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## ISDN/Q.931/Q.921/DSS1 Source Code

TsLink3 Basic Rate (BRI) ISDN, Primary Rate (PRI) ISDN, Q.931, Q.921, ISDN drivers, ISDN protocol stacks, telecom and datacom stacks, ISDN source code libraries, and associated device drivers accelerate development and conformance testing of ISDN-enabled products.

TeleSoft licenses well-proven source code for AutoSPID, Autoswitch Detection, NFAS, and D-Channel Backup in addition to DSS1 and other switch variants used worldwide. Manufacturers license TsLink3 ISDN/Q.931/Q.921/DSS1 and other TsLink3 conformance-proven source code stacks to accelerate the development and conformance testing of in-band signaling products.

TsLink3 is architected for embedded and host-based applications in which performance and code size are important.

### For:

- Base stations
- Customer Premise Equipment
- Intelligent networks
- Signaling transfer points
- Switches
- Telephony
- Test Equipment

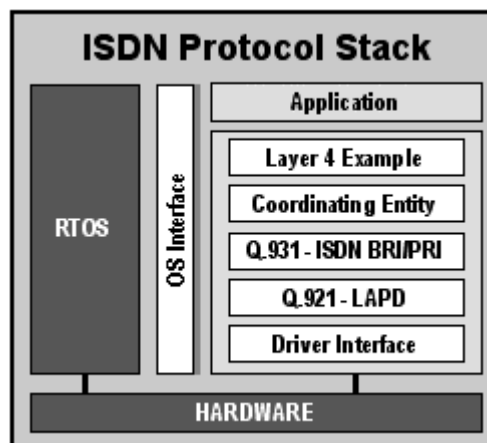
*"The TeleSoft code gave us a fast way to add ISDN capabilities to the InstantOffice system. During implementation, technical support responded very quickly with concise answers to our questions. When the rare problem was found at a customer site, technical support was again right there, helping us to quickly solve the problem."*  
-Vertical Networks, Sunnyvale CA

### Well-Structured, Maintainable Code

Maintainability and scalability are designed into each TsLink3 stack. Comprehensive comments and documentation support you or a colleague 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 ->**  
Easy to relate TsLink3 code to other ITU-T based protocols (e.g., E1 CAS, X.25, FR).



- **'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 ->** 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.

## 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 "rock solid" code.

## Smaller Code Inventory Required

- 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, PPP, and ML-PPP stacks.

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## ISDN BRI Features

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- Network (NT)- and Terminal (TE)- Side Support
- Worldwide switch coverage
  - US National ISDN-1 + Lucent 5ESS + Nortel DMS-100/250 + GTE GTD-5
  - US National ISDN-2 with Parameter Download (for use with Supplementary Services)
  - Euro ISDN ETSI DSS1 NET3 (TBR3) including deltas for:
    - France
    - Germany
    - UK
    - China
    - Hong Kong
    - Korea
    - Singapore
  - Japanese NTT INSnet64
  - France VNx
  - German 1TR6
  - Australian TS-013 and TS-031
- AutoSPID selection per Bellcore SR-3888
  - Includes Automatic Number Load (ANL)
- Autoswitch Detection per Bellcore SR-3888
- Supplementary Services
  - US National ISDN
  - Lucent 5ESS Custom
  - EuroISDN ETSI Compliant
- Q.931 (see Q.931 section below)
- Q.921 (see Q.921 section below)

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## ISDN PRI Features

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- Network (NT)- and Terminal (TE)- Side Support
  - Worldwide switch coverage
    - US National ISDN-2 + TR41459 (Lucent 4ESS and 5ESS) + Nortel DMS-100/250 + GTE GTD-5
    - Euro ISDN ETSI DSS1 NET5 (TBR4)
      - China
      - Hong Kong
      - Korea
      - Singapore
    - Japanese NTT INSnet1500
    - Australian TS-014 and TS-038
  - NFAS (in support of NI-2 + Lucent 41459 + Nortel DMS100 PRI), NT & TE
  - D-Channel Backup (in support of NI-2), NT & TE
  - Q.931 (see Q.931 section below)
  - Q.921 (see Q.921 section below)
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## Q.931 Features

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- Supports BRI and PRI applications
  - Network (NT)- and Terminal (TE)- Side Support
    - Easy to correlate source code with documentation, due to mapping code structure directly to Q.931 SDLs (Specification Description Language Diagrams).
    - Maintain smaller code size when using both NT- and TE-side code, due to reuse of core elements for both network- and terminal-side.
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## Q.921 Features

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- Supports BRI configurations
  - Point-to-Point
  - Point-to-Multipoint
- Supports PRI configuration
  - Point-to-Point
- Network (NT)- and Terminal (TE)- Side Support
- Maintain smaller code size, decrease memory requirements, decrease the number of OS tasks required, and decrease the engineering effort required when using two or more LAP protocols (LAPD/LAPB/V.120 Layer 2), due to ability to use a single LAP module to support multiple LAP protocols.
- Increase efficiency of customer's application, due to handling both fixed and automatic TEIs in a single task to decrease the number of overall OS tasks.
- Easy to correlate source code with documentation, due to mapping code structure directly to Q.921 state tables
- LAPD Support
  - Supports BRI and PRI applications
  - Network (NT)- and Terminal (TE)- Side Support

