INTERNATIONAL TELECOMMUNICATION UNION

CCITT

THE INTERNATIONAL
TELEGRAPH AND TELEPHONE
CONSULTATIVE COMMITTEE

F.72

(11/1988)

SERIES F: NON-TELEPHONE TELECOMMUNICATION SERVICES

Telegraph and Mobile Services: Operations and Quality of Service – Telex

INTERNATIONAL TELEX STORE AND FORWARD – GENERAL PRINCIPLES AND OPERATIONAL ASPECTS

Reedition of CCITT Recommendation F.72 published in the Blue Book, Fascicle II.4 (1988)

NOTES

1   CCITT Recommendation F.72 was published in Fascicle II.4 of the *Blue Book*. This file is an extract from the *Blue Book*. While the presentation and layout of the text might be slightly different from the *Blue Book* version, the contents of the file are identical to the *Blue Book* version and copyright conditions remain unchanged (see below).

2   In this Recommendation, the expression "Administration" is used for conciseness to indicate both a telecommunication administration and a recognized operating agency.

Recommendation F.72

INTERNATIONAL TELEX STORE AND FORWARD – GENERAL PRINCIPLES AND OPERATIONAL ASPECTS

The CCITT,

considering

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

(b)   that a requirement for telex access from the sender in one country to a store and forward facility in another country has been identified;

(c)   that a store and forward unit (SFU) in one country may be interconnected with the store and forward unit in another country;

(d)   that where (b) and (c) above are introduced the facilities and procedures should be sufficiently standardized to allow subscribers to send messages using the same procedures for each country called,

unanimously declares

that the general principles and operational aspects described in this Recommendation should be adopted for the future provision of SFUs internationally.

1   Scope

1.1   This Recommendation describes the general principles and operational aspects of the store and forward facility, operated internationally between two terminal Administrations. It does not, at this stage, cover transit store and forward offered internationally. The general aspects of telex store and forward are given in § 2 of this Recommendation, the service requirements in § 3, the facilities in § 4, the quality of service in § 5, the access principles and procedures in §§ 6, 7, 8, 9 and 10, the status enquiry procedures in § 11, the delivery principles and procedures in §§ 12, 13, 14 and 15, whilst the interconnected provisions are in § 16.

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

Recommendation U.80   International telex store and forward – access from telex;

Recommendation U.81   International telex store and forward – delivery to telex;

Recommendation U.82   International telex store and forward – international interconnection of telex store and forward units.

1.3   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 SFU Administration.

2   General

2.1   The telex store and forward facility is provided in addition to the basic telex service. 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 four types of facility have been identified:

 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.

 c) *International transit store and forward* is where a subscriber in Country A accesses a store and forward unit in Country B for the transmission of messages to other countries.

 d) *Interconnected transit store and forward* is where the store and forward unit in Country A accesses the store and forward unit in Country B for further transmission of messages to other countries.

2.3 Further study is required before c) and d) can be recommended.

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

2.5 *Limitations of access to service*

2.5.1 The international and interconnected store and forward facility will be provided on the basis of bilateral agreements between the Administrations concerned.

2.5.2 The Administrations providing the   store and forward unit (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 of the SFU and is beyond the scope of this Recommendation.

2.5.3 It may also be necessary for Administrations to make provision to selectively block access to international telex store and forward facilities in other countries.

3 Service requirements

3.1 *Message identification*

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

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

 b) the message reference as allocated and advised to the originating subscriber at the time of input of the telex message for onward delivery.

3.2 *Service codes*

3.2.1 *Service codes received by the SFU*

All standardized telex service codes (see Recommendation F.60 for list of codes 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 or an alternative specific SFU Recommendation. It is desirable that the SFU attempt to interpret non-standard service codes and continue with the appropriate procedure. If the SFU is unable to interpret a non-standard service code, the SFU will have to give a notification of non-delivery to the calling party and repeat the service codes in the format it received.

3.2.2 *Service codes sent by the SFU*

The following new service codes are used:

 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.
ITD	Input transaction accepted for delivery.
TMA	Maximum number of addresses exceeded.
IMA	Input message acknowledgement.
OCC	Store full, SFU unavailable.
ITR	Input transaction rejected.
REJ	Address REJected.

3.3 *Duration of message storage*

The retry procedure will be in accordance with the principles of Recommendation U.40. However, the time for which a message will be held in store will not exceed 24 hours from time of input. If delivery has not been effected, the procedure as in § 3.9 will 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. However, for an interim period, 12,000 characters or even lower may be accepted. Initially, it is envisaged that the capacity will vary from one storage unit to another and customers should therefore be advised by their Administrations as to the maximum message length accepted at those SFUs to which they have access.

