| Revision | Date | Change Summary |
|---|---|---|
| 00 | 27-Feb-2009 | Protocol specification for MTX & MRK up-link redundant systems. |
| 01 | 16-Apr-2009 | Added network configuration commands. |
| 02 | 09-Jul-2009 | Added input voltage alarm. |
| 03 | 21-Apr-2010 | Added reading freq band, LO freq & power class commands.<br>Added read/write IF frequency commands. |
| 04 | 14-Dec-2010 | Added alarm bit definitions to PA status update. |
| 05 | 08-Nov-2011 | Document reorganization. |
| 06 | 22-Oct-2012 | Logo change. |
| 07 | 11-Oct-2013 | Adding 1:2 redundancy configuration. |

# Serial Communication Protocol Specification
# for
# High Power Block Up Converters
# and
# MRK Up-Link Redundancy Systems

# Table of Contents


*1 Project Overview* ____ *3*

*2 Definitions and Acronyms* ____ *3*

*3 Scope* ____ *3*

*4 Serial Communications Link Interface* ____ *3*

**4.1 Customer Interface Port Configuration** ____ **3**

**4.2 Customer Interface Transport Medium** ____ **3**

*5 Communication Protocol Framing* ____ *4*

**5.1 SCI Packet Frame Format** ____ **4**

**5.2 SCI Packet Byte Description** ____ **4**

**5.3 Default Address Values** ____ **5**

**5.4 CRC Calculation Example** ____ **5**

**5.5 Command / Reply Packet Sequencing** ____ **5**

*6 Default Reply Packet Format* ____ *6*

*7 MTX Command List* ____ *7*

**7.1 MTX Monitor Commands** ____ **7**

**7.2 MTX Control Commands** ____ **9**

**7.3 MTX Settings Commands** ____ **10**

*8 Network Access Command List* ____ *11*

**8.1 GET Network Configuration** ____ **11**

**8.2 SET Network Configuration** ____ **12**

*9 Redundant System Command List* ____ *13*

**9.1 Redundant System Monitor Commands** ____ **13**

**9.2 Redundant System Control Commands** ____ **14**

*10 Appendix I: Troubleshooting Guide* ____ *15*

# 1 Project Overview

This document describes the communication protocol used to communicate with MitecVsat high power MTX block up converters (BUCs) and their MRK redundant systems, including:

- C-band MTX units, 60W and higher
- Ku-band MTX units, 25W and higher
- MRK redundant systems

# 2 Definitions and Acronyms

The following terms appear throughout this document:

| | |
|---|---|
| CM: | Control Module. |
| Controller: | The microprocessor-based card and associated embedded software which handles all communications between the customer interface and the amplifier. |
| CRC: | Cyclic Redundancy Check |
| Customer Interface Port: | The interface port through which the device used by the customer will interact with the Control Module. |
| Customer Interface Device: | The interface device used by the customer to interact with the Control Module (i.e. typically a modem or PC). |
| PC: | Personal Computer. |
| RF: | Radio Frequency. |
| SCI: | Serial Communications Interface. |
| SSPA: | Solid State Power Amplifier. |
| BUC: | Block Up Converter. |

# 3 Scope

This document covers all aspects of the communication protocol which are required for the customer to develop a controlling device (typically a PC application program or modem) to interface with the MitecVsat product.

# 4 Serial Communications Link Interface

## 4.1 Customer Interface Port Configuration

The customer interface port of the controller is configured as follows:

| | |
|---|---|
| Baud Rate: | 19200bps |
| Data bits: | 8 |
| Stop bits: | 1 |
| Parity: | None |
| HW Control | None |

## 4.2 Customer Interface Transport Medium

The customer interface transport medium for this product may be configured for RS485 half duplex (2-wire) or RS232. Please refer to the specific table in the user manual for pin allocations.

## 5 Communication Protocol Framing

### 5.1 SCI Packet Frame Format

The packets exchanged with the master controller will have the following format (regardless of direction):

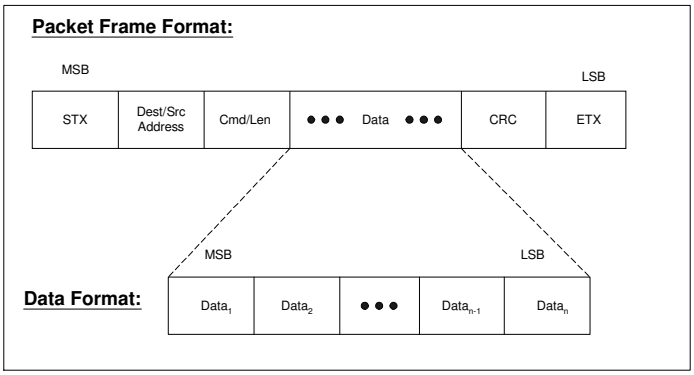



**Figure 1) SCI Packet Frame Format**

### 5.2 SCI Packet Byte Description

- **STX** is the start transmission byte (defined as 0x7E). This byte is used to determine the start of a packet.

