INTERNATIONAL STANDARD

ISO/IEC 15773

First edition
1998-07-15

Information technology — Telecommunications and information exchange between systems — Broadband Private Integrated Services Network — Inter-exchange signalling protocol — Transit counter additional network feature

Technologies de l'information — Télécommunications et échange d'information entre systèmes — Réseau privé à large bande à intégration de services — Protocole de signalisation d'échange — Caractéristique de réseau additionnelle de compteur de transit

Reference number
ISO/IEC 15773:1998(E)

Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS

Not for Resale

Contents

Foreword iii

Introduction iv

1 Scope 1

2 Conformance 1

3 Normative references 1

4 Definitions 2

4.1 External definitions 2

5 List of acronyms 2

6 Signalling protocol for the support of ANF-TC 2

6.1 ANF-TC description 2
6.2 ANF-TC operational requirements 3

6.2.1 Requirements on the Originating PINX 3
6.2.2 Requirements on the Terminating PINX 3
6.2.3 Requirements on a Transit PINX 3

6.3 ANF-TC coding requirements 3

6.3.1 Transit counter information element 3
6.3.2 Messages 4

6.4 ANF-TC signalling procedures 4

6.4.1 Actions at the Originating PINX 4
6.4.2 Actions at the Terminating PINX 4
6.4.3 Actions at a Transit PINX 4
6.4.4 At an Incoming Gateway PINX 4
6.4.5 At an Outgoing Gateway PINX 4

Annex A - Protocol Implementation Conformance Statement (PICS) proforma 5

Annex B - Guidelines for interworking with ATM Forum PNNI 1.0 9

© ISO/IEC 1998

All rights reserved. Unless otherwise specified, no part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from the publisher.

ISO/IEC Copyright Office • Case postale 56 • CH-1211 Genève 20 • Switzerland

Printed in Switzerland

Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS Not for Resale

Foreword

ISO (the International Organization for Standardization) and IEC (the International Electrotechnical Commission) form the specialized system for worldwide standardization. National bodies that are members of ISO or IEC participate in the development of International Standards through technical committees established by the respective organization to deal with particular fields of technical activity. ISO and IEC technical committees collaborate in fields of mutual interest. Other international organizations, governmental and non-governmental, in liaison with ISO and IEC, also take part in the work.

In the field of information technology, ISO and IEC have established a joint technical committee, ISO/IEC JTC 1. Draft International Standards adopted by the joint technical committee are circulated to national bodies for voting. Publication as an International Standard requires approval by at least 75 % of the national bodies casting a vote.

International Standard ISO/IEC 15773 was prepared by ECMA (as ECMA-252) and was adopted, under a special “fast-track procedure”, by Joint Technical Committee ISO/IEC JTC 1, *Information technology*, in parallel with its approval by national bodies of ISO and IEC.

Annex A forms an integral part of this International Standard. Annex B is for information only.

--`,,```,,,,````-`-,,`,,`,`,,`---

Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS
Not for Resale

Introduction

This International Standard is one of a series of standards defining services and signalling protocols applicable to Broadband Private Integrated Services Networks. The series uses the B-ISDN concepts as developed by ITU-T and is also within the framework of standards for open systems interconnection as defined by ISO.

This International Standard specifies the signalling protocol for use at the Q reference point in support of the Transit Counter additional network feature.

This International Standard is based upon the practical experience of ECMA member companies and the results of their active and continuous participation in the work of ISO/IEC JTC 1, ITU-T, ETSI and other international and national standardization bodies. It represents a pragmatic and widely based consensus.

Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS Not for Resale

Information technology — Telecommunications and information exchange between systems — Broadband Private Integrated Services Network — Inter-exchange signalling protocol — Transit counter additional network feature

1 Scope

This International Standard specifies the signalling protocol for the support of the Transit Counter additional network feature (ANF-TC) at the Q reference point between Private Integrated Services Network Exchanges (PINXs) connected together within a Broadband Private Integrated Services Network (B-PISN).

ANF-TC is a feature that limits the number of Transit PINXs that a call/connection setup request may be routed through e.g., to protect the network against indefinite looping.

The Q reference point is defined in ISO/IEC 11579-1.

