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ISE Power Control Requirements

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Revision History

	Design Document Name: ISE Power Control Requirements		
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Rev.	**Descriptions**	**Approval**	**Date**
1.7	a. Add detail to antenna gain compensation example.	GE Hosimer	January 4, 2001
1.8	a. Corrected text and flowcharts related to EIRP computation and Antenna Gain Control. b. Added details to example system calibration with antenna gain compensation. c. Convert to Technical Note format.	GE Hosimer	January 17, 2002
1.9	a. Add detail on No_Power_Flag operation to Sec. 9.0 b. Change Sec. 6.1 to Sec. 9.1 c. Minor corrections	GE Hosimer	March 29, 2002
2.0	a. Add Appendix A - System Calibration Tables for FCC	GE Hosimer	April 17, 2002

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1 Introduction

This paper has been updated from version 1.8 to version 1.9 and includes the latest changes to the ISE Power Control design and implementation requirements. In particular, clarifications have been added that outline the software implementation requirements for antenna gain compensation for each case where the host is either logged-off or logged-on. Flowcharts have been enhanced to provide additional detail for software engineering implementation.

2 General Requirements

The ISE MTU power control mechanism is implemented via software functionally partitioned between the DSP and the LP in a manner commensurate with the capabilities of each of these configuration items.

A baseline is defined for power control in three operational modes, signaling (M-Burst transmission), Voice, and HSD.

Power Control for the ISE MTU consists of two procedures. Both procedures work toward managing the Aero-M4 SATCOM EIRP.

1. **Antenna Gain Compensation** - maintains nominal EIRP during aircraft movement.
2. **Dynamic Power Control** - maintains optimal (presumed) link performance between LES and MES.

Refer to the block diagram of Figure 1 for the various functional elements of the Aero-M4 SATCOM system also referred to as the Aero-M4 MES. The EIRP is adjusted asynchronously by either power control procedure during normal MTU operation.

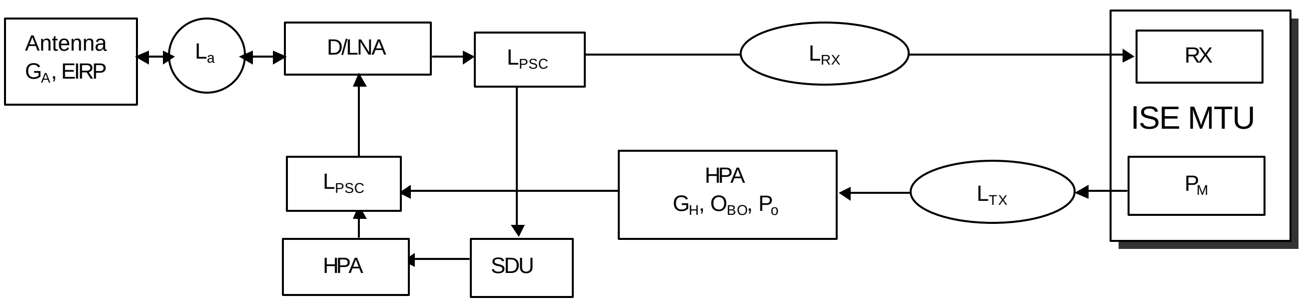

Figure 1- Aero-M4 SATCOM System Block Diagram

The Aero-M4 MES nominal EIRP is related to the parameters of the various system elements according to equation (1).

$$EIRP = P_M - L_{TX} + G_H - L_{HA} + G_A \quad (1)$$

3 Initial Setup

Six settable system parameters are defined in Table 1 of which the initial values are selected via the debug port while in "Protocol Mode". Any of these settable parameters not selected by the user should be set to the default values shown in Table 1. Default values are hard coded in the LP software. Manually selected settable values along with default values are stored in non-volatile Flash memory.

Additional system parameters necessary to support the power control functions are defined in Table 2. Computational resolution for the variables shown is ±0.5dB.

Table 1 - System Parameters Settable from the Debug Port

Parameter Notation	Parameter Definition	Settable Values	Default Value
$EIRP_{limit}$	Initial nominal EIRP limit override	Override = 20-24.5dBW in 0.5dB steps. Normal = 25dBW.	25dBW
G_{A_limit}	Minimum antenna gain threshold limit defines boundary of invalid operation	Range 7-12dBi in 1dB steps.	10dBi
G_{M-H}	Gain from ISE MTU TX output to HPA output computed as; ($G_{M-H} = P_H(k) + 30 - P_M(k)$)	Range 36-42dB in 1dB steps.	38dB
L_{HA}	Loss from HPA to antenna ($L_{HA} = L_a + L_{PSC}$)	1dB steps. (Minimum=1dB)	4dB
P_{H_limit}	Maximum nominal HPA output power limit.	Range 13-18dBW in 0.5dB steps.	17.5dBW
T_{M*FR}	Time Period between HPA commands where M is the equivalent number of frames with $M \geq 2$	Settable via debug port from M=2-6 frames where frame=80msec.	3

COMMENTARY: The ISE MTU in its currently designed state, and given its origin in the Gemini-128 LMT, will not meet the dynamic range requirements defined in the Honeywell Inc. TRS document to the extent with which it was originally intended. The Aero-M4 dynamic power control requirements are not compatible with the inherited power control mechanisms of the current DSP software making it impossible to use the MTUs output power adjustment capability to compensate for the specified installation variances on the transmit side. This paper defines a reasonable implementation that seeks to minimize the impact of the current design limitation. **(As of 8/27/01 the set-ability of $P_M(0)$ backed off from P_{M_max} is reduced to a range of about 10dB below P_{M_max} and may be enough to compensate for most all cases where backoff may be required.)**

Table 2 - Power Control Parameters for the ISE MTU

Parameter Notation	Parameter Definition	Value	Type
$EIRP_{ADJ}$	EIRP Adjust Value from SU (AA_H) (Mini-M Section B Table 15 Item 64)	Table 4	System Input Variable
$EIRP(k)$	EIRP at output of antenna	dBW	Computed Variable
$e_{GA}(k)$	Antenna gain error computed as, ($e_{GA}(k) = g_a - G_{A\_nom}$)	dB	Computed Variable
g_a	Actual antenna gain as reported by SDU via the HTCE port	dBi	System Input Variable
$G_A(k)$	Antenna gain working value used during computation	dBi	Computed Variable
G_{A_max}	Maximum Antenna Gain	17dBi	Reference Only
G_{A_min}	Minimum Antenna Gain	7dBi	Reference Only
G_{A_nom}	Nominal Antenna gain, Also represented as $G_A(0)$.	12dBi	Hard Coded
$G_H(k)$	HPA gain computed as;	dB	Computed Variable
$G_H(0)$	Calibrated HPA gain	dB	Computed Constant
G_{H_max}	Maximum HPA gain	58±2 dB	Hard Coded Value = 60
L_a	Loss through antenna	≈0.3 dB	Reference Only
L_{PSC}	Loss through power splitter/combiner	≈3.5 dB	Reference Only
L_{TX}	Total TX losses: Includes loss through HS-600 chassis and loss through cable between MTU Tx port to HPA Tx port. ($L_{TX} = L_{txcable} + L_{HS600}$)	22.5dB	Hard Coded
$L_{txcable}$	Loss through cable between MTU Tx port to HPA	20dB	Reference Only
L_{HS600}	Loss through HS-600 chassis between ARINC-600 connector and Tx port of Radio Module	2.5dB	Reference Only
$O_{BO}(k)$	HPA output back off	dB	Computed Variable
$O_{BO}(0)$	Calibrated HPA output back off	dB	Computed Constant
O_{BO_max}	Maximum HPA output back off to minimize output while carrier is off	25dB	Hard coded
O_{BO_min}	Minimum HPA output back off required to maintain linearity	0dB	Hard Coded
$P_H(k)$	HPA output power	dBW	Computed Variable
$P_H(0)$	Calibrated HPA output power	dBW	Computed Constant
P_{H_in}	Power level input to the HPA	dBm	Computed Intermediate
$P_M(k)$	Nominal ISE MTU TX power level	dBm	Computed Variable
$P_M(0)$	Calibrated ISE MTU Tx power level	dBm	Computed Constant
P_{M_max}	Maximum ISE MTU TX power level	+14dBm	Hard Coded

4 Initialization and System Calibration

During system initialization the LP establishes communication with the HPA equipment, where upon power up, the transmit carrier is commanded to the OFF condition with the HPA programmed using $O_{BO}(k) = O_{BO\_max}$ with the MTU control signal *TX_SLEEP=Enabled* to disable final transmit amplifier stage on the Radio Module.

The Aero SATCOM equipment must first be calibrated for a given installation before the ISE MTU can operate within the Inmarsat network. System calibration is performed for a nominal initial EIRP of 25dBW for the system to operate in HSD mode.

The sequence of steps required for calibration is straightforward. During initialization the MTU's LP computes static values for certain system parameters that aid in "calibrating" the SATCOM equipment for a given MTU equipment installation. Due to the differences between aero SATCOM equipment configurations the potential exists for the MTU's Tx power level to exceed the specified HPA input level or cause the HPA to exceed its rated maximum power level.

Accurate system calibration requires valid system parameter settings. Before entering the operating mode, the settings for G_{A_limit}, P_{H_limit}, $EIRP_{limit}$, and $G_{M\text{-}H}$ should be checked to verify that system operational limits are being violated. For computed values that violate such limits, working values are set to the limiting value. System calibration requires use of the settable parameters entered via the debug port under the MAINTENACE SETTINGS menu to compute the two basic system operational settings; the ISE MTU Tx output back off and the HPA output back off.

5 System Calibration Procedure

The SATCOM system calibration for the ISE is performed in two steps.

(STEP 1) The first calibration step checks to see if the limits for HPA P_{H_limit} and antenna gain G_{A_limit} entered via the debug port will cause the computed HPA output power to exceed its maximum rated output $P_H(k) \le P_{H\_limit}$ that might satisfy the initial nominal $EIRP(k) = EIRP_{limit}$ given the output back off is set to its limit $O_{BO}(k) = O_{BO\_min}$. Figure 4 defines the requirements for software implementation of System Calibration Step 1.

The HPA output power is computed relative to the output EIRP and the antenna gain by equation (2).

$$P_H(k) = EIRP(k) - G_A(k) + L_{HA} \tag{2}$$

Table 3 summarizes the valid operating range for system parameters $O_{BO}(k)$ and $P_M(k)$ given the settings for P_{H_limit} and $EIRP_{limit}$.

To calibrate the HPA gain, indicated by $G_H(0)$, equation (3) allows a limit be set on the overall HPA gain if desired by setting the value for O_{BO_min} to any value other than the default value of 0dB.

$$G_H(0) = G_{H\_max} - O_{BO\_min} \tag{3}$$

Equations (2) and (3) are used to compute the calibrated ISI MTU Tx output power $P_M(0)$ using equation (4).

$$P_M(k) = P_H(k) - G_H(k) + 30.0. \tag{4}$$

Such that,

$$P_M(0) = P_H(0) - G_H(0) + 30.0$$

The index notation k is not used in calibration computations. Values noted with k=0 are defined as calibrated values.

Example: Step 1:

The numerical values computed in this example are summarized in Table 4.

Suppose the initial settings at the debug port are set as follows.

L_{HA} = 3.0 dB
G_{A_limit} = 8.0 dBi
$EIRP_{limit}$ = 25.0 dBW
P_{H_limit} = 17.5 dBW
O_{BO_min} = 0dB (fixed value)

Since O_{BO_min} = 0dB the initial calibrated HPA gain is set to maximum,

$G'_H(0) = G_{H\_max}$ -0dB= 60.0dB.

The HPA output power required to maintain $EIRP(k) = EIRP_{limit}$ = 25.0dBW when $G_A(k) = G_{A\_limit}$ =8.0 dBi is determined using equation (2) as,

$P'_H(k)$ = 25.0dBW - 8.0 dBi + 3.0 dB = 20.0dBW.

If $P'_H(k) > P_{H\_limit}$ (20.0dBW > 17.5dBW), then the HPA output power should be set to $P'_H(0)$ = 17.5dBW.

At this point $P'_H(0)$ represents the HPA calibration point with $G_A(k) = G_{A\_limit}$ and is not the final calibrated HPA output power. The EIRP at this HPA output level is less than $EIRP_{limit}$ or 23.5dBW.

With P_{M_max} = +14.0dBm at the MTU TX port and with HS-600 chassis loss L_{HS600} = 2.5dB the maximum available Tx output power from the MTU is,

$P'_{M\_max} = P_{HS600\_max} - L_{HS600}$ = +14.0 - 2.5 = +11.5dBm,

Where P'_{M_max} would be a measurable value at the output of the HS-600 transmit port. However, in order not to exceed P_{H_limit} = 17.5dBW the first order MTU transmit output level for should be determined from (4) as,

$P'_M(k)$ = 17.5dBW +30.0dB - 60.0dB + 20.0dB = +7.5dBm,

To achieve this output level the MTU transmit power must be backed off from its maximum nominal level by,

$P'_{M\_max} - P'_M(k)$ = +11.5dBm - 7.5dBm = 3.0dB.

For P_{H_limit} maintenance settings with half-dB values the 0.5dB attenuation shall be managed by the HTCE Interface Task by adjusting $P_M(k)$ as required as described in calibration step 2.

The example also shows the need for a 0.5dB adjustment at the ISE MTU Tx output when P_{H_limit} values are 17.5, 16.5, 15.5, 14.5, or 13.5dBW. Implementing the 0.5dB adjustment can be achieved by adjusting the power_setting value of Table 5 accordingly in the MTU as defined in calibration step 2.

(STEP 2) The second calibration step computes the final calibrated HPA output $P_H(0)$ with the antenna gain set to the nominal antenna gain G_{A_nom}=12dBi such that $G_A(k) = G_{A\_nom}$ and $EIRP(k) = EIRP_{limit}$. In addition, the HPA output back off is computed $O_{BO}(0)$ using equation (5). Finally the calibrated values $G_H(0)$, $P_M(0)$ and $EIRP(0)$ are determined. Figure 5 defines the requirements for software implementation of System Calibration Step 2.

The HPA output power given nominal antenna gain $G_A(k) = G_{A\_nom}$ and $EIRP(k) = EIRP_{limit}$ is again from equation (2),

$P_H(k) = EIRP_{limit} - G_{A\_nom} + L_{HA}$,

But if $P_H(k) > P_{H\_limit}$, then the calibrated HPA power should be set to $P_H(0) = P_{H\_limit}$.

With this HPA output power the initial calibrated transmit EIRP is,

$EIRP'(0) = P_H(0) - L_{HA} + G_{A\_nom}$

To allow adjustment room to compensate for antenna gain variations the HPA OBO is computed based on the following equation,

$O_{BO}(0)$ = Round Up $[P'_H(0) - P_H(0)]$ (5)

If the $P'_H(0) - P_H(0)$ result has both <u>integer</u> and <u>fractional</u> values > 0, it should be rounded up to the next highest integer value, e.g. $P'_H(0) - P_H(0) = 0.5$dB rounds up to 1, $P'_H(0) - P_H(0) = 1.5$dB rounds up to 2, etc. The purpose of rounding up is that the HPA only accepts OBO in whole dB numbers.

Finally, the values for $G_H(0)$ and $P_M(0)$ are computed using $O_{BO}(0)$ for the calibrated HPA gain,

$$G_H(0) = G_{H\_max} - O_{BO}(0)$$

And the calibrated ISE MTU transmit output level,

$$P_M(0) = P_H(0) + 30.0 - G_H(0) + L_{txcable}$$

The final calibrated EIRP is then,

$$EIRP(0) = P_M(0) - L_{txcable} + G_H(0) - 30.0 - L_{HA} + G_{A\_nom}$$

This $EIRP(0)$ should be equal to $EIRP'(0)$. $P_M(0)$ and $O_{BO}(0)$ are the calibrated MTU Tx output power and HPA output backoff settings respectively for HSD.

Example: Step 2:

The numerical values computed in this example are summarized in Table 4.

