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TELEGRAPH SWITCHING

INTERNATIONAL TELEX SERVICE

INTEX SERVICE NETWORK REQUIREMENTS TO EFFECT INTERWORKING WITH THE INTERNATIONAL TELEX SERVICE

ITU-T Recommendation U.210

(Previously "CCITT Recommendation")

FOREWORD

The ITU Telecommunication Standardization Sector (ITU-T) is a permanent organ of the International Telecommunication Union. 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, established the topics for study by the ITU-T Study Groups which, in their turn, produce Recommendations on these topics.

ITU-T Recommendation U.210 was prepared by the ITU-T Study Group IX (1988-1993) and was approved by the WTSC (Helsinki, March 1-12, 1993).

NOTES

1 As a consequence of a reform process within the International Telecommunication Union (ITU), the CCITT ceased to exist as of 28 February 1993. In its place, the ITU Telecommunication Standardization Sector (ITU-T) was created as of 1 March 1993. Similarly, in this reform process, the CCIR and the IFRB have been replaced by the Radiocommunication Sector.

In order not to delay publication of this Recommendation, no change has been made in the text to references containing the acronyms "CCITT, CCIR or IFRB" or their associated entities such as Plenary Assembly, Secretariat, etc. Future editions of this Recommendation will contain the proper terminology related to the new ITU structure.

2 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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INTEX SERVICE NETWORK REQUIREMENTS TO EFFECT INTERWORKING WITH THE INTERNATIONAL TELEX SERVICE

(Helsinki, 1993)

The CCITT,

considering

(a) that new networks are being introduced based upon stored program control techniques;

(b) that these networks as well as being able to carry the international telex service, can also carry the Intex service using alphabets other than International Telegraph Alphabet No. 2 and that interworking between these services is essential;

(c) that the equipment provided for these networks supports an enhanced range or facilities but that for speed and ease of introduction of the Intex service some Administrations may wish not to offer these enhanced facilities at the outset;

(d) that Intex and similar services require the establishment of new types of signalling, and that these signalling types shall permit interworking between Intex terminals, between Telex terminals and Intex, and between Telex terminals and terminals capable of operating both Telex and Intex dual service;

(e) that Recommendation S.33 defines the alphabet and presentation characteristics for Intex;

(f) that Recommendation S.34 describes Intex terminal requirements to effect interworking with the international telex service;

(g) that Recommendation S.35 defines the coding of answerbacks for Intex service;

(h) that Recommendation F.150 defines the operational and service requirements of the Intex service;

(i) that Recommendation F.82 defines the operational and service requirements for interworking between the Intex service and the international telex service;

(j) that a prompt response to the WRU/ENQ request is required when interworking between Intex and Telex,

NOTE – The development in the future of services similar to Intex may occur. It may be possible that some of the provisions of this Recommendation should be applied to such services.

unanimously declares the view,

(1) that there are two means (type 1 and type 2) whereby networks can provide interworking between Intex services and the international telex service;

(2) in type 1 network operation interworking is effected by the provision of speed and code conversion facilities within the network. type 1 network operation is described in clause 1;

(3) in type 2 network operation interworking is effected by the dynamic changing of the baud rate and code structure of all switching centres and circuits involved in a call after call establishment, or by automatic call reselection. If dynamic changing is involved then the network may have to be speed and code independent. type 2 network operation is described in clause 2;

(4) clause 3 describes the establishment of calls between type 1 and type 2 networks.

1 Recommendation U.210 – Type 1 network requirements to effect interworking with the international telex service

1.1 Call Routing and establishment

1.1.1 Calls originating from Intex or similar terminals shall normally be routed over circuits operating at the same speed as the calling terminal until received at the switching centre from which the called terminal is served. This terminating switching centre will know if the called destination is a customer of the international telex service.

Calls from Intex terminals may be routed to international telex trunk circuits at an originating or transit switching centre if that switching centre is able to determine that the called destination is a customer of the international telex service from, for example, examination of the selection received.

1.1.2 On calls incoming from a type E trunk, which are successfully routed to the international telex service (either directly to a telex customer line or via an international telex trunk circuit), the switching centre making the connection to the telex service shall transmit call progress signal 91 to the calling type E circuit during call establishment as detailed in 1/U.101.

