



INTERNATIONAL TELECOMMUNICATION UNION

ITU-T

TELECOMMUNICATION
STANDARDIZATION SECTOR
OF ITU

M.1150

(04/97)

SERIES M: TMN AND NETWORK MAINTENANCE:
INTERNATIONAL TRANSMISSION SYSTEMS,
TELEPHONE CIRCUITS, TELEGRAPHY, FACSIMILE
AND LEASED CIRCUITS

Mobile telecommunication systems and services

**Maintenance aspects of maritime/land mobile
telecommunication store-and-forward services
(packet mode) via satellite**

ITU-T Recommendation M.1150

(Previously CCITT Recommendation)

ITU-T M-SERIES RECOMMENDATIONS

TMN AND NETWORK MAINTENANCE: INTERNATIONAL TRANSMISSION SYSTEMS, TELEPHONE CIRCUITS, TELEGRAPHY, FACSIMILE AND LEASED CIRCUITS

Introduction and general principles of maintenance and maintenance organization	M.10–M.299
International transmission systems	M.300–M.559
International telephone circuits	M.560–M.759
Common channel signalling systems	M.760–M.799
International telegraph systems and phototelegraph transmission	M.800–M.899
International leased group and supergroup links	M.900–M.999
International leased circuits	M.1000–M.1099
Mobile telecommunication systems and services	M.1100–M.1199
International public telephone network	M.1200–M.1299
International data transmission systems	M.1300–M.1399
Designations and information exchange	M.1400–M.1999
International transport network	M.2000–M.2999
Telecommunications management network	M.3000–M.3599
Integrated services digital networks	M.3600–M.3999
Common channel signalling systems	M.4000–M.4999

For further details, please refer to ITU-T List of Recommendations.

ITU-T RECOMMENDATION M.1150

MAINTENANCE ASPECTS OF MARITIME/LAND MOBILE TELECOMMUNICATION STORE-AND-FORWARD SERVICES (PACKET MODE) VIA SATELLITE

Summary

This Recommendation describes special maintenance procedures for maritime and land mobile-satellite messaging systems predominantly based on Inmarsat-C maintenance requirements.

Source

ITU-T Recommendation M.1150 was revised by ITU-T Study Group 4 (1997-2000) and was approved under the WTSC Resolution No. 1 procedure on the 19th of April 1997.

Keywords

Inmarsat-C, Maintenance Aspects, Satellite Maritime and Land Mobile Messaging Systems.

FOREWORD

ITU (International Telecommunication Union) is the United Nations Specialized Agency in the field of telecommunications. The ITU Telecommunication Standardization Sector (ITU-T) is a permanent organ of the ITU. The ITU-T 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 World Telecommunication Standardization Conference (WTSC), which meets every four years, establishes the topics for study by the ITU-T Study Groups which, in their turn, produce Recommendations on these topics.

The approval of Recommendations by the Members of the ITU-T is covered by the procedure laid down in WTSC Resolution No. 1.

In some areas of information technology which fall within ITU-T's purview, the necessary standards are prepared on a collaborative basis with ISO and IEC.

NOTE

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

INTELLECTUAL PROPERTY RIGHTS

The ITU draws attention to the possibility that the practice or implementation of this Recommendation may involve the use of a claimed Intellectual Property Right. The ITU takes no position concerning the evidence, validity or applicability of claimed Intellectual Property Rights, whether asserted by ITU members or others outside of the Recommendation development process.

As of the date of approval of this Recommendation, the ITU had/had not received notice of intellectual property, protected by patents, which may be required to implement this Recommendation. However, implementors are cautioned that this may not represent the latest information and are therefore strongly urged to consult the TSB patent database.

© ITU 1997

All rights reserved. No part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from the ITU.

