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Information technology — Telecommunications and information exchange between systems — Broadband Private Integrated Services Network — Inter-exchange signalling protocol — Signalling ATM adaptation layer

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 — Couche d'adaptation de signalisation ATM

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Contents

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 13246 was prepared by Joint Technical Committee ISO/IEC JTC 1, *Information technology*, Subcommittee SC 6, *Telecommunications and information exchange between systems.*

Annex A forms an integral part of this International Standard. Annexes B and C are for information only.

Introduction

This International Standard is one of a series of International Standards defining services and signalling protocols applicable to Broadband Private Integrated Services Networks (B-PISNs). The series uses B-ISDN concepts as developed by ITU-T and conforms to the framework of International Standards for Open Systems Interconnection as defined by ISO/IEC.

This particular International Standard specifies the Signalling ATM Adaptation Layer (SAAL) protocol for use at the Q reference point (B-QSIG SAAL).

Information technology — Telecommunications and information exchange between systems — Broadband Private Integrated Services Network — Inter-exchange signalling protocol — Signalling ATM adaptation layer

1 Scope

This International Standard specifies the signalling ATM adaptation layer (SAAL) protocol used at the interface between Broadband PINXs and between Broadband PISNs within the framework of the B-QSIG signalling system protocol family. The B-QSIG SAAL uses the functions provided by the ATM layer, and provides the services required by the B-QSIG Layer 3 signalling protocols.

2 Conformance

In order to conform to this International Standard, a PINX shall satisfy requirements identified in the Protocol Implementation Conformance Statement (PICS) 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 9646-1:1994, *Information technology — Open Systems Interconnection — Conformance testing methodology and framework — Part 1: General concepts.*

ISO/IEC 9646-7:1995, *Information technology — Open Systems Interconnection — Conformance testing methodology and framework — Part 7: Implementation Conformance Statements.*

ITU-T Rec. I.321 (1991), *B-ISDN Protocol Reference Model and Its Application.*

ITU-T Rec. I.361 (1993), *B-ISDN ATM Layer Specification.*

ITU-T Rec. I.362 (1993), *B-ISDN ATM Adaptation Layer (AAL) Functional Description.*

ITU-T Rec. I.363.5 (1996), *B-ISDN ATM Adaptation Layer (AAL) Specification — Part 5: AAL Type 5.*

ITU-T Rec. I.371 (1996), *Traffic control and congestion control in B-ISDN.*

ITU-T Rec. Q.2100 (1994), *B-ISDN Signalling ATM Adaptation Layer Overview Description.*

ITU-T Rec. Q.2110 (1994), *B-ISDN ATM Adaptation Layer — Service Specific Connection Oriented Protocol (SSCOP).*

ITU-T Rec. Q.2130 (1994), *B-ISDN Signalling ATM Adaptation Layer — Service Specific Coordination Function for Support of Signalling at the User-to-Network Interface (SSCF at UNI).*

4 Definitions

For the purposes of this International Standard, the definitions given in ITU-T Recommendations I.363.5, Q.2110 and Q.2130 apply.

5 List of Acronyms

AAL	ATM Adaptation Layer
ATM	Asynchronous Transfer Mode
B-ISDN	Broadband ISDN
B-PISN	Broadband Private Integrated Service Network

B-PINX	B-PISN Exchange
B-QSIG	Broadband QSIG
CRC	Cyclic Redundancy Check
IPL	Inter-PINX-Link
PICS	Protocol Implementation Conformance Statement
PINX	Private Services Network eXchange
SAAL	Signalling AAL
SDU	Service Data Unit
SPC	Semi-Permanent Connection
SSCF	Service Specific Convergence Functions
SSCOP	Service Specific Connection Oriented Protocol
UBR	Unspecified Bit Rate
UNI	User Network Interface

6 Description

The SAAL protocol for Broadband Inter-PINX signalling uses the services of the ATM layer and provides the services required by the B-QSIG Layer 3 signalling protocols. It is based on the generic framework outlined by Recommendations I.362 for the functional description of the AAL, and Q.2100 for the signalling AAL specification.

The B-QSIG SAAL allows a B-QSIG SAAL user (i.e. a layer 3 signalling protocol) to communicate with its peer entity. In particular, it provides for a reliable transfer of layer 3 signalling messages. The information transfer between the B-QSIG SAAL user and the B-QSIG SAAL uses primitives and is performed in Message Mode.

Two peer-to-peer operational procedures are specified: Unassured or Assured operation. The support of the Assured operation is mandatory. The support of Unassured operation is optional.

