



Users Guide for the MCR2000

MCR2000 Release 1.2
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Overview

This manual defines the contents of the menu system presented to a user connected to the MCR2000 via a Terminal Emulator or telnet. In the process of configuring each parameter, an overview of the parameter and its impact on the configuration of the MCR2000 is provided.

When connecting via a Terminal Emulator, the user should be physically attached to the Term Port of the MCR2000. The terminal emulator should be configured to operate at the configured baud rate of the MCR2000. The default baud rate is 9600 bps, but it can be configured to other values from the factory as required.

When connecting via telnet, the user should be physically attached to the Ethernet Port of the MCR2000. The Ethernet Speed Mode is a configurable parameter of the MCR2000 and thus its exact setting can vary between specific installations. The default setting allows the Ethernet port to auto negotiate its link speed on power up.

This manual is divided into two sections. The first section provides a description of each menu item presented to the user of the menu system. The second section provides a view of the menu system.

The MCR2000 can be configured as a Transmitter and/or a Receiver. This manual describes the configuration of the MCR2000. Therefore, if a unit is configured as a Receiver only, then the descriptions of all parameters specific to the Transmitter will not be applicable. For Receiver Only products, the user will typically be required only to change the IP Address during installation. A description of how to change the IP Address is provided in the *Network Configuration* section below.

Description of Menu System

Dflt Menu Page

The Dflt Menu Page is displayed at the bottom of each menu page. It contains the following entries:

Save Parameters

This option allows a user to save the current configuration of the MCR2000 to permanent storage.

This configuration will be restored on each successive power cycle of the MCR2000.

Exit

This option allows a user to exit the current menu and return to its parent menu.

Main Menu Page

The Main Menu Page is the first menu presented to the user after the banner page is displayed. The Main Menu Page contains the following entries:

Network Configuration

This Network Configuration option allows the user to define each Network Interface defined in the MCR2000.

Transmitter Configuration

The Transmitter Configuration option allows the user to relay traffic from the Ethernet LAN to the HDLC Wan Interface.

Receiver Configuration

The Receiver Configuration option allows the user to relay traffic from the HDLC Wan Interface to the Ethernet LAN.

Statistics

The Statistics option displays relevant statistics gathered by the MCR2000. These statistics include, but are not limited to, the number and type of each packet transmitted and received by the MCR2000.

Misc Protocol Settings

The Misc Protocol Settings option displays the Misc Protocols menu. This menu allows the user to configure various protocols used to control access to the MCR2000 and the optional protocols that regulate the flow of data from the MCR2000. These protocols include, but are not limited to, Telnet, IGMP, SNMP.

Modem Parameters

The Modem Parameters option displays a set of menus that allow a user to configure and monitor a satellite modem connected to the MCR2000.

Diagnostics

The Diagnostics option displays a set of utilities available to the user to analyze and troubleshoot the MCR2000 installed in a network.

Administration

The Administration menu provides a basic set of standard admin functions to the MCR2000. The list of admin functions includes, but is not limited to, operating on the configuration stored in non-volatile memory, setting password access to the MCR2000, viewing the ARP table of the MCR2000, and resetting the MCR2000.

Network Configuration Page

The Network Configuration Page is activated from the Main Menu page. The Network Configuration Page contains the following entries:

Ethernet MAC Address

The Ethernet MAC address is a unique number assigned by the factory during the assembly of the MCR2000. This MAC address is often referred to as the serial number of the MCR2000. If a device attached to the same subnet as the MCR2000 establishes an IP connection to the MCR2000, then this number will be displayed on that device's arp entry for the MCR2000.

Ethernet Speed Mode

The Ethernet Speed mode defines the type of Ethernet connection being made to the MCR2000. The possible options are :

- 1 -- Auto
- 2 -- 10 MB/sec Half Duplex
- 3 -- 100 MB/sec Half Duplex
- 4 -- 10 MB/sec Full Duplex
- 5 -- 100 MB/sec Full Duplex

Use DHCP

The "Use DHCP" option allows a user to configure the MCR2000 to solicit an IP Address, Subnet Mask, and Default gateway for the Ethernet Interface of the MCR2000 from a DHCP server on powerup. If a DHCP server can not be found on power-up, then the MCR2000 chooses an arbitrary IP address forcing the user to use the terminal connection or a power-cycle to establish communication with the MCR2000.

Ethernet IP Address

Specifies the IP Address assigned to the Ethernet Interface of the MCR2000. This value is either configured by an operator if the "Use DHCP" option is set to NO, or assigned by a DHCP server if the "Use DHCP" option is set to YES.

Ethernet Subnet Mask

Specifies the Subnet Mask assigned to the Ethernet Interface of the MCR2000. This value is either configured by an operator if the "Use DHCP" option is set to NO, or assigned by a DHCP server if the "Use DHCP" option is set to YES.

Ethernet Default Gateway

Specifies the Default Gateway assigned to the the MCR2000. This value is either configured by an operator if the "Use DHCP" option is set to NO, or assigned by a DHCP server if the "Use DHCP" option is set to YES. If the Default Gateway assigned is on the same subnet as the HDLC interface, then the MCR2000 will limit the traffic sent on its Ethernet Interface. In this configuration, only ping, SNMP, HTML, and other IP responses to devices on the same subnet as its Ethernet Interface will physically be transmitted on its Ethernet Interface.

HDLC IP Address

The MCR2000 has two network interfaces: The Ethernet Port and the HDLC link. Each of these network interfaces must be assigned an IP Address. The only requirement of the HDLC IP Address is that it not be on the same subnet as the Ethernet Interface and that it is on the same subnet as the IP address assigned to the HDLC interface of the MCR2000 on the other side of the HDLC link

Since the only devices communicating on the HDLC link are a MCR2000, the HDLC IP address can usually be an arbitrary address assigned to many different systems. However, because of the possibility of conflict with an assigned Ethernet IP Address or the IP Address of a defined route, the user can select this value.

