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Information technology — International Standardized Profile RB — Relaying the connection-mode Network Service —

Part 2:
LAN Subnetwork-dependent media-independent requirements

Technologies de l'information — Profil normalisé international RB — Relais du service de réseau en mode connexion —

Partie 2: Prescriptions RLE dépendantes du sous-réseau indépendantes du milieu

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Contents

Page

Foreword iii

Introduction iv

1 Scope 1

2 Normative references 1

3 Definitions 2

4 Abbreviations 2

5 Requirements 2
5.1 Introduction 2
5.2 Static conformance requirements 2
5.3 Dynamic conformance requirements 3

Annex A Profile Requirements List (normative) 5
A.1 Introduction 5
A.2 Notation and conventions 5
A.3 Profile RL for ISO/IEC 8208 6
A.4 Profile RL for ISO/IEC 8802-2 7

Annex B Recommendations (informative) 8
B.1 Introduction 8
B.2 ISO/IEC 8802-2 recommendations 8

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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. In addition to developing International Standards, ISO/IEC JTC 1 has created a Special Group on Functional Standardization for the processing of International Standardized Profiles.

An International Standardized Profile is an internationally agreed, harmonized document which identifies a standard or group of standards, together with options and parameters, necessary to accomplish a function or set of functions.

Draft International Standardized Profiles are circulated to national bodies for voting. Publication as an International Standardized Profile requires approval by at least 75 % of the national bodies casting a vote.

International Standardized Profile ISO/IEC ISP 12067-2 was prepared with the collaboration of

— Asia-Oceania Workshop (AOW);

— European Workshop for Open Systems (EWOS);

— Open Systems Environment Implementors' Workshop (OIW).

ISO/IEC ISP 12067 consists of the following parts, under the general title *Information technology — International Standardized Profile RB — Relaying the connection-mode Network Service*:

— *Part 1: Subnetwork-independent requirements*

— *Part 2: LAN Subnetwork-dependent media-independent requirements*

— *Part 3: PSDN Subnetwork-dependent media-dependent requirements for virtual calls over a permanent access*

— *Part 4: Definition of profile RB51.1111, relaying the connection-mode Network Service between CSMA/CD LAN subnetworks and PSDNs using virtual calls over a PSTN leased line permanent acess*

— *Part 5: Definition of profile RB51.1121, relaying the connection-mode Network Service between CSMA/CD LAN subnetworks and PSDNs using virtual calls over a digital data circuit/CSDN leased line permanent acess*

Annex A forms an integral part of this part of ISO/IEC ISP 12067. Annex B is for information only.

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Introduction

This International Standardized Profile (ISP) is defined in accordance with the principles specified by ISO/IEC Technical Report 10000.

The context of Functional Standardization is one area in the overall field of Information Technology (IT) standardization activities, covering base standards, profiles, and registration mechanisms. A profile defines a combination of base standards that collectively perform a specific well-defined IT function. Profiles standardize the use of options and other variations in the base standards, and provide a base for the development of uniform, internationally recognized system tests.

ISPs are produced not simply to "legitimize" a particular choice of base standards and options, but to promote real system interoperability. One of the most important roles for an ISP is to serve as the basis for the development (by organizations other than ISO and IEC) of internationally recognized test methods. The development and widespread acceptance of tests based on this and other ISPs is crucial to the successful realisation of this goal.

ISO/IEC ISP 12067 consists of several parts of which this is Part 2. ISO/IEC ISP 12067-1 specifies the profile requirements that are subnetwork-independent. There are further parts which specify subnetwork-dependent and media-dependent requirements. In addition, for each individual profile there is a part of ISO/IEC ISP 12067 which identifies the specific requirements of that profile, making reference to appropriate material from part 1 and from the subnetwork-dependent parts.

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Information technology — International Standardized Profile RB — Relaying the connection-mode Network Service —

Part 2:
LAN Subnetwork-dependent media-independent requirements

1 Scope

ISO/IEC ISP 12067 is applicable to interworking units concerned with operating in the Open Systems Interconnection (OSI) environment. It specifies a combination of OSI base standards that collectively provide a relay function for the connection-mode Network Service.

