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METEOSAT SECOND GENERATION (MSG)
GEOSAR PERFORMANCE
EVALUATION PLAN

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MSG PERFORMANCE EVALUATION PLAN

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1. INTRODUCTION

The European Organisation for the Exploitation of Meteorological Satellites (EUMETSAT) has installed 406 MHz Search and Rescue (SAR) repeaters on their Meteosat Second Generation (MSG) meteorological satellites. This instrument will be made available for use in the Cospas-Sarsat GEOSAR system after the completion of initial satellite on-orbit tests. Because these satellites were still under development when the Cospas-Sarsat GEOSAR demonstration and evaluation programme was conducted, the performance of its SAR instrument has yet to be evaluated. In light of this, the Cospas-Sarsat Council has directed that an MSG GEOSAR performance evaluation programme be conducted to:

a. establish MSG GEOSAR / GEOLUT performance; and

b. establish specification and commissioning requirements for GEOLUTs which operate with the MSG GEOSAR payload.

1.1 Purpose of Document

The purpose of this document is to provide:

a. test procedures for assessing the performance of GEOLUTs which operate with the MSG SAR instrument;

b. guidelines for analysing the test results; and

c. guidelines, procedures and schedule for managing the MSG GEOSAR performance evaluation programme and reporting the results.

1.2 Background

From 1996 to 1998 Cospas-Sarsat conducted a demonstration and evaluation programme to determine the suitability of using satellites in geostationary orbit equipped with SAR instruments to process the signals from Cospas-Sarsat 406 MHz distress beacons. This programme, hereafter referred to as the GEOSAR D & E, was implemented using the GOES series of satellites provided by the USA, the Insat-2 satellites provided by India, and experimental ground segment equipment provided by Canada, Chile, India, Spain and the United Kingdom. The GEOSAR D & E demonstrated that GEOSAR satellites provided a significant enhancement to the Cospas-Sarsat system. Following from this conclusion, in October 1998 the Cospas-Sarsat Council decided that the 406 MHz GEOSAR system components should be incorporated into the Cospas-Sarsat System as soon as possible.

During the period that the GEOSAR D & E was being conducted, EUMETSAT was developing the MSG meteorological geostationary satellite. The decision was made by EUMETSAT to include on the MSG satellite a 406 MHz repeater to receive and retransmit the signals from Cospas-Sarsat 406 MHz distress beacons. This satellite is scheduled for launch in late August 2002, and will be available for use by Cospas-Sarsat in late 2002.

Because the technical characteristics of the MSG SAR instrument are different from SAR instruments on the GOES and the Insat-2 satellites, there is a need to conduct tests with Cospas-Sarsat GEOLUTs to establish MSG GEOSAR / GEOLUT performance, and any special GEOLUT specification and commissioning requirements. The Cospas-Sarsat Council decided that the MSG performance evaluation programme should be based on the technical (T) series of tests defined in the GEOSAR D & E Plan, as amended to address anticipated MSG performance.

The administrations of Algeria, France, Greece, Italy, Norway, Spain and the United Kingdom have announced that they will be operating GEOLUTs which will track the MSG satellite, and have volunteered to participate in the MSG GEOSAR performance evaluation programme.

1.3 Responsibilities

France has agreed to act as the Cospas-Sarsat point of contact with EUMETSAT during the MSG performance evaluation programme. As such, France is responsible for confirming, through EUMETSAT, the operational status of the SAR payload during the test period. Furthermore, France has volunteered to transmit the beacon test signals required for much of the testing, using the CNES beacon simulator.

GEOSAR ground station operators are responsible for the development, implementation and operation of their GEOLUTs. Each participating GEOLUT operator is responsible for conducting the tests as described herein, and to produce a report in the format specified at Annex A for the consideration of the Cospas-Sarsat Joint Committee.

1.4 Schedule

The chart at Annex J provides the major milestones of the MSG GEOSAR Performance Evaluation Programme.

- END OF SECTION 1 -

2. MSG GEOSAR PERFORMANCE EVALUATION GOALS AND OBJECTIVES

2.1 Performance Evaluation Goals

The goals of the performance evaluation programme are to:

a. characterize the technical performance of the MSG GEOSAR / GEOLUT system and confirm that MSG GEOSAR satellite / GEOLUT systems are effective for providing useful 406 MHz alert data; and

b. validate specification and commissioning requirements for GEOLUTs which will operate with the MSG satellite.

In addition to the evaluation programme, individual GEOLUTs will have to be tested in accordance with the commissioning requirements detailed in document C/S T.010, and if appropriate, will be commissioned into the Cospas-Sarsat System.

2.2 Objectives

The programme has been subdivided into specific objectives. Each objective is addressed by conducting specific tests and analysing the results. Most of the tests require a beacon simulator whose power output and message content can be controlled and varied. The tests will be conducted over several weeks to collect enough data to provide statistically valid results.

An overview of each objective is listed below, the detailed descriptions of these objectives are provided in section 3.2.

T-1 Processing Threshold, System Margin, and Beacon Message Processing Performance
Determine the processing threshold, processing performance, system margin and the performance in respect of long format beacon messages for GEOLUTs which operate with the MSG payload. The beacon test signals used to assess these parameters do not include beacon messages that collide with each other.

T-2 Time to Produce Valid and Confirmed Messages
Determine the statistical distribution of the time required for the GEOLUT to produce valid and confirmed beacon messages. The beacon test signals used to assess this parameter do not include beacon messages which collide with each other.

T-3 Carrier Frequency Measurement Accuracy
Determine how accurately the beacon carrier frequency can be determined by the MSG GEOSAR / GEOLUT system. The beacon test signals used to assess this parameter do not include beacon messages which collide with each other.

T-4 MSG GEOLUT Channel Capacity
Assess the capability of the GEOSAR system to handle multiple simultaneously active distress beacons in a single 406 MHz channel. This parameter is assessed by generating traffic loads which include beacon messages which collide with each other.

T-5 Impact of Interference
Monitor the band for the presence of interference while the tests are being performed, in order to understand any anomalies in the results and to illustrate the ability of the GEOSAR system to provide valid messages in the presence of interference and noise in the frequency bands used by the MSG GEOSAR system.

T-6 Impact of Interference From LEOSAR Satellites
Assess the impact of interference from LEOSAR satellite downlink signals on the ability of the GEOLUT to produce valid and confirmed alert messages.

T-7 MSG GEOLUT Network Performance
To verify that although at any given time some GEOLUTs may be affected by interference from the LEOSAR system, expected GEOSAR alerts will be reliably provided by other GEOLUTs in the MSG ground segment.

T-8 Processing Anomalies
Assess the performance of the GEOLUT in respect of the production of processing anomalies.

T-9 MSG Coverage
Estimate the geographic coverage of the MSG GEOSAR system.

- END OF SECTION 2 -

3. MSG PERFORMANCE EVALUATION METHODOLOGY

3.1 General Evaluation Methodology

All participants in the MSG GEOSAR performance evaluation programme are requested to conduct their testing and evaluation in accordance with the common set of guidelines and procedures as defined below.

a. France is responsible for scheduling, in conjunction with the GEOLUT operators, all the tests that require the support of the beacon simulator.

b. Prior to conducting any tests that do not require the simulator, the participating GEOLUT operators should liaise with France to confirm that there are no reported problems with the satellite which could affect test results.

c. Each GEOLUT operator should produce an MSG GEOSAR Performance Evaluation Report in the format described at Annex A.

d. Distress alerts from operational beacons generated by GEOLUTs participating in the MSG evaluation programme should not be released into the Cospas-Sarsat System until the respective GEOLUT operator has confirmed that the GEOLUT does not produce processing anomalies.

Every effort should be made to ensure that the use of real or simulated beacon signals in support of the MSG Performance Evaluation Plan will not generate distress alert messages which might be interpreted in the existing LEOSAR and GEOSAR Systems as real alerts.

3.2 Detailed Description of Objectives

This section provides the following for each objective of the MSG GEOSAR Performance Evaluation Programme:

a. test procedures,
b. data collection requirements, and
c. data reduction/analysis requirements.

To simplify the testing and to reduce the number of 406 MHz test transmissions, test procedures have been developed which share test transmissions. For example the output produced by the GEOLUT resulting from the test transmissions for test T-1, is also used for evaluating the performance of the GEOLUT in respect of the time to produce valid and confirmed messages (T-2), and frequency measurement accuracy performance (T-3).

To ensure that the alert messages generated by the GEOLUTs can be correlated to the test signal transmissions, GEOLUT operators should confirm that the time of day setting in the GEOLUT is correct before conducting each test.

3.2.1 T-1: Processing Threshold, System Margin, and Beacon Message Processing Performance

The processing threshold, processing performance and the system margin are "figures of merit" of the GEOLUT.

Processing Threshold
The processing threshold is the value of the minimum carrier to noise density ratio (C/No) in dBHz at the GEOLUT processor for which the GEOLUT is able to produce a valid message for each beacon event 99% of the time (the lower this value the more sensitive the GEOLUT).

System Margin
The system margin is the difference between a nominal beacon, with an EIRP of 37 dBm, and a beacon operating at the GEOLUT threshold.

Valid Message Processing Performance
The processing performance requirement documented in C/S T.009 is that GEOLUTs should be capable of producing valid messages within 5 minutes of beacon activation 95% of the time, for all beacon signals whose C/No as measured at the GEOLUT is greater than 26 dB-Hz. This test will determine the C/No, for which the MSG GEOLUT can produce a valid message for each beacon event within 5 minutes of beacon activation 95% of the time.

Long Message Processing Performance
At present Cospas-Sarsat has no GEOLUT specification requirement in respect of producing complete and confirmed long messages. Nevertheless, with the increased use of location protocol beacons using the long message format, it is necessary to assess the MSG system performance in this regard.

3.2.1.1 Methodology and Data Collection

This test assesses the GEOLUT performance in respect of its ability to produce single valid, complete and confirmed complete distress beacon messages as a function of the beacon power transmitted in the direction of the MSG satellite (beacon EIRP).

A beacon simulator is used to replicate distress beacons that transmit long format messages at specific EIRPs, for a duration necessary to transmit 20 bursts for each beacon ID. Hereafter the term "beacon event" is used to describe a beacon being active for a period of time. The test is conducted by transmitting 200 beacon events for each EIRP, whilst ensuring that signals from individual beacon events do not overlap in time and frequency with the signals from other beacon events. The output of the GEOLUT is monitored and the information identified in Table E-1 is recorded. The procedure is repeated at EIRP values ranging from 35 dBm to 28 dBm, in one dB increments.

Performance of this test requires the following steps.

a. Use a beacon simulator as a set of controlled test beacons with a variable output EIRP.

b. Program the simulator to provide different long format beacon identification codes for each beacon event. The test scripts used for this test are provided at Annex B, Table B-1.

c. Calibrate the beacon simulator output EIRP and carrier frequency (to an accuracy of 0.2 Hz) to confirm the technical characteristics of the transmitted signals.

d. To avoid interference to the 406 MHz channels currently active for operational use, ensure that the simulator does not transmit in the channels used for operational beacons.

e. Set the simulator EIRP to 35 dBm in the direction of the MSG satellite.

f. Transmit the 200 beacon events provided at Table B-1 (each event consists of the same beacon message transmitted 20 times), ensuring that individual beacon transmissions do not interfere with each other. To eliminate any potential interference from LEOSAR satellite downlinks, this test shall be scheduled to ensure that test signals are not transmitted when MSG GEOLUTs are in the footprint of a Cospas-Sarsat LEOSAR satellites.

g. Collect the data produced by the GEOLUT for each beacon event as described at Annex E (note that this data will be analysed to provide the results for this test objective, as well as for objectives T-2 and T-3).

h. Repeat the process at the EIRP values listed at Table 3-1, using the associated test scripts described at Table B-1.

3.2.1.2 Data Reduction, Analysis and Results

For each set of 200 beacon events transmitted at a given EIRP as recorded at Annex E Table E-1:

a. Calculate the probability of:

(i) producing at least one valid message for each beacon event as follows:

$$\frac{\textit{number of beacon events for which GEOLUT produced at least one valid message}}{\textit{number of beacon events transmitted at the selected EIRP}}$$

(ii) producing at least one valid message within 5 minutes of beacon activation as follows:

$$\frac{\textit{number of beacon events for which GEOLUT produced a valid message within } 5 \text{ min } \textit{of activation}}{\textit{number of beacon events transmitted at the selected EIRP}}$$

(iii) producing at least one complete beacon message as follows:

$$\frac{\textit{number of beacon events for which GEOLUT produced a correct complete long message}}{\textit{number of beacon events transmitted at the selected EIRP}}$$

(iv) producing a confirmed complete beacon message as follows:

$$\frac{\textit{number of beacon events for which GEOLUT was able to confirm a complete long message}}{\textit{number of beacon events transmitted at the selected EIRP}}$$

b. Calculate the C/No at the GEOLUT processor corresponding to each EIRP. Note that this is a calculated theoretical value of C/No, not the value measured by the GEOLUT.

c. Record the results of the calculations above in sample Table 3-1.

d. Using the data from Table 3-1, produce graphs of the results as depicted at Figure 3-1.

EIRP from simulator (dBm)	Calculated C/No at GEOLUT (dBHz)	Number of Beacon Events Used (Valid Msg Sample Set)	Number of Beacon Events for which		Probability of Valid Message	Probability of Valid Message within 5 Min
			Valid Message was Produced	Valid Message was Produced within 5 Min		
28.0						
29.0						
30.0						
31.0						
32.0						
33.0						
34.0						
35.0		200	200	200	1.00	1.00

EIRP from simulator (dBm)	Number of Beacon Events Used (Complete Msg Sample Set)	Number of Beacon Events Used (Confirmed Complete Msg Sample Set)	Number of Beacon Events for which a Complete Message was Produced	Number of Beacon Events for which a Confirmed Complete Message was Produced	Probability of Complete / Confirmed Complete Msg
28.0					
29.0					
30.0					
31.0					
32.0					
33.0					
34.0					
35.0	200	200	200	1.00	1.00 / 1.00

