MicroSAT Software ICD 4.6

Document # UM-181223 revision 4.0

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1. SYSTEM OVERVIEW

Figure 1: System Block Diagram

1.1. Abstract

This document gives short description for software ICD for MicroSAT/NanoSAT antenna.

1.2. Revision History

Table 1: Revision history

ICD Ver.	Doc Ver.	Date	Author	Description
1.3440	1.0	10/04/2016	Boris Kessel	Initial Version
2.0	1.0	15/02/2017	Ilia Kanevsky	SWICD Update to version 2.93
2.01	1.1	01/03/2017	Boris Kessel	Typo at payload bytes of Sat Position and Scan Limiters OpCode. And more minor improvements.
2.02	1.2	20/07/2017	Menachem Polak	SWICD Update to version 3.11.
2.1	1.0	10/10/2017	Ilia Kanevsky	SWICD Update to version 3.12
2.11	1.0	06/11/2017	Menachem Polak	SWICD Update to version 3.13
2.11	1.1	11/12/2017	Boris Kessel	Added document version that is on the left. Fixed opcode 0x01 ICD message.
2.12	1.1	09/01/2018	Maor Malka	SWICD Update to Version 3.16
2.12	1.1	14/02/2018	Boris Kessel	Added chapter 1.10 System operating values
2.12	1.2	14/02/2018	Boris Kessel	Added messages sequence for antenna pointing.
3.20	1.0	22/04/2018	Ilia Kanevsky	Changed ICD version to follow Release version. Added new SWICD to version 3.20
3.30	1.0	01/09/2018	Ilia Kanevsky	Changed ICD version to follow Release version. Added new SWICD to version 3.30
3.30	1.1	06/09/18	Ilia Kanevsky	Added 0x39 External GPS SET
3.40	1.0	11/11/18	Menachem Polak	SWICD Update to version 3.40
3.41	1.0	23/12/18	Menachem Polak	SWICD Update to version 3.41
4.5	1.0	09/06/20	Yarom Swissa	SWICD Update to version 4.5
4.5	4.0	19/08/20	Shmuel Gandin	SWICD Update to version 4.5
4.6	4.0	9/12/20	Shmuel Gandin	SWICD Update to version 4.6

1.3. Approvals

Table 2: Approvals

Approved by	Name	Date	Signature
CTO	Oleg Roitberg	19/08/20	SEE HARD COPY

1.4. ICD Change Log

1.4.1. ICD Version 2.12

Table 3: Change Log 2.12

No.	OP CODE	Name	Changes
1	0x0E	Regulation configuration	Added opcode
2	0x0F	Regulation Table configuration	Added opcode
3	0x1D	PWM status	Added opcode
4	0x1E	Regulation status	Added opcode
5	0xF0	Discovery Report	Added system in use bit
6	0x08	Rx Config	Changed size of "roll off" factor to u16
7	0x20	**Sat Ant pos**	Added RxPoltilt_HnV u8, Added TxPoltilt_HnV u8
8	0x16	Stats Refresh	Added opcode
9	0x1B	Stats Refresh	Added opcode
10	0x41	Tx Mode	Added SatType u8, Added TxFreq u32
11	0x1C	Poltilt stats	Added Opcode

1.4.2. ICD Version 3.20

Table 4: Change Log 3.20

No.	OP code	Name	Changes
1	0x2E	MC_TRACK_EL_SCAN_ICD	Added opcode for SCAN PID
2	0x00	SYS_DEVICE_ID_ICD	Option to update only string.
3	0x19	PWR_UP_MODE_CFG_ICD	Added new options for track configuration.
4	0xF2	DEBUG_SYSTEM_STATUS	Added CBIT and PBIT
5	0xF5	DEBUG_SYSTEM_LOG	Added Log.
6	0x20	SAT_POSITION	Coordinates control update (explanation only).

1.4.3. ICD Version 3.30

Table 5: Change Log 3.30

No.	OP code	Name	Changes
1	0x00	System Device ID	Added new fields. Added new Sub values.
2	0x01	Interface Configuration	Added SNMP receive port. From reserved [Uint_16]
3	0x02	OpMode	Added New internal modes, struct refinement.
4	0x20	Sat Position	Fixed message byte count.
5	0x22	Track Control Constants	Fixed missing [azDIIR] and [elDIIR].
6	0x2B	IMU Type Configuration	Added IMU Type Configuration.
7	0x2F	Track FOG Constants	Added New position PID configuration.
8	0x39	GPS Position Report	Added FOG Interface report.
9	0x39	GPS Position	Added Set option for external GPS.
10	0x41	Micro Tx Mode Set	Added "Buc Mission BMIP"to Buc option.

1.4.4. ICD Version 3.40

Table 6: Change Log 3.40

No.	OP code	Name	Changes
1	0x0A	PM Advanced Configuration	Added Fields related to OpenAMIP RSSI Tracking
2	0xB9	OpenAMIP Configuration	Added Fields related to IP Configuration.
3	0xBB	OpenAMIP Status	Added opcode for OpenAMIP status.
4	0xF2	DEBUG_SYSTEM_STATUS	Added internal fields to PBIT.

1.4.5. ICD Version 4.5

Table 7: Change Log 4.5

No.	Rev	OP code	Name	Changes
1	1.0	0x02	OpMode	Corrected byte count to comply with swicd.h file.
2	1.0	0x03	Version Statistics	Corrected byte count to comply with swicd.h file.
3	1.0	0x08	RX Configuration	Added new parameter and fixed incorrect type.
4	1.0	0x09	RX Statistics	Corrected byte count to comply with swicd.h file.
5	1.0	0x0E	Regulation Configuration	Corrected byte count to comply with swicd.h file.
6	1.0	0x12	MC Scope	Corrected byte count to comply with swicd.h file.
7	1.0	0x18	BIT Status	Corrected byte count to comply with swicd.h file.
8	1.0	0x1E	Regulation Statistics	Corrected byte count to comply with swicd.h file.
9	1.0	0x20	Sat Position	Corrected byte count to comply with swicd.h file.
10	1.0	0x28	Servo Motor Limit	Added missing description
11	1.0	0x30	Bridge Statistics	Corrected byte count to comply with swicd.h file.
12	1.0	0x39	GPS Position	Added correct byte count to "set" reserved bytes.
13	1.0	0x41	TX Mode SET	Added description on power out mode
14	1.0	0xBB	OpenAMIP Status	Added missing description
15	1.0	0xF1	Debug Control	Corrected byte count to comply with swicd.h file.
16	1.0	0xF2	Debug System Report	Corrected byte count to comply with swicd.h file.
17	1.0	0xC0	Terminal Configuration	Added new message description
18	1.0	0xC1	Antenna Configuration	Added new message description
19	1.0	0xC2	LNB Configuration	Added new message description
20	1.0	0xC3	BUC Configuration	Added new message description
21	1.0	0xC4	ACU Configuration	Added new message description
22	1.0	0xC5	Bridge Configuration	Added new message description
23	1.0	0xC6	Front Panel Configuration	Added new message description
24	1.0	0xC7	Spectrum Calibration	Added new message description
25	4.0	0xC8	GYRO Calibration	Added new message description

1.4.6.   ICD Version 4.6

Table 8: Change Log 4.6

No.	Rev	OP code	Name	Changes
1	1.0	0x02	MC Mode	Added new fields: - IsGetSatStaticMode - BootIsGetSatStaticMode
2	1.0	0x1F	O3B Channel Table	Added new message description
3	1.0	0x2A	O3B Timetable	Added new field: - Region
4	1.0	0x39	GPS Statistics	Added new fields: - Speed - Satellites Use
5	1.0	0x3C	O3B Information	Added new message description

1.5. Communication Interfaces

Communication with the antenna is conducted using a serial RS232 interface or 10/100Mbps RJ45 Ethernet interface.

1.5.1. RS232

Serial interface factory/default parameters are:

Table 9: RS232 Factory Settings

Baud Rate	115200 bps
Parity	None
Start Bit	1
Stop Bit	1
Data Bits	8
Flow control	None

1.5.2. Ethernet

All communication messages can be over UDP over LAN 10/100 Mbit.
Ethernet interface factory/default parameters are:

Table 10: Ethernet Factory Settings

System	IP: Port	192.168.10.200: 50001
	Subnet - Mask	255.255.255.0
	Default Gateway	192.168.10.1
Host	IP: Port	192.168.10.14: 50001

The default values can be changed using messages described below.

1.6. Communication Massage structure

1.6.1. Message Fields structure

Table 11: message structure for communication

Byte #	0-3	4-5	6	7	8-9	10-11	12-[12+N]	[13+N] - [14+N]
Field	Preamble	Packet Seq.	Opcode ID	CMD	Payload Len	Ack Seq.	Payload (Length-N)	Checksum

1.6.2. Message field's description

Table 12: Message fields description

Field Name	Size (Bytes)	Description
Preamble	4	Should be `0x4D545564`
Packet Sequence	2	Message sequence. Increased by 1 each packet. The System Manager and the System have separate sequence numbers.
Opcode ID	1	Operation Code ID represents the message "subject" (What data we would like to set/receive). The full opcode list described at <u>Messages List</u>.
CMD	1	Command byte represent the type of operation we would like to perform. Detailed information given at the "Command byte description" table below.
Payload Length	2	Describes the length of the payload field in bytes. Valid size: 0-1400
Ack Seq.	2	Valid only in acknowledge message. Represent the sequence of the acknowledged message.
Payload	Payload Length	The transferred data.
Checksum	2	Checksum of the entire packet. Details on how to calculate this field is described at the <u>Software guide</u> section.

Table 13: Command byte description

Bit Name	Bit #	Initiated by	Description
Set	0	Host	Request, initiated by the Host, to set new data/parameters at the System.
Report	1	Host	Request, initiated by the Host, to report data/parameters from the System. There is no payload in Report request.
Acknowledge	2	System	A Response from the System which indicate that a set/report message received successfully or not.
Set Default	3	Host	Only valid with Set message. The System will save the data internally and will be loaded at the next power up.
Statistics	4	System	Initiated by the System. Data messages.
Warning	5	System	The System indicates a warning.
Error	6	System	The System indicates an error occurred.

"Host"   – The System Manager/Controller (Laptop/PC).
"System" – The System (MicroSAT/NanoSAT)

1.6.3. Communication messages flow

Command: Set.
Seq#: M

Command: Ack.
Seq#: N
AckSeq#: M

Command: Stats.
Seq#: N+1
AckSeq#: -

Command: Stats.
Seq#: N+2
AckSeq#: -

Command: Stats.
Seq#: N+3
AckSeq#: -

Command: Report.
Seq#: M+1
No payload (Payload
Len = 0)

Command: Ack.
Seq#: N+4
AckSeq#: M+1

System
Manager

System
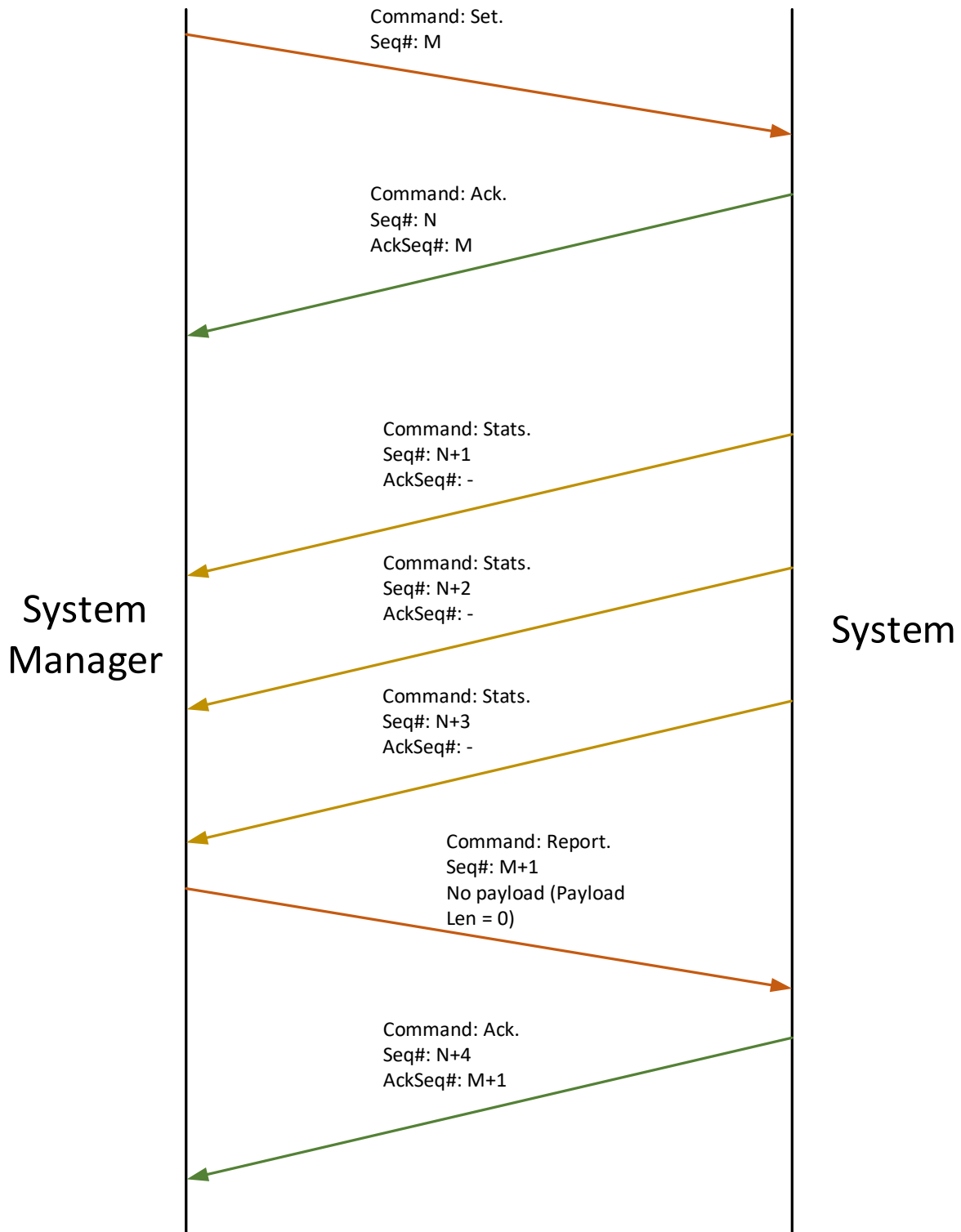
Figure 2: Communication messages flow

1.7.　Messages List

The table below describes the various messages used to control the MicroSAT/NanoSAT antenna. The table includes Opcode IDs, Opcode names and short description of each message. The "Valid Operations" section describes which commands the Host can use on a specific opcode.