This part of ISO/IEC ISP 12067 specifies subnetwork-dependent requirements applicable to an interworking unit attached to a LAN and using the ISO 8802-2 LLC type 2 protocol, irrespective of the LAN medium. The operation of an interworking unit may involve relaying from one subnetwork to another, and those subnetworks need not be of the same type. This part of ISO/IEC ISP 12067 applies only to communication over those subnetworks which are LANs using ISO 8802-2 LLC type 2.

2 Normative references

The following documents contain provisions which, through reference in this text, constitute provisions of this part of ISO/IEC ISP 12067. At the time of publication, the editions indicated were valid. All documents are subject to revision, and parties to agreements based on this part of ISO/IEC ISP 12067 are warned against automatically applying any more recent editions of the documents listed below, since the nature of references made by ISPs to such documents is that they may be specific to a particular edition. Members of IEC and ISO maintain registers of currently valid International Standards and ISPs, and ITU-T maintains published editions of its current Recommendations.

ISO/IEC 8208 : 1995, *Information technology - Data communications - X.25 Packet Layer Protocol for Data Terminal Equipment*

ISO/IEC 8802-2 : 1994, *Information technology - Telecommunications and information exchange between systems - Local and metropolitan area networks - Specific requirements - Part 2: Logical link control*

ISO/IEC 8881 : 1989, *Information processing systems - Data communications - Use of the X.25 packet level protocol in local area networks*

ISO/IEC 8881 : 1989/Cor.1 : 1991, *Information processing systems - Data communications - Use of the X.25 packet level protocol in local area networks - TECHNICAL CORRIGENDUM 1*

NOTE - This Technical Corrigendum to ISO/IEC 8881 is to apply throughout in this part of ISO/IEC ISP 12067, wherever ISO/IEC 8881 itself is referenced.

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

ISO/IEC TR 10000-1 : 1995, *Information technology - Framework and taxonomy of International Standardized Profiles - Part 1: General principles and documentation framework*

ISO/IEC TR 10000-2 : 1995, *Information technology - Framework and taxonomy of International Standardized Profiles - Part 2: Principles and Taxonomy for OSI profiles*

3 Definitions

The terms used in this part of ISO/IEC ISP 12067 are defined in the referenced base standards (see clause 2).

4 Abbreviations

Abbreviations used in this part of ISO/IEC ISP 12067 are defined in the referenced base standards (see clause 2).

5 Requirements

5.1 Introduction

The requirements in this clause apply to all interworking units within the scope of ISO/IEC ISP 12067, without regard to the type of medium of the LAN to which they are attached. Additional requirements apply to interworking units according to the types of medium to which they are attached; these requirements are specified in other parts of ISO/IEC ISP 12067.

5.2 Static conformance requirements

5.2.1 Overall requirements

An implementation conforming to this part of ISO/IEC ISP 12067 shall:

a) meet the requirements for ISO/IEC 8208 in the subclause 5.2.2 below;

b) meet the requirements for ISO/IEC 8802-2 in the subclause 5.2.3 below;

c) support all the features identified as requirements in the Profile Requirements List in annex A.

5.2.2 ISO/IEC 8208

The implementation shall:

a) meet the requirements for the X.25 Packet Layer Protocol of ISO/IEC 8208, as modified for operation over LLC type 2 in a LAN environment by ISO/IEC 8881;

b) support the following optional user facilities:
   - Non-standard Default Packet Sizes;
   - Non-standard Default Window Sizes;

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c) support at least the following non-standard default parameter values:
   - all Non-standard Default Packet Sizes (maximum user data field length) from 32 octets to 1024 octets;
   - all Non-standard Default Window Sizes from 1 to 7.

5.2.3 ISO/IEC 8802-2

The implementation shall:

a) support the functions required by ISO/IEC 8802-2 for the support of the Logical Link Control Class II;

b) in order to achieve intercommunication, agree the values of N1 and the Ack Timer on a LAN-wide basis;

c) support an Ack Timer value of 5 ±1 seconds, and it is recommended that the Ack Timer should be configurable.