NOTE The use of unassured operation is not required by the B-QSIG layer 3 signalling protocol.

The basic structure of the B-QSIG SAAL is contained in Figure 1. For the B-QSIG SAAL, 3 sublayers are defined similar to those shown in Figure 1 of Rec. Q.2100:

- SSCF for B-QSIG
- SSCOP
- Common Part - AAL Type 5.

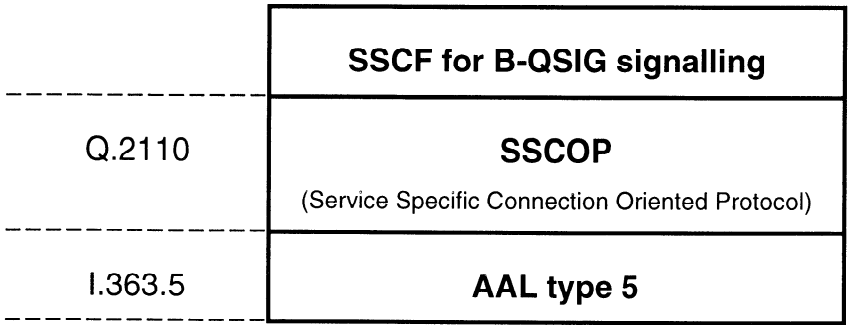

Figure 1 — B-QSIG SAAL Structure

6.1 Common Part - AAL Type 5

AAL Type 5 provides transparent transfer and CRC checking (32 Bits) for SSCOP SDUs, segmentation into ATM cells, and reassembly.

6.2 SSCOP

SSCOP provides the basic mechanisms for the establishment and release of connections and the reliable exchange of information between B-PINX peer entities.

6.3 SSCF for Broadband Inter-PINX Signalling

SSCF maps the particular requirements of the Broadband Inter-PINX layer 3 signalling protocols to the SSCOP services.

7 Operational Requirements

B-QSIG SAAL requires that the following configuration information is available at both sides of an IPL (the method for making this information available for both peer entities is outside the scope of this International Standard):

- which virtual channel acts as the signalling channels for the IPL
- which traffic management method is applied on that virtual channel.

7.1 B-QSIG SAAL Connections

The B-QSIG SAAL operates in a connection-oriented mode. The B-QSIG SAAL connection(s) shall be established as part of the IPL establishment, and shall reside permanently (except for error cases).

NOTE B-QSIG SAAL connections are established between two peer entities at the two ends of an IPL.

7.2 Traffic Management Method for B-QSIG SAAL Connections

For the operation of the B-QSIG SAAL protocol, the peer entities at two ends of an IPL shall be pre-configured with the traffic resources allocated to the B-QSIG SAAL connections. For each B-QSIG SAAL connection (or for a set of them together), the following are examples of parameters that can be pre-configured (see also ITU-T Rec. I.371):

a) a peak cell rate indication (only), e.g. 167 cells/sec.

b) peak cell rate, sustainable cell rate, and maximum burst size (together)

c) an indication as "unspecified bit rate" (UBR).

The method of configuring the traffic resources allocated to the B-QSIG SAAL connection is outside the scope of this International Standard. However, it is essential for the traffic management of B-QSIG SAAL connections that both peer entities at the IPL apply the same allocation of parameters.

8 B-QSIG SAAL Specification

8.1 Basic Structure

Clause 5 of ITU-T Rec. Q.2100 applies.

8.2 AAL Type 5

ITU-T Rec. I.363.5 applies.

8.3 SSCOP

ITU-T Rec. Q.2110 applies.

NOTE The SSCOP can be combined with different Service Specific Coordination Functions (SSCFs) to offer different AAL services. As a result, the SSCOP specification defines mandatory functions for a general protocol. Some of these functions are not needed within B-QSIG SAAL. Therefore, it is possible for an implementation not to implement a certain SSCOP function and still meet the mandatory requirements of B-QSIG SAAL (e.g. the SSCOP local data retrieval function is not needed within B-QSIG SAAL), provided that the SSCOP implementation provides for the services used by the B-QSIG SAAL-SSCF.

A fully compliant SSCOP implementation according to ITU-T Rec. Q.2110 meets the requirements for the SSCOP of this International Standard.

8.4 SSCF for Broadband Inter-PINX Signalling

8.4.1 SAAL Services Provided by the SSCF for B-QSIG Signalling

The following services shall be provided. Unless specified differently, they shall be provided as specified in clause 5 of ITU-T Rec. Q.2130:

- assured transfer of data.
- transparency of transferred information.