Table 14: Messages List

Opcode	Opcode Name	Description	Operations
0x00	System Device ID	Contains Device ID/Serial number, Device Type (MicroSAT/NanoSAT/Etc.) and system MAC address.	S/R
0x01	System Interface Config	System interface configuration. Such as interface type (Ethernet or RS232), IPs, Ports, etc.	S/R
0x02	Op Mode	Operation mode. (Manual, Scan, GetSAT etc.)	S/R
0x03	Versions	System Versions Report.	R
0x04	System SAM Config	External processor (SAM) configuration message.	S
0x05	Sam Log Message	External processor log messages.	ST
0x06	System Status Message	System status. (Currently only temperature)	R
0x07	Reserved		
0x08	RX Configuration	System receive path configuration. (Gain, frequency, bandwidth etc.)	S/R
0x09	RX Statistics	System receive path measurements/samples.	R/ST
0x0A	PM Advanced Configuration	Power Meter Advanced Track Configurations.	S/R
0x0B	Track imu filter configuration	Reserved	
0x0C	Internal Log configuration	Reserved	
0x0D	Internal loc Stats	Reserved	
0x0E	TX Regulation Configuration	Defines the current Regulation mode of the device	S/R
0x0F	TX Regulation Skew Table	Defines the regulation table that the system will use	S/R
0x10	IMU Status	IMU measurements.	R/ST
0x11	Encoders Status	Encoder's measurements.	R/ST
0x12	MC Scope	Movement sample buffer.	ST
0x13	MC Stats	Movement Status/Info.	R/ST
0x14	MC RSSI Scope	RSSI Scan sample buffer.	ST
0x15	MC Advanced Config	Movement/Tracking advanced configuration.	S/R
0x16	Stats Refresh Eth config	Defines the rate of Statistics for the Ethernet port	S/R
0x17	BIT Configuration	Configures the System to Perform a BIT.	S
0x18	BIT Stats	System BIT Results.	ST
0x19	Power Up Mode	Configure System Power Up Operation.	S/R
0x1A	Compass Stats	Reserved	S/R
0x1B	Stats Refresh Uart Config	Defines the rate of message for the Uart Port.	S/R
0x1C	PolTilt Stats	Reserved	S/R
0x1D	PWM Stats	Reports currently set PWM value for the motors	ST
0x1E	Regulation Stats	Reports stats of the TX Regulation Manager	ST
0x1F	O3B Channel file	O3b Channel Table	S/R
0x20	Sat Position	Satellite position (Azimuth & Elevation)	S/R
0x21	Move Control Constants	Movement/Tracking advanced configuration.	S/R
0x22	Track Control Constants	Movement/Tracking advanced configuration.	S/R
0x23	Track MC Scan Config	Tracking Micro Scan configuration.	S/R
0x24	Track IMU Calibration	Gyro calibration and filter selection.	S/R
0x25	Scan Limiters	Scan options/limits configuration	S/R
0x26	Step Tracking	Step Tracking configuration.	S/R
0x27	Motor Current Limits	Motor Current Limit configuration.	S/R
0x29	Servo Freq Table	Servo Motors Frequency offset table	S/R
0x2A	O3B Timetable	O3B Handover times	S
0x2B	IMU Type config	IMU Device type configuration	S/R
0x2C	Ku Skew Tx Config	Ku antenna Tx skew configuration	S

0x2D	Ku Skew Rx Config	Ku antenna Rx skew configuration	S
0x2E	Elevation Scan PID Config	Elevation tracking PID configuration	S/R
0x2F	Track Fog Constants	System Position PID configuration	S/R
0x30	Bridge SW Perf Status	Active Bridge software ICD Status Report.	R
0x31	Bridge Init update	Bridge Initialize update process	S
0x32	Bridge Get Update Status	Bridge Update status report	R
0x33	Bridge Enter Boot Mode	Active Bridge Enable Boot Mode.	S/R
0x34	Bridge Boot Config	Active Bridge Boot Configuration.	S
0x35	Bridge Boot Config Ack	Active Bridge Boot ACK.	R
0x36	Bridge End Boot Mode	Active Bridge End Boot Mode.	S
0x37	Bridge ADC status	Active Bridge ADC Status Report.	R
0x38	Bridge Motor Limit Error	Active Bridge Motor Limits Error Report.	R
0x39	GPS Status	GPS Position Report / External GPS Set.	S/R
0x3A	Bridge SSPA Status	Active Bridge SSPA Status Report.	R
0x3B	Bridge BUC Status	Active Bridge Buc Status Report.	R
0x3C	O3B Information	O3B Information	S/ST
0x3D-0x3F	Reserved		
0x40	MC WaveLab Buc	WaveLab Buc Status Report.	S/R
0x41	MC Tx Mode Set	Transmission Mode Set.	S/R
0x42	Reserved		
0x43	MC Mission Buc Status	Mission Buc Status Report.	R
0x44	MC Atom Buc Status	Atom BUC Status Report.	R
0x45	MC Mission Buc Info	Reserved	R
0x46	MC Mission Inv Buc Config	Reserved	
0x47	MC GetSAT Buc Stats	Reserved	
0x48-0x4F	Reserved		
0x50	cx 751 CM reset	Reserved	S
0x51	cx Power control	Reserved	R
0x52	SD Card Status Report	Reserved	R
0x53-0x7F	Reserved		
0x80	Modem Mode and SR Config	Modem Mode/Send/Receive Configuration.	
0x81	Modem Tx Config	Modem Tx Configuration.	
0x82	Modem Rx Config	Modem Rx Configuration.	
0x83	Demodulator Status	Modem Demodulation Status.	
0x84	Modem Reset	Modem Reset.	
0x85	Modem ADRF6518Cfg	Modem ADRF6518 Configuration.	
0x86	Gem Panel Status	Mode Gem Panel Status Report.	
0x87	Modem Ethernet Status	Modem Ethernet Status.	
0x88	Modem Tx Mute Config	Modem Tx Mute Configuration.	
0x89	Modem Buc Power Config	Modem Buc Power Configuration.	
0x8A	Modem Ref Clk10MHz Enable	Modem Clock Reference 10MHz Enable.	
0x8B	Modem Rx LNB Config	Modem Rx LNB Configuration.	
0x8C	Modem RF All Tx Config	Modem RF ALL Tx Configuration.	
0x8D	Modem RF All Rx Config	Modem RF ALL Rx Configuration.	
0x8E-0x8F	Reserved		
0x90	Transfer to Modem	Send Configuration to Modem.	S
0x91-0xA2	Reserved		
0xA3	One-way link manual POS	Reserved	S/R
0xA4-0xAF	Reserved		
0xB1	Mate Info Configuration	Reserved	S/R
0xB2	Mate Status	Reserved	R

0xB3	System Region Configuration	Reserved	S/R
0xB4	Mate Mode Configuration	Reserved	S/R
0xB5	Mate Region Configuration	Reserved	S/R
0xB6	Reserved	Reserved	
0xB7	HelliSAT Status Report	Reserved	R
0xB8	Follow PID Configuration	Reserved	S/R
0xB9	Open Amip Configuration	Antenna OpenAMIP Configuration.	S/R
0xBA	Open AMIP ECHO		R
0xBB	Open Amip Status	Antenna OpenAMIP Communication Status	R
0xBC	Open Amip Ident config		S/R
0xBD	Inmarsat mib Led stats		R
0xBE	CM751 Extender Stats		R
0xBF	Reserved		
0xC0	Terminal Configuration	Terminal Configuration	S
0xC1	Antenna Configuration	Antenna Configuration	S
0xC2	LNB Configuration	LNB Configuration	S
0xC3	BUC Configuration	BUC Configuration	S
0xC4	ACU Configuration	ACU Configuration	S
0xC5	Bridge Configuration	Bridge Configuration	S
0xC6	Front Panel Configuration	Front Panel Configuration	S
0xC7	Spectrum Calibration		S
0xC8	GYRO Calibration	Gyro Calibration Process	S/R
0xC9-0xEF	Reserved		
0xF0	Discovery Report	System Ethernet Discovery Report.	R
0xF1	Debug Control	System Debug Interface.	S/R
0xF2	Debug System Status	System Status Report.	R
0xF3-0xFF	Reserved		

Valid operations:
* S – Set Command
* R – Report Command
* ST – Statistics Command

1.8. Detailed OpCode Description

1.8.1. System Device ID – 0x00

System general information.

1.8.1.1. Set message payload:

Table 15: System Device ID Set message payload

Byte #	Name	Type	Value	Description
0-1	Device Type	Uint_16	0	None
			1	MicroSAT
			2	NanoSAT
			3	PicoSAT
			4	MicroSAT_LW
			5	MiliSAT_W
			6	MiliSAT_H
			7-9	Reserved
			10	MicroModem
2-3	Device Sub Type	Uint_16	0	None
			[1]	KA
			2	KU
			3	KU_30B
			4	Reserved
4-7	Device ID	Uint_32	-	The serial number of the system – XXYYYYZZZ – each XX – month of production. YYYY – year of production. ZZZ – system sequence number.
8-13	Mac Address	Uint_8[6]	-	System MAC address.
14	DeviceBitsConfig	Uint_8	Bit#	Description
			1	Antenna with Front Panel Interface
			2	No GPS Antenna installed
15	Antenna Type	Uint_8	0	TX_L - RX_L
			1	TX_L - RX_R
			2	TX_R - RX_L
			3	TX_R - RX_R
16-21	Reserved	Uint_8[6]		
22	String Size	Uint_8		Length of the string.
23-54	String	Uint_8[32]		Free text to describe the system.

1.8.1.2. Report Acknowledge message payload:

Same as Set message payload.

1.8.2. Ethernet Interface Configuration – 0x01

Ethernet settings and messaging interface select.

1.8.2.1. Set message payload:

Table 16: Ethernet Interface Configuration Set message payload

Byte #	Name	Type	Value	Description
0	Set Ethernet Settings	Uint_8	0	Ignores the Ethernet settings parameters.
			1	Sets the Ethernet settings and restarting.
1-4	System IP	Uint_32	[0xC0A80AC8]	System IP - **192.168.10.200**
5-8	System Subnet	Uint_32	[0xFFFFFF00]	System Subnet Mask - **255.255.255.0**
9-12	System Gateway	Uint_32	[0xC0A80A01]	System Gateway - **192.168.10.1**
13-14	System Port	Uint_16	[0xC351]	System listen port - **50001**.
15-18	Host IP	Uint_32	[0xC0A80A0E]	Host IP - **192.168.10.14**
19-20	Host Port	Uint_16	[0xC351]	Host listen port - **50001**.
21-24	Reserved IP 0	Uint_32	[0]	Reserved.
25-26	Listen SNMP Port	Uint_16	[161]	SNMP receive port.
27-30	Discovery Cast	Uint_32	[0xFFFFFFFF]	Used to enable discovery report as Multicast. Discovery report will be sent both multicast and broadcast in case of multicast use.
31-32	Reserved Port 1	Uint_16	[0]	Reserved.
33	Set Interface Type	Uint_8	[0]	Ignores the interface type field
			1	Sets the messaging interface type.
34	Interface Type	Uint_8	0	RS232
			[1]	Ethernet
35-42	Reserved	Uint_8[8]	[0]	Reserved.
43-74	System Name	Uint_8[32]	[0]	A string that used as a system label. For example, "New York MicroSAT".

1.8.2.2. Report Acknowledge message payload:

Same as Set message payload.

1.8.3. OpMode – 0x02

Movement operational mode message. The system

1.8.3.1. Set message payload:

Table 17: Op Mode Set message payload

Byte #	Name	Type	Value		Description
0	System OpMode	Uint_8	[0]	None	
			1	Position	
			2	Scan	
			3	Scan360	
			4	Track	
			5	GetSAT	
			6	Continues Position	
			7	GetSAT 2 Position	
			16	Follow Mate [Reserved]	
1	Auto Update	Uint_8	0	The motors stop when required position reached.	
			1	The motors keep the required position after reaching it.	
2	Azimuth Use IMU	Uint_8	0	Use encoders for Azimuth.	
			1	Use IMU for Azimuth.	
3	Elevation Use IMU	Uint_8	0	Use encoders for elevation.	
			1	Use IMU for elevation.	
4	Clear Align	Uint_8	0	None	
			1	Clears the compass align flag.	
5	Boot MC mode	Uint_8	0	keeps mode value that should be used to initialize mode field during boot	
6	IsGetSatStaticMode	Uint_8	0		
7	BootIsGetSatStaticMode	Uint_8	0		
8-45	Reserved	Uint_8[38]	0	Reserved	

Notes:

[1] Valid only in Position and Scan modes.

1.8.3.2. Report Acknowledge message payload:

Same as Set message payload.

1.8.4. Version Statistics – 0x03

Reports the system Versions.

1.8.4.1. Set message payload:

None.

1.8.4.2. Report Acknowledge message payload:

Table 18: Version Statistics message payload

Byte #	Name	Type	Default	Description
0-3	Reserved	Uint_32	-	
4-7	Reserved	Uint_32	-	
8-11	Reserved	Uint_32	-	
12-15	Reserved	Uint_32	-	
16	Active FW	Uint_8		Active Firmware version
17	FW Major	Uint_8	-	Firmware main number.
18	FW Minor	Uint_8	-	Firmware sub number.
19-20	FW Patch	Uint_16		Firmware patch number.
21-24	FW Git	Uint_32		Firmware Git Commit number
25-28	Bridge FW	Uint_32		
29	SSPA FW	Uint_8		Valid for NanoSAT only if used
30-33	BUC FW	Uint_32		Valid for NanoSAT only if used
34-37	Reserved	Uint_8[4]	-	

1.8.5. System Sam Configuration – 0x04

SAM FW upload control.

1.8.5.1. Set message payload:

Table 19: System Sam Configuration Set message payload

Byte #	Name	Type	Default	Description
0	SAM Config Command	Uint_8	1	1 – Start SAM configuration. SAM is erased and reset. The main UART interface will be used for SAM programming. 2 – Stop SAM configuration. The main UART returns to serve as messaging interface.

1.8.5.2. Report Acknowledge message payload:

None.

1.8.6. Sam Log Message – 0x05

SAM processor log messages. Received only as statistic.

1.8.6.1. Set message payload:

None.

1.8.6.2. Report Acknowledge message payload:

None.

1.8.6.3. Statistics message payload:

Table 20: Sam Log Level Statistics message payload

Byte #	Name	Type	Default	Description
0	Log Level	Uint_8	-	0 – Error. 1 – Warning. 2 – Info. 3 – Debug.
Payload Length	Message String	char	-	A string message from Sam.

1.8.7. System Status Message – 0x06

System Status. Currently only temperature.

1.8.7.1. Set message payload:

None.