Service specifications are produced in three stages and according to the method specified in CCITT Rec. I.130. This International Standard contains the stage 3 specification for the Q reference point and satisfies the requirements identified by the stage 1 and stage 2 specifications in ISO/IEC 15055.

The signalling protocol for ANF-TC operates in association with the signalling protocols for basic call/connection control (as specified in ISO/IEC 13247) and call independent (connection oriented) signalling connections (as specified in ECMA-254).

This International Standard is applicable to PINXs that can interconnect to form a PISN.

2 Conformance

In order to conform to this International Standard, a PINX shall satisfy the requirements identified in the Protocol Implementation Conformance Statement (PICS) proforma in annex A.

3 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this International Standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this International Standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

ISO/IEC 11579-1:1994, *Information technology - Telecommunications and information exchange between systems - Private Integrated Services Network - Part 1: Reference configuration for PISN Exchanges (PINX).*

ISO/IEC 13247:1997, *Information technology - Telecommunications and information exchange between systems - Broadband Private Integrated Services Network - Inter-exchange signalling protocol - Basic call/connection control.*

ISO/IEC 15055:1997, *Information technology - Telecommunications and information exchange between systems - Private Integrated Services Network - Specification, functional model and information flows - Transit counter additional network feature.*

ECMA-254:1996, *Broadband Private Integrated Services Network (B-PISN) - Inter-Exchange Signalling Protocol - Generic Functional Protocol.*

CCITT Rec. I.112:1988, *Vocabulary of terms for ISDNs.*

CCITT Rec. I.130:1988, *Method for the characterization of telecommunication services supported by an ISDN and network capabilities of an ISDN.*

CCITT Rec. I.210:1988, *Principles of telecommunication services supported by an ISDN and the means to describe them.*

Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS
Not for Resale

4 Definitions

For the purposes of this International Standard, the following definitions apply.

4.1 External definitions

This International Standard uses the following terms defined in other documents:

- Basic Service (CCITT Rec. I.210)
- Call, Basic Call (ECMA-254)
- Call Independent Signalling Connection (ECMA-254)
- Incoming Gateway PINX (ISO/IEC 13247)
- Incoming Side (ISO/IEC 13247)
- Inter-PTNX Link (ISO/IEC 13247)
- Originating PINX (ISO/IEC 13247)
- Outgoing Gateway PINX (ISO/IEC 13247)
- Outgoing Side (ISO/IEC 13247)
- Preceding PINX (ISO/IEC 13247)
- Private Integrated Services Network (PISN) (ISO/IEC 11579-1)
- Private Integrated Services Network Exchange (PINX) (ISO/IEC 11579-1)
- Signalling (CCITT Rec. I.112)
- Subsequent PINX (ISO/IEC 13247)
- Supplementary Service (CCITT Rec. I.210)
- Terminating PINX (ISO/IEC 13247)
- Transit PINX (ISO/IEC 13247)

5 List of acronyms

ANF	Additional Network Feature
ANF-TC	Transit Counter Additional Network Feature
B-ISDN	Broadband Integrated Services Digital Network
B-PISN	Broadband Private Integrated Services Network
PICS	Protocol Implementation Conformance Statement
PINX	Private Integrated Services Network Exchange
PISN	Private Integrated Services Network

6 Signalling protocol for the support of ANF-TC

6.1 ANF-TC description

ANF-TC is invoked when it is desired to limit the number of Transit PINXs that a call/connection setup request may be routed through.

This additional network feature is applicable to the broadband connection oriented bearer service.

ANF-TC may be used in conjunction with either a Basic call setup request or a setup request for a call independent (connection oriented) signalling connection.

Use of ANF-TC is a network option. The criteria for determining:

– when ANF-TC should be invoked;

Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS Not for Resale

- the number of PINXs through which a call may be routed; and,
- the means by which the feature is activated or deactivated

are network dependent and outside the scope of this International Standard.

6.2 ANF-TC operational requirements

6.2.1 Requirements on the Originating PINX

Call/connection establishment procedures for the outgoing side of an inter-PINX link and call/connection release procedures, as specified in ISO/IEC 13247, shall apply.

If the PINX supports connection-oriented APDU transport, then the generic procedures for the call independent control (connection oriented) of supplementary services, as specified in ECMA-254 for an Originating PINX, shall apply.

