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**OPERATIONS AND QUALITY OF SERVICE
MOBILE SERVICE**

**OPERATIONAL PROCEDURES FOR
THE MARITIME SATELLITE DATA
TRANSMISSION SERVICE**

ITU-T Recommendation F.122

(Extract from the *Blue Book*)

NOTES

1 ITU-T Recommendation F.122 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.122

OPERATIONAL PROCEDURES FOR THE MARITIME SATELLITE DATA TRANSMISSION SERVICE

1 Introduction

1.1 The purpose of this Recommendation is:

- a) to standardize the procedures for subscribers of a public data network (PDN) calling ship earth stations in the Maritime Satellite Data Transmission Service;
- b) to standardize the procedures for calling subscribers of a PDN from ship earth stations using the packet switched data transmission service defined in Recommendations X.25 and X.352;
- c) to standardize the procedures for calling subscribers of a PDN from ship earth stations by accessing packet assembly/disassembly facilities (PAD) as defined in Recommendation X.351.

Note 1 - This Recommendation does not cover data calls passed through the international public switched telephone network other than those which are accessed through PADs designed in accordance with Recommendation X.351.

Note 2 - Procedures for subscribers of a PDN calling a ship earth station by accessing a PAD are for further study.

1.2 Related CCITT Recommendations are:

- | | |
|-------------|--|
| E.200/F.110 | Operational provisions for the maritime mobile service. |
| E.210/F.120 | Ship station identification for VHF/UHF and Maritime Mobile-Satellite Services. |
| E.215 | Telephone/ISDN numbering plan for the Mobile-Satellite Service of INMARSAT. |
| E.216 | Selection procedure for the INMARSAT mobile-satellite telephone and ISDN services. |
| F.125 | Telex numbering plan for the Mobile-Satellite Service of INMARSAT. |
| F.126 | Selection procedures for the INMARSAT Mobile-Satellite Telex Service. |
| X.1 | International user classes of service in public data networks and ISDNs. |
| X.2 | International data transmission services and optional user facilities in public data networks. |
| X.96 | Call progress signals in public data networks. |
| X.121 | International numbering plan for public data networks. |
| X.180 | Administrative arrangements for international closed user groups (CUGs). |
| X.300 | General principles and arrangements for interworking between public data networks, and between public data networks and other public networks. |
| X.350 | General interworking requirements to be met for data transmission in the international public mobile satellite systems. |
| X.351 | Special requirements to be met for packet assembly/disassembly facilities (PADS) located at or in association with coast earth stations in the Maritime Satellite Service. |
| X.352 | Interworking between packet switched public data networks and the public maritime mobile satellite data transmission system. |
| X.353 | Routing principles for interworking public maritime mobile satellite data transmission systems in the public data network. |

1.3 The following basic considerations were taken into account when formulating this Recommendation:

- a) Each ship is allocated a unique 9-digit INMARSAT mobile number.

Note - The first generation maritime mobile satellite (INMARSAT) system also caters for a 7-digit INMARSAT mobile number beginning with digit 1.

- b) The routing principles to be used for data transmission to and from ships are as defined in Recommendation X.353.

- c) The procedures to be used on board ships when accessing a subscriber of a PDN should be as similar as possible to the procedures used on PDNs.
- d) The Maritime Satellite Service is international in nature and international procedures will be adopted to provide access to this service. For some purposes, a maritime satellite data transmission system can be regarded as analogous to a national network and the ship earth stations as subscribers within that network.
- e) The procedures used on board the ship when accessing a subscriber of a PDN should be the same in all coast earth stations.

1.4 The following basic access methods are defined for the Maritime Satellite Data Transmission Service:

- a) access using the packet mode in accordance with draft Recommendation X.352;
- b) access using packet assembly/disassembly facilities (PADS) in accordance with Recommendation X.351.

1.5 Ships may form part of a closed user group (CUG) in accordance with Recommendation X.180. It should be noted that a ship being part of a CUG should be known as such in all coast earth stations.

The International Maritime Satellite Organization (INMARSAT) should be charged with the responsibility of acting as the coordinating Administration (see Recommendation X.180) for ship earth stations wanting to form CUGS. The application from ships to join or cease membership of a CUG should be forwarded through INMARSAT who should then inform the coordinating Administration of the CUG in accordance with Recommendation X.180.

For each CUG the same index identifying the CUG by a calling ship earth station (see Recommendation X.300) should be used in all coast earth stations in order to simplify the calling procedures. The index should be coordinated through INMARSAT.

1.6 Permanent virtual circuits (PVC) would require a permanent circuit between a ship earth station and the coast earth station. The PVC service should not normally be offered to ship earth stations (see also Recommendations X.2 and X.350).