5.3 Dynamic conformance requirements

5.3.1 Overall requirements

An implementation conforming to this part of ISO/IEC ISP 12067 shall:

a) meet the requirements for ISO/IEC 8208 in the subclause 5.3.2 below;

b) meet the requirements for ISO/IEC 8802-2 in the subclause 5.3.3 below;

c) behave in accordance with the requirements of the Profile Requirements List in annex A.

5.3.2 ISO/IEC 8208

5.3.2.1 General requirements

The implementation shall:

a) use the ISO/IEC 8208 functions specified in 5.2.2 in accordance with the procedures for the X.25 Packet Level Protocol of ISO/IEC 8208, as modified for operation over LLC type 2 in a LAN environment by ISO/IEC 8881;

b) not use the procedures for the operation of ISO/IEC 8208 over LLC type 1 defined in Section 3 of ISO/IEC 8881;

c) support the method for determining the range of logical channels detailed in subclause 5.3.2.2 below.

5.3.2.2 Method for the determination of the range of logical channels

The logical channel ranges (LIC, HIC, LTC, HTC, LOC and HOC) to be used are determined by local knowledge. If local knowledge is not available, then by default only a single two-way logical channel will be used (i.e. LTC and HTC will be set to 1, while LIC, HIC, LOC and HOC will be set to zero). If more then one channel is available, a higher value of HTC may be negotiated using the On-line Facility Registration Facility.

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If a DTE is capable of initiating a REGISTRATION REQUEST packet, then the registration parameter fields shall be set as follows:

i) the LIC, HIC, LOC and HOC parameters shall be set to zero; the LTC shall be set to the value 1; the value in the total number of logical channels parameter field shall be set equal to the value in the HTC parameter field;

ii) no other optional user facilities shall be identified in the REGISTRATION REQUEST packet, and may be ignored by a responder if they are present;

iii) if a DTE is capable of responding with a REGISTRATION CONFIRMATION packet, the maximum number of two-way logical channels allowed between the two DTEs shall be indicated in the HTC parameter field; the value in the HTC parameter field shall be less than or equal to the value requested in the HTC parameter field in the REGISTRATION REQUEST packet;

iv) registration of facilities normally applies in one direction only for the DTE/DTE case (i.e. registration of facilities is performed independently for each direction), but for the logical channel range negotiation it applies to both directions.

NOTE - A REGISTRATION REQUEST packet may be ignored by a responder. However, it is recommended that DTEs are capable of responding with a REGISTRATION CONFIRMATION packet even if they support only a single two-way logical channel. This will prevent unnecessary delays for the initiator in transmitting a CALL REQUEST packet. Such delays are determined by the initiator's values for timer T28 and retry counter R28.

5.3.3 ISO/IEC 8802-2

5.3.3.1 General requirements

The implementation shall:

a) use the ISO/IEC 8802-2 functions specified in 5.2.3 in accordance with the procedures specified in ISO/IEC 8802-2;

b) if a value of k other than 7 is to be used, negotiate the value to be used by XID frames according to the procedures in subclause 5.3.3.2 below.

5.3.3.2 Use of XID

This part of ISO/IEC ISP 12067 does not require an implementation to transmit XID command frames, except for the negotiation of values of k other than 7.

An implementation receiving an XID command frame addressed to the individual address value specified in ISO/IEC 8881 is required to respond with an XID response frame using the same individual address. The implementation shall act as follows:

i) take note of the initiator's Receive Window Size; if the default value is in use this would be 7; however if the value is different, the implementation shall not use a transmit window size greater than the value indicated in the received XID command; if a transmit window size is used which is greater than the receive window size, it can lead to LLC connection resets; there is no requirement to use the full window size indicated in the received XID command;

ii) the information field in the XID response should contain the responder's receive window size; the default window size shall be as specified in ISO/IEC 8881;

iii) the initiator receiving the XID response shall note and act on the receive window size as indicated in i).