Table 3-1: Sample Table for Analysed Results for Objective T-1

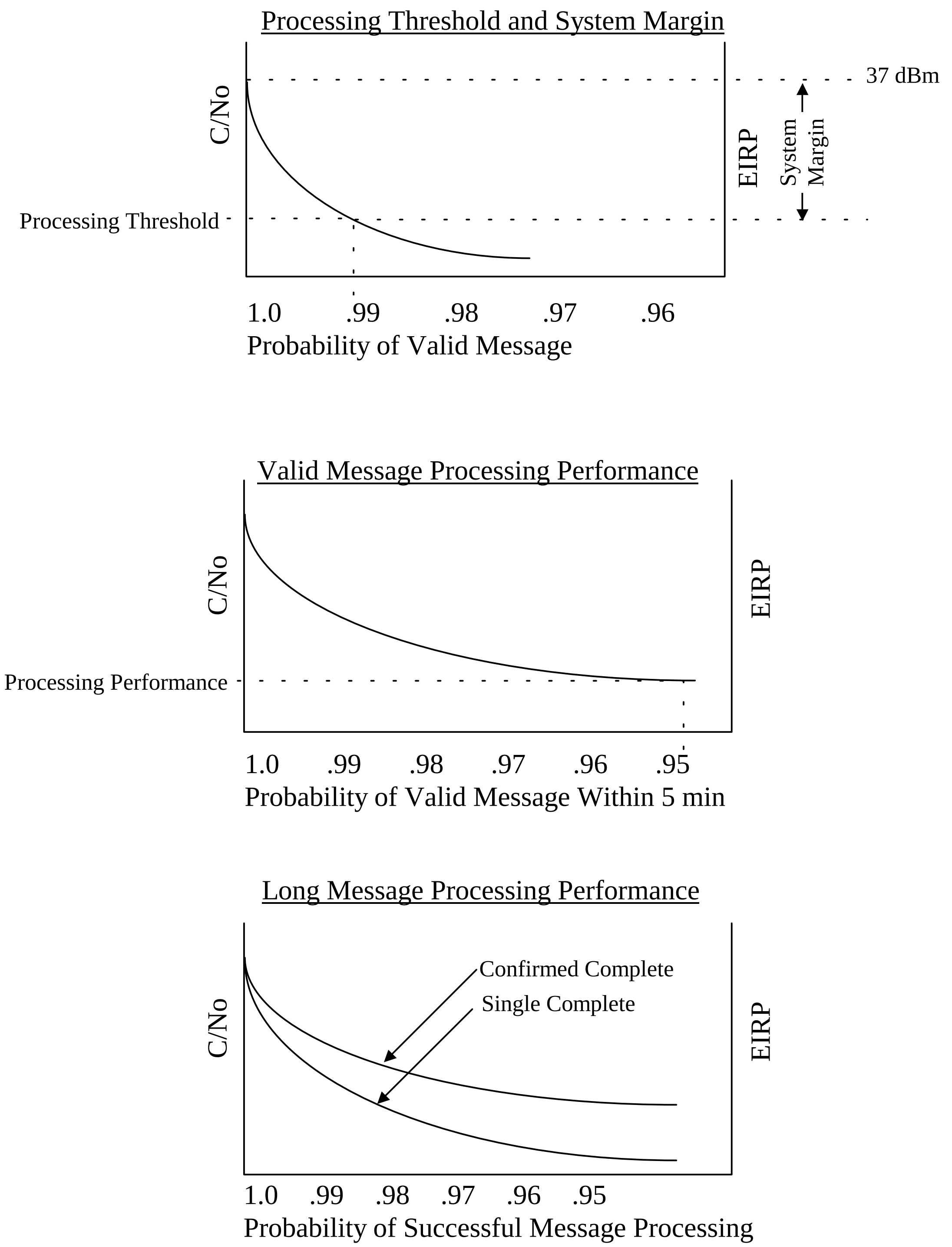


Figure 3-1: Graphs Depicting Processing Threshold, System Margin, Valid Message and Complete Long Message Processing Performance

All cases where the GEOLUT was not able to produce a valid message for a beacon event should be analysed to determine if extraordinary external factors (e.g. interference) could have caused the GEOLUT not to detect the beacon. If extraordinary external factors caused the GEOLUT to miss a beacon event, the event should be removed from the statistics and an explanation provided in the report.

3.2.2 T-2: Time to Produce Valid, Complete and Confirmed Messages

This test assesses how long it takes GEOLUTs operating with the MSG satellite to produce valid beacon messages, complete long messages, and confirmed complete long messages. This information will be used to validate message processing requirements for GEOLUTs which operate with the MSG satellite, and to determine a figure of merit for the number of bursts required to successfully process a message.

3.2.2.1 Methodology and Data Collection

For simplicity this test is conducted by analysing the data collected for test T-1 (Threshold). Note that the T-1 test scenario is specifically designed not to generate beacon bursts which overlap in time and frequency. Consequently, for operational beacon events, the times to produce valid, complete, and the time to confirm complete messages may differ from those determined during this test.

The following test methodology and data collection requirements apply:

a. Note the EIRP and 15 Hex ID for each beacon event.

b. For each beacon event note the date/time that the GEOLUT produced:
   (i) the first valid message;
   (ii) the first complete message; and
   (iii) the first confirmation of the complete message with an independent integration process.

c. Record the data collected above in tabular format as described at Annex E. The table should have an entry for each beacon event at each EIRP.

3.2.2.2 Data Reduction, Analysis and Results

a. For each EIRP calculate the average time to:

   (i) produce valid messages (ATVM), as follows:

$$ATVM = \frac{\sum \textit{time after first burst in beacon event for GEOLUT to produce valid message}}{\textit{number of beacon events for which at least one valid message produced}}$$

   (ii) produce complete messages (ATCM), as follows:

$$ATCM = \frac{\sum \textit{time after first burst in beacon event for GEOLUT to produce complete message}}{\textit{number of beacon events for which at least one complete message produced}}$$

(iii) confirm a complete messages (ATCCM), as follows:

$$ATCCM = \frac{\sum \textit{time after first burst in beacon event for GEOLUT to confirm complete message}}{\textit{number of beacon events for which at least one complete message was confirmed}}$$

b. In addition, for each EIRP calculate the standard deviation for the time to produce valid, complete and confirmed complete messages.

c. For each EIRP determine the time (duration) required for the GEOLUT to provide 95% and 98% of valid, complete, and confirmed complete messages. These values are determined by normalising the time values by removing the time bias resulting from the requirement to stagger the start times of each beacon event. The normalised values are analysed to identify how long the GEOLUT required to produce the 95th and 98th percentile for valid, complete, and confirmed messages. If the 95th or 98th percentile was not achieved for any given category, this should be designated as Not Available (N/A) in the appropriate cell of the table.

d. Record the results of the above in sample Table 3-2.

e. Using the data from Table 3-2, produce graphs of the results as depicted in Figure 3-2.

EIRP (dBm)	C/No (dBHz)	ATVM (Sec)	Standard Deviation of ATVM	ATCM (Sec)	Standard Deviation of ATCM	ATCCM (Sec)	Standard Deviation of ATCCM
28.0							
29.0							
.							
.							
.							
35.0							

EIRP (dBm)	C/No (dBHz)	95th Percentile			98th Percentile		
		Valid Msg (Sec)	Complete Msg (Sec)	Confirmed Msg (Sec)	Valid Msg (Sec)	Complete Msg (Sec)	Confirmed Msg (Sec)
28.0							
29.0							
.							
.							
.							
35.0							

Table 3-2: Sample Table for Analysed Results for Objective T-2

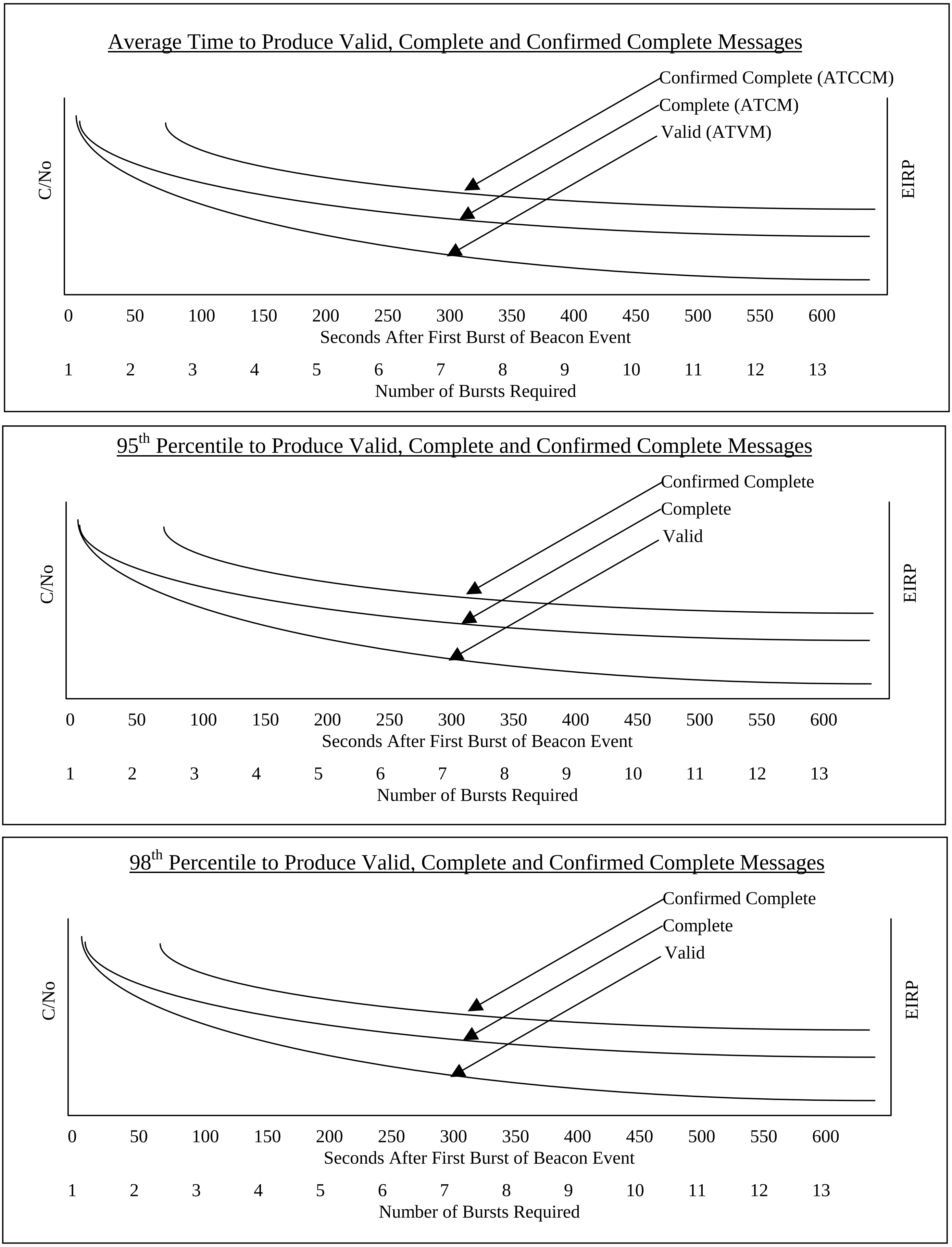


Figure 3-2: Graphs Depicting Message Production Times

3.2.3 T-3: Carrier Frequency Measurement Accuracy

The purpose of this objective is to assess how accurately the beacon carrier frequency can be measured by the MSG GEOSAR / GEOLUT system. This is accomplished by comparing the beacon's carrier frequency for each valid message as measured by the GEOLUT with the known frequency value for the same beacon, provided by the beacon simulator operator. The current GEOLUT specification (C/S T.009) requires a frequency measurement accuracy of 2 Hz.

3.2.3.1 Methodology and Data Collection

For simplicity, this test is conducted by analysing the data collected for test T-1. For each beacon event note the frequency measurement provided by the GEOLUT associated with the first valid message produced, and record this information as described at Annex E.

The measured frequency should be corrected by the GEOLUT, as possible, to account for any calibration that would normally be performed during real GEOLUT operations (e.g. if the GEOLUT includes features for assessing and correcting frequency measurements by applying calibration correction factors, these features should be activated).

3.2.3.2 Data Reduction, Analysis, and Results

Using the data recorded at Annex E the mean and standard deviation of the frequency differences for each EIRP should be calculated and recorded as indicated in sample Table 3-3 and graphed as depicted at Figure 3-3. Measurements which have large differences may be removed from the data set if the measurement error can be explained by a known phenomenon which degraded the GEOLUT's ability to produce a valid measurement.

EIRP (dBm)	Calculated C/No at GEOLUT (dBHz)	Avg Freq Measurement Error (Hz rounded to 1 decimal place)	Std Deviation of Error (Hz)
28.0			
.			
.			
35.0			

Table 3-3: Sample Table for Analysed Results for Objective T-3

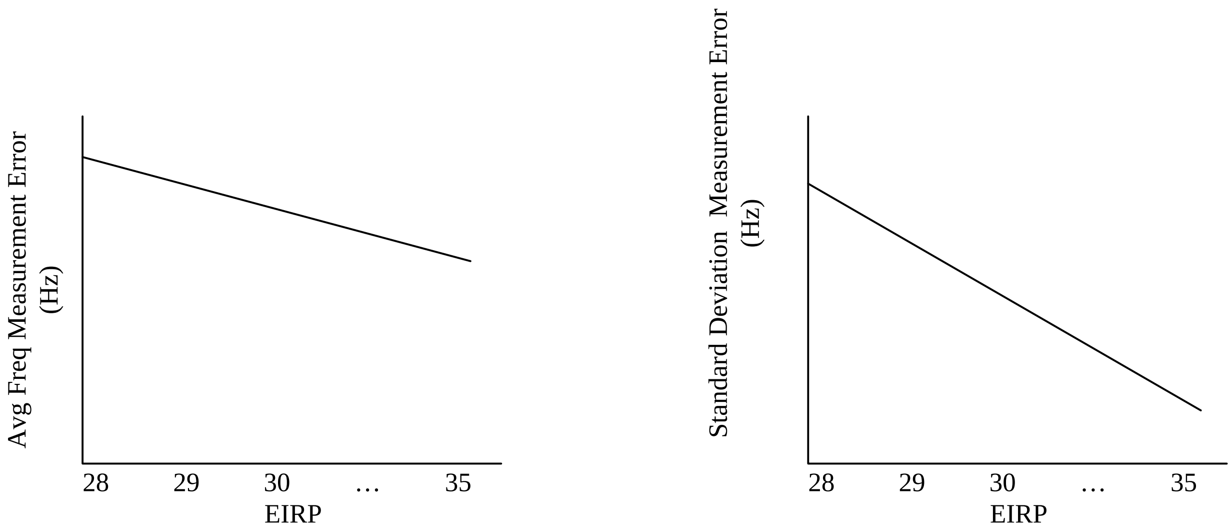


Figure 3-3: Graphs Depicting Frequency Measurement Accuracy Performance

3.2.4 T-4: MSG GEOLUT Channel Capacity

The definition of capacity in Cospas-Sarsat GEOSAR systems is the number of 406 MHz distress beacons operating simultaneously in the field of view of a GEOSAR satellite, that can be successfully processed by the System to provide a valid beacon message, under nominal conditions, within 5 minutes of beacon activation 95% of the time, and the number of beacons that can be successfully processed within 10 minutes of beacon activation 98% of the time. The applicable nominal conditions are described in document C/S T.012, Cospas-Sarsat 406 MHz Frequency Management Plan, except that the uplink EIRP will be set to 34 dBm.

3.2.4.1 Methodology and Data Collection

The MSG GEOSAR channel capacity is determined by generating traffic loads equivalent to known numbers of simultaneously active long format beacons in a Cospas-Sarsat 406 MHz channel. The time required for the GEOLUT to produce a valid beacon message, complete message and confirm a complete message for each beacon event is recorded. The number of simultaneously occurring beacon events is changed and the time required for the GEOLUT to produce valid, complete and complete confirmed messages are calculated and recorded for the new 406 MHz traffic load.

The test scripts transmitted by the beacon simulator should conform to the nominal conditions detailed in document C/S T.012, with the exception that the uplink EIRP will be 34 dBm. Specifically, the test shall replicate a number of beacon messages overlapping in time and frequency commensurate with the number of simultaneously active beacons. Further, the beacon events used in the test script shall also replicate the beacon burst repetition period defined in document C/S T.001 (406 MHz beacon specification). The test shall be scheduled to avoid any potential interference caused by Cospas-Sarsat LEOSAR satellite downlink transmissions.

The test will replicate scenarios of 15, 20, 25 and 30 simultaneously active beacons.

