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ITU-T

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OF ITU

X.116

(10/96)

SERIES X: DATA NETWORKS AND OPEN SYSTEM
COMMUNICATION

Public data networks – Network aspects

Address translation registration and resolution protocol

ITU-T Recommendation X.116

(Previously CCITT Recommendation)

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For further details, please refer to ITU-T List of Recommendations.

FOREWORD

The ITU-T (Telecommunication Standardization Sector) is a permanent organ of the International Telecommunication Union (ITU). The ITU-T is responsible for studying technical, operating and tariff questions and issuing Recommendations on them with a view to standardizing telecommunications on a worldwide basis.

The World Telecommunication Standardization Conference (WTSC), which meets every four years, establishes the topics for study by the ITU-T Study Groups which, in their turn, produce Recommendations on these topics.

The approval of Recommendations by the Members of the ITU-T is covered by the procedure laid down in WTSC Resolution No. 1 (Helsinki, March 1-12, 1993).

ITU-T Recommendation X.116 was prepared by ITU-T Study Group 7 (1993-1996) and was approved under the WTSC Resolution No. 1 procedure on the 5th of October 1996.

NOTE

In this Recommendation, the expression "Administration" is used for conciseness to indicate both a telecommunication administration and a recognized operating agency.

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SUMMARY

This Recommendation defines a protocol for the exchange of alternative address related information between a DTE and an address resolution entity as defined in Recommendation X.115. This Recommendation complements Recommendation X.115 which defines the address translation capability in public data networks. The protocol defined in this Recommendation enables DTEs to register alternative addresses (e.g. addresses in formats other than X.121 or E.164). The ARE stores the registered information along with the addresses where DTEs are reachable and provides this information when queried by a DTE or a switching system to enable call establishment.

Recommendation X.116**ADDRESS TRANSLATION REGISTRATION AND
RESOLUTION PROTOCOL***(Geneva, 1996)***1 Introduction**

This Recommendation defines a protocol for the exchange of alternative address related information between a DTE and an Address Resolution Entity.

This Recommendation is applicable to:

- a) DTEs which operate according to ISO/IEC 8208;
- b) Address Resolution Entities which operate according to ISO/IEC 8208.

This Recommendation does not specify any protocol elements nor algorithms for facilitating routing and relaying among AREs. Such functions are intentionally outside the scope of this Recommendation.

2 Reference Model Definitions

The following Recommendations and other references contain provisions which, through reference in this text, constitute provisions of this Recommendation. At the time of publication, the editions indicated were valid. All Recommendations and other references are subject to revision: all users of this Recommendation are therefore encouraged to investigate the possibility of applying the most recent edition of the Recommendations and other references listed below. A list of the currently valid ITU-T Recommendations is regularly published.

2.1 Identical Recommendations | International Standards

- ITU-T Recommendation X.200 (1994) | ISO/IEC 7498-1:1994, *Information technology – Open Systems Interconnection – Basic Reference Model: the Basic Model*.
- ITU-T Recommendation X.213 (1995) | ISO/IEC 8348:1996, *Information technology – Open Systems Interconnection – Network service definition*.
- ITU-T Recommendation X.263 (1995) | ISO/IEC TR 9577:1996, *Information technology – Protocol Identification in the Network Layer*.

2.2 Additional references

- ITU-T Recommendation X.25 (1996), *Interface between Data Terminal Equipment (DTE) and Data Circuit-terminating Equipment (DCE) for terminals operating in the packet mode and connected to public data networks by dedicated circuit*.
- ISO/IEC 8208:1995, *Information technology – Data Communications – X.25 Packet Layer Protocol for Data Terminal Equipment*.

3 Definitions**3.1 Reference Model definitions**

This Recommendation makes use of the following terms defined in Recommendation X.200 | ISO/IEC 7498-1:

- a) Network Layer;
- b) Network Service Access Point;
- c) Network Service Access Point Address;

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- d) Network Point of Attachment;
- e) Network Protocol Data Unit;
- f) Routing;
- g) Subnetwork.

3.2 X.25 Definition

- Alternative Address.

3.3 Additional definitions

For the purposes of this Recommendation, the following definitions apply.

3.3.1 alternative address related information: Information about the alternative address of DTEs attached to a subnetwork defined in terms of the system types, Network Addresses present, Network Entity Titles present, and the correspondence between systems, X.121 or E.164 addresses and potential routes.

3.3.2 redirection information: Information supplied when a Call Request fails to achieve establishment of a connection, indicating an X.121 or E.164 address which could be used to establish such a connection.

3.3.3 address resolution entity: Supplier of information concerning address translation within a single network.

4 Abbreviations

For the purposes of this Recommendation, the following abbreviations apply.

4.1 Systems

ARE Address Resolution Entity

DTE Data Terminal Equipment

4.2 Protocol data units

ECQ-PDU DTE Configuration Query Protocol Data Unit

ENC-PDU DTE Notification Complete Protocol Data Unit

ESC-PDU DTE Connect Protocol Data Unit

ESH-PDU DTE Hello Protocol Data Unit

RD-PDU Redirect Protocol Data Unit

SCC-PDU ARE Configuration Complete Protocol Data Unit

SCR-PDU ARE Configuration Response Protocol Data Unit

SNC-PDU ARE Notification Complete Protocol Data Unit

SRN-PDU ARE Received Notification Protocol Data Unit

4.3 Miscellaneous

AA	Alternative Address
BCD	Binary Coded Decimal
NPA	Network Point of Attachment (i.e. X.121 address or E.164 address)
PDU	Protocol Data Unit
QOS	Quality of Service
SNAcF	Subnetwork Access Function
SNAcP	Subnetwork Access Protocol

NPA defined in this Recommendation is referred to as SNPA in ITU-T Rec. X.213 | ISO/IEC 8348.

