



Technical Document TNA 136

Telecom ISDN User-Network Interface: Layers 1/2/3: Primary Rate Access ("PRA Lite")

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May 2006

**TELECOM ISDN USER-NETWORK INTERFACE
LAYERS 1/2/3
PRIMARY RATE ACCESS (“PRA LITE”)**

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FOREWORD

This Specification is issued by Telecom in compliance with its undertakings to advise the New Zealand telecommunications industry on forthcoming changes in the Telecom telecommunication networks.

This Specification is one of a series which defines the Telecom implementation of ISDN. It covers the technical requirements for the various hardware items used as the network terminations and customer premises terminal equipment interfaces, but leaves the design details and facilities of such hardware to individual manufacturers to decide.

The success of ISDN in New Zealand depends on the cooperation and support given by local hardware and software suppliers in providing the specialised equipment and systems for the various new services that this network will make possible.

This Specification describes the Layer 1/2/3 requirements for the control of ISDN services between a particular implementation of Telecom's Integrated Services Digital Network (ISDN), known as "PRA Lite", and a single unit of user's equipment, e.g. a terminal or small business system on a Primary rate access. The Specification is prepared in a format showing compliance/exceptions to Technical Documents PTC 132 [2], TNA 133 [3] and TNA 134 [4].

"PRA Lite" is an ISDN Primary rate access implementation by Telecom with a reduced feature set compared with that described in Technical Documents PTC 132 [2], TNA 133 [3] and TNA 134 [4].

1. Scope

The ISDN is defined in the I-series Recommendations of the Standardisation Bureau of the International Telecommunication Union (ITU-T), formerly the International Telegraph and Telephone Consultative Committee (CCITT). It is a plan for organising digital technology to provide advanced services to sophisticated digital terminals over an end-to-end digital network.

ISDN services are offered by the network to a user via an interface that provides either Basic access, consisting of one 16 kbit/s D-channel and up to two 64 kbit/s B-channels, or Primary rate access, consisting of one 64 kbit/s D-channel and up to 30 64 kbit/s B-channels.

This Specification describes the Layer 1/2/3 requirements for the access protocol for the Primary Rate Access user-network interface between a particular implementation of Telecom's Integrated Services Digital Network (ISDN), known as "PRA Lite", and a single unit of user's equipment, e.g. a terminal or small business system. This protocol applies at the T reference point or the coincident S/T reference point.

"PRA Lite" is an ISDN Primary rate access implementation by Telecom with a reduced feature set compared with that described in Technical Documents PTC 132 [2], TNA 133 [3] and TNA 134 [4].

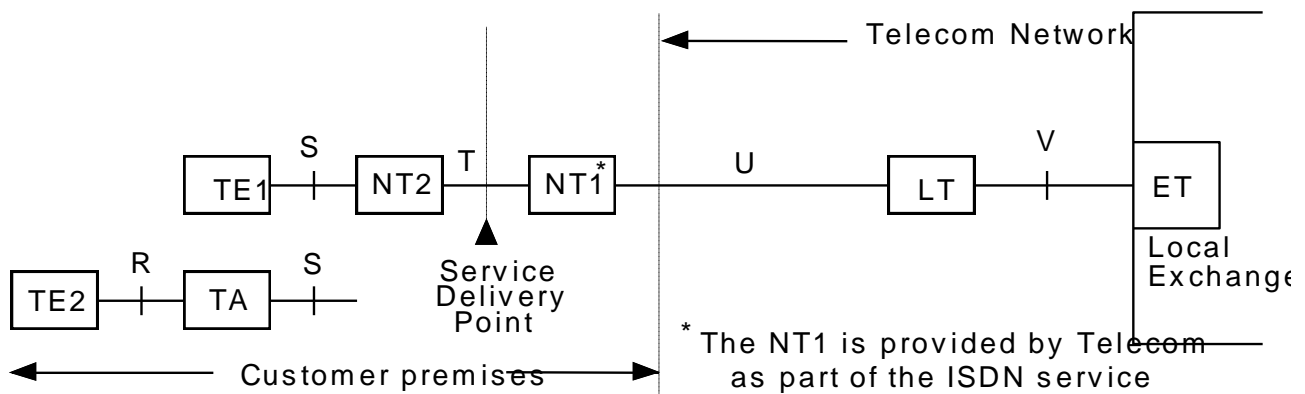


FIGURE 1: ISDN Access Reference Model

ET	Exchange terminal	TA	Terminal Adaptor
LT	Line Terminal	TE1	ISDN Terminal
NT1	Network Termination 1	TE2	Non-ISDN Terminal
NT2	Network Termination 2	S,T,U,V	Reference points

The NT1, LT and ET will be provided by Telecom as an inherent part of the ISDN service

The TA may also be provided with some service offerings.

