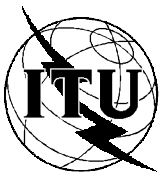

INTERNATIONAL TELECOMMUNICATION UNION

ITU-T

TELECOMMUNICATION
STANDARDIZATION SECTOR
OF ITU

F.72

(03/93)

OPERATIONS AND QUALITY OF SERVICE

TELEGRAPH SERVICES

THE INTERNATIONAL TELEX SERVICE – GENERAL PRINCIPLES AND OPERATIONAL ASPECTS OF A STORE AND FORWARD FACILITY

ITU-T Recommendation F.72

(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 F.72 was revised by the ITU-T Study Group I (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 Similarly, in this reform process, the CCIR and the IFRB have been replaced by the Radiocommunication Sector.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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Recommendation F.72

THE INTERNATIONAL TELEX SERVICE – GENERAL PRINCIPLES AND OPERATIONAL ASPECTS OF A STORE AND FORWARD FACILITY

(Melbourne, 1988; revised Helsinki, 1993)

The CCITT

considering

(a) that telex store and forward is included in Recommendation F.63 as an additional facility within the international telex service;

(b) that telex store and forward facilities have been and are being introduced by many countries;

(c) that a requirement for access via the international telex service from an originator in one country to a telex store and forward facility in another country has been identified;

(d) that a store and forward facility in one country may be interconnected with the store and forward facility in another country via Message Handling Services in accordance with F- and X-Series Recommendations,

unanimously declares

that the general principles and operational aspects described in this Recommendation should be adopted for the provision of store and forward as an additional facility within the international telex service.

1 Scope

1.1 This Recommendation is one of a series which define telex store and forward facilities. The other Recommendations are:

Rec. U.80 – International telex store and forward – Access from a telex subscriber

Rec. U.81 – International telex store and forward – Delivery to a telex subscriber

1.2 The service requirements and Quality of Service provisions along with the single address facility and classes of delivery specified in this Recommendation are essential for the store and forward facility. The other facilities are optional and will be provided at the discretion of the Administration operating the store and forward unit (SFU).

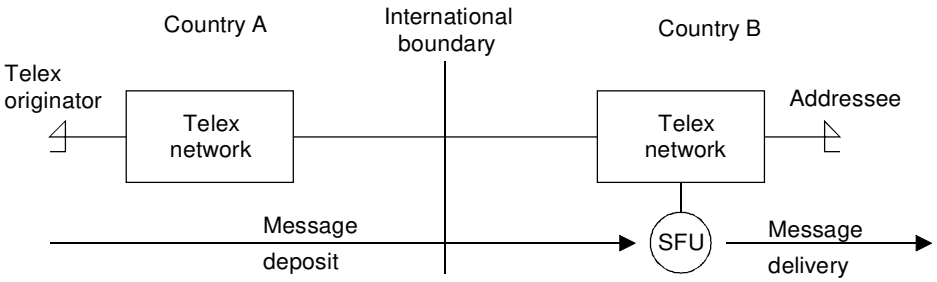
2 General

2.1 Within the store and forward facility, communication between terminals is on a store and forward basis via the SFU, thus conversational mode connection between terminals is not provided.

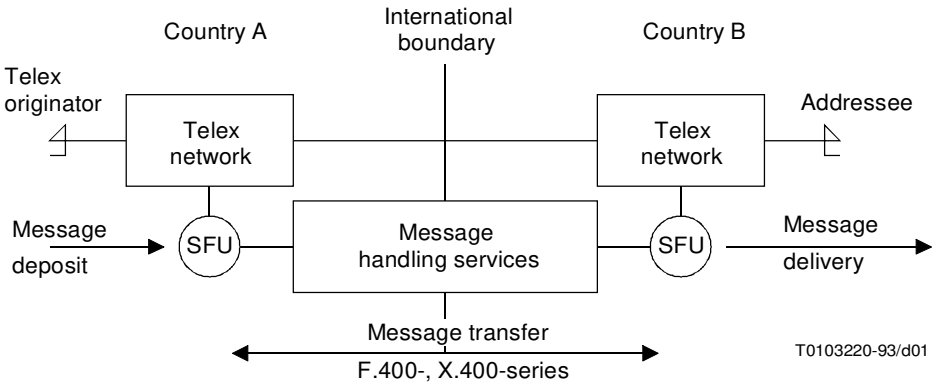
2.2 The following two types of configuration have been identified as shown in Figure 1:

a) *International store and forward* is where a subscriber in Country A accesses the store and forward unit in Country B for the transmission of messages to that country.

b) *Interconnected store and forward* is where the store and forward unit in Country A is connected to the store and forward unit in Country B for the transmission of messages between the two countries.



a) Case of international store and forward



b) Case of interconnected store and forward

FIGURE 1/F.72

General model for the deployment of SFUs

2.3 Whilst the Recommendation addresses international and interconnected store and forward, the delivery procedures can be used for international traffic from a national SFU.