1.1.3 On calls incoming from a type F trunk, which are successfully routed to the international telex service (either directly to a telex customer line or via an international telex trunk circuit), the switching centre making the connection to the telex service shall transmit to the type F circuit a call connected signal which indicates connection to telex during call establishment as detailed in 2/U.101.

1.1.4 On calls incoming from Intex customer lines, the originating switching centre shall not transmit a Speed Indicator sequence (as detailed in Recommendation U.101) if either:

a) the call is routed directly to a telex customer line or trunk circuit; or

b) call progress signal 91 is received over a type E circuit from a subsequent switching centre during call establishment; or

c) the call connected signal received over a type F circuit indicates connection to the international telex service.

1.1.5 No Speed Indicator sequence shall be transmitted on calls incoming from the international telex service and terminating on Intex customer lines.

1.2 Code conversion

1.2.1 A switching centre which effects connection from an Intex circuit (customer line or trunk) to the international telex service, or vice-versa, shall provide code conversion facilities for the duration of the call.

1.2.2 Conversion between IA5 and ITA2 and between ITA2 and IA5 shall be as detailed in Recommendation S.18 with the exception that characters from IA5 Columns 0 and 1 should be entirely non-printing and that IA5 characters 1/14 and 1/15 convert to ITA2 combinations 29 and 30 in figures mode (L/S and F/S) respectively. Similarly, in the reverse direction L/S and F/S convert to IA5 combinations 1/14 and 1/15.

1.2.3 When converting from IA5 to ITA2, a switching centre shall check each received character for parity errors. Any characters found to be in error shall be translated as ITA2 character 2 in figures shift (?).

1.2.4 When converting from IA5 to ITA2, a switching centre shall ensure that each ITA2 character has been preceded by the appropriate shift character. A shift character shall only be inserted when a change of case is required. The switching centre shall ensure that both the forward and backward signalling paths of the international circuit are maintained in the same shift.

1.2.5 The responsibility for ensuring line length compatibility with the international telex service rests with the Intex terminal (see Recommendation S.34). The network does not therefore need to monitor the number of printing or spacing characters forwarded to the international circuit between line feed sequences. The network shall not introduce any line feed sequences.

1.3 Speed conversion and flow control

1.3.1 A switching centre which effects connection from an Intex circuit (customer line or trunk) to the international telex service, or vice-versa, shall be known for the purposes of this Recommendation as the conversion centre.

1.3.2 The conversion centre shall provide speed conversion and character flow control facilities for the duration of the call.

1.3.3 The Intex terminal is required to lower the rate at which it transmits characters to that of the international telex service (as detailed in Recommendation S.34). However, to allow for the insertion of shift characters the conversion centre shall provide a small buffer store for characters requiring conversion, and shall operate flow control procedures with the Intex terminal.

1.3.4 When the buffer contains more characters than Threshold 1 awaiting transmission to the telex circuit, the conversion centre shall transmit an X-OFF character (IA5 character 1/3) to the Intex circuit. If the buffer continues to fill, additional X-OFF characters shall be transmitted to the Intex circuit when other thresholds are exceeded. The conversion centre shall not rely upon a single generation of the X-OFF character (at Threshold 1) to achieve flow control because of the possibility of corruption of this character before reception by the Intex terminal.

1.3.5 The conversion centre shall continue to transmit the contents of the buffer to the international telex circuit.

1.3.6 If the number of characters in the buffer reaches Threshold 2 the conversion centre shall immediately clear both the international telex and Intex circuits.

1.3.7 After transmission of one or more X-OFF characters, the conversion centre shall transmit an X-ON character (IA5 character 1/1) to the Intex circuit when the number of characters in the buffer awaiting transmission to the international telex circuit has fallen below Threshold 3.

1.3.8 If, after transmission of an X-ON character, no further characters are received from the Intex circuit the conversion centre shall transmit further X-ON characters at frequent intervals until a character is received from the Intex circuit, or until a clearing signal is received from either the international telex or Intex circuits. The conversion centre shall not rely upon a single generation of the X-ON character (at Threshold 3) to achieve flow control because of the possibility of corruption of this character before reception by the Intex terminal.

