Remote Operations

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The Remote Protocols for the DMD20, DMD20LBST, DMD50, DMD2050 and OM20 are similar in design and utilize the same protocol platforms. This document should be used as the primary source for identifying the various protocol structures and control menus for products listed below. The most current Remote Protocols manual can be accessed from the Radyne web site at

http://www.radyne.net

The Remote Protocol identified in TM117 are RLLP (Radyne Link Level Protocol), SNMP MIB file, Web Browser menus and Terminal Port menus. The TM117 document does not identify equipment setup processes. The Product manuals include instructions to set up the equipment but will not include the protocol structure. The Remote Protocol manual TM117 is applicable to the following products:

Equipment	**Manual**
DMD20	TM103
DMD20LBST	TM103
DMD50	TM118
DMD2050	TM110
DMD1050	TM130
OM20	TM116

1.1 Modem Remote Communications (RLLP)

The Remote Port allows for complete control and monitoring of all parameters and functions via an RS-232 Serial Interface, or RS-485 for RLLP Protocol. 'Equipment Remote Mode' can be entered from the GUI interface under the "System" menu by selecting "System" and then "Terminal" followed by "Terminal". The baud rate and evaluation type can be changed at the front panel by using the *System>Baud Rate* Menu.

Control and status messages are conveyed between the modem and all subsidiary modems and the host computer using packetized message blocks in accordance with a proprietary communications specification. This communication is handled by the Radyne Link Level Protocol (RLLP), which serves as a protocol 'wrapper' for the RM&C data. Complete information on monitor and control software is contained in the following sections.

This specification is applicable to the DMD20/20LBST, DMD50, DMD2050, DMD1050 and OM20 Modems. Any reference to the DMD20 in this document can be applicable to any one of these three modems.

For configuration setup, refer to the product manuals.

1.1.1 Protocol Structure

The Communications Specification (COMMSPEC) defines the interaction of computer resident Monitor and Control Software used in satellite earth station equipment such as modems, redundancy switches, multiplexers, and other ancillary support gear. Communication is bi-directional, and is normally established on one or more full-duplex 9600-baud multi-drop control buses that conform to EIA Standard RS-485.

Each piece of earth station equipment on a control bus has a unique physical address, which is assigned during station setup/configuration or prior to shipment. Valid decimal addresses on one control bus range from 032 through 255 for a total of up to 224 devices per bus. Address 255 of each control bus is usually reserved for the M&C computer.

1.1.2 Protocol Wrapper

The Radyne Corporation COMMSPEC is byte-oriented, with the Least Significant Bit (LSB) issued first. Each data byte is conveyed as mark/space information with two marks comprising the stop data. When the last byte of data is transmitted, a hold comprises one steady mark (the last stop bit). To begin or resume data transfer, a space (00h) substitutes this mark. This handling scheme is controlled by the hardware and is transparent to the user. A pictorial representation of the data and its surrounding overhead may be shown as follows:

S1	S2	B_0	B_1	B_2	B_3	B_4	B_5	B_6	B_7	S1	S2, etc.

The Stop Bits, S1 and S2, are each a mark. Data flow remains in a hold mode until S2 is replaced by a space. If S2 is followed by a space, it is considered a start bit for the data byte and not part of the actual data (B_0 - B_7). The COMMSPEC developed for use with the Radyne Corporation Link Level Protocol (RLLP) organizes the actual monitor and control data within a shell, or 'protocol wrapper', that surrounds the data. The format and structure of the COMMSPEC message exchanges are described herein. Decimal numbers have no suffix; hexadecimal numbers end with a lower case 'h' suffix and binary values have a lower case 'b' suffix. Thus, 22 = 16h = 000010110b. The principal elements of a data frame, in order of occurrence, are summarized as follows:

<SYNC>: The message format header character, or ASCII sync character, that defines the beginning of a message. The <SYNC> character value is always 16h.

<BYTE COUNT>: The Byte Count is the number of bytes in the <DATA> field (2 Bytes).

<SOURCE ID>: The Source Identifier defines the multi-drop address origin.

All nodes on a given control bus have a unique address that must be defined.

<DESTINATION ID>: The Destination Identifier serves as a pointer to the multi-drop destination device that indicates where the message is to be sent.

<FRAME SEQUENCE NUMBER>: The Frame Sequence Number (FSN) is a tag with a value from 0 through 255 that is sent with each message. It assures sequential information framing and correct equipment acknowledgment and data transfers.

<OPCODE>: The Operation Code field contains a number that identifies the message type associated with the data that follows it. Equipment under MCS control recognizes this byte via firmware identification and subsequently steers the DATA accordingly to perform a specific function or series of functions. Acknowledgment and error codes are returned in this field (2 Bytes).

<DATA>: The Data field contains the binary, bi-directional data bytes associated with the <OPCODE>. The number of data bytes in this field is indicated by the <BYTE COUNT> value.

<CHECKSUM>: The checksum is the modulo 256 sum of all preceding message bytes, excluding the <SYNC> character. The checksum determines the presence or absence of errors within the message. In a message block with the following parameters, the checksum is computed as shown in Table 1-1.

Table 1-1. Checksum Calculation Example

BYTE FIELD	DATA CONTENT	RUNNING CHECKSUM
<BYTE COUNT> (BYTE 1)	00h = 00000000b	00000000b
<BYTE COUNT> (BYTE 2)	04h = 00000100b	00000100b
<SOURCE ID>	FFh = 11111111b	00000011b
<DESTINATION ID>	20h = 00100000b	00100011b
<FSN>	09h = 00001001b	00101100b
<OPCODE> (BYTE 1)	2Ah = 00101010b	01010110b
<OPCODE> (BYTE 2)	01h = 00000001b	01010111b
<DATA> (Byte 1)	08h = 00001000b	01011111b
<DATA> (Byte 2)	58h = 01011000b	10110111b
<DATA> (Byte 3)	3Bh = 00111011b	11110010b
<DATA> (Byte 4)	00h = 00000000b	11110010b

Thus, the checksum is 11110010b; which is F2h or 242 decimal. Alternative methods of calculating the checksum for the same message frame are:

00h + 04h + FFh + 20h + 09h + 2Ah + 01h + 08h + 58h + 3Bh + 00h = 1F2h.

Since the only concern is the modulo 256 (modulo 1 00h) equivalent (values that can be represented by a single 8-bit byte), the checksum is F2h. For a decimal checksum calculation, the equivalent values for each information field are:

0 + 4 + 255 + 32 + 9 + 42 + 1 + 8 + 88 + 59 + 0 = 498;

498/256 = 1 with a remainder of 242.

This remainder is the checksum for the frame.

242 (decimal) = F2h = 11110010b = <CHECKSUM>

1.1.3 Frame Description and Bus Handshaking

In a Monitor and Control environment, every message frame on a control bus port executes as a packet in a loop beginning with a wait-for-SYNC-character mode. The remaining message format header information is then loaded, either by the M&C computer or by a subordinate piece of equipment (such as the DMD20) requesting access to the bus. Data is processed in accordance with the OPCODE, and the checksum for the frame is calculated. If the anticipated checksum does not match, then a checksum error response is returned to the message frame originator. The entire message frame is discarded and the wait-for-SYNC mode goes back into effect. If the OPCODE resides within a command message, it defines the class of action that denotes an instruction that is specific to the device type, and is a prefix to the DATA field if data is required. If the OPCODE resides within a query message packet, then it defines the query code, and can serve as a prefix to query code DATA.

The Frame Sequence Number (FSN) is included in every message packet, and increments sequentially. When the M&C computer or bus-linked equipment initiates a message, it assigns the FSN as a tag for error control and handshaking. A different FSN is produced for each new message from the FSN originator to a specific device on the control bus. If a command packet is sent and not received at its intended destination, then an appropriate response message is not received by the packet originator. The original command packet is then re-transmitted with the same FSN. If the repeated message is received correctly at this point, it is considered a new message and is executed and acknowledged as such.

If the command packet is received at its intended destination but the response message (acknowledgment) is lost, then the message originator (usually the M&C computer) re-transmits the original command packet with the same FSN. The destination device detects the same FSN and recognizes that the message is a duplicate, so the associated commands within the packet are not executed a second time. However, the response packet is again sent back to the source as an acknowledgment in order to preclude undesired multiple executions of the same command.

To reiterate, valid equipment responses to a message require the FSN tag in the command packet. This serves as part of the handshake/acknowledge routine. If a valid response message is absent, then the command is re-transmitted with the same FSN. For a repeat of the same command involving iterative processes (such as increasing or decreasing the transmit power level of a DMD20 modulator), the FSN is incremented after each message packet. When the FSN value reaches 255, it overflows and begins again at zero. The FSN tag is a powerful tool that assures sequential information framing, and is especially useful where commands require more than one message packet.

The full handshake/acknowledgment involves a reversal of source and destination ID codes in the next message frame, followed by a response code in the <OPCODE> field of the message packet from the equipment under control.

If a command packet is sent and not received at its intended destination, a timeout condition can occur because a response message is not received by the packet originator. On receiving devices slaved to an M&C computer, the timeout delay parameters may be programmed into the equipment in accordance with site requirements by Radyne Corporation prior to shipment, or altered by qualified personnel. The FSN handshake routines must account for timeout delays and be able to introduce them as well.

1.1.4 Global Response Operational Codes

In acknowledgment (response) packets, the operational code <OPCODE> field of the message packet is set to 0 by the receiving devices when the message intended for the device is evaluated

as valid. The device that receives the valid message then exchanges the <SOURCE ID> with the <DESTINATION ID>, sets the <OPCODE> to zero in order to indicate that a good message was received, and returns the packet to the originator. This "GOOD MESSAGE" Opcode is one of nine global responses. Global response opcodes are common responses, issued to the M&C computer or to another device, that can originate from and are interpreted by all Radyne Corporation equipment in the same manner. These are summarized as follows (all opcode values are expressed in decimal form):

Table 1-2. Response OPCODES

Response OPCODE Description	OPCODE
Good Message	000d = 0000h
Bad Parameter	255d = 00FFh
Bad Opcode	254d = 00FEh
Incomplete Parameter	247d = 00F7h

The following response error codes are specific to the DMD20:

DMD20 Response Error Code Descriptions	OPCODE
MPARM_FREQUENCY_ERROR	0x0401
MPARM_STRAP_ERROR	0x0402
MPARM_FILTERMASK_ERROR	0x0403
MPARM_DATARATE_ERROR	0x0404
MPARM_EXTEXCCLOCK_ERROR	0x0405
MPARM_EXTREFERENCE_ERROR	0x0406
MPARM_EXTREFSOURCE_ERROR	0x0407
MPARM_MODULATIONTYPE_ERROR	0x0408
MPARM_CONVENCODER_ERROR	0x0409
MPARM_REEDSOLOMON_ERROR	0x040A
MPARM_SCRAMBLERCONTROL_ERROR	0x040B
MPARM_SCRAMBLERTYPE_ERROR	0x040C
MPARM_DIFFERENTIALENCODER_ERROR	0x040F
MPARM_XMITPOWERLEVEL_ERROR	0x0410
MPARM_CARRIERCONTROL_ERROR	0x0411
MPARM_CARRIERSELECTION_ERROR	0x0412
MPARM_SPECTRUM_ERROR	0x0413
MPARM_TXTESTPATTERN_ERROR	0x0414
MPARM_TERRLOOPBACK_ERROR	0x0415
MPARM_BASELOOPBACK_ERROR	0x0416
MPARM_CLOCKCONTROL_ERROR	0x0417
MPARM_CLOCKPOLARITY_ERROR	0x0418
MPARM_FRAMING_ERROR	0x0419
MPARM_DROPMODE_ERROR	0x041A
MPARM_SCTSOURCE_ERROR	0x041B
MPARM_T1D4YELLOW_ERROR	0x041E
MPARM_NETWORKSPEC_ERROR	0x0422
MPARM_CIRCUITID_ERROR	0x0423
MPARM_ESCCHANNEL1VOLUME_ERROR	0x0424
MPARM_ESCCHANNEL2VOLUME_ERROR	0x0425
MPARM_INTERFACETYPE_ERROR	0x0429
MPARM_INTERFACENOTPRESENT_ERROR	0x042A
MPARM_INTERFACECOMMUNICATION_ERROR	0x042B
MPARM_SYMBOLRATE_ERROR	0x042C
MPARM_NOTIMPLEMENTED_ERROR	0x042D
MPARM_SUMMARYFAULT_ERROR	0x0430
MPARM_DATAINVERT_ERROR	0x0431

MPARM_ESCSOURCE_ERROR	0x0432
MPARM_AUPCLOCALENABLE_ERROR	0x0435
MPARM_AUPCREMOTEENABL_ERROR	0x0436
MPARM_AUPCLOCALCLACTION_ERROR	0x0437
MPARM_AUPCREMOTECLACTION_ERROR	0x0438
MPARM_AUPCTRACKINGRATE_ERROR	0x0439
MPARM_AUPCREMOTEBBLOOPACK_ERROR	0x043A
MPARM_AUPCREMOTE2047_ERROR	0x043B
MPARM_AUPCEBNO_ERROR	0x043C
MPARM_AUPCMINPOWER_ERROR	0x043D
MPARM_AUPCMAXPOWER_ERROR	0x043E
MPARM_AUPCNOMINAPOWER_ERROR	0x043F
MPARM_ASYNCBAUDRATE_ERROR	0x0452
MPARM_ASYNCDATABITS_ERROR	0x0453
MPARM_ASYNCMODE_ERROR	0x0454
MPARM_TPCINTERLEAVER_ERROR	0x0455
DPARM_NETWORKSPEC_ERROR	0x0600
DPARM_FREQUENCY_ERROR	0x0601
DPARM_SWEEPDELAY_ERROR	0x0602
DPARM_DATARATE_ERROR	0x0603
DPARM_SWEEPBOUNDARY_ERROR	0x0604
DPARM_LEVELLIMIT_ERROR	0x0605
DPARM_STRAP_ERROR	0x0606
DPARM_FILTERMASK_ERROR	0x0607
DPARM_DEMODULATIONTYPE_ERROR	0x0608
DPARM_CONVDECODER_ERROR	0x0609
DPARM_REEDSOLOMON_ERROR	0x060A
DPARM_DIFFERENTIALDECODER_ERROR	0x060B
DPARM_DESCRAMBLERCONTROL_ERROR	0x060C
DPARM_DESCRAMBLERTYPE_ERROR	0x060D
DPARM_SPECTRUM_ERROR	0x060E
DPARM_BUFFERSIZE_ERROR	0x060F
DPARM_BUFFERCLOCK_ERROR	0x0610
DPARM_BUFFERCLOCKPOL_ERROR	0x0611
DPARM_INSERTMODE_ERROR	0x0612
DPARM_T1E1FRAMESOURCE_ERROR	0x0614
DPARM_FRAMING_ERROR	0x0615
DPARM_RXTESTPATTERN_ERROR	0x0616
DPARM_MAPSUMMARY_ERROR	0x0617
DPARM_BEREXPONENT_ERROR	0x0619
DPARM_CIRCUITID_ERROR	0x061A
DPARM_TERRLOOPBACK_ERROR	0x061B
DPARM_BASELOOPBACK_ERROR	0x061C
DPARM_IFLOOPBACK_ERROR	0x061D
DPARM_INTERFACETYPE_ERROR	0x061E
DPARM_INTERFACENOTPRESENT_ERROR	0x061F
DPARM_INTERFACECOMMUNICATION_ERROR	0x0620
DPARM_SYMBOLRATE_ERROR	0x0621
DPARM_NOTIMPLEMENTED_ERROR	0x0622
DPARM_DATAINVERT_ERROR	0x0623
DPARM_SUMMARYFAULT_ERROR	0x0624
DPARM_EXTERNALEXCSOURCE_ERROR	0x0625
DPARM_ASYNCMODE_ERROR	0x062C
DPARM_ASYNCBAUDRATE_ERROR	0x062D
DPARM_ASYNCTYPE_ERROR	0x062E

DPARM_ASYNCDATABITS_ERROR	0x062F
DPARM_REACQ_SWEEP_ERROR	0x0631
DPARM_ESCCHANNEL1VOLUME_ERROR	0x0632
DPARM_ESCCHANNEL2VOLUME_ERROR	0x0633
DPARM_ESCOVERHEADTYPE_ERROR	0x0634
DPARM_TPCINTERLEAVER_ERROR	0x0635
DPARM_FASTACQENABLE_ERROR	0x0636
MDPARM_MAPNUMBER_ERROR	0x0A00
MDPARM_TIME_ERROR	0x0A01
MDPARM_DATE_ERROR	0x0A02
MDPARM_MINORALARMRELAYUSAGE_ERROR	0x0A03

1.1.5 Collision Avoidance

When properly implemented, the physical and logical devices and ID addressing scheme of the COMMSPEC normally precludes message packet contention on the control bus. The importance of designating unique IDs for each device during station configuration cannot be overemphasized. One pitfall, which is often overlooked, concerns multi-drop override IDs. All too often, multiple devices of the same type are assigned in a direct-linked ("single-thread") configuration accessible to the M&C computer directly.

For example, if two DMD20 Modems with different addresses (DESTINATION IDs) are linked to the same control bus at the same hierarchical level, both will attempt to respond to the M&C computer when the computer generates a multi-drop override ID of 22. If their actual setup parameters, status, or internal timing differs, they will both attempt to respond to the override simultaneously with different information or asynchronously in their respective message packets and response packets, causing a collision on the serial control bus.

To preclude control bus data contention, different IDs must always be assigned to the equipment. If two or more devices are configured for direct-linked operation, then the M&C computer and all other devices configured in the same manner must be programmed to inhibit broadcast of the corresponding multi-drop override ID.

The multi-drop override ID is always accepted by devices of the same type on a common control bus, independent of the actual DESTINATION ID. These override IDs with the exception of “BROADCAST” are responded to by all directly linked devices of the same type causing contention on the bus. The “BROADCAST” ID, on the other hand, is accepted by all equipment but none of then returns a response packet to the remote M&C.

The following multi-drop override IDs are device-type specific, with the exception of "BROADCAST". These are summarized below with ID values expressed in decimal notation:

Directly-Addressed Equipment	Multi-Drop Override ID
Broadcast (all directly-linked devices)	00
DMD-3000/4000, 4500 or 5000 Mod Section, DMD20	01
DMD-3000/4000, 4500 or 5000 Demod Section, DMD20	02
RCU-340 1:1 Switch	03
RCS-780 1:N Switch	04
RMUX-340 Cross-Connect Multiplexer	05
CDS-780 Clock Distribution System	06
SOM-340 Second Order Multiplexer	07
DMD-4500/5000 Modulator Section	08
DMD-4500/5000 Demodulator Section	09
RCU-5000 M:N Switch	10
DMD20 Modulator	20

DMD20 Demodulator	21
DMD20 Modem	22
DVB3030 Video Modulator, DM240	23
RCS20 M:N Switch	24
RCS10 M:N Switch	25
RCS11 1:1 Switch	26
Reserved for future equipment types	27-31

Multi-drop override IDs 01 or 02 can be used interchangeably to broadcast a message to a DMD-3000/4000 Modem, DMD-4500/5000, or a DMD20 Modem. Radyne Corporation, Inc. recommends that the multi-drop override IDs be issued only during system configuration as a bus test tool by experienced programmers, and that they not be included in run-time software. It is also advantageous to consider the use of multiple bus systems where warranted by a moderate to large equipment complement.

Therefore, if a DMD20 Modulator is queried for its equipment type identifier, it will return a "20" and DMD20 Demodulator will return a "21". A DMD20 Modem will also return a "22".

1.1.6 Software Compatibility

The COMMSPEC, operating in conjunction within the RLLP shell, provides for full forward and backward software compatibility independent of the software version in use. New features are appended to the end of the DATA field without OPCODE changes. Older software simply discards the data as extraneous information without functional impairment for backward compatibility.

If new device-resident or M&C software receives a message related to an old software version, new information and processes are not damaged or affected by the omission of data.

The implementation of forward and backward software compatibility often, but not always, requires the addition of new Opcodes. Each new function requires a new Opcode assignment if forward and backward compatibility cannot be attained by other means.

When Radyne Corporation, Inc. equipment is queried for bulk information (Query Mod, Query Demod, etc.) it responds by sending back two blocks of data; a Non-Volatile Section (parameters that can be modified by the user) and a Volatile Section (status information). It also returns a count value that indicates the size of the Non-Volatile Section. This count is used by M&C developers to index into the start of the Volatile Section.

When new features are added to Radyne Corporation, Inc. equipment, the control parameters are appended to the end of the Non-Volatile Section, and status of the features, if any, are added at the end of the Volatile Section. If a remote M&C queries two pieces of Radyne Corporation equipment with different revision software, they may respond with two different sized packets. The remote M&C MUST make use of the non-volatile count value to index to the start of the Volatile Section. If the remote M&C is not aware of the newly added features to the Radyne Corporation, Inc. product, it should disregard the parameters at the end of the Non-Volatile Section and index to the start of the Volatile Section.

If packets are handled in this fashion, there will also be backward-compatibility between Radyne Corporation, Inc. equipment and M&C systems. Remote M&C systems need not be modified every time a feature is added unless the user needs access to that feature.

1.1.7 Flow Control and Task Processing

The original packet sender (the M&C computer) relies on accurate timeout information with regard to each piece of equipment under its control. This provides for efficient bus communication without unnecessary handshake overhead timing. One critical value is designated the Inter-Frame Space (FS). The Inter-Frame Space provides a period of time in which the packet receiver and medium (control bus and M&C computer interface) fully recover from the packet transmission/reception process and the receiver is ready to accept a new message. The programmed value of the Inter-Frame Space should be greater than the sum of the "turnaround time" and the round-trip (sender/receiver/bus) propagation time, including handshake overhead. The term "turnaround time" refers to the amount of time required for a receiver to be re-enabled and ready to receive a packet after having just received a packet. In flow control programming, the Inter-Frame Space may be determined empirically in accord with the system configuration, or calculated based on established maximum equipment task processing times.

Each piece of supported equipment on the control bus executes a Radyne Link Level Task (RLLT) in accordance with its internal hardware and fixed program structure. In a flow control example, the RLLT issues an internal "message in" system call to invoke an I/0 wait condition that persists until the task receives a command from the M & C computer. The RLLT has the option of setting a timeout on the incoming message. Thus, if the equipment does not receive an information/command packet within a given time period, the associated RLLT exits the I/0 wait state and takes appropriate action.

Radyne equipment is logically linked to the control bus via an Internal I/O Processing Task (IOPT) to handle frame sequencing, error checking, and handshaking. The IOPT is essentially a link between the equipment RLLT and the control bus. Each time the M&C computer sends a message packet, the IOPT receives the message and performs error checking. If errors are absent, the IOPT passes the message to the equipment's RLLT. If the IOPT detects errors, it appends error messages to the packet. Whenever an error occurs, the IOPT notes it and discards the message; but it keeps track of the incoming packet. Once the packet is complete, the IOPT conveys the appropriate message to the RLLT and invokes an I/0 wait state (wait for next <SYNC> character).

If the RLLT receives the packetized message from the sender before it times out, it checks for any error messages appended by the IOPT. In the absence of errors, the RLLT processes the received command sent via the transmitted packet and issues a "message out" system call to ultimately acknowledge the received packet. This call generates the response packet conveyed to the sender. If the IOPT sensed errors in the received packet and an RLLT timeout has not occurred, the RLLT causes the equipment to issue the appropriate error message(s) in the pending equipment response frame.

To maintain frame synchronization, the IOPT keeps track of error-laden packets and packets intended for other equipment for the duration of each received packet. Once the packet is complete, the IOPT invokes an I/0 wait state and searches for the next <SYNC> character.

1.1.8 RLLP Summary

The RLLP is a simple send-and-wait protocol that automatically re-transmits a packet whenever an error is detected, or when an acknowledgment (response) packet is absent.

During transmission, the protocol wrapper surrounds the actual data to form information packets. Each transmitted packet is subject to time out and frame sequence control parameters, after

which the packet sender waits for the receiver to convey its response. Once a receiver verifies that a packet sent to it is in the correct sequence relative to the previously received packet, it computes a local checksum on all information within the packet excluding the <SYNC> character and the <CHECKSUM> fields. If this checksum matches the packet <CHECKSUM>, the receiver processes the packet and responds to the packet sender with a valid response (acknowledgment) packet. If the checksum values do not match, the receiver replies with a negative acknowledgment (NAK) in its response frame.

The response packet is therefore an acknowledgment either that the message was received correctly, or some form of a packetized NAK frame. If the sender receives a valid acknowledgment (response) packet from the receiver, the <FSN> increments and the next packet is transmitted as required by the sender. However, if a NAK response packet is returned the sender re-transmits the original information packet with the same embedded <FSN>.

If an acknowledgment (response) packet or a NAK packet is lost, corrupted, or not issued due to an error and is thereby not returned to the sender, the sender re-transmits the original information packet; but with the same <FSN>. When the intended receiver detects a duplicate packet, the packet is acknowledged with a response packet and internally discarded to preclude undesired repetitive executions. If the M&C computer sends a command packet and the corresponding response packet is lost due to a system or internal error, the computer times out and re-transmits the same command packet with the same <FSN> to the same receiver and waits once again for an acknowledgment or a NAK packet.

To reiterate, the format of the Link Level Protocol Message Block is shown below.

SYNC	COUNT	SRC ADDR	DEST ADDR	FSN	OP CODE	DATA BYTES	CHECKSUM

1.2 Remote Port Packet Structure

The Modem protocol is an enhancement on the DMD20 protocol. It also uses a packet structure format. The structure is as follows:

<SYNC>: Message format header character that defines the beginning of a message. The <SYNC> character value is always 0x16 (1 byte).

<BYTE COUNT>: The number of bytes in the <DATA> field (2 bytes).

<SOURCE ID>: Identifies the address of the equipment from where the message originated (1 byte).

<DEST. ID>: Identifies the address of the equipment where the message is to be sent (1 byte).

<FSN>: Frame sequence number ensures correct packet acknowledgment and data transfers (1 byte).

<OPCODE>: This byte identifies the message type associated with the information data. The equipment processes the data according to the value in this field. Return error codes and acknowledgment are also included in this field (2 bytes).

<...DATA...>: Information data. The number of data bytes in this field is indicated by the <BYTE COUNT> value.

<CHECKSUM>: The modulo 256 sum of all preceding message bytes excluding the <SYNC> character (1 byte).

CAUTION!!

The Modem RLLP is not software-compatible with the following previous Radyne Corporation products: RCU5000 and DMD4500. These products may not occupy the same bus while using this protocol as equipment malfunction and loss of data may occur.

