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FASCICLE VI.8

Recommendations Q.721 to Q.766

SPECIFICATIONS OF SIGNALLING SYSTEM No. 7

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SECTION 1

TELEPHONE USER PART (TUP)

Recommendation Q.721

FUNCTIONAL DESCRIPTION OF THE SIGNALLING SYSTEM No. 7

TELEPHONE USER PART (TUP)

1 General

Use of Signalling System No. 7 for telephone call control signalling requires:

— application of *Telephone User Part* (TUP) functions, in combination with

— application of an appropriate set of *Message Transfer Part* (MTP) functions.

A general description of the signalling system and the division of functions between the Message Transfer Part and the Telephone User Part are presented in Recommendation Q.700 and the requirements of interaction between those two parts are contained in Recommendation Q.701.

2 Telephone User Part

The Telephone User Part specified in these specifications defines the necessary telephone signalling functions for use of Signalling System No. 7 for international telephone call control signalling. It is specified with the aim of providing the same features for telephone signalling as other CCITT telephone signalling systems.

Signalling System No. 7 can be used to control the switching of all types of international circuits to be used in a worldwide connection, including circuits with speech interpolation and satellite circuits.

The system meets all requirements defined by the CCITT concerning the service features for worldwide international semiautomatic and automatic telephone traffic. It is designed for the bothway operation of speech circuits.

When used with homogeneous digital telephone circuits the continuity of these circuits is ensured by the means for transmission quality supervision and failure detection that are inherent in the digital systems providing these circuits. However, the system includes means for link-by-link assurance of continuity check of the speech path when used with analogue telephone circuits and/or digital circuits including certain types of equipment, where fault indications are lost, e.g., circuit multiplication equipment.

The signalling system is suitable for national telephone applications. Most telephone signalling message types and signals specified for international use are also required in typical national applications. In addition to these, national applications typically require additional signalling message types and signals; the system provides ample spare capacity for such additions.

The standard label structure specified for telephone signalling messages requires that all exchanges using the signalling system are allocated codes from code plans established for the purpose of unambiguous identification of signalling points. The principles to apply to the international signalling network are specified in Recommendation Q.708.

3 Message Transfer Part

The Message Transfer Part of Signalling System No. 7 is specified in Recommendations Q.701 to Q.709. An overview description of the Message Transfer Part is contained in Recommendation Q.701.

The Message Transfer Part defines a range of functions by which different signalling modes and different signalling network configurations may be realized. Any application of Signalling System No. 7 requires that an appropriate selection of these functions is applied depending on the intended use of the system and the characteristics of the telecommunications network concerned.

Recommendation Q.722

GENERAL FUNCTION OF TELEPHONE MESSAGES AND SIGNALS

This Recommendation describes the general function of telephone signalling messages and the telephone signals and other information components contained in those messages. The requirements relating to the use of the signalling messages and their signal content are specified in Recommendations Q.723 and Q.724.

1 Telephone signalling messages

The definition of formats and codes for telephone messages is based on a functional grouping as indicated in the following. It is expected that national application of the signalling system typically will require further message types in addition to the internationally defined message types indicated in the following. As a result of the criteria on which the grouping of message types are based some groups as yet only contain one message type.

1.1 *Forward address message group*

This message group includes messages sent in the forward direction containing address information. Signals from § 3.3 may be included. Messages so far specified are as follows.

1.1.1 *Initial address message*

A type of message sent first in the forward direction at call set-up. It contains address information and other information relating to the routing and handling of the call.

1.1.2 *Initial address message with additional information*

A type of message sent first in the forward direction at call set-up. It contains address, routing and handling information such as charging and supplementary services information to be used in the call set-up procedures.

1.1.3 *Subsequent address message*

A type of message sent in the forward direction subsequent to the initial address message and containing further address information.

1.1.4 *Subsequent address message with one signal*

A type of message sent in the forward direction subsequent to the initial address message or to the subsequent address message and containing only one address signal.

1.2 *Forward set-up message group*

This message group includes messages sent in the forward direction, subsequent to address messages containing further information for call set-up. Signals from § 3.3 may be included. Messages so far specified are as follows.

1.2.1 *General forward set-up information message*

A type of message containing information relating to the calling line or possibly other information required for call set-up. This message is sent in response to a general request message.

1.2.2 *Continuity check message*

A type of message containing a continuity signal or a continuity-failure signal.

1.3 *Backward set-up request message group*

This message group includes messages sent in the backward direction requesting further information for call set-up. Signals from § 3.4 may be included. Messages so far specified are as follows.

1.3.1 *General request message*

A type of message containing a signal requesting transfer of information relating to a call, e.g., the identity or the category of the calling party.

1.4 *Successful backward set-up information message group*

This message group includes messages sent in the backward direction containing information relating to a successful call set-up. Signals from § 3.4 may be included. Messages so far specified are as follows.

1.4.1 *Address-complete message*

A type of message containing a signal indicating that all address signals required for routing the call to the called party have been received and giving additional information relating to this.

1.4.2 *Charging message*

A type of message containing charging information.

1.5 *Unsuccessful backward set-up information message group*

This message group includes messages sent in the backward direction containing information relating to an unsuccessful call set-up. Signals from § 3.4 may be included. Messages so far specified are as follows.

1.5.1 *Simple unsuccessful backward set-up information message*

A message containing a signal from § 3.4, relating to an unsuccessful call set up.

1.5.2 *Extended unsuccessful backward set-up information message*

A message containing a signal from § 3.4, relating to an unsuccessful call set up, and additional information.

1.6 *Call supervision message group*

This message group includes messages sent in the forward or backward direction, relating to the supervision of the call. Signals from § 3.5 are included.

1.7 *Circuit supervision message group*

This message group includes messages sent in the forward and backward direction, relating to the supervision of the circuit. Signals from § 3.6 are included.

1.8 *Circuit group supervision message group*

This message group contains messages from § 3.7, relating to the supervision of circuit groups.

1.9 *Circuit network management message group*

This message group includes network management messages sent in the backward direction, which are used to control traffic flow to reduce exchange switching congestion. Messages so far specified are as follows.

1.9.1 *Automatic congestion control information message*

A type of message containing information relating to the congestion status of the exchange. Signals from § 3.8 are included.

2 **Service information**

The service information provides the highest level of discrimination between different sets of signalling messages. It contains the following components. (See also Note.)

2.1 *Service indicator*

Information used to identify the User Part to which the signalling message belongs.

2.2 *Network indicator*

Information used for discrimination between international and national messages. In case of national messages, it may for example also be used for discrimination between different label alternatives for national use.

Note — The service information octet and the label are not included in messages transferred between the telephone user part and the signalling connection control part (e.g., node to node messages).

3 **Signalling information**

3.1 *Label components*

In the case of the telephone signalling messages, the label is used for message routing and, in general, identification of the concerned telephone circuit. The standard label structure consists of the following components.

3.1.1 *Destination point code*

Information identifying the signalling point to which the message is to be routed.

3.1.2 *Originating point code*

Information identifying the signalling point from which the message has been originated.

3.1.3 *Circuit identification code*

Information identifying the telephone circuit among those interconnecting the destination point and originating point.

3.2 *Message format identifiers*

3.2.1 *Heading*

Information discriminating, as applicable, between different groups or individual types of messages within the set of messages identified by the service information. The heading is split into two levels. The first level discriminates between different groups. The second level either discriminates between different message types or contains a signal.

3.2.2 *Field length indicator*

Information associated with and indicating the length of a variable length field.

3.2.3 *Field indicator*

Information associated with and indicating the presence or absence of an optional field.

3.3 *Forward set-up telephone signals*

3.3.1 *Address signal*

A call set-up signal sent in the forward direction containing one element of information (digit 0, 1, 2, . | | , 9, Code 11 or Code 12) about the called party’s number or the end-of-pulsing (ST) signal.

For each call, a succession of address signals is sent.

3.3.2 *End-of-pulsing (ST) signal*

An address signal sent in the forward direction indicating that there are no more address signals to follow.

3.3.3 *Nature-of-address indicator*

Information sent in the forward direction indicating whether the associated address or line identity is an international, national significant or subscriber number.

