Recommendation X.350

GENERAL INTERWORKING REQUIREMENTS TO BE **MET FOR DATA TRANSMISSION**

IN INTERNATIONAL PUBLIC MOBILE SATELLITE SYSTEMS

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

The CCITT,

considering

(a) that a maritime satellite service is being operated by the International Maritime Satellite Organization (INMARSAT);

(b) that data transmission services in the INMARSAT system should meet the provisions laid down for data transmission in general;

(c) that the mobile DTE may be connected to a PDN on a call-by-call basis;

(d) that mobile DTEs should have the capability of interfacing public data networks through all land earth stations even though they are located in different countries and interfacing different public data networks,

unanimously recommends

that the following general provisions should apply for data transmission in international public mobile satellite systems.

1 Definitions

The following are definitions of terms used in relation with data transmission in public mobile satellite systems.

Note - A similar set of definitions for telephone interworking is contained in Recommendation M.1100.

1.1 **mobile satellite data transmission system** is a means for the establishment of temporary connections between a data switching exchange (DSE) in a public data network (PDN) and a mobile DTE. The maritime satellite data transmission system comprises a *mobile satellite circuit*, a *mobile local circuit*, a *mobile satellite data switching exchange (MSDSE)*, and a *mobile terrestrial circuit*. The general maritime mobile satellite configuration is shown in Figure 1/X.350. International aeronautical and land mobile satellite data transmission are not defined yet.

1.2 **mobile local circuit** is a circuit between the *mobile earth station* and a mobile DTE.

1.3 **mobile satellite circuit** is a circuit between the *mobile earth station* and the *land earth station*. It comprises all elements required for establishing, maintaining and clearing the mobile satellite circuit including the *network coordination station*.

Figure 1/X.350 - T0702171-87

1.4 **mobile terrestrial circuit** is a circuit between the *land earth station* and the *mobile satellite data switching exchange* if used.

1.5 **mobile earth station** is defined in [Article 1, ¤ 4.9], of the Radio Regulations, ITU, Geneva 1982.

1.6 **coast earth station** is defined in Article 1, ¤ 4.14, of the Radio Regulations, ITU, Geneva 1982.

aeronautical earth station is defined in Article 1, ¤ 4.20 of the Radio Regulations, ITU, Geneva 1982.

land earth station is defined in Article 1, ¤ 4.10A of the Radio Regulations, as modified by MOB-WARC 1987.

base earth station is defined in Article 1, ¤ 4.11A of the Radio Regulations, as modified by MOB-WARC 1987.

1.7 **mobile satellite data switching exchange (MSDSE)** is the functional interface between the *public maritime satellite data transmission system* and a public data network.

The MSDSE provides the following functions:

- interworking between the signalling systems used in the *public mobile satellite data transmission system* and the PDN,
- routing and call control for calls to and from mobile stations,
- charging.

1.8 **network coordination station** is a station in the public mobile satellite system with the capability to coordinate, supervise and monitor the assignment and utilization of the maritime satellite circuits within a satellite coverage area. The network coordination station is designated and operated by the satellite system operator.

Note - The rest of this Recommendation applies to public maritime satellite data transmission systems. Its applicability for public aeronautical and land mobile satellite systems is for further study.

2 Choice of interface between a mobile DTE and the **MSDSE**

2.1 For data signalling rates at and above 600 bit/s two types of terminal mode of operation are defined (Recommendation X.1):

i) terminals operating in the synchronous mode for user classes of service 3 through 7 interfacing circuit switched PDNs using the interfaces defined in Recommendations X.21, X.21 *bis* and X.22;

ii) terminals operating in the packet mode for user classes of service 8 through 12 interfacing packet switched PDNs using the interface defined in Recommendation X.25.

2.2 Operation in the packet mode has several advantages as compared to operation in the synchronous mode:

i) operation in the packet mode permits the interconnection of DTEs operating in different user classes of service;

ii) the interface comprises layers 1, 2 and 3 of the Open system interconnection (OSI) protocol so that the higher layers may be built directly on top of the interface defined in Recommendation X.25;

iii) the link level protocol (level 2) provides link-by-link error protection using ARQ techniques.

Note - This error protection is additional to and independent of any forward error correction applied as part of level 1;

iv) the provision of PADs will also interconnect a mobile packet mode DTE with data subscribers of the public switched telephone network and with subscribers of circuit switched PDNs; the PAD may also be used for interconnection with leased lines;

v) it would be possible to operate with different data rates in the two directions of transmission over the satellite link.