CONTENTS

	Page
1 General.....	1
1.2 References.....	1
2 Available services.....	2
3 System configuration.....	2
3.1 Space segment.....	2
3.2 Earth facilities.....	2
3.2.1 Land Earth Station (LES).....	2
3.2.2 Ship or land mobile earth station (SES).....	3
3.2.3 Network Coordinating Station (NCS).....	3
3.3 General maintenance principles.....	3
3.3.1 Responsibilities.....	3
3.3.2 Available services.....	4
3.4 Lining-up and maintaining international public switched telex and data circuits.....	4
3.5 Lining-up and maintaining satellite circuits.....	4
3.5.1 Control, sub-control stations and respective responsibilities.....	4
3.5.2 Transmission characteristics.....	5
4 Maintenance organization for the Inmarsat-C maritime satellite.....	5
4.1 Maintenance organization as applicable to Inmarsat.....	5
4.1.1 Ship Earth Station (SES) maintenance responsibility.....	5
4.1.2 Land Earth station (LES) maintenance responsibility.....	5
4.1.3 Network Coordination Station (NCS) maintenance responsibility.....	6
4.1.4 Network Operations Centre (NOC) maintenance responsibility.....	6

Recommendation M.1150

MAINTENANCE ASPECTS OF MARITIME/LAND MOBILE TELECOMMUNICATION STORE-AND-FORWARD SERVICES (PACKET MODE) VIA SATELLITE

(1992; revised in 1997)

1 General

The purpose of this Recommendation is to describe the special maintenance procedures and facilities that are required for the maintenance of a maritime and land 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.

1.2 References

The following ITU-T Recommendations and other references contain provisions which, through reference in this text, constitute revisions of this Recommendation. At the time of publication, the editions indicated are valid. All Recommendations and other references are subject to revision; all users of this Recommendation are therefore encouraged to investigate the possibility of applying the most recent edition of the Recommendations and other references listed below. A list of the currently valid ITU-T Recommendations is regularly published.

- [1] ITU-T Recommendation F.127 (1996), *Operational procedures for interworking between the international telex service and the service offered by Inmarsat-C system.*
- [2] ITU-T Recommendation U.1 (1993), *Signalling conditions to be applied in the international telex service.*
- [3] ITU-T Recommendation U.80 (1993), *International telex store and forward access from a telex subscriber.*
- [4] ITU-T Recommendation X.25 (1996), *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 (1988), *General maintenance organization for the international automatic and semi-automatic telephone service.*
- [6] CCITT Recommendation M.715 (1988), *Fault report point (circuit).*
- [7] CCITT Recommendation M.716 (1988), *Fault report point (network).*
- [8] CCITT Recommendation M.720 (1988), *Network analysis point.*
- [9] CCITT Recommendation M.721 (1988), *System availability information point.*
- [10] CCITT Recommendation M.725 (1988), *Restoration control point.*
- [11] CCITT Recommendation M.717 (1988), *Testing point (transmission).*
- [12] CCITT Recommendation M.718 (1988), *Testing point (line signalling).*
- [13] CCITT Recommendation M.719 (1988), *Testing point (switching and interregister signalling).*
- [14] CCITT Recommendation M.723 (1988), *Circuit control station.*

2 Available services

This system is intended for the provision of store-and-forward telex, fax and electronic messaging services between corresponding telex and data terrestrial networks and ships, small aircraft and land vehicles or off-shore platforms. The range of possible applications for these services includes distress reporting, polling and data reporting, X.400 electronic mail, EDI (Electronic Data Interchange), etc.

3 System configuration

The Inmarsat-C system consists of the following major elements per ocean region (see Figure 1):

- a) the space segment including satellites and Network Operation Centre (NOC);
- b) the network coordination station (NCS);
- c) land earth stations (LES);
- d) ship or land mobile earth stations (SES).