Continuing from the previous example, the calibrated HPA output is computed with nominal antenna gain is,

$$\boldsymbol{P_H(0) = EIRP_{limit} - G_{A\_nom} + L_{HA}}$$

$$= 25.0\text{dBW} - 12.0\text{dBi} + 3.0\text{ dB} = 16\text{dBW}.$$

Verify relationship of $P_H(0)$ to P_{H_limit} (16.0dBW < 17.5dBW), thus $\boldsymbol{P_H(0)}$ = 16.0 dBW,

$$EIRP'(0) = P_H(0) - L_{HA} + G_{A\_nom}$$

$$= 16.0\text{dBW} - 3.0\text{dB} + 12.0\text{dBi} = 25.0\text{dBW}.$$

The HPA OBO that maintains $P_H(k) \le P_{H\_limit}$ is found using equation (5),

$$\boldsymbol{O_{BO}(0) = \text{Round Up } [P'_H(0) - P_H(0)]}$$

$$= \text{Round Up } [17.5\text{dBW} - 16.0\text{ dBW}] = \text{Round Up } [1.5\text{dB}] = 2.0\text{ dB}.$$

The calibrated HPA gain is,

$$\boldsymbol{G_H(0) = G_{H\_max} - O_{BO}(0)}$$

$$= 60.0 - 2.0\text{ dB} = 58.0\text{ dB}.$$

Then the calibrated ISE MTU transmit output power level is,

$$\boldsymbol{P_M(0) = P_H(0) + 30.0 - G_H(0) + L_{txcable}}$$

$$= 16.0\text{ dBW} + 30.0 - 58.0\text{ dB} + 20.0\text{dB} = +8.0\text{ dBm}.$$

The calibrated EIRP can then be found,

$$\boldsymbol{EIRP(0) = P_M(0) - L_{txcable} + G_H(0) - 30.0 - L_{HA} + G_{A\_nom}}$$

$$= 8.0 - 20.0 + 58.0 - 30.0 - 3.0 + 12.0 = 25.0\text{dBW}$$

The **Tx_backoff** of Table 5 corresponding to the calibrated MTU level is determined as follows relative the HS-600 output power,

Tx_backoff = $P'_{M\_max} - P_M(0) = (11.5\text{dBm} - 8.0\text{ dBm})\text{x}10 =$ **35**

The resulting HPA OBO and MTU OBO establishes the nominal initial EIRP at the output of the antenna with nominal antenna gain $G_A(k) = G_{A\_nom}$.

The debug setting G_{M-H} defines the gain from the MTU output to the HPA output and is related to the values for $P_H(0)$ and $P_M(0)$ according to equation (6).

$$G_{M-H} = P_H(0) + 30 - P_M(0) \tag{6}$$

When the Host is logged-in to the Inmarsat Network, the LP sets $O_{BO}(0)$ into the HPA via the HTCE transmit serial port (according to the ISE MTU Design Requirements Document GL1.201.032-1-002-DRD).

See Appendix A for a summary of useful System Calibration Tables.

5.1 Economy Mode Flag

There are two conditions when the **Economy_Mode_Flag**=1.

1. If $EIRP_{limit}$ is selected via the debug port to be less than 25dBW the ACSE will set the Economy Flag=1 in the $C6_{Hex}$ NG access request message.
2. In addition, if the initial calibrated value for EIRP(0) computed during system calibration described in section 5 is less than 25dBW the ACSE will set the Economy Flag=1 in the $C6_{Hex}$ NG access request message.

6 Transmission Modes and MTU Tx Output Power

Because it is calibrated for the system to operate in HSD mode, the calibrated power level $P_M(0)$ cannot be used for M-Burst signaling or Voice mode transmissions each of which requires a lower EIRP. Table 3 summarizes the ISE MTU output level requirement for each carrier type.

Table 3 - MTU Tx Output Power vs. Transmission Mode.

Transmission Mode	$P_M(k)$	Remarks
M-Burst Signaling (BPSK)	$P_M(0)$-11dB	
Voice (O-QPSK) SCPC	$P_M(0)$-11dB	
HSD (16-QAM) SCPC	$P_M(0)$	System Calibration Point
IPDS (16-QAM)	Not Applicable	

7 Timing of HPA control and ISE MTU Carrier-On

During TDM operation, for an MESRP transmission the MTU is expected to set the initial HPA output backoff setting to $O_{BO}(0)$ within 300ms of the ACSE receiving the call assignment message and then back to $O_{BO}(k) = O_{BO\_max}$ after or between each transmitted burst. Because of the HPA control port latency (on the order of no less than 250ms) the HPA gain may not have achieved a stable point before the MTU transmits the MESRP burst. In addition, the timing between this event and when the DSP enables (*TX_SLEEP=Disabled*) the MTU's transmitter adds to the timing uncertainty. For this reason the HPA is programmed "ON" and it's output back off is set to $O_{BO}(0)$ when the terminal status $TS(k) = 2$ (**logged-on**). The HPA is programmed "OFF" two seconds after the MTU ACSE completes its log-off sequence once the terminal status $TS(k) \neq 2$ (**logged-off**).

8 Compensating for Antenna Gain Variations

The procedure for compensating antenna gain variations is performed continuously while the Host MES is either logged-off or logged-on to the Inmarsat Network. The HTCE provides the ISE MTU the SDU logged-on status and reports the antenna gain g_a via the receive serial port at a rate of 1Hz. The flowchart shown in Figure 6 defines the software implementation requirements for antenna gain compensation.

The full operating range of the system has the ability to compensate for maximum antenna gain variation of ±5dB around the nominal antenna gain of 12dBi under the condition where $O_{BO}(0) \geq 5$dB.

Initially, and anytime the SDU is logged-off, the HTCE Interface Task must send $O_{BO}(k)$ = 25dB to the HPA and at the same time compute the HPA output backoff $O_{BO}(k)$ necessary to track variations in the reported antenna gain such that when the SDU indicates being logged-on, the correct $O_{BO}(k)$ value will be sent to the HPA corresponding to the desired nominal initial EIRP.

The HTCE Interface Task checks the reported antenna gain $G_A(k) = g_a$ against the maintenance parameter minimum antenna gain limit G_{A_limit} such that when the reported gain is less than this limit, or $G_A(k) = g_a < G_{A\_limit}$ is true, the HPA output back off will be set to $O_{BO}(k)$ = 0dB, AND sends the message **MSG_AG_LOW** to the ACSE Task. When the reported gain $G_A(k) = g_a \geq G_{A\_limit}$, the HTCE Interface Task computes the *absolute antenna gain error* defined as the difference between the nominal antenna gain and the SDU reported gain in equation (7).

$$e_{GA}(k) = G_A(k) - G_{A\_nom} \tag{7}$$

The numerical range for $e_{GA}(k)$ is from 0 to ±5dB with a resolution of 1dB. Adding this to the calibrated HPA output back off value as shown in equation (8), computes the initial HPA output backoff (for k=1) just after the SDU changes its terminal status to state $TS(k)$=2 (**logged-on**).

$$O_{BO}(k) \quad \left\{ \begin{array}{ll} = O_{BO}(0) + e_{GA}(k); & \text{For } [O_{BO}(0) + e_{GA}(k)] \geq 0 \\ = 0; & \text{For } [O_{BO}(0) + e_{GA}(k)] < 0 \end{array} \right\} \tag{8}$$

The value $O_{BO}(k)$ will set the HPA output backoff that corresponds to the desired nominal initial EIRP. Equation (8) is normally used to control the HPA OBO while the host is logged-on (see Case 1 below).

In addition, while the host is logged-on, the *relative antenna gain error* of equation (9) is computed to determine the degree of gain change between consecutive values (samples) of reported antenna gain where $G_A(k) = g_a$ is the current antenna gain as indicated by the sample index notation k and $G_A(k\text{-}1) = g_a'$ is the previous antenna gain as indicated by the sample index notation k-1, and n is defined for use when the absolute value of the relative error > 1dB (see Case 2 below). In this case, the HPA OBO is programmed based on the relative gain error as shown in equation (10).

$$\epsilon(k,n) = G_A(k) - G_A(k-1) \tag{9}$$

$$O_{BO}(k,n) = O_{BO}(k-1,n) + \epsilon(k,n) \tag{10}$$

The HPA OBO is thus programmed according to the following case criteria.

Case 1:

If $|\epsilon(k,n)| \leq$ 1dB, immediately send $O_{BO}(k)$ to the HPA. Applies when the antenna gain either does not change or changes with typical values of $\epsilon(k,n)$= ±1dB. In this case, equation (8) is used to program the HPA OBO.

Case 2:

If $|\epsilon(k,n)|$ > 1dB, $O_{BO}(k,n)$ must be applied to the HPA incrementally spaced apart by the minimum duration $T_{M*FR} \geq$ 160msec (where FR=80msec, and M=3 is the default maintenance setting value) until the required HPA output back off setting is reached (when $\epsilon(k,n)$ = 0dB). The index n is used to count the number of times the output back off adjustment is applied to the HPA and is decremented until n=0 from the initial value of $n = N = |\epsilon(k,n)|$. Note also that the notation index k-1 indicates the previous HPA output backoff setting to which 1dB is sequentially added or subtracted, depending on the sign of $\epsilon(k,n)$, from $n=N$ until n=0 as follows.

$O_{BO}(k,N-1) = O_{BO}(k-1,N) \pm$ 1dB

Delay by T_{M*FR}…

$O_{BO}(k,0) = O_{BO}(k,N\text{-}1) \pm 1\text{dB}$

The total time required to program the HPA OBO under Case 2 is NxM where M is set under the maintenance parameter menu (accessible only once after the LP SW boots up). The change in antenna gain between samples (one second intervals) is not expected to exceed 2dB ($N \leq 2$) under normal operating conditions. Given this value, M could be set to its maximum settable value M=6 and the total HPA OBO programming time when N=2 remains within the one (1) second limit, 2x6=12x80ms=960ms<1sec.

The defined systems antenna gain compensation operating range is limited by two other conditions when the reported antennas gain < 12dBi (*absolute antenna gain error* is negative). The first is when the calibrated value for $O_{BO}(0)$ < 5dB, which is managed with equation (8) and the second is when the reported antenna gain reaches the antenna gain limit $G_A(k) = G_{A\_limit}$. When the antenna gain limit is exceeded, $G_A(k) < G_{A\_limit}$, the HTCE Interface task must send the message **`MSG_AG_LOW`** to the ACSE task. When the antenna gain returns within its normal operating range, the HTCE Interface task must sent the message **`MSG_AG_NORM`** to the ACSE task.

How the antenna gain compensation process works is best illustrated by the following example of which the results are summarized in the following example over a range of k samples and for various values of antenna gain.

Example:

The numerical values computed in this example are summarized in Table 5.

This example continues from the previous example with the following system parameters,

$P_H(0)$	= 16.0 dBW	L_{HA}	= 3.0 dB
$O_{BO}(0)$	= 2.0 dB	G_{A_limit}	= 8.0 dBi
$G_H(0)$	= 58.0 dB	$EIRP_{limit}$	= 25.0dBW
$P_M(0)$	= 8.0 dBm	P_{H_limit}	= 17.5dBW
$EIRP(0)$	= 25.0 dBW		
backoff	= 35		

Suppose the SDU terminal status is **logged-off** and the current reported antenna gain is $G_A(k)$ = 9dBi (as reported by the SDU) with G_{A_nom} = 12dBi and using equation (7) the *absolute antenna gain error* computes to,

$e_{GA}(k)$ = 9dBi - 12dBi = -3dB.

Also while **logged-off** the actual HPA output back off for all samples k<1 is,

$O_{BO}(k<1)$ = 25dB.

Then, at sample instant k=1, when the SDU terminal status changes to **logged-on**, the *absolute gain error* is,

$e_{GA}(1)$ = 9dBi - 12dBi = -3dB,

and the initial HPA OBO value is set according to equation (8) as,

$O_{BO}(1) = O_{BO}(0) + e_{GA}(1)$

$= \underline{2\text{dB}} + -3\text{dB} = -1\text{dB} < 0,$

thus, the initial HPA OBO is set to,

$O_{BO}(1)$ = 0dB.

While logged-on, suppose that the reported antenna gain at sample k=2 is $G_A(2)$ = 8dBi (where the antenna gain at sample k=1 is $G_A(1)$ = 9dBi as previously reported by the SDU). Using equation (7) the *absolute antenna gain error* computes to,

$e_{GA}(2)$ = 8dBi - 12dBi = -4dB.

The *relative antenna gain error* is computed at this point according to equation (9) to determine the HPA OBO programming case as follows,

$\epsilon(2,n) = G_A(2) - G_A(1)$

= 8dBi - 9dBi = -1dB,

Since $N = |\epsilon(2,n)| = 1$, **Case 1** applies (index n is not used in Case 1), and because the HPA OBO is already at the 0dB limit, $O_{BO}(1)$ = 0dB, the HPA OBO is set according to equation (8),

$O_{BO}(2) = O_{BO}(0) + e_{GA}(2)$

= $\underline{2\text{dB}}$ + -4dB = -2dB < 0,

thus, the HPA OBO is set to,

$O_{BO}(2)$ = 0dB.

Next, suppose the reported antenna gain at sample k=3 is $G_A(3)$ = 10dBi. Again, the *absolute antenna gain error* computes to,

$e_{GA}(3)$ = 10dBi - 12dBi = -2dB,

and according to equation (8),

$O_{BO}(3) = O_{BO}(0) + e_{GA}(3)$,

= $\underline{2\text{dB}}$ + -2dB = 0dB,

thus, the HPA OBO remains at,

$O_{BO}(3)$ = 0dB.

The *relative antenna gain error* according to equation (9) is,

$\epsilon(3,n) = G_A(3) - G_A(2)$

= 10dBi - 8dBi = +2dB,

At sample k=3, $N = |\epsilon(2,n)| = 2$, and thus **Case 2** applies. However, because the HPA OBO remains at the 0dB limit, $O_{BO}(3)$ = 0dB according to equation (8), it is not necessary to perform the actions required under Case 2.

Finally, suppose the reported antenna gain at sample k=4 is $G_A(4)$ = 12dBi. The *absolute antenna gain error* computes to,

$e_{GA}(4)$ = 12dBi - 12dBi = 0dB,

and according to equation (8),

$O_{BO}(4) = O_{BO}(0) + e_{GA}(4)$,

= $\underline{2\text{dB}}$ + 0dB = 2dB.

The *relative antenna gain error* according to equation (9) is,

$\epsilon(4,n) = G_A(4) - G_A(3)$

= 12dBi - 10dBi = +2dB,

Because $N = |\epsilon(2,n)| = 2$, **Case 2** applies, and since the HPA OBO exceeds the 0dB limit, $O_{BO}(4) = 2$dB according to equation (8), the actions required under Case 2 are performed as follows.

According to equation (10), the HPA OBO value at k=3 is represented by $O_{BO}(k\text{-}1,N)$ or $O_{BO}(3,2)$ =0dB with k=4 and N=2. The *relative antenna gain error* $\epsilon(4,n)$ = +2dB is changed by 1dB per HPA OBO programming step as follows.

Step 1:

$O_{BO}(4,1) = O_{BO}(3,2)$ + 1dB

= 0dB + 1dB = 1dB

…delay 240 ms…

Step 2:

$O_{BO}(4,0) = O_{BO}(4,1)$ + 1dB

= 1dB + 1dB = 2dB

The final applied HPA OBO is $O_{BO}(k)$ = 2dB which is the same as that computed by equation (8) and achieved by two consecutive OBO setting adjustments.

8.1 EIRP Limits and the No Power Flag

As the antenna gain varies so will the HPA OBO to compensate and maintain the desired EIRP to within the limits of the system equipment and maintenance parameter settings. It is possible to exceed the HPA power limit setting under the conditions where HPA OBO = 0dB and the actual HPA power level is within 1dB of the HPA power limit. To ensure this limit will not be exceeded during antenna gain compensation it is necessary to continuously compute the HPA output power $P_H(k)$ relative to $P_M(0)$ and $G_H(k)$,

$$P_H(k) = P_M(0) - L_{txcable} + G_H(k) - 30.0 \tag{11}$$

and then test this result against the HPA power output limit P_{H_Limit} such that if the limit is exceeded the HTCE Interface Task will set the **No_Power_Flag**=1 indicating the require output power is not available.