Performance of this test requires the following steps**.**

a. A beacon simulator test script is developed which replicates 15 simultaneously active beacons, with each beacon event having a unique ID. The transmitted signals for all beacon events shall conform to the nominal conditions stated in the in the Cospas-Sarsat 406 MHz Frequency Management Plan (C/S T.012), except that the uplink power will be set to 34 dBm. The test signals will be transmitted with a carrier frequency of 406.061 MHz. Since the distribution of beacon event start times and transmit frequencies shall be in accordance with the nominal conditions described document C/S T.012, the test script will include instances where beacon bursts overlap in time and frequency. Each beacon event shall replicate a beacon being active for a 15 minute period.

b. Ensuring that the GEOLUTs will not be in the downlink footprint of a Cospas-Sarsat LEOSAR satellite, the test script is transmitted.

c. For each beacon event the time that the GEOLUT produced the first valid message, first complete message and first confirmed complete message should be recorded in the tabular format provided at Annex F.

d. Repeat test with a different test script which also replicates 15 active beacons, until 10 different test scripts have been transmitted.

e. Repeat the process above for scenarios in which the beacon simulator replicates 20, 25, and 30 simultaneously active beacons.

3.2.4.2 Data Reduction, Analysis and Results

Using the data collected at Annex F, Table 3-4 should be completed for each simulated traffic load (e.g. the 10 repetitions of the test script for 15 active beacons are consolidated to provide the data in a single row of the table).

Channel: 406.061				
# of Active Bcn Events	**% Valid Msg within 5 Min**	**% Valid Msg within10 Min**	**% Valid Msg within 15 Min**	**% Confirmed Complete Msg within 15 Min**
15				
20				
25				
30				

Table 3-4: Sample Table for Capacity Statistics

From the data in Table 3-4, the percentage of beacon events which produced valid messages within 5, 10 and 15 minutes of the start of the beacon event, and also the percentage of confirmed complete messages, should be graphed against the respective beacon channel population as indicated at Figure 3-4. As described below, the capacity of the channel is determined by evaluating the number of active beacons corresponding to the 95th percentile of the 5 minute curve and the 98th percentile of the 10 minute curve. Since the capacity of the channel must satisfy both the 5 and 10 minute criteria, the lowest of these two figures is the channel capacity.

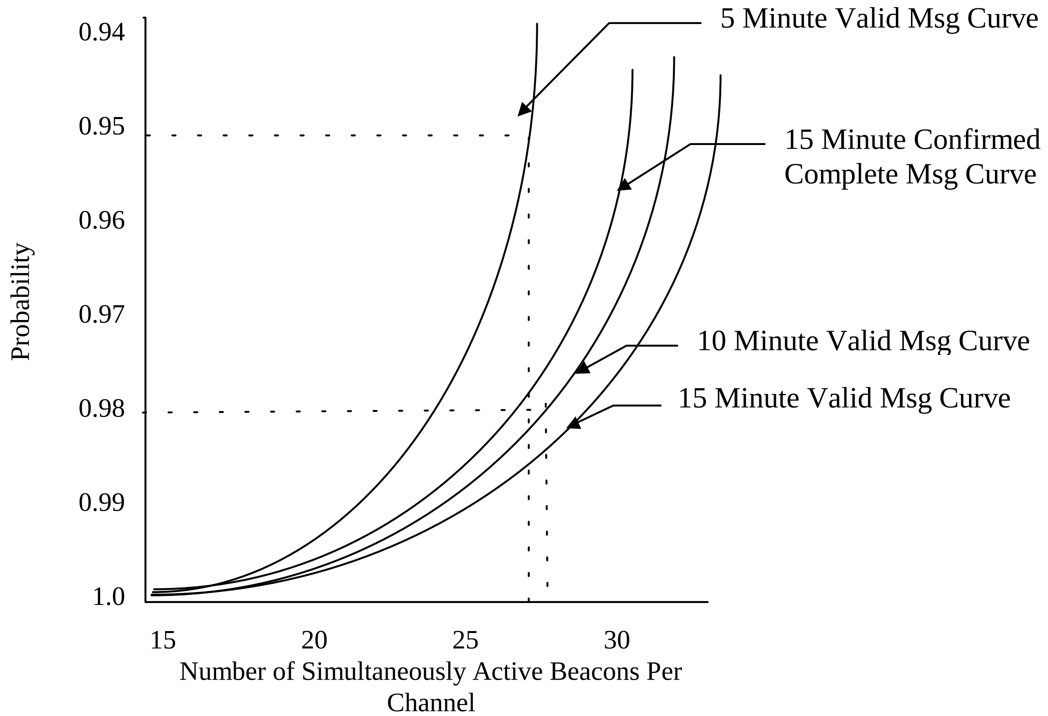


Figure 3-4: Graph Depicting MSG GEOSAR Capacity

In the fictitious example above, the 0.95 probability in 5 minutes would be the most stringent criteria, and, therefore, defines the capacity as being approximately 26.5 active beacons.

3.2.4.3 Interpretation, Conclusion and Recommendation

The results of these tests will provide an estimate of the capacity a single channel in the MSG GEOSAR system. It is recommended that these results be used to validate the GEOLUT capacity models being developed for the 406 MHz Frequency Management Plan.

3.2.5 T-5: Impact of Interference

The purpose of this objective is to determine the ability of the GEOSAR system to provide valid messages in the presence of interference and noise. In view of the specialized test equipment required to conduct this objective, not all MSG GEOLUT operators need participate, but as a minimum one operator should monitor and report the impact of interference in accordance with these procedures.

3.2.5.1 Methodology and Data Collection

This objective will use both real alerts and controlled test beacons to determine the impact of actual interferers seen in the GEOSAR field of view when interference is present. It will also examine the relationship between the characteristics of the interfering signals and any changes in the production of valid messages.

The following methodology should be used.

a. Characterize the interference by using a spectrum analyser and a data storage device to permit detailed analysis of the interfering signal at a later time than its occurrence. The following test set up could be used (see Figure 3-5):

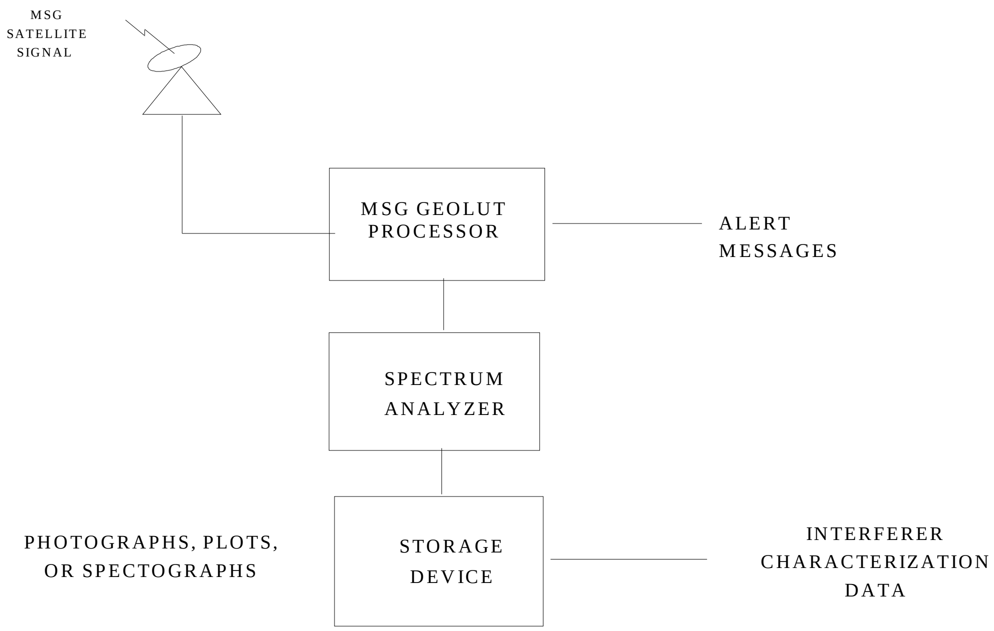


Figure 3-5: Test Set-up for Interference Evaluation

b. Monitor the GEOSAR band using the spectrum analyser. Record the output in a storage device for later detailed analysis. Photographs, data plots, or spectrographs could be used for this purpose.

c. When interference is detected the following parameters concerning the interfering signal should be collected.

i) The identification of the GEOLUT.

ii) Time of occurrence and the duration of the interfering signal.

iii) Spectral occupancy.

iv) Signal strength.

v) Time patterns (e.g. on/off versus continuous, sweeping versus constant, etc.).

vi) Nature of modulation (analogue versus digital).

vii) Location of the interferer (if known).

During periods of interference the production of valid messages by the GEOSAR processor should be evaluated. Any loss of messages, the production of invalid messages or increases in the message transfer time should be noted.

3.2.5.2 Data Reduction, Analysis and Results

When interference is detected, all GEOSAR messages during the period should be examined to determine if there is:

a. a loss of expected messages;

b. a decrease in the number of valid messages from operational and test beacons before and after the occurrence of the interference; and

c. an increase in processing anomalies.

Examine the technical parameters of the interferer and try to relate the impact on the message processing to specific characteristics of the interferer. For example, is there a relationship between the rate of reduction in valid messages to the interferer's signal strength?

3.2.6 T-6: Impact of Interference From LEOSAR Satellites

The purpose of this objective is to analyse and quantify the impact that Cospas-Sarsat LEOSAR satellite downlink transmissions have on the ability of MSG GEOLUTs to process beacon signals. The test transmissions used for this objective will also be used for objective T-7 (MSG GEOLUT network performance).

3.2.6.1 Methodology and Data Collection

The impact of interference from LEOSAR satellite downlink transmissions is assessed by activating beacon events at regular intervals over extended periods of time. The performance of the GEOLUT to produce valid and confirmed messages for these beacon events during periods when the GEOLUT was within, and periods when not within a LEOSAR satellite footprint, is analysed. It should be noted that harmful interference does not always occur every time GEOLUTs are in the footprint of the LEOSAR satellites, since the level of interference is dependant on many factors (e.g. side lobe characteristics of GEOLUT antenna, GEOLUT antenna shielding, etc.). Consequently, this test will not categorically confirm whether LEOSAR satellites generate harmful interference to the MSG GEOSAR System.

However, the test may provide sufficient information to determine whether additional tests on the matter will be required.

Performance of this test requires the following steps.

a. The beacon simulator is programmed to transmit a new beacon event, each with an EIRP of 37 dBm every 10 minutes over a 48 hour period. Each beacon event shall have a unique ID, transmit long format messages and shall be active for 20 minutes. The burst repetition interval for each beacon event shall be implemented in a manner which ensures that at least 10 bursts from each event do not collide with bursts from other events.

b. The output of the GEOLUT should be monitored and the time required for the GEOLUT to produce the first valid, complete, and confirmed complete message for each beacon event shall be noted. Also, for each beacon event it should be noted whether the GEOLUT was in the footprint of a LEOSAR satellite during the time between beacon activation and the production of the first valid message, and the C/No measured by the GEOLUT for the first valid message of each beacon event. The results shall be recorded in the format provided at Annex G.

3.2.6.2 Data Reduction, Analysis and Results

From the data collected, the following shall be provided.

a. A histogram in 100 second intervals (as depicted at Figure 3-6), which provides the number of beacon events for which the GEOLUT was able to produce the first valid message for a beacon event. As indicated in the example, the histogram should report separately beacon events which occurred when the GEOLUT was in the footprint of a LEOSAR satellite and those which occurred for which there was no possibility of LEOSAR interference.

b. The graph shall also be annotated to depict the cumulative percentage of beacon events for which a valid message was produced.

c. A histogram similar to the one described above, depicting the number of beacon events for which the GEOLUT was able to produce confirmed complete messages, should be provided.

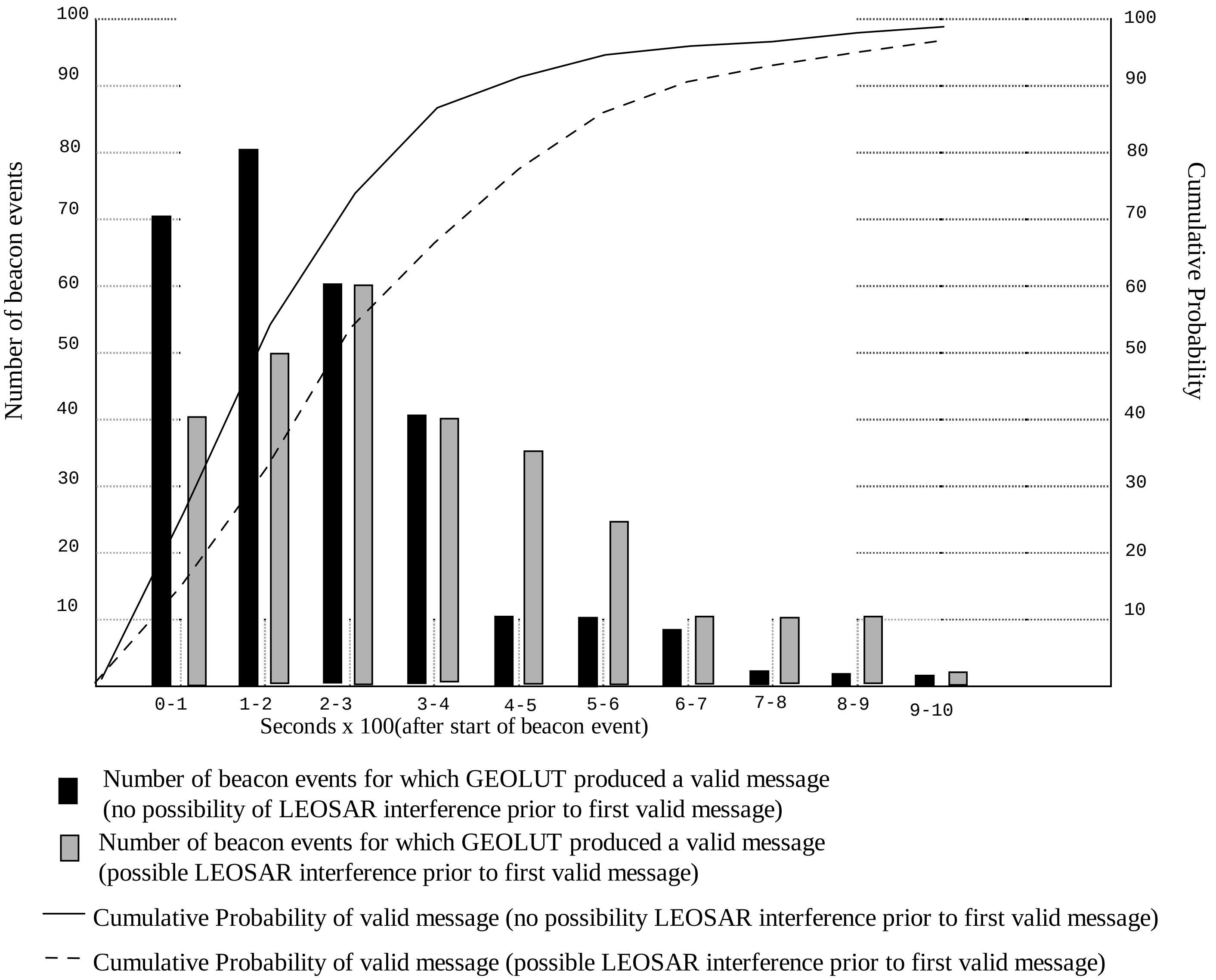
d. A graph depicting the C/No values covering the 48 hours of the test should also be provided.

e. The average and standard deviation of the time required by the GEOLUT to produce valid and confirmed complete messages should be provided separately, for:

   (i) beacon events which occurred while the GEOLUT was within the footprint of a LEOSAR downlink; and

(ii) beacon events which occurred while the GEOLUT was not within the footprint of a LEOSAR downlink.

Figure 3-6: GEOLUT Valid Message Production Performance



3.2.7 T-7: MSG GEOLUT Network Performance

There is a requirement to confirm that the MSG GEOSAR system comprised of the GEOSAR satellite and the network of GEOLUTs which track it will provide reliable and timely 406 MHz alerts even if one or more of the MSG GEOLUTs were unavailable due to interference from LEOSAR downlink transmissions.