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Annex A

(normative)

Profile Requirements List

A 1 Introduction

ISO/IEC 9646-7 requires that a Profile Requirements List is provided for each profile and captures:

a) the general options of the profile as a whole;

b) a list of specifications selected and combined in the profile; and references to the related ICS proforma;

c) for each of these referenced base specifications, a section of the profile RL expressing the restrictions upon allowed support answers in the corresponding PICS proforma and information object ICS proforma. This section of the profile RL is derived from the ICS proformas of the relevant base specifications, indicating the changes of status values necessary to express the profile requirements.

The first two items relate to the profile as a whole, and so are included only in those parts of ISO/IEC ISP 12067 which are specific to individual profiles. But each part of ISO/IEC ISP 12067 contains the identification of those PICS proforma constraints which are within its scope.

ISO/IEC 9646-7 indicates that a profile RL may consist either of a simple list of constraints or of amended copies of the base PICS proforma. In this part of ISO/IEC ISP 12067 the former method is used.

A.2 Notation and conventions

In many cases the constraints imposed by the profile RL are expressed in the form of symbols indicating the status in the context of this part of ISO/IEC ISP 12067 of those base standard PICS proforma items to which the constraints apply. The symbols used to identify constraints on the capabilities to be supported by a conforming implementation are defined in ISO/IEC 9646-7.

It should be noted that, in the context of received PDUs or fields or parameters of received PDUs, the capability to support them is the ability to interpret the significance of the PDU or field and act upon it in accordance with the dynamic conformance requirements of the protocol (which may in some cases mean generating an error report). PDUs or fields which are not supported are those whose receipt is ignored and have no impact on the protocol operation.

In some cases it is necessary to specify constraints not only on the capabilities which are implemented, but on whether they are used. When this is necessary, an additional profile specific ICS proforma is used to specify such additional requirements.

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A.3 Profile RL for ISO/IEC 8208

The relevant base standard PICS proforma is the PICS proforma given in annex B of ISO/IEC 8208. This part of ISO/IEC ISP 12067 imposes the following additional constraints:

B.5 General DTE characteristics		
Base Item	Description	Constraint
	What environments are supported ?	
Ec/3	- DTE/DCE (1993)	x
Ec/8	- DTE/DCE (1988)	x
Ec/4	- DTE/DCE (1984)	x
Ec/0	- DTE/DCE (1980)	x
Et/d	- DTE/DTE with dynamic role selection	m
M8	Modulo 8	m

B.10 Parameter values and ranges B.10.1 Values for flow control parameters and throughput class, Virtual Call service		
Base Item	Description	Constraint
	What values are supported for:	
V1s	- Default packet sizes, sending (octets) ?	each of the values 32, 64, 128, 256, 512 and 1024 shall be supported
V1r	- Default packet sizes, receiving (octets) ?	each of the values 32, 64, 128, 256, 512 and 1024 shall be supported
V2s	- Default window sizes, sending ?	each of the values 1 to 7 shall be supported
V2r	- Default window sizes, receiving ?	each of the values 1 to 7 shall be supported

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A.4 Profile RL for ISO/IEC 8802-2

The relevant base standard PICS proforma is the PICS proforma given in annex C of ISO/IEC 8802-2. This part of ISO/IEC ISP 12067 imposes the following additional constrains:

C.5 Claimed conformance to ISO/IEC 8802-2		
Base Item	Description	Constraint
CLS2a	Is Class II LLC supported ?	m

C.6 LLC type 1 operation - unacknowledged connectionless mode C.6.1 LLC type 1 - supported PDU types		
Base Item	Description	Constraint
XID/3	XID_CMD supported on transmission	c1
TES/7	TEST_CMD supported on transmission	i

Definition of conditional status item
c1 if a value of k other than 7 is supported then m else o

C.6 LLC type 1 operation - unacknowledged connectionless mode C.6.4 LLC type 1 - miscellaneous		
Base Item	Description	Constraint
	Which of the following addresses are supported in the DSAP address field of XID_CMD PDUs ?	
MIS/66	- individual address	m
MIS/69	- null address	m
	Which of the following addresses are supported in the SSAP address field of XID_CMD PDUs ?	
MIS/70	- individual address	m
MIS/71	- null address	m

C.7 LLC type 2 operation - connection-mode C.7.1 LLC type 2 - supported PDU types		
Base Item	Description	Constraint
IC/92b	I_CMD supported on transmission	m
RJC/104	REJ_CMD supported on transmission	m