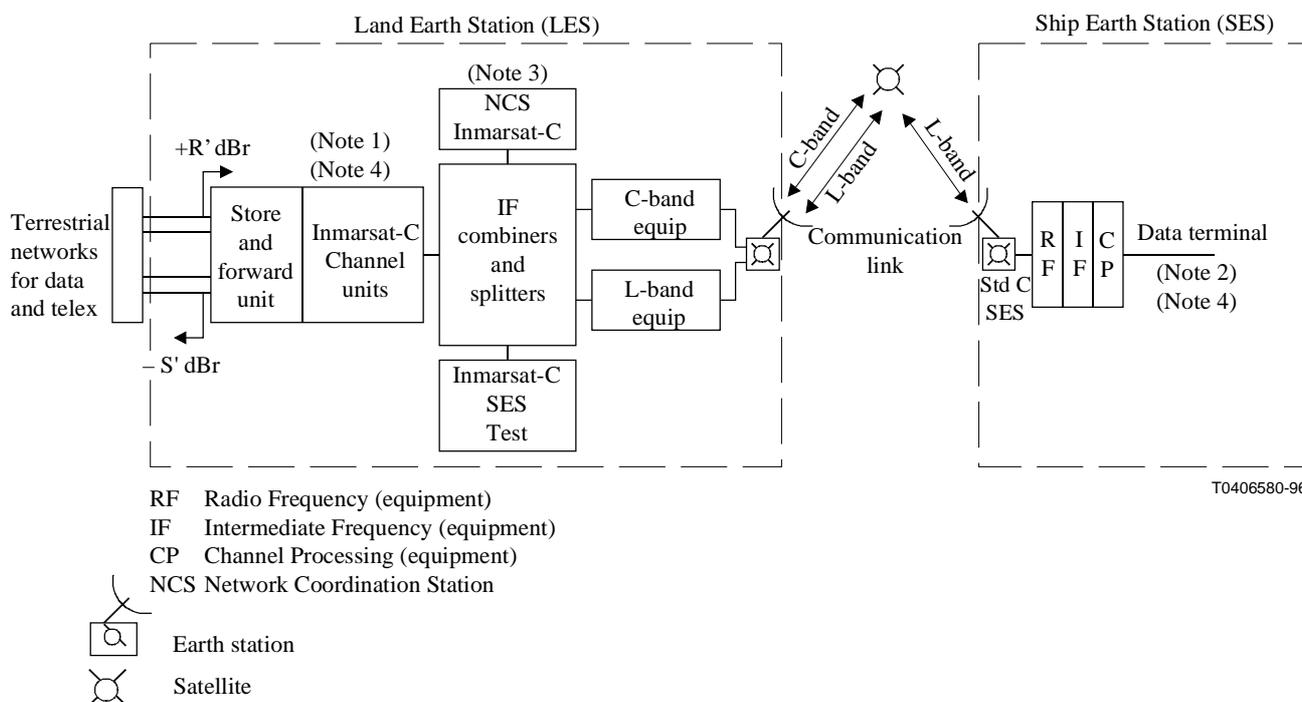
3.1 Space segment

The space segment comprises the satellite communication transponder(s) for each ocean region and associated frequency bands assigned for use by the Inmarsat-C System. The ocean regions are: the Atlantic East, the Atlantic West, the Pacific and the Indian Oceans.

3.2 Earth facilities

3.2.1 Land Earth Station (LES)

When providing multiple mobile services, an LES 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.



- RF Radio Frequency (equipment)
 IF Intermediate Frequency (equipment)
 CP Channel Processing (equipment)
 NCS Network Coordinating Station
- NOTE 1 – +R' dBr and –S' dBr in the land 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 Inmarsat-C requires an NCS. An LES 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 an Inmarsat-C LES and SES system

3.2.2 Ship or land mobile earth station (SES)

An SES consists of the shipboard or mobile 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 LESs and SESs within an ocean region. It maintains a pool of frequencies, assigns frequencies on demand to LESs and supervises and monitors the use of these frequencies. In addition, NCS administers common data, e.g. SES ship lists and system parameters and is capable of call-record information collection for statistical purpose.

3.3 General maintenance principles

3.3.1 Responsibilities

In an international connection, which includes a ship or land mobile earth station, the Inmarsat-C satellite system may be regarded, from a transmission point of view, as analogous to a national network and the mobile terminal or local system as analogous to a subscriber terminal within that network. Nevertheless, it should be noted that the satellite circuit is usually set up between the coast earth station and the ship earth station or mobile on a demand assignment basis. Therefore, a land

earth station may not have direct or full responsibility for the maintenance of a particular Inmarsat-C satellite circuit and a particular mobile earth station all of the time. The operation and maintenance of the overall mobile satellite system is the responsibility of the mobile satellite system operator, e.g. Inmarsat.