The EIRP level is then be computed according to equation (12) as follows,

$$EIRP(k) = P_M(k) - L_{txcable} + G_H(k) - 30.0 - L_{HA} + G_A(k) \tag{12}$$

The ordering of these computations is shown in the flowchart of Figure 7 and EIRP computations are illustrated in the example summarized in Table 5.

Table 4 - Example of ISE MTU System Calibration

(Settable Range) →						(20-25dBW)		(1-6dB)		(7-12dBi)			(13-18dBW)		
k	$O_{BO}(0)$	$O_{BO}(k)$	$\epsilon(k)$	$e(k)$	$G_H(k)$	$EIRP_{Limit}$	$EIRP(k)$	L_{HA}	$G_A(k)$	G_{A_Limit}	$P_M(k)$	$P_H(k)$	P_{H_Limit}	$P_M(0)$	$L_{txcable}$
'	CAL:Step1	0	-	-	60 See Note 1	25	22.5 See Note 3	3	8	8		17.5 See Note 2	17.5	7.5 See Note 4	20
"	CAL:Step2	2 See Note 7	-	-	60	25	25 See Note 6	3	12	8		16 See Note 5	17.5	7.5	20
0	2	2	0	0	58 See Note 8	25	25 See Note 6	3	12	8		16	17.5	8 See Note 9	20

Notes:

1. IF [60 - O_{BO_min} > 60, THEN $G'_H(0) = 60$, ELSE $G'_H(0) = 60 - O_{BO\_min}$] (for illustrative purposes only, SW implementation not required).
2. Compute **initial** HPA power output calibration: IF [$EIRP_{Limit} - G_{A\_Limit} + L_{HA} > P_{H\_Limit}$, THEN $P'_H(0) = P_{H\_Limit}$, ELSE $P'_H(0) = EIRP_{Limit} - G_{A\_Limit} + L_{HA}$].
3. Compute EIRP for $G_A(k) = G_{A\_Limit}$; $EIRP(k) = P'_H(0) - L_{HA} + G_{A\_Limit}$. (for illustrative purposes only, not required in SW implementation).
4. Compute **initial** MTU power output calibration: $P'_M(0) = P'_H(0) + 30 - G'_H(0) + L_{txcable}$.
5. Compute **final** HPA power output calibration: IF [$EIRP_{Limit} - G_{A\_nom} + L_{HA} > P_{H\_Limit}$, THEN $P_H(0) = P_{H\_Limit}$, ELSE $P_H(0) = EIRP_{Limit} - G_{A\_nom} + L_{HA}$].
6. Compute EIRP for $G_A(k) = G_{A\_nom}$; $EIRP(k) = P_H(0) - L_{HA} + G_{A\_nom}$. (for illustrative purposes only, not required in SW implementation).
7. Compute calibrated HPA OBO: IF [ROUNDUP [$P'_H(0) - P_H(0)$] < 0, THEN $O_{BO}(0) = 0$, ELSE $O_{BO}(0)$ = ROUNDUP[$P'_H(0) - P_H(0)$]].
8. Compute calibrated HPA gain: $G'_H(0) = 60 - O_{BO}(0)$.
9. Compute **final** MTU power output calibration: $P_M(0) = P_H(0) + 30 - G_H(0) + L_{txcable}$.

Table 5 - Example of Maintaining System Operation during Antenna Gain Compensation Activity

k	$O_{BO}(0)$	$O_{BO}(k)$	$\epsilon(k)$	$e(k)$	$G_H(k)$	$EIRP_{Limit}$	$EIRP(k)$	L_{HA}	$G_A(k)$	G_{A_Limit}	$P_M(k)$	$P_H(k)$	P_{H_Limit}	$P_M(0)$	$L_{txcable}$
1	2	0 See Note c	-3 See Note d	-3 See Note b	60	25	23.5 See Note e	3	9	8	7.5 See Note a	18	17.5	8	20
2	2	0	-1	-4	60	25	22.5	3	8	8	7.5	18	17.5	8	20
3	2	0	2	-2	60	25	24.5	3	10	8	7.5	18	17.5	8	20
4	2	0	2	0	58	25	25	3	12	8	8	16	17.5	8	20
5	2	1	-1	-1	59	25	25	3	11	8	8	17	17.5	8	20
6	2	3	2	1	57	25	25	3	13	8	8	15	17.5	8	20
7	2	2	-1	0	58	25	25	3	12	8	8	16	17.5	8	20
8	2	2	0	0	58	25	25	3	12	8	8	16	17.5	8	20
9	2	1	-1	-1	59	25	25	3	11	8	8	17	17.5	8	20
10	2	0	-1	-2	60	25	24.5	3	10	8	7.5	18	17.5	8	20
11	2	0	0	-2	60	25	24.5	3	10	8	7.5	18	17.5	8	20
12	2	0	-1	-3	60	25	23.5	3	9	8	7.5	18	17.5	8	20
13	2	0	-1	-4	60	25	22.5	3	8	8	7.5	18	17.5	8	20
14	2	0	-1	-5	60	25	21.5	3	7	8	7.5	18	17.5	8	20
15	2	0	1	-4	60	25	22.5	3	8	8	7.5	18	17.5	8	20
16	2	0	1	-3	60	25	23.5	3	9	8	7.5	18	17.5	8	20
17	2	0	1	-2	60	25	24.5	3	10	8	7.5	18	17.5	8	20
18	2	1	1	-1	59	25	25	3	11	8	8	17	17.5	8	20
19	2	2	1	0	58	25	25	3	12	8	8	16	17.5	8	20
20	2	4	2	2	56	25	25	3	14	8	8	14	17.5	8	20
21	2	5	1	3	55	25	25	3	15	8	8	13	17.5	8	20
22	2	6	1	4	54	25	25	3	16	8	8	12	17.5	8	20

Notes:

a. Compute working MTU calibration point: IF [[$O_{BO}(k) = 0$ AND $(P_H(0) - P_{H\_Limit}) > 0$], THEN $P_M(k) = (P_M(0) - 0.5)$, ELSE $P_M(k) = P_M(0)$].

b. Compute absolute antenna gain error: $e(k) = G_A(k) - G_{A\_nom}$.

c. Compute working HPA OBO: IF [$O_{BO}(0) + e(k) < 0$, THEN $O_{BO}(k) = 0$, ELSE $O_{BO}(k) = O_{BO}(0) + e(k)$].

d. Compute relative antenna gain error: $\epsilon(k) = G_A(k\text{-}1) - G_A(k)$.

e. Compute working EIRP $EIRP(k) = P_M(k) - L_{txcable} + G_H(k) - 30 - L_{HA} + G_A(k)$.

9 Dynamic Power Control

The dynamic power control procedure is active only when the ISE MTU is required to setup an HSD channel. It operates asynchronously to the antenna gain compensation procedure and commences after the one-time basic power control procedure is complete.

The EIRP Adjust SU (AA_H) provides the applicable $EIRP_{ADJ}$ values shown in Table 4 for the Aero-M4 MES. is not a complete representation of the requirements in Mini-M SDM Section B Annex 10 Paragraph 3.5.1.1(b)(ii). The LP ACSE software extract the $EIRP_{ADJ}$ value and makes this available to the LP dynamic power control routine every 6-second dynamic power control cycle.

Table 6 - EIRP Adjust values provided by the LES in the power control SU (AA_H)

Code (hex)	$EIRP_{ADJ}$	Remarks	power_setting scale	Change Rate (msec)
0	None		0	N/A
1	-1dB		+10	>160
2	-2dB	Basic power control only	+20	>340
3	-3dB	-3dB is not provided by the LES		
4	-4dB	Basic power control only	+40	>640
5	-5dB	-5dB is not provided by the LES		
6	-6dB	Basic power control only	+60	>960
D	+3dB		-30	>480
E	+2dB		-20	>340
F	+1dB		-10	>160

The dynamic power control routine uses $EIRP_{ADJ}$ to adjust the current MTU Tx output power level $P_M(i\text{-}1)$ to derive the to be applied MTU Tx power level $P_M(i)$ according to equation (11).

$$P_M(i) = P_M(i\text{-}1) + EIRP_{ADJ} \qquad (11)$$

Different for dynamic power control is the notation index i that defines any 6-second dynamic power control cycle using indices i = 2, 3, 4…etc. Index i=1 is reserved for the one time basic power control event.

The outcome of the basic power control action adjusts the calibrated MTU Tx power level $P_M(0)$ by the value of $EIRP_{ADJ}$ establishing a new output power level as follows,

$$P_M\,(1) = P_M\,(0) + EIRP_{ADJ}$$

Basic or Initial power control always reduces P_M (0) by -2dB, -4dB, or -6dB.

COMMENTARY: *If while in Economy Mode the EIRP is too low as determined by the C/No measured at the LES, the Initial power control could send a positive EIRP Adjust value with the intent to increase the MTU Tx power level. This would only be possible when the system configuration is such that the HPA gain is sufficiently backed off. Refer to the commentary in Section 9.1.*

The calibrated MTU Tx output power level P_M (0) defines the upper power limit of the dynamic power control range corresponding to the nominal initial EIRP and is not to be exceeded. In addition, the lower limit of the dynamic power control range is defined as $P_M(0)$-8dB (Mini-M SDM Section B Annex 10 Paragraph 3.4.3.1) and also should not be exceeded. The upper and lower EIRP adjustment limits are summarized as follows.

Upper EIRP adjustment limit: $P_{MU}(0) = P_M(0)$

Lower EIRP adjustment limit: $P_{ML}(0) = P_M(0)\text{-}8dB$

In each dynamic power control cycle, the computed MTU Tx power level $P_M(i)$ must not exceed the upper and lower limits such that $P_{ML}(0) \leq P_M(i) \leq P_{MU}(0)$. The following tests should be performed each time equation (11) is computed for any dynamic power control cycle,

If $P_M(i) < P_{ML}(0)$; then set $P_M(i) = P_{ML}(0)$.

If $P_M(i) > P_{MU}(0)$; then set $P_M(i) = P_{MU}(0)$.

Parameter data flow during each dynamic power control cycle is shown in Figure 2.

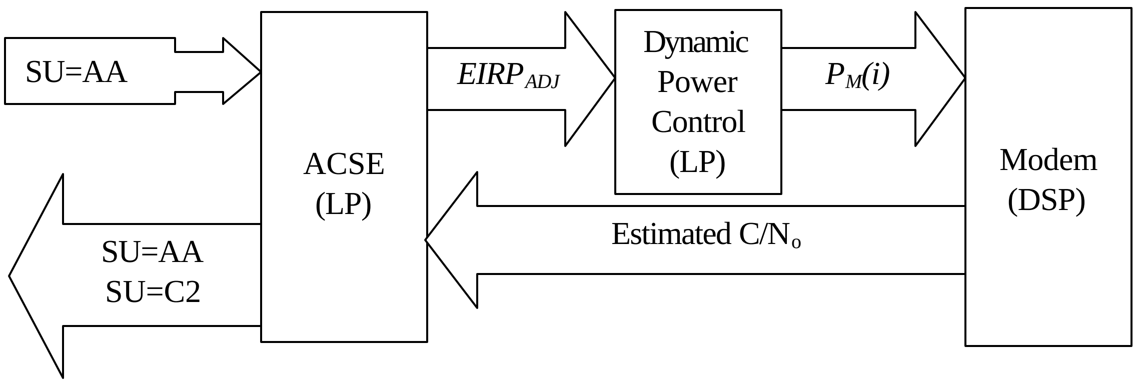

Figure 2 - Flow of parameter data during Dynamic Power Control.

9.1 No Power Flag

In addition to being controlled under antenna gain compensation the **No_Power_Flag** should be set whenever the LES EIRP Adjust is positive while the Tx power level is equal to the calibration value $P_M(0)$ even if the economy mode bit is set. If the LES has previously sent EIRP Adjust to reduce power such that the MTU output $P_M(k) < P_M(0)$ and then upon a subsequent EIRP Adjust with a positive value, the power increase is allowed to the limit $P_M(k) = P_M(0)$ For example, if the current MTU Tx power is $P_M(k) = P_M(0)$-2dB and the next LES EIRP Adjust is +3dB, the MTU can only increase power by 2dB and then the **No_Power_Flag** should be set. If the LES continues to send positive EIRP Adjust values with $P_M(k) = P_M(0)$ the **No_Power_Flag** should remain set. For EIRP Adjust values that reduce Tx power, the **No_Power_Flag** should be reset.

COMMENTARY: *While the Economy Mode Flag is set (EIRP=22.5dBW), EIRP adjustments that increase MTU Tx power such that $P_M(k) > P_M(0)$ may be possible for a fixed gain antenna configuration in which the HPA gain margin normally set aside for operation with a variable gain antenna would provide enough headroom for increasing the MTU output power. The range of increase in $P_M(k)$ above $P_M(0)$ is directly proportional to $O_{BO}(0)$.*

9.2 EIRP Change Rate Limits

The ISE MTU Tx power adjustments must comply with the maximum EIRP change rate defined as ±1dB/160msec (two 80msec frames). Any required power adjustment that exceeds ±1dB should be apportioned by the DSP software in 1dB steps spaced apart by a minimum of two 80ms frames. The time required by the DSP to make each of the respective power adjustments is summarized in Table 4.

9.3 Concurrent MTU and HPA Power Control Events (Optional)

Should the MTU and HPA power control occur simultaneously, the MTU power adjustment will be performed first with the HPA power adjustment some time later. Sequencing the power correction in this manner prevents simultaneous additive power adjustments that may exceed the maximum EIRP Change Rate. The DSP controls the MTU output while the LP controls the HPA.

When the DSP adjusts the MTU output level it enables an inhibit signal of **TBD**ms used by the LP to wait performing an HPA gain adjustment.

9.4 Numerical Representation of Power Adjustment

The dynamic power level computations can be greatly simplified in the LP when the power values are represented in integer form. The Reference Design's transmit power adjustment range is limited to 20dB and is defined in the DSP software by the integer called power_ backoff which has a range from 0 to 200 with 0 = P_{M_max} and 200 = P_{M_max} - 20dB, and a resolution and step size of 0.1dB.

The LP's dynamic power control procedure performs all $P_M(i)$ computations using the **Tx_Backoff** scale shown in Table 7. The $EIRP_{ADJ}$ values of Table 4 are represented in the **Tx_Backoff** scale.

Table 7 - Numerical Scale used for Dynamic Power Control

$P_M(i)$ (dB)	MTU Tx Power (dBm)	Tx_Backoff
P_{M_max}	+14	0
P_{M_max} - 1dB	+13	10
…	…	…
P_{M_max} - 19dB	-5	190
P_{M_max} - 20dB	-6	200

COMMENTARY: *The dynamic range of the Radio Module's voltage controlled amplifier should be extended another 7 or 8 dB if the next opportunity for hardware redesign occurs in order to meet the required ISE MTU Tx level adjustment range. Accordingly, the* **Tx_backoff** *scale should be extended to 280. This may be attained using a dual scale adjustment to offset this range downward by 10dB. Thus, this lower range would extend from +4dBm to -16dBm.*

10 Call Processing

The diagram of Figure 3 illustrates the high level messaging, data, and call processing flow for the ISE MTU within the general context of the Inmarsat Network.

10.1 EIRP and Antenna Gain Reporting

The system EIRP should be computed each time a control adjustment is made to the MTU's output level or the HPA backoff setting $O_{BO}(k)$. The system EIRP is computed using equation (12) as follows.

$$EIRP(k) = P_M(k) - L_{txcable} + G_H(k) - L_{HA} + G_A(k)$$

Where $G_A(k)$ is the most recent antenna gain reported by the SDU and with $P_M(k)$ and $G_H(k)=G_{H\_max} - O_{BO}(k)$ the most recent computed values. Due to processing time requirements EIRP is computed by ACSE and not the HTCE I/F Task.

For a CALL_ASSIGNMENT or CALL_TERMINATION ACSE event which occurs asynchronous to any two antenna gain compensation power control events **K** and **K'** such that the computed value $EIRP$(**K**) would be reported by the ACSE for EIRP at the beginning of the call and the computed value $EIRP$(**K'**) at the termination of the call.