The interface is functionally organised into the first three layers of the ISO Open Systems Interconnection 7-layer model, consisting of the physical layer (Layer 1), the data link layer (Layer 2) and the network layer (Layer 3). Layers 1/2/3 for the Primary rate access implementation known as "PRA Lite" is the focus of this Specification.

The following Specifications together specify the requirements for ISDN connections:

	Basic Access	Primary Rate Access	“PRA Lite”
Layer 1	PTC 131 [1]	PTC 132 [2]	TNA 136
Layer 2	TNA 133 [3]		TNA 136
Layer 3	TNA 134 [4]		TNA 136

TNA 136 defines the layer 1/2/3 aspects of the user-network interface for the attachment of terminals. It is intended for terminal vendors and users.

2. Definitions

D-Channel- A 16 kbit/s or 64 kbit/s channel carrying signalling, low speed packet switched data, and user-to-user information. (See ITU-T Recommendation I.412 [7]).

B-Channel- A 64 kbit/s channel that carries customer information such as voice, circuit switched or packet switched data. (See ITU-T Recommendation I.412 [7]).

PORT An interface on a piece of equipment for the purpose of supplying an output signal or accepting an input signal.

USER User's equipment e.g. terminal.

- *The definitions of ITU-T Recommendations G.701 [5] and I.112 [6] also apply.*

3. Abbreviations

ETSI European Telecommunications Standards Institute

IEC International Electrotechnical Commission

ISDN Integrated Services Digital Network

ISO International Standards Organization

ITU International Telecommunications Union

ITU-T International Telecommunications Union - Telecommunications Standard

NT1 Network Termination Type one (see ITU-T Recommendation I.411)

NT2 Network Termination Type Two (see ITU-T Recommendation I.411)

TA Terminal Adaptor (see ITU-T Recommendation I.411)

TE1 Terminal Equipment of type 1 - ISDN terminal (see ITU-T Recommendation I.411)

TE2 Terminal Equipment of type 2 - non-ISDN terminal (see ITU-T Recommendation I.411)

TEI Terminal Endpoint Identifier (see ITU-T Recommendations Q.920 and Q.921)

Telecom Telecom New Zealand Limited



4. References

- [1] PTC 131, "Telecom ISDN user-network interface: Layer 1: Basic access", 1997
- [2] PTC 132, "Telecom ISDN user-network interface: Layer 1: Primary Rate Access", 1997
- [3] TNA 133, "Telecom ISDN user-network interface: Layer 2", 1997
- [4] TNA 134, "Telecom ISDN user-network interface: Layer 3", 1997 (Amendment 2)
- [5] ITU-T Recommendation G.701, "Vocabulary of digital transmission and multiplexing, and pulse code modulation (PCM) terms."
- [6] ITU-T Recommendation I.112, "Vocabulary of terms for ISDNs."
- [7] ITU-T Recommendation I.412, "ISDN user-network interfaces - interface structures and access capabilities."
- [8] ITU-T Recommendation I.430, "ISDN Basic user-network interface - Layer 1 specification", 1995
- [9] ITU-T Recommendation I.431, "ISDN Primary rate user-network interface - Layer 1 specification", 1993
- [10] ITU-T Recommendation I.440 (Q.920), "ISDN user-network interface data link layer - general aspects", 1993
- [11] ITU-T Recommendation I.441 (Q.921), "ISDN user-network interface data link layer - specification", 1993
- [12] ITU-T Recommendation I.451 (Q.931), "ISDN user-network interface layer 3 specification", 1993
- [13] ITU-T Recommendation Q.932, "Generic procedures for the control of ISDN supplementary services."
- [14] ETS 300 011, "Primary rate user-network interface Layer 1 specification and test principles", 1992
- [15] ETS 300 402-1, "Digital Subscriber Signalling System No. one (DSS1) protocol; Data link layer: Part 1: General aspects [ITU-T Recommendation Q.920 (1993), modified]", 1995
- [16] ETS 300 402-2, "Digital Subscriber Signalling System No. one (DSS1) protocol; Data link layer: Part 2: General protocol specification [ITU-T Recommendation Q.921 (1993), modified]", 1995
- [17] ETS 300 102-1, Integrated Services Digital Network (ISDN); User-network interface layer 3 Specification for basic call control, December 1990
- [18] ETS 300 102-1A2, Integrated Services Digital Network (ISDN); User-network interface layer 3 Specification for basic call control, October 1993
- [19] ETSI TBR 4, Integrated Services Digital Network (ISDN); Attachment Requirements for terminal equipment to connect to an ISDN using ISDN Primary rate access, November 1995

