MCDD-100

MetaCarrier® Detection Device
Installation and Operation Manual
For Firmware Version 1.2.1 or Higher

IMPORTANT NOTE: The information contained in this document supersedes all previously published information regarding this product. Product specifications are subject to change without prior notice.

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PREFACE

About this Manual

This manual provides installation and operation information for the Comtech EF Data MCDD-100 MetaCarrier® Detection Device. This is an informational document intended for the persons responsible for the operation and maintenance of the MCDD-100.

Conventions and References

Patents and Trademarks

See all of Comtech EF Data's Patents and Patents Pending at http://patents.comtechefdata.com.

Comtech EF Data acknowledges that all trademarks are the property of the trademark owners.

Warnings, Cautions, and Notes

> *A <u>WARNING</u> GIVES INFORMATION ABOUT A POSSIBLE HAZARD THAT MAY CAUSE DEATH OR SERIOUS INJURY.*

> *A <u>CAUTION</u> gives information about a possible hazard that MAY CAUSE INJURY or PROPERTY DAMAGE.*

> *A <u>NOTE</u> gives important information about a task or the equipment.*

> *A <u>REFERENCE</u> directs the user to additional information about a task or the equipment.*

Recommended Standard Designations

The new designation of the Electronic Industries Association (EIA) supersedes the Recommended Standard (RS) designations. References to the old designations may be shown when depicting actual text (e.g., RS-232) displayed on Web Server pages, serial remote interfaces, or unit rear panels. All other references in the manual refer to EIA designations.

> *The user should carefully review the following information:.*

Safety and Compliance

Electrical Safety and Compliance

The unit complies with the **EN 60950 Safety of Information Technology Equipment (Including Electrical Business Machines)** safety standard.

> *IF THE UNIT IS OPERATED IN A VEHICLE OR MOVABLE INSTALLATION, MAKE SURE THE UNIT IS STABLE. OTHERWISE, EN 60950 SAFETY IS NOT GUARANTEED.*

Electrical Installation

> *CONNECT THE UNIT TO A POWER SYSTEM THAT HAS SEPARATE GROUND, LINE AND NEUTRAL CONDUCTORS. DO NOT CONNECT THE UNIT WITHOUT A DIRECT CONNECTION TO GROUND.*

> *Sect 3.5 MCDD-100 Ground and Power Connections*

Operating Environment

> *DO NOT OPERATE THE UNIT IN ANY OF THESE EXTREME OPERATING CONDITIONS:*
> - *AMBIENT TEMPERATURES LESS THAN 0° C (32° F) OR MORE THAN 50° C (122° F).*
>
> - *PRECIPITATION, CONDENSATION, OR HUMID ATMOSPHERES OF MORE THAN 95% RELATIVE HUMIDITY.*
>
> - *UNPRESSURIZED ALTITUDES OF MORE THAN 2000 METRES (6561.7 FEET).*
>
> - *EXCESSIVE DUST.*
>
> - *FLAMMABLE GASES.*
>
> - *CORROSIVE OR EXPLOSIVE ATMOSPHERES.*

European Union Radio Equipment and Telecommunications Terminal Equipment (R&TTE) Directive (1999/5/EC) and EN 301 489-1

Independent testing verifies that the unit complies with the European Union R&TTE Directive, its reference to EN 301 489-1 (*Electromagnetic compatibility and **R**adio spectrum **M**atters [ERM]; **E**lectro**M**agnetic **C**ompatibility [EMC] standard for radio equipment and services, Part 1: Common technical requirements*), and the Declarations of Conformity for the applicable directives, standards, and practices that follow:

European Union Electromagnetic Compatibility (EMC) Directive (2004/108/EC)

- **Emissions: EN 55022 Class B** – Limits and Methods of Measurement of Radio Interference Characteristics of Information Technology Equipment.

- **Immunity: EN 55024** – Information Technology Equipment: Immunity Characteristics, Limits, and Methods of Measurement.

- **EN 61000-3-2** – Harmonic Currents Emission

- **EN 61000-3-3** – Voltage Fluctuations and Flicker.

- **Federal Communications Commission Federal Code of Regulation FCC Part 15, Subpart B.**

> ⚠ *TO ENSURE THAT THE UNIT COMPLIES WITH THESE STANDARDS, OBEY THESE INSTRUCTIONS:*

- Use coaxial cable that is of good quality for connections to the L-Band Type 'N' Rx (receive) female connector.

- Use Type 'D' connectors that have back-shells with continuous metallic shielding.

  Type 'D' cabling must have a continuous outer shield (either foil or braid, or both). The shield must be bonded to the back-shell.

- Operate the unit with its cover on at all times.

European Union Low Voltage Directive (LVD) (2006/95/EC)

Symbol	Description
<HAR>	Type of power cord required for use in the European Community.
⚠	**CAUTION: Double-pole/Neutral Fusing** **ACHTUNG: Zweipolige bzw. Neutralleiter-Sicherung**

International Symbols			
Symbol	**Definition**	**Symbol**	**Definition**
~	Alternating Current	⏚	Protective Earth
⊟	Fuse	⏛	Chassis Ground

For additional symbols, refer to Warnings, Cautions and Notes listed earlier in this Preface.

European Union RoHS Directive (2002/95/EC)

This unit satisfies (with exemptions) the requirements specified in the European Union Directive on the Restriction of Hazardous Substances in Electrical and Electronic Equipment (EU RoHS, Directive 2002/95/EC).

European Union Telecommunications Terminal Equipment Directive (91/263/EEC)

In accordance with the European Union Telecommunications Terminal Equipment Directive 91/263/EEC, the unit should not be directly connected to the Public Telecommunications Network.

CE Mark

Comtech EF Data declares that the unit meets the necessary requirements for the CE Mark.

Product Support

For all product support, please call:

+1.240.243.1880

+1.866.472.3963 (toll free USA)

Comtech EF Data Headquarters

http://www.comtechefdata.com

Comtech EF Data Corp.

2114 West 7th Street

Tempe, Arizona USA 85281

+1.480.333.2200

Warranty Policy

Comtech EF Data products are warranted against defects in material and workmanship for a specific period from the date of shipment, and this period varies by product. In most cases, the warranty period is two years. During the warranty period, Comtech EF Data will, at its option, repair or replace products that prove to be defective. Repairs are warranted for the remainder of the original warranty or a 90 day extended warranty, whichever is longer. Contact Comtech EF Data for the warranty period specific to the product purchased.

For equipment under warranty, the owner is responsible for freight to Comtech EF Data and all related customs, taxes, tariffs, insurance, etc. Comtech EF Data is responsible for the freight charges only for return of the equipment from the factory to the owner. Comtech EF Data will return the equipment by the same method (i.e., Air, Express, Surface) as the equipment was sent to Comtech EF Data.

All equipment returned for warranty repair must have a valid RMA number issued prior to return and be marked clearly on the return packaging. Comtech EF Data strongly recommends all equipment be returned in its original packaging.

Comtech EF Data Corporation's obligations under this warranty are limited to repair or replacement of failed parts, and the return shipment to the buyer of the repaired or replaced parts.

Limitations of Warranty

The warranty does not apply to any part of a product that has been installed, altered, repaired, or misused in any way that, in the opinion of Comtech EF Data Corporation, would affect the reliability or detracts from the performance of any part of the product, or is damaged as the result of use in a way or with equipment that had not been previously approved by Comtech EF Data Corporation.

The warranty does not apply to any product or parts thereof where the serial number or the serial number of any of its parts has been altered, defaced, or removed.

The warranty does not cover damage or loss incurred in transportation of the product. The warranty does not cover replacement or repair necessitated by loss or damage from any cause beyond the control of Comtech EF Data Corporation, such as lightning or other natural and weather related events or wartime environments.

The warranty does not cover any labor involved in the removal and or reinstallation of warranted equipment or parts on site, or any labor required to diagnose the necessity for repair or replacement.

The warranty excludes any responsibility by Comtech EF Data Corporation for incidental or consequential damages arising from the use of the equipment or products, or for any inability to use them either separate from or in combination with any other equipment or products.

A fixed charge established for each product will be imposed for all equipment returned for warranty repair where Comtech EF Data Corporation cannot identify the cause of the reported failure.

Exclusive Remedies

Comtech EF Data Corporation's warranty, as stated is in lieu of all other warranties, expressed, implied, or statutory, including those of merchantability and fitness for a particular purpose. The buyer shall pass on to any purchaser, lessee, or other user of Comtech EF Data Corporation's products, the aforementioned warranty, and shall indemnify and hold harmless Comtech EF Data Corporation from any claims or liability of such purchaser, lessee, or user based upon allegations that the buyer, its agents, or employees have made additional warranties or representations as to product preference or use.

The remedies provided herein are the buyer's sole and exclusive remedies. Comtech EF Data shall not be liable for any direct, indirect, special, incidental, or consequential damages, whether based on contract, tort, or any other legal theory.

Chapter 1. INTRODUCTION

1.1 Overview

Figure 1-1. MCDD-100 MetaCarrier® Detection Device

Comtech EF Data's MCDD-100 MetaCarrier® Detection Device (**Figure 1-1**) is a patent pending carrier identification (CID) product that uses spread spectrum technology to decode an embedded unique carrier identification sequence for a transmission carrier.

The MCDD-100 is combined with the MCED-100 MetaCarrier® Embedding Device to provide a complete MetaCarrier embedding and decoding product. In a typical network, there can be as many MCED-100s as there are modulating devices, and a smaller number of MCDD-100s to verify the presence of the MetaCarrier on each carrier. In an interference condition, the MCDD-100 may be used to decode the MetaCarrier of an interfering carrier that may not be part of one's own transmission network, as long as the interfering carrier has a MetaCarrier embedded.

The MCDD-100 is unique in that it operates in both non-interfered and interfered conditions. By using the MetaCarrier concept, a low-speed data sequence containing information about the transmission carrier is spread using Direct Sequence Spread Spectrum (DSSS), and then combined with the transmission "desired" carrier to produce a composite carrier with an embedded CID.

The MCDD-100 supports an L-Band (950 MHz to 2150 MHz) or IF (50 MHz to 180 MHz) input for decoding and demodulating the MetaCarrier sequence for a carrier that contains the Comtech EF Data embedded CID.

- **Sect. 1.3 MCDD-100 Features**
- **Sect. 1.4 MCDD-100 Specifications**

1.2   Functional Description
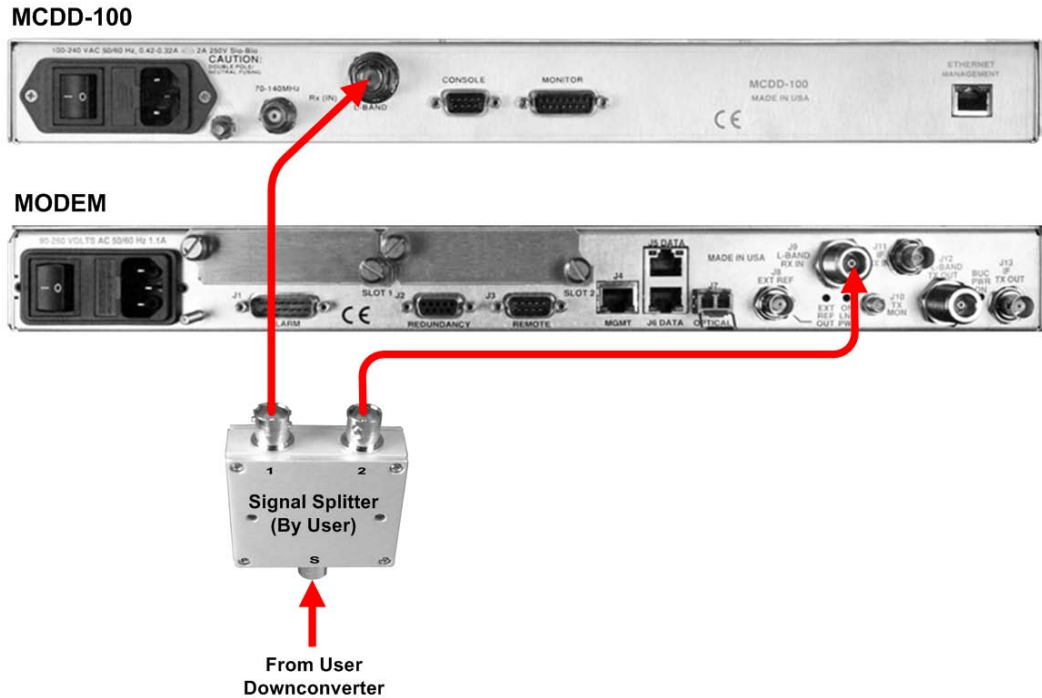
Figure 1-2. MCDD-100 Connection Example

The MCDD-100 supports both L-Band operation (950 MHz to 2150 MHz) and IF operation (50 MHz to 180 MHz). Note that the MCDD-100 does not provide DC power for a Low-Noise Block Downconverter (LNB) for the L-Band input.

At the monitoring (receive) station, the MCDD-100 may be connected after the downconversion equipment for detection and decoding of the MetaCarrier – an example of this setup is shown in **Figure 1-2**. Once directed to the desired carrier frequency and symbol rate (area of interference), the MCDD-100 automatically determines whether a MetaCarrier is present.

The carrier's characteristics may be obtained through the use of a spectrum analyzer or an interference monitoring system. Upon entry of the approximate center frequency and symbol rate, the MCDD-100 then begins to search under the assigned spectrum for the presence of a MetaCarrier. The MetaCarriers, when present, have a power spectral density (PSD) between 27.5 dB and 17.5 dB below the transmission carrier's spectral density in accordance with the following table:

Host carrier symbol rate (SR) range (ksps ≡ kilo symbols/sec)	CID Signal PSD level relative to host carrier PSD level, dB
128≤ SR < 2048ksps	-27.5
2048ksps≤ SR < 4096ksps	-24.5
4096ksps≤ SR < 8192ksps	-21.5
8192ksps≤ SR < 16384ksps	-18.5
SR ≥ 16384 ksps	-17.5

Detection of the presence of the MetaCarrier is initiated in the MCDD-100 by searching, using digital signal processing techniques, for one of two possible MetaCarrier chip rates. These MetaCarrier chip rates are as follows:

Host Carrier	Embedded MetaCarrier
≥512 ksps	224 kcps
128 ksps to < 512 ksps	112 kcps

As shown in this table, the MetaCarrier is sized to be no more than 43.75% of the bandwidth of the transmission carrier. In all configurations of the combined carrier, the MetaCarrier power raises the total transmission power less than 0.01 dB.

The CID message consists of at least the following information:

- DVB Carrier ID Global Unique Identifier (read only, fixed by the transmission equipment manufacturer)
- Carrier ID format (code to indicate version information for the Carrier ID format)

Additional user configurable fields may contain other information, for example:

- Latitude and longitude information
- Contact telephone number
- Other user data

The entire CID message is composed of 4 packets containing 244 bits (formatting, Forward Error Correction (FEC), and user information) for a total message length of 976 bits for the transmission of the MetaCarrier. Each packet of the MetaCarrier message carries 32 bits of CID information data. However, the MAC address is sent at a higher rate so that, upon reception of a frame that is comprised of three (3) packets, the MAC address may be determined.

The data rate of messages being carried in the MetaCarrier is shown before spreading is applied. The associated time to send a complete CID message (including the framing and FEC) is as follows:

Embedded MetaCarrier	CID Data Rate	Time for Complete Message
224 kcps	55 bps	17.8 seconds
112 kcps	27 bps	35.7 seconds

Therefore, the time for the MCDD-100 to extract a complete MAC sequence is as follows:

Embedded MetaCarrier	CID Data Rate	Time for Unique ID
224 kcps	55 bps	35.6 seconds
112 kcps	27 bps	71.2 seconds

The MCDD-100 may be monitored and controlled using its HTTP Web Server Interface (for user-to-device control) or via *Simple Network Management Protocol* (SNMP) (for device-to-device

control). SNMP may be used for fully automatic control for dynamic searching of the presence of the MetaCarrier under the detected carriers within a spectrum. The presence of a MetaCarrier may be obtained as part of a standard operating procedure or during an interference condition.