NOTE

When transmitting a packet at 9600 baud, the Remote M&C should ensure that the timeout value between characters does not exceed the time it takes to transmit 200 characters(H 200 msec). If this timeout value is exceeded, the equipment will timeout.

1.3 DMD20 Opcode Command Set

The DMD20/DMD20 LBST Opcode Command Set is listed below:

CAUTION!!

When new features are added to Radyne Corporation equipment, the control parameters are appended to the end of the Non-Volatile Section of the Remote Communications Specification, and status of the features, if any, are added at the end of the Volatile Section. If a remote M & C queries two pieces of Radyne Corporation equipment with different revision software, they could respond with two different sized packets. The remote M & C MUST make use of the non-volatile count value to index to the start of the Volatile Section. If the remote M & C is not aware of the newly added features to the product, it should disregard the parameters at the end of the Non-Volatile Section and index to the start of the Volatile Section.

Before creating any software based on the information contained in this document, contact the Radyne Corporation Customer Service Department (602-437-9620) to find out if the software revision for that piece of equipment is current and that no new features have been added since the release of this document.

1.3.1 Modem Command Set

Command	Opcode
Query Modulator Configuration and Status	2400h
Query Demodulator Configuration and Status	2401h
Query Modem Drop & Insert Map	2402h
Query Modems Identification	2403h
Query Modem Control Mode	2404h
Query Modulator Latched Alarms	2405h
Query Demodulator Latched Alarms	2406h
Query Modem Latched Alarms	2407h
Query Modulator Current Alarms	2408h
Query Demodulator Current Alarms	2409h
Query Modem Current Alarms	240Ah
Query Modulator Status	240Bh
Query Demodulator Status	240Ch
Query Modem Eb/No, BER and Level	240Dh
Query Time	240Eh
Query Date	240Fh
Query Time and Date	2410h
Query Modem Summary Faults	2411h
Query Modem Event Buffer	2412h
Query Modulator Configuration	2448h
Query Demodulator Configuration	2449h
Query Modem Features	2450h
Query Modulator Async Configuration	2451h
Query Demodulator Async Configuration	2452h
Query Upconverter Configuration	2490h
Query Uplink RF	2491h
Query Downconverter Configuration	2492h
Query Downlink RF	2493h
Query Demodulator Ethernet Terrestrial Interface Packet Status	2494h
Query BUC FSK Pass Thru Reply	2E06h

Command	Opcode
Command Upconverter Configuration	2500h
Command Uplink RF	2501h

Command Downconverter Configuration	2502h
Command Downlink RF	2503h
Command Modem Control Mode	2600h
Command Modulator Configuration	2601h
Command Modulator Frequency	2602h
Command Modulator Strap Code	2603h
Command Modulator Data Rate	2604h
Command Modulator Filter Mask	2605h
Command Modulator Modulation Type	2606h
Command Modulator Convolutional Encoder	2607h
Command Modulator Differential Encoder	2608h
Command Modulator Carrier Control	2609h
Command Modulator Carrier Selection	260Ah
Command Modulator Clock Control	260Bh
Command Modulator Clock Polarity	260Ch
Command Modulator SCT Source	260Dh
Command Modulator Drop Mode	260Eh
Command Modulator Output Level	260Fh
Command Modulator Reed Solomon	2610h
Command Modulator Spectrum	2611h
Command Modulator Test Pattern	2612h
Command Modulator Scrambler Control	2613h
Command Modulator Scrambler Type	2614h
Command Modulator Framing	2615h
Command Modulator External Reference Source	2616h
Command Modulator Terrestrial Loopback	2617h
Command Modulator Baseband Loopback	2618h
Command Modulator Network Spec	2619h
Command Modulator External EXC Clock	261Ah
Command Modulator External Reference Frequency	261Bh
Command Modulator T1 D4 Yellow Alarm Selection	261Dh
Command Modulator Interface Type	261Eh
Command Modulator Circuit ID	261Fh
Command Force Modulator Alarm Test	2622h
Command Modulator Data Invert	2623h

Clear Modulator Latched Alarm 1	2625h
Command AUPC Local Enable	2629h
Command AUPC Remote Enable	262Ah
Command AUPC Local CL Action	262Bh
Command AUPC Remote CL Action	262Ch
Command AUPC Tracking Rate	262Dh
Command AUPC Remote BB Loopback	262Eh
Command AUPC Remote Test 2047	262Fh
Command AUPC Eb/No	2630h
Command AUPC Minimum Power	2631h
Command AUPC Maximum Power	2632h
Command AUPC Nominal Power	2633h
Command AUPC Local Configuration	2634h
Command AUPC Remote Configuration	2635h
Command Modulator Reed Solomon N & K Codes and Interleaver Depth	2636h
Command Modulator TPC Interleaver	2638h
Command Modulator Async Configuration	2640h
Command Minor Alarm Relay Usage	2641h
Command Modulator Ethernet Terrestrial Interface Configuration	2642h
Command Demodulator Configuration	2A00h
Command Demodulator Frequency	2A01h
Command Demodulator Data Rate	2A02h
Command Demodulator Strap Code	2A03h
Command Demodulator Sweep Boundary	2A04h
Command Demodulator Sweep Delay	2A05h
Command Demodulator Demodulation Type	2A07h
Command Demodulator Convolutional Decoder	2A08h
Command Demodulator Differential Decoder	2A09h
Command Demodulator Reed Solomon	2A0Ah
Command Demodulator Network Spec	2A0Bh
Command Demodulator Filter Mask	2A0Ch
Command Demodulator Descrambler Control	2A0Dh
Command Demodulator Descrambler Type	2A0Eh
Command Demodulator Spectrum	2A0Fh

Command Demodulator Buffer Size	2A10h
Command Demodulator Buffer Clock	2A11h
Command Demodulator Buffer Clock Polarity	2A12h
Command Demodulator Insert Mode	2A13h
Command Demodulator T1 E1 Frame Source	2A15h
Command Demodulator Framing	2A16h
Command Demodulator Test Pattern	2A17h
Command Map Summary to Backward Alarm	2A18h
Command Demodulator BER Exponent	2A1Ah
Command Demodulator Circuit ID	2A1Bh
Command Demodulator Terrestrial Loopback	2A1Ch
Command Demodulator Baseband Loopback	2A1Dh
Command Demodulator IF Loopback	2A1Eh
Command Demodulator Interface Type	2A1Fh
Command Center Buffer	2A20h
Command Demodulator Data Invert	2A21h
Command Force Demodulator Alarm Test	2A22h
Command External EXC Source	2A23h
Clear Demodulator Latched Alarm 1	2A24h
Clear Demodulator Latched Alarm 2	2A25h
Clear Demodulator Latched Alarm 3	2A26h
Command Demodulator Reacquisition Boundary	2A2Fh
Command Demodulator Reed Solomon N & K Codes and Interleaver Depth	2A32h
Command Demodulator TPC Interleaver	2A34h
Command Demodulator Async Configuration	2A35h
Command Demodulator Fast Acquisition	2A36h
Command Clear Demodulator Ethernet Terrestrial Interface Packet Status	2A37h
Command Drop and Insert Map Copy	2C00h
Command Drop and Insert Map	2C01h
Command Clear Latched Alarms	2C03h
Command Set Time	2C04h
Command Set Date	2C05h
Command Set Time and Date	2C06h
Clear Modem Common Latched Alarm 1	2C08h

Clear Modem Common Latched Alarm 2	2C09h
Command Delete Modem Event Buffer	2C0Ah
Command Soft Reset	2C0Bh
Command BUC FSK Pass Thru	2F61h

1.4 Detailed Command Descriptions

1.4.1 DMD20 Modulator

Opcode: <2400h> Query a Modulator's Configuration and Status

Query Response		
<1>	Number of nonvol bytes	Number of Configuration Bytes
Configuration Bytes (Nonvol Bytes)		
<1>	Network Spec	0 = Closed Net, 1 = IDR, 2 = IBS, 3 = D & I, 5 = DVB SAT, 11 = MIL-188-165A
<4>	Frequency	Selects the IF Frequency in Hz, IF Range = 50 MHz to 180 MHz, L-Band Range = 950 MHz to 2050 MHz
<2>	Strap Code	Binary value
<1>	Filter Mask	0 = INTELSAT 0.35, 18 = MIL-188-165A, 20 = DVB 0.20, 25 = DVB 0.25, 35 = DVB 0.35
<4>	Data Rate	Binary value, 1 bps steps 2.4 Kbps to 20 Mbps for DMD20 2.4 Kbps to 52 Mbps for DMD2050 and DMD50
<4>	External Clock	Binary value, 1 Hz steps, 2.4 kHz to 20 MHz
<4>	External Reference	Binary value, 8 kHz steps, 256 kHz to 10 MHz
<1>	Freq. Reference Source	0 = Internal, 1 = External, 2 = High stability
<1>	Modulation Type	0 = QPSK, 1 = BPSK, 2 = 8PSK, 3 = 16QAM, 4 = OQPSK
<1>	Convolutional Encoder	0 = None, 1 = Viterbi ½, 2 = Viterbi 2/3 (DVB Only), 3 = Viterbi ¾, 4 = Viterbi 5/6 (DVB Only), 5 = Viterbi 7/8, 6 = Reserved, 7 = Sequential ½, 8 = Reserved, 9 = Sequential ¾, 10 = Reserved, 11 = Sequential 7/8, 12 = Reserved, 13 = Reserved, 14 = Trellis 2/3, 15 = Trellis ¾ (DVB - 16QAM Only), 16 = Trellis 5/6 (DVB - 8PSK Only), 17 = Trellis 7/8 (DVB - 16QAM Only), 18 = Trellis 8/9 (DVB - 8PSK Only), 19 = ComStream 3/4 SEQ, 20 = TPC .793 2D, 21 = TPC .495 3D, 22 = Reserved, 23 = TPC ½, 24 = TPC ¾, 25 = TPC 7/8, 26 = TPC 21/44, 27 = TPC 750, 28 = TPC 875, 29 = TPC 288
<1>	Reed Solomon	0 = Disable, 1 = Enable
<1>	Scrambler Control	0 = Disable, 1 = Enable
<1>	Scrambler Type	0 = None, 1 = IBS, 2 = V35_IESS, 3 = V35_CCITT, 4 = V35_EFDATA, 5 = V35_FAIRCHILD, 6 = OM-73, 7 = RS, 8 = V35_EFRS, 9 = TPC, 10 = DVB, 11 = EDMAC, 12 = TPC and IBS, 13 = TPC and EDMAC, 14 = V35_ComStream
<2>	Transmit Power Level	Signed value, 0 to -250 (0.0 to -25.0 dBm) (two's compliment)
<1>	Differential Encoder	0 = Disable, 1 = Enable
<1>	Carrier Control	0 = Off, 1 = On, 2 = Auto, 3 = VSAT, 4 = RTS (Refer To Appendix E)

<1>	Carrier Selection	0 = Normal, 1 = CW, 2 = Dual, 3 = Offset, 4 = Pos Fir, 5 = Neg Fir
<1>	Spectrum	0 = Normal, 1 = Inverted
<1>	TX Test Pattern	0 = None, 1 = 2047 test, 2 = 2^15-1, 3 = 2^23-1
<1>	Clock Control	0 = SCTE, 1 = SCT
<1>	Clock Polarity	0 = Normal, 1 = Inverted, 2 = Auto
<1>	SCT Source	0 = Internal, 1 = SCR
<1>	Satellite Framing	0 = No Framing, 1 = 96K IDR, 2 = 1/15 IBS, 3 = EF AUPC 1/15, 4 = DVB, 5 = EDMAC, 6 = SCC, 7 = 96K, 8 = Efficient D&I
<1>	Drop Mode	0 = Disabled, 1 = T1-D4, 2 = T1-ESF, 3 = PCM-30, 4 = PCM-30C, 5 = PCM-31, 6 = PCM-31C, 7 = SLC-96, 8 = T1 D4 S, 9 = T1 ESF S
<30>	Drop Map	Timeslots to drop organized by satellite channel (Mapping of Satellite Channels 1 thru 30 to dropped Terrestrial Timeslots (Terrestrial Timeslots = 1..31))
<1>	T1D4 Yellow Alarm Sel.	Reserved
<1>	Forced Backward Alarms	Bit 0 = Backward Alarm 1 IDR Bit 1 = Backward Alarm 2 IDR Bit 2 = Backward Alarm 3 IDR Bit 3 = Backward Alarm 4 IDR Bits 4 & 5 = Reserved Bit 6 = IBS Prompt Bit 7 = IBS Service 0 = None, 1 = Force
<1>	Alarm 1 Mask	Bit 0 = Transmit FPGA/Processor Fault Bit 1 = Drop DSP Bit 2 = Transmit Symbol Clock PLL Lock Bit 3 = Reserved Bit 4 = IF/L-Band Synthesizer Lock Bits 5 - 7 = Reserved 0 = Mask, 1 = Allow
<1>	Alarm 2 Mask	Bit 0 = Terrestrial Clock Activity Detect Bit 1 = Internal Clock Activity Detect Bit 2 = Tx Sat Clock Activity Detect Bit 3 = Tx Data Activity Detect Bit 4 = Terrestrial AIS. Tx Data AIS Detect Bit 5 = Tx Clock Fallback Bit 6 = DVB Frame Lock Fault Bit 7 = Spare 0 = Mask, 1 = Allow
<1>	Common Alarm 1 Mask	Bit 0 = -12V Alarm Bit 1 = +12V Alarm Bit 2 = +5V Alarm Bits 3 – 5 = Reserved Bit 6 = IF SYNTH Alarm Bit 7 = Spare 0 = Mask, 1 = Allow
<1>	Common Alarm 2 Mask	Bit 0 = TERR FPGA Config Bit 1 = CODEC FPGA Config Bit 2 = CODEC Device Config Bit 3 = Reserved Bit 4 = +1.5 V Rx Alarm

		Bit 5 = +1.5 V TX Alarm Bit 6 = +3.3 V Alarm Bit 7 = +20 V Alarm 0 = Mask, 1 = Allow
<11>	Tx Circuit ID	11 ASCII characters, null terminated
<1>	Tx ESC Ch 1 Volume	-20 to +10 (+10 dBm to –20 dBm) (two's compliment)
<1>	Tx ESC Ch 2 Volume	-20 to +10 (+10 dBm to –20 dBm) (two's compliment)
<1>	Tx Interface Type	0 = G703-B-T1-AMI, 1 = G703-B-T1_B8ZS, 2 = G703-B-E1, 3 = G703-B-T2, 4 = G703-U-E1, 5 = G703-U-T2, 6 = G703-U-E2, 7 = RS-422, 8 = V.35, 9 = RS-232, 10 = HSSI, 11 = ASI, 12 = Advanced ASI, 13 = M2P, 14 = DVB, 24 = Ethernet Bridge, 25 = MIL-188-114A, 26 = RS423, 27 = Eurocomm 256, 28= Eurocomm 512, 29 = Eurocomm 1024, 30 = Eurocomm 2048, 31 = G.703-U-T3, 32 = G.703-U-E3, 33 = G.703-U-STS1
<1>	Tx Terrestrial Loopback	0 = Disabled, 1 = Enabled
<1>	Tx Baseband Loopback	0 = Disabled, 1 = Enabled
<1>	Drop Status Mask	Bit 0 = Frame lock fault Bit 1 = Multiframe lock Fault. Valid in E1 PCM-30 and PCM-30C Bit 2 = CRC lock fault. Valid in T1ESF, and E1 CRC enabled Bits 3 – 7 = Reserved 0 = Mask, 1 = Allow
<1>	Tx RS N Code	2 – 255, Reed-Solomon code word length
<1>	Tx RS K Code	1 – 254, Reed-Solomon message length
<1>	Tx RS Depth	4, 8, or 12
<1>	Data Invert	0 = None, 1 = Terrestrial, 2 = Baseband, 3 = Terrestrial and Baseband
<1>	BPSK Symbol Pairing	0 = Normal Pairing, 1 = Swapped Pairing
<1>	IDR Overhead Type	0 = 32K Voice, 1 = 64K Data
<1>	Terminal Emulation	0 = Adds Viewpoint, 1 = VT100, 2 = WYSE50
<1>	Terminal Baud Rate	0 = 300, 1 = 600, 2 = 1200, 3 = 2400, 4 = 4800, 5 = 9600, 6 = 19200, 7 = 38400, 8 = 57600, 9 = 1152000, 10 = 150
<1>	FM Orderwire Mode	Reserved
<1>	FM Orderwire Test Tone	Reserved
<1>	AUPC Local Enable	0 = Off, 1 = EF AUPC, 2 = Radyne AUPC
<1>	AUPC Remote Enable	0 = Off, 1 = EF AUPC
<1>	AUPC Local CL Action	0 = Hold, 1 = Nominal, 2 = Maximum
<1>	AUPC Remote CL Action	0 = Hold, 1 = Nominal, 2 = Maximum
<1>	AUPC Tracking Rate	0 = 0.5 dB/Min, 1 = 1.0 dB/Min, 2 = 1.5 dB/Min, 3 = 2.0 dB/Min, 4 = 2.5 dB/Min, 5 = 3.0 dB/Min, 6 = 3.5 dB/Min, 7 = 4.0 dB/Min, 8 = 4.5 dB/Min, 9 = 5.0 dB/Min, 10 = 5.5 dB/Min, 11 = 6.0 dB/min
<1>	AUPC Remote BB Loopback	0 = Disable, 1 = Enable
<1>	AUPC Remote 2047	0 = Disable, 1 = Enable
<2>	AUPC Target Eb/No	Target Eb/No at Receiver, 400 to 2000 (4.00 db to 20.00 db)

<2>	AUPC Minimum Power	Signed value 0 to –2500 with implied decimal point; (0.00 to –25.00 dBm) (two's compliment)
<2>	AUPC Maximum Power	Signed value 0 to –2500 with implied decimal point; (0.00 to –25.00 dBm) (two's compliment)
<2>	AUPC Nominal Power	Signed value 0 to –2500 with implied decimal point; (0.00 to –25.00 dBm) (two's compliment)
<1>	TMT Pattern Enable	Reserved
<1>	TMT Pattern Length	Reserved
<1>	Terrestrial Framing	0 = DVB 188, 1 = DVB 204, 2 = NONE
<1>	Alarm 4 Mask	Bit 0 = LBST BUC DC Current Alarm Bit 1 = LBST BUC DC Voltage Alarm Bit 2 = Ethernet WAN Alarm Bit 3 = LBST BUC PLL Alarm Bit 4 = LBST BUC Over Temperature Alarm Bit 5 = LBST BUC Summary Alarm Bit 6 = LBST BUC Output Enable Alarm Bit 7 = LBST BUC Communications Alarm 0 = Mask, 1 = Allow
<1>	TPC Interleaver	0 = Disable, 1 = Enable
<1>	Ethernet Flow Control	0 = Disabled, 1 = Enabled
<1>	Ethernet Daisy Chain	0 = Disabled, 1 = Port 4
<1>	ES Mode	0 = Normal, 1 = Enhanced
<1>	ES Type	0 = RS232, 1 = RS485
<1>	ES Baud Rate	0 =150, 1 = 300, 2 = 600, 3 = 1200, 4 = 2400, 5= 4800, 6 = 9600, 7 = 19200, 8 = 38400, 9 = 57600, 10 = 115200
<1>	ES Data Bits	0 = 7 bits, 1 = 8 bits
<1>	Carrier Enable Delay	0 – 255 in seconds
<1>	SCC Control Ratio	1 = 1/1, 2 = 1/2, 3 = 1/3, 4 = 1/4, 5 = 1/5, 6 = 1/6, 7 = 1/7
<4>	SCC In band Rate	300 to 200000 bps
<2>	LBST BUC DC Voltage Alarm Lower Threshold	Volts, Implied decimal point, 10 = 1.0V (00.0 V to 55.0 V)
<2>	LBST BUC DC Voltage Alarm Upper Threshold	Volts, Implied decimal point, 10 = 1.0V (00.0 V to 55.0 V)
<2>	LBST BUC DC Current Alarm Lower Threshold	Amps, Implied decimal point, 1000 = 1.000A (0.000 A to 8.000 A)
<2>	LBST BUC DC Current Alarm Upper Threshold	Amps, Implied decimal point, 1000 = 1.000A (0.000 A to 8.000 A)
<2>	Compensation	TX Power Level offset from 0 to 10 (0.0 dBm to 1.0 dBm), Implied decimal point
<1>	Forced Alarm Test	Bit 0 = Tx Major Alarm Bits 1 – 7 = Spares 0 = Not Forced, 1 = Forced
<1>	Asynchronous In-Band Rate	0 =150, 1 = 300, 2 = 600, 3 = 1200, 4 = 2400, 5= 4800, 6 = 9600, 7 = 19200, 8 = 38400, 9 = 57600, 10 = 115200
<1>	FSK Communications Select	0 = None, 1 = Codan, 2 = TerraSat, 3 = Amplus
<1>	FSK Test Type	0 = None, 1 = Loopback, 2 = Cycle TX Enable, 3 = Codan Pass thru, 4 = TerraSat pass thru, 5 = Amplus Pass thru, 6 =

		Query for address
<2>	BUC Address	
<1>	BUC Output Enable	0 = Disable, 1 = Enable
<1>	Minor Alarm Relay Usage	0 = undefined, 1= IBS Usage, 2 = IBS & Minor Alarms, 3 = IBS, Minor Alarms and Major Alarms
<1>	Ethernet QOS Type	0 = Normal, 1 = Port based
<1>	Ethernet QOS QUEUE	0 = Fair Weighted, 1 = Strict Priority
Status Bytes		
<1>	Control Mode	0 = Front Panel, 1 = Terminal, 2 = Computer, Note: DMD20 will always return 2 = Computer
<1>	Revision Number	Decimal point implied
<1>	Alarm 1	Bit 0 = Transmit FPGA/Processor Fault, 1 = Fail Bit 1 = Drop DSP, 1 = Fail Bit 2 = Transmit Symbol Clock PLL Lock, 1 = Lock Bit 3 = Reserved Bit 4 = IF/L-Band Synthesizer Lock, 1 = Lock Bits 5 & 6 = Reserved Bit 7 = Mod Summary Fault, 1 = Fail
<1>	Alarm 2	Bit 0 = Terrestrial Clock Activity Detect, 1 = Activity Bit 1 = Internal Clock Activity Detect, 1 = Activity Bit 2 = Tx Sat Clock Activity Detect, 1 = Activity Bit 3 = Tx Data Activity Detect, 1 = Activity Bit 4 = Terrestrial AIS. Tx Data AIS Detect, 1 = AIS Fail Bit 5 = Tx Clock Fallback, 1 = Clock Fallback Bit 6 = DVB Frame Lock Fault, 1 = Fail Bit 7 = Spare
<1>	Common Alarm 1	Bit 0 = -12V Alarm, 1 = Fail Bit 1 = +12V Alarm, 1 = Fail Bit 2 = +5V Alarm, 1 = Fail Bits 3 – 5 = Reserved Bit 6 = IF SYNTH Alarm, 1 = Fail Bit 7 = Spare
<1>	Common Alarm 2	Bit 0 = TERR FPGA Config, 1 = Fail Bit 1 = CODEC FPGA Config, 1 = Fail Bit 2 = CODEC Device Config, 1 = Fail Bit 3 = Reserved Bit 4 = +1.5 V Rx Alarm, 1 = Fail Bit 5 = +1.5 V TX Alarm, 1 = Fail Bit 6 = +3.3 V Alarm, 1 = Fail Bit 7 = +20 V Alarm, 1 = Fail
<1>	Latched Alarm 1	Bit 0 = Transmit FPGA/Processor Fault Bit 1 = Drop DSP Bit 2 = Transmit Symbol Clock PLL Lock Bit 3 = Reserved Bit 4 = Transmit L-Band Synthesizer Lock Bits 5 -7 = Reserved 0 = Not Latched, 1 = Latched
<1>	Latched Common Alarm 1	Bit 0 = -12V Alarm Bit 1 = +12V Alarm Bit 2 = +5V Alarm Bits 3 - 5 = Reserved Bit 6 = IF SYNTH Alarm

		Bit 7 = Spare 0 = Not Latched, 1 = Latched
<1>	Latched Common Alarm 2	Bit 0 = TERR FPGA Config Bit 1 = CODEC FPGA Config Bit 2 = CODEC Device Config Bit 3 = Reserved Bit 4 = +1.5 V Rx Alarm Bit 5 = +1.5 V TX Alarm Bit 6 = +3.3 V Alarm Bit 7 = +20 V Alarm 0 = Not Latched, 1 = Latched
<1>	Drop Status	Bit 0 = Frame lock fault. 1 = Fail Bit 1 = Multiframe lock Fault. Valid in E1 PCM-30 and PCM-30C, 1 = Fail Bit 2 = CRC lock fault. Valid in T1ESF, and E1 CRC enabled, 1 = Fail Bits 3 - 7 = Reserved
<1>	Online Flag	Online Switch Status: 0 = Offline, 1 = Online (DMD20 is always online)
<1>	+5V Voltage	+5V, Implied decimal point; 49 = +4.9 V
<1>	+12V Voltage	+12V, Implied decimal point; 121 = +12.1 V
<1>	-12V Voltage	-12V, Implied decimal point; 118 = -11.8 V (two's compliment)
<2>	Reserved	Ignore
<1>	ESC Source	0 = Internal, 1 = External
<1>	Backward Alarms	Bit 0 = Backward Alarm 1 Transmitted Bit 1 = Backward Alarm 2 Transmitted Bit 2 = Backward Alarm 3 Transmitted Bit 3 = Backward Alarm 4 Transmitted Bits 4 & 5 = Spares Bit 6 = IBS Prompt Alarm Transmitted Bit 7 = IBS Service Alarm Transmitted 0 = No, 1 = Yes
<2>	AUPC Remote Test 2047 Mantissa	Binary value with implied decimal point; 795 = 7.95
<1>	AUPC Remote Test 2047 BER Exponent	Binary value with implied sign; 6 = -6
<1>	Reserved	Ignore
<4>	Symbol Rate	Binary value, 1 sps steps
<1>	Latched Alarm 2	Bit 0 = Terrestrial Clock Activity Detect Bit 1 = Internal Clock Activity Detect Bit 2 = Tx Sat Clock Activity Detect Bit 3 = Tx Data Activity Detect Bit 4 = Terrestrial AIS. Tx Data AIS Detect Bit 5 = Tx Clock Fallback Bit 6 = DVB Frame Lock Fault Bit 7 = Spare 0 = Not Latched, 1 = Latched
<1>	Alarm 4	Bit 0 = LBST BUC DC Current Alarm, 1 = Fail Bit 1 = LBST BUC DC Voltage Alarm, 1 = Fail Bit 2 = Ethernet WAN Alarm, 1 = Fail Bit 3 = LBST BUC PLL Alarm, 1 = Fail Bit 4 = LBST BUC Over Temperature Alarm, 1 = Fail Bit 5 = LBST BUC Summary Alarm, 1 = Fail Bit 6 = LBST BUC Output Enable Alarm, 1 = Fail

