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MAINTENANCE: MOBILE SYSTEMS

MARITIME MOBILE TELECOMMUNICATION STORE-AND-FORWARD SERVICES (PACKET MODE) VIA SATELLITE

Recommendation M.1150

FOREWORD

The CCITT (the International Telegraph and Telephone Consultative Committee) is a permanent organ of the International Telecommunication Union (ITU). CCITT is responsible for studying technical, operating and tariff questions and issuing Recommendations on them with a view to standardizing telecommunications on a worldwide basis.

The Plenary Assembly of CCITT which meets every four years, establishes the topics for study and approves Recommendations prepared by its Study Groups. The approval of Recommendations by the members of CCITT between Plenary Assemblies is covered by the procedure laid down in CCITT Resolution No. 2 (Melbourne, 1988).

Recommendation M.1150 was prepared by Study Group IV and was approved under the Resolution No. 2 procedure on the 5th of October 1992.

CCITT NOTE

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

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Recommendation M.1150

MARITIME MOBILE TELECOMMUNICATION STORE-AND-FORWARD SERVICES (PACKET MODE) VIA SATELLITE

(1992)

Abstract: This Recommendation describes special maintenance procedures for maritime mobile-satellite messaging systems predominantly based on INMARSAT-C maintenance requirements.

Keywords: Satellite Maritime Mobile Messaging Systems, Maintenance Aspects, INMARSAT-C.

1 Purpose

The purpose of this Recommendation is to describe the special maintenance procedures and facilities that are required for the maintenance of a maritime mobile packet mode telecommunication systems via satellite (INMARSAT-C). Wherever possible, since telex and data services are involved, the standard maintenance procedures and facilities specified in the F- and X-Series Recommendations should be followed for the maintenance of these systems.

2 Available services

This system is intended for the provision of store-and-forward telex and electronic messaging services between corresponding telex and data terrestrial networks and ships, or off-shore platforms[1)]. The range of possible applications for these services includes distress reporting, polling and data reporting, X.400 electronic mail, EDI, etc.

3 System configuration

The Standard-C system consists of the following major elements per ocean region (see Figure 1/M.1150):

a) the space segment including satellites and NCC;

b) the network coordination station (NCS);

c) coast earth stations (CES);

d) ship earth stations (SES).

3.1 *Space segment*

The space segment comprises one satellite for each ocean region and associated frequency bands assigned for use by the Standard-C System. The ocean regions are: the Atlantic East, the Atlantic West, the Pacific and the Indian Ocean.

3.2 *Earth facilities*

3.2.1 *Coast earth station (CES)*

Also known as land earth station (LES), when providing multiple mobile services, a CES serves as a gateway to and from the terrestrial telex and data networks to SESs within the coverage area of the satellite. It interfaces with the space segment (at L-band and C-band) on the one hand and with the fixed terrestrial networks on the other.

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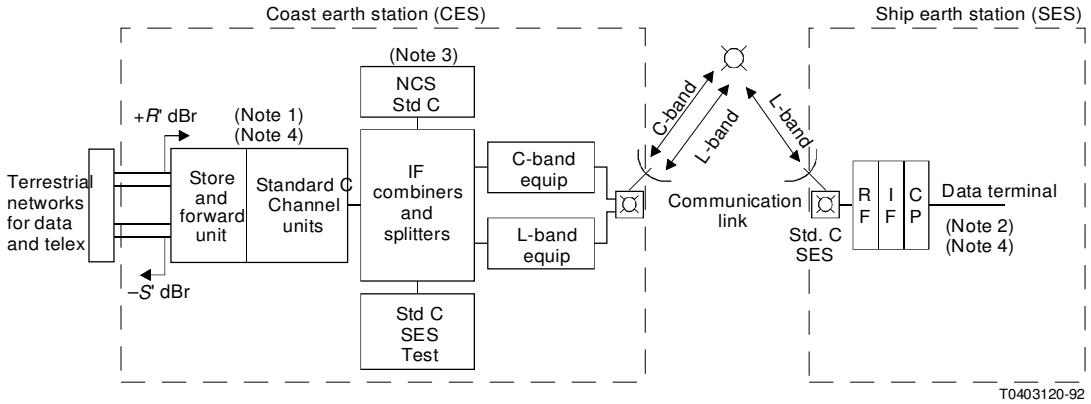
1) This system is also being used for land mobile services.



RF Radio frequency (equipment)
IF Intermediate frequency (equipment)
CP Channel processing (equipment)
NCS Network coordination station

Earth station

Satellite

Note 1 – *+R´* dBr and *–S´* dBr in the coast earth station correspond to the levels *R´* dBm and *–S´* dBm using a modulation signal with the level of 0 dBm0.

Note 2 – See Figure 1/M.1140 for 4-wire test access points.