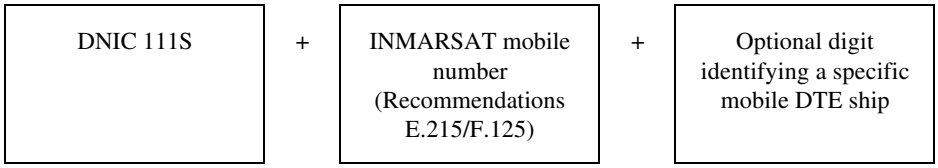
2.3 Based on the above considerations it is concluded that access to PDNs from the public maritime satellite systems should be provided for the packet mode of operation.

Interconnection with circuit switched PDNs may be offered on an optional basis.

2.4 The procedures for interworking between packet switched data networks and the maritime satellite data transmission system are given in Recommendation X.352.

3 International data number for a mobile DTE

The format of the international data number for a mobile DTE is defined in Recommendation X.121, and is composed as follows:



4 Data transmission prefixes

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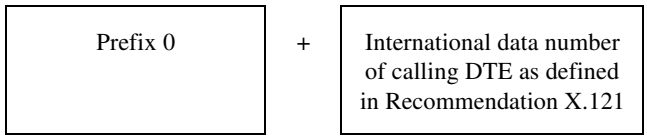
Prefixes to be used at the mobile DTE for calling a DTE of a PDN or a special termination located at the public maritime mobile satellite data switching exchange (MSDSE) or in a PDN are given in Annex A.

5 Transfer of address signal between the MSDSE and a **mobile DTE**

5.1 *Calls originating in a PDN*

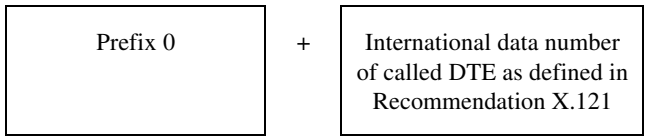
5.1.1 For an incoming call to a mobile DTE, the part of the called DTE address which includes the DNIC and the INMARSAT mobile number need not be transferred across the DCE/DTE interface since the coast earth station identifies the called mobile earth stations by procedures on the radio path. If present, the optional digit identifying a specific mobile DTE must be transferred transparently to the mobile earth station. [See also Recommendation X.352, ¤ 2.3 ii).]

5.1.2 The calling DTE address transferred across the DCE/DTE interface should have the following format:



5.2 Calls originating at a mobile earth station

5.2.1 For a calling mobile DTE the called DTE address transferred across the DTE/DCE interface must have the following format irrespective of the location of the called DTE:

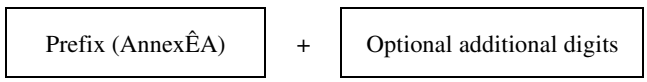


5.2.2 The calling DTE address consisting of the mobile INMARSAT number optionally followed by the digit identifying the particular mobile DTE should be tranferred across the DTE/DCE interface [see also Recommendation X.352, ¤ 2.4 i)].

Note - As required by Recommendation X.300, the calling DTE address, if present, should be checked by the MSDSE before the call request packet is transmitted into a PDN. The DNIC of the ocean area in which the calling mobile earth station is located should be inserted by the MSDSE. If the calling DTE address is not present, it should be inserted by the MSDSE. The inserted address should consist of the DNIC followed by the mobile earth station number.

5.3 Calls to special terminations

For a mobile DTE calling a special termination defined by one of the prefixes (other than 0) given in Annex A, the called DTE address transferred across the DTE/DCE interface must have the following format:



5.4 *Sub-addressing*

The use of the shared address method for identifying a specific mobile DTE is given in ¤ 3 above.

For identifying a specific mobile DTE by using the extended address method in the facility field, see Recommendation X.25.

6 User services and facilities

6.1 User services and facilities should be offered in accordance with Recommendation X.2.

6.2 The realization of user facilities is given in Recommendation X.300.

6.3 The default values for facilities and parameters may be independently fixed for each MSDSE.

Methods for negotiation of facilities and parameters on a per call basis are for further study.

See also Recommendation X.32.

7 Routing

The general principles for routing between PDNs are given in Recommendation X.110. Special routing requirements related to the mobile satellite service are given in Recommendation X.353.