- **Dest/Src Address** contains the destination address in the high nibble and the source address in the low nibble. The destination address is the address of the device which is to process the packet. The source address is the address of the device which sent the packet. Note that the device address of the customer interface device is always = 0x0F.

- **CMD/Len** contains the packet command in the high nibble and the number of bytes in the data portion of the packet in the lower nibble.

  The following commands may be sent by the customer interface device:

  | | |
  |---|---|
  | GET (command high nibble = 0x0) | Request the current value of a database element. |
  | SET (command high nibble = 0x1) | Set the database element to the specified value. |

  The following commands may be returned to the customer interface device:

  | | |
  |---|---|
  | UPD (command high nibble = 0x8) | Return the current value of a database element. |
  | ACK (command high nibble = 0xE) | Acknowledge a received packet. |
  | NACK (command high nibble = 0xF) | Reject a received packet (Not ACKnowledge). |

- **$Data_1$ - $Data_n$** contains the packet payload. The value of the data bytes is specific to the command and will be covered in following sections.

- **CRC** is the cyclic redundancy check and is calculated by performing a byte-wise exclusive OR of the Dest/Src address byte, Cmd/Len byte and all data bytes. A bit-wise inversion is then applied to the CRC before being inserted into the packet. Refer to 5.4 CRC Calculation Example.

- **ETX** is the end transmission byte (defined as 0x7F). This byte is used to determine the end of a packet.

### 5.3 Default Address Values

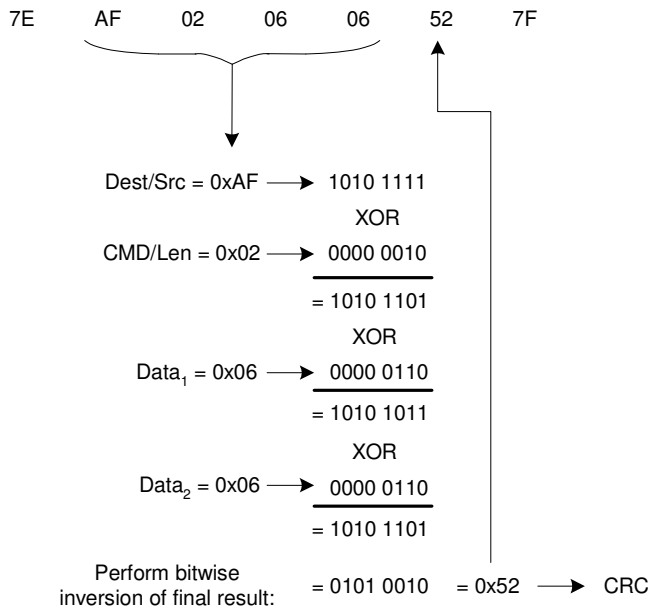
The customer interface device (e.g. a PC) must always be assigned address 0xF.

***Standalone BUC***: a standalone BUC defaults to address 0xA. The main controller will always respond to address 0xF. So communication with a standalone BUC can be established using address 0xA or address 0xF.

***Redundant system***: in a redundant system, upon connecting the redundancy cable, the address of the unit is automatically set to 0xA for unit A and 0xB for unit B (for 1:2 config, unit C is set to address 0xC). Communication has to be established using addresses 0xA, 0xB (or 0xC), respectively.

### 5.4 CRC Calculation Example

To send a command to read the temperature (database element = 0x0606) from unit A (device address 0x0A), the command is:




### 5.5 Command / Reply Packet Sequencing

The main control module will only send a packet to the customer interface device in response to a packet received from the customer.

## 6 Default Reply Packet Format

This section identifies the packet format of the ACK (Acknowledge) and NACK (Not acknowledge) replies which may be sent to the customer interface device in response to a received command.

