INTERNATIONAL STANDARD

ISO/IEC 14709-1

First edition
1997-09-01

Information technology — Configuration of Customer Premises Cabling (CPC) for applications —

Part 1:
Integrated Services Digital Network (ISDN) basic access

Technologies de l'information — Configuration du câblage dans les locaux d'usagers (CPC) pour les applications —

Partie 1: Accès de base au réseau numérique à intégration de services (RNIS)

Reference number
ISO/IEC 14709-1:1997(E)

Contents

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. 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.

International Standard ISO/IEC 14709-1 was prepared by Joint Technical Committee ISO/IEC JTC 1, *Information technology*, Subcommittee SC 25, *Interconnection of information technology equipment.*

ISO/IEC 14709 consists of the following parts, under the general title *Information technology — Configuration of Customer Premises Cabling (CPC) for applications*:

– *Part 1: Integrated Services Digital Network (ISDN) basic access*

– *Part 2: Integrated Services Digital Network (ISDN) primary access*

Annexes A and B of this part of ISO/IEC 14709 are for information only.

Introduction

This part of ISO/IEC 14709 is intended for use by those designing, planning or procuring cabling for ISDN basic access within a customer's premises. The configurations in this part of ISO/IEC 14709 are designed to be effective when either implemented with cabling having the recommended characteristics, or implemented with the components specified in clause 7. In addition, guidance is given for the use of generic cabling in accordance with ISO/IEC 11801.

Information technology — Configuration of Customer Premises Cabling (CPC) for applications —

Part 1:
Integrated Services Digital Network (ISDN) basic access

1 Scope

This part of ISO/IEC 14709 defines the requirements for the design and configuration of customer premises cabling for the connection of basic access ISDN equipment.

It defines

- design requirements for ISDN basic access with point-to-point and point-to-multipoint cabling configurations;
- minimum cabling requirements for the installation of new cabling;[1)]
- criteria for the use of generic cabling;
- criteria for the use of existing cabling.

This part of ISO/IEC 14709 applies to the customer premises cabling. It describes the cabling requirements, needed to transmit ISDN basic access signals as defined by ITU-T Recommendation I.430. The requirements placed on the customer premises cabling are solely those necessary to enable terminal equipment conforming to ITU-T Rec. I.430 to operate into the Network Termination (NT) via configurations defined in this part of ISO/IEC 14709.

2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this part of ISO/IEC 14709. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this part of ISO/IEC 14709 are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

ISO/IEC 8877:1992,	*Information technology - Telecommunications and information exchange between systems - Interface connector and contact assignments for ISDN Basic Access Interface located at reference points S and T.*
ISO/IEC 11801:1995,	*Information technology - Generic cabling for customer premises.*
IEC 603-7:1996,	*Connectors for frequencies below 3 MHz for use with printed boards - Part 7: Detail specification for connectors, 8-way, including fixed and free connectors with common mating features, with assessed quality.*
ITU-T Rec I.430 (Blue Book)	*ISDN user-network interface; Layer 1 recommendations.*

3 Definitions

The meaning of the term *round trip delay* can be found in ITU-T Recommendation I.430 (Blue Book), A.2.

Furthermore, for the purposes of this part of ISO/IEC 14709, the following definitions apply.

3.1 cabling: The assembly of all cables, connections, patch panels and other passive components which comprise the telecommunications infrastructure.

3.2 network termination: The functional group on the network side of a user-network interface.

NOTE: A network termination always comprises a transmission part NT1 and optionally a switching part NT2.

3.3 power feeding: The function which provides for the capability to transfer power across the interface of the NT.

3.4 terminal equipment: The functional group on the user side of a user-network interface.

NOTE: Terminal equipment includes terminal(s), terminal adapter(s) and, if any, NT2 functional group.

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1) Although this part of ISO/IEC 14709 specifies the minimum requirements for cabling dedicated to ISDN basic access, it is highly recommended that cabling newly installed complies with ISO/IEC 11801 class B or higher.

4 Abbreviations and symbols

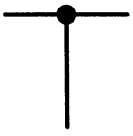
4.1 Abbreviations

BD	Building distributor
CD	Campus distributor
FD	Floor distributor
FFS	For further study
ISDN	Integrated services digital network
NEXT	Near-end crosstalk loss
NT1	Network termination 1
NT2	Network termination 2
S	S reference point
S_0	S_0 interface
SC	Structured cabling
T	T reference point
TE	Terminal equipment
TP	Transition Point
TR	Terminating resistor

NOTE: The meanings of the abbreviations S, S_0 and T conform to ITU-T Recommendation I.430.

