

5th edition, June 2004

Original

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General technical regulations governing establishment and development of communication capacity over the railway telecommunications network of UIC members

Prescriptions techniques générales pour l'établissement et le développement de la capacité de communication sur le réseau de télécommunications des membres de l'UIC
Allgemeine technische Vorschriften für den Auf- und Ausbau der Kommunikationen im UIC-Bahnentelekomunikationsnetz



UNION INTERNATIONALE DES CHEMINS DE FER
INTERNATIONALER EISENBAHNVERBAND
INTERNATIONAL UNION OF RAILWAYS

Leaflet to be classified in Volume:

VII - Way and Works

Application:

With effect from 1 May 2004

All members of the International Union of Railways

Record of updates

1st edition, January 1959	First issue
2nd edition, January 1961	with Amendment of 1.1.1970
3rd edition, January 1985	
4th edition, January 1997	
5th edition, June 2004	Overhaul of leaflet

The person responsible for this leaflet is named in the UIC Code

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Summary

The UIC Leaflet 753-2 describes the facilities, equipment and organisation required to support international switched-circuit telecom services. These services are offered through the UIC International Railway Telephone Network (IRTN) consisting of the internationally-connected telecommunication networks of the UIC Members. The Leaflet states the railway's responsibilities in support of the implementation of these services, including the obligation to keep the international directory up-to-date.

1 - General

1.1 - Scope of document

This document describes in terms of hardware and software requirements the current UIC Corporate Fixed Telecommunication Network (consisting of the internationally-connected fixed telecommunication networks of the UIC Members). It focuses on the network's technological evolution and deals with the same UIC Corporate Fixed Telecommunication Network using digital PABXs (see [List of abbreviations - page 24](#)), to be known in future as the International Railway Telecommunications Network (IRTN).

It also explains the international switched-circuit telecom services with which railway users in Europe will be provided in the digital era. It describes the facilities, equipment and organisation required to support them. It states the UIC Members responsibilities in support of the implementation of these services.

This leaflet does not prescribe any requirement for the switches of the railways' national networks that are operated by Railway Telecommunication Operators (RTOs).

Its provisions are based in principle on those of the International Telecommunications Union - Telecommunication Standardisation Sector (ITU-T) (see [List of abbreviations - page 24](#)). However, the type of automatic telephone equipment used by the RTOs has enabled major simplifications to be made in relation to the ITU-T Recommendations.

Matters relating to operating are addressed in UIC Leaflets 750 and 753-3 (see [Bibliography - page 25](#)).

Terminology and definitions can be found in ITU-T Volume I, Fascicle I.3.

1.2 - Approval of revised interconnection arrangements

The UIC Way and Works Committee agreed in 1989 that all UIC Members would proceed with digitalisation of the International Railway Telecommunications Network. The agreement was ratified by letter from the Chairman of the UIC to the Chief Executives of the railways to confirm the Board of Management's commitment to ensure that members made adequate financial provision for this operation.

1.3 - Technology migration

With the acceptance of the switch from analogue to digital networking came an agreement at the January 1992 Sub-Committee for Telecommunications whereby all new international transit exchanges ordered in future would use the ITU-T (formerly CCITT (see [List of abbreviations - page 24](#))) N.7 Signalling System. As members upgrade to digital transit exchanges, they shall be responsible for maintaining existing signalling arrangements adjacent to international transit exchanges.

2 - Existing network

2.1 - Structure of the Telecommunications Network of UIC Members

International telephone communications are established semi-automatically¹ or automatically and the latter mode formerly used must be progressively upgraded over the whole network.

The network must be structured to allow migration from analogue to digital operation, and as a consequence the network will evolve into the potential International Railway Telecommunications Network (IRTN).

Initially one or two countries will have digital transit exchanges and progressively, as each RTO upgrades its international connections and transit exchanges, the requirement for retention of analogue interfaces will diminish.

Large RTOs, for national and safety reasons, may operate several international switches distributed over different locations within the country, but these should be seen to operate as a single switch for the adjoining Railways and UIC network users. In this case, the national circuits between these exchanges shall be considered as international circuits, in accordance with UIC Leaflet 753-1 (see [Bibliography - page 25](#)). The number of such national circuits, together with those in the telecommunications network of UIC members that are connected in tandem, must be kept to a minimum to limit transit times. The current and proposed IRTN network architecture is given in the UIC Infrastructure Commission's permanent documents. Examples of possible solutions are given in Appendices [A - page 20](#) and [B - page 21](#).

2.2 - User information

The international directory of the existing UIC Corporate Telecommunications Network and IRTN is located on the UIC WWW site (ernst.uic.asso.fr) in the form of a database. The database contains the European Railway Numbering Scheme for Telecommunications (ERNST) and was created under the UIC Project of the same name.