**NOTE:** The packets shown in the list below are based on the assumption that the master controller device address is set to 0xA for unit A and 0xB for unit B (in 1:2 config, unit C is set to address 0xC). Any unit will reply to address 0xF in standalone mode. To modify the commands for different addresses, the Dest/Src byte and the CRC byte will have to change in all packets. In the following: ***X = main controller serial address and ZZ = CRC.***

| Reply | Packet Format | Explanation | Interpretation | Examples |
|---|---|---|---|---|
| **ACK (Acknowledge)** | 7E FX E0 ZZ 7F | Acknowledge that the received packet was properly processed. | X = Device address of the packet source device. | 1) reply: 7E FF E0 E0 7F<br>ACK reply sent from the main control module (address 0xF)<br><br>2) reply: 7E FA E0 E5 7F<br>ACK reply sent from unit A |
| **NACK (Not Acknowledge)** | 7E FX F1 YY ZZ 7F | Indicate that a problem was encountered with the received packet. | X = Device address of the packet source device.<br><br>YY = Error code:<br>02 = Incorrect no of bytes for the command.<br>03 = Incorrect CRC.<br>18 = Unrecognized command.<br>30 = Set command attempted on a protected element. | 1) reply: 7E FF F1 03 F2 7F<br>NACK reply sent from the main control module (address 0xF) for an invalid CRC<br><br>2) reply: 7E FA F1 18 EC 7F<br>NACK reply sent from unit A for an unrecognized command |

# 7 MTX Command List

## 7.1 MTX Monitor Commands

This section identifies the list of commands available to monitor the status of MTX units.

**NOTES:**

1. The packets shown in the list below are based on the assumption that the master controller device address is set to 0xA for unit A and 0xB for unit B (in 1:2 config, unit C is set to address 0xC). Any unit will reply to address 0xF in standalone mode. To modify the commands for different addresses, the Dest/Src byte and the CRC byte will have to change in all packets. In the following: ***X = main controller serial address and ZZ = CRC***.
2. In case of error, a NACK reply will be received. Refer to section 6 for possible error codes.
3. Shaded cells contain legacy commands that can be replaced by global commands (defined later in the table).

| Command | Possible Replies | Interpretation | Examples |
|---|---|---|---|
| **Get Mute Status**<br><br>7E XF 02 06 01 ZZ 7F<br><br>Query for mute status | **Update Mute Status:**<br><br>7E FX 84 06 01 00 MM ZZ 7F | MM = 0x00 if unmuted, 0x01 if muted. | 1) cmd: 7E AF 02 06 01 55 7F<br>reply: 7E FA 84 06 01 00 00 86 7F<br>Unit A is enabled (unmuted).<br><br>2) cmd: 7E CF 02 06 01 35 7F<br>reply: 7E FC 84 06 01 00 01 81 7F<br>Unit C is muted. |
| **Get Alarm Status**<br><br>7E XF 02 10 FF ZZ 7F<br><br>Query for alarm status | **Update Alarm Status:**<br><br>7E FX 84 10 FF WW YY ZZ 7F | WW YY: alarm bit map.<br>This packet will be automatically sent upon any change (if alarm broadcast is enabled), where:<br><br>WW bitmap is defined as:<br>**Bits 0-5:** Internal biasing fail alarm status<br>**Bit 6:** Over current alarm status<br>**Bit 7:** Summary alarm status (0 = no critical alarm; 1 = critical alarm)<br><br>YY Bitmap is defined as:<br>**Bit 0:** PLL out of lock alarm status<br>**Bit 1:** DropInBUC fail alarm status (dc volt out of range)<br>**Bit 2:** Over temperature alarm status<br>**Bit 3:** Internal CAN communication alarm status<br>**Bit 4:** RF output power overdrive alarm status<br>**Bit 5:** Low RF output power alarm status<br>**Bit 6:** Power supply alarm status<br>**Bit 7:** Low input dc voltage alarm status | 1) cmd: 7E AF 02 10 FF BD 7F<br>reply: 7E FA 84 10 FF 80 04 EA 7F<br>Unit A over temperature alarm is declared.<br>Unit A summary alarm is declared. |
| **Get Temperature**<br><br>7E XF 02 06 06 ZZ 7F<br><br>Query for unit temperature | **Update Temp:**<br><br>7E FX 84 06 06 TT TT ZZ 7F | TT TT = signed number representing 10 * temperature in deg C. | 1) cmd: 7E AF 02 06 06 52 7F<br>reply: 7E FA 84 06 06 01 95 15 7F<br>Unit A temp = 0x0195 = 0d405, 405/10 = 40.5ºC |