3.4.2   Where interconnected store and forward is concerned, the maximum acceptable message length of the SFUs should be agreed to by the Administrations concerned.

3.4.3   The maximum input duration for a single transaction should be 2 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.

3.4.5   After sending the service code **LDE**, the SFU will wait for the EOM or 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. 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 transmission (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. This can be one of two types as follows:

a)   **NNNN**, which is simply used to separate messages;

b)   **NNNNACK**, which is used to separate messages AND to request the SFU for an input message acknowledgement (IMA) plus reference information of those messages not previously acknowledged. Once this type of EOM is received and acknowledged, the SFU will attempt to deliver the message even if the subscriber clears.

3.6.2   Where there is a stop in transmission for 30 seconds and no EOM or EOT signal is detected, the service code GA will 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 shall inform the subscriber that no EOM/EOT signal has been received by sending the service code **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*

The SFU shall send an input transaction accepted code for delivery (ITD) notifying the subscriber that the message(s) has/have been accepted and that delivery would 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 given a non-delivery notification with service code **NA** for the reason of non-delivery.

3.8.1.2   The SFU shall not accept message input unless acceptable identification of the sending subscriber has been received at call set-up.

3.8.1.3   The SFU may validate the called address(es). If this validation is unsuccessful for all addresses the message shall be rejected and the service code **ITR** should be returned (see Recommendation U.80 § 4.6). 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 unit to validate the answerback received in order to provide message security. If the subscriber does not provide the expected answerback, then the SFU may provide validation by comparing the called party's number with the received answerback. If an invalid destination answerback is received by the SFU, the message will not be sent. A non-delivery notification will be given to the sending subscriber including the service code **IAB** and optionally repeating the destination answerback actually received. The method used for checking the answerback is the responsibility of the Administration offering the store and forward service.

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 message retry cycle 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 cycle has been completed for all of the specified addresses. If an advice of non-delivery cannot be delivered, then 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 offering 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 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.

3.10   *Message status enquiry point*

3.10.1   A message status enquiry point 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.

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

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

3.11 *Call records*

Records of effective and ineffective calls along with the number of each in the case of multi-address 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 must agree bilaterally on the format and method of information transfer.

3.12 *Incomplete message*

If there is any doubt as to whether a message has been delivered completely and it is to be re-sent, the header "Possible duplicate message" should be added.

4 Facilities

4.1 *Single address*

This is where a store and forward message is sent to a single telex or teletex addressee and is considered to be a minimum requirement. Delivery to other type of address(es) is for further study.

4.2 *Multi-address*

4.2.1   A multi-address message is where a common text is sent to two or more mixed telex or teletex 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 service code **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.

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 sending subscriber may cancel a message after it has been accepted by the SFU is not permitted.

4.6 *Address correction*

The facility whereby the subscriber can correct an address during input is desirable and may be provided.

5 Quality of service

5.1 *Loss probability in the store and forward procedure*

5.1.1 The introduction of an SFU into the 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 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 not therefore 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-connected signal.

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

6.3 The calling address for calling subscribers with non-F.60 answerback codes should be obtained to enable identification of the calling subscriber.

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   *Telex access*

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

7.2.2   Figure 1/F.72 shows the recommended access procedures.

7.3   *Service request*

7.3.1   Interactive service request

The calling telex subscriber shall 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 calling 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 in a confidential manner.

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 calling 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 (but with exception of letter D, figure case) should be transmitted transparently by SFU.

7.4.7   An input transaction accepted for delivery (**ITD**) service code should be returned to the calling subscriber to indicate that the SFU has accepted the message on receipt of the EOT or EOM(ACK) signal.

8   Information field content for address line

8.1   *Message input address line*

8.1.1   Each address to which it is required to attempt to deliver the message should be provided by the customer in the address line.

8.1.2   The address line information may consist of up to 4 fields:

   a)   address to be called;
   b)   expected answerback or part of answerback;
   c)   attention information;
   d)   delivery indication;
   e)   positive delivery notification (PDN) request.