3.3.4 *Nature-of-circuit indicator*

Information sent in the forward direction about the nature of the circuit or any preceding circuit(s) already engaged in the connection:

— a satellite circuit, or

— no satellite circuit.

An international exchange receiving this information will use it (in combination with the appropriate part of the address information) to determine the nature of the outgoing circuit to be chosen.

3.3.5 *Outgoing echo suppressor indicator*

Information sent in the forward direction indicating whether or not an outgoing half-echo suppressor is included in the connection.

3.3.6 *Incoming international call indicator*

Information sent in the forward direction indicating that the call is an incoming international call.

3.3.7 *Calling-party's-category*

Information sent in the forward direction about the category of the calling party and, in case of semiautomatic calls, about the service language to be spoken by the incoming, delay and assistance operators.

The following categories are provided:

— operator,

— ordinary calling subscriber,

— calling subscriber with priority,

— data call,

— test call,

— payphone.

3.3.8 *Incomplete calling line identity indicator*

An indicator sent in the forward direction indicating that the calling line identity is incomplete.

3.3.9 *Continuity-check indicator*

Information sent in the forward direction indicating whether or not a continuity check will be performed on the circuit concerned or is being (has been) performed on a previous circuit in the connection.

3.3.10 *Calling line identity*

Information sent in the forward direction indicating the national significant number of the calling party.

3.3.11 *Calling line identity presentation indicator*

Information indicating whether or not the calling line identity presentation is restricted.

3.3.12 *Calling-line-identity-unavailable indicator*

Information sent in the forward direction indicating that the identity of the calling line is not available.

3.3.13 *Calling party's category unavailable indicator*

Information sent in the forward direction to indicate that the calling party's category is not available.

3.3.14 *Original called address not available indicator*

Information sent in the forward direction indicating that the original called address is not available.

3.3.15 *Continuity signal*

A signal sent in the forward direction indicating continuity of the preceding System No. 7 speech circuit(s) as well as of the selected speech circuit to the following international exchange, including verification of the speech path across the exchange with the specified degree of reliability.

3.3.16 *Continuity-failure signal*

A signal sent in the forward direction indicating failure of continuity of the System No. 7 speech circuit.

3.3.17 *Redirected call indicator*

Information sent in the forward direction indicating that the call is a forwarded call.

3.3.18 *Original called address*

Information sent in the forward direction indicating the address towards which the call was previously routed (before the redirection occurred).

3.3.19 *All digital path required indicator*

Information sent in the forward direction indicating the type path required (64 kbit/s circuit switched connection-transparent).

3.3.20 *Signalling path indicator*

Information sent in the forward direction indicating that the signalling system used since the originating exchange is System No. 7.

3.3.21 *Additional signals relating to the closed user group facilities*

3.3.21.1 *Closed user group call indicator*

Information sent in the forward direction indicating whether or not the call involves a closed user group and whether or not outgoing access is allowed for the calling user.

3.3.21.2 *Interlock code*

Information sent in the forward direction identifying a closed user group to which the calling user belongs.

3.3.22 *Malicious call identification indicator*

Information sent in the forward direction indicating that the malicious call identification has been provided or not.

3.3.23 *Hold indicator*

Information sent in the forward direction indicating whether the requested holding of the connection is possible or not.

3.3.24 *Transit exchange identity type indicator*

Information sent in the forward direction indicating the type of information included as transit exchange identity.

3.3.25 *Transit exchange identity*

Information sent in the forward direction indicating the identity of the transit exchange by which the call is established such as signalling point code or a part of the calling line identity.

3.3.26 *Incoming trunk identity*

Information sent in the forward direction indicating the identity of the incoming trunk on which the call is established.

3.3.27 *Signals related to charging facilities*

For further study.

3.3.28 *Charging information*

Information sent in the forward direction for charging and/or accounting purposes.

3.4 *Backward set-up telephone signals*

3.4.1 *Calling-line-identity-request indicator*

Information sent in the backward direction requesting transfer of the calling line identity from the originating exchange.

3.4.2 *Calling party's category request indicator*

Information sent in the backward direction requesting transfer of the calling party's category from the originating exchange.

3.4.3 *Original called address information request indicators*

Information sent in the backward direction requesting transfer of the original called address from the originating exchange.

3.4.4 *Address-complete signal*

A signal sent in the backward direction indicating that all the address signals required for routing the call to the called party have been received and that no called-party's-line-condition signals (electrical) will be sent.

3.4.5 *Address-complete signal, charge*

A signal sent in the backward direction indicating that all the address signals required for routing the call to the called party have been received, that no called-party's-line-condition signals (electrical) will be sent and that the call should be charged on answer.

3.4.6 *Address-complete signal, no-charge*

A signal sent in the backward direction indicating that all the address signals required for routing the call to the called party have been received, that no called-party's-line-condition (electrical) will be sent and that the call should not be charged on answer.

3.4.7 *Address-complete signal, payphone*

A signal sent in the backward direction indicating that all the address signals required for routing the call to the called party have been received, that no called-party's-line-condition (electrical) will be sent, that the call should be charged on answer and that the called number is a payphone station.

3.4.8 *Subscriber-free indicator*

Information sent in the backward direction indicating that the called party's line is free.

3.4.9 *Incoming echo suppressor indicator*

Information sent in the backward direction indicating that an incoming half-echo suppressor has been inserted or not.

3.4.10 *Call forwarding indicator*

Information sent in the backward direction indicating that the call has been forwarded to a different address.

3.4.11 *Signalling path indicator*

Information sent in the backward direction indicating that the signalling system used since the terminating exchange is Signalling System No. 7.

3.4.12 *Charging information signals*

Information sent in the backward direction for charging and/or accounting purposes.

3.4.13 *Outgoing echo suppressor request indicator*

Information sent in the backward direction requesting for the insertion of an outgoing suppressor.

3.4.14 *Hold request indicator*

Information sent in the backward direction indicating that the hold of the connection is requested. The release of the call will be controlled by the terminating exchange.

3.4.15 *Malicious call identification indicator*

Information sent in the backward direction indicating that a malicious call identification facility has been encountered.

3.4.16 *Switching-equipment-congestion signal*

A signal sent in the backward direction indicating the failure of the call set-up attempt due to congestion encountered at international switching equipment.

3.4.17 *Circuit-group-congestion signal*

A signal sent in the backward direction indicating the failure of the call set-up attempt due to congestion encountered on an international circuit group.

3.4.18 *National-network-congestion signal*

A signal sent in the backward direction indicating the failure of the call set-up attempt due to congestion encountered in the national destination network [excluding the busy condition of the called party's line(s)].

3.4.19 *Digital path not provided signal*

Information sent in the backward direction indicating that a routing which allows the complete digital path requested does not exist.

3.4.20 *Address-incomplete signal*

A signal sent in the backward direction indicating that the number of address signals received is not sufficient for setting up the call. This condition may be determined in the incoming international exchange (or in the national destination network):

— immediately after the reception of an ST signal, or

— on timeout after the latest digit received.

3.4.21 *Call-failure signal*

A signal sent in the backward direction indicating the failure of a call set-up attempt due to the lapse of a timeout or a fault not covered by specific signals.

3.4.22 *Called party's line condition signals*

3.4.22.1 *Unallocated-number signal*

A signal sent in the backward direction indicating that the received number is not in use (e.g., spare level, spare code, vacant subscriber's number).

3.4.22.2 *Subscriber-busy signal (electrical)*

A signal sent in the backward direction indicating that the line(s) connecting the called party with the exchange is (are) engaged. The subscriber-busy signal will also be sent in case of complete uncertainty about the place where the busy or congestions are encountered and in the case where a discrimination between subscriber-busy and national-network congestion is not possible.

3.4.22.3 *Line-out-of-service signal*

A signal sent in the backward direction indicating that the called party's line is out-of-service or faulty.

3.4.22.4 *Send-special-information-tone signal*

A signal sent in the backward direction indicating that the special information tone should be returned to the calling party. This tone indicates that the called number cannot be reached for reasons not covered by other specific signals and that the unavailability is of a long-term nature (see also Recommendation Q.35 [1]).

3.4.23 *Access barred signal*

Information sent in the backward direction indicating that the call is rejected because a compatibility check failed.