- *Further references are included in Specification TNA 134 [4] Part A.7.2.*

5. Specification (TNA 136)

5.1 Compliance/Exceptions to Specification PTC 132

The requirements for this layer 1 part of the Specification are defined in ITU-T Recommendation I.431 [9]. The options which apply are identified below. References are to clauses in this Recommendation.

Clause 4 The interface at 1544 kbit/s does not apply

Clause 5 The interface at 2048 kbit/s applies

It is recommended that the CRC procedures and setting of the RAI signal are fully implemented as this will assist in the early detection and resolution of faults.

Clause 6 The preferred connection between the NT1 and TE is permanent connection using insulation displacement terminations

Clause 7 Interface wiring uses symmetrical wiring with a characteristic impedance of 120 ohm.

Clause 8 Power feeding from the TE to the NT is not required.

- *These layer 1 requirements are unchanged from those in Specification PTC 132 [2].*

5.2 Compliance/Exceptions to Specification TNA 133

The requirements for this layer 2 part of the Specification are defined in ITU-T Recommendations I.440 (Q.920) [10] and I.441 (Q.921) [11]. The options which apply are identified below. References are to clauses in Recommendation Q.921.

Clause	Modification
1	Delete the last sentence referring to abstract test suites.
2.3	LAPB data link connections are not supported.
3.3.3	SAPI value 12, defined by ETS 300 402-2 [16], is not supported.
3.6.7	The optional procedures for the retransmission of a REJ response frame is not supported.
5.8.1	The optional procedures for the retransmission of a REJ response frame is not supported.
5.10	The data link layer monitor function is implemented on the network side. It is optional on the user side.

Annex A Primary rate interfaces will use a single point-to-point signalling connection. As a subscription option, Basic rate interfaces may use a single point-to-point signalling connection.

The following shall apply to a Point-to-point signalling connection:

- Layer 2 management procedures according to subclause 5.3 shall not be used;
- the value 0 shall be used for the TEI;
- two peer-to-peer layer 3 signalling entities shall communicate over a single point-to-point data link connection within the SAP identified by SAPI value 0, making use of the acknowledged information transfer service provided by layer 2;
- any message associated with TEI administration procedures, if received, shall be discarded and no action shall be taken as a result of the receipt of that message.

Appendix I The optional procedures for automatic negotiation of data link parameters is supported by the network. It is optional on the user side.

- *These layer 2 requirements are unchanged from those in Specification TNA 133 [3].*

5.3 Compliance/Exceptions to Specification TNA 134

This layer 3 part of the Specification should be read in conjunction with Specification TNA 134 [4]. Due to the large size of Specification TNA 134 [4], only exceptions to its requirements in relation to the “PRA Lite” implementation have been shown in this layer 3 part of the Specification.

5.3.1 PART A - General Matters

5.3.1.1 Summary of Differences between this Specification, ITU-T Recommendations and ETSI Standards

The significant differences between this Specification and those shown in Specification TNA 134 [4] Part A.6 are summarised below.

