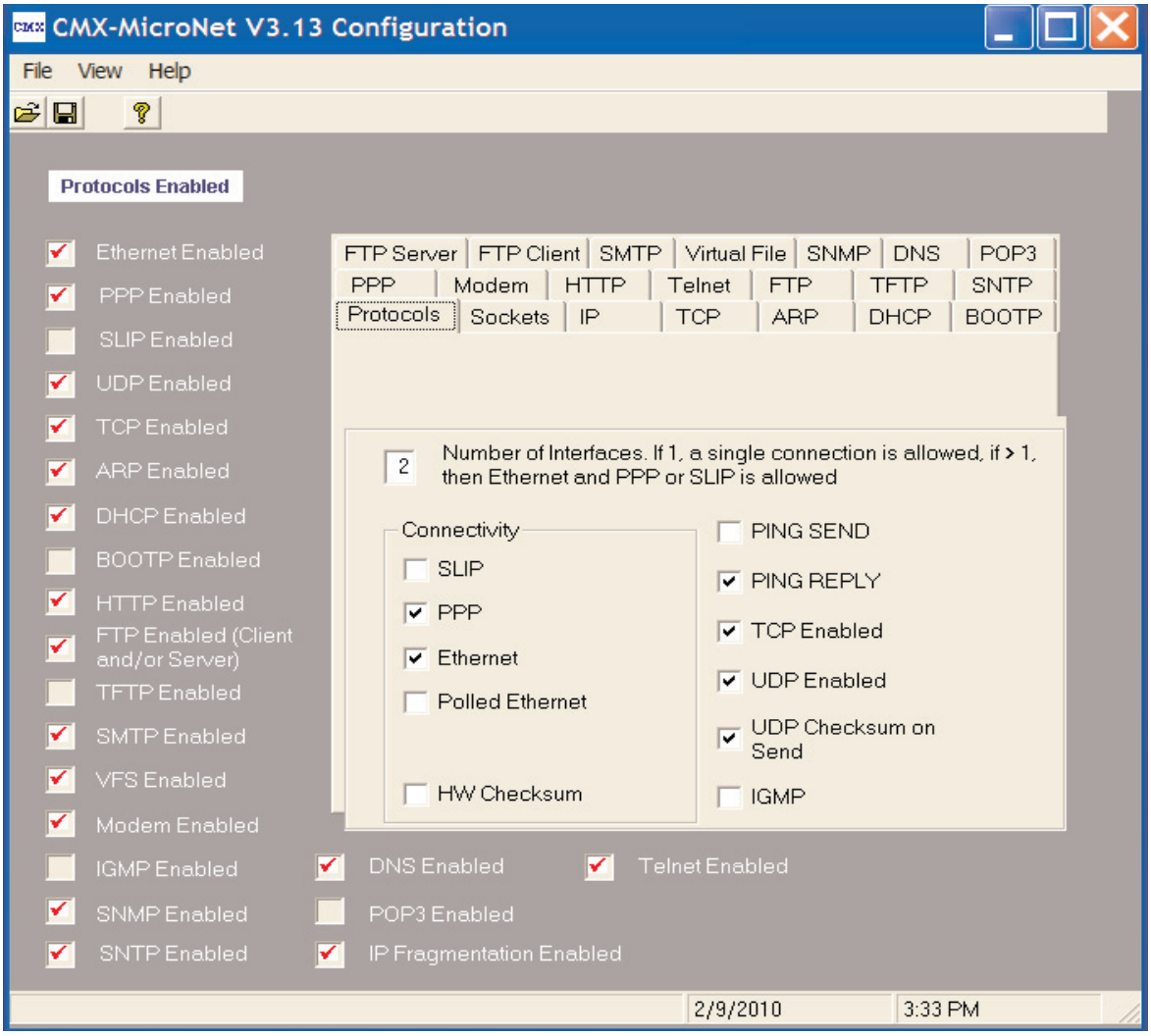
CMX-Micronet Configuration Manager



CMX-MicroNet is easy to configure and integrate with your application. Get your embedded processor networked FAST with CMX-MicroNet.

Important Features of CMX-MicroNet

- **Tested and Proven with Hundreds of Design Wins Around the World**
- **Extremely Small ROM/RAM Requirements**
- **Supports Virtually All 8-, 16-, 32-bit Processors and DSPs**
- **Software Solution does not Require Additional Processor**
- **Web Pages May Contain CGI calls & Server Side Includes**
- **FTP Files, Including New Firmware Send Emails**
- **Can Serve up Java Applets**
- **No Proprietary Protocols**
- **Runs Stand Alone or with any RTOS**
- **New SSL/TLS with small ROM/RAM footprint.**
- **Full Source Code Provided**
- **No Royalties on Shipped Products**

Contact CMX for a current list of supported processors.

Portability

CMX-MicroNet has been designed for maximum portability and is written in 100% standard C code. As a consequence, some clients have decided to port the software to processors not yet supported directly by CMX, including microprocessors, microcontrollers and DSPs. Please contact CMX about this option.

CMX-RTX™

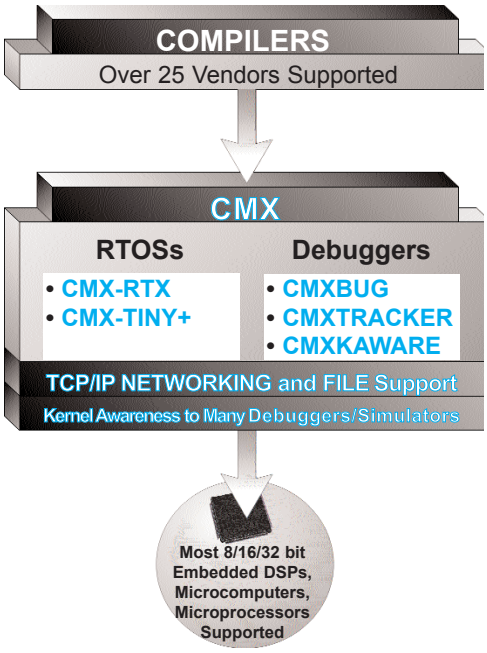
IS YOUR PROCESSOR IN NEED OF A REAL-TIME MULTI-TASKING OPERATING SYSTEM?

- **Does your processor control the way you program?**
- **Do you spend too much time figuring out how to make a section of code execute when it needs to?**
- **Do you constantly have to test flags (or go to routines that test) to see if you should execute a certain function?**
- **Do you spend too much time with interrupt routines while trying to write the code necessary to process the interrupt's event because the main code would not get to it in a timely manner?**

If you answered YES to any of the above questions, you would certainly benefit from considering an RTOS for your application.

In some cases, well structured linear programming is sufficient for a product. In most cases, however, programmers appreciate not having to worry about structuring their code to perform all necessary tasks in a timely manner. This is where CMX-RTX can help. CMX-RTX allows tasks (pieces of code that do specific duties) to run quasi-concurrently. This means that tasks will seem to run all at the same time - doing many specific jobs simultaneously.