1.8.7.2. Report Acknowledge message payload:

Table 21: System Status Message Set message payload

Byte #	Name	Type	Default	Description
0-1	Temperature	Int_16	-	Temperature of the system controller. In 0.0625-degree resolution. Normal: -40 ÷ +85 Warning: +85 ÷ +105 Error: >105

1.8.8. RX Configuration – 0x08

Signal receive path and RSSI measurement configuration.
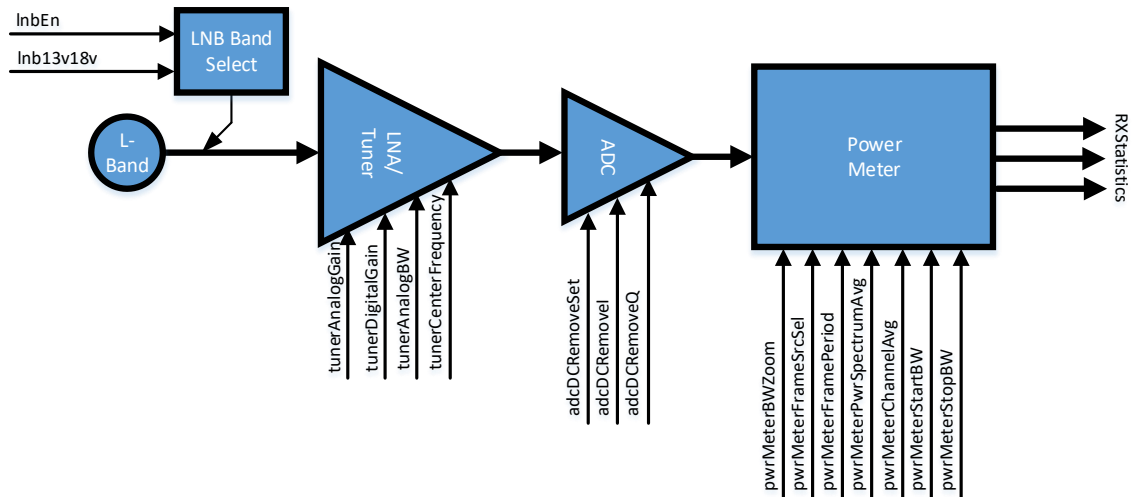
Figure 3: Receive path basic block diagram

1.8.8.1. Set message payload:

Table 22: RX Configuration Set message payload

Byte#	Name	Type	Default	Description
0-1	Tuner Analog Gain	Uint_16	20	Tuner analog gain. 0-60 dB
2	Tuner Digital Gain	Uint_8	0	Tuner digital gain. 0-15 dB
3-6	Tuner Analog BW	Uint_32	16000000	Tuner output LPF bandwidth. In Hz.
7-10	Tuner Center Frequency	Uint_32	1360000000	Tuner center frequency. In Hz.
11	Power Meter BW Zoom	Uint_8	4	Digital bandwidth zoom. 1 – 80MHz bandwidth. 2 – 40MHz bandwidth. 4 – 20MHz bandwidth.
12	Power Meter Frame Source Selector	Uint_8	5	RX Statistics frame source select. 0 – ADC (Raw ADC samples) 1 – HBF1 (After first half band filter samples) 2 – HBF2 (After second half band filter samples) 3 – FFT 4 – PSA (Power Spectrum samples) 5 – PSA_DB (Power Spectrum in DB)
13-15	Power Meter Frame Period	Uint_32	14	Period of a frame. In 14mSec resolution. Minimum period time is: 3.25uSec * pwrMeterBWZoom * pwrMeterPwrSpectrumAvg.
16-17	Power Meter Spectrum Average	Uint_16	256	Average factor of the Power Spectrum.
18-19	Power Meter Channel Average	Uint_16	4	Average factor of RSSI channel power.
20	Power Meter Channel DB Average	Uint_8	1	Not used.
21-24	Power Meter Start BW	Uint_32	1359000000	The start frequency of RSSI channel. In Hz.
25-28	Power Meter Stop BW	Uint_32	1361000000	The stop frequency of RSSI channel. In Hz.
29	ADC DC Remove Set	Uint_8	0	Set the remove dc values. (1 - set)
30-31	ADC DC Remove I	Int_16	-	I channel dc value.
32-33	ADC DC Remove Q	Int_16	-	Q channel dc value.
34	LNB Enable	Uint_8	1	Enable the dc supply for the LNB.
35	LNB 13v 18v	Uint_8	0	DC voltage select. 0 – 13v (18.25 GHz LNB LO) 1 – 18v (19.25 GHz LNB LO)
36	Signal Roll Off	Uint_16	10	(Stop BW - Start BW) in Percentage. 1 – 16384
37-43	Reserved	Uint_8[7]		

1.8.8.2. Report Acknowledge message payload:

Same as Set message payload.

1.8.9. RX Statistics – 0x09

Reports different power measurements and signal frame samples. The frame signal type configured with RX Configuration message.

1.8.9.1. Set message payload:

None.

1.8.9.2. Report Acknowledge message payload:

Same as statistics message.

1.8.9.3. Statistics message payload:

Table 23: RX Statistics message payload

Byte #	Name	Type	Default	Description
0-1023	Signal Snap Shot	Int_32[256]	-	256 samples. Samples type is specified by Frame Source Select at RX Configuration.
1024-1027	ADC Power	Uint_32	-	ADC measured power. Averaged over 10ms.
1028-1031	RSSI Power	Uint_32	-	RSSI measured power. Start and stop BW of RSSI measurement and averaging are specified by Frame Source Select at RX Configuration.
1032-1033	RSSI Power DB	Uint_16	-	RSSI measured power in DB. The 6 LSB bits are reminder.
1034-1035	ADC Max I	Int_16	-	Maximum value of I channel. Measured in 10mS window.
1036-1037	ADC Max Q	Int_16	-	Maximum value of Q channel. Measured in 10mS window.
1038-1039	ADC Average I	Int_16	-	Average value of I channel. Measured in 10mS window. (Represents the DC value)
1040-1041	ADC Average Q	Int_16	-	Average value of Q channel. Measured in 10mS window. (Represents the DC value)
1042-1043	ADC RMS I	Int_16	-	RMS value of I channel. Measured in 10mS window.
1044-1045	ADC RMS Q	Int_16	-	RMS value of Q channel. Measured in 10mS window.
1046-1047	C/N Power DB	Uint_16	-	C/N measured power in DB. The 6 LSB bits are reminder.
1048-1051	Detected BW	Uint_32	-	Signal BW Detected between the ranges defined by (Stop BW - Start BW) + ((Stop BW - Start BW) * (Signal Roll Off/100)).
1052-1055	RMSE Res.	Uint_32		RMSE Resolution
1056-1059	Spec. RMSE dB	Uint_32		Spectral RMSE dB

1.8.10. PM Advanced Configuration – 0x0A

Power Meter Advanced Track Configurations.

1.8.10.1. Set message payload:

Table 24: PM Advanced Configuration Set message payload

Byte#	Name	Type	Default	Description
0	Track on BW Detection	Uint_8	0	Checks that in Scan & Track Mode, the signal is in the configured BW Limits, else continues to scan.
1	Spec Compare Track Ena	Uint_8		Spectrum Compare Track Enable

2-3	Spec Compare Min Thresh	Uint_16		Spectrum Compare Minimum Threshold
4-5	Spec Compare Time Out	Uint_16		Spectrum Compare Time out
6	Signal Lock Methods	Uint_8	1	Defines on Which Parameter to Perform Scan & Track: 0 – RSSI 1 – C/N 2 – OpenAMIP RSSI Pilots 3 – OpenAMIP RSSI Data
7	Spec Compare BW	Uint_8		Spectrum Compare Signal BW
8-9	Spec Compare Learn Time	Uint_16		Spectrum Compare Learn Time.
10	OpenAMIP RSSI Average Factor	Uint_8	9	Number of OpenAMIP RSSI samples to perform average on.
11-12	OpenAMIP RSSI minimum track threshold	Int_16		Minimum OpenAMIP RSSI Track threshold 0.1 dB units, for example 10 = 1dB
13-16	Reserved	Uint_8[4]		

1.8.10.2. Report Acknowledge message payload:

Same as Set message payload.

1.8.11. Regulation Configuration – 0x0E

Configuration of the Regulation Manager

1.8.11.1. Set message payload:

Table 25: Regulation Configuration Message Payload

Byte#	Name	Type	Default	Description
0	Mode	Uint_8	0	Enum of the Regulation Manager- 0 – Manual 1- Fixed Power 2- Fixed EIRP 3- Regulation Table
1-4	Agc Step Time	Uint_32		Amount of ticks (in 100usec) delay to tune the requested power
5-8	AgcStepMinVal	Float		Lowest EIRP allowed to be tuned (in dBW)
9-12	AgcStepMaxVal	Float		Highest EIRP allowed to be tuned (in dBW)
13-14	Reserved	Uint_16		Reserved
15-16	Reserved	Uint_16		Reserved
17-18	ALC Mode PwrLevel	Uint_16		Sets the target power for fixed power or fixed EIRP Fixed power – Defines the output power (in dBm) measured in the buc Fixed EIRP – Defines the output power (in dBW) measured at the antenna.
19-22	Tx Signal BW	Uint_32		Defines the tx signal BW (in Hz)

1.8.11.2. Report Acknowledge message payload:

Same as Set message payload.

1.8.12. Regulation Table Configuration – 0x0F

Configuration of the Regulation Table

1.8.12.1. Set message payload:

Table 26: Regulation Table Cfg Message Payload

Byte#	Name	Type	Default	Description
0-3	Skew Table Bw Scale	Uint_32		Set the reference BW (in Hz) of the regulation table used.
4-185	Skew Eirp Table	Uint_16[91]		Defined Max EIRP(in dBW) per deg of skew from sat lock
186	String Size	Byte		Size of the following string
187-218	Table Name	Uint_8[32]		Name of Table Loaded

1.8.12.2. Report Acknowledge message payload:

Same as Set message payload.

1.8.13. IMU Status – 0x10

IMU measurements.

1.8.13.1. Set message payload:

None.

1.8.13.2. Report Acknowledge message payload:

Same as statistics message.

1.8.13.3. Statistics message payload:

Table 27: IMU Status Statistics message payload

Byte #	Name	Type	Default	Description
0-3	imuAzPos	Int_32	-	Antennas azimuth position in milli degrees.
4-7	imuAzSpd	Int_32	-	Antennas azimuth speed in milli degrees per second.
8-11	imuElPos	Int_32	-	Antennas elevation position in milli degrees.
12-15	imuElSpd	Int_32	-	Antennas elevation speed in milli degrees per second.
16-19	imuEulerRoll	Int_32	-	IMU Euler roll angle in milli degrees.
20-23	imuEulerPitch	Int_32	-	IMU Euler pitch angle in milli degrees.
24-27	imuEulerYaw	Int_32	-	IMU Euler yaw angle in milli degrees.
28-31	imuMagX	Int_32	-	IMU magnetometer measurement at X axis direction.
32-35	imuMagY	Int_32	-	IMU magnetometer measurement at Y axis direction.
36-39	imuMagZ	Int_32	-	IMU magnetometer measurement at Z axis direction.
40-43	imuGyroX	Int_32	-	IMU Gyro rate of turn measurement around X axis. In milli degrees per second.
44-47	imuGyroY	Int_32	-	IMU Gyro rate of turn measurement around Y axis. In milli degrees per second.
48-51	imuGyroZ	Int_32	-	IMU Gyro rate of turn measurement around Z axis. In milli degrees per second.
52-55	imuAccX	Int_32	-	IMU Accelerometer measurement in X axis. In meter/sec^2.
56-59	imuAccY	Int_32	-	IMU Accelerometer measurement in Y axis. In meter/sec^2.
60-63	imuAccZ	Int_32	-	IMU Accelerometer measurement in Z axis. In meter/sec^2.
64-67	imuTemp	Uint_32	-	IMU temperature measurement. In centi-degrees.
68-71	imuCntr	Uint_32	-	IMU counter. Increased every 100mS. Represents a clock.
72-87	Reserved	Uint_8[16]	-	

1.8.14. Encoders Status – 0x11

Encoders measurements.

1.8.14.1. Set message payload:

None.

1.8.14.2. Report Acknowledge message payload:

Same as statistics message.

1.8.14.3. Statistics message payload:

Table 28: Encoders Status Statistics message payload

Byte #	Name	Type	Default	Description
0-3	Az Encoder Position	Int_32	-	Azimuth absolute encoder position. In milli-degrees.
4-7	Az Motor Encoder Position	Int_32	-	Azimuth motor encoder position. In milli-degrees.
8-11	Az Encoder Speed	Int_32	-	Azimuth absolute encoder speed. In milli-degrees per second.
12-15	Az Motor Encoder Speed	Int_32	-	Azimuth motor encoder speed. In milli-degrees per second.
16-19	El Encoder Position	Int_32	-	Elevation absolute encoder position. In milli-degrees.
20-23	El Motor Encoder Position	Int_32	-	Elevation motor encoder position. In milli-degrees.
24-27	El Encoder Speed	Int_32	-	Elevation absolute encoder speed. In milli-degrees per second.
28-31	El Motor Encoder Speed	Int_32	-	Elevation motor encoder speed. In milli-degrees per second.
32	Home Position	Uint_8		Homing position indicator
33-36	Elevation ABS Status	Uint_32		Elevation ABS Status
37-48	Reserved	Uint_8[12]		

1.8.15. MC Scope – 0x12

Movement control scope samples. Can be up to 2048 samples. The full scope window can be transmitted in up to 16 MC Scope messages. The MC Scope message include fields that indicate the message sequence, number of sample, and last message indication.

1.8.15.1. Set message payload:

None.

1.8.15.2. Report Acknowledge message payload:

None.

1.8.15.3. Statistics message payload:

Table 29: MC Scope Statistics message payload

Byte #	Name	Type	Default	Description
0	Sequence	Uint_8	-	The sequence of the message in a full scope window. Can be 0-15.
1	Final Message	Uint_8	-	1 indicates the last message of a full scope window.
2	Sample Count	Uint_8	-	Number of samples used from the 64 samples buffers. Only valid at the last buffer indicated by final Msg.
3-258	Command Position	Int_32[64]	-	The position movement command. In milli-degrees.
259-514	Command Speed	Int_32[64]	-	The speed movement command. In milli-degrees per second.

| 515-770 | Motor Position | Int_32[64] | - | The actual antenna positions. In milli-degrees. |
| 771-1026 | Motor Speed | Int_32[64] | - | The actual antenna speeds. In milli-degrees per second. |

1.8.16. MC Status – 0x13

Movement control statistics. Update the Host if any error occurred, current operational mode, compass status and RSSI limits.

1.8.16.1. Set message payload:
None.

1.8.16.2. Report Acknowledge message payload:
None.

1.8.16.3. Statistics message payload:

Table 30: MC Stats Statistics message payload

Byte #	Name	Type	Default	Description
0	Current Mode	Uint_8	-	The current operational mode of the system: 0 – None 1 – Position. 2 – Scan. 3 – Scan360. 4 – Track. 5 - GetSAT
1-4	Error Register	Uint_32	-	Error register. Each bit represents a different error. (refer to the MCStats ErrBit table)
5	Compass Aligned	Uint_8	-	0 – indicates that the compass is not aligned. 1 – Compass is aligned.
6-9	Compass Align Angle	Int_32	-	Compass align angle. The difference between IMU azimuth angle and real compass angle. Valid only when compass Aligned is 1.
10-13	Scan Min RSSI	Int_32	-	Scan minimum RSSI result.
14-17	Scan Max RSSI	Int_32	-	Scan maximum RSSI result.

Table 31: MC Status Error Bits Description

Bit#	Name	Description
1	Cannot Reach Position	The required position is unreachable.
2	Out of Position Limits	During movement, the antenna moved out of configured position limits.
3	Out of Speed Limits	During movement, the antenna moved out of configured speed limits.
4	Out of Acc Limits	Not used.
5	Signal SNR too Low	Scan operation didn't find a signal above the configured minimum SNR limit.
6	Signal Power Too Low	Scan operation didn't find a signal above the configured minimum power limit.
7	Reserved	-
8	Reserved	-

9	Out of Mechanical Low Limit	During movement, the antenna reached under 0 degrees in elevation (mechanical).
10	Out of Mechanical High Limit	During movement, the antenna reached over 90 degrees in elevation (mechanical).
11	Out of Az Max Speed Limit	During track the antenna azimuth speed is greater than the requested speed limit.
12	Out of El Max Speed Limit	During track the antenna elevation speed is greater than the requested speed limit.
13	Signal Sync Loss	During track the signal was lost.
14-31	Reserved	

1.8.17. MC RSSI Scope – 0x14

RSSI scope samples. Can be up to 2048 samples. The full scope window can be transmitted in up to 8 MC RSSI Scope messages. The MC RSSI Scope message include fields that indicate the message sequence, number of sample, and last message indication.

1.8.17.1. Set message payload:
None.

1.8.17.2. Report Acknowledge message payload:
None.

1.8.17.3. Statistics message payload:

Table 32: MC RSSI Scope Statistics message payload

Byte #	Name	Type	Default	Description
0	Sequence	Uint_8	-	The sequence of the message in a full scope window. Can be 0-7.
1	Final Message	Uint_8	-	1 indicates the last message of a full scope window.
2	Sample Count	Uint_8	-	Number of samples used from the 128 samples buffer. Only valid when the last buffer is indicated by final Message.
3-515	RSSI Position	Int_32[128]	-	The position of the RSSI measurement. In milli-degrees.
516-1027	RSSI Value	Int_32[128]	-	The RSSI measurements samples.

1.8.18. MC Advance Configuration – 0x15

Movement advanced configuration constants.