3.4.24 *Misdialled trunk prefix*

A signal sent in the backward direction indicating the erroneous inclusion of a trunk prefix (for national use).

3.5 *Call supervision signals*

3.5.1 *Forward-transfer signal*

A signal sent in the forward direction on semiautomatic calls when the outgoing international exchange operator wants the help of an operator at the incoming international exchange. The signal will normally serve to bring an assistance operator (see Recommendation Q.101 [2]) into the circuit if the call is automatically set up at the exchange. When a call is completed via an operator (incoming or delay operator) at the incoming international exchange, the signal should preferably cause this operator to be recalled.

3.5.2 *Answer signal, charge*

A signal sent in the backward direction indicating that the call is answered and subject to charge.

In semiautomatic working, this signal has a supervisory function. In automatic working, the signal is used:

— to start metering the charge to the calling subscriber (Recommendation Q.28 [3]), and

— to start the measurement of call duration for international accounting purposes (Recommendation E.260 [4]).

3.5.3 *Answer signal, no charge*

A signal sent in the backward direction indicating that the call is answered but is not subject to charge. It is used for calls to particular destinations only.

In semiautomatic working, this signal has a supervisory function. In automatic working, the reception of this signal shall not start the metering to the calling subscriber.

3.5.4 *Answer signal, unqualified* (basic national use)

A signal sent in the backward direction to indicate that the call is answered.

3.5.5 *Clear-back signal*

A signal sent in the backward direction indicating that the called party has cleared.

In semiautomatic working, this signal has a supervisory function. In automatic working, the arrangements specified in Recommendation Q.118 [5] apply.

3.5.6 *Re-answer signal*

A signal sent in the backward direction indicating that the called party, after having cleared, again lifts his receiver or in some other way reproduces the answer condition, e.g., switch-hook flashing.

3.5.7 *Clear-forward signal*

A signal sent in the forward direction to terminate the call or call attempt and release the circuit concerned. This signal is normally sent when the calling party clears but also may be a proper response in other situations as, for example, when reset circuit is received.

3.5.8 *Calling party clear signal* | national option)

A signal sent in the forward direction, when the holding of the connection is provided, to indicate that the calling party has cleared.

3.6 *Circuit supervision signals*

3.6.1 *Release-guard signal*

A signal sent in the backward direction in response to a clear-forward signal, or if appropriate to the reset-circuit signal, when the circuit concerned has been brought into the idle condition.

3.6.2 *Reset-circuit signal*

A signal that is sent to release a circuit when, due to memory mutilation or other causes, it is unknown whether, for example, a clear-forward or clear-back signal is appropriate. If at the receiving end the circuit is blocked, this signal should remove that condition.

3.6.3 *Blocking signal*

A signal sent only for maintenance purposes to the exchange at the other end of a circuit to cause engaged conditions of that circuit for subsequent calls outgoing from that exchange. When a circuit is used in the bothway mode of operation, an exchange receiving the blocking signal must be capable of accepting incoming calls on that circuit unless it also has sent a blocking signal. Under conditions covered later, a blocking signal is also a proper response to a reset circuit signal.

3.6.4 *Unblocking signal*

A signal sent to the exchange at the other end of a circuit to cancel in that exchange the engaged conditions of that circuit caused by an earlier blocking signal or maintenance-oriented group blocking message.

3.6.5 *Blocking-acknowledgement signal*

A signal sent in response to a blocking signal indicating that the speech circuit has been blocked.

3.6.6 *Unblocking-acknowledgement signal*

A signal sent in response to an unblocking signal indicating that the speech circuit has been unblocked.

3.6.7 *Continuity-check-request signal*

A signal sent requesting an independent circuit continuity test.

3.7 *Circuit group supervision messages*

3.7.1 *Maintenance oriented group blocking message*

A message sent for maintenance purposes to the exchange at the other end of a circuit group to cause an engaged condition on that circuit group or parts thereof for subsequent calls outgoing from that exchange. An exchange receiving the maintenance oriented group blocking message must be capable of accepting incoming calls on the blocked circuits of that circuit group unless it also has sent a blocking message.

3.7.2 *Maintenance oriented group unblocking message*

A message sent to the exchange at the other end of a circuit group to cancel in that exchange the engaged condition on that circuit group or parts thereof caused by an earlier maintenance-oriented group blocking message or blocking signal.

3.7.3 *Hardware failure oriented group blocking message*

A message sent for reason of a hardware failure to the exchange at the other end of a circuit group to cause an engaged condition on that circuit group or parts thereof. An exchange receiving the hardware failure oriented group blocking message must be capable of accepting incoming calls on the blocked circuits of that circuit group unless it also has sent a blocking message.

3.7.4 *Hardware failure oriented group unblocking message*

A message sent to the exchange at the other end of a circuit group to cancel in that exchange the engaged condition on that circuit group or parts thereof caused by an earlier hardware failure oriented group blocking message.

3.7.5 *Software generated group blocking message (national option)*

A message sent for reason of a software generated alarm to the exchange at the other end of a circuit group to cause an engaged condition on that circuit group or parts thereof. An exchange receiving the software generated group blocking message must be capable of accepting incoming calls on the blocked circuits of that circuit group unless it also has sent a blocking message.

3.7.6 *Software generated group unblocking message (national option)*

A message sent to the exchange at the other end of a circuit group to cancel in that exchange the engaged condition on that circuit group or parts thereof caused by an earlier software generated group blocking message.

3.7.7 *Circuit group reset message*

A message that is sent to release a circuit group or parts thereof when, due to memory mutilation or other causes, it is unknown which of the clearing signals is appropriate for the particular circuits within that circuit group. If at the receiving end circuits are blocked, this message should remove that condition.

3.7.8 *Maintenance oriented group blocking-acknowledgement message*

A message sent in response to a maintenance oriented group blocking message indicating that the circuit group or parts thereof has/have been blocked.

3.7.9 *Maintenance oriented group unblocking-acknowledgement message*

A message sent in response to a maintenance oriented group unblocking message indicating that the circuit group or parts thereof has/have been unblocked.

3.7.10 *Hardware failure oriented group blocking-acknowledgement message*

A message sent in response to a hardware failure oriented group blocking message indicating that the circuit group or parts thereof has/have been blocked.

3.7.11 *Hardware failure oriented group unblocking-acknowledgement message*

A message sent in response to a hardware failure oriented group unblocking message indicating that the circuit group or parts thereof has/have been unblocked.

3.7.12 *Software generated group blocking-acknowledgement message (national option)*

A message sent in response to a software generated group blocking message indicating that the circuit group or parts thereof has/have been blocked.

3.7.13 *Software generated group unblocking-acknowledgement message (national option)*

A message sent in response to a software generated group unblocking message indicating that the circuit group or parts thereof has/have been unblocked.

3.7.14 *Circuit group reset-acknowledgement message*

A message sent in response to a circuit group reset message indicating that:

i) if the range field is not coded all zero, the circuits are reset; or

ii) if the range field is coded all zero, the reset of the circuit group has been started and the reset state of each circuit concerned will be reported by the appropriate call, circuit or circuit group supervision signal/message.

3.8 *Automatic congestion control signals*

Signals generated by the exchange to indicate that a congestion threshold has been exceeded (see Recommendation Q.542, § 5.4.5).

3.8.1 *Congestion level 1*

A signal indicating that the first (less severe) congestion threshold in an exchange has been exceeded.

3.8.2 *Congestion level 2*

A signal indicating that the second (more severe) congestion threshold in an exchange has been exceeded.

References

[1] CCITT Recommendation *Characteristics of the dial tone, ringing tone, busy tone, congestion tone, special information tone and warning tone,* Rec. Q.35.

[2] CCITT Recommendation *Facilities provided in international semiautomatic working* , Rec. Q.101.

[3] CCITT Recommendation *Determination of the moment of the called subscriber's answer in the automatic service* , Rec. Q.28.

[4] CCITT Recommendation *Basic technical problems concerning the measurement and recording of call durations* , Rec. E.260.

[5] CCITT Recommendation *Special release arrangements and indication of congestion conditions at transit exchanges* , Rec. Q.118.