8.1.3   Each field within an address line and also each address line should be delimited.

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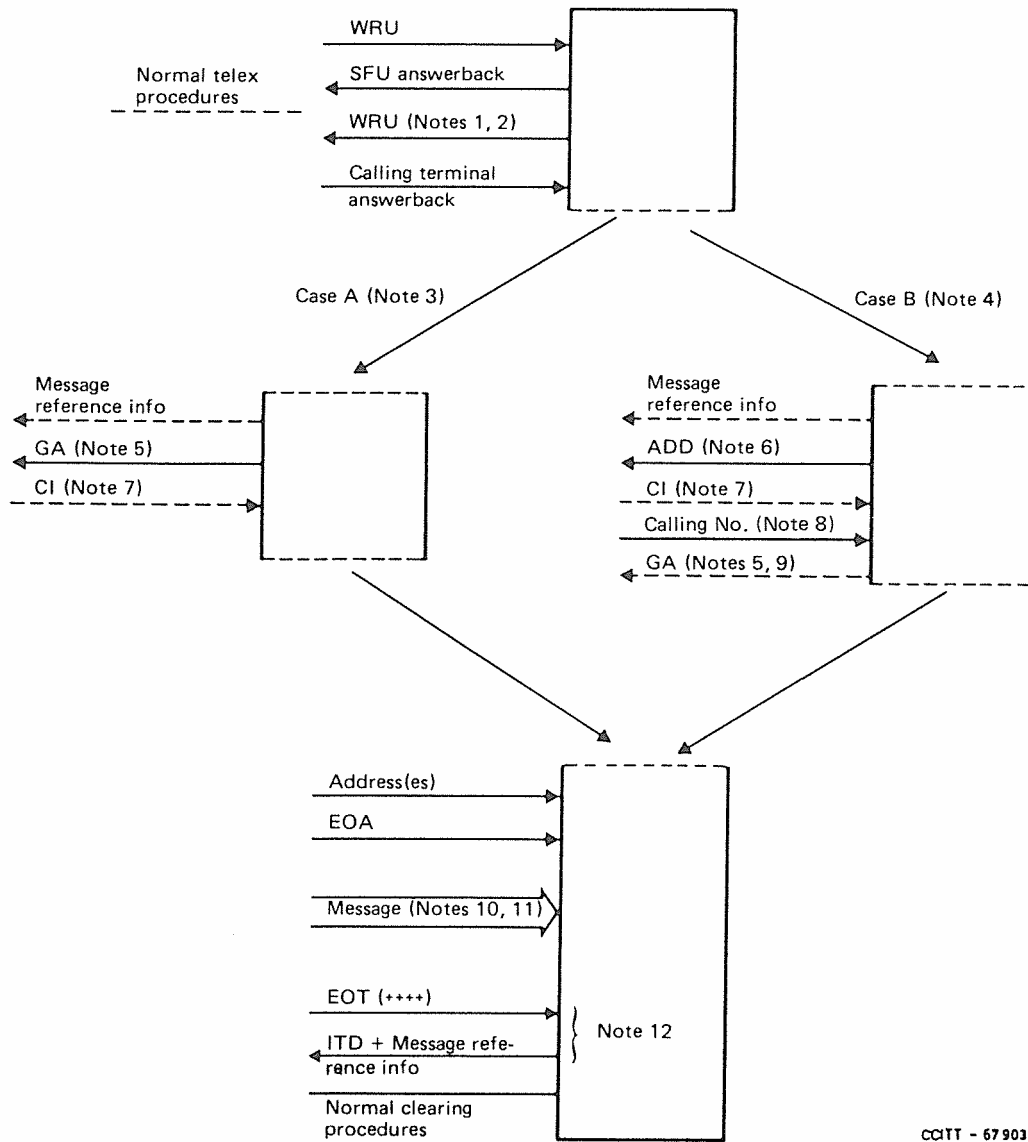
8.1.5   The address line(s) should be delimited from the message text by an end of address (EOA) signal.

8.1.6   Teletex address input shall be:

a)   where a one-stage CF (conversion facility) is implemented: F.69 code, CF prefix, and teletex national number;

b)   where a two-stage CF is implemented: **TTX** character sequence, followed by the data network identification code (DNIC) or 9 + TCC (where 9 is the telephone network interworking digit and TCC is the telephone country code, see Recommendation X.121), and the telex national number.

9   SFU access protocol

This section is to be read in combination with Recommendation U.80.

FIGURE 1/F.72

SFU access protocol

9.1 *Note 1*

The WRU is transmitted 800 ms after transmission of the SFU answerback if the forward path remains idle.

9.2 *Note 2*

One additional WRU shall be transmitted by the SFU if:

a)   there was no response to the first WRU;

b)   signals were received after the first WRU which could not be identified as an answerback.

This second WRU should be transmitted when a 300 ms idle condition has been detected from the calling terminal at least 10 seconds after the transmission of the first WRU.

9.3 *Note 3 – Case A*

Procedure when calling address can be determined from the calling terminal answerback.

