

Proven advanced starting points

TsLink3 ML-PPP/PPP SDK

Source Code Stack

Multi-Link Point-to-Point Protocol (ML-PPP)

Multi-Link PPP is a bandwidth-on-demand software protocol that connects multiple links between systems as needed to provide bandwidth on demand. ML-PPP also provides for the fragmentation and reassembly of PPP packets across aggregated B-channels. Each outbound data packet is divided evenly across aggregated B-channels and held long enough at the receiving end to be reassembled in the proper sequence. ML-PPP treats each channel as a separate link and has fast setup and low latency.

The TsLink3 ML-PPP and Point-to-Point Protocol (PPP) Software Development Kit (SDK) source code modules fully implement the aggregation, fragmentation and reassembly of PPP packets and are fully conformant to the respective IETF Standards. TsLink3 ML-PPP/PPP software has been extensively tested for interoperability and has been proven over many years of deployment worldwide.

TsLink3 ML-PPP/PPP protocol stacks are delivered as ANSI C source code SDKs pre-ported to a defined RTOS to give you an advanced starting point to accelerate your development, with the flexibility to exercise full control while minimizing technical risk.

All TsLink3 protocol software stacks are based on a Standard Core Architecture with a Universal API that enables easy migration between different stacks and portability to different software/hardware platforms.

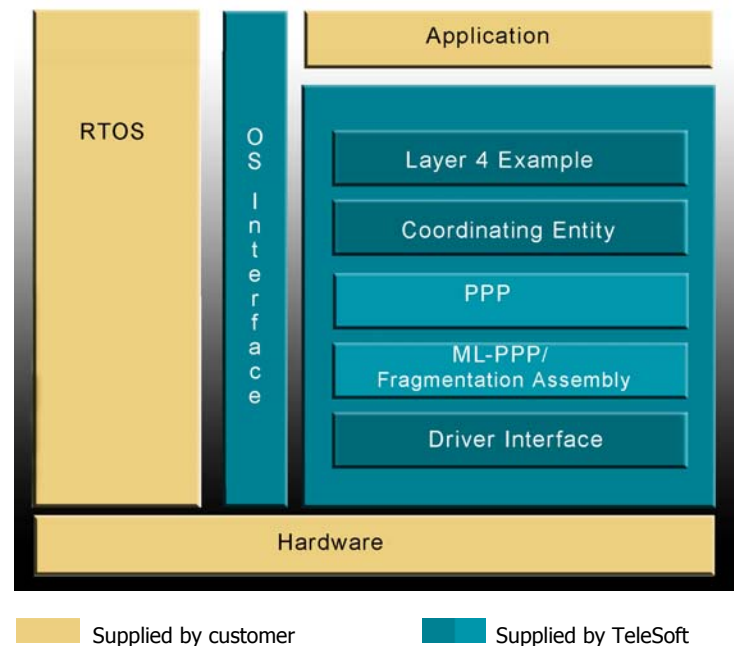
TsLink3 software stacks are specifically architected for all types of embedded and host-based applications and are optimized for excellent performance combined with small code size.

Applications

- ◆ Base Stations
- ◆ Gateways
- ◆ Network interface cards
- ◆ Switches
- ◆ Terminal adapters
- ◆ Test equipment

Well-Structured, Maintainable Code

Maintainability and scalability are designed into each TsLink3 stack SDK. Comprehensive comments and documentation support you as your product goes forward. All TsLink3 SDKs are based on the TeleSoft Standard Core Architecture (SCA) and use the TeleSoft Universal API (UAPI) in order to streamline the porting process and make it as easy as possible to add other protocols when required. The inherent value of TsLink3 stacks will be evident in each phase of your engineering schedule and the product life span.



Note: The Layer 4 example is provided as a template for API interactions.

Shorter Learning Curve & Faster Customization

- ◆ IETF primitives and software structure
 - Easy to relate TsLink3 code to other IETF based protocols
- ◆ 'C' switch statements that closely correspond to the IETF standards
 - Straightforward to read code and locate state action points in IETF standards

- ◆ Adherence to ANSI 'C' standards
 - provides for full portability.
- ◆ OS-independence
 - Choice of RTOS, not locked into a single vendor
- ◆ Processor-independence
 - Mobility across CPU platforms.
- ◆ Simple state machine design
 - Easy to understand and change code for national- specific variants.

Multi-Link PPP is a bandwidth-on-demand protocol that is used to aggregate multiple links between systems as required to provide higher bandwidths on demand. For example, the two 64-Kbit/sec B channels of ISDN can be combined to form a single 128-Kbit/sec data channel or thirty 64-Kbit/sec B channels can be combined to form a single 1920-Kbit/sec data channel.