## TeleSoft TsLink3 Software Compliance Testing

<b>Signaling Modules</b>	<b>Compliance Tested by</b>
US NI-2 BRI	Telcordia/Bellcore
US NI-1 BRI	Telcordia/Bellcore
Lucent 5ESS BRI	Telcordia/Bellcore + AT&T
Nortel DMS-100 BRI	Northern Telecom & Telcordia/Bellcore
ETSI CTR3 (NET3) BRI	PTT Telecom, CSELT (Italy) & TUV
UK ISDN-2 BRI	BTL (UK)
German 1TR6 BRI	FTZ (Germany)
French VN3 BRI	CNET (France)
Japan INSnet64 BRI	JATE (Japan) & TUV
Australia TS-013 BRI	Comtest (Australia) & TUV
Australia TS-031 BRI	Comtest (Australia) & TUV
Lucent TR41459 (4ESS+5ESS) PRI	Bellcore
Nortel DMS-100 PRI	Bellcore
US NI-2 PRI	Bellcore
ETSI CTR4 (NET5) PRI	TUV
Japan INSnet1500 PRI	JATE (Japan) & TUV
Australia TS-014 PRI	Comtest (Australia) & TUV
Australia TS-038 PRI	Comtest (Australia) & TUV
<b>Data + Signaling</b>	<b>Compliance Tested by</b>
Always On/ Dynamic ISDN (AO/DI)	CIUG Pac Bell
<b>Supplementary Services</b>	<b>Compliance Tested by</b>
US NI-1	Bellcore
EuroISDN	Digital Engineering
NI-2 Parameter Download	Ameritech
ETSI QSIG	Digital Engineering
Lucent 5ESS	AT&T

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## Special Features and Upgrade Modules

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### Universal Application Programming Interface (UAPI)

TsLink3 Complete API allows full access to the Q.931 protocol stream, and requires in-depth knowledge of ISDN. The Complete API is particularly useful when developing gateways and blade servers due to the unlimited access to the raw contents of all received Q.931 messages and Information Elements (IEs) and most of the transmitted Q.931 messages and IEs.

The Complete API is an extension and supplement to the TsLink3 “Universal API (UAPI).” Both the Complete API and the UAPI are located at the Layer 4/Coordinating Entity (L4/CE) boundary and work together; both APIs enable sending L4/CE primitives that produce Q.931 IEs.

To increase your products' competitive edge with an enriched feature set, you can use the Complete API to design your application to translate or forward optional IEs based upon additional information (e.g., billing, QOS) received from the CO switch or user.

TsLink3 Universal Application Programming Interface (UAPI) is recommended when the application is passing pre-determined IEs. The UAPI intentionally hides many details of the Q.931 protocols to minimize the complexity of the ISDN call control interface, presenting the developer with a rich message-based API that uses a simple interface for simple applications such as “signaling-only.” The UAPI does not require in-depth knowledge of ISDN protocols.

The 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.

### High Availability (HA)

TsLink3 supports High Availability applications for high density switches with multiple modes of HA operation, including the seven key elements of HA. Please refer to the TeleSoft HA White Paper for details. Applications requiring HA will benefit from the TsLink3 stack capacity to support up to 64,000 simultaneous connections and up to 256 ports.

### 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.

### Purchasing TsLink3 Software

TsLink3 Source Code is supplied in comprehensive, portable packages of 'C' source code modules and interfaces necessary to develop robust ISDN 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.

## **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 PPP, ML-PPP, X.25, AO/DI, Frame Relay, T1 RBS, E1 CAS, R2, V.120, and Supplementary Services.

## **Technical and Custom Support**

12-month maintenance extensions include code updates and quick-response technical support via E-mail, phone and fax.

## **Expert Consulting and Customization Services**

Consult with our experienced engineers early to avoid expensive pitfalls later.

## **Documentation**

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

## **Price**

Cost-effective one-time licensing fee; no royalties or user-fees for TsLink3 source code or the TsRITE operating system.

*TeleSoft International specializes in the development of Intelligent WAN solutions specifically for OEMs. We supply source code for DSL, PPPoA, PPPoE, ISDN, Q.931, Q.921, QSIG, ML-PPP, PPP, Frame Relay, T1 RBS, E1 CAS, R2 and X.25 Protocol Stacks for license to manufacturers of telecommunications products around the world.*

*TeleSoft provides 'C' Language Source Code Stacks and Hardware Reference Designs backed up by comprehensive documentation and expert technical support. TeleSoft solutions accelerate time-to-market, minimize technology risk, and decrease the cost of both product development and product maintenance.*