	Telecom (“PRA Lite”)	ETSI	Notes
Information elements			
Signal	implemented	not included in messages	CPE shall provide all tones
Procedures			
5.1.2 B-channel selection - Originating	B-channel negotiation not implemented	implemented	a B-channel shall be indicated and used
5.1.3 Overlap sending	not implemented	clarification on applying dial tone	en-bloc shall be used

	Telecom (“PRA Lite”)	ETSI	Notes
5.2.3 B-channel selection - Destination	B-channel negotiation not implemented	implemented	a B-channel shall be indicated and used
6 Packet communication	not implemented	implemented	
Annex F. D-channel backup procedures	not implemented	not implemented	aligns with ETSI

5.3.2 PART B - Basic Call Control Procedures

5.3.2.1 PART B.1 - General

No change from Specification TNA 134 [4], Part B.1.

5.3.2.2 PART B.2 - Overview of call control

The following are exceptions from Specification TNA 134 [4], Part B.2 in relation to “PRA Lite”:

B.2.1.1.3

Overlap sending (U2) – users cannot use overlap sending, and shall use en bloc sending instead

B.2.2

Packet-mode access connections – not supported on “PRA Lite”

5.3.2.3 PART B.3 - Message functional definitions and content

The following are exceptions from Specification TNA 134 [4], Part B.3 in relation to “PRA Lite”:

B.3.2

Messages for packet mode connection control – not supported on “PRA Lite”

5.3.2.4 PART B.4 - General message format and information elements coding

The following are exceptions from Specification TNA 134 [4], Part B.4 in relation to “PRA Lite”:

B.4.5.28

Signal – for “PRA Lite” all tones shall be provided by the user, in response to Signal information element values received from the network, as described in Specification TNA 134 [4], Part B.4.5.28, Table 4-26/B. The only exception is ring-back tone for user-originated calls, which is provided by the terminating switch in the network.

Note also that for terminating calls to the user, the user shall provide ring-back tone towards the network.

B.4.6

Information element for packet communications – not supported on “PRA Lite”

B.4.7.3

Feature activation – not supported on “PRA Lite”

5.3.2.5 PART B.5 - Circuit-switched call control procedures

The following are exceptions from Specification TNA 134 [4], Part B.5 in relation to “PRA Lite”:

B.5.1.2

B-channel selection Originating – case c) “any channel is acceptable” cannot be used, because B-channel negotiation is not supported (in any form) on “PRA Lite”. Instead it shall be necessary to use either case a) “channel is indicated, no acceptable alternative”, or case b) “channel is indicated, any alternative is acceptable”, but both will provide the same case a) result.

B.5.1.3

Overlap sending – users cannot use overlap sending, and shall use en bloc sending instead

B.5.2.3

B-channel selection Destination/B.5.2.3.1 SETUP message delivered by point-to-point data link – the network will always indicate case 1) “channel is indicated, no acceptable alternative”, and the user shall be able to accept this indication. B-channel negotiation is not supported (in any form) on “PRA Lite”.

5.3.2.6 PART B.6 - Packet communication procedures

Packet communications is not supported on “PRA Lite”.

5.3.2.7 PART B.7 - User signalling bearer service call control procedures

Not currently used by Telecom (no change from Specification TNA 134 [4], Part B.7).

5.3.2.8 PART B.8 - Circuit-mode multirate (64 kbit/s base rate) procedures

Not currently used by Telecom (no change from Specification TNA 134 [4], Part B.8).

5.3.2.9 PART B.9 - List of system parameters

No change from Specification TNA 134 [4], Part B.9.

5.3.2.10 PART B. Annex A User side and network side SDL diagrams

No change from Specification TNA 134 [4], Part B. Annex A.

5.3.2.11 PART B. Annex B Compatibility and address checking

No change from Specification TNA 134 [4], Part B. Annex B.

5.3.2.12 PART B. Annex C Transit network selection

No change from Specification TNA 134 [4], Part B. Annex C.

5.3.2.13 PART B. Annex D Extensions for symmetric call operation

Not currently used by Telecom (no change from Specification TNA 134 [4], Part B. Annex D).

5.3.2.14 PART B. Annex E Network specific facility selection

Not currently used by Telecom (no change from Specification TNA 134 [4], Part B. Annex E).

