TECHNICAL REPORT

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Information technology — Telecommunications and information exchange between systems — Local and metropolitan area networks — Technical reports and guidelines —

Part 1: The structure and coding of Logical Link Control addresses in Local Area Networks

Technologies de l'information — Télécommunications et échange d'information entre systèmes — Réseaux locaux et métropolitains — Rapports techniques et lignes directrices —

Partie 1: Structure et codage des adresses de contrôle de liaison logique dans les réseaux locaux

Reference number
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Foreword

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International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of the joint technical committee is to prepare International Standards. 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.

In exceptional circumstances, the joint technical committee may propose the publication of a Technical Report of one of the following types:

— type 1, when the required support cannot be obtained for the publication of an International Standard, despite repeated efforts;

— type 2, when the subject is still under technical development or where for any other reason there is the future but not immediate possibility of an agreement on an International Standard;

— type 3, when the joint technical committee has collected data of a different kind from that which is normally published as an International Standard ("state of the art", for example).

Technical Reports of types 1 and 2 are subject to review within three years of publication, to decide whether they can be transformed into International Standards. Technical Reports of type 3 do not necessarily have to be reviewed until the data they provide are considered to be no longer valid or useful.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO and IEC shall not be held responsible for identifying any or all such patent rights.

ISO/IEC TR 11802-1 which is a Technical Report of type 3, was prepared by Joint Technical Committee ISO/IEC JTC 1, *Information technology*, Subcommittee SC 6, *Telecommunications and information exchange between systems.*

This fourth edition cancels and replaces the third edition (ISO/IEC TR 11802-1:2002), which has been technically revised.

ISO/IEC TR 11802 consists of the following parts, under the general title *Information technology — Telecommunications and information exchange between systems — Local and metropolitan area networks — Technical reports and guidelines*:

— *Part 1: The structure and coding of Logical Link Control addresses in Local Area Networks [Technical Report]*

— *Part 2: Standard Group MAC Addresses [Technical Report]*

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Introduction

The standards for LANs are generally comprised of the physical layer, the medium access control (MAC) sublayer, and the logical link control (LLC) sublayer. In OSI terminology, the MAC and LLC sublayers are considered to be sublayers of the OSI data link layer. Both the MAC and LLC sublayers contain fields for addressing.

This TR contains a description of the LLC addresses, and a reference to the url whereby a list of those values in current use can be found together with the application process for requesting a new assignment. This site is managed by the august IEEE-SA Registration authority.

The addressing space in LLC is limited, and it is such that it is considered to be a scarce resource. It is therefore prudent to consume this resource in a considered and conservative manner. To this end this TR indicates the kind of considerations which will be used by ISO/IEC when making the association between a particular LLC address value and use to which it is put. These considerations are intended to be sufficiently broad to allow a wide variety of LLC address uses to be recorded, and also sufficiently restrictive so that addresses values are not unwisely assigned.

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Information technology — Telecommunications and information exchange between systems — Local and metropolitan area networks — Technical reports and guidelines —

Part 1:
The structure and coding of Logical Link Control addresses in Local Area Networks

1 Scope

This Technical Report (TR) provides:

— a description of the ISO/IEC 8802-2 LLC addressing conventions, and

— the consideration for the manner in which new LLC address uses are assigned a value.

It is outside the scope of this TR to provide architectural judgements regarding the entities which are identified by particular address value(s).

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO/IEC TR 9577, *Information technology — Telecommunications and information exchange between systems — Protocol identification in the network layer*

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*

3 Abbreviations

The following abbreviations are used in this Technical Report.

DSAP	Destination Service Access Point
IEEE	Institute of Electrical and Electronics Engineers
LLC	Logical Link Control
PDU	Protocol Data Unit
SAP	Service Access Point
SNAP	Sub-Network Access Protocol
SSAP	Source Service Access Point
LSAP	Link Service Access Point

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4 General considerations

4.1 Functions of LLC addresses

Logical Link Control (LLC) protocol data units contain addressing information. This addressing information consists of two fields; the Destination Service Access Point (DSAP) address field, and the Source Service Access Point (SSAP) address field. Each of these is an 8 bit field and each is made up of two components.

In the DSAP address field, the components are an *address type designation bit*, and seven bits of *actual address*. When the *address type designation bit* is set to '0', it denotes that the *actual address* is an individual address. When the *address type designation bit* is set to '1', it denotes that the DSAP *actual address* is a group address. This Technical Report considers the two types of *actual address* separately.

In the SSAP address field, the components are the *command/response identifier bit*, and seven bits of *actual address*. The *actual address* in the SSAP field is always an individual address.

In the general case, an individual *actual address* identifies a protocol, or set of protocols, in the next higher layer. In OSI environments, the next higher layer is the Network Layer. In non-OSI environments, the next higher layer is dependent on the architecture in use.