If a PC is attached to the subnet of the Ethernet Interface of the MCR2000, then that PC will be able to ping MCR2000 via its HDLC IP address if the following command is executed from a DOS prompt on that PC:

```
route add <HDLC_IP_Address> mask 255.255.255.255 <Ethernet_MAC_Address>
```

where the HDLC_IP_Address and Ethernet MAC Address refer to the respective settings of the MCR2000.

Remote HDLC IP Address

This value is required to allow a MCR2000 to route IP packets across its HDLC link when it is configured as a flexible router. The remote side HDLC IP Address is needed in similar fashion as a route's "gateway" is required in the 'route add' command described above.

Remote Ethernet IP Address

This is an optional parameter used to minimize some complexity in the configuration of the MCR2000 as a flexible router. Assume that the MCR2000 is connected in a system as depicted in Illustration 1 - Sample Installation of a MCR2000.

If a PC on the hub side of the system attempts to ping a PC on the remote side of the system, then the MCR2000 on each side of the link must process both the ICMP request and ICMP reply. This implies that the devices attached to the remote side MCR2000 must be defined in the routing table of the MCR2000 on the hub side. In similar fashion, the devices attached to the hub side of the MCR2000 must be defined in the routing table of the remote side MCR2000.

If the user specifies the *Remote Ethernet IP Address* and *Remote Ethernet Subnet Mask* parameters, then the network of devices attached to the MCR2000 on the other side of the HDLC link will automatically be added to the route table of the MCR2000 being configured.

All traffic processed by a MCR2000 configured as a flexible router is assigned a common HDLC address. However, each route processed by a MCR2000 configured as a fast router can use a separate HDLC address for each route. Because of this distinction, a MCR2000 configured, as a fast router will not use the *Remote Network IP Address* parameter.

Remote Ethernet Subnet Mask

The *Remote Ethernet Subnet Mask* allows a user to define how many devices attached a MCR2000 on the other side of the HDLC link will be automatically added to its internal routing table. A subnet mask of 255.255.255.255 will imply that only the MCR2000 on other side of the HDLC link will automatically be added. If the *Remote Network Subnet Mask* matches the *Ethernet Subnet Mask* of the MCR2000 on the other side of the HDLC link, then all devices connected to the remote side MCR2000 will be added automatically to the route table of the MCR2000 being configured.

Transmitter Configuration Page

A user can select the *Transmitter Configuration* page from the Main Menu page of the MCR2000. The *Transmitter Configuration* Page contains the following entries:

Transmitter State

The Transmitter state reflects the current state of MCR2000 as a routing device. This parameter has one of two values:

- 1 - Enabled
- 2 - Disabled

When the transmitter state is enabled, the MCR2000 will allow routing of packets from its Ethernet LAN interface to its HDLC Wan interface. When the transmitter state is disabled, the MCR2000 will not allow routing of any packets over its HDLC Wan Interface.

If the transmitter state is changed from disabled to enabled, then the MCR2000 will have to be reset in order for routing functions to start.

Router Mode

When the Transmitter State is enabled, the MCR2000 can be configured to route packets from its Ethernet LAN Interface to its HDLC Wan Interface in one of two modes:

- 1 - Flexible
- 2 - Fast

When configured as a Flexible router, the MCR2000 may provide out-of-band ICMP support to prevent devices sending traffic to the MCR2000 at a higher rate than is supported by a MCR2000. The TTL flags in all processed IP datagrams will also be decremented. However, all traffic routed by the MCR2000 will be assigned a common HDLC address. In addition, the MCR2000 will not be capable of processing data at rates that are supported when it is configured as a Fast router. Currently, QoS support is also not provided when the MCR2000 is configured as a flexible router.

When configured as a Fast router, a MCR2000 can assign a unique HDLC address for each defined route. In addition, as a Fast router, the MCR2000 can also enforce Quality of Service rules. However, if a packet must be dropped because of loading or a violation of a QoS rule, the packet is silently discarded. No attempt is made to regulate the information rate of the device sending traffic to the MCR2000. Furthermore, the TTL field of all processed IP datagrams is left untouched by a MCR2000 configured as a Fast router.

HDLC Address used by a Flexible Router

This parameter allows the user to specify the HDLC address used to carry all packets processed by the MCR2000 configured as a flexible router. If the MCR2000 is configured as a Fast Router, then the value of this field will be displayed as N/A.

Transmitter Route Table Configuration Page

The *Transmitter Route Table Configuration Page* can be selected from the *Transmitter Configuration Page*. The *Transmitter Route Table Configuration Page* allows a user to define the traffic routed by a MCR2000 configured as a fast router.

Route Table Page

The Transmitter Route Table allows a user to define the traffic routed by a MCR2000 configured as a fast router. Defining an entry in this table is similar to the using the 'route add' command of machines that support that command. For each route, the user must define

- 1 - The destination address of an IP packet of interest
- 2 - The number of network addresses that are governed by the selected entry
- 3 - A destination MAC address used by the transmitted HDLC packet

The value of this field can optionally be used for parsing by the MCR2000 on the other side of the HDLC link

- 4 - The HDLC address used to encapsulate the IP packet across the HDLC link

QoS Configuration/DES Key Select Page

The QoS/DES Configuration Page allows the user to define rules that govern how much bandwidth is guaranteed or allowed by a specified route. This table also allows definition for how a route should be encrypted.

The Min bandwidth field establishes a guaranteed minimum data rate that a route will be allowed to support before the MCR2000 starts to silently discard traffic. A value of 0 implies that a route is not guaranteed any bandwidth and it is acceptable to drop 100% of the packets for a route because of a lack in carrier bandwidth.