1.8.18.1. Set message payload:

Table 33: MC Advance Configuration Set message payload

Byte #	Name	Type	Default	Description
0-3	Azimuth Ticks Degree	Uint_32	0x02C3 (Micro) 0x04A1 (Nano)	Azimuth motor encoder resolution constant
4-7	Elevation Ticks Degree	Uint_32	0x0359 (Micro) 0x0451 (Nano)	Elevation motor encoder resolution constant
8-11	Azimuth ABS Ticks Degree	Uint_32	0x01EA	Azimuth absolute encoder resolution constant
12-15	Elevation ABS Position Calibration	Int_32	-	Calibration angle value for elevation absolute encoder. (unique for each system)

16-19	Azimuth ABS Position Calibration	Int_32	-	Calibration angle value for azimuth absolute encoder. (unique for each system)
20	Scope Type select	Uint_8	1	Azimuth or elevation select for MCScope. 0 – None 1 – Azimuth 2 – Elevation
21	Use RSSI Scope	Uint_8	1	Enable the RSSI scope message. If enabled, after each scan the system will transmit the scope samples. 0 – Disabled. 1 – Enabled.
22-23	Az Max PWM Limit	Uint_16	4000 (Micro) 4999 (Nano)	PWM Limit of the azimuth motor. Can be from 1000-4999.
24-25	El Max PWM Limit	Uint_16	3000 (Micro) 4000 (Nano)	PWM Limit of the elevation motor. Can be from 1000-4999.
26-29	Az Max Speed Limit	Uint_32	300000	Maximum antenna speed limit in azimuth.
30-33	El Max Speed Limit	Uint_32	200000	Maximum antenna speed limit in elevation.

1.8.18.2. Report Acknowledge message payload:

Same as Set message payload.

1.8.19. Stats Refresh Configuration Ethernet – 0x16

Defines which Stats are enabled and at what rate they are sent from the system.

1.8.19.1. Set message payload:

Table 34: MC Advance Configuration Set message payload

Byte #	Name	Type	Default	Description
0-3	Enable Status	Uint_32	0x03DF	Enable Stats bits, allows you to select what stats will be reported from the device. 0- IMU 1- Spectrum 2-Encoder 3-Move Control Stats 4-Move Control RSSI 5-Move Control Scope 6-Move Control Skews 7-Move Control SAM 8-Discovery Enable 9-Bridge Stats 10- Pwm Stats 11-31 Reserved
4-7	Imu Refresh Time	Uint_32	0x000007d0	Refresh Time for Imu stats (in 100uSec)
8-11	Spectrum Refresh Time	Uint_32	0x000005dc	Refresh Time for Spectrum stats (in 100uSec)
12-15	Encoder Refresh Time	Uint_32	0x000007d0	Refresh Time for Encoder stats (in 100uSec)
16-19	MC Stats Refresh Time	Uint_32	0x00002710	Refresh Time for MoveControl stats (in 100uSec)

20-23	MC RSSI Refresh Time	Uint_32	0x00001388	Refresh Time for MoveControl RSSI (in 100uSec)
24-27	MC Scope Refresh Time	Uint_32	0x00001388	Refresh Time for MoveControl Scope (in 100uSec)
28-31	MC Skew Refresh Time	Uint_32	0x00001388	Refresh Time for MoveControl Skew (in 100uSec)
32-35	MC SAM Refresh Time	Uint_32	0x00002710	Refresh Time for MoveControl Sam (in 100uSec)
36-39	Ethernet Discovery Refresh Time	Uint_32	0x0000C350	Refresh Time for Ethernet Discoveries (in 100uSec)
40-43	Bridge Stats Refresh Time	Uint_32	0x00002710	Refresh Time for ActiveBridge stats (in 100uSec)
44-47	PWM stats Refresh Time	Uint_32	0x00002710	Refresh Time for PWM stats (in 100uSec)
48-163	Reserved	Uint_8		

1.8.19.2. Report Acknowledge message payload:

Same as Set message payload.

1.8.20.   BIT Configuration – 0x17

System BIT configuration constants.

1.8.20.1. Set message payload:

Table 35: BIT Configuration Set message payload

Byte #	Name	Type	Default	Description
0	El Encoder Test Enable	Uint_8	-	Perform El Motor Encoder Test :0 – no, 1 - yes
1	El Abs Encoder Abs Test Enable	Uint_8	-	Perform El Abs Encoder Test :0 – no, 1 - yes
2	AZ Encoder Test Enable	Uint_8	-	Perform AZ Motor Encoder Test :0 – no, 1 - yes
3	AZ Abs Encoder Test Enable	Uint_8	-	Perform AZ Abs Encoder Test :0 – no, 1 - yes
4	IMU Test Enable	Uint_8	-	Perform IMU Test :0 – no, 1 - yes
5	Temperature Test Enable	Uint_8	-	Perform Temperatures Test :0 – no, 1 - yes
6	GPS Test Enable	Uint_8	-	Perform GPS Test :0 – no, 1 - yes

1.8.20.2. Report Acknowledge message payload:

None

1.8.21.   BIT Status – 0x18

BIT Results Status.

1.8.21.1. Report Acknowledge message payload:

Table 36: MC Stats Statistics message payload

Byte #	Name	Type	Default	Description
0	El Encoder Test Result	Uint_8	-	0 – Failed, 1 - Passed
1	El Abs Encoder Abs Test Result	Uint_8	-	0 – Failed, 1 - Passed

2	AZ Encoder Test Result	Uint_8	-	0 – Failed, 1 - Passed
3	AZ Abs Encoder Test Result	Uint_8	-	0 – Failed, 1 - Passed
4	AZ Abs Homing Test Result	Uint_8	-	0 – Failed, 1 - Passed
5	IMU Test Result	Uint_8	-	0 – Failed, 1 - Passed
6	Temperature Test Result	Uint_8	-	0 – Failed, 1 - Passed
7	GPS Module Test Result	Uint_8	-	0 – Failed, 1 – Passed

1.8.22.   Power Up Mode Constants – 0x19

Control constants for Tracking PIDs.

1.8.22.1. Set message payload:

Table 37: Track Ctrl Constants Set message payload

Byte #	Name	Type	Default	Description
0	Up Mode	Uint_8	0	
1	Reserved	Uint_8	0	
2	Sat Search Mode	Uint_8	0	0 - Continues mode. (Will search forever) 1 - Interval Search mode. 2 - Stop Search After N retries.
3-4	Search Cycles	Uint_16	0	Search cycles retries. The system will stop satellites search after this number.
5-6	Search ON	Uint_16	0	System will search for satellites with this number in minutes.
7-8	Search OFF	Uint_16	0	System will NOT search for satellites with this number in minutes.
9	Current Fail Mode	Uint_8	0	0 - Disable Current Mode 1 - Enable Current Protection Mode.
10-11	Fail cycles	Uint_16	0	System will stop any mode after this number of motors over current.
12-51	Reserved	Uint_32[10]	0	

1.8.22.2. Report Acknowledge message payload:

Same as Set message payload.

1.8.23.   Stats Refresh Configuration Uart – 0x1B

Defines which Stats are enabled and at what rate they are sent from the system.

1.8.23.1. Set message payload:

Table 38: MC Advance Configuration Set message payload

Byte #	Name	Type	Default	Description
0-3	Enable Stats	Uint_32	0x03DF	Enable Stats bits, allows you to select what stats will be reported from the device. 0- IMU 1- Spectrum 2-Encoder 3-Move Control Stats 4-Move Control RSSI 5-Move Control Scope 6-Move Control Skews 7-Move Control SAM 8-Discovery Enable 9-Bridge Stats 10- Pwm Stats 11-31 Reserved
4-7	Imu Refresh Time	Uint_32	0x00001388	Refresh Time for Imu stats (in 100uSec)
8-11	Spectrum Refresh Time	Uint_32	0x00001388	Refresh Time for Spectrum stats (in 100uSec)

12-15	Encoder Refresh Time	Uint_32	0x00001388	Refresh Time for Encoder stats (in 100uSec)
16-19	MC Stats Refresh Time	Uint_32	0x00001388	Refresh Time for MoveControl stats (in 100uSec)
20-23	MC RSSI Refresh Time	Uint_32	0x00001388	Refresh Time for MoveControl RSSI (in 100uSec)
24-27	MC Scope Refresh Time	Uint_32	0	Refresh Time for MoveControl Scope (in 100uSec)
28-31	MC Skew Refresh Time	Uint_32	0x00001388	Refresh Time for MoveControl Skew (in 100uSec)
32-35	MC SAM Refresh Time	Uint_32	0x00001388	Refresh Time for MoveControl Sam (in 100uSec)
36-39	Reserved			
40-43	Bridge Stats Refresh Time	Uint_32	0x00001388	Refresh Time for ActiveBridge stats (in 100uSec)
44-47	PWM stats Refresh Time	Uint_32	0x00001388	Refresh Time for Pwm stats (in 100uSec)
48-163	Reserved	Uint_8		

1.8.23.2. Report Acknowledge message payload:

Same as Set message payload.

1.8.24. Poltilt Stats– 0x1C

Statistic of PWM values currently sent to the motors

1.8.24.1. Set message payload:

None.

1.8.24.2. Report Acknowledge message payload:

None.

1.8.24.3. Statistics message payload:

Table 39: MC Scope Statistics message payload

Byte #	Name	Type	Default	Description
0-1	TxAngleCurrent	Int_16	-	Pwm value to TX Servo (in 100nSec)
2-3	TxAngleCalculated	Int_16	-	TX Servo Degrees (in 10mDegs)
4-5	Reserved	Int_16	0	
6-7	TxSkew	Int_16		Calculated Tx Skew vs. the Sat (in Degs)
8	TxPol_HnV	Uint_8		Defined Tx Polarization 0-Vertical 1-Horizontal
9-12	Reserved	Uint_32		
13-14	RxAngleCurrent	Int_16	-	Pwm value to RX Servo (in 100nSec)
15-16	RxAngleCalculated	Int_16	-	RX Servo Degrees (in 10mDegs)
17-18	Reserved	Int_16	0	
19-20	RxSkew	Int_16		Calculated Rx Skew vs. the Sat (in Degs)
21	RxPol_HnV	Uint_8		Defined Rx Polarization 0-Vertical 1-Horizontal
22-37	Reserved	Uint_32[4]		

1.8.25. PWM Stats– 0x1D

Statistic of PWM values currently sent to the motors

1.8.25.1. Set message payload:

None.

1.8.25.2. Report Acknowledge message payload:

None.

1.8.25.3. Statistics message payload:

Table 40: MC Scope Statistics message payload

Byte #	Name	Type	Default	Description
0-1	AzPwm	Int_16	-	Current Azimuth motor pwm value
2-3	ElPwm	Int_16	-	Current Elevation motor pwm value

1.8.26. Regulation Stats– 0x1E

Statistics of Regulation Manager

1.8.26.1. Set message payload:

None.

1.8.26.2. Report Acknowledge message payload:

None.

1.8.26.3. Statistics message payload:

Table 41: MC Scope Statistics message payload

Byte #	Name	Type	Default	Description
0-1	reserved	Uint_16	-	reserved
2-5	reserved	UInt_32	-	reserved
6-9	BucMeasuredPwr	Float	-	Current power from the BUC (in dBm)
10-13	CurrEirp	Float		Current EIRP of the BUC (in dBW)
14-17	requiredEirp	Float		Required EIRP of the BUC (in dBw)
18-21	MaxAttenEirpErrCnt	Uint_32		Counter Increments if Manager cannot reach the required attenuation of the regulation skew
22-25	MaxGainEirpErrCnt	Uint_32		Counter Increments if Manager cannot reach the Max EIRP set.

1.8.27. O3B Channel Table – 0x1F

O3B Channel Table

1.8.27.1. Set message payload:

None.

1.8.27.2. Report Acknowledge message payload:

None.

1.8.27.3. Channel Table message payload:

Table 42: O3B Channel Table message payload

Byte #	Name	Type	Default	Description
0-3	UTC Time Set	Uint_32	-	Not Used

4-7	UTC Time	UInt_32	-	Not Used
8	Local Site Type Size	UInt_8	-	Not Used
9-18	Local Site Type	UInt_8[10]		Not Used
19	Local Site Id Size	UInt_8		Not Used
20-39	Local Site Id	UInt_8[20]		Not Used
40-43	Local Latitude	float		Not Used
44-47	Local Longitude	float		Not Used
48-51	Local Altitude	float		Not Used
52	Peer Site Type Size	UInt_8	-	Not Used
53-62	Peer Site Type	UInt_8[10]		Not Used
63	Peer Site Id Size	UInt_8		Not Used
64-83	Peer Site Id	UInt_8[20]		Not Used
84-87	Peer Latitude	float		Not Used
88-91	Peer Longitude	float		Not Used
92-95	Peer Altitude	float		Not Used
96	Beam	UInt_8		Not Used
97-100	Region	UInt_8[4]		Region
101-104	Region Center	UInt_32		Not Used
105-108	Uplink Freq Modem	UInt_32		
109-112	Uplink Freq RF	UInt_32		
113-116	Uplink Freq LO	UInt_32		
117-120	Uplink BW	UInt_32		
121	Uplink Polarization	UInt_8		
122-123	Uplink Power Modem	Int_16		
124-127	Downlink Freq Modem	UInt_32		
128-131	Downlink Freq RF	UInt_32		
132-135	Downlink Freq LO	UInt_32		
136-139	Downlink BW	UInt_32		
140	Downlink Polarization	UInt_8		
141	Control Bits	UInt_8		
142-181	Reserved	UInt_32[10]		

1.8.28. Sat Position – 0x20

Satellite pointing angle (Azimuth and Elevation).

1.8.28.1. Set message payload:

Table 43: Sat Position Set message payload

Byte #	Name	Type	Default	Description
0-3	Elevation	Uint_32	0	Elevation pointing angle. In milli-degrees.
4-7	Azimuth	Uint_32	0	Azimuth pointing angle. In milli-degrees.
8-11	Poltilt Angle	Int_32		Poltilt Servo motor angle. In milli-degrees.
12	GPS Type	Uint_8	0 1 2 3	None GPS – In case of no reception using Manual coordinates. Manual – Using Manual coordinates. External (Not USED)
13-20	Latitude	Double		GPS Manual Coordinates
21-28	Longitude	Double		GPS Manual Coordinates
29-36	Altitude	Double		GPS Manual Coordinates
37-44	Satellite Orbit Pos.	Double		Satellite Orbital position
45	Position Method	Uint_8	0 1 2 3	None GEO – Calculated by Terminal. GEO – Geographic acquisition using coordinates. O3B – Must use GPS UTC Time
46	Satellite Continent	Uint_8		This configuration is in case when the satellite orbit is configured from GetSAT GUI Data Base & is not relevant in case of another UI or user Control.
47	Satellite Name	Uint_8		This configuration is in case when the satellite orbit is configured from GetSAT GUI Data Base & is not relevant in case of another UI or user Control.
48	RxPoltilt_HnV	Uint_8		KU only: Defines if Sat RX is Horizontal or Vertical 1 – Horizontal 0 - Vertical
49	TxPoltilt_HnV	Uint_8		KU only: Defines if Sat TX is Horizontal or Vertical 1 – Horizontal 0 - Vertical
50	Skew offset	Int_8		Offset to skew
51-65	Reserved	Int_8[15]		

1.8.28.2. Report Acknowledge message payload:

Same as Set message payload.

1.8.29. Move Ctrl Constants – 0x21

Control constants for Scan and Manual/Position move.