There are certain exceptions to this general rule as discussed below.

NOTE 1 The terms in italics, namely; *address type designation bit, command/response identifier bit* and *actual address* are as defined in ISO/IEC 8802-2. See ISO/IEC 8802-2 clause 3.3.1.1 items (2), (3), and (4).

NOTE 2 The format of LLC addresses is defined in ISO/IEC 8802-2. For information this is reproduced in Annex A.

NOTE 3 An individual *actual address* value does not necessarily have any relationship with a group address of the same *actual address* value.

4.2 Binary and Hexadecimal representation of LLC addresses

4.2.1 Binary representation

The seven-bit LLC *actual address* value is conveyed in the eight-bit DSAP/SSAP fields and therefore can be represented in a sequence of eight binary digits. The least significant digit is shown to the left and the significance of the digits increases from left to right. The least significant digit of the sequence represents the *address type designation bit* of the DSAP address field and the *command/response identifier bit* of the SSAP address field, see figure A.1.

The following are the two permitted binary representations of an example individual *actual address*;

0111 1011

Z111 1011.

The following is the permitted binary representation of an example group *actual address*;

1101 0101.

4.2.2 Hexadecimal representation

The eight-bit binary representation of an *actual address* value may be represented as two hexadecimal digits encoding the value of the octet address field with the least significant bit set to 0 in the case of an individual address and the least significant bit set to 1 in the case of a group address.

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The following is the permitted hexadecimal representation of the example individual *actual address* shown in clause 4.2.1 (Z111 1011);

DE/DF.

The following is the permitted hexadecimal representation of the example group *actual address* shown in 4.2.1 (1101 0101);

AB.

4.2.3 Bit order of transmission

The order of transmission of bits or other components of the octet address field by any particular MAC is outside the scope of this Technical Report which describes LLC address values in terms of the significance of individual bits.

4.3 The null address

4.3.1 Function of the null address

The null LLC address designates the LLC entity associated with the underlying MAC SAP. The null address does not identify any higher layer protocol nor the LLC sublayer management entity.

The null address is only valid for use in the address fields of XID and TEST PDUs. The use of the null address (DSAP and SSAP) is specified in ISO/IEC 8802-2.

4.3.2 Definition of the null address

The null address (DSAP and SSAP) is defined in ISO/IEC 8802-2.

4.4 The global address

4.4.1 Function of the global address

The global LLC address is an address reserved from the range of group addresses and is used to identify all LSAPs at the station identified by the MAC address.

4.4.2 Definition of the global address

NOTE The global address can only exist as a DSAP address. The individual *actual address* value '111 1111' in DSAP and SSAP address fields is a different address and should not be confused with the global address.

4.5 The address used in conjunction with ISO/IEC TR 9577

The mechanisms described in ISO/IEC TR 9577 is an important feature of this Technical Report. It provides a means for standardised network layer protocols to be self identifying. Protocols within the scope of ISO/IEC TR 9577 do not therefore need to be separately identified by means of distinct individual *actual address* values. A specific individual *actual address* has been assigned to ISO/IEC TR 9577.

The considerations in clause 7 include the notion that whenever possible, new network layer protocols should be identified by ISO/IEC TR 9577.

It might not be possible in all cases to identify the protocol which operates above the LLC sublayer by means of ISO/IEC TR 9577. In these cases, associating that protocol with a different *actual address* value could be necessary; see clause 7.

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4.6 The address used in conjunction with SNAP

Proprietary protocols do not qualify for inclusion in this Technical Report, nor are they suitable for identification by ISO/IEC TR 9577. To accommodate the use of private and proprietary protocols in a LAN environment, the method defined in Annex B is available. This method of identifying private/proprietary protocols is associated with a specific individual *actual address* value.

5 Unreserved addresses

This Technical Report defines a range of individual *actual addresses* as unreserved. The corresponding DSAP and SSAP addresses are in the range 'Z000 0001' through to 'Z011 1111' inclusive (the left most bit is the least significant bit).

This Technical Report defines a range of group *actual addresses* as unreserved. The corresponding DSAP addresses are in the range '1000 0000' through '1011 1111' inclusive (the left most bit is the least significant bit).

Further definition of the unreserved addresses is beyond the scope of this Technical Report. They may be used for any purpose whatsoever, including identification of protocols to which reserved addresses have been assigned. The responsibility for controlling the use of unreserved LLC addresses rests with an appropriate authority, for example a system designer, an implementer, or a LAN administrative manager.

6 Reserved addresses

This Technical Report defines a portion of the individual *actual address* range as reserved. The corresponding DSAP and SSAP addresses have the general form 'Z1XX XXXX'.