Recommendation Q.723

FORMATS AND CODES

1 Basic format characteristics

1.1 *General*

The telephone user messages are carried on the signalling data link by means of signal units, the format of which is described in Recommendation Q.703, § 2.2.

The signalling information of each message constitutes the signalling information field of the corresponding signal unit and consists of an integral number of octets. It basically contains the *label* , the *heading code* and one or more *signals* and/or *indications* . Structure and function of the label are described in § 2; the heading codes and detailed message formats are described in § 3.

1.2 *The service information octet*

The *service information octet* | comprises the *service indicator* and the *subservice field* .

The service indicator is used to associate signalling information with a particular User Part and is only used with message signal units (see Recommendation Q.704, § 12.2).

The information in the subservice field permits a distinction to be made between national and international signalling messages. In national applications when this discrimination is not required possibly for certain national User Parts only, the subservice field can be used independently for different User Parts.

The format of the service information octet is shown in Figure 1/Q.723.

Figure 1/Q.723, (M), p.

The following codes are used in the fields of the service information octet:

a) The service indicator is coded 0100.

b) Subservice field.

bits B A Spare (see Note)

bits D C Network indicator

0 0 International network

0 1 Spare (for international use only)

1 0 National network

1 1 Reserved for national use

Note — The two unused bits in the service information octet are spare for possible future needs that may require a common solution for all international User Parts and Message Transfer Part level 3. The bits are coded 00.

1.3 *Format principles*

The user generated information in the signalling information field is, in general, divided into a number of subfields which may be either of fixed or variable length. For a given message type identified by a unique message heading, the presence of a given subfield may be either mandatory or optional. The various types of subfields are further defined below.

1.3.1 *Mandatory subfields*

Subfields which have been declared mandatory for a given message type appear in all messages of that type.

1.3.2 *Optional subfields*

Subfields which have been declared optional for a given message type only appear when required in messages of that type. The presence or absence of each optional field is indicated by the state of a field indicator located in an indicator field, which in this case is a mandatory subfield.

1.3.3 *Fixed length subfields*

Subfields which have been declared fixed length for a given message type, contain the same number of bits in all messages of that type.

1.3.4 *Variable length subfields*

For subfields which have been declared variable length for a given message type, the number of bits may vary between messages of that type. The size of a variable length subfield is indicated in an immediately preceding fixed length subfield in terms of a predefined unit such as bits, octets or half-octets.

1.3.5 *Order of subfield transmission*

For a given type of message the various types of subfields are transmitted in the following order:

a) mandatory subfields,

b) optional subfields.

Within each of these two classes, the order of subfield transmission is, in general, as follows:

1) fixed length subfields (with the exception of the indicator field and subfields indicating the size of a variable length subfield),

2) variable length subfields.

1.3.6 *Order of bit transmission*

Within each defined subfield the information is transmitted least significant bit first.

1.3.7 *Coding of spare bits*

Spare bits are coded 0 unless indicated otherwise.

2 Label

2.1 *General*

The *label* | is an item of information which forms part of every signalling message and is used by the message routing function at Message Transfer Part level 3 to select the appropriate signalling route and by the User Part function to identify the particular transaction (e.g. the call) to which the message pertains.

In general, label information encompasses an explicit or implicit indication of the message source and destination and, depending on the application, various forms of transaction identification.

For messages which are related to circuits or calls, the transaction is conveniently identified by including the corresponding circuit identity in the label. This technique applies to messages which pass between adjacent nodes, and to messages which pass between nodes which are not adjacent; in this case the technique is known as the pass-along method. In future, the introduction of new subscriber services may require the transfer of call related messages between exchanges at a time when no circuit is associated with the call. Such messages could be carried using the services of the Signalling Connection Control Part SCCP [6]. In this case the standard access to the Signalling Connection Control Part is used.

Note — The service information octet, the routing label and the circuit identification code are not included in the information transferred between the Telephone User Part and the Signalling Connection Control Part.

One standard label format is specified (§ 2.2) for international use. The same standard label is applicable for national use; admitted deviations from the format of the standard label are described in § 2.3.

2.2 *Standard telephone label*

2.2.1 *Label format*

The *standard label* | has a length of 40 bits and is placed at the beginning of the signalling information field. The label structure is as shown in Figure 2/Q.723.

Figure 2/Q.723, (M), p.

The *destination point code* | (DPC) indicates the signalling point for which the message is intended, while the *originating point code* (OPC) indicates the signalling point which is the source of the message. The *circuit identification code* (CIC) indicates one speech circuit among those directly interconnecting the destination and the originating points.

The portion of the label that consists of the destination point code and originating point code fields and of the four least significant bits of the circuit identification code field corresponds to the standard routing label specified in Recommendation Q.704, § 13.2.

2.2.2 *Destination and originating point codes*

The standard label structure requires that each telephone exchange in its role as signalling point is allocated a code from code plans established for the purpose of unambiguous identification of signalling points.

Separate code plans will be used for the international signalling network and for different national signalling networks.

The principles of code allocation which apply to the international signalling network should be in accordance with Recommendation Q.708.

The destination point code will be the code applicable to the telephone exchange to which the message is sent. The originating point code will be the code applicable to the telephone exchange from which the message is sent.

2.2.3 *Circuit identification code*

The allocation of circuit identification codes to individual telephone circuits is determined by bilateral agreement and/or in accordance with applicable predetermined rules.

Allocation rules for certain applications are defined below:

a) 2048 kbit/s digital path

For circuits which are derived from a 2048-kbit/s digital path (Recommendations G.732 [1] and G.734 [2]) the circuit identification code contains in the 5 least significant bits a binary representation of the actual number of the time slot which is assigned to the speech circuit. The remaining bits in the circuit identification code are used where necessary, to identify one among several systems interconnecting an originating and destination point.

b) 8448 kbit/s digital path

For circuits which are derived from a 8448-kbit/s digital path (Recommendation G.744 [3] and G.746 [4]) the circuit identification code contains in the 7 least significant bits an identification of the channel which is assigned to the speech circuit. The codes in Table 1/Q.723 are used.

The remaining bits are used, where necessary, to identify one among several systems interconnecting an originating and destination point.

c) Frequency division multiplex (FDM) systems in networks using the 2048-kbit/s pulse code modulation standard

For FDM systems existing in networks that also use the 2048-kbit/s pulse code modulation standard, the circuit identification code contains in the 6 least significant bits the identification of a channel within a group of 60 channels carried by 5 basic FDM groups which may or may not be part of the same supergroup.

The codes in Table 2/Q.723 are used.

H.T. [T1.723]

TABLE 1/Q.723

0000000		channel 1
0000001 | 0011111		channel 2 | channel 32
0100000 | 1111110		channel 33 | channel 127
1111111		channel 128

Tableau 1/Q.723, [T1.723], p.

H.T. [T2.723]
TABLE 2/Q.723

000000		unallocated		
000001 | 001100		channel 1 | channel 12		1st basic (FDM) group

{
001101
001110
001111
010000
010001
|
011001
}
channel 1
channel 2
channel 3
unallocated
channel 4
|
channel 12
}
		{
		2nd basic (FDM) group		

{
011010
|
011111
100000
100001
|
100110
}
channel 1
|
channel 6
unallocated
channel 7
|
channel 12
}
		{
		3rd basic (FDM) group		

{
100111
|
101111
110000
110001
110010
110011
}
channel 1
|
channel 9
unallocated
channel 10
channel 11
channel 12
}
		{
		4th basic (FDM) group		

110100 | 111111		channel 1 | channel 12		5th basic (FDM) group

Tableau 2/Q.723, [T2.723], p.

2.3 *Optional national labels*

For the purpose of satisfying the requirements imposed by specific characteristics of some national signalling networks, field sizes different from those specified for the standard label are admitted for the destination point code, originating point code and circuit identification code fields in national labels.

3 Telephone signal message formats and codes

3.1 *General*

All telephone signal messages contain a *heading* | consisting of two parts, heading code H0 and heading code H1. Code H0 identifies a specific message group (see Recommendation Q.722, § 3.2.1) while H1 either contains a signal code or in case of more complex messages, identifies the format of these messages. The allocation of the H0 and H1 code is summarized in Table 3/Q.723.