The Max bandwidth field establishes a hard maximum traffic rate that can be processed by the MCR2000 before it starts to silently discard traffic. A value of 0 for this field implies that no maximum limit is assigned to a route.

If a user sets both the guaranteed and maximum bandwidths assigned to a route to 0, then packets will be randomly dropped only when the resources of the carrier are being over-utilized.

DES Configuration

The DES Configuration Page can be selected from the *Transmitter Configuration* menu. The *DES Configuration* page allows the user to determine if DES encryption is enabled on a device and if so, the DES keys that are used to decrypt traffic. The keys specified for the transmit function of the MCR2000 are completely independent for the DES keys specified for the receiver function. This menu contains the following options:

DES Status

This field reports the availability of DES encryption. The two possible values for this field include:

- 1 – Available
- 2 – Not Available

Currently, the availability of DES is dependent only on the hardware configuration of the MCR2000. Future releases of the software will also require a license to access DES features.

Encrypt Enabled

This field indicates the status of the DES encrypt engine. The two possible values for this field include:

- 1 – Enabled
- 2 – Disabled

If DES Encrypt is disabled, then all traffic processed by the MCR2000 will be transmitted in the clear regardless of the DES encryption key specified in the route table.

Set Key 1

Information processed by the MCR2000 can be encrypted using one of two well-defined system keys for data transmitted by the MCR2000. The Set Key 1 field allows the user to specify the value of the key used to encrypt packets that specify Key1 in the route table..

SetKey 2

Information processed by the MCR2000 can be encrypted using one of two well-defined system keys for data transmitted by the MCR2000. The Set Key 2 field allows the user to specify the value of the key used to encrypt packets that specify Key2 in the route table..

Receiver Configuration Page

A user can select the *Receiver Configuration* page from the Main Menu page of the MCR2000. This page specifies how the receiver should process traffic received on its WAN HDLC link. The Receiver Configuration Page contains the following entries:

Sync Status

The Sync Status reflects the integrity of the data path on the HDLC WAN interface. The Sync Status will have one of two values:

- 1 - In-Sync
- 2 - Out-of-Sync

A value of In-Sync indicates that the MCR2000 is properly synchronized to the data stream being delivered on the HDLC WAN interface. A value of Out-of-Sync indicates that either the clock on the HDLC link is not present (cable or equipment problem), or the data being delivered on that interface does not contain intelligible HDLC datagrams.

Receiver State

The Receiver state reflects the current state of MCR2000 as a routing device. This parameter has one of two values:

- 1 - Enabled
- 2 - Disabled

When the Receiver state is enabled, the MCR2000 will allow routing of packets from its HDLC Wan interface to its Ethernet LAN interface. When the Receiver state is disabled, the MCR2000 will not allow routing of any packets received on its HDLC Wan Interface.

Number of HDLC Control Bytes

This parameter defines the number of control bytes that can be expected on an HDLC packet.

A MCR2000 configured as a Transmitter can only support 1 control Byte in an HDLC mode. Therefore, if a MCR2000 is receiving traffic generated from a Transmit MCR2000, the value must be set to 1.

HDLC Addresses

This parameter displays the HDLC Addresses Configuration Page. This page allows the user to define up to four HDLC addresses that can carry user information on the HDLC Wan Interface.

Unicast Filters

If the user selects this menu option, then the Receiver Unicast Configuration page will be presented. The Receiver Unicast Configuration page allows the user to determine if Unicast traffic should be analyzed and/or filtered by the MCR2000.

The Unicast Filter page contains the following options:

HDLC RX MAC Address

The MCR2000 has two network interfaces. Each interface is assigned a Network IP Address and a hardware MAC Address. The Ethernet MAC Address is configured as a Read Only parameter from the factory because the Ethernet interface must interact with many different types of equipment from many different vendors. The user, however, can configure the HDLC Rx MAC Address.

Enable Unicast Packets

The operator may want to prevent all Unicast traffic from being delivered onto a LAN. The *Enable Unicast Packets* parameter supports this need. This parameter can have one of two values:

- 1 – Enabled
- 2 – Disabled

Unicast Packets received by the MCR2000 on the HDLC Wan Interface will not be relayed to the Ethernet Interface if the *Enable Unicast Packets* parameter is disabled.

Active Unicast Filter

If Unicast Packets are enabled on a MCR2000, the operator may want to filter the traffic placed on the LAN with more information than the IP Address. The Active Unicast Filter parameter supports this need. This parameter can have one of the three following values:

- 1 – None
- 2 – HDLC MAC
- 3 – Ethernet MAC

If the parameter is set to NONE, then Unicast traffic is filtered on destination IP Address alone.

If the parameter is set to HDLC MAC, then any Unicast Traffic that is received with a MAC Address that does not match the HDLC MAC Address will be discarded.

If the parameter is set to Ethernet MAC, then any Unicast Traffic that is received with a MAC Address that does not match the Ethernet MAC Address will be discarded.

Send Unkown Unicast Packets to Dflt Gateway

An operator may connect a MCR2000 to an Internet backbone to facilitate remote management of the device via telnet, SNMP, and/or HTML. In these types of installations, the operator may not want any traffic received on the HDLC WAN interface to be delivered to this Internet backbone. The *Send Unkown Unicast Packets to Dflt Gateway* supports this need. This parameter can have one of the following two values:

- 1 – Yes
- 2 - No

If the parameter is set to YES, then any Unicast traffic received by the MCR2000 on the HDLC Wan interface that does not match the Ethernet subnet of the MCR2000 will be forwarded to its default gateway.

If the parameter is set to No, then any Unicast traffic received by the MCR2000 on the HDLC Wan interface that does not match the Ethernet subnet of the MCR2000 will be discarded.