Note 3 – Each Ocean Region and each standard requires an NCS. A CES may be configured for one or more NCS.

Note 4 – Interface protocols for data are those given in Recommendations F.127 [1], U.1 [2], U.80 [3] and X.25 [4].

FIGURE 1/M.1150

Configuration of a Standard-C CES and SES system

3.2.2 *Ship earth station (SES)*

An SES consists of the shipboard Data Terminal Equipment (DTE) and a Data Circuit Terminating Equipment (DCE) which acts as an interface to the satellite network (space segment). The DTE is the equipment at which a communication path begins or ends; it is usually a personal computer. The DCE is used at either end of a data circuit to provide the functions necessary to establish, maintain and terminate a connection. The DCE also carries out all signal conversion and coding between the DTE and the satellite link.

3.2.3 *Network coordinating station (NCS)*

Each ocean region is served by an NCS which manages common space segment resources and controls the access of SESs to the system. The NCS provides central control of satellite channel resources to CESs and SESs within an ocean region. It maintains a pool of frequencies, assigns frequencies on demand to CESs and supervises and monitors the use of these frequencies. In addition, it administers common data, e.g. SES ship lists and system parameters and is responsible for collection of call record information for statistic and accounting purposes.

3.3 *General maintenance principles*

3.3.1 *Responsibilities*

In an international connection, which includes a ship earth station, the maritime satellite system may be regarded, from a transmission point of view, as analogous to a national network and the maritime terminal or local system as analogous to a subscriber terminal within that network. Nevertheless, it should be noted that the maritime satellite circuit is usually set up between the coast earth station and the ship earth station on a demand assignment basis. Therefore, a coast earth station in the maritime satellite system may not have direct or full responsibility for the

maintenance of a particular maritime satellite circuit and a particular ship earth station all of the time. The operation and maintenance of the overall maritime satellite system is the responsibility of the maritime satellite system operator, e.g. INMARSAT.

The maintenance organization in each participating Administration is in general, responsible for the maintenance of the maritime satellite circuits in accordance with the M.700-Series Recommendations [5]-[14] as related to the operation and maintenance of their own coast earth station (CES) and its interface to terrestrial telex, data and messaging networks.

3.3.2 *Available services*

The maritime satellite systems in service provide telex services to maritime mobile units in addition to general messaging and data services. When instituting maintenance procedures, Administrations should consider the utilization of these services for communication, diagnostic and maintenance purposes, and should also ensure that trained technical staff are generally available at the ship earth station at the time the ship earth station is commissioned; however, under normal operating conditions the ship earth station is usually operated by a qualified radio officer who may only be able to assist in carrying out simple test procedures. Such test procedures include commissioning and performance verification tests (PVT), the latter being an automatic method of testing space segment accessing parameters.

3.3.2.1 *Commissioning testing*

Commissioning testing consists of a series of performance checks on a newly installed SES. These tests are designed to ensure that the SES complies with the technical requirements. Notification of a successful commissioning test is forwarded to all ocean regions via NCS to NCS to CES links. The commissioning tests are performed automatically by the Standard-C system operator (INMARSAT) in conjunction with CES operators and manufacturer's agents once the request for commissioning testing has been initiated by the SES operator.

3.3.2.2 *Performance verification tests (PVT)*

The performance verification test is a fully automatic test to check individual SESs with respect to signal level and some access and control sequences. The NCS maintains a record of all PVT results conducted in its ocean region and can initiate such tests if requested by a CES or by the network coordinating station (NCS).

3.4 *Lining-up and maintaining international public switched telex and data circuits*

The circuit between the international telex and data switching centre and the CES should be lined-up and maintained in accordance with those M-Series Recommendations appropriate to international public switched telex/data circuits.

3.5 *Lining-up and maintaining aeronautical satellite circuits*

3.5.1 *Control, sub-control and respective responsibilities*

3.5.1.1 *General*

The assignment of control and sub-control stations and respective responsibilities must address the configuration of the maritime satellite system. A control station must be assigned to each circuit, and, in addition, sub-control stations as required for efficient maintenance.

3.5.1.2 *Assignment of control stations*

The coast earth station will be the control station for the maritime satellite circuit. The CES will conduct these tests under the assistance of the regional NCS and report the results to the network control centre according to appropriate procedures set out by the satellite network operator.

3.5.1.3 *Assignment of sub-control stations*

3.5.1.3.1 In principle, a ship earth station can act as the maritime satellite circuit sub-control station. However, the required staff and facilities may not be available to meet the circuit sub-control responsibilities, and special measures may need to be taken.

3.5.1.3.2 A maritime test terminal at each CES may be used to facilitate fault location and maintenance in the maritime satellite system. In this regard the maritime test terminal may carry out some tests, normally considered to be within the province of a sub-control station, on behalf of a ship earth station. Whether or not a maritime test terminal should be assigned as a sub-control station is left for further study when the operation of a maritime test terminal is further defined.