H.T. [1T7.723]
TABLE 3/Q.723
Heading code allocation

Message group	H1 | 0	0000	0001	0010	0011	0100	0101	0110	0111	1000	1001	1010	1011	1100	1101	1110	1111
{																	
FAM	0001	IAM	IAI	SAM	SAO												
FSM	0010	GSM	COT	CCF													
BSM	0011	GRQ															
SBM	0100	ACM	CHG														
UBM	0101	SEC	CGC	NNC	ADI	CFL	SSB	UNN	LOS	SST	ACB	DPN	MPR	EUM			
CSM	0110	ANU	ANC	ANN	CBK	CLF	RAN	FOT	CCL								
CCM	0111	RLG	BLO	BLA	UBL	UBA	CCR	RSC									
GRM	1000	MGB	MBA	MGU	MUA	HGB	HBA	HGU	HUA	GRS	GRA	SGB[a)]	SBA[a)]	SGU[a)]	SUA[a)]		
1001	RESERVED																
CNM 1011 Spare reserved for international and basic national use }	1010	ACC	{														
1100																	
1101 1110 Spare, reserved for national use }	{																
{ 1111 a) National option. }																	

Tableau 3/Q.723, [1T7.723], p.5

Blanc

H.T. [2T7.723]
TABLEAU AVEC (AR)
Abbreviations used in Table 3/Q.723

ACB Access barred signal
{
ACC
Automatic congestion control information message
}
{
ACM
Address complete message (note)
}
ADI Address incomplete signal
ANC Answer signal, charge
ANN Answer signal, no charge
{
ANU
Answer signal, unqualified
}
{
BLA
Blocking-acknowledgement signal
}
BLO Blocking signal
{
BSM
Backward set-up message
}
CBK Clear-back signal
{
CCF
Continuity-failure signal
}
{
CCL
Calling party clear signal
}
{
CCM
Circuit supervision message
}
{
CCR
Continuity-check-request signal
}
CFL Call-failure signal
{
CGC
Circuit-group-congestion signal
}
CHG Charging message
CLF Clear-forward signal
{
CNM
Circuit network management message group
}
COT Continuity signal
CSM Call supervision message
{
DPN
Digital path not provided signal
}
{
EUM
Extended unsuccessful backward set-up information

message
 }
FAM Forward address message
 {
FOT
Forward-transfer signal
 }
FSM Forward set-up message
 {
GRA
Circuit group reset-acknowledgement message
 }
 {
GRM
Circuit group supervision messages
 }
GRQ General request message
 {
GRS
Circuit group reset message
 }
 {
GSM
General forward set-up information message
 }
 {
HBA
Hardware failure oriented group blocking-acknowledgement message
 }

Tableau 3/Q.723, [2T7.723], p.6

3.2 *Heading code H0*

The *heading code* | H0 occupies the 4-bit field following the label and is coded as follows:

0000 spare, reserved for national use

0001 forward address messages

0010 forward set-up messages

0011 backward set-up request messages

0100 successful backward set-up information messages

0101 unsuccessful backward set-up information messages

0110 call supervision messages

0111 circuit supervision messages

1000 circuit group supervision messages

1001 reserved

1010 circuit network management messages

1011 reserved for international and basic national use

1100
to reserved for national use
1111

3.3 *Forward address messages*

The following types of *forward address messages* | are specified and are each identified by a different heading code H1:

— Initial address message.

— Initial address message with additional information.

— Subsequent address message (with one or more address signals).

— Subsequent address message with one (address) signal.

3.3.1 *Initial address message*

The basic format of the *initial address message* | is shown on Figure 3/Q.723.

Figure 3/Q.723, (M), p.

The following codes are used in the fields of the initial address message.

a) Label: see § 2

b) Heading code H0 is coded 0001

c) Heading code H1 is coded 0001

d) Calling party category

bits F	E	D	C	B	A	
0	0	0	0	0	0	unknown source (Note 1)
0	0	0	0	0	1	operator, language French
0	0	0	0	1	0	operator, language English
0	0	0	0	1	1	operator, language German
0	0	0	1	0	0	operator, language Russian
0	0	0	1	0	1	operator, language Spanish
0	0	0	1	1	0	
0	0	0	1	1	1	
0	0	1	0	0	0	
–v’2P’ –v’1p’						available to Administrations for selecting a particular language provided by mutual agreement
0	0	1	0	0	1	reserved (see Recommendation Q.104 [5]) (Note 2)
0	0	1	0	1	0	ordinary calling subscriber
0	0	1	0	1	1	calling subscriber with priority
0	0	1	1	0	0	data call
0	0	1	1	0	1	test call
0	0	1	1	1	0	spare
0	0	1	1	1	1	payphone
0	1	0	0	0	0	
		to		spare		
1	1	1	1	1	1	

Note 1 — The calling party category ‘‘unknown source’’ is classified, for the time being, for basic national use. The use of this category in the international network is for further study.

Note 2 — In national networks, code 001001 may be used to indicate that the calling party is a national operator.

e) Spare

The bits in this field are spare for international allocation.

f) Message indicators

bits B	A:	nature of address indicator
0	0	subscriber number
0	1	spare, reserved for national use
1	0	national (significant) number
1	1	international number

bits D	C:	nature-of-circuit indicator
0	0	no satellite circuit in the connection
0	1	one satellite circuit in the connection

1 0 spare

1 1 spare

bits F E: continuity-check indicator

0 0 continuity-check not required

0 1 continuity-check required on this circuit

1 0 continuity-check performed on a previous circuit

1 1 spare

bit G: echo-suppressor indicator

0 outgoing half echo suppressor not included

1 outgoing half echo suppressor included

bit H: incoming international call indicator

0 call other than international incoming

1 incoming international call

bit I: redirected call indicator

0 not a redirected call

1 redirected call

bit J: all-digital-path-required indicator

0 ordinary call

1 digital path required

bit K: signalling path indicator

0 any path

1 all signalling system No. 7 path

bit L: spare

Note — The spare indicator may be used, e.g., to provide the μ/A law conversion control, pending further study.

g) Number of address signals

A code expressing in pure binary representation the number of address signals contained in the initial address message, except for the code 0000 to which the meaning 16 digits including ST signal is assigned.

h) Address signals

0000 digit 0

0001 digit 1

0010 digit 2

0011 digit 3

0100 digit 4

0101 digit 5

0110 digit 6

0111 digit 7

1000 digit 8

1001 digit 9

1010 spare

1011 code 11

1100 code 12

1101 spare

1110 spare

1111 ST

The most significant address signal is sent first. Subsequent address signals are sent in successive 4-bit fields.

i) Filler

In case of an odd number of address signals, the filler code 0000 is inserted after the last address signal. This ensures that the variable length field which contains the address signals consists of an integral number of octets.

3.3.2 *Initial address message with additional information*

The basic format of the *initial address message with additional information*
| is shown in Figure 4/Q.723.

Figure 4/Q.723, (MC), p.

The following codes are used in the initial address message with additional information:

a) Label: see § 2

b) Heading code H0 is coded 0001

c) Heading code H1 is coded 0010

d) Calling party category: [see § 3.3.1 |)]

e) Message indicators: [see § 3.3.1 |)]

f) Number of address signals: [see § 3.3.1 |)]

g) Address signals: [see § 3.3.1 |)]

h) First indicator octet

bit A: network capability or user facility information indicator

0 network capability or user facility information not included

1 network capability or user facility information included

bit B: closed user group information indicator

0 closed user group information not included

1 closed user group information included

bit C: additional calling party information indicator

0 additional calling party information not included

1 additional calling party information included

bit D: additional routing information indicator

0 additional routing information not included

1 additional routing information included

bit E: calling line identity indicator

0 calling line identity not included

1 calling line identity included

bit F: original called address indicator

0 original called address not included

1 original called address included

bit G: charging information indicator

0 charging information not included

1 charging information included

bit H: spare, reserved for indicating the presence or absence of a second indicator octet

i) Network capability or user facility information: spare, reserved for national use. (This optional field may be used in national applications to indicate specific network capabilities and/or user facility information.)

j) Closed user group (CUG) information

The basic format of the closed user group information field is shown in Figure 4a/Q.723.

