



BID-0002
December 1989

ISDN Primary Rate Access

Terminal-to-Network Interface

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TABLE OF CONTENTS

| | <u>Page</u> |
|---|--------------------|
| Document History | 1 |
| Disclaimer | 2 |
| 1.0 Service Description | 3 |
| 2.0 Feature Description | 4 |
| 2.1 Physical Layer | 5 |
| 2.2 Data Link Layer | 5 |
| 2.3 Network Layer | 6 |
| 2.3.1 Basic Call Service Capabilities | 6 |
| 2.3.2 Supplementary Service Capabilities | 7 |
| Appendix A | 9 |
| Draft Canadian Standards | |
| dpANS Standards (in T1 ballot process) | |
| Draft T1 Standards (not in T1 ballot process) | |
| Appendix B | 10 |
| Glossary | |

DOCUMENT HISTORY

1 December 1989 Initial issue

RENAMED AS BELL CANADA BID-0002 FROM STENTOR ID-0002

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1.0 SERVICE DESCRIPTION

This specification describes the Bell Canada **ISDN PRA** network interface. The interface will apply in customer trials scheduled for the first half of 1990.

Bell Canada's **ISDN PRA** trial will be based on the Northern Telecom DMS-100 Central Office switch. The interface requirements are defined in relevant portions of the following Northern Telecom publications, and the clarifications contained in this document:

1. NIS A211-1, Version 2 "ISDN Primary Rate User - Network Interface Specification"
2. NIS D302-1, "T-link Protocol for Rate Adaptation Over a 64 kbps Channel"

These Northern Telecom publications were developed to include markets in addition to Bell Canada, and thus contain information which is not applicable within Bell Canada.

They may be obtained from:

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This document defines basic call service capabilities, and two supplementary service capabilities. The supplementary services are Calling Number Delivery, and Integrated Service Access.

Other supplementary services described in NIS A211-1 Version 2 are not part of the planned trial.

2.0 FEATURE DESCRIPTION

Bell Canada's **ISDN PRA** service capabilities are based on the emerging **ISDN PRA** standards.

The circuit-mode digital switching systems operate at a fundamental rate of 64 kbps and the transmission capability is provided in the same units (i.e., 64 kbps). In the Bell Canada network, existing T1 line repeaters require a certain one's density bit pattern to maintain timing. The transmission capability in this case is called "restricted 64 kbps". Although the **ISDN PRA** access itself is capable of unrestricted 64 kbps, the practical result is that only 56 kbps may actually be available to the user on interoffice and interworking calls. To interoperate properly with the **ISDN PRA**, it is essential that customer premise equipment continue to support information transfer at 56 kbps.

A typical **ISDN PRA** interface consists of a single DS1. The interface is configured as a "23B + D" interface: 23 B channels and one D channel, providing for a combined total of 1.536 Mbps of user information in each direction.

The number of B channels associated with an **ISDN PRA** interface may vary from the typical 23. In particular, up to 20 DS1 facilities may be controlled using a single D channel, thereby increasing the number of B channels to 479.

For basic call services, each B channel is switched independently by the network. Some B channels may be permanently connected, e.g., for dedicated access to packet-mode switching services.

The technical interface specification is categorized, for the purpose of this disclosure document, in the following manner:

- Physical Layer
- Data Link Layer
- Network Layer

2.1 Physical Layer

NIS 211-1, Version 2, Section D applies at the **ISDN PRA** interface, with the following clarifications:

1. The point of connection to the **ISDN PRA** interface is the Service Interface Jack (SIJ). The SIJ is an 8 pin jack provided by Bell Canada. The pin assignments are given in Section D, Figure 8.
2. The electrical characteristics are based on the relevant sections of the emerging **ISDN PRA** standard (T1E1/89-46R3) at the point of connection.
3. The **ISDN PRA** interface supports only B8ZS and Extended Super Frame (ESF). The option to support conventional bit robbing signalling trunks with A/B/C/D signalling or A/B signalling is not provided at the **ISDN PRA** interface.
4. Zero Code Suppression (ZCS) is a requirement in customer premises equipment.
5. The Facility Data Link (FDL) of the Extended Super Frame only supports the yellow alarm for the trial. However, the tariffed service offering is expected to make greater use of the FDL and it will be based on the emerging **ISDN PRA** standard (T1M1/89-53R1).

2.2 Data Link Layer

The data link layer is as specified in NIS A211-1, Version 2, Section C. That specification is based on the draft CAN/CSA T542 standard.

2.3 Network Layer

Network layer specifications are given in two categories: basic call service capabilities, and supplementary service capabilities.

2.3.1 Basic Call Service Capabilities

The basic call services are as specified in Section A 4.1 of NIS A211-1, Version 2, with the following clarifications:

1. For the trial, the **ISDN PRA** interface will not support carrier or transit network selection.
2. The network does not perform routing based on bearer capability information. Routing is performed using the Directory Number. As an option, calls will be screened using the bearer capability. This option may be used to screen calls routed over incompatible bearer capabilities.
3. The **ISDN PRA** services normally provided are circuit-switched. The "dedicated" or "nailed-up" B channel is an option.
4. Any of the basic call services can be used to access public packet-switched services. Packet-switched services are supported in the B channel in accordance with the emerging CAN/CSA T543 standard. High Level Data Link Control (HDLC) Flag Stuffing is required when using a dedicated connection to the public packet-switched network. For circuit-switched digital access, T link rate adaptation is required as specified in NIS D302-1.