DES Configuration

If the user selects this menu option from the *Receiver Configuration* menu, then the *DES Configuration* page will be presented. The *DES Configuration* page allows the user to determine if DES decryption is enabled on a device and if so, the DES keys that are used to decrypt traffic. The DES keys specified for the receiver function of the MCR2000 are completely independent from the keys specified for the transmit function. This menu contains the following options:

DES Status

This field reports the availability of DES decryption. The two possible values for this field include:

- 1 – Available
- 2 – Not Available

Currently, the availability of DES is dependent only on the hardware configuration of the MCR2000. Future releases of the software will also require a license to access DES features.

Decrypt Enable

This field indicates if the DES decrypt engine is enabled or disabled. The two possible values for this field include:

- 1 – Enabled
- 2 – Disabled

If DES Decrypt is disabled, then all traffic received will be processed as though it was received in the clear regardless of the DES encryption flags specified in the header of the received packet.

Set Key 1

Information processed by the MCR2000 can be encrypted using one of two well-defined system keys for all data received by the MCR2000. The Set Key 1 field allows the user to specify the value of the key used to decrypt received packets that specify Key1 is used for encrypting the payload of the packets.

SetKey 2

Information processed by the MCR2000 can be encrypted using one of two well-defined system keys for all data received by the MCR2000. The Set Key 2 field allows the user to specify the value of the key used to decrypt received packets that specify Key2 is used for encrypting the payload of the packets.

Statistics Menu Page

The Statistics Menu page can be selected from the the Main Menu page of the MCR2000. This page allows the user to determine the type of data that the MCR2000 is processing. The Receiver Configuration Page contains the following entries:

Transmitter Snapshots Stats

The Transmitter Snapshot Stats page displays counts of the number of packets transmitted on each configured route on the MCR2000. This page contains the following data :

Route Table Stats

The Route Table Stats shows the total packets transmitted and dropped for each route in the MCR2000. This table also shows the minimum, maximum, and average data rates sustained on each route.

Base Route for Display

The terminal screen is only capable of displaying stats for 8 routes. The value of 'Base Route for Display' allows the user to define the index of the route to display on the first line of the screen. This allows the user to view stats for each individual route defined by the transmitter.

HDLC Tx Latched Status

The HDLC Tx Latched Status reports the state of the HDLC Transmit hardware.

If the HDLC Transmitter is actively processing traffic, this field will typically be empty.

This field will report the following abnormal conditions :

- CLK DIED : The TxClock that gates the output of the HDLC transmitter has died
- CLK RECOVERED : The TxClock that has originally died, has been recovered
- OUT OF SYNC : The HDLC Transmit engine has gotten out of sync with the data being generated by the CPU.
This condition should never be displayed.
- UNDER RUN : The HDLC Tx engine sampled an underrun condition. This implies that the CPU did not provide the data required to transmit the remainder of an HDLC frame.
The HDLC Transmit engine should never report this condition.
- FIFO EMPTY : The HDLC Transmit engine has run out of data to process. The Transmit engine will be generating continuous HDLC idles in this condition.
- FIFO FULL : The HDLC Transmit engine's output FIFO is full. This condition indicates a high probability that data will be dropped by the HDLC transmit engine.
The HDLC Transmit engine should never report this condition.

HDLC Tx Clock Status

The HDLC TX Clock Status reports the state of the HDLC Transmit clock. This information will also be displayed in the HDLC TX Latched Status field described above, but it is also provided as a separate line item for easier reference. This field will display one of the following values :

TX CLK OK - The clock to gate the flow of data from the HDLC Transmit Hardware is valid.

NO TX CLK - The clock to gate the flow of data from the HDLC Transmit Hardware has died.

Reset Counters

Executing this menu option resets all statistics gathered for the transmitter to zero.

Dump HST Packets

Executing this menu option forces the MCR2000 to dump a hexadecimal representation of each packet that it processes. Great care should be taken when using this option, if the unit is processing high data rates, then the terminal screen will scroll data for very long periods of time. Selecting the menu option a second time terminates the dump operation. Each selection toggles the value of the dump engine.

Receiver Snapshots Stats

The Receiver Snapshot Stats page displays counts of the number of packets received by the MCR2000. This page contains the following data :

Unicast Packets Received

The Unicast Packets Received counter indicates the number of Unicast packets that were received on the HDLC WAN Interface, processed correctly by the MCR2000, and transmitted over the Ethernet.

Unicast Packets Received Local

The *Unicast Packets Received Local* counter indicates the number Unicast packets that were received on the WAN interface that were targeted for the MCR2000.

Unicast Packets Filtered

The Unicast Packets Filtered counter indicates the number of Unicast packets that were received by the MCR2000 but then dropped because the received packets did not match the filter configured in the Receiver | Unicast Filters Configuration Page.

Unicast Packets Subnet Mismatch

The Unicast Packets Subnet Mismatch counter indicates the number of Unicast packets that were received by the MCR2000 but dropped because the destination IP packet of the received packet could not be routed. A packet may not be routed because no default gateway was defined for the MCR2000 and the received Unicast packet was not on the same subnet as the MCR2000. The forwarding of packets to the default gateway is configured via the *Receiver Configuration / Unicast Filters Configuration* Page.

Unicast Packets ARP Failed

The *Unicast Packet ARP Fail* counter indicates the number of Unicast packets that were received by the MCR2000 and were destined for a device on the same subnet as the MCR2000, but were dropped because the device specified in the destination IP packet of the received packet has not yet responded to an ARP. After power-up, this counter typically increments for the first three seconds that packets are received for a device on the same subnet as the MCR2000.

Multicast Packets Received

The *Multicast Packets Received* counter indicates the number of Multicast packets that were received by the MCR2000.

Total Packets Dropped

The Total Packets dropped counter indicates the number of total packets that were dropped by the MCR2000. A packet can be dropped because of the following reasons :

The received packet contained a CRC Error

The received packet specified an invalid length

The received packet was a Multicast Packet, the MCR2000 is configured as an IGMP server, and no clients have yet joined the Multicast group for the received packet.