6.2.2 Requirements on the Terminating PINX

Call/connection establishment procedures for the incoming side of an inter-PINX link and call/connection release procedures, as specified in ISO/IEC 13247, shall apply.

If the PINX supports connection-oriented APDU transport, then the generic procedures for the call independent control (connection oriented) of supplementary services, as specified in ECMA-254 for a Terminating PINX, shall apply.

6.2.3 Requirements on a Transit PINX

Basic call procedures for call/connection establishment and call/connection clearing at a Transit PINX, as specified in ISO/IEC 13247, shall apply.

If the PINX supports connection-oriented APDU transport, then the generic procedures for the call independent control (connection oriented) of supplementary services, as specified in ECMA-254 for a Transit PINX, shall apply.

6.3 ANF-TC coding requirements

6.3.1 Transit counter information element

ANF-TC shall be encoded as a discrete information element (called Transit counter) within codeset 4 (ISO codeset), according to the rules for the general format and coding of variable length information elements defined in 8.5.1 of ISO/IEC 13247.

The Transit counter information element shall be a variable length category 1 (see 12.1.9.2 of ISO/IEC 13247) information element with the format shown in figure 1 and coded as shown in table 1.

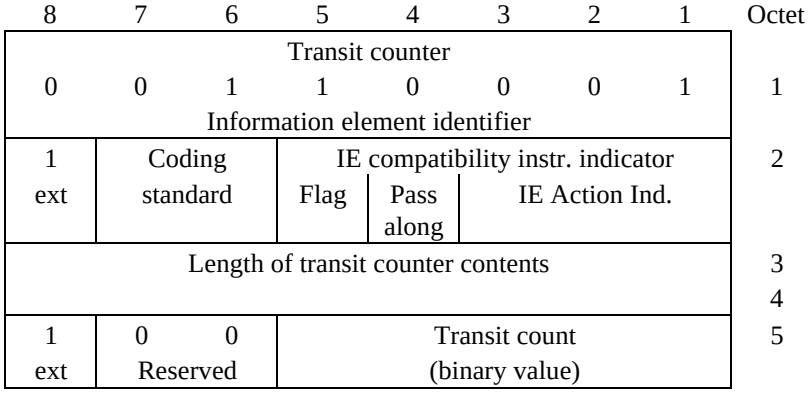


Figure 1 - Transit counter information element

Table 1 - Transit counter information element

Transit count (octet 3)
A binary value (in the range 0 - 31) that indicates the number of Transit PINXs through which the SETUP request has already passed. The maximum number of Transit PINXs through which a SETUP request may pass is a network dependent value.

--`,,```,,,,````-`-`,,`,,`,`,,`---

Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS
Not for Resale

6.3.2 Messages

If used, the Transit counter information element shall be conveyed in a SETUP message.

One of the shift information elements (see 8.5.3 and 8.5.4 of ISO/IEC 13247) shall precede the Transit counter information element in the SETUP message.

6.4 ANF-TC signalling procedures

The signalling protocol for Transit counter functionality operates in association with the signalling protocols for basic call/connection control (as specified in ISO/IEC 13247) and call independent (connection oriented) signalling connections (as specified in ECMA-254).

Note 1 - The actions specified in the following subclauses are applicable to both cases.

Where a reference is made to procedures specified in ISO/IEC 13247 and ECMA-254, the interpretation of such reference should be made according to whether the call concerned is a basic call or a call independent signalling connection.

6.4.1 Actions at the Originating PINX

An Originating PINX may include a Transit counter information element in the SETUP message sent across an inter-PINX link. The value of the transit count field shall be set to zero.

6.4.2 Actions at the Terminating PINX

A Terminating PINX shall ignore the Transit counter information element if it is contained in any received SETUP message.

6.4.3 Actions at a Transit PINX

6.4.3.1 Normal procedures

On receipt of a SETUP message from the Preceding PINX, the call/connection request shall be processed according to the procedures specified in ISO/IEC 13247 and ECMA-254.

If the received SETUP message contains a Transit counter information element in which the transit count field has a value that is less than the acceptable (network dependent) limit, that information element shall be included in the SETUP message sent to the Subsequent PINX. The value of the transit count field in the outgoing Transit counter information element shall be set to one greater than the value received.