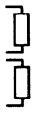
4.2 Symbols

cable

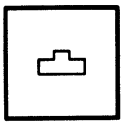


spur/tap with a junction to a cable which is the terminated bus

Network Termination

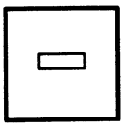


Terminating Resistors



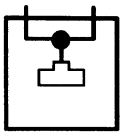
outlet according to IEC 603-7

plug according to IEC 603-7



any socket

any plug



Joint at outlet

5 Design requirements

5.1 General

Signals passing between the NT and TE(s) for the various configurations are subject to attenuation, delay and distortion. Cabling components (including extension cords, adapters, cross-connect components, outlets, junction boxes, cables, spurs etc.) and connected terminals all contribute to these effects. The design requirements for the cabling are dependent on the configuration chosen.

5.2 Insertion loss

The insertion loss is measured from the NT to the TR at 96 kHz with 100 Ω source and load impedances. The maximum insertion loss for each configuration is shown in table 1.

Table 1 — Maximum insertion loss for each configuration

Configuration	Insertion loss at 96 kHz
Point-to-point	6 dB
Extended passive bus	4 dB
Short passive bus	not critical
Y-configuration	not critical

5.3 Longitudinal conversion loss

The longitudinal conversion loss of the cabling shall be equal to, or greater than, 43 dB when measured at 96 kHz.

5.4 Round trip delay

The round trip delay introduced by the cabling shall not exceed:

a) 2,0 µs for the total cabling of both the short passive bus at 96 kHz and the Y-configuration;

b) 0,5 µs differential round trip delay for the cabling between the first and last outlet of the extended passive bus.

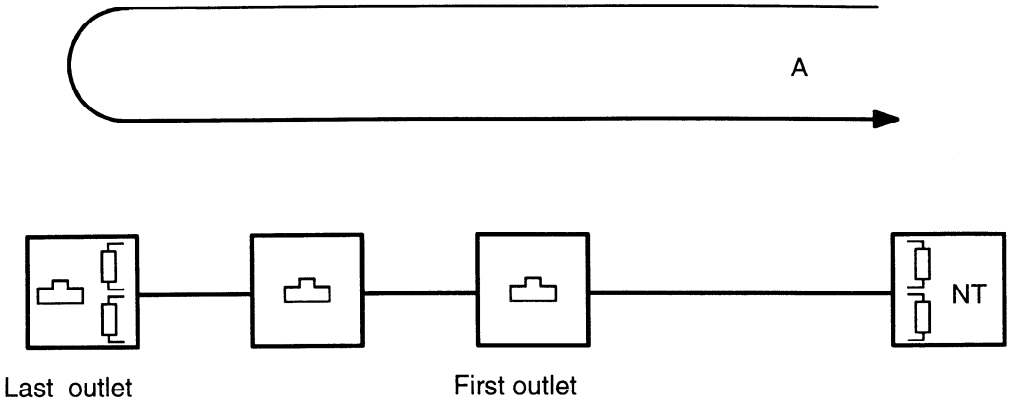
These requirements are illustrated in figure 1.

5.5 Power feeding

The length of the cabling may be limited by the cable resistivity, the number of terminals, their power consumption and the capability of the remote power sources.

The loop resistance has to be controlled in order to fulfil the power feeding requirements and to avoid static saturation of inductive components in NT and TEs due to the difference in d.c. resistances of the two wires making up the twisted pair. The d.c. resistance unbalance of the two wires shall not exceed 3 % if the loop resistance is greater than 5 Ω.

In the majority of cases power is supplied via the phantom of the transmit and receive pairs. In this case only two pairs are used. In some applications a third pair is needed for power source 2 and power sink 2.



For the short passive bus configuration: A ≤2,0 µs
For the extended passive bus configuration: A - B ≤0,5 µs

Figure 1 — Round trip delay requirements

5.6 Electromagnetic environment

The ISDN basic access is designed to work in most environments. However, its performance may be degraded by interference from external electromagnetic sources (such as motors) and interference from other transmission systems sharing the same cable.