CMX-RTX takes the worry and headaches out of real time programming. Our software lets you concentrate on the overall application while taking care of the little details for you. Finish your projects faster and more efficiently with CMX-RTX in your programmer's toolbox!



CMX-RTX offers a truly preemptive, multi-tasking operating system.

WHAT DOES *TRULY PREEMPTIVE* MEAN?

Some RTOS vendors offer only cooperative scheduling which means that the running task has to call the scheduler to perform a task switch. Others offer time slicing in which each task runs for a certain period of time at which point a task switch takes place no matter what. Other vendors claim to be fully preemptive, yet they do not allow any interrupt to cause a preemption. All of these models will fail you at one point or another.

CMX-RTX allows a task of higher priority that is able to run (whether starting or resuming) to preempt the lower priority running task. This will cause the scheduler to save the context of the running (lower priority) task and restore the context of the higher priority task so that it is now running. A truly preemptive RTOS allows interrupts to cause an immediate task switch. This means that the interrupts now have the added ability of using the RTOS's functions and causing an immediate context switch if needed.

NOT ALL REAL TIME OPERATING SYSTEMS ARE CREATED EQUAL!

CMX-RTX is a powerful RTOS that uniquely provides:

- **The smallest footprint**
- **The fastest context switch times**
- **The lowest interrupt latency times**
- **True preemption**
- **Scheduler and interrupt handler written in assembly for speed and optimization**
- **Optional co-operative and time-slicing scheduling**
- **Nested interrupts**
- **All functions contained in a library**
- **Interrupt callable functions**
- **Scalability**
- **Several C vendors supported**

NOT ALL COMPANIES ARE CREATED EQUAL

CMX technical support is renowned throughout the world. Average wait times for a tech support person is under one minute and over 95% of our calls are resolved over the phone! If a question cannot be resolved over the phone, the answer is usually found and relayed to the customer within hours.

Our philosophy also includes giving the engineer all of the source code to the product. This is not only an invaluable debugging tool, but dramatically reduces the learning curve associated with any RTOS. It also allows for smaller code size because only functions that are used are linked into the final output module.

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A PARTIAL LISTING OF CMX-RTX FUNCTIONS

TASK MANAGEMENT

Create a task.
Remove a task.
Start a task.
Suspend a task, with time-out provision.
Wake a suspended task.
Forcefully wake a task.
Change a task's priority.
Terminate a task early.
Do a cooperative rescheduling.
Disable task scheduling.
Enable task scheduling.

EVENT MANAGEMENT

Wait on event(s), with time-out provision.
Set an event.
Clear an event.

SEMAPHORE MANAGEMENT

Get semaphore.
Pend for semaphore, with time out provision.
Post to semaphore.
Flush semaphore.

MESSAGE MANAGEMENT

Get a message.
Wait for a message, with time out provision.
Send a message.
Send a message, wait for reply.
Wake task that sent message, if waiting on reply.
Wait on Mailbox(s), with time out provision.

QUEUE MANAGEMENT

Create a circular queue.
Reset queue to empty.
Add to top of queue.
Add to bottom of queue.
Remove from top of queue.
Remove from bottom of queue.

RESOURCE MANAGEMENT

Get a resource.
Reserve a resource, with time out provision.
Release a resource.
Automatic priority inversion.

MEMORY MANAGEMENT

Create a fixed block pool.
Request free block from pool.
Release block back to pool.

TIMER MANAGEMENT

Create a cyclic timer.
Change a cyclic timer event parameters.
Start a cyclic timer.
Restart a cyclic timer.
Stop a cyclic timer.
Restart a cyclic timer with new initial time period.
Restart a cyclic timer with new cyclic time period.

SYSTEM MANAGEMENT

Initialize CMX.
Enter CMX.
Enter interrupt.
Exit interrupt.
Enter power down mode.

Contact CMX for a current list of supported processors.

A Few Customers of CMX...

- **AMD**
- **IBM**
- **Sony**
- **Baxter**
- **Philips**
- **TV/COM**
- **Analog Devices**
- **Fujitsu Telecom**
- **Ericsson Mobile**
- **Nokia Telecomm**
- **Invensys**
- **ITT**
- **AMP**
- **Ford**
- **Boeing**
- **U.S. Navy**
- **U.S. Robotics**
- **AT&T Wireless**
- **Temic Telefunken**
- **Hewlett Packard**
- **Emerson Appliance**
- **Bose Corporation**
- **TRW**
- **Enraf**
- **Xerox**
- **Siemens**
- **Rockwell**
- **Kenwood**
- **Honeywell**
- **ABB Power**
- **Benefon OY**
- **Allied Signal**
- **Hughes Network**

CMX TCP/IP™

WHAT IS CMX TCP/IP?

CMX TCP/IP is a portable, high performance TCP/IP implementation for embedded systems. Memory usage is localized and deterministic. CMX TCP/IP uses RTOS signaling mechanisms to provide a true, multi-tasking re-entrant network stack. When no RTOS is available, CMX TCP/IP provides a straight forward, single threaded stack that supports multiple sockets via the select multiplexer. The system has a simple and familiar programming API, including standard sockets and callable application modules.

CMX TCP/IP is the only solution that you will need for embedded applications. It is embedded in set top boxes to connect thousands of homes to the internet through their cable TV provider. It links thousands of sites to a home office for interactive, satellite-based training. It connects instruments to a PC or workstation over ethernet. It links gaming tables and industrial controllers on LAN's to host computers.

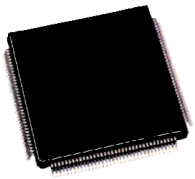
CMX TCP/IP is sophisticated enough to handle the toughest wide area networking jobs, but is still compact and economical enough to be used in a simple LAN application. CMX TCP/IP's low cost, clean implementation, and high functionality make it a breeze to add TCP/IP networking to any application.

CMX TCP/IP is a 100% RFC compliant stack

Complete Solution for Embedded Processors

CMX-RTX

Real Time Multi-Tasking Operating System



Many 8/16/32 Bit Microcomputers, Microprocessors and DSPs Supported

CMX TCP/IP

Client/Server
FTP, Telnet, Web, SNMP, Mail

Socket Interface
BSD Compatible Sockets

Protocols
TCP, IP, UDP, ICMP, ARP, IGMP

Data Link Layer
Ethernet, Slip, PPP

Physical Layer
Drivers

CMX TCP/IP INCLUDES:

- TCP
- UDP
- IP
- ICMP
- ARP
- IGMP
- SLIP
- ETHERNET
- Standard BSD Socket Interface

WHY USE CMX TCP/IP?

When selecting networking tools for your embedded project, there are technical decisions to be made and there are business decisions to be made. Once you have determined that the tool is technically appropriate, it is time to consider the following questions:

- Is full source code provided with the system?
- Are there no royalty payments for deployed products?
- Can the system be run without purchasing an RTOS, if desired?
- Is the software fully documented and supported?
- Is training readily available?
- Is the system economically priced?

With CMX TCP/IP, you can happily answer YES to all of the above questions. CMX is in the business of providing tools that not only make sense to engineers but to management, as well!

WHY CMX?