The ERNST Database comprises the following lists:

- Details – Common information on the railway corporate telephone network;
- Routing – Overview of all dialling codes from originating to destination railway in table form;
- Destination Codes – most important town (area) codes. The number of records is limited to 100 of the most important towns (areas);
- Subscribers – most important subscriber numbers or group of numbers, e.g. railway headquarters, controllers, etc.

The UIC Infrastructure Department issues printed versions of the directory at least every two years.

1. With operator intervention.

2.3 - Number of circuits placed end-to-end when making a call in the analogue network sections

Calls are made by connecting end-to-end as many circuits as necessary, depending on the structure of the national telephone networks and the layout of the railway international network, while complying with the provisions of UIC Leaflet 753-1 (see Bibliography - page 25). UIC Members should endeavour to reduce the number of connections whenever the structure of their networks permits.

As a result of the structure of the telephone system of the UIC Members, the number of pulse trains necessary for different destinations varies according to circumstances.

2.4 - Access to the international network

Since calls are normally made without telephone operator intervention, either in the destination network or any network crossed in transit, it follows that there is no check by the destination or transit exchanges.

UIC Members should therefore take adequate measures to make provision, at the calling point, for any check which might appear relevant to them, so that access to international telephone links is restricted to authorised users. For this purpose, UIC Members should select the most suitable methods (monitoring by telephone operator, technical monitoring by equipment or software).

At the moment, to establish communications with a user who can be reached through a UIC international circuit, it is necessary to define a route, the shortest one, and to apply the following directives:

- dial the national prefix to gain access to the international network;
- dial, in accordance with the numbering plans referred to in Point 2.2 - page 3, the code for gaining access to the desired network;
- dial the subscriber number.

NB : Using the ERNST Database, the entire destination number of the desired network to be dialled can be found without requiring a distinct prefix and access code.

To gain access to destination exchanges via the Network of UIC Members, it may be necessary to wait for a tone, a Morse code or verbal announcement from the exchange obtained, or even to observe a short pause before beginning to dial. The necessity of waiting for a tone, Morse code or verbal announcement is reflected in the ERNST Database by marker "W" (wait).

Examples:

1. In the digital network, when calling from the originating digital network to the destination digital network, it shall be possible to:
 - a. transmit the digit sequence without pauses for tones, Morse codes or verbal announcements;
 - b. apply a single code only, determining the destination network, and leaving optional route selection and control to the international transit exchange;
 - c. see Point 4.1.4 - page 12: Procedures for using IRTN, for details.

2. In a mixed analogue and digital network, when calling from an originating analogue to a destination digital network, the new digital transit exchange will not return a verbal announcement. However, all pauses necessary in order to reach the international part of the analogue network must be respected.
3. In a mixed analogue and digital network, when calling from an originating digital to a destination analogue network, all necessary pauses (waiting for a tone, Morse code or verbal announcement) must be taken into consideration and be entered manually by the subscriber or automatically by the digital international transit exchange.

2.5 - Direction, type and characteristics of the signals transmitted over international circuits in analogue network sections

2.5.1 - Direction for making calls on international circuits

Bearing in mind the relatively small number of international circuits on each route, these circuits will only be used to fullest capacity if calls can be made in both directions (so-called “two-way” or “mixed” circuits).

However, for important routes, consideration can be given to whether the circuits should be operated so that some of them are used in one direction. This technique can also be used when additional circuits are available at little extra cost. Unidirectional operation makes it possible to reduce simultaneous connections (“head-on clashes”) and in certain technologies, the equipment to be installed at connecting points.

The number of international circuits is determined by mutual agreement between the two RTOs concerned. The volume of telephone business must be measured periodically for each link; measuring must be carried out at least once a year. Neighbouring RTOs must mutually exchange data on the results of the measurements undertaken.

In principle, a sufficient number of circuits must be provided to ensure that the level of service for automatic operation never exceeds 5 % loss at the busiest period; indeed, every effort must be made to reduce this loss to a maximum of 1 %.

For semi-automatic services, a sufficient number of circuits must in principle be provided to ensure that the waiting period does not exceed 1 minute.

2.5.2 - Type of signalling in analogue networks

2.5.2.1 - The type of signalling to be used for a given circuit is selected by the RTOs concerned when the circuit is being constructed, and in consideration of its transmission medium and terminations.

2.5.2.2 - The signalling procedure on analogue circuits in accordance with Point **2.5.2.3** of this leaflet remains unchanged until digitalisation.

- **2.5.2.3** - As soon as a circuit between analogue exchanges is digitalised, conversion of the analogue system for signalling into channel 16 of the 2 Mbit/s circuit is to be undertaken. When converting, the conditions of ITU-T G.704, Table 9, are to be respected.