| Command | Possible Replies | Interpretation | Examples |
|---|---|---|---|
| **Get Gain**<br><br>7E XF 02 06 07 ZZ 7F<br><br>Query for gain | **Update Gain:**<br><br>7E FX 84 06 07 GG GG ZZ 7F | GG GG = 10 * Gain in dB. | 1) cmd: 7E AF 02 06 07 53 7F<br>reply: 7E FA 84 06 07 02 8A 08 7F<br>Unit A gain = 0x028A = 0d650, 650/10 = 65.0 dB |
| **Get Output Power**<br><br>7E XF 02 16 FF ZZ 7F<br><br>Query for output power | **Update Output Power:**<br><br>7E FX 84 16 FF PP PP ZZ 7F | PP PP = 10 * Output power in dBm. | 1) cmd: 7E AF 02 16 FF BB 7F<br>reply: 7E FA 84 16 FF 01 2C 45 7F<br>Unit A power = 0x012C = 0d300, 300/10 = 30.0 dBm<br><br>2) cmd: 7E CF 02 16 FF DB 7F<br>reply: 7E FC 84 16 FF 01 F9 96 7F<br>Unit C power = 0x01F9 = 0d505, 505/10 = 50.5 dBm |
| **Get PA Status**<br><br>7E XF 02 FF 09 ZZ 7F<br><br>Query for global status parameters (mute status, alarms, temperature, gain, output power)<br><br>**This command replaces the above 5 legacy commands.** | **Update PA Status**<br><br>7E FX 8B FF 09 MM WW YY TT TT GG GG PP PP ZZ 7F | Updates global status of the unit, where:<br><br>MM = mute status; 0x00 if unmuted, 0x01 if muted.<br>WW YY = alarm status, see below* for bit definitions.<br>TT TT = signed number representing 10 * temperature in deg C.<br>GG GG = 10 * Gain in dB.<br>PP PP = 10 * Output power in dBm.<br><br>*__Alarm bit definitions__:<br>WW bitmap is defined as:<br>**Bits 0-5:** Internal biasing fail alarm status<br>**Bit 6:** Over current alarm status<br>**Bit 7:** Summary alarm status (0 = no critical alarm; 1 = critical alarm)<br><br>YY Bitmap is defined as:<br>**Bit 0:** PLL out of lock alarm status<br>**Bit 1:** DropInBUC fail alarm status (dc volt out of range)<br>**Bit 2:** Over temperature alarm status<br>**Bit 3:** Internal CAN communication alarm status<br>**Bit 4:** RF output power overdrive alarm status<br>**Bit 5:** Low RF output power alarm status<br>**Bit 6:** Power supply alarm status<br>**Bit 7:** Low input dc voltage alarm status | 1) cmd: 7E AF 02 FF 09 A4 7F<br>reply: 7E FA 8B FF 09 01 80 04 03 66 02 08 00 C8 5A 7F<br>Unit A:<br>Mute status = 01; muted<br>Alarm bits = 0x8004; Over temperature alarm<br>Temp = 0x0366 = 0d870; 870/10 = 87 ºC<br>Gain = 0x0208 = 0d520; 520/10 = 52.0 dB<br>Output power = 0x00C8 = 0d200; 200/10 = 20.0 dBm |
| **Get Alarm Log History**<br><br>7E XF 02 FF YY ZZ 7F<br><br>Query for last 5 alarm events<br><br>YY = alarm events from earliest to latest, as follows:<br>11: alarm event 1<br>12: alarm event 2<br>13: alarm event 3<br>14: alarm event 4<br>15: alarm event 5 | **Update Alarm Log History**<br><br>7E FX 85 FF YY LL LL UU ZZ 7F | Returns a log of **previous alarm history** status.<br><br>LL LL = Alarm bytes:<br>Bitmap corresponds to PA alarm, system alarm or switch alarm bitmap as defined in this document.<br><br>UU = Code byte:<br>This byte defines where the alarm occurred, as follows:<br>01: PA;<br>02: N/A;<br>03: system;<br>04: switches. | 1) cmd: 7E AF 02 FF 11 BC 7F<br>reply: 7E FA 85 FF 11 80 04 01 EB 7F<br>Unit A earliest alarm:<br>01: PA A<br>80 04: Over temperature alarm.<br><br>2) cmd: 7E BF 02 FF 15 A8 7F<br>reply: 7E FB 85 FF 15 81 00 03 E9 7F<br>Unit B latest alarm:<br>03: System<br>81 00: switch 1 communication alarm. |

### 7.2 MTX Control Commands

This section identifies the list of commands available to control the MTX units.

**NOTES:**

1. The packets shown in the list below are based on the assumption that the master controller device address is set to 0xA for unit A and 0xB for unit B (in 1:2 config, unit C is set to address 0xC). Any unit will reply to address 0xF in standalone mode. To modify the commands for different addresses, the Dest/Src byte and the CRC byte will have to change in all packets. In the following: ***X = main controller serial address and ZZ = CRC***.
2. In case of error, a NACK reply will be received. Refer to section 6 for possible error codes.