3.2.7.1 Methodology and Data Collection

The results from objective T-6 from all the participating GEOLUTs is analysed to complete the table provided below. For each beacon event the earliest time that any of the GEOLUTs produced a valid message and the earliest that any of the GEOLUTs produced a confirmed complete message is recorded. Since this test requires consolidating the results from objective T-6 from all the participating MSG GEOLUTs, objective T-7 will not be included in the performance evaluation reports provided by individual GEOLUT operators.

Beacon ID	Time to Produce Valid Msg	GEOLUT which Produced Valid Msg	Time to Produce Confirmed Complete Msg	GEOLUT which Produced Confirmed Complete Msg

Table 3-5: Sample Table of MSG GEOLUT Network Performance

3.2.7.2 Data Reduction, Analysis and Results

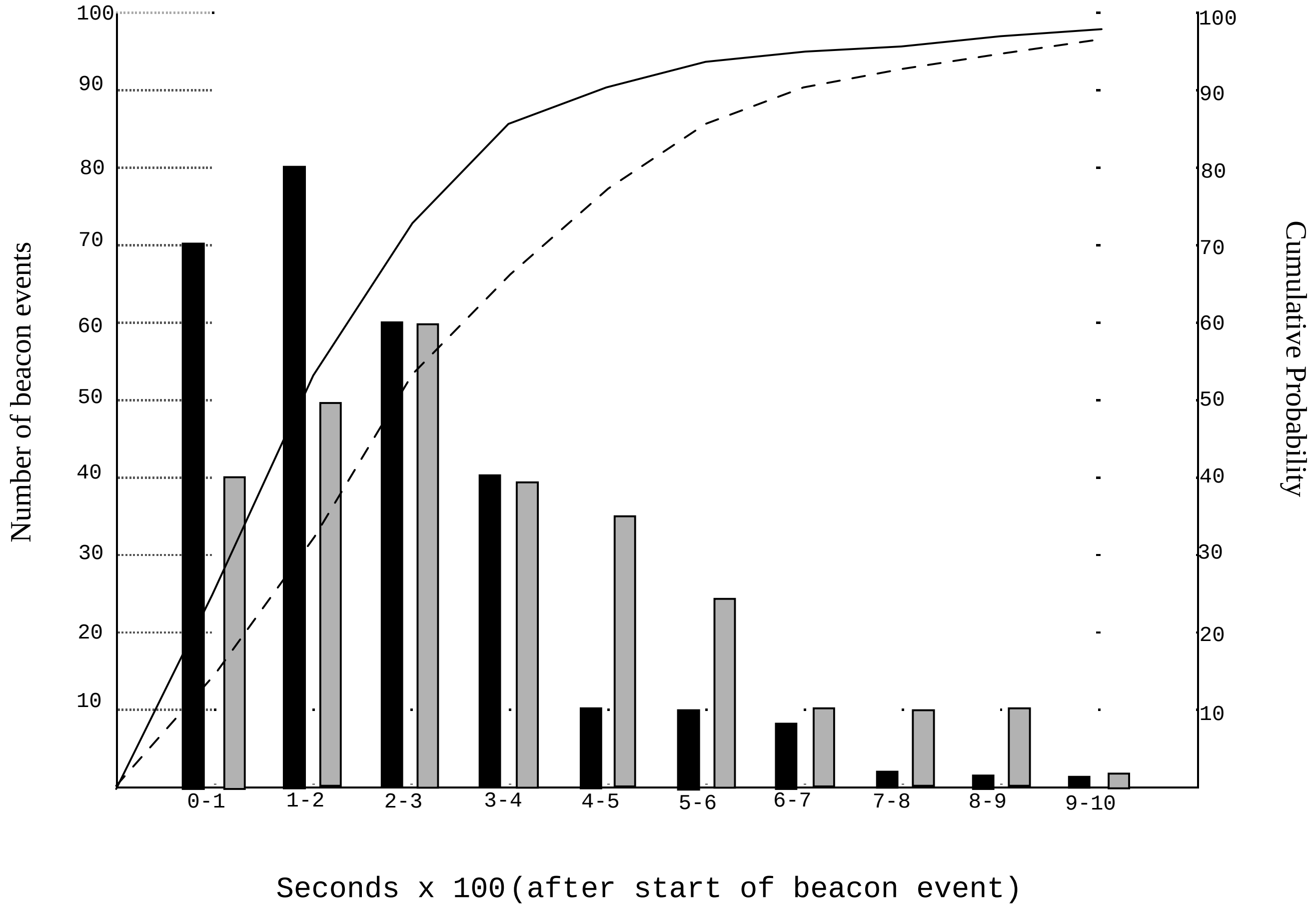
From the data collected, the following shall be provided.

a. A histogram, with 100 second intervals, depicting the number of beacon events for which valid and confirmed complete messages were produced, and the cumulative probabilities of valid and confirmed complete messages (as provided at Figure 3-7).

b. The mean time and standard deviation for the MSG GEOSAR system to produce valid and confirmed complete messages.

c. The probability that the combined network of GEOLUTs would produce a valid message within 5 minutes, and within 10 minutes.

Figure 3-7: GEOLUT Network Performance



■ Number of beacon events for which one of the MSG GEOLUTs produced the first valid message within the time interval

□ Number of beacon events for which one of the MSG GEOLUTs produced the first confirmed message within the time interval

—— Cumulative Probability of the valid message being produced by at least one of the MSG GEOLUTs

– – Cumulative Probability of confirmed message being produced by at least one of the MSG GEOLUTs

3.2.8 T-8: Processing Anomalies (PA)

This test assesses GEOLUT performance in respect of its ability to suppress the number of processing anomalies produced.

3.2.8.1 Methodology and Data Collection

This test is conducted by monitoring the 406 MHz channel (406.022 MHz) used by Cospas-Sarsat reference beacons, and noting instances where the GEOLUT produced valid beacon messages which did not correspond to any of the reference beacons in the coverage area of the MSG satellite. Since the identifications (IDs) of all reference beacons in view of the MSG satellite are known, it can be inferred that beacons detected in the 406.022 MHz channel which do not correspond to known reference beacons are processing anomalies. The following test methodology and data collection requirements apply:

a. Note the 15 hexadecimal identification of all the reference beacons in the coverage area of the MSG satellite.

b. Monitor the 406 MHz channel used by Cospas-Sarsat reference beacons for a 4 week period, and note each instance of the GEOLUT producing a processing anomaly. For each processing anomaly note the date and time that it was produced by the GEOLUT, the 15 Hex ID and the 30 Hex beacon message reported by the GEOLUT, and whether there was interference from a LEOSAR satellite at the time the PA was produced (an example of the table for collecting this data is provided at Annex H).

3.2.8.2 Data Reduction, Analysis and Results

a. Identify those valid messages that were processing anomalies (their 15 Hex ID did not correspond to the 15 Hex ID of any of the reference beacons in the coverage area of the MSG satellite).

b. For each processing anomaly, determine if the GEOLUT was in the coverage area of a LEOSAR satellite at the time the alert was produced. This information will be used to develop statistics which will provide an indication of whether LEOSAR interference impacts upon GEOLUT processing anomaly performance.

c. For each processing anomaly, attempt to determine the source (i.e. reference beacon) of the transmission. This is done by converting the GEOLUT produced message into its binary representation, and comparing it with bit-shifted versions of all the reference beacons in the MSG coverage area. If the bits of the processing anomaly message correspond to 80% or more of a reference beacon message, then it could be assumed that the processing anomaly was generated from the GEOLUT processing of transmissions from that reference beacon.

d. Record the results in the table provided at Annex H, and copied below:

15 Hex ID Produced by GEOLUT	15 Hex ID of Associated Reference Beacon	Beacon Message Produced by GEOLUT (30 Hex)	Date / Time	LUT in LEO Footprint (Y/N)

e. Calculate the PA rate as a function of beacon bursts in the coverage area of the MSG satellite. This is calculated with the following equation:

$$\left(\frac{\text{Total Number of PAs}}{\text{Number of Days Observed} * \text{Number of Reference Beacon Bursts per Day in MSG Coverage Area}} \right)$$

f. Calculate the PA rate when the GEOLUT is in the footprint of a LEOSAR satellite using the following equation.

$$\left(\frac{\text{Total Number of PAs during LEO Cov}}{\text{Total Duration of LEO Cov in Days} * \text{Number of Reference Beacon Bursts per Day in MSG Coverage Area}} \right)$$

3.2.9 T-9: MSG Coverage

The coverage of the MSG GEOSAR system is evaluated using a combination of:

a. technical tests, in which a beacon is activated for a period of time, during which it crosses in or out of the MSG GEOSAR coverage area; and

b. evaluating real beacon alerts detected by the LEOSAR system, and assessing if the same alerts were detected by the MSG GEOSAR system.

3.2.9.1 Methodology and Data Collection

<u>Testing Using Beacon Crossing Coverage Area</u>

A beacon will be mounted on a vessel or vehicle which will be crossing the expected MSG GEOSAR coverage area. After the beacon has been activated, the beacon operator will record its location as a function of time. MSG GEOLUT operators will monitor the output of their GEOLUTs for the test period, and record the times associated with the production of all valid messages for the test beacon.

<u>Evaluating Coverage Area Using Real Beacon Events of Opportunity</u>

The location and times of real beacon events detected by the LEOSAR system during the period of the MSG GEOSAR Performance testing are to be identified. Beacon events located within an area enclosed by 80° latitude and longitude should be recorded in the format provided at Annex I. The beacon ID and time of each alert in the sample set are to be compared against the GEOLUT output to determine if the event was also detected by the MSG GEOSAR system.

3.2.9.2 Data Reduction, Analysis and Results

Testing Using Beacon Crossing Coverage Area

From the data collected, the time that MSG GEOSAR coverage was lost (or began depending whether the beacon was moving in or out of coverage) is to be recorded. The movement of the beacon during the test period is to be plotted on a map, and the plot is to be annotated to depict GEO coverage / no GEO coverage. From the collected data, the estimated latitude and longitude of the last valid message detected by the GEOLUT before the beacon left coverage, should be provided.

Evaluating Coverage Area Using Real Beacon Events of Opportunity

a. all the LEOSAR alerts detected during the period of the MSG Performance evaluation that satisfy the criteria for inclusion in the sample set should be recorded in the format provided at Annex I (i.e., situated within an area enclosed by 80° latitude and longitude);

b. each beacon event in the sample set should be checked to determine if it was also detected by the MSG GEOLUT, and the results recorded as per Annex I;

c. the beacon events are to be grouped into geographic areas of 10° latitude/longitude blocks;

d. for each block, the percentage of LEOSAR beacon events that were also detected by the GEOLUT should be calculated and presented as indicated at Table 3-6 below; and

e. the location of each beacon event should be plotted on two maps, one depicting events that were detected by both the LEOSAR and GEOLUT, and a separate map depicting beacon events detected only by the LEOSAR system.

Block Location		Number of LEOSAR Beacon Events	Number Detected by GEOLUT	% Detected by GEOLUT
Longitude	Latitude			
0/10w	0/10n			
10w/20w	0/10n			
20w/30w	0/10n			
.	.			
.	.			
.	.			
70e/80e	70s/80s			

Table 3-6: Sample Table of Coverage Statistics

- END OF SECTION 3 -

4. REPORTING GUIDELINES

Each GEOLUT operator participating in the MSG GEOSAR Performance Evaluation Programme shall submit an individual report to the Cospas-Sarsat Secretariat. The report should follow the structure described in Annex A, using the same section paragraph numbering and annexes.

The Secretariat will retain the complete reports on file for archival purposes, and will format each report into a summarized version for presentation to the Joint Committee. Based upon the recommendations of the Joint Committee, a summary report of the performance of the MSG System will be produced for the consideration of the Cospas-Sarsat Council.

- END OF SECTION 4 -

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ANNEXES TO THE COSPAS-SARSAT METEOSAT SECOND GENERATION (MSG) GEOSAR PERFORMANCE EVALUATION PLAN

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ANNEX A

FORMAT OF MSG PERFORMANCE EVALUATION REPORTS BY GEOLUT OPERATORS

A.1 INTRODUCTION

Introductory remarks provide information necessary to understand the report. The introduction should identify which test objectives were completed and have been reported in this document and any known deficiencies with the GEOLUT which could affect the results. Furthermore, the introduction shall provide:

a. the dates covered by the test programme;
b. the location of the GEOLUT; and
c. the configuration settings of the GEOLUT which could impact upon its observed performance (e.g. the bandwidth settings of the GEOLUT receiver).

A.2 SUMMARY OF RESULTS

This section will provide summary statements concerning the results of each objective. It should specifically identify any difficulties experienced with the evaluation programme and any recommendations that should be noted by the Joint Committee.

A.3 TEST T-1: PROCESSING THRESHOLD, SYSTEM MARGIN AND BEACON MESSAGE PROCESSING PERFORMANCE

A.3.1 Test Description

This section should include a statement confirming that the tests were conducted and analysed in accordance with C/S R.011, or describe any modifications to the test procedures that were required.

A.3.2 Calculation of C/No

The calculations converting the EIRP of the simulator, to a C/No value at the GEOLUT processor should be provided.

A.3.3 Test Results

The GEOLUT data collected for this test should be included as an annex to the report, and referenced in this section of the report. In addition, the tables below should be produced based on the collected data and provided in this section of the national report.