11 HTCE Interface Flowcharts

The flowcharts for the HTCE Interface tasks are summarized in this section. The software implementation for the HTCE Interface Task and sub-tasks should follow the process outlined by each flowchart in order to satisfy the SATCOM system functional and operational requirements for the ISE unit operating in conjunction with Aero-H equipment.

Figure 3 presents the system level events in a ladder diagram with the NCS and LES network elements and MTU elements consisting of the SDU, HPA and MTU including the HTCE interface, ACSE, and DSP. The typical sequences of events are shown in the order in which they occur. Most events are generally represented, as the diagram would be too busy to show every event and handshake.

System calibration steps one and two are shown in Figure 4 and Figure 5 respectively. Antenna gain compensation is illustrated in Figure 6 and the EIRP determination is shown in Figure 7. The overall HTCE Interface Task flowchart is depicted in Figure 8.

Figure 3 - ISE Call Process Event Ladder Diagram

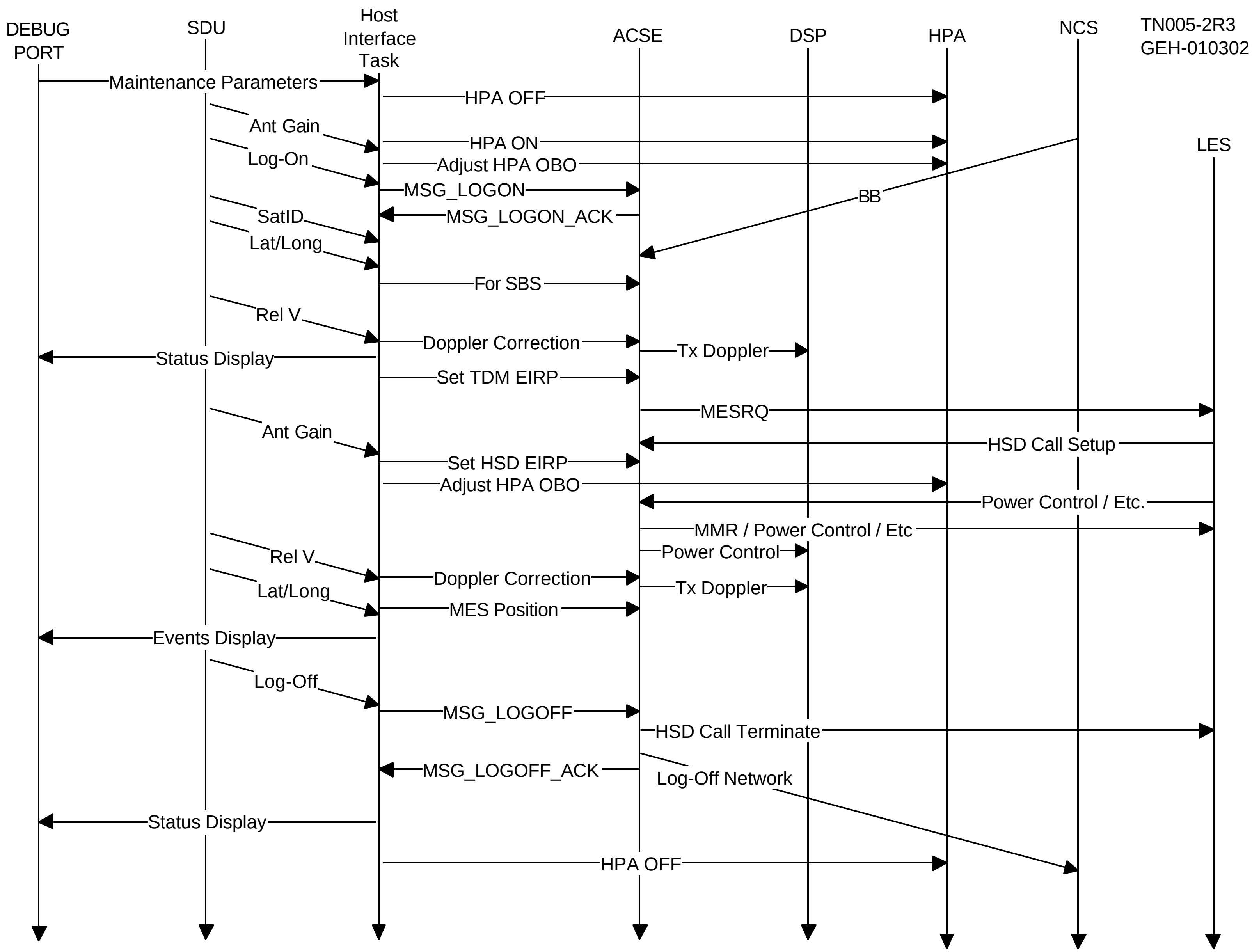

Figure 4 - System Calibration Flowchart- Step 1

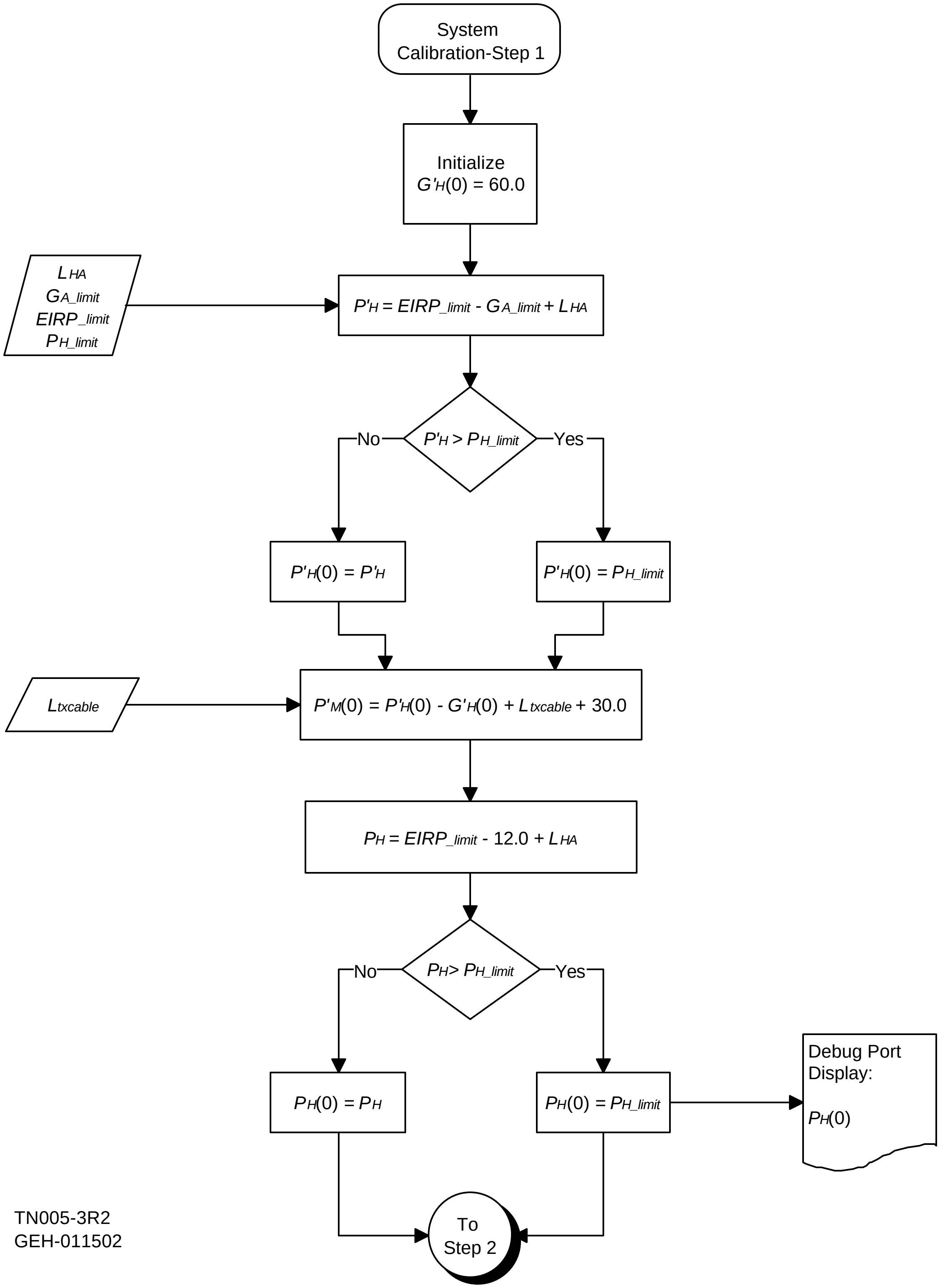

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Figure 5 - System Calibration Flowchart- Step 2

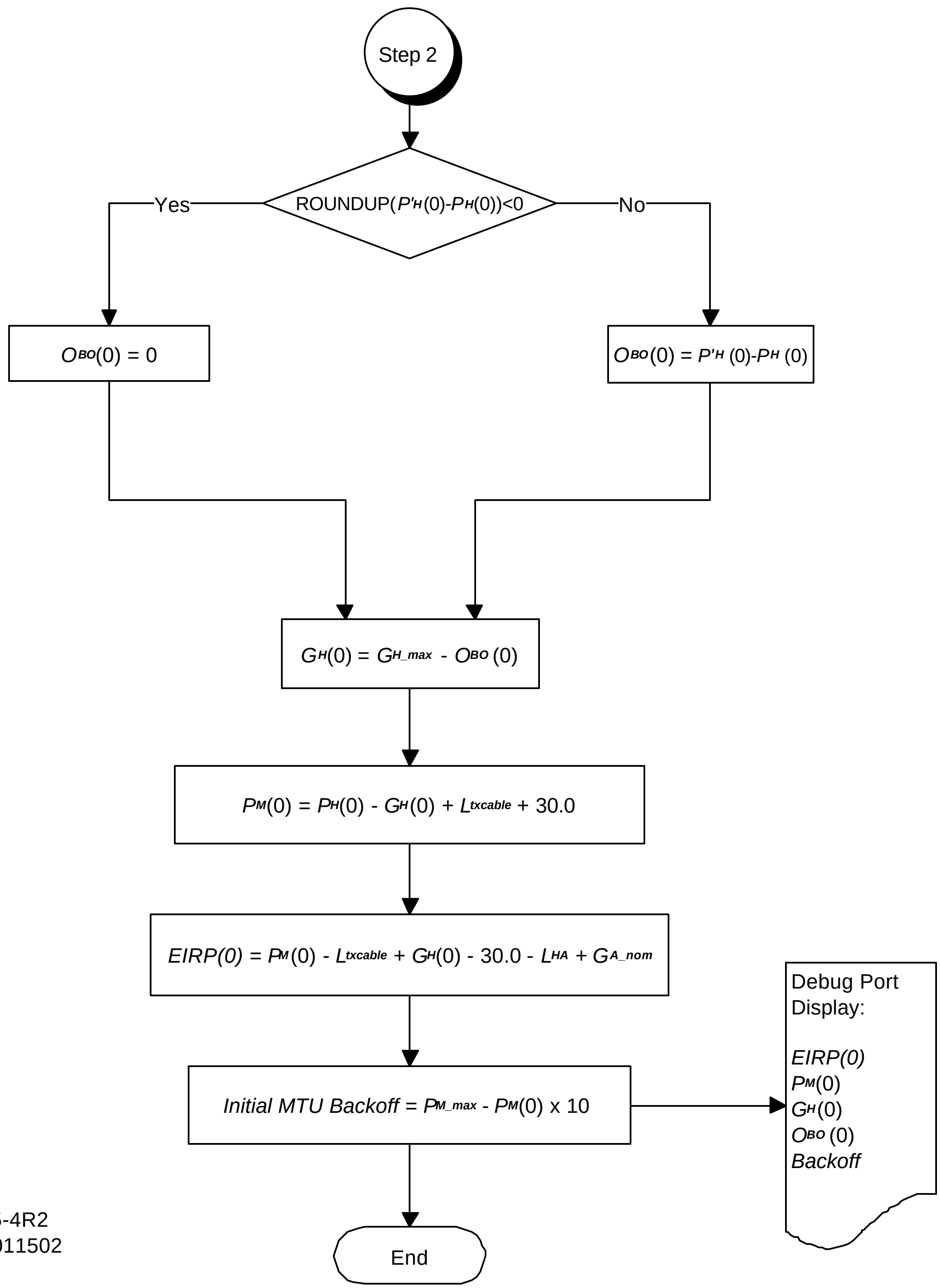

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Figure 6 - Antenna Gain Compensation Flowchart