CMX technical support is renowned throughout the world. Average wait times for a tech support person is under one minute and over 95% of our calls are resolved over the phone! If a question cannot be resolved over the phone, the answer is usually found and relayed to the customer within hours.

Our philosophy also includes giving the engineer all of the source code to the product. This is not only an invaluable debugging tool, but dramatically reduces the learning curve associated with any TCP/IP stack.

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CMX TCP/IP Add On Options

♦ DHCP Client	Dynamic Host Configuration Protocol Client
♦ DHCP Server	Dynamic Host Configuration Protocol Server
♦ FFS	Flash File System
♦ FTP	File Transfer Protocol Client/Server
♦ IMAP4	Internet Messaging Access Protocol
♦ NAT	Network Address Translation
♦ POP3 Client	Post Office Protocol
♦ PPP	Point to Point / Serial Link Internet Protocols
♦ PPPoE	PPP Over Ethernet
♦ SMTP	Simple Mail Transfer Protocol
♦ SNMP V2	Simple Network Management Protocol V2 Agent (includes V1)
♦ SSL/TLS	Secure Socket Layer / Transport Layer Security
♦ TELNET Server	Telnet Server
♦ TFTP	Trivial File Transfer Protocol Client/Server
♦ WEB Server	Embedded Web Server (HTTP Server)

CMX TCP/IP offers Ethernet drivers for the most popular ethernet controllers available for the embedded industry. The library of drivers also includes drivers for supported target processors that offer an onboard MAC with the chip. Please contact CMX for the latest list of Ethernet Drivers and/or Wireless Ethernet functionality for CMX TCP/IP. For processors that have built-in ethernet capabilities, the drivers have been specifically developed and are also provided with CMX TCP/IP.

Contact CMX for a current list of supported processors.

IMPORTANT FEATURES

- Free Source Code
- No Runtime Royalties
- Unlimited Users per Site
- Sample Program
- Easy to Use
- No RTOS Required
- Full Documentation
- Free Technical Support
- Economical

CMX-INet-Plus™

WHAT IS CMX-INet-Plus?

CMX-INet-Plus is an RFC compliant TCP/IP stack offering extensive security protocols as well as IPv4 and IPv6 support for projects that require IPv4 now with an upgrade path to IPv6 in the future or projects that require IPv6 now. CMX-INet-Plus will work with or without an RTOS and offers a wide variety of networking and security Add-On options giving the designer the ability to implement only those options required for their embedded application.

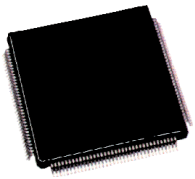
CMX-INet-Plus is provided as full ANSI source code and is 100% RFC compliant and was designed to provide uncompromised support for IPv6 networking applications. CMX-INet-Plus includes increased IP address space, simplified header structure, Quality of Service support, standard BSD sockets, IPSec and SSL/TLS security and has been tested for interoperability in IPV4 and V6 environments.

CMX-INet-Plus is flexible enough to address a broad range of networking applications ranging from set top boxes, security systems, industrial automation, energy automation or virtually any embedded project requiring IPV4/IPV6, security and multiprotocol support but compact enough to address simple LAN applications as well. CMX-INet-Plus is also backed by a company who has delivered TCP/IP networking software for numerous 8-, 16- and 32-bit processors with implementations in thousands of products across all market sectors.

Complete Solution for Embedded Processors

CMX-RTX

Real Time Multi-Tasking Operating System



Many 16/32 Bit Microcomputers, Microprocessors and DSPs Supported

CMX-INet-Plus

Client/Server
FTP, Telnet, Web, SNMP, Mail

Socket Interface
BSD Compatible Sockets

Protocols
TCP, IP, UDP, ICMP, ARP, IGMP

Data Link Layer
Ethernet, Slip, PPP

Physical Layer
Drivers

CMX-INet-Plus INCLUDES:

- TCP
- UDP
- IP
- ICMP
- ARP
- IGMP V2/Multicast
- DHCP Client
- DNS Client
- SLIP
- ETHERNET
- Standard BSD Socket Interface

WHY USE CMX-INet-Plus?

When selecting networking tools for your embedded project, there are a number of technical and commercial decisions to be made. In determining which tools are the best fit for your project, you need to consider questions such as:

- Has the vendor had experience in providing networking tools?
- Is source code provided giving my control over all aspects of my product?
- Will my product be deployed without the burden of royalties?
- Can I run the system with or without and RTOS?
- Is the software fully documented and supported?
- Can I easily call / email for help?

With CMX-INet-Plus, you can happily answer YES to all of the above questions. CMX is in the business of providing tools that not only make sense to engineers but to management, as well!

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CMX-INet-Plus Add On Options

- DUAL IPV4/V6 base stack
- DHCP — Dynamic Host Configuration Protocol Server
- DNS — Domain Name System Server
- FTP — File Transfer Protocol Client/Server
- IGMP V3 — Internet Group Management Protocol V3
- IKE — Internet Key Exchange
- IPSec — Internet Protocol Security
- NAT — Network Address Translation
- POP3 — Client Post Office Protocol
- PPP — Point to Point Protocol
- PPPoE — PPP over Ethernet
- RIP V1 & V2 — Routing Information Protocol (V1, V2)
- RTP/RTCP — Real-time Transport / RTP Control Protocol
- SMTP — Simple Mail Transfer Protocol
- SNMP V1 — Simple Network Management Protocol V1 Agent
- SNMP V2C — Simple Network Management Protocol V2C Agent
- SNMP V1/V2C/V3 — Simple Network Management Protocol V1/V2C/V3 Agent
- SNTP — Simple Network Time Protocol
- SSL — Secure Socket Layer
- Telnet Server
- Web Server (HTTP Server)

CMX-INet-Plus offers Ethernet drivers for the most popular ethernet controllers available for the embedded industry. The library of drivers also includes drivers for supported target processors that offer an onboard MAC with the chip. Please contact CMX for the latest list of Ethernet Drivers and/or Wireless Ethernet functionality for CMX-INet-Plus. For processors that have built-in ethernet capabilities, the drivers have been specifically developed and are also provided with CMX-INet-Plus.

Contact CMX for a current list of supported processors.

IMPORTANT FEATURES

- Free Source Code
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- Unlimited Users per Site
- Sample Program
- Easy to Use
- No RTOS Required
- Full Documentation
- Free Technical Support
- Economical

CMX-TINY+™

CMX-Tiny+ RTOS Minimizes RAM Usage for 8-, 16, 32-bit processors!

The CMX-Tiny+ real time multi-tasking operating system is an extremely "lean and mean" kernel that provides an optimized, small footprint solution for 8-, 16-, 32-bit processors with limited RAM. This specially designed RTOS allows the user to develop application code that is run under an RTOS and yet only use the onboard RAM that the processor provides! CMX-Tiny+ does not need any external RAM, regardless of whether the processor can support the use of external RAM or not.

CMX-Tiny+'s code size is so small that it allows the processor's onboard FLASH to support both the user's application code and the CMX-Tiny+ code, in most cases. This unique RTOS, based on a scaled down version of the popular CMX-RTX™, retains most of the power of CMX-RTX as well as the more frequently used functions. CMX-Tiny+, a truly preemptive RTOS, also provides support for cooperative scheduling, if desired. CMX-Tiny+ also is integrated with the CMX-MicroNet™ TCP/IP stack for those applications requiring networking connectivity.