8 Call progress signals and diagnostic codes

8.1 A subscriber of a PDN calling a mobile DTE may receive call progress signals and diagnostic codes in accordance with Recommendation X.96 and Annex E to Recommendation X.25, respectively. If the call progress signal (and diagnostic code) is returned from the MSDSE in case of unsuccessful call set-up of the mobile satellite circuit, Recommendation X.352 gives more precise information about the cause.

8.2 Call progress signals and diagnostic codes received at the mobile DTE as part of a clear indication packet will also be in accordance with Recommendation X.96 and Annex E to Recommendation X.25, respectively. Moreover, Recommendation X.352 suggests call progress signals to be returned to the mobile DTE for unsuccessful call set-up of the maritime satellite circuit.

9 Closed user groups

9.1 In accordance with Recommendation X.2 the closed user group is considered as an essential user facility and should therefore also be made available for ships.

9.2 Because mobile earth stations may set up and receive data calls through any MSDSE, a mobile earth station being part of a closed user group should be known as such on all MSDSEs in the mobile satellite service.

9.3 The principles and procedures for realizing closed user groups are given in Recommendation X.300.

9.4 Administrative arrangements for closed user groups are given in Recommendation X.180. See also Recommendation F.122 regarding administrative arrangements for including mobile earth stations in closed user groups.

10 Interface to PADs

10.1 A packet mode mobile DTE should access PADs on a PDN using the procedures defined in Recommendation X.29.

10.2 The procedures for a mobile DTE operating in the start-stop mode accessing a PAD should be in accordance with Recommendation X.351.

11 Transfer of C and I lead information

When required the mobile satellite circuit should include provisions for transferring the C and I leads (Recommendation X.21) between the mobile DTE/mobile earth station interface and the coast earth station/MSDSE interface. If an envelope structure is used for this purpose, it must be ensured that non-standard envelopes are not passed into the PDN.

12 Handling of group calls (broadcast service)

12.1 The international public maritime mobile satellite system provides for a communication service (maritime group calls) where a calling DTE of a PDN may forward messages simultaneously to a given group of ships. There will be no return link from the ships (i.e. a simplex service) so that no acknowledgement will be given as to whether a given ship in the called group has received the message.

These maritime group calls are identified by the following international data number (see Recommendation E.215/F.125):

DNIC	INMARSAT mobile number for group calls
111S	$0\ X_2X_3 \ldots . X_8$

where the first digit of the mobile earth station number has the fixed value 0. The remaining digits of the INMARSAT mobile number determine which group of ships is being addressed.

Group calls in other public mobile satellite systems are also defined in Recommendation E.215.

12.2 If maritime group calls are required through a PDN, the calls should be forwarded through a message handling system (MHS) at the MSDSE. The procedures to be used between a DTE of a PDN and the MHS should be in accordance with rules defined by the CCITT.

The MHS (or the MSDSE) must make sure that the calling DTE is authorized for maritime group calls, e.g. by use of the calling line identification facility or the closed user group facility. Calls from non-authorized DTEs must be barred.

12.3 Calls with a group address (other than those forwarded by the MHS) must be barred by the MSDSE or the coast earth station.

ANNEX A

(to Recommendation X.350)

Allocation of telephone prefixes, telex access codes

and data transmission prefixes

A.1 Administrations should make the application for the allocation of new prefixes and access codes to the CCITT Secretariat. The application should contain a definition for the service, termination or facility to be accessed.

The CCITT Secretariat would be responsible for coordinating the allocation of new prefixes and access codes with the competent Study Groups. The allocation of new prefixes and access codes should be done in such a way as to ensure that equivalent services carried by means of telephone, telex or data circuits are given the same prefix.

The prefixes and access codes to be used for automatic calling should be as follows:

Telephone: For international calls the prefix should be 00 followed by the international telephone number of the called subscriber. As an option for national calls the prefix 0 followed by the national (significant) number of the called subscriber could be used.

Note - In the maritime satellite service only the international format is preferred.

Telex: For international calls the access code should be 00 followed by the international telex number of the called subscriber. As an option for national calls the access code 0 followed by the national telex number of the called subscriber could be used.

Note - In the maritime satellite service only the international format is preferred.

Data transmission: For data calls through a public data network the format should always consist of the prefix 0 followed by the international data number of the called subscriber (see ¤ 5.2.1, Recommendation X.350).

A.2 Table A-1/X.350 contains a list of prefixes and access codes allocated so far for access to special destinations, services or facilities.