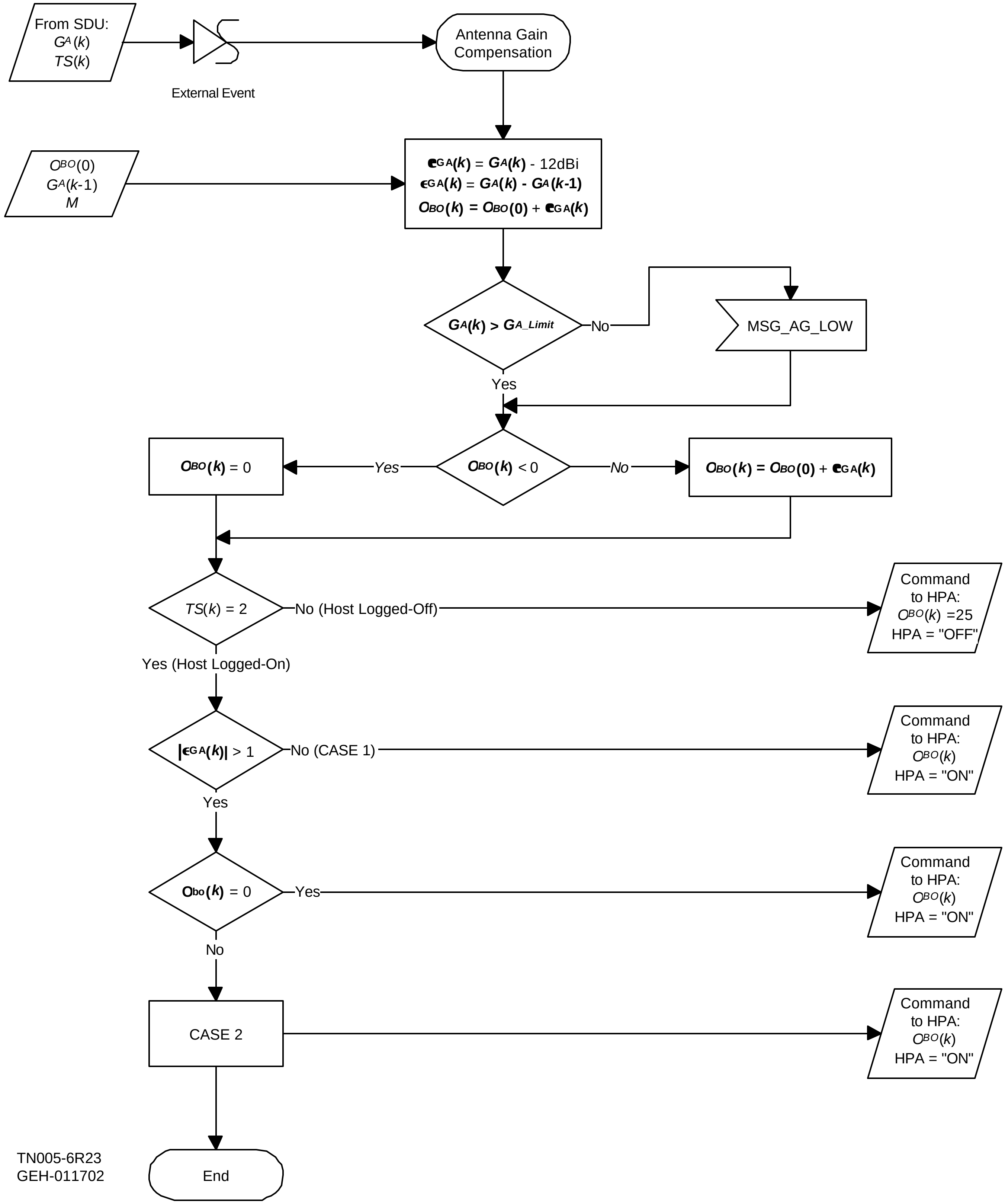


Figure 7 - EIRP Determination Flowchart

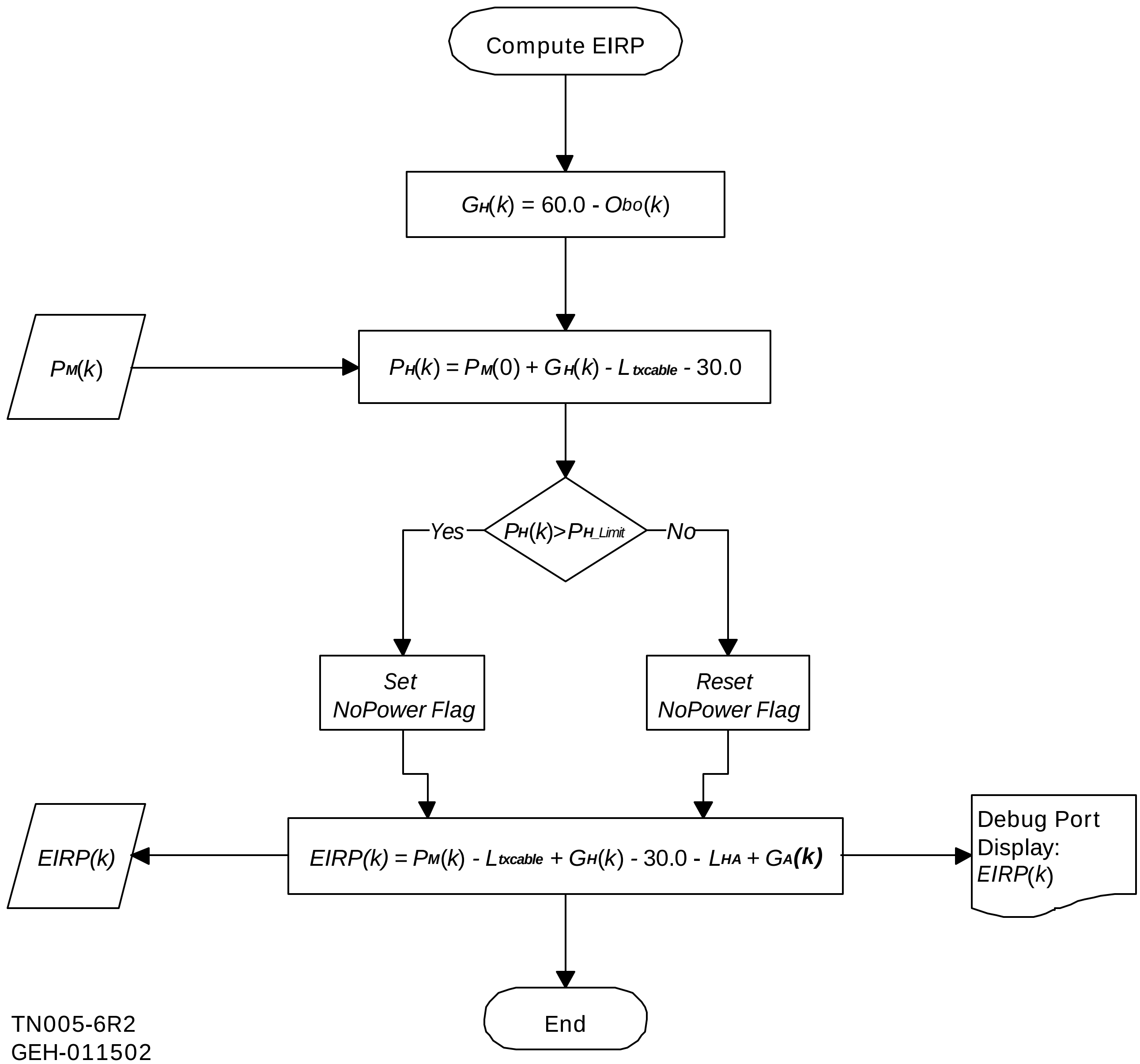
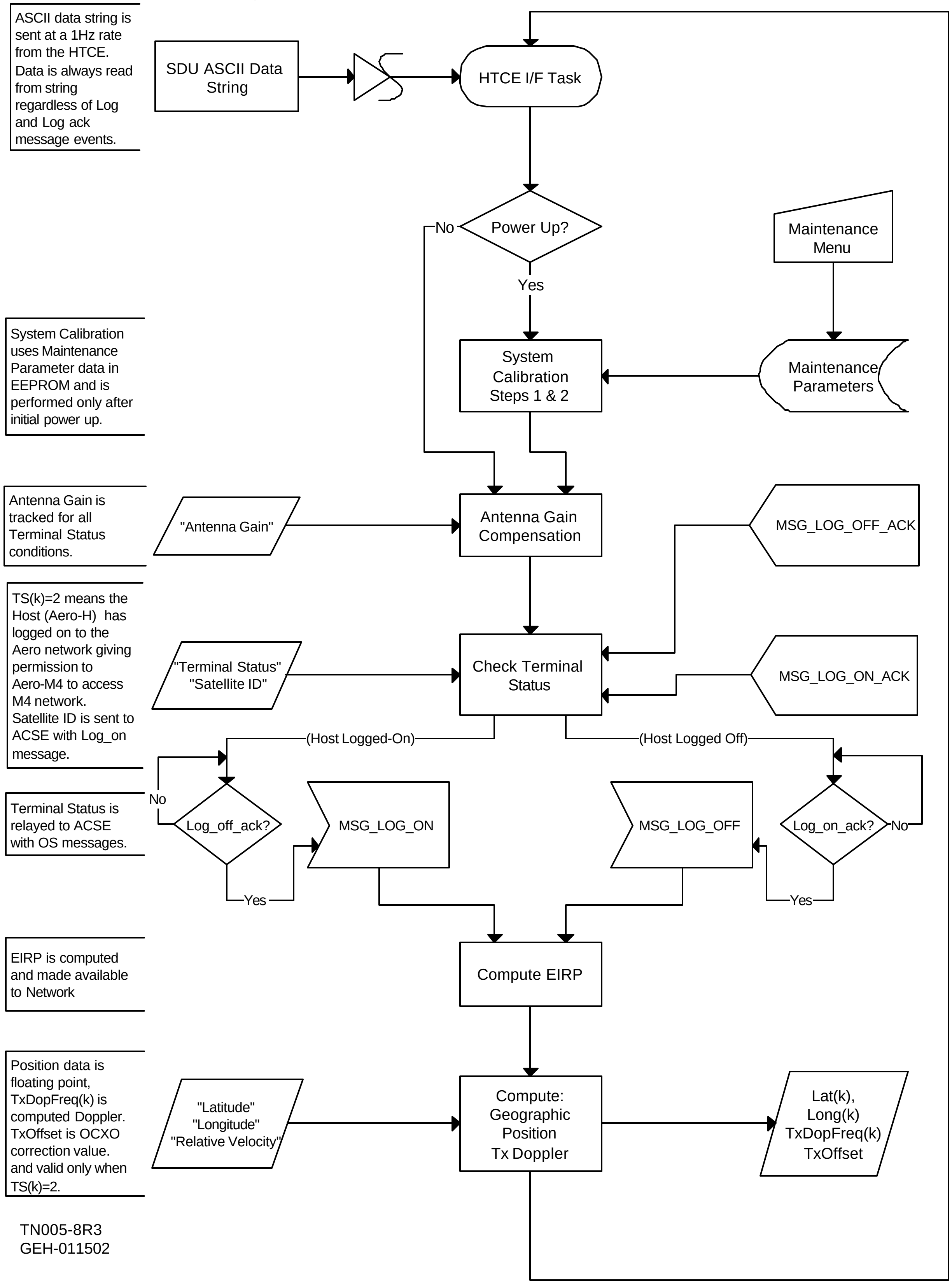


Figure 8 - HTCE Interface Task Flowchart (Top Level)



12 References

The following references were used in the preparation of this document.

[1] "Design Requirements Document For the ISE Aero-M4 MTU", GL1.201,032-1-002-DRD Rev 2, June 21, 2001, Glocom Corporation.

[2] "Product Design Documentation", GCM-CGP-1011, Rev. A, 1998, Glocom Corporation.

APPENDIX A - ISE SYSTEM CALIBRATION TABLES

The following tables are for reference purposes to provide a summary of maintenance menu settings for useful ISE system operation. The tables are limited and cover the range of maximum HPA output from 18dBW to 15dBW. Calibration for values less than 15dBW are considered impractical and thus not included because the EIRP falls at the lower limit of 20dBW under most conditions.

$O_{BO}(0)$	$EIRP_{Limit}$	$EIRP$(dBW)	L_{HA}	$P_M(k)$	P_H(dBW)	P_{H_Limit}	$P_M(0)$	$L_{txcable}$	*TxBackoff*	*OH*
4	25.0	25.0	1	10.5	14.0	18.0	10.5	22.5	3.5	0.0
4	24.5	24.5	1	10.0	13.5	18.0	10.0	22.5	4.0	0.5
4	24.0	24.0	1	9.5	13.0	18.0	9.5	22.5	4.5	1.0
4	23.5	23.5	1	9.0	12.5	18.0	9.0	22.5	5.0	1.5
4	23.0	23.0	1	8.5	12.0	18.0	8.5	22.5	5.5	2.0
4	22.5	22.5	1	8.0	11.5	18.0	8.0	22.5	6.0	2.5
4	22.0	22.0	1	7.5	11.0	18.0	7.5	22.5	6.5	3.0
4	21.5	21.5	1	7.0	10.5	18.0	7.0	22.5	7.0	3.5
4	21.0	21.0	1	6.5	10.0	18.0	6.5	22.5	7.5	4.0
4	20.5	20.5	1	6.0	9.5	18.0	6.0	22.5	8.0	4.5
4	20.0	20.0	1	5.5	9.0	18.0	5.5	22.5	8.5	5.0

$O_{BO}(0)$	$EIRP_{Limit}$	$EIRP$(dBW)	L_{HA}	$P_M(k)$	P_H(dBW)	P_{H_Limit}	$P_M(0)$	$L_{txcable}$	*TxBackoff*	*OH*
4	25.0	25.0	1	10.5	14.0	17.5	10.5	22.5	3.5	-0.5
4	24.5	24.5	1	10.5	13.5	17.5	10.0	22.5	4.0	0.0
4	24.0	24.0	1	10.5	13.0	17.5	9.5	22.5	4.5	0.5
4	23.5	23.5	1	10.5	12.5	17.5	9.0	22.5	5.0	1.0
4	23.0	23.0	1	10.0	12.0	17.5	8.5	22.5	5.5	1.5
4	22.5	22.5	1	10.0	11.5	17.5	8.0	22.5	6.0	2.0
4	22.0	22.0	1	10.0	11.0	17.5	7.5	22.5	6.5	2.5
4	21.5	21.5	1	10.0	10.5	17.5	7.0	22.5	7.0	3.0
4	21.0	21.0	1	10.0	10.0	17.5	6.5	22.5	7.5	3.5
4	20.5	20.5	1	10.0	9.5	17.5	6.0	22.5	8.0	4.0
4	20.0	20.0	1	10.0	9.0	17.5	5.5	22.5	8.5	4.5

$O_{BO}(0)$	$EIRP_{Limit}$	$EIRP$(dBW)	L_{HA}	$P_M(k)$	P_H(dBW)	P_{H_Limit}	$P_M(0)$	$L_{txcable}$	*TxBackoff*	*OH*
3	25.0	25.0	1	9.5	14.0	17.0	9.5	22.5	4.5	0.0
4	24.5	24.5	1	9.5	13.5	17.0	10.0	22.5	4.0	-0.5
4	24.0	24.0	1	9.5	13.0	17.0	9.5	22.5	4.5	0.0
4	23.5	23.5	1	9.5	12.5	17.0	9.0	22.5	5.0	0.5
4	23.0	23.0	1	9.5	12.0	17.0	8.5	22.5	5.5	1.0
4	22.5	22.5	1	9.5	11.5	17.0	8.0	22.5	6.0	1.5
4	22.0	22.0	1	10.0	11.0	17.0	7.5	22.5	6.5	2.0
4	21.5	21.5	1	10.0	10.5	17.0	7.0	22.5	7.0	2.5
4	21.0	21.0	1	10.0	10.0	17.0	6.5	22.5	7.5	3.0
4	20.5	20.5	1	10.0	9.5	17.0	6.0	22.5	8.0	3.5
4	20.0	20.0	1	9.5	9.0	17.0	5.5	22.5	8.5	4.0

$O_{BO}(0)$	$EIRP_{Limit}$	$EIRP$(dBW)	L_{HA}	$P_M(k)$	P_H(dBW)	P_{H_Limit}	$P_M(0)$	$L_{txcable}$	*TxBackoff*	*OH*
3	25.0	25.0	1	9.5	14.0	16.5	9.5	22.5	4.5	-0.5
3	24.5	24.5	1	9.5	13.5	16.5	9.0	22.5	5.0	0.0
4	24.0	24.0	1	9.5	13.0	16.5	9.5	22.5	4.5	-0.5
4	23.5	23.5	1	9.0	12.5	16.5	9.0	22.5	5.0	0.0
4	23.0	23.0	1	9.0	12.0	16.5	8.5	22.5	5.5	0.5
4	22.5	22.5	1	9.0	11.5	16.5	8.0	22.5	6.0	1.0
4	22.0	22.0	1	9.0	11.0	16.5	7.5	22.5	6.5	1.5
4	21.5	21.5	1	9.0	10.5	16.5	7.0	22.5	7.0	2.0
4	21.0	21.0	1	9.0	10.0	16.5	6.5	22.5	7.5	2.5
4	20.5	20.5	1	9.0	9.5	16.5	6.0	22.5	8.0	3.0
4	20.0	20.0	1	9.0	9.0	16.5	5.5	22.5	8.5	3.5

$O_{BO}(0)$	$EIRP_{Limit}$	$EIRP$(dBW)	L_{HA}	$P_M(k)$	P_H(dBW)	P_{H_Limit}	$P_M(0)$	$L_{txcable}$	*TxBackoff*	*OH*
2	25.0	25.0	1	8.5	14.0	16.0	8.5	22.5	5.5	0.0
3	24.5	24.5	1	8.5	13.5	16.0	9.0	22.5	5.0	-0.5
3	24.0	24.0	1	8.5	13.0	16.0	8.5	22.5	5.5	0.0
4	23.5	23.5	1	8.5	12.5	16.0	9.0	22.5	5.0	-0.5
4	23.0	23.0	1	8.5	12.0	16.0	8.5	22.5	5.5	0.0
4	22.5	22.5	1	8.5	11.5	16.0	8.0	22.5	6.0	0.5
4	22.0	22.0	1	9.0	11.0	16.0	7.5	22.5	6.5	1.0
4	21.5	21.5	1	9.0	10.5	16.0	7.0	22.5	7.0	1.5
4	21.0	21.0	1	9.0	10.0	16.0	6.5	22.5	7.5	2.0
4	20.5	20.5	1	8.5	9.5	16.0	6.0	22.5	8.0	2.5
4	20.0	20.0	1	8.5	9.0	16.0	5.5	22.5	8.5	3.0

$O_{BO}(0)$	$EIRP_{Limit}$	$EIRP$(dBW)	L_{HA}	$P_M(k)$	P_H(dBW)	P_{H_Limit}	$P_M(0)$	$L_{txcable}$	*TxBackoff*	*OH*
2	25.0	25.0	1	8.5	14.0	15.5	8.5	22.5	5.5	-0.5
2	24.5	24.5	1	8.5	13.5	15.5	8.0	22.5	6.0	0.0
3	24.0	24.0	1	8.0	13.0	15.5	8.5	22.5	5.5	-0.5
3	23.5	23.5	1	8.0	12.5	15.5	8.0	22.5	6.0	0.0
4	23.0	23.0	1	8.0	12.0	15.5	8.5	22.5	5.5	-0.5
4	22.5	22.5	1	8.0	11.5	15.5	8.0	22.5	6.0	0.0
4	22.0	22.0	1	8.0	11.0	15.5	7.5	22.5	6.5	0.5
4	21.5	21.5	1	8.0	10.5	15.5	7.0	22.5	7.0	1.0
4	21.0	21.0	1	8.0	10.0	15.5	6.5	22.5	7.5	1.5
4	20.5	20.5	1	8.0	9.5	15.5	6.0	22.5	8.0	2.0
4	20.0	20.0	1	8.0	9.0	15.5	5.5	22.5	8.5	2.5