- *Manually entered using the MCED-100 HTTP Web Server Interface:*
  - Telephone Number
  - Custom Message

- **MCED-100 MetaCarrier™ Embedding Device Installation and Operation Manual (CEFD P/N MN-MCED100)**
- **Chapter 5. SERIAL-BASED REMOTE PRODUCT MANAGEMENT**
- **Sect. 6.3 (ETHERNET-BASED REMOTE PRODUCT MANAGEMENT) SNMP (MIB II and Private MIB)**
- **Sect. 6.4 (ETHERNET-BASED REMOTE PRODUCT MANAGEMENT) Web Server (HTTP) Interface**

Field update of the operating system firmware is possible through file upload via the rear panel RJ-45 '**ETHERNET MANAGEMENT**' port.

Chapter 4. UPDATING FIRMWARE

1.2.1   About MetaCarrier

The MetaCarrier operates independent of the modulation, forward error rate, symbol rate, etc. of the transmission carrier. In configurations where the carrier is encrypted or uses cryptographic technologies, the CID contained in the MetaCarrier is not affected.

Traditionally, identification of an interfering carrier may involve using a geo-location system that, in turn, uses the phase offset from an adjacent satellite to triangulate the approximate location on the surface of the earth where the interference is being generated.

While these tools have been proven useful and invaluable to satellite operators and service providers, the geo-location products' methods are imprecise; for example, in densely populated areas, a helicopter with a feed horn and spectrum analyzer must be used to find the exact location of the transmission source. The time and costs associated with such methods are significant.

By contrast, Comtech EF Data's CID products provide the operator with the interference source's identification information within minutes. Once the offending carrier is identified, appropriate action can be taken to shut down or otherwise remove the identified transmission from service.

The MCED-100 MetaCarrier Embedding Device's combined carrier (transmission carrier and embedded MetaCarrier) creates a composite carrier that results in scalable identification system that requires minimal power (typically less than 0.1 dB) from the transmission carrier.

1.2.2   Compatibility

The MCDD-100 is compatible with any L-Band or 70/140 MHz carrier supporting up to 64 Msps that is transporting a MetaCarrier.

Sect. 1.4.1 Product Feature Specifications

1.3   MCDD-100 Features

1.3.1   Physical Description

The MCDD-100 is constructed as a 1RU-high rack-mounting chassis. Handles at the front facilitate removal from and placement into a rack. The unit can be free-standing if desired.

- **Sect. 1.4.1 Product Feature Specifications**
- **Sect. 2.2 Installation into a Rack Enclosure**

1.3.2   Dimensional Envelope
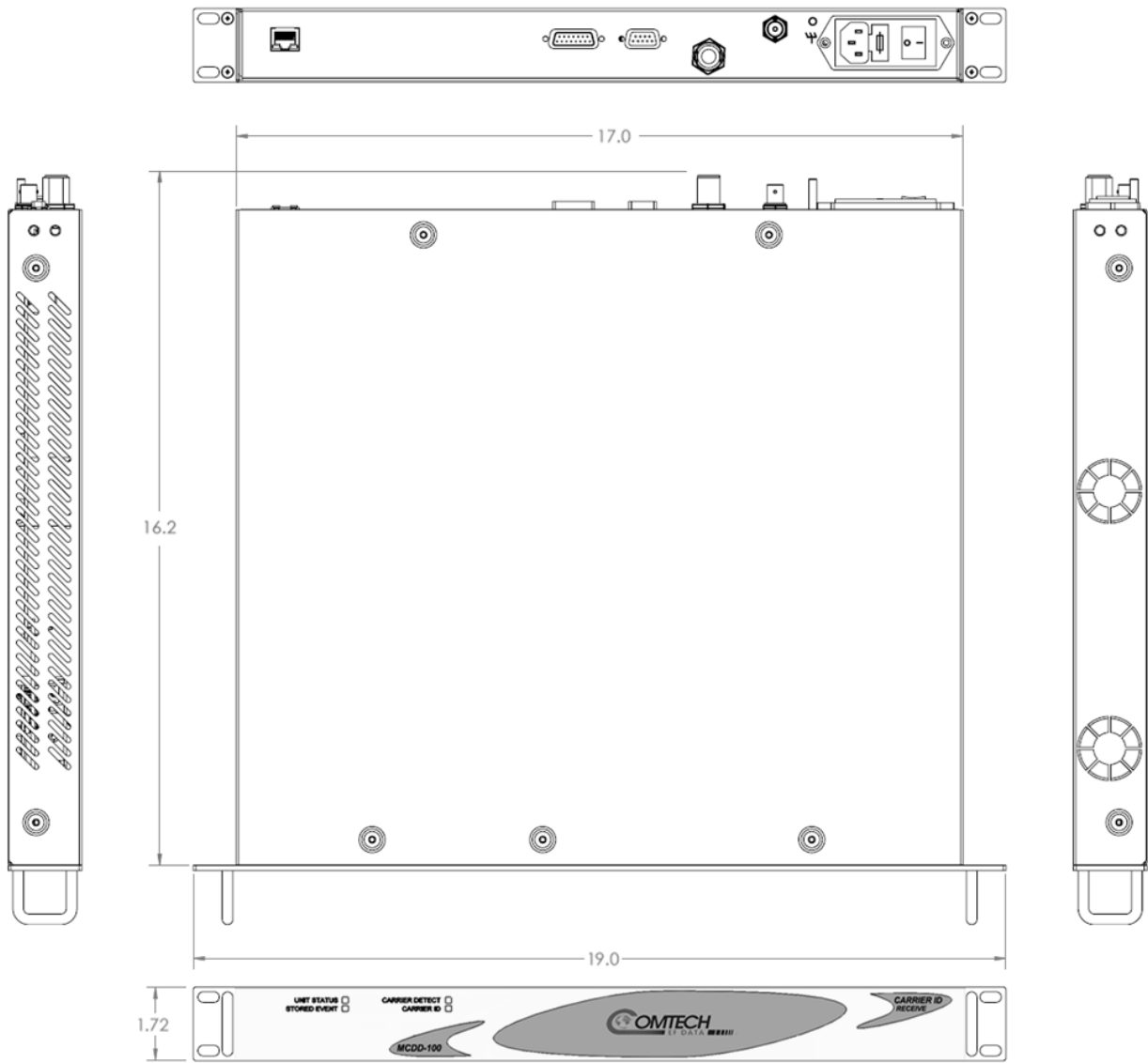
Figure 1-3. MCDD-100 Dimensional Envelope

1.3.3   MCDD-100 Physical Features

1.3.3.1   Front Panel
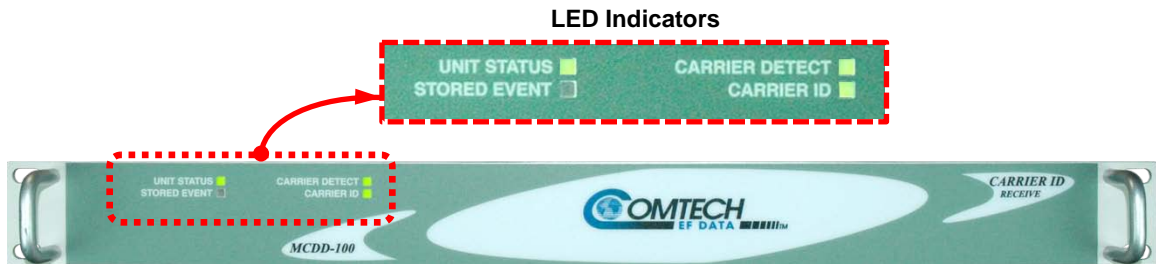
Figure 1-4. MCDD-100 – Front Panel View

The MCDD-100 front panel (**Figure 1-4**) features four Light-Emitting Diode (LED) indicators. The LEDs indicate, in a summary fashion, the following information:

LED	Condition	
UNIT STATUS	Green	No Unit Faults or Alarms.
	Amber	No Unit Faults, but an Alarm exists.
	Red	A Unit Fault exists.
STORED EVENT	Off	There are no Stored Events.
	Amber	There is a Stored Event in the log, which can be viewed from the Web Server Interface
CARRIER DETECT	Red	No carrier is detected.
	Green	A carrier has been detected and analyzed.
	Amber	A carrier has been found and is being analyzed.
CARRIER ID	Green	MetaCarrier lock is achieved.
	Amber	MetaCarrier detected, but lock not achieved.
	Red	MetaCarrier is not detected.

1.3.3.2   Rear Panel

> *PROPER GROUNDING PROTECTION IS REQUIRED. The equipment must be connected to the protective earth connection at all times. It is therefore imperative that the unit is properly grounded, using the ground stud provided on the unit rear panel, during installation, configuration, and operation.*

> - **Sect. 3.2 MCDD-100 Connector Overview**
> - **Sect. 3.5 MCDD-100 Grounding and Power Connections**

Figure 1-5. MCDD-100 – Rear Panel View

External cables are attached to connectors provided on the rear panel of the unit. The unit provides the following standard interfaces (**Figure 1-5,** from left):

Power Interface:

- 100–240 VAC Primary Input Power Supply with Press-fit Fuse Holder.

IF Interfaces:

- **IF Operation:** 50 MHz to 180 MHz via dedicated 50Ω or 75Ω Type BNC connector ('**Rx (IN) | 70-140 MHz'** port).
- **L-Band Operation:** 950 MHz to 2150 MHz via dedicated 50Ω Type 'N' connector ('**Rx (IN) | L-BAND'** port).

Utility Interfaces:

- (1X) D-Sub, 9-pin male (DB-9M) EIA-232 connector for serial remote control (**'CONSOLE'** port).
- (1X) D-Sub, 15-pin male (DB-15M) connector for provision of the Rx MetaCarrier IQ constellation for troubleshooting purposes ('**MONITOR'** port).
- (1X) 10/100 BaseT Fast Ethernet RJ-45 Interface for HTTP and SNMP management and control purposes (Web and SNMP) ('**ETHERNET MANAGEMENT'** port).

1.4   MCDD-100 Specifications

1.4.1   Product Feature Specifications

Specification		Description
Dimensional Envelope		19.0 W x 16.2 D x 1 RU (1.7) H inches (483 W x 411 D x 44 H mm)
Weight		5.73 lbs (2.6 kg)
Temperature	Operating	32° to 122°F (0° to 50°C)
	Storage	-4° to 158°F (–20° to 70°C)
Humidity	Operating	95% maximum, non-condensing
	Storage	99% maximum, non-condensing
Vibration		Per MIL-STD-810F Method 514.5 Category 4a
Front Panel		**4 Light-Emitting Diodes (LEDs):** • UNIT STATUS (Green/Amber/Red) • CARRIER DETECTED (Green/Amber) • STORED EVENT (Amber) • CARRIER ID (Green/Amber/Red) • NO CARRIER DETECTED (Red)
Rear Panel Connectors	Data Interfaces	• 1X RJ-45 10/100 BaseT Fast Ethernet • 1X DB-9M EIA-232 interface for basic serial configuration
	L-Band	50Ω Type 'N' female input.
	70/140 MHz	50Ω or 75Ω Type BNC female input
AC Power Supply		Rear Panel-installed Module includes On/Off Switch
AC Operating Voltage		100V – 240V AC, +6%/-10% autosensing (Total absolute maximum range is 90V – 254V AC)
Power Consumption		30W typical
Fuse Protection		2X 120/240VAC T2A 5x20mm slow-blow fuses
Frequency		50-180 MHz or 950-2150 MHz ($\pm$0.06ppm) in 100 Hz steps
Impedance	L-Band	50Ω, 14dB minimum return loss
	70/140 MHz	50Ω or 75Ω, 18dB minimum return loss
Input Power Range [1]	L-Band	-130 + 10_{log} (symbol rate) to -80 + 10_{log} (Symbol rate) dBm
	70/140 MHz	-105 + 10_{log} (symbol rate) to -70 + 10_{log} (Symbol rate) dBm
Maximum Composite Operating Level	L-Band	102 – 10_{log} (symbol rate, desired carrier) dBc, + 10 dBm maximum; within $\pm$10 MHz of the desired carrier, composite power is ≤ +30 dBc
	70/140 MHz	94 – 10_{log} (symbol rate, desired carrier) dBc, + 10 dBm maximum; within $\pm$10 MHz of the desired carrier, composite power is ≤ +30 dBc
Absolute Maximum, No Damage		+20 dBm
Acquisition Range [2]		Programmable up to $\pm$150 kHz
Main Carrier Modulation Types		BPSK, QPSK, 8PSK
Main Carrier Symbol Rates		128 ksps to 64 Msps
FEC Mode		(111, 69) BCH Code

Specification	Description			
Chip Rate	112 kcps, 224 kcps			
Symbol Rate	Parameter	Chip Rate	Spreading Ratio	Data Rate (bps)
	≥ 128 ksps to <512 ksps	112 kcps	4096	28.00
	≥512 ksps	224 kcps	4096	56.00

NOTES:
   (1) Refers to the power level of the overlaying carrier.
   (2) Acquisition time increases with acquisition range.

1.4.2   Standard Assemblies

Assembly	Description	Where Installed
PL-0000972	MCDD-100 Base Chassis Assembly	–
PL-0000939	MCDD-100 PCB Assembly	MCDD-100 chassis

1.4.3   Optional Assemblies

Assembly	Description	Where Installed
KT-0000168	Rear-Mounting Support Bracket Kit (4″)	Sides of MCDD-100 chassis / rear of user-provided mounting rack – See Sect. 2.2.1
KT-0000195	Rear-Mounting Support Bracket Kit (10″)	

Sect. 2.2.1 Installing the Optional Rear-Mounting Support Brackets Kit

1.4.4   Regulatory Compliance

Specification	Description
"CE" as follows:	• EN 30489-1 • EN 55022 Class B (Emissions) • EN 55024 (Immunity) • EN 60950 (Safety)
FCC	FCC Part 15 Subpart B
RoHS Compliance	Yes

Chapter 2. INSTALLATION

2.1   Unpacking and Inspecting the Shipment

The MCDD-100 MetaCarrier® Detection Device, its Installation and Operation Manual, and its power cord were packaged and shipped in a reusable cardboard carton containing protective foam spacing.
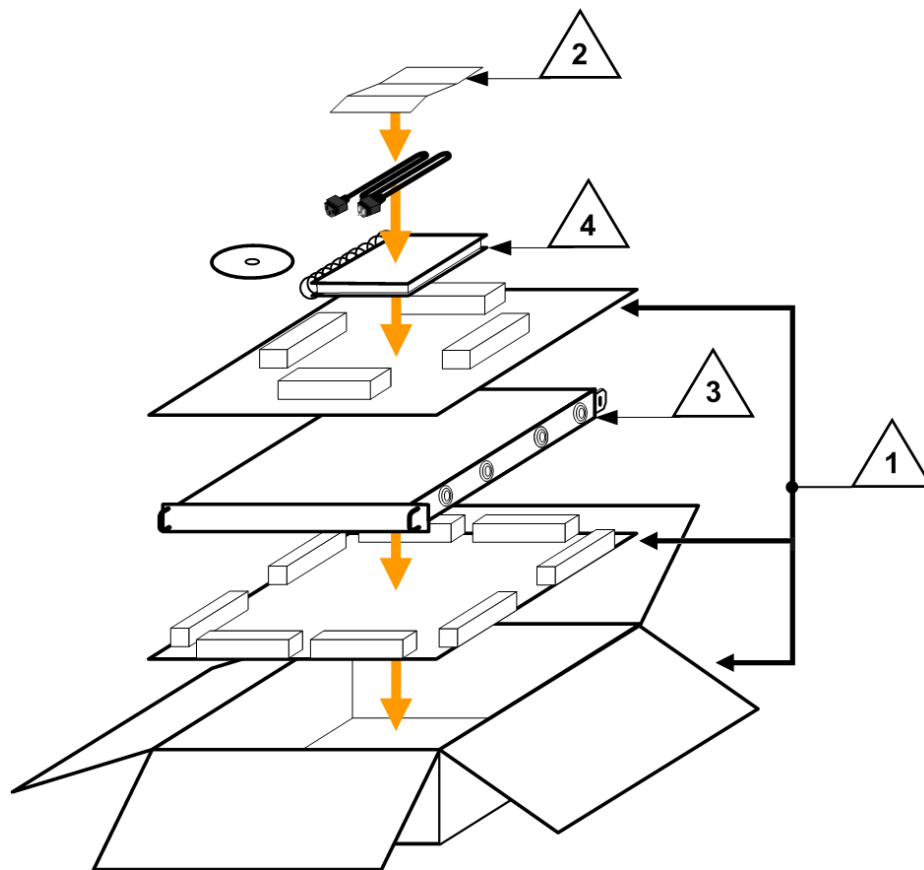
Figure 2-1. Unpacking and Inspecting the Shipment

⚠ *This equipment contains parts and assemblies sensitive to damage by Electrostatic Discharge (ESD). Use ESD precautionary procedures when handling the equipment.*

> **Once opened, inspect the shipment:**

Step	Task
1	Keep all shipping materials for storage or reshipment.
2	Check the packing list to ensure the shipment is complete.
3	Inspect the equipment for any possible damage incurred during shipment. Contact the carrier and Comtech EF Data immediately to submit a damage report if damage is evident.
4	*Review this* **MCDD-100 MetaCarrier® Detection Device Installation and Operation Manual** *carefully to become familiar with operation.*
5	*Proceed to* **Sect. 2.2 Installation into a Rack Enclosure.**

2.2   Installing into a Rack Enclosure

When mounting the MCDD-100 into a rack enclosure (Figure 2-4):

- *PROPER GROUNDING PROTECTION IS REQUIRED. The equipment must be connected to the protective earth connection at all times. It is therefore imperative that the unit is properly grounded, using the ground stud provided on the unit rear panel, during installation, configuration, and operation.*

- *PROPER AIR VENTILATION IS REQUIRED. In a rack system where there is high heat discharge, provide forced-air cooling with top- or bottom-mounted fans or blowers.*

  - *Make sure there is adequate clearance inside the enclosure, especially at the side for air ventilation.*

  - *Air temperature inside the rack enclosure should <u>never</u> exceed 50°C (122°F).*

  For information about custom rack enclosures, contact Comtech EF Data Customer Support during normal business hours or visit Comtech EF Data's Web site (www.comtechefdata.com/support.asp).