		Bit 7 = LBST BUC Communications Alarm, 1 = Fail
<1>	Latched Alarm 4	Bit 0 = LBST BUC DC Current Alarm Bit 1 = LBST BUC DC Voltage Alarm Bit 2 = Ethernet WAN Alarm Bit 3 = LBST BUC PLL Alarm Bit 4 = LBST BUC Over Temperature Alarm Bit 5 = LBST BUC Summary Alarm Bit 6 = LBST BUC Output Enable Alarm Bit 7 = LBST BUC Communications Alarm 0 = Not Latched, 1 = Latched
<1>	Reserved	Ignore
<2>	LBST BUC DC Current	Amps, Implied decimal point, 1000 = 1.000A
<2>	LBST BUC DC Voltage	Volts, Implied decimal point, 10 = 1.0V
<1>	FSK Test Result	0 = Pass, 1 = Fail
<2>	BUC Carrier Level	Implied decimal point, dBm
<4>	BUC Summary Status	
<1>	BUC Temperature	Implied Decimal Point, C

Opcode: <2448h> Query a Modulator's Configuration

Query Response		
<1>	Network Spec	0 = Closed Net, 1 = IDR, 2 = IBS, 3 = D & I, 5 = DVB SAT, 11 = MIL-188-165A
<4>	Frequency	Selects the IF Frequency in Hz, IF Range = 50 MHz to 180 MHz, L-Band Range = 950 MHz to 2050 MHz
<2>	Strap Code	Binary value
<1>	Filter Mask	0 = INTELSAT 0.35, 18 = MIL-188-165A, 20 = DVB 0.20, 25 = DVB 0.25, 35 = DVB 0.35
<4>	Data Rate	Binary value, 1 bps steps 2.4 Kbps to 20 Mbps for DMD20 2.4 Kbps to 52 Mbps for DMD2050 and DMD50
<4>	External Clock	Binary value, 1 Hz steps. 2.4 kHz to 20 MHz
<4>	External Reference	Binary value, 8 kHz steps. 256 kHz to 10 MHz
<1>	Freq. Reference Source	0 = Internal, 1 = External, 2 = High stability
<1>	Modulation Type	0 = QPSK, 1 = BPSK, 2 = 8PSK, 3 = 16QAM, 4 = OQPSK
<1>	Convolutional Encoder	0 = None, 1 = Viterbi ½, 2 = Viterbi 2/3 (DVB Only), 3 = Viterbi ¾, 4 = Viterbi 5/6 (DVB Only), 5 = Viterbi 7/8, 6 = Reserved, 7 = Sequential ½, 8 = Reserved, 9 = Sequential ¾, 10 = Reserved, 11 = Sequential 7/8, 12 = Reserved, 13 = Reserved, 14 = Trellis 2/3, 15 = Trellis ¾ (DVB - 16QAM Only), 16 = Trellis 5/6 (DVB - 8PSK Only), 17 = Trellis 7/8 (DVB - 16QAM Only), 18 = Trellis 8/9 (DVB - 8PSK Only), 19 = ComStream 3/4 SEQ, 20 = TPC .793 2D, 21 = TPC .495 3D, 22 = Reserved, 23 = TPC ½, 24 = TPC ¾, 25 = TPC 7/8, 26 = TPC 21/44, 27 = TPC 750, 28 = TPC 875, 29 = TPC 288
<1>	Reed Solomon	0 = Disable, 1 = Enable
<1>	Scrambler Control	0 = Disable, 1 = Enable
<1>	Scrambler Type	0 = None, 1 = IBS, 2 = V35_IESS, 3 = V35_CCITT, 4 = V35_EFDATA, 5 = V35_FAIRCHILD, 6 = OM-73, 7 = RS, 8 =

		V35_EFRS, 9 = TPC, 10 = DVB, 11 = EDMAC, 12 = TPC and IBS, 13 = TPC and EDMAC, 14 = V35_ComStream
<2>	Transmit Power Level	Signed value, 0 to -250 (0.0 to -25.0 dBm) (two's compliment)
<1>	Differential Encoder	0 = Disable, 1 = Enable
<1>	Carrier Control	0 = Off, 1 = On, 2 = Auto, 3 = VSAT, 4 = RTS (Refer To Appendix E)
<1>	Carrier Selection	0 = Normal, 1 = CW, 2 = Dual, 3 = Offset, 4 = Pos Fir, 5 = Neg Fir
<1>	Spectrum	0 = Normal, 1 = Inverted
<1>	TX Test Pattern	0 = None, 1 = 2047 test, 2 = 2^15-1, 3 = 2^23-1
<1>	Clock Control	0 = SCTE, 1 = SCT
<1>	Clock Polarity	0 = Normal, 1 = Inverted, 2 = Auto
<1>	SCT Source	0 = Internal, 1 = SCR
<1>	Satellite Framing	0 = No Framing, 1 = 96K IDR, 2 = 1/15 IBS, 3 = EF AUPC 1/15, 4 = DVB, 5 = EDMAC, 6 = SCC, 7 = 96K, 8 = Efficient D&I
<1>	Drop Mode	0 = Disabled, 1 = T1-D4, 2 = T1-ESF, 3 = PCM-30, 4 = PCM-30C, 5 = PCM-31, 6 = PCM-31C, 7 = SLC-96, 8 = T1 D4 S, 9 = T1 ESF S
<30>	Drop Map	Timeslots to drop organized by satellite channel (Mapping of Satellite Channels 1 thru 30 to dropped Terrestrial Timeslots (Terrestrial Timeslots = 1..31))
<1>	T1D4 Yellow Alarm Sel.	Reserved
<1>	Forced Backward Alarms	Bit 0 = Backward Alarm 1 IDR Bit 1 = Backward Alarm 2 IDR Bit 2 = Backward Alarm 3 IDR Bit 3 = Backward Alarm 4 IDR Bits 4 & 5 = Reserved Bit 6 = IBS Prompt Bit 7 = IBS Service 0 = None, 1 = Force
<1>	Alarm 1 Mask	Bit 0 = Transmit FPGA/Processor Fault Bit 1 = Drop DSP Bit 2 = Transmit Symbol Clock PLL Lock Bit 3 = Reserved Bit 4 = IF/L-Band Synthesizer Lock Bits 5 - 7 = Reserved 0 = Mask, 1 = Allow
<1>	Alarm 2 Mask	Bit 0 = Terrestrial Clock Activity Detect Bit 1 = Internal Clock Activity Detect Bit 2 = Tx Sat Clock Activity Detect Bit 3 = Tx Data Activity Detect Bit 4 = Terrestrial AIS. Tx Data AIS Detect Bit 5 = Tx Clock Fallback Bit 6 = DVB Frame Lock Fault Bit 7 = Spare 0 = Mask, 1 = Allow
<1>	Common Alarm 1 Mask	Bit 0 = -12V Alarm Bit 1 = +12V Alarm Bit 2 = +5V Alarm Bits 3 – 5 = Reserved Bit 6 = IF SYNTH Alarm

		Bit 7 = Spare 0 = Mask, 1 = Allow
<1>	Common Alarm 2 Mask	Bit 0 = TERR FPGA Config Bit 1 = CODEC FPGA Config Bit 2 = CODEC Device Config Bit 3 = Reserved Bit 4 = +1.5 V Rx Alarm Bit 5 = +1.5 V TX Alarm Bit 6 = +3.3 V Alarm Bit 7 = +20 V Alarm 0 = Mask, 1 = Allow
<11>	Tx Circuit ID	11 ASCII characters, null terminated
<1>	Tx ESC Ch 1 Volume	-20 to +10 (+10 dBm to –20 dBm) (two's compliment)
<1>	Tx ESC Ch 2 Volume	-20 to +10 (+10 dBm to –20 dBm) (two's compliment)
<1>	Tx Interface Type	0 = G703-B-T1-AMI, 1 = G703-B-T1_B8ZS, 2 = G703-B-E1, 3 = G703-B-T2, 4 = G703-U-E1, 5 = G703-U-T2, 6 = G703-U-E2, 7 = RS-422, 8 = V.35, 9 = RS-232, 10 = HSSI, 11 = ASI, 12 = Advanced ASI, 13 = M2P, 14 = DVB, 24 = Ethernet Bridge, 25 = MIL-188-114A, 26 = RS423, 27 = Eurocomm 256, 28= Eurocomm 512, 29 = Eurocomm 1024, 30 = Eurocomm 2048, 31 = G.703-U-T3, 32 = G.703-U-E3, 33 = G.703-U-STS1
<1>	Tx Terrestrial Loopback	0 = Disabled, 1 = Enabled
<1>	Tx Baseband Loopback	0 = Disabled, 1 = Enabled
<1>	Drop Status Mask	Bit 0 = Frame lock fault Bit 1 = Multiframe lock Fault. Valid in E1 PCM-30 and PCM-30C Bit 2 = CRC lock fault. Valid in T1ESF, and E1 CRC enabled Bits 3 – 7 = Reserved 0 = Mask, 1 = Allow
<1>	Tx RS N Code	2 – 255, Reed-Solomon code word length
<1>	Tx RS K Code	1 – 254, Reed-Solomon message length
<1>	Tx RS Depth	4, 8, or 12
<1>	Data Invert	0 = None, 1 = Terrestrial, 2 = Baseband, 3 = Terrestrial and Baseband
<1>	BPSK Symbol Pairing	0 = Normal Pairing, 1 = Swapped Pairing
<1>	IDR Overhead Type	0 = 32K Voice, 1 = 64K Data
<1>	Terminal Emulation	0 = Adds Viewpoint, 1 = VT100, 2 = WYSE50
<1>	Terminal Baud Rate	0 = 300, 1 = 600, 2 = 1200, 3 = 2400, 4 = 4800, 5 = 9600, 6 = 19200, 7 = 38400, 8 = 57600, 9 = 1152000, 10 = 150
<1>	FM Orderwire Mode	Reserved
<1>	FM Orderwire Test Tone	Reserved
<1>	AUPC Local Enable	0 = Off, 1 = EF AUPC, 2 = Radyne AUPC
<1>	AUPC Remote Enable	0 = Off, 1 = EF AUPC
<1>	AUPC Local CL Action	0 = Hold, 1 = Nominal, 2 = Maximum
<1>	AUPC Remote CL Action	0 = Hold, 1 = Nominal, 2 = Maximum
<1>	AUPC Tracking Rate	0 = 0.5 dB/Min, 1 = 1.0 dB/Min, 2 = 1.5 dB/Min, 3 = 2.0 dB/Min, 4 = 2.5 dB/Min, 5 = 3.0 dB/Min, 6 = 3.5 dB/Min, 7 =

		4.0 dB/Min, 8 = 4.5 dB/Min, 9 = 5.0 dB/Min, 10 = 5.5 dB/Min, 11 = 6.0 dB/min
<1>	AUPC Remote BB Loopback	0 = Disable, 1 = Enable
<1>	AUPC Remote 2047	0 = Disable, 1 = Enable
<2>	AUPC Target Eb/No	Target Eb/No at Receiver, 400 to 2000 (4.00 db to 20.00 db)
<2>	AUPC Minimum Power	Signed value 0 to –2500 with implied decimal point; (0.00 to –25.00 dBm) (two's compliment)
<2>	AUPC Maximum Power	Signed value 0 to –2500 with implied decimal point; (0.00 to –25.00 dBm) (two's compliment)
<2>	AUPC Nominal Power	Signed value 0 to –2500 with implied decimal point; (0.00 to –25.00 dBm) (two's compliment)
<1>	TMT Pattern Enable	Reserved
<1>	TMT Pattern Length	Reserved
<1>	Terrestrial Framing	0 = DVB 188, 1 = DVB 204, 2 = NONE
<1>	Alarm 4 Mask	Bit 0 = LBST BUC DC Current Alarm Bit 1 = LBST BUC DC Voltage Alarm Bit 2 = Ethernet WAN Alarm Bit 3 = LBST BUC PLL Alarm Bit 4 = LBST BUC Over Temperature Alarm Bit 5 = LBST BUC Summary Alarm Bit 6 = LBST BUC Output Enable Alarm Bit 7 = LBST BUC Communications Alarm 0 = Mask, 1 = Allow
<1>	TPC Interleaver	0 = Disable, 1 = Enable
<1>	Ethernet Flow Control	0 = Disabled, 1 = Enabled
<1>	Ethernet Daisy Chain	0 = Disabled, 1 = Port 4
<1>	ES Mode	0 = Normal, 1 = Enhanced
<1>	ES Type	0 = RS232, 1 = RS485
<1>	ES Baud Rate	0 =150, 1 = 300, 2 = 600, 3 = 1200, 4 = 2400, 5= 4800, 6 = 9600, 7 = 19200, 8 = 38400, 9 = 57600, 10 = 115200
<1>	ES Data Bits	0 = 7 bits, 1 = 8 bits
<1>	Carrier Enable Delay	0 – 255 in seconds
<1>	SCC Control Ratio	1 = 1/1, 2 = 1/2, 3 = 1/3, 4 = 1/4, 5 = 1/5, 6 = 1/6, 7 = 1/7
<4>	SCC In band Rate	300 to 200000 bps
<2>	LBST BUC DC Voltage Alarm Lower Threshold	Volts, Implied decimal point, 10 = 1.0V (00.0 V to 55.0 V)
<2>	LBST BUC DC Voltage Alarm Upper Threshold	Volts, Implied decimal point, 10 = 1.0V (00.0 V to 55.0 V)
<2>	LBST BUC DC Current Alarm Lower Threshold	Amps, Implied decimal point, 1000 = 1.000A (0.000 A to 8.000 A)
<2>	LBST BUC DC Current Alarm Upper Threshold	Amps, Implied decimal point, 1000 = 1.000A (0.000 A to 8.000 A)
<2>	Compensation	TX Power Level offset from 0 to 10 (0.0 dBm to 1.0 dBm), Implied decimal point
<1>	Forced Alarm Test	Bit 0 = Tx Major Alarm Bits 1 – 7 = Spares 0 = Not Forced, 1 = Forced

<1>	Asynchronous In-Band Rate	0 =150, 1 = 300, 2 = 600, 3 = 1200, 4 = 2400, 5= 4800, 6 = 9600, 7 = 19200, 8 = 38400, 9 = 57600, 10 = 115200
<1>	FSK Communications Select	0 = None, 1 = Codan, 2 = TerraSat, 3 = Amplus
<1>	FSK Test Type	0 = None, 1 = Loopback, 2 = Cycle TX Enable, 3 = Codan Pass thru, 4 = TerraSat pass thru, 5 = Amplus Pass thru, 6 = Query for address
<2>	BUC Address	
<1>	BUC Output Enable	0 = Disable, 1 = Enable
<1>	Minor Alarm Relay Usage	0 = undefined, 1= IBS Usage, 2 = IBS & Minor Alarms, 3 = IBS, Minor Alarms and Major Alarms
<1>	Ethernet QOS Type	0 = Normal, 1 = Port based
<1>	Ethernet QOS QUEUE	0 = Fair Weighted, 1 = Strict Priority

Opcode: <240Bh> Query a Modulator's Status

Query Response		
<1>	Control Mode	0 = Front Panel, 1 = Terminal, 2 = Computer, Note: DMD20 will always return 2 = Computer
<1>	Revision Number	Decimal point implied
<1>	Alarm 1	Bit 0 = Transmit FPGA/Processor Fault, 1 = Fail Bit 1 = Drop DSP, 1 = Fail Bit 2 = Transmit Symbol Clock PLL Lock, 1 = Lock Bit 3 = Reserved Bit 4 = IF/L-Band Synthesizer Lock, 1 = Lock Bits 5 & 6 = Reserved Bit 7 = Mod Summary Fault, 1 = Fail
<1>	Alarm 2	Bit 0 = Terrestrial Clock Activity Detect, 1 = Activity Bit 1 = Internal Clock Activity Detect, 1 = Activity Bit 2 = Tx Sat Clock Activity Detect, 1 = Activity Bit 3 = Tx Data Activity Detect, 1 = Activity Bit 4 = Terrestrial AIS. Tx Data AIS Detect, 1 = AIS Fail Bit 5 = Tx Clock Fallback, 1 = Clock Fallback Bit 6 = DVB Frame Lock Fault, 1 = Fail Bit 7 = Spare
<1>	Common Alarm 1	Bit 0 = -12V Alarm, 1 = Fail Bit 1 = +12V Alarm, 1 = Fail Bit 2 = +5V Alarm, 1 = Fail Bits 3 – 5 = Reserved Bit 6 = IF SYNTH Alarm, 1 = Fail Bit 7 = Spare
<1>	Common Alarm 2	Bit 0 = TERR FPGA Config, 1 = Fail Bit 1 = CODEC FPGA Config, 1 = Fail Bit 2 = CODEC Device Config, 1 = Fail Bit 3 = Reserved Bit 4 = +1.5 V Rx Alarm, 1 = Fail Bit 5 = +1.5 V TX Alarm, 1 = Fail Bit 6 = +3.3 V Alarm, 1 = Fail Bit 7 = +20 V Alarm, 1 = Fail
<1>	Latched Alarm 1	Bit 0 = Transmit FPGA/Processor Fault Bit 1 = Drop DSP Bit 2 = Transmit Symbol Clock PLL Lock Bit 3 = Reserved

		Bit 4 = Transmit L-Band Synthesizer Lock Bits 5 -7 = Reserved 0 = Not Latched, 1 = Latched
<1>	Latched Common Alarm 1	Bit 0 = -12V Alarm Bit 1 = +12V Alarm Bit 2 = +5V Alarm Bits 3 - 5 = Reserved Bit 6 = IF SYNTH Alarm Bit 7 = Spare 0 = Not Latched, 1 = Latched
<1>	Latched Common Alarm 2	Bit 0 = TERR FPGA Config Bit 1 = CODEC FPGA Config Bit 2 = CODEC Device Config Bit 3 = Reserved Bit 4 = +1.5 V Rx Alarm Bit 5 = +1.5 V TX Alarm Bit 6 = +3.3 V Alarm Bit 7 = +20 V Alarm 0 = Not Latched, 1 = Latched
<1>	Drop Status	Bit 0 = Frame lock fault. 1 = Fail Bit 1 = Multiframe lock Fault. Valid in E1 PCM-30 and PCM-30C, 1 = Fail Bit 2 = CRC lock fault. Valid in T1ESF, and E1 CRC enabled, 1 = Fail Bits 3 - 7 = Reserved
<1>	Online Flag	Online Switch Status: 0 = Offline, 1 = Online (DMD20 is always online)
<1>	+5V Voltage	+5V, Implied decimal point; 49 = +4.9 V
<1>	+12V Voltage	+12V, Implied decimal point; 121 = +12.1 V
<1>	-12V Voltage	-12V, Implied decimal point; 118 = -11.8 V (two's compliment)
<2>	Reserved	Ignore
<1>	ESC Source	0 = Internal, 1 = External
<1>	Backward Alarms	Bit 0 = Backward Alarm 1 Transmitted Bit 1 = Backward Alarm 2 Transmitted Bit 2 = Backward Alarm 3 Transmitted Bit 3 = Backward Alarm 4 Transmitted Bits 4 & 5 = Spares Bit 6 = IBS Prompt Alarm Transmitted Bit 7 = IBS Service Alarm Transmitted 0 = No, 1 = Yes
<2>	AUPC Remote Test 2047 Mantissa	Binary value with implied decimal point; 795 = 7.95
<1>	AUPC Remote Test 2047 BER Exponent	Binary value with implied sign; 6 = -6
<1>	Reserved	Ignore
<4>	Symbol Rate	Binary value, 1 sps steps
<1>	Latched Alarm 2	Bit 0 = Terrestrial Clock Activity Detect Bit 1 = Internal Clock Activity Detect Bit 2 = Tx Sat Clock Activity Detect Bit 3 = Tx Data Activity Detect Bit 4 = Terrestrial AIS. Tx Data AIS Detect Bit 5 = Tx Clock Fallback Bit 6 = DVB Frame Lock Fault Bit 7 = Spare

		0 = Not Latched, 1 = Latched
<1>	Alarm 4	Bit 0 = LBST BUC DC Current Alarm, 1 = Fail Bit 1 = LBST BUC DC Voltage Alarm, 1 = Fail Bit 2 = Ethernet WAN Alarm, 1 = Fail Bit 3 = LBST BUC PLL Alarm, 1 = Fail Bit 4 = LBST BUC Over Temperature Alarm, 1 = Fail Bit 5 = LBST BUC Summary Alarm, 1 = Fail Bit 6 = LBST BUC Output Enable Alarm, 1 = Fail Bit 7 = LBST BUC Communications Alarm, 1 = Fail
<1>	Latched Alarm 4	Bit 0 = LBST BUC DC Current Alarm Bit 1 = LBST BUC DC Voltage Alarm Bit 2 = Ethernet WAN Alarm Bit 3 = LBST BUC PLL Alarm Bit 4 = LBST BUC Over Temperature Alarm Bit 5 = LBST BUC Summary Alarm Bit 6 = LBST BUC Output Enable Alarm Bit 7 = LBST BUC Communications Alarm 0 = Not Latched, 1 = Latched
<1>	Reserved	Ignore
<2>	LBST BUC DC Current	Amps, Implied decimal point, 1000 = 1.000A
<2>	LBST BUC DC Voltage	Volts, Implied decimal point, 10 = 1.0V
<1>	FSK Test Result	0 = Pass, 1 = Fail
<2>	BUC Carrier Level	Implied decimal point, dBm
<4>	BUC Summary Status	
<1>	BUC Temperature	Implied Decimal Point, C

Opcode: <2405h> Query a Modulator's Latched Alarms

Query Response		
<1>	Latched Alarm 1	Bit 0 = Transmit FPGA/Processor Fault Bit 1 = Drop DSP Bit 2 = Transmit Symbol Clock PLL Lock Bit 3 = Reserved Bit 4 = Transmit L-Band Synthesizer Lock Bits 5 -7 = Reserved 0 = Not Latched, 1 = Latched
<1>	Latched Common Alarm 1	Bit 0 = -12V Alarm Bit 1 = +12V Alarm Bit 2 = +5V Alarm Bits 3 - 5 = Reserved Bit 6 = IF SYNTH Alarm Bit 7 = Spare 0 = Not Latched, 1 = Latched
<1>	Latched Common Alarm 2	Bit 0 = TERR FPGA Config Bit 1 = CODEC FPGA Config Bit 2 = CODEC Device Config Bit 3 = Reserved Bit 4 = +1.5 V Rx Alarm Bit 5 = +1.5 V TX Alarm Bit 6 = +3.3 V Alarm Bit 7 = +20 V Alarm

		0 = Not Latched, 1 = Latched
<1>	Latched Alarm 2	Bit 0 = Terrestrial Clock Activity Detect Bit 1 = Internal Clock Activity Detect Bit 2 = Tx Sat Clock Activity Detect Bit 3 = Tx Data Activity Detect Bit 4 = Terrestrial AIS. Tx Data AIS Detect Bit 5 = Tx Clock Fallback Bit 6 = DVB Frame Lock Fault Bit 7 = Spare 0 = Not Latched, 1 = Latched
<1>	Latched Alarm 4	Bit 0 = LBST BUC DC Current Alarm Bit 1 = LBST BUC DC Voltage Alarm Bit 2 = Ethernet WAN Alarm Bit 3 = LBST BUC PLL Alarm Bit 4 = LBST BUC Over Temperature Alarm Bit 5 = LBST BUC Summary Alarm Bit 6 = LBST BUC Output Enable Alarm Bit 7 = LBST BUC Communications Alarm 0 = Not Latched, 1 = Latched

Opcode: <2408h> Query a Modulator's Current Alarms

Query Response		
<1>	Alarm 1	Bit 0 = Transmit FPGA/Processor Fault, 1 = Fail Bit 1 = Drop DSP, 1 = Fail Bit 2 = Transmit Symbol Clock PLL Lock, 1 = Lock Bit 3 = Reserved Bit 4 = IF/L-Band Synthesizer Lock, 1 = Lock Bits 5 & 6 = Reserved Bit 7 = Mod Summary Fault, 1 = Fail
<1>	Alarm 2	Bit 0 = Terrestrial Clock Activity Detect, 1 = Activity Bit 1 = Internal Clock Activity Detect, 1 = Activity Bit 2 = Tx Sat Clock Activity Detect, 1 = Activity Bit 3 = Tx Data Activity Detect, 1 = Activity Bit 4 = Terrestrial AIS. Tx Data AIS Detect, 1 = AIS Fail Bit 5 = Tx Clock Fallback, 1 = Clock Fallback Bit 6 = DVB Frame Lock Fault, 1 = Fail Bit 7 = Spare
<1>	Drop Status	Bit 0 = Frame lock fault. 1 = Fail Bit 1 = Multiframe lock Fault. Valid in E1 PCM-30 and PCM-30C, 1 = Fail Bit 2 = CRC lock fault. Valid in T1ESF, and E1 CRC enabled, 1 = Fail Bits 3 - 7 = Reserved
<1>	Common Alarm 1	Bit 0 = -12V Alarm, 1 = Fail Bit 1 = +12V Alarm, 1 = Fail Bit 2 = +5V Alarm, 1 = Fail Bits 3 – 5 = Reserved Bit 6 = IF SYNTH Alarm, 1 = Fail Bit 7 = Spare
<1>	Common Alarm 2	Bit 0 = TERR FPGA Config, 1 = Fail Bit 1 = CODEC FPGA Config, 1 = Fail Bit 2 = CODEC Device Config, 1 = Fail Bit 3 = Reserved Bit 4 = +1.5 V Rx Alarm, 1 = Fail