If the received SETUP message does not contain a Transit counter information element, the Transit PINX may include a Transit counter information element in the SETUP message sent to the Subsequent PINX. The value of the transit count field in this element shall be set to a value not less than 1.

6.4.3.2 Exceptional procedures

If the SETUP message received from the Preceding PINX contains a Transit counter information element in which the transit count field has a value that is greater than or equal to the acceptable (network dependent) limit of Transit PINX's through which the call may be routed, and the PINX is unable to become a Terminating or Outgoing Gateway PINX, the call shall be rejected. The acceptable limit shall not exceed 31.

6.4.4 Actions at an Incoming Gateway PINX

When routeing a call entering the PISN an Incoming Gateway PINX may include a Transit counter information element in the SETUP message sent across the inter-PINX link. The value of the transit count field shall be set to an initial value. This initial value shall be zero unless knowledge of the history of the call enables a higher value to be chosen.

6.4.5 Actions at an Outgoing Gateway PINX

An Outgoing Gateway PINX shall ignore the Transit counter information element if it is contained in any received SETUP message.

--`,,```,,,,````-`-`,,`,,`,`,,`---

Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS Not for Resale

Annex A

(normative)

Protocol Implementation Conformance Statement (PICS) proforma

A.1 Introduction

The supplier of a protocol implementation which is claimed to conform to this International Standard shall complete the following Protocol Implementation Conformance Statement (PICS) proforma.

A completed PICS proforma is the PICS for the implementation in question. The PICS is a statement of which capabilities and options of the protocol have been implemented. The PICS can have a number of uses, including use:

- by the protocol implementor, as a check list to reduce the risk of failure to conform to the Standard through oversight;
- by the supplier and acquirer, or potential acquirer, of the implementation, as a detailed indication of the capabilities of the implementation, stated relative to the common basis for understanding provided by the Standard's PICS proforma;
- by the user or potential user of the implementation, as a basis for initially checking the possibility of interworking with another implementation - while interworking can never be guaranteed, failure to inter-work can often be predicted from incompatible PICSs;
- by a protocol tester, as the basis for selecting appropriate tests against which to assess the claim for conformance of the implementation.

A.2 Instructions for completing the PICS proforma

A.2.1 General structure of the PICS proforma

The PICS proforma is a fixed format questionnaire divided into sub-clauses each containing a group of individual items. Each item is identified by an item number, the name of the item (question to be answered), and the reference(s) to the clause(s) that specifies (specify) the item(s) in the main body of this International Standard.

The "Status" column indicates whether an item is applicable and if so whether support is mandatory or optional. The following terms are used:

m	mandatory (the capability is required for conformance to the protocol);
o	optional (the capability is not required for conformance to the protocol, but if the capability is implemented it is required to conform to the protocol specifications);
o.<n>	optional, but support of at least one of the group of options labelled by the same numeral <n> is required;
x	prohibited;
c.<cond>	conditional requirement, depending on support for the item or items listed in condition <cond>;
<item>:m	simple conditional requirement, the capability being mandatory if item number <item> is supported, otherwise not applicable;
<item>:o	simple conditional requirement, the capability being optional if item number <item> is supported, otherwise not applicable.

Answers to the questionnaire items are to be provided either in the "Support" column, by simply marking an answer to indicate a restricted choice (Yes or No), or in the "Not Applicable" column (N/A).

Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS
Not for Resale

A.2.2 Additional Information

Items of Additional Information allow a supplier to provide further information intended to assist the interpretation of the PICS. It is not intended or expected that a large quantity will be supplied, and a PICS can be considered complete without any such information. Examples might be an outline of the ways in which a (single) implementation can be set up to operate in a variety of environments and configurations.

References to items of Additional Information may be entered next to any answer in the questionnaire, and may be included in items of Exception information.

A.2.3 Exception Information

It may occasionally happen that a supplier will wish to answer an item with mandatory or prohibited status (after any conditions have been applied) in a way that conflicts with the indicated requirement. No pre-printed answer will be found in the Support column for this. Instead, the supplier is required to write into the support column an x.<i> reference to an item of Exception Information, and to provide the appropriate rationale in the Exception item itself.