Total Packets Received

The Total Packets Received Counter indicates the total number of packets received by the MCR2000 on its HDLC WAN interface. This value should typically reflect the sum of the Unicast Packets Received, Multicast Packets Received, and Total Packets dropped counters.

Total HSR Packets Received

An HSR packet refers to a block of information that is transferred from hardware to the software from the WAN interface. An IP Datagram may be composed of one or more HSR packets. This counter can be used to determine if the software is receiving information.

When the receiver is configured to expect 1-control bytes in an HDLC frame [*Receiver Configuration / Number of HDLC Control Bytes*], the *Total HSR Packets Received* counter should be twice the number of the Total Packets Received counter. When the receiver is configured to expect 2 control bytes in an HDLC frame, this value should close to the total number of bytes received on the HDLC WAN interface divided by the *Total HSR Packets Receiver* counter. The HDLC Rx hardware inserts padding characters in the data stream presented to the CPU, so this correlation will not exactly reflect the total number of bytes received on the WAN interface.

Please Reference the section on *Receiver Configuration / Number of HDLC Control Bytes* for more information on HDLC Control Bytes.

Total CRC Errors

The Total CRC Errors counter indicates the total number of packets that were received by the MCR2000 that contained CRC errors. If received packets contain CRC errors, then the MCR2000 discards the packet.

Total CRC Flag Errors

To determine an HDLC CRC error, the CPU examines a 32-bit field for the value that contains either all zero's or all one's. If the field being examined does not contain one of these two well-defined bit patterns, then the Total CRC Flag Errors counter is incremented.

This counter should always be set to zero. If it is not zero, then the counter reflects a synchronization problem between the streams of data transferred from the HDLC Rx Hardware to the CPU.

HDLC RX Latched Status

The HDLC Rx Latched Status reports the state of the HDLC Receive hardware.

If the HDLC Receiver is actively processing traffic, this field will typically be empty.

This field will report the following abnormal conditions :

- | | |
|-----------------|---|
| CLK DIED : | The RxClock that gates the input of the HDLC transmitter has died |
| CLK RECOVERED : | The RxClock that has originally died, has been recovered |
| CRC ERROR: | The last HDLC frame received by the HDLC hardware contained a CRC error. |
| ABORT RCVD : | An HDLC Abort sequence was sampled by the HDLC hardware. |
| FIFO EMPTY : | The HDLC Receive engine has run out of data to process. The Receive Hardware is processing either a continuous stream HDLC idles or stream of HDLC packets whose addresses are not configured in <i>Receiver Configuration / HDLC Addresses</i> . |
| FIFO FULL : | The HDLC Receive engine's output FIFO is full. This condition indicates that the CPU is not keeping up with the data being supplied on the HDLC WAN Interface.
The HDLC Transmit engine should never report this condition. |

Reset Counters

Executing this menu option resets all statistics gathered for the receiver to zero.

Dump HSR Packets

Executing this menu option forces the MCR2000 to dump a hexadecimal representation of each packet that it processes. Great care should be taken when using this option, if the unit is processing high data rates, then the terminal screen will scroll data for very long periods of time. Selecting the menu option a second time terminates the dump operation. Each selection toggles the value of the dump engine.

Transmitter Detailed Stats

This page displays detailed statistics that are value to the developers of the MCR2000.

Misc Protocols Settings Page

The *Misc Protocols Settings* page can be selected from the Main Menu page of the MCR2000. This page allows the user to configure several protocols that are used by the MCR2000 to monitor and control the unit and regulate how the unit processes data. This configuration page contains the following options:

In-Band Command IP Address

Future releases of the MCR2000 may support a means to control the unit via a proprietary protocol that uses a well-defined system level Multicast IP Address. The In band Command IP Address defines the Multicast Address that will be used to deliver commands using this protocol to a MCR2000.

Require Password before accessing HTML

When a user sets a parameter from the HTML interface, a correct username and password must be supplied to initiate the change on the MCR2000. If an invalid username or password is supplied, then the MCR2000 will not make the requested change.

Some operators, however, require that a user also supply a password for access to the read-only portions of the HTML interface. The *Require Password before accessing HTML* option supports this need. This option can have one of two values:

- 1 - YES
- 2 - NO

If the value is set to YES, then a user will be prompted to enter a username and password for gaining access to even the READ-ONLY web pages.

If the value is set to NO, then a user will have to supply a username and password only when a change is made to a configuration parameter.

Enable Telnet

The MCR2000 supports a telnet interface. However, some operators may want to inhibit access to the MCR2000 via telnet. The Enable Telnet option supports this need.

The parameter can have one of two values :

- 1 - Enabled
- 2 - Disabled

If telnet is enabled, then a user will be allowed to access the MCR2000 via telnet. After establishing a connection, the user will be prompted to enter a username and password.

If telnet is disabled, then all attempts to connect to the MCR2000 via telnet will be refused.

UDP Reports

Future releases of the MCR2000 may support the generation of reports via a proprietary application that runs on the UDP/IP protocol. Activating the UDP Reports option allows a user to define the machine that will process these reports and how often reports should be generated. The UDP Reports configuration page contains the following parameters :

Enable UDP Reports

This parameter has two possible values :

- 1 – Yes
- 2 - No

If *UDP Reports* is enabled, then a MCR2000 that is running a software release that supports UDP reports will generate the reports at the time interval specified in the *UDP reports timer value* to the machine specified by the *IP Address to receive reports* parameter.

UDP reports timer value

If UDP reports are enabled, the value of UDP reports timer value defines the time interval (in seconds) that a report is generated.

IP Address to receive reports

If UDP reports are enabled, this parameter defines the machine that is expecting the reports.

