

Implementation of ENV 41109 : 1988

**Information Systems
Interconnection; Local Area
Networks; Provision of the OSI
Connection-mode Transport
Service using
Connectionless-mode Network
Service in an End System on a
Token Ring Single LAN**

National foreword

This Draft for Development is identical with the European Prestandard ENV 41109 : 1988 'Information Systems Interconnection; Local Area Networks; Provision of the OSI Connection-mode Transport Service using Connectionless-mode Network Service in an End System on a Token Ring single LAN', prepared by CEN/CENELEC whose members have committed themselves to making it available in an appropriate form. In the UK the Draft for Development is the form now chosen for ENVs in the information technology area.

This Draft for Development is published under the direction of the Information Systems Technology Standards Policy Committee whose Technical Committee IST/6 has the responsibility to:

- aid enquirers to understand the text;
- present to the responsible international/European committee any enquiries on interpretation, or proposals for change, and to keep UK interests informed;
- monitor related international and European developments and promulgate them in the UK.

NOTE. International and European Standards, as well as overseas standards, are available from BSI Sales Department, BSI, Linford Wood, Milton Keynes, MK14 6LE.

This ENV, initially available in 1988, has been reviewed by CEN/CENELEC members and has been given extension for a further two years.

The future of this Draft for Development is therefore bound to that of the ENV and the Draft for Development will not be reviewed or developed separately.

This publication is not to be regarded as a British Standard.

UDC 681.3.01/.02

Key words : Teleprocessing, Open system interconnection, Data transmission, Local Area Networks, Connection oriented transmission, Connectionless mode transmission, Services, Protocols, Transport Layer, Network Layer, Data Link Layer, Physical Layer, Implementation.

English Version

Information Systems Interconnection; Local Area Networks; Provision of the OSI Connection-mode Transport Service using Connectionless-mode Network Service in an End System on a Token Ring single LAN.

Interconnexion des systèmes d'information; réseaux locaux; fourniture du service de transport OSI en mode connexion utilisant le service de réseau en mode sans connexion dans un système d'extrémité, sur un réseau local anneau à jeton

Kommunikation von Informationssystemen; Locale Netzwerke; Bereitstellung des verbindungsorientierten OSI Transportdienstes über dem verbindungslosen Vermittlungsdienst in einem Endsystem in einem einzelnen Ring mit Weitergabe der Sendeberechtigungsmarke

This European Prestandard (ENV) was accepted by a technical body of CEN/CENELEC on 8 January 1988 as a prospective standard for provisional application. The period of validity of this ENV is limited initially to three years. After two years the members of CEN/CENELEC will be requested to submit their comments, particularly on the question whether the ENV can be converted into an EN.

CEN/CENELEC members are required to announce the existence of this ENV in the same way as for EN and to make the ENV available promptly at national level in an appropriate form. It is permissible to keep conflicting national standards in force (in parallel to the ENV) until the final decision about the possible conversion of the ENV into an EN is reached.

CEN/CENELEC members are the national standards organizations and national electrotechnical committees, respectively, of Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxemburg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom.

CEN/CENELEC

The Joint European Standards Institution
Organisation Commune Européenne de Normalisation
Die Gemeinsame Europäische Normeninstitution

Central Secretariat: rue Bréderode 2, B-1000 Brussels

(c) CEN/CENELEC 1988

Copyright reserved to all CEN and CENELEC members

Ref. No. ENV 41 109:1988 E

Brief History

This European Prestandard (ENV) was drawn up by Working Group CEN/CENELEC/WG-LAN (Secretariat held by DIN) which had been established by the CEN/CENELEC/CEPT Information Technology Steering Committee (ITSTC) on 1985-07-17.

On 1988-01-08, this ENV was adopted by CEN/CENELEC on the strength of its acceptance by the following member countries: France, Germany, United Kingdom.