CMX-Tiny+ Features

- **Extremely Small FLASH/RAM Footprint**
- **Truly Preemptive RTOS**
- **Low Power mode supported**
- **Full Source Code With Every Purchase**
- **Free Technical Support and Updates**
- **Low, Economical Pricing**
- **No Royalties on Shipped Products**
- **Integrated with CMX-MicroNet for Optional Networking Connectivity**

Contact CMX for a current list of supported processors.

A Partial Listing of CMX-Tiny+ Functionality

- **Task Management**
- **Message Management**
- **System Management**
- **Event Management**
- **Resource Management**
- **Timer Management**

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CMX Add-In Modules

CMXKAware™ Kernel Awareness

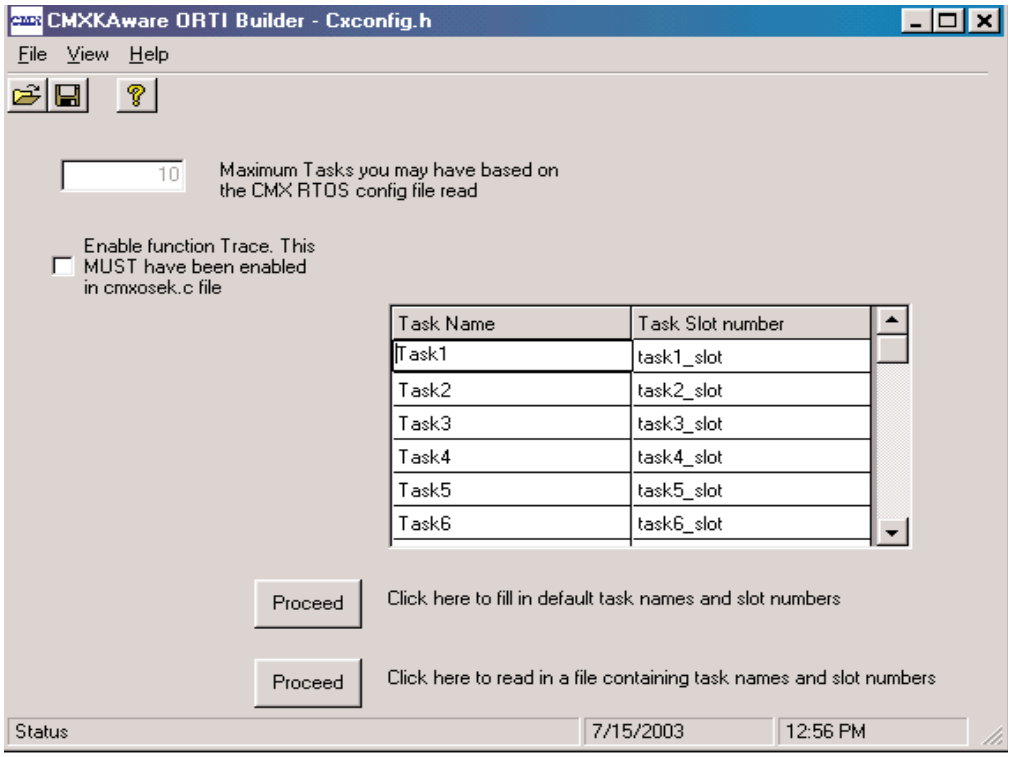
Embedded systems engineers have long desired the ability to view their programming applications running under an RTOS via their In-Circuit Emulators and Simulators/ROM monitor debuggers. To meet this important need, CMX has developed CMXKAware which integrates seamlessly with a number of the leading emulator manufacturers' and/or C vendors' simulators/ROM monitor debuggers. The result is a dramatically enhanced debugging capability that will help to minimize application development time, thereby reducing time to market for companies that manufacture products which include embedded systems.

CMXKAware is an Active X object, DLL or ORTI (OSEK Run Time Interface) that presents all of the RTOS-specific information on the screen. CMXKAware allows you to display CMX-RTX's internal data structures in a convenient series of lists in the RTOS window of the debugger. This provides you with information about each of the active tasks in the target application, about each semaphore, resources, mailbox, queue and event flag group along with a list of all the tasks waiting on these kernel objects, and more. Data can be displayed graphically in real-time.

The new OSEK Run Time Interface (ORTI) for CMXKAware is a universal interface for development tools to the CMX-RTX RTOS. This powerful and flexible interface allows for the evaluation and display of information about CMX-RTX, its state, its performance, the different task states, the different operating system objects etc. The object information is provided via an ASCII text file and since these implementations are configured statically, this data will be available at compilation. Additionally, the ORTI file contains dynamic information as a set of attributes that are represented by formulas to access corresponding dynamic values. Formulas for dynamic data access are comprised of constants, operations, and symbolic names within the target file. By performing a continuous scan of the internal data structures described in the ORTI file, debugging tools can extract and display critical kernel-relative information, such as task states and event traces for the last four RTOS calls in the application under test. Further, the CMXKAware ORTI Builder (see graphic below) automates the creation of ORTI files adapted to the CMX-RTX RTOS for debugging purposes, thereby allowing embedded engineers to focus their efforts exclusively on debugging their application.

Since the OCX, DLL or ORTI utilizes the emulator or simulator kernel aware API, no target resources are used, as in the case with CMXBug (shown on another page). Most emulators and simulators/ROM monitor debuggers are supported. Please contact CMX for a complete list of supported platforms.