H.T. [T3.723]

DCBA		
Interlock code	Spare	CUG indicator
32 4 FIGURE 4a/Q.723 **Closed user group information field** }	4	{

Figure 4a/Q.723 (comme tableau) [T3.723], p.

The following codes are used in the subfields of the closed user group information field.

— bits B A: CUG call indicator

0 0 ordinary call

0 1 successful check

1 0 outgoing access allowed

1 1 outgoing access not allowed

— bits C D: spare

— Interlock code

A code identifying the closed user group involved in the call. The nature of this code is for further study.

k) Additional calling party information: for further study. (This optional field is of fixed length and will indicate additional information concerning the calling party, which is not carried by the calling party's category indicator.)

l) Additional routing information: for further study. (This optional field is of fixed length and will indicate that the call has to be routed in some particular way, due for example to additional customer services.)

m) Calling line identity

The basic format of the calling line identity field is shown in Figure 4b/Q.723.

H.T. [T4.723]

DCBA	DCBA	
Calling line identity	Number of address signals	Address indicator
n | (mu | 4 FIGURE 4b/Q.723 **Calling line identity field** }	4	{

Figure 4b/Q.723 (comme tableau) [T4.723], p.

The following codes are used in the subfields of the calling line identity field.

— Address indicators:

bits B A: nature of address indicator

0 0 subscriber number

0 1 spare, reserved for national use

1 0 national significant number

1 1 international number

bit C: calling line identity presentation indicator

0 calling line identity presentation not restricted

1 calling line identity presentation restricted

bit D: incomplete calling line identity indicator

0 no indication

1 incomplete calling line identity

— Number of address signals

bits	D	C	B	A
0	0	0	0	calling line identity not available indicator
0	0	0	1	
to				
1	1	1	1	

–v'2P' –v'1p' a code expressing in pure binary representation the number of address signals.

— Calling line address signals

Each signal is coded as indicated in § 3.3.1 h) as applicable.

n) Original called address

The basic format of the original called address field is shown in Figure 4c/Q.723.

H.T. [T5.723]

DCBA	DCBA	
Original called address	Number of address signals	Address indicators
n | (mu | 4 FIGURE 4c/Q.723 **Original called address field** }	4	{

Figure 4c/Q.723 (comme tableau) [T5.723], p.

The following codes are used in the subfields of the original address field:

— Address indicator

bits B A: nature of address indicator

0 0 subscriber number

0 1 spare, reserved for national use

1 0 national (significant) number

1 1 international number

bits D C: spare

— Number of address signals

bits D C B A

0 0 0 0 original called address not available

0 0 0 1

to

1 1 1 1

–v’2P’ –v’1p’ a code expressing in pure binary representation the number of address signals.

— Original called address signals

Each signal is coded as indicated in § 3.3.1 h) as applicable.

o) Charging information: for further study. (This optional field will contain information to be sent to a successive exchange for charging and/or accounting purposes.)

3.3.3 *Subsequent address message*

The basic format of the *subsequent address* | message (SAM) is shown in Figure 5/Q.723.

Figure 5/Q.723, (M), p.

The following codes are used in the fields of the subsequent address message:

a) Label: see § 2

b) Heading code H0 is coded 0001

c) Heading code H1 is coded 0011

d) Address signal is coded as indicated in § 3.3.1 |) as applicable

e) Number of address signals: a code expressing in pure binary representation the number of address signals contained in the subsequent address message.

3.3.4 *Subsequent address message with one signal*

The basic format of the *subsequent address message with one signal* | is shown in Figure 6/Q.723.

Figure 6/Q.723, (M), p.

The following codes are used in the fields of the subsequent address message with one signal:

a) Label: see § 2

b) Heading code H0 is coded 0001

c) Heading code H1 is coded 0100

d) Address signal is coded as indicated in § 3.3.1 |) as applicable.

3.4 *Forward set-up messages*

The following types of forward set-up messages are specified and are each identified by a different heading code H1:

— general forward set-up information message,

— continuity-check message.

Unallocated H1 codes in this message group are spare.

3.4.1 *General forward set-up information message*

The basic format of the general forward set-up information message is shown in Figure 7/Q.723.

Figure 7/Q.723, (M), p.

The following codes are used in the fields of the general forward set-up information message:

a) Label: see § 2

b) Heading code H0 is coded 0010

c) Heading code H1 is coded 0001

d) Response type indicator

bit A: calling party category indicator

0 calling party category not included

1 calling party category included

bit B: calling line identity indicator

0 calling line identity not included

1 calling line identity included

bit C: incoming trunk and transit exchange: identity indicator

0 incoming trunk and transit exchange identity not included

1 incoming trunk and transit exchange identity included

bit D: original called address indicator

0 original called address not included

1 original called address included

bit E: outgoing echo suppressor indicator

0: outgoing half echo suppressor not included

1: outgoing half echo suppressor included

bit F: malicious call identification indicator

0 malicious call identification not provided

1 malicious call identification provided

bit G: hold indicator

0 hold not provided

1 hold provided

bit H: spare

e) Calling party category:

bits F	E	D	C	B	A	
0 0	0	0	0	0		unknown source/calling party category unavailable indicator
0 0	0	0	0	1		
	to		(see § 3.3.1 d))			
1 1	1	1	1	1		

f) Calling line identity:

Format and codes are the same as used in the calling line identity contained in the initial address message with additional information (see § 3.3.2).

g) Incoming trunk and transit exchange identity:

The basic format of the incoming trunk and transit exchange identity field is shown in Figure 8/Q.723.

H.T. [T6.723]

DCBA	DCBA	DCBA			
Incoming trunk identity Exchange identity length indicator }	Field length indicator Identity type indicator	Spare	Transit exchange identity	{	
n | (mu | 4 FIGURE 8/Q.723 **Incoming trunk and transit exchange identity field** }	4	4	n | (mu |	4	{

Figure 8/Q.723 (comme tableau) [T6.723], p.

The following codes are used in the subfields of the incoming trunk and transit exchange identity field:

— Identity type indicator

bits B A:

0 0 spare

0 1 signalling point code

1 0 available part of calling line identity

1 1 spare

bits D C: spare

— Exchange identity length indicator

A code expressing in pure binary representation the number of address signals included in the transit exchange identity subfield for the case when part of the calling line identity is used for this purpose.

When the transit exchange is identified by the signalling point code, this subfield is coded 0000.

— Transit exchange identity

A code consisting of either:

i) the signalling point code of the exchange, or

ii) a part of the calling line identity, in which case each address digit contained in this identity is coded as indicated in § 3.3.1 h) where applicable.

— Field length indicator

A code indicating in pure binary representation the number of octets in the incoming trunk identity field.

Code 0000 indicates that the incoming trunk identity is not provided.

— Incoming trunk identity

A code contained in a maximum of 15 octets, identifying the incoming trunk. The encoding of the incoming trunk identity is for further study.

h) Original called address

See § 3.3.2 n).

3.4.2 *Continuity-check message*

The basic format of the *continuity-check* | message is shown in Figure 9/Q.723.

Figure 9/Q.723, (M), p.

The following codes are used in the fields of the continuity-check message:

a) Label: see § 2

b) Heading code H0 is coded 0010

c) Heading code H1 contains signal codes as follows:

0011 continuity signal

0100 continuity-failure signal

3.5 *Backward set-up request message*

The following type of backward set-up request message is specified and is identified by one of the heading codes H1. The other H1 codes in this message group are spare.

3.5.1 General request message

The basic format of the general *request* | message is shown in Figure 10/Q.723.

Figure 10/Q.723, (M), p.

The following codes are used in the fields of the general request message:

a) Label: see § 2

b) Heading code H0 is coded 0011

c) Heading code H1 is coded 0001

d) Request type indicators

bit A: calling party category request indicator

0 no calling party category request

1 calling party category request

bit B: calling line identity request indicator

0 no calling line identity request

1 calling line identity request

bit C: original called address request

0 no original called address request

1 original called address request

bit D: malicious call identification indicator (national option)

0 no malicious call identification encountered

1 malicious call identification encountered

bit E: hold request indicator

0 hold not requested

1 hold requested

bit F: echo suppressor request indicator

0 no outgoing half echo suppressor requested

1 outgoing half echo suppressor requested

bit GH: spare

3.6 *Successful backward set-up information messages*

The following types of successful backward set-up information messages are specified and are each identified by a different heading code H1:

— address-complete message

— charging message.