  NOTE The SSCF does not interpret the structure or meaning of SDUs; as a default, it supports the transfer of octet-aligned SDUs up to a maximum of 4 096 octets.
- establishment and release of B-QSIG SAAL connections for assured transfer of data.

  B-QSIG SAAL connections are established during IPL establishment, and reside permanently. However, in certain error scenarios, the SSCF may release B-QSIG SAAL connections to recover from error situations.

The following SAAL services may optionally be provided:

- unacknowledged transfer of data.

  The use of this service is not specified by the B-QSIG layer 3 signalling protocol.

8.4.2 Functions of the SSCF and Signalling Protocol Stack

Clause 6 of ITU-T Rec. Q.2130 applies with the following exception:

- only point-to-point B-QSIG SAAL connections shall be supported. In particular, B-QSIG SAAL shall not provide the broadcast capability described in clause 6/Q.2130.

8.4.3. Definition of the Boundary of SSCF to B-QSIG-Layer 3 Protocols

Clause 7 of ITU-T Rec. Q.2130 applies with the following exceptions:

- The support of the AAL-UNITDATA primitive is not mandatory. The use of this primitive is not specified by B-QSIG layer 3 signalling protocol.
- The support of layer 3 peer-to-peer messages in the AAL-ESTABLISH and AAL-RELEASE primitives is not mandatory. The use of those parameter data in these primitives is not specified by the B-QSIG layer 3 signalling protocol.

8.4.4 Definition of the Boundary of SSCF with SSCOP

Clause 8 of ITU-T Rec. Q.2130 applies with the following exception:

- The support of the AA-UNITDATA primitive is not mandatory.

8.4.5 State Transition Table of SSCF for Supporting B-QSIG Signalling

Clause 9 of ITU-T Rec. Q.2130 applies with the exceptions specified in sections 8.4.3 and 8.4.4 above.

8.4.6 Boundary to Layer Management

No requirements have been identified.

8.4.7 Applicability of SSCOP Parameters and Timers to B-QSIG Signalling

The values specified in Table 4 of ITU-T Rec. Q.2130 are used as default parameters.

However, parameter and timer values at the B-QSIG-IPL shall be configurable, in order to be able to select a proper set of parameter and timer values depending on the use, condition, IPL link rate, round-trip delay, and receiver resequencing buffer size. As a general guide, Timer_POLL should be set to as large a value as possible that still maintains throughput efficiency and satisfies the average and maximum delivery of data.

For the signalling channels at the Q reference point, no restrictions to operating at below 10 kbit/s applies.

8.4.8 PICS Proforma for SSCOP AND SSCOP-SSCF

Annex A applies.

8.4.9 SSCF for Semi-Permanent Connection (SPC) Control Signalling

Functions for the support of semi-permanent connections are outside the scope of this International Standard.

Annex A

(normative)

Protocol Implementation Conformance Statement (PICS) proforma for B-QSIG SAAL

A.1 Introduction

A.1.1 Basic reference documents for PICS proforma specifications

General rules for the specification of PICS proforma are provided by ISO/IEC 9646-1. Detailed guidance for the specification of PICS proforma is provided by ISO/IEC 9646-7; in particular the structure of a PICS proforma, the questions to be asked, the syntax and notation to be used and the semantics of the questions and expected answers.

For a PICS proforma, specific acronyms and terms are used as defined in ISO/IEC 9646-1 or ISO/IEC 9646-7, e.g.:

– ICS	Implementation Conformance Statement
– ICS proforma	Implementation Conformance Statement proforma
– ICS (proforma) item	A row in an ICS (proforma) table
– PICS	Protocol ICS
– PICS proforma	Protocol ICS proforma
– status (value)	An allowed entry in the status column for an item in an ICS proforma table
– (support) answer	An allowed entry in the support or supported values columns for an item in an ICS question

A.1.2 Copyright Information

Users of this specification may freely reproduce the PICS proforma of this Annex A so that it can be used for its intended purpose and may further publish the completed PICS.

A.1.3 Structure of this PICS proforma

This PICS proforma is subdivided into (sub-)clauses as follows:

- Instructions (A.2)
- Purpose of a PICS proforma (A.2.1)
- Instructions for completing the PICS proforma (A.2.2)
- Additional Information (A.2.3)
- Exception Information (A.2.4)
- Legend for the columns of the PICS proforma tables (A.2.5)
- Legend for further indications of the PICS proforma tables (A.2.6)
- Identification of the implementation (A.3), including:
- Identification of the protocol for which this PICS applies (A.3.7)
- Global statement of conformance (A.4)
- SSCOP (A.5)
- SSCOP-SSCF B-QSIG Protocol Capabilities (A.6)

A.2 Instructions

A.2.1 Purpose of a PICS proforma

To evaluate conformance of a particular implementation, it is necessary to have a statement of which capabilities and options have been implemented for a given OSI specification. Such a statement is called an Implementation Conformance Statement (ICS).

