TeleSoft International
Protocols for Developers

The TeleSoft Advantage

ROI

TCO

Proven advanced starting points

TsLink3 T1 RBS and E1 CAS R2 SDKs   Source Code Stack

TsLink3 T1 RBS and E1 CAS R2

TsLink3 T1 Robbed-bit Signaling (RBS) and E1 Channel Associated Signaling (CAS) R2 Software Development Kits (SDKs) are proven software solutions delivered in ANSI C source code format. Each SDK includes a protocol stack, source code library, and device driver to provide an advanced starting point and accelerate the development and conformance testing of in-band signaling products.

T1 RBS is used primarily in North America. E1 CAS R2 is used widely throughout South America, China, Asia, India and Europe. The TsLink3 RBS SDK and the TsLink3 CAS R2 SDK are available as separate or combined source code stacks.

TsLink3 RBS and TsLink3 CAS R2 are available integrated with the TsLink3 Q.931 and Q.921 ISDN source code modules with support for: Multi Level Precedence and Preemption, Supplementary Services, AutoSPID, Autoswitch Detection, NFAS, D-Channel Backup and Physical Layer drivers.

TsLink3 software modules are carefully architected and developed for embedded and host-based applications where performance and code size are important. The software modules have been extensively tested and are deployed in products on a worldwide basis.

Typical Applications:

♦ PBX/PABXs and Channel Banks
♦ Single and Multi-span cards
♦ Gateways
♦ Digital loop carrier systems
♦ Network interface cards
♦ Multiplexers
♦ Switches
♦ Protocol Converters
♦ Test equipment
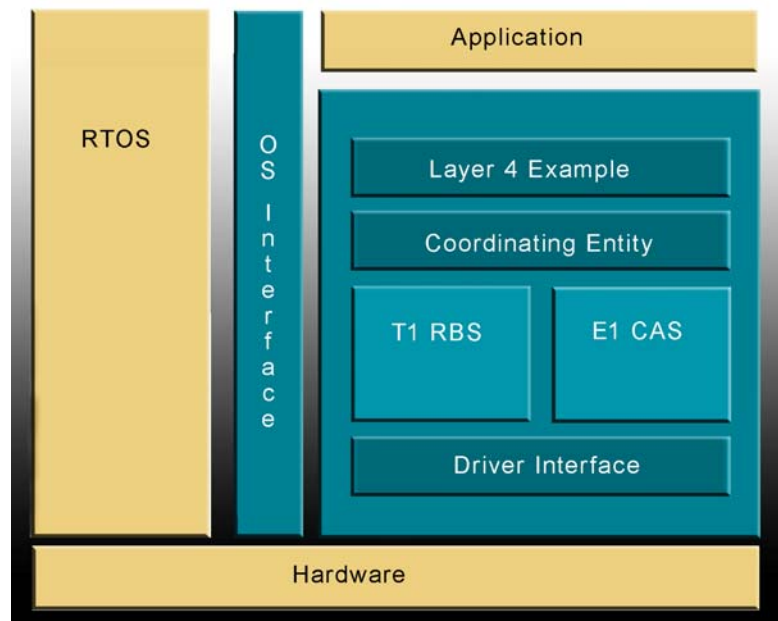
Supplied by customer   Supplied by TeleSoft

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

TsLink3 T1 RBS Module Supports:

♦ TE-side and NT-side Signaling
♦ EIA-464B Compliant
♦ AT&T TR41458 Compliant
♦ Wink start - E&M support
♦ Delayed Start - E&M support
♦ Immediate Start - E&M support
♦ Ground start - FXS and FXO support
♦ Loop start - FXS and FXO support
♦ DTMF Tone Processing Module
♦ Direct Inward Dialing support (DID) for Wink start
♦ Logging function (tracks line signaling state changes)
♦ State Machine common with PRI and E1 CAS As defined below:
♦ ABCD signaling for the following protocols as defined by TIA-464-C (Oct 2002):
  − PBX Tie-Trunk (4W E&M)