2.4 Limitations of access to a store and forward facility

2.4.1 The configurations identified in 2.2 will be provided on the basis of bilateral agreements between the Administrations concerned.

2.4.2 An Administration operating an SFU should be responsible for the barring of international access from unauthorized users and for barring unauthorized types of call such as transit calls to specific countries. The method of barring shall be the responsibility of the Administration operating the SFU and is beyond the scope of this Recommendation.

2.4.3 It may also be necessary for Administrations to make provision to selectively block access to SFUs in other countries.

3 Service requirements

3.1 Message identification

The SFU will provide to the subscriber a unique message reference readily identifiable for every message, comprising:

a) the date and time of message input as provided to the originating telex subscriber in accordance with Recommendation U.80; and

b) the message reference number as allocated and provided to the originating telex subscriber at the time of input of the message.

3.2 Service signals

3.2.1 Service signals received by the SFU

All standardized telex service signals (see Recommendation F.60 for a list of code expressions and appropriate Series-U Recommendations for their format) must be recognized by the SFU. The retry procedure will be according to the principles of Recommendation U.40. It is desirable that the SFU attempt to interpret non-standard service signal and continue with the appropriate procedure. If the SFU is unable to interpret a non-standard service signal, the SFU should give a non-delivery notification to the calling subscriber and repeat the service signal in the format received.

3.2.2 Code expressions sent by the SFU

The following code expressions may be generated by the SFU:

ADD	Please input your international telex number
LDE	Maximum acceptable message length or duration has been exceeded
BMC	No end of message or end of transmission received, therefore message cancelled
IAB	Invalid answerback from destination (only sent as part of a non-delivery notification)
ITD	Input transaction accepted for delivery
TMA	Maximum number of addresses exceeded
IMA	Input message acknowledgement
OCC	Store full, SFU unavailable
ITR	Input transactions rejected
REJ	Address rejected

3.3 Duration of message storage

The retry procedure applied by the SFU should be in accordance with the principles of Recommendation U.40. However, the period for which the SFU should retain responsibility for the message should not exceed 24 hours from time of input. If delivery has not been effected, the procedure as in 3.9 should apply.

3.4 Maximum message length and duration

3.4.1 All SFUs should have sufficient capacity to accept at least 24 000 characters per single message. Exceptionally, some SFUs may set this limit at 12 000 characters or even lower. Subscribers should therefore be advised by their Administrations as to the maximum message length accepted by those SFUs to which they have access.

3.4.2 In the case of interconnected SFUs, the maximum acceptable message length of the SFUs should be agreed to by the Administrations operating the SFUs.

3.4.3 The maximum input duration for a single transaction should be two hours.

3.4.4 If the maximum acceptable message length or duration is reached, the sender should be advised by sending to him the service code LDE. Prior to sending the service code LDE, an attempt should be made to stop his transmission by sending the letter T, repeatedly in accordance with Recommendation S.4.

3.4.5 After sending the service code LDE, the SFU will wait for the end of message signal (EOM) or end of transaction signal (EOT) and proceed in accordance with 3.6.

3.5 Store full indication

Messages should cease to be accepted when the level of store capacity is reduced to a predetermined state to ensure that any messages in the process of being transmitted to the unit can be accepted in their entirety bearing in mind the provisions of 3.4. The unit will return the service code OCC in response to attempts to access the unit for message input.

3.6 End of transaction and end of message signal

3.6.1 At the end of each transaction, an end of transaction (EOT) signal is required. This signal is ++++. However, for follow-on messages, an end of message (EOM) signal is required at the end of each individual message. The functions of these signals are described in Table 1.