The impulsive noise generated by, for instance, analogue telephony or unbalanced data interfaces, can cause interference with signals carried on the ISDN cabling.

Crosstalk can be limited by using pairs for ISDN basic rate in separate cables or in separate bundles of pairs in the same cable. Before sharing of ISDN S-bus with other transmission systems in the same cable it shall be verified that they do not interfere with each other.

In noisy environments or adjacent to sensitive equipment, shielded cabling may be advisable. Cables routed outside of buildings may require protection devices. The attenuation and capacitance of protection devices shall be taken into account.

5.7 Spurs

Because spurs will add capacitance to the cabling, they are not recommended. When needed, the length of spurs used for connection of terminal outlets shall not exceed 1 m. The length of a spur used to attach a NT should not exceed 0,5 m.

5.8 Near-end crosstalk loss (NEXT)

The near-end crosstalk loss of the cabling shall be greater than 35 dB at 96 kHz. It is recommended that the NEXT of the cable be greater than 54 dB for satisfactory noise immunity (see 7.2).

6 Configurations

6.1 General

The following design requirements are common to all ISDN basic access user network interface configurations:

a) Where S_0 interfaces can be extended under fallback mode (e.g. when the NT2 is bypassed), further loss and delay will be introduced into the link. The design requirements apply to worst case conditions.

b) The TE may be hardwired to the cable termination. If a TE cord is used it shall comply with ISO/IEC 8877.

c) Terminating resistors (see 7.4) are needed at both ends of the transmit and receive pairs. Locations are shown in figures 2 to 5 and figures 7 to 9.[1)] If a specific configuration requires the terminating resistors at the NT, these terminating resistors shall always be present either within the NT or at the connection point between the NT (cord) and the bus cabling.

d) The NT may be connected to the cabling in three ways:

- hardwired;
- with a outlet integral to the NT;
- via a flexible cord with a plug.

ISO/IEC 8877 and IEC 603-7 may be applied for the case with a connector at the NT. If however hardwiring is used, an outlet complying to ISO/IEC 8877 and IEC 603-7 should be available close to the NT for supervision and maintenance.

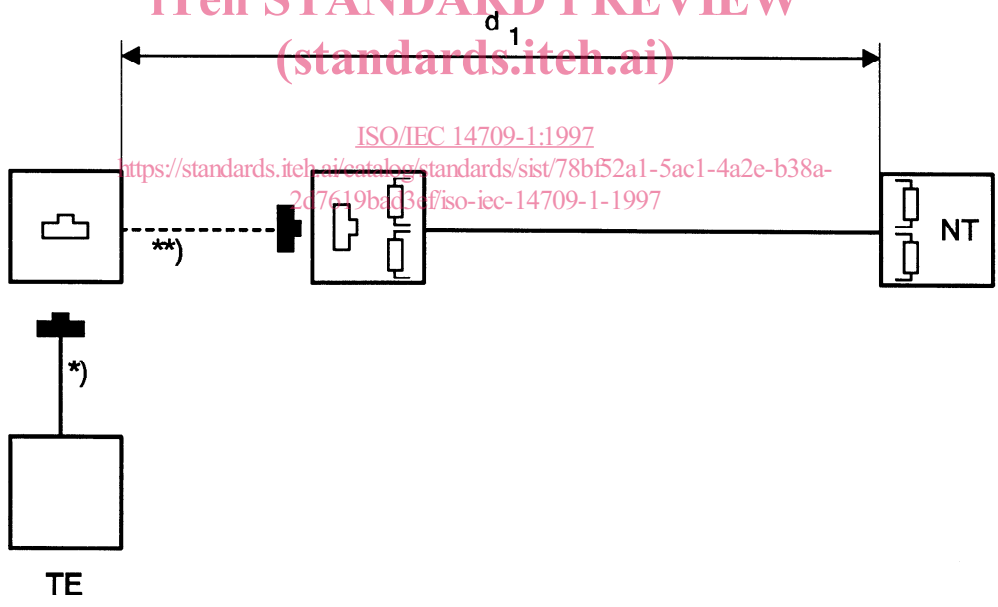
Configurations which can be supported within the hierarchical star topology allow the full flexibility of generic cabling to be exploited. When planning configurations, the following should be taken into account:

1) point-to-point configurations including star (see 6.6) can easily be carried out via generic cabling defined in ISO/IEC 11801;

2) short passive bus can not be carried out via generic cabling defined in ISO/IEC 11801. Extended passive bus and Y-configurations can be carried out via generic cabling using adapters in the work area. See 6.7 for implementation over structured cabling systems. Only two B-channels are available for all the possible extension outlets of one single bus. Thus point-to-multipoint configurations can not replace PBX functionality.