ML-PPP/ PPP Features

- ◆ Network (NT)- and Terminal (TE)- Side Support
- ◆ Synchronous and asynchronous PPP inputs accepted
- ◆ Supports multiple LAN protocols (e.g., IP, IPX, AppleTalk, NETBEUI)
- ◆ Fully conformant with the IETF standards as defined in the RFC specifications.
 - ML-PPP-specific
 - RFC 1990: PPP Multilink Protocol (MP)
 - RFC 2125: BAP/BACP
 - PPP-specific
 - RFC 2684/1483: Multiprotocol Encapsulation over ATM
 - RFC 2516: PPPoE Protocols
 - RFC 2364: PPPoA Protocols
 - Applicable to both ML-PPP and PPP
 - RFC 2153: Point-to-Point Protocol (PPP)
 - RFC 1994: PPP CHAP Authentication Protocols (For sync-to-sync connections)
 - RFC 1974: STAC LVS Compression Control (STAC not included)
 - RFC 1962: PPP Compression Control Protocol
 - RFC 1662: PPP in HDLC-like Framing
 - RFC 1638: PPP Bridging Control Protocol (BCP)
 - RFC 1332: PPP Internet Protocol Control Protocol (IPCP)

RFC Descriptions

RFC 1990, ML-PPP over 'n' ISDN B-Channels enables bundling of ISDN links to increase the number of B-channels available for aggregation, increasing the bandwidth supported for a single data session.

RFC 2125, Bandwidth Allocation Control Protocol (BACP)— an industry-standard method to manage the dynamic bandwidth allocation in a multi-link bundle. Used in response to changing line or resource conditions between two peers to coordinate the addition and removal of individual links.

RFC2684, Multiprotocol Encapsulation over ATM LLC/SNAP— two encapsulation methods for carrying network interconnect traffic over AAL type 5 over ATM. The first method allows multiplexing of multiple protocols over a single ATM virtual connection whereas the second method assumes that each protocol is carried over a separate ATM virtual connection.

RFC2516, Point-to-Point Protocol over Ethernet PPPoE— provides the ability to connect a network of hosts over a simple bridging access device to a remote Access Concentrator by encapsulating PPP packets over Ethernet.

RFC2364, Point-to-Point Protocol over ATM PPPoA—provides the ability to establish a point- to-point relationship between peers using ATM Adaptation Layer 5 (AAL5) for framing PPP encapsulated packets.

RFC2153, Point-to-Point Protocol—provides a standard method for transporting multi-protocol datagrams over point-to-point links. PPP defines an extensible Link Control Protocol (LCP) for establishing, configuring, and testing the data-link connection; and a family of Network Control Protocols (NCPs) for establishing and configuring different network-layer protocols.

RFC1994, Challenge Handshake Authentication Protocol (CHAP)— the next best password scheme over PAP—a three-way handshake using a public domain encryption algorithm to securely pass user information across the link to authenticate a user with the server.

RFC1994, Password Authentication Protocol (PAP)—the basic internet password scheme— sends the user name and password in the clear to the server.

RFC1962, PPP Compression Control - provides the framework to link in a compression software package, such

as STAC, for higher throughput on PPP links.

RFC 1662, Async-PPP to Sync ML-PPP converter allows PC based asynchronous PPP implementations (COM port-based products) to communicate with synchronous PPP based routers or bridges via ISDN terminal adapters

RFC1638, Bridging over PPP -allows digital products to send any LAN protocol over the link; required for LAN-LAN communication without IP.

RFC 1332, IP (both static and dynamic) over PPP allows ISDN products to send Internet Protocol (IP) over an ISDN link; required for communications with Internet-connected routers

TeleSoft Advantages

TsLink3 software stacks are specifically architected for all types of embedded and host-based applications and are optimized for excellent performance and small code size.

Written in ANSI C and delivered as source code SDKs with a pre-ported interface to a defined RTOS of your choice, TsLink3 stacks give you an advanced starting point to shorten your development schedule, minimize technical risk and maintain the flexibility to exercise full control over your end product.

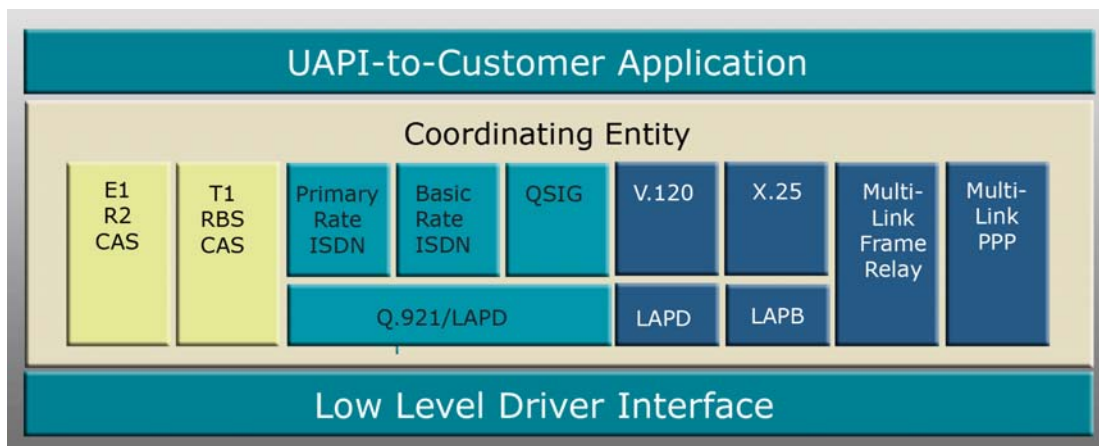
All TsLink3 protocol software stacks are based on a Standard Core Architecture (SCA) with a Universal API (UAPI) that enables easy migration between different stacks and portability to different software/hardware platforms.