TABLE 1/F.72

Functions of end of message and end of transaction signals

Sequence	Mnemonic	Function	Action by SFU
NNNN	EOM	Used to separate different messages (end of message) deposited in the SFU during the same transaction for delivery to different addresses or groups of addresses.	1) Enables follow-on calls to be provided by the SFU. 2) Will result in force clearing by the SFU and cancellation of the message(s) if not followed by either an address or the EOT signal.
NNNNACK	EOM(ACK)	Used to request input message acknowledgement (IMA) of previously deposited messages, to separate messages, and to request a follow-on call.	As for EOM, except that messages already acknowledged will be delivered whatever the subsequent action by either the subscriber or the SFU.
+ + + +	EOT	End of transaction signal, used to indicate to the SFU that the transaction has been completed and also to request message reference information for previously submitted messages not already acknowledged.	Provide message reference information and initiate clearing.

3.6.2 If there is a stop in transmission for 30 seconds without receipt of either an EOM or EOT signal, the code expression GA should be sent to the subscriber.

3.6.3 If the EOM/EOT signal is not received, or transmission does not resume within a further 30 seconds, the SFU shall initiate the clear down procedure.

3.6.4 The incomplete message should either be cancelled or, optionally, sent to an operator assistance position.

3.6.5 If the message is to be cancelled before clearing the connection, the SFU should inform the subscriber that no EOM/EOT signal has been received by sending the code expression BMC.

3.6.6 In the event of clear down by the caller without an EOM or EOT signal, the incomplete message(s) will be processed as in 3.6.4.

3.7 Input transaction accepted

On receipt of an EOT signal the SFU should send an input transaction accepted for delivery signal (ITD) notifying the subscriber that the message(s) has/have been accepted and that delivery will be attempted. Delivery should be attempted even if the call is cleared before the ITD is sent. The ITD should be followed by the message reference(s) and, if applicable, number of messages.

3.8 Message security

3.8.1 Message acceptance

3.8.1.1 The SFU should only accept messages for delivery to destination addresses served by that SFU. Any messages for other destinations should be refused with code expression NA for the reason of non-delivery.

3.8.1.2 The SFU should not accept message input unless acceptable identification of the originating subscriber has been received at call set-up in accordance with Recommendations U.74 and U.80.

3.8.1.3 The SFU may validate the called address(es). If this validation is unsuccessful for all addresses the message should be rejected and the code expression ITR should be returned (see Recommendation U.80). However positive validation result does not guarantee that the message can be delivered to the given address.

3.8.2 Expected answerback comparison

Subscribers may provide all or part of the expected answerback to enable the SFU to validate the answerback received in order to enhance message security. This information should be compared with the answerback received by the SFU at call set-up to the destination subscriber and, if found not to be in compliance, the message should not be delivered.

A non-delivery notification should be given to the originating subscriber including the code expression IAB and optionally repeating the destination answerback actually received. The method used for checking the answerback is the responsibility of the Administration operating the SFU. If the subscriber does not provide the expected answerback, the SFU may provide validation by comparing the called party's national telex number with the received answerback.

3.9 Advice of non-delivery/delivery

3.9.1 Automatic advice of non-delivery should be given to the subscriber as soon as the delivery retry procedure in accordance with Recommendation U.40 has been terminated. In the case of multi-address messages, advice of non-delivery may be issued on a per message or per address basis, the former being preferred when the retry procedure has been completed for all of the specified addresses. If an advice of non-delivery cannot be delivered, it should be sent to a manual assistance position associated with the SFU. Normal telex operator calling procedures must be observed when attempting manually-assisted advice of non-delivery.

3.9.2 Automatic advice of delivery is preferred. However, it will be provided at the discretion of the Administrations operating the SFU service.

3.9.3 In the case of interconnected store and forward, the destination SFU should pass all delivery, non-delivery and status information to the originating SFU from which advice will be sent to the originating subscriber.

3.9.4 The provision of a periodic (e.g. daily) notification or journal may be considered as an adequate form of delivery, non-delivery and status information.

3.9.5 Notification of message delivery/non-delivery may be on a per message or per address basis. This Recommendation assumes that notification will be returned, as a minimum, on a per message basis.

3.10 Call records

Records of effective and ineffective calls should be maintained and forwarded to the origin Administration at regular intervals (at least once per month) for general accounting, billing, and statistical purposes. The Administrations should agree bilaterally on the format and method of information transfer.