CMXKAware ORTI Builder



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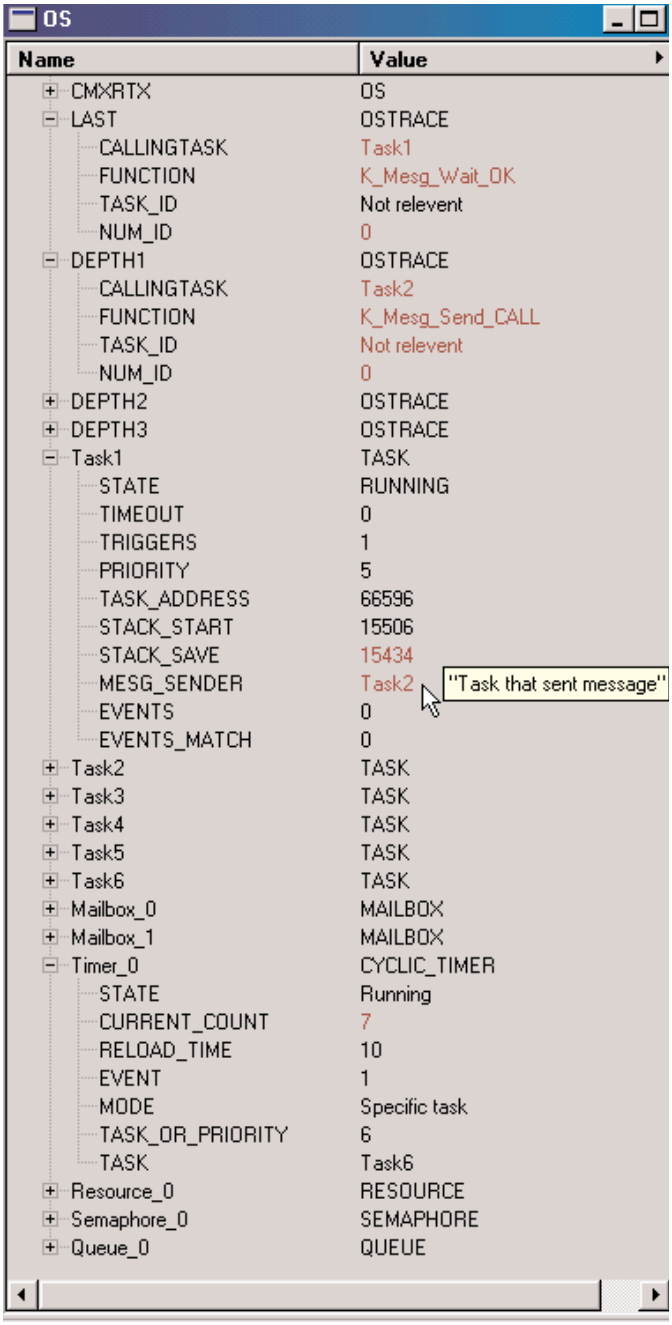
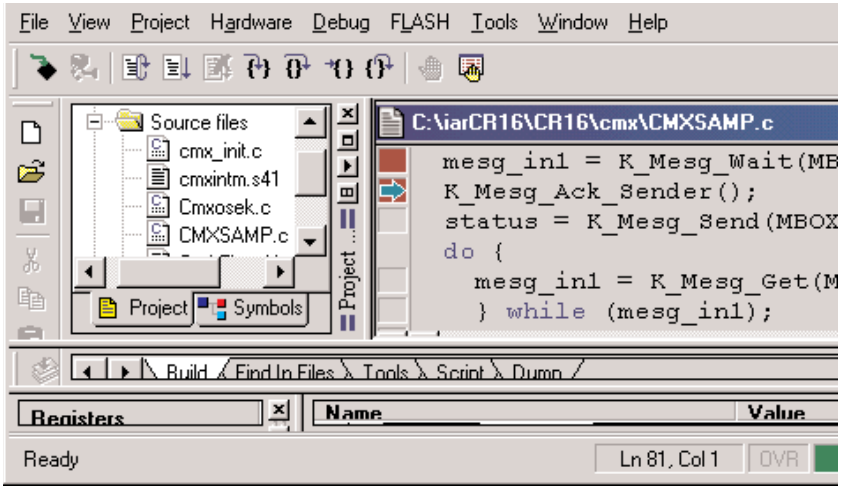
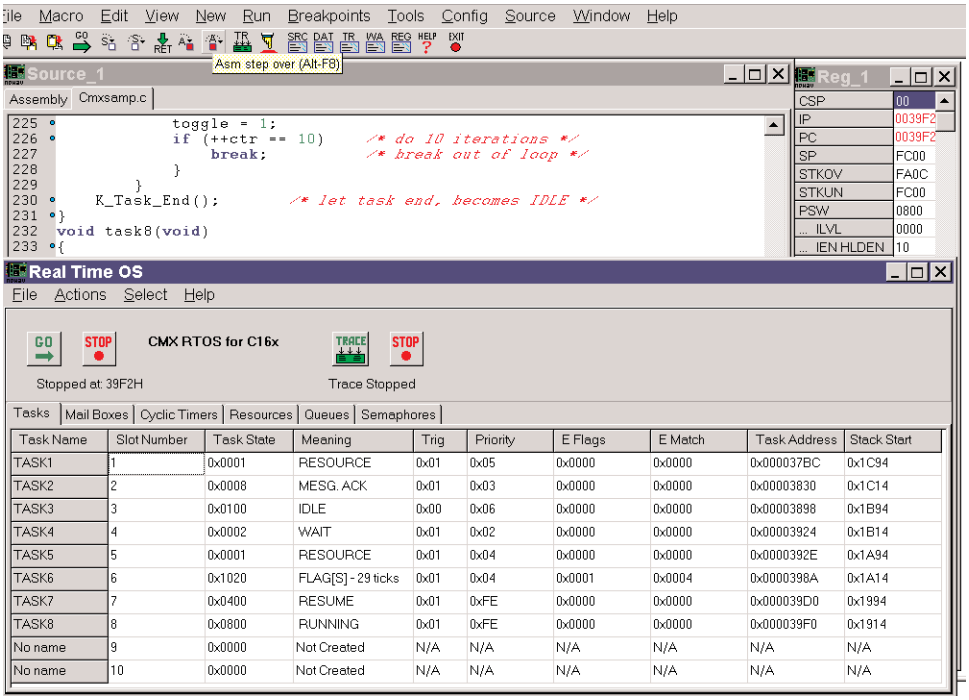
Emulator displays with CMXKAware

The screen shots below and right illustrate an emulator displaying an OSEK ORTI file generated by the CMXKAware ORTI builder. As you can see, ALL aspects of the RTOS can be seen and viewed. Also, if enabled by the user, CMXKAware offers the ability to display the last four RTOS calls, which can be a powerful 'trace' capability for debugging.







The screen shot on left illustrates another emulator displaying RTOS functionality via an Active X file. As shown in the graphic, ALL aspects of the RTOS can be seen and viewed.

CMX Embedded Storage

CMX-Embedded Storage Products

CMX-FFS Flash File Systems is a suite of five products which address memory management needs for a wide variety of target storage media types used in embedded designs.

CMX-FFS - failsafe flash file system for embedded systems supporting NOR, NAND and DataFlash devices.
CMX-FFS-TINY - failsafe flash file system for micros with limited resources supporting small erasable flash.
CMX-FFS-FAT - FAT12/16/32 compatible file system supporting standard media.
CMX-FFS-SAFE-FAT - FAT12/16/32 file system for standard media featuring failsafe protection
CMX-FFS-THIN - FAT12/16/32 compatible file system for micros with limited resources supporting standard media.

	Failsafe	FAT Compatible	RAM Usage	ROM Usage	Storage Media
CMX-FFS	Yes	No	20K +	40KB	NAND Flash NOR Flash DataFlash RAM
CMX-FFS-TINY	Yes	No	<1K	10K	ST Serial Flash DataFlash Small Sector Erasable Flash RAM
CMX-FFS-FAT	No	Yes	3K	35K	SD/SDHC/ MMC Card Compact Flash NAND, NOR DataFlash
CMX-FFS-SAFE-FAT	Yes	Yes	6K	45K	SD/SDHC/ MMC Card Compact Flash NAND, NOR DataFlash
CMX-FFS-THIN	No	Yes	1K	4-12K	SD/SDHC/ MMC Card Compact Flash NAND, NOR DataFlash

RAM Usage shown above are minimum requirements. Additional RAM may be required to increase performance.

CMX Systems, Inc.

