Portable TCP/IP Protocol Stack

Technology Overview

The Transmission Control Protocol/Internet Protocol, TCP/IP, has become the de-facto standard for communications on heterogeneous networks. While the term TCP/IP is loosely used to include user-level applications such as FTP, Telnet and various mail programs, the protocols which perform the low-level data preparation and checking are the platform upon which these user programs depend.

Product Overview

InterNiche's implementation of the TCP/IP protocol suite is designed to be small, portable and compliant. It includes ANSI "C" sources for the TCP/IP family of protocols listed below, a "Sockets" API, and full technical documentation. The InterNiche IP layer can be configured as a standard client machine, an IP router, or a multi-homed server. Related protocols such as PPP, SNMP and a Web browser and server are also available from InterNiche. In addition to providing a protocol platform for InterNiche's FTP, Web Server, Web browser, Email, SNMP and routing products, the following protocols and services are provided:

- Address Resolution Protocol (ARP)
- Internet Protocol (IP)
- Internet Control Message Protocol (ICMP)
- Domain Name Services (DNS)
- User Datagram Protocol (UDP)
- Transmission Control Protocol (TCP)
- Bootstrap Protocol (BOOTP)

Key Features:

Small Memory Requirement: A minimal Boot Client (ARP, IP, ICMP, UDP, DHCP & TFTP) can be as small as 12.8K. A Full featured TCP/IP (ARP, IP, ICMP, UDP, DHCP & TCP) compiles to 42.4K; adding the Sockets API brings the total ROM and RAM requirements to 51.5K bytes on an ARM 32-bit processor.

Two Way Tasking: No special multitasking features are required. All code is implemented as an event driven state machine, which means you can either run the stack by polling from a central loop or take advantage of an RTOS suspend/resume feature.

Versatile Memory Management: All memory is allocated and freed by macros, each of which only allocates a specific size. Systems which support alloc()/free() functions can map the macros to these. RTOS systems (which typically use partitions) can define the macros to allocate the next larger partition.

RTOS Independence: InterNiche provides a tasking API that interfaces to InterNiche's NicheTask™ or other commercial RTOS environments. With this feature, developers can use InterNiche's TCP/IP for very deeply-embedded applications, and easily port the same code for execution by virtually any commercial RTOS. The API also provides a level of portability among other RTOSes, so that the developer can also easily migrate among a variety of third-party RTOS environments. The API introduces no additional overhead, so there is no performance penalty when migrating from RTOS to RTOS.

High Performance: On most target systems, TCP transfer rates are limited only by the bandwidth of Ethernet. (Target system: 33MHZ 486, FTP file transfer, NE2000 Ethernet hardware, 15K of free buffers and no other network activity.)

Network Hardware: InterNiche's TCP/IP supports Ethernet, Token Ring, SLIP and PPP. Implementations for ATM and DSL connections have been implemented by our customers in their embedded systems.

TCP Highlights: InterNiche's portable TCP layer is fast, small and has been highly optimized for embedded systems. It is based on MBUFS and sockets that are based on BSD 4.4 specifications, and therefore familiar to experienced TCP programmers. For example, all sockets operations can be made in a non-blocking mode (SS_NBIO) socket option, including connect(). All "mbuf" data, including headers, is in contiguous buffers to simplify memory management and avoid data copies. The macros to protect critical sections of code are used sparingly to improve throughput and reduce stack space. Memory allocation can be via malloc/free, or mapped to "partition" based memory management systems that are popular in real-time applications. Tunable parameters such as MSS (Maximum Segment Size) and the TCP window can be left to the runtime logic or be customized for your application.

Technical Summary:

- Zero data copy for ultra fast performance
- Standard Sockets Interface
- Non-blocking versions of all functions
- Versatile MSS and window options
- Trace and log debugging in source

- Connections limited only by memory availability
- Optimized assembly language checksum routines (or C language if you prefer)
- "Predictive" header processing for speed
- Nagle Algorithm (Slow Start)
- VJ Smoothed Round Trip Timing
- Delayed ACKs
- BSD style "Keepalive option"
- RFC 791 - Internet Protocol
- RFC 792 - Internet Control Message Protocol
- RFC 793 - Transmission Control Protocol
- RFC 768 - User Datagram Protocol
- RFC 826 - Ethernet Address Resolution Protocol
- RFC 862 - Echo Protocol
- RFC 919 - IP Broadcast Datagrams
- RFC 950 - IP Subnet Extension
- RFC 1055 - IP Datagrams over serial lines

IP Highlights:

The IP layer is often overlooked when evaluating TCP/IP code. While the differences between products are easiest to see at the TCP layer (where speed and code size vary widely), a well-designed IP layer may be more critical to the long-term success of your product. Many embedded IP layers lack support for some or all of the features listed below. While you may not need them upon initial implementation of TCP/IP in your product, as you add features and your product matures your product is almost sure to require that you add these features. InterNiche supports all of them and our staff continuously tracks IETF stands process for developments important to embedded hosts so that our TCP/IP stack is up to the most current specifications and offers the most advanced features.

IP Features:

- DHCP Client
- Support for NAT Routing
- Fragmentation and re-assembly
- IP Routing - Routes set via ICMP, SNMP, IGP, etc.
- Loop back test driver included
- Optimized checksum routines
- Multi Homed IP support

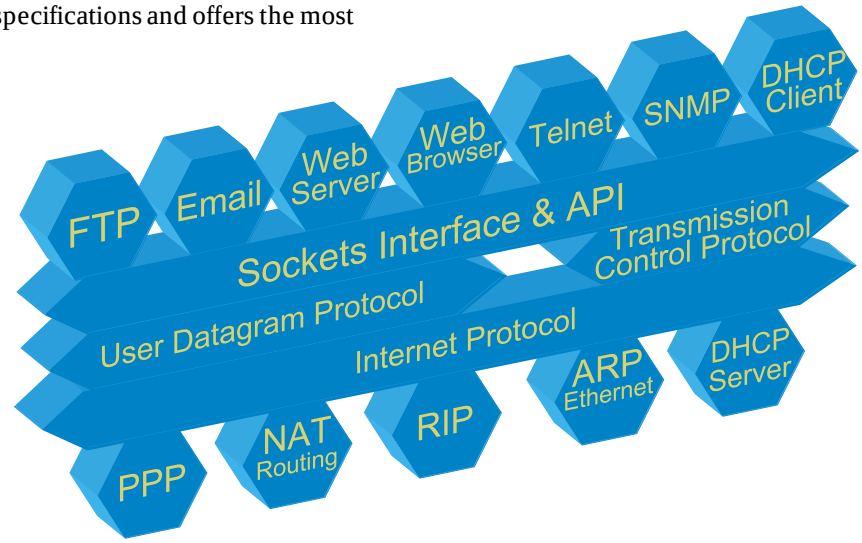
Protocols Included With Basic Stack:

- TCP
- UDP
- IP
- TFTP
- DHCP client
- ICMP
- ARP
- SLIP

Support Services

One year of Software Warranty is included with the product. Optionally, InterNiche also provides an Annual Support Program, which consists of unlimited electronic support enabling users to quickly integrate the software, assuring that the implementation will perform properly, thus decreasing time to market.

After the initial Warranty/Annual Support Program, InterNiche customers can choose to renew Support at two levels: Gold Support, which includes electronic support, or Platinum Support, which adds new product releases to the Gold Support level.



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