3.11 Incomplete message

In the case of partial delivery of a message by the SFU, the header "Possible duplicate message" should be appended to the message at subsequent delivery.

4 Facilities

4.1 Single address

This is where a message is sent via an SFU to another telex subscriber addressee and is a minimum requirement. In addition, messages may also be sent to subscribers of other services (e.g. Teletex, Videotex) in accordance with Recommendation U.80.

4.2 Multi-address

4.2.1 A multi-address message is where a common text is sent to two or more addresses. This facility should be provided only for addresses in the same country as the destination SFU and requires bilateral agreement.

4.2.2 The acceptable number of individual addresses for any one message will be decided by the Administrations operating the SFU but should be at least 20.

4.2.3 If the maximum acceptable number of addresses is exceeded, the SFU shall clear the communication after sending the code expression TMA.

4.3 Follow-on messages

This facility enables the subscriber to enter more than one message into storage without clearing, each message being preceded by a different header, and is considered to be highly desirable. At the completion of the transaction, the unit should advise the sender of the number of messages received. Each separate message must have a unique reference number. See also 3.6.1.

4.4 Classes of delivery

The following three classes of delivery have been identified; one or more of these should be offered by Administrations:

a) *Normal delivery* – The SFU attempts to deliver the message as soon as operationally feasible after receipt.

b) *Deferred delivery* – The delay can be either:

   i) set by the Administration offering the SFU facility;

   ii) set by the calling subscriber, such that the delivery of the message is not attempted until after the expiration of the indicated delay.

c) *Time limited delivery* – Where the SFU attempts to deliver the message as soon as operationally feasible up to a customer – specified time limit not exceeding 24 hours.

These classes of delivery should be offered on a per address basis.

4.5 Cancellation

The facility whereby the originating subscriber may cancel a message after it has been accepted by the SFU is not permitted.

4.6 Address correction

When provided, the facility whereby the originating subscriber can correct an address during input should be implemented in accordance with Recommendation U.80.

5 Quality of Service

5.1 Loss probability in the store and forward procedure

5.1.1 The introduction of an SFU into the international telex network should not increase, on a per address basis, the probability of message loss or corruption.

5.1.2 In international store and forward, the unique identification of each message should enable the system to provide information as to the status of any message upon interrogation.

5.1.3 In the event of system failure, all accepted messages should be traceable. However, if messages have to be cancelled, the originating subscriber should be informed.

5.2 Error protection

The overall error protection should be in accordance with Recommendation F.10 and the error rate should therefore not be greater than 3 in 100 000.

5.3 Duration of service

The automatic service should be continuous.

5.4 Number of circuits

Where international store and forward exists, the amount of traffic generated and received by the SFU should be considered when determining the number of international circuits in conformity with Recommendation F.64. However, the actual number of circuits will depend on the capacity of the SFU. Care must be taken that routes are not congested by the SFU. Such factors as the time difference between the countries concerned need to be taken into account.

5.5 Minimum storage capacity

The storage capacity will vary from unit to unit according to the volume of traffic. However, it should be sufficient to provide a grade of service not less than that of the international telex service provided by that Administration.

6 Access principles

6.1 The procedure defined in this part of the Recommendation is a two-stage selection procedure whereby the calling telex subscriber gains access to a foreign SFU in the first stage of selection and either inputs the called address(es) and message, or requests a status report, in the second stage of selection, after the return of a call-connect by the called SFU.

6.2 Message input from both manual and automatic emitting devices should be accommodated.

6.3 The telex address of the originating telex subscriber should be determined in accordance with Recommendation U.74. It should be noted, however, that not all answerbacks follow the preferred sequence described in Recommendation F.60 and allowance should be made for this condition.

6.4 A different access code should be used depending on the desired mode of operation; either message input or status enquiry.

7 Access procedures

7.1 General

7.1.1 Two basic access procedures should be provided:

a) *Interactive operation* – Input from manual calling terminals, where the SFU may return prompt signals.

b) *Non-interactive operation* – Either input from automatic emitting devices or from subscribers'terminals, where prompt signals from the SFU are not required or are input from another SFU (detection of this type of access will rely on the identification of the calling SFU answerback).

