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TELECOMMUNICATION
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GENERAL RECOMMENDATIONS ON TELEPHONE SWITCHING AND SIGNALLING

CLAUSES APPLICABLE TO ITU-T STANDARD SYSTEMS

ANALYSIS OF FORWARD ADDRESS INFORMATION FOR ROUTING

ITU-T Recommendation Q.107 *bis*

(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 Q.107 *bis* was revised by the ITU-T Study Group XI (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 Similarly, in this reform process, the CCIR and the IFRB have been replaced by the Radiocommunication Sector.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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ANALYSIS OF FORWARD ADDRESS INFORMATION FOR ROUTING

(Geneva, 1980; modified at Melbourne, 1980 and at Helsinki, 1993)

1 General

This Recommendation covers the analysis of forward address information for the routing of circuits using Signalling Systems No. 4, No. 5, No. 6, No. 7 and R2.

For Signalling System R1, Recommendation Q.324 [1] indicates that in the application of Signalling System R1 to intra-regional networks, the routing plan of that network shall apply. The routing plan is such that analysis is limited to a maximum of six digits.

Signalling Systems No. 4, No. 5, No. 6, No. 7 and R2 as specified are suitable for international application (see also Recommendation Q.7) and Recommendations Q.12 and Q.13 on routing are applicable. Similarly, for international traffic the combinations of digits to be sent must be in accordance with Recommendations Q.10, Q.11 *bis* and Q.101 to Q.107.

Based on the forward address information received (see Recommendation Q.107), routing is performed at the outgoing international exchange and at the following (transit) exchanges. For this purpose, an analysis of some of the information received is required. Recommendation Q.107 specifies the standard sequences of forward address information for each of the signalling systems mentioned above.

2 Digit analysis at the outgoing international exchange

The ISDN numbering plan is based on an extension of the existing numbering plans applicable to national and international public telephone networks. In fact, ISDN services may be provided under the existing numbering plan for the international telephone service. However, some Administrations may choose to allow for full E.164 numbers (maximun 15 digits). Therefore, the associated change which motivates an increase in the maximum number of digits which must be analysed in the outgoing international exchange to determine routing should be fully supported.

More specifically, according to Recommendation E.164, this maximum should be equal to 6 digits, the language digit (L) or the discriminating digit (D) not being included. Some examples of the information required to determine routing at an international exchange are given in the following:

$I_1\ Z\ N_1\ N_2\ N_3\ N_4\ N_5$, or

$I_1\ I_2\ Z\ N_1\ N_2\ N_3\ N_4$, or

$I_1\ I_2\ I_3\ Z\ N_1\ N_2\ N_3$

where

I_1, I_2, I_3	are the digits of the country code
Z	is the characteristic digit, i.e. discriminating digit (D) or language digit (L), and
$N_1, \ldots N_n$	are the digits of the national (significant) number.

In cases where the country code is shared by different countries, up to 7 digits may have to be analysed for routing and accounting purposes. In the implementation of new international exchanges, this should be taken into account.

In general, the whole amount of forward address information relating to international calls is stored at the outgoing international exchange.

Some examples of the information required to determine the routing at an international exchange are given in the following:

$I_1\ Z\ N_1\ N_2\ N_3$[1], or

$I_1\ I_2\ Z\ N_1\ N_2$[1], or

$I_1\ I_2\ I_3\ Z\ N_1\ N_2$[1]

where

I_1, I_2, I_3	are the digits of the country code
Z	is the characteristic digit, i.e. discriminating digit (D) or language digit (L), and
$N_1, \ldots N_n$	are the digits of the national (significant) number.

The maximum number of digits which have to be analysed in the outgoing international exchange to determine the routing is 5, the language digit (L) or the discriminating digit (D) not being included. In cases where the country code is shared by different countries, up to 7 digits may have to be analysed for routing and accounting purposes. In the implementation of new international exchanges, this should be taken into account.

In semi-automatic working, in the case where the language digit is not sent by the operator, and in automatic working, it is necessary to determine (in the outgoing international exchange) the position where the language or discriminating digit must be inserted automatically (for channel associated signalling systems immediately after the country code). This position is determined by an analysis of the first or the first two digits of the country code. A three-digit country code can also be detected by an analysis of the first two digits.

In the case of countries with more than one incoming international exchange where semi-automatic calls to code 11 or code 12 operators require a digit analysis beyond the country code for routing in the outgoing international exchange, N_1 may be used as the extra digit designating the incoming international exchange. For direct relations between the outgoing exchange and the incoming exchanges, sending of the digit N_1 to the incoming international exchanges is not required[2] .

3 Digit analysis at the international transit exchange

Signalling equipment for transit exchanges must be designed for the transfer of all information necessary for setting up calls including access to operators' positions.

In an international transit exchange, analysis of some of the digits is required to determine the routing to the desired international incoming exchange or to another international transit exchange. The maximum number of digits which has to be analysed at the international transit exchange to determine the routing is 6, the language (L) or the discriminating digit (D) not being included (see also 2). In cases where the country code is shared by different countries, up to 7 digits may have to be analysed for routing and accounting purposes. In the implementation of new international exchanges, this should be taken into account.

The transit exchange decides how many of the received digits it needs for this analysis.

In an international transit exchange, an analysis, effective on the first or the first two digits of the country code, determines the number of digits in the country code. For channel associated signalling systems, the position of the language or the discriminating digit is therefore determined which, in the sequence of forward address information, follows immediately the country code.

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1) In the cases of common channel Signalling Systems No. 6 and No. 7, the information content of the D or L digit will be conveyed by the calling-party's-category indicator.