The protocol and procedures for the **ISDN PRA** interface are as specified in NIS A211-1, Version 2, Section B, with the following clarifications:

1. The Facility and Facility Reject messages, described in Section 3.3.1 and 3.3.2, are not supported for the trial. The information elements in Sections 4.5.10 through 4.5.13, 4.5.17 through 4.5.19, 4.5.21, 4.5.22, are not supported in the trial. The Network-specific-facilities information element, described in Section 4.5.15, applies to the ISA service. The Calling-party-number information element, described in Section 4.5.5, applies to the Calling Number Delivery (CND) service.

2. Although not implemented for the trial, the tariffed service offering is expected to have two additional parameters to refine the cut-through procedures defined for incoming calls. When provided, the cut-through default will be on receipt of the CONNECT message only at the network side of the interface. Audible alerting provided by customer premises equipment would then be a subscriber option. When the two parameters are provided, additional elements of procedure will be required, and they are associated with notification of interworking. These procedures are expected to be based on dpANS T1.607. The parameters are a) user-provided audible ring, and b) early cut-through for remote networking. For purposes of the **ISDN PRA** trial, the early cut-through procedure as described in Section B of NIS A211-1, Version 2 applies.

The network layer specification is based on the emerging dpANS T1.607.

2.3.2 Supplementary Service Capabilities

Comprehensive standards for supplementary service protocols are not currently available from CCITT, T1S1, or CSA. This section defines two supplementary service capabilities which, although not fully standardized, will be part of the trial.

Calling Number Delivery (CND)

CND is available as an option on a per **ISDN PRA** interface basis. The service description is as specified in Sections A 5.2.2.1 and 5.2.2.3 of NIS A211-1, Version 2.

NIS A211-1, Version 2, Section B 4.5.5 defines the Calling-party-number information element and it applies to CND. When the CND option is active, the information element containing the calling party number will be delivered unless the calling party number is not available. The number is not available when a call is routed over certain existing signalling systems (e.g., MF) in the Bell Canada network. If a call encounters this routing, neither the Calling-party-number information element nor the number will be delivered.

When it is sent, the Calling-party-number information element will be contained in the incoming SETUP message.

Integrated Service Access (ISA)

Integrated Service Access is available as an option on a per **ISDN PRA** interface basis.

The service description is as specified in Section A 4.7 of NIS A211-1, Version 2, with the following clarifications:

1. Substitute "OUTWATS" with "WATS".
2. Substitute "INWATS" with "800 Service".

The ISA trunk type is indicated by the customer premise equipment for outgoing calls. On incoming calls, the network indicates the trunk type.

NIS A211-1, Version 2, Section B 4.5.15 defines the Network-specific-facilities information element which applies to ISA.

To initiate an ISA call, the customer premise equipment sends an appropriately encoded Network-specific-facilities information element in the SETUP message to the network. To send an ISA call, the network sends the Network-specific-facilities information element with appropriate encoding in a SETUP message to the customer premise equipment. An ISA call follows basic call procedures. The Network-specific-facilities information element allows the customer premises equipment to designate the treatment of the call with regard to routing and billing behaviour.

APPENDIX A

Draft Canadian Standards

1. CAN/CSA T543 "Minimal Set of Bearer Services for the Primary Rate Access Interface".
2. CAN/CSA T542 Integrated Services Digital Network - Data Link Signalling Specification for Application at the User-Network Interface".

dpANS Standards (in T1 ballot process)

1. dpANS T1.607 "Digital Subscriber System No. 1 (DSS1) - Layer 3 Signalling Specification for Circuit Switched Bearer Service".
2. T1M1/89-53R1 "ISDN Management - PRA Physical Layer/Draft Standard".

Draft T1 Standards (not in T1 ballot process)

1. T1E1/89-46R3 "ISDN Primary Rate - Customer Installation Interfaces, Layer 1 Specification".

APPENDIX B

| | |
|-----------------|--|
| bps: | bits per second |
| CCITT: | The International Telephone and Telegraph Consultative Committee |
| CND: | Calling Number Delivery |
| CSA: | Canadian Standards Association |
| dpANS: | draft proposed American National Standard |
| ESF: | Extended Super Frame |
| FDL: | Facility Data Link |
| HDLC: | High Level Data Link Control |
| IN WATS: | Inward Wide Area Telephone Service |
| ISA: | Integrated Service Access |
| ISDN: | Integrated Services Digital Network |
| MF: | Multi-frequency |
| NIS: | Network Interface Specification |
| OUTWATS: | Outward Wide Area Telephone Service |
| PRA: | Primary Rate Access |
| SIJ: | Service Interface Jack |
| T1: | Committee T1 of the Exchange Carrier Standards Association |
| T1S1: | Technical Subcommittee S1 of Committee T1 |
| ZCS: | Zero Code Suppression |