7.2 Access from a telex subscriber

7.2.1 The originating telex subscriber should establish a call to the SFU by means of normal telex procedures.

7.2.2 Figure 2 shows the recommended procedures for message deposit in the SFU. The protocol to be followed between the originating telex subscriber and the SFU should be in accordance with Recommendation U.80.

7.3 Service request

7.3.1 Interactive service request

The originating telex subscriber should be recognized as interactive by the omission of the non-interactive service request (see 7.3.2).

7.3.2 Non-interactive service request

The originating telex subscriber should indicate that the transmission is from an automatic terminal by commencing the procedure with the non-interactive service request (characters CI).

7.4 Message input

7.4.1 Provision should be made for both single and multi-addressed calls.

7.4.2 The SFU should only accept messages for delivery to destination addresses served by that SFU.

7.4.3 An attention information field may be provided by the SFU to convey the name and address of the recipient.

7.4.4 The desired class of delivery should be selectable on a destination address basis.

7.4.5 A message reference number may be returned to the originating subscriber immediately after the date and time information and before message input. In addition, it must be returned after the ITD signal at the end of the transaction. The reference number should comprise up to six numeric characters and cycle through consecutively for follow-on messages within the same transaction with accommodation being made for at least the last two or three digits for this purpose.

7.4.6 Characters received in the message text with the exception of the WRU signal should be transmitted transparently by the SFU.

7.4.7 The ITD should be returned to the originating subscriber to indicate that the SFU has accepted the message on receipt of the EOT. Alternatively, an input message acknowledgement signal (IMA) will be sent on receipt of an EOM(ACK) signal.

8 Contents of the address line

8.1 Address line

8.1.1 Each address to which the message is to be delivered should be provided by the originating subscriber in the address line.

8.1.2 The address line information may consist of up to five fields:

a) address to be called;

b) expected answerback or part thereof;

c) attention information;

d) delivery indication;

e) positive delivery notification (PDN) request.