CMX Embedded Software Products are shipped royalty free, with full 'C' source code, 6 months technical support and software updates.

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Flash File Systems

CMX-FFS is the standard edition flash file system for embedded systems developers and includes 100% Failsafe, Multiple volumes, Wear-leveling, Directories, Boot sector support, and RAM Drive. Additional drivers for CMX-FFS include NOR Flash Driver, NAND Flash Driver and Atmel DataFlash Driver.

CMX-FFS-TINY is specifically designed for certain characteristics in the flash being used. In this way it is possible to get efficient, fail-safe flash on devices with minimal resources.

CMX-FFS-TINY-BW	This system is for use with any flash devices with small erasable sectors (typically <4K) and in which data can be written in either byte or word units. Typical devices include MSP430 internal flash, SST serial flash and many more.
CMX-FFS-TINY-ST	This system is for use with ST serial flash for data.
CMX-FFS-TINY-DF	This system is for use with Atmel DataFlash.

CMX-FFS-FAT is a full-featured file system for embedded systems developers who wish to add devices to their products that require FAT12/16/32 compliant media to be attached to them and includes Long filenames, Multiple Volumes, and the following Drivers: Compact Flash (True IDE and Memory I/O), MMC/SD (SPI S/W or H/W) and RAM. Additional drivers for CMX-FFS-FAT include Flash Translation Layer for NAND Devices, NOR devices and a DataFlash Management Layer for Atmel DataFlash and for multiple Atmel DataFlash devices.

CMX-FFS-SAFE-FAT is the CMX-FFS-FAT with added protection against the loss of data caused by unanticipated resets and/or power loss.

CMX-FFS-THIN is a scalable, reduced footprint file system designed for integration with 8-bit or 16-bit embedded processors with limited resources and includes FAT 12/16/32, Long file names, and the following Drivers: Compact Flash (True IDE and Memory I/O), MMC/SD (SPI S/W or H/W) and RAM. Additional drivers for CMX-FFS-THIN include Flash Translation Layer for NAND Devices, and a DataFlash Management Layer for Atmel DataFlash and for multiple Atmel DataFlash devices.

Flash Management Software

CMX-SAFE-FTL is an optional Flash Translation Layer for CMX FAT compatible file systems, providing a reliable interface for NAND, NOR or DataFlash. This Translation Layer option allows the file system to manage flash and provides a logical sector interface to the embedded host. The Flash Translation Layer can support up to 4 Terabytes for each array, provides 528, 2112 and 4224 byte pages, provides safety against resets, includes wear-leveling, bad block management, garbage collection, and supports all standard NAND devices.

CMX-FFS-FAT-DFML is specifically tailored for DataFlash Management and works with DataFlash devices with 528-byte or 1056-byte page sizes. CMX-FFS-FAT-DFML incorporates block erases improving overall performance and wear characteristics.

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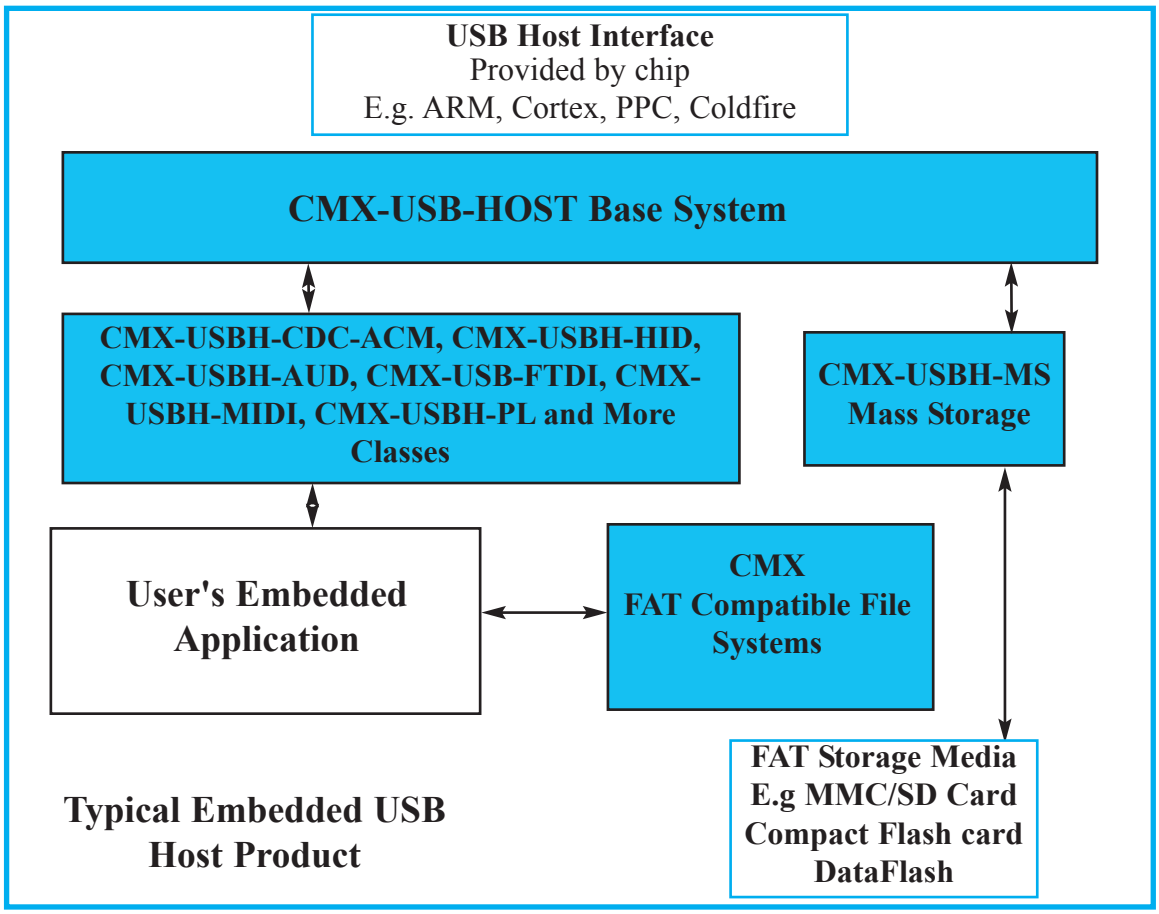
CMX-USB Host™

CMX-USB Host - Overview

CMX Systems is a well-known provider of Embedded Software Solutions. CMX-USB-Host is targeted at systems which need USB Host connectivity and the USB interface is provided to the End Point management level. CMX-USB Host Software provides an integrated suite of USB Host functionality that also includes pre-built packages for several targets. Adding USB Host connectivity just got easier for the embedded developer.



CMX-USB-Host Base System

CMX-USB Host stacks (OHCI, EHCI and Proprietary) are designed for processors with both integrated USB host controllers and external USB host controllers. The CMX-USB Host package offers Class drivers for Mass Storage, CDC, HID, Audio, MIDI, FTDI, Hub, OBEX, ECM, EEM, RNDIS, MTP, Printer and a Bootloader. CMX-USB Host Mass Storage is fully compatible with CMX-FFS-THIN, CMX-FFS-FAT and CMX-FFS-SAFE-FAT File Systems and works with or without an RTOS

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CMX-USBH-CDC-ACM - This class driver implements a virtual USB serial port on the embedded target acting as a standard serial port and can be accessed using simple, serial API functions. CMX-USB-CDC-ACM is optimized to use minimal RAM and ROM and requires just control channel and single interrupt endpoints.

