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

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

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Technologies de l'information — Télécommunications et échange d'information entre systèmes — Réseaux locaux et métropolitains —
Partie 1: Structure et codage des adresses de contrôle de liaison logique dans les réseaux locaux

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Contents

Page

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.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 3.

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 part of ISO/IEC TR 11802 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 third edition cancels and replaces the second edition (ISO/IEC TR 11802-1:1997), 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*:

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

— *Part 2: Standard Group MAC Addresses*

— *Part 5: Media Access Control (MAC) Bridging of Ethernet V2.0 in Local Area Networks*

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 part of ISO/IEC TR 11802 contains a description of the LLC addresses, together with a list of those values in current use.

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 part of ISO/IEC TR 11802 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.

This part of ISO/IEC TR 11802 will be kept up to date by ISO/IEC JTC 1 as new entries are added to the tables.

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

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

1   Scope

This part of ISO/IEC TR 11802 provides:

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

b)   the consideration for the manner in which new LLC address uses are assigned an entry in this part of ISO/IEC TR 11802, and

c)   a record, in the form of a table, of assigned uses of ISO/IEC 8802-2 LLC address values.

This part of ISO/IEC TR 11802 is for use by implementers to ascertain the value, or values, of LLC addresses that have been assigned for use in a particular circumstance.

It is outside the scope of this part of ISO/IEC TR 11802 to provide architectural judgements regarding the entities which are identified by particular address value(s).

2   References

ISO/IEC TR 9577:1999, *Information technology — Protocol identification in the network layer*

ISO/IEC 8802-2:1998, *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 part of ISO/IEC TR 11802.

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

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 part of ISO/IEC TR 11802 considers and records 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.

Table 1 is a record of individual address values and is applicable to SSAP *actual addresses*, and DSAP individual *actual addresses*. Table 2 is a record of DSAP group *actual addresses*.

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, 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.

The following is the permitted hexadecimal representation of the example individual *actual address* shown in 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 part of ISO/IEC TR 11802 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.

The null LLC address is included in Table 1.

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 (see Table 2) and is used to identify all LSAPs at the station identified by the MAC address.

4.4.2 Definition of the global address

The global LLC (DSAP) address is defined in ISO/IEC 8802-2.

The global LLC address is included in Table 2.

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 part of ISO/IEC TR 11802. 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 and this is recorded in Table 1.

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.

4.6 The address used in conjunction with SNAP

Proprietary protocols do not qualify for inclusion in this part of ISO/IEC TR 11802, 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 as indicated in Table 1.

5 Unreserved addresses

This part of ISO/IEC TR 11802 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); see Table 1.

This part of ISO/IEC TR 11802 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); see Table 2.

Further definition of the unreserved addresses is beyond the scope of this part of ISO/IEC TR 11802. 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 part of ISO/IEC TR 11802 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. Table 1 shows all the reserved individual LLC address values.

This part of ISO/IEC TR 11802 defines a portion of the group *actual address* range as reserved. The corresponding DSAP addresses have the general form '11XX XXXX'.

Table 2 shows the reserved group LLC address values.

For each value, the tables indicate:

1) the standards organisation responsible for the protocol, and

2) the document reference that records the purpose for which it is being used.

The entries indicate the values that are reserved for use in the documents indicated. All other entries are reserved for future assignment.

7 Procedures 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 listed against a value in Table 1. Where possible, the use of complementary mechanisms, for example ISO/IEC TR 9577, is also considered.

7.2 Specific procedures

The need for a higher layer protocol to be listed in Table 1 is brought to the attention of ISO/IEC JTC 1 by means of a submission to Subcommittee JTC1/SC6. A request for an LLC address value shall be accompanied by a copy of the protocol standard.

The protocol proposed for inclusion in Table 1 should be one which

1) is a standard published by an internationally recognised standards organisation, and

2) is only changed as a result of a public review process, and

3) has a potentially large field of application.

Wherever possible, network layer protocols should be identified by using the value in Table 1 for ISO/IEC TR 9577. It is likely therefore that consultation between JTC1/SC6 working groups, and between JTC1/SC6 and the submitting member, will be needed to ensure that this goal is fulfilled. It is possible that the outcome of such a liaison could lead to a revision of ISO/IEC TR 9577.

If it is not possible to use the mechanisms of ISO/IEC TR 9577 and hence a need for a specific LLC address is evident, then an LSAP address not currently assigned in Table 1 shall be assigned.

Generally only one use should be associated with each address value. However, in exceptional circumstances, it could be necessary to mark an address value as being used for more than one protocol. Caution should be exercised in associating multiple protocols with a single LLC address value, and considerations could include the fact that the protocols concerned have their own mechanisms for protocol identification, or that they will never coexist in the same installation.