9.4 *Note 4 – Case B*

Procedure when calling address cannot be determined from the calling terminal answerback.

9.5 *Note 5*

In Case A, the prompt GA shall be transmitted after the message reference information. In Case B, the prompt GA shall be transmitted after receipt of the calling number.

9.6 *Note 6*

The prompt ADD is used in Case B only and shall be transmitted after the message reference number.

9.7 *Note 7*

The service request CI is transmitted when the terminal is operating in a non-interactive mode (e.g. an automatic terminal or a manual terminal using a tape transmitter).

9.8 *Note 8*

If the calling address is expected and is not received within 15 seconds of the original ADD prompt, a further prompt shall be transmitted. The procedure is shown in Figure 2/F.72.

The calling address should be input in the Recommendation F.69 destination code format followed by national telex number followed by at least two carriage return line feed sequences when received in the non-interactive mode.

9.9 *Note 9*

The prompt GA is inhibited in Case B if the service request CI has been received.

9.10 *Note 10*

Several messages can be contained within the same transaction and are separated by EOM sequences, as shown in Figure 3/F.72.

9.11 *Note 11*

The EOM signal may optionally be followed directly by an ACK request signal. The sequence will then be as shown in Figure 4/F.72.

Immediately following transmission of an IMA, the SFU shall return reference information containing reference numbers for previous unacknowledged messages and the signal ←≡↓GA←≡ and then be prepared to accept further follow-on messages.

9.12   *Note 12*

Following receipt of the EOT signal, the SFU shall operate as shown in Figure 5/F.72:

a)   If the EOT signal originated from a non-interactive telex terminal, the SFU should wait for up to two seconds for a WRU signal. If WRU is received, the SFU should return its answerback followed immediately by the ITD sequence. If WRU is not received in the two-second period, the SFU should return the ITD sequence.

b)   If the EOT signal originated from an interactive telex terminal, the SFU should return the ITD sequence as soon as possible.

c)   The ITD signal and associated reference information must be returned within five seconds of the EOT signal.

9.13   *Note 13*

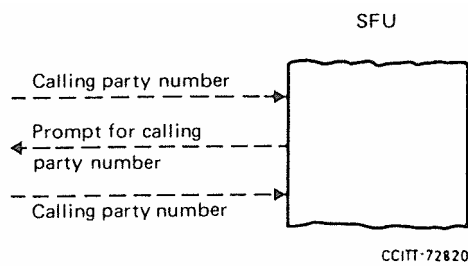If a WRU signal is received at any time during the procedure, the SFU shall return its own answerback.
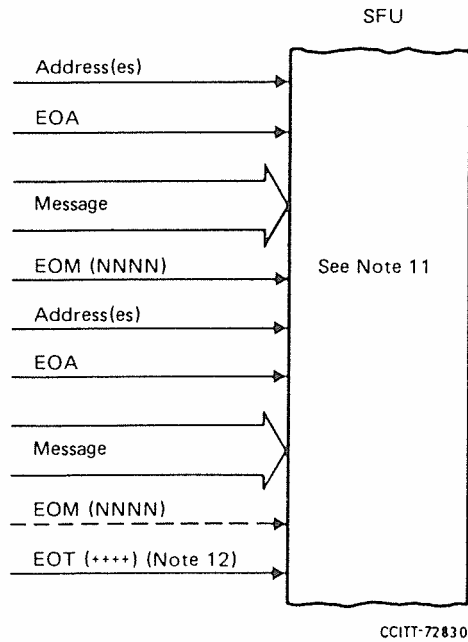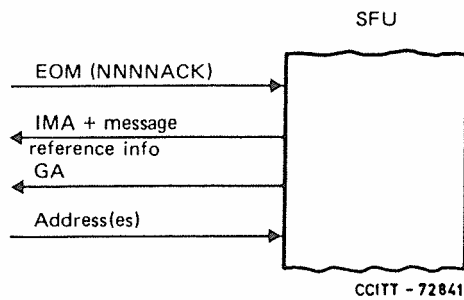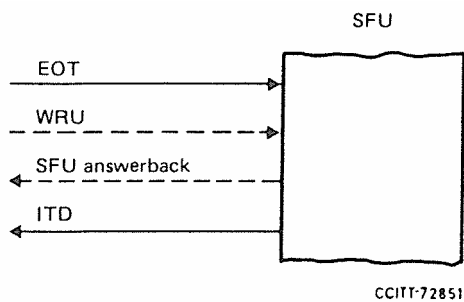
FIGURE 2/F.72

FIGURE 3/F.72

FIGURE 4/F.72

FIGURE 5/F.72

10 Abnormal conditions during message input

10.1 *Telex subscriber clearing during text input without EOT*

The SFU either cancels the call or sends it to an operator assistance position.