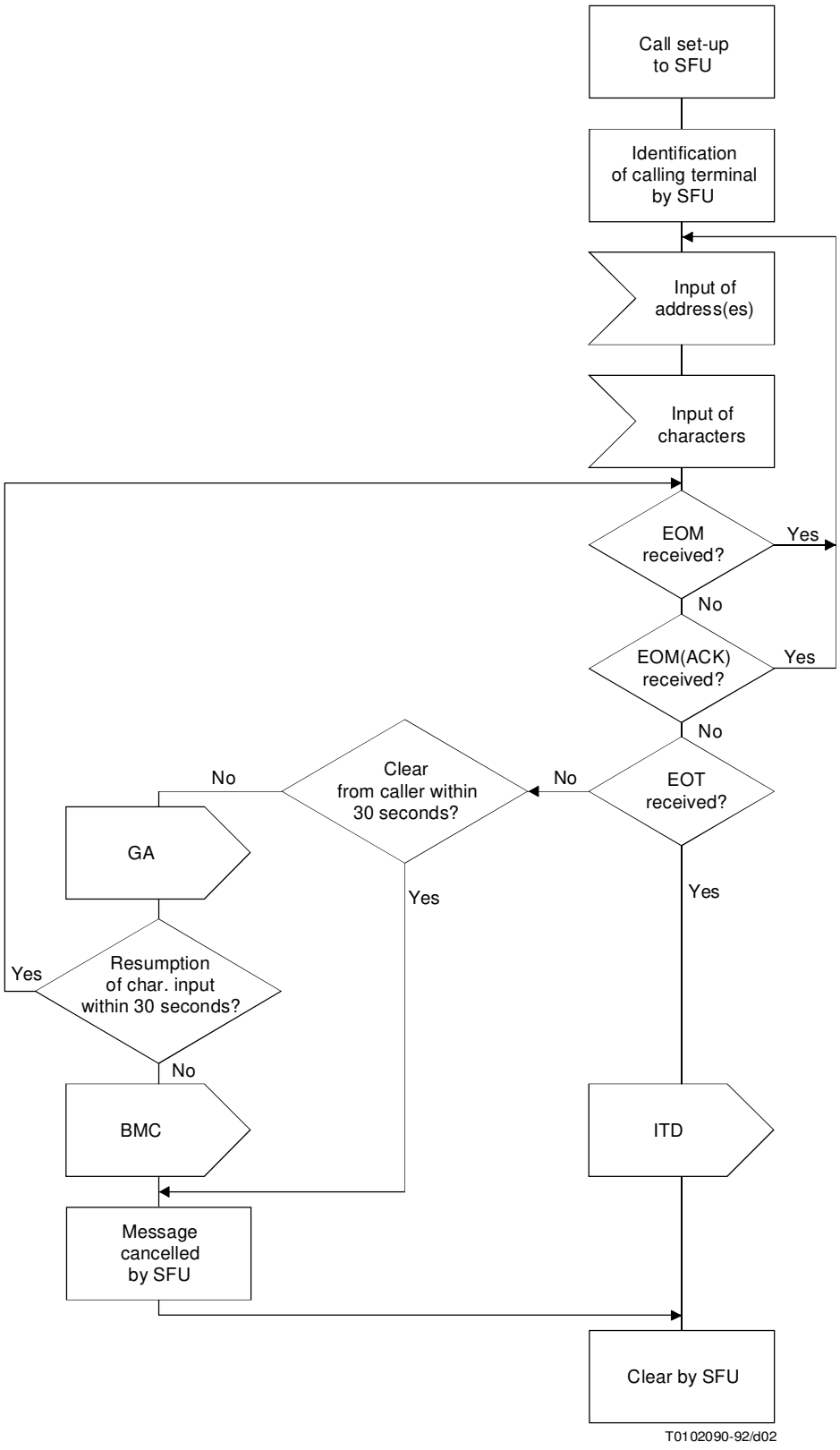


FIGURE 2/F.72

General procedure for message deposit into an SFU

8.1.3 Each field within an address line and also each address line should be delimited in accordance with Recommendation U.80.

8.1.4 All fields within an address line except for 8.1.2 a) are optional and may be omitted at the discretion of the originating subscriber.

8.1.5 The address line(s) should be delimited from the message text by an end of address (EOA) signal +.

8.1.6 In general, non-telex addresses should be input in accordance with Recommendation U.80, including the relevant service identifier (e.g. TTX, VTX, PDA)

9 Abnormal conditions during message input

Abnormal conditions encountered during message input should be handled in accordance with Recommendation U.80.

10 Message status enquiry

10.1.1 A message status enquiry facility should be provided internationally to provide information only in response to a status request from the originator. This message status enquiry point will be accessed by a separate access code to that used for message input.

10.1.2 When the SFU automatically provides advice of delivery and non-delivery, or a request for positive delivery can be indicated, then the provision of status enquiry facilities is optional.

10.1.3 Status enquiry information should be maintained preferably for 72 hours.

10.1.4 The answerback of the message originator should be used for identification and therefore needs to be retained by the SFU for this purpose.

10.1.5 In the case of multi-address messages, status information may be requested on:

a) all addresses associated with a message reference number;

b) addresses which have not yet received the message;

c) addresses specified by the originating telex subscriber.

10.2 Status enquiry information field content

10.2.1 The status enquiry should contain the following fields:

a) message reference information;

b) a status request;

c) address(es).

10.2.2 The status request indicates the information required (see 10.2.1).

10.2.3 The address(es) field, see 8.1.2 a), should only be included when status information has been requested for specific addresses.

10.3 The status report

10.3.1 The status report format should be consistent with the delivery/non-delivery notification advice format as described in Recommendation U.81.

10.4 Status report field content

10.4.1 The status report should contain the following fields where applicable for each address:

a) message reference number;

b) selection information;

c) expected answerback or part thereof;

d) notification, i.e. not delivered or delivered;

e) received answerback;

f) reason for non-delivery;

g) date and time of delivery;

h) duration of call.

10.4.2 The information contained in fields e), g) and h) will only be included in a delivery notification whilst the information in field f) will only be included in a non-delivery notification.

10.4.3 The information contained in field f) should indicate to the subscriber the reason why the SFU has been unable to deliver the message to the address detailed in field b). This information should describe the reason for failure on the latest or final attempt.

10.4.3.1 When a service signal is received by the SFU, this information shall be placed in the reason field.

10.4.3.2 Other reasons for non-delivery are:

a) wrong answerback received from destination

The reason field content should be IAB (see 3.2.2).

b) clear received by the SFU during message transmission

The reason field content should be PREM CLR.

c) interruption of message transmission caused by receipt of characters at the SFU

The reason field content should be INTERRUPTED.

d) address validation failure

The reason field content should be REJ.