2) It is recognized that the existing design of some equipment may not permit the reception of the extra digit N_1. In this situation, agreement will be required between the relevant countries concerned that the extra digit N_1 would not be sent to a particular incoming international exchange.

Since in the case of common channel Signalling Systems No. 6 and No. 7 the initial address message contains all digits required for routing the call, selection of the outgoing circuit can start as soon as this message has been received. In addition to the digit information, other routing information is contained in the initial address message, e.g. country code or nature-of-address indicator, nature-of-circuit indicator, calling-party's-category indicator, and echo-suppressor indicator, some or all of which must be analysed as described in the detailed specifications.

Normally, it will not be necessary for a transit exchange using Signalling System No. 6 or No. 7 to analyse digits in more than the initial address message. Subsequent address messages can be forwarded to the next international exchange without analysis as soon as the outgoing circuit is determined.

In the case of Signalling System No. 6, however, a subsequent address message (SAM) must always be analysed for sequence reasonableness before being forwarded to the next international exchange.

In the case of incoming Signalling System No. 4, the transit exchange must ensure that it does not request signal code 15 in order to avoid premature release of the outgoing register, e.g. by evaluating the signal code 11 or code 12.

4 Examples of the digit analysis in an international transit exchange

Possible cases for digit analysis by an international transit exchange are shown in the following examples (the letters given to the international exchanges correspond to Figure 1 and the letters given to the digits correspond to the examples given in clause 2 above). It should be noted that in some cases analysis of fewer digits than those indicated in the following examples may be sufficient.

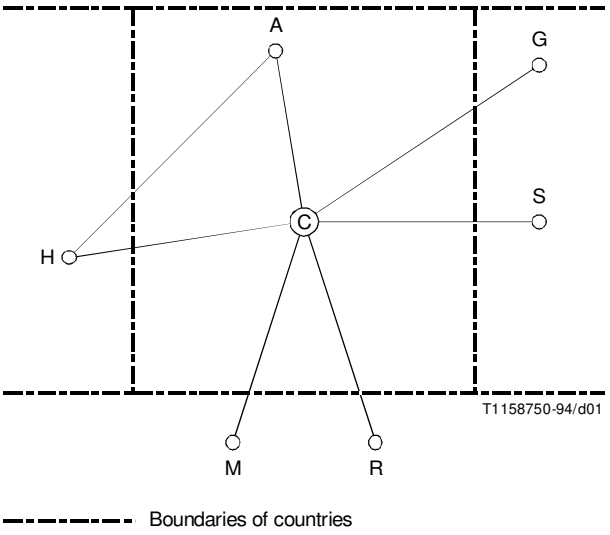

FIGURE 1/Q.107 *bis*

Examples of the digit analysis in an international transit exchange C

4.1 Example 1

In example 1, transit traffic via C in one country is routed to one of the two exchanges M or R in another country according to the first digit(s) of the national (significant) number.

a) Automatic and semi-automatic calls with normal national numbers

Example: $I_1\ I_2\ Z\ N_1\ N_2$[3)]

b) Semi-automatic calls to code 11 or code 12 operators in the case where only one incoming international exchange (M or R) is equipped to receive calls to operators' positions

Examples: $I_1\ I_2\ L\ C_{11}$ or $I_1\ I_2\ L\ C_{12}$[3)]

In the case of countries with more than one incoming international exchange where code 11 or code 12 traffic requires for routing in the transit exchange a digit analysis beyond the country code, N_1 may be used as the extra digit designating the incoming international exchange[4)] .

Examples: $I_1\ I_2\ L\ N_1\ C_{11}$ or $I_1\ I_2\ L\ N_1\ C_{12}$[3)]
analysed analysed

4.2 Example 2

In example 2, transit traffic via C in one country is routed to G or S in another country. Automatic traffic with the presence of discriminating digit (D) is routed to G or S according to the first digit of the national significant number, while all semi-automatic traffic with the presence of language digit (L) is routed to S for assistance operator use regardless of digits following L.

Examples: $I_1\ I_2\ D$ or $I_1\ I_2\ L$[3)]
analysed analysed

5 Example of digit analysis for incoming terminal traffic

Terminal traffic incoming to an international exchange C in a country and which is to be routed to code 11 or code 12 operators in another international exchange A in the same country according to the extra digit N_1[4)].

Examples: $L\ N_1\ C_{11}\ C_{15}$ or $L\ N_1\ C_{12}\ X\ X\ C_{15}$[5)]
analysed analysed

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3) In the cases of common channel Signalling Systems No. 6 and No. 7, the information content of the D or L digit will be conveyed by the calling-party's-category indicator.

4) It is recognized that the existing design of some equipment may not permit the reception of the extra digit N_1. In this situation, agreement will be required between the relevant countries concerned that the extra digit N_1 would not be sent to a particular incoming international exchange.

5) In the cases of common channel Signalling Systems No. 6 and No. 7, the information content of the D or L digit will be conveyed by the calling-party's-category indicator. Code 15 may be considered as equivalent to ST in call CCITT signalling systems.

6 Cross-border traffic between adjacent countries

If for cross-border traffic between adjacent countries access to operators' positions is not provided, it may be decided by bilateral agreement to exclude the transfer of the language or the discriminating digit. In this case, the first digit sent will be the first of the national (significant) number. In addition, one or more of the first digits of the national (significant) number may be omitted, depending on the routing requirements at the incoming exchange.

For cross-border traffic between adjacent countries, the number of digits that must be analysed will be determined by bilateral agreement. This may involve more digits than for normal international traffic.

Reference

[1] CCITT Recommendation *Analysis of address information for routing*, Rec. Q.324.