These addresses are used to identify protocols as described in 4.1 above.

This Technical Report defines a portion of the group *actual address* range as reserved. The corresponding DSAP addresses have the general form '11XX XXXX'.

7 Process for assignment of reserved addresses

7.1 General considerations

The number of reserved LLC addresses is limited and therefore a case-by-case review against the criteria for assignment is made before a protocol is assigned a value. Where possible, the use of complementary mechanisms, for example ISO/IEC TR 9577, is also considered.

7.2 Specific Process

The specific process to follow to request an address assignment can be found at:

http://standards.ieee.org/regauth/llc/index.html

together with a list of assigned addresses.

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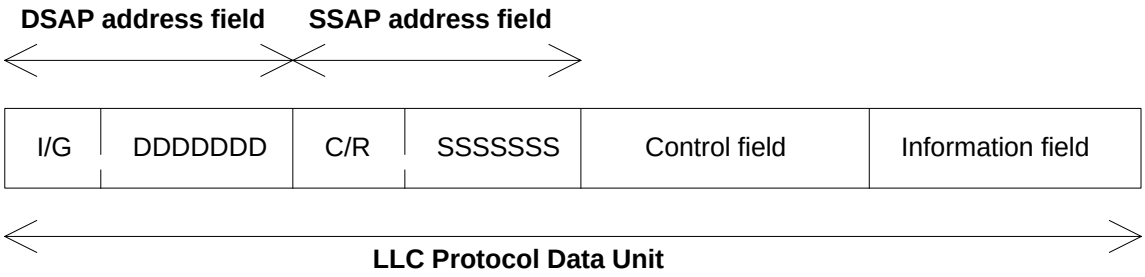
Annex A
(informative)

General format of ISO/IEC 8802-2 addresses

For the benefit of readers of this Technical Report, the LLC address format , as specified in ISO/IEC 8802-2, is illustrated in figure A.1.



I/G = Address type designation bit (indicating individual or group actual addresses)

0 = Individual DSAP

1 = Group DSAP

C/R = The command/response identifier bit

0 = Command } The value of the C/R bit is set by the

1 = Response } operation of the LLC protocol

D D D D D D D = Destination actual address

S S S S S S S = Source actual address

Figure A.1 — Format of the LLC address fields

NOTE 1 A complete LLC PDU is shown so that the address fields can be seen in context.

NOTE 2 The leftmost bit of each field is the least significant bit.

NOTE 3 The Information field is not present in all LLC PDUs.

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Annex B
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IEEE 802 — Sub-Network Access Protocol (SNAP)

IEEE 802 includes a definition of a mechanism to allow proprietary protocols to be identified when conveyed by LLC. The following description illustrates its operation.

A specific individual *actual address* is assigned for use in conjunction with the IEEE 802 SNAP mechanism. When an LLC PDU carries this individual *actual address* in the DSAP and SSAP fields, the information field is further defined such that it contains two elements. These two elements are a protocol identification field and the protocol data. The protocol identification field is 40 bits in length and contains two subfields. The first subfield is 24 bits, and the second subfield is 16 bits.

In order to identify a proprietary protocol, this mechanism requires that the organisation responsible for its definition can be unambiguously identified by a value which is numerically identical to a 24-bit Organisationally Unique Identifier which has been assigned to that organisation. The second subfield is controlled and used by that organisation to distinguish among any other proprietary protocols which it has defined.

Figure B.1 illustrates this mechanism. For full details of the definition refer to IEEE 802 clauses 4 and 5.

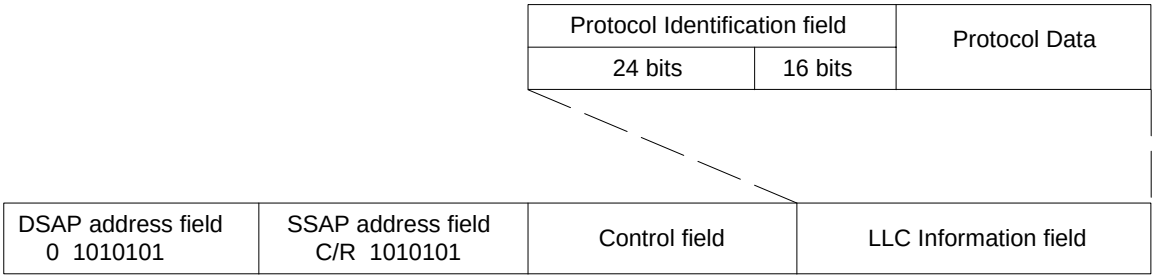

Figure B.1 — Illustration of the IEEE 802 SNAP mechanism

NOTE The value of the Organisationally Unique Identifier is also used as the first 24 bits of a globally administered MAC address.

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