- *The MCDD-100 CANNOT have rack slides mounted to the sides of the chassis. Cooling fans and exhaust vents are provided here – air flow must not be impeded. Comtech EF Data recommends that an alternate method of support is provided within the rack, such as standard rack shelves or the optional Rear-Mounting Support Bracket Kit. If there is any doubt, contact Comtech EF Data Customer Support during normal business hours.*

Feature	Description
1	Custom Rack Enclosure
2	MCDD-100 MetaCarrier® Detection Device
3	Standard Rack Shelving
4	Rack Enclosure Threaded Front Mounting Rail (typical)
5	Unit Front Panel
6	User-supplied Screws
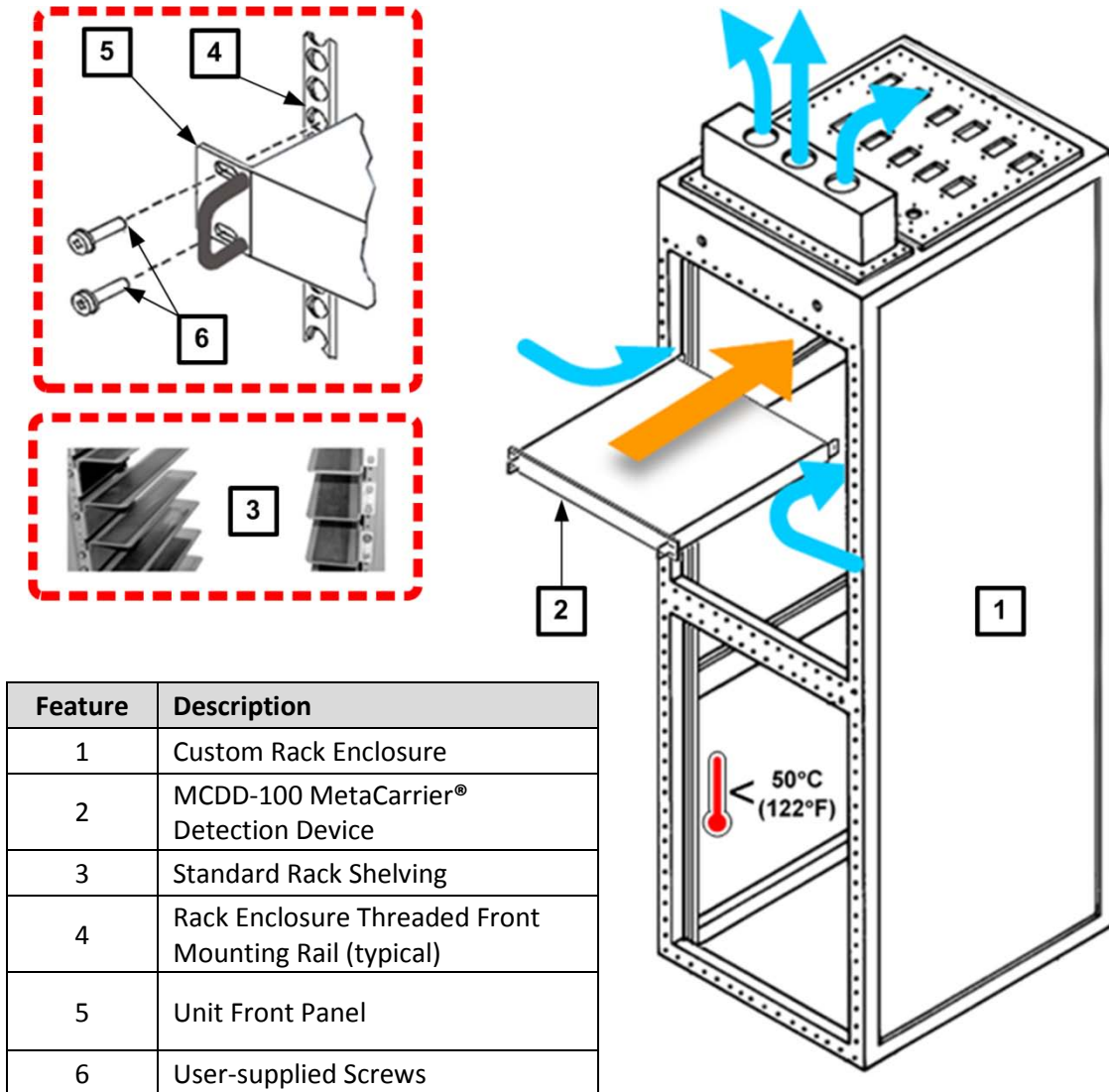
Figure 2-2. Installing into a Rack Enclosure

Mount the MCDD-100 in its assigned position in the rack enclosure. Use, as required:

- A standard rack-mounted shelf;

- User-supplied screws to secure the front panel to the rack enclosure threaded front mounting rails;

- Comtech EF Data's optional KT-0000168 (4") or KT-0000195 (10") Rear-Mounting Support Brackets Kit (**Figure 2-3**).

2.2.1   Installing the Optional Rear-Mounting Support Brackets Kit
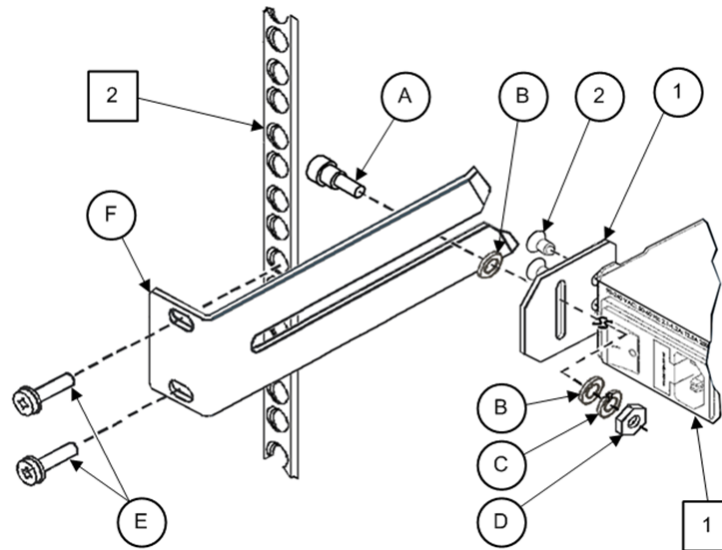
Feature	Description
1	Back of Unit
2	Rack Enclosure Threaded Rear Mounting Rail (typical)

KT-0000XXX Primary Rear Support Bracket Kit				
Item	**Quantity**		**CEFD Part Number**	**Description**
	KT-0000168	**KT-0000195**		
1	2	2	FP-0000913	Plate, Adapter
2	4	4	HW/10-32X3/8FLT	Screw, #10 Flat Head
3	1	–	KT/6228-2	4" Rear Support Bracket Kit
	–	1	KT/6228-3	10" Rear Support Bracket Kit

KT/6228-X Rear Support Bracket Kit				
Item	**Quantity**		**CEFD Part Number**	**Description**
	KT/6228-2	**KT/6228-3**		
A	2	2	HW/10-32SHLDR	Screw, #10 Shoulder
B	4	4	HW/10-32FLT	Washer, #10 Flat
C	2	2	HW/10-32SPLIT	Washer, #10 Split
D	2	2	HW/10-32HEXNUT	Nut, #10 Hex
E	4	4	HW/10-32x1/2RK	Bolt, #10 Rack Bracket
F	2	–	FP/6138-2	Bracket, Rear Support – 4"
	–	2	FP/6138-3	Bracket, Rear Support – 10"

Figure 2-3. Installing the Optional Rear-Mounting Support Brackets Kit

Tools needed to install the KT-0000168 (4") or KT-0000195 (10") Bracket Kit (**Figure 2-3**):

- A medium Phillips™ screwdriver

- A 5/32-inch SAE Allen™ Wrench

- An adjustable Crescent™ wrench.

Follow these steps to install the *Radyne-style chassis* kit:

Step	Description
1	Assemble the Adapter Plates to the back side of the MCDD-100 chassis using the #10 Flat Head Screws.
2	Assemble the #10 Shoulder Screws through the Adapter Plate mounting slots using the #10 Flat Washers, #10 Split Washers, and #10 Hex Nuts.
3	Mount the Rear Support Brackets to the rack enclosure threaded rear mounting rails using the #10 Rack Bracket Bolts.
4	Slide the MCDD-100 into the front of the rack enclosure. Make sure that the #10 Shoulder Screws properly engage into the slots of the Rear Support Brackets.

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Chapter 3. REAR PANEL CONNECTORS AND PINOUTS

3.1 Cabling Connection Types

The MCDD-100 MetaCarrier® Detection Device uses a number of different cables. Each cable type is typically dedicated to a specific mode of operation.

3.1.1 Coaxial Cable Connections

Coupling Type	Connector Type	
	Plug	Jack
Bayonet (Type 'BNC' shown)		
Threaded (Type 'N' shown)		

Figure 3-1. Coaxial Connector Examples

The types of coaxial cables used with the MCDD-100 by Comtech EF Data are '**BNC'**, '**N'**, and '**SMA'**. Coaxial cables (plugs) and their mating connectors (jacks/sockets) are available in two coupling styles: **Bayonet** or **Threaded**.

- **Bayonet Coupling Style:** The jack has a pair of guide posts that accommodate the plug's lockdown slots. This lockdown design provides secure assembly without over-tightening the connection.

- **Threaded Coupling Style:** The jack features external threads. The plug shell features internal threads, and has either a knurled outer surface to permit hand-tightening of the connection, or hex flats to accommodate torqued installation.

Connection Instructions:

- **Bayonet Coupling Connections:** Use the plug slots to guide, then slide the plug onto the jack posts. Then, turn the plug clockwise until the jack posts are fully seated within the plug slot.

- **Threaded Coupling Connections:** Engage the plug onto the jack threads, and then turn the plug clockwise until it is fully threaded onto the jack. Do not over-tighten the connection.

3.1.1.1 Type 'BNC'

BNC plugs and jacks feature a **Bayonet Coupling** design.

3.1.1.2 Type 'N'

Type 'N' connectors feature a **Threaded Coupling** design similar to Type 'SMA' connectors.
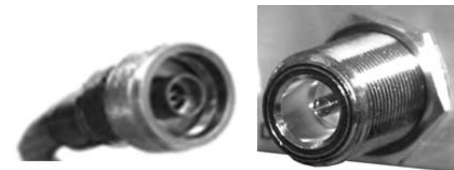
3.1.1.3 Type 'SMA' (Subminiature Version 'A')

Type 'SMA' connectors feature a **Threaded Coupling** design similar to Type 'N' connectors.
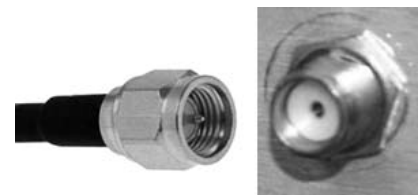
3.1.2   D-Subminiature Cable Connections

Type 'D' Connection Type	Example
Chassis Receptacles: Female (top) Male (bottom)	
Type 'D' Cable with Jack Screws (female shown)	

Figure 3-2. D-Subminiature Connector Examples

D-Subminiature connectors are also called **Type 'D'** or '**D-Sub**' connectors. The connector pair features multiple rows of pins (male side) coupled to mating sockets (female side). The cable plug and chassis receptacle each feature a D-shaped profile that interlock to ensure proper pin orientation and connector seating.

Either chassis receptacle gender features two jack nuts for secure assembly of the cable plug to the chassis receptacle.

Whether its gender is male or female, the cable plug features two jack screws for secure connection to the jack nuts provided on the mating chassis receptacle. The jack screws may be hand tightened or tightened with a standard flat-blade screwdriver.

Connection Instructions: Orient the plug to the receptacle in the proper position. Press firmly into place. Use the jack screws to secure the plug to the receptacle jack nuts. Do not over-tighten.

3.1.3   RJ-45, RJ-48 Cable Connections

The plug for an RJ-45 or RJ-48 cable features a flexible tab. The RJ-45 or RJ-48 jack features a mating slot. This design configuration assures proper installation and pin orientation.

Connection Instructions: Press down the tab on the cable plug, and then insert the plug into the RJ-4*x* jack. The connection is complete when the tab 'clicks' into position inside the jack.
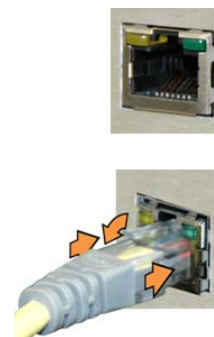
3.2 MCDD-100 Connector Overview

The rear panel connectors for the MCDD-100 MetaCarrier Detection Device, shown here in **Figure 3-1**, provide all necessary external connections between the unit and other equipment. **Table 3-1** summarizes the connectors provided on the rear panel interface, grouped according to service function.

Figure 3-3. MCDD-100 – Rear Panel View

Table 3-1. MCDD-100 Rear Panel Connectors

Connector Group	Name		Connector Type	Function
IF Sect. 3.3	Rx (IN)	70-140MHz	50Ω/75Ω female BNC	70/140MHz Rx Input
		L-BAND	50Ω Type 'N' female	L-Band Rx Input
Utility Sect. 3.4	CONSOLE		9-Pin Type 'D' male	Serial Remote Interface (EIA-232)
	MONITOR		15-Pin Type 'D' male	MetaCarrier I&Q Constellation Monitor Output
	ETHERNET MANAGEMENT		RJ-45 female	10/100 BaseT Fast Ethernet management and data
Ground/Power Sect. 3.5	Ground		#10-32 stud	Common Chassis ground
	AC		See Sect. 3.5.2	Chassis power

> *The European EMC Directive (EN55022, EN50082-1) requires using properly shielded cables for DATA I/O. These cables must be double-shielded from end-to-end, ensuring a continuous ground shield.*

3.3   Rx (IN) IF Connections

⚠️ *THERE MAY BE DC VOLTAGES PRESENT ON THE TYPE 'N' RX IF CONNECTORS, UP TO A MAXIMUM OF 48 VOLTS.*
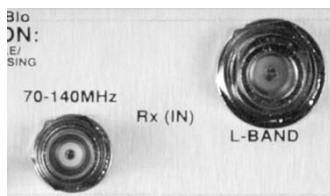
Rx Connector Name	Connector Type	Description	Direction
Rx (IN) | 70-140MHz	BNC 50Ω/75Ω Female	Rx IF Signal, 70/140 MHz	Input
Rx (IN) | L-BAND	Type 'N' 50Ω Female	Rx IF Signal, L-Band	

Rx (IN) | L-BAND Connector Notes:

1. Return loss on the L-Band port is typically better than 14 dB.

2. If connection to an L-Band 75Ω system is required, a Type 'N' to Type 'F' adapter can be used and is available from Comtech EF Data as an optional accessory. While a reduction in return loss will occur when adapting from 50Ω to 75Ω operation, the effect in most systems will be imperceptible.