C.7 LLC type 2 operation - connection-mode C.7.3 LLC type 2 - supported procedures		
Base Item	Description	Constraint
PRS/125	Support of Connection Establishment as initiator	m
PRS/127	Support of Connection Release as initiator (originating release)	m
PRS/130	Support of Data Transfer as originator	m

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Annex B

(informative)

Recommendations

B.1 Introduction

The information in this annex is tutorial in nature. It does not constitute a normative part of this part of ISO/IEC ISP 12067. In the absence of specific applications making alternative behaviour appropriate, it is recommended that the features described in this annex are implemented.

B.2 ISO/IEC 8802-2 recommendations

1 The recommended parameter values are depicted in table B.1. It is recommended that the implementation supports a value of N1 as indicated in table B.1, that is 1031 octets. The support of larger sizes may be possible with certain LAN technologies. The support of these larger sizes is not addressed in this part of ISO/IEC ISP 12067. If specified, these larger sizes will be contained in the parts of ISO/IEC ISP 12067 that contain the requirements for particular LAN technologies.

NOTE - 1031 octets can be conveyed as a MAC service data unit by all ISO/IEC 8802 LANs. Where there is a need for LAN interconnection, the maximum size of 1031 octets for N1 can enable a MAC service relay (RD 5n.5n) to be used regardless of the technologies being interconnected.

Table B.1 - LLC parameter values

Parameter	Value
Maximum number of octets in an I PDU (N1)	1031
Maximum number of outstanding I PDUs (k)	7
Maximum number of transmissions (N2)	10(1)

NOTE -
1. Parameter N2, although titled 'Number of transmissions' for consistency with ISO/IEC 8802-2, is actually defined as the number of retransmissions. Thus the above value could lead to a PDU being transmitted a total of 11 times.

2 The recommended timer values are depicted in table B.2. It is recommended that all timers are configurable. These timer values are based on empirical evidence from the operation of a bridged LAN environment. In the case of a single isolated LAN smaller timer values may be appropriate.

Table B.2 - LLC timer values

Timer name	Value (seconds)
Busy-state	30
Reject	10
P-bit	5

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3 It is recommended that where the end system is to operate in an environment with MAC level bridging that the flow control technique below should be applied. It should be noted that all end systems using LLC type 2 which are connected to such LAN configuration should apply the technique. This is the only way to maintain fairness.

The end system applies the following procedure to each LLC connection it supports:

i) each time congestion is detected, the congestion recovery period starts: the working window size is set to one and the I-PDU whose sequence number equals the N(R) of the last PDU correctly received is retransmitted;

ii) during the congestion recovery period the LLC type 2 procedure ensure that the maximum number of outstanding I-PDUs does not exceed the working window size;

iii) when the number of previously unacknowledged I-PDUs successfully transmitted and acknowledged reaches the value of the working window size, the working window size is incremented by one; the congestion recovery period terminates when the working window size reaches the k value defined in ISO/IEC 8802-2 subclause 7.8.4;

iv) an I-PDU is considered as lost by its sending LLC entity on one of the following conditions:

1. the transmitter receives a REJECT PDU, which indicates that the receiver detected the loss of an I-PDU, or

2. the following sequence of events occurs:

   a. the transmitter ACK TIMER expires and the Retry Count is lower than the N2 value,

   b. the transmitter sends an RR command PDU with the Poll bit set to one,

   c. the transmitter receives an I-PDU or S-format PDU in which the Final bit is set to one but in which the value of N(R) is not equal to the value held by the transmitter's V(S) when the RR command PDU with the Poll bit set to one was send;

v) the operation of this algorithm is interrupted by any condition causing LLC connection component to enter a Resetting or Disconnect state.

Additionally a LAN station can refuse to establish new LLC connections and or decide to release LLC connections it supports.

NOTE - An appropriate sizing of a bridged LAN environment can considerably reduce the congestion problem occurring in MAC relay equipment. The sizing of a real world configuration of bridged LANs should be carefully estimated in order to limit the occurrence of congestion problems within the MAC sub-layer.

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