10.2 *Telex subscriber stopping transmission for a certain time without transmitting the EOT signal, or transmitting a partial, or invalid EOT signal*

If at any time between the SFU returning the GA prompt (Case A) or calling address prompt (Case B) and the detection of the EOT signal, the SFU detects a 30-second period of idle, the following should apply:

The SFU shall send a GA prompt to the telex subscriber in order to request more information input (text, EOM or EOT). If after a further 30 seconds no more characters are received, the SFU shall either:

a) send the BMC service code and clear the call (if the SFU cancels incomplete messages); or,

b) clear the call (if the SFU sends the message to an operator assistance position).

10.3 *Telex subscriber sending WRU to SFU during text input*

The SFU should return its answerback after receiving a WRU. In addition, if:

– WRU is followed by text, then the message input is continued after the SFU answerback. Also, the WRU is deleted from the message text.

– WRU is followed by a clear from telex, then the SFU proceeds as in § 10.1 above.

– WRU is followed by a lack of transmission (pause), then the SFU proceeds as in § 10.2 above.

10.4   *Telex subscriber sending text after the EOT signal*

Any characters received between EOT and ITD service code (with the exception of WRU) will be ignored. The SFU shall use a sequence of TTT . . . characters to stop telex transmission and then send an ITD code followed by a clearing signal. After clearing, message is forwarded to the telex subscriber(s).

10.5   *Telex subscriber clearing after EOT but before ITD*

The message shall be forwarded normally by the SFU under these circumstances.

10.6   *Telex subscriber sending national variants of ITA No. 2 alphabet - (↑F, ↑G, ↑H)*

Since Recommendation F.60, § A.3.8 recommends that these combinations should not be used for international communications, the SFU should not monitor for their use and these combinations will be passed on to the called subscribers if received.

10.7   *Telex subscriber sending J Bell combination (↑J)*

The SFU should transmit this combination, if received, to the called party.

10.8   *SFU storage capacity overflow during telex message input*

10.8.1   If the number of characters received by the SFU during a message input exceeds the available storage to that input (which may be greater than the agreed minimum storage), the SFU should discard the excess characters. No attempt should be made by the SFU to overwrite previously stored characters.

10.8.2   When this occurs, the SFU should immediately attempt to prevent the calling telex subscriber from sending further characters by transmitting a sequence of TTT... characters for a maximum of 20 seconds.

10.8.3   If the calling terminal stops the transmission within a 20-second period, the SFU should return the service code LDE and then wait for the EOT or EOM(ACK) in accordance with § 3.6. If the EOM signal is received without ACK, the message shall be rejected as incomplete.

10.8.4   If the terminal continues to transmit characters after the 20-second period, the SFU should forcefully clear the connection back to the calling terminal.

10.8.5   The SFU should deal with the incomplete message(s) in accordance with § 3.6.

10.8.6   If the SFU has insufficient storage to receive messages, it should still continue to process status enquiry requests.

10.9   *Repeated characters during message input*

The SFU shall be capable of detecting continuous reception of one character combination and shall recognize this as a "tape stuck" condition. The SFU shall detect this condition only after receipt of 80 identical combinations received consecutively. The SFU shall attempt to signal the calling terminal by transmitting a sequence of TTT... characters for a maximum of 20 seconds. If the character combinations become different, the SFU shall continue with the message input and deliver all characters received. If the "tape stuck" condition remains at the end of 20 seconds, the SFU shall clear the connection and follow the procedure outlined in § 3.6.

11   Status enquiry

11.1   Status information on messages should only be available for return to the originator of the message. In all cases the answerback should be used for identification and therefore needs to be retained.

11.1.1   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 customer.

11.2   *Status enquiry information field content*

11.2.1   The status enquiry should contain the following fields:
   a)   message reference information;
   b)   a status request;
   c)   address(es).

11.2.2   The status request indicates the information required (see § 11.2.1).

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

11.3   *The status report*

11.3.1   The status report format will be consistent with the notification advice format.

11.3.2   Two types of status report are returned:
   a)   delivered;
   b)   not delivered.

11.4   *Status report field content*

11.4.1   The status report should contain the following fields where applicable for each address:
   a)   message reference number;
   b)   selection information;
   c)   expected answerback;
   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.

11.4.2   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.

11.4.3   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.