Contents	page
0 Introduction	4
1 Scope and Field of Application	4
2 Conformity	5
2.1 Conformity Principles	5
2.2 Relationship with Base Standards	5
2.2.1 Transport Layer	5
2.2.2 Network Layer	5
2.2.3 Data Link Layer	5
2.2.4 Physical Layer	5
3 References	5
3.1 Base References	5
3.2 Additional References	6
4 Definitions	7
5 Abbreviations	9
6 Scenario Description	9
7 Layer 4	10
7.1 Strategy for Implementation	10
7.2 Options to be Used	10
7.3 Parameters	10
7.4 Addressing	11
7.5 Quality of Service	11
7.6 Details of the Data Units (Concatenation)	11
7.7 Connection Establishment	11
7.8 Data Transfer	12
7.9 Connection Release	12
7.10 Protocol Errors	12
7.11 Tests	12
8 Layer 3	12

Contents	page
9 Layer 2	13
9.1 General	13
9.2 Strategy for Implementation	13
9.3 Logical Link Control	13
9.3.1 Parameter Values	14
9.3.2 Addressing	14
9.3.3 Use of the MAC Priority	14
9.3.4 MA-UNITDATA-STATUS indication	14
9.4 MAC Token Ring	15
9.4.1 Strategy for Implementation	15
9.4.2 Data Signalling Rate	15
9.4.3 Parameter Values	15
9.4.4 Addressing	15
9.4.5 Use of Priority	15
10 Layer 1	15
10.1 Strategy for Implementation	15
10.2 Safety	16
Annex A: Token Ring Cabling System	17
A.0 Introduction and Scope	17
A.0.1 Token Ring Wiring System	17
General Considerations	
A.0.1.1 Passive Cabling	18
A.0.1.2 Active Cabling	18
A.1 Characteristics for the Design of a TCU	19
A.1.1 Phantom Signalling	19
A.1.2 Crosstalk	19
A.1.3 Attenuation	19
A.2 Cable Characteristics	20
A.2.1 Scope and Field of Application	20
A.2.2 Cable Types	20
A.2.3 Electrical Specifications	20
A.2.3.1 Near End Crosstalk	20
A.2.3.2 Impedance	21
A.2.3.3 Attenuation	21
A.2.3.4 Capacitance of shielded Cables at 1 kHz	21
A.2.3.5 Resistance	22
A.2.3.6 Insulation Resistance	22
A.3 Guidelines for Installation and	23
Planning of a Token Ring Wiring System	
A.3.1 Introduction and Scope	23
A.3.2 Specific Advice for Cable Installation	23
A.3.2.1 Ground Potential Difference	23
A.3.2.2 Cable Separation from Power Wiring	24
A.3.3 Maximum Cable Lengths	25
A.3.4 Token Ring Wiring System Components	26
A.3.5 Maximum Number of Attaching Devices	28
A.3.6 Configuration Constraints	28
Annex B: CR TPDU Format	30
Annex C: CC TPDU Format	32
Annex D: DR TPDU Format	33

0 INTRODUCTION

The concept and structure of Functional Standards for Information Systems Interconnection are laid down in the CEN/CENELEC/CEPT Memorandum M-IT-01. The purpose of a Functional Standard is to recommend when and how certain information technology standards should be used. This Functional Standard specifies telecommunication function T/6231 as defined in the CEN/CENELEC/CEPT Memorandum M-IT-02.

1 SCOPE AND FIELD OF APPLICATION

This Functional Standard defines the provision of the OSI connection-mode transport service between two end systems connected to a Token Ring LAN. The use of this profile is restricted to a single LAN.

A system that supports only the protocol set for layers 1 to 4 specified in this Functional Standard does not satisfy the conformity requirements for the transport layer defined in ISO/DIS 8073, nor does it satisfy the conformity requirements for the network layer defined in ISO/DIS 8473.

This Functional Standard specifies a set of protocols, termed a profile, to provide the function defined above. It does not specify total system capability. In particular a system may operate this profile and at the same time engage in other communications over the medium to which it is connected. The requirements placed on a system in this Functional Standard are solely those necessary for operation of the protocol set specified.