3.4   Utility Connections

3.4.1   CONSOLE Interface Connector, DB-9M

The CONSOLE interface is a 9-pin Type 'D' male connector. It is intended for connection to an M&C computer or terminal device, and is used for EIA-232 communications. The settings for this serial interface are fixed at 38400 baud, 8 data bits, no parity, and 1 stop bit(8-N-1). See **Table 3-2** for pinouts.

Table 3-2. CONSOLE Connector Pinouts

Pin #	Description	Direction
1	Ground	–
2	EIA-232 Transmit Data	Out
3	EIA-232 Receive Data	In
4	Reserved - do not connect to this pin	–
5	Ground	–
6	Reserved - do not connect to this pin	–
7	Reserved - do not connect to this pin	–
8	Reserved - do not connect to this pin	–
9	Reserved - do not connect to this pin	–

3.4.2 MONITOR Interface Connector, DB-15M

The **MONITOR** interface is a 15-pin Type 'D' male connector. It provides the Rx MetaCarrier I&Q constellation for troubleshooting purposes. See **Table 3-3** for pinouts.

Table 3-3. MONITOR Connector Pinouts

Pin #	Description	Direction
1	Ground	–
2	Reserved	–
3	Constellation Q Channel	Out
4	Reserved	–
5	Reserved	–
6	Reserved	–
7	Reserved	–
8	Reserved	–
9	Reserved	–
10	Reserved	–
11	Constellation I Channel	Out
12	Reserved	–
13	Reserved	–
14	Reserved	–
15	Reserved	–

3.4.3 ETHERNET MANAGEMENT Port, RJ-45

The **ETHERNET MANAGEMENT** interface is a standard 8-pin RJ-45 port, operating at 10/100 Mbps, half and full duplex, auto-negotiating. It is used for Ethernet-based remote management and control (M&C) of MCDD-100 functions via HTTP/SNMP.

The **ETHERNET MANAGEMENT** port features two operational LED indicators:

- **LED 1 (to left) – Comms Link detected (glows amber)**

- **LED 2 (to right) – Activity detected (flashes green)**

3.5   MCDD-100 Ground and Power Connections

3.5.1   Chassis Ground Interface

PROPER GROUNDING PROTECTION IS REQUIRED. The equipment must be connected to the protective earth connection at all times. It is therefore imperative that the unit is properly grounded, using the ground stud provided on the unit rear panel, during installation, configuration, and operation.

The AC power interface provides the safety ground.
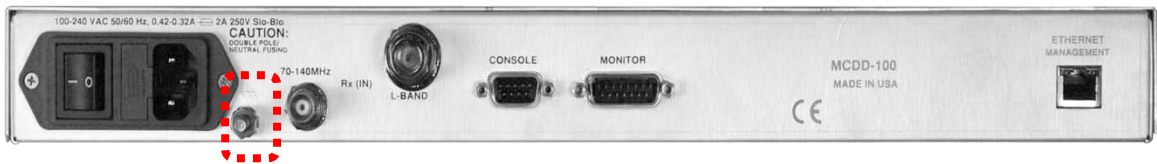
Figure 3-4. MCDD Chassis Ground Interface

Use the #10-32 stud, located adjacent to the power interface, for connecting a common chassis ground among equipment.

3.5.2   Alternating Current (AC) Power Interface (Standard)

Feature	Description
1	On / Off Switch
2	Press-fit Fuse Holder
3	IEC Three-prong Connector

AC Power Specifications	
Input Power	40W maximum, 20W typical
Input Voltage	100V to 240V AC, +6%/-10%, autosensing (Total absolute max. range is 90V to 254V AC)
Connector Type	IEC
Fuse Protection	Line and neutral fusing : (2X) 120/240VAC T2A 5x20mm slow-blow type fuses
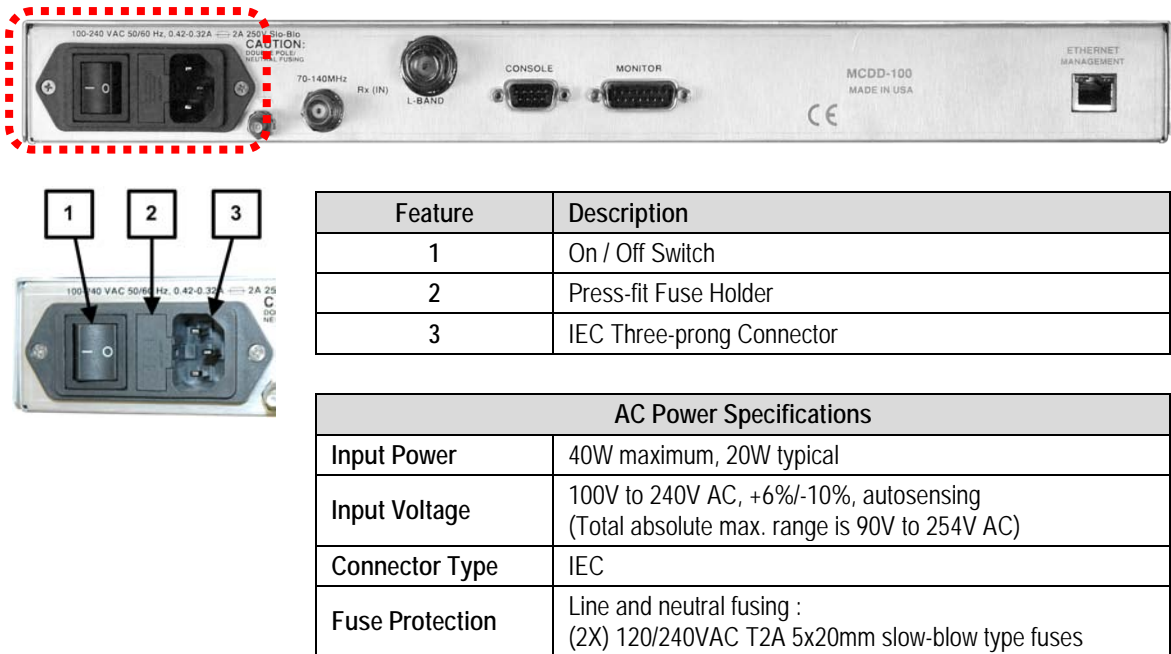
Figure 3-5. MCDD-100 AC Power Interface

3.5.2.1   AC Operation (Standard) – Applying Power

Figure 3-6. Applying AC Power

To apply AC power to the MCDD-100:

- **First, plug the provided AC power cord female end into the unit.**

- **Then, plug the AC power cord male end into the user-supplied power source.**

- **Finally, switch the unit ON.**

3.5.2.2 AC Operation (Standard) – Replacing Fuses

> ⚠️ *FOR CONTINUED OPERATOR SAFETY, ALWAYS REPLACE THE FUSES WITH THE CORRECT TYPE AND RATING.*

The MCDD-100 uses two 20mm Slow-blow fuses – one each for line and neutral connections. The fuses are contained within a fuse holder that is press-fit into the body of the IEC power module (**Figure 3-7**).
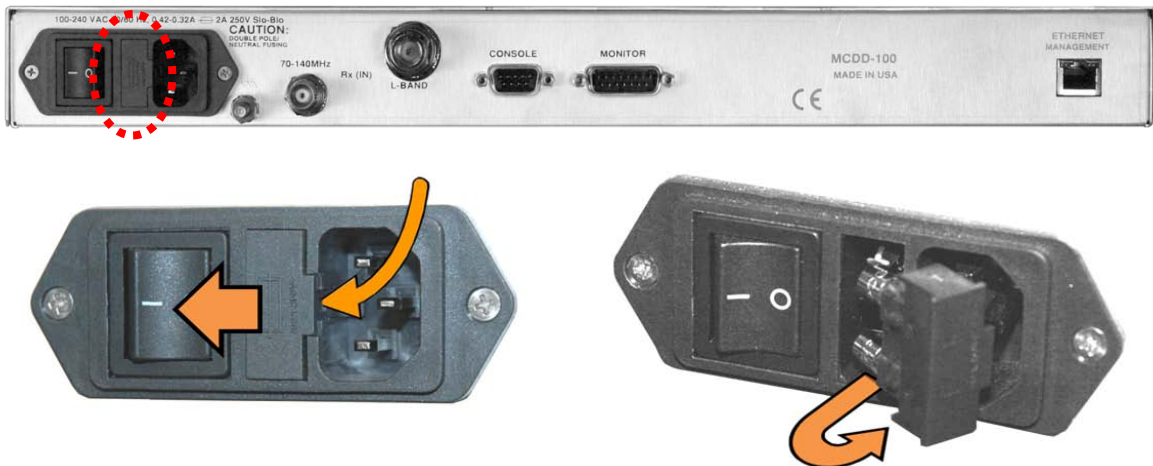
Figure 3-7. AC Fuse Replacement

To replace the fuses:

> ⚠️ *DISCONNECT THE POWER SUPPLY BEFORE PROCEEDING!*

- **First, unseat the fuse holder from the IEC power module.**

    o   Use the slot to pry the holder outward from the IEC power module.

    o   Pull the holder straight out, and then swing the holder away from the module.

- **Then, remove and replace the fuses as needed.**

    o   Use **T2A** fuses for standard operation.

- **Finally, re-seat the fuse holder in the IEC power module.**

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Chapter 4. UPDATING FIRMWARE

4.1 Updating Firmware via the Internet

TO ENSURE OPTIMAL PERFORMANCE, IT IS IMPORTANT TO OPERATE THE MCDD-100 WITH ITS LATEST AVAILABLE FIRMWARE.

Comtech EF Data ships the MCDD-100 MetaCarrier® Detection Device with its latest version of operating firmware. If you need a firmware update, you can obtain it by download from Comtech EF Data's Web site (www.comtechefdata.com) or from Comtech EF Data Product Support via e-mail or on CD by standard mail delivery.

The MCDD-100 Firmware Update process is as follows:

- Perform the update without opening the MCDD-100 by connecting the '**ETHERNET MANAGEMENT**' port on the MCDD-100 rear panel to the Ethernet port of a user-supplied PC.

- Download the firmware update archive file from the Internet to the user PC.

- Transfer the extracted firmware update via File Transfer Protocol (FTP) from the user PC to the MCDD-100 by directing the FTP client (using the MCDD-100 Management IP Address) to connect to an FTP server.

4.2   Getting Started: Preparing for the Firmware Download

1. **First, identify the MCDD-100's assigned Management IP address, and the firmware number, revision letter, and revision number.**

    User-supplied items needed:

    - A Microsoft Windows-based PC, equipped with available serial and Ethernet ports; a compatible Web browser (e.g., Internet Explorer); and a terminal emulator program (e.g., Tera Term or HyperTerminal).

    - A 9-pin serial cable to connect the PC to the MCDD-100.

    A. **Connect the 9-pin serial cable from the MCDD-100 'CONSOLE' port to a serial port on the user PC.**
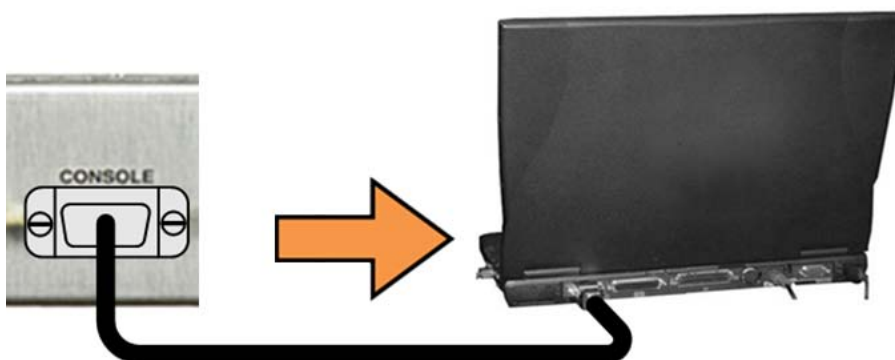
    B. **On the PC: Open the terminal emulator program.**

    Refer to your terminal emulator program's HELP feature or user guide for operating and configuration instructions.

    Configure the utility program serial port communication and terminal display operation as follows:

    - **38400 bps (Baud Rate)**   - **8 Data Bits**   - **1 Stop Bit**

    - **Parity = NO**   - **Port Flow Control = NONE**   - **Display New line Rx/Tx: CR**

    - **Local Echo = ON**

    C. **On the MCDD-100: Turn on the power.**
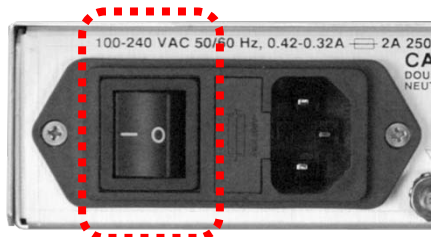
D. On the PC: Review and record the information displayed on the MCDD-100 Serial Interface:

- Management IP Address (factory default is 192.168.1.5/24)
- Firmware Number (FW-0000420) and its Release Version (e.g., 1.2.1)
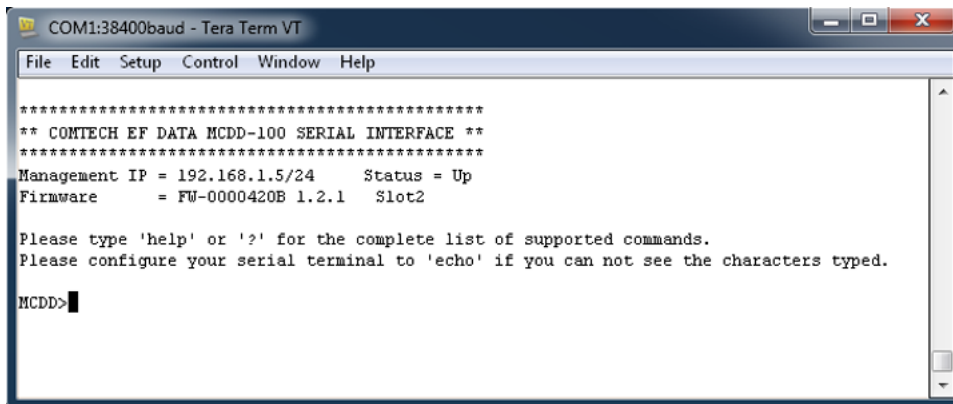
  See Chapter 5. SERIAL-BASED REMOTE PRODUCT MANAGEMENT *for information and instructions on using the MCDD-100 Serial Interface.*

E. Alternately, use the MCDD-100 Web Server Interface to obtain the firmare information.

- Connect the MCDD-100 'ETHERNET MANAGEMENT' port to an Ethernet port on the user PC using a hub, a switch, or a direct Ethernet cable connection:
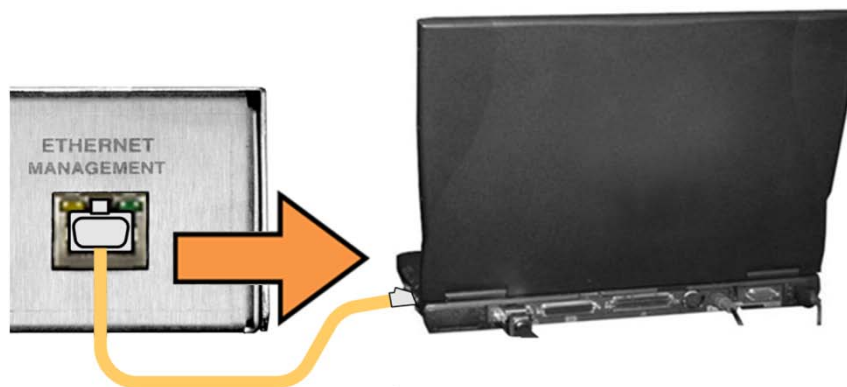
- On the user PC: Use a Web browser (e.g., Internet Explorer) to open the MCDD-100 Web server Interface's 'Admin | Firmware' page, and then view the Slot1 and Slot2 firmware loads:

Firmware Information

Slot #	Running	Name	Version	Date	Size
1	No	FW-0000420B	1.2.1	7/29/13	2828957
2	Yes	FW-0000420B	1.2.1	7/29/13	2828957

> *See* **Chapter 6. ETHERNET-BASED REMOTE PRODUCT MANAGEMENT** *for information and instructions on using the MCDD-100 Web Server Interface.*

2. **Next, create a temporary folder (subdirectory) on the user PC for the firmware archive download.**

- *Drive letter* c: *is used in these examples. Any valid, writable drive letter can be used.*
- *Typical for all tasks: Type the command* <u>without quotes</u>, *and then press* **Enter** *to execute.*

There are several ways the user may use create a temporary folder on a Windows-based PC:

A. **Use the Windows Desktop to create and rename the temporary folder.**

- Right-click anywhere on the desktop to open the popup submenu, and then select **New > Folder** to create the temporary folder. The new folder will be created on the desktop.