11.4.3.1   When a service signal is received by the SFU, this information shall be placed in the reason field. The service signals are:

OCC, NC, ABS, NA, NP, NCH, DER, RDI.

11.4.3.2   Other reasons for delivery failure are:
   a)   wrong answerback received from destination.
          The reason field content should be IAB (see § 3.2.2).
   b)   premature clear of call 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.

12   Delivery procedure

This section shall be read in combination with Recommendation U.81.

12.1   §§ 12, 13 and 14 outline procedures for the delivery of international telex messages by an SFU and comprise the following:
   a)   message forwarding procedures;
   b)   notification procedures;
   c)   delivery retry procedures.

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

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

12.4   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.

12.5   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 telex network.

12.6   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.

12.7   *Telex message forwarding procedures*

12.7.1   The sequence of the message forwarding procedure components are illustrated in Figures 6/F.72 and 7/F.72.

12.8   The components of message forwarding procedures are as follows:

12.8.1   *Call set-up*

  a)   Establishment of a connection by an SFU over the 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 § 3.2.1.

  b)   If service codes are received during the call set-up cycle, the SFU should act in accordance with § 3.2.

  c)   Messages should be considered non-deliverable if the service code NCH or RDI is received during the call set-up cycle.

12.8.2   *Called subscriber answerback validation*

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

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

12.8.3   *Store and forward unit identification*

       The SFU identification should consist of:

  a)   the service code CI;

  b)   an indication that the message is from an SFU;

  c)   the date and time of transmission (optional).

12.8.4   *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.

12.8.5   *Answerback of originating telex subscriber*

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

12.8.6   *Message text*

12.8.6.1   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 ITA No. 2 sequence WRU shall not be transmitted.