Note: Both Functional Standards ENV 41 109 and ENV 41 110 can be applied to single LAN environments. Preference should be given to ENV 41 110 in such cases where extensibility of a configuration is to be envisaged.

This Functional Standard does not specify the Token Ring Wiring System, i.e., trunk coupling units, trunk cables, repeaters and TCU/MIC cable, because the associated base standard ISO/DIS 8802-5 identifies but intentionally does not fully specify these components. International standardization of the Token Ring Wiring System within ISO/IEC JTC 1 is expected in the future.

Before completion of the international standardization work it is not possible to give a complete specification of the Token Ring Wiring System. However, clause 10.1 contains requirements upon the Token Ring Wiring System that are necessary for interworking of attached DTEs. Operation of DTEs with Token Ring Wiring System implementations that do not meet these requirements is outside the scope of this Functional Standard.

In addition, because of this lack of standardization, interconnection of different Token Ring Wiring System components to form a single LAN (e.g. to extend the LAN topology) may be restricted due to incompatible components.

Annex A, which is not an integral part of this Functional Standard, provides further information on

- the design of a TCU
- the electrical characteristics of cable types
- the planning and installation of a Token Ring Wiring System.

Its contents are of an interim nature and are expected to be superseded by the ISO/IEC JTC 1 standardization work mentioned above.

2 CONFORMITY

2.1 Conformity Principles

The body of this Functional Standard states requirements upon systems for the purpose of achieving interworking. In addition, the notes of the Functional Standard contain a number of recommendations that are not required for interworking but may affect performance.

A claim of conformity to the Functional Standard is a claim that all requirements in the body of the Standard are satisfied. Section 2.2 states the relationship between these requirements and those of the base standards. In addition, any supplier claiming conformity must make available a statement of support or non-support of each recommendation identified in the notes.

2.2 Relationship with Base Standards

2.2.1 Transport Layer

To conform to the Transport Protocol used in this Functional Standard it is required to:

- implement ISO/DIS 8073 Class 4
- conform to the requirements in clause 14.5 of ISO/DIS 8073

Claims of conformity shall be defined in terms of clause 14.6 of ISO/DIS 8073.

2.2.2 Network Layer

To conform to the Network Protocol used in this Functional Standard it is required to implement the Inactive Network Layer Protocol Subset of ISO/DIS 8473 clause 7.9.

2.2.3 Data Link Layer

To conform to the Logical Link Control used in this Functional Standard it is required to implement ISO/DIS 8802-2 Type 1 with the restriction that the XID and TEST commands shall not be generated.

To conform to the Media Access Control used in this Functional Standard it is required to implement ISO/DIS 8802-5 Token Ring Media Access Control with the restriction that only 48 bit addressing is permitted.

2.2.4 Physical Layer

To conform to the physical requirements of this Functional Standard it is required to implement a DTE according to ISO/DIS 8802-5 clause 7.

3 REFERENCES

3.1 Base References

ISO 7498 Add 1:1987	Information Processing Systems - Open Systems Interconnection - Basic Reference Model - Addendum 1
ISO 8072:1986	Information Processing Systems - Open Systems Interconnection - Connection oriented transport service definition

ISO 8073:1986	Information Processing Systems - Open Systems Interconnection - Connection oriented transport protocol specification
ISO 8073 DAD 2	Draft proposed addendum (DAD 2) to ISO 8073 to enable class four operation over connectionless mode network service as defined in ISO/DIS 8348/DAD 1 (ISO/TC 97/SC 6 N 4615, June 1987)
ISO 8348 Add 1:1987	Information Processing Systems - Data Communications - Network Service Definition - Addendum 1
ISO 8348 DAD2 Rev.	Information Processing Systems - Data Communications - Network Service Definition - Addendum 2 covering Network Layer Addressing (ISO/TC 97/SC 6 N 4548, August 1987)
ISO/DIS 8473	Information Processing Systems - Data Communications - Protocol for providing the Connectionless-mode Network Service (ISO/TC 97/SC 6 N 4542, May 1987)
ISO/DIS 8802-2	Information Processing Systems - Local Area Networks - Part 2: Logical Link Control (ISO/TC 97/SC 6 N 4609, October 1987)
ISO/DIS 8802-5	Information Processing Systems - Local Area Networks - Part 5: Token Ring access method and physical layer specification (ISO/TC 97/SC 6 N 4477, February 1987)