6.2 The point-to-point configuration

The point-to-point configuration is illustrated in figure 2.



d_1 Total length of cabling from NT to outlet
*) TE connecting cord or integral cord
**) Optional extension cord
Maximum number of outlets: 1
Maximum number of terminals: 1

Figure 2 — Point-to-point configuration

Requirements

For a point-to-point configuration, the insertion loss at 96 kHz shall be less than 6 dB (see 5.2) over the distance d_1 in figure 2. This includes cabling and extension cords if used. Maximum distances can be found in annex B.

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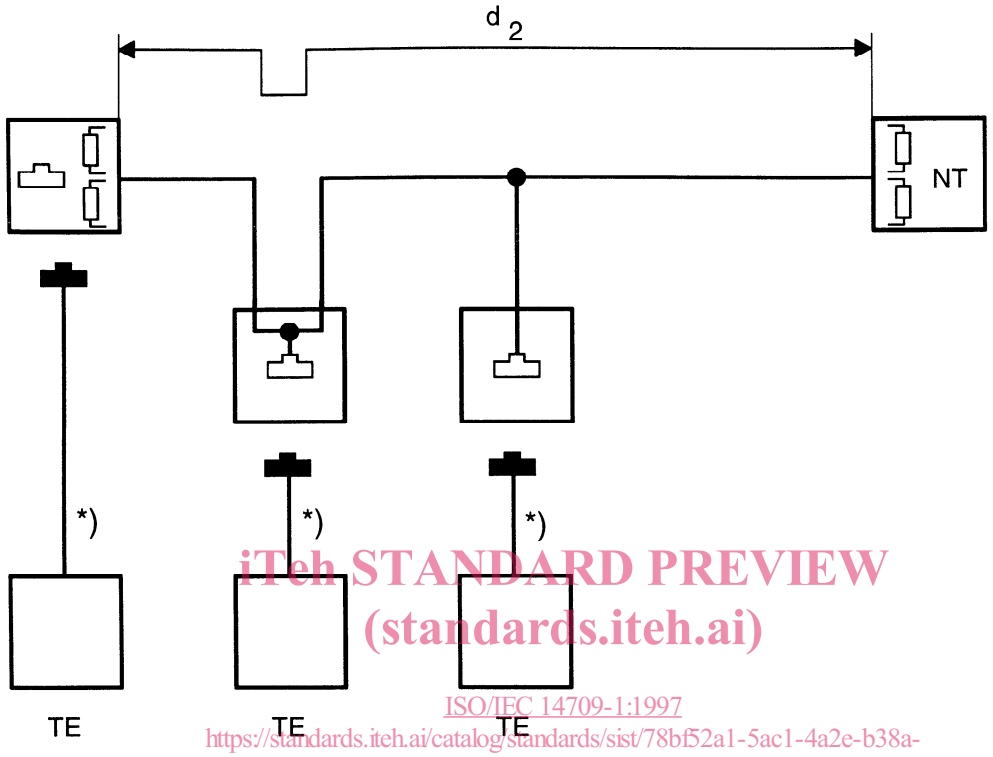
1) In generic cabling terminating resistors shall be placed external to the TO.

The length of an optional extension cord shall not exceed 25 m.

It is recommended that the polarity of each wire be maintained throughout the length of the cabling to facilitate testing and more effective cable management.

6.3 The short passive bus configuration

In the short passive bus configuration, outlets for the terminals are distributed at any point along the bus. A typical short passive bus is illustrated in figure 3.



d_2 Total length of cabling from NT to last outlet
*) TE connecting cord or integral cord
Maximum number of outlets: 12
Maximum number of terminals: 8

Figure 3 — Short passive bus

Requirements

The round trip delay requirement for the short passive bus specified in 5.4a) applies to the bus length d_2 in figure 3. Length d_2 is the total length of the cabling between the NT and the last outlet, it does not include the length of spurs. Maximum distances can be found in annex B.