1.8.29.1. Set message payload:

Table 44: Move Ctrl Set message payload

Byte #	Name	Type	Default	Description
0	Type	Uint_8	-	0 – Manual/Position

				1 – Scan
1	Direction	Uint_8	-	0 – Azimuth 1 – Elevation
2-5	kvff	Int_32	1024 (Az. Man.) 1024 (El. Man.) 1024 (Az. Scan) 1024 (El. Scan)	Feed forward speed profile gain constant.
6-9	kpp	Int_32	4000 (Az. Man.) 3500 (El. Man.) 4000 (Az. Scan) 3500 (El. Scan)	Position loop proportional constant.
10-13	kvp	Int_32	200 (Az. Man.) 100 (El. Man.) 200 (Az. Scan) 100 (El. Scan)	Speed loop proportional constant.
14-17	kvi	Int_32	40 (Az. Man.) 30 (El. Man.) 40 (Az. Scan) 30 (El. Scan)	Speed loop integral constant.
18-21	acc	Int_32	200 (Az. Man.) 200 (El. Man.) 300 (Az. Scan) 160 (El. Scan)	Acceleration value for speed profile generation. In degree/sec^2.
22-25	spd	Int_32	100 (Az. Man.) 100 (El. Man.) 200 (Az. Scan) 40 (El. Scan)	Speed value for speed profile generation. In degree/sec^2.

1.8.29.2. Report Acknowledge message payload:

Same as Set message payload.

1.8.30. Track Ctrl Constants – 0x22

Control constants for Tracking PIDs.

1.8.30.1. Set message payload:

Table 45: Track Ctrl Constants Set message payload

Byte #	Name	Type	Default	Description
0-3	azKp	Int_32	400 (Micro) 200 (Nano)	Azimuth proportional constants.
4-7	azKi	Int_32	90 (Micro) 80 (Nano)	Azimuth integral constants.

8-11	azKd	Int_32	600 (Micro) 250 (Nano)	Azimuth derivative constants.
12-15	azDIIR	Int_32		
16-19	elKp	Int_32	100 (Micro) 100 (Nano)	Elevation proportional constants.
20-23	elKi	Int_32	30 (Micro) 35 (Nano)	Elevation integral constants.
24-27	elKd	Int_32	100 (Micro) 150 (Nano)	Elevation derivative constants.
28-31	elDIIR	Int_32		

1.8.30.2. Report Acknowledge message payload:

Same as Set message payload.

1.8.31. Track M Scan Configuration – 0x23

Control constants for Tracking Micro-Scan.

1.8.31.1. Set message payload:

Table 46: Track M Scan Constants Set message payload

Byte #	Name	Type	Default	Description
0	Azimuth Enable	Uint_8	1 (Micro) 1 (Nano)	Enable Azimuth micro scan operation.
1	Elevation Enable	Uint_8	1 (Micro) 1 (Nano)	Enable Elevation micro scan operation.
2-5	Period	Uint_32	8000 (Micro) 8000 (Nano)	Period for checking if micro scan is required. In 100uSec resolution.
6-9	Time	Uint_32	10 (Micro) 10 (Nano)	Time of movement in each direction. In 5mSec resolution.
10-13	Speed	Uint_32	15000 (Micro) 15000 (Nano)	Speed of movement. In milli-degree per second.
14-17	Time Out	Uint_32	50000 (Micro) 50000 (Nano)	Signal loss timeout. The system stops micro scan and initiate rescan.
18-21	Degree	Uint_32	300 (Micro) 300 (Nano)	Not used.
22-25	Azimuth RSSI TH	Uint_32	750 (Micro) 750 (Nano)	SNR percentage threshold for enabling azimuth micro scan.
26-29	Elevation RSSI TH	Uint_32	500 (Micro) 500 (Nano)	SNR percentage threshold for enabling elevation micro scan.

1.8.31.2. Report Acknowledge message payload:

Same as Set message payload.

1.8.32. Track IMU Calibration – 0x24

IMU Gyro drift calibration and filter selection.

1.8.32.1. Set message payload:

Table 47: Track IMU Calibration Set message payload

Byte #	Name	Type	Default	Description
0-3	Gyro X	Int_32	-	Gyro X drift calibration.
4-7	Gyro Y	Int_32	-	Gyro Y drift calibration.
8-11	Gyro Z	Int_32	-	Gyro Z drift calibration.
12	Filter Type	Uint_8	0	Type of Gyro filter: 0 – None 1 – Chebyshev
13-14	Freq Cut Off	Int_16	0	Cut off frequency. Can be 0-99 Hz.
15-16	El Corr Const	Int_16	1500	Roll elevation correction constant.

1.8.32.2. Report Acknowledge message payload:

Same as Set message payload.

1.8.33. Scan Limiters – 0x25

Scan limits configuration.

1.8.33.1. Set message payload:

Table 48: Scan Limiters Set message payload

Byte #	Name	Type	Default	Description
0-3	Min Snr Const	Int_32	2	Minimum signal SNR during scan operation. In dB. This Param resolution depends on the Signal Track Method: RSSI or C/N: 1 dB = 64, only positive SNR is Supported. OpenAMIP Pilots RSSI: this param is not in dB but in absolute value and can change between modem types. OpenAMIP Data RSSI: 1 dB in this mode equals 1000 Value can be positive & negative. .
4-7	Min Power Const	Uint_32	10	Minimum signal power during scan operation. In dB.
8-11	Az Speed Error Const	Uint_32	0	Not in use.
12-15	El Pos Error Const	Uint_32	0	Not in use.

1.8.33.2. Report Acknowledge message payload:

Same as Set message payload.

1.8.34. Step Tracking – 0x26

Step tracking configuration.

1.8.34.1. Set message payload:

Table 49: Step Tracking Set message payload

Byte #	Name	Type	Default	Description
0	Az Enable	Uint_8	1	Enable step tracking for azimuth.
1-4	Az Step Period	Uint_32	xxx	xxx
5-8	Az Step Speed	Uint_32	xxx	The movement speed each step.
9-12	Az Step Duration	Uint_32	xxx	The time of each step. In 5mSec resolution.
13-16	Az Step Track on Time	Uint_32	xxx	Time that the azimuth step tracking is on before switching to elevation.
17	El Enable	Uint_8	1	Enable step tracking for elevation.
18-21	El Step Period	Uint_32	xxx	xxx
22-25	El Step Speed	Uint_32	xxx	Elevation, movement speed of each step.
26-29	El Step Duration	Uint_32	xxx	Elevation, time of each step. In 5mSec resolution.
30-33	El Step Track On Time	Uint_32	xxx	Time that the azimuth step tracking is on before switching to elevation.
34-37	RSSI Update Time	Uint_32	xxx	Time window for measuring RSSI minimum and maximum values before updating the Hosts.

1.8.34.2. Report Acknowledge message payload:

Same as Set message payload.

1.8.35. Motor Current Lim – 0x27

1.8.35.1. Set message payload:

Table 50: Motor Current Lim Set message payload

Byte #	Name	Type	Value	Description
0	Azimuth Limit Enable	Uint_8	0 1	Value Disregard Value Set Enable.
1-2	Azimuth Limit Value	Int_16		Azimuth Limit Value.
3	Elevation Limit Enable	Uint_8	0 1	Value Disregard Value Set Enable.
4-5	Elevation Limit Value	Int_16		Elevation Limit Value.

1.8.35.2. Report Acknowledge message payload:

Same as Set message payload.

1.8.36. Servo Motor Limit – 0x28

1.8.36.1. Set message payload:

Table 51: Servo Motor Limit Set message payload

Byte #	Name	Type	Value	Description
0	Reserved	Uint_8	0	
1-4	TxPositionStart	Uint_32	900	Resolution of 1 lsb=1ms
5-8	TxPositionEnd	Uint_32	2200	Resolution of 1 lsb=1ms
9	TxAngle	Uint_8		Skew degree manual, Resolution of 1 lsb=1deg
10-11	TxSkewOffSet	Int_16		Skew degree offset, Resolution of 1 lsb=1deg
12-15	Reserved	Uint_32	0	
16-19	RxPositionStart	Uint_32	900	Resolution of 1 lsb=1ms
20-23	RxPositionEnd	Uint_32	2200	Resolution of 1 lsb=1ms
24	RxAngle	Uint_8		Skew degree offset, Resolution of 1 lsb=1deg
25-26	RxSkewOffSet	Int_16		Skew degree offset, Resolution of 1 lsb=1deg
27	SwapHV	Uint_8		Invert H/V polarization.
28-29	Reserved	Uint_8[2]		
30-37	Reserved	Uint_32[2]		

1.8.36.2. Report Acknowledge message payload:
Same as Set message payload.

1.8.37. Servo Frequency Table – 0x29

1.8.37.1. Set message payload:

Table 52: Servo Frequency Table Set message payload

Byte #	Name	Type	Value	Description
0-3	Reserved	Uint_32		Skew inversed position
4-7	Reserved	Uint_32		Start position
8-11	Reserved	Uint_32		End Position
12-13	Frequency	Uint_16		Current cell Frequency
14-17	Skew offset	double		Added Skew offset to current skew table
18	Cell number	Uint_8		Current cell number of the array
19	Total cells in array	Uint_8		Total number of skew tables.
20	Size	Uint_8		Skew table size
21-250	Skew table	Int_16[230]		Skew table

1.8.38. O3B Time Table – 0x2A

1.8.38.1. Set message payload:

Table 53: Servo Frequency Table Set message payload

Byte #	Name	Type	Value	Description
0	addedSeconds	Int_8	0	Second to add on hand over time.
1	totalSats	Uint_8		Total amount of used Satellites.
2-241	SatTimeTable	**SatTime**[20]		Time table per satellite.
242	Reserved	Uint_8		
243-246	utcTimeEphemeris	Uint_32		Time stamp of Ephemeris file
247-250	utcTimeSchedule	Uint_8		Time stamp of Schedule file
251-254	Region	Uint_8[4]		Region

1.8.38.2. SatTime Struct payload:

Byte #	Name	Type	Value	Description
0	SatNumber	Uint_8		Ephemeris Satellite number
1	HandOver Hours	Uint_8		Schedule time hours
3	HandOver minutes	Uint_8		Schedule time Minutes
4	HandOver seconds	Uint_8		Schedule time Seconds
5-8	Start Sat Position	float		Calculated satellite position at handover time.
9	StepTime	Uint_8		Time until next handover in minutes
10-12	Reserved	Uint_8[3]		

1.8.39. IMU Type Configuration – 0x2B

1.8.39.1. Set message payload:

Table 54: IMU Type Configuration Set message payload

Byte #	Name	Type	Value	Description
0	IMU Type	Uint_8	0	IMU Generation 4
			1	IMU Generation 5
			2	External FOG IMU.
1	Internal IMU Data Rate	Uint_8	200	Configuration of data rate for internal IMU only.
			400	

1.8.39.2. Report Acknowledge message payload:

Same as Set message payload.

1.8.40. **Track Elevation Scan PID Constants – 0x2E**

1.8.40.1. **Set message payload:**

Table 55: Track Elevation Scan PID Constants Set message payload

Byte #	Name	Type	Default	Description
0-3	elkp	Int_32	5000	Elevation proportional constants.
4-7	Elki	Int_32	15	Elevation integral constants.
8-11	elkd	Int_32	45000	Elevation derivative constants.
12-15	Speed (Reserved)	Uint_32		
16-19	ElevMaxPos	Uint_32	88000	Elevation maximum software limit
20-23	ElevMinPos	Uint_32	0	Elevation minimum software limit
24-39	Reserved	Uint_32[4]		

1.8.40.2. **Report Acknowledge message payload**

Same as Set message payload.

1.8.41. Track FOG Constants – 0x2F

Control constants for Tracking PIDs.

1.8.41.1. Set message payload:

Table 56: Track FOG Constants Set message payload

Byte #	Name	Type	Default	Description
0-3	azKp	Int_32	400 (Micro) 200 (Nano)	Azimuth proportional constants.
4-7	azKi	Int_32	90 (Micro) 80 (Nano)	Azimuth integral constants.
8-11	azKd	Int_32	600 (Micro) 250 (Nano)	Azimuth derivative constants.
12-15	azDIIR	Int_32		
16-19	elKp	Int_32	100 (Micro) 100 (Nano)	Elevation proportional constants.
20-23	elKi	Int_32	30 (Micro) 35 (Nano)	Elevation integral constants.
24-27	elKd	Int_32	100 (Micro) 150 (Nano)	Elevation derivative constants.
28-31	elDIIR	Int_32		

1.8.41.2. Report Acknowledge message payload:

Same as Set message payload.

1.8.42.   **Bridge Micro Communication Status – 0x30**

Active Bridge to Micro Tracker Communication Status Report.

1.8.42.1. **Report message payload:**

Table 57: Bridge Micro Communication Report message payload

Byte #	Name	Type	Value	Description
0-3	Bridge IMU Messages	Uint_32		Bridge IMU Messages Overflow Count
4-7	Bridge IMU Min Messages	Uint_32		Bridge IMU Min Messages in Second Error Count
8-11	Bridge Other Messages	Uint_32		Bridge Other Messages FIFO Over Flow Count
12-15	Bridge Rx Sequence Error	Uint_32		Bridge Rx Sequence Error Count
16-19	Bridge Preamble Error	Uint_32		Bridge Preamble Error Count
20-23	Bridge Encoders Message	Uint_32		Bridge Encoders Message Over Flow Count
24-27	Bridge PWM Time Out	Uint_32		Bridge PWM Time Out Error Count
28-29	Bridge Rx Keep Alive Error	Uint_16		Bridge Rx Keep Alive Error Count
30-33	Bridge Crc16 Error	Uint_32		Bridge Crc16 Error Count
34-37	Bridge Hamming Dec Error	Uint_32		Bridge Hamming Decoder Error Count
38-41	Micro IMU Message	Uint_32		Micro Tracker IMU Message Over Flow Count
42-45	Micro SAM Tx	Uint_32		Micro Tracker Sam Tx Lost Data Count
46-49	Micro Rx Sequence	Uint_32		Micro Tracker Rx Sequence Error Count
50-53	Micro Preamble Error	Uint_32		Micro Tracker Preamble Error Count
54-57	Micro MB Rx Lost Packets	Uint_32		Micro Tracker MB Rx Lost Packets Count
58-61	Micro FP Rx Lost Packets	Uint_32		Micro Tracker FP Rx Lost Packets Count
62-65	Micro Tx Time Out Error	Uint_32		Micro Tracker Tx Time Out Error Count
66-69	Micro Tx Prog Full Error	Uint_32		Micro Tracker Tx Prog Full Error Count
70-73	Micro CRC16 Error Count	Uint_32		Micro Tracker Crc16 Error Count
74-77	Micro Hamming Decoding Error	Uint_32		Micro Tracker Hamming Decoding Error Count
78-85	Debug Data	Uint_16[4]		
86-97	Reserved	Uint_32[3]		

1.8.43. **Bridge Init Boot Update – 0x31**

Active Bridge Boot Configuration Status Message.

1.8.43.1. **Report message payload:**

Table 58: Bridge Init Boot Update message payload

Byte #	Name	Type	Value	Description
0-3	File checksum	Uint_32		
4-7	File size	Uint_32		
8	File iDX	Uint_8		

1.8.44. **Bridge Boot Update Status – 0x32**

Active Bridge Boot Configuration Status Message.

1.8.44.1. **Report message payload:**

Table 59: Bridge Boot config Status message payload

Byte #	Name	Type	Value	Description
0	Boot Done	Uint_8		
1	Burn passed	Uint_8		
2-5	Packets Sent	Uint_32		
6-9	Boot Debug Err Counter	Uint_32		Debug errors in config blocks counter.

1.8.45. **Bridge Enter Boot Mode – 0x33**

Active Bridge Enter Boot Mode.

1.8.45.1. **Set message payload:**

Table 60: Bridge Enter Boot Mode message payload

Byte #	Name	Type	Value	Description
0-3	Total Packets	Uint_32		Number of Configuration Packets

1.8.45.2. **Report Acknowledge message payload:**

Same as Set message payload.

