



CycloneTCP is a dual IPv4/IPv6 stack dedicated to embedded applications. CycloneTCP conforms to RFC standards and offers seamless interoperability with existing TCP/IP systems. By supporting IPv6, CycloneTCP eases deployment of next-generation Internet. The stack is distributed as a full ANSI C and highly maintainable source code. CycloneTCP is available either as open source (GPLv2) or under a commercial license.

## Main Features

- Dual stack (IPv4 and/or IPv6)
- Built-in support for multiple network interfaces
- BSD style socket API
- Blocking/non-blocking socket operation and event-driven functions (select and poll)
- Efficient data transfer through zero copy
- Well-crafted TCP module with selective acknowledgement (SACK) and congestion control
- Raw socket interface
- Multicast support (IGMPv2 and MLDv1)
- IP fragmentation and reassembly support
- Flexible memory footprint. Built-time configuration to embed only the necessary features
- High throughput
- Off-load checksum calculation (when supported by hardware) to accelerate IP/TCP/UDP/ICMP checksum generation and verification
- Configurable memory model: Static memory pool or heap memory allocation
- Dialog-based configuration wizard
- Portable architecture (no processor dependencies)
- Straightforward port to any RTOS

- Debugging and trace functionality to ease development and integration
- Highly maintainable source code

## Add-On Modules

- WebSocket client and server
- Auto-IP for dynamic configuration of IPv4 address
- DHCP client
- SLAAC for dynamic IPv6 address assignment and auto-configuration
- DHCPv6 client and relay agent
- Host name resolution (DNS, mDNS and NetBIOS Name Service)
- mDNS and NetBIOS responder
- DNS service discovery (DNS-SD)
- SMTP client for sending e-mails
- FTP client
- Secure FTPS client (both implicit and explicit security modes are supported)
- FTP server
- HTTP server with Server-Sides Includes and CGI scripting for dynamic contents
- Secure Web server (HTTPS)
- MQTT v3.1.1 client (TCP, TLS, WebSocket and secure WebSocket transport layers supported)
- MQTT-SN client (UDP and DTLS transport layers supported)
- CoAP client (UDP and DTLS transport layers supported)
- SNMPv1/v2c/v3 agent (MD5/SHA-1 authentication and DES/AES privacy protocols are supported)
- SNTP client
- TFTP client and server
- Icecast/SHOUTcast client for streaming audio over the Internet
- Modbus/TCP client and server
- VLAN support (802.1q)
- PPP (Point-to-Point) protocol
- USB/RNDIS driver

## Related products

- CycloneSSL (lightweight TLS/DTLS library)
- CycloneCrypto (cryptographic toolkit)

## Supported Devices

### MCUs with 10/100 Ethernet MAC:

|            |  |
|------------|--|
| Atmel®     | AVR32 UC3A<br>SAM3X<br>SAM4E<br>SAM7X<br>SAM9263<br>SAME54<br>SAME70<br>SAMV71     |
| Freescale® | Coldfire V2<br>PowerPC MPC57xx<br>Kinetis K6x / K7x<br>Kinetis KV5x<br>i.MX RT1052 |
| Infineon®  | XMC4500<br>XMC4700<br>XMC4800  |
| Microchip® | PIC32MX<br>PIC32MZ EC/EF   |
| Microsemi® | SmartFusion<br>SmartFusion2  |
| Nuvoton®   | NUC472   |
| NXP®       | LPC1700<br>LPC1800<br>LPC2300<br>LPC4300<br>LPC54608                               |
| Renesas®   | RX62N<br>RX63N<br>RX64M<br>Synergy S7  |
| Spansion®  | FM4  |
| ST®        | STM32F107<br>STM32F2x7<br>STM32F4xx<br>STM32F7xx<br>STM32H7xx<br>STR912            |

### MCUs with 10/100 Ethernet MAC+PHY:

|                    |   |
|--------------------|---|
| Texas Instruments® | MSP432E4<br>Stellaris LM3S<br>Tiva TM4C129X |
|--------------------|---|

### MPUs with 10/100 Ethernet MAC:

|          |                                 |
|----------|---------------------------------|
| Atmel®   | SAMA5D2<br>SAMA5D4              |
| Renesas® | RZ/A1L / LU<br>RZ/A1M<br>RZ/A1H |