| Command | Possible Replies | Interpretation | Examples |
|---|---|---|---|
| **Mute / Unmute**<br><br>7E XF 14 13 01 00 MM ZZ 7F<br><br>Enable / disable RF output | **ACK**<br>Refer to section 6 | MM = 0x00 to unmute; 0x01 to mute. | 1) cmd: 7E AF 14 13 01 00 00 56 7F<br>reply: 7E FA E0 E5 7F<br>ACK received from unit A.<br>Unmute unit A. |
| **Set Gain**<br><br>7E XF 14 06 07 GG GG ZZ 7F<br><br>Specify gain | **ACK**<br>Refer to section 6 | GG GG = 10 * required Gain in dB. | 1) cmd: 7E AF 14 06 07 02 BC FB 7F<br>reply: 7E FA E0 E5 7F<br>ACK received from unit A.<br>Set unit A gain to 0x02BC = 0d700, 700/10 = 70.0 dB |
| **Set IF Frequency**<br><br>7E XF 14 17 FF YY YY ZZ 7F<br><br>Set IF frequency | **ACK**<br>Refer to section 6 | YY YY = IF frequency in MHz.<br><br>Note: setting the system IF frequency will provide a more accurate output power reading. | 1) cmd: 7E AF 14 17 FF 03 B6 19 7F<br>reply: 7E FA E0 E5 7F<br>ACK received from unit A.<br>Set unit A IF freq to 0x03B6 = 950 MHz |
| **Reset Alarms**<br><br>7E XF 14 06 0B YY YY ZZ 7F<br><br>Reset all latched alarms | **ACK**<br>Refer to section 6 | YY YY = any value will reset the alarms, for example 00 00. | 1) cmd: 7E AF 14 06 0B 00 00 49 7F<br>reply: 7E FA E0 E5 7F<br>ACK received from unit A.<br>Alarms reset on unit A. |
| **Clear Alarm Log**<br><br>7E XF 14 06 20 YY YY ZZ 7F<br><br>Clear all alarm log history | **ACK**<br>Refer to section 6 | YY YY = any value will reset the alarm log, for example 00 00.<br><br>This command will clear all alarm history from the controller memory.<br><br>Note that in redundant configuration, alarm history will be cleared in all units. | 1) cmd: 7E AF 14 06 20 00 00 62 7F<br>reply: 7E FA E0 E5 7F<br>ACK received from unit A.<br>Alarm log history reset. |

### 7.3 MTX Settings Commands

This section identifies the list of commands available to query the MTX settings information.

**NOTES:**

1. The packets shown in the list below are based on the assumption that the master controller device address is set to 0xA for unit A and 0xB for unit B (in 1:2 config, unit C is set to address 0xC). Any unit will reply to address 0xF in standalone mode. To modify the commands for different addresses, the Dest/Src byte and the CRC byte will have to change in all packets. In the following: ***X = main controller serial address and ZZ = CRC***.
2. In case of error, a NACK reply will be received. Refer to section 6 for possible error codes.

| Command | Possible Replies | Interpretation | Examples |
|---|---|---|---|
| **Get SW Version**<br><br>7E XF 02 FF 00 ZZ 7F<br><br>Query Main Control Module for SW version | **Update SW Version**<br><br>7E FX 8A FF 00 YY YY YY YY GG GG RR RR ZZ 7F | Global software version.<br>YY YY YY YY = SW version base number.<br>GG GG = SW version configuration.<br>RR RR = SW version revision (in ASCII). | 1) cmd: 7E AF 02 FF 00 AD 7F<br>reply: 7E FA 8A FF 00 00 21 61 42 00 01 30 31 72 7F<br>The resulting software version is:<br>216142-01-R01 |
| **Get Unit LO Frequency & Tx Freq Band**<br><br>7E XF 02 FF 17 ZZ 7F<br><br>Query for LO frequency and Tx frequency band | **Update LO Frequency and Tx Freq Band**<br><br>7E FX 88 FF 17 L1 L2 M1 M2 M3 M4 ZZ 7F | L1 L2 Unit LO freq in MHz<br>M1 M2 – M3 M4 Tx freq band in MHz | 1) cmd: 7E AF 02 FF 17 BA 7F<br>reply: 7E FA 88 FF 17 **13 24** 16 DA 19 19 9E 7F<br><br>**LO freq** = L1 L2 = 0x1324 = 4900 MHz<br>M1 M2 = 0x16DA = 5850 MHz<br>M3 M4 = 0x1919 = 6425 MHz<br>So, **Tx freq band** = 5850 – 6425 MHz |
| **Get IF Frequency**<br><br>7E XF 02 17 FF ZZ 7F<br><br>Query for IF frequency | **Update IF Frequency**<br><br>7E FX 84 17 FF YY YY ZZ 7F | YY YY = IF frequency in MHz.<br><br>Note: setting the system IF frequency will provide a more accurate output power reading. | 1) cmd: 7E AF 02 17 FF BA 7F<br>reply: 7E FA 84 17 FF 03 B6 DC 7F<br>Unit A IF freq = 0x03B6 = 950 MHz<br><br>2) cmd: 7E AF 02 17 FF BA 7F<br>reply: 7E FA 84 17 FF 05 DC B0 7F<br>Unit A IF freq = 0x05DC = 1500 MHz |

## 8 Network Access Command List

### 8.1 GET Network Configuration

This section identifies the list of commands available to query the network configuration.