3.6.1 *Address-complete message*

The basic format of the *address-complete* | message is shown in Figure 11/Q.723.

Figure 11/Q.723, (M), p.

The following codes are used in the fields of the address-complete message:

a) Label: see § 2

b) Heading code H0 is coded 0100

c) Heading code H1 is coded 0001

d) Message indicators

bits B A: type of address-complete signal indicators

0 0 address-complete signal

0 1 address-complete signal, charge

1 0 address-complete signal, no charge

1 1 address-complete signal, payphone

bit C: subscriber-free indicator

0 no indication

1 subscriber-free

bit D: incoming echo suppressor indicator

0 no incoming half echo suppressor included

1 incoming half echo suppressor included

bit E: call forwarding indicator

0 call not forwarded

1 call forwarded

bit F: signalling path indicator

0 any path

1 all signalling system No. 7 path

bits G H: spare, for national use (may be used to indicate call redirection, holding of the connection or the end-to-end signalling method to be used).

Note — The address-complete signal without qualification is classified for the time being in the basic national category of signals. The use of this signal in the international network is for further study.

3.6.2 *Charging message* | (see Note)

The basic format of the *charging* | message is shown in Figure 12/Q.723.

Figure 12/Q.723, (M), p.

The following codes are used in the fields of the charging message:

a) Label: see § 2

b) Heading code H0 is coded 0100

c) Heading code H1 is coded 0010

d) Charging information

(Possible formats and codes of the charging information field are shown in Annex A.)

Note — The charging message is classified, for the time being, in the basic national category of messages. The use of this message in the international network is for further study.

3.7 *Unsuccessful backward set-up information messages*

3.7.1 *Simple unsuccessful backward set-up information message*

The basic format of the simple unsuccessful backward set-up information message is shown in Figure 13/Q.723.

Figure 13/Q.723, (M), p.

The following codes are used in the fields of the simple unsuccessful backward set-up information message.

a) Label: see § 2

b) Heading code H0 is coded 0101

c) Heading code H1 contains signal codes as follows:

0000	spare
0001	switching-equipment-congestion signal
0010	circuit-group-congestion signal
0011	national-network-congestion signal
0100	address-incomplete signal
0101	call-failure signal
0110	subscriber-busy signal (electrical)
0111	unallocated-number signal
1000	line-out-of-service signal
1001	send-special-information-tone signal
1010	access barred signal
1011	digital path not provided signal
1100	misdialled trunk prefix signal (for national use)
1101 to 1110	spare

3.7.2 *Extended unsuccessful backward set-up information message*

The basic format of the extended unsuccessful backward set-up information message is shown in Figure 13a/Q.723.

Figure 13a/Q.723, (M), p.

The following codes are used in the fields of the extended unsuccessful backward set-up information message:

a) Label: see § 2

b) Heading code H0 is coded 0101

c) Heading code H1 contains signal code 1111

d) Octet indicator

bits D C B A: unsuccessful indicator

0	0	0	0	spare
0	0	0	1	subscriber busy
0	0	1	0	
to		spare		
1	1	1	1	

bits H G F E: spare.

e) Signalling point code

The point code of the signalling point in which the message is originated.

3.8 *Call supervision message*

The basic format of the *call supervision* | message is shown in Figure 14/Q.723.

Figure 14/Q.723, (M), p.

The following codes are used in the fields of the call supervision message:

a) Label: see § 2

b) Heading code H0 is coded 0110

c) Heading code H1 contains signal codes as follows:

0000	answer signal, unqualified
0001	answer signal, charge
0010	answer signal, no charge
0011	clear-back signal
0100	clear-forward signal
0101	re-answer signal
0110	forward-transfer signal
0111	calling party clear signal (national option)
1000 to 1111	spare

3.9 *Circuit supervision message*

The basic format of the *circuit supervision* | message is shown in Figure 15/Q.723.

Figure 15/Q.723, (M), p.

The following codes are used in the fields of the circuit supervision message:

a) Label: see § 2

b) Heading code H0 is coded 0111

c) Heading code H1 contains signal codes as follows:

0000 spare

0001 release-guard signal

0010 blocking signal

0011 blocking-acknowledgement signal

0100 unblocking signal

0101 unblocking-acknowledgement signal

0110 continuity-check-request signal

0111 reset-circuit signal

1000

to spare

1111

3.10 *Circuit group supervision message*

The basic format of the circuit group supervision message is shown in Figure 16/Q.723:

Figure 16/Q.723, (M), p.

The following codes are used in the fields of the circuit group supervision message:

a) Label: see § 2

The following interpretations apply to the CIC given in the label:

i) If the range field is not coded all zero the CIC given in the label is the first CIC within the circuit group or the first CIC within that part of the circuit group.

ii) If the range field is coded all zero (national option) the CIC given in the label is a representative CIC within the circuit group.

b) Heading code H0 is coded 1000

c) Heading code H1 contains message codes as follows:

0000	spare
0001	Maintenance oriented group blocking message
0010	Maintenance oriented group blocking-acknowledging message
0011	Maintenance oriented group unblocking message
0100	Maintenance oriented group unblocking-acknowledgement message
0101	Hardware failure oriented group blocking message
0110	Hardware failure oriented group blocking-acknowledge message
0111	Hardware failure oriented group unblocking message
1000	Hardware failure oriented group unblocking-acknowledgement message
1001	Circuit group reset message
1010	Circuit group reset-acknowledgement message
1011	Software generated group blocking message (national option)
1100	Software generated group blocking-acknowledgement message (national option)
1101	Software generated group unblocking message (national option)
1110	Software generated group unblocking-acknowledgement message (national option)
1111	spare

d) Range: in principle, two different codings are possible:

i) not all zero: The message is related to a whole circuit group or a part thereof, and includes a status field unless the message is the circuit group reset message. The number of consecutive circuits to be handled is indicated by the value contained in the range field increased by 1. The CIC of the first circuit to be handled is given in the label. The number of circuits to be indicated is 2 (range value 1) to 256 (range value 255).

ii) all zero (national option): The message is related to a pre-determined circuit group. No status field is included. In this case the circuit group is addressed by means of a representative CIC within the circuit group.

Note — In national networks, the range field may not be used if only the concept of pre-determined circuit group applies.

e) Status field

All circuit group supervision messages except the circuit group reset message include a status field containing status indicator bits when the range field is not coded all zero. The number of status indicator bits is indicated by the value given in the range field increased by one.

The status field contains up to 256 one bit status indicators. The first status indicator bit is related to the circuit indicated by the CIC contained within the label, the second one is related to the circuit address by the CIC contained in the label increased by 1.

figure 17/Q.723, (M), p.

The CIC of the last circuit concerned is obtained by adding the value given in the range field to the CIC in the label. The status field consists of an integral number of octets. Bits within the last octet that are not used as status indicators are filled with zeros.

The status indicator bits are coded as follows:

— in all group blocking messages (MGB, HGB, SGB)

1 blocking

0 no blocking

— in all group blocking-acknowledgement messages (MGB, HBA, SBA)

1 blocking acknowledgement

0 no blocking acknowledgement

— in all unblocking messages (MGU, HGU, SGU)

1 unblocking

0 no unblocking

— in all group unblocking-acknowledgement messages (MUA, HUA, SUA)

Range value zero is only for national use.

1 unblocking acknowledgement

0 no unblocking acknowledgement

— in the circuit group reset-acknowledgement message (GRA)

1 blocking for maintenance reasons

0 no blocking for maintenance reasons

3.11 *Circuit network management messages*

The following type of circuit network management message is specified and identified by one of the heading codes H1. Unallocated H1 codes in this message group are spare.

3.11.1 *Automatic congestion control information message*

The basic format of the automatic congestion control (ACC) information message is shown in Figure 18/Q.723:

Figure 18/Q.723, (N), p.