- Right-click on the new folder and then select "**Rename**" from the popup submenu. Rename this folder to "**temp**" or some other convenient, unused name.
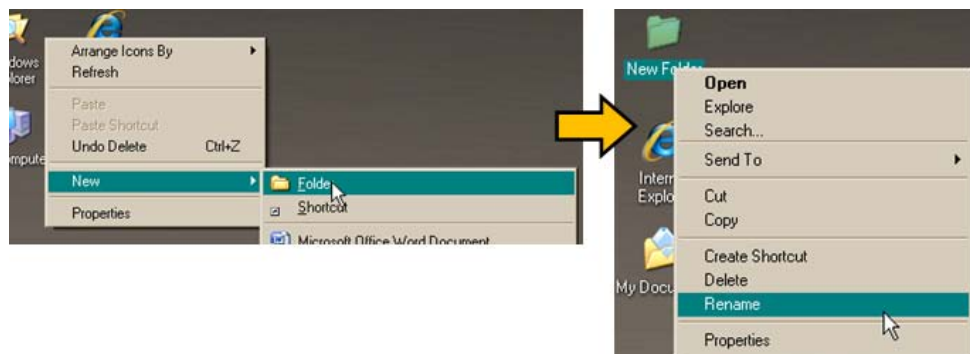
B. **Use Windows Explorer to create and rename the temporary folder.**

- Select **File > New > Folder** to create the temporary folder. The new folder will be created in the active folder.

- Right-click the "**New Folder**" folder name, and then rename this folder to "**temp**" or some other convenient, unused name.
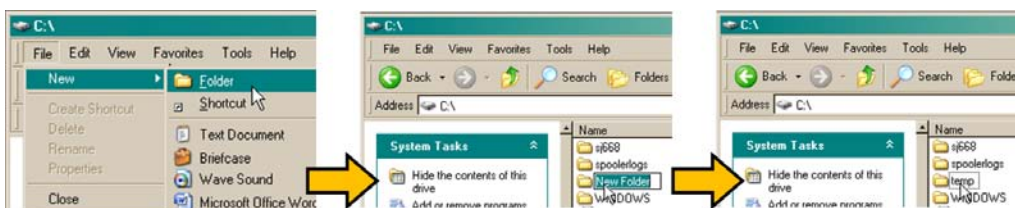
C. **Use the "Run" and "Browse" windows to create and rename the temporary folder.**

- Select **[Start]** on the Windows taskbar, and then click the "**Run…**" icon. The "**Run**" window will open.

- Click **[Browse]** in the "**Run**" window. The "**Browse**" window will open.

- Click the "**Create New Folder**" icon in the "**Browse**" window. The new folder will be created.

- Right-click the "New Folder" folder name, and then rename this folder to "temp" or some other convenient, unused name.
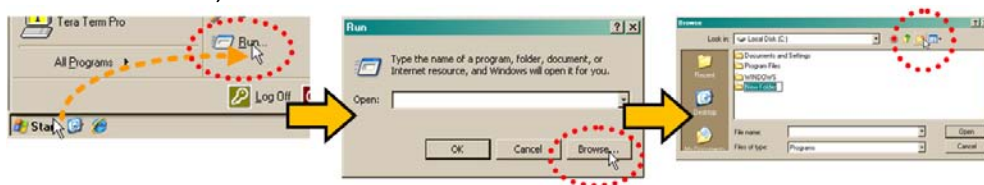
D. **Use Windows Command-line to create the temporary folder.**

- **First,** click **[Start]** on the Windows taskbar, and then click the "**Run…**" icon (or, depending on Windows OS versions *prior* to Windows 95, click the "**MS-DOS Prompt**" icon from the Main Menu).

- **Next,** open a **Command-line window**…

  o For Windows 95 or Windows 98 – Type "**command**".

  o For any Windows OS versions later than Windows 98 – Type "**cmd**" or "**command**".
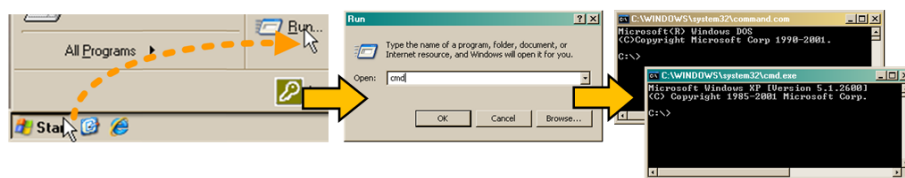
  o Alternately, from **[Start]**, select **All Programs > Accessories > Command Prompt**.

  o Finally, from the Command-line prompt (**c:\>**), type "**mkdir temp**" or "**md temp**" (*mkdir* and *md* stand for *make directory*), and then click **[OK]**.
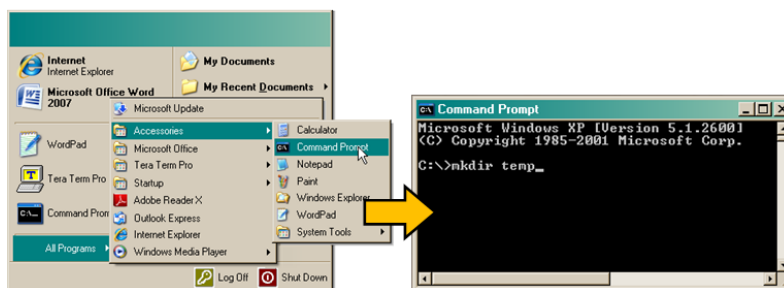
There should now be a "temp" folder created and available for placement of the firmware file download.

4.3   Downloading and Extracting the Firmware Update

1. **First, download the firmware update file from Comtech EF Data's Web site:**

    A. **Go online to www.comtechefdata.com.**

    B. **On the *Main* page – select the *Support* tab and then the *Software Downloads* hyperlink – *or* – under *Support Information*, click *Software Downloads*.**

    C. **On the *Software Downloads* page – click *Download Flash and Software Update Files*.**

    D. **On the *Flash Updates Index* page – select the *(Select a Product Line) MetaCarrier Products* hyperlink.**

    E. **On the *MetaCarrier Products* page – select the MCDD-100 product hyperlink;**

    F. **Select the appropriate firmware EXE or ZIP download hyperlink.**

        - **About File Archive Formats:** Comtech EF Data provides its downloadable files in two compressed archive formats: ***.exe** (self-extracting) and ***.zip** (compressed).

          The ***.exe** file does not require a file archiver and compression utility program such as *PKZIP for Windows, WinZip, ZipCentral,* etc. (*PKZIP for DOS* is not supported due to file naming conventions). **Comtech EF Data does not provide this utility program.**

          Some firewalls do not allow the download of ***.exe** files. Download the ***.zip** file instead, and extract the firmware files from the archive download with a user-supplied utility program. For detailed information on handling archived files, refer to the utility program's Help documentation.

        - **About Firmware Numbers, File Versions, and Formats:** Comtech EF Data's Web site catalogues its firmware update files by product type (e.g., router, modem, etc.), the specific model, and optional hardware configurations.

          The MCDD-100 firmware download hyperlink appears as **F0000420X_V###**, where '**X**' denotes the revision letter, and '**###**' represents the firmware version (e.g., V121 = Version 1.2.1).

G. Download the archive file to the temporary folder.

- Once the **EXE** or **ZIP** hyperlink is selected the "**File Download"** window opens and prompts selection of **[Open]** or **[Save]**:

  - Click **[Open]** to turn over file extraction to the user-supplied utility program. Be sure to extract the firmware files to the "**temp**" folder created earlier.

  - Click **[Save]** to open the "**Save As"** window. Be sure to select and **[Save]** the archive ***.exe** or ***.zip** file to the "**temp**" folder created earlier.

  - Otherwise, click **[Cancel]** to quit and exit the file download process.

2. **Next, extract the firmware files from the archive file.**

- (If not already done with **File Download > [Open]**) Extract the firmware files from the downloaded ***.exe** or ***.zip** archive file with the user-supplied utility program:

  - Double-click on the archive file name, and then follow the prompts provided by the user-supplied utility program. Extract, at a minimum, two files:

    - **FW0000420x_MCDD100.bin** – the Firmware Bulk image file ('x' denotes the revision letter), and

    - **MCDD-100ReleaseNotes_v#-#-#.pdf** – the Firmware Release Notes PDF file ('#-#-#' denotes the firmware version number).

3. **Confirm availability of the firmware files in the temporary folder.**

There are several ways the user may view the contents of the temporary folder on a Windows-based PC:

A. From the Windows Desktop:

- Double-left-click the "**temp"** folder saved to the Windows Desktop.

- Use **Windows Explorer** to locate, and then double-left-click the "**temp**" folder.

- Use the **Browse Window** (**[Start] > ...Run > [Browse]**) to locate, and then double-click the "**c:/temp**" folder.

B. Using Command-line:

- Type "**cd c:\temp**" at the Command-line prompt to change to the temporary directory created earlier using Command-line.

- Type "**dir**" to list the files extracted to the temporary directory from the downloaded archive file.

The firmware files have been successfully downloaded and are now available for transfer to the MCDD-100.

4.4   Performing the Ethernet FTP Upload Procedure

To proceed with the firmware update procedure, assumptions are made that:

- *The MCDD-100 is connected to a user-supplied, Windows-based PC, and:*

    o *The PC's serial port is connected to the MCDD-100 'CONSOLE' port.*

    o *The PC's Ethernet port is connected to the MCDD-100 'ETHERNET MANAGEMENT' 10/100 BaseT Ethernet port with a user-supplied hub, switch, or direct Ethernet cable connection.*

    o *The PC is running a terminal emulation program (for operation of the MCDD-100 Serial Interface) and a compatible Web browser (for operation of the MCDD-100 Web Server Interface).*

- *The MCDD-100's Management IP address has been recorded using the MCDD-100 Serial Interface, and the firmware has been identified using either the CLI or the MCDD-100 Web Server Interface '**Admin | Firmware**' page.*

- *The latest firmware files have been downloaded or otherwise received from Comtech EF Data and are available on the user PC in an accessible temporary folder.*

1. **Use Command-Line to send a "PING" command to confirm proper connection and communication between the user PC and the MCDD-100:**

- **If the Management IP Address of the unit is still not known**, type "**info**" at the CLI **MCDD-100>** command prompt and record the displayed information. Alternately, use Serial Remote Control or the Web Server Interface:

    o **Serial Remote Control** – Type the "**<0/IPA?"** remote query (without quotes) at the CLI **MCDD-100>** command prompt. The unit returns the configured Management IP Address:

        >0000/IPA=192.168.1.38/24 *(default)*

o **Web Server Interface** – View the '**Configuration | Interface**' page:
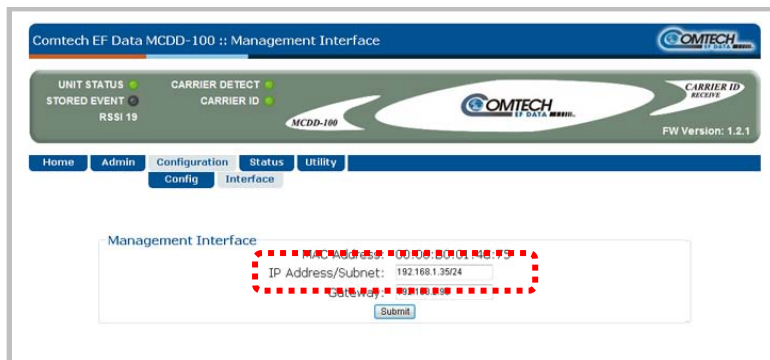
- **Once the Management IP address is known – use Command-line to PING:** Type "**ping xxx.xxx.xxx.xxx**" at the Command-line prompt (where 'xxx.xxx.xxx.xxx' is the unit Management IP Address).

  The response should confirm whether or not the unit is properly connected and communicating.

2. **Use Command-line to transfer (FTP) the files from the user pc to the MCDD-100:**

- Type "**put FW-0000420x_MCDD100.bin**" (where '**x**' denotes the revision letter) at the Command-line prompt, without quotes, to begin the file transfer. The process sequences through several blocks – this may take several minutes for the transfer to occur. Once the upgrade file is received, the image is written to Flash memory and the unit transmits the message "**UPLOAD COMPLETE.**"

- Type "**bye**" to terminate the FTP session, and then close the Command-line window.

3. **Use the CLI or the Web Server Interface 'Admin | Firmware' page to verify that the PC-to-Router FTP file transfer was successful.**

4. **Use the MCDD-100 Web Server Interface to select the firmware and reboot the unit:**

A. **Select the desired Boot Slot (Image):**

- Go to the Web Server Interface '**Admin | Firmware**' page.

- Use the '**Boot From:**' drop-down menu to select **Latest**, **Slot 1**, or **Slot 2** (in the **Firmware Configuration** section).
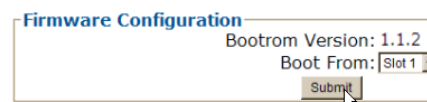
  By default, the unit will boot from the Slot that stores the firmware version having the *latest date* (**Boot From: Latest**). '**Boot From:**' may also be set to force the unit to boot up using either firmware image loaded in **Slot 1** or **Slot 2**.

- Click **[Submit]** to save the setting.

B. **Reboot the MCDD-100:**

- Go to the Web Server Interface '**Admin | Firmware**' page.

- Click **[Reboot]** (in the *System Reboot* section) and **[OK]** when prompted, and then wait while the MCDD-100 reboots.

System Reboot

Reboot
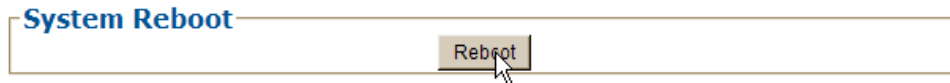
The MCDD-100 is now operating with its latest firmware. The firmware update process is now complete.

Chapter 5. SERIAL-BASED REMOTE PRODUCT MANAGEMENT

5.1 Introduction
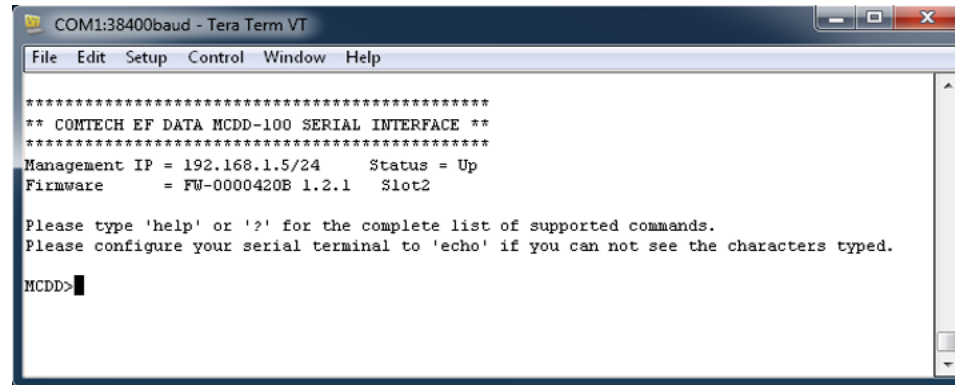
1. *To proceed with the MCDD-100 Meta-Carrier® Detection Device's Serial-based Remote Product Management, assumptions are made that:*

   - *The MCDD-100 is operating with the latest version firmware files.*

   - *The MCDD-100 is connected to a user-supplied, Windows-based PC, and:*

     o *The PC's serial port is connected to the MCDD-100's serial 'CONSOLE' port with a user-supplied serial cable.*

     o *The PC's Ethernet port is connected to the MCDD-100's 'ETHERNET MANAGEMENT' RJ-45 10/100 BaseT Fast Ethernet port with a user-supplied hub, switch, or direct Ethernet cable connection.*

     o *The PC is running a terminal emulation program (for operation of the MCDD-100 Serial Interface) and a compatible Web browser (for operation of the MCDD-100 Web Server Interface).*

   - *The MCDD-100's Management IP Address has been noted using the MCDD-100 Serial Interface.*

   Note that, while use of the serial port connection/Serial Interface is required only for initial configuration of the 'ETHERNET MANAGEMENT' port, it is also useful for firmware updating operations.