		Bit 5 = +1.5 V TX Alarm, 1 = Fail Bit 6 = +3.3 V Alarm, 1 = Fail Bit 7 = +20 V Alarm, 1 = Fail
<1>	Backward Alarms	Bit 0 = Backward Alarm 1 Transmitted Bit 1 = Backward Alarm 2 Transmitted Bit 2 = Backward Alarm 3 Transmitted Bit 3 = Backward Alarm 4 Transmitted Bits 4 & 5 = Spares Bit 6 = IBS Prompt Alarm Transmitted Bit 7 = IBS Service Alarm Transmitted 0 = No, 1 = Yes
<1>	Alarm 4	Bit 0 = LBST BUC DC Current Alarm, 1 = Fail Bit 1 = LBST BUC DC Voltage Alarm, 1 = Fail Bit 2 = Ethernet WAN Alarm, 1 = Fail Bit 3 = LBST BUC PLL Alarm, 1 = Fail Bit 4 = LBST BUC Over Temperature Alarm, 1 = Fail Bit 5 = LBST BUC Summary Alarm, 1 = Fail Bit 6 = LBST BUC Output Enable Alarm, 1 = Fail Bit 7 = LBST BUC Communications Alarm, 1 = Fail

Opcode: <2451h> Query a Modulator's Async Configuration

Query Response		
<1>	ES Mode	0 = Normal, 1 = Enhanced
<1>	ES Type	0 = RS232, 1 = RS485
<1>	ES Baud Rate	0 =150, 1 = 300, 2 = 600, 3 = 1200, 4 = 2400, 5= 4800, 6 = 9600, 7 = 19200, 8 = 38400, 9 = 57600, 10 = 115200
<1>	ES Data Bits	0 = 7 bits, 1 = 8 bits

Opcode: <2600h> Command a Modem's Control Mode (Deprecated on DMD20, listed for backward compatibility only)

<1>	Modem control mode	0 = Front panel, 1 = Terminal, 2 = Computer

Opcode: <2601h> Command a Modulator's Configuration

<1>	Network Spec	0 = Closed Net, 1 = IDR, 2 = IBS, 3 = D & I, 5 = DVB SAT, 11 = MIL-188-165A
<4>	Frequency	Selects the IF Frequency in Hz, IF Range = 50 MHz to 180 MHz, L-Band Range = 950 MHz to 2050 MHz
<2>	Strap Code	Binary value
<1>	Filter Mask	0 = INTELSAT 0.35, 18 = MIL-188-165A, 20 = DVB 0.20, 25 = DVB 0.25, 35 = DVB 0.35
<4>	Data Rate	Binary value, 1 bps steps 2.4 Kbps to 20 Mbps for DMD20 2.4 Kbps to 52 Mbps for DMD2050 and DMD50
<4>	External Clock	Binary value, 1 Hz steps, 2.4 kHz to 20 MHz
<4>	External Reference	Binary value, 8 kHz steps, 256 kHz to 10 MHz
<1>	Freq. Reference Source	0 = Internal, 1 = External, 2 = High stability
<1>	Modulation Type	0 = QPSK, 1 = BPSK, 2 = 8PSK, 3 = 16QAM, 4 = OQPSK
<1>	Convolutional Encoder	0 = None, 1 = Viterbi ½, 2 = Viterbi 2/3 (DVB Only), 3 = Viterbi ¾, 4 = Viterbi 5/6 (DVB Only), 5 = Viterbi 7/8, 6 = Reserved, 7 = Sequential ½, 8 = Reserved, 9 = Sequential ¾, 10 = Reserved, 11 = Sequential 7/8, 12 = Reserved, 13 =

		Reserved, 14 = Trellis 2/3, 15 = Trellis ¾ (DVB - 16QAM Only), 16 = Trellis 5/6 (DVB - 8PSK Only), 17 = Trellis 7/8 (DVB - 16QAM Only), 18 = Trellis 8/9 (DVB - 8PSK Only), 19 = ComStream 3/4 SEQ, 20 = TPC .793 2D, 21 = TPC .495 3D, 22 = Reserved, 23 = TPC ½, 24 = TPC ¾, 25 = TPC 7/8, 26 = TPC 21/44, 27 = TPC 750, 28 = TPC 875, 29 = TPC 288
<1>	Reed Solomon	0 = Disable, 1 = Enable
<1>	Scrambler Control	0 = Disable, 1 = Enable
<1>	Scrambler Type	0 = None, 1 = IBS, 2 = V35_IESS, 3 = V35_CCITT, 4 = V35_EFDATA, 5 = V35_FAIRCHILD, 6 = OM-73, 7 = RS, 8 = V35_EFRS, 9 = TPC, 10 = DVB, 11 = EDMAC, 12 = TPC and IBS, 13 = TPC and EDMAC, 14 = V35_ComStream
<2>	Transmit Power Level	Signed value, 0 to -250 (0.0 to -25.0 dBm) (two's compliment)
<1>	Differential Encoder	0 = Disable, 1 = Enable
<1>	Carrier Control	0 = Off, 1 = On, 2 = Auto, 3 = VSAT, 4 = RTS (Refer To Appendix E)
<1>	Carrier Selection	0 = Normal, 1 = CW, 2 = Dual, 3 = Offset, 4 = Pos Fir, 5 = Neg Fir
<1>	Spectrum	0 = Normal, 1 = Inverted
<1>	TX Test Pattern	0 = None, 1 = 2047 test, 2 = 2^15-1, 3 = 2^23-1
<1>	Clock Control	0 = SCTE, 1 = SCT
<1>	Clock Polarity	0 = Normal, 1 = Inverted, 2 = Auto
<1>	SCT Source	0 = Internal, 1 = SCR
<1>	Satellite Framing	0 = No Framing, 1 = 96K IDR, 2 = 1/15 IBS, 3 = EF AUPC 1/15, 4 = DVB, 5 = EDMAC, 6 = SCC, 7 = 96K, 8 = Efficient D&I
<1>	Drop Mode	0 = Disabled, 1 = T1-D4, 2 = T1-ESF, 3 = PCM-30, 4 = PCM-30C, 5 = PCM-31, 6 = PCM-31C, 7 = SLC-96, 8 = T1 D4 S, 9 = T1 ESF S
<30>	Drop Map	Timeslots to drop organized by satellite channel (Mapping of Satellite Channels 1 thru 30 to dropped Terrestrial Timeslots (Terrestrial Timeslots = 1..31))
<1>	T1D4 Yellow Alarm Sel.	Reserved
<1>	Forced Backward Alarms	Bit 0 = Backward Alarm 1 IDR Bit 1 = Backward Alarm 2 IDR Bit 2 = Backward Alarm 3 IDR Bit 3 = Backward Alarm 4 IDR Bits 4 & 5 = Reserved Bit 6 = IBS Prompt Bit 7 = IBS Service 0 = None, 1 = Force
<1>	Alarm 1 Mask	Bit 0 = Transmit FPGA/Processor Fault Bit 1 = Drop DSP Bit 2 = Transmit Symbol Clock PLL Lock Bit 3 = Reserved Bit 4 = IF/L-Band Synthesizer Lock Bits 5 - 7 = Reserved 0 = Mask, 1 = Allow
<1>	Alarm 2 Mask	Bit 0 = Terrestrial Clock Activity Detect Bit 1 = Internal Clock Activity Detect Bit 2 = Tx Sat Clock Activity Detect Bit 3 = Tx Data Activity Detect

		Bit 4 = Terrestrial AIS. Tx Data AIS Detect Bit 5 = Tx Clock Fallback Bit 6 = DVB Frame Lock Fault Bit 7 = Spare 0 = Mask, 1 = Allow
<1>	Common Alarm 1 Mask	Bit 0 = -12V Alarm Bit 1 = +12V Alarm Bit 2 = +5V Alarm Bits 3 – 5 = Reserved Bit 6 = IF SYNTH Alarm Bit 7 = Spare 0 = Mask, 1 = Allow
<1>	Common Alarm 2 Mask	Bit 0 = TERR FPGA Config Bit 1 = CODEC FPGA Config Bit 2 = CODEC Device Config Bit 3 = Reserved Bit 4 = +1.5 V Rx Alarm Bit 5 = +1.5 V TX Alarm Bit 6 = +3.3 V Alarm Bit 7 = +20 V Alarm 0 = Mask, 1 = Allow
<11>	Tx Circuit ID	11 ASCII characters, null terminated
<1>	Tx ESC Ch 1 Volume	-20 to +10 (+10 dBm to –20 dBm) (two's compliment)
<1>	Tx ESC Ch 2 Volume	-20 to +10 (+10 dBm to –20 dBm) (two's compliment)
<1>	Tx Interface Type	0 = G703-B-T1-AMI, 1 = G703-B-T1_B8ZS, 2 = G703-B-E1, 3 = G703-B-T2, 4 = G703-U-E1, 5 = G703-U-T2, 6 = G703-U-E2, 7 = RS-422, 8 = V.35, 9 = RS-232, 10 = HSSI, 11 = ASI, 12 = Advanced ASI, 13 = M2P, 14 = DVB, 24 = Ethernet Bridge, 25 = MIL-188-114A, 26 = RS423, 27 = Eurocomm 256, 28= Eurocomm 512, 29 = Eurocomm 1024, 30 = Eurocomm 2048, 31 = G.703-U-T3, 32 = G.703-U-E3, 33 = G.703-U-STS1
<1>	Tx Terrestrial Loopback	0 = Disabled, 1 = Enabled
<1>	Tx Baseband Loopback	0 = Disabled, 1 = Enabled
<1>	Drop Status Mask	Bit 0 = Frame lock fault Bit 1 = Multiframe lock Fault. Valid in E1 PCM-30 and PCM-30C Bit 2 = CRC lock fault. Valid in T1ESF, and E1 CRC enabled Bits 3 – 7 = Reserved 0 = Mask, 1 = Allow
<1>	Tx RS N Code	2 – 255, Reed-Solomon code word length
<1>	Tx RS K Code	1 – 254, Reed-Solomon message length
<1>	Tx RS Depth	4, 8, or 12
<1>	Data Invert	0 = None, 1 = Terrestrial, 2 = Baseband, 3 = Terrestrial and Baseband
<1>	BPSK Symbol Pairing	0 = Normal Pairing, 1 = Swapped Pairing
<1>	IDR Overhead Type	0 = 32K Voice, 1 = 64K Data
<1>	Terminal Emulation	0 = Adds Viewpoint, 1 = VT100, 2 = WYSE50
<1>	Terminal Baud Rate	0 = 300, 1 = 600, 2 = 1200, 3 = 2400, 4 = 4800, 5 = 9600, 6 = 19200, 7 = 38400, 8 = 57600, 9 = 1152000, 10 = 150
<1>	FM Orderwire Mode	Reserved
<1>	FM Orderwire Test	Reserved

	Tone	
<1>	AUPC Local Enable	0 = Off, 1 = EF AUPC, 2 = Radyne AUPC
<1>	AUPC Remote Enable	0 = Off, 1 = EF AUPC
<1>	AUPC Local CL Action	0 = Hold, 1 = Nominal, 2 = Maximum
<1>	AUPC Remote CL Action	0 = Hold, 1 = Nominal, 2 = Maximum
<1>	AUPC Tracking Rate	0 = 0.5 dB/Min, 1 = 1.0 dB/Min, 2 = 1.5 dB/Min, 3 = 2.0 dB/Min, 4 = 2.5 dB/Min, 5 = 3.0 dB/Min, 6 = 3.5 dB/Min, 7 = 4.0 dB/Min, 8 = 4.5 dB/Min, 9 = 5.0 dB/Min, 10 = 5.5 dB/Min, 11 = 6.0 dB/min
<1>	AUPC Remote BB Loopback	0 = Disable, 1 = Enable
<1>	AUPC Remote 2047	0 = Disable, 1 = Enable
<2>	AUPC Target Eb/No	Target Eb/No at Receiver, 400 to 2000 (4.00 db to 20.00 db)
<2>	AUPC Minimum Power	Signed value 0 to –2500 with implied decimal point; (0.00 to –25.00 dBm) (two's compliment)
<2>	AUPC Maximum Power	Signed value 0 to –2500 with implied decimal point; (0.00 to –25.00 dBm) (two's compliment)
<2>	AUPC Nominal Power	Signed value 0 to –2500 with implied decimal point; (0.00 to –25.00 dBm) (two's compliment)
<1>	TMT Pattern Enable	Reserved
<1>	TMT Pattern Length	Reserved
<1>	Terrestrial Framing	0 = DVB 188, 1 = DVB 204, 2 = NONE
<1>	Alarm 4 Mask	Bit 0 = LBST BUC DC Current Alarm Bit 1 = LBST BUC DC Voltage Alarm Bit 2 = Ethernet WAN Alarm Bit 3 = LBST BUC PLL Alarm Bit 4 = LBST BUC Over Temperature Alarm Bit 5 = LBST BUC Summary Alarm Bit 6 = LBST BUC Output Enable Alarm Bit 7 = LBST BUC Communications Alarm 0 = Mask, 1 = Allow
<1>	TPC Interleaver	0 = Disable, 1 = Enable
<1>	Ethernet Flow Control	0 = Disabled, 1 = Enabled
<1>	Ethernet Daisy Chain	0 = Disabled, 1 = Port 4
<1>	ES Mode	0 = Normal, 1 = Enhanced
<1>	ES Type	0 = RS232, 1 = RS485
<1>	ES Baud Rate	0 =150, 1 = 300, 2 = 600, 3 = 1200, 4 = 2400, 5= 4800, 6 = 9600, 7 = 19200, 8 = 38400, 9 = 57600, 10 = 115200
<1>	ES Data Bits	0 = 7 bits, 1 = 8 bits
<1>	Carrier Enable Delay	0 – 255 in seconds
<1>	SCC Control Ratio	1 = 1/1, 2 = 1/2, 3 = 1/3, 4 = 1/4, 5 = 1/5, 6 = 1/6, 7 = 1/7
<4>	SCC In band Rate	300 to 200000 bps
<2>	LBST BUC DC Voltage Alarm Lower Threshold	Volts, Implied decimal point, 10 = 1.0V (00.0 V to 55.0 V)
<2>	LBST BUC DC Voltage Alarm Upper Threshold	Volts, Implied decimal point, 10 = 1.0V (00.0 V to 55.0 V)
<2>	LBST BUC DC	Amps, Implied decimal point, 1000 = 1.000A (0.000 A to 8.000

	Current Alarm Lower Threshold	A)
<2>	LBST BUC DC Current Alarm Upper Threshold	Amps, Implied decimal point, 1000 = 1.000A (0.000 A to 8.000 A)
<2>	Compensation	TX Power Level offset from 0 to 10 (0.0 dBm to 1.0 dBm), Implied decimal point
<1>	Forced Alarm Test	Bit 0 = Tx Major Alarm Bits 1 – 7 = Spares 0 = Not Forced, 1 = Forced
<1>	Asynchronous In-Band Rate	0 =150, 1 = 300, 2 = 600, 3 = 1200, 4 = 2400, 5= 4800, 6 = 9600, 7 = 19200, 8 = 38400, 9 = 57600, 10 = 115200
<1>	FSK Communications Select	0 = None, 1 = Codan, 2 = TerraSat, 3 = Amplus
<1>	FSK Test Type	0 = None, 1 = Loopback, 2 = Cycle TX Enable, 3 = Codan Pass thru, 4 = TerraSat pass thru, 5 = Amplus Pass thru, 6 = Query for address
<2>	BUC Address	
<1>	BUC Output Enable	0 = Disable, 1 = Enable
<1>	Minor Alarm Relay Usage	0 = undefined, 1= IBS Usage, 2 = IBS & Minor Alarms, 3 = IBS, Minor Alarms and Major Alarms
<1>	Ethernet QOS Type	0 = Normal, 1 = Port based
<1>	Ethernet QOS QUEUE	0 = Fair Weighted, 1 = Strict Priority

Opcode: <2602h> Command a Modulator's Frequency

<4>	Frequency	Selects the IF Frequency in Hz, IF Range = 50 MHz to 180 MHz, L-Band Range = 950 MHz to 2050 MHz

This command also turns the carrier off to protect the satellite.

Opcode: <2603h> Command a Modulator's Strap Code

<2>	Strap Code	Binary value

This command also turns the carrier off to protect the satellite.

Opcode: <2604h> Command a Modulator's Data Rate

<4>	Data Rate	Binary value, 1 bps steps 2.4 Kbps to 20 Mbps for DMD20 2.4 Kbps to 52 Mbps for DMD2050 and DMD50

This command also turns the carrier off to protect the satellite.

Opcode: <2605h> Command a Modulator's Filter Mask

<1>	Filter Mask	0 = INTELSAT 0.35, 18 = MIL-188-165A, 20 = DVB 0.20, 25 = DVB 0.25, 35 = DVB 0.35

Opcode: <2606h> Command a Modulator's Modulation Type

<1>	Modulation Type	0 = QPSK, 1 = BPSK, 2 = 8PSK, 3 = 16QAM, 4 = OQPSK

This command also turns the carrier off to protect the satellite.

Opcode: <2607h> Command a Modulator's Convolutional Encoder

<1>	Convolutional Encoder	0 = None, 1 = Viterbi ½, 2 = Viterbi 2/3 (DVB Only), 3 = Viterbi ¾, 4 = Viterbi 5/6 (DVB Only), 5 = Viterbi 7/8, 6 = Reserved, 7 = Sequential ½, 8 = Reserved, 9 = Sequential ¾, 10 = Reserved, 11 = Sequential 7/8, 12 = Reserved, 13 = Reserved, 14 = Trellis 2/3, 15 = Trellis ¾ (DVB - 16QAM Only), 16 = Trellis 5/6 (DVB - 8PSK Only), 17 = Trellis 7/8 (DVB - 16QAM Only), 18 = Trellis 8/9 (DVB - 8PSK Only), 19 = ComStream 3/4 SEQ, 20 = TPC .793 2D, 21 = TPC .495 3D, 22 = Reserved, 23 = TPC ½, 24 = TPC ¾, 25 = TPC 7/8, 26 = TPC 21/44, 27 = TPC 750, 28 = TPC 875, 29 = TPC 288

This command also turns the carrier off to protect the satellite.

Opcode: <2608h> Command a Modulator's Differential Encoder

<1>	Differential Encoder	0 = Disable, 1 = Enable

Opcode: <2609h> Command a Modulator's Carrier Control

<1>	Carrier Control	0 = Off, 1 = On, 2 = Auto, 3 = VSAT, 4 = RTS (Refer To Appendix E)

Opcode: <260Ah> Command a Modulator's Carrier Selection

<1>	Carrier Selection	0 = Normal, 1 = CW, 2 = Dual, 3 = Offset, 4 = Pos Fir, 5 = Neg Fir

Opcode: <260Bh> Command a Modulator's Clock Control

<1>	Clock Control	0 = SCTE, 1 = SCT

Opcode: <260Ch> Command a Modulator's Clock Polarity

<1>	Clock Polarity	0 = Normal, 1 = Inverted, 2 = Auto

Opcode: <260Dh> Command a Modulator's SCT Source

<1>	SCT Source	0 = Internal, 1 = SCR

Opcode: <260Eh> Command a Modulator's Drop Mode

<1>	Drop Mode	0 = Disabled, 1 = T1-D4, 2 = T1-ESF, 3 = PCM-30, 4 = PCM-30C, 5 = PCM-31, 6 = PCM-31C, 7 = SLC-96, 8 = T1 D4 S, 9 = T1 ESF S

Opcode: <260Fh> Command a Modulator's Output Level

<2>	Transmit Power Level	Signed value, 0 to -250 (0.0 to -25.0 dBm) (two's compliment)

Opcode: <2610h> Command a Modulator's Reed-Solomon

<1>	Reed Solomon	0 = Disable, 1 = Enable

This command also turns the Carrier off.

Opcode: <2611h> Command a Modulator's Spectrum

<1>	Spectrum	0 = Normal, 1 = Inverted

Opcode: <2612h> Command a Modulator's TX Test Pattern

<1>	TX Test Pattern	0 = None, 1 = 2047 test, 2 = 2^15-1, 3 = 2^23-1

Opcode: <2613h> Command a Modulator's Scrambler Control

<1>	Scrambler Control	0 = Disable, 1 = Enable

Opcode: <2614h> Command a Modulator's Scrambler Type

<1>	Scrambler Type	0 = None, 1 = IBS, 2 = V35_IESS, 3 = V35_CCITT, 4 = V35_EFDATA, 5 = V35_FAIRCHILD, 6 = OM-73, 7 = RS, 8 = V35_EFRS, 9 = TPC, 10 = DVB, 11 = EDMAC, 12 = TPC and IBS, 13 = TPC and EDMAC, 14 = V35_ComStream

Opcode: <2615h> Command a Modulator's Satellite Framing

<1>	Satellite Framing	0 = No Framing, 1 = 96K IDR, 2 = 1/15 IBS, 3 = EF AUPC 1/15, 4 = DVB, 5 = EDMAC, 6 = SCC, 7 = 96K, 8 = Efficient D&I

This command also turns the carrier off to protect the satellite.

Opcode: <2616h> Command a Modem's Frequency Reference Source

<1>	Freq. Reference Source	0 = Internal, 1 = External, 2 = High stability

Opcode: <2617h> Command a Modulator's Terrestrial Loopback

<1>	Tx Terrestrial Loopback	0 = Disabled, 1 = Enabled

Opcode: <2618h> Command a Modulator's Baseband Loopback

<1>	Tx Baseband Loopback	0 = Disabled, 1 = Enabled

Opcode: <2619h> Command a Modulator's Network Specification

<1>	Network Spec	0 = Closed Net, 1 = IDR, 2 = IBS, 3 = D & I, 5 = DVB SAT, 11 = MIL-188-165A

Opcode: <261Ah> Command a Modem's External Clock Frequency

<4>	External Clock	Binary value, 1 Hz steps, 2.4 kHz to 20 MHz

Opcode: <261Bh> Command a Modem's External Reference Frequency

<4>	External Reference	Binary value, 8 kHz steps, 256 kHz to 10 MHz

Opcode: <261Dh> Command a Modulator's T1D4 Yellow Alarm Selection

<1>	T1D4 Yellow Alarm Sel.	Reserved

Opcode: <261Eh> Command a Modulator's Interface Type

<1>	Tx Interface Type	0 = G703-B-T1-AMI, 1 = G703-B-T1_B8ZS, 2 = G703-B-E1, 3 = G703-B-T2, 4 = G703-U-E1, 5 = G703-U-T2, 6 = G703-U-E2, 7 = RS-422, 8 = V.35, 9 = RS-232, 10 = HSSI, 11 = ASI, 12 = Advanced ASI, 13 = M2P, 14 = DVB, 24 = Ethernet Bridge, 25 = MIL-188-114A, 26 = RS423, 27 = Eurocomm 256, 28= Eurocomm 512, 29 = Eurocomm 1024, 30 = Eurocomm 2048, 31 = G.703-U-T3, 32 = G.703-U-E3, 33 = G.703-U-STS1

Opcode: <261Fh> Command a Modulator's Circuit ID

<11>	Tx Circuit ID	11 ASCII characters, null terminated

Opcode: <2622h> Command Force Modulator Alarm Test

<1>	Forced Alarm Test	Bit 0 = Tx Major Alarm Bits 1 – 7 = Spares 0 = Not Forced, 1 = Forced

Opcode: <2623h> Command Modulator Data Invert

<1>	Data Invert	0 = None, 1 = Terrestrial, 2 = Baseband, 3 = Terrestrial and Baseband

Opcode: <2625h> Clear a Modulator's Latched Alarm 1 (No Data)

Opcode: <2629h> Command AUPC Local Enable

<1>	AUPC Local Enable	0 = Off, 1 = EF AUPC, 2 = Radyne AUPC

Opcode: <262Ah> Command AUPC Remote Enable

<1>	AUPC Remote Enable	0 = Off, 1 = EF AUPC

Opcode: <262Bh> Command AUPC Local CL Action

<1>	AUPC Local CL Action	0 = Hold, 1 = Nominal, 2 = Maximum

Opcode: <262Ch> Command AUPC Remote CL Action

<1>	AUPC Remote CL Action	0 = Hold, 1 = Nominal, 2 = Maximum

Opcode: <262Dh> Command AUPC Tracking Rate

<1>	AUPC Tracking Rate	0 = 0.5 dB/Min, 1 = 1.0 dB/Min, 2 = 1.5 dB/Min, 3 = 2.0 dB/Min, 4 = 2.5 dB/Min, 5 = 3.0 dB/Min, 6 = 3.5 dB/Min, 7 = 4.0 dB/Min, 8 = 4.5 dB/Min, 9 = 5.0 dB/Min, 10 = 5.5 dB/Min, 11 = 6.0 dB/min

Opcode: <262Eh> Command AUPC Remote Baseband Loopback

<1>	AUPC Remote BB Loopback	0 = Disable, 1 = Enable

Opcode: <262Fh> Command AUPC Remote Test 2047

<1>	AUPC Remote 2047	0 = Disable, 1 = Enable

Opcode: <2630h> Command AUPC Eb/No

<2>	AUPC Target Eb/No	Target Eb/No at Receiver, 400 to 2000 (4.00 db to 20.00 db)

Opcode: <2631h> Command AUPC Minimum Power

<2>	AUPC Minimum Power	Signed value 0 to –2500 with implied decimal point; (0.00 to –25.00 dBm) (two's compliment)

Opcode: <2632h> Command AUPC Maximum Power

<2>	AUPC Maximum Power	Signed value 0 to –2500 with implied decimal point; (0.00 to –25.00 dBm) (two's compliment)

Opcode: <2633h> Command AUPC Nominal Power

<2>	AUPC Nominal Power	Signed value 0 to –2500 with implied decimal point; (0.00 to –25.00 dBm) (two's compliment)

Opcode: <2634h> Command AUPC Local Configuration

<1>	AUPC Local Enable	0 = Off, 1 = EF AUPC, 2 = Radyne AUPC
<1>	AUPC Local CL Action	0 = Hold, 1 = Nominal, 2 = Maximum
<1>	AUPC Tracking Rate	0 = 0.5 dB/Min, 1 = 1.0 dB/Min, 2 = 1.5 dB/Min, 3 = 2.0 dB/Min, 4 = 2.5 dB/Min, 5 = 3.0 dB/Min, 6 = 3.5 dB/Min, 7 = 4.0 dB/Min, 8 = 4.5 dB/Min, 9 = 5.0 dB/Min, 10 = 5.5 dB/Min, 11 = 6.0 dB/min
<1>	AUPC Remote CL Action	0 = Hold, 1 = Nominal, 2 = Maximum
<2>	AUPC Target Eb/No	Target Eb/No at Receiver, 400 to 2000 (4.00 db to 20.00 db)
<2>	AUPC Minimum Power	Signed value 0 to –2500 with implied decimal point; (0.00 to –25.00 dBm) (two's compliment)
<2>	AUPC Maximum Power	Signed value 0 to –2500 with implied decimal point; (0.00 to –25.00 dBm) (two's compliment)
<2>	AUPC Nominal	Signed value 0 to –2500 with implied decimal point; (0.00 to –