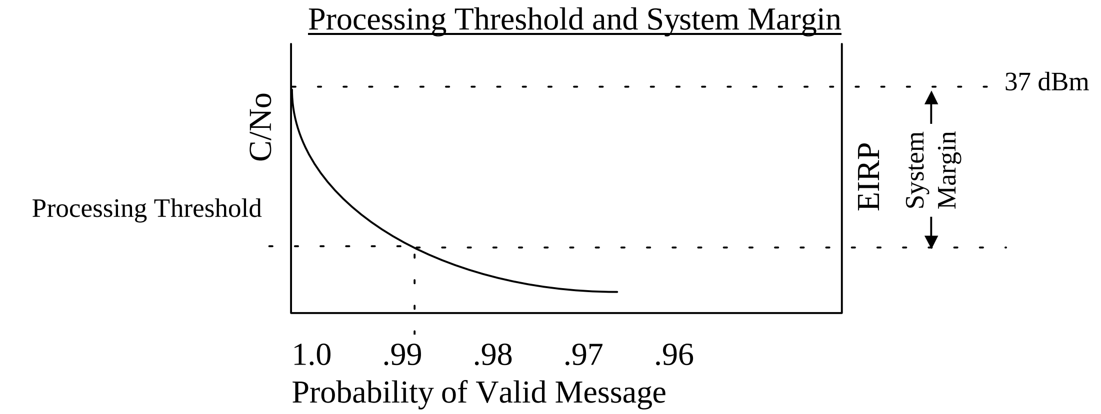
Analysed Data for Test T-1

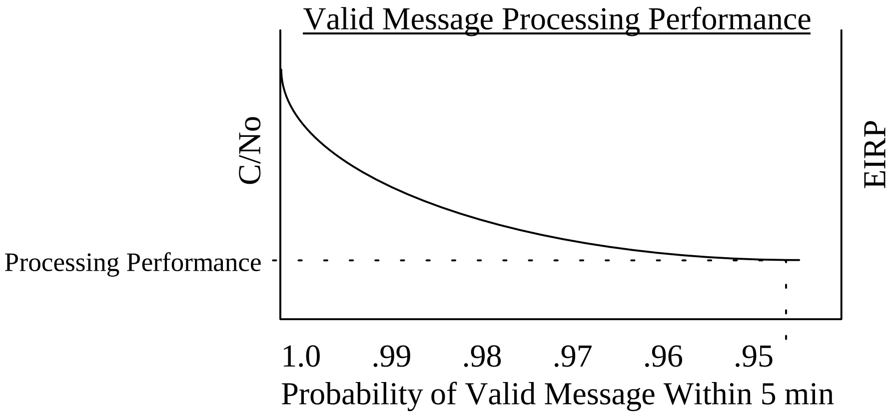
EIRP from simulator (dBm)	Calculated C/No at GEOLUT (dBHz)	Number of Beacon Events Used (Valid Msg Sample Set)	Number of Beacon Events for which		Probability of Valid Message	Probability of Valid Message within 5 Min
			Valid Message was Produced	Valid Message was Produced within 5 Min		
28.0						
29.0						
30.0						
31.0						
32.0						
33.0						
34.0						
35.0		200	200	200	1.00	1.00

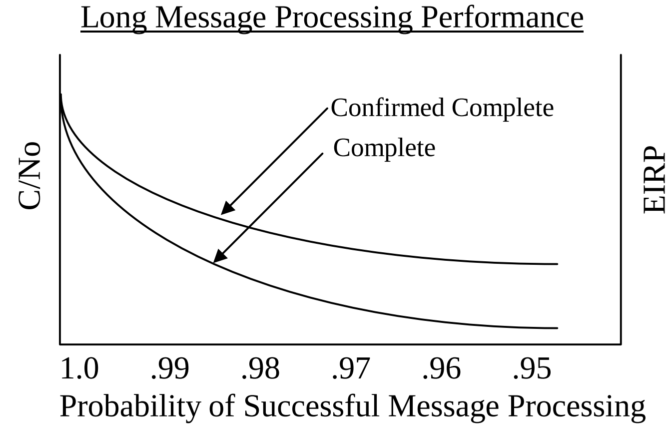
EIRP from simulator (dBm)	Number of Beacon Events Used (Complete Msg Sample Set)	Number of Beacon Events Used (Confirmed Complete Msg Sample Set)	Number of Beacon Events for which a Complete Message was Produced	Number of Beacon Events for which a Confirmed Complete Message was Produced	Probability of Complete / Confirmed Complete Msg
28.0					
29.0					
30.0					
31.0					
32.0					
33.0					
34.0					
35.0	200	200	200	1.00	1.00 / 1.00

A.3.4 Processing Threshold and Message Processing Performance

A graph of the results from the tables above should be included (a theoretical example is provided herein). The processing threshold value should be highlighted by noting the value of C/No corresponding to a 0.99 probability of obtaining a valid message as indicated below. Similarly the processing performance is determined from the graph depicting C/No versus the probability of producing a valid message within 5 minutes.







A.3.5 System Margin

The calculations converting the threshold value of C/No to the associated EIRP, and the resulting system margin should be provided.

A.3.6 Test Anomalies

This section should provide information concerning issues which occurred during the test which could affect results. If some data was excluded from the results, an explanation should be provided.

A.3.7 Recommendations

Any proposed recommendations resulting from this test should be detailed in this section.

A.4 TEST T-2: TIME TO PRODUCE VALID, COMPLETE AND CONFIRMED MESSAGES

A.4.1 Test Description

This section should include a statement confirming that the tests were conducted and analysed in accordance with C/S R.011, or describe any modifications to the test procedures that were required.

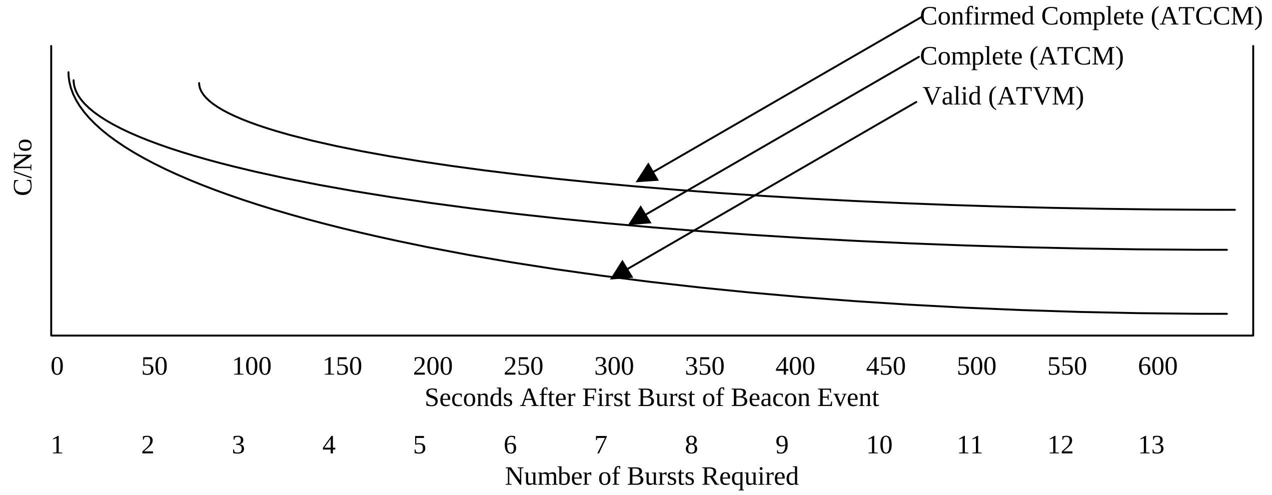
A.4.2 Test Results

The results for this test are obtained by analysing the data that was collected for the T-1 Test. A reference should be provided to indicate the annex of the report where this data is provided. From the data, the table and graphs described below should be produced and included in this section of the report. In addition to the mean time to produce valid, complete and confirmed complete messages for each EIRP, the standard deviation for each of these statistics should also be calculated and provided.

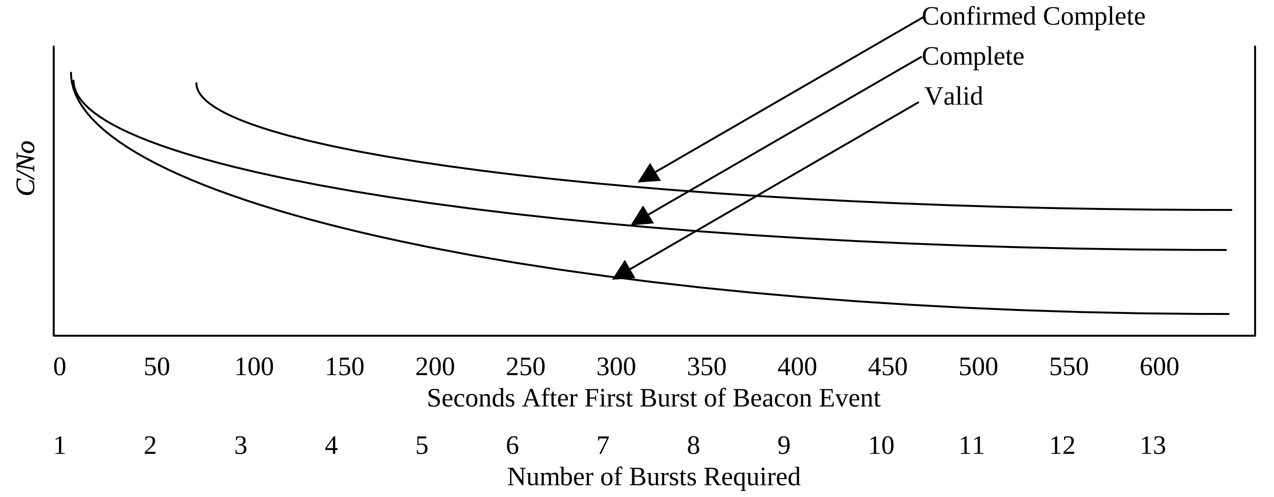
EIRP (dBm)	C/No (dBHz)	ATVM (Sec)	Standard Deviation of ATVM	ATCM (Sec)	Standard Deviation of ATCM	ATCCM (Sec)	Standard Deviation of ATCCM
28.0							
29.0							
.							
.							
35.0							

EIRP (dBm)	C/No (dBHz)	95th Percentile			98th Percentile		
		Valid Msg (Sec)	Complete Msg (Sec)	Confirmed Msg (Sec)	Valid Msg (Sec)	Complete Msg (Sec)	Confirmed Msg (Sec)
28.0							
29.0							
.							
.							
35.0							

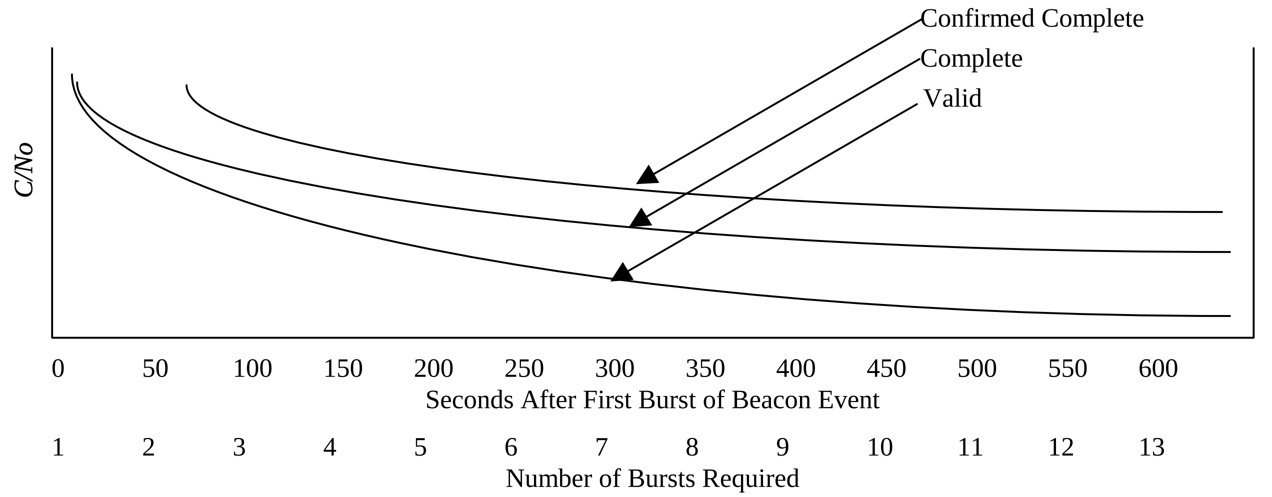
Average Time to Produce Valid, Complete and Confirmed Complete Messages



95th Percentile to Produce Valid, Complete and Confirmed Complete Messages



98th Percentile to Produce Valid, Complete and Confirmed Complete Messages



This section should provide information concerning issues which occurred during the test which could affect results. If some data was excluded from the results, an explanation should be provided.

A.4.4 Recommendations

Any proposed recommendations resulting from this test should be detailed in this section.

A.5 TEST T-3: CARRIER FREQUENCY MEASUREMENT ACCURACY

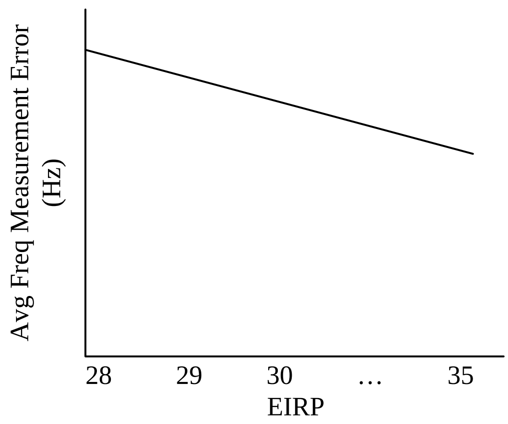
A.5.1 Test Description

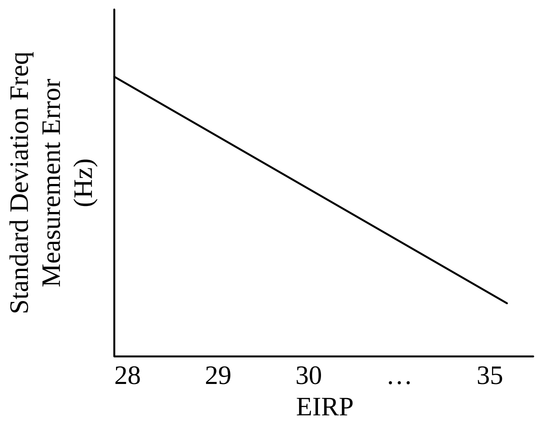
This section should include a statement confirming that the tests were conducted and analysed in accordance with C/S R.011, or describe any modifications to the test procedures that were required.

A.5.2 Test Results

The results for this test are obtained by analysing the data that was collected for the T-1 Test, to obtain the average frequency measurement error and standard deviation of this error, for each EIRP. A reference should be provided to indicate the annex of the report where this data is provided. The results of these calculations should be presented in tabular and graphical formats as indicated below.

EIRP (dBm)	Calculated C/No at GEOLUT (dBHz)	Avg Freq Measurement Error (Hz rounded to 1 decimal place)	Std Deviation of Error (Hz)
28.0			
.			
.			
35.0			





A.5.3 Test Anomalies

This section should provide information concerning issues which occurred during the test which could affect results. If some data was excluded from the results, an explanation should be provided.

A.5.4 Recommendations

Any proposed recommendations resulting from this test should be detailed in this section.

A.6 TEST T-4: MSG GEOLUT CHANNEL CAPACITY

A.6.1 Test Description

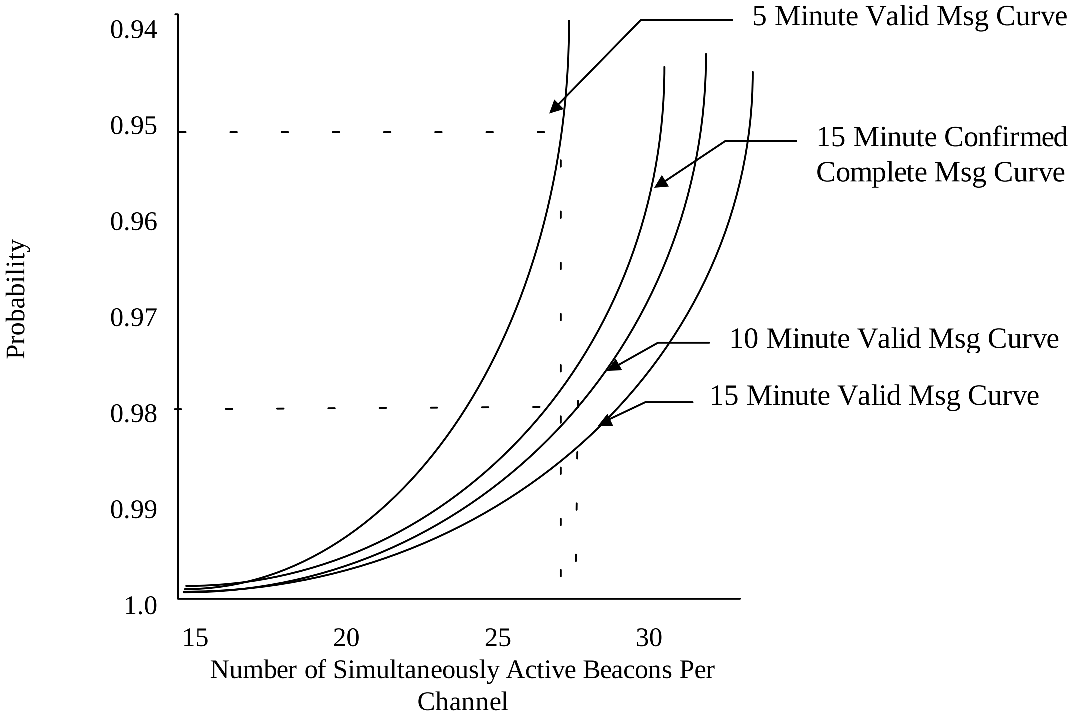
This section should include a statement confirming that the tests were conducted and analysed in accordance with C/S R.011, or describe any modifications to the test procedures that were required.