2 Procedures for ship originated calls

2.1 Access to packet switched PDNs

2.1.1 Calling a subscriber of a PDN

2.1.1.1 The coast earth station through which the call is to be set up is selected by procedures defined within the INMARSAT system.

2.1.1.2 The ship board subscriber should select a prefix followed by the full international number of the called DTE. Hence, the numbering sequence selected by a ship board subscriber will be as shown in Table 1/F.122 or, where an integrated numbering system exists within a country, as shown in Table 2/F.122.

TABLE 1/F.122

0	Prefix
DNIC	Data network identification code
$N_1 \dots N_n$	Network terminal number

TABLE 2/F.122

0	Prefix
DCC	Data country code
N ₁ ... N _n	National data number

See also Recommendations X.121 and X.350.

2.1.1.3 The calling DTE address of the ship board DTE should always be inserted and have the following format:

$$TX_1, X_2 \dots X_8 Y$$

where $TX_1, X_2 \dots X_8$ is the INMARSAT mobile number as defined in Recommendation F.125 and Y is an optional digit identifying a specific DTE on board the ship. If the ship is equipped with only one DTE, the digit Y should be omitted. The calling DTE address should not include the prefix and the DNIC allocated to the ocean area in which the ship earth station is located at the time of the call.

2.1.1.4 Selection of facilities on a call-by-call basis should be in accordance with Recommendations X.25 and X.300. The facilities that may be offered on a call-by-call basis are given in Recommendation X.2. A given facility may not be offered in all coast earth stations.

User facilities that have to be agreed for a contractual period are also listed in Recommendation X.2. The application for a given facility should be made with the Administrations operating coast earth stations providing access to public packet switched data networks. The availability of user facilities on the various coast earth stations should be coordinated and be disseminated to ships by INMARSAT; however, the decision to implement a given user facility should be made by each coast earth station owner.

Further study is required to determine which user facilities and/or other user parameters should be offered on all coast earth stations.

Note - Separate provisions apply to closed user groups as described in § 1.5 above.

2.1.2 Use of data transmission prefixes

2.1.2.1 Annex A to Recommendation F.126 defines data transmission prefixes for accessing special terminations. The general called DTE address format when accessing such a termination will be as shown in Table 3/F.122.

TABLE 3/F.122

P ₁ P ₂	Two-digit prefix defined in Annex A to Recommendation F.126
A ₁ ... A _k	Optional digits

Optional digits may be a data country code (DCC), a data network identification code (DNIC) or other additional digits.

2.1.2.2 The calling DTE address should have the format defined in § 2.1.1.3 above.

2.1.2.3 Selection of facilities, if required, should be as defined in § 2.1.1.4 above.

2.1.2.4 The use of some prefixes could be barred to some customers.

2.1.2.5 The prefix will be sent on the radio path to the coast earth station but would not be used outside the satellite system. The prefix will be converted at the coast earth station, if required, to the data number associated with the appropriate destination.

2.1.3 Ship-to-ship calls

For ship-to-ship calls the called DTE address should have the composition shown in Table 4/F.122.

TABLE 4/F.122

0		Prefix
	111S	DNIC allocated to the Maritime Satellite Service
		TX ₁ X ₂ ... X ₈
		INMARSAT mobile number
		Y
		Optional digit to designate a particular DTE

The digit S determines the ocean area in which the called ship is located. The values for the digit S are given in Recommendation X.121. The digit Y identifies a specific DTE on board the ship.

2.1.4 Call progress signals and diagnostic codes

Call progress signals and diagnostic codes may be received in accordance with § 8.2 of Recommendation X.350.

2.1.5 CCITT standardized services

Ships should have full access to CCITT standardized services offered on public data networks such as Teletex, Videotex, and facsimile in accordance with relevant F and S Series Recommendations.

2.2 Access to PADs

2.2.1 Ships with start-stop mode DTEs may be offered access to packet switched public data networks through PADs.

PADs associated with coast earth stations are defined in Recommendation X.351. These PADs are defined in such a way that identical procedures may be used when working towards PADs located at different coast earth stations.

Note - Ships may also access a national PAD in a country, but in such cases special procedures only applicable for that PAD would be required. Only PADs designed in accordance with Recommendation X.351 are considered in this Recommendation.

2.2.2 Telephone access procedure

The coast earth station at which the PAD is located is selected in accordance with INMARSAT procedures for telephone calls. The start-stop mode DTE on board the ship would use telephone procedures in order to access a PAD. When the telephone circuit has been established, i.e. when the dial tone is heard, the following digits have to be dialled:

20 Prefix
 X₁ X₂ Digits indicating required data rate

Recommendation X.351 specifies that the following data rates and types of modem for full duplex operation will be supported by the PAD:

- Recommendation V.21, 300 bit/s;
- Recommendation V.22, 1200 bit/s;
- Recommendation V.23, 75/1200 bit/s.