	Power	25.00 dBm) (two's compliment)

Opcode: <2635h> Command AUPC Remote Configuration

<1>	AUPC Remote Enable	0 = Off, 1 = EF AUPC
<1>	AUPC Remote BB Loopback	0 = Disable, 1 = Enable
<1>	AUPC Remote 2047	0 = Disable, 1 = Enable

Opcode: <2636h> Command Modulator Reed Solomon N & K Codes and Interleaver Depth

<1>	Tx RS N Code	2 – 255, Reed-Solomon code word length
<1>	Tx RS K Code	1 – 254, Reed-Solomon message length
<1>	Tx RS Depth	4, 8, or 12

Opcode: <2638h> Command Modulator TPC Interleaver

<1>	TPC Interleaver	0 = Disable, 1 = Enable

Opcode: <2640h> Command Modulator Async Configuration

<1>	ES Mode	0 = Normal, 1 = Enhanced
<1>	ES Type	0 = RS232, 1 = RS485
<1>	ES Baud Rate	0 =150, 1 = 300, 2 = 600, 3 = 1200, 4 = 2400, 5= 4800, 6 = 9600, 7 = 19200, 8 = 38400, 9 = 57600, 10 = 115200
<1>	ES Data Bits	0 = 7 bits, 1 = 8 bits

Opcode: <2641h> Command Minor Alarm Relay Usage

<1>	Minor Alarm Relay Usage	0 = undefined, 1= IBS Usage, 2 = IBS & Minor Alarms, 3 = IBS, Minor Alarms and Major Alarms

Opcode: <2642h> Command Modulator Ethernet Terrestrial Interface Configuration

<1>	Ethernet Flow Control	0 = Disabled, 1 = Enabled
<1>	Ethernet Daisy Chain	0 = Disabled, 1 = Port 4
<1>	Ethernet QOS Type	0 = Normal, 1 = Port based
<1>	Ethernet QOS QUEUE	0 = Fair Weighted, 1 = Strict Priority

1.4.2 DMD20 Demodulator

Opcode: <2401h> Query a Demodulator's Configuration and Status

Query Response		
<1>	Number of nonvol bytes	Number of Configuration Bytes
Configuration Bytes (Nonvol Bytes)		
<1>	Network Spec	0 = Closed Net, 1 = IDR, 2 = IBS, 3 = D & I, 5 = DVB SAT, 11 = MIL-188-165A
<4>	Frequency	Selects the IF Frequency in Hz, IF Range = 50 MHz to 180 MHz, L-Band Range = 950 MHz to 2050 MHz
<2>	Sweep Delay	Binary value, 0.1 second steps, Implied decimal point, 0 – 65535 (0.0 sec to 6553.5 sec)
<4>	Data Rate	Binary value, 1 bps steps 2.4 Kbps to 20 Mbps for DMD20

		2.4 Kbps to 52 Mbps for DMD2050 and DMD50
<1>	Sweep Boundary	Sweep limits. Max of ± 255 kHz in kHz steps 0 - 255
<1>	Input Level Limit	Lower level limit, binary value, 1 dB steps, and Implied sign. 30 to 90 (-30 to –90 dBm)
<2>	Strap Code	Binary value
<1>	Filter Mask	0 = INTELSAT 0.35, 18 = MIL-188-165A, 20 = DVB 0.20, 25 = DVB 0.25, 35 = DVB 0.35
<1>	Demodulation Type	0 = QPSK, 1 = BPSK, 2 = 8PSK, 3 = 16QAM, 4 = OQPSK
<1>	Convolutional Decoder	0 = None, 1 = Viterbi ½, 2 = Viterbi 2/3 (DVB Only), 3 = Viterbi ¾, 4 = Viterbi 5/6 (DVB Only), 5 = Viterbi 7/8, 6 = Reserved, 7 = Sequential ½, 8 = Reserved, 9 = Sequential ¾, 10 = Reserved, 11 = Sequential 7/8, 12 = Reserved, 13 = Reserved, 14 = Trellis 2/3, 15 = Trellis ¾ (DVB - 16QAM Only), 16 = Trellis 5/6 (DVB - 8PSK Only), 17 = Trellis 7/8 (DVB - 16QAM Only), 18 = Trellis 8/9 (DVB - 8PSK Only), 19 = ComStream 3/4 SEQ, 20 = TPC .793 2D, 21 = TPC .495 3D, 22 = Reserved, 23 = TPC ½, 24 = TPC ¾, 25 = TPC 7/8, 26 = TPC 21/44, 27 = TPC 750, 28 = TPC 875, 29 = TPC 288
<1>	Reed Solomon	0 = Disable, 1 = Enable
<1>	Differential Decoder	0 = Disable, 1 = Enable
<1>	Descrambler Control	0 = Disable, 1 = Enable
<1>	Descrambler Type	0 = None, 1 = IBS, 2 = V35_IESS, 3 = V35_CCITT, 4 = V35_EFDATA, 5 = V35_FAIRCHILD, 6 = OM-73, 7 = RS, 8 = V35_EFRS, 9 = TPC, 10 = DVB, 11 = EDMAC, 12 = TPC and IBS, 13 = TPC and EDMAC, 14 = V35_ComStream
<1>	Spectrum	0 = Normal, 1 = Inverted
<1>	Buffer Size Msec	Indicates buffer size in msecs, 0 through 64
<1>	Active Buffer Clock Source	0 = SCTE, 1 = SCT, 2 = EXT BNC, 3 = RX SAT, 4 = EXT IDI
<1>	Buffer Clock Polarity	0 = Normal, 1 = Inverted
<1>	Insert Mode	0 = Disabled, 1 = T1-D4, 2 = T1-ESF, 3 = PCM-30, 4 = PCM-30C, 5 = PCM-31, 6 = PCM-31C, 7 = SLC-96, 8 = T1 D4 S, 9 = T1 ESF S
<1>	T1E1 Frame Source	0 = Internal, 1 = External, 2 = IDI/DDO Loopback
<30>	Insert Map	Timeslots to insert organized by satellite channel (Mapping of Satellite channels 1 thru 30 to inserted Terrestrial Timeslots (Terrestrial Timeslots = 1..31) (0 = Insert None))
<1>	Satellite Framing	0 = No Framing, 1 = 96K IDR, 2 = 1/15 IBS, 3 = EF AUPC 1/15, 4 = DVB, 5 = EDMAC, 6 = SCC, 7 = 96K, 8 = Efficient D&I
<1>	RX Test Pattern	0 = None, 1 = 2047 test, 2 = 2^15-1, 3 = 2^23-1
<1>	Map Summary To Backward Alarm	0 = None, 1 = BK1, 2 = BK2, 3 = BK1 & 2, 4 = BK3, 5 = BK1 & 3, 6 = BK2 & 3, 7 = BK1, 2 & 3, 8 = BK4, 9 = BK1 & 4, 10 = BK2 & 4, 11 = BK1, 2 & 4, 12 = BK3 & 4, 13 = BK1, 3 & 4, 14 = BK2, 3 & 4, 15 = BK1, 2, 3 & 4
<1>	Force Alarm Test	0 = None, 1 = Send the Alarm Bit 0 = Rx Major Alarm Bits 1 - 7 = Spares
<1>	Alarm 1 Mask	Bit 0 = Receive FPGA/Processor Fault Bit 1 = Carrier Loss Bit 2 = Multiframe Sync Loss Bit 3 = Frame Sync Loss Bit 4 = IBS BER Alarm

		Bit 5 = Satellite AIS Bit 6 = Rx Data Activity Bit 7 = Rx AGC Level 0 = Mask, 1 = Allow
<1>	Alarm 2 Mask	Bit 0 = Buffer Underflow Bit 1 = Buffer Overflow Bit 2 = Buffer Under 10% Bit 3 = Buffer Over 90% Bit 4 = RS Decoder Lock Fault Bit 5 = RS De-Interleaver Fault Bit 6 = RS Decoder Uncorrectable Word Bit 7 = Reserved 0 = Mask, 1 = Allow
<1>	Alarm 3 Mask	Bit 0 = Rx L-Band Synthesizer Lock Bit 1 = Insert DSP Config Bit 2 = Buffer Clock PLL Lock Detect Bit 3 = Viterbi Decoder Lock Bit 4 = Sequential Decoder Lock Bit 5 = Rx Test Pattern Lock Bit 6 = External Reference PLL Lock Bit 7 = Rx Carrier Level 0 = Mask, 1 = Allow
<1>	Alarm 4 Mask	Bit 0 = Buffer Clock Activity Detect Bit 1 = External BNC Activity Detect Bit 2 = Rx Satellite Clock Activity Detect Bit 3 = Insert Clock Activity Detect Bit 4 = External Reference Activity Detect Bit 5 = High Stability Reference PLL Activity Bit 6 = Reserved Bit 7 = Low EbNo 0 = Mask, 1 = Allow
<1>	Common Alarm 1 Mask	Bit 0 = -12V Alarm Bit 1 = +12V Alarm Bit 2 = +5V Alarm Bits 3 – 5 = Reserved Bit 6 = IF SYNTH Alarm Bit 7 = Spare 0 = Mask, 1 = Allow
<1>	Common Alarm 2 Mask	Bit 0 = TERR FPGA Config Bit 1 = CODEC FPGA Config Bit 2 = CODEC Device Config Bit 3 = Reserved Bit 4 = +1.5 V Rx Alarm Bit 5 = +1.5 V TX Alarm Bit 6 = +3.3 V Alarm Bit 7 = +20 V Alarm 0 = Mask, 1 = Allow
<1>	ESC Channel 1 Volume	Binary value, valid in IDR only, +10 dBm to –20 dBm (two's compliment)
<1>	ESC Channel 2 Volume	Binary value, valid in IDR only, +10 dBm to –20 dBm (two's compliment)
<1>	BER Exponent	6 through 9 for Viterbi, 5 through 7 for Sequential
<11>	Rx Circuit ID	11 ASCII characters, null terminated
<1>	Rx Terrestrial	0 = Disabled, 1 = Enabled

	Loopback	
<1>	Rx Baseband Loopback	0 = Disabled, 1 = Enabled
<1>	Rx IF Loopback	0 = Disabled, 1 = Enabled
<1>	Rx Interface Type	0 = G703-B-T1 AMI, 1 = G703-B-T1_B8ZS, 2 = G703-B-E1, 3 = G703-B-T2, 4 = G703-U-E1, 5 = G703-U-T2, 6 = G703-U-E2, 7 = RS-422, 8 = V.35, 9 = RS-232, 10 = HSSI, 11 = ASI, 12 = Advanced ASI, 13 = M2P, 14 = DVB, 24 = Ethernet Bridge, 25 = MIL-188-114A, 26 = RS423, 27 = Eurocomm 256, 28= Eurocomm 512, 29 = Eurocomm 1024, 30 = Eurocomm 2048, 31 = G.703-U-T3, 32 = G.703-U-E3, 33 = G.703-U-STS1
<1>	Insert Status Mask	Bit 0 = Frame lock Bit 1 = Multiframe lock. Valid in E1 PCM-30 and PCM-30C Bit 2 = CRC lock. Valid in T1ESF, and E1 CRC enabled Bits 3 – 7 = Reserved 0 = Mask, 1 = Allow
<1>	Rx RS N Code	2 - 255 Reed-Solomon code word length
<1>	Rx RS K Code	1 - 254 Reed-Solomon message length
<1>	Rx RS Depth	4, 8, or 12
<1>	External Clock Source	Reserved
<1>	Data Invert	0 = None, 1 = Terrestrial, 2 = Baseband, 3 = Terrestrial and Baseband
<1>	Alarm 5 Mask	Bit 0 = Trellis Decoder Lock Bit 1 = IFEC Alarm Bit 2 = T1/E1 Signaling Bit 3 = Turbo Decoder Fault Bit 4 – 5 = Spares Bit 6 = DVB Frame Lock Fault Bit 7 = Spare ***0 = Mask, 1 = Allow***
<1>	BPSK Symbol Pairing	0 = Normal, 1 = Swapped
<1>	ES Mode	0 = Normal, 1 = Enhanced
<1>	ES Type	0 = RS-232, 1 = RS-485
<1>	ES Baud	0 =150, 1 = 300, 2 = 600, 3 = 1200, 4 = 2400, 5= 4800, 6 = 9600, 7 = 19200, 8 = 38400, 9 = 57600, 10 = 115200
<1>	ES Data Bits	0 = 7 Bits, 1 = 8 Bits
<1>	IDR Overhead Type	0 = 32K Voice, 1 = 64K Data
<1>	FM Orderwire Mode	Reserved
<1>	TMT Pattern Length	Reserved
<1>	EbNo Threshold	Unsigned Binary Value, 0-99, Implied Decimal Point (0.0 through 9.9 dB)
<2>	Reacquisition Sweep Limit	Binary value, 1 Hz steps, 0 - 65535
<1>	Terrestrial Streaming	0 = Continuous, 1 = Burst
<1>	Terrestrial Framing	0 = DVB 188, 1 = DVB 204, 2 = NONE
<1>	Alarm 6 Mask	Bit 0 = LBST LNB DC Current Alarm Bit 1 = LBST LNB DC Voltage Alarm Bit 2 = Ethernet WAN Alarm Bits 3 – 7 = Spares 0 = Mask, 1 = Allow

<1>	TPC De-Interleaver	0 = Disable, 1 = Enable
<1>	SCC Control Ratio	1 = 1/1, 2 = 1/2, 3 = 1/3, 4 = 1/4, 5 = 1/5, 6 = 1/6, 7 = 1/7
<4>	SCC In band Rate	300 to 200000 bps
<1>	Fast Acquisition	0 = Disabled, 1 = Enabled
<1>	Adjacent Carrier Type	0 = Normal, 1 = High Power
<2>	LBST LNB DC Voltage Alarm Lower Threshold	Volts, Implied decimal point, 10 = 1.0V (00.0 V to 55.0 V)
<2>	LBST LNB DC Voltage Alarm Upper Threshold	Volts, Implied decimal point, 10 = 1.0V (00.0 V to 55.0 V)
<2>	LBST LNB DC Current Alarm Lower Threshold	Amps, Implied decimal point, 1000 = 1.000A (0.000 A to 8.000 A)
<2>	LBST LNB DC Current Alarm Upper Threshold	Amps, Implied decimal point, 1000 = 1.000A (0.000 A to 8.000 A)
<1>	Number of Buffer Clock Sources	1 - 5
<1>	First Buffer Clock Source	0 = SCTE, 1 = SCT, 2 = EXT BNC, 3 = RX SAT, 4 = EXT IDI Each buffer clock source must be unique
<1>	Second Buffer Clock Source	0 = SCTE, 1 = SCT, 2 = EXT BNC, 3 = RX SAT, 4 = EXT IDI Each buffer clock source must be unique
<1>	Third Buffer Clock Source	0 = SCTE, 1 = SCT, 2 = EXT BNC, 3 = RX SAT, 4 = EXT IDI Each buffer clock source must be unique
<1>	Forth Buffer Clock Source	0 = SCTE, 1 = SCT, 2 = EXT BNC, 3 = RX SAT, 4 = EXT IDI Each buffer clock source must be unique
<1>	Fifth Buffer Clock Source	0 = SCTE, 1 = SCT, 2 = EXT BNC, 3 = RX SAT, 4 = EXT IDI Each buffer clock source must be unique
<1>	Asynchronous In-Band Rate	0 =150, 1 = 300, 2 = 600, 3 = 1200, 4 = 2400, 5= 4800, 6 = 9600, 7 = 19200, 8 = 38400, 9 = 57600, 10 = 115200
<2>	Rotation Ambiguity	0 = 0.0.0, 1 = 0.0.1, 2 = 0.1.0, 3 = 0.1.1, 4 = 1.0.0, 5 = 1.0.1, 6 = 1.1.0, 7 = 1.1.1
Status Bytes		
<1>	Control Mode	0 = Front Panel, 1 = Terminal, 2 = Computer, Note: DMD20 will always return 2 = Computer
<1>	Revision Number	Decimal point implied
<1>	Alarm 1	Bit 0 = Receive FPGA/Processor Fault, 1 = Fail Bit 1 = Carrier Loss, 1 = Fail Bit 2 = Multiframe Sync Loss, 1 = Fail Bit 3 = Frame Sync Loss, 1 = Fail Bit 4 = IBS BER Alarm, 1 = Fail Bit 5 = Satellite AIS, 1 = Fail Bit 6 = Rx Data Activity, 1 = Activity Bit 7 = Rx AGC Level, 1 = Fail
<1>	Alarm 2	Bit 0 = Buffer Underflow, 1 = Underflow Bit 1 = Buffer Overflow, 1 = Overflow Bit 2 = Buffer Under 10%, 1 = Fail Bit 3 = Buffer Over 90%, 1 = Fail Bit 4 = RS Decoder Lock Fault, 1 = Fail Bit 5 = RS De-Interleaver Fault, 1 = Fail

		Bit 6 = RS Decoder Uncorrectable Word, 1 = Fail Bit 7 = Demod Summary Fault, 1 = Fail
<1>	Alarm 3	Bit 0 = Rx L-Band Synthesizer Lock, 1 = Lock Bit 1 = Insert DSP Config, 1 = Fail Bit 2 = Buffer Clock PLL Lock Detect, 1 = Lock Bit 3 = Viterbi Decoder Lock, 1 = Lock Bit 4 = Sequential Decoder Lock, 1 = Lock Bit 5 = Rx Test Pattern Lock, 1 = Lock Bit 6 = External Reference PLL Lock, 1 = Lock Bit 7 = Rx Carrier Level, 1 = Fail
<1>	Alarm 4	Bit 0 = Buffer Clock Activity Detect, 1 = Activity Bit 1 = External BNC Activity Detect, 1 = Activity Bit 2 = Rx Satellite Clock Activity Detect, 1 = Activity Bit 3 = Insert Clock Activity Detect, 1 = Activity Bit 4 = External Reference Activity Detect, 1 = Activity Bit 5 = High Stability Reference PLL Activity, 1 = Activity Bit 6 = Reserved Bit 7 = Low EbNo, 1 = Fail
<1>	Common Alarm 1	Bit 0 = -12V Alarm, 1 = Fail Bit 1 = +12V Alarm, 1 = Fail Bit 2 = +5V Alarm, 1 = Fail Bits 3 – 5 = Reserved Bit 6 = IF SYNTH Alarm, 1 = Fail Bit 7 = Spare
<1>	Common Alarm 2	Bit 0 = TERR FPGA Config, 1 = Fail Bit 1 = CODEC FPGA Config, 1 = Fail Bit 2 = CODEC Device Config, 1 = Fail Bit 3 = Reserved Bit 4 = +1.5 V Rx Alarm, 1 = Fail Bit 5 = +1.5 V TX Alarm, 1 = Fail Bit 6 = +3.3 V Alarm, 1 = Fail Bit 7 = +20 V Alarm, 1 = Fail
<1>	Latched Alarm 1	Bit 0 = Receive FPGA/Processor Fault Bit 1 = Carrier Loss Bit 2 = Multiframe Sync Loss Bit 3 = Frame Sync Loss Bit 4 = IBS BER Alarm Bit 5 = Satellite AIS Bit 6 = Rx Data Activity Bit 7 = Rx AGC Level 0 = Not Latched, 1 = Latched
<1>	Latched Alarm 2	Bit 0 = Buffer Underflow Bit 1 = Buffer Overflow Bit 2 = Buffer Under 10% Bit 3 = Buffer Over 90% Bit 4 = RS Decoder Lock Fault Bit 5 = RS De-Interleaver Fault Bit 6 = RS Decoder Uncorrectable Word Bit 7 = Reserved 0 = Not Latched, 1 = Latched
<1>	Latched Alarm 3	Bit 0 = Rx L-Band Synthesizer Lock Bit 1 = Insert DSP Config Bit 2 = Buffer Clock PLL Lock Detect Bit 3 = Viterbi Decoder Lock Bit 4 = Sequential Decoder Lock

		Bit 5 = Rx Test Pattern Lock Bit 6 = External Reference PLL Lock Bit 7 = Rx Carrier Level 0 = Not Latched, 1 = Latched
<1>	Latched Common Alarm 1	Bit 0 = -12V Alarm Bit 1 = +12V Alarm Bit 2 = +5V Alarm Bits 3 – 5 = Reserved Bit 6 = IF SYNTH Alarm Bit 7 = Spare 0 = Not Latched, 1 = Latched
<1>	Latched Common Alarm 2	Bit 0 = TERR FPGA Config Bit 1 = CODEC FPGA Config Bit 2 = CODEC Device Config Bit 3 = Reserved Bit 4 = +1.5 V Rx Alarm Bit 5 = +1.5 V TX Alarm Bit 6 = +3.3 V Alarm Bit 7 = +20 V Alarm 0 = Not Latched, 1 = Latched
<1>	Backward Alarms	Bit 0 = Backward Alarm 1 IDR Bit 1 = Backward Alarm 2 IDR Bit 2 = Backward Alarm 3 IDR Bit 3 = Backward Alarm 4 IDR Bits 4 - 7 = Reserved 0 = No, 1 = Yes
<4>	Error Counter	Binary value
<4>	Test Error Counter	Binary value
<2>	Raw BER Mantissa	Bytes 1 - 2 = Binary value Raw BER; 896 = 8.96
<2>	Corrected BER Mantissa	Bytes 1 - 2 = Binary value corrected BER
<2>	EbNo	Binary value, 1 decimal point implied; 700 = 7.00
<4>	Offset Frequency	Binary value, 1 Hz steps
<2>	Test BER Mantissa	Bytes 1 - 2 = Binary value test BER
<1>	Raw BER Exponent	Byte 3 = Binary value exponent
<1>	Corrected BER Exponent	Byte 3 = Binary value exponent
<1>	Test BER Exponent	Byte 3 = Binary value exponent
<1>	Offset Frequency Sign	If <> 0, '-' offset
<1>	BER/EbNo Status	Bit 0 = Raw BER and corrected BER status. 1 = Valid Bit 1 = Test BER status. 1 = Valid Bits 2 - 3 = EbNo status, 0 = EbNo is invalid 1 = EbNo is valid, 2 = EbNo is smaller than indicated value, 3 = EbNo is greater than indicated value Bit 4 = BER Counter Overflow. 1 = Overflow Condition Bit 5 = Test BER Counter Overflow 1 = Overflow Condition Bits 6 – 7 = Reserved
<1>	Buffer Percent Full	Binary value representing % buffer full, 0 - 100 in 1% steps
<1>	Input Level	Binary value in 1 dB steps, implied sign
<1>	Insert Status Fault	Bit 0 = Frame lock fault. 1 = Fail

		Bit 1 = Multiframe lock fault. Valid in E1 PCM-30 and PCM-30C. 1 = Fail Bit 2 = CRC lock fault. Valid in T1ESF, and E1 CRC enabled. 1 = Fail Bits 3 – 7 = Reserved
<1>	Online Flag	Online Switch Status: 0 = Offline, 1 = Online (DMD20 is always online)
<1>	Loss Flag	1 = Loss of IDI Signal, DMD20
<1>	Alarm 5	Bit 0 = Trellis Decoder Lock, 1 = Lock Bit 1 = IFEC Alarm, 1 = fail Bit 2 = T1/E1 Signaling, 1 = Fail Bit 3 = Turbo Decoder Fault, 1 = Fail Bit 4 – 5 = Spares Bit 6 = DVB Frame Lock Fault, 1 = Fail Bit 7 = Spare
<1>	Latched Alarm 4	Bits 0 – 6 = Reserved Bit 7 = Low EbNo 0 = Not Latched, 1 = Latched
<4>	Symbol Rate	Binary value, 1 sps steps
<1>	Latched Alarm 5	Bit 0 = Trellis Decoder Lock Bit 1 = IFEC Alarm Bit 2 = T1/E1 Signaling Bit 3 = Turbo Decoder Fault Bit 4 – 5 = Spares Bit 6 = DVB Frame Lock Fault Bit 7 = Spare 0 = Not Latched, 1 = Latched
<1>	Alarm 6	Bit 0 = LBST LNB DC Current Alarm, 1 = Fail Bit 1 = LBST LNB DC Voltage Alarm, 1 = Fail Bit 2 = Ethernet WAN Alarm, 1 = Fail Bits 3 – 7 = Spares
<1>	Latched Alarm 6	Bit 0 = LBST LNB DC Current Alarm Bit 1 = LBST LNB DC Voltage Alarm Bit 2 = Ethernet WAN Alarm Bits 3 – 7 = Spares 0 = Not Latched, 1 = Latched
<2>	LBST LNB DC Current	Amps, Implied decimal point, 1000 = 1.000A
<2>	LBST LNB DC Voltage	Volts, Implied decimal point, 10 = 1.0V
<2>	Ethernet Bridge PER Mantissa	Bytes 1 - 2 = Binary value of Packet Error Rate
<1>	Ethernet Bridge PER Exponent	Byte 3 = Binary exponent of Packet Error Rate
<4>	Ethernet Bridge Packet Error Count	Binary value
<4>	Ethernet Bridge Packet Total Count	Binary Value
<1>	Ethernet Bridge Port 1 Status	0 = Down, 1 = Unresolved, 2 = 10 Mbps Half, 3 = 100 Mbps Half, 4 = 10 Mbps Full, 5 = 100 Mbps Full, 6 = Port Not Used, 7 = 1000 Mbps Half, 8 = 1000 Mbps Full
<1>	Ethernet Bridge Port 2 Status	0 = Down, 1 = Unresolved, 2 = 10 Mbps Half, 3 = 100 Mbps Half, 4 = 10 Mbps Full, 5 = 100 Mbps Full, 6 = Port Not Used, 7 = 1000 Mbps Half, 8 = 1000 Mbps Full

<1>	Ethernet Bridge Port 3 Status	0 = Down, 1 = Unresolved, 2 = 10 Mbps Half, 3 = 100 Mbps Half, 4 = 10 Mbps Full, 5 = 100 Mbps Full, 6 = Port Not Used, 7 = 1000 Mbps Half, 8 = 1000 Mbps Full
<1>	Ethernet Bridge Port 4 Status	0 = Down, 1 = Unresolved, 2 = 10 Mbps Half, 3 = 100 Mbps Half, 4 = 10 Mbps Full, 5 = 100 Mbps Full, 6 = Port Not Used, 7 = 1000 Mbps Half, 8 = 1000 Mbps Full
<1>	Ethernet Bridge WAN Status	0 = Down, 1 = Unresolved, 2 = 10 Mbps Half, 3 = 100 Mbps Half, 4 = 10 Mbps Full, 5 = 100 Mbps Full, 6 = Port Not Used, 7 = 1000 Mbps Half, 8 = 1000 Mbps Full