A.3 The facilities are defined in Annex B of Recommendation E.216.

TABLE A-1/X.350

(Note 1)

Allocation of telephone prefixes, telex access codes and data transmission prefixes

Category	Prefix or access code		Applications (Notes 2 and 3)	Telephone	Telex	Data
	Digit 1	Digit 2				
Operator	1	0	Spare	-	-	-
	1	1	International outgoing operator	A	A	NA
	1	2	International information service	A	A	FS
	1	3	National operator	A	A	NA
	1	4	National information service	A	A	FS
	1	5	Radiotelegram service	FS	A	NA
	1	6	Spare	-	-	-
	1	7	Booking of telephone calls (Note 4)	A	A	NA
	1	8	Spare	-	-	-
	1	9	Spare	-	-	-
Automatic facilities	2	0	Access to maritime PAD (Note 5)	A	NA	NA
	2	1	Store-and-forward (international)	NA	A	NA
	2	2	Store-and-forward (national)	NA	A	NA
	2	3	Abbreviated dialling (short code selection)	A	A	NA
	2	4	Telex letter service	NA	A	NA
	2	5	Access to PSPDN	Note 8	NA	Note 8
	2	6	-	-	-	
	2	7	Spare	-	-	-
	2	8	-	-	-	
	2	9	-	-	-	
Specialized assistance (Note 6)	3	0	Spare	-	-	-
	3	1	Maritime enquiries	A	A	A
	3	2	Medical advice	A	A	A
	3	3	Technical assistance	A	A	A
	3	4	Person-to-person call	A	NA	NA
	3	5	Collect calls	A	NA	NA
	3	6	Credit card calls	A	A	NA
	3	7	Time and charges requested at end of call	A	A	NA
	3	8	Medical assistance	A	A	A
	3	9	Maritime assistance	A	A	A
Ship Reporting	4	0	Spare	-	-	-
	4	1	Meteorological reports	A	A	A
	4	2	Navigational hazards and warnings	A	A	A
	4	3	Ship position reports	A	A	A
	4	4	-	-	-	-
	4	5	-	-	-	
	4	6	Spare	-	-	-
	4	7	-	-	-	
	4	8	-	-	-	
	4	9	-	-	-	

TABLE A-1/X.350 *(cont.)*

Category	Prefix or access code		Applications (Notes 2 and 3)	Telephone	Telex	Data
	Digit 1	Digit 2				
Information retrieval	5	0	Spare	-	-	-
	5	1	Meteorological forecasts	FS	FS	FS
	5	2	Navigational warnings	FS	FS	FS
	5	3	Videotex (international)	FS	NA	FS
	5	4	Videotex (national)	FS	NA	FS
	5	5	News (international)	FS	FS	FS
	5	6	News (national)	FS	FS	FS
	5	7	-	-	-	
	5	8	Spare	-	-	-
	5	9	-	-	-	
Specialized use (Note 7)	6		Administration specialized use, e.g. leased lines	A	A	FS
	7		Spare	-	-	-
	8		Spare	-	-	-
Test	9	0	Spare	-	-	-
	9	1	Automatic test line	A	A	FS
	9	2	Commissioning tests	A	A	A
	9	3	Spare	-	-	-
	9	4	Spare	-	-	-
	9	5	Operational coordination	A	A	A
	9	6	-	-	-	
	9	7	Spare	-	-	-
	9	8	-	-	-	
	9	9	-	-	-	

Note 1 - The same table is contained in Recommendations E.216, F.126 and X.350.

Note 2 - The entries in the columns under Telephone, Telex and Data have the following meanings:

A = Applicable for access by this service

NA = Not applicable for access by this service

FS = For further study.

Note 3 - The prefix or access code may be followed by an optional telephone country code, data country code (or data network identification code) or telex destination code, or other optional digits.

Note 4 - Via some coast earth stations it would be possible to book telephone calls using the telex service.

Note 5 - PAD = Packet Assembly/Disassembly facility. The prefix 20 should be followed by two digits indicating the required data rate (see Recommendation X.351).

Note 6 - The prefixes 34, 35, 36 and 37 may be followed by the international number of the called subscriber.

Note 7 - Digits following digit 6 will be allocated on a national basis.

Note 8 - The prefix is used for access to MSDSEs (see Recommendation X.350) for virtual call data services (Recommendation X.25) by means of telephone circuits in the INMARSAT system.