Recommendation X.351

SPECIAL REQUIREMENTS TO BE MET FOR PACKET

ASSEMBLY/DISASSEMBLY FACILITIES (PADs) LOCATED

AT OR IN ASSOCIATION WITH COAST EARTH STATIONS

IN THE PUBLIC MOBILE SATELLITE SERVICE

(Malaga-Torremolinos, 1984; amended at Melbourne, 1988)

The CCITT,

considering

(a) that the PAD is defined in Recommendation X.3;

(b) that the DTE/DCE interface for a start-stop mode DTE accessing a PAD is defined in Recommendation X.28;

(c) that the procedures for the exchange of control information and user data between a PAD and a packet mode DTE are given in Recommendation X.29;

(d) that Recommendation X.350 gives the general requirements to be met for data transmission in the maritime satellite service;

(e) that start-stop mode DTEs are in use in the maritime satellite service;

(f) that it is desirable that such DTEs are offered access to and from packet switched public data networks via PADs located at or in association with coast earth stations or maritime satellite data switching exchanges (MSDSEs);

(g) that it is desirable to employ the same access procedures, service initiation and exchange of control information and characters in all PADs in the maritime satellite service (maritime PADs).

Note 1 - The term *maritime PAD* is used for PADs located at or in association with coast earth station in the maritime satellite service designed in accordance with this Recommendation.

Note 2 - This Recommendation does not specify PADs to be used on-board ships.

unanimously recommends

(1) that PADs in the Maritime Satellite Service (maritime PADs) should meet the requirements of this Recommendation in order to ensure full compatibility between PADs associated with different coast earth stations or mobile satellite data switching exchanges (MSDSEs) (see Recommendation X.350 for the definition of MSDSE). The general specifications of PADs are given in Recommendations X.3, X.28 and X.29;

(2) that the maritime PAD shall accept calls from any ship participating in the Maritime Satellite Service. Optionally, the maritime PAD may also offer the capability of setting up calls to ship board start-stop mode DTEs;

(3) that maritime PADs shall offer the initial standard profile given in Table 3/X.351;

(4) that maritime PADs will in addition offer other standard profiles defined in Recommendation X.28;

(5) that the user on board the ship should be advised to place the data call through the maritime PAD which is nearest to the called subscriber in order to avoid long terrestrial routes;

(6) that the protocol should enable access to and from unattended start-stop mode DTEs on-board ships and ensure efficient disconnection of the access information path at the end of a virtual call in order to avoid undue holding of the satellite circuit;

(7) that network user identification (NUI) facility is required for all calls set up from an on-board DTE in order to avoid fraudulent calls. The format of the NUI facility request signal is defined in Annex A;

(8) that maritime PADs may be located as shown in Annex B.

1 Procedures for establishing the access information path for **ship originated calls**

1.1 *DTE/DCE interface*

The access information path should be provided by the use of modems standardized for use in the public switched telephone network:

i) At the rate of 300 bit/s for full duplex operation in accordance with Recommendation V.21. Channel No. 1 is to be used in the direction from the ship to the PAD and channel No. 2 in the opposite direction. Tone disabling is required for disabling of echo suppressors.

ii) At the rate of 1200 bit/s for full duplex operation in accordance with Recommendation V.22, alternative B, mode ii) with 10 bits per character (i.e. one start bit, eight information bits and one stop bit) [¤ 4.2.1 b) of Recommendation V.22]. The handshake procedure should be in accordance with Figure 4/V.22. The ship board modem shall transmit in the low channel and receive in the high channel. The modem of the PAD will have the opposite channel configuration. Tone disabling is required for disabling of echo suppressors.

iii) At the rate of 75/1200 bit/s in accordance with Recommendation V.23. The rate of 75 bit/s should be used for the direction from the on-board DTE to the PAD and the rate of 1200 bit/s should be used for the other direction. Tone disabling is required for disabling of echo suppressors.

Note 1 - The alternative given in ii) above is preferred.

Note 2 - Administrations may offer other additional data rates at the maritime PAD.

The particular interchange circuits provided, and their operation, shall be in accordance with Recommendation V.24 and clamping of circuit 104 should be implemented in accordance with Recommendation V.24, ¤ 4.3.

1.2 *Procedures for setting up the access information path by the DTE*

1.2.1 *Setting up the satellite link*

The satellite link is established by using procedures defined within the INMARSAT system.