IGMP Management

Some operators may want to limit unnecessary traffic generated on a LAN segment. Unicast traffic does this natively through the use of IP Addresses and subnet zones. The IGMP protocol allows this same concept to be applied to Multicast traffic. The protocol allows a machine to only send data on a LAN if at least one machine on the LAN has expressed an interest in the content. Exercising the IGMP Management option allows a user to define the use and configuration of IGMP on the MCR2000.

The IGMP Management configuration page contains the following options:

Enable IGMP

The Enable IGMP parameter has two possible values :

- 1 – Yes
- 2 – No

If IGMP is enabled, then a multicast packet that is received from the HDLC WAN Interface will only be forwarded to the Ethernet LAN if a client on the Ethernet LAN has joined the Multicast group via an IGMP request.

IGMP query period

The IGMP protocol requests that a server periodically publish to users on the LAN the Multicast IP Addresses that it can service. The IGMP query period defines the time interval (in seconds) between each of these queries for membership.

IGMP max response time

The IGMP max response time defines the time interval (in seconds) that the MCR2000 should wait before it assumes that no parties are interested in the content published via an IGMP query. The protocol does not allow a response time of greater than 25.6 seconds. This option is expressed seconds, so the max response time that is accepted by the MCR2000 is 25 seconds.

Number of missed responses before leaving IGMP group

Because of the Multicast nature of IGMP traffic and the lack of an ACK/NAK protocol, it is possible for solicitations for joining a group to not reach the intended recipient. This parameter minimizes this risk by allowing a user to define how many queries to remain

connected to a group must go unanswered before the service being provided to that group are discontinued.

For example, consider a MCR2000 that has the *IGMP query period* set to 60 seconds and the *number of missed responses* set to 3. If a client joins an IGMP group, then the service to that group will not be discontinued until no clients respond to a query from the MCR2000 for a period of $60 \times 3 = 180$ seconds.

SNMP settings

The MCR2000 allows a user to monitor and control its parameters via the SNMP Protocol. Activating the SNMP Settings option allows the user to define different levels of security to be enforced from a user that connects to the MCR2000 via SNMP.

The SNMP settings configuration page contains the following options:

Allow Access to Private Community

The SNMP community named private is commonly used to control access to SNMP OID's specific to the architecture of a system. It has become so common, however, that it is regarded by some as an easy security breach for unauthorized access to a system. To minimize, this risk, the MCR2000 allows an operator to refuse access to a user that accesses the MCR2000 via SNMP using the community named private.

Operator Community

The *Operator Community* parameter allows the operator to specify the name of a community other than private that will be allowed to access read-only configuration parameters on the MCR2000.

Admin Community

The Admin Community parameter allows the operator to specify the name of a community other than private that will be allowed to access a subset of the read-write SNMP OID's that are specific to the MCR2000 architecture. In order for a user to change the value of a parameter using the community specified by the Admin Community parameter, the user must first unlock access by providing the password via an snmpset to a well-defined OID. In other words, if the password of a unit is set to 'secret', a user will not be able to set an SNMP variable using the Admin community name until the value 'secret' is written to the defined admin security OID.

TCP/IP Acceleration

TCP/IP connections can sometimes be limited in performance for Unicast data because of the intrinsic delay introduced by a satellite connection. A proprietary TCP/IP Acceleration protocol helps to overcome these restrictions. The TCP/IP Acceleration page allows a user to define the parameters required to configure this proprietary protocol.

The TCP/IP Acceleration configuration page contains the following options:

Enable

The Enable parameter can have one of two values :

- 1 – Yes
- 2 – No

If TCP/IP Acceleration is enabled, then all Unicast data received by the MCR2000 is assumed to be generated from a server that packages the Unicast data. If TCP/IP Acceleration is disabled, then all Unicast data is assumed to be native and the MCR2000 simply forwards the received Unicast data as-is to the Ethernet LAN.

Peer IP Address

The Peer IP Address specifies the IP Address of the server that is packaging Unicast data using the TCP/IP Acceleration Protocol.

Modem Parameters Page

A user can activate the *Modem Parameters* page by selecting the Modem Parameters option on the Main Menu page. This page allows the user to configure a satellite modem supported by the MCR2000 software.

Diagnostics Page

A user can activate the Diagnostics page by selecting the *Diagnostics* option on the Main Menu page. This page allows the user to configure a satellite modem supported by the MCR2000 software.

The *Diagnostics* page contains the following options:

CiM Module Loop Back Mode

This option allows a user to put the MCR2000 into loop back mode. This allows MCR2000 that are configured as Transmitters to receive the same packets that it transmits.

Send Test Packet on Defined Route

This option allows the user to transmit a packet on a defined route in the Route Table for MCR2000 units that are configured as Transmitters. This utility is useful for commissioning of new systems or new routes by ensuring that a MCR2000 is configured correctly to pass data on a route as expected.

Command Line Debug Prompt

This option displays a command line prompt that allows a user to issue more diagnostic commands. The list of available commands support by the command line can be displayed by typing help from the command line.

Administration Page

A user can activate the Administration page by selecting the *Administration* option on the Main Menu page. This page allows the user to perform administrative operations on the MCR2000.

The *Diagnostics* page contains the following options:

Database Operations

The *Database Operations* option allows the user to view, save, or erase an existing user configuration of the MCR2000. A MCR2000 uses these types of configuration files to initialize itself on power-up. A Factory Configuration File contains a set of read-only parameters and a User Configuration File contains a user-defined profile.

The Factory Configuration File is intended to minimize the configuration of a MCR2000 for installation into a large network. At a minimum, it defines the Ethernet MAC Address of the MCR2000, but this file can also provide default settings for any configurable parameter defined in this document.