Universal Application Programming Interface (UAPI)

TsLink3 code includes a rich message-based Universal API (UAPI) which presents a simple interface for simple applications such as signaling-only. UAPI also provides the versatility and power needed to support more complex configurations which combine signaling with data protocols or with specialized hardware. The TsLink3 Universal API coupled with the straightforward structure of the TsLink3 protocol stack enables you to easily follow the API message flow through the code to determine where to make modifications required for your application.

The majority of simple signaling-only applications require a very small subset of the TsLink3 API messages and parameters - and the non-applicable messages can be disregarded and unused parameters set to zero. More complex applications benefit from the large set of messages and parameters that we provide as templates.

UAPI is common across all TeleSoft stacks which decreases the time and effort required to add upgrade modules to an existing TsLink3 stack and to develop with additional TeleSoft stacks.



Software Tools

Internal Protocol State Logging Tool and Debugging Tool are invaluable aids during portation and integration, included with every TsLink3 stack at no additional charge.

Upgrade and Individual Modules

Completing the solution are upgrade- and individual-modules that increase your market opportunity by increasing your products' connectivity capabilities. Modules include High Availability, PPP, ML-PPP, X.25, MLPP, Frame Relay, T1 RBS, E1 CAS, R2, V.120, and Supplementary Services.

Purchasing TsLink3 Software

TsLink3 Source Code is supplied in comprehensive, portable packages of 'C' source code modules and interfaces necessary to develop robust products. Source Code packages provide source code from Layer 1 device driver

software up through the Layer 3/Layer 4 interface of the OSI model. Cost-effective one-time licensing fee; no royalties or user-fees for TsLink3 source code.

Well-Structured, Maintainable Code

Maintainability and scalability are designed into each TsLink3 stack. Comprehensive comments and documentation support you as your product goes forward. The value of TsLink3 stacks will be evident in each phase of your engineering schedule and the product life span.

Shorter Learning Curve & Faster Customization

- ◆ ITU-T primitives and software structure – make it easy to relate TsLink3 code to other ITU-T based protocols.
- ◆ ETSI/ECMA compliant code - ensures interoperation with other equipment (e.g., PBX) that is ETSI/ECMA compliant.
- ◆ 'C' switch statements that closely correspond to the ITU-T standard - straightforward to read and modify code, and locate the event/state action points in the ITU-T standard.
- ◆ Adherence to ANSI 'C' standards – provides for full portability.
- ◆ OS-independence - choice of RTOS, not locked into a single vendor.
- ◆ Processor-independence - enables mobility across CPU platforms.
- ◆ Simple state machine design - easy to understand and change code for national specific variants.
- ◆ Consult with our experienced engineers early to avoid expensive pitfalls later.

Faster debugging

- ◆ Specific defined constants, comment strings and variable naming - supports use of text search techniques to quickly locate a specific section of code and determine the side effects of changes that are being considered.
- ◆ ITU-T primitives and software structure - clear traceable dataflow.
- ◆ Development and testing on TsLink3 hardware - clean, proven and robust code.

Smaller inventory

- ◆ Each line can be configured at run-time for a different T1, E1, R2, PRI or BRI variant
- ◆ Co-resident T1, E1, R2, ISDN PRI and BRI switch variants, Frame Relay, X.25, MLPP, PPP, and ML-PPP stacks.

Documentation

Comprehensive documentation customized for your load. Provided in a searchable soft format. All nomenclature complies with ITU-T.

Technical and Custom Support

3-months included with each license. 12-month maintenance extensions include code updates and quick-response technical support via E-mail, phone and fax.

About TeleSoft International

TeleSoft International, Inc., is an industry-leading, US-based provider of field-proven, scalable, standards-based protocol stacks for developers. We specialize in telecom applications, licensing source code stacks to OEMs and ODMs worldwide for VoIP, ISDN, Q.931, Q.921, QSIG, Supplementary Services, ML-PPP, PPP, Frame Relay, T1 RBS, E1 CAS R2, and X.25.

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