1.2.2 *Dialling procedures*

The dialling procedures for setting up telephone circuits in the INMARSAT system is given in Recommendation E.211.

Table 1/X.351 gives the dialling sequences which should be used for accessing the maritime PADs using the modems given in ¤ 1.1.

TABLE 1/X.351

Dialling information for accessing the modems defined in ¤ 1.1

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

Table 2/X.351 gives the dialling sequences for other data rates of Recommendation X.3 which can be supported in the existing INMARSAT system. These data rates may be offered on an optional basis.

TABLE 2/X.351

Dialling information for additional data signalling rates

Data signalling rate (bit/s)	Dialling sequence
50 ,5	2010
75 ,5	2005
100 ,5	2009
110 ,5	2000
134.5	2001
150 ,5	2006
200 ,5	2008
600 ,5	2004
1 800 ,5	2007
2 400 ,5	2012
4 800 ,5	2013
9 600 ,5	2014
56 000 ,5	2017

The dialling sequences 2050 through 2099 are allocated for national use, e.g. access to PADs for special services such as videotex.

For access to PADs other than maritime PADs, national access procedures and access numbers should be used. The numbering and dialling procedures will then be as defined for calling a terrestrial telephone subscriber (see ¤ 2.3.1 of Recommendation E.211).

1.2.3 Routing and digit conversion at the coast earth *station*

The routing of calls from the ship earth station to the maritime PAD is as shown in Annex B.

There may be a separate input port to the maritime PAD for each data rate, or several data rates may be accepted on one port. The coast earth station will route the call automatically to the appropriate port of the PAD.

If the maritime PAD is remotely connected to the coast earth station via the public switched telephone network [corresponding to case a) of Annex B], the coast earth station will convert the digits $20X_1X_2$ into the appropriate telephone access number allocated to the required input port of the PAD.

1.2.4 Disabling of echo suppressors

Echo suppressors are normally fitted at both ends of the satellite connection. Even though the echo suppressors in some cases may be disabled by signalling means, it is advisable that the disabling tone is sent by the modems whenever the access information path is being established.

2 Procedures for establishing the access information path for calls originating in a PDN

This point is for further study.

3 Procedures for disconnecting the access information path

Procedures for disconnecting the access information path, i.e. the maritime satellite telephone circuit, are given in ¤¤ 1.1.3.2 and 1.1.3.4 of Recommendation X.28.

Note 1 - Since a maritime satellite telephone circuit is used for accessing the maritime PAD, charging of the call may take place until the circuit has been cleared forward (see the Q.1100 series of Recommendations for the relevant conditions). For calls set up from the on-board DTE, disconnection by the maritime PAD corresponds to clearback on the maritime satellite telephone circuit. The clearing procedures related to clearback of telephone circuits in the maritime satellite service are defined in the Q.1100 series of Recommendations.

Note 2 - The maritime PAD may be provided with control mechanisms for disconnecting the access information path during fault conditions, for example when no information has been passed between the DTE and the PAD for a given period of time.

Note 3 - When the maritime PAD detects that a clearing condition of layer 3 exists on the interface to the PDN and after the necessary control signals (e.g. the *clear indication PAD service* signal) have been passed to or received from the DTE, the PAD should disconnect the access information path.

4 Format of characters used in the exchange of control **information**

The start-stop mode DTE shall generate and be capable of receiving characters in accordance with International Alphabet No. 5 as described in Recommendation T.50. The general structure of characters should be in accordance with Recommendation X.4.

The following specific conditions should apply. The PAD will transmit and expect to receive 8-bit characters, where the 8th bit (i.e. the last bit preceding the stop element) shall be the parity bit. The maritime PAD will detect the parity from the *service request* signal.

If the transparent mode is selected during the call (see ¤ 5.2 below), the PAD will ignore the parity bit and will pass octets transparently between the two interconnected DTEs.

The initial standard profile in Table 3/X.351 assumes that the even parity is used. However, the maritime PAD will also support the optional parameter values 1, 2 and 3 of parameter 21 (see Recommendation X.3). If the on-board start-stop mode DTE requires the use of a specific value for parameter 21, this value should be selected by a *set PAD command* (or a *set and read PAD command*) signal (e.g. SET 21:3) sent as soon as the *PAD identification PAD service* signal has been received [see ¤ 5.2.1 ii)].

It is for further study whether specific standard profiles for maritime applications should be included in Table 3/X.351 for the purpose of parity treatment other than that provided with the initial standard profile.