3.2 Additional References

- ECMA-97 Standard ECMA¹⁾-97: Local Area Networks Safety Requirements, September 1985²⁾
- ECMA-117 Standard ECMA-117: Network Layer Address Domain Specific Part, June 1986²⁾
- M-IT-01 CEN/CENELEC/CEPT Memorandum on the Concept and Structure of Functional Standards for Information Technology (March 1986)
- M-IT-02 CEN/CENELEC/CEPT Memorandum on Directory of Functional Standards (March 1987)
- ENV 41 110 Information Systems Interconnection; Local Area Networks; Provision of the OSI Connection-mode Transport Service and the OSI Connectionless-mode Network Service in an End System on a Token Ring LAN in a single or multiple LAN configuration

Note: A standard on Local Area Network Safety Requirements is in preparation by IEC. It will be based on ECMA-97. An additional IEC standard will deal with Electromagnetic Compatibility Considerations.

¹⁾ ECMA - European Computer Manufacturers Association

²⁾ Documents are available from ECMA, 114 Rue du Rhône, 1204 Geneva (Switzerland)

4 DEFINITIONS

All terms used in this Functional Standard but the following are defined in the base references.

DTE	Data Terminal Equipment. For the purpose of this Functional Standard a DTE consists of a Station, a PH/MIC cable and a MIC.
Token Ring Wiring System	A Token Ring Wiring System contains Trunk Coupling Units, Trunk Cables, TCU/MIC Cables, repeaters and MICs and provides a number of MIC interfaces for connection of DTEs.

Figure 1 shows a DTE interfacing with the Token Ring Wiring System.