An implementation for which an Exception item is required in this way does not conform to this International Standard. A possible reason for the situation described above is that a defect in the Standard has been reported, a correction for which is expected to change the requirement not met by the implementation.

Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS Not for Resale

A.3 PICS Proforma

A.3.1 Implementation identification

Supplier	
Contact point for queries about the PICS	
Implementation name(s) and version(s)	
Other information necessary for full identification, e.g. name(s) and version(s) for machines and/or operating systems; system name(s)	

Only the first three items are required for all implementations; other information may be completed as appropriate in meeting the requirement for full identification.

The terms Name and Version should be interpreted appropriately to correspond with a suppliers terminology (e.g. Type, Series, Model).

A.3.2 Protocol summary

Protocol version	1.0
Addenda implemented (if applicable)	
Amendments implemented	
Have any exception items been required (see A.2.3)?	No [ ] Yes [ ] (The answer Yes means that the implementation does not conform to this International Standard)

Date of statement	

--`,,```,,,,````-`-`,,`,,`,`,,`---

Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS Not for Resale

A.3.3 General

Item	Question/feature	Reference	Status	N/A	Support
A1	Behaviour as an Originating PINX for ANF-TC in association with basic circuit switched call control (ISO/IEC 13247)	6.2.1, 6.4.1	o.1		Yes [ ] No [ ]
A2	Behaviour as an Originating PINX for ANF-TC in association with call independent signalling connections (ECMA-254)	6.2.1, 6.4.1	o.1		Yes [ ] No [ ]
A3	Behaviour as a Terminating PINX for ANF-TC in association with basic circuit switched call control (ISO/IEC 13247)	6.2.2, 6.4.2	o.1		Yes [ ] No [ ]
A4	Behaviour as a Terminating PINX for ANF-TC in association with call independent signalling connections (ECMA-254)	6.2.2, 6.4.2	o.1		Yes [ ] No [ ]
A5	Behaviour as a Transit PINX for ANF-TC in association with basic circuit switched call control (ISO/IEC 13247)	6.2.3, 6.4.3	o.1		Yes [ ] No [ ]
A6	Behaviour as a Transit PINX for ANF-TC in association with call independent signalling connections (ECMA-254)	6.2.3, 6.4.3	o.1		Yes [ ] No [ ]
A7	Behaviour as an Incoming Gateway PINX for ANF-TC in association with basic circuit switched call control (ISO/IEC 13247)	6.4.4	o.1		Yes [ ] No [ ]
A8	Behaviour as an Incoming Gateway PINX for ANF-TC in association with call independent signalling connections (ECMA-254)	6.4.4	o.1		Yes [ ] No [ ]
A9	Behaviour as an Outgoing Gateway PINX for ANF-TC in association with basic circuit switched call control (ISO/IEC 13247)	6.4.5	o.1		Yes [ ] No [ ]
A10	Behaviour as an Outgoing Gateway PINX for ANF-TC in association with call independent signalling connections (ECMA-254)	6.4.5	o.1		Yes [ ] No [ ]

Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS Not for Resale

Annex B

(informative)

Guidelines for interworking with ATM Forum PNNI 1.0

This annex contains guidelines for interworking at a gateway PINX between a network employing the signalling system specified in this International Standard (B-QSIG) and a network employing the ATM Forum's PNNI 1.0 specification (PNNI), as specified in the following:

ATM Forum PNNI 1.0: 1996, *Private Network-Network Interface Specification Version 1.0 (af-pnni-0055.000)*.

For the purposes of this annex, a gateway PINX is a PINX that provides interworking between B-QSIG and PNNI.

The guidelines of annex L of ISO/IEC 13247 apply with the following addition.

L.4.9 of ISO/IEC 13247 provides guidelines for handling at a gateway PINX information elements from codesets other than codeset 0 received in messages that are to be passed on to a PNNI link. In the case of a Transit counter information element, the gateway PINX should increase the transit counter value by at least one to take account of nodes expected to be passed through in the PNNI network. The method of calculating the amount of increase is implementation dependent.

Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS Not for Resale

ICS 35.110

Descriptors: data processing, information interchange, telecommunications, telecommunication network, network interconnection, ISDN, private network, data transmission, signal processing, protocols.

Price based on 9 pages

Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS Not for Resale