The User Configuration File allows a User to over-write the values defined in the Factory Configuration file. This allows full customization of a MCR2000 without erasing a set of parameters defined from the factory. The User configuration file can also be retrieved or overwritten via FTP by specifying a hidden filename called 'param'.

The *Database Operations* Page contains the following options :

Save Parameters to permanent storage

This option performs the same operation as the option with the same name in the default menu.

It forces the current configuration of the MCR2000 to be saved to permanent storage for initialization of the MCR2000 on the next power cycle.

Restore Factory Default

This option erases the current User Configuration file in flash and forces the MCR2000 to be initialized on power-up in the same state as it was received from the factory.

Load Parameters from permanent storage

This option overwrites the current configuration of the MCR2000 with the configuration last saved to permanent storage. It allows the user to perform an 'Undo' type operation if the MCR2000 put into an undesirable state by the user.

View

This option displays all of the parameters defined in the Factory Configuration File and the User parameter file.

Users and passwords

This option allows an operator to define the password required to access the MCR2000 via telnet, HTML, and/or FTP. It also defines the password required to gain write access to the MCR2000 via SNMP using the Administrative Community as defined in the Misc Protocol Settings | SNMP settings configuration page.

The *Users and Passwords* page contains the following options:

User/Passwd #1

This option defines the username and password required to gain access to the MCR2000 through the protocols that have password protection.

IGMP Information

The *IGMP Information* option allows a user to view the IGMP clients are actively listening to content being provided by the MCR2000. It also allows the user to determine how the Ethernet Interface is configured to receive requests to join IGMP groups.

The *IGMP Information* page contains the following options:

View IGMP Table

This table reports the content that clients have subscribed to the MCR2000 using the IGMP protocol. This allows an operator to determine which services are being used and the minimum time before a service will be terminated.

View Multicast List

The MCR2000 filters unnecessary Ethernet traffic in hardware to prevent overloading the CPU with erroneous data. This filtering allows only Unicast traffic that is targeted for the Ethernet MAC to be passed to the CPU. Multicast traffic is filtered through the use of an Ethernet HASH table. The contents of the Ethernet Hash table are derived from the IGMP table. The View Multicast List allows an operator to determine which Multicast Addresses are allowed to pass the hardware filters to the CPU.

Add Entry to Multicast List

This option allows a user to explicit force a certain type of Multicast traffic to pass the hardware filters to the CPU. This can be a valuable tool when diagnosing problems with subscribing to Multicast Traffic using the IGMP protocol.

Remove Entry to Multicast List

This option allows a user to explicit prevent a certain type of Multicast traffic to pass the hardware filters to the CPU. This can be a valuable tool when diagnosing problems with subscribing to Multicast Traffic using the IGMP protocol.

Display Arp Tbl

This option allows the operator to view the current Arp table. This is very similar to the standard UNIX command “arp -a”.

Flush Arp Tbl

This option allows an entire Arp table to be removed. This is equivalent to performing the standard UNIX command “arp -d” on each address reported in an “arp -a” command.

Reset the Box

This option forces a reset of the MCR2000. It has the same logical effect of power-cycling the unit.

View of the Menu System

Dflt Menu Page

Save ParametersS
ExitX

Main Menu Page

Network Configuration.....N
Transmitter Configuration.....T
Receiver Configuration.....R
Statistics.....S
Misc ProtocolSettings.....P
Modem Parameters.....M
Diagnostics.....D
Administration.....A

Network Configuration Page

Ethernet MAC Address.....[00-60-AA-01-02-01]
Ethernet speed mode.....[Auto].....S
Use DHCP.....[No].....D
Ethernet IP Address.....[10.10.20.1].....I
Ethernet Subnet Mask.....[255.255.255.0].....M
Ethernet Dflt Gateway.....[NOT-DEFINED].....G
HDLC IP Address.....[192.168.2.1].....H
Remote HDLC IP Address.....[NOT-DEFINED].....J
Remote Ethernet IP Address...[NOT-DEFINED].....R
Remote Ethernet Subnet Mask..[255.255.255.0].....N

Transmitter Configuration Page

```

Transmitter State.....[Disabled].....N
Router Mode.....[Fast].....E
Flexible Router HDLC Address.....[N/A].....H
Route Table.....R
QoS Configuration/DES Key Selection.....Q
DES Configuration.....D
  
```

Transmitter Route Table Configuration Page

Name	Dest IP/SNet Bits	MAC Address	ADDR
Route001..[PING	192.168.020.050/32	00-01-02-03-04-05	5555].....1
Route002..[	NOT-DEFINED/NA	NOT-DEFINED	0000].....2
Route003..[	NOT-DEFINED/NA	NOT-DEFINED	0000].....3
Route004..[	NOT-DEFINED/NA	NOT-DEFINED	0000].....4
Route005..[	NOT-DEFINED/NA	NOT-DEFINED	0000].....5
Route006..[	NOT-DEFINED/NA	NOT-DEFINED	0000].....6
Route007..[	NOT-DEFINED/NA	NOT-DEFINED	0000].....7
Route008..[	NOT-DEFINED/NA	NOT-DEFINED	0000].....8

QoS/DES Configuration Page

Name	Blade	Min B/W	Max B/W	Pack	DES Key
Route001..[PING	1	0.0	0.0	No	Clear].....1
Route002..[					].....2
Route003..[					].....3
Route004..[					].....4
Route005..[					].....5
Route006..[					].....6
Route007..[					].....7
Route008..[					].....8

DES Configuratio Page

```

DES Status.....[Available]
Encrypt Enabled..[Disabled].....T
Set Key 1.....[0000000000000000].....1
Set Key 2.....[0000000000000000].....2
  
```

Receiver Configuration Page

Sync Status.....[OUT-OF-SYNC]
Receiver State.....[Enabled].....R
Number of HDLC Control Bytes..[2].....C
HDLC Addresses.....H
Unicast Filters.....U
DES Configuration.....D