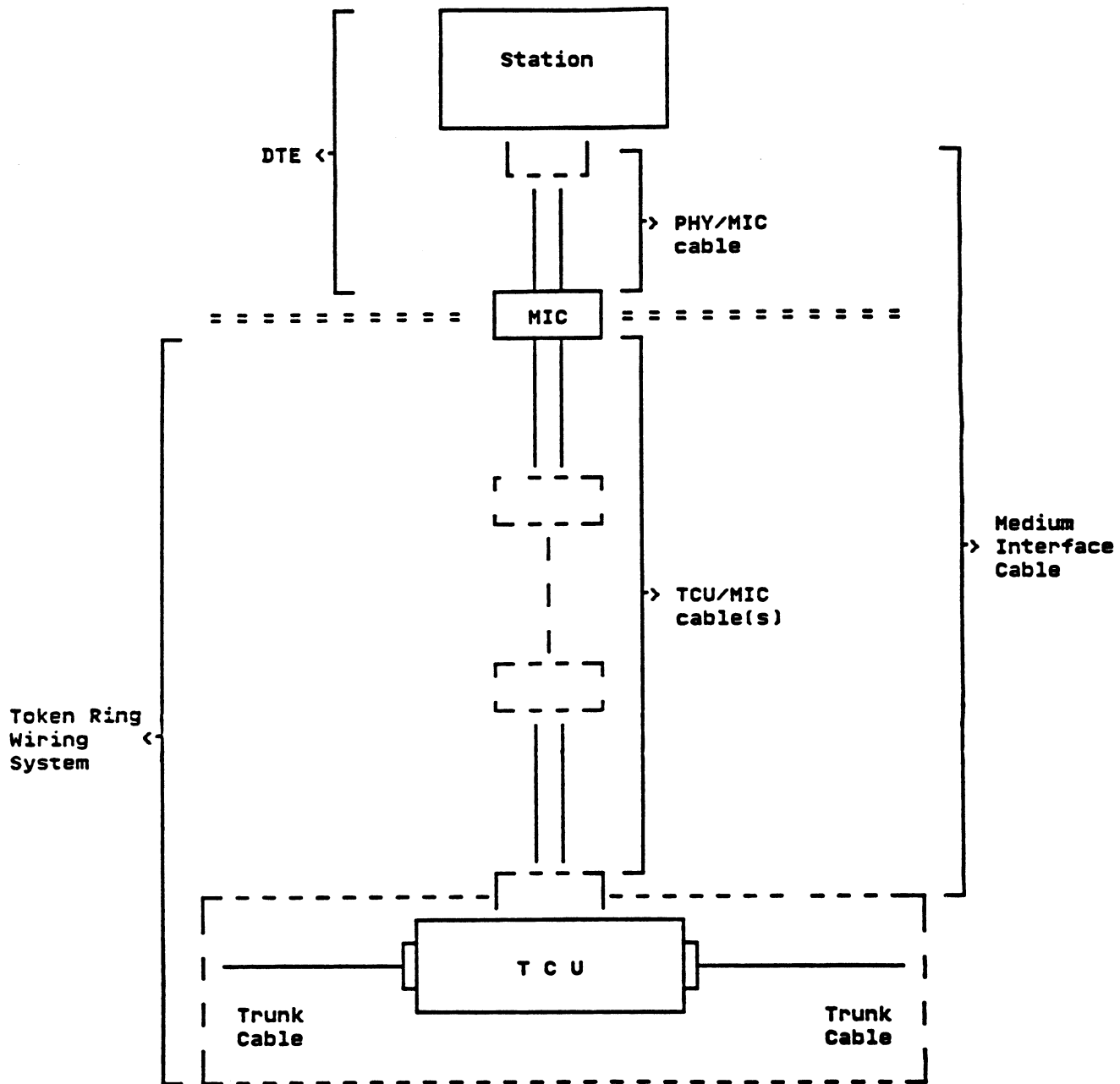


Figure 1. DTE interfacing with the Token Ring Wiring System

5 ABBREVIATIONS

AK	Data Acknowledgement
AOS	Additional Option Selection
CC	Connection Confirm
CL	Connectionless (-mode)
CO	Connection-mode
CR	Connection Request
DC	Disconnect Confirm
DLSDU	Data Link Layer Service Data Unit
DR	Disconnect Request
DSAP	Destination Service Access Point (as defined in ISO/DIS 8802-2)
DSP	Domain Specific Part
DTE	Data Terminal Equipment
ED	Expedited Data
ER	Error
IEEE	Institute of Electrical and Electronics Engineers
JTC	Joint Technical Committee
LAN	Local Area Network
LLC	Logical Link Control
MAC	Media Access Control
MIC	Medium Interface Connector
NSAP	Network Service Access Point
NSDU	Network Service Data Unit
OSI	Open Systems Interconnection
PDU	Protocol Data Unit
PHY	Physical
QOS	Quality of Service
SAP	Service Access Point
SSAP	Source Service Access Point (as defined in ISO/DIS 8802-2)
TCU	Trunk Coupling Unit
TPDU	Transport Protocol Data Unit
TSAP	Transport Service Access Point
TSAP-ID	Transport Service Access Point Identifier
TSEL	Transport Selector
UI	Unnumbered Information
XID	Exchange Identification

6 SCENARIO DESCRIPTION

The scenario is illustrated in Figures 2 and 3.

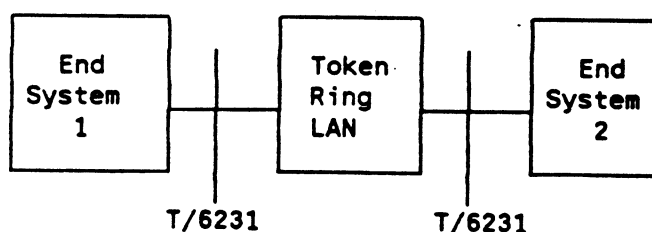


Figure 2. Communication across a single Token Ring LAN