3.5.1.4 *Responsibilities of control and sub-control stations*

Control stations dealing with maritime satellite circuits should in general fulfill the responsibilities of control stations as defined in the M-Series Recommendations. The same will apply to sub-control stations. However, maritime satellite systems present new concepts which require guidelines in as much as a maritime mobile unit is essentially a subscriber location.

3.5.2 *Transmission characteristics*

The transmission design characteristics for maritime satellite channels are as defined by the maritime satellite system operator (INMARSAT) for its Standard-C network.

4 Maintenance organization for the Standard-C maritime satellite system

4.1 *Maintenance organization as applicable to INMARSAT*

The maintenance responsibility within a maritime satellite network is divided among the ship earth station, the coast earth station, the network coordination station, and the network control centre.

4.1.1 *Ship earth station (SES) maintenance responsibility*

The ship earth station must be capable of communicating reliably with the coast earth station and may act as a sub-control station with responsibilities to the coast earth station. As a sub-control station, it is responsible for reporting noticeable degradations in the maritime satellite circuits to the coast earth station and for reporting ship earth station problems to the manufacturer's or ship's maintenance agent.

4.1.2 *Coast earth station (CES) maintenance responsibility*

The coast earth station provides interworking communication functions and has the overall coordination responsibility between the ship earth station and the international public telex/data network, including the responsibility of reporting problems to the network coordination station and the network control centre as required. It serves as a gateway between the terrestrial networks and the maritime SESs within the coverage area of the particular satellite region. In order to perform its functions, Protocol Signalling Data Base Registration updates, traffic and billing data, etc., are exchanged between it and the NCS of its ocean region. As such it has significant capability of detecting and reporting failures of its own equipment.

4.1.3 *Network coordination station (NCS) maintenance responsibility*

The network coordination station provides communication monitoring, maintenance and support functions within the maritime satellite system.

a) Communication functions include

- transmitting the control (signalling) and message channels to the ship earth stations and/or coast earth stations;
- assigning control or communication channels on demand;
- maintaining a list of active ship earth stations and updating CESs of its ocean region with this information, and communicating with NCCs of other regions.

b) Maintenance and monitoring functions include

- assisting in performing routine system tests;
- monitoring the performance of coast earth stations;
- monitoring, identifying and clearing of unauthorized transmissions.

c) Other supporting functions include

- coordinating network actions in its ocean region in case of serious failure of CES outage;
- providing performance reports for its region.

4.1.4 *Network control centre (NCC) maintenance responsibility*

The network control centre provides administrative, operational and maintenance functions within the maritime satellite network.

a) Administrative functions include

- acting as the fault report point (network);
- preparing, controlling and disseminating system information;
- providing a focal point for ships (or their agents, etc.), Administrations or others.

b) Routine and normal operational functions include

- liaising with the various space segment suppliers;
- scheduling and coordinating type approval and commissioning of ship earth stations;
- scheduling and coordinating the bringing-into-service of coast earth stations and network coordination stations;
- carrying out some limited monitoring of transmission parameters;
- analysing traffic and performance data provided by network coordination stations and coast earth stations.

c) Emergency and/or corrective (maintenance) actions, including as required the issue of broadcast network advisory messages to ship earth stations, in case of

- space segment failures;
- extended network coordination stations failures;
- failures or outages of individual coast earth stations;
- incorrect operation of ship earth stations;
- interference in the network.

References

[1] CCITT Recommendation F.127 *Operational procedures for interworking between the telex service and the service offered by INMARSAT Standard-C system*.

[2] CCITT Recommendation U.1 *Signalling conditions to be applied in the international telex service*.

[3] CCITT Recommendation U.80 *International telex store and forward access from telex*.

[4] CCITT Recommendation X.25 *Interface between data terminal equipment (DTE) and data-circuit terminating equipment (DCE) for terminals operating in the packet mode and connected to public data networks by dedicated circuit*.

[5] CCITT Recommendation M.710 *General maintenance organization for the international automatic and semi-automatic service*.

[6] CCITT Recommendation M.715 *Fault report point (circuit)*.

[7] CCITT Recommendation M.716 *Fault report point (network)*.

[8] CCITT Recommendation M.720 *Network analysis point*.

[9] CCITT Recommendation M.721 *System availability information point*.

[10] CCITT Recommendation M.725 *Restoration control point*.

[11] CCITT Recommendation M.717 *Testing point (transmission)*.

[12] CCITT Recommendation M.718 *Testing point (line signalling)*.

[13] CCITT Recommendation M.719 *Testing point (switching and interregister signalling)*.

[14] CCITT Recommendation M.723 *Circuit control station*.