**NOTES:**

1. The packets shown in the list below are based on the assumption that the master controller device address is set to 0xA for unit A and 0xB for unit B (in 1:2 config, unit C is set to address 0xC). Any unit will reply to address 0xF in standalone mode. To modify the commands for different addresses, the Dest/Src byte and the CRC byte will have to change in all packets. In the following: ***X = main controller serial address and ZZ = CRC***.
2. In case of error, a NACK reply will be received. Refer to section 6 for possible error codes.

| Command | Possible Replies | Interpretation | Examples |
|---|---|---|---|
| **Get MAC Address**<br><br>7E XF 02 FF 20 ZZ 7F<br><br>Query MAC Address | **Update MAC Address**<br><br>7E FX 88 FF 20 Y1 Y2 Y3 Y4 Y5 Y6 ZZ 7F | Y1 Y2 Y3 Y4 Y5 Y6 = 6 bytes representing the MAC address. | 1) cmd: 7E AF 02 FF 20 8D 7F<br>reply: 7E FA 88 FF 20 **00 04 A3 00 00 00** F5 7F<br>The MAC address is **00:04:A3:00:00:00** |
| **Get Host Name**<br>**(Net Bios Name)**<br><br>7E XF 02 FF 21 ZZ 7F<br><br>Query Host Name | **Update Host Name**<br><br>7E FX 8D FF 21 Y1 Y2 Y3 Y4 Y5 Y6 Y7 Y8 Y9 Y10 Y11 ZZ 7F | Y1 Y2 Y3 Y4 Y5 Y6 Y7 Y8 Y9 Y10 Y11 = 11 bytes representing the Host Name (in ASCII). | 1) cmd: 7E AF 02 FF 21 8C 7F<br>reply: 7E FA 8D FF 21 **4D 54 43 30 39 31 33 31 30 30 31** 07 7F<br>The Host Name is **4D 54 43 30 39 31 33 31 30 30 31** in ASCII = MTC09131001 |
| **Get DHCP Configuration**<br><br>7E XF 02 06 31 ZZ 7F<br><br>Query Dynamic Host Configuration Protocol Setting | **Update DHCP Configuration**<br><br>7E FX 84 06 31 00 YY ZZ 7F | Update Dynamic Host Configuration Protocol Setting<br>YY = 00 DHCP disabled<br>YY = 01 DHCP enabled | 1) cmd: 7E AF 02 06 31 65 7F<br>reply: 7E FA 84 06 31 00 01 B7 7F<br>DHCP is enabled.<br><br>2) cmd: 7E AF 02 06 31 65 7F<br>reply: 7E FA 84 06 31 00 00 B6 7F<br>DHCP is disabled. |

## 8.2 SET Network Configuration

This section identifies the list of commands available to change the network configuration.

**NOTES:**

1. The packets shown in the list below are based on the assumption that the master controller device address is set to 0xA for unit A and 0xB for unit B (in 1:2 config, unit C is set to address 0xC). Any unit will reply to address 0xF in standalone mode. To modify the commands for different addresses, the Dest/Src byte and the CRC byte will have to change in all packets. In the following: ***X = main controller serial address and ZZ = CRC***.
2. In case of error, a NACK reply will be received. Refer to section 6 for possible error codes.