11 Delivery procedure

The technical aspects of message delivery are described in Recommendation U.81.

11.1 Clauses 11, 12 and 13 describe procedures for the delivery of international telex messages by an SFU and comprise the following:

a) message delivery procedures;

b) notification procedures;

c) delivery retry procedures.

11.2 The procedures should apply to all classes of message delivery.

11.3 The priority and time of message delivery should be the responsibility of the SFU that has accepted the input message for delivery.

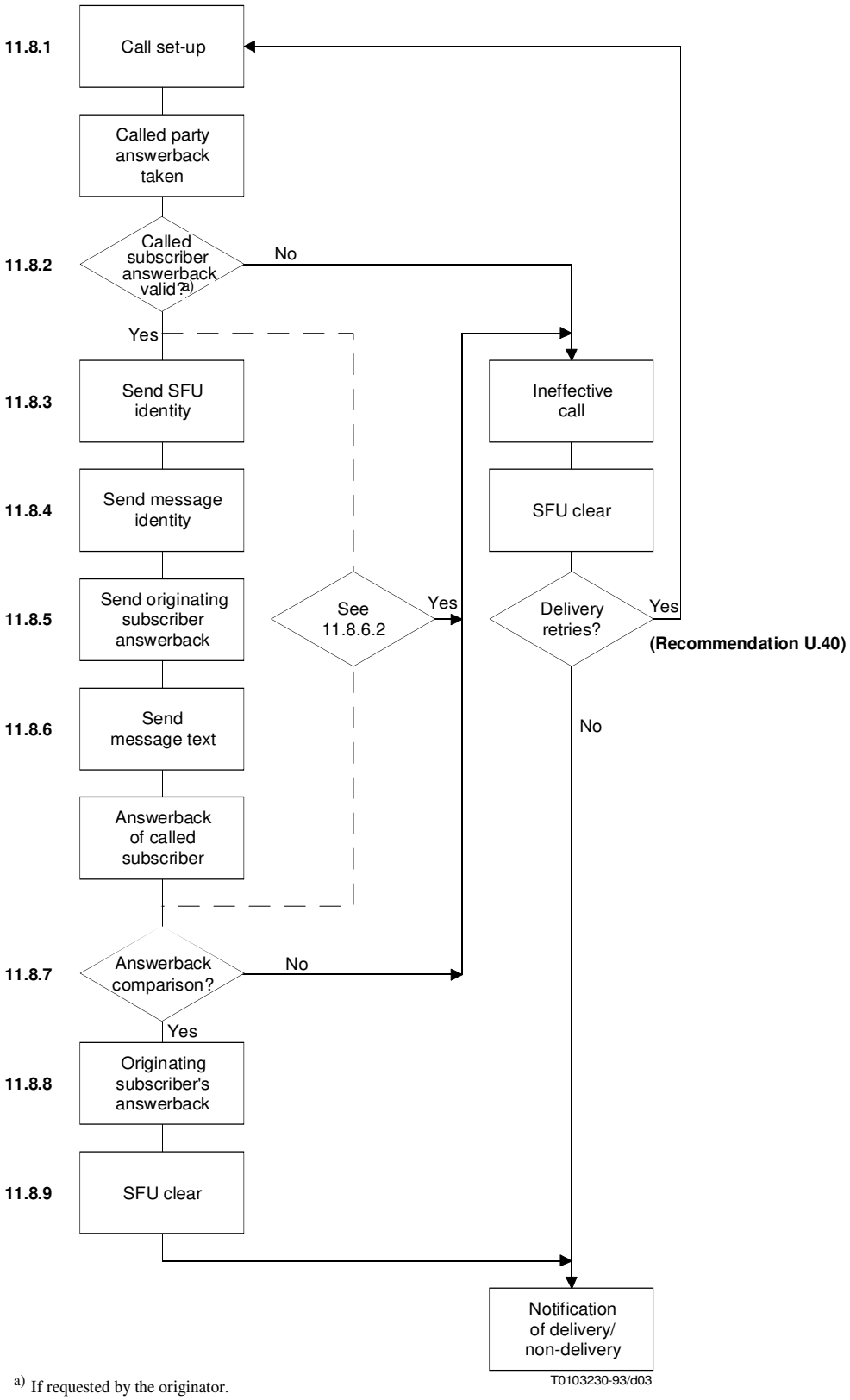
11.4 In the case of international interworking between the SFUs, the priority and time of message delivery may be controlled by the originating or destination SFU subject to bilateral agreement between the Administrations concerned.

