N e t B u r n e r
Networking in 1 Day!

NetBurner Standard Network Platform Software and Protocols

The NetBurner Solution
NetBurner's solution is unique because it enables you to write application specific code immediately. All of the necessary elements are combined in a unique package that lets you concentrate on developing your product instead of reinventing network protocols and designing hardware.

Network Software and Protocols
The NetBurner designed TCP/IP protocol suite is optimized to work with our high-performance embedded systems. It includes UDP, DHCP, BOOTP, ARP, DNS, ICMP, FTP/TFTP, and a Web Server (HTTP) as standard components. It also features network protocols and software that are often excluded from standard protocol suites such as e-mail, PPP, telnet, NTP, multicast, multihome, ping and SNMP. The web server (HTTP) supports dynamic HTML, Java, Flash Player, Ajax, forms, cookies and passwords. The project directory of HTML documents, gifs, and JAVA classes is
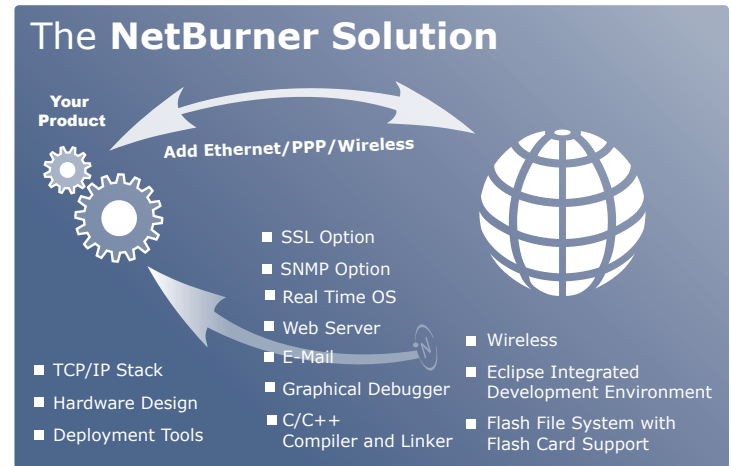
The **NetBurner Solution**

Your Product

Add Ethernet/PPP/Wireless

■ SSL Option
■ SNMP Option
■ Real Time OS
■ Web Server
■ TCP/IP Stack
■ E-Mail
■ Hardware Design
■ Graphical Debugger
■ Deployment Tools
■ C/C++ Compiler and Linker

■ Wireless
■ Eclipse Integrated Development Environment
■ Flash File System with Flash Card Support

Figure 1: **The Complete Hardware and Software Solution**

compressed into a file that is embedded in the run-time application. The included e-mail (SMTP, POP3) support enables your product to send and receive e-mail through an Ethernet or PPP con-

Table 1: **The NetBurner TCP/IP Protocol Suite**

Product	Software Description
ARP	Maps an IP address (such as 192.168.2.1) to a physical address (such as 00-02-F4-02-61-1F) on an Ethernet LAN.
DHCP / BOOTP	Enables hardware to join a network by automatically configuring its IP address
DNS	Translates URL text addresses (such as NetBurner.com) into a numeric Internet address (such as 216.75.35.168)
E-mail / POP3 / SMTP	Hardware can intelligently send an e-mail report, or make a decision based on data retrieved from a POP3 e-mail account
FTP / TFTP	Easily upload or download files stored on your hardware across a local network or the Internet
HTTP / Web Server	Use a standard web browser to access your custom web pages that control, monitor, or configure the hardware
IP	Protocol used to send data over a network or internet
Multicast / IGMP	Send data to a group of hosts and/or servers from single UDP stream
Multihome	Add a new IP interface to your system
NTP	Enables your hardware to synchronize its time with a network time server clock
Ping / ICMP	Performs a quick test to see weather a particular host is reachable across an IP network
PPP	Enables your hardware to communicate using a direct serial link or modem
TCP	Send and receive network data with this compact, hardware optimized, high-performance protocol
Telnet	Communicate with your hardware by creating a remote connection through a standard TCP telnet session
UDP	Use this high performance communication protocol to coordinate the one-way transmission of data over a local network or Internet