5 Procedures for ship originated calls

5.1 *General*

5.1.1 Initial standard profile for maritime PADs

The initial standard profile for maritime satellite applications which will be offered in all maritime PADs is given in Table 3/X.351.

Parameters Nos. 1 through 12 and parameter No. 21 will be implemented in all maritime PADs. The remaining parameters may be offered on a national basis.

TABLE 3/X.351

PAD parameter settings for the initial standard profile for maritime PADs

Parameter reference number	Parameter description	Parameter setting for standard maritime satellite profile	Parameter value
1	PAD recall using a character	Set to possible	1
2	Echo	Set to no echo	0
3	Selection of data forwarding signal	Set to all characters in column 0 and 1 and character DEL	126
4	Selection of idle timer delay	Set to no time-out	0
5	Ancillary device control	Set to no use of X-ON and X-OFF	0
6	Control of PAD service signal	Set to service signals are sent	1
7	Selection of operation of PAD on receipt of break signal from the start-stop mode DTE	Set to reset	2
8	Discard output	Set to normal data delivery	0
9	Padding after carriage return	Set to no padding after carriage return	0
10	Line folding	Set to no line folding	0
11	Binary speed of start-stop mode DTE	Set to speed of DTE	See Rec. X.3
12	Flow control of the PAD by the start-stop mode DTE	Set to use of X-ON and X-OFF	1
13	Linefeed insertion after carriage return	Set to no linefeed insertion	0
14	Linefeed padding	Set to no padding after LF	0
15	Editing	Set to no editing	0
16	Character delete	Set to character 7/15 (DEL)	127
17	Line delete	Set to character 1/8 (CAN)	24
18	Line display	Set to character 1/2 (DC2)	18
19	Editing PAD service signals	Set to editing PAD service signals for printing terminals	1
20	Echo mask	Set to echo all characters	0
21	Parity treatment	Set to no parity detection or generation	0
22	Page wait	Set to page wait disabled	0

5.1.2 *Coding of PAD command signals and PAD service signals*

The coding of *PAD command* signals and *PAD service* signals are given in Recommendation X.28.

5.2 *Procedures*

5.2.1 Figure 1/X.351 shows the sequence of events for call establishment and call clearing for ship originated calls.

Figure 1/X.351 - CCITT 71330

The following procedures will be supported in maritime PADs for virtual calls set up by the on-board start-stop mode DTE. These procedures are based on those given in Recommendation X.28, however, where the procedures given below deviate from those given in Recommendation X.28 or where Recommendation X.28 gives several alternative procedures, those given below should prevail.

i) The procedure should be initiated by the on-board start-stop mode DTE sending a *service request* signal consisting of the characters <2/14(.) 0/13(CR)> to the PAD.

The PAD will detect the parity and, if required, the data rate used from this signal.

ii) The PAD will respond within 10 seconds with the *PAD identification PAD service* signal with the following format:

PAD and/or port identification <(CR) (LF)>

[The signal <(CR) (LF)> is the format effector.]

On receipt of this signal the start-stop mode DTE shall send either:

- the *selection PAD command* signal, or

- a *set PAD command* (or *set and read PAD command)* signal for setting of specific PAD parameters followed by the *selection PAD command* signal, or

- a *standard profile selection PAD command* signal followed by the *selection PAD command* signal.

The format of the *selection PAD command* signal is given in Annex A.

If the NUI facility request signal contained in the *selection PAD command* signal is not accepted by the PAD, the PAD will transmit the *clear indication PAD service* signal <CLR NA> and disconnect the access information path.

If the first character of the *selection PAD command* signal has not been received within 60 seconds or the last character within 120 seconds, the PAD will transmit the *error PAD service* signal and disconnect the access information path.

iii) The PAD will acknowledge the *selection PAD command* signal within 10 seconds with the *acknowledgement PAD service* signal composed of the characters <0/13 (CR) 0/10 (LF)>.

iv) When the virtual call has been extended to the called DTE, the PAD will return the *PAD service* signal <COM> to the start-stop mode DTE. The interface will now be in the data transfer state where characters may be transferred using International Alphabet No. 5 except for the character <1/0 (DLE)> (which would be interpreted by the PAD as an escape from the data transfer state) and the characters <1/1 (DC1)> and <1/3 (DC3)> (which are used for flow control, see also Recommendation X.28, ¤ 4.1).