Opcode: <2449h> Query a Demodulator's Configuration

Query Response		
<1>	Network Spec	0 = Closed Net, 1 = IDR, 2 = IBS, 3 = D & I, 5 = DVB SAT, 11 = MIL-188-165A
<4>	Frequency	Selects the IF Frequency in Hz, IF Range = 50 MHz to 180 MHz, L-Band Range = 950 MHz to 2050 MHz
<2>	Sweep Delay	Binary value, 0.1 second steps, Implied decimal point, 0 – 65535 (0.0 sec to 6553.5 sec)
<4>	Data Rate	Binary value, 1 bps steps 2.4 Kbps to 20 Mbps for DMD20 2.4 Kbps to 52 Mbps for DMD2050 and DMD50
<1>	Sweep Boundary	Sweep limits. Max of ± 255 kHz in kHz steps 0 - 255
<1>	Input Level Limit	Lower level limit, binary value, 1 dB steps, and Implied sign. 30 to 90 (-30 to –90 dBm)
<2>	Strap Code	Binary value
<1>	Filter Mask	0 = INTELSAT 0.35, 18 = MIL-188-165A, 20 = DVB 0.20, 25 = DVB 0.25, 35 = DVB 0.35
<1>	Demodulation Type	0 = QPSK, 1 = BPSK, 2 = 8PSK, 3 = 16QAM, 4 = OQPSK
<1>	Convolutional Decoder	0 = None, 1 = Viterbi ½, 2 = Viterbi 2/3 (DVB Only), 3 = Viterbi ¾, 4 = Viterbi 5/6 (DVB Only), 5 = Viterbi 7/8, 6 = Reserved, 7 = Sequential ½, 8 = Reserved, 9 = Sequential ¾, 10 = Reserved, 11 = Sequential 7/8, 12 = Reserved, 13 = Reserved, 14 = Trellis 2/3, 15 = Trellis ¾ (DVB - 16QAM Only), 16 = Trellis 5/6 (DVB - 8PSK Only), 17 = Trellis 7/8 (DVB - 16QAM Only), 18 = Trellis 8/9 (DVB - 8PSK Only), 19 = ComStream 3/4 SEQ, 20 = TPC .793 2D, 21 = TPC .495 3D, 22 = Reserved, 23 = TPC ½, 24 = TPC ¾, 25 = TPC 7/8, 26 = TPC 21/44, 27 = TPC 750, 28 = TPC 875, 29 = TPC 288
<1>	Reed Solomon	0 = Disable, 1 = Enable
<1>	Differential Decoder	0 = Disable, 1 = Enable
<1>	Descrambler Control	0 = Disable, 1 = Enable
<1>	Descrambler Type	0 = None, 1 = IBS, 2 = V35_IESS, 3 = V35_CCITT, 4 = V35_EFDATA, 5 = V35_FAIRCHILD, 6 = OM-73, 7 = RS, 8 = V35_EFRS, 9 = TPC, 10 = DVB, 11 = EDMAC, 12 = TPC and IBS, 13 = TPC and EDMAC, 14 = V35_ComStream
<1>	Spectrum	0 = Normal, 1 = Inverted
<1>	Buffer Size Msec	Indicates buffer size in msecs, 0 through 64
<1>	Active Buffer Clock Source	0 = SCTE, 1 = SCT, 2 = EXT BNC, 3 = RX SAT, 4 = EXT IDI
<1>	Buffer Clock Polarity	0 = Normal, 1 = Inverted
<1>	Insert Mode	0 = Disabled, 1 = T1-D4, 2 = T1-ESF, 3 = PCM-30, 4 = PCM-30C, 5 = PCM-31, 6 = PCM-31C, 7 = SLC-96, 8 = T1 D4 S, 9

		= T1 ESF S
<1>	T1E1 Frame Source	0 = Internal, 1 = External, 2 = IDI/DDO Loopback
<30>	Insert Map	Timeslots to insert organized by satellite channel (Mapping of Satellite channels 1 thru 30 to inserted Terrestrial Timeslots (Terrestrial Timeslots = 1..31) (0 = Insert None))
<1>	Satellite Framing	0 = No Framing, 1 = 96K IDR, 2 = 1/15 IBS, 3 = EF AUPC 1/15, 4 = DVB, 5 = EDMAC, 6 = SCC, 7 = 96K, 8 = Efficient D&I
<1>	RX Test Pattern	0 = None, 1 = 2047 test, 2 = 2^15-1, 3 = 2^23-1
<1>	Map Summary To Backward Alarm	0 = None, 1 = BK1, 2 = BK2, 3 = BK1 & 2, 4 = BK3, 5 = BK1 & 3, 6 = BK2 & 3, 7 = BK1, 2 & 3, 8 = BK4, 9 = BK1 & 4, 10 = BK2 & 4, 11 = BK1, 2 & 4, 12 = BK3 & 4, 13 = BK1, 3 & 4, 14 = BK2, 3 & 4, 15 = BK1, 2, 3 & 4
<1>	Force Alarm Test	0 = None, 1 = Send the Alarm Bit 0 = Rx Major Alarm Bits 1 - 7 = Spares
<1>	Alarm 1 Mask	Bit 0 = Receive FPGA/Processor Fault Bit 1 = Carrier Loss Bit 2 = Multiframe Sync Loss Bit 3 = Frame Sync Loss Bit 4 = IBS BER Alarm Bit 5 = Satellite AIS Bit 6 = Rx Data Activity Bit 7 = Rx AGC Level 0 = Mask, 1 = Allow
<1>	Alarm 2 Mask	Bit 0 = Buffer Underflow Bit 1 = Buffer Overflow Bit 2 = Buffer Under 10% Bit 3 = Buffer Over 90% Bit 4 = RS Decoder Lock Fault Bit 5 = RS De-Interleaver Fault Bit 6 = RS Decoder Uncorrectable Word Bit 7 = Reserved 0 = Mask, 1 = Allow
<1>	Alarm 3 Mask	Bit 0 = Rx L-Band Synthesizer Lock Bit 1 = Insert DSP Config Bit 2 = Buffer Clock PLL Lock Detect Bit 3 = Viterbi Decoder Lock Bit 4 = Sequential Decoder Lock Bit 5 = Rx Test Pattern Lock Bit 6 = External Reference PLL Lock Bit 7 = Rx Carrier Level 0 = Mask, 1 = Allow
<1>	Alarm 4 Mask	Bit 0 = Buffer Clock Activity Detect Bit 1 = External BNC Activity Detect Bit 2 = Rx Satellite Clock Activity Detect Bit 3 = Insert Clock Activity Detect Bit 4 = External Reference Activity Detect Bit 5 = High Stability Reference PLL Activity Bit 6 = Reserved Bit 7 = Low EbNo 0 = Mask, 1 = Allow
<1>	Common Alarm 1 Mask	Bit 0 = -12V Alarm Bit 1 = +12V Alarm

		Bit 2 = +5V Alarm Bits 3 – 5 = Reserved Bit 6 = IF SYNTH Alarm Bit 7 = Spare 0 = Mask, 1 = Allow
<1>	Common Alarm 2 Mask	Bit 0 = TERR FPGA Config Bit 1 = CODEC FPGA Config Bit 2 = CODEC Device Config Bit 3 = Reserved Bit 4 = +1.5 V Rx Alarm Bit 5 = +1.5 V TX Alarm Bit 6 = +3.3 V Alarm Bit 7 = +20 V Alarm 0 = Mask, 1 = Allow
<1>	ESC Channel 1 Volume	Binary value, valid in IDR only, +10 dBm to –20 dBm (two's compliment)
<1>	ESC Channel 2 Volume	Binary value, valid in IDR only, +10 dBm to –20 dBm (two's compliment)
<1>	BER Exponent	6 through 9 for Viterbi, 5 through 7 for Sequential
<11>	Rx Circuit ID	11 ASCII characters, null terminated
<1>	Rx Terrestrial Loopback	0 = Disabled, 1 = Enabled
<1>	Rx Baseband Loopback	0 = Disabled, 1 = Enabled
<1>	Rx IF Loopback	0 = Disabled, 1 = Enabled
<1>	Rx Interface Type	0 = G703-B-T1 AMI, 1 = G703-B-T1_B8ZS, 2 = G703-B-E1, 3 = G703-B-T2, 4 = G703-U-E1, 5 = G703-U-T2, 6 = G703-U-E2, 7 = RS-422, 8 = V.35, 9 = RS-232, 10 = HSSI, 11 = ASI, 12 = Advanced ASI, 13 = M2P, 14 = DVB, 24 = Ethernet Bridge, 25 = MIL-188-114A, 26 = RS423, 27 = Eurocomm 256, 28= Eurocomm 512, 29 = Eurocomm 1024, 30 = Eurocomm 2048, 31 = G.703-U-T3, 32 = G.703-U-E3, 33 = G.703-U-STS1
<1>	Insert Status Mask	Bit 0 = Frame lock Bit 1 = Multiframe lock. Valid in E1 PCM-30 and PCM-30C Bit 2 = CRC lock. Valid in T1ESF, and E1 CRC enabled Bits 3 – 7 = Reserved 0 = Mask, 1 = Allow
<1>	Rx RS N Code	2 - 255 Reed-Solomon code word length
<1>	Rx RS K Code	1 - 254 Reed-Solomon message length
<1>	Rx RS Depth	4, 8, or 12
<1>	External Clock Source	Reserved
<1>	Data Invert	0 = None, 1 = Terrestrial, 2 = Baseband, 3 = Terrestrial and Baseband
<1>	Alarm 5 Mask	Bit 0 = Trellis Decoder Lock Bit 1 = IFEC Alarm Bit 2 = T1/E1 Signaling Bit 3 = Turbo Decoder Fault Bit 4 – 5 = Spares Bit 6 = DVB Frame Lock Fault Bit 7 = Spare ***0 = Mask, 1 = Allow***

<1>	BPSK Symbol Pairing	0 = Normal, 1 = Swapped
<1>	ES Mode	0 = Normal, 1 = Enhanced
<1>	ES Type	0 = RS-232, 1 = RS-485
<1>	ES Baud	0 =150, 1 = 300, 2 = 600, 3 = 1200, 4 = 2400, 5= 4800, 6 = 9600, 7 = 19200, 8 = 38400, 9 = 57600, 10 = 115200
<1>	ES Data Bits	0 = 7 Bits, 1 = 8 Bits
<1>	IDR Overhead Type	0 = 32K Voice, 1 = 64K Data
<1>	FM Orderwire Mode	Reserved
<1>	TMT Pattern Length	Reserved
<1>	EbNo Threshold	Unsigned Binary Value, 0-99, Implied Decimal Point (0.0 through 9.9 dB)
<2>	Reacquisition Sweep Limit	Binary value, 1 Hz steps, 0 - 65535
<1>	Terrestrial Streaming	0 = Continuous, 1 = Burst
<1>	Terrestrial Framing	0 = DVB 188, 1 = DVB 204, 2 = NONE
<1>	Alarm 6 Mask	Bit 0 = LBST LNB DC Current Alarm Bit 1 = LBST LNB DC Voltage Alarm Bit 2 = Ethernet WAN Alarm Bits 3 – 7 = Spares 0 = Mask, 1 = Allow
<1>	TPC De-Interleaver	0 = Disable, 1 = Enable
<1>	SCC Control Ratio	1 = 1/1, 2 = 1/2, 3 = 1/3, 4 = 1/4, 5 = 1/5, 6 = 1/6, 7 = 1/7
<4>	SCC In band Rate	300 to 200000 bps
<1>	Fast Acquisition	0 = Disabled, 1 = Enabled
<1>	Adjacent Carrier Type	0 = Normal, 1 = High Power
<2>	LBST LNB DC Voltage Alarm Lower Threshold	Volts, Implied decimal point, 10 = 1.0V (00.0 V to 55.0 V)
<2>	LBST LNB DC Voltage Alarm Upper Threshold	Volts, Implied decimal point, 10 = 1.0V (00.0 V to 55.0 V)
<2>	LBST LNB DC Current Alarm Lower Threshold	Amps, Implied decimal point, 1000 = 1.000A (0.000 A to 8.000 A)
<2>	LBST LNB DC Current Alarm Upper Threshold	Amps, Implied decimal point, 1000 = 1.000A (0.000 A to 8.000 A)
<1>	Number of Buffer Clock Sources	1 - 5
<1>	First Buffer Clock Source	0 = SCTE, 1 = SCT, 2 = EXT BNC, 3 = RX SAT, 4 = EXT IDI Each buffer clock source must be unique
<1>	Second Buffer Clock Source	0 = SCTE, 1 = SCT, 2 = EXT BNC, 3 = RX SAT, 4 = EXT IDI Each buffer clock source must be unique
<1>	Third Buffer Clock Source	0 = SCTE, 1 = SCT, 2 = EXT BNC, 3 = RX SAT, 4 = EXT IDI Each buffer clock source must be unique
<1>	Forth Buffer Clock Source	0 = SCTE, 1 = SCT, 2 = EXT BNC, 3 = RX SAT, 4 = EXT IDI Each buffer clock source must be unique
<1>	Fifth Buffer Clock Source	0 = SCTE, 1 = SCT, 2 = EXT BNC, 3 = RX SAT, 4 = EXT IDI Each buffer clock source must be unique
<1>	Asynchronous In-Band Rate	0 =150, 1 = 300, 2 = 600, 3 = 1200, 4 = 2400, 5= 4800, 6 = 9600, 7 = 19200, 8 = 38400, 9 = 57600, 10 = 115200

<2>	Rotation Ambiguity	0 = 0.0.0, 1 = 0.0.1, 2 = 0.1.0, 3 = 0.1.1, 4 = 1.0.0, 5 = 1.0.1, 6 = 1.1.0, 7 = 1.1.1

Opcode: <240Ch> Query a Demodulator's Status

Query Response		
<1>	Control Mode	0 = Front Panel, 1 = Terminal, 2 = Computer, Note: DMD20 will always return 2 = Computer
<1>	Revision Number	Decimal point implied
<1>	Alarm 1	Bit 0 = Receive FPGA/Processor Fault, 1 = Fail Bit 1 = Carrier Loss, 1 = Fail Bit 2 = Multiframe Sync Loss, 1 = Fail Bit 3 = Frame Sync Loss, 1 = Fail Bit 4 = IBS BER Alarm, 1 = Fail Bit 5 = Satellite AIS, 1 = Fail Bit 6 = Rx Data Activity, 1 = Activity Bit 7 = Rx AGC Level, 1 = Fail
<1>	Alarm 2	Bit 0 = Buffer Underflow, 1 = Underflow Bit 1 = Buffer Overflow, 1 = Overflow Bit 2 = Buffer Under 10%, 1 = Fail Bit 3 = Buffer Over 90%, 1 = Fail Bit 4 = RS Decoder Lock Fault, 1 = Fail Bit 5 = RS De-Interleaver Fault, 1 = Fail Bit 6 = RS Decoder Uncorrectable Word, 1 = Fail Bit 7 = Demod Summary Fault, 1 = Fail
<1>	Alarm 3	Bit 0 = Rx L-Band Synthesizer Lock, 1 = Lock Bit 1 = Insert DSP Config, 1 = Fail Bit 2 = Buffer Clock PLL Lock Detect, 1 = Lock Bit 3 = Viterbi Decoder Lock, 1 = Lock Bit 4 = Sequential Decoder Lock, 1 = Lock Bit 5 = Rx Test Pattern Lock, 1 = Lock Bit 6 = External Reference PLL Lock, 1 = Lock Bit 7 = Rx Carrier Level, 1 = Fail
<1>	Alarm 4	Bit 0 = Buffer Clock Activity Detect, 1 = Activity Bit 1 = External BNC Activity Detect, 1 = Activity Bit 2 = Rx Satellite Clock Activity Detect, 1 = Activity Bit 3 = Insert Clock Activity Detect, 1 = Activity Bit 4 = External Reference Activity Detect, 1 = Activity Bit 5 = High Stability Reference PLL Activity, 1 = Activity Bit 6 = Reserved Bit 7 = Low EbNo, 1 = Fail
<1>	Common Alarm 1	Bit 0 = -12V Alarm, 1 = Fail Bit 1 = +12V Alarm, 1 = Fail Bit 2 = +5V Alarm, 1 = Fail Bits 3 – 5 = Reserved Bit 6 = IF SYNTH Alarm, 1 = Fail Bit 7 = Spare
<1>	Common Alarm 2	Bit 0 = TERR FPGA Config, 1 = Fail Bit 1 = CODEC FPGA Config, 1 = Fail Bit 2 = CODEC Device Config, 1 = Fail Bit 3 = Reserved Bit 4 = +1.5 V Rx Alarm, 1 = Fail Bit 5 = +1.5 V TX Alarm, 1 = Fail Bit 6 = +3.3 V Alarm, 1 = Fail Bit 7 = +20 V Alarm, 1 = Fail

<1>	Latched Alarm 1	Bit 0 = Receive FPGA/Processor Fault Bit 1 = Carrier Loss Bit 2 = Multiframe Sync Loss Bit 3 = Frame Sync Loss Bit 4 = IBS BER Alarm Bit 5 = Satellite AIS Bit 6 = Rx Data Activity Bit 7 = Rx AGC Level 0 = Not Latched, 1 = Latched
<1>	Latched Alarm 2	Bit 0 = Buffer Underflow Bit 1 = Buffer Overflow Bit 2 = Buffer Under 10% Bit 3 = Buffer Over 90% Bit 4 = RS Decoder Lock Fault Bit 5 = RS De-Interleaver Fault Bit 6 = RS Decoder Uncorrectable Word Bit 7 = Reserved 0 = Not Latched, 1 = Latched
<1>	Latched Alarm 3	Bit 0 = Rx L-Band Synthesizer Lock Bit 1 = Insert DSP Config Bit 2 = Buffer Clock PLL Lock Detect Bit 3 = Viterbi Decoder Lock Bit 4 = Sequential Decoder Lock Bit 5 = Rx Test Pattern Lock Bit 6 = External Reference PLL Lock Bit 7 = Rx Carrier Level 0 = Not Latched, 1 = Latched
<1>	Latched Common Alarm 1	Bit 0 = -12V Alarm Bit 1 = +12V Alarm Bit 2 = +5V Alarm Bits 3 – 5 = Reserved Bit 6 = IF SYNTH Alarm Bit 7 = Spare 0 = Not Latched, 1 = Latched
<1>	Latched Common Alarm 2	Bit 0 = TERR FPGA Config Bit 1 = CODEC FPGA Config Bit 2 = CODEC Device Config Bit 3 = Reserved Bit 4 = +1.5 V Rx Alarm Bit 5 = +1.5 V TX Alarm Bit 6 = +3.3 V Alarm Bit 7 = +20 V Alarm 0 = Not Latched, 1 = Latched
<1>	Backward Alarms	Bit 0 = Backward Alarm 1 IDR Bit 1 = Backward Alarm 2 IDR Bit 2 = Backward Alarm 3 IDR Bit 3 = Backward Alarm 4 IDR Bits 4 - 7 = Reserved 0 = No, 1 = Yes
<4>	Error Counter	Binary value
<4>	Test Error Counter	Binary value
<2>	Raw BER Mantissa	Bytes 1 - 2 = Binary value Raw BER; 896 = 8.96
<2>	Corrected BER Mantissa	Bytes 1 - 2 = Binary value corrected BER

<2>	EbNo	Binary value, 1 decimal point implied; 700 = 7.00
<4>	Offset Frequency	Binary value, 1 Hz steps
<2>	Test BER Mantissa	Bytes 1 - 2 = Binary value test BER
<1>	Raw BER Exponent	Byte 3 = Binary value exponent
<1>	Corrected BER Exponent	Byte 3 = Binary value exponent
<1>	Test BER Exponent	Byte 3 = Binary value exponent
<1>	Offset Frequency Sign	If <> 0, '-' offset
<1>	BER/EbNo Status	Bit 0 = Raw BER and corrected BER status. 1 = Valid Bit 1 = Test BER status. 1 = Valid Bits 2 - 3 = EbNo status, 0 = EbNo is invalid 1 = EbNo is valid, 2 = EbNo is smaller than indicated value, 3 = EbNo is greater than indicated value Bit 4 = BER Counter Overflow. 1 = Overflow Condition Bit 5 = Test BER Counter Overflow 1 = Overflow Condition Bits 6 – 7 = Reserved
<1>	Buffer Percent Full	Binary value representing % buffer full, 0 - 100 in 1% steps
<1>	Input Level	Binary value in 1 dB steps, implied sign
<1>	Insert Status Fault	Bit 0 = Frame lock fault. 1 = Fail Bit 1 = Multiframe lock fault. Valid in E1 PCM-30 and PCM-30C. 1 = Fail Bit 2 = CRC lock fault. Valid in T1ESF, and E1 CRC enabled. 1 = Fail Bits 3 – 7 = Reserved
<1>	Online Flag	Online Switch Status: 0 = Offline, 1 = Online (DMD20 is always online)
<1>	Loss Flag	1 = Loss of Signal, DMD20
<1>	Alarm 5	Bit 0 = Trellis Decoder Lock, 1 = Lock Bit 1 = IFEC Alarm, 1 = fail Bit 2 = T1/E1 Signaling, 1 = Fail Bit 3 = Turbo Decoder Fault, 1 = Fail Bit 4 – 5 = Spares Bit 6 = DVB Frame Lock Fault, 1 = Fail Bit 7 = Spare
<1>	Latched Alarm 4	Bits 0 – 6 = Reserved Bit 7 = Low EbNo 0 = Not Latched, 1 = Latched
<4>	Symbol Rate	Binary value, 1 sps steps
<1>	Latched Alarm 5	Bit 0 = Trellis Decoder Lock Bit 1 = IFEC Alarm Bit 2 = T1/E1 Signaling Bit 3 = Turbo Decoder Fault Bit 4 – 5 = Spares Bit 6 = DVB Frame Lock Fault Bit 7 = Spare 0 = Not Latched, 1 = Latched
<1>	Alarm 6	Bit 0 = LBST LNB DC Current Alarm, 1 = Fail Bit 1 = LBST LNB DC Voltage Alarm, 1 = Fail Bit 2 = Ethernet WAN Alarm, 1 = Fail Bits 3 – 7 = Spares

<1>	Latched Alarm 6	Bit 0 = LBST LNB DC Current Alarm Bit 1 = LBST LNB DC Voltage Alarm Bit 2 = Ethernet WAN Alarm Bits 3 – 7 = Spares 0 = Not Latched, 1 = Latched
<2>	LBST LNB DC Current	Amps, Implied decimal point, 1000 = 1.000A
<2>	LBST LNB DC Voltage	Volts, Implied decimal point, 10 = 1.0V
<2>	Ethernet Bridge PER Mantissa	Bytes 1 - 2 = Binary value of Packet Error Rate
<1>	Ethernet Bridge PER Exponent	Byte 3 = Binary exponent of Packet Error Rate
<4>	Ethernet Bridge Packet Error Count	Binary value
<4>	Ethernet Bridge Packet Total Count	Binary Value
<1>	Ethernet Bridge Port 1 Status	0 = Down, 1 = Unresolved, 2 = 10 Mbps Half, 3 = 100 Mbps Half, 4 = 10 Mbps Full, 5 = 100 Mbps Full, 6 = Port Not Used, 7 = 1000 Mbps Half, 8 = 1000 Mbps Full
<1>	Ethernet Bridge Port 2 Status	0 = Down, 1 = Unresolved, 2 = 10 Mbps Half, 3 = 100 Mbps Half, 4 = 10 Mbps Full, 5 = 100 Mbps Full, 6 = Port Not Used, 7 = 1000 Mbps Half, 8 = 1000 Mbps Full
<1>	Ethernet Bridge Port 3 Status	0 = Down, 1 = Unresolved, 2 = 10 Mbps Half, 3 = 100 Mbps Half, 4 = 10 Mbps Full, 5 = 100 Mbps Full, 6 = Port Not Used, 7 = 1000 Mbps Half, 8 = 1000 Mbps Full
<1>	Ethernet Bridge Port 4 Status	0 = Down, 1 = Unresolved, 2 = 10 Mbps Half, 3 = 100 Mbps Half, 4 = 10 Mbps Full, 5 = 100 Mbps Full, 6 = Port Not Used, 7 = 1000 Mbps Half, 8 = 1000 Mbps Full
<1>	Ethernet Bridge WAN Status	0 = Down, 1 = Unresolved, 2 = 10 Mbps Half, 3 = 100 Mbps Half, 4 = 10 Mbps Full, 5 = 100 Mbps Full, 6 = Port Not Used, 7 = 1000 Mbps Half, 8 = 1000 Mbps Full

Opcode: <2406h> Query a Demodulator's Latched Alarms

Query Response		
<1>	Latched Alarm 1	Bit 0 = Receive FPGA/Processor Fault Bit 1 = Carrier Loss Bit 2 = Multiframe Sync Loss Bit 3 = Frame Sync Loss Bit 4 = IBS BER Alarm Bit 5 = Satellite AIS Bit 6 = Rx Data Activity Bit 7 = Rx AGC Level 0 = Not Latched, 1 = Latched
<1>	Latched Alarm 2	Bit 0 = Buffer Underflow Bit 1 = Buffer Overflow Bit 2 = Buffer Under 10% Bit 3 = Buffer Over 90% Bit 4 = RS Decoder Lock Fault Bit 5 = RS De-Interleaver Fault Bit 6 = RS Decoder Uncorrectable Word Bit 7 = Reserved 0 = Not Latched, 1 = Latched

<1>	Latched Alarm 3	Bit 0 = Rx L-Band Synthesizer Lock Bit 1 = Insert DSP Config Bit 2 = Buffer Clock PLL Lock Detect Bit 3 = Viterbi Decoder Lock Bit 4 = Sequential Decoder Lock Bit 5 = Rx Test Pattern Lock Bit 6 = External Reference PLL Lock Bit 7 = Rx Carrier Level 0 = Not Latched, 1 = Latched
<1>	Latched Common Alarm 1	Bit 0 = -12V Alarm Bit 1 = +12V Alarm Bit 2 = +5V Alarm Bits 3 – 5 = Reserved Bit 6 = IF SYNTH Alarm Bit 7 = Spare 0 = Not Latched, 1 = Latched
<1>	Latched Common Alarm 2	Bit 0 = TERR FPGA Config Bit 1 = CODEC FPGA Config Bit 2 = CODEC Device Config Bit 3 = Reserved Bit 4 = +1.5 V Rx Alarm Bit 5 = +1.5 V TX Alarm Bit 6 = +3.3 V Alarm Bit 7 = +20 V Alarm 0 = Not Latched, 1 = Latched
<1>	Latched Alarm 4	Bits 0 – 6 = Reserved Bit 7 = Low EbNo 0 = Not Latched, 1 = Latched
<1>	Latched Alarm 5	Bit 0 = Trellis Decoder Lock Bit 1 = IFEC Alarm Bit 2 = T1/E1 Signaling Bit 3 = Turbo Decoder Fault Bit 4 – 5 = Spares Bit 6 = DVB Frame Lock Fault Bit 7 = Spare 0 = Not Latched, 1 = Latched
<1>	Latched Alarm 6	Bit 0 = LBST LNB DC Current Alarm Bit 1 = LBST LNB DC Voltage Alarm Bit 2 = Ethernet WAN Alarm Bits 3 – 7 = Spares 0 = Not Latched, 1 = Latched