2. *USE OF THE SERIAL-BASED REMOTE PRODUCT MANAGEMENT INTERFACE IS RECOMMENDED ONLY FOR ADVANCED USERS. ALL OTHER USERS ARE STRONGLY ENCOURAGED TO USE THE MCDD-100 WEB SERVER INTERFACE FOR MONITOR AND CONTROL (M&C) OF THE MCDD-100.*

Figure 5-1. MCDD-100 Serial Interface Example

Serial Remote Product Management for the MCDD-100 MetaCarrier® Detection Device is available through the EIA-232 operational interface, where the 'Controller' device (the user PC or an ASCII dumb terminal) is connected directly to the 'Target' device (the MCDD-100 Remote Router, via its DB-9M 'CONSOLE' port). This connection makes possible serial remote monitor and control (M&C) of the MCDD-100 through its Serial Interface.

Through this EIA-232 connection (for the control of a single device), data is transmitted in asynchronous serial form, using ASCII characters. Control and status information is transmitted in packets of variable length in accordance with the structure and protocol defined later in this chapter.

Access to the Serial Interface is accomplished with a user-supplied terminal emulator program such as Tera Term or HyperTerminal (**Figure 5-1**). Use this utility program to first configure serial port communication and terminal display operation:

- **38400 bps (Baud Rate)**
- **8 Data Bits**
- **1 Stop Bit**
- **Parity = NO**
- **Port Flow Control = NONE**
- **Display New line Rx/Tx: CR**
- **Local Echo = ON**

When the user-supplied terminal emulator program is configured correctly, upon power-up of the MCDD-100, the Serial Interface Info Screen appears, followed by the Serial Interface command prompt **MCDD-100>**. From here, type "**help[cr]"** or "**?[cr]"** (without the quotes) to display the MCDD-100's available commands and queries, and to review instructions for using the interface.

5.2   Remote Commands and Queries Overview

5.2.1   Basic Protocol

In an EIA-232 configuration, the Controller device is connected directly to the Target device via a two wire-plus-ground connection. All data is transmitted in framed packets as asynchronous serial characters, suitable for transmission and reception to the Controller using a universal asynchronous receiver/transmitter (UART). Controller-to-Target data is carried via EIA-232 electrical levels on one conductor, and Target-to-Controller data is carried in the other direction on the other conductor:

- **Controller-to-Target:** The Controller device (e.g., the user PC/Serial Interface) is used to transmit instructions (commands) to – or to request information from (queries) – the Target device (i.e., the MCDD-100).

- **Target-to-Controller:** The Target, in return, only transmits response information to the Controller when specifically directed by the Controller.

For Serial Remote Control, all issued commands (**Controller-to-Target**) require a response (**Target-to-Controller**). This response is either to return data that has been queried by the Controller, or to confirm the Target's receipt of a command to change the Target's configuration.

5.2.2   Packet Structure

The exchange of information is transmitted, Controller-to-Target and Target-to-Controller, in '**packets**'. Each packet contains a finite number of bytes consisting of printable ASCII characters, excluding ASCII code 127 (DELETE).

In this context, the Carriage Return and Line Feed characters are considered printable. With one exception, all messages from Controller-to-Target require a response – this will be either to return data that has been requested by the Controller, or to acknowledge reception of an instruction to change the configuration of the Target.

Controller-to-Target (Issued Command or Query)						
Start of Packet	Target Address	Address Delimiter	Instruction Code	Code Qualifier	Optional Arguments	End of Packet
 < ASCII code 60 (1 character)	0000 (default) (4 characters)	/ ASCII code 47 (1 character)	 (3 characters)	= or ? ASCII codes 61 or 63 (1 character)	 (n characters)	Carriage Return ASCII code 13 (1 character)

Packet Example: **<0000/IPA=010.006.030.001/24 [cr]**

Target-to-Controller (Response to Command or Query)						
Start of Packet	Target Address	Address Delimiter	Instruction Code	Code Qualifier	Optional Arguments	End of Packet
 > ASCII code 62 (1 character)	0000 (default) (4 characters)	/ ASCII code 47 (1 character)	 (3 characters)	= or ? ASCII codes 61 or 63 (1 character)	 (n characters)	Carriage Return ASCII code 13 (1 character)

Packet Example: **>0000/IPA=010.006.030.001/24 [cr][lf]**

Detailed description of the packet components follow.

5.2.2.1   Start of Packet

Controller-to-Target: This is the character '**<**' (ASCII code 60).

Target-to-Controller: This is the character '**>**' (ASCII code 62).

The '**<**' and '**>**' characters indicate the start of packet. They may not appear anywhere else within the body of the message.

5.2.2.2   Target Address

In EIA-232 applications, this value is set to **0000**.

> *The Target Address designates the packet destination. The Controller does not have its own address. After the Controller sends a packet with the designated Target Address, the Target responds to the Controller, using this same address, to indicate the source of the packet.*

5.2.2.3   Address Delimiter

This is the "forward slash" character '**/** ' (ASCII code 47).

5.2.2.4   Instruction Code

This is a three-character alphabetic sequence that identifies the message subject.

Wherever possible, the instruction codes have been chosen to have some significance – e.g., **IPA** for Management **IP A**ddress, **IPG** for **IP G**ateway Address, etc. This aids in the readability of the message, should it be displayed in its raw ASCII form.

Only upper case alphabetic characters may be used ('**A**' to '**Z**', ASCII codes 65 - 90).

5.2.2.5   Instruction Code Qualifier

This is a single character that further qualifies the preceding instruction code. Code Qualifiers obey the following rules:

From Controller-to-Target, the only permitted characters are:

Character	Definition
= (ASCII code 61)	This character is used as the **Assignment Operator** (AO). It establishes that the Instruction Code that precedes it is to be used as a *command* to assign or configure operation. The instruction set that follows serves to assign the Target's new parameter setting or operational value. **Example:** In a message from Controller-to-Target, **IPA=aaa.bbb.ccc.ddd/yy** means "set the IP Address and network prefix for the Management | FE port to aaa.bbb.ccc.ddd/yy"
? (ASCII code 63)	This character is used as the **Query Operator** (QO). It establishes that the Instruction Code that precedes it is to be used as a *query* that returns the Target's current configured parameter setting or operational value. **Example:** *From Controller-to-Target*, **IPA?** means "what's the current Management | FE port's IP Address and network prefix?"

From Target-to-Controller, the only permitted characters are:

Character	Definition
= (ASCII code 61)	This character is used in two ways: a. If the Controller sends a query to the Target – for example, **IPG?** (meaning "what's the Management | FE port's current IP Gateway Address?") – the Target responds with **IPG= aaa.bbb.ccc.ddd**, the value for that queried parameter. b. If the Controller sends an instruction to set a parameter to a particular value, and the value sent is valid, the Target acknowledges the message and responds with **IPG=** (with no message arguments).
? (ASCII code 63)	If the Controller sends an instruction to set a parameter to a particular value, and the value sent is not valid, the Target then acknowledges the message and responds with, for example, **SRC?** (with no message arguments). This indicates that there was an error in the message sent by the Controller.

Character	Definition
! (ASCII code 33)	If the Controller sends an instruction code that the Target does not recognize, the Target responds by echoing the invalid instruction, followed by **!** **Example: SRC!**
* (ASCII code 42)	If the Controller sends the command to set a parameter to a particular value, and the value sent is valid BUT the router will not permit that particular parameter to be changed at present, the Target acknowledges the message and responds with, for example, **IPG*** (with message arguments).
# (ASCII code 35)	If the Controller sends a correctly formatted command, BUT the unit is not in Remote Mode, it does not allow reconfiguration and responds, for example, with **IPG#**.

5.2.2.6   Optional Message Arguments

Arguments are not required for all messages. Arguments are ASCII codes for the characters '**0**' to '**9**' (ASCII codes 48 to 57), period '**.**' (ASCII code 46), and comma '**,**' (ASCII code 44).

5.2.2.7   End of Packet

Controller-to-Target: This is the 'Carriage Return' ([CR]) character (ASCII code 13).

Target-to-Controller: This is the two-character sequence 'Carriage Return', 'Line Feed' ([cr][lf]) (ASCII codes 13 and 10). Both indicate the valid termination of a packet.

5.3   Remote Commands and Queries

The Serial Interface (the Controller), shown previously in **Figure 5-1**, is used to issue remote commands and queries to the MCDD-100 (the Target). From the Serial Interface command prompt **MCDD-100>** type in the command or query packet, using the format explained previously, for transmission to the MCDD-100.

For example: MCDD-100><0000/IPA=010.006.030.001/24 [cr]

The table that follows provides a 'quick reference' to the Instruction Codes available at present for M&C of the MCDD-100. The '**C**' and '**Q**' columns, when marked with an '**X**', denote whether that Instruction Code is *Command Only*, *Query Only*, or *Command and Query*.

INSTRUCTION CODE	USED TO...	C	Q	Page
DPW	Resets the admin username/password to the factory defaults	X		**5-9**
IPA	Set or query the IP Address and network prefix for the Management	FE port	X	X	**5-9**
IPG	Set or query the IP Gateway Address for the Management	FE port	X	X	**5-9**

These Instruction Codes are explained in complete detail in the tables that follow. Note that the Target-to-Controller Instruction Code Qualifiers, described earlier, that appear in the "Response to Command" column carry the following meanings:

=   Message OK.

?   Received OK, but invalid arguments were found.

*   Message OK, but not permitted in current mode.

Message OK, but unit is not in **Remote** mode.

!   Invalid instruction.

Parameter Type	Command (Instruction & Qualifier)	Number of Arguments	Description of Arguments	Response to Command	Query (Instruction & Qualifier)	Response to Query

Reset Password	DPW=	None	Command only.
			Resets the username/password to the factory defaults, where:
			  Username = "comtech"
			  Password = "comtech"
			Note: This command takes no arguments.
			Example: DPW=
				DPW=	N/A	N/A

Management IP Address	IPA=	18 bytes numerical	Command or Query. Sets the IP Address and network prefix for the 10/100 BaseT Ethernet Management | FE port, in the form aaa.bbb.ccc.ddd/yy, where: (Permitted ranges – cannot all be zero) aaa = 0-223 bbb = 0-255 ccc = 0-255 ddd = 0-255 yy = network prefix (range: 8 to 31) **Example:** IPA=010.006.030.001/24	IPA= IPA? IPA* IPA#	IPA?	IPA=xxx.xxx.xxx.xxx/yy (see Description of Arguments)
Gateway IP Address	IPG=	15 bytes numerical	Command or Query. Sets the IP Gateway Address for the 10/100 BaseT Ethernet Management | FE port, in the form aaa.bbb.ccc.ddd, where: (Permitted ranges – cannot all be zero) aaa = 0-223 bbb = 0-255 ccc = 0-255 ddd = 0-255 **Example:** IPG=010.006.030.002	IPG= IPG? IPG* IPG#	IPG?	IPG=xxx.xxx.xxx.xxx (see Description of Arguments)

Notes:

Chapter 6. ETHERNET-BASED REMOTE PRODUCT MANAGEMENT

6.1   Introduction

Ethernet-based Remote Product Management is available through the MCDD-100 MetaCarrier® Detection Device's **'ETHERNET MANAGEMENT'** RJ-45 10/100 BaseT Fast Ethernet port.

1. *TO PROCEED WITH ETHERNET-BASED REMOTE PRODUCT MANAGEMENT (SNMP OR WEB SERVER), ASSUMPTIONS ARE MADE THAT:*

    - *The MCDD-100 is operating with the latest version firmware files.*

    - *The MCDD-100 is connected to a user-supplied, Windows-based PC, and:*

        o   *The PC serial port is connected to the MCDD-100's serial 'CONSOLE' port with a user-supplied serial cable.*

        o   *The PC Ethernet port is connected to the MCDD-100's RJ-45 'ETHERNET MANAGEMENT' port with a user-supplied hub, switch, or direct Ethernet cable connection.*

        o   *The PC is running a terminal emulation program (for operation of the MCDD-100's Serial Interface) and a compatible Web browser (for operation of the MCDD-100 Web Server Interface).*

    - *The MCDD-100's Management IP Address has been noted using the MCDD-100 Serial Interface.*

        Note that, while use of the serial port connection/Serial Interface is required only for initial configuration of the 'ETHERNET MANAGEMENT' port, it is also useful for firmware updating operations.

2. *USE OF THE ETHERNET-BASED SNMP INTERFACE IS RECOMMENDED ONLY FOR ADVANCED USERS. ALL OTHER USERS ARE STRONGLY ENCOURAGED TO USE*

THE MCDD-100 WEB SERVER INTERFACE FOR MONITOR AND CONTROL (M&C) OF THE MCD-100.

6.2 Ethernet Management Interface Protocols

The user PC facilitates access to Ethernet-based remote monitor and control (M&C) of the MCDD-100 through two separately-operated protocols:

- **Simple Network Management Protocol (SNMP).** This requires a user-supplied Network Management System (NMS) and a user-supplied Management Information Base (MIB) File Browser.

- **The MCDD-100 Web Server (HTTP) Interface.** This requires a compatible user-supplied Web browser such as Internet Explorer.

6.2.1 Ethernet Management Interface Access
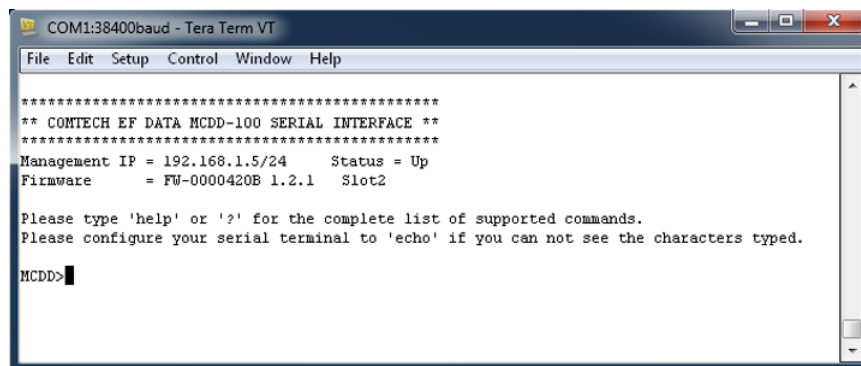
Access to the MCDD-100 Ethernet Management Interface requires the user to specify the unit's Management IP Address. This address may be obtained from the MCDD-100 Serial Interface, upon power-up of the unit, via use of a terminal emulator connected to the 9-pin serial '**CONSOLE'** port.

As shown, a number of operational parameters (including the unit's factory-default IP addresses) are displayed. The default (factory-assigned) IP addresses are provided in the table that follows (if otherwise assigned, the user may use the last column to write down the IP Addresses for future reference):

Description	Query	Default Address	User-assigned Address
Management IP Address	IPA?	192.168.1.5/24	_____
IP Gateway Address	IPG?	192.168.1.1	_____

See **Chapter 5. SERIAL-BASED REMOTE PRODUCT MANAGEMENT** *for information and instructions on using the MCDD-100 Serial Interface.*

6.3   SNMP Interface

The *Simple Network Management Protocol* (SNMP) is an Internet-standard protocol for managing devices on IP networks. An SNMP-managed network consists of three key components:

- The managed device – this includes the MCDD-100 MetaCarrier Detection Device.

- The SNMP Agent — the software (i.e., MIB file) that runs on the MCDD-100. The MCDD-100 SNMP Agent supports both **SNMPv1** and **SNMPv2c**.