For protocol specifications, this statement is called "Protocol Implementation Conformance Statement" (PICS). For the provision of this statement, a fixed format questionnaire called PICS proforma has to be used. A completed PICS proforma is the PICS for the implementation in question. It is an ICS (as defined in ISO/IEC 9646-7) for an implementation or system which claims to conform to a given specification.

The PICS can have a number of uses, including:

– by the protocol implementor, as a check list for implementations to reduce the risk of unintended non-conformance, e.g. 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 interwork can often be predicted from incompatible PICS

– by a protocol tester, as the basis for selecting appropriate tests against which to assess the claim for conformance of the implementation.

The PICS proforma of this Annex therefore reflect a compromise between these different requirements.

A.2.2 Instructions for completing the PICS proforma

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.

The PICS proforma is a fixed format questionnaire. The supplier of the implementation shall complete this questionnaire, in particular identify the implementation, complete the global statement of conformance, and providing the answers in the rows of the tables in clauses A.5 - A.6. The structure of the tables is explained in subclauses A.2.5 and A.2.6. For each row in each table, the supplier shall enter an explicit answer (i.e. by ticking the appropriate "yes", "no", or "N/A" in each of the support column boxes provided. Where a support column box is left blank, or where it is marked "N/A" without any tick box, no answer is required. If a "prerequisite line" (see A.2.6 below) is used after a subclause heading or table title, and its predicate is false, no answer is required for the whole sublause or table, respectively.

A supplier may also provide - or be required to provide - further information, categorized as either Additional Information or Exception Information. When present, each kind of further information is to be provided in a further subclause of items labelled

"a.<i>" for additional information,

"x.<i>" for exceptional information

for cross-referencing purposes, where <i> is any unambiguous identification for the item (e.g., simply a numeral); there are no other restrictions on its format and presentation.

A.2.3 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.2.4 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; and the answer to the global statement of conformance (see A.4) cannot be "yes". A possible reason for the situation described above is that a defect in the Standards has been reported, a correction for which is expected to change the requirement not met by the implementation.

A.2.5 Legend for the columns of the PICS proforma tables

The questionnaire in clauses A.5-A.6 is structured as a set of tables in accordance with the guidelines presented in ISO/IEC 9646-7. The columns of the tables shall be interpreted as follows:

"Item"

The item column contains a unique reference (a mnemonic plus a number) for each item within the PICS proforma. Items need not always be numbered sequentially.

"Item Description"

The item description column contains a brief summary of the static requirement for which a support answer is required. This may be done by a question or a reference to a specific feature.

"Conditions for Status"

The conditions for status column contains a specification, if appropriate, of the predicate upon which a conditional status is based. The indication of an item reference in this column indicates a simple-predicate condition (support of this item is dependent on the support marked for the referenced item).

Within the "conditions for status" column, the logical symbol "]" is used to indicate a logical negation ("NOT").

"Status"

The following notations, as defined in ISO/IEC 9646-7, are used for the status column:

I Irrelevant or out-of-scope - this capability is outside the scope of the standard to which this PICS proforma applies and is not subject to conformance testing in this context.

M Mandatory - the support of this capability is required for conformance to the standard

N/A Not Applicable - in the given context, it is impossible to use the capability. No answer in the support column is required.

O Optional - the capability is not required for conformance to the protocol and may be supported or not. However, if the capability is implemented, it is required to conform to the protocol specifications.

O.<n> Qualified optional - in this case, <n> is an integer that identifies a unique group of related optional items. If no additional qualification is indicated, the support of at least one of the optional items is required for conformance to the standard. Otherwise, the qualification and logic of the selection among the optional items is defined below the table explicitly.

X eXcluded or prohibited - there is a requirement not to use this capability in a given context.

"Reference"

Except where explicitly stated, the reference column refers to the appropriate subclause(s) of this International Standard describing the particular item. The reference merely indicates the place(s) where the core of a description of an item can be found; additional information on this item may be contained in other parts of this International Standard, and has to be taken into account when making a statement about the conformance to that particular item.

"Support "

In the support column, the supplier of the implementation shall enter an explicit answer. The following notation is used:

[ ] Yes [No] Tick "yes", if item is supported; tick "No", if item is not supported.

[ ] N/A Tick "N/A", if the item is "not applicable".