CMX-USBH-HID - This Class driver enables the designer to provide support for Human Interface Devices such as a mouse, keyboard or joystick.

CMX-USBH-MS - Is designed for connecting USB mass storage devices to an embedded USB Host controller and allows a standard sector-based FAT file system to be connected to a USB mass storage device. CMX-USBH-MS supports multiple volumes and flash drives and is compatible with all CMX FAT compatible file systems.

CMX-USBH-AUD - This Audio Class driver supplies a wide range of audio functions for USB Hosts with speakers and microphones. Supporting both Type I and TYPE II stream formats, CMX-USBH-AUD provides sample rate adjustment, volume/mute control, graphic EQ, loudness, bass boost, input terminal for playback and output terminal for recording. Processing features include; up/down mix, Dolby Prologic, 3D stereo extender, reverb chorus, compression and processing unit extension. Also includes mixer unit, line in or microphone selection and AF Version 1 (full speed).

CMX-USBH-FTDI - This Class driver is available for embedded designs which include FTDI USB to Serial converter devices.

CMX-USBH-MIDI - Implements the Musical Instrument Digital Interface protocol when required for USB Host applications.

CMX-USBH-PL - The Print Class driver enabling USB Hosts to interface with PLC5 format compliant printers.

CMX-USBH-HUB - Provides support for the connection of one or more external USB hubs to the Host system.

CMX-USBH-RNDIS - Is a class driver option providing RNDIS host functionality for an embedded target.

CMX-USBH-CDC-ECM - Is an Ethernet Control Model driver handling the exchange of Ethernet framed data between a USB Host and Device.

CMX-USBH-CDC-EEM - Is the Ethernet Emulation Model class driver implementation for simplified networking over USB.

CMX-USBH-CDC-OBEX - Provides support for the Object Exchange protocol intended for transmitting data objects between devices.

CMX-USBH-MTP - Implements MTP host functionality and access to MTP enabled devices. A user-friendly API is provided for accessing connected MTP and PTP devices as well.

Integrated Packages

CMX offers complete pre-ported packages for several Microcontrollers with integrated USB HOST and external USB Host controllers. These packages work on various standard evaluation boards.

Contact CMX for a current list of supported processors.

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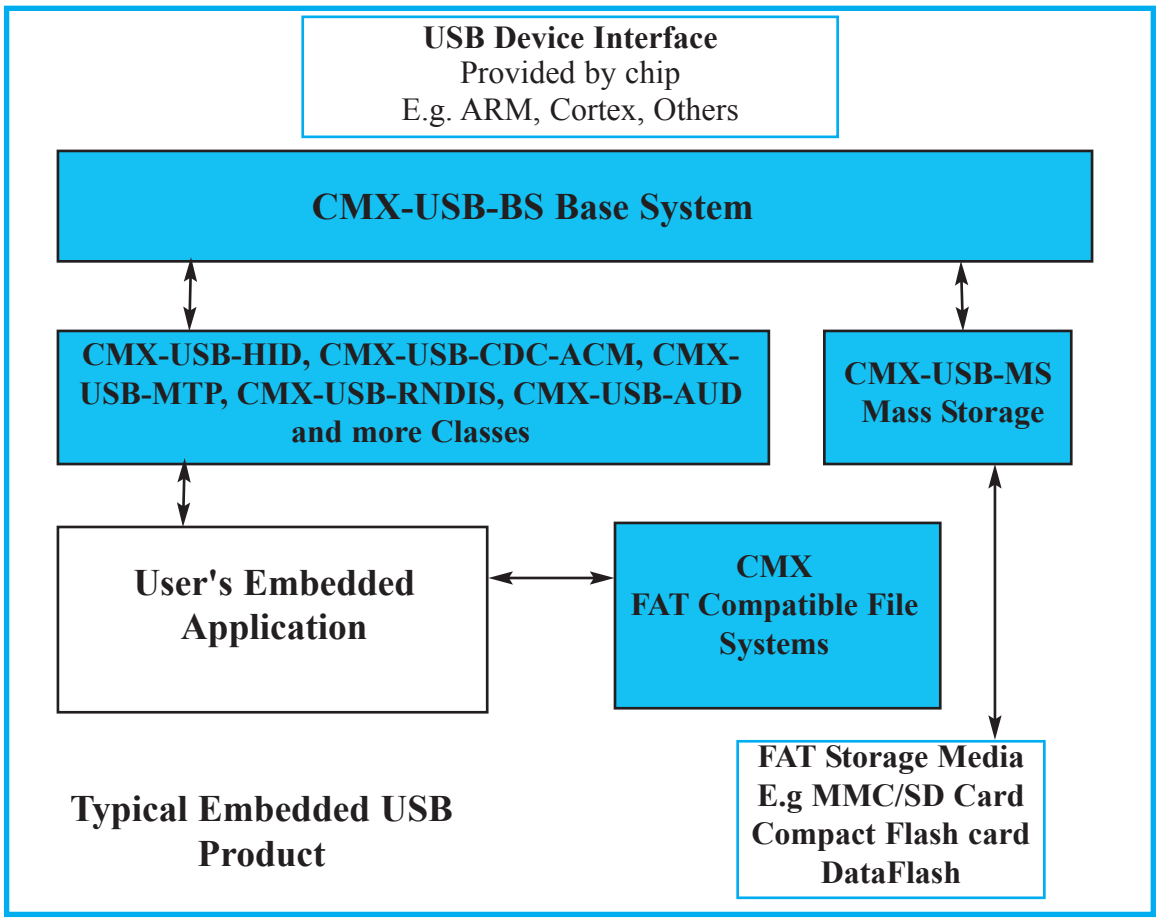
CMX-USB-Device - Overview

CMX Systems is a well-known provider of Embedded Software Solutions. CMX-USB is targeted at systems which need USB device connectivity and the USB interface is provided to the End Point management level. CMX-USB provides an integrated suite of USB device functionality that also includes pre-built packages for several targets. Adding device USB connectivity just got easier for the embedded developer.



CMX-USB Base System - CMX-USB-BS handles all the basic setup and management of the USB system. The system assumes a USB Device Controller which handles all of USB up to the end point level. Also, part of the CMX-USB-BS system is the USB configuration including: Vendor ID, Product ID, End Point Type, End Point Addresses, Bulk, Interrupt, Control channels.

CMX-USB-MS - CMX-USB-MS storage allows you to connect standard PC compatible storage media attached to your embedded system like a standard pen-drive. The package includes the USB SCSI layer and also the low level drivers for attaching media to the device. Possible media you can attach include: Compact Flash cards, MMC/SD cards, HDDs, DataFlash, NAND or NOR flash. CMX provides tested drivers and reference schematics for all these media types.