1.8.46. **Bridge Boot Configuration – 0x34**

Active Bridge Boot Configuration Block.

1.8.46.1. Set message payload:

Table 61: Bridge Boot Configuration message payload

Byte #	Name	Type	Value	Description
0-3	Packet Serial	Uint_32		Configuration Block Serial Number.
4-5	Config bytes	Uint_16		Length of message
6-1305	Config Data	Uint_8[1300]		Configuration Data Block.

1.8.46.2. Report Acknowledge message payload:

Same as Set message payload.

1.8.47. Bridge Boot Config ACK – 0x35

Active Bridge Boot configuration acknowledge Message.

1.8.47.1. Report message payload:

Table 62: Bridge Boot config ACK message payload

Byte #	Name	Type	Value	Description
0-3	Packet Serial	Uint_32		Last received packet serial number.
4	Boot Done	Uint_8		
5	In Boot Mode	Uint_8		
6-9	Boot Debug Err Counter	Uint_32		Debug errors in config blocks counter.

1.8.48. Bridge End Boot Mode – 0x36

End Active Bridge Boot mode configuration.

1.8.48.1. Set message payload:

Table 63: Bridge End Boot Mode Set message payload

Byte #	Name	Type	Value	Description
0	Empty Byte	Uint_8		Dummy byte to end the process.

1.8.48.2. Report Acknowledge message payload:

Same as Set message payload.

1.8.49. Bridge ADC Status Report – 0x37

Active Bridge ADC Status report.

1.8.49.1. Report message payload:

Table 64: Bridge ADC Status Report message payload

Byte #	Name	Type	Value	Description
0-3	Az Vpropi Sample	Uint_32		Azimuth Vpropi Sample
4-7	El Vpropi Sample	Uint_32		Elevation Vpropi Sample
8-11	Digital Voltage 12v	Uint_32		Digital voltage sense. Units: 1LSB=0.06v
12-15	Motor Voltage 18v	Uint_32		Motor voltage sense. Units: 1LSB=0.06v
16-19	Motor Sense Vin	Uint_32		Voltage Sense. Units: 1LSB=0.1 [V]
20-23	Motor Sense Current	Uint_32		Current Sense. Units: 1LSB=0.001 [A]
24-27	Motor Sense ADC in	Uint_32		Not Used.
28-51	Reserved	Uint_32[6]		

1.8.50.   Bridge Motor Limit Error – 0x38

Bridge Motor Limit Error Report.

1.8.50.1. Report message payload:

Table 65: Bridge Motor Limit Error Report message payload

Byte #	Name	Type	Value	Description
0	Elevation Error	Uint_8		Elevation Error
1	Azimuth Error	Uint_8		Azimuth Error

1.8.51.   GPS Position – 0x39

1.8.51.1. External GPS Set message payload:

GPS Position SET.

Table 66: GPS Position Set/Report message payload

Byte #	Name	Type	Value	Description
0-3	Latitude	Float		Latitude in Radians.
4-7	Longitude	Float		Longitude in Radians.
8-11	Altitude	Float		Altitude in Meters.
12	GPS Fix	Uint_8	0	not connected.
			1	Waiting
			2	2D Position
			3	2D Position Differential.
			4	3D Position
			5	3D Position Differential.
			6	Reserved
			7	Reserved
			8	Reserved
13-16	UTC Time (Seconds)	Uint_32		Coordinated Universal Time, From: **01.01.1970** **Must be updated every second.**
17	GPS Type	Uint_8	3	
18-19	System Status	Uint_16	0	System Status
20-21	Filter Status	Uint_16	0	Filter Status
22-25	Speed	float	0	Speed
26	Satellites Used	Uint_8	0	Satellites Used
27-37	Reserved	Uint_8[11]		

1.8.52. Bridge SSPA Report – 0x3A

1.8.52.1. Report message payload:

Table 67: Bridge SSPA Report message payload

Byte #	Name	Type	Bit #	Description
0	Status Byte	Uint_8	0	Bit Value Always '1'
			1-3	Reserved
			4	Temperature Fail When '1'
			5	Transmitter On When '1'
			6	System Fail When '1'
			7	Bit Value Always '0'
1	Power on Byte	Uint_8	0	6v Power On Status
			1	4v Power On Status
			2	2v Power On Status
			3	15v Power On Status
			4	1v Power On Status
			5-7	Reserved
2-3	Sequence Number	Uint_16		
4-5	Power Out	Int_16		Measured Power Out. LSB: 0.01 dBm
6	SW Version	Uint_8		CPU Software version.
7	PW Version	Uint_8		Module Type: 2 - 2Watts, 4 – 4Watts
8-9	Reserved			

1.8.53. **Bridge BUC Report – 0x3B**

Active Bridge Buc Interface Report.

1.8.53.1. **Report message payload:**

Table 68: Bridge Buc Report message payload

Byte #	Name	Type	Bit #	Description
0	Status Byte	Uint_8	0	Reserved
			1	Attenuator Value Set
			2	RF Enable
			3	Sleep On
			4	Band 1 Selected [Low]
			5	Band 2 Selected [High]
			6-7	Reserved
1	Alarm Byte	Uint_8	0	PLL1 Lock Status
			1	PLL2 Lock Status
			2	Reserved
			3	LBUC Enabled
			4-7	Reserved
2-3	Power Out	Int_16		LSB: 0.1dBm
4-5	Reserved	Uint_8[2]		
6	SW Version	Uint_8		
7	Attenuation	Uint_8		Buc Attenuation Value.
8	Temperature	Uint_8		Buc Temperature. LSB: 1°c
9	Reserved	Uint_8		

1.8.54. **O3B Information – 0x3C**

O3B Information Message

1.8.54.1. **O3B Information message payload:**

Table 69: O3B Information message payload

Byte #	Name	Type	Value	Description
0	O3B Satellites ID	Uint_8		O3B Satellites ID
1	O3B Satellites Next	Uint_8		O3B Satellites Next
2	O3B Satellites Left	Uint_8		O3B Satellites Left
3	O3B Satellites Time Type	Uint_8		O3B Satellites Time Type
4-5	O3B Elevation	Int_16		Elevation
6-7	O3B Azimuth	Uint_16		Azimuth
8-25	Reserved	Uint_8[18]		Reserved

1.8.55.   **WaveLab Buc – 0x40**

WaveLab BUC control message. Using this message, we can mute/unmute, set gain, get TX power, etc.

1.8.55.1. **Set message payload:**

Table 70: WaveLab Buc Set message payload

Byte #	Name	Type	Value	Description
0	OpCode	Uint_8	0xE0	Gain Status Report
			0xE1	RF Power Set
			0xE9	Mute Status Report
			0xE6	Temp Status Report
			0x02	Mute Set
			0x01	Gain Set
			0x90	Ka Band Set
			0x91	Ka Band Get Report
			0x92	IF Band Set
			0x93	IF Band Get Report
1-4	Data	Uint_32	-	Data writing and reading.

1.8.55.2. **Report Acknowledge message payload:**

Same as Set message payload.

1.8.56.   Micro Tx Mode Set – 0x41

Tx Buc Control Configuration Set.

1.8.56.1. Set message payload:

Table 71: Micro Tx Mode Set message payload

Byte #	Name	Type	Value	Description
0	Tx Mode	Uint_8	[0] 1 2	Tx OFF Tx ON – (When Rx) Tx FORCE ON
1	Buc Type	Uint_8	[0]	Buc Other
			1	Buc WaveLab
			2	Buc InSystem
			3	Buc Mission
			4	Buc Atom
			5	Buc Mission BMIP
2	Power Out Mode	Uint_8	[0] 1 2	OFF Auto (Requested Power Out) Manual (using Attenuation)
3-4	Gain	Uint_16	[0]	Resolution 0.1 dB
5-6	Attenuation	Uint_16	[0]	Resolution 0.1 dB
7	Band Mode (LO)	Uint_8	[1] 2 3	28.0 GHz – Low Band 29.0 GHz – Mid Band 30.0 GHz – High Band (Not used)
8	KA Band	Uint_8	[0]	Reserved. Set to 0.
9	IF Band	Uint_8	[0]	Reserved. Set to 0.
10	Sat Type [1]	Uint_8	0	GEO
			1	MEO
11-14	Tx Frequency	Uint_32		Current requested Tx Frequency (in MHz)
15-17	Reserved	Uint_8[8]	[0]	Set to 0.

Notes:

[1] Defines what Sat we are working with

1.8.56.2. Report Acknowledge message payload:

Same as Set message payload.

1.8.57. Micro Mission Buc Status – 0x43

Mission Buc Status Report.

Table 72: Micro Mission Buc Status message payload

Byte #	Name	Type	Bit #	Description
0-3	Reserved	Uint_32	[0]	Reserved
4-5	Status Word	Uint_16	1 – 2	Reserved
			3	PwrLimiterFix '0'- ok, '1'- Fault
			4	OverDriveFault '0'- ok, '1'- Fault
			5	Line Fault. '0'- ok, '1'- Fault
			6	Lut Check. '0'- Fail, '1'- Pass
			7	Ext Mute Status. '0'- Unmuted, '1'- Muted
			8	Fan Speed Warning '0'- ok, '1'- Fault
			9	Fan Power Warning '0'- ok, '1'- Fault
			10	Drain Voltage. '0'- ok, '1'- Fault
			11	Reflected Power. '0'- ok, '1'- Fault
			12	Reserved
			13	Tx Ref. Lock. '0'- Unlocked, '1'- Locked
			14	Reserved
			15	Tx Temperature. '0'- ok, '1'- Fault
			16	Master Fault. '0'- ok, '1'- Fault
6-7	Settings Word	Uint_16	1-7	Reserved
			8	Redundancy Mode. '0'- OFF, '1'- ON
			9	Gain Set Mode. '0'- Software, '1'- Panel
			10	Fault Output Polarity. '0'- Low, '1'- High
			11	External Mute Polarity. '0'- Low, '1'- High
			12	LED Enable. '0'- Disabled, '1'- Enabled
			13	Reserved
			14	Tx Ref Source. '0'- Disabled, '1'- Enabled
			15	Reserved
			16	Tx Software. '0'- Disabled, '1'- Enabled
8-9	Tx Step Attenuator	Uint_16	0x0177	3.75 [dB]
10-11	Tx Lo Frequency	Uint_16		
12-13	Tx Power	Uint_16	0x0172	37.0 [dBm]
14-19	Reserved	Uint_16[3]		
20-21	Fan Speed	Uint_16	-	
22-23	Temperature	Int_16		

1.8.58. Micro ATOM Buc Status – 0x44

ATOM Buc Status Report.

Table 73: Micro ATOM Buc Status message payload

Byte #	Name	Type	Bit #	Description
0	Status Word	Uint_8	1 - 2	Reserved
			3	PLL fault. '0'- Fail, '1'- Pass
			4	Over temperature '0'- Fail, '1'- Pass
			5	Muted '0'- Unmuted, '1'- Muted
			6	Fault '0'- ok, '1'- Fault
			7-8	Current frequency value

1	Buc temperature	Uint_8		In degrees
2-5	Froward power	Int_32		[dBm]
6-9	Reverse power	Int_32		[dBm]
10-13	Minimal Frequency	Int_32		GHz
14-17	Maximum Frequency	Int_32		GHz
18-21	LO frequency	Int_32		GHz

1.8.59. Micro Mission Buc Info Report – 0x45

Mission Buc Device Info Report.

Table 74: Micro Mission Buc Info message payload

Byte #	Name	Type		Description
0-25	ModelNumber	Uint_8[26]		Mission Model Number
26-51	SerialNumber	Uint_8[26]		Mission Serial Number
52-66	HWRev	Uint_8[15]		Mission HW Revision
67-81	FirmwareRev	Uint_8[15]		Mission Firmware Revision
82-93	BootLoaderRev	Uint_8[12]		Mission Boot Loader Revision

1.8.60. Micro Mission Buc Invalid Configuration – 0x46

Mission Buc Device Type Invalid configuration.

Table 75: Micro Mission Buc Invalid message payload

Byte #	Name	Type	Bit #	Description
0	Enable Invalid SN	Uint_8	1	Enable invalid serial BUC
1-8	Reserved	Uint_8[8]		

1.8.61. Micro GS Buc Configuration – 0x47

GS Buc Device Status configuration.

Table 76: Micro GS Buc Status message payload

Byte #	Name	Type	Bit #	Description
1	buc_fault_on_byte	Uint_8		
2	sspa_fault_on_byte	Uint_8		
3	mucFaultOnByte	Uint_8		
4	fan_rps	Uint_8		
5-6	power_consumption	Uint_16		
7-8	sspa_temperature	int_16		
9-12	power_out_avr	int_32		
13-16	power_out	int_32		
17	device_type	Uint_8		
18	lo_band_mode	Uint_8		
19-20	power_meter	int_16		
21	attenuator	Uint_8		
22	muc_temperature	int_8		
23	tx_mode	Uint_8		
24-27	buc_version	Uint_32		
28	sspa_type	Uint_8		

1.8.62.   OpenAMIP Configuration – 0xB9

OpenAMIP Configuration Set.

1.8.62.1. Set message payload:

Table 77: Micro OpenAMIP configuration Set message payload

Byte #	Name	Type	Value	Description
0-1	TCP port	Uint_16	5001	System OpenAMIP TCP server port.
2	Echo enable	Uint_8	[0] [1]	Enable echoing of all valid OpenAMIP messages back to system GUI. 0 – disable 1 – enable
3	L Message Period	Uint_8	1	Modem Period between L messages (seconds units)
4	OpenAmip Enable	Uint_8	1	
5-6	GPS unlocked Timeout	Uint_16	30000	system GPS unlock time out in case terminal is tracking and the GPS got unlocked, this is time out until the system will stop tracking. (in milliseconds units, for example 1000 = 1 second)
7-10	OpenAMIP IP	Uint_32	[0xC0A80103]	System OpenAMIP IP - **192.168.1.3**
11-12	OpenAMIP RSSI UDP port	Uint_16	47960	System OpenAMIP RSSI UDP port.
13	OpenAMIP Go to Last Valid Sat	Uint_8		If enabled the terminal in power up after acquiring open AMIP communication will Load last valid satellite and signal params from flash, 0-disabled 1-enabled
14-45	Reserved	Uint_8[32]	[0]	Set to 0.

1.8.62.2. Report Acknowledge message payload:

Same as Set message payload.

1.8.63. **OpenAMIP Status – 0xBB**

OpenAMIP Status Report.