Table 2: **Optional Software Modules[1]**

Product	Software Description
SSL Option[2]	Add secure pages to your product with just a few function calls
SNMP Option[2]	Use the Simple Network Management Protocol to send data to a Network Management System
Ethernet/IP Option[3]	Enables your hardware to communicate over Ethernet/IP
Modbus/TCP Option[3]	Enables your hardware to communicate over Modbus/TCP
DeviceNet Option[3]	Enables your hardware to communicate over DeviceNet
PROFInet IO Option[3]	Enables your hardware to communicate over PROFInet IO
CANopen Option[3]	Enables your hardware to communicate over CANopen
J1939 Option[3]	Enables your hardware to communicate over J1939
Advanced SNMP Option[3]	Adds all the popular SNMP versions including SNMPv3c and SNMPv3

Note:

1. Optional Software Modules are sold as a licensed option only, and are not part of the standard development kit package.

2. The SSL & SNMP Option can be purchase directly from the NetBurner Store.

3. Software Modules are available through 3rd party partner.

nection. Your hardware can intelligently send an e-mail reports, or make a decision based on data retrieved from a POP3 e-mail account. Table 1 provides brief descriptions of the NetBurner TCP/IP Suite that is included with every NetBurner Network Development Kit.

Real-Time Operating System

The included uC/OS RTOS is a pre-emptive multitasking real-time operating system designed to be very efficient and full featured, providing rapid real-time response and a small footprint. You can easily create and manage multiple tasks and communicate between tasks with the intuitive API. The RTOS is integrated with the I/O system to make communication with the other system components (such as the TCP/IP Stack), quick and easy.

• Based on uC/OS
• Pre-emptive with priority scheduling
• Semaphores, Mail Boxes, Message Queues and FIFOs
• Timers
• Stack Checking
• Task debugging tools

Flash File System

The Embedded Flash File System (EFFS) is a software module that enables embedded systems developers to add one or more types of Flash memory storage such as: SD Flash Cards, Compact Flash Cards, or Multi-Media

Cards (MMC). Additional features include wear-leveling, bad block management and CRC32 checks. This system contains an easy to use flexible common reentrant API. The EFFS will enable you to store such things as: application data, images, video, audio, or files for FTP transfers. In one provided example, a memory card from a digital camera, can simply be plugged into a NetBurner module and the images and video can be accessed via a web browser.

C/C++ Compiler and Linker

The GCC C/C++ compiler is one of the most well known and widely used ANSI compliant compilers available today. NetBurner maintains and supports the latest updates and releases so developers can stay focused on product development. Each release of GCC is tested with the NetBurner tools and software.

• Fully ANSI compliant C/C++ compiler and linker
• Integrated with the NetBurner Eclipse IDE. It can also be used with other IDE's such as Codewrite and Visual SlickEdit, or run from a command prompt

Table 3: **System Software**

Product	Software Description
uC/OS RTOS[1]	This full-featured preemptive real-time OS allows you to easily create multiple tasks, semaphores, mail boxes, mutexs, timers and more
Flash File System	Store and exchange large amounts of data with SD/MMC flash cards, compact flash cards, or on-board flash chips
C/C++ Compiler and Linker	Begin writing code immediately with the familiar ANSI compliant GCC C/C++ compiler and linker

Table 4: **Development Software**

Product	Software Description
NetBurner's Eclipse IDE	Shorten development time with one click compile-and-load capability, intelligent code completion, and an integrated debugger
Graphical Debugger	Set breakpoints, step through code, and track variables with NetBurner's Eclipse Debugger
Example Source / Video	Source code examples and videos show you how to load your first webpage, control serial ports, or debug applications
Command Line Tools	Link the NetBurner tools to your favorite development environment such as Codewrite or Visual SlickEdit.

Table 5: **CPU Peripheral Software Support[2]**

Product	Software Description
I²C	Add additional peripherals to your product with the NetBurner I²C API
SPI	The included SPI examples make it easy to add additional peripherals to your hardware design
CAN	Add a CAN device to the bus and begin communicating with it with NetBurners CAN library
A/D	Quickly get ADC readings from your hardware
GPIO / Digital I/O	Drive pins high or low, or read the data pins are outputting with a few function calls
UART	Communicating with your RS-232, RS-422, RS-485 serial devices is easy with the included API and example source code
Timers / PWM	Appnotes, example code, will help you customise in days not weeks

Note:

1. The NetBurner version of uC/OS has many added features not included with uC/OS-II. We do however encourage developers to read "MicroC/OS-II" by Jean Labrosse, since most of the functions are basically the same.