11.5 The term “delivery of messages” applies to the forwarding of messages, which were input into an SFU by an originating telex subscriber, to a telex subscriber over the international telex network.

11.6 The term “notification” applies to the forwarding of an advice of delivery/non-delivery of a message to the originating telex subscriber over an international telex circuit.

11.7 Procedures for delivery of messages

11.7.1 The sequence of the message forwarding procedure is illustrated in Figure 3.



a) If requested by the originator.

FIGURE 3/F.72

Message delivery procedure

11.8 The components of message forwarding procedures are as follows:

11.8.1 Call set-up

a) Establishment of a connection by an SFU over the international telex network should use normal telex procedures. If a call connect signal is not received, the call attempt should be terminated and a retry made in accordance with Recommendation U.40.

b) If service signals are received during the call set-up cycle, the SFU should act in accordance with Recommendation U.40.

11.8.2 Called subscriber answerback validation

11.8.2.1 To ensure security of delivery, the answerback of the called subscriber should be compared with the expected answerback of the called subscriber, if supplied by the originating telex subscriber.

11.8.2.2 One erroneous character displacement shall be tolerated in the validation process of the called subscriber's answerback.

11.8.3 SFU identification

The SFU identification should consist of the answerback sequence of the SFU, formatted in accordance with Recommendation F.60 and optionally preceded by the code expression CI.

11.8.4 Message identification

The SFU shall transmit to the called subscriber a message identification sequence issued at the time of input of the message in accordance with 3.1.

11.8.5 Answerback of originating telex subscriber

The answerback of the originating subscriber shall then be sent to the called subscriber.

11.8.6 Message text

11.8.6.1 The SFU should transmit to the called subscriber any message header information together with the stored message in the format in which it was originated by the calling subscriber. The EOM/EOT separators and the WRU signal shall not be transmitted.

11.8.6.2 If any signal is received on the backward path during the message text delivery, transmission of the message should be stopped for two seconds. If during that time further signals or a clearing condition is received, the call shall be cleared, message delivery deemed unsuccessful and action taken in accordance with 3.9. If no further signals are received on the backward path during that time, transmission of the message shall be resumed.

11.8.7 Called subscriber answerback comparison

Following message transmission, the answerback of the called subscriber should be taken and compared with that received at the start of message delivery. If they are the same, the delivery of the message shall be deemed successful. Otherwise, the answerback of the called subscriber shall be taken again for comparison. If there is a second mismatch, the delivery of the message should be considered as unsuccessful and further delivery attempts shall be made in accordance with 13.

11.8.8 Answerback of originating telex subscriber

The answerback of the originating subscriber shall then be sent to the called subscriber.

11.8.9 Call clearing sequence

Following the transmission of its answerback, the SFU should clear the call using normal telex clearing procedures. However, in the case of delivery to a Teletex destination, clearing procedures should be in accordance with Recommendations F.201 and U.201.

12 Notification procedures

12.1 Types of notification

The types of notification are shown in 3.9.

12.2 Notification delivery procedures

12.2.1 Status reports should be returned in response to a status request.

12.2.2 All other types of notification should be delivered using the procedure described for telex message forwarding in 11.7 and 11.8.

12.2.3 To ensure security of delivery of the notification, the answerback of the called subscriber should be compared with the answerback of the originating subscriber received at the time of message input.

13 Delivery retry procedures

13.1 The principles of Recommendation U.40 should be applied for all delivery/notification retry requirements.

13.2 The action to be taken when a notification cannot be delivered should be the responsibility of the Administration operating the SFU as described in 3.9.

13.3 Recorded message from the called subscriber

13.3.1 If the recorded message is followed by clear, the message shall be considered undeliverable.

13.3.2 The action to be taken by the SFU if the recorded message is not followed by a clear is for further study.

14 Contents of delivery/non-delivery notifications

14.1 The delivery/non-delivery notification should contain the same fields as shown for the status report in 10.4.1.

15 Internationally interconnected store and forward units

The international interconnection of telex SFUs should be implemented using the procedures and functions of the Message Handling Services in accordance with the F.400-Series of Recommendations.