12.8.6.2   If any signal is received on the backward path during the message text delivery, transmission of the message text shall be stopped for two seconds. If during that time further signals or a clearing condition is received, the call shall be cleared and the message delivery deemed unsuccessful and action taken in accordance with § 3.9 of this Recommendation. If no further signals are seen on the backward path during that time, transmission of the message text shall be resumed.
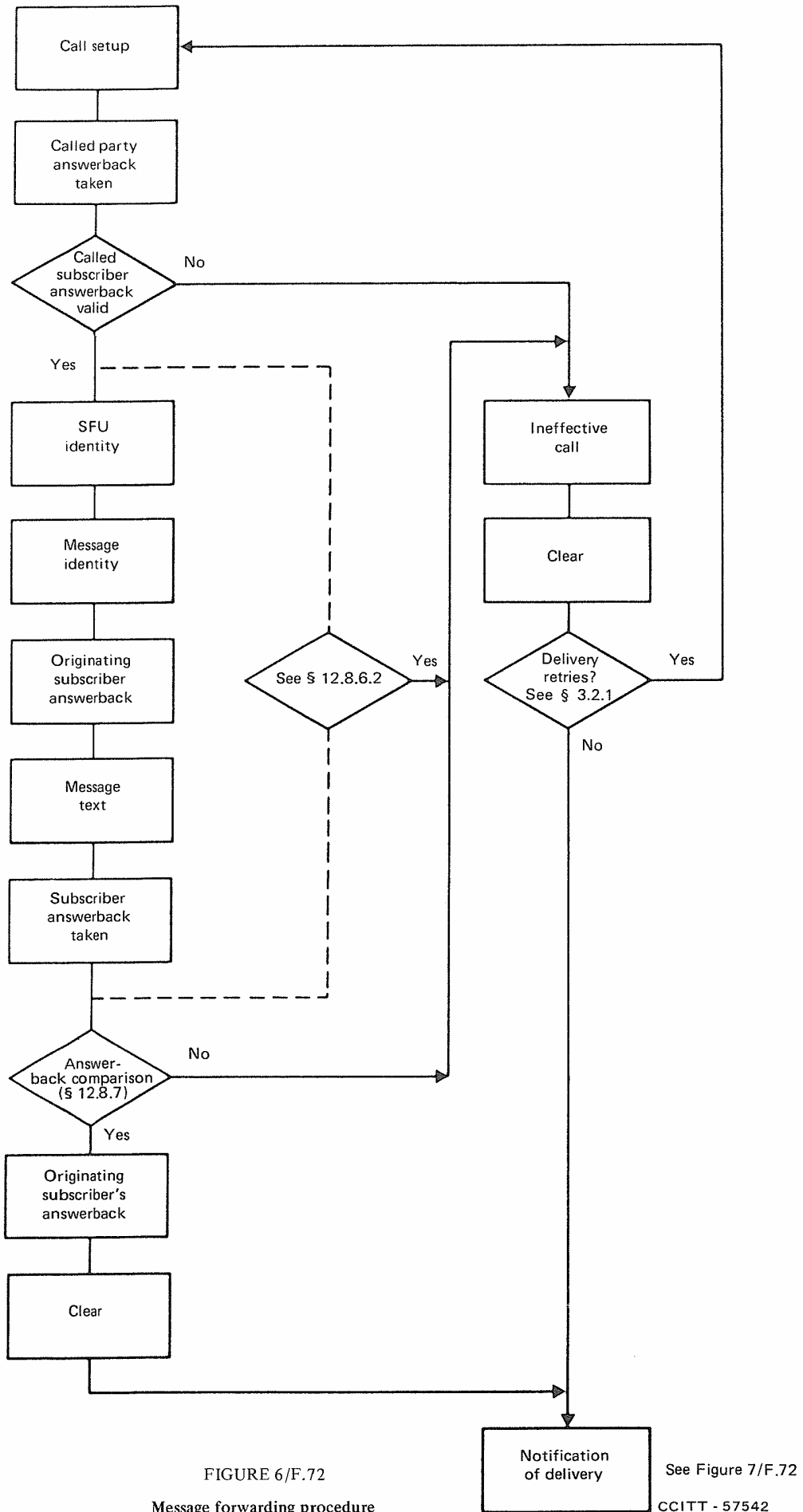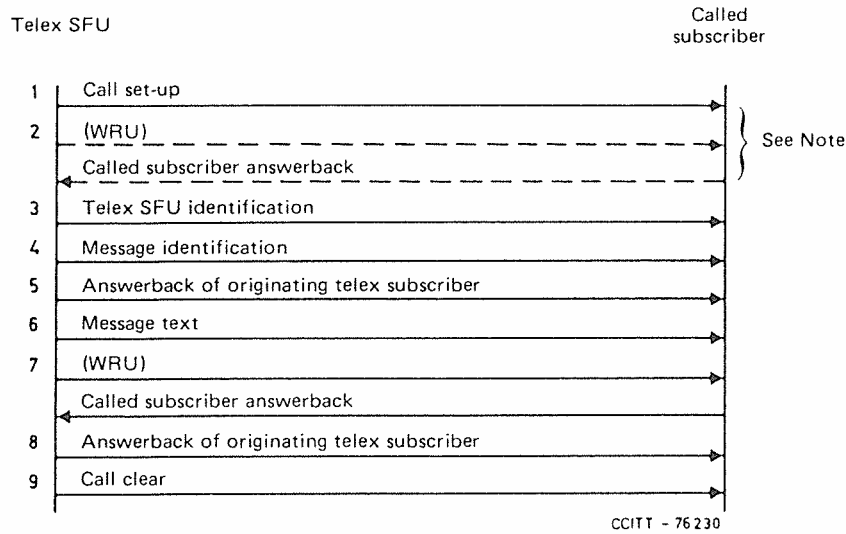
FIGURE 6/F.72

Message forwarding procedure

See Figure 7/F.72

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                                                                 Called
        Telex SFU                                              subscriber

    1 │  Call set-up                                    │
                                                        │ ⎫
    2 │  (WRU)  ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─│ ⎬  See Note
      │  Called subscriber answerback ─ ─ ─ ─ ─ ─ ─ ─ ─ │ ⎭
    3 │  Telex SFU identification                       │
    4 │  Message identification                         │
    5 │  Answerback of originating telex subscriber     │
    6 │  Message text                                   │
    7 │  (WRU)                                           │
      │  Called subscriber answerback                   │
    8 │  Answerback of originating telex subscriber     │
    9 │  Call clear                                      │

                                              CCITT – 76 230
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Note – Optional answerback capture if not available from Step 1.

FIGURE 7/F.72

12.8.7 *Called subscriber answerback comparison*

Following message text transmission, the answerback of the called subscriber shall be taken and compared with that received at the start of message delivery. If there is a match, the delivery of the message shall be deemed successful. In the event of a mismatch of answerbacks, the answerback of the called subscriber shall be taken once again for comparison. If there is a second mismatch, the delivery of the message shall be considered as unsuccessful and further delivery attempts shall be made in accordance with § 14.

12.8.8 *Answerback of originating telex subscriber*

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

12.8.9 *Call clearing sequence*

The SFU should clear the call using normal telex clearing procedures. However in the case of delivery to a teletex destination, different clearing procedures may apply (details are for further study).

13   Notification procedures

13.1   *Types of notification*

The types of notification are shown in § 3.9.