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CMX-USB-CDC-ACM - This Class driver provides a CDC class implementation for supporting standard comm ports. An API is provided which allows the comm port to be either virtual in your embedded application or connect it to a serial port on your embedded design. Provided is a sample application, which has an embedded command line terminal which can be accessed by the standard Windows terminal program (e.g. HyperTerm) through a Comm port over USB interface.

CMX-USB-MTP - This Class driver provides the Windows XP/Vista compliant Media Transfer Protocol (MTP) widely used in the design of portable media devices. This class driver option and Mass Storage alternative, appears as a standard drive to the host and can also be used with CMX-FFS file systems to provide synchronized device/ host file system access as well as API controlled file system access.

CMX-USB-RNDIS - This Class driver is a USB virtual Ethernet driver with a simple API for easy integration with any TCP/IP stack or Ethernet driver interface. RNDIS Class allows the embedded target to appear as a standard network card to the host allowing access to the target from a directly connected PC or from devices sharing the same network.

CMX-USB-PHDC - Is a USB device class option designed for communications requirements for medical devices used in the healthcare industry.

CMX-USB-AUD - Enables an embedded device to play audio output from a USB host device (PC) or to send audio input, such as a microphone, to a USB host in conjunction with the CMX-USB-HID class driver used for audio device control.

CMX-USB-PL - Class driver enables USB printers to be attached to an embedded device that generates pages in the PCL5 format.

CMX-USB-MIDI - Class driver is available for embedded USB devices that implement the MIDI (Musical Instrument Digital Interface) protocol.

CMX-USB-CDC-ECM - Is an Ethernet Control Model driver handling the exchange of Ethernet framed data between a USB Host and Device.

CMX-USB-Pictbridge - Is a USB Add-On option which, when used with CMX-USB-MTP, allows images to print directly from an image source without the need for a PC. Includes XML parser for encoding and decoding PictBridge protocol objects.

Integrated Packages

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USB OTG for Host and Device

The CMX-USB suite offers an optional OTG (On-The-Go) Module for applications whereby two devices must negotiate and decide which will act as a USB Host and which will operate as a USB device. The CMX-USB-OTG module is available for those processors which are equipped with an OTG controller that supports the HNP and SRP protocols which are used for USB host and USB device negotiation.

More often, embedded applications that require both USB host and USB device capability require dual mode operation. In dual mode, when a USB host is inserted, the host stack will start and when a USB device is inserted, the device stack will respond. This is accomplished by recognition of the ID pin on the USB OTG connector and is supported by CMX USB host and device stacks. For dual mode operation, OTG software is not required.

Bootloaders

CMX offers a variety of Bootloaders all of which are installed as fixed boot stubs in the target processor. Based on the developers' trigger mechanism, the bootloader will check for a new code image. If available, the bootloader will program the image into the device. Specific Bootloader variants include:

CMX-USB-BL - Used to configure a bootloader that loads a new code image from a host (PC) application over a USB connection.

CMX-USBH-BL - A standalone boot stub that can read a new code image from any USB pen drive, and use it to update your target device's firmware safely.

CMX-FAT-BL - Checks an attached SD card (or other similar media) for a new code image and if available, programs the image into the device.

CMX-ENC-BL - An Encryption extension option for all CMX Bootloaders.

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CMX-CANopen™

Integrated or Stand Alone CANopen Functionality from CMX!

CMX-CANopen implements the CANopen protocol stack as defined by the CiA (CAN in Automation manufacturer's group) Draft Standard "CANopen Application Layer and Communication Profile" DS301 version 4.02. Although primarily intended for the usage in CANopen slaves, the code can also be used to implement a CANopen NMT Master (Network Management Master). Code examples provided have been tested with and passed the official CANopen conformance test.

CMX-CANopen can be used both as a stand-alone product as well as a communication stack for the real-time operating system CMX-RTX. When used with CMX-RTX task priorities can be adapted to best suit the needs of a particular application allowing to assign different priority levels to different process data messages.

Many define statements are used to enable and disable CANopen features, allowing for a very high-level of customization. Single transmission types can be selected to only include those transmission types that are actually used in the application.

Functionality Provided

- Object Dictionary and SDO Functionality
  - One SDO server
  - Expedited SDO transfer
  - Segmented SDO transfer
- NMT Services
  - Full NMT slave state machine
  - Node Guarding client
  - Heartbeat producer
  - Heartbeat consumer
- PDO Functionality
  - Event timer
  - Change-of-state with inhibit time
  - Synchronized transfer
  - Dynamic or static PDO communication parameters
  - Dynamic or static PDO mapping parameters
  - Maximum of 1024 PDOs supported
- Example Implementations Provided

Features

- CANopen Conformance Test Compliant
- Can Be Run Stand Alone or with CMX RTOS
- Complete Documentation with Examples
- Full Source Code With Every Purchase
- Free Technical Support and Updates
- Low, One-time License Fee
- No Royalties on Shipped Products

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About CMX

Background

Since its inception in 1990, CMX Systems, Inc. (formerly known as CMX Company) has focused on providing its customers with all of the tools needed to program their embedded applications. These applications range from automotive, medical equipment, consumer electronics, communications, to aerospace, manufacturing automation, and many other industries. The company's business is to develop and support real-time multi-tasking operating systems (OS's) for a wide variety of 8-, 16-, 32- and 64-bit microprocessors, DSP's and microcomputers. CMX enhances its RTOS with an optional TCP/IP networking package and additional networking add-on components.

CMX also develops and supports products that enhance the user's ability to create, test and debug application code. In addition to developing OS's and tools, CMX also distributes a variety of C tools including compilers, assemblers, linkers, librarians, simulators and ROM debuggers. The company's CMX-RTX Real-Time Multi-Tasking Operating System supports more then 40 processor families and more than 30 C-compiler vendors.

A Message from the President

Thank you for considering CMX real time software. Our company's sole mission is to develop and meticulously support the world's best real time software products. We take great pride in participating in the ultimate success of our clients who are constantly finding new and innovative uses for our software.

On behalf of the entire staff of CMX, I would like to welcome you to join our family of satisfied users. I promise you that we will never lose our focus on your complete satisfaction.

- Chuck Behrmann

Our Commitment to You!

Service and Support

CMX is dedicated to providing our customers with personal attention, quality, commitment, and meticulous support in the use of our products. Because of this philosophy, CMX technical support is renowned throughout the world for its thoroughness and fast resolution of problems. Our quality control statistics indicate that over 95% of technical support calls are resolved over the phone on the first call. In the rare case in which the question cannot be answered immediately on the phone, the correct answer is usually found and relayed to the customer within hours.

We also strongly believe that the source code for the software be given to our customers with every purchase. Not only does this afford the user with an invaluable debugging tool, it also greatly reduces the learning curve normally associated with any real time software product.

Training

While many of our users are able to begin using our software after spending a short amount of time with our examples and documentation, some companies prefer to have formal training for their staff.

CMX has made a special effort to employ expert trainers with years of hands-on experience in the embedded systems industry. We offer standard training and/or customized training courses to suit the needs of the smallest design firm or the largest multi-national engineering corporation.

Call us for more information about our currently available training courses.

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