- The user-supplied Network Management System (NMS) — the software that runs on the manager.

6.3.1 Management Information Base (MIB) Files

MIB files are used for SNMP remote management of a unique device. A MIB file consists of a tree of nodes called Object Identifiers (OIDs). Each OID provides remote management of a particular function. These MIB files should be compiled in a user-supplied MIB Browser or SNMP Network Monitoring System server. The following MIB files are associated with the MCDD-100:

MIB File/Name (where 'x' is revision letter)	Description
ComtechEFData.mib ComtechEFData Root MIB file	ComtechEFData MIB file gives the root tree for ALL Comtech EF Data products and consists of only the following OID: **Name:** comtechEFData **Type:** MODULE-IDENTITY **OID:** 1.3.6.1.4.1.6247 **Full path:** iso(1).org(3).dod(6).internet(1).private(4).enterprises(1).comtechEFData(6247) **Module:** ComtechEFData
FW-0000420x_MCDD100.mib MCDD-100 MIB file	MIB file consists of all of the OID's for management of The MCDD-100 functions

6.3.2 SNMP Community Strings

In SNMP v1/v2c, the SNMP Community String is sent unencrypted in the SNMP packets. Caution must be taken by the network administrator to ensure that SNMP packets travel only over a secure and private network if security is a concern.

The MCDD-100 uses Community Strings as a password scheme that provides authentication before gaining access to the MCDD-100 agent's MIBs. They are used to authenticate users and determine access privileges to the SNMP agent.

Type the SNMP Community String into the user-supplied MIB Browser or Network Node Management software.

The user defines two Community Strings for SNMP access:

- Read Community   default = public

- Write Community   default = private

For proper SNMP operation, the MCDD-100 MIB files must be used with the associated version of the MCDD-100 M&C. Please refer to the MCDD-100 FW Release Notes for information on the required FW/SW compatibility.

6.4   Web Server (HTTP) Interface

A user-supplied Web browser allows the full monitoring and control (M&C) of the MCDD-100 from its Web Server Interface. The MCDD-100's embedded Web application is designed for, and works best with, Microsoft's Internet Explorer Version 7.0 or higher.

6.4.1 User Login

Type the MCDD-100's Management IP Address (shown here as *http://xxx.xxx.xxx.xxx*) into the **Address** area of the user PC's Web browser:

The login page opens.

Enter the assigned **User Name** and **Password** – the default for both is **comtech**. Click **[Log On]**.

If the User Name and Password are accepted: The MCDD-100's Web Server Interface Home (Info) page, similar to the example shown here, appears:
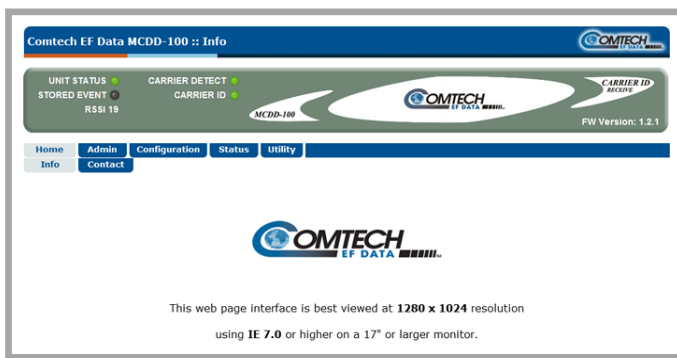
6.4.2 Web Server Interface – Operational Features

6.4.2.1   Virtual Front Panel

The MCDD-100 Web Server Interface features a **read-only** 'Virtual Front Panel' display at the top of every page. This section emulates the MCDD-100 front panel's real-time LED operation. This provides the Web Server Interface user with 'heads-up' operational status indicators that react to any changes made to device operation.

> *RSSI indicates the signal strength, ranging from 0 to 50, of the energy detected by the MCDD-100.*

6.4.2.2   Navigation

Each page features a row of top-level navigation tabs located just below the Virtual Front Panel. To navigate between pages, first roll the cursor over and select a navigation tab. Then, select an available primary page tab. In turn, any nested tabs will appear for further selection.

This manual uses a naming format for all Web pages to indicate to the user the depth of navigation needed to view the referenced page: "**Top Level Tab | Primary Page Tab**".

For example: "**Configuration | Interface"** is interpreted to mean "*first* click the top-level '**Configuration**' navigation tab; *then*, click the '**Interface**' primary page tab. Where applicable, nested tabs may exist to direct the user to more specific functionality.

6.4.2.3   Page Sections

Each page is divided into operational content sections. Whether there is one section to a page, or there are multiple sections, the title at the upper-left corner of each page section provides the user with a reference to its operational features.

This manual explains the purpose and operation for each Web page on a **per-page, per-section** basis.

6.4.2.4   Execution Buttons

Configuration changes generally do not take effect until a selection has been saved to Flash memory. There may be anywhere from one execution button per page up to multiple execution buttons within a page section. The label for each of these buttons is generally self-explanatory, e.g., **[Submit]**, **[Clear]**, **[Refresh**], etc.

All execution buttons serve the same purpose – to save the configuration changes to Flash memory, or to execute an update of the active page display.

Always make sure to click the execution button before selecting another Web page. Any changes made on that previous page will <u>not</u> be saved if the execution button for those functions Is not clicked.

6.4.2.5   Feature Selection

Drop-down menus provide access to multiple setting selections, where available for a specific function.
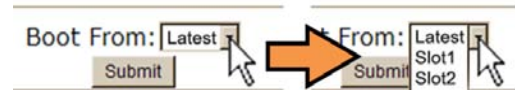
Move the cursor to the drop-down tab, and then left-click the tab. The drop-down will open and list the available selections. Move the cursor to the desired choice and then left-click once again to select that choice.

6.4.2.6   Text or Data Entry

Text boxes are provided any time an alphanumeric entry is required for access or configuration.
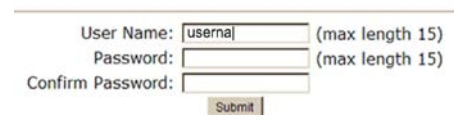
Move the cursor to the text box, and then left-click anywhere inside the box. Then, use the keyboard to type in the desired alphanumeric string. Press **Enter** when done.

6.4.3 Web Server Interface – Menu Tree

The MCDD-100 Web Server Interface features five (5) navigation tabs (shown in blue):

- **Home**   • **Admin**   • **Configuration**   • **Status**   • **Utility**

Beyond this top-level row of navigation tabs, primary page tabs (green) direct the user to further in-depth M&C functionality. Click any tab to continue.
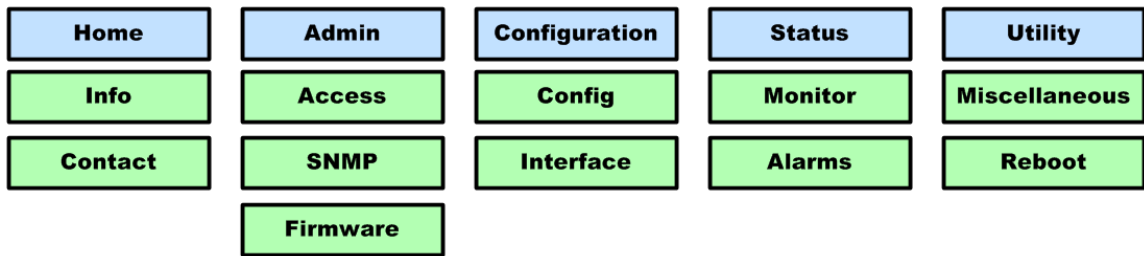
Figure 6-1. MCDD-100 Web Server Interface Menu Tree

6.4.4 Web Server Interface Page Descriptions

6.4.4.1 Home Pages

Click the **Info** tab to continue.

6.4.4.1.1 Home | Info

Click the **Home** top-level navigation tab and/or the **Info** nested page tab from any location within the Web Server Interface to view this informational page.

Figure 6-2. MCDD-100 Home | Info page

6.4.4.1.2   Home | Contact

For all product support, please call:

+1.240.243.1880

+1.866.472.3963 (toll free USA)

6.4.4.2   Admin (Administration) Pages

Use these pages to set up user access, manage the firmware load preferences, and activate FAST features.

> **The Admin pages are available only to users who have logged in using the Administrator Name and Password.**

Click the **Access**, **SNMP**, or **Firmware** tab to continue.

6.4.4.2.1   Admin | Access

Use this page to assign the user names and passwords required to access the MCDD-100 Web Server Interface.

Figure 6-3. Admin | Access page

User Access

- Enter a **User Name**. The **User Name** can be any alphanumeric combination with a maximum length of 15 characters. The factory default is **comtech**.

- Enter a **Password**. The **Password** can be any alphanumeric combination with a maximum length of 15 characters. The factory default is **comtech**.

- Re-enter the new **Password** in the **Confirm Password** text box.

Click **[Submit]** to save these settings.

6.4.4.2.2   Admin | SNMP

Sect. 6.3 SNMP Interface

Use this page to set up and return administration information for the MCDD-100 Simple Network Management Protocol (SNMP) feature.

Figure 6-4. Admin | SNMP page

SNMP Configuration

- Enter an **SNMP Read Community** string. The SNMP Read Community string can be any combination of characters and a length of 4 to 15 characters. The factory default SNMP Read Community string is **public**.

  Click **[Submit]** to save this entry.

- Enter an **SNMP Write Community** string. The SNMP Write Community string can be any combination of characters and a length of 4 to 15 characters. The factory default SNMP Write Community string is **private**.

  Click **[Submit]** to save this entry.

6.4.4.2.3   Admin | Firmware

Chapter 4. UPDATING FIRMWARE

Use this page to select which image (boot Slot #) is to be designated as the *active running firmware image* – i.e., the version loaded for operation upon power-up or soft reboot.

Figure 6-5. Admin | Firmware page

Firmware Information

This *read-only* status section displays operating status for the firmware versions loaded into Slot #1 and Slot #2.

Firmware Configuration

Use the **Boot From:** drop-down menu to select **Latest**, **Slot 1**, or **Slot 2**. The default selection is **Latest,** in which the unit will automatically select the image that contains the most current firmware.

Click **[Submit]** to execute the desired firmware boot preference.

(Note that the Slot Information section, which in the above example displays Slot #2 as the designated *active running firmware image*, will *not* update until *after* the unit is rebooted.)

System Reboot

Click **[Reboot]** to reboot the unit. A dialogue box appears to prompt continuation or cancellation of the reboot process:
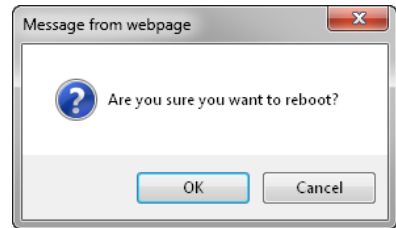
Click **[OK]** to continue the reboot process, or **[Cancel]** to abort the process and return to the '**Admin | Firmware'** page.

Once the reboot process resumes, the '**Utility | Reboot'** page is replaced with the dynamic message "**Please wait...System is rebooting, page will refresh in *XX* seconds**" – the time count decrements to 0 seconds before the unit reboots. After the reboot, login is required once again to resume use of the Web Server Interface.

6.4.4.3   Configuration Pages

Use the nested '**Configuration**' pages to configure all unit parameters. Click the **Config** or **Interface** tab to continue.

6.4.4.3.1   Configuration | Config

Figure 6-6. Configuration | Config Page

Demod Config

- **Rx Frequency** – Use this box to enter the center Rx Frequency, in MHz, of the signal for identification.

- **Rx Symbol Rate** – Use this box to enter the Rx Symbol rate, in ksps, of the signal for identification.

- **Rx Sweep Width** – Use this box to enter the range, in kHz, that the MCDD-100 will sweep, based on the Rx Frequency, when searching for a carrier.

- **Max Sweep Time (read-only) –** The value displayed here is calculated based on the user-defined symbol rate and the sweep width.

Click **[Submit]** to save these settings.

6.4.4.3.2   Configuration | Interface

Use this page to configure the **'ETHERNET MANAGEMENT'** RJ-45 10/100 BaseT Fast Ethernet
Management Interface port.

Figure 6-7. Configuration | Interface | E1 Page

Management Interface

- **MAC Address** – The MAC Address is *read-only* and cannot be changed.

- **IP Address / Subnet** – Use this box to enter the IP Address and Subnet Mask in CIDR format.
  The valid range for the Subnet Mask is from **8** to **30**.

- **Gateway** – Use this box to enter the IP Gateway Address.

Click **[Submit]** to save these settings.

6.4.4.4   Status Pages

The **Status** pages provide status, event logging, and operational statistics windows.

Click the **Monitor** or **Alarms** tab to continue.

6.4.4.4.1   Status | Monitor

Figure 6-8. Status | Monitor page

Demod Status

This section provides estimates for the Center Frequency (in MHz), Symbol Rate (in ksps), and the status of the MCDD acquisition circuit.

Carrier ID Info

This section provides information decoded from the received MetaCarrier:

- **GUI Type** – This is the Global Unique Identifier Type received. The types can be **SDA-48**, **MAC-48**, **EUI-48**, or **CUSTOM**.

- **GUI** – This is the Global Unique Identifier of the MetaCarrier. The first byte contains the CRC of the GUI; the fifth and sixth bytes are the GUI type.

- **Latitude –** This is the latitude coordinate of the MetaCarrier source.

- **Longitude –** This is the longitude coordinate of the MetaCarrier source.

- **Telephone Number –** The telephone number is shown only if the transmitter operator has provided this number.

- **Custom Message –** This is the optional text field embedded in the MetaCarrier.

6.4.4.4.2   Status | Alarms

Use this page to view cumulative alarms and stored events information.

Figure 6-9. Status | Alarms page

Alarms

Use the associated drop-down menu to define a designated alarm as **Alarm**, **Fault** or **Masked**, and then click **[Change]** to initiate. Note the following:

- Select **Alarm** so that the condition triggers a 'yellow' alarm.

- Select **Fault** so that the condition triggers a unit fault indication.

- Select **Masked** so that the condition triggers no alarm.

Click **[Refresh]** to save any changes and to update the reporting status for all info entries in this section.

Events

Note that in accordance with European convention, the Events Log shows the date in DAY-MONTH-YEAR format.

When a fault condition occurs, it is date- and time-stamped and entered into the Stored Events Log. This log can store up to 255 events. The log also records when the fault condition clears.

Click **[Clear Event Table]** to clear the event log. Note that, if there already are faults present on the unit at this time, they will be re-stamped and new log entries will be generated.

6.4.4.5   Utility Page

Use this page to access top-level system information and monitoring utilities.

Figure 6-10. Utility page

MCDD-100

- **Serial Number** – The unique identifier for this specific product is provided here. Refer to this number when contacting Comtech EF Data Customer Support for upgrade or service issues.

- **Unit Name** – The product (e.g., **MCDD-100**) is identified here.

- **System Contact / System Location** – E-mail and telephone contact information for Comtech EF Data Product Support are provided here.

Click **[Submit]** to save these settings.

- **Set Time (hh:mm:ss)** – Use HH:MM:SS format (where HH = hour [00 to 23], MM = minutes [00 to 59], and SS = seconds [00 to 59]) to enter a time.

- **Set Date (dd/mm/yy)** – Use the European time format DD/MM/YY (where DD = day [01 to 31], MM = month [01 to 12], and YY = year [00 to 99]) to enter a date.

Click **[Submit]** to save these settings.

BER/PER Monitor

 The MetaCarrier is a low power signal and is susceptible to occasional bit or packet errors under normal operating conditions.

This *read-only* section displays the ongoing BER (Bit Error Rate) of the MetaCarrier packets that have been rerouted correctly by FEC decoding, and the ongoing PER (Packet Error Rate) of the MetaCarrier.

Click **[Reset]** to *restart* the BER/PER Monitor. Otherwise, the statistics will continuously and automatically update.

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Appendix A. INTERFERENCE IDENTIFICATION

A.1 Introduction

Without Carrier ID technology, the ability to identify carriers is a complex task even for the most seasoned operator, technician, or engineer. The ability to identify an interference condition, in and of itself, is simple – the carrier that is assigned to the given spectrum may either experience marginally degraded communications (resulting in poor communications or periodic error), or it may be rendered completely unusable (resulting in no usable communications).