13.2   *Notification delivery procedures*

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

13.2.2 All other types of notification should be delivered using the procedure described for telex message forwarding in §§ 12.7 and 12.8.

13.2.3 To ensure security of delivery of the notification, the answerback of the called subscriber should be compared with the answerback taken from the subscriber at the time of message input.

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

14   Delivery retry procedures

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

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

14.3   If the service code RDI is received during call set-up more than once in any one message delivery/notification attempt cycle, the message shall be considered undeliverable.

14.4   *Recorded message from the called subscriber*

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

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

15   Field content delivery/non-delivery notification

15.1   The delivery/non-delivery notification should contain the same fields as shown for the status report in § 11.4.1.

16   Special provisions for interconnected telex store and forward

16.1   *Service outline*

16.1.1 The telex store and forward facility allows a telex subscriber to deposit single or multi-address messages with an SFU for subsequent delivery to the specified address or addresses.

16.1.2 In the event of a failure to deliver to any address or addresses, a non-delivery notification is issued to the originating telex subscriber. The requirement to send a non-delivery notification is mandatory. Transmission of non-delivery notifications may occur on a per address or per multi-address basis.

16.1.3 A delivery notification for successful delivery and/or subscriber initiated status enquiry information may also be issued.

16.1.4 The term "network management boundary" refers to the boundary within which the telex store and forward service is provided by one or more telex SFUs under the control of one Administration.

16.2   *International interconnection*

16.2.1   The extension of telex store and forward facilities beyond the management network boundary of an Administration requires cooperation between SFUs across international connections.

16.2.2 In the international interconnection of telex SFUs, the responsibility to deliver single and multi-address messages is transferred from the originating Administration to one or a number of destination Administrations.

16.2.3 In the basic service, messages addressed to more than one destination store and forward management network should be separated at the originating management network.

16.2.4 The possibility of forwarding messages via transit management networks is for further study.

16.2.5   In the international interconnection of telex SFUs it is necessary to return delivery/non-delivery status information to the originating SFU. This information is compiled on a per address basis at the destination SFU when either the message has been delivered or no further attempts to deliver will be made to that address.

16.2.6 The return of delivery and non-delivery advice information to the originating SFU may be on a per message address or per message basis.

16.2.7   When information is issued on a per message basis, the originating SFU may request interim message delivery status reports by transmitting message status requests.

16.2.8   Delivery and non-delivery information provided on a per message address basis requires explicit notification to the originating SFU.

16.2.9   Delivery and non-delivery information provided on a per message basis may only require explicit notification of non-deliveries and implicit notification of deliveries.

16.2.10   The method employed on an international connection between SFUs to transfer delivery/non-delivery status information should be the subject of bilateral agreement. Account must be taken of the means by which the interconnection is established and the possible effects in service.

16.2.11   The storage of messages during the specified period for messages (or addresses) requiring delayed delivery should generally be carried out by the originating SFU. In this case the delay indicator is omitted in the corresponding message to the destination SFU. When the delay action is not carried out in the originating SFU, the appropriate delay indicator should be retained.

16.3   *Elements of inter-SFU message transfer procedure*

16.3.1   The basic element of the inter-SFU message transfer procedure is the message transfer unit. This unit is classified as either a user message transfer unit or service message transfer unit allowing easy identification of the function(s) for which cooperation is required.

16.3.2   User message transfer units carry messages submitted by a telex customer for delivery to a specified address or addresses.

16.3.3   Service message transfer units do not contain telex customer messages but are used to convey service information about messages. There may be two types of such units:

    a)   notification (delivery and/or non-delivery);

    b)   status (enquiry/report).

       Use of other service message transfer units is for further study.

16.3.4   Notification service message transfer units are issued automatically by the SFU. Status service message transfer units are generated as a result of a customer request or in response to a received status service message transfer unit.

16.3.5   There are six types of message transfer units used to provide a telex SFU interworking capability:

    1)   Text transfer – used to transfer address information and the customer message.

    2)   Status request – used to request from a destination telex SFU the present status of message delivery to:

        i)   all addresses;

        ii)   those addresses to which the message has not been delivered;

        iii) specified addresses.

    3)   Status report – only used in response to a status request.

    4)   Delivery notification – used to provide information on an address or addresses to which the message has been delivered.

    5)   Non-delivery notification – used to provide information on an address or addresses to which the message has not been delivered.

    6)   Combined delivery/non-delivery notification – used to provide information on whether a message has or has not been delivered to a number of addresses.

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NON-TELEPHONE TELECOMMUNICATION SERVICES

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