A.6.2 Test Results

The GEOLUT data collected for this test should be included as an annex to the report, and should be referenced in this section of the report. From the data collected, the table and graph depicted below should be provided, and the capacity calculated and reported in this section of the report.

Channel: 406.061				
# of Active Bcn Events	**% Valid Msg within 5 Min**	**% Valid Msg within10 Min**	**% Valid Msg within 15 Min**	**% Confirmed Complete Msg within 15 Min**
15				
20				
25				
30				

406.061 MHz Channel Capacity



A.6.3 Test Anomalies

This section should provide information concerning issues which occurred during the test which could affect results. If some data was excluded from the results, an explanation should be provided.

A.6.4 Recommendations

Any proposed recommendations resulting from this test should be detailed in this section.

A.7 TEST T-5: IMPACT OF INTERFERENCE

This objective is not accomplished through a controlled test, but rather by monitoring the performance of the GEOLUT throughout the period of the entire MSG performance evaluation programme, during which time it is anticipated that there will be periods of interference. In view of the unstructured nature of this process it is not possible to predict what information will be collected, the detailed analysis which will be required, nor define the structure for reporting the results in advance.

In view of the above, for administrations which participated in this test objective, a description of the configuration used to detect and measure interference should be provided. In addition, the data collected for this objective should be provided as an annex to the report. Finally any data reduction and/or analysis conducted should be described and the results reported.

A.8 TEST T-6: IMPACT OF INTERFERENCE FROM LEOSAR SATELLITES

A.8.1 Test Description

This section should include a statement confirming that the tests were conducted and analysed in accordance with C/S R.011, or describe any modifications to the test procedures that were required.

A.8.2 Test Results

The GEOLUT data collected for this test should be included as an annex to the report, and should be referenced in this section of the report. The following should be provided:

a. histograms / graphs, as provided in the example below, which depict the performance of the GEOLUT to produce valid messages during periods when the GEOLUT was in the footprint of a LEOSAR satellite prior to the production of a valid message for a beacon event and when it was not;

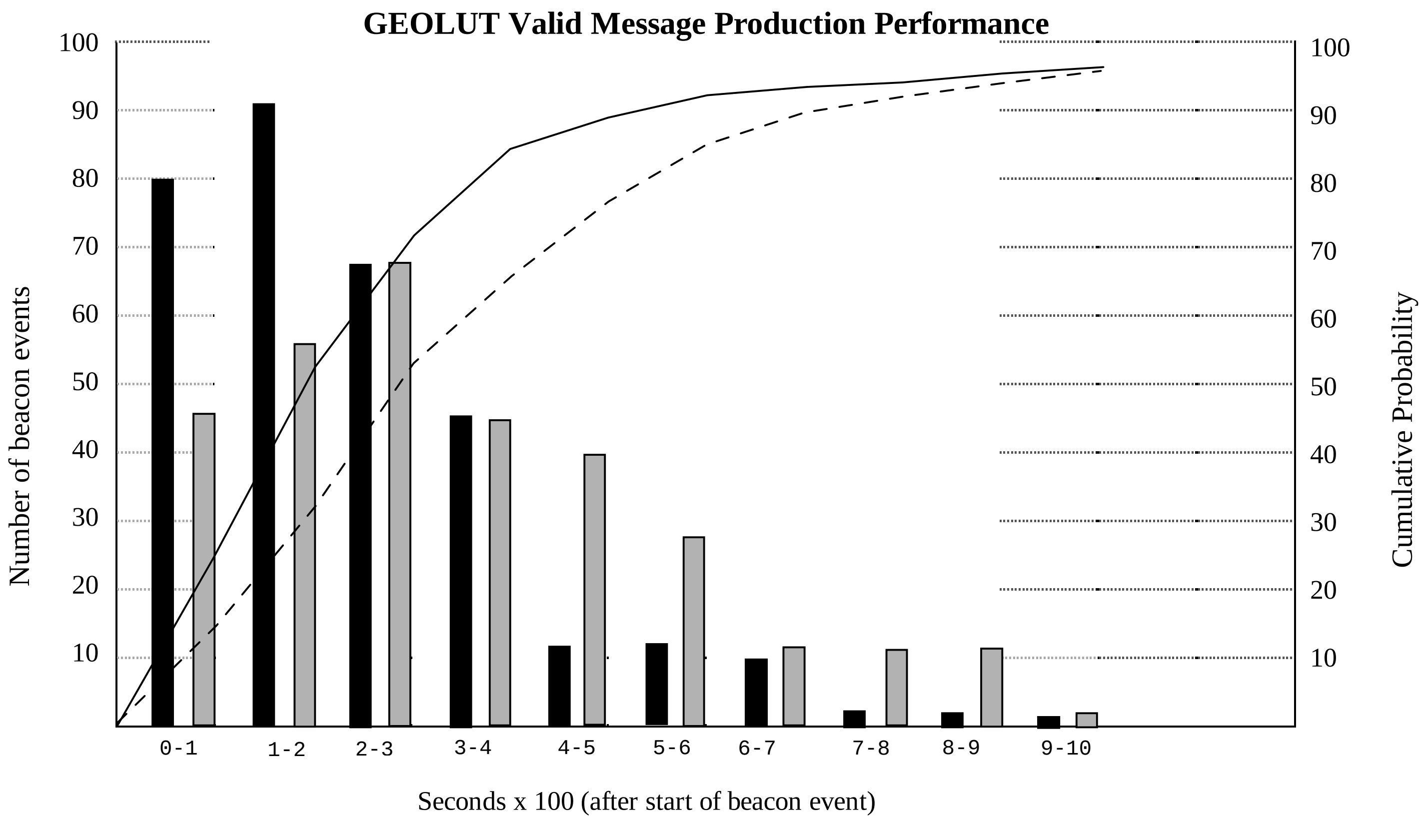
b. the mean and standard deviation for the time to produce valid messages, for both sample sets;

c. histograms / graphs, also in the format provided below, which depict the performance to produce confirmed complete messages during periods when the GEOLUT was in the footprint of a LEOSAR satellite prior to the first valid message, and when it was not;

d. the mean and standard deviation for the time to produce confirmed complete messages; and

e. a graph depicting the C/No, as measured by the GEOLUT to produce the first valid message for each beacon event, plotted against the time since the start of the test (i.e., the horizontal axis of the graph will cover the 48 hour test period).

With respect to the calculation for the mean and standard deviation, if the GEOLUT did not produce a valid or confirmed complete message, the beacon event should not be included in the respective sample set, and a note should be provided in the report indicating how many such events occurred. For example, the note might indicate that valid messages were not produced for 3 beacon events, and confirmed complete messages were not produced for 7 events.



■ Number of beacon events for which GEOLUT produced a valid message (no possibility of LEOSAR interference prior to first valid message)

□ Number of beacon events for which GEOLUT produced a valid message (possible LEOSAR interference prior to first valid message)

—— Cumulative Probability of valid message (no possibility of LEOSAR interference prior to first valid message)

\- - Cumulative Probability of valid message (possible LEOSAR interference prior to first valid message)

A.8.3 Test Anomalies

This section should provide information concerning issues which occurred during the test that could affect the results. If some data was excluded from the results, an explanation should be provided. Specifically, the number of beacon events for which the GEOLUT was not able to produce a valid or a confirmed complete message should be provided.

A.8.4 Recommendations

Any proposed recommendations resulting from this test should be detailed in this section.

A.9 TEST T-7: MSG GEOLUT NETWORK PERFORMANCE

Since this test requires consolidating the results of objective T-6 from all the participating MSG GEOLUTs, objective T-7 will not be included in the performance evaluation reports provided by the individual GEOLUT operators. Instead the Joint Committee will produce a report for this objective by consolidating the results provided by the participating GEOLUT operators for objective T-6.

A.9.1 Test Results

The Joint Committee should analyse the data collected for objective T-6 (impact of LEOSAR interference), and complete the actions described below.

a. An entry should be made in the format of the table described at Annex G which captures the earliest time that any of the MSG GEOLUTs produced a valid message for each beacon event, and the earliest time that any of the GEOLUTs produced a confirmed complete message for each beacon event.

b. From the table produced by the Joint Committee, a graph (as described at Figure 3.7) should be provided, which depicts the performance of the MSG GEOLUT network in respect of producing valid and confirmed complete messages.

c. From the consolidated data:

   (i) mean and standard deviation for time required for the network of MSG GEOLUTs to produce valid and confirmed messages for each beacon event should be calculated and reported;

   (ii) the probability that the network of MSG GEOLUTs would produce valid messages within 5 and 10 minutes should be calculated and reported; and

   (iii) the probability that the GEOLUT network produced confirmed complete messages should be calculated and reported.

A.10 TEST T-8: PROCESSING ANOMALIES

A.10.1 Test Description

This section should include a statement confirming that the tests were conducted and analysed in accordance with C/S R.011, or describe any modifications to the test procedures that were required.

A.10.2 Test Results

An entry should be made in the table provided at Annex H (a copy of the format of the table is provided below) for each instance when the GEOLUT produced a valid message which satisfied both conditions stated below:

a. the bias frequency calculated by the GEOLUT confirmed the transmission occurred in the channel reserved for reference beacons (406.0205 - 406.0235 MHz); and

b. the 15 Hex ID of the valid message produced by the GEOLUT did not match any of the 15 Hex IDs of reference beacons operating in the MSG coverage area.

15 Hex ID Produced by GEOLUT	15 Hex ID of Associated Reference Beacon	Beacon Message Produced by GEOLUT (30 Hex)	Date / Time	LUT in LEO Footprint (Y/N)

Table for Recording 406 MHz Processing Anomalies (extracted from Annex H)

A.10.3 Processing Anomaly Rate (PA)

The PA rate and the PA rate when the GEOLUT was in the footprint of a LEOSAR satellite should be calculated and reported.

A.10.4 Test Anomalies

This section should provide information concerning issues which occurred during the test which could affect results. If some data was excluded from the results, an explanation should be provided.

A.10.5 Recommendations

Any proposed recommendations resulting from this test should be detailed in this section.

A.11 Test T-9: MSG COVERAGE

A.11.1 Test Description

This section should include a statement confirming that the tests were conducted and analysed in accordance with C/S R.011, or describe any modifications to the test procedures that were required.

A.11.2 Test Results

Beacon Crossing Coverage Area

a. A narrative description of the test should provided, indicating the route taken, the beacon identification, and the times associated with the activation and deactivation of the beacon.

b. The GEOLUT performance in respect of producing valid messages, as a function of time and elevation angle (as indicated below) should be provided.

c. The results provided in the table should be graphically depicted on a map.

Beacon 15 Hex ID:____________________ Activation Date / Time:_____________ De-activation Date / Time:__________			
Date / Time	Location (Lat/Long)	Beacon to Satellite Elevation Angle	Detected by GEOLUT (Yes/No)

Evaluating Coverage Using Real Beacon Events

a. All beacon events detected by the LEOSAR system in the area enclosed by 80° N/S and 80° E/W, shall be recorded as per Annex I, and an indication of whether the beacon event was also detected by the MSG GEOLUT.

b. Using the data captured at Annex I, beacon events are to be grouped into geographic locations of 10° latitude/longitude blocks, and the associated statistics calculated as indicated below.

Block Location		Number of LEOSAR Beacon Events	Number Detected by GEOLUT	% Detected by GEOLUT
Longitude	Latitude			
0/10w	0/10n			
10w/20w	0/10n			
20w/30w	0/10n			
.	.			
.	.			
.	.			
70e/80e	70s/80s			

c. Two maps of the data collected as per Annex I should be produced. One map depicting each beacon event that was detected by the LEOSAR and also by the MSG GEOLUT, and the second map depicting each beacon event that was only detected by the LEOSAR system.

A.11.3 Test Anomalies

This section should provide information concerning issues which occurred during the test which could affect results. If some data was excluded from the results, an explanation should be provided.

A.11.4 Recommendations

Any proposed recommendations resulting from this test should be detailed in this section.

List of Annexes (electronic copies of annexes to be provided to Secretariat separately)

Annex A GEOLUT Data Collected for Objectives T-1, T-2, and T-3;
Annex B GEOLUT Data Collected for Objective T-4;
Annex C GEOLUT Data Collected for Objective T-6;
Annex D GEOLUT Data Collected for Objective T-8; and
Annex E GEOLUT Data Collected for Objective T-9

- END OF ANNEX A -

ANNEX B

TEST SCRIPTS FOR OBJECTIVES T-1, T-2 AND T-3

Introduction

This annex provides a description of the test signals that will be transmitted by the French simulator for objectives T-1, T-2 and T-3. In order to transmit the required number of beacon events at each EIRP, each script will be comprised of 200 beacon events. A different script will be used for each EIRP value. The test script for uplink signals with EIRPs of 28 dBm is provided below. The scripts for the other EIRPs will be identical to this example except that the beacon event IDs transmitted will be coded with the appropriate EIRP value. Copies of the test scripts for EIRP values from 28 to 35 dBm are available from the Cospas-Sarsat Secretariat on request.

Each row in the table represents a single beacon event. Each beacon event is comprised of 20 beacon bursts with a fixed burst repetition interval of 50 sec. The start time for each beacon event is indicated in the table.