The purpose of this appendix is to present a number of scenarios that address marginal, partial, and complete interference, and to provide explanations of how Comtech EF Data's MCDD-100 MetaCarrier® Detecting Device or MCED-100 MetaCarrier® Embedding Device (referred to collectively as the MCxD-100), using Carrier ID technology, may be used to extract the source of the interference.

The scenarios presented in this appendix are as follows:

Appendix Section	Title	Scenario Description
A.2	Scenario 1: Marginal Interference	256 ksps Data Carrier Interfering with a 3.5 Msps Data Carrier
A.3	Scenario 2: Marginal Interference	256 ksps Data Carrier Interfering due to Cross Polarization with a 3.5 Msps Data Carrier
A.4	Scenario 3: Partial Interference	5.0 Msps Video Carrier Interfering with a 3.5 Msps Data Carrier
A.5	Scenario 4: Complete Interference	3.5 Msps Data Carrier Interfering with a 256 ksps Data Carrier
A.6	Scenario 5: Complete Interference	Two 5.0 Msps Carriers with Identical Center Frequency and Symbol Rate

A.2   Scenario 1: Marginal Interference
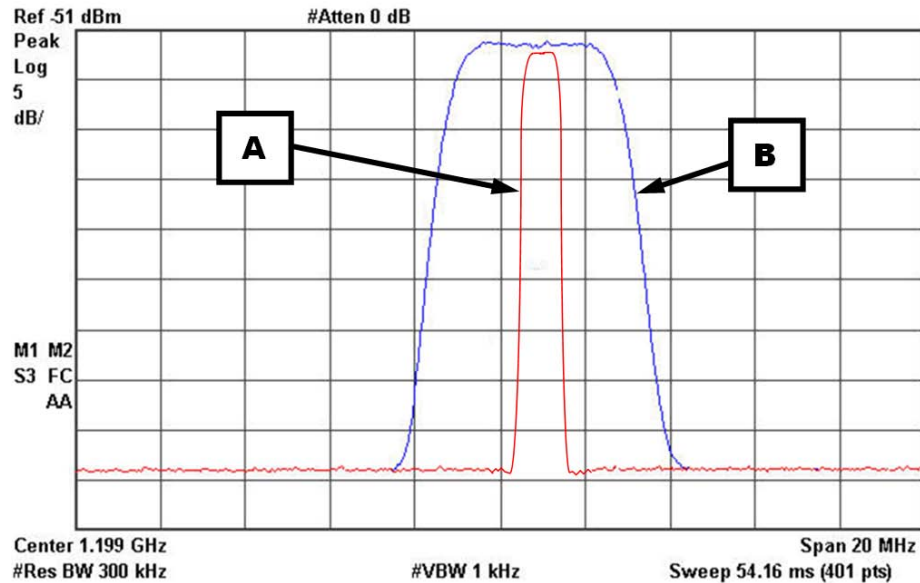
Item	Description
A	"Interfering" 256 ksps Data Carrier
B	"Desired" 3.5 Msps Data Carrier

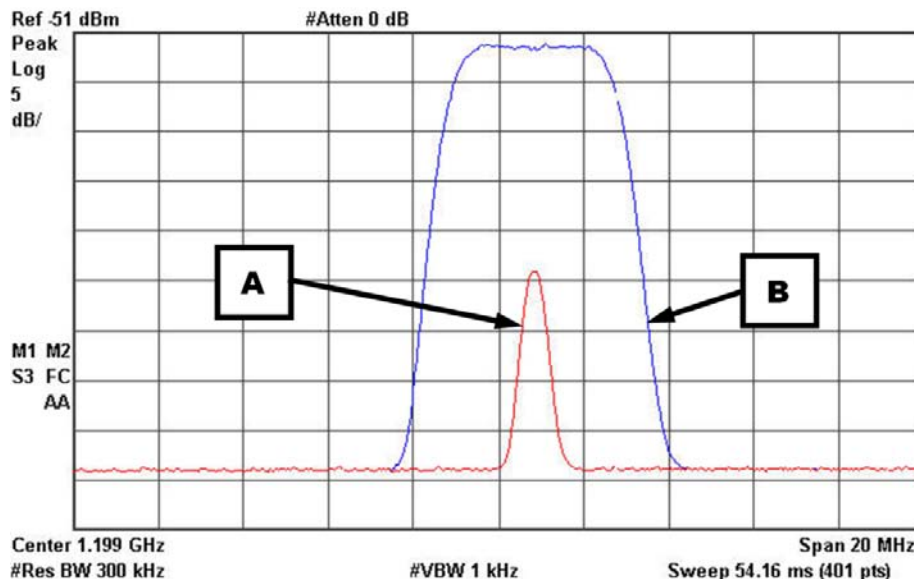**Figure A-1. Scenario 1 (Marginal Interference)**

Figure A-1 shows a marginal interference scenario where a 256 ksps Data Carrier is interfering with a 3.5 Msps Data Carrier.

In this situation, the energy of the interfering carrier is not significant. As shown, the 256 ksps carrier does not have enough energy to completely interfere with the 3.5 Msps carrier. In most cases, a carrier as small as this would not be detectable, and the only discernable problem would be where the Forward Error Correction (FEC) does not compensate for the reduction in Es/No due to the minor interference.

When both carriers have Carrier ID technology enabled, the MCxD-100 may be instructed to look in the spectrum below the composite envelope of the 3.5 Msps carrier to determine if Carrier IDs are present. Optimally, only a single carrier would be present, but in such interference conditions, multiple Carrier IDs may be found.

Once an interfering carrier is found, the uplinking station may be contacted and a request made to disable the identified transmission service.

A.3   Scenario 2: Marginal Interference

Item	Description
A	"Interfering" 256 ksps Data Carrier
B	"Desired" 3.5 Msps Data Carrier

Figure A-2. Scenario 2 (Marginal Interference)

In the marginal interference scenario shown here in **Figure A-2**, the energy of the interfering carrier is due to cross polarization and is not significant – the 256 ksps (cross polarization) carrier, as shown, does not have enough energy to completely interfere with the 3.5 Msps carrier. In most cases, a carrier as small as this would not be detectable, and the only discernable problem would be where FEC does not compensate for the reduction in Es/No due to the minor interference.
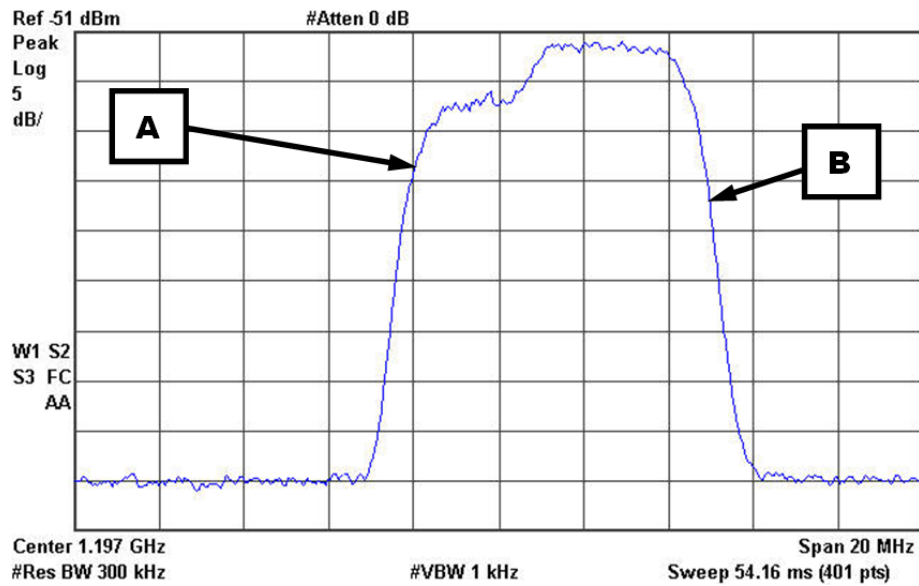
When the carriers have Carrier ID technology enabled, the MCxD -100 may be instructed to look in the spectrum below the composite envelope of the 3.5 Msps carrier to determine if Carrier IDs are present. Optimally, only a single carrier would be present, but in such interference conditions, multiple Carrier IDs may be found.

Once an interfering carrier is found, the uplinking station may be contacted and a request made to disable the identified transmission service.

In a cross polarization scenario, the energy of the cross polarization carrier may be extremely small, and the desired 3.5 Msps data carrier may be much larger than the cross polarization component. In this situation, the monitoring station may simply move to the cross polarization and look directly under the interfering carrier to determine the transmission source.

Once an interfering carrier is found, the uplinking station can be contacted and a request may be made to either disable or re-peak the identified transmission service.

A.4   Scenario 3: Partial Interference

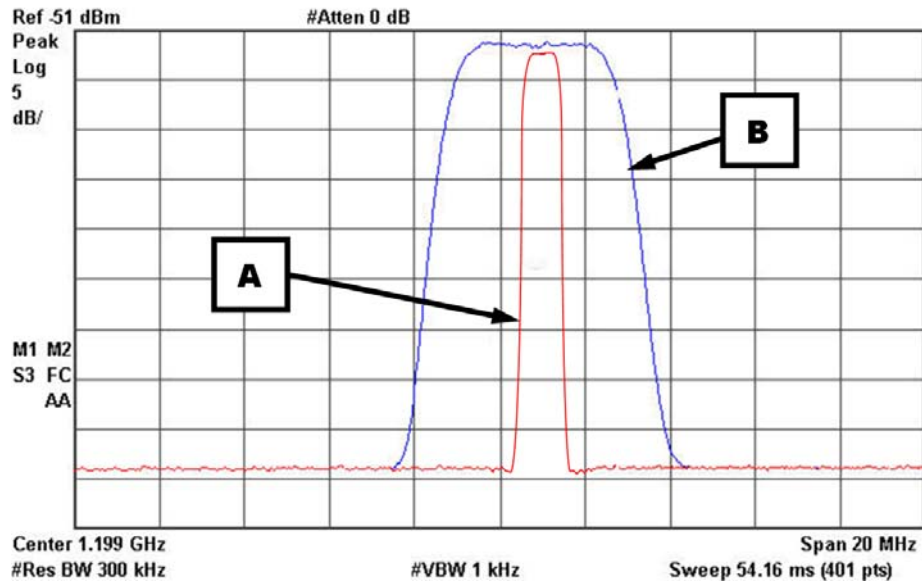| Item	Description
A	"Interfering" 5.0 Msps DVB-2 Video Carrier
B	"Desired" 3.5 Msps Data Carrier

Figure A-3. Scenario 3 (Partial Interference)

In the partial interference scenario shown here in **Figure A-3**, the energy of the interfering carrier is significant. As shown here, the 5.0 Msps carrier partially interferes with the 3.5 Msps carrier, and the resultant interference is significant enough that neither carrier results in usable communication.

When the carriers have Carrier ID technology enabled, the MCxD-100 may be instructed to look in the spectrum below the composite envelope to determine if Carrier IDs are present.

Once an interfering carrier is found, the uplinking station may be contacted and a request made to disable the identified transmission service.

A.5   Scenario 4: Complete Interference

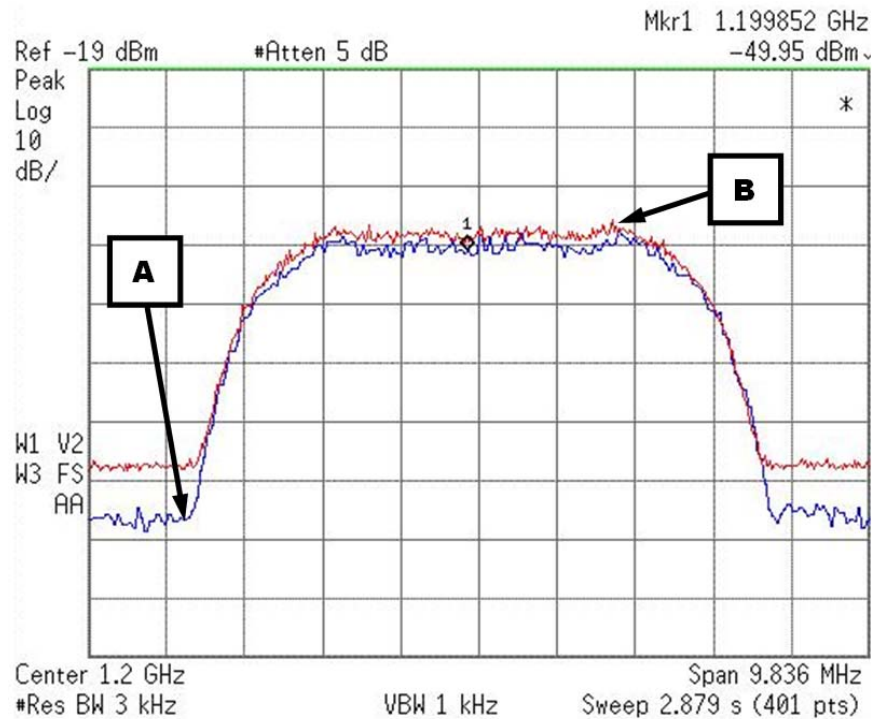| Item	Description
A	"Desired" 256 ksps Data Carrier
B	"Interfering" 3.5 Msps Data Carrier

Figure A-4. Scenario 4 (Complete Interference)

In this complete interference scenario (**Figure A-4**), the energy of the interfering carrier is significant. As shown here, the 3.5 Msps carrier completely interferes with the 256 ksps carrier: the interference is total.

When the carriers have Carrier ID technology enabled, the MCxD-100 may be instructed to look in the spectrum below the composite envelope to determine if Carrier IDs are present.

Once an interfering carrier is found, the uplinking station may be contacted and a request made to disable the identified transmission service.

A.6   Scenario 5: Complete Interference

Item	Description
A	"Desired" 5.0 Msps DVB-2 Video Carrier
B	"Interfering" 5.0 Msps DVB-2 Video Carrier

Figure A-5. Scenario 5 (Complete Interference)

In this scenario (**Figure A-5**), two 5.0 Msps carriers contain an identical center frequency and symbol rate. If the carriers have Carrier ID technology enabled, situations such as this require special consideration because, while the MCxD-100 may be instructed to look in the spectrum below the composite envelope of both 5.0 Msps carriers to determine if carrier IDs are present, the MetaCarriers may be at the same MetaCarrier center frequency and chip rate. Therefore, multiple approaches may need to be undertaken to obtain the MetaCarrier information from the interfering carrier:

- **Step 1:** The simplest step to take is to allow the MCxD-100 to look under the carriers. If both carriers' properties are approximately the same, there is a 50% probability that the MCxD-100 will lock to the desired carrier or the interfering transmission carrier.

  If the MCxD-100 locks to the *desired* carrier and not the *interfering* carrier, the user may instruct the MCxD-100 to reacquire. This will cause the MCxD-100 to again look for the MetaCarrier.

As before, 50% probability is assumed, since the MCxD-100 must achieve code phase-lock to obtain the Carrier ID from the MetaCarrier. Therefore, each time the MCxD-100 is instructed to reacquire, the probability remains that it will achieve code phase-lock to the *interfering* carrier.

If the MetaCarrier is obtained and the *interfering* carrier is identified, the uplinking station may be contacted and a request made to disable the transmission service.

If the MetaCarrier is *not* obtained, proceed to **Step 2**.

- **Step 2:** Disable the MetaCarrier on the *desired* carrier to allow the MCxD-100 to look for the MetaCarrier under the *interfering* carrier.

  If the MetaCarrier is obtained, the uplinking station may be contacted and a request made to disable the transmission service.

  If the MetaCarrier is *not* obtained, proceed to **Step 3**.

- **Step 3:** Many receiving devices may tolerate the center frequency being offset from the transmission station if it is kept within the carrier tracking loop of the receiver. Move the center frequency of the *desired* carrier up or down to allow the MCxD-100 to look for the MetaCarrier under the *interfering* carrier.

  If the MetaCarrier is obtained, the uplinking station may be contacted and a request made to disable the transmission service.

  If the MetaCarrier is *not* obtained, proceed to **Step 4**.

- **Step 4**: *This is the most drastic step* – disable the *desired* carrier to allow the MCxD-100 to look for the MetaCarrier under the *interfering* carrier

  If the MetaCarrier is obtained, the uplinking station may be contacted and a request made to disable the transmission service.

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