$O_{BO}(0)$	$EIRP_{Limit}$	$EIRP$(dBW)	L_{HA}	$P_M(k)$	P_H(dBW)	P_{H_Limit}	$P_M(0)$	$L_{txcable}$	*TxBackoff*	*OH*
1	25.0	25.0	1	7.5	14.0	15.0	7.5	22.5	6.5	0.0
2	24.5	24.5	1	7.5	13.5	15.0	8.0	22.5	6.0	-0.5
2	24.0	24.0	1	7.5	13.0	15.0	7.5	22.5	6.5	0.0
3	23.5	23.5	1	7.5	12.5	15.0	8.0	22.5	6.0	-0.5
3	23.0	23.0	1	7.5	12.0	15.0	7.5	22.5	6.5	0.0
4	22.5	22.5	1	7.5	11.5	15.0	8.0	22.5	6.0	-0.5
4	22.0	22.0	1	8.0	11.0	15.0	7.5	22.5	6.5	0.0
4	21.5	21.5	1	8.0	10.5	15.0	7.0	22.5	7.0	0.5
4	21.0	21.0	1	7.5	10.0	15.0	6.5	22.5	7.5	1.0
4	20.5	20.5	1	7.5	9.5	15.0	6.0	22.5	8.0	1.5
4	20.0	20.0	1	7.5	9.0	15.0	5.5	22.5	8.5	2.0

$O_{BO}(0)$	$EIRP_{Limit}$	$EIRP$(dBW)	L_{HA}	$P_M(k)$	P_H(dBW)	P_{H_Limit}	$P_M(0)$	$L_{txcable}$	*TxBackoff*	*OH*

3	25.0	25.0	2	10.5	15.0	18.0	10.5	22.5	3.5	0.0
4	24.5	24.5	2	11.0	14.5	18.0	11.0	22.5	3.0	-0.5
4	24.0	24.0	2	10.5	14.0	18.0	10.5	22.5	3.5	0.0
4	23.5	23.5	2	10.0	13.5	18.0	10.0	22.5	4.0	0.5
4	23.0	23.0	2	9.5	13.0	18.0	9.5	22.5	4.5	1.0
4	22.5	22.5	2	9.0	12.5	18.0	9.0	22.5	5.0	1.5
4	22.0	22.0	2	8.5	12.0	18.0	8.5	22.5	5.5	2.0
4	21.5	21.5	2	8.0	11.5	18.0	8.0	22.5	6.0	2.5
4	21.0	21.0	2	7.5	11.0	18.0	7.5	22.5	6.5	3.0
4	20.5	20.5	2	7.0	10.5	18.0	7.0	22.5	7.0	3.5
4	20.0	20.0	2	6.5	10.0	18.0	6.5	22.5	7.5	4.0

$O_{BO}(0)$	$EIRP_{Limit}$	$EIRP$(dBW)	L_{HA}	$P_M(k)$	P_H(dBW)	P_{H_Limit}	$P_M(0)$	$L_{txcable}$	*TxBackoff*	*OH*
3	25.0	25.0	2	10.5	15.0	17.5	10.5	22.5	3.5	-0.5
3	24.5	24.5	2	10.5	14.5	17.5	10.0	22.5	4.0	0.0
4	24.0	24.0	2	10.5	14.0	17.5	10.5	22.5	3.5	-0.5
4	23.5	23.5	2	10.0	13.5	17.5	10.0	22.5	4.0	0.0
4	23.0	23.0	2	10.0	13.0	17.5	9.5	22.5	4.5	0.5
4	22.5	22.5	2	10.0	12.5	17.5	9.0	22.5	5.0	1.0
4	22.0	22.0	2	10.0	12.0	17.5	8.5	22.5	5.5	1.5
4	21.5	21.5	2	10.0	11.5	17.5	8.0	22.5	6.0	2.0
4	21.0	21.0	2	10.0	11.0	17.5	7.5	22.5	6.5	2.5
4	20.5	20.5	2	10.0	10.5	17.5	7.0	22.5	7.0	3.0
4	20.0	20.0	2	10.0	10.0	17.5	6.5	22.5	7.5	3.5

$O_{BO}(0)$	$EIRP_{Limit}$	$EIRP$(dBW)	L_{HA}	$P_M(k)$	P_H(dBW)	P_{H_Limit}	$P_M(0)$	$L_{txcable}$	*TxBackoff*	*OH*
2	25.0	25.0	2	9.5	15.0	17.0	9.5	22.5	4.5	0.0
3	24.5	24.5	2	9.5	14.5	17.0	10.0	22.5	4.0	-0.5
3	24.0	24.0	2	9.5	14.0	17.0	9.5	22.5	4.5	0.0
4	23.5	23.5	2	9.5	13.5	17.0	10.0	22.5	4.0	-0.5
4	23.0	23.0	2	9.5	13.0	17.0	9.5	22.5	4.5	0.0
4	22.5	22.5	2	10.0	12.5	17.0	9.0	22.5	5.0	0.5
4	22.0	22.0	2	10.0	12.0	17.0	8.5	22.5	5.5	1.0
4	21.5	21.5	2	10.0	11.5	17.0	8.0	22.5	6.0	1.5
4	21.0	21.0	2	10.0	11.0	17.0	7.5	22.5	6.5	2.0
4	20.5	20.5	2	9.5	10.5	17.0	7.0	22.5	7.0	2.5
4	20.0	20.0	2	9.5	10.0	17.0	6.5	22.5	7.5	3.0

$O_{BO}(0)$	$EIRP_{Limit}$	$EIRP$(dBW)	L_{HA}	$P_M(k)$	P_H(dBW)	P_{H_Limit}	$P_M(0)$	$L_{txcable}$	*TxBackoff*	*OH*
2	25.0	25.0	2	9.5	15.0	16.5	9.5	22.5	4.5	-0.5
2	24.5	24.5	2	9.5	14.5	16.5	9.0	22.5	5.0	0.0
3	24.0	24.0	2	9.0	14.0	16.5	9.5	22.5	4.5	-0.5
3	23.5	23.5	2	9.0	13.5	16.5	9.0	22.5	5.0	0.0
4	23.0	23.0	2	9.0	13.0	16.5	9.5	22.5	4.5	-0.5
4	22.5	22.5	2	9.0	12.5	16.5	9.0	22.5	5.0	0.0
4	22.0	22.0	2	9.0	12.0	16.5	8.5	22.5	5.5	0.5
4	21.5	21.5	2	9.0	11.5	16.5	8.0	22.5	6.0	1.0
4	21.0	21.0	2	9.0	11.0	16.5	7.5	22.5	6.5	1.5
4	20.5	20.5	2	9.0	10.5	16.5	7.0	22.5	7.0	2.0
4	20.0	20.0	2	9.0	10.0	16.5	6.5	22.5	7.5	2.5

$O_{BO}(0)$	$EIRP_{Limit}$	$EIRP$(dBW)	L_{HA}	$P_M(k)$	P_H(dBW)	P_{H_Limit}	$P_M(0)$	$L_{txcable}$	*TxBackoff*	*OH*
1	25.0	25.0	2	8.5	15.0	16.0	8.5	22.5	5.5	0.0
2	24.5	24.5	2	8.5	14.5	16.0	9.0	22.5	5.0	-0.5

2	24.0	24.0	2	8.5	14.0	16.0	8.5	22.5	5.5	0.0
3	23.5	23.5	2	8.5	13.5	16.0	9.0	22.5	5.0	-0.5
3	23.0	23.0	2	8.5	13.0	16.0	8.5	22.5	5.5	0.0
4	22.5	22.5	2	9.0	12.5	16.0	9.0	22.5	5.0	-0.5
4	22.0	22.0	2	9.0	12.0	16.0	8.5	22.5	5.5	0.0
4	21.5	21.5	2	9.0	11.5	16.0	8.0	22.5	6.0	0.5
4	21.0	21.0	2	8.5	11.0	16.0	7.5	22.5	6.5	1.0
4	20.5	20.5	2	8.5	10.5	16.0	7.0	22.5	7.0	1.5
4	20.0	20.0	2	8.5	10.0	16.0	6.5	22.5	7.5	2.0

$O_{BO}(0)$	$EIRP_{Limit}$	$EIRP$(dBW)	L_{HA}	$P_M(k)$	P_H(dBW)	P_{H_Limit}	$P_M(0)$	$L_{txcable}$	*TxBackoff*	*OH*
1	25.0	25.0	2	8.5	15.0	15.5	8.5	22.5	5.5	-0.5
1	24.5	24.5	2	8.0	14.5	15.5	8.0	22.5	6.0	0.0
2	24.0	24.0	2	8.0	14.0	15.5	8.5	22.5	5.5	-0.5
2	23.5	23.5	2	8.0	13.5	15.5	8.0	22.5	6.0	0.0
3	23.0	23.0	2	8.0	13.0	15.5	8.5	22.5	5.5	-0.5
3	22.5	22.5	2	8.0	12.5	15.5	8.0	22.5	6.0	0.0
4	22.0	22.0	2	8.0	12.0	15.5	8.5	22.5	5.5	-0.5
4	21.5	21.5	2	8.0	11.5	15.5	8.0	22.5	6.0	0.0
4	21.0	21.0	2	8.0	11.0	15.5	7.5	22.5	6.5	0.5
4	20.5	20.5	2	8.0	10.5	15.5	7.0	22.5	7.0	1.0
4	20.0	20.0	2	8.0	10.0	15.5	6.5	22.5	7.5	1.5

$O_{BO}(0)$	$EIRP_{Limit}$	$EIRP$(dBW)	L_{HA}	$P_M(k)$	P_H(dBW)	P_{H_Limit}	$P_M(0)$	$L_{txcable}$	*TxBackoff*	*OH*
0	25.0	25.0	2	7.5	15.0	15.0	7.5	22.5	6.5	0.0
1	24.5	24.5	2	7.5	14.5	15.0	8.0	22.5	6.0	-0.5
1	24.0	24.0	2	7.5	14.0	15.0	7.5	22.5	6.5	0.0
2	23.5	23.5	2	7.5	13.5	15.0	8.0	22.5	6.0	-0.5
2	23.0	23.0	2	7.5	13.0	15.0	7.5	22.5	6.5	0.0
3	22.5	22.5	2	8.0	12.5	15.0	8.0	22.5	6.0	-0.5
3	22.0	22.0	2	8.0	12.0	15.0	7.5	22.5	6.5	0.0
4	21.5	21.5	2	7.5	11.5	15.0	8.0	22.5	6.0	-0.5
4	21.0	21.0	2	7.5	11.0	15.0	7.5	22.5	6.5	0.0
4	20.5	20.5	2	7.5	10.5	15.0	7.0	22.5	7.0	0.5
4	20.0	20.0	2	7.5	10.0	15.0	6.5	22.5	7.5	1.0

$O_{BO}(0)$	$EIRP_{Limit}$	$EIRP$(dBW)	L_{HA}	$P_M(k)$	P_H(dBW)	P_{H_Limit}	$P_M(0)$	$L_{txcable}$	*TxBackoff*	*OH*
2	25.0	25.0	3	10.5	16.0	18.0	10.5	22.5	3.5	0.0
3	24.5	24.5	3	11.0	15.5	18.0	11.0	22.5	3.0	-0.5
3	24.0	24.0	3	10.5	15.0	18.0	10.5	22.5	3.5	0.0
4	23.5	23.5	3	11.0	14.5	18.0	11.0	22.5	3.0	-0.5
4	23.0	23.0	3	10.5	14.0	18.0	10.5	22.5	3.5	0.0
4	22.5	22.5	3	10.0	13.5	18.0	10.0	22.5	4.0	0.5
4	22.0	22.0	3	9.5	13.0	18.0	9.5	22.5	4.5	1.0
4	21.5	21.5	3	9.0	12.5	18.0	9.0	22.5	5.0	1.5
4	21.0	21.0	3	8.5	12.0	18.0	8.5	22.5	5.5	2.0
4	20.5	20.5	3	8.0	11.5	18.0	8.0	22.5	6.0	2.5
4	20.0	20.0	3	7.5	11.0	18.0	7.5	22.5	6.5	3.0

$O_{BO}(0)$	$EIRP_{Limit}$	$EIRP$(dBW)	L_{HA}	$P_M(k)$	P_H(dBW)	P_{H_Limit}	$P_M(0)$	$L_{txcable}$	*TxBackoff*	*OH*
2	25.0	25.0	3	10.5	16.0	17.5	10.5	22.5	3.5	-0.5
2	24.5	24.5	3	10.5	15.5	17.5	10.0	22.5	4.0	0.0
3	24.0	24.0	3	10.0	15.0	17.5	10.5	22.5	3.5	-0.5
3	23.5	23.5	3	10.0	14.5	17.5	10.0	22.5	4.0	0.0
4	23.0	23.0	3	10.0	14.0	17.5	10.5	22.5	3.5	-0.5
4	22.5	22.5	3	10.0	13.5	17.5	10.0	22.5	4.0	0.0
4	22.0	22.0	3	10.0	13.0	17.5	9.5	22.5	4.5	0.5
4	21.5	21.5	3	10.0	12.5	17.5	9.0	22.5	5.0	1.0
4	21.0	21.0	3	10.0	12.0	17.5	8.5	22.5	5.5	1.5
4	20.5	20.5	3	10.0	11.5	17.5	8.0	22.5	6.0	2.0
4	20.0	20.0	3	9.5	11.0	17.5	7.5	22.5	6.5	2.5

$O_{BO}(0)$	$EIRP_{Limit}$	$EIRP$(dBW)	L_{HA}	$P_M(k)$	P_H(dBW)	P_{H_Limit}	$P_M(0)$	$L_{txcable}$	*TxBackoff*	*OH*
1	25.0	25.0	3	9.5	16.0	17.0	9.5	22.5	4.5	0.0
2	24.5	24.5	3	9.5	15.5	17.0	10.0	22.5	4.0	-0.5
2	24.0	24.0	3	9.5	15.0	17.0	9.5	22.5	4.5	0.0
3	23.5	23.5	3	9.5	14.5	17.0	10.0	22.5	4.0	-0.5
3	23.0	23.0	3	10.0	14.0	17.0	9.5	22.5	4.5	0.0
4	22.5	22.5	3	10.0	13.5	17.0	10.0	22.5	4.0	-0.5
4	22.0	22.0	3	10.0	13.0	17.0	9.5	22.5	4.5	0.0
4	21.5	21.5	3	10.0	12.5	17.0	9.0	22.5	5.0	0.5
4	21.0	21.0	3	9.5	12.0	17.0	8.5	22.5	5.5	1.0
4	20.5	20.5	3	9.5	11.5	17.0	8.0	22.5	6.0	1.5
4	20.0	20.0	3	9.5	11.0	17.0	7.5	22.5	6.5	2.0

$O_{BO}(0)$	$EIRP_{Limit}$	$EIRP$(dBW)	L_{HA}	$P_M(k)$	P_H(dBW)	P_{H_Limit}	$P_M(0)$	$L_{txcable}$	*TxBackoff*	*OH*
1	25.0	25.0	3	9.5	16.0	16.5	9.5	22.5	4.5	-0.5
1	24.5	24.5	3	9.0	15.5	16.5	9.0	22.5	5.0	0.0
2	24.0	24.0	3	9.0	15.0	16.5	9.5	22.5	4.5	-0.5
2	23.5	23.5	3	9.0	14.5	16.5	9.0	22.5	5.0	0.0
3	23.0	23.0	3	9.0	14.0	16.5	9.5	22.5	4.5	-0.5
3	22.5	22.5	3	9.0	13.5	16.5	9.0	22.5	5.0	0.0
4	22.0	22.0	3	9.0	13.0	16.5	9.5	22.5	4.5	-0.5
4	21.5	21.5	3	9.0	12.5	16.5	9.0	22.5	5.0	0.0
4	21.0	21.0	3	9.0	12.0	16.5	8.5	22.5	5.5	0.5
4	20.5	20.5	3	9.0	11.5	16.5	8.0	22.5	6.0	1.0
4	20.0	20.0	3	9.5	11.0	16.5	7.5	22.5	6.5	1.5