- – CO/FX/WATS Trunk (SAS/FXS&SAO/FXO)
  - – DID (DPT&DPO)
  - – OPS (SAO/FXO&SAS/FXS)
- ♦ Both ends of the interface (PBX end and far end) are required such that peer-to-peer connections may be established.
- ♦ Line framing for:
  - – SF (D4), ESF, TR-08 (SLC-96)
- ♦ Maintenance operations for:
  - – Remote, local and payload loopbacks
  - – ANSI T1.403 (FDL reports)
  - – AT&T TR54016 (FDL reports)
- ♦ Performance data per:
  - – ANSI T1.403
  - – ANSI T1.231
  - – AT&T TR54016
- ♦ Alarms per:
  - – ANSI T1.231 (LOF, LOS, AIS, RAI)
  - – ANSI T1.231 (Declaration & clearing)
- ♦ Line encoding for:
  - – AMI, B8ZS, CMI
  - – Bit oriented messages
  - – BOM/BOC per T1.403
- ♦ Signaling variants selectable by Time Slot supported:
  - – 4W E&M Wink Start
  - – Immediate Start
  - – Delayed Start
  - – DPO/DPT/SAO/FXO/SA/FXS
  - – Loop Start
  - – Ground Start
- ♦ Hook Flash Support includes ability to initiate and receive flashes and digits during active call phase using pulse dialing
- ♦ Uses well-proven state machine from widely-used TsLink3 ISDN stack
- ♦ DTMF Tone Processing module allows user to process received tones based on existing DTMF detection and generation.

TsLink3 E1 CAS R2 Module Supports:
- ♦ TE-side and NT-side Signaling
- ♦ Implements ITU-T Signaling per:
  - – Q.421 & Q.422
- ♦ Supports ITU-T standards Q.400-Q.480 via:
  - – Line signaling call setup state machine for ABCD bit-handling
  - – R2 signaling state machine for MF tone handling
- ♦ Maintenance operations for:
  - – Alarms capability per:
  - – 1.431
  - – G.732
  - – ETSI 300-233
- ♦ Line encoding for:
  - – HDB3, CMI
- ♦ CAS R2 Multi-Frequency (MF) variants are available for:
  - – Argentina
  - – Bangladesh
  - – Brazil
  - – Chile
  - – China
  - – Colombia
  - – India
  - – ITU variant
  - – Korea
  - – Mexico
  - – Nicaragua
  - – Singapore

 – Spain
 – Taiwan (R1)
♦ ITU variant includes support for:
 – Denmark
 – Finland
 – Germany
 – Russia
 – Hong Kong
 – South Africa
♦ MF Tone Processing module supports ITU R2 protocol processing of received tones based on existing MF detection and generation

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.
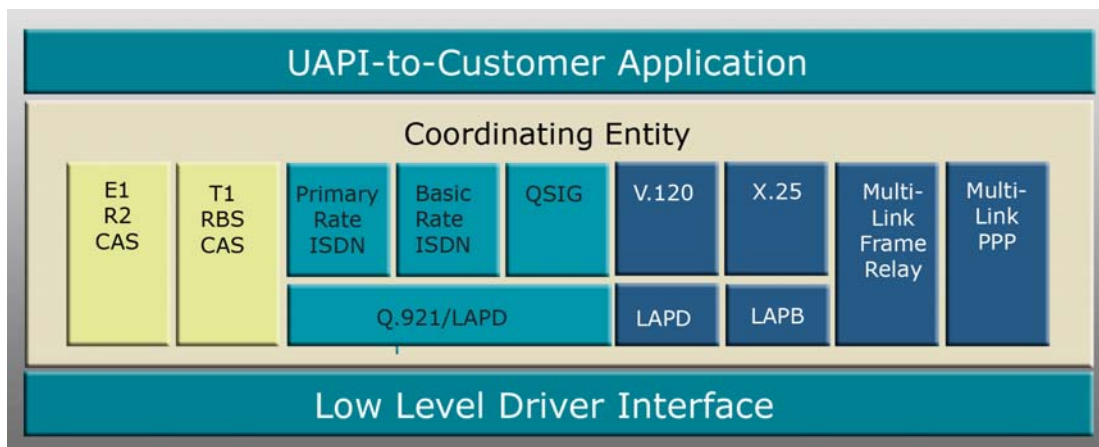
Software Tools

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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