The specific modes of operation of the modems are given in Recommendation X.351, § 1.1.

The number to be dialled for each of these data rates is given in Table 5/F.122.

TABLE 5/F.122

Data rate (bit/s)	Dialling sequence
300	2002
1200	2003
75/1200	2011

The PAD may support other data rates on an optional basis. For such data rates the dialling information will be as given in Table 2/X.351.

The dialling sequences 2050 through 2099 are reserved for national use and may be used for access to for example Videotex data bases via the PAD.

2.2.3 Data access procedures

The call control procedures to be used during set-up and clearing of the data connection and the data transfer protocol are given in Recommendation X.351.

The basic elements of the procedure are:

First the DTE accesses the PAD by sending a service request signal consisting of the characters “.” (full stop) and “CR” (carriage return) corresponding to the characters 2/14 0/13 of International Alphabet No. 5 (see Recommendation T.50 for a description of International Alphabet No. 5).

The PAD will respond by returning a PAD identification signal, the composition of which is left to the Administration operating the PAD.

The DTE shall then send, as soon as possible, a signal, i.e. a string of characters, called the selection PAD command signal. This signal is composed as shown in Annex A. The purpose of this signal is:

- to provide the PAD with the address of the called DTE; and
- to provide the PAD with the identity of the calling DTE.

When the call has been extended to the called DTE, the character string COM will be received from the PAD.

At this stage the system enters into the data transfer phase.

The call set-up procedure outlined above may be operated manually or be programmed into the DTE.

During call set-up and during the data transfer phase, the DTE may receive PAD service signals as defined in Recommendation X.28. These signals may indicate various call failures.

Recommendation X.351 also allows other procedures to be used during call set-up. See that Recommendation for further details.

2.2.4 Standard profile and profile selection

In order to operate a PAD, a number of PAD parameters must be specified. A general list of PAD parameters is contained in Recommendation X.3.

The PAD defined in Recommendation X.351 offers an initial standard profile with PAD parameter values as given in Table 3/X.351. This standard profile permits a data transfer protocol based on International Alphabet No. 5.

The characters 1/0 (DLE), 1/1 (DC1) and 1/3 (DC3) are used for control purposes and can therefore not be passed transparently through the PAD. The character 1/0 (DLE) is interpreted by the PAD as an escape from the data transfer phase. Therefore, this character is used in order to enable commands to be sent to the PAD. For the various commands that can be used during the data transfer phase, see Recommendation X.28.

The initial standard profile offers the following capabilities:

- by using the character 1/0 (DLE) commands can be sent to the PAD;
- the PAD can at any time send service signals to the DTE;

- the DTE can use characters in order to indicate when a data packet shall be sent from the PAD into the data network;
- the DTE may use the characters 1/1 (DC1) and 1/3 (DC3) for flow control.

The profile does not permit the PAD to provide for any editing functions. Characters which are entered into the PAD are not echoed to the DTE. This has been done because the echoed character will be delayed by approximately 0.6 seconds, thus reducing the character rate to less than two characters per second. The echo mode should therefore not be used. If echo is required, it should be generated locally in the DTE.

A transparent profile or any other profile standardized in Recommendation X.28 may be selected as soon as the data transfer phase is entered by procedures defined in Recommendations X.28 and X.351. The transparent profile will allow octets of data to be passed transparently between the two DTEs. When operating in this mode, the on-board DTE cannot recall the PAD, nor can the PAD send any service signals to the on-board DTE. Therefore, a data transfer protocol must exist between the two DTEs for proper call control.

The various PAD parameters which can be selected by the DTE are given in Recommendation X.3. It should be noted that some of these parameters may not be implemented on all PADS.

Since DTEs may treat the parity bit included in the data octets differently when International Alphabet No. 5 is used, Recommendation X.351 specifies the means by which this problem can be resolved.

2.2.5 Clearing of calls

At the end of the call the user at the on-board DTE should make sure that the satellite telephone circuit is properly cleared. The PAD may include provisions for clearing the circuit but this may delay the clearing for several minutes. During this time, the user on-board is still being charged for the use of a maritime satellite telephone circuit.

3 Procedures for shore-to-ship calls

3.1 Calls to ships with DTEs operating in the packet mode

3.1.1 A subscriber of a PDN calling a ship equipped with DTEs operating in the packet mode will select a numbering sequence as shown in Table 6/F.122.

3.1.2 The numbering sequence requires the subscriber to know the satellite coverage area in which the ship is located in order to select the S digit. The values for the digits are given in Recommendation X.121.