Table 78: Micro OpenAMIP Status message payload

Byte #	Name	Type	Bit #	Description
0	Connection Status	Uint_8		Indicates if TCP connection established. '0'= not established '1'= established
1-4	's'message period	Uint_32		Period between terminal 's' messages. Set by Modem.
5-8	RX LO Frequency	float		RX LO Frequency in MHz Units Set by Modem.
9-12	TX LO Frequency	float		TX LO Frequency in MHz Units Set by Modem.
13-16	Pilots SNR	UInt_32		SNR Measured on the Link Pilots Frames by the Modem. (units can differ between different modem Types).
17-20	Data SNR	float		SNR Measured on the Link Data Frames by the Modem (dBm units).
21-24	Time SNR	float		
25-28	Max Modem Power	float		
29-32	RX signal Frequency	float		RX signal L-Band Frequency (MHz units) Set by Modem.
33-36	RX signal Bandwidth	float		RX signal L-Band Bandwidth (MHz units). Set by Modem.
37-164	Reserved			
165-168	Maximum Skew	float		Terminal maximum skew to satellite allowed (degree units). Set by Modem.
169-172	Minimum Skew	float		Terminal minimum skew to satellite allowed (degree units). Set by Modem.
173	Modem Lock Status	Uint_8		Modem Lock status '0'= unlocked '1'= Locked
174	Transmit Enable	Uint_8		Modem Transmit Enable '0'= TX off. '1' = TX on
175	RX polarization	char		Antenna RX polarization, Set by Modem. 'L'- Left Hand (KA) 'R'- Right Hand (KA) 'V'- Vertical (KU) 'H'- Horizontal (KU)
176	TX polarization	char		Antenna RX polarization, Set by Modem. 'L'- Left Hand (KA) 'R'- Right Hand (KA) 'V'- Vertical (KU) 'H'- Horizontal (KU)
177-180	Satellite Longitude	float		Satellite Longitude, Set by Modem. Range -180 ÷ +180 (degree units)
181-184	Latitude variance	float		
185-188	Polarization skew	float		

189	Valid SAT	UInt_8		
190-193	TX signal Frequency	float		TX signal L-Band Frequency (MHz units) Set by Modem.
194-197	TX signal Bandwidth	float		TX signal L-Band Bandwidth (MHz units) Set by Modem.
198-201	'w'report interval	float		System 'w'report interval to modem. Set by Modem.
202	Buc Power	char		
203-206	Pilot avg rssi	UInt_32		
207-210	Data avg rssi	UInt_32		
211-234	Reserved	UInt_8[24]		

1.8.64. Terminal Configuration – 0xC0

Terminal Configuration Set.

1.8.64.1. Set message payload:

Table 79: Terminal configuration Set message payload

Byte #	Name	Type	Value	Description
0	Terminal Type	Uint_8	0 – None 1 – Micro 2 – Milli 3 – Nano 4 – Pico 5 - Mega	Describes the terminal physical type.
1	Terminal Extra	Uint_8	1 – W 2 – H 3 - WEX	Used only in millisat terminal. Otherwise do not care.
2	Terminal App	Uint_8	0 – None 1 – LM 2 - LW	
3	ACU Communication	Uint_8	0 – None 1 – Serial 2 - Ethernet	
4	ACU Power Communication	Uint_8	0 – None 1 – Serial 2 - Ethernet	
5	Integrated Modem	Uint_8	0 – None 1 – GetSat 2- UHP1000	Describes the integrated modem in the terminal
6	DualSat support	Uint_8	0 – False 1 – True	
7-22	Terminal Serial Number	Uint_8[16]		The serial number of the terminal

1.8.65. **Antenna Configuration – 0xC1**

Antenna Configuration Set.

1.8.65.1. **Set message payload:**

Table 80: Antenna configuration Set message payload

Byte #	Name	Type	Value	Description
0	Frequency Band	Uint_8	0 – None 1 – KA 2 – KU	
1	Chopped	Uint_8	0 1	
2	Rx Frequency	Uint_8	NONE = 0 19.2-21.2= 1 18.0-20.5=2 10.7-12-75= 3 10.7-11.7 = 4 18.7-20.2 = 5	GHz.
3	Tx Frequency	Uint_8	NONE = 0 29-31= 1 28.2-30.5=2 27.6-30= 3 13.75-14.5= 4 12.75-13.25= 5	GHz.
4	Antenna Polarization	Uint_8	0 – NONE 1 – RR 2 – RL 3 – LR 4 – LL 5 – VH	First letter for TX. Second letter for RX. R- Right hand. L – Left hand. V – Vertical H - Horizontal
5-20	Antenna Serial Number	Uint_8[16]		The serial number of the Antenna

1.8.66. **LNB Configuration – 0xC2**

LNB Configuration Set.

1.8.66.1. **Set message payload:**

Table 81: LNB configuration Set message payload

Byte #	Name	Type	Value	Description
0	LNB Brand	Uint_8	0 – None 1 – GetSat	
1	LO Lower Frequency	float	MHz	
2	LO Higher Frequency	float	MHz	
3-18	LNB Serial Number	Uint_8[16]		

1.8.67. **BUC Configuration – 0xC3**

BUC Configuration Set.

1.8.67.1. **Set message payload:**

Table 82: BUC configuration Set message payload

Byte #	Name	Type	Value	Description
0	BUC Brand	Uint_8	0 – None 1 – GetSat 2 – MissionNMW 3 - WaveLab	
1	BUC Ext	Uint_8	0 – NONE 1 - OpenBMIP	
2	Frequency Band	Uint_8	0 – NONE 1 – KA 2 - KU	
3	Power	Uint_8	0 – NONE 4 8 12 20 25 35	
4	LO Lower Frequency	float	MHz	
5	LO Higher Frequency	float	MHz	
6	Serial Interface	Uint_8	0 – NONE 1 – RS232 2 – RS422	
7-23	BUC Serial Number	Uint_8[16]		

1.8.68.   ACU Configuration – 0xC4

ACU Configuration Set.

1.8.68.1. Set message payload:

Table 83: ACU configuration Set message payload

Byte #	Name	Type	Value	Description
0	ACU Type	Uint_8	0 – None 1 – MicroTracker 2 – SuperTracker	
1	Revision	Uint_8	0 – NONE 1 - F	
2	ACU Ext	Uint_8	0 – NONE 1 – ASRC	
3-8	MAC	Uint_8[6]		
8-22	Serial Number	Uint_8[16]		

1.8.69.   Bridge Configuration – 0xC5

Bridge Configuration Set.

1.8.69.1. Set message payload:

Table 84: Bridge configuration Set message payload

Byte #	Name	Type	Value	Description
0	Bridge Type	Uint_8	0 – None 1 – Dual 2 – Mega 3 - ADRX	
1	Revision	Uint_8	0 – NONE 1 - B	
2	Bridge Extra	Uint_8	0	
3-18	Serial Number	Uint_8[16]		

1.8.70. Front Panel Configuration – 0xC6

Front Panel Configuration Set.

1.8.70.1. Set message payload:

Table 85: Front Panel configuration Set message payload

Byte #	Name	Type	Value	Description
0	Front Panel Type	Uint_8	0 – None 1 - 3	
1	Revision	Uint_8	0 – NONE 1 - B	
2	Bridge Extra	Uint_8	0	
3-18	Serial Number	Uint_8[16]		

1.8.71. Spectrum Calibration Configuration – 0xC7

Spectrum Calibration Configuration Set.

1.8.71.1. Set message payload:

Table 86: Spectrum Calibration configuration Set message payload

Byte #	Name	Type	Value	Description
0	Low Frequency Calibration	Frequency Point*[20]		
1	High Frequency Calibration	Frequency Point*[20]		

*Table 87: *Frequency Point*

Byte #	Name	Type	Value	Description
0	Analog Calibration	Int_16		Analog Gain calibration.
2	I Compensation	Int_16		ADC DC remove.
4	Q Compensation	Int_16		ADC DC remove.

1.8.72. GYRO Calibration Configuration – 0xC8

GYRO Calibration Configuration Set.

1.8.72.1. Set message payload:

Byte #	Name	Type	Value	Description
0	GYRO Calibration Status	U8	0 1	Start Gyro Calibration Start Gyro Test
1	Reserved	U8		

1.8.72.2. Report Acknowledge message payload:

Table 88: GYRO Calibration configuration Set message payload

Byte #	Name	Type	Value	Description
0	GYRO Calibration Status	U8	0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 19 20	Idle, Start Calibration Panel Drop Average Position Wait Position Track Wait Track Test Finished Finished X Finished Y Calibrating Time Out Failed Stopped Calibrated Calibrated X Calibrated Y Not Calibrated
1	Progress Status	U8	0-100	Progress status in percentage

1.8.73. Discovery Report – 0xF0

System Discovery Report is sent to Broadcast IP. On Port: 61500.

Table 89: Discovery Report message payload

Byte #	Name	Type	Value	Description
0-1	Ethernet Port	Uint_16	[0xF03C]	Discovery Port: **61500**
2	Device Type	Uint_8	0	None
			1	MicroSAT
			2	NanoSAT
			3	PicoSAT
			4	MicroSAT_LW
			5	MilliSAT_W

			6	MilliSAT_H
			-	Reserved
			10	MicroModem
3-6	Device ID	Uint_32		System Serial Number.
7-10	System IP	Uint_32	0xC0A80AC8	System IP - **192.168.10.200**
11-14	System Subnet	Uint_32	0xFFFFFF00	System Subnet Mask - **255.255.255.0**
15-18	System Getway	Uint_32	0xC0A80A01	System Getway - **192.168.10.1**
19-20	System Port	Uint_16	0xC351	System listen port - **50001**
21-24	Host IP	Uint_32	0xC0A80A0E	Host IP - **192.168.10.14**
25-26	Host Port	Uint_16	0xC351	Host listen port - **50001**
27-30	Reserved IP	Uint_32		Reserved
31-32	Reserved Port	Uint_16		Reserved
33-36	Discovery Cast	Uint_32	0xFFFFFFFF	Discovery Multi cast configuration.
37-38	Reserved Port	Uint_16	[0]	Reserved
39	Release Main	Uint_8		Release Main Version number
40	Release Sub	Uint_8		Release Sub Version number
41	Status Byte	Uint_8		Currently contains one bit. 0- System In Use reports if the system has received commands in the last 5 seconds, as in the device is in use.
42-45	ModemSerial	UInt_32		Internal Modem serial number.
46	Reserved	Uint_8		
47	String Size	Uint_8		Length of the string.
48-79	String	Uint_8[32]		Free text to describe the system.

1.8.74. Debug Control – 0xF1

System Debug interface configuration.

1.8.74.1. Set message payload:

Table 90: Debug Control interface message payload

Byte #	Name	Type	Default	Description
0-3	Address	Uint_32		Debug Internal Register Address.
4-7	Data	Uint_32		Debug Internal Register Data.
8-15	Reserved	Uint_8[8]		

1.8.74.2. Report Acknowledge message payload:

Same as Set message payload.

1.8.75. Debug System Status Report – 0xF2

Debug System Status Report.

1.8.75.1. Report message payload:

Table 91: Debug System Status Report message payload

Byte #	Name	Type	Bit #	Description
0	Power Good	Uint_8		Not in use. Default value is 0.
1-2	Temp. MicroTracker	Int_16		Temperature MicroTracker. Units: 1LSB = 0.1°c
3-4	Temp. FPGA	Int_16		Temperature FPGA. Units: 1LSB = 0.1°c
5-6	Temp. Bridge	Int_16		Temperature Bridge. Units: 1LSB = 0.1°c
7-8	Temp. Modem	Int_16		Temperature Modem. NOT USED Units: 1LSB = 0.1°c
9-10	Temp. Compass	Int_16		Temperature Compass Not in use. Default value is 0.
11-12	Temp. IMU	Int_16		Temperature IMU. Units: 1LSB = 0.1°c
13-20	Reserved	Int_16[4]		
21	Device Status Bits	Uint_8	0	Processor (SAM) CPU [1]
			1	Active Bridge CPU
			2	In System Buc
			3	SSPA
			4	GPS
			5	IMU
			6	Motor Azimuth
			7	Motor Elevation
22	Ethernet Status	Uint_8	0	Ethernet Port 1: Full Duplex
			1	Ethernet Port 1: Speed
			2	Ethernet Port 1: Connection
			3	Ethernet Port 2: Full Duplex
			4	Ethernet Port 2: Speed
			5	Ethernet Port 2: Connection
			6	Reserved
			7	MII CPU Interface.
23-24	System Voltage	Int_16		Units: 1LSB=0.01 [V]
25-26	System Current	Int_16		Units: 1LSB=0.01 [A]
27-28	FPGA vCore	Int_16		Units: 1LSB=0.01 [V]
29-30	FPGA vAux	Int_16		Units: 1LSB=0.01 [V]
31-38	Reserved	Uint_16[4]		
39-40	Bridge mVoltage	Uint_16		Units: 1LSB=0.01 [V]
41-42	Bridge dVoltage	Uint_16		Units: 1LSB=0.01 [A]
43-44	Bridge Sense Volt	Uint_16		Units: 1LSB=0.01 [V]
45-46	Bridge Sense Cur.	Uint_16		Units: 1LSB=0.01 [V]
47-74	Reserved	Uint_32[7]		

75-78	Cycles counter	Uint_32		GetSAT search cycles counter. It will clear when system moves to track Mode.
79-82	CBit	Uint_32		Continues system bit.
83-86	Reserved	Uint_32		
87-90	PBit Low	Uint_32		Power up Low bits.
91-94	PBit High	Uint_32		Power up High bits.
95-114	Reserved	Uint_16[10]		

(1) '0' – Device is not active, '1' - Device is active.

CBIT – QWORD Parsing.

bit #	Name	Type	Description
0	mExternalDC Fail		System External DC Fail. Over\Under voltage.
1	mInternalDC Fail		System Internal DC Fail. Over\Under voltage.
2	mOverCurrent Fail		System Total Power Fail. Over Current.
3-7	Reserved		
8	mOverTempFPGA		Main Controller Over Temperature Fail.
9	mOverTempCPU		CPU Over Temperature Fail.
10	mOverTempSatix		Modem Over Temperature Fail.
11	mOverTempPower		Power Module Over Temperature Fail.
11-15	Reserved		
16	Bridge Fail		Total Bridge Fail.
17	bDigitalDC Fail		Bridge Digital Power Fail. [12v]
18	bMotorDC Fail		Bridge Motor Power Fail. [18v]
19	bMotorCurrent Fail		Bridge Total Motor Over Current Fail.
20	bAzimCurrent Fail		Bridge Azimuth Motor over current Fail.
21	bElevCurrent Fail		Bridge Elevation Motor over current Fail.
22-23	Reserved		
24	bOverTempFPGA		Bridge FPGA Over Temperature Fail.
25	bOverTempPower		Bridge Power Over Temperature Fail.
26	bOverTempIMU		Bridge IMU Over Temperature Fail.
27	Reserved		
28	bFans Fail		Bridge Fans Fail.
29	bGPS Fail		Bridge GPS Module Fail.
30	bIMU Fail		Bridge IMU Module Fail.
31	Reserved		

(1) '0' – Struct Empty, '1' - Struct Loaded OK.