1.3.9 The choice of values for Thresholds 1, 2 and 3 is a matter for individual Administrations to determine in conjunction with the designers of switching equipment. However, in order that the delay from transmission of an ENQ signal from an Intex terminal and reception of the consequent answerback is kept within acceptable limits Threshold 2 shall not exceed 50 characters. Furthermore, to allow for propagation and switching delays, plus the response time of an Intex terminal to a received X-OFF character, the interval between Thresholds 1 and 2 shall not be less than 25 characters.

2 Recommendation U.210 – Type 2 network requirements to effect interworking with the international telex service

2.1 Call Routing and establishment

2.1.1 Calls originating from Intex terminals shall normally be routed over circuits operating at the same speed as the calling terminal until received at the switching centre from which the called terminal is served. This terminating switching centre will know if the called destination is a customer of the international telex service.

Calls from Intex terminals may be routed to international telex trunk circuits at an originating or transit switching centre if that switching centre is able to determine that the called destination is a customer of the international telex service from, for example, examination of the selection received.

2.1.2 On calls incoming from a type E trunk, which are successfully routed to the international telex service (either directly to a telex customer line or via an international telex trunk circuit), the switching centre making the connection to the telex service shall transmit call progress signal 91 to the calling type E circuit during call establishment as detailed in 1/U.101.

2.1.3 On calls incoming from a type F trunk, which are successfully routed to the international telex service (either directly to a telex customer line or via an international telex trunk circuit), the switching centre making the connection to the telex service shall transmit to the type F circuit a call connected signal which indicates connection to the international telex service during call establishment as detailed in 2/U.101.

2.1.4 On calls incoming from Intex customer lines the originating switching centre shall transmit a Telex Indictor signal signifying connection to the international telex service (as detailed in Recommendation U.101) if either:

a) the call is routed directly to the international telex service (via a customer line or trunk circuit); or

b) call progress signal 91 is received over a type E circuit from a subsequent switching centre during call establishment; or

c) the call connected signal received over a type F circuit indicates connection to the international telex service.

The Telex Indicator signal shall be transmitted by the originating switching centre to the calling Intex customer line. This transmission shall be after reception of a call connected signal from the called circuit and before transmission of a WRU signal to the called circuit.

2.1.5 Within 33 milliseconds from the transmission of the Telex Indicator signal the originating switching centre shall ensure that both the calling and called circuits are conditioned to receive and transmit ITA2 characters at a nominal modulation rate of international.

2.1.6 Terminating and transit switching centres shall ensure that both the calling and called circuits are conditioned to receive and transmit ITA2 characters at a nominal modulation rate of 50 baud within 33 milliseconds of the transmission or transfer or either:

a) a call connected signal which is preceded by non-clearing call progress signal 91 (type E circuits); or

b) a call connected signal which indicates connection to the international telex service (type F circuits).

2.1.7 On call incoming from the international telex service which terminates on an Intex customer line, the terminating switching centre shall transmit a Telex Indicator signal to the called terminal.

Transmission of this signal shall occur after reception of a call connected signal from the called terminal. The transmission of a call connected signal to the calling circuit shall be delayed until after transmission of the Telex Indicator signal.

3 Recommendation U.210 – Interworking between type 1 and type 2 networks

3.1 When a receiving type 2 network determines that a call has originated on a type 1 network (as indicated by the received class of traffic character on a type E or type F trunk) and the call is destined for an international telex customer the call shall be cleared by the receiving network after transmission of call progress signal 75 (type E trunks) or the Change Speed service signal CS (type F trunks).

3.2 When a receiving type 1 network determines that a call has originated on a type 2 network (as indicated by the received class of traffic character on a type E or type F trunk) and the call is destined for an international telex customer the call shall be cleared by the receiving network after transmission of call progress signal 75 (type E trunks) or the Change Speed service signal CS (type F trunks).

3.3 Upon reception of call progress signal 75 on a type E trunk, or service signal CS from a type F trunk the originating switching centre shall maintain the call on the calling customer line, clear and guard the called Intex trunk circuit and reattempt the call via the international telex network.

When the call is established the originating network shall operate as detailed in clause 1 or clause 2 as appropriate.

3.4 At transit switching centres any call progress signal 75 received from a called type E trunk, or service signal CS received from a called type F trunk shall be transferred to the calling circuit in the format appropriate to the calling circuit (see 3/U.101). After transfer of this signal to the calling circuit the called circuit shall be cleared.