2. The CPU peripheral software support is written to work with built-in processor specific hardware peripherals.

Eclipse based Integrated Development Environment
The full-featured NetBurner Eclipse Integrated Development Environment (IDE) for C/C++ enables you to create, edit and download applications

• One-click compile and load to target flash
• Application Wizard to create new applications
• Intelligent code completion
• Bracket matching
• Auto Indentation
• Build Environment
• Customize views to fit work style
• Full-featured web browser
• Customizable syntax highlighting
• Project manager
• Managed makefiles
• Network flash code image update capability
• Class browser and function listing

Graphical Debugger
NetBurner Eclipse has an integrated debugger that includes all of the standard features you would expect from a excellent debug application including:

• Single step, step into, step out
• 1-click debug compile/load
• Register Window
• Thread/Process Window
• Function Browser Window
• Start/Stop button
• Memory Window
• Watch Window
• Source Window
• Console Window

• View C/C++ source, assembly, or mixed mode
• Set/Clear breakpoints
• Integrated remote debugging capability
• Graphical error reporting

Runtime Environment
Complete I/O system supports TCP, Telnet and serial ports. I/O includes read, write, select, fprintf and fscanf functionality.

• User Parameter Flash storage routines
• Applications are stored compressed in on-board Flash, and decompressed into RAM at start up. This provides the same environment for RAM based debugging and the end application.
• Embedded Monitor supports serial and network code updates
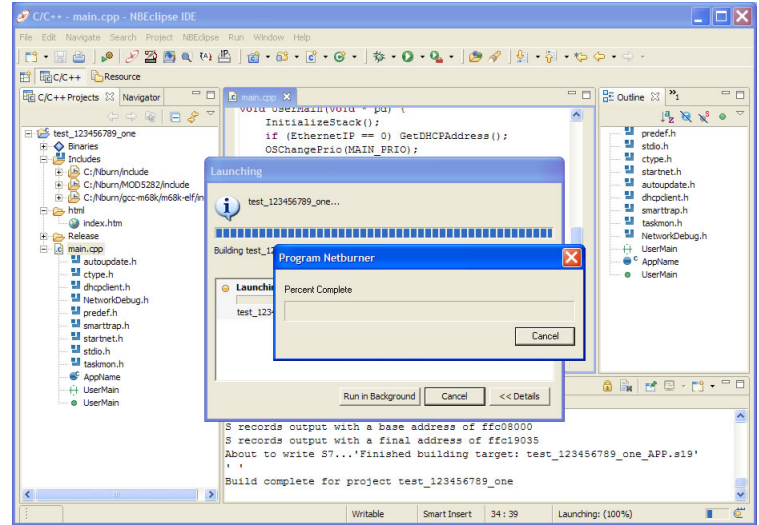• Programmable default exception handling

Figure 2: **NetBurner Eclipse IDE with one click compile-and-load**
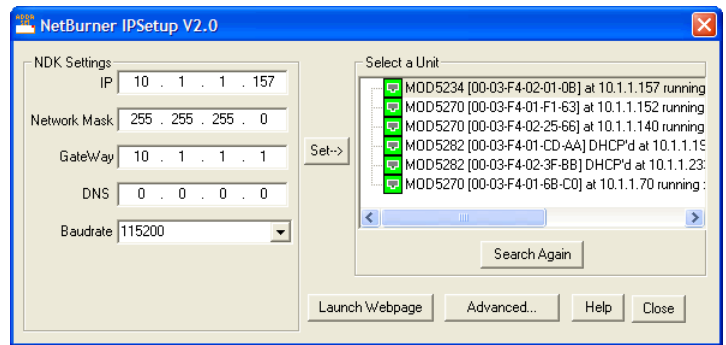

Figure 3: **Network Configuration is simple with the included NetBurner IPSetup Tool.**

• Display watch variables, processor registers, memory areas and stack
• Point at variables to display values

Application Update
Update applications using a serial port or through a network connection using TFTP, NetBurner Autoupdate, or FTP. Examples of each method are included

• NetBurner devices can automatically update by checking a centrally located FTP server with the included TFTP Server application.