5.3.2.15 PART B. Annex F D-channel backup procedures

D-channel backup is not supported on "PRA Lite".

5.3.2.16 PART B. Annex G Use of progress indicators

No change from Specification TNA 134 [4], Part B. Annex G.

5.3.2.17 PART B. Annex H Message segmentation procedures

Not currently used by Telecom (no change from Specification TNA 134 [4], Part B. Annex H).

5.3.2.18 PART B. Annex I Low layer information coding principles

No change from Specification TNA 134 [4], Part B. Annex I.

5.3.2.19 PART B. Annex J Low layer compatibility negotiation

No change from Specification TNA 134 [4], Part B. Annex J.

5.3.2.20 PART B. Annex K Procedures for establishment of bearer connection prior to call acceptance

No change from Specification TNA 134 [4], Part B. Annex K.

5.3.2.21 PART B. Annex L Optional procedures for bearer service change

Not currently used by Telecom (no change from Specification TNA 134 [4], Part B. Annex L).

5.3.2.22 PART B. Appendix I Definition of causes values

No change from Specification TNA 134 [4], Part B. Appendix I.

5.3.2.23 PART B. Appendix II Example message flow diagrams and example conditions for cause mapping

No change from Specification TNA 134 [4], Part B. Appendix II.

5.3.3 PART C - Generic Procedures for the Control of ISDN Supplementary Services

No change from Specification TNA 134 [4], Part C.

5.3.4 PART D - Procedures For Specific Supplementary Services

5.3.4.1 PART D.1 - General

“PRA Lite” has a reduced feature set compared with that described in Specification TNA 134 [4] Part D. The only ISDN Supplementary Services offered with “PRA Lite” are as follows:

- Direct Dialling In
- Calling line identification Presentation
- Calling line identification Restriction
- Date and Time

Compliance/exception information follows on these and other ISDN Supplementary Services listed in Specification TNA 134 [4], Part D.

5.3.4.2 PART D.2 - Direct Dialling In

No change from Specification TNA 134 [4], Part D.2.

5.3.4.3 PART D.3 - Multiple Subscriber Number

Multiple Subscriber Number is not supported on “PRA Lite”.

5.3.4.4 PART D.4 - Calling line identification Presentation

No change from Specification TNA 134 [4], Part D.4, except that the service is provided to all “PRA Lite” users (i.e. it is not a subscription option).

5.3.4.5 PART D.5 - Calling line identification Restriction

No change from Specification TNA 134 [4], Part D.5.

5.3.4.6 PART D.6 - Connected line identification Presentation

Connected line identification Presentation is not supported on “PRA Lite”.

5.3.4.7 PART D.7 - Connected line identification Restriction

No change from Specification TNA 134 [4], Part D.7.

5.3.4.8 PART D.8 - Malicious Call Identification

No change from Specification TNA 134 [4], Part D.8.

5.3.4.9 PART D.9 - Sub-addressing

No change from Specification TNA 134 [4], Part D.9.

5.3.4.10 PART D.10 - Call Transfer

Call Transfer is not supported on “PRA Lite”.

5.3.4.11 PART D.11 - Call Forwarding Busy

Call Forwarding Busy is not supported on “PRA Lite”.

5.3.4.12 PART D.12 - Call Forwarding No Reply

Call Forwarding No Reply is not supported on “PRA Lite”.

5.3.4.13 PART D.13 - Call Forwarding Unconditional

Call Forwarding Unconditional is not supported on “PRA Lite”.

5.3.4.14 PART D.14 - Call Deflection

Not currently used by Telecom (no change from Specification TNA 134 [4], Part D.14).

5.3.4.15 PART D.15 - Line Hunting

Line Hunting on “PRA Lite” will generally be limited to a set totalling no more than three “PRA Lite” interfaces.

5.3.4.16 PART D.16 - Call Waiting

Call Waiting is not supported on “PRA Lite”.

5.3.4.17 PART D.17 - Completion of Calls to Busy Subscriber

Completion of Calls to Busy Subscriber is not supported on “PRA Lite”.

5.3.4.18 PART D.18 - Terminal Portability

Terminal Portability is not supported on “PRA Lite”.