PBIT – QWORD Low Parsing.

bit #	Name	Type	Description
1	Pbit_Done		This bit indicates that Pbit report was generated
2-6	Reserved		
7	KuRxTable		Ku Antenna Rx Skew Configuration Struct – No value.
8	KuTxTable		Ku Antenna Tx Skew Configuration Struct – No value.
9	DeviceConfig		Device Configuration Struct – No Value.
10	AgcConfig		AGC Configuration Struct – No Value.
11	EthernetConfig		Ethernet Properties Configuration Struct – No Value.
12	AzimPosConst		Azimuth Position Constant Struct – No Value.
13	ElevPosConst		Elevation Position Constant Struct – No Value.
14	AzimScanConst		Azimuth Scan Constants Struct – No Value.
15	ElevMoveConst		Elevation Move Constants Struct – No Value.
16	TrackConfig		Track PID Configuration Struct – No Value.
17	TrackModeScan		Track PID Mode Scan Configuration Struct – No Value.
18	TrackImuCalib		Track IMU Calibration Struct – No Value.
19	ScanLimiters		Scan Limiters Struct – No Value.
20	StepTracking		Step Tracking Struct – No Value.
21	SystemLog		System Log system has no value yet.
22	EthMateConfig		Ethernet Mate Configuration Struct – No Value.
23	ElevScanConst		Elevation Scan PID Constants Struct – No Value.
24	TrackFogConfig		Track Fog Configuration Struct – No Value.
24-32	Reserved		

PBIT – QWORD High Parsing.

bit #	Struct Name	Type	Description
1	AntennaSatPos		Antenna Satellite Position Struct – No Value.
2	AntennaMode		Antenna Mode Configuration Struct – No Value.
3	McAdvConfig		MicroTracker Advance Configuration Struct – No Value.
4	RxConfig		Rx Configuration Struct – No Value.
5	StatReportEth		Status Report Ethernet Configuration Struct – No Value.
6	BucConfig		Buc Configuration Struct – No Value.
7	MotorCurLimit		Motor Current Struct – No Value.
8	ModemConfig		Modem Configuration Struct – No Value.
9	TxConfig		Tx Configuration Struct – No Value.
10	UpModeConfig		System Power Up Mode Struct – No Value.
11	StatReportUart		Status Report Uart Configuration Struct – No Value.
12	ServoMotorConfig		Servo Motors Configuration Struct – No Value.
13	ServoFreqConfig		Servo Frequencies Configuration Struct – No Value.
14	PmAdvConfig		PM Advance Configuration Struct – No Value.
15	O3BScedulerConfig		O3B System Configuration Struct – No Value.
16	ImuTypeConfig		IMU Type Configuration Struct – No Value.
17	ImuFilterConfig		IMU Filter Configuration Struct – No Value.
18	RegulationConfig		Regulation Configuration Struct – No Value.
19	RegulationTable		Regulation Table Struct – No Value.
20	StatReportMate		Status Report Mate Struct – No Value.
21	RegionSystem		Region System Struct – No Value.
22	RegionMate		Region Mate Struct – No Value.
23	ModeMateConfig		Modem Mate Configuration Struct – No Value.
24	FollowPIDConfig		Follow PID Configuration Struct – No Value.
25	OpenAmipConfig		Open AMIP Configuration Struct – No Value.
26	OpenAmipDBConfig		Last Open AMIP Valid Configuration Struct – No Value.
27	O3BChannelConfig		
28	O3B EphemericConfig		
29-32	Reserved		

1.8.76. **Ack Message**

Acknowledge message is a reply to a Set message or bad Report request message.

Table 92: Acknowledge message payload

byte #	Name	Type	default	Description
0	Error Code	Uint_8	-	Represents the error type. See Error Codes section for types of errors.
	Data	String	-	String message that describes the error code.

1.9. **Error Codes**

If a Set message was issued by the Host, the System will respond with an acknowledge message which includes an error code.
The following table lists all possible error codes.

Table 93: Error Codes

Code	Name	Description
0x00	ERR_CDS_SUCCESS	The message received successfully.
0x01	ERR_CDS_GLOBAL_ERR	Global error.
0x02	ERR_CDS_SEQUENCE_ERR	Sequence number error. The message is discarded.
0x03	ERR_CDS_CHECKSUM_ERR	Checksum calculation error. The message is discarded.
0x04-0x0F	Reserved.	
0x10	ERR_CDS_TUNER_AN_BW_ERR	Wrong tuner analog filter bandwidth configuration value.
0x11	ERR_CDS_TUNER_AN_GAIN_ERR	Wrong tuner analog gain configuration value.
0x12	ERR_CDS_TUNER_DIG_GAIN_ERR	Wrong tuner digital gain configuration value.
0x13	ERR_CDS_TUNER_CF_ERR	Wrong tuner center frequency configuration value.
0x14	ERR_CDS_PM_ZOOM_ERR	Wrong power meter zoom configuration value.
0x15	ERR_CDS_PM_PWR_SPCT_AVG_ERR	Wrong power meter Power Spectrum Average configuration value.
0x16	ERR_CDS_PM_CH_PWR_AVG_ERR	Wrong power meter channel power average configuration value.
0x17	ERR_CDS_PM_CH_PWR_DB_AVG_ERR	Not used.
0x18	ERR_CDS_PM_BW_ERR	Wrong power meter RSSI bandwidth configuration value.
0x19	ERR_CDS_PM_PERIOD_ERR	Wrong power meter Frame period configuration value.

1.10. **System Operating Values**

Table 94: System Operating Values

Opcode	Field Name	Description	Normal	Warning	Error

0x10	IMU Temp	IMU temperature	-40 ÷ +75	+75 ÷ +95	>95 || < -40
0x37	Digital Voltage 12v	Bridge Digital voltage	11 ÷ 13	13 ÷ 14 || 10 ÷ 11	<10 || >14
0x37	Motor Voltage 18v	Bridge Motor voltage	17 ÷ 26	26 ÷ 30	<17 || >30
0xF2	Temperature MicroTracker	ACU Temperature.	-40 ÷ +85	+85 ÷ +105	>105 || < -40
0xF2	Temperature FPGA	ACU FPGA Temperature.	-40 ÷ +85	+85 ÷ +105	>105 || < -40
0xF2	Temperature Bridge	Bridge Temperature	-40 ÷ +85	+85 ÷ +105	>105 || < -40
0xF2	System Voltage	System Voltage	12 ÷ 48	-	<12 || >48
0xF2	System Current	System Current Note: Limit on system power. Voltage * Current	<20 Watt	<24 Watt	>24 Watt

2. SOFTWARE GUIDE

1.11. Checksum Calculation

The next method will describe how to calculate message checksum field.

```c
/*************************************************
 * buffer - Message byte array
 * offset - The checksum start byte (always 0)
 * len    - Message length (without 2 bytes of checksum)
 * return - Message checksum value
 *************************************************/
u16 CalcICDCheckSum(u8* buffer, u16 offset, u16 len)
{
    u16 checkSum;
    u8 byteMsb=0,byteLsb=0;
    u16 ii;
    for(ii=0;ii<len;ii+=2)
    {
        byteMsb += buffer[offset + ii];
        if((ii+1)<len)
            byteLsb += buffer[offset + ii+1];
    }
    checkSum = (u16)(byteMsb<<8) | byteLsb;
    return checkSum;
}
```

1.12. Basic System Operations

1.12.1. Acquire satellite and track

The following diagram shows basic steps that will cause the terminal to be in GetSAT mode, which acquires the required beacon/signal and tracks it.
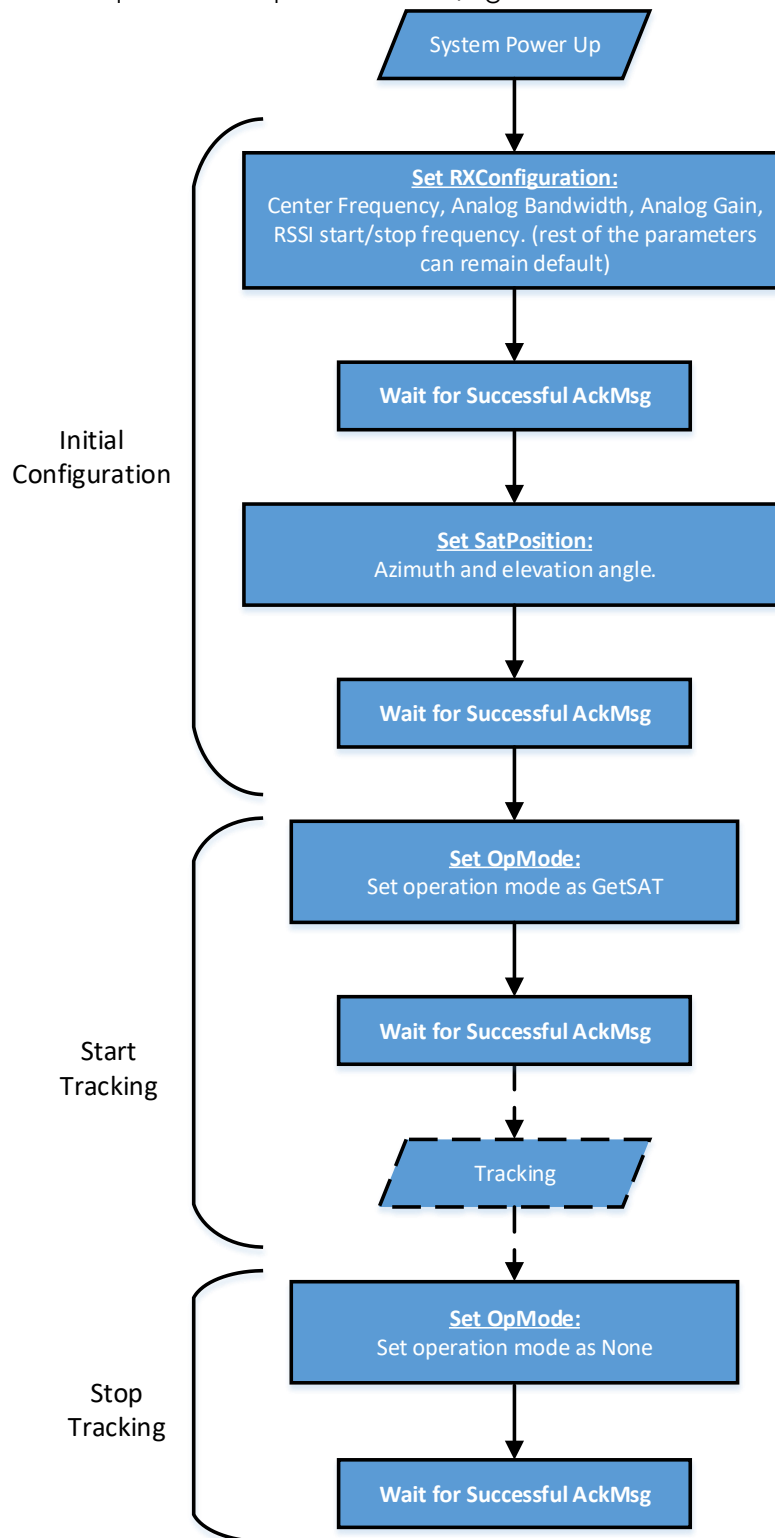

Figure 4: Basic System operation command sequence

If the system is using the same satellite and all the initial configuration is set as default, the only required operation command to start and stop tracking the satellite is OpMode.

1.12.2. Manual Pointing (Antenna Position Set)

There are 2 sets of sensors that are used for antenna position setting.

- Encoders – which sets the antenna position relative to the terminal stator (terminal base). When 0 degree is when the antenna panel is aligned in parallel with the connection panel.

- IMU – which sets the antenna position relative to earth surface.

There is more info on pointing in the GUI user document.

For antenna position setting only 2 messages are used:

- Satellite position (Op-Code 0x20) – to set the pointing angle.

- Operation Mode (Op-Code 0x02) – to command the terminal to point to the configured angle using encoders or IMU.

Note: For fixed antenna pointing use encoders.

When the antenna reached the initial configured angle a "Fine Tune" option is available for correcting the pointing angle by less than 3 degree in each axis.

The GetSAT application (GUI) uses this option when selecting "Manual" mode and using the arrows to move the antenna.

Start:
System is Idle

Set Antenna
pointing angle to
azimuth 50 and
elevation 50
degrees

Set Satellite position (op-code 0x20):
Azimuth and Elevation angle.
For example (Az=50, El=50) degrees.

Set Operation Mode (op-code 0x02):
Select encoders or IMU for each axis (Usually encoders for
antenna position pointing).
Set OpMode Byte to 1.
Set Auto Update to 1.
Clear compass align should be 0.

Set Antenna
pointing angle to
azimuth 170 and
elevation 40
degrees

Set Satellite position (op-code 0x20):
Azimuth and Elevation angle.
For example (Az=170, El=40) degrees.

Set Operation Mode (op-code 0x02):
Select encoders or IMU for each axis (Usually encoders for
antenna position pointing).
Set OpMode Byte to 1.
Set Auto Update to 1.
Clear compass align should be 0.

Fine tune
Antenna azimuth
to 171 degrees

Set Satellite position (op-code 0x20):
Azimuth and Elevation angle.
For example (Az=171, El=40) degrees.

Set Operation Mode (op-code 0x02):
Select encoders or IMU for each axis (Usually encoders for
antenna position pointing).
Set OpMode Byte to 6.
Set Auto Update to 1.
Clear compass align should be 0.

Fine tune
Antenna
elevation to 40.5
degrees

Set Satellite position (op-code 0x20):
Azimuth and Elevation angle.
For example (Az=171, El=40.5) degrees.

Set Operation Mode (op-code 0x02):
Select encoders or IMU for each axis (Usually encoders for
antenna position pointing).
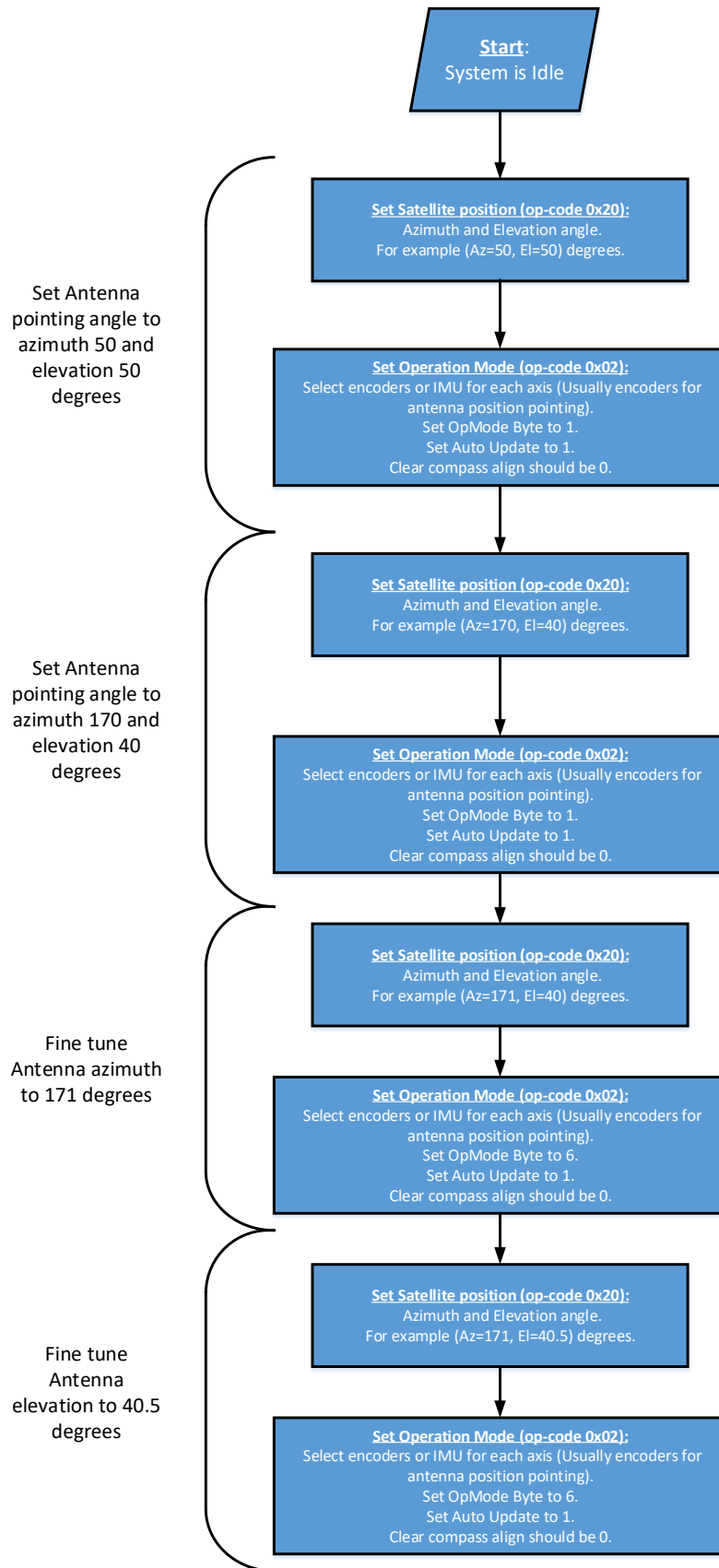Set OpMode Byte to 6.
Set Auto Update to 1.
Clear compass align should be 0.

Figure 5: Antenna Pointing operation command sequence