$O_{BO}(0)$	$EIRP_{Limit}$	$EIRP$(dBW)	L_{HA}	$P_M(k)$	P_H(dBW)	P_{H_Limit}	$P_M(0)$	$L_{txcable}$	*TxBackoff*	*OH*

0	25.0	25.0	3	8.5	16.0	16.0	8.5	22.5	5.5	0.0
1	24.5	24.5	3	8.5	15.5	16.0	9.0	22.5	5.0	-0.5
1	24.0	24.0	3	8.5	15.0	16.0	8.5	22.5	5.5	0.0
2	23.5	23.5	3	8.5	14.5	16.0	9.0	22.5	5.0	-0.5
2	23.0	23.0	3	9.0	14.0	16.0	8.5	22.5	5.5	0.0
3	22.5	22.5	3	9.0	13.5	16.0	9.0	22.5	5.0	-0.5
3	22.0	22.0	3	9.0	13.0	16.0	8.5	22.5	5.5	0.0
4	21.5	21.5	3	8.5	12.5	16.0	9.0	22.5	5.0	-0.5
4	21.0	21.0	3	8.5	12.0	16.0	8.5	22.5	5.5	0.0
4	20.5	20.5	3	8.5	11.5	16.0	8.0	22.5	6.0	0.5
4	20.0	20.0	3	8.5	11.0	16.0	7.5	22.5	6.5	1.0

$O_{BO}(0)$	$EIRP_{Limit}$	$EIRP$(dBW)	L_{HA}	$P_M(k)$	P_H(dBW)	P_{H_Limit}	$P_M(0)$	$L_{txcable}$	*TxBackoff*	*OH*
0	25.0	24.5	3	8.0	15.5	15.5	8.0	22.5	6.0	0.0
0	24.5	24.5	3	8.0	15.5	15.5	8.0	22.5	6.0	0.0
1	24.0	24.0	3	8.0	15.0	15.5	8.5	22.5	5.5	-0.5
1	23.5	23.5	3	8.0	14.5	15.5	8.0	22.5	6.0	0.0
2	23.0	23.0	3	8.0	14.0	15.5	8.5	22.5	5.5	-0.5
2	22.5	22.5	3	8.0	13.5	15.5	8.0	22.5	6.0	0.0
3	22.0	22.0	3	8.0	13.0	15.5	8.5	22.5	5.5	-0.5
3	21.5	21.5	3	8.0	12.5	15.5	8.0	22.5	6.0	0.0
4	21.0	21.0	3	8.0	12.0	15.5	8.5	22.5	5.5	-0.5
4	20.5	20.5	3	8.0	11.5	15.5	8.0	22.5	6.0	0.0
4	20.0	20.0	3	8.5	11.0	15.5	7.5	22.5	6.5	0.5

$O_{BO}(0)$	$EIRP_{Limit}$	$EIRP$(dBW)	L_{HA}	$P_M(k)$	P_H(dBW)	P_{H_Limit}	$P_M(0)$	$L_{txcable}$	*TxBackoff*	*OH*
0	25.0	24.0	3	7.5	15.0	15.0	7.5	22.5	6.5	0.0
0	24.5	24.0	3	7.5	15.0	15.0	7.5	22.5	6.5	0.0
0	24.0	24.0	3	7.5	15.0	15.0	7.5	22.5	6.5	0.0
1	23.5	23.5	3	7.5	14.5	15.0	8.0	22.5	6.0	-0.5
1	23.0	23.0	3	8.0	14.0	15.0	7.5	22.5	6.5	0.0
2	22.5	22.5	3	8.0	13.5	15.0	8.0	22.5	6.0	-0.5
2	22.0	22.0	3	7.5	13.0	15.0	7.5	22.5	6.5	0.0
3	21.5	21.5	3	7.5	12.5	15.0	8.0	22.5	6.0	-0.5
3	21.0	21.0	3	7.5	12.0	15.0	7.5	22.5	6.5	0.0
4	20.5	20.5	3	7.5	11.5	15.0	8.0	22.5	6.0	-0.5
4	20.0	20.0	3	7.5	11.0	15.0	7.5	22.5	6.5	0.0

$O_{BO}(0)$	$EIRP_{Limit}$	$EIRP$(dBW)	L_{HA}	$P_M(k)$	P_H(dBW)	P_{H_Limit}	$P_M(0)$	$L_{txcable}$	$TxBackoff$	OH
1	25.0	25.0	4	10.5	17.0	18.0	10.5	22.5	3.5	0.0
2	24.5	24.5	4	11.0	16.5	18.0	11.0	22.5	3.0	-0.5
2	24.0	24.0	4	10.5	16.0	18.0	10.5	22.5	3.5	0.0
3	23.5	23.5	4	11.0	15.5	18.0	11.0	22.5	3.0	-0.5
3	23.0	23.0	4	10.5	15.0	18.0	10.5	22.5	3.5	0.0
4	22.5	22.5	4	11.0	14.5	18.0	11.0	22.5	3.0	-0.5
4	22.0	22.0	4	10.5	14.0	18.0	10.5	22.5	3.5	0.0
4	21.5	21.5	4	10.0	13.5	18.0	10.0	22.5	4.0	0.5
4	21.0	21.0	4	9.5	13.0	18.0	9.5	22.5	4.5	1.0
4	20.5	20.5	4	9.0	12.5	18.0	9.0	22.5	5.0	1.5
4	20.0	20.0	4	8.5	12.0	18.0	8.5	22.5	5.5	2.0

$O_{BO}(0)$	$EIRP_{Limit}$	$EIRP$(dBW)	L_{HA}	$P_M(k)$	P_H(dBW)	P_{H_Limit}	$P_M(0)$	$L_{txcable}$	$TxBackoff$	OH
1	25.0	25.0	4	10.5	17.0	17.5	10.5	22.5	3.5	-0.5
1	24.5	24.5	4	10.0	16.5	17.5	10.0	22.5	4.0	0.0
2	24.0	24.0	4	10.0	16.0	17.5	10.5	22.5	3.5	-0.5
2	23.5	23.5	4	10.0	15.5	17.5	10.0	22.5	4.0	0.0
3	23.0	23.0	4	10.0	15.0	17.5	10.5	22.5	3.5	-0.5
3	22.5	22.5	4	10.0	14.5	17.5	10.0	22.5	4.0	0.0
4	22.0	22.0	4	10.0	14.0	17.5	10.5	22.5	3.5	-0.5
4	21.5	21.5	4	10.0	13.5	17.5	10.0	22.5	4.0	0.0
4	21.0	21.0	4	10.0	13.0	17.5	9.5	22.5	4.5	0.5
4	20.5	20.5	4	9.5	12.5	17.5	9.0	22.5	5.0	1.0
4	20.0	20.0	4	10.5	12.0	17.5	8.5	22.5	5.5	1.5

$O_{BO}(0)$	$EIRP_{Limit}$	$EIRP$(dBW)	L_{HA}	$P_M(k)$	P_H(dBW)	P_{H_Limit}	$P_M(0)$	$L_{txcable}$	$TxBackoff$	OH
0	25.0	25.0	4	9.5	17.0	17.0	9.5	22.5	4.5	0.0
1	24.5	24.5	4	9.5	16.5	17.0	10.0	22.5	4.0	-0.5
1	24.0	24.0	4	9.5	16.0	17.0	9.5	22.5	4.5	0.0
2	23.5	23.5	4	10.0	15.5	17.0	10.0	22.5	4.0	-0.5
2	23.0	23.0	4	10.0	15.0	17.0	9.5	22.5	4.5	0.0
3	22.5	22.5	4	10.0	14.5	17.0	10.0	22.5	4.0	-0.5
3	22.0	22.0	4	10.0	14.0	17.0	9.5	22.5	4.5	0.0
4	21.5	21.5	4	9.5	13.5	17.0	10.0	22.5	4.0	-0.5
4	21.0	21.0	4	9.5	13.0	17.0	9.5	22.5	4.5	0.0
4	20.5	20.5	4	9.5	12.5	17.0	9.0	22.5	5.0	0.5
4	20.0	20.0	4	9.5	12.0	17.0	8.5	22.5	5.5	1.0

$O_{BO}(0)$	$EIRP_{Limit}$	$EIRP$(dBW)	L_{HA}	$P_M(k)$	P_H(dBW)	P_{H_Limit}	$P_M(0)$	$L_{txcable}$	$TxBackoff$	OH
0	25.0	24.5	4	9.0	16.5	16.5	9.0	22.5	5.0	0.0
0	24.5	24.5	4	9.0	16.5	16.5	9.0	22.5	5.0	0.0
1	24.0	24.0	4	9.0	16.0	16.5	9.5	22.5	4.5	-0.5
1	23.5	23.5	4	9.0	15.5	16.5	9.0	22.5	5.0	0.0
2	23.0	23.0	4	9.0	15.0	16.5	9.5	22.5	4.5	-0.5
2	22.5	22.5	4	9.0	14.5	16.5	9.0	22.5	5.0	0.0
3	22.0	22.0	4	9.0	14.0	16.5	9.5	22.5	4.5	-0.5
3	21.5	21.5	4	9.0	13.5	16.5	9.0	22.5	5.0	0.0
4	21.0	21.0	4	9.0	13.0	16.5	9.5	22.5	4.5	-0.5
4	20.5	20.5	4	9.5	12.5	16.5	9.0	22.5	5.0	0.0
4	20.0	20.0	4	9.5	12.0	16.5	8.5	22.5	5.5	0.5

$O_{BO}(0)$	$EIRP_{Limit}$	$EIRP$(dBW)	L_{HA}	$P_M(k)$	P_H(dBW)	P_{H_Limit}	$P_M(0)$	$L_{txcable}$	$TxBackoff$	OH

0	25.0	24.0	4	8.5	16.0	16.0	8.5	22.5	5.5	0.0
0	24.5	24.0	4	8.5	16.0	16.0	8.5	22.5	5.5	0.0
0	24.0	24.0	4	8.5	16.0	16.0	8.5	22.5	5.5	0.0
1	23.5	23.5	4	9.0	15.5	16.0	9.0	22.5	5.0	-0.5
1	23.0	23.0	4	9.0	15.0	16.0	8.5	22.5	5.5	0.0
2	22.5	22.5	4	9.0	14.5	16.0	9.0	22.5	5.0	-0.5
2	22.0	22.0	4	8.5	14.0	16.0	8.5	22.5	5.5	0.0
3	21.5	21.5	4	8.5	13.5	16.0	9.0	22.5	5.0	-0.5
3	21.0	21.0	4	8.5	13.0	16.0	8.5	22.5	5.5	0.0
4	20.5	20.5	4	8.5	12.5	16.0	9.0	22.5	5.0	-0.5
4	20.0	20.0	4	8.5	12.0	16.0	8.5	22.5	5.5	0.0

$O_{BO}(0)$	$EIRP_{Limit}$	$EIRP$(dBW)	L_{HA}	$P_M(k)$	P_H(dBW)	P_{H_Limit}	$P_M(0)$	$L_{txcable}$	*TxBackoff*	*OH*
0	25.0	23.5	4	8.0	15.5	15.5	8.0	22.5	6.0	0.0
0	24.5	23.5	4	8.0	15.5	15.5	8.0	22.5	6.0	0.0
0	24.0	23.5	4	8.0	15.5	15.5	8.0	22.5	6.0	0.0
0	23.5	23.5	4	8.0	15.5	15.5	8.0	22.5	6.0	0.0
1	23.0	23.0	4	8.0	15.0	15.5	8.5	22.5	5.5	-0.5
1	22.5	22.5	4	8.0	14.5	15.5	8.0	22.5	6.0	0.0
2	22.0	22.0	4	8.0	14.0	15.5	8.5	22.5	5.5	-0.5
2	21.5	21.5	4	8.0	13.5	15.5	8.0	22.5	6.0	0.0
3	21.0	21.0	4	8.0	13.0	15.5	8.5	22.5	5.5	-0.5
3	20.5	20.5	4	8.5	12.5	15.5	8.0	22.5	6.0	0.0
4	20.0	20.0	4	8.5	12.0	15.5	8.5	22.5	5.5	-0.5

$O_{BO}(0)$	$EIRP_{Limit}$	$EIRP$(dBW)	L_{HA}	$P_M(k)$	P_H(dBW)	P_{H_Limit}	$P_M(0)$	$L_{txcable}$	*TxBackoff*	*OH*
0	25.0	23.0	4	7.5	15.0	15.0	7.5	22.5	6.5	0.0
0	24.5	23.0	4	7.5	15.0	15.0	7.5	22.5	6.5	0.0
0	24.0	23.0	4	7.5	15.0	15.0	7.5	22.5	6.5	0.0
0	23.5	23.0	4	8.0	15.0	15.0	7.5	22.5	6.5	0.0
0	23.0	23.0	4	8.0	15.0	15.0	7.5	22.5	6.5	0.0
1	22.5	22.5	4	7.5	14.5	15.0	8.0	22.5	6.0	-0.5
1	22.0	22.0	4	7.5	14.0	15.0	7.5	22.5	6.5	0.0
2	21.5	21.5	4	7.5	13.5	15.0	8.0	22.5	6.0	-0.5
2	21.0	21.0	4	7.5	13.0	15.0	7.5	22.5	6.5	0.0
3	20.5	20.5	4	7.5	12.5	15.0	8.0	22.5	6.0	-0.5
3	20.0	20.0	4	7.5	12.0	15.0	7.5	22.5	6.5	0.0

$O_{BO}(0)$	$EIRP_{Limit}$	$EIRP$(dBW)	L_{HA}	$P_M(k)$	P_H(dBW)	P_{H_Limit}	$P_M(0)$	$L_{txcable}$	$TxBackoff$	OH
0	25.0	25.0	5	10.5	18.0	18.0	10.5	22.5	3.5	0.0
1	24.5	24.5	5	11.0	17.5	18.0	11.0	22.5	3.0	-0.5
1	24.0	24.0	5	10.5	17.0	18.0	10.5	22.5	3.5	0.0
2	23.5	23.5	5	11.0	16.5	18.0	11.0	22.5	3.0	-0.5
2	23.0	23.0	5	10.5	16.0	18.0	10.5	22.5	3.5	0.0
3	22.5	22.5	5	11.0	15.5	18.0	11.0	22.5	3.0	-0.5
3	22.0	22.0	5	10.5	15.0	18.0	10.5	22.5	3.5	0.0
4	21.5	21.5	5	11.0	14.5	18.0	11.0	22.5	3.0	-0.5
4	21.0	21.0	5	10.5	14.0	18.0	10.5	22.5	3.5	0.0
4	20.5	20.5	5	10.0	13.5	18.0	10.0	22.5	4.0	0.5
4	20.0	20.0	5	9.5	13.0	18.0	9.5	22.5	4.5	1.0

$O_{BO}(0)$	$EIRP_{Limit}$	$EIRP$(dBW)	L_{HA}	$P_M(k)$	P_H(dBW)	P_{H_Limit}	$P_M(0)$	$L_{txcable}$	$TxBackoff$	OH
0	25.0	24.5	5	10.0	17.5	17.5	10.0	22.5	4.0	0.0
0	24.5	24.5	5	10.0	17.5	17.5	10.0	22.5	4.0	0.0
1	24.0	24.0	5	10.0	17.0	17.5	10.5	22.5	3.5	-0.5
1	23.5	23.5	5	10.0	16.5	17.5	10.0	22.5	4.0	0.0
2	23.0	23.0	5	10.0	16.0	17.5	10.5	22.5	3.5	-0.5
2	22.5	22.5	5	10.0	15.5	17.5	10.0	22.5	4.0	0.0
3	22.0	22.0	5	10.0	15.0	17.5	10.5	22.5	3.5	-0.5
3	21.5	21.5	5	10.0	14.5	17.5	10.0	22.5	4.0	0.0
4	21.0	21.0	5	9.5	14.0	17.5	10.5	22.5	3.5	-0.5
4	20.5	20.5	5	10.5	13.5	17.5	10.0	22.5	4.0	0.0
4	20.0	20.0	5	10.5	13.0	17.5	9.5	22.5	4.5	0.5