5.3.4.19 PART D.19 - Conference Calling

Conference Calling is not supported on “PRA Lite”.

5.3.4.20 PART D.20 - Three Party Service

Three Party Service is not supported on “PRA Lite”.

5.3.4.21 PART D.21 - Outgoing Call Barring

Outgoing Call Barring is not supported on “PRA Lite”.

5.3.4.22 PART D.22 - Credit Card Calling

No change from Specification TNA 134 [4], Part D.22.

5.3.4.23 PART D.23 - Advice of Charge

No change from Specification TNA 134 [4], Part D.23.

5.3.4.24 PART D.24 - Reverse Charging

No change from Specification TNA 134 [4], Part D.24.

5.3.4.25 PART D.25 - User-to-User Signalling

No change from Specification TNA 134 [4], Part D.25 (but UUS service 1 is not being offered with “PRA Lite”).

5.3.4.26 PART D.26 - Dialed Number Information Service

Dialed Number Information Service is not supported on “PRA Lite”.

5.3.4.27 PART D.27 - Dialed Number Information Restriction

Dialed Number Information Restriction is not supported on “PRA Lite”.

5.3.4.28 PART D.28 - Date and Time

No change from Specification TNA 134 [4], Part D.28.

6. Compliance with ETSI Standards

6.1 Layer 1 Compliance

ETS 300 011 [14] is based on the 1988 version of ITU-T Recommendation I.431 [9] with modifications and additions. These changes were essentially included in the latest version of ITU-T Recommendation I.431 [9] on which this layer 1 part of the Specification is based.

Compliance with ETS 300 011 [14] will be accepted as compliance with this layer 1 part of the Specification.

- *This layer 1 compliance is unchanged from that in Specification PTC 132 [2].*

6.2 Layer 2 Compliance

Compliance with ETS 300 402-2, "Digital Subscriber Signalling System No. one (DSS1) protocol; Data link layer: Part 2: General protocol specification [ITU-T Recommendation Q.921 (1993), modified]", 1995 [16] will be considered as compliance with this layer 2 part of the Specification.

- *This layer 2 compliance is unchanged from that in Specification TNA 133 [3].*

6.3 Layer 3 Compliance

Please refer to sections 5.3.1.1 and 6.4.2 of this Specification.

6.4 Test Compliance

6.4.1 TBR 4 Compliance

For "PRA Lite", a test report is required showing compliance with ETSI TBR 4, "ISDN Attachment Requirements for terminal equipment to connect to an ISDN using ISDN Primary rate access", Nov 1995 [19], together with supplementary testing outlined in section 6.4.2 following.

6.4.2 ISDN Layer 3 Supplementary Testing

The following tests, related to Telecom's ISDN and likely to affect NZ users, are not covered in a standard ETSI ISDN test report. In view of this, applicants for "PRA Lite" ISDN Telepermits are required to carry out these additional tests and to verify that the requirements are complied with.

"EUT" signifies "Equipment Under Test":-

I. Applicable to all ISDN CPE

1. Redirecting Number IE (Information Element). Ref. Amendment 2, TNA 134 [4] Part B.4.7.5. The purpose of the Redirecting number information element is to identify the redirecting party of a call.

The test checks that calls with the Redirecting number information element in the SETUP message are accepted by the EUT. The extraction and processing of the redirecting information element is left to the equipment supplier. This is a subscription option.

EUT shall accept calls with Redirecting Number IE PASS/FAIL

2. Date and Time IE. Ref. Amendment 2, TNA 134 [4] Part B.4.5.15. The Purpose of the Date/Time information element is to provide the date and time to the user. It indicates the point in time when the message has been generated by the network.

The tests check that calls with the Date/Time information element in the SETUP or CONNECT messages are accepted by the EUT. The extraction and processing/display of the date and time information element is left to the equipment supplier. This is a subscription option.

EUT accepts call Setup with date and time PASS/FAIL

EUT accepts Connect with date and time PASS/FAIL

II. Only for EUTs intended to support Telecom CENTREX

Not required for "PRA Lite", as Telecom CENTREX is not supported.

III. Only for EUTs with Analogue ports (Terminal adapters)

Not required for "PRA Lite", as Analogue ports are not supported.

END