| Command | Possible Replies | Interpretation | Examples |
|---|---|---|---|
| **Set Host Name (NetBios Name)**<br><br>7E XF 1D FF 21 Y1 Y2 Y3 Y4 Y5 Y6 Y7 Y8 Y9 Y10 Y11 ZZ 7F<br><br>Set Host Name | **ACK**<br>Refer to section 6 | Y1 Y2 Y3 Y4 Y5 Y6 Y7 Y8 Y9 Y10 Y11 = 11 bytes for Host Name (in ASCII).<br><br>Note that this command will cause a reset of the controller in order to restart with the new host name. | 1) cmd: 7E AF 1D FF 21 **4D 54 43 31 32 33 34 35 36 37 38** C1 7F<br>reply: 7E FA E0 E5 7F (Ack)<br>The Host Name is set to **4D 54 43 31 32 33 34 35 36 37 38** (in ASCII) = MTC12345678<br><br>Controller will be reset in order to restart with the new host name. |
| **Set DHCP Configuration**<br><br>7E XF 14 06 31 00 YY ZZ 7F<br><br>Set Dynamic Host Configuration Protocol Setting | **ACK**<br>Refer to section 6 | Set Dynamic Host Configuration Protocol Configuration<br>YY = 00 disable DHCP<br>YY = 01 enable DHCP<br><br>Note that this command will cause a reset of the controller in order to restart with the new configuration. | 1) cmd: 7E AF 14 06 31 00 01 72 7F<br>reply: 7E FA E0 E5 7F (Ack)<br>DHCP is enabled.<br><br>2) cmd: 7E AF 14 06 31 00 00 73 7F<br>reply: 7E FA E0 E5 7F (Ack)<br>DHCP is disabled. |
| **Restore Default Values**<br><br>7E XF 14 06 30 00 00 ZZ 7F<br><br>Restore Network Configuration Default Values | **ACK**<br>Refer to section 6 | This command enables DHCP and restores the following parameters to their factory default values:<br><br>• Host Name • IP Address<br>• Gateway • Subnet Mask<br>• Primary DNS • Secondary DNS<br><br>Note that this command will cause a reset of the controller in order to restart with the new configuration. | 1) cmd: 7E AF 14 06 30 00 00 72 7F<br>reply: 7E FA E0 E5 7F (Ack)<br><br>Controller will be reset in order to restart with the new configuration. |

# 9 Redundant System Command List

## 9.1 Redundant System Monitor Commands

This section identifies the list of commands available **ONLY IN CASE OF A REDUNDANT SYSTEM** to monitor the redundant system and switches status.

**NOTES:**

1. The packets shown in the list below can be sent to address 0xA for unit A or 0xB for unit B (or 0xC for unit C in 1:2 config). The system status can be queried from any unit. To modify the commands for different addresses, the Dest/Src byte and the CRC byte will have to change in all packets. In the following: ***X = main controller serial address and ZZ = CRC***.
2. In case of error, a NACK reply will be received. Refer to section 6 for possible error codes.

| Command | Packet Format | Interpretation | Examples |
|---|---|---|---|
| **Get Redundant System Status**<br><br>7E XF 02 FF 08 ZZ 7F<br><br>Query controller for system mode & configuration and switch position | **Update Redundant System Status:**<br><br>7E FX 86 FF 08 00 WW 00 YY ZZ 7F | WW = System status, bitmap defined as follows:<br><br>**Bit 0:** System configuration: 0 = 1:1 config; 1 = 1:2 config.<br>**Bit 1:** Operation mode: 0 = auto; 1 = manual.<br>**Bits 2-6:** Not used.<br>**Bit 7:** Stand-alone bit: 0 = redundant config; 1 = stand-alone.<br><br>YY = Switch position, bitmap defined as follows:<br><br>**Bits 1,0:** RF switch 1 position.<br>Where:<br>00: switch is stuck between 2 positions or disconnected.<br>11: undetermined position.<br>01: switch in position A.<br>10: switch in position B.<br>**Bits 3,2:** RF switch 2 position (in 1:2 config)<br>Where:<br>00: switch is stuck between 2 positions or disconnected.<br>11: undetermined position.<br>01: switch in position C.<br>10: switch in position B.<br>**Bits 4-7:** Not used. | 1) cmd: 7E AF 02 FF 08 A5 7F<br>reply: 7E FA 86 FF 08 00 02 00 01 77 7F<br>System in 1:1 redundant configuration, manual mode<br>RF switch 1 in position A |
| **Get System and Switches Alarm Status**<br><br>7E XF 02 FF 0C ZZ 7F<br><br>Query controller for current system and switches alarms | **Update System and Switches Alarm Status:**<br><br>7E FX 86 FF 0C VV WW 00 YY ZZ 7F | VV WW = System alarm status:<br><br>VV = Bitmap as follows:<br>**Bit 0:** Switch 1 communication alarm<br>**Bit 1:** Switch 2 communication alarm (in 1:2 config)<br>**Bit 2:** Unit B CAN bus communication alarm<br>**Bit 3:** Unit A CAN bus communication alarm<br>**Bit 4:** Manual mode warning<br>**Bit 5:** Unit C CAN bus communication alarm (in 1:2 config)<br>**Bit 6:** Not used<br>**Bit 7:** System summary alarm<br><br>WW = Bitmap as follows:<br>**Bit 0:** Unit A summary alarm<br>**Bit 1:** Unit B summary alarm<br>**Bit 2:** Unit C summary alarm (in 1:2 config)<br>**Bits 3-7:** Not used | 1) cmd: 7E AF 02 FF 0C A1 7F<br>reply: 7E FA 86 FF 0C 10 00 00 00 60 7F<br>Manual mode warning<br>No switch alarms |