The following codes are used in the fields of the automatic congestion control information message.

a) Label: see § 2

b) Heading code H0 is coded 1001

c) Heading code H1 is coded 0001

d) Message indicators

bits B	A	ACC information
0	0	spare
0	1	congestion level 1
1	0	congestion level 2
1	1	spare

bits HGFEDC spare

ANNEX A
(to Recommendation Q.723)

Charging messages

A.1 *Introduction*

The application of Signalling System No. 7 in national networks was recognized from the beginning of the discussions about the signalling system. The result of this can be found throughout the specifications especially in those Recommendations dealing with the TUP. One of the points which is particularly of interest for an Administration is the possibility of transfer of charging information. Signalling System No. 7 allows for such a feature for charging a calling subscriber by defining a specific charging message as indicated in § 3.6.2. However, the detailed format, coding and related procedures are not given, mostly because this matter is very dependent on the circumstances within a specific national network. The following examples illustrate a particular implementation in a national network for telephony without exclusion of other possible solutions.

A.2 *Starting points*

Before describing in detail the messages involved, a number of starting points have to be adopted.

a) The first No. 7 exchange performs metering according to all possible tariffs.

b) The determination of a particular tariff is performed in a point somewhere in the network.

c) The receipt of messages containing charging information should be acknowledged within the call control procedures.

d) At dedicated moments the actual charging should be adapted.

e) A variety of charging possibilities should be available.

The effect of these starting points is:

a) the actual generation of charging units according to a particular tariff is always performed at the lowest level of the national public telephone network (local exchange);

b) the determination of tariffs for local and trunk calls is carried out in the local exchange and for international calls in the international exchange; however, also the use of a centre for determination of all kinds of tariffs is possible;

c) the transmission of charging information is assured at the highest level of the call control procedures and possibly inhibits call completion without receipt of charging information;

d) calls of long duration can be subject to different charging rates;

e) the application of charge free calls, specific charge on answer, time dependent charging during a call, additional (specific) charge during a call and a combination of these.

A.3 *Messages and procedures*

To meet all the above mentioned requirements a number of messages are defined.

A.3.1 *Charging message*

This message has to be sent for any call, charge free or not. In the procedure this is covered by the fact that the charging message has to be received during call set up before receipt of the address complete message.

If not, then the call should be cleared immediately.

The content of the message will vary depending on the actual tariff and this is indicated by a number of indicators indicating the presence of certain fields in the message.

Possible contents:

a) charge band

The indication of a certain charge band should allow the receiving exchange to charge a call according to a certain tariff including possible switchover times to higher or lower rates. This method results in a simple message but requires the receiving exchange to have all the information available related to all possible charge bands, national and international.

b) explicit charging indication

In this case the message contains explicit indications of details of the tariff viz.

— number of charging units on answer (packet)

— time dependent tariff(s)

— possible switchover time.

This method results in a more complex message but does not require the permanent storage of any charging information.

A.3.2 *Change message*

A consequence of the adoption of the method with explicit charging indication (§ A.3.1 b)) is the necessity to allow for tariff switchover for calls of very long duration or for calls which are answered just after the switchover time given in the message described in § A.3.1 b). The content of such at message is rather simple because it only contains the new applicable tariff and the actual switch-over time.

The procedure to acknowledge the receipt of the message cannot be found in the normal call control procedure, therefore an acknowledgement message (see § A.3.5) in the forward direction is used. If this acknowledgement message is not received within a certain time, the change message has to be repeated.

A.3.3 *Collection charging*

For a variety of reasons it might be necessary to charge a subscriber during the call a certain amount. For this purpose a message is used indicating the number of charging units related to the amount for which the subscriber has to be charged.

The procedure to assure the receipt of this message is the same as described in § A.3.2 above. A possible further collection charging message should not be sent before receipt of the acknowledgement message and the charging confirmation message (see § A.3.4 charging confirmation).

A.3.4 *Charging confirmation*

In relation with the message described in § A.3.3 a message in the forward direction is required indicating how many charging units actually are charged to the subscriber. This number should match to the number given in the collection charging message, otherwise it must be concluded that for some reason the order is not executed, e.g., a certain service should now be withheld to be furnished to the subscriber.

Again the procedure is the one as described in § A.3.2 above but in the opposite direction.

A.3.5 *Acknowledgement*

To acknowledge the receipt of the messages described in §§ A.3.2, A.3.3 and A.3.4, an acknowledgement message is used in both directions only indicating the receipt of the related message.

A.4 *Formats and codes*

A.4.1 *Charging messages*

A.4.1.1 *Charge band*

tableau ccitt 86010, (M), p.

— Charge band

A charge indicates the combination of tariffs including switch-over times which is applicable for a certain period (e.g., day or week).

A.4.1.2 *Explicit charging indication*

tableau ccitt 86020, (M), p.

— Message indicators

bit A: tariff indicator current tariff (A)

0 packet charging field and tariff indicators current tariff (A) not present

1 packet charging field and tariff indicators current tariff (A) present

bit B: tariff factor current tariff (A)

0 tariff factor field current tariff (A) not present

1 tariff factor field current tariff (A) present

bit C: tariff indicator next tariff (B)

0 packet charging field and tariff indicators next tariff (B) not present

1 packet charging field and tariff indicators next tariff (B) present

bit D: tariff factor next tariff (B)

0 tariff factor field next tariff (B) not present

1 tariff factor field next tariff (B) present

bit H-E spare

— Packet charging field

0000

| number of charging units on answer

1111

— Tariff indicators

0000 tariff scale 0 (no time dependent tariff)

0001 tariff scale I

| tariff scale | every scale indicates a certain step in seconds or parts thereof

1111 tariff scale XV

— Tariff factors

If a call is charge free (A = B = C = D = 0) only the message indicator octet is present.

If a call is charge free from the start but may become chargeable (A = 1, B = 0, C = 1, D = 0/1), the packet charging field for the current tariff is 0000 and the tariff indicator for the current tariff indicates scale 0.

If a call is chargeable from the start but may become charge free (A = 1, B = 0/1, C = 1, D = 0) the packet charging field for the next tariff is 0000 and the tariff indicator for the next tariff indicates scale 0. If a call is chargeable according to only one tariff (A = 1, B = 0/1, C = 0, D = 0), also the time indicator is not present in the message. The actual tariff is determined by multiplication of the step indicated by the tariff indicator with the tariff factor which gives then a specific charging unit interval in seconds.

— Time indicator

000000 spare

000001 00.30 h

000010 01.00 h

| |

| |

110000 24.00 h

A.4.2 *Tariff change message*

tableau ccitt 86030, (M), p.

— Message indicator

Bit A: tariff factor next tariff

0 tariff factor field next tariff not present

1 tariff factor field next tariff present

Bits D-B: spare

— Tariff indicator, tariff factor and time indicator: see § A.4.1.2

A.4.3 *Collection charging message*

tableau ccitt 86040, (M), p.

The collection field contains the number of charging units which are to be charged to the calling subscriber. The field has a length of 8 bits so a maximum of 256 units is possible.

A.4.4 *Charging confirmation message*

tableau ccitt 86040 (?), (M), p.

— Heading code H1

H1 = 0101 confirmation of packet charging

H1 = 0110 confirmation of collection charging

— Charging unit field

Number of charging units which actually are charged to the calling party

A.4.5 *Acknowledgement message*

tableau ccitt 86050, (M), p.

— Heading code H1

H1 = 1000 acknowledgement receipt of tariff review, collection charging or charging confirmation message

References

[1] CCITT Recommendation *Characteristics of primary PCM multiplex equipment operating at 2048 kbit/s* , Rec. G.732.

[2] CCITT Recommendation *Characteristics of 2048-kbit/s frame structure for use with digital exchanges* , Vol. III, Rec. G.734.

[3] CCITT Recommendation *Second order PCM multiplex equipment operating at 8448 kbit/s* , Rec. G.744.

[4] CCITT Recommendation *Characteristics of 8448-kbit/s frame structure for use with digital exchanges* , Rec. G.746.

[5] CCITT Recommendation *Language digit or discriminating digits* , Rec. Q.104.

[6] CCITT Recommendation *Signalling Connection Control Part* , Recs. Q.711-Q.714.

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