Opcode: <2409h> Query a Demodulator's Current Alarms

Query Response		
<1>	Alarm 1	Bit 0 = Receive FPGA/Processor Fault, 1 = Fail Bit 1 = Carrier Loss, 1 = Fail Bit 2 = Multiframe Sync Loss, 1 = Fail Bit 3 = Frame Sync Loss, 1 = Fail Bit 4 = IBS BER Alarm, 1 = Fail Bit 5 = Satellite AIS, 1 = Fail Bit 6 = Rx Data Activity, 1 = Activity Bit 7 = Rx AGC Level, 1 = Fail
<1>	Alarm 2	Bit 0 = Buffer Underflow, 1 = Underflow Bit 1 = Buffer Overflow, 1 = Overflow

		Bit 2 = Buffer Under 10%, 1 = Fail Bit 3 = Buffer Over 90%, 1 = Fail Bit 4 = RS Decoder Lock Fault, 1 = Fail Bit 5 = RS De-Interleaver Fault, 1 = Fail Bit 6 = RS Decoder Uncorrectable Word, 1 = Fail Bit 7 = Demod Summary Fault, 1 = Fail
<1>	Alarm 3	Bit 0 = Rx L-Band Synthesizer Lock, 1 = Lock Bit 1 = Insert DSP Config, 1 = Fail Bit 2 = Buffer Clock PLL Lock Detect, 1 = Lock Bit 3 = Viterbi Decoder Lock, 1 = Lock Bit 4 = Sequential Decoder Lock, 1 = Lock Bit 5 = Rx Test Pattern Lock, 1 = Lock Bit 6 = External Reference PLL Lock, 1 = Lock Bit 7 = Rx Carrier Level, 1 = Fail
<1>	Alarm 4	Bit 0 = Buffer Clock Activity Detect, 1 = Activity Bit 1 = External BNC Activity Detect, 1 = Activity Bit 2 = Rx Satellite Clock Activity Detect, 1 = Activity Bit 3 = Insert Clock Activity Detect, 1 = Activity Bit 4 = External Reference Activity Detect, 1 = Activity Bit 5 = High Stability Reference PLL Activity, 1 = Activity Bit 6 = Reserved Bit 7 = Low EbNo, 1 = Fail
<1>	Insert Status Fault	Bit 0 = Frame lock fault. 1 = Fail Bit 1 = Multiframe lock fault. Valid in E1 PCM-30 and PCM-30C. 1 = Fail Bit 2 = CRC lock fault. Valid in T1ESF, and E1 CRC enabled. 1 = Fail Bits 3 – 7 = Reserved
<1>	Common Alarm 1	Bit 0 = -12V Alarm, 1 = Fail Bit 1 = +12V Alarm, 1 = Fail Bit 2 = +5V Alarm, 1 = Fail Bits 3 – 5 = Reserved Bit 6 = IF SYNTH Alarm, 1 = Fail Bit 7 = Spare
<1>	Common Alarm 2	Bit 0 = TERR FPGA Config, 1 = Fail Bit 1 = CODEC FPGA Config, 1 = Fail Bit 2 = CODEC Device Config, 1 = Fail Bit 3 = Reserved Bit 4 = +1.5 V Rx Alarm, 1 = Fail Bit 5 = +1.5 V TX Alarm, 1 = Fail Bit 6 = +3.3 V Alarm, 1 = Fail Bit 7 = +20 V Alarm, 1 = Fail
<1>	Alarm 5	Bit 0 = Trellis Decoder Lock, 1 = Lock Bit 1 = IFEC Alarm, 1 = fail Bit 2 = T1/E1 Signaling, 1 = Fail Bit 3 = Turbo Decoder Fault, 1 = Fail Bit 4 – 5 = Spares Bit 6 = DVB Frame Lock Fault, 1 = Fail Bit 7 = Spare
<1>	Alarm 6	Bit 0 = LBST LNB DC Current Alarm, 1 = Fail Bit 1 = LBST LNB DC Voltage Alarm, 1 = Fail Bit 2 = Ethernet WAN Alarm, 1 = Fail Bits 3 – 7 = Spares

Opcode: <2452h> Query a Demodulator's Async Configuration

Query Response		
<1>	ES Mode	0 = Normal, 1 = Enhanced
<1>	ES Type	0 = RS-232, 1 = RS-485
<1>	ES Baud	0 =150, 1 = 300, 2 = 600, 3 = 1200, 4 = 2400, 5= 4800, 6 = 9600, 7 = 19200, 8 = 38400, 9 = 57600, 10 = 115200
<1>	ES Data Bits	0 = 7 Bits, 1 = 8 Bits

Opcode: <2494h> Query Demodulator's Ethernet Terrestrial Interface Packet Status

Query Response		
<2>	Ethernet Bridge PER Mantissa	Bytes 1 - 2 = Binary value of Packet Error Rate
<1>	Ethernet Bridge PER Exponent	Byte 3 = Binary exponent of Packet Error Rate
<4>	Ethernet Bridge Packet Error Count	Binary value
<4>	Ethernet Bridge Packet Total Count	Binary Value
<1>	Ethernet Bridge Port 1 Status	0 = Down, 1 = Unresolved, 2 = 10 Mbps Half, 3 = 100 Mbps Half, 4 = 10 Mbps Full, 5 = 100 Mbps Full, 6 = Port Not Used, 7 = 1000 Mbps Half, 8 = 1000 Mbps Full
<1>	Ethernet Bridge Port 2 Status	0 = Down, 1 = Unresolved, 2 = 10 Mbps Half, 3 = 100 Mbps Half, 4 = 10 Mbps Full, 5 = 100 Mbps Full, 6 = Port Not Used, 7 = 1000 Mbps Half, 8 = 1000 Mbps Full
<1>	Ethernet Bridge Port 3 Status	0 = Down, 1 = Unresolved, 2 = 10 Mbps Half, 3 = 100 Mbps Half, 4 = 10 Mbps Full, 5 = 100 Mbps Full, 6 = Port Not Used, 7 = 1000 Mbps Half, 8 = 1000 Mbps Full
<1>	Ethernet Bridge Port 4 Status	0 = Down, 1 = Unresolved, 2 = 10 Mbps Half, 3 = 100 Mbps Half, 4 = 10 Mbps Full, 5 = 100 Mbps Full, 6 = Port Not Used, 7 = 1000 Mbps Half, 8 = 1000 Mbps Full
<1>	Ethernet Bridge WAN Status	0 = Down, 1 = Unresolved, 2 = 10 Mbps Half, 3 = 100 Mbps Half, 4 = 10 Mbps Full, 5 = 100 Mbps Full, 6 = Port Not Used, 7 = 1000 Mbps Half, 8 = 1000 Mbps Full

Opcode: <2A00h> Command a Demodulator's Configuration

<1>	Network Spec	0 = Closed Net, 1 = IDR, 2 = IBS, 3 = D & I, 5 = DVB SAT, 11 = MIL-188-165A
<4>	Frequency	Selects the IF Frequency in Hz, IF Range = 50 MHz to 180 MHz, L-Band Range = 950 MHz to 2050 MHz
<2>	Sweep Delay	Binary value, 0.1 second steps, Implied decimal point, 0 – 65535 (0.0 sec to 6553.5 sec)
<4>	Data Rate	Binary value, 1 bps steps 2.4 Kbps to 20 Mbps for DMD20 2.4 Kbps to 52 Mbps for DMD2050 and DMD50
<1>	Sweep Boundary	Sweep limits. Max of ± 255 kHz in kHz steps 0 - 255
<1>	Input Level Limit	Lower level limit, binary value, 1 dB steps, and Implied sign. 30 to 90 (-30 to –90 dBm)
<2>	Strap Code	Binary value
<1>	Filter Mask	0 = INTELSAT 0.35, 18 = MIL-188-165A, 20 = DVB 0.20, 25 = DVB 0.25, 35 = DVB 0.35
<1>	Demodulation Type	0 = QPSK, 1 = BPSK, 2 = 8PSK, 3 = 16QAM, 4 = OQPSK
<1>	Convolutional	0 = None, 1 = Viterbi ½, 2 = Viterbi 2/3 (DVB Only), 3 = Viterbi

	Decoder	¾, 4 = Viterbi 5/6 (DVB Only), 5 = Viterbi 7/8, 6 = Reserved, 7 = Sequential ½, 8 = Reserved, 9 = Sequential ¾, 10 = Reserved, 11 = Sequential 7/8, 12 = Reserved, 13 = Reserved, 14 = Trellis 2/3, 15 = Trellis ¾ (DVB - 16QAM Only), 16 = Trellis 5/6 (DVB - 8PSK Only), 17 = Trellis 7/8 (DVB - 16QAM Only), 18 = Trellis 8/9 (DVB - 8PSK Only), 19 = ComStream 3/4 SEQ, 20 = TPC .793 2D, 21 = TPC .495 3D, 22 = Reserved, 23 = TPC ½, 24 = TPC ¾, 25 = TPC 7/8, 26 = TPC 21/44, 27 = TPC 750, 28 = TPC 875, 29 = TPC 288
<1>	Reed Solomon	0 = Disable, 1 = Enable
<1>	Differential Decoder	0 = Disable, 1 = Enable
<1>	Descrambler Control	0 = Disable, 1 = Enable
<1>	Descrambler Type	0 = None, 1 = IBS, 2 = V35_IESS, 3 = V35_CCITT, 4 = V35_EFDATA, 5 = V35_FAIRCHILD, 6 = OM-73, 7 = RS, 8 = V35_EFRS, 9 = TPC, 10 = DVB, 11 = EDMAC, 12 = TPC and IBS, 13 = TPC and EDMAC, 14 = V35_ComStream
<1>	Spectrum	0 = Normal, 1 = Inverted
<1>	Buffer Size Msec	Indicates buffer size in msecs, 0 through 64
<1>	Active Buffer Clock Source	0 = SCTE, 1 = SCT, 2 = EXT BNC, 3 = RX SAT, 4 = EXT IDI
<1>	Buffer Clock Polarity	0 = Normal, 1 = Inverted
<1>	Insert Mode	0 = Disabled, 1 = T1-D4, 2 = T1-ESF, 3 = PCM-30, 4 = PCM-30C, 5 = PCM-31, 6 = PCM-31C, 7 = SLC-96, 8 = T1 D4 S, 9 = T1 ESF S
<1>	T1E1 Frame Source	0 = Internal, 1 = External, 2 = IDI/DDO Loopback
<30>	Insert Map	Timeslots to insert organized by satellite channel (Mapping of Satellite channels 1 thru 30 to inserted Terrestrial Timeslots (Terrestrial Timeslots = 1..31) (0 = Insert None))
<1>	Satellite Framing	0 = No Framing, 1 = 96K IDR, 2 = 1/15 IBS, 3 = EF AUPC 1/15, 4 = DVB, 5 = EDMAC, 6 = SCC, 7 = 96K, 8 = Efficient D&I
<1>	RX Test Pattern	0 = None, 1 = 2047 test, 2 = 2^15-1, 3 = 2^23-1
<1>	Map Summary To Backward Alarm	0 = None, 1 = BK1, 2 = BK2, 3 = BK1 & 2, 4 = BK3, 5 = BK1 & 3, 6 = BK2 & 3, 7 = BK1, 2 & 3, 8 = BK4, 9 = BK1 & 4, 10 = BK2 & 4, 11 = BK1, 2 & 4, 12 = BK3 & 4, 13 = BK1, 3 & 4, 14 = BK2, 3 & 4, 15 = BK1, 2, 3 & 4
<1>	Force Alarm Test	0 = None, 1 = Send the Alarm Bit 0 = Rx Major Alarm Bits 1 - 7 = Spares
<1>	Alarm 1 Mask	Bit 0 = Receive FPGA/Processor Fault Bit 1 = Carrier Loss Bit 2 = Multiframe Sync Loss Bit 3 = Frame Sync Loss Bit 4 = IBS BER Alarm Bit 5 = Satellite AIS Bit 6 = Rx Data Activity Bit 7 = Rx AGC Level 0 = Mask, 1 = Allow
<1>	Alarm 2 Mask	Bit 0 = Buffer Underflow Bit 1 = Buffer Overflow Bit 2 = Buffer Under 10% Bit 3 = Buffer Over 90% Bit 4 = RS Decoder Lock Fault

		Bit 5 = RS De-Interleaver Fault Bit 6 = RS Decoder Uncorrectable Word Bit 7 = Reserved 0 = Mask, 1 = Allow
<1>	Alarm 3 Mask	Bit 0 = Rx L-Band Synthesizer Lock Bit 1 = Insert DSP Config Bit 2 = Buffer Clock PLL Lock Detect Bit 3 = Viterbi Decoder Lock Bit 4 = Sequential Decoder Lock Bit 5 = Rx Test Pattern Lock Bit 6 = External Reference PLL Lock Bit 7 = Rx Carrier Level 0 = Mask, 1 = Allow
<1>	Alarm 4 Mask	Bit 0 = Buffer Clock Activity Detect Bit 1 = External BNC Activity Detect Bit 2 = Rx Satellite Clock Activity Detect Bit 3 = Insert Clock Activity Detect Bit 4 = External Reference Activity Detect Bit 5 = High Stability Reference PLL Activity Bit 6 = Reserved Bit 7 = Low EbNo 0 = Mask, 1 = Allow
<1>	Common Alarm 1 Mask	Bit 0 = -12V Alarm Bit 1 = +12V Alarm Bit 2 = +5V Alarm Bits 3 – 5 = Reserved Bit 6 = IF SYNTH Alarm Bit 7 = Spare 0 = Mask, 1 = Allow
<1>	Common Alarm 2 Mask	Bit 0 = TERR FPGA Config Bit 1 = CODEC FPGA Config Bit 2 = CODEC Device Config Bit 3 = Reserved Bit 4 = +1.5 V Rx Alarm Bit 5 = +1.5 V TX Alarm Bit 6 = +3.3 V Alarm Bit 7 = +20 V Alarm 0 = Mask, 1 = Allow
<1>	ESC Channel 1 Volume	Binary value, valid in IDR only, +10 dBm to –20 dBm (two's compliment)
<1>	ESC Channel 2 Volume	Binary value, valid in IDR only, +10 dBm to –20 dBm (two's compliment)
<1>	BER Exponent	6 through 9 for Viterbi, 5 through 7 for Sequential
<11>	Rx Circuit ID	11 ASCII characters, null terminated
<1>	Rx Terrestrial Loopback	0 = Disabled, 1 = Enabled
<1>	Rx Baseband Loopback	0 = Disabled, 1 = Enabled
<1>	Rx IF Loopback	0 = Disabled, 1 = Enabled
<1>	Rx Interface Type	0 = G703-B-T1 AMI, 1 = G703-B-T1_B8ZS, 2 = G703-B-E1, 3 = G703-B-T2, 4 = G703-U-E1, 5 = G703-U-T2, 6 = G703-U-E2, 7 = RS-422, 8 = V.35, 9 = RS-232, 10 = HSSI, 11 = ASI, 12 = Advanced ASI, 13 = M2P, 14 = DVB, 24 = Ethernet Bridge, 25 = MIL-188-114A, 26 = RS423, 27 = Eurocomm 256,

		28= Eurocomm 512, 29 = Eurocomm 1024, 30 = Eurocomm 2048, 31 = G.703-U-T3, 32 = G.703-U-E3, 33 = G.703-U-STS1
<1>	Insert Status Mask	Bit 0 = Frame lock Bit 1 = Multiframe lock. Valid in E1 PCM-30 and PCM-30C Bit 2 = CRC lock. Valid in T1ESF, and E1 CRC enabled Bits 3 – 7 = Reserved 0 = Mask, 1 = Allow
<1>	Rx RS N Code	2 - 255 Reed-Solomon code word length
<1>	Rx RS K Code	1 - 254 Reed-Solomon message length
<1>	Rx RS Depth	4, 8, or 12
<1>	External Clock Source	Reserved
<1>	Data Invert	0 = None, 1 = Terrestrial, 2 = Baseband, 3 = Terrestrial and Baseband
<1>	Alarm 5 Mask	Bit 0 = Trellis Decoder Lock Bit 1 = IFEC Alarm Bit 2 = T1/E1 Signaling Bit 3 = Turbo Decoder Fault Bit 4 – 5 = Spares Bit 6 = DVB Frame Lock Fault Bit 7 = Spare ***0 = Mask, 1 = Allow***
<1>	BPSK Symbol Pairing	0 = Normal, 1 = Swapped
<1>	ES Mode	0 = Normal, 1 = Enhanced
<1>	ES Type	0 = RS-232, 1 = RS-485
<1>	ES Baud	0 =150, 1 = 300, 2 = 600, 3 = 1200, 4 = 2400, 5= 4800, 6 = 9600, 7 = 19200, 8 = 38400, 9 = 57600, 10 = 115200
<1>	ES Data Bits	0 = 7 Bits, 1 = 8 Bits
<1>	IDR Overhead Type	0 = 32K Voice, 1 = 64K Data
<1>	FM Orderwire Mode	Reserved
<1>	TMT Pattern Length	Reserved
<1>	EbNo Threshold	Unsigned Binary Value, 0-99, Implied Decimal Point (0.0 through 9.9 dB)
<2>	Reacquisition Sweep Limit	Binary value, 1 Hz steps, 0 - 65535
<1>	Terrestrial Streaming	0 = Continuous, 1 = Burst
<1>	Terrestrial Framing	0 = DVB 188, 1 = DVB 204, 2 = NONE
<1>	Alarm 6 Mask	Bit 0 = LBST LNB DC Current Alarm Bit 1 = LBST LNB DC Voltage Alarm Bit 2 = Ethernet WAN Alarm Bits 3 – 7 = Spares 0 = Mask, 1 = Allow
<1>	TPC De-Interleaver	0 = Disable, 1 = Enable
<1>	SCC Control Ratio	1 = 1/1, 2 = 1/2, 3 = 1/3, 4 = 1/4, 5 = 1/5, 6 = 1/6, 7 = 1/7
<4>	SCC In band Rate	300 to 200000 bps
<1>	Fast Acquisition	0 = Disabled, 1 = Enabled
<1>	Adjacent Carrier Type	0 = Normal, 1 = High Power
<2>	LBST LNB DC Voltage Alarm Lower Threshold	Volts, Implied decimal point, 10 = 1.0V (00.0 V to 55.0 V)

<2>	LBST LNB DC Voltage Alarm Upper Threshold	Volts, Implied decimal point, 10 = 1.0V (00.0 V to 55.0 V)
<2>	LBST LNB DC Current Alarm Lower Threshold	Amps, Implied decimal point, 1000 = 1.000A (0.000 A to 8.000 A)
<2>	LBST LNB DC Current Alarm Upper Threshold	Amps, Implied decimal point, 1000 = 1.000A (0.000 A to 8.000 A)
<1>	Number of Buffer Clock Sources	1 - 5
<1>	First Buffer Clock Source	0 = SCTE, 1 = SCT, 2 = EXT BNC, 3 = RX SAT, 4 = EXT IDI Each buffer clock source must be unique
<1>	Second Buffer Clock Source	0 = SCTE, 1 = SCT, 2 = EXT BNC, 3 = RX SAT, 4 = EXT IDI Each buffer clock source must be unique
<1>	Third Buffer Clock Source	0 = SCTE, 1 = SCT, 2 = EXT BNC, 3 = RX SAT, 4 = EXT IDI Each buffer clock source must be unique
<1>	Forth Buffer Clock Source	0 = SCTE, 1 = SCT, 2 = EXT BNC, 3 = RX SAT, 4 = EXT IDI Each buffer clock source must be unique
<1>	Fifth Buffer Clock Source	0 = SCTE, 1 = SCT, 2 = EXT BNC, 3 = RX SAT, 4 = EXT IDI Each buffer clock source must be unique
<1>	Asynchronous In-Band Rate	0 =150, 1 = 300, 2 = 600, 3 = 1200, 4 = 2400, 5= 4800, 6 = 9600, 7 = 19200, 8 = 38400, 9 = 57600, 10 = 115200
<2>	Rotation Ambiguity	0 = 0.0.0, 1 = 0.0.1, 2 = 0.1.0, 3 = 0.1.1, 4 = 1.0.0, 5 = 1.0.1, 6 = 1.1.0, 7 = 1.1.1

Opcode: <2A01h> Command a Demodulator's Frequency

<4>	Frequency	Selects the IF Frequency in Hz, IF Range = 50 MHz to 180 MHz, L-Band Range = 950 MHz to 2050 MHz

Opcode: <2A02h> Command a Demodulator's Data Rate

<4>	Data Rate	Binary value, 1 bps steps 2.4 Kbps to 20 Mbps for DMD20 2.4 Kbps to 52 Mbps for DMD2050 and DMD50

Opcode: <2A03h> Command a Demodulator's Strap Code

<2>	Strap Code	Binary value

Opcode: <2A04h> Command a Demodulator's Sweep Boundary

<1>	Sweep Boundary	Sweep limits. Max of ± 255 kHz in kHz steps 0 - 255

Opcode: <2A05h> Command a Demodulator's Sweep Delay

<2>	Sweep Delay	Binary value, 0.1 second steps, Implied decimal point, 0 – 65535 (0.0 sec to 6553.5 sec)

Opcode: <2A07h> Command a Demodulator's Demodulation Type

<1>	Demodulation Type	0 = QPSK, 1 = BPSK, 2 = 8PSK, 3 = 16QAM, 4 = OQPSK

Opcode: <2A08h> Command a Demodulator's Convolutional Decoder

<1>	Convolutional Decoder	0 = None, 1 = Viterbi ½, 2 = Viterbi 2/3 (DVB Only), 3 = Viterbi ¾, 4 = Viterbi 5/6 (DVB Only), 5 = Viterbi 7/8, 6 = Reserved, 7 = Sequential ½, 8 = Reserved, 9 = Sequential ¾, 10 =

		Reserved, 11 = Sequential 7/8, 12 = Reserved, 13 = Reserved, 14 = Trellis 2/3, 15 = Trellis ¾ (DVB - 16QAM Only), 16 = Trellis 5/6 (DVB - 8PSK Only), 17 = Trellis 7/8 (DVB - 16QAM Only), 18 = Trellis 8/9 (DVB - 8PSK Only), 19 = ComStream 3/4 SEQ, 20 = TPC .793 2D, 21 = TPC .495 3D, 22 = Reserved, 23 = TPC ½, 24 = TPC ¾, 25 = TPC 7/8, 26 = TPC 21/44, 27 = TPC 750, 28 = TPC 875, 29 = TPC 288

Opcode: <2A09h> Command a Demodulator's Differential Decoder

<1>	Differential Decoder	0 = Disable, 1 = Enable

Opcode: <2A0Ah> Command a Demodulator's Reed-Solomon

<1>	Reed Solomon	0 = Disable, 1 = Enable

Opcode: <2A0Bh> Command a Demodulator's Network Specification

<1>	Network Spec	0 = Closed Net., 1 = IDR, 2 = IBS, 3 = D & I, 5 = DVB SAT, 11 = MIL-188-165A

Opcode: <2A0Ch> Command a Demodulator's Filter Mask

<1>	Filter Mask	0 = INTELSAT 0.35, 18 = MIL-188-165A, 20 = DVB 0.20, 25 = DVB 0.25, 35 = DVB 0.35

Opcode: <2A0Dh> Command a Demodulator's Descrambler Control

<1>	Descrambler Control	0 = Disable, 1 = Enable

Opcode: <2A0Eh> Command a Demodulator's Descrambler Type

<1>	Descrambler Type	0 = None, 1 = IBS, 2 = V35_IESS, 3 = V35_CCITT, 4 = V35_EFDATA, 5 = V35_FAIRCHILD, 6 = OM-73, 7 = RS, 8 = V35_EFRS, 9 = TPC, 10 = DVB, 11 = EDMAC, 12 = TPC and IBS, 13 = TPC and EDMAC, 14 = V35_ComStream

Opcode: <2A0Fh> Command a Demodulator's Spectrum

<1>	Spectrum	0 = Normal, 1 = Inverted

Opcode: <2A10h> Command a Demodulator's Buffer Size

<1>	Buffer Size Msec	Indicates buffer size in msecs, 0 through 64

Opcode: <2A11h> Command a Demodulator's Buffer Clock

<1>	Active Buffer Clock Source	0 = SCTE, 1 = SCT, 2 = EXT BNC, 3 = RX SAT, 4 = EXT IDI
<1>	Number of Buffer Clock Sources	1 – 5
<1>	First Buffer Clock Source	0 = SCTE, 1 = SCT, 2 = EXT BNC, 3 = RX SAT, 4 = EXT IDI Each buffer clock source must be unique
<1>	Second Buffer Clock Source	0 = SCTE, 1 = SCT, 2 = EXT BNC, 3 = RX SAT, 4 = EXT IDI Each buffer clock source must be unique
<1>	Third Buffer Clock Source	0 = SCTE, 1 = SCT, 2 = EXT BNC, 3 = RX SAT, 4 = EXT IDI Each buffer clock source must be unique
<1>	Forth Buffer Clock Source	0 = SCTE, 1 = SCT, 2 = EXT BNC, 3 = RX SAT, 4 = EXT IDI Each buffer clock source must be unique
<1>	Fifth Buffer Clock Source	0 = SCTE, 1 = SCT, 2 = EXT BNC, 3 = RX SAT, 4 = EXT IDI Each buffer clock source must be unique

Opcode: <2A12h> Command a Demodulator's Buffer Clock Polarity

<1>	Buffer Clock Polarity	0 = Normal, 1 = Inverted

Opcode: <2A13h> Command a Demodulator's Insert Mode

<1>	Insert Mode	0 = Disabled, 1 = T1-D4, 2 = T1-ESF, 3 = PCM-30, 4 = PCM-30C, 5 = PCM-31, 6 = PCM-31C, 7 = SLC-96, 8 = T1 D4 S, 9 = T1 ESF S