| Command | Packet Format | Interpretation | Examples |
|---|---|---|---|
| | | YY = Switches alarm status, bitmap defined as follows:<br>**Bit 0:** RF switch 1 out of position<br>**Bit 1:** Not used<br>**Bit 2:** RF switch 1 unable to move<br>**Bit 3:** RF switch 2 out of position (in 1:2 config)<br>**Bit 4:** Not used<br>**Bit 5:** RF switch 2 unable to move (in 1:2 config)<br>**Bits 6-7:** Not used<br>**All alarm and warning bits**:<br>0 = no alarm or warning; 1 = alarm or warning. | |

### 9.2 Redundant System Control Commands

This section identifies the list of commands available **ONLY IN CASE OF A REDUNDANT SYSTEM** to control the switch and the redundancy mode.

**NOTES:**

1. Note that the switch control commands are sent to unit B (address 0xB). In a 1:1 configuration, these packets can be sent to unit A or unit B.
2. In the following: ***X = main controller serial address and ZZ = CRC***.
3. In case of error, a NACK reply will be received. Refer to section 6 for possible error codes.

| Command | Possible Replies | Interpretation | Examples |
|---|---|---|---|
| **Set Auto/Manual operation mode**<br><br>7E XF 14 06 03 00 YY ZZ 7F | **ACK**<br>Refer to section 6 | Select system operation mode (automatic or manual):<br><br>YY: 00 = auto mode (default); 01 = manual mode | 1) cmd: 7E BF 14 06 03 00 01 50 7F<br>Set system in manual mode<br><br>2) cmd: 7E BF 14 06 03 00 00 51 7F<br>Set system in auto mode |
| **Drive switches**<br><br>7E XF 14 06 09 WW YY ZZ 7F | **ACK**<br>Refer to section 6 | Drive a switch to the required position.<br><br>WW = switch to drive:<br>00: RF switch 1.<br>01: RF switch 2 (in 1:2 config).<br><br>YY = switch new position:<br>01: drive to side A (side C for switch 2).<br>02: drive to side B. | 1) cmd: 7E BF 14 06 09 00 01 5A 7F<br>Drive RF switch 1 to side A.<br><br>2) cmd: 7E BF 14 06 09 00 02 59 7F<br>Drive RF switch 1 to side B. |
| **Toggle switches**<br><br>7E XF 14 06 0A 00 YY ZZ 7F | **ACK**<br>Refer to section 6 | Alternate the position of a switch.<br><br>YY = switch to toggle:<br>00: RF switch 1.<br>01: RF switch 2 (in 1:2 config). | 1) cmd: 7E BF 14 06 0A 00 00 58 7F<br>Toggle RF switch 1. |

## 10 Appendix I: Troubleshooting Guide

| Problem | Possible Remedies |
|---|---|
| No response at all from the control module. | 1) Ensure the cable assembly is wired properly (refer to pin definitions table in the user manual) and that it is properly connected between the control module customer interface port and the customer device.<br>2) Verify that the com port parameters are as specified in 4.1 Customer Interface Port Configuration.<br>3) Ensure the user has administration privileges on the PC to change the com port settings. If not, make sure the com port baud rate is set at the correct value.<br>4) Confirm that the customer interface cable is connected to the correct PC com port.<br>5) Ensure that there are no other applications executing on the same com port.<br>6) If using RS485, ensure port (or converter) is set to half duplex (2-wire configuration), and that echo is turned off.<br>7) Ensure that external RS485 converter has its own power supply.<br>8) Disable “Fast flush” property on the RS485 converter, if available (Moxa converter Uport).<br>9) If using a control module address other than 0xF, then verify the proper Device Address. Note that the control module will respond to all commands received with destination address 0xF.<br>10) If the transport medium is RS485 half duplex, note that some PC cards require software control of the RS485 transmit and receive buffer enable lines. The software in the customer device may need to coordinate the enabling /disabling of these buffers. It is also possible that the timing between the transition needs to be adjusted.<br>11) Ensure the control module is powered on. |
| Packet response is not as expected. | 1) Confirm that the Destination / Source address byte is not inverted (i.e. Destination address is in the upper nibble, source address is in the lower nibble). |
| Reply packet is incomplete. | 1) If software control of the transmit and receive buffer enable lines is required (RS485 half duplex), then it is possible that the timing between the transition needs to be adjusted. |
| Ethernet communication cannot be established. | 1) Try using default IP address 169.254.1.1.<br>2) Using the serial interface, check the network configuration parameters (host name and DHCP configuration). |