• Compile, link, download, program flash, and reboot your NetBurner device during development in one simple step

Table 6: **Deployment and Code Update Tools**

Product	Software Description
AutoUpdate	Easily download a new code image to your device from any point that has network access
IPSetup	Quickly configure your device through a network connection (even if its IP address is not configured)
MTTTY Serial Terminal	Use this simple high performance serial communications program to communicate with your serial devices
TaskScan	View all your application tasks (and their status) over a network connection
SmartTrap WinAddr2Line	This network debugging tool will help you troubleshoot where your application trapped
SerialLoad	Update your hardware application over a serial port
UDP Terminal Tool	Communicate with your hardware by creating a remote connection through UDP
TFTP Server	A server where hardware can retrieve applications to reprogram themselves with

Device Configuration
Quickly and easily configure network and other device settings through a network connection using the NetBurner IPSetup utility, even if the device's IP address is 0.0.0.0

Optional Modules
For brief descriptions of the following optional modules, refe to Table 2.

- SSL
- Modbus/TCP
- DeviceNet
- J1939
- Advanced SNMP V1, V2c, V3
- Ethernet/IP
- PROFInet
- CANopen

SSL
Secure Sockets Layer (SSL) encrypts and secures data for transmission over the Internet or a local network. SSL is an optional software module for the NetBurner development suite. The NetBurner SSL implementation was written from the ground up to provide high performance and a small memory footprint of approximately 90K bytes.

The SSL module is integrated with the NetBurner TCP/IP stack and web server, enabling you to add secure web pages to your product with just a few function calls. Unlike 8-bit and 16-bit microcontrollers, the 32-bit NetBurner processor platforms can easily handle the demands of connecting and transmitting data using SSL.

- 128-bit (A)RC4 and 1024-bit RSA encryption and key exchange
- SSL v3
- SSL Client and Server
- SSL key and certificate creation and management tools
- Enables secure web based management via HTTPS with the NetBurner web server
- Exceptional embedded performance on NetBurner 32-bit processor platforms
- Optimized for an embedded environment
- Small footprint; approximately 90K bytes of code space
- Blocking and non-blocking I/O
- Public key asymmetric cryptography
- API Compatable with Openssl

SNMP
Simple Network Management Protocol (SNMP) is an optional software module that includes:

- SNMP V1, MIBII
- MIB Compiler generator
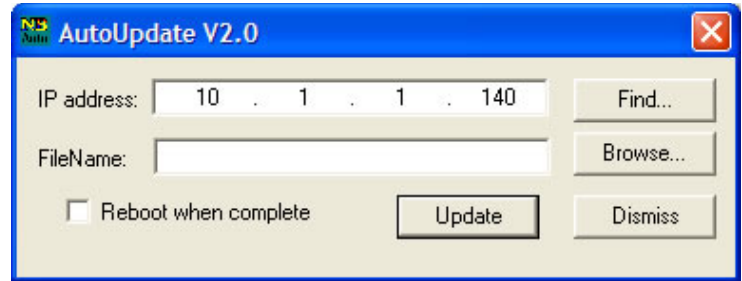- SNMP V2c & V3 are available from NetBurner partner DMH Software

Figure 4: **Download a new code image to your device from any point that has network access**

Part Numbers

All of the software mentioned above is included with the Standard NetBurner Network Development Kits with the exception of the optional modules mentioned in table 2. Also note that none of the network software is included with non-network devices such as the MOD5213.

NetBurner SNMP V1 - Module License
P/N: NBSNMPV1-LIC-100
Add royalty free SNMP functionality for existing development kits for use on NetBurner Modules.

NetBurner's SSL 3.0 Server, RSA & (A)RC4 - Module License
P/N: NBSSL-MOD-LIC
Add royalty free SSL functionality for existing development kits for use on NetBurner Modules.

NetBurner's SSL 3.0 Server, RSA & (A)RC4 - Platform Site License
P/N: NBLIC-SSLV3
Add royalty free SSL functionality for existing development kits for use with a Platform Site License.

Ordering Information

E-mail: sales@netburner.com
Online Store: www.NetburnerStore.com
Telephone: 1-800-695-6828