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

3.3.2 Available services

The Inmarsat-C satellite systems in service provide telex and fax services to maritime and land 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 or land mobile earth station is commissioned; however, under normal operating conditions, the mobile earth station is usually operated by a qualified person, 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 LES links. The commissioning tests are performed automatically by the Inmarsat-C system operator (Inmarsat) in conjunction with LES 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 (PVTs)

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 LES 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 LES 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 satellite circuits

3.5.1 Control, sub-control stations and respective responsibilities

3.5.1.1 General

The assignment of control and sub-control stations and respective responsibilities must be apportioned according to the configuration of the Inmarsat-C 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 land earth station will be the control station for the maritime or land mobile satellite circuit. The LES will conduct these tests under the assistance of the regional NCS and report the results to the network operations 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 General case

In principle, a ship or mobile earth station can act as the 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 Test terminals

A SES test terminal at each LES may be used to facilitate fault location and maintenance in the Inmarsat-C satellite system. In this regard, the 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.

3.5.1.4 Responsibilities of control and sub-control stations

Control stations dealing with either maritime or land mobile satellite circuits should in general fulfil the responsibilities of control stations as defined in the M-Series Recommendations. The same will apply to sub-control stations.

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 Inmarsat-C network.

4 Maintenance organization for the Inmarsat-C maritime satellite

4.1 Maintenance organization as applicable to Inmarsat

The maintenance responsibility within the Inmarsat-C satellite network is divided among the ship or land mobile earth station, the land earth station, the network coordination station, and the network operations centre.

4.1.1 Ship Earth Station (SES) maintenance responsibility

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

4.1.2 Land Earth station (LES) maintenance responsibility

The land earth station provides interworking communication functions and has the overall coordination responsibility between the ship or land mobile earth station and the international public telex/data network, including the responsibility of reporting problems to the network coordination station and the network operations centre as required. As such, the LES 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 Inmarsat-C satellite system.

- a) Communication functions include:
 - transmitting the control (signalling) and message channels to the mobile earth stations and/or land earth stations;
 - assigning control or communication channels on demand;
 - maintaining a list of active SESs and updating LESs of its ocean region with this information, and communicating with NCSs of other regions.
- b) Maintenance and monitoring functions include:
 - assisting in performing routine system tests;
 - monitoring the performance of land 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 LES outage;
 - providing performance reports for its region.

4.1.4 Network Operations Centre (NOC) maintenance responsibility

The network operations 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:
 - scheduling and coordinating type approval and commissioning of ship earth stations;
 - scheduling and coordinating the bringing-into-service of land earth stations and network coordination stations;
 - carrying out monitoring of transmission parameters;
 - analysing traffic and performance data provided by network coordination stations and land 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 land earth stations;
 - incorrect operation of ship earth stations;
 - interference in the network.

ITU-T RECOMMENDATIONS SERIES

- Series A Organization of the work of the ITU-T
- Series B Means of expression: definitions, symbols, classification
- Series C General telecommunication statistics
- Series D General tariff principles
- Series E Overall network operation, telephone service, service operation and human factors
- Series F Non-telephone telecommunication services
- Series G Transmission systems and media, digital systems and networks
- Series H Audiovisual and multimedia systems
- Series I Integrated services digital network
- Series J Transmission of television, sound programme and other multimedia signals
- Series K Protection against interference
- Series L Construction, installation and protection of cables and other elements of outside plant
- Series M TMN and network maintenance: international transmission systems, telephone circuits, telegraphy, facsimile and leased circuits**
- Series N Maintenance: international sound programme and television transmission circuits
- Series O Specifications of measuring equipment
- Series P Telephone transmission quality, telephone installations, local line networks
- Series Q Switching and signalling
- Series R Telegraph transmission
- Series S Telegraph services terminal equipment
- Series T Terminals for telematic services
- Series U Telegraph switching
- Series V Data communication over the telephone network
- Series X Data networks and open system communication
- Series Z Programming languages