Opcode: <2A15h> Command a Demodulator's T1E1 Frame Source

<1>	T1E1 Frame Source	0 = Internal, 1 = External, 2 = IDI/DDO Loopback

Opcode: <2A16h> Command a Demodulator's Satellite Framing

<1>	Satellite Framing	0 = No Framing, 1 = 96K IDR, 2 = 1/15 IBS, 3 = EF AUPC 1/15, 4 = DVB, 5 = EDMAC, 6 = SCC, 7 = 96K, 8 = Efficient D&I

Opcode: <2A17h> Command a Demodulator's Test Pattern

<1>	RX Test Pattern	0 = None, 1 = 2047 test, 2 = 2^15-1, 3 = 2^23-1

Opcode: <2A18h> Command Map Summary to Backward Alarm

<1>	Map Summary To Backward Alarm	0 = None, 1 = BK1, 2 = BK2, 3 = BK1 & 2, 4 = BK3, 5 = BK1 & 3, 6 = BK2 & 3, 7 = BK1, 2 & 3, 8 = BK4, 9 = BK1 & 4, 10 = BK2 & 4, 11 = BK1, 2 & 4, 12 = BK3 & 4, 13 = BK1, 3 & 4, 14 = BK2, 3 & 4, 15 = BK1, 2, 3 & 4

Opcode: <2A1Ah> Command a Demodulator's BER Exponent

<1>	BER Exponent	6 - 9 for Viterbi, 5 - 7 for Sequential

Opcode: <2A1Bh> Command a Demodulator's Circuit ID

<11>	Rx Circuit ID	11 ASCII characters, null terminated

Opcode: <2A1Ch> Command a Demodulator's Terrestrial Loopback

<1>	Rx Terrestrial Loopback	0 = Disabled, 1 = Enabled

Opcode: <2A1Dh> Command a Demodulator's Baseband Loopback

<1>	Rx Baseband Loopback	0 = Disabled, 1 = Enabled

Opcode: <2A1Eh> Command a Demodulator's IF Loopback

<1>	Rx IF Loopback	0 = Disabled, 1 = Enabled

Opcode: <2A1Fh> Command a Demodulator's Interface Type

<1>	Rx Interface Type	0 = G703-B-T1 AMI, 1 = G703-B-T1_B8ZS, 2 = G703-B-E1, 3 = G703-B-T2, 4 = G703-U-E1, 5 = G703-U-T2, 6 = G703-U-E2, 7 = RS-422, 8 = V.35, 9 = RS-232, 10 = HSSI, 11 = ASI, 12 = Advanced ASI, 13 = M2P, 14 = DVB, 24 = Ethernet Bridge, 25 = MIL-188-114A, 26 = RS423, 27 = Eurocomm 256, 28= Eurocomm 512, 29 = Eurocomm 1024, 30 = Eurocomm 2048, 31 = G.703-U-T3, 32 = G.703-U-E3, 33 = G.703-U-STS1

Opcode: <2A20h> Command Center Buffer (No Parameters)

Opcode: <2A21h> Command a Demodulator's Data Invert

<1>	Data Invert	0 = None, 1 = Terrestrial, 2 = Baseband, 3 = Terrestrial and Baseband

Opcode: <2A22h> Command Force Demodulator Alarm Test

<1>	Force Alarm Test	Bit 0 = Rx Major Alarm Bits 1 – 7 = Spares 0 = Do not force, 1 = Force

Opcode: <2A23h> Command External EXC Source

<1>	External EXC Source	Reserved

Opcode: <2A24h> Clear Demodulator Latched Alarm 1 (No Data)

Opcode: <2A25h> Clear Demodulator Latched Alarm 2 (No Data)

Opcode: <2A26h> Clear Demodulator Latched Alarm 3 (No Data)

Opcode: <2A2Fh> Command Demodulator Reacquisition Boundary

<2>	Reacquisition Sweep Limit	Binary value, 1 Hz steps, 0 - 65535

Opcode: <2A32h> Command a demodulator's Reed Solomon N & K Codes and Interleaver Depth

<1>	Rx RS N Code	2 - 255 Reed-Solomon code word length
<1>	Rx RS K Code	1 - 254 Reed-Solomon message length
<1>	Rx RS Depth	4, 8 or 12 Reed Solomon Interleaver Depth

Opcode: <2A34h> Command Demodulator TPC Interleaver

<1>	TPC Interleaver	0 = Disable, 1 = Enable

Opcode: <2A35h> Command Demodulator Async Configuration

<1>	ES Mode	0 = Normal, 1 = Enhanced
<1>	ES Type	0 = RS-232, 1 = RS-485
<1>	ES Baud	0 =150, 1 = 300, 2 = 600, 3 = 1200, 4 = 2400, 5= 4800, 6 = 9600, 7 = 19200, 8 = 38400, 9 = 57600, 10 = 115200
<1>	ES Data Bits	0 = 7 Bits, 1 = 8 Bits

Opcode: <2A36h> Command a Demodulator's Fast Acquisition

<1>	Fast Acquisition	0 = Disabled, 1 = Enabled

Opcode: <2A37h> Command Clear Demodulator Ethernet Terrestrial Interface Packet Status (No Parameters)

1.4.3 Modem Queries & Commands

Opcode: <2403h> Query a Modem's Identification

Query Response		
<1>	Modem ID	DMD20 Modulator = 20, DMD20 Demodulator = 21, DMD20 Modem = 22

Opcode: <2404h> Query a Modem's Control Mode

Query Response		
<1>	Modem control mode	0 = Front Panel, 1 = Terminal, 2 = Computer Note: DMD20 will always return 2 = Computer

Opcode: <2407h> Query a Modem's Latched Alarms

Query Response		
<1>	Mod Latched Alarm 1	Bit 0 = Transmit FPGA/Processor Fault Bit 1 = Drop DSP Bit 2 = Transmit Symbol Clock PLL Lock Bit 3 = Reserved Bit 4 = Transmit L-Band Synthesizer Lock Bits 5 -7 = Reserved 0 = Not Latched, 1 = Latched
<1>	Demod Latched Alarm 1	Bit 0 = Receive FPGA/Processor Fault Bit 1 = Carrier Loss Bit 2 = Multiframe Sync Loss Bit 3 = Frame Sync Loss Bit 4 = IBS BER Alarm Bit 5 = Satellite AIS Bit 6 = Rx Data Activity Bit 7 = Rx AGC Level ***0 = Not Latched, 1 = Latched***
<1>	Demod Latched Alarm 2	Bit 0 = Buffer Underflow Bit 1 = Buffer Overflow Bit 2 = Buffer Under 10% Bit 3 = Buffer Over 90% Bit 4 = RS Decoder Lock Fault Bit 5 = RS De-Interleaver Fault Bit 6 = RS Decoder Uncorrectable Word Bit 7 = Reserved ***0 = Not Latched, 1 = Latched***
<1>	Demod Latched Alarm 3	Bit 0 = Rx L-Band Synthesizer Lock Bit 1 = Insert DSP Config Bit 2 = Buffer Clock PLL Lock Detect Bit 3 = Viterbi Decoder Lock Bit 4 = Sequential Decoder Lock Bit 5 = Rx Test Pattern Lock Bit 6 = External Reference PLL Lock Bit 7 = Rx Carrier Level ***0 = Not Latched, 1 = Latched***
<1>	Latched Common Alarm 1	Bit 0 = -12V Alarm Bit 1 = +12V Alarm Bit 2 = +5V Alarm Bits 3 – 5 = Reserved Bit 6 = IF SYNTH Alarm Bit 7 = Spare ***0 = Not Latched, 1 = Latched***
<1>	Latched Common Alarm 2	Bit 0 = TERR FPGA Config Bit 1 = CODEC FPGA Config Bit 2 = CODEC Device Config Bit 3 = Reserved

		Bit 4 = +1.5 V Rx Alarm Bit 5 = +1.5 V TX Alarm Bit 6 = +3.3 V Alarm Bit 7 = +20 V Alarm ***0 = Not Latched, 1 = Latched***
<1>	Mod Latched Alarm 2	Bit 0 = Terrestrial Clock Activity Detect Bit 1 = Internal Clock Activity Detect Bit 2 = Tx Sat Clock Activity Detect Bit 3 = Tx Data Activity Detect Bit 4 = Terrestrial AIS. Tx Data AIS Detect Bit 5 = Tx Clock Fallback Bit 6 = DVB Frame Lock Fault Bit 7 = Spare ***0 = Not Latched, 1 = Latched***
<1>	Mod Latched Alarm 4	Bit 0 = LBST BUC DC Current Alarm Bit 1 = LBST BUC DC Voltage Alarm Bit 2 = Ethernet WAN Alarm Bit 3 = LBST BUC PLL Alarm Bit 4 = LBST BUC Over Temperature Alarm Bit 5 = LBST BUC Summary Alarm Bit 6 = LBST BUC Output Enable Alarm Bit 7 = LBST BUC Communications Alarm 0 = Not Latched, 1 = Latched
<1>	Demod Latched Alarm 4	Bits 0 – 6 = Reserved Bit 7 = Low EbNo ***0 = Not Latched, 1 = Latched***
<1>	Demod Latched Alarm 5	Bit 0 = Trellis Decoder Lock Bit 1 = IFEC Alarm Bit 2 = T1/E1 Signaling Bit 3 = Turbo Decoder Fault Bit 4 – 5 = Spares Bit 6 = DVB Frame Lock Fault Bit 7 = Spare ***0 = Not Latched, 1 = Latched***
<1>	Demod Latched Alarm 6	Bit 0 = LBST LNB DC Current Alarm Bit 1 = LBST LNB DC Voltage Alarm Bit 2 = Ethernet WAN Alarm Bits 3 – 7 = Spares 0 = Not Latched, 1 = Latched

Opcode: <240Ah> Query a Modem's Current Alarms

Query Response		
<1>	Mod Alarm 1	Bit 0 = Transmit FPGA/Processor Fault, 1 = Fail Bit 1 = Drop DSP, 1 = Fail Bit 2 = Transmit Symbol Clock PLL Lock, 1 = Lock Bit 3 = Reserved Bit 4 = IF/L-Band Synthesizer Lock, 1 = Lock Bits 5 & 6 = Reserved Bit 7 = Mod Summary Fault, 1 = Fail
<1>	Mod Alarm 2	Bit 0 = Terrestrial Clock Activity Detect, 1 = Activity Bit 1 = Internal Clock Activity Detect, 1 = Activity Bit 2 = Tx Sat Clock Activity Detect, 1 = Activity Bit 3 = Tx Data Activity Detect, 1 = Activity Bit 4 = Terrestrial AIS. Tx Data AIS Detect, 1 = AIS Fail

		Bit 5 = Tx Clock Fallback, 1 = Clock Fallback Bit 6 = DVB Frame Lock Fault, 1 = Fail Bit 7 = Spare
<1>	Drop Status Fault	Bit 0 = Frame lock fault, 1 = Fail Bit 1 = Multiframe lock Fault. Valid in E1 PCM-30 and PCM-30C, 1 = Fail Bit 2 = CRC lock fault. Valid in T1ESF, and E1 CRC enabled, 1 = Fail Bits 3 – 7 = Reserved
<1>	Demod Alarm 1	Bit 0 = Receive FPGA/Processor Fault, 1 = Fail Bit 1 = Carrier Loss, 1 = Fail Bit 2 = Multiframe Sync Loss, 1 = Fail Bit 3 = Frame Sync Loss, 1 = Fail Bit 4 = IBS BER Alarm, 1 = Fail Bit 5 = Satellite AIS, 1 = Fail Bit 6 = Rx Data Activity, 1 = Activity Bit 7 = Rx AGC Level, 1 = Fail
<1>	Demod Alarm 2	Bit 0 = Buffer Underflow, 1 = Underflow Bit 1 = Buffer Overflow, 1 = Overflow Bit 2 = Buffer Under 10%, 1 = Fail Bit 3 = Buffer Over 90%, 1 = Fail Bit 4 = RS Decoder Lock Fault, 1 = Fail Bit 5 = RS De-Interleaver Fault, 1 = Fail Bit 6 = RS Decoder Uncorrectable Word, 1 = Fail Bit 7 = Demod Summary Fault, 1 = Fail
<1>	Demod Alarm 3	Bit 0 = Rx L-Band Synthesizer Lock, 1 = Lock Bit 1 = Insert DSP Config, 1 = Fail Bit 2 = Buffer Clock PLL Lock Detect, 1 = Lock Bit 3 = Viterbi Decoder Lock, 1 = Lock Bit 4 = Sequential Decoder Lock, 1 = Lock Bit 5 = Rx Test Pattern Lock, 1 = Lock Bit 6 = External Reference PLL Lock, 1 = Lock Bit 7 = Rx Carrier Level, 1 = Fail
<1>	Demod Alarm 4	Bit 0 = Buffer Clock Activity Detect, 1 = Activity Bit 1 = External BNC Activity Detect, 1 = Activity Bit 2 = Rx Satellite Clock Activity Detect, 1 = Activity Bit 3 = Insert Clock Activity Detect, 1 = Activity Bit 4 = External Reference Activity Detect, 1 = Activity Bit 5 = High Stability Reference PLL Activity, 1 = Activity Bit 6 = Reserved Bit 7 = Low EbNo, 1 = Fail
<1>	Insert Status Fault	Bit 0 = Frame lock fault. 1 = Fail Bit 1 = Multiframe lock fault. Valid in E1 PCM-30 and PCM-30C, 1 = Fail Bit 2 = CRC lock fault. Valid in T1ESF, and E1 CRC enabled. 1 = Fail Bits 3 – 7 = Reserved
<1>	Common Alarm 1	Bit 0 = -12V Alarm, 1 = Fail Bit 1 = +12V Alarm, 1 = Fail Bit 2 = +5V Alarm, 1 = Fail Bits 3 – 5 = Reserved Bit 6 = IF SYNTH Alarm, 1 = Fail Bit 7 = Spare
<1>	Common Alarm 2	Bit 0 = TERR FPGA Config, 1 = Fail Bit 1 = CODEC FPGA Config, 1 = Fail

		Bit 2 = CODEC Device Config, 1 = Fail Bit 3 = Reserved Bit 4 = +1.5 V Rx Alarm, 1 = Fail Bit 5 = +1.5 V TX Alarm, 1 = Fail Bit 6 = +3.3 V Alarm, 1 = Fail Bit 7 = +20 V Alarm, 1 = Fail
<1>	Mod Backward Alarms	Bit 0 = Backward Alarm 1 Transmitted Bit 1 = Backward Alarm 2 Transmitted Bit 2 = Backward Alarm 3 Transmitted Bit 3 = Backward Alarm 4 Transmitted Bits 4 & 5 = Spares Bit 6 = IBS Prompt Alarm Transmitted Bit 7 = IBS Service Alarm Transmitted 0 = No, 1 = Yes
<1>	Mod Alarm 4	Bit 0 = LBST BUC DC Current Alarm, 1 = Fail Bit 1 = LBST BUC DC Voltage Alarm, 1 = Fail Bit 2 = Ethernet WAN Alarm, 1 = Fail Bit 3 = LBST BUC PLL Alarm, 1 = Fail Bit 4 = LBST BUC Over Temperature Alarm, 1 = Fail Bit 5 = LBST BUC Summary Alarm, 1 = Fail Bit 6 = LBST BUC Output Enable Alarm, 1 = Fail Bit 7 = LBST BUC Communications Alarm, 1 = Fail
<1>	Demod Alarm 5	Bit 0 = Trellis Decoder Lock, 1 = Lock Bit 1 = IFEC Alarm, 1 = fail Bit 2 = T1/E1 Signaling, 1 = Fail Bit 3 = Turbo Decoder Fault, 1 = Fail Bit 4 – 5 = Spares Bit 6 = DVB Frame Lock Fault, 1 = Fail Bit 7 = Spare
<1>	Demod Alarm 6	Bit 0 = LBST LNB DC Current Alarm, 1 = Fail Bit 1 = LBST LNB DC Voltage Alarm, 1 = Fail Bit 2 = Ethernet WAN Alarm, 1 = Fail Bits 3 – 7 = Spares

Opcode: <240Dh> Query a Modem's Eb/No, BER, and Level

Query Response		
<2>	Raw BER Mantissa	Bytes 1 - 2 = Binary value Raw BER
<2>	Corrected BER Mantissa	Bytes 1 - 2 = Binary value corrected BER
<2>	EbNo	Binary value, 1 decimal point implied
<1>	Raw BER Exponent	Byte 3 = Binary value exponent
<1>	Corrected BER Exponent	Byte 3 = Binary value exponent
<1>	BER/EbNo Status	Bit 0 = Raw BER and corrected BER status. 1 = Valid Bit 1 = Test BER status. 1 = Valid Bits 2 – 3 = EbNo status, 0 = EbNo is invalid 1 = EbNo is valid, 2 = EbNo is smaller than indicated value, 3 = EbNo is greater than indicated value Bit 4 = BER Counter Overflow. 1 = Overflow Condition Bit 5 = Test BER Counter Overflow 1 = Overflow Condition Bits 6 – 7 = Reserved

<1>	Input Level	Binary value in 1 dB steps
<1>	Reacquisition Is Ready	0 = Uses full Sweep Range to acquire signal lock 1 = Uses Reacquisition range to acquire signal lock

Opcode: <240Eh> Query Time

Query Response		
<1>	Hour	0 - 23
<1>	Minute	0 - 59
<1>	Second	0 – 59

Opcode: <240Fh> Query Date

Query Response		
<1>	Year	0 - 99
<1>	Month	0 - 11
<1>	Day	0 - 30

Opcode: <2410h> Query Time and Date

Query Response		
<1>	Year	0 - 99
<1>	Month	0 - 11
<1>	Day	0 - 30
<1>	Hour	0 - 23
<1>	Minute	0 - 59
<1>	Second	0 – 59

Opcode: <2411h> Query Modem Summary Faults

Query Response		
<1>	Mod Summary Fault	0 = Pass, 1 = Fail
<1>	Demod Summary Fault	0 = Pass, 1 = Fail

Opcode: <2412h> Query a Modem's Event Buffer

<1>	Starting Point	(0..99) Stored event number to start query at 1 through 100
<1>	Number Of Events	Number of events to query, maximum events that can be queried is 3
Query Response		
<1>	Number Of Events	Number of events in response 0 = no events, there is no additional response data 1 = 1 event, see event data for additional response data 2 = 2 events, see event data for additional response data, event data will repeat once 3 = 3 events, see event data for additional response data, event data will repeat twice
Event Data		
<4>	Event Number	Actual event number since events were cleared Note: Events are cleared on a power cycle, via the front panel when the “CLEAR” key is pressed using “ERASE EVENTS” under the “MONITOR” menu or via the remote port by using

		opcode 2C0Ah and selecting 2 delete all events Note: The event numbers listed hear is the actual event number since events were cleared. The event buffer stores up to 100 events, once the 101st event occurs the first event stored in the event buffer is event number 2 and the last is event number is 101. As new events occur they are appended to the end of the event buffer and events at the beginning of the buffer are dropped.
<2>	Reserved	Ignored
<1>	Hour	0 - 23
<1>	Minute	0 - 59
<1>	Second	0 - 59
<1>	Reserved	Ignored
<1>	Year	0 - 99
<1>	Month	0 - 11
<1>	Day	0 - 30
<3>	Reserved	Ignored
<58>	Event	ASCII character string, null terminated
<2>	Reserved	Ignored

Opcode: <2402h> Query a Modem's Drop & Insert Map

<1>	Requested map	0 = Drop active map, 1 = Insert active map, 2 = Drop edit map, 3 = Insert edit map, 4 - 11 = User map #1 through #8, 12 - 19 = ROM maps #1 - #8
Query Response		
<1>	Requested map number	0 = Drop active map, 1 = Insert active map, 2 = Drop edit map, 3 = Insert edit map, 4 - 11 = User map #1 through #8, 12 - 19 = ROM maps #1 - #8
<30>	Requested map	(Mapping of Satellite channels 1 thru 30 to dropped or inserted Terrestrial Timeslots (Terrestrial Timeslots = 1..31) (0 = Insert None))

Opcode: <2C00h> Command Drop & Insert Map Copy

<1>	From Map	0 = Drop active map, 1 = Insert active map, 2 = Drop edit map, 3 = Insert edit map, 4 - 11 = User map #1 through #8, 12 - 19 = ROM maps #1..#8
<1>	To Map	0 = Drop active map, 1 = Insert active map, 2 = Drop edit map, 3 = Insert edit map, 4 – 11 = User map #1 through #8

Opcode: <2C01h> Command Drop & Insert Map

<1>	Map to Change	0 = Drop active map, 1 = Insert active map, 2 = Drop edit map, 3 = Insert edit map, 4 – 11 = User map #1 through #8
<30>	New map	(Mapping of Satellite channels 1 thru 30 to dropped or inserted Terrestrial Timeslots (Terrestrial Timeslots = 1..31) (0 = Insert None))

Opcode: <2C03h> Command Clear Latched Alarms (No Parameters)

Opcode: <2C04h> Command Set Time

<1>	Hour	0 - 23
<1>	Minute	0 - 59

<1>	Second	0 – 59

Opcode: <2C05h> Command Set Date

<1>	Year	0 - 99
<1>	Month	0 - 11
<1>	Day	0 - 30

Opcode: <2C06h> Command Set Time and Date

<1>	Year	0 - 99
<1>	Month	0 - 11
<1>	Day	0 - 30
<1>	Hour	0 - 23
<1>	Minute	0 - 59
<1>	Second	0 – 59

Opcode: <2C08h> Clear Modem Common Latched Alarm 1 (No Data)

Opcode: <2C09h> Clear Modem Common Latched Alarm 2 (No Data)

Opcode: <2C0Ah> Command Delete a Modem's Event Buffer

<1>	Events to Delete	1 = delete one event (deletes first event in buffer) , 2 = delete all events

Opcode: <2C0Bh> Command Soft Reset (No Data) (Stops petting the watch dog to restart the processor)

Opcode: <2490h> Query Upconverter Configuration

Query Response		
<8>	LO Frequency	Hz
<1>	Mix Select	0 = High side, 1 = Low side
<1>	Reference Enable	0 = Disable, 1 = Enable
<1>	Supply Voltage Enable	0 = Disable, 1 = Enable
<1>	FSK Communications Select	0 = None, 1 = Codan, 2 = TerraSat, 3 = Amplus
<2>	BUC Address	
<1>	BUC Output Enable	0 = Disable, 1 = Enable
<2>	BUC Carrier Level	Implied decimal point, dBm
<4>	BUC Summary Status	
<1>	BUC Temperature	Degrees, C

Opcode: <2491h> Query Uplink RF

Query Response		
<8>	RF	Hz

Opcode: <2492h> Query Downconverter Configuration

Query Response		
<8>	LO Frequency	Hz
<1>	Mix Select	0 = High side, 1 = Low side

<1>	Reference Enable	0 = Disable, 1 = Enable
<1>	Supply Voltage Enable	0 = Disable, 1 = Enable
<1>	Supply Voltage Sel.	13, 16, 18, 24, 48

Opcode: <2493h> Query Downlink RF

Query Response		
<8>	RF	Hz

Opcode: <2500h> Command Upconverter Configuration

<8>	LO Frequency	Hz
<1>	Mix Select	0 = High side, 1 = Low side
<1>	Reference Enable	0 = Disable, 1 = Enable
<1>	Supply Voltage Enable	0 = Disable, 1 = Enable
<1>	FSK Communications Select	0 = None, 1 = Codan, 2 = TerraSat, 3 = Amplus
<2>	BUC Address	
<1>	BUC Output Enable	0 = Disable, 1 = Enable

Opcode: <2501h> Command Uplink RF

<8>	RF	Hz

Opcode: <2502h> Command Downconverter Configuration

<8>	LO Frequency	Hz
<1>	Mix Select	0 = High side, 1 = Low side
<1>	Reference Enable	0 = Disable, 1 = Enable
<1>	Supply Voltage Enable	0 = Disable, 1 = Enable
<1>	Supply Voltage Sel.	13, 16, 18, 24, 48

Opcode: <2503h> Command Downlink RF

<8>	RF	Hz

Opcode: <2F61h> Command BUC FSK Pass Thru

<64>	BUC FSK Command Data	Null Terminated ASCII string

Opcode: <2E06h> Query BUC FSK Pass Thru Reply

Query Response		
<255>	BUC FSK Reply Data	Null Terminated ASCII string

The following opcode is for customer purchased and installed features only.

Opcode: <2450h> Query a Module's Installed Features (Customer Purchased)

Query Response		
<1>	Installed Features 1	Bit 0 = 1 Mbps data rate Bit 1 = 5 Mbps data rate Bit 2 = 10 Mbps data rate Bit 3 = 20 Mbps data rate Bit 4 = Rx IF Band Bit 5 = Rx L Band Bit 6 = Tx IF Band Bit 7 = Tx L Band 0 = Feature Not Installed, 1 = Feature Installed
<1>	Installed Features 2	Bit 0 = Enhanced ASYNC Feature Bit 1 = IDR Feature Bit 2 = Sequential Feature Bit 3 = Reed Solomon Bit 4 = Custom Reed Solomon Feature Bit 5 = IBS Feature Bit 6 = Drop & Insert Feature Bit 7 = AUPC Feature 0 = Feature Not Installed, 1 = Feature Installed
<1>	Installed Features 3	Bit 0 = 8PSK Feature Bit 1 = 16QAM Feature Bit 2 = 5 MHz Turbo Codec Feature Bit 3 = 20 MHz Turbo Codec Feature Bit 4 = OM73 Feature Bit 5 = DVB Feature Bit 6 = EDMAC Feature Bit 7 = 512 Kbps Data Rate 0 = Feature Not Installed, 1 = Feature Installed
<1>	Installed Features 4	Bit 0 = 52 Mbps data rate (DMD1050, DMD2050 and DMD 50 only) Bit 1 = 52 MHz Turbo Codec Feature (DMD1050, DMD2050 and DMD 50 only) Bit 2 = FSK (DMD20LBST and OM20 only) Bits 3 - 7 = Spares 0 = Feature Not Installed, 1 = Feature Installed
<1>	Installed Features 5	Bits 0 - 7 = Spares 0 = Feature Not Installed, 1 = Feature Installed
<1>	Installed Features 6	Bits 0 - 7 = Spares 0 = Feature Not Installed, 1 = Feature Installed

The features that are set refer to options purchased by the customer. These could be a subset of the overall physical capabilities of the product.

The highest data rate feature that is set indicates the highest data rate the product can attain. This is also true for the Turbo Codec rates.


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