$O_{BO}(0)$	$EIRP_{Limit}$	$EIRP$(dBW)	L_{HA}	$P_M(k)$	P_H(dBW)	P_{H_Limit}	$P_M(0)$	$L_{txcable}$	$TxBackoff$	OH
0	25.0	24.0	5	9.5	17.0	17.0	9.5	22.5	4.5	0.0
0	24.5	24.0	5	9.5	17.0	17.0	9.5	22.5	4.5	0.0
0	24.0	24.0	5	10.0	17.0	17.0	9.5	22.5	4.5	0.0
1	23.5	23.5	5	10.0	16.5	17.0	10.0	22.5	4.0	-0.5
1	23.0	23.0	5	10.0	16.0	17.0	9.5	22.5	4.5	0.0
2	22.5	22.5	5	10.0	15.5	17.0	10.0	22.5	4.0	-0.5
2	22.0	22.0	5	9.5	15.0	17.0	9.5	22.5	4.5	0.0
3	21.5	21.5	5	9.5	14.5	17.0	10.0	22.5	4.0	-0.5
3	21.0	21.0	5	9.5	14.0	17.0	9.5	22.5	4.5	0.0
4	20.5	20.5	5	9.5	13.5	17.0	10.0	22.5	4.0	-0.5
4	20.0	20.0	5	9.5	13.0	17.0	9.5	22.5	4.5	0.0

$O_{BO}(0)$	$EIRP_{Limit}$	$EIRP$(dBW)	L_{HA}	$P_M(k)$	P_H(dBW)	P_{H_Limit}	$P_M(0)$	$L_{txcable}$	$TxBackoff$	OH
0	25.0	23.5	5	9.0	16.5	16.5	9.0	22.5	5.0	0.0
0	24.5	23.5	5	9.0	16.5	16.5	9.0	22.5	5.0	0.0
0	24.0	23.5	5	9.0	16.5	16.5	9.0	22.5	5.0	0.0
0	23.5	23.5	5	9.0	16.5	16.5	9.0	22.5	5.0	0.0
1	23.0	23.0	5	9.0	16.0	16.5	9.5	22.5	4.5	-0.5
1	22.5	22.5	5	9.0	15.5	16.5	9.0	22.5	5.0	0.0
2	22.0	22.0	5	9.0	15.0	16.5	9.5	22.5	4.5	-0.5
2	21.5	21.5	5	9.0	14.5	16.5	9.0	22.5	5.0	0.0
3	21.0	21.0	5	9.5	14.0	16.5	9.5	22.5	4.5	-0.5
3	20.5	20.5	5	9.5	13.5	16.5	9.0	22.5	5.0	0.0
4	20.0	20.0	5	9.5	13.0	16.5	9.5	22.5	4.5	-0.5

$O_{BO}(0)$	$EIRP_{Limit}$	$EIRP$(dBW)	L_{HA}	$P_M(k)$	P_H(dBW)	P_{H_Limit}	$P_M(0)$	$L_{txcable}$	$TxBackoff$	OH

0	25.0	23.0	5	8.5	16.0	16.0	8.5	22.5	5.5	0.0
0	24.5	23.0	5	8.5	16.0	16.0	8.5	22.5	5.5	0.0
0	24.0	23.0	5	9.0	16.0	16.0	8.5	22.5	5.5	0.0
0	23.5	23.0	5	9.0	16.0	16.0	8.5	22.5	5.5	0.0
0	23.0	23.0	5	9.0	16.0	16.0	8.5	22.5	5.5	0.0
1	22.5	22.5	5	8.5	15.5	16.0	9.0	22.5	5.0	-0.5
1	22.0	22.0	5	8.5	15.0	16.0	8.5	22.5	5.5	0.0
2	21.5	21.5	5	8.5	14.5	16.0	9.0	22.5	5.0	-0.5
2	21.0	21.0	5	8.5	14.0	16.0	8.5	22.5	5.5	0.0
3	20.5	20.5	5	8.5	13.5	16.0	9.0	22.5	5.0	-0.5
3	20.0	20.0	5	8.5	13.0	16.0	8.5	22.5	5.5	0.0

$O_{BO}(0)$	$EIRP_{Limit}$	$EIRP$(dBW)	L_{HA}	$P_M(k)$	P_H(dBW)	P_{H_Limit}	$P_M(0)$	$L_{txcable}$	*TxBackoff*	*OH*
0	25.0	22.5	5	8.0	15.5	15.5	8.0	22.5	6.0	0.0
0	24.5	22.5	5	8.0	15.5	15.5	8.0	22.5	6.0	0.0
0	24.0	22.5	5	8.0	15.5	15.5	8.0	22.5	6.0	0.0
0	23.5	22.5	5	8.0	15.5	15.5	8.0	22.5	6.0	0.0
0	23.0	22.5	5	8.0	15.5	15.5	8.0	22.5	6.0	0.0
0	22.5	22.5	5	8.0	15.5	15.5	8.0	22.5	6.0	0.0
1	22.0	22.0	5	8.0	15.0	15.5	8.5	22.5	5.5	-0.5
1	21.5	21.5	5	8.0	14.5	15.5	8.0	22.5	6.0	0.0
2	21.0	21.0	5	8.5	14.0	15.5	8.5	22.5	5.5	-0.5
2	20.5	20.5	5	8.5	13.5	15.5	8.0	22.5	6.0	0.0
3	20.0	20.0	5	8.5	13.0	15.5	8.5	22.5	5.5	-0.5

$O_{BO}(0)$	$EIRP_{Limit}$	$EIRP$(dBW)	L_{HA}	$P_M(k)$	P_H(dBW)	P_{H_Limit}	$P_M(0)$	$L_{txcable}$	*TxBackoff*	*OH*
0	25.0	22.0	5	7.5	15.0	15.0	7.5	22.5	6.5	0.0
0	24.5	22.0	5	7.5	15.0	15.0	7.5	22.5	6.5	0.0
0	24.0	22.0	5	8.0	15.0	15.0	7.5	22.5	6.5	0.0
0	23.5	22.0	5	8.0	15.0	15.0	7.5	22.5	6.5	0.0
0	23.0	22.0	5	7.5	15.0	15.0	7.5	22.5	6.5	0.0
0	22.5	22.0	5	7.5	15.0	15.0	7.5	22.5	6.5	0.0
0	22.0	22.0	5	7.5	15.0	15.0	7.5	22.5	6.5	0.0
1	21.5	21.5	5	7.5	14.5	15.0	8.0	22.5	6.0	-0.5
1	21.0	21.0	5	7.5	14.0	15.0	7.5	22.5	6.5	0.0
2	20.5	20.5	5	7.5	13.5	15.0	8.0	22.5	6.0	-0.5
2	20.0	20.0	5	7.5	13.0	15.0	7.5	22.5	6.5	0.0

$O_{BO}(0)$	$EIRP_{Limit}$	$EIRP$(dBW)	L_{HA}	$P_M(k)$	P_H(dBW)	P_{H_Limit}	$P_M(0)$	$L_{txcable}$	*TxBackoff*	*OH*
0	25.0	24.0	6	10.5	18.0	18.0	10.5	22.5	3.5	0.0
0	24.5	24.0	6	10.5	18.0	18.0	10.5	22.5	3.5	0.0
0	24.0	24.0	6	10.5	18.0	18.0	10.5	22.5	3.5	0.0
1	23.5	23.5	6	11.0	17.5	18.0	11.0	22.5	3.0	-0.5
1	23.0	23.0	6	10.5	17.0	18.0	10.5	22.5	3.5	0.0
2	22.5	22.5	6	11.0	16.5	18.0	11.0	22.5	3.0	-0.5
2	22.0	22.0	6	10.5	16.0	18.0	10.5	22.5	3.5	0.0
3	21.5	21.5	6	11.0	15.5	18.0	11.0	22.5	3.0	-0.5
3	21.0	21.0	6	10.5	15.0	18.0	10.5	22.5	3.5	0.0
4	20.5	20.5	6	11.0	14.5	18.0	11.0	22.5	3.0	-0.5
4	20.0	20.0	6	10.5	14.0	18.0	10.5	22.5	3.5	0.0

$O_{BO}(0)$	$EIRP_{Limit}$	$EIRP$(dBW)	L_{HA}	$P_M(k)$	P_H(dBW)	P_{H_Limit}	$P_M(0)$	$L_{txcable}$	*TxBackoff*	*OH*
0	25.0	23.5	6	10.0	17.5	17.5	10.0	22.5	4.0	0.0
0	24.5	23.5	6	10.0	17.5	17.5	10.0	22.5	4.0	0.0
0	24.0	23.5	6	10.0	17.5	17.5	10.0	22.5	4.0	0.0
0	23.5	23.5	6	10.0	17.5	17.5	10.0	22.5	4.0	0.0
1	23.0	23.0	6	10.0	17.0	17.5	10.5	22.5	3.5	-0.5
1	22.5	22.5	6	10.0	16.5	17.5	10.0	22.5	4.0	0.0
2	22.0	22.0	6	10.0	16.0	17.5	10.5	22.5	3.5	-0.5
2	21.5	21.5	6	9.5	15.5	17.5	10.0	22.5	4.0	0.0
3	21.0	21.0	6	10.5	15.0	17.5	10.5	22.5	3.5	-0.5
3	20.5	20.5	6	10.5	14.5	17.5	10.0	22.5	4.0	0.0
4	20.0	20.0	6	10.5	14.0	17.5	10.5	22.5	3.5	-0.5

$O_{BO}(0)$	$EIRP_{Limit}$	$EIRP$(dBW)	L_{HA}	$P_M(k)$	P_H(dBW)	P_{H_Limit}	$P_M(0)$	$L_{txcable}$	*TxBackoff*	*OH*
0	25.0	23.0	6	9.5	17.0	17.0	9.5	22.5	4.5	0.0
0	24.5	23.0	6	10.0	17.0	17.0	9.5	22.5	4.5	0.0
0	24.0	23.0	6	10.0	17.0	17.0	9.5	22.5	4.5	0.0
0	23.5	23.0	6	10.0	17.0	17.0	9.5	22.5	4.5	0.0
0	23.0	23.0	6	10.0	17.0	17.0	9.5	22.5	4.5	0.0
1	22.5	22.5	6	9.5	16.5	17.0	10.0	22.5	4.0	-0.5
1	22.0	22.0	6	9.5	16.0	17.0	9.5	22.5	4.5	0.0
2	21.5	21.5	6	9.5	15.5	17.0	10.0	22.5	4.0	-0.5
2	21.0	21.0	6	9.5	15.0	17.0	9.5	22.5	4.5	0.0
3	20.5	20.5	6	9.5	14.5	17.0	10.0	22.5	4.0	-0.5
3	20.0	20.0	6	9.5	14.0	17.0	9.5	22.5	4.5	0.0

$O_{BO}(0)$	$EIRP_{Limit}$	$EIRP$(dBW)	L_{HA}	$P_M(k)$	P_H(dBW)	P_{H_Limit}	$P_M(0)$	$L_{txcable}$	*TxBackoff*	*OH*
0	25.0	22.5	6	9.0	16.5	16.5	9.0	22.5	5.0	0.0
0	24.5	22.5	6	9.0	16.5	16.5	9.0	22.5	5.0	0.0
0	24.0	22.5	6	9.0	16.5	16.5	9.0	22.5	5.0	0.0
0	23.5	22.5	6	9.0	16.5	16.5	9.0	22.5	5.0	0.0
0	23.0	22.5	6	9.0	16.5	16.5	9.0	22.5	5.0	0.0
0	22.5	22.5	6	9.0	16.5	16.5	9.0	22.5	5.0	0.0
1	22.0	22.0	6	9.0	16.0	16.5	9.5	22.5	4.5	-0.5
1	21.5	21.5	6	9.5	15.5	16.5	9.0	22.5	5.0	0.0
2	21.0	21.0	6	9.5	15.0	16.5	9.5	22.5	4.5	-0.5
2	20.5	20.5	6	9.5	14.5	16.5	9.0	22.5	5.0	0.0
3	20.0	20.0	6	9.5	14.0	16.5	9.5	22.5	4.5	-0.5

$O_{BO}(0)$	$EIRP_{Limit}$	$EIRP$(dBW)	L_{HA}	$P_M(k)$	P_H(dBW)	P_{H_Limit}	$P_M(0)$	$L_{txcable}$	*TxBackoff*	*OH*

0	25.0	22.0	6	8.5	16.0	16.0	8.5	22.5	5.5	0.0
0	24.5	22.0	6	9.0	16.0	16.0	8.5	22.5	5.5	0.0
0	24.0	22.0	6	9.0	16.0	16.0	8.5	22.5	5.5	0.0
0	23.5	22.0	6	9.0	16.0	16.0	8.5	22.5	5.5	0.0
0	23.0	22.0	6	8.5	16.0	16.0	8.5	22.5	5.5	0.0
0	22.5	22.0	6	8.5	16.0	16.0	8.5	22.5	5.5	0.0
0	22.0	22.0	6	8.5	16.0	16.0	8.5	22.5	5.5	0.0
1	21.5	21.5	6	8.5	15.5	16.0	9.0	22.5	5.0	-0.5
1	21.0	21.0	6	8.5	15.0	16.0	8.5	22.5	5.5	0.0
2	20.5	20.5	6	8.5	14.5	16.0	9.0	22.5	5.0	-0.5
2	20.0	20.0	6	8.5	14.0	16.0	8.5	22.5	5.5	0.0

$O_{BO}(0)$	$EIRP_{Limit}$	$EIRP$(dBW)	L_{HA}	$P_M(k)$	P_H(dBW)	P_{H_Limit}	$P_M(0)$	$L_{txcable}$	*TxBackoff*	*OH*
0	25.0	21.5	6	8.0	15.5	15.5	8.0	22.5	6.0	0.0
0	24.5	21.5	6	8.0	15.5	15.5	8.0	22.5	6.0	0.0
0	24.0	21.5	6	8.0	15.5	15.5	8.0	22.5	6.0	0.0
0	23.5	21.5	6	8.0	15.5	15.5	8.0	22.5	6.0	0.0
0	23.0	21.5	6	8.0	15.5	15.5	8.0	22.5	6.0	0.0
0	22.5	21.5	6	8.0	15.5	15.5	8.0	22.5	6.0	0.0
0	22.0	21.5	6	8.0	15.5	15.5	8.0	22.5	6.0	0.0
0	21.5	21.5	6	8.5	15.5	15.5	8.0	22.5	6.0	0.0
1	21.0	21.0	6	8.5	15.0	15.5	8.5	22.5	5.5	-0.5
1	20.5	20.5	6	8.5	14.5	15.5	8.0	22.5	6.0	0.0
2	20.0	20.0	6	8.0	14.0	15.5	8.5	22.5	5.5	-0.5

$O_{BO}(0)$	$EIRP_{Limit}$	$EIRP$(dBW)	L_{HA}	$P_M(k)$	P_H(dBW)	P_{H_Limit}	$P_M(0)$	$L_{txcable}$	*TxBackoff*	*OH*
0	25.0	21.0	6	7.5	15.0	15.0	7.5	22.5	6.5	0.0
0	24.5	21.0	6	8.0	15.0	15.0	7.5	22.5	6.5	0.0
0	24.0	21.0	6	8.0	15.0	15.0	7.5	22.5	6.5	0.0
0	23.5	21.0	6	7.5	15.0	15.0	7.5	22.5	6.5	0.0
0	23.0	21.0	6	7.5	15.0	15.0	7.5	22.5	6.5	0.0
0	22.5	21.0	6	7.5	15.0	15.0	7.5	22.5	6.5	0.0
0	22.0	21.0	6	7.5	15.0	15.0	7.5	22.5	6.5	0.0
0	21.5	21.0	6	7.5	15.0	15.0	7.5	22.5	6.5	0.0
0	21.0	21.0	6	7.5	15.0	15.0	7.5	22.5	6.5	0.0
1	20.5	20.5	6	7.5	14.5	15.0	8.0	22.5	6.0	-0.5
1	20.0	20.0	6	7.5	14.0	15.0	7.5	22.5	6.5	0.0