If the start-stop mode DTE would require data to be transferred transparently through the PAD, the DTE should either send the *standard profile selection PAD command* signal <PROF91> or the *set PAD command* signal <SET 1:0, 3:0, 4:20, 6:0, 12:0> as soon as the *PAD service* signal <COM> has been received.

Selection of other PAD parameter values should be done in accordance with the procedures given in Recommendation X.28.

Note - When the transparent profile has been selected, the start-stop mode DTE will no longer be capable of escaping from the data transfer state and, since no *PAD service* signal will be given, a call control procedure needs to exist between the two communicating DTEs. For the packet mode DTE this would require a protocol at a layer above layer 3.

5.2.2 The general conditions for clearing are given in Recommendation X.28, ¤ 3.2.2. However, the following should be noted:

a) When parameter 6 is not set to 0, the PAD will return the *clear confirmation PAD service* signal within 10 seconds after the receipt of a *clear request PAD command* signal from the ship-board DTE without awaiting a clear confirmation packet from the packet mode DTE. The start-stop mode DTE should be responsible for disconnecting the access information path. However, if the start-stop mode DTE does not disconnect the access information path or does not send the first character of a new *PAD command* signal within 20 seconds, the PAD should disconnect the access information path.

b) If parameter 6 is not set to 0, the PAD will send a *clear indication PAD service* signal to the start-stop mode DTE when receiving a clear indication packet from the PDN. The PAD should be capable of disconnecting the access information path within 20 seconds provided that

- the on-board start-stop mode DTE has not disconnected the access information path,
- a new *PAD command* signal has not been received from the on-board DTE, or
- an incoming call packet to the same ship has not been received from the PDN within this time-out period.

c) If parameter 6 has been set to 0, the on-board DTE should disconnect the access information path at the end of the virtual call. If a clear indication packet is received from the PDN and the path has not been disconnected by the on-board DTE, the PAD should be capable of disconnecting the access information path.

5.2.3 Maritime PADs may offer initial profiles and procedures additional to those given in this Recommendation on a national basis.

6 Procedures for PDN originated calls

These procedures are for further study.

7 Procedures for exchange of user data

7.1 *General*

The procedures given in Recommendation X.28, ¤ 4, should be used.

7.2 *Special conditions for the Maritime Satellite Service*

The following conditions relate to the long two-way transmission delay on the satellite circuit (approximately 0.6 seconds):

i) The PAD should be capable of storing more than one packet before a flow control signal is sent to the start-stop mode DTE.

ii) The parameter M in Recommendation X.28, ¤ 4.6, must have the minimum values given in Table 4/X.351.

iii) The echo will be delayed by approximately 0.6 seconds. Therefore parameter 2 should normally be set to 0.

TABLE 4/X.351

Minimum values for the parameter M

Data signalling rate (bit/s)	Minimum value of M
300	18
1200	72

ANNEX A

(to Recommendation X.351)

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 follows:

Figure

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 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 *NUI facility request signal*

A.2.1 *Format of the NUI facility request signal*

The NUI facility request signal shall have the following format and be sent in the order shown:

Figure

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 INMARSAT mobile number is also included in the validation.

The INMARSAT mobile number may also be used for identifying the calling ship for charging purposes and for insertion in the calling DTE address field of 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 destination*

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.

ANNEX B

(to Recommendation X.351)

Possible locations of PADs in the Maritime Satellite Service

PADs in the Maritime Satellite Service may be located as shown in Figure B-1/X.351. The following cases have been identified:

a) The PAD is connected to a DSE in the country in which the coast earth station is located. In this case a call from a ship board start-stop mode DTE is routed from the maritime satellite telephone system via the telephone network to the PAD. For charging purposes a network user identification (NUI) signal must be used for identification of the calling ship.

This solution may be used irrespective of the telephone switching capabilities of the coast earth station. It is the only possible solution when the coast earth station does not incorporate a telephone switch.

b) The PAD is located at the coast earth station and is connected to the maritime satellite telephone system at the coast earth station and to the MSDSE on the interface defined in Recommendation X.25. In this case also, the NUI signal would be required.

c) The PAD is integrated with the MSDSE and the interworking procedure defined in Recommendation X.352 is used for transferring the calling line identification from the coast earth station to the MSDSE. In this case the use of the NUI signal would not be required for identification purposes.

Figure B-1/X.351 - CCITT 71340