### MPUs with Gigabit Ethernet MAC:

|                    |               |
|--------------------|---------------|
| Atmel®             | SAMA5D3       |
| Texas Instruments® | Sitara AM335x |

### DSPs with 10/100 Ethernet MAC:

|                    |                               |
|--------------------|-------------------------------|
| Texas Instruments® | Concerto F28M35x<br>OMAP-L138 |
|--------------------|-------------------------------|

### Processor IP cores with 10/100 Ethernet MAC:

|         |          |
|---------|----------|
| Cortus® | APS1/3/5 |
|---------|----------|

### Standalone 10/100 Ethernet Controllers:

|            |                        |
|------------|------------------------|
| Davicom®   | DM9000A/B              |
| Micrel®    | KSZ8851                |
| Microchip® | ENC28J60<br>ENC624J600 |

### Wi-Fi® modules (802.11b/g/n):

|            |                      |
|------------|----------------------|
| Atmel®     | WILC1000<br>WINC1500 |
| Broadcom®  | BCM43362             |
| Espressif® | ESP32<br>ESP8266     |
| Microchip® | MRF24WG0MA/B         |
| Murata®    | SN8000<br>SN8205     |
| MXCHIP®    | EWM3162              |

### Ethernet PHY transceivers:

|                    |   |
|--------------------|---|
| Davicom®           | DM9161  |
| Micrel®            | KSZ8031<br>KSZ8041<br>KSZ8051<br>KSZ8081<br>KSZ8721 |
| Renesas®           | uPD6061x  |
| SMCS®              | LAN8710<br>LAN8720<br>LAN8740<br>LAN8742            |
| ST®                | ST802RT1A   |
| Texas Instruments® | DP83620<br>DP83848                                  |

### Gigabit Ethernet PHY transceivers:

|          |         |
|----------|---------|
| Atheros® | AR8031  |
| Micrel®  | KSZ9031 |

## Reference Standards

### **Network Layer (IPv4)**

- RFC 791: Internet Protocol Specification
- RFC 792: Internet Control Message Protocol Specification
- RFC 815: IP Datagram Reassembly Algorithms
- RFC 826: Ethernet Address Resolution Protocol
- RFC 1112: Host Extensions for IP Multicasting
- RFC 1122: Requirements for Internet Hosts - Communication Layers
- RFC 2113: IP Router Alert Option
- RFC 2236: Internet Group Management Protocol, Version 2

### **Network Layer (IPv6)**

- RFC 2460: Internet Protocol, Version 6 (IPv6) Specification
- RFC 2464: Transmission of IPv6 Packets over Ethernet Networks
- RFC 2710: Multicast Listener Discovery (MLD) for IPv6
- RFC 3484: Default Address Selection for Internet Protocol version 6 (IPv6)
- RFC 3493: Basic Socket Interface Extensions for IPv6
- RFC 4291: IP Version 6 Addressing Architecture
- RFC 4294: IPv6 Node Requirements
- RFC 4443: Internet Control Message Protocol Version 6 (ICMPv6) Specification
- RFC 4861: Neighbor Discovery for IP version 6 (IPv6)
- RFC 4862: IPv6 Stateless Address Autoconfiguration

### **Transport Layer**

- RFC 768: User Datagram Protocol
- RFC 793: Transmission Control Protocol
- RFC 2018: TCP Selective Acknowledgment Options
- RFC 5681: TCP Congestion Control
- RFC 6298: Computing TCP's Retransmission Timer

### **Application Layer**

- RFC 959: File Transfer Protocol (FTP)
- RFC 1035: Domain Names – Implementation and Specification
- RFC 2131: Dynamic Host Configuration Protocol
- RFC 2132: DHCP Options and BOOTP Vendor Extensions
- RFC 2616: Hypertext Transfer Protocol - HTTP/1.1
- RFC 2617: HTTP Authentication: Basic and Digest Access Authentication
- RFC 2818: HTTP Over TLS
- RFC 3207: SMTP Service Extension for Secure SMTP over Transport Layer Security
- RFC 3315: Dynamic Host Configuration Protocol for IPv6 (DHCPv6)
- RFC 3646: DNS Configuration options for DHCPv6
- RFC 4954: SMTP Service Extension for Authentication
- RFC 5321: Simple Mail Transfer Protocol
- RFC 6762: Multicast DNS
- RFC 7252: The Constrained Application Protocol (CoAP)



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