5 Address Translation Service Model

The network layer in the DTE and in the address translation service may be modeled as consisting of three sub-layers (see Figure 1):

- *ARE service sub-layer*: The modeling of this sub-layer permits the definition of a peer-peer ARE service function communication in support of the address translation service defined in Recommendation X.115.
- *Subnetwork-dependent mapping sub-layer*: This sub-layer operates over the Subnetwork Access Protocol (SNAcP) and is used to provide the capabilities assumed by the ARE service sub-layer. It permits to decouple the peer-peer communication between ARE service functions from the detailed operation of particular SNAcPs. The realization of this sub-layer may consist simply of a set of rules for manipulating the network access protocol and may not involve explicit exchange of PCI (Protocol Control Information). The modeling of this sub-layer provides for application of the peer-peer ARE service function communication over other subnetworking technologies. For example over a Frame Relay network, a new set of mapping rules need to be defined while peer-peer ARE service function communication remains unchanged.
- *Subnetwork Access Protocol (SNAcP)*: The access protocol in this Recommendation is X.25 protocol, however, the access protocol could be a different protocol (e.g. Frame Relay). Annex A defines the mapping applicable to Recommendation X.25.

The above subdivision of the network layer into sub-layers is for modeling purposes and should not be interpreted as implying a particular implementation.

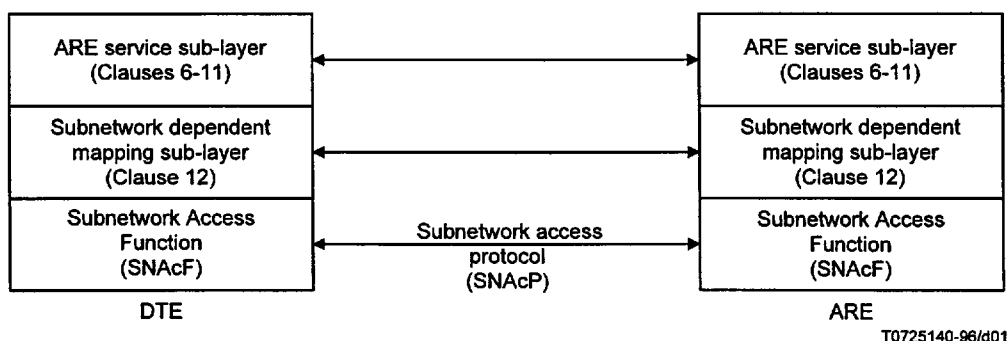
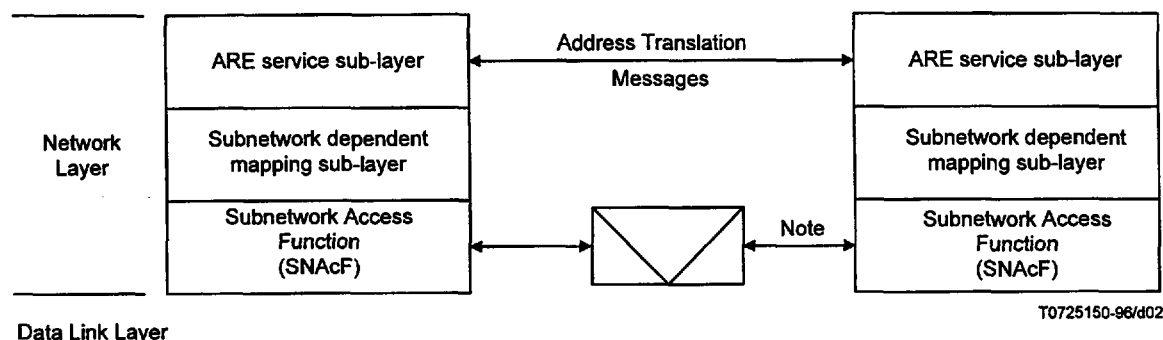


FIGURE 1/X.116
Subdivision of network layer into sub-layers

The ARE function can be realized in a single entity or can be distributed among several logical entities. As illustrated in Figure 2, the model applies irrespective of the location of the entity(ies) providing the address translation service (in a DCE, inside the network, in a DTE outside the network).



NOTE – Internal Protocol in case the ARE is inside the network or SNACF in case the ARE is outside the network.

FIGURE 2/X.116
Realization of Address Translation service functionality

6 Overview of the protocol

The protocol specified in this Recommendation comprises two subsets:

- the Alternative Address (related) Information subset;
- the Redirection Information subset.

The functions of the Alternative Address Information subset are:

- to enable DTEs to notify an ARE of the existence and reachability of their Alternative Addresses (AAs);
- to enable DTEs to discover, for certain AAs, the addresses of systems on the network via which communications may potentially be completed.

The function of the Redirection Information subset is to enable DTEs which are attempting to establish a connection to be directed to a specific appropriate address via which the connection should be completed.

The two subsets are complementary in that the information obtained from the Redirection Information subset implicitly carries associated Alternative Address related Information, and in that the information obtained from the Alternative Address Information subset may be used to derive a suitable address and so avoid the need for use of the Redirection Information subset. The choice of which subset to use to obtain Alternative Address related Information for any individual instance of communication is a local DTE decision, which may be different for different instances of communication and may be varied freely during the DTE operation without impacting the ability to interwork.

6.1 The ARE function

An ARE is an entity which collects Alternative Address related information from DTEs, and which distributes Alternative Address related and redirection information to them.

NOTE – An ARE may also interact with Switching Systems but the details of such interactions are outside the scope of this Recommendation.

The function of an ARE may be carried out by one or more DTEs or SSs attached to the network. Where the network is one which itself acts on the X.25 protocol, it is also possible that some or all of the ARE operations may be performed by functions integrated within the network itself.