Not more than 8 terminals shall be connected to the short passive bus at any one time. The maximum number of outlets connected directly to the bus is limited to 12, however, no more than 8 shall be attached via spurs.

NOTE: It may be necessary to plan for less than 8 terminals on a short passive bus to meet the anticipated traffic conditions.

It is recommended not to use spurs. However, if they are used they shall not exceed 1 m. A spur shall be terminated with a single outlet.

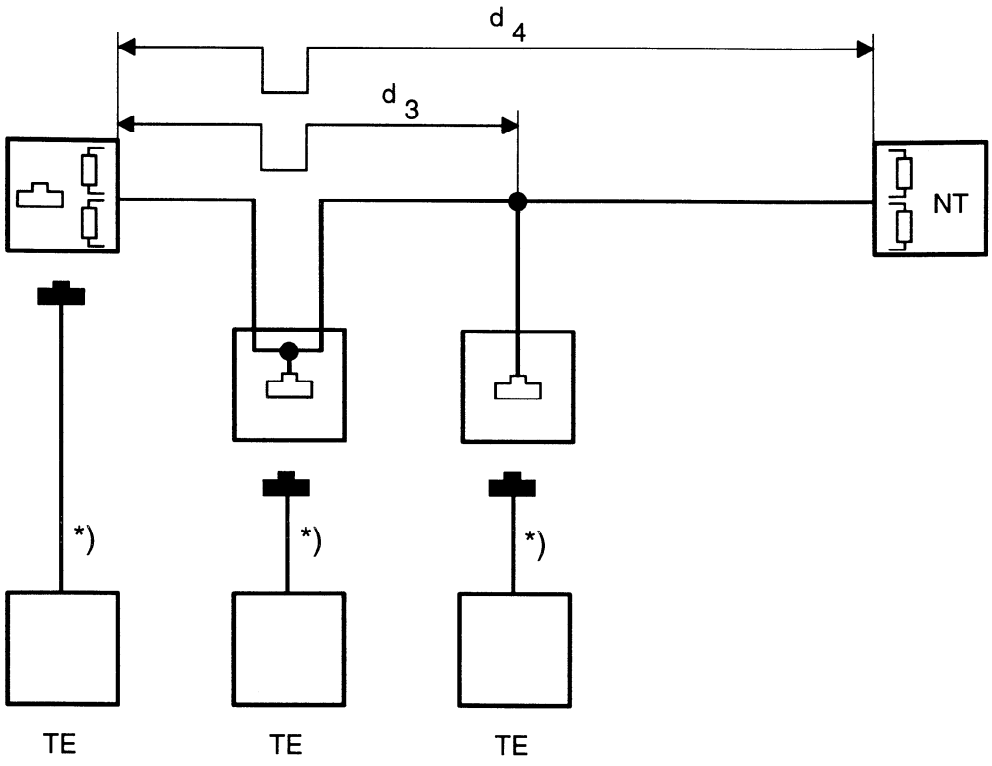
The polarity of each wire of the twisted pair shall be maintained throughout the bus.

Extension cords shall not be used to extend the TE cord.

6.4 The extended passive bus configuration

Up to 4 TEs are grouped together at the distant end of the bus to the NT.

A typical extended passive bus is illustrated in figure 4.



d_3 Length of cabling between first and last outlet
d_4 Length of cabling from NT to last outlet
*) TE connecting cord or integral cord
Maximum number of outlets: 12
Maximum number of terminals: 4

Figure 4 — Extended passive bus

Requirements

The insertion loss requirement for the extended passive bus specified in 5.2 applies to the length d_4 in figure 4. The differential round trip delay requirement for the extended passive bus specified in 5.4b) applies to the length d_3 in figure 4. Maximum distances can be found in annex B.

The number of terminals that may be connected to the bus shall not exceed 4.

NOTE: It may be necessary to plan for less than 4 terminals on an extended passive bus to meet the anticipated traffic conditions.

It is recommended not to use spurs. However, if spurs are present they shall not exceed 1 m.

The polarity of each wire of the twisted pairs shall be maintained throughout the bus.

Extension cords shall not be used to extend the TE cord.

6.5 The Y-configuration

The Y-configuration is illustrated in figure 5.

NOTE: If the NT is equipped with terminating resistors, they may stay.