TABLE 6/F.122

P		International prefix (if required)
	111	Maritime data country code
	S	Ocean area code
	TX ₁ X ₂ ... X ₈	INMARSAT mobile number
	Y	Optional digit to designate a particular DTE

3.1.3 Facility selection will follow the normal procedures used in the PDN of origin.

3.1.4 The calling subscriber should be aware of the long two-way transmission delay (approximately 0.6 seconds) on the maritime satellite circuit. This implies that acknowledgement signals may be delayed more than for terrestrial connections.

3.1.5 Call progress signals and diagnostic codes may be received in accordance with Recommendation X.350, § 8. 1.

3.1.6 When accessing a ship for CCITT standardized services such as Teletex, Videotex and facsimile, the calling subscriber should make sure before initiating the call that the called ship is equipped with the appropriate termination.

3.2 Calls to ships with DTEs operating in the start-stop mode

For further study.

4 Group calls

Group calls to ship earth stations are calls comprising a message sent simultaneously to all ships within a predetermined group. The group numbering scheme is given in Annex B of Recommendation F.125.

Group calls using direct access through a PDN will not be permitted.

Other means for setting up group calls through public data networks, e.g. by using a message handling system (MHS), are for further study.

ANNEX A

(to Recommendation F.122)

Format of selection PAD command signal for maritime satellite applications

A.1 General format

The general format of the selection PAD command signal is given in Recommendation X.28 and is composed as shown in Figure A-1/F.122.

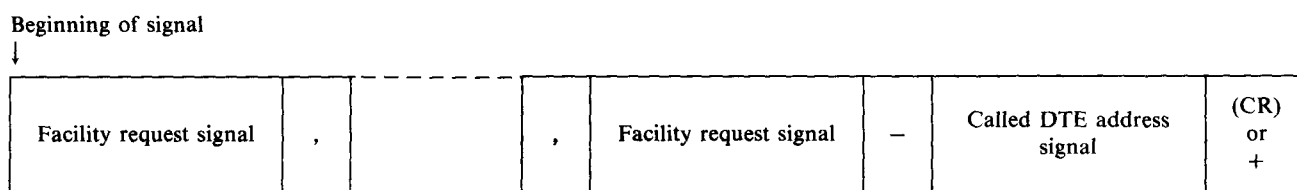


FIGURE A-1/F.122

The character 2/12 (,) is used as a separator between facility request signals and the character 2/13 (-) is used as a separator between the facility request block and the called DTE address signal. The selection PAD command signal is terminated by either of the characters 0/13 (CR) or 2/11 (+).

The facility request block must contain the network user identification (NUI) facility request signal. Other facility request signals are optional.

If the PAD receives a selection PAD command signal with a separator character 2/12 (,) followed by an empty facility request field, the signal will be accepted provided that the other fields of the signal are accepted.

The inclusion of user data in the selection PAD command signals is for further study.

A.2 Network user identification (NUI) facility request signal

A.2.1 Format of the NUI facility request signal

The NUI facility request signal shall have the format of Figure A-2/F.122 and be sent in the order shown.

Beginning of signal



N	9 digit INMARSAT mobile number (Recommendations E.215/F.125)	Mnemonic code
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FIGURE A-2/F.122

N is the character 4/14 (N) of International Alphabet No. 5. The mnemonic code of the NUI facility request signal may consist of 1 to 4 characters in columns 2 to 7 of International Alphabet No. 5, except 2/0 (SP), 7/15 (DEL), 2/13 (-), 2/12 (,) and 2/11 (+).

A.2.2 *Validation of the NUI facility request signal*

The coast earth station will check the general authorization of the calling ship for access to the INMARSAT system. Therefore, validation of the NUI facility request signal may be limited to the mnemonic code. However, the possibility of fraudulent calling would be reduced if the ship station identity is also included in the validation.

The ship station identity may also be used for identifying the calling ship for charging purposes, and for insertion of the calling DTE in the call request packet.

A.3 *Composition of the called DTE address signal*

A.3.1 *Calls to a DTE of a PDN*

The called DTE address signal shall consist of the prefix 0 followed by the full international number of the called DTE. This applies also when the called DTE is located in the same country as the maritime PAD.

A.3.2 *Calls to special destinations*

Annex A of Recommendation X.350 defines two-digit prefixes for access to special destinations. For calls to such destinations the called DTE address shall consist of the two-digit prefix, optionally followed by additional digits.

A.4 *Optional facilities*

Facilities to be offered in a maritime PAD is to be determined by the Administration concerned.

The shipboard DTE may request available facilities in accordance with the procedures given in Recommendation X.28.