The 15 Hex ID of each beacon event conforms to the following convention:

9 C 5 C 0 0	X X X	0 0 0 0	X X
Fixed Values For all Beacon Events	Beacon Event Serial 001 through 200	Fixed Values For all Beacon Events	Transmit EIRP

Table B-1: Test Script for Tests T-1, T-2 and T-3

EIRP 28 dBm To= Year/Month/Time (GMT hour : minute : second) e.g. 2002/08/06:43:22_______________________			
15 Hex ID of Bcn Event	30 Hex Msg of Bcn Event	Time of First Burst in Bcn Event	Tx Freq
9C5C00001000028	CE2E000008000147BD4340100002C1	To	406.061 MHz –500 Hz
9C5C00002000028	CE2E0000100001415E91C0100002C1	To	406.064 MHz –500 Hz
9C5C00003000028	CE2E000018000143002040100002C1	To	406.067 MHz –500 Hz
9C5C00004000028	CE2E0000200001452F4C00100002C1	To	406.070 MHz –500Hz
9C5C00005000028	CE2E00002800014771FD80100002C1	To + 1	406.061 MHz –400 Hz
9C5C00006000028	CE2E000030000141922F00100002C1	To + 1	406.064 MHz –400 Hz
9C5C00007000028	CE2E000038000143CC9E80100002C1	To + 1	406.067 MHz –400 Hz
9C5C00008000028	CE2E0000400001447A8F40100002C1	To + 1	406.070 MHz –400Hz
9C5C00009000028	CE2E000048000146243EC0100002C1	To + 2	406.061 MHz –300 Hz
9C5C00010000028	CE2E000080000146D109C0100002C1	To + 2	406.064 MHz –300 Hz
9C5C00011000028	CE2E0000880001448FB840100002C1	To + 2	406.067 MHz –300 Hz
9C5C00012000028	CE2E0000900001426C6AC0100002C1	To + 2	406.070 MHz –300Hz
9C5C00013000028	CE2E00009800014032DB40100002C1	To + 3	406.061 MHz –200 Hz
9C5C00014000028	CE2E0000A00001461DB700100002C1	To + 3	406.064 MHz –200 Hz

EIRP 28 dBm To= Year/Month/Time (GMT hour : minute : second) e.g. 2002/08/06:43:22______________________			
15 Hex ID of Bcn Event	30 Hex Msg of Bcn Event	Time of First Burst in Bcn Event	Tx Freq
9C5C00015000028	CE2E0000A80001444306801000002C1	To + 3	406.067 MHz –200 Hz
9C5C00016000028	CE2E0000B0000142A0D400100002C1	To + 3	406.070 MHz –200Hz
9C5C00017000028	CE2E0000B8000140FE6580100002C1	To + 4	406.061 MHz –100 Hz
9C5C00018000028	CE2E0000C0000147487440100002C1	To + 4	406.064 MHz –100 Hz
9C5C00019000028	CE2E0000C800014516C5C0100002C1	To + 4	406.067 MHz –100 Hz
9C5C00020000028	CE2E0001000001438604C0100002C1	To + 4	406.070 MHz –100Hz
9C5C00021000028	CE2E000108000141D8B540100002C1	To + 5	406.061 MHz
9C5C00022000028	CE2E0001100001473B67C0100002C1	To + 5	406.064 MHz
9C5C00023000028	CE2E00011800014565D640100002C1	To + 5	406.067 MHz
9C5C00024000028	CE2E0001200001434ABA00100002C1	To + 5	406.070 MHz
9C5C00025000028	CE2E000128000141140B80100002C1	To + 6	406.061 MHz +500 Hz
9C5C00026000028	CE2E000130000147F7D900100002C1	To + 6	406.064 MHz +500 Hz
9C5C00027000028	CE2E000138000145A96880100002C1	To + 6	406.067 MHz +500 Hz
9C5C00028000028	CE2E0001400001421F7940100002C1	To + 6	406.070 MHz +500Hz
9C5C00029000028	CE2E00014800014041C8C0100002C1	To + 7	406.061 MHz +400 Hz
9C5C00030000028	CE2E000180000140B4FFC0100002C1	To + 7	406.064 MHz +400 Hz
9C5C00031000028	CE2E000188000142EA4E40100002C1	To + 7	406.067 MHz +400 Hz
9C5C00032000028	CE2E000190000144099CC0100002C1	To + 7	406.070 MHz +400Hz
9C5C00033000028	CE2E000198000146572D40100002C1	To + 8	406.061 MHz +300 Hz
9C5C00034000028	CE2E0001A0000140784100100002C1	To + 8	406.064 MHz +300 Hz
9C5C00035000028	CE2E0001A800014226F080100002C1	To + 8	406.067 MHz +300 Hz
9C5C00036000028	CE2E0001B0000144C52200100002C1	To + 8	406.070 MHz +300Hz
9C5C00037000028	CE2E0001B80001469B9380100002C1	To + 9	406.061 MHz +200 Hz
9C5C00038000028	CE2E0001C00001412D8240100002C1	To + 9	406.064 MHz +200 Hz
9C5C00039000028	CE2E0001C80001437333C0100002C1	To + 9	406.067 MHz +200 Hz
9C5C00040000028	CE2E0002000001409E6600100002C1	To + 9	406.070 MHz +200Hz
9C5C00041000028	CE2E000208000142C0D780100002C1	To + 10	406.061 MHz +100 Hz
9C5C00042000028	CE2E00021000014423050010000 2C1	To + 10	406.064 MHz +100 Hz
9C5C00043000028	CE2E0002180001467DB480100002C1	To + 10	406.067 MHz +100 Hz
9C5C00044000028	CE2E00022000014052D8C0100002C1	To + 10	406.070 MHz +100Hz
9C5C00045000028	CE2E0002280001420C6940100002C1	To + 11	406.061 MHz
9C5C00046000028	CE2E000230000144EFBBC0100 002C1	To + 11	406.064 MHz
9C5C00047000028	CE2E000238000146B10A40100002C1	To + 11	406.067 MHz
9C5C00048000028	CE2E000240000141071B80100002C1	To + 11	406.070 MHz
9C5C00049000028	CE2E00024800014359AA00100002C1	To + 12	406.061 MHz –500 Hz
9C5C00050000028	CE2E000280000143AC9D00100002C1	To + 12	406.064 MHz –500 Hz
9C5C00051000028	CE2E000288000141F22C80100002C1	To + 12	406.067 MHz –500 Hz
9C5C00052000028	CE2E00029000014711FE00100002C1	To + 12	406.070 MHz –500Hz
9C5C00053000028	CE2E0002980001454F4F8010000 2C1	To + 13	406.061 MHz –400 Hz
9C5C00054000028	CE2E0002A00001436023C0100002C1	To + 13	406.064 MHz –400 Hz
9C5C00055000028	CE2E0002A80001413E9240100002C1	To + 13	406.067 MHz –400 Hz
9C5C00056000028	CE2E0002B0000147DD40C0100002C1	To + 13	406.070 MHz –400Hz
9C5C00057000028	CE2E0002B800014583F140100002C1	To + 14	406.061 MHz –300 Hz
9C5C00058000028	CE2E0002C000014235E080100002C1	To + 14	406.064 MHz –300 Hz

EIRP 28 dBm To= Year/Month/Time (GMT hour : minute : second) e.g. 2002/08/06:43:22______________________			
15 Hex ID of Bcn Event	30 Hex Msg of Bcn Event	Time of First Burst in Bcn Event	Tx Freq
9C5C00059000028	CE2E0002C80001406B5100100002C1	To + 14	406.067 MHz –300 Hz
9C5C00060000028	CE2E000300000146FB9000100002C1	To + 14	406.070 MHz –300Hz
9C5C00061000028	CE2E000308000144A52180100002C1	To + 15	406.061 MHz –200 Hz
9C5C00062000028	CE2E00031000014246F300100002C1	To + 15	406.064 MHz –200 Hz
9C5C00063000028	CE2E000318000140184280100002C1	To + 15	406.067 MHz –200 Hz
9C5C00064000028	CE2E000320000146372EC0100002C1	To + 15	406.070 MHz –200Hz
9C5C00065000028	CE2E000328000144699F40100002C1	To + 16	406.061 MHz –100 Hz
9C5C00066000028	CE2E0003300001428A4DC0100002C1	To + 16	406.064 MHz –100 Hz
9C5C00067000028	CE2E000338000140D4FC40100002C1	To + 16	406.067 MHz –100 Hz
9C5C00068000028	CE2E00034000014762ED80100002C1	To + 16	406.070 MHz –100Hz
9C5C00069000028	CE2E0003480001453C5C00100002C1	To + 17	406.061 MHz
9C5C00070000028	CE2E000380000145C96B001000 02C1	To + 17	406.064 MHz
9C5C00071000028	CE2E00038800014797DA80100002C1	To + 17	406.067 MHz
9C5C00072000028	CE2E000390000141740800100002C1	To + 17	406.070 MHz
9C5C00073000028	CE2E0003980001432AB980100002C1	To + 18	406.061 MHz +500 Hz
9C5C00074000028	CE2E0003A000014505D5C0100002C1	To + 18	406.064 MHz +500 Hz
9C5C00075000028	CE2E0003A80001475B6440100002C1	To + 18	406.067 MHz +500 Hz
9C5C00076000028	CE2E0003B0000141B8B6C0100002C1	To + 18	406.070 MHz +500Hz
9C5C00077000028	CE2E0003B8000143E60740100002 C1	To + 19	406.061 MHz +400 Hz
9C5C00078000028	CE2E0003C000014450168010000 2C1	To + 19	406.064 MHz +400 Hz
9C5C00079000028	CE2E0003C80001460EA700100002C1	To + 19	406.067 MHz +400 Hz
9C5C00080000028	CE2E000400000146AEA380100002C1	To + 19	406.070 MHz +400Hz
9C5C00081000028	CE2E000408000144F01200100002C1	To + 20	406.061 MHz +300 Hz
9C5C00082000028	CE2E00041000014213C080100002C1	To + 20	406.064 MHz +300 Hz
9C5C00083000028	CE2E0004180001404D7100100002C1	To + 20	406.067 MHz +300 Hz
9C5C00084000028	CE2E000420000146621D40100002C1	To + 20	406.070 MHz +300Hz
9C5C00085000028	CE2E0004280001443CACC0100002C1	To + 21	406.061 MHz +200 Hz
9C5C00086000028	CE2E000430000142DF7E40100002C1	To + 21	406.064 MHz +200 Hz
9C5C00087000028	CE2E00043800014081CFC0100002C1	To + 21	406.067 MHz +200 Hz
9C5C00088000028	CE2E00044000014737DE00100002C1	To + 21	406.070 MHz +200Hz
9C5C00089000028	CE2E000448000145696F80100002C1	To + 22	406.061 MHz +100 Hz
9C5C00090000028	CE2E0004800001459C5880100002C1	To + 22	406.064 MHz +100 Hz
9C5C00091000028	CE2E000488000147C2E900100002C1	To + 22	406.067 MHz +100 Hz
9C5C00092000028	CE2E000490000141213B80100002C1	To + 22	406.070 MHz +100Hz
9C5C00093000028	CE2E0004980001437F8A00100002C1	To + 23	406.061 MHz
9C5C00094000028	CE2E0004A000014550E64010000 2C1	To + 23	406.064 MHz
9C5C00095000028	CE2E0004A80001470E57C0100002C1	To + 23	406.067 MHz
9C5C00096000028	CE2E0004B0000141ED8540100002C1	To + 23	406.070 MHz
9C5C00097000028	CE2E0004B8000143B334C0100002C1	To + 24	406.061 MHz –500 Hz
9C5C00098000028	CE2E0004C000014405250010000 2C1	To + 24	406.064 MHz –500 Hz
9C5C00099000028	CE2E0004C80001465B9480100002C1	To + 24	406.067 MHz –500 Hz
9C5C00100000028	CE2E000800000143795040100002C1	To + 24	406.070 MHz –500Hz
9C5C00101000028	CE2E00080800014127E1C0100002C 1	To + 25	406.061 MHz –400 Hz
9C5C00102000028	CE2E000810000147C43340100002C1	To + 25	406.064 MHz –400 Hz

EIRP 28 dBm To= Year/Month/Time (GMT hour : minute : second) e.g. 2002/08/06:43:22______________________			
15 Hex ID of Bcn Event	30 Hex Msg of Bcn Event	Time of First Burst in Bcn Event	Tx Freq
9C5C00103000028	CE2E0008180001459A82C0100002C1	To + 25	406.067 MHz –400 Hz
9C5C00104000028	CE2E000820000143B5EE80100002C1	To + 25	406.070 MHz –400Hz
9C5C00105000028	CE2E000828000141EB5F00100002C1	To + 26	406.061 MHz –300 Hz
9C5C00106000028	CE2E000830000147088D80100002C1	To + 26	406.064 MHz –300 Hz
9C5C00107000028	CE2E000838000145563C00100002C1	To + 26	406.067 MHz –300 Hz
9C5C00108000028	CE2E000840000142E02DC0100002C1	To + 26	406.070 MHz –300Hz
9C5C00109000028	CE2E000848000140BE9C40100002C1	To + 27	406.061 MHz –200 Hz
9C5C00110000028	CE2E0008800001404BAB40100002C1	To + 27	406.064 MHz –200 Hz
9C5C00111000028	CE2E000888000142151AC0100002C1	To + 27	406.067 MHz –200 Hz
9C5C00112000028	CE2E000890000144F6C840100002C1	To + 27	406.070 MHz –200Hz
9C5C00113000028	CE2E000898000146A879C0100002C1	To + 28	406.061 MHz –100 Hz
9C5C00114000028	CE2E0008A00001408715801000002C1	To + 28	406.064 MHz –100 Hz
9C5C00115000028	CE2E0008A8000142D9A400100002C1	To + 28	406.067 MHz –100 Hz
9C5C00116000028	CE2E0008B00001443A7680100002C1	To + 28	406.070 MHz –100Hz
9C5C00117000028	CE2E0008B800014664C700100002C1	To + 29	406.061 MHz
9C5C00118000028	CE2E0008C0000141D2D6C0100002 C1	To + 29	406.064 MHz
9C5C00119000028	CE2E0008C80001438C6740100002C1	To + 29	406.067 MHz
9C5C00120000028	CE2E0009000001451CA640100002C1	To + 29	406.070 MHz
9C5C00121000028	CE2E0009080001474217C0100002C1	To + 30	406.061 MHz +500 Hz
9C5C00122000028	CE2E000910000141A1C540100002C1	To + 30	406.064 MHz +500 Hz
9C5C00123000028	CE2E000918000143FF74C0100002C1	To + 30	406.067 MHz +500 Hz
9C5C00124000028	CE2E000920000145D01880100002C1	To + 30	406.070 MHz +500Hz
9C5C00125000028	CE2E0009280001478EA900100002C1	To + 31	406.061 MHz +400 Hz
9C5C00126000028	CE2E0009300001416D7B80100002C1	To + 31	406.064 MHz +400 Hz
9C5C00127000028	CE2E00093800014333CA00100002C1	To + 31	406.067 MHz +400 Hz
9C5C00128000028	CE2E00094000014485DBC0100002C1	To + 31	406.070 MHz +400Hz
9C5C00129000028	CE2E000948000146DB6A40100002C1	To + 32	406.061 MHz +300 Hz
9C5C00130000028	CE2E0009800001462E5D40100002C1	To + 32	406.064 MHz +300 Hz
9C5C00131000028	CE2E00098800014470ECC0100002C1	To + 32	406.067 MHz +300 Hz
9C5C00132000028	CE2E000990000142933E40100002C1	To + 32	406.070 MHz +300Hz
9C5C00133000028	CE2E000998000140CD8FC0100002C1	To + 33	406.061 MHz +200 Hz
9C5C00134000028	CE2E0009A0000146E2E380100002C1	To + 33	406.064 MHz +200 Hz
9C5C00135000028	CE2E0009A8000144BC5200100002C1	To + 33	406.067 MHz +200 Hz
9C5C00136000028	CE2E0009B00001425F8080100002C1	To + 33	406.070 MHz +200Hz
9C5C00137000028	CE2E0009B80001400131001000002C1	To + 34	406.061 MHz +100 Hz
9C5C00138000028	CE2E0009C0000147B720C0100002C1	To + 34	406.064 MHz +100 Hz
9C5C00139000028	CE2E0009C8000145E99140100002C1	To + 34	406.067 MHz +100 Hz
9C5C00140000028	CE2E000A0000014604C480100002C1	To + 34	406.070 MHz +100Hz
9C5C00141000028	CE2E000A080001445A7500100002C1	To + 35	406.061 MHz
9C5C00142000028	CE2E000A10000142B9A780100002C 1	To + 35	406.064 MHz
9C5C00143000028	CE2E000A18000140E71600100002C1	To + 35	406.067 MHz
9C5C00144000028	CE2E000A20000146C87A40100002C1	To + 35	406.070 MHz
9C5C00145000028	CE2E000A2800014496CBC0100002C1	To + 36	406.061 MHz –500 Hz
9C5C00146000028	CE2E000A30000142751940100002C1	To + 36	406.064 MHz –500 Hz