Receiver HDLC Addresses

HDLC Addr 1..[5555].....1
HDLC Addr 2..[0505].....2
HDLC Addr 3..[AAAA].....3
HDLC Addr 4..[4321].....4

Receiver Unicast Filter Configuration

HDLC RX MAC Address.....[00-60-AA-01-48-F7].....M
Allow Unicast Packets.....[Enabled].....E
Active Unicast Filter.....[None].....F
Send Unknown Unicast Packets to Dflt Gateway..[No].....G

Receiver DES Configuration

DES Status...[Available]
DES Enabled..[Disabled].....T
Set Key 1....[0000000000000000].....1
Set Key 2....[0000000000000000].....2

Statistics Menu Page

Transmitter Snapshot Stats.....T
 Receiver Snapshot Stats.....R
 Transmitter Detailed Stats.....E

Transmitter Snapshots Stats

Route Name	Total Packets Transmitted	Total Packets Dropped	Minimum Packet Rate	Maximum Packet Rate	Average Packet Rate
PING	0	0	0.000	0.000	0.000
Totals	0	0	0.000	0.000	0.000

Base Route for Display..[1].....B
 HDLC TX Latched Status..[CLK LATCHED]
 HDLC TX Clock Status....[TX CLK OK]
 Reset Counters.....R
 Dump HST Packets.....[No].....T

Receiver Snapshots Stats

Unicast Packets Received.....[0]
 Unicast Packets Received Local...[0]
 Unicast Packets Filtered.....[0]
 Unicast Packets Subnet Mismatch..[0]
 Unicast Packets ARP Fail.....[0]
 Multicast Packets Received.....[0]
 Total Packets Dropped.....[0]
 Total Packets Received.....[0]
 Total HSR Pkts Rcvd.....[0]
 Total CRC Errors.....[0]
 Total CRC Flag Errors.....[0]
 HDLC RX Latched Status.....[HDLC Locked]
 Reset Counters.....R
 Dump HSR Packets.....[No].....T
 Send Downlink Test Message.....Z

Transmitter Detailed Stats

Prints out detailed stats that reflect the state of internal state machines used by the software to manage the flow of information into and out of the box.

Misc Protocols Configuration Page

Maestro CMD IP Address.....[NOT-DEFINED].....M
Require Password before accessing HTML..[No].....H
Enable Telnet.....[Enabled].....T
UDP Reports.....U
IGMP Management.....I
SNMP settings.....S
Pronto Settings.....P

UDP Reports Configuration Page

Enable UDP Reports.....[No].....U
UDP reports timer value.....[20].....T
IP Address to receive reports..[NOT-DEFINED].....I

IGMP Management

Enable IGMP.....[No].....I
IGMP query period.....[40].....Q
IGMP max. response time.....[25].....R
Number of missed responses before leaving IGMP group..[2].....M

SNMP Settings

Allow Access to Private Community..[Yes].....P
Operator Community.....[operator].....O
Admin Community.....[admin].....A

TCP/IP Settings

Enable Pronto.....[No].....E
Pronto Peer IP Address..[NOT-DEFINED].....P
Pronto Network.....[NOT-DEFINED].....N
Pronto NetMask.....[NOT-DEFINED].....M

Modem Parameters Page

Transmit Modem Configuration.....T
Receive Modem Configuration.....R
AUPC.....P
Miscellaneous.....M
Alarm Masks.....A

Transmit Modem Configuration Page

Transmit Frequency.....[077.0000].....T
Transmit Data Rate.....[0012.000].....D
Encoder.....[7/8].....E
Scrambler.....[Off].....M
Tx Output Power (minus sign assumed)..[1000.0].....P
Tx Clock Source.....[Internal].....C

Receive Modem Configuration Page

Rx Center frequency.....[066.0000].....R
Receive Data Rate.....[0000.000].....D
Decoder.....[UNDEFINED].....E
De-scrambler.....[Off].....M
Sweep Width.....[6000].....W
Scrolling EbNo.....O
EbNo (Low, High, Present).....[No Data Collected]
LNB Frequency Offset,KHz (Low/High/Present)..[No Data Collected]

AUPC Modem Configuration

Framing.....[Disabled / Enabled].F
Remote Demod Target Eb/No (db)[7.0 dB].....D
Tx Power Max Increase)db)....[0 dB].....T
Max Power Reached Action.....[Generate_TX_Alarm]..P
Remote Demod Unlock Action....[Go_to_Nominal_Power].A

Alarm Masks Modem Configuration

Tx AIS Mask.....[Masked / Enabled].....T
Rx AIS Mask.....[Masked / Enabled].....R
Buffer Mask.....[Masked / Enabled].....B
Rx AGC Mask.....[Masked / Enabled].....A
Eb/No Mask.....[Masked / Enabled].....E

Miscellaneous

Interface.....[RS232_(sync)].....T
IF Impedance (ohms).....[50/75].....D
ODU Communications.....[Disabled / Enabled]....E
Statistics Log Update Interval..[Disabled / Enabled]....E
Test Mode.....[On / Off].....M

Diagnostics Page

CiM Module Loopback Mode.....[Disabled].....L
Send Test Packet on Defined Route.....T
Command Line Debug Prompt.....D

Administration Page

Database Operations.....D
Users and passwords.....P
IGMP Information.....I
Display Arp Tbl.....A
Flush ARP Table.....F
Reset the Box.....R

Administration Database Operations

Save Parameters to permanent storage.....S
Restore Factory Default.....F
Load Parameters from permanent storage.....L
View.....V

Password access

User/Passwd #1..[idi/idi].....1

IGMP Information

View IGMP Table.....V
View Multicast List.....M
Add Entry to Multicast List.....A
Remove Entry to Multicast List.....R

Illustration 1 – Sample Installation of a MCR2000