EIRP 28 dBm To= Year/Month/Time (GMT hour : minute : second) e.g. 2002/08/06:43:22______________________			
15 Hex ID of Bcn Event	30 Hex Msg of Bcn Event	Time of First Burst in Bcn Event	Tx Freq
9C5C00147000028	CE2E000A380001402BA8C0100002C1	To + 36	406.067 MHz –500 Hz
9C5C00148000028	CE2E000A400001479DB900100002C1	To + 36	406.070 MHz –500Hz
9C5C00149000028	CE2E000A48000145C30880100002C1	To + 37	406.061 MHz –400 Hz
9C5C00150000028	CE2E000A80000145363F80100002C1	To + 37	406.064 MHz –400 Hz
9C5C00151000028	CE2E000A88000147688E00100002C1	To + 37	406.067 MHz –400 Hz
9C5C00152000028	CE2E000A900001418B5C80100002C1	To + 37	406.070 MHz –400Hz
9C5C00153000028	CE2E000A98000143D5ED00100002C1	To + 38	406.061 MHz –300 Hz
9C5C00154000028	CE2E000AA0000145FA8140100002C1	To + 38	406.064 MHz –300 Hz
9C5C00155000028	CE2E000AA8000147A430C0100002C1	To + 38	406.067 MHz –300 Hz
9C5C00156000028	CE2E000AB000014147E240100002C1	To + 38	406.070 MHz –300Hz
9C5C00157000028	CE2E000AB80001431953C0100002C1	To + 39	406.061 MHz –200 Hz
9C5C00158000028	CE2E000AC0000144AF4200100002C1	To + 39	406.064 MHz –200 Hz
9C5C00159000028	CE2E000AC8000146F1F380100002C1	To + 39	406.067 MHz –200 Hz
9C5C00160000028	CE2E000B000001406132801000002C1	To + 39	406.070 MHz –200Hz
9C5C00161000028	CE2E000B080001423F8300100002C1	To + 40	406.061 MHz –100 Hz
9C5C00162000028	CE2E000B10000144DC5180100002C1	To + 40	406.064 MHz –100 Hz
9C5C00163000028	CE2E000B1800014682E000100002C1	To + 40	406.067 MHz –100 Hz
9C5C00164000028	CE2E000B20000140AD8C40100002C1	To + 40	406.070 MHz –100Hz
9C5C00165000028	CE2E000B28000142F33DC0100002C1	To + 41	406.061 MHz
9C5C00166000028	CE2E000B3000014410EF40100002C1	To + 41	406.064 MHz
9C5C00167000028	CE2E000B380001464E5EC0100002C1	To + 41	406.067 MHz
9C5C00168000028	CE2E000B40000141F84F00100002C1	To + 41	406.070 MHz
9C5C00169000028	CE2E000B48000143A6FE80100002C1	To + 42	406.061 MHz +500 Hz
9C5C00170000028	CE2E000B8000014353C980100002C1	To + 42	406.064 MHz +500 Hz
9C5C00171000028	CE2E000B880001410D7800100002C1	To + 42	406.067 MHz +500 Hz
9C5C00172000028	CE2E000B90000147EEAA80100002C1	To + 42	406.070 MHz +500Hz
9C5C00173000028	CE2E000B98000145B01B00100002C1	To + 43	406.061 MHz +400 Hz
9C5C00174000028	CE2E000BA00001439F7740100002C1	To + 43	406.064 MHz +400 Hz
9C5C00175000028	CE2E000BA8000141C1C6C0100002C1	To + 43	406.067 MHz +400 Hz
9C5C00176000028	CE2E000BB0000147221440100002C1	To + 43	406.070 MHz +400Hz
9C5C00177000028	CE2E000BB80001457CA5C0100002C1	To + 44	406.061 MHz +300 Hz
9C5C00178000028	CE2E000BC0000142CAB400100002C1	To + 44	406.064 MHz +300 Hz
9C5C00179000028	CE2E000BC8000140940580100002C1	To + 44	406.067 MHz +300 Hz
9C5C00180000028	CE2E000C000001403401001000002C1	To + 44	406.070 MHz +300Hz
9C5C00181000028	CE2E000C080001426AB080100002C1	To + 45	406.061 MHz +200 Hz
9C5C00182000028	CE2E000C1000014489620010000 2C1	To + 45	406.064 MHz +200 Hz
9C5C00183000028	CE2E000C18000146D7D380100002C1	To + 45	406.067 MHz +200 Hz
9C5C00184000028	CE2E000C20000140F8BFC0100002C1	To + 45	406.070 MHz +200Hz
9C5C00185000028	CE2E000C28000142A60E40100002C1	To + 46	406.061 MHz +100 Hz
9C5C00186000028	CE2E000C3000014445DCC0100002C1	To + 46	406.064 MHz +100 Hz
9C5C00187000028	CE2E000C380001461B6D40100002C1	To + 46	406.067 MHz +100 Hz
9C5C00188000028	CE2E000C40000141AD7C80100002C1	To + 46	406.070 MHz +100Hz
9C5C00189000028	CE2E000C48000143F3CD00100002C1	To + 47	406.061 MHz
9C5C00190000028	CE2E000C8000014306FA00100002C1	To + 47	406.064 MHz

EIRP 28 dBm To= Year/Month/Time (GMT hour : minute : second) e.g. 2002/08/06:43:22______________________			
15 Hex ID of Bcn Event	30 Hex Msg of Bcn Event	Time of First Burst in Bcn Event	Tx Freq
9C5C00191000028	CE2E000C88000141584B80100002C1	To + 47	406.067 MHz
9C5C00192000028	CE2E000C90000147BB9900100002C1	To + 47	406.070 MHz
9C5C00193000028	CE2E000C98000145E52880100002C1	To + 48	406.061 MHz +500 Hz
9C5C00194000028	CE2E000CA0000143CA44C0100002C1	To + 48	406.064 MHz +500 Hz
9C5C00195000028	CE2E000CA800014194F540100002C1	To + 48	406.067 MHz +500 Hz
9C5C00196000028	CE2E000CB00001477727C0100002C1	To + 48	406.070 MHz +500Hz
9C5C00197000028	CE2E000CB80001452996401000002C1	To + 49	406.061 MHz +400 Hz
9C5C00198000028	CE2E000CC00001429F8780100002C1	To + 49	406.064 MHz +400 Hz
9C5C00199000028	CE2E000CC8000140C13600100002C1	To + 49	406.067 MHz +400 Hz
9C5C00200000028	CE2E00100000014160CF00100002C1	To + 49	406.070 MHz +400Hz

- END OF ANNEX B -

ANNEX C

TEST SCRIPTS FOR OBJECTIVE T-4
(Channel Capacity)

Introduction

This annex provides a description of the test signals that will be transmitted by the French simulator for objective T-4. Each row in the table represents a single beacon event. Each beacon event is comprised of 18 beacon bursts, which may overlap in time. The start of time of the first beacon burst for each beacon event is provided in the table.

To obtain sufficient statistics 10 different scripts for each beacon population will be transmitted. The first of the 10 scripts simulating 15 simultaneously active beacons is provided below.

The 15 Hex ID of each beacon event conforms to the following convention:

9 C 5 C 0 0	C	XX	XX	X	0	34
Fixed Values For all Beacon Events	"C" Indicating Capacity Test	Number of Active Beacons	Beacon Event Serial Number	Script Sequence Identifier (1 through A)	Fixed Values For all Beacon Events	Transmit EIRP

Updated table to be provided by France

- END OF ANNEX C -

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ANNEX D

TEST SCRIPTS FOR OBJECTIVES T-6 AND T-7

Introduction

This annex provides a description and schedule of the test signals that will be transmitted by the French simulator for objectives T-6 and T-7. Each row in the table represents a single beacon event used in the test script. Each beacon event will replicate a typical 406 MHz distress beacon active for a period of 20 minutes (24 bursts).

The 15 Hex ID of each beacon event conforms to the following convention:

9 C 5 C 0 0	67	0	XXX	0	37
Fixed Values For all Beacon Events	"67" indicating tests T6 and T7	Fixed Value	Beacon Event Serial Number	Fixed Value	Transmit EIRP

15 Hex ID of Bcn Event	30 Hex Msg of Bcn Event	Time of First Burst in Bcn Event To + X Sec (hh:mm:ss.cc)	Tx Freq
9C5C00670001037	CE2E0033800081BB80A1C0100002C1	00:00:40.58	406.061
9C5C00670002037	CE2E0033800101BFC3CF40100002C1	00:10:24.79	406.061
9C5C00670003037	CE2E0033800181BC02EAC0100002C1	00:20:42.40	406.061
9C5C00670004037	CE2E0033800201BEF36A80100002C1	00:30:00.75	406.061
9C5C00670005037	CE2E0033800281BD324F00100002C1	00:40:26.58	406.061
9C5C00670006037	CE2E0033800301B9712180100002C1	00:50:43.33	406.061
9C5C00670007037	CE2E0033800381BAB00400100002C1	01:00:19.72	406.061
9C5C00670008037	CE2E0033800401BC922100100002C1	01:10:32.53	406.061
9C5C00670009037	CE2E0033800481BF530480100002C1	01:20:02.53	406.061
9C5C00670010037	CE2E0033800801B850B600100002C1	01:30:14.09	406.061
…			
…			
…			
…			
9C5C00670272037	CE2E0033813901BD921880100002C1	48:10:48.27	406.061

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ANNEX E

DATA TO BE COLLECTED FOR OBJECTIVES T-1, T-2 AND T-3

Introduction

This annex provides a description of the data to be recorded for each beacon event transmitted by the simulator for objectives T-1, T-2, and T-3. This information provides the foundation for the analysis and conclusions provided in the body of the report.

The table below combines information obtained from the simulator operator, with data collected from the GEOLUT under test. Each row in the table represents a single beacon event.

A separate table should be provided for each run of the simulator (i.e. there should be 4 tables for each EIRP value since each EIRP scenario is repeated 4 times).

These tables should be included as an annex in the MSG Performance Evaluation Report provided by each participating MSG GEOLUT operator.

Table E-1: Results for Tests T-1, T-2 and T-3

EIRP (dBm)___________________ Date/Time of First Burst in Test Script Run 1_____________									
15 Hex ID Tx by Simulator	Time of First Burst in Bcn Event	Time GEOLUT provided First Valid Msg	First Valid Msg C/No Measured by GEOLUT (dBHz)	Time GEOLUT provided First Complete Msg	First Complete Msg C/No Measured by GEOLUT (dBHz)	Time GEOLUT Provided Confirmed Msg	Confirmed Complete Msg C/No Measured by GEOLUT (dBHz)	Freq Transmitted (Hz)	Calibrated Freq Measured by GEOLUT for first Valid Message (Hz)

The time required for the GEOLUT to produce a valid message for each beacon event can be calculated by taking the difference between columns 3 and 2. The time to produce complete and confirmed complete message is the difference between columns 5 and 2, and 7 and 2.

- END OF ANNEX E –

ANNEX F

DATA TO BE COLLECTED FOR OBJECTIVE T-4

Introduction

This annex provides a description of the data which should be recorded for each beacon event transmitted by the simulator for objective T-4. This information provides the foundation for the analysis and conclusions provided in the body of the report.

The table below combines information obtained from the simulator operator, with data collected by the GEOLUT under test. Each row in the table represents a single beacon event.

A separate table should be provided for each run of a test script (i.e. there should be 10 tables for each simulated traffic load).

These tables should be included as an annex in the MSG Performance Evaluation Report provided by each participating MSG GEOLUT operator.

Simulated Traffic Load (Number of simultaneously occurring beacon events)______________ Script Number ___ Date/Time of First Burst in Test Script Run 1____________								
15 Hex ID Tx by Simulator	Time of First Burst in Bcn Event	Time GEOLUT provided First Valid Msg	First Valid Msg C/No Measured by GEOLUT (dBHz)	Time GEOLUT provided first Complete Msg	First Complete Msg C/No Measured by GEOLUT (dBHz)	Time GEOLUT Confirmed Complete Msg	Confirmed Complete Msg C/No Measured by GEOLUT (dBHz)	Frequency

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ANNEX G

DATA TO BE COLLECTED FOR OBJECTIVES T-6 AND T-7

Introduction

This annex provides a description of the data which should be recorded for each beacon event transmitted by the simulator for objectives T-6 and T-7. This information provides the foundation for the analysis and conclusions provided in the body of the report.

The table below combines information obtained from the simulator operator, with data collected by the GEOLUT under test. Each row in the table represents a single beacon event.

This table should be included as an annex in the MSG Performance Evaluation Report provided by each participating MSG GEOLUT operator.

15 Hex ID Tx by Simulator	Time of First Burst in Bcn Event	Time GEOLUT Provided First Valid Msg	First Valid Msg C/No measured by GEOLUT (dBHz)	Time GEOLUT Provided First Complete Message	First Complete Msg C/No measured by GEOLUT (dBHz)	Time GEOLUT Provided First Confirmed Complete Msg	Confirmed Complete Msg C/No measured by GEOLUT (dBHz)	LEOSAR Interference (Y/N)

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ANNEX H

DATA TO BE COLLECTED FOR OBJECTIVE T-8

Introduction

This annex provides a description of the data which should be recorded for each processing anomaly noted in the 406 MHz channel reserved for reference beacons.

This table should be included as an annex in the MSG Performance Evaluation Report provided by each participating MSG GEOLUT operator.

15 Hex ID Produced by GEOLUT	15 Hex ID of Associated Reference Beacon	Beacon Message Produced by GEOLUT (30 Hex)	C/No of Message as Measured by GEOLUT (dBHz)	Date / Time	LUT in LEO Footprint (Y/N)

__________ = Total duration that the GEOLUT was in the footprint of a LEOSAR satellite during the 4 week period of observation.

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ANNEX I

DATA TO BE COLLECTED FOR OBJECTIVE T-9

Introduction

This annex provides a description of the data which should be recorded for test T-9 (MSG Coverage), for the test using beacon events of opportunity.

This table should be included as an annex in the MSG Performance Evaluation Report provided by each participating MSG GEOLUT operator.

15 Hex ID	Location Determined by LEOSAR System	LEOSAR Detection Time	Detected by GEOLUT (Yes / No)

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ANNEX J

MSG GEOSAR Performance Evaluation Programme Schedule

MILESTONE	2002												2003												2004									
	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O
01 – MSG Experts Working Group Meeting		x																																
02 - JC-16 Review Performance Evaluation Plan						x																												
03 - Finalise Changes to Plan								x																										
04 - CSC-29 Approve Plan										x																								
05 - GEOLUT Providers Install GEOLUTs	—	—	—	—	—	—	—	—	—	—																								
06 - France Develop Test Scripts For Eval Prog (Phase 3 - C/S R.011)			—	—	—	—	—	—	—	—																								
07 - MSG Satellite Launched								x																										
08 - EUMETSAT Initial On-orbit Testing									x																									
09 - Confirmation by EUMETSAT that Sat Available										x																								
10 - GEOSAR Space Segment Commissioning Tests (Phase 1 Testing)										—	—																							
11 – National GEOLUT Testing (Phase 2 Testing)													—	—																				
12 – Phase 2 Test Review and Phase 3 Preparation Meeting															x																			
13 – Individual GEOLUTs Declared Operational by Administration																—	—	—	—	—	—	—	—	—	—	—	—	—						
14 – Conduct Performance Evaluation Programme (Phase 3 - C/S R.011)																—	—	—	—															
15 – CSC-31 Consider Preliminary Phase 3 Test Reports																						x												
16 – MSG GEOSAR Task Group (Prepare MSG Performance Eval Report)																									x									
17 – Modify Technical Documents (if required)																				—	—	—	—	—	—	—	—	—						
GEOLUT Specification (C/S T.009)																																		
GEOLUT Commissioning (C/S T.010)																																		
18 – Modify Operational Documents (if required)																				—	—	—	—	—	—	—	—	—						
C/S A.001 (DDP)																																		
C/S A.002 (SID)																																		
19 – GEOLUT Operators Commission Tests (if not done under 11 above)																									—	—	—							
20 – JC-18 Review MSG Performance Evaluation Report																														x				
21 - CSC Commission MSG GEOLUTs																						x												x

-END OF ANNEX J-

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