



MC-EMA
General Description and
Operational Manual for MCU-100

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Contents

1	GENERAL	5
2	APPLICABLE PRODUCTS	6
3	SETTING UP THE SYSTEM	7
3.1	INITIAL SETTINGS FOR AN MCU	7
3.1.1	<i>Mobile PTP and PTMP system</i>	7
3.2	INSTALLATION	7
4	UNITS' BRING UP	12
4.1	MCU BRING UP	12
5	INSTALLING AND CONNECTING THE MC-EMA	13
5.1	CONNECTING MC-EMA TO UNITS	13
5.1.1	<i>Local MC-EMA connection</i>	13
5.1.2	<i>Remote MC-EMA connection</i>	13
5.2	MC-EMA SOFTWARE INSTALLATION	14
5.2.1	<i>Installing MC-EMA on a Laptop\PC</i>	14
5.3	UPDATING FIRMWARE TO AN MCU UNIT	14
6	MC-EMA OVERVIEW	15
6.1	MC-EMA ELEMENT MANAGEMENT APPLICATION.....	15
6.1.1	<i>General Screen View</i>	16
6.1.2	<i>Link Monitor Screen View</i>	18
6.1.3	<i>Throughput Screen View</i>	19
7	STANDARDIZATION	20
7.1	DECLARATION OF CONFORMITY.....	20
7.2	PROFESSIONAL INSTALLATION ATTESTATION	21

List of Figures

Figure 1: MCU-100 Unit Connectors (Front \ Back).....	10
Figure 2: MCU-100 Auxiliary Cable	11
Figure 4: Local connection of MC-EMA on PDA (Left) and Laptop\PC (right)	13
Figure 5: Remote connection over the air via another device (top) from NOC (down)	13
Figure 6: MC-EMA General Screen View	16
Figure 7: Link Monitor Screen View.....	18
Figure 8: MC-EMA Throughput Screen View.....	19

1 General

This document aims to describe how to operate and monitor Mobilicom's MCU's and MC-HPA units by using the MC-EMA including operational procedures and troubleshooting.

2 Applicable Products

Following are applicable products that are covered in this document, for more information please refer to the specific product general description:

- MCU-100

3 Setting up the System

3.1 Initial settings for an MCU

3.1.1 Mobile PTP and PTMP system

- 1) A mobile point-to-point or P2MP system should contain at least 2 units.
- 2) In a system one MCU will be a master and at least one should be set as slave (P2P), or more (P2MP).
- 3) Setting up a Master/Slave is done by burning the relevant ZIP file (Mobilicom will provide both Master and Slave Files) (MC-EMA will support such configuration in the future)
- 4) After setting up Master/Slave the unit can be boot up and set up the rest of the parameters via the EMA.
- 5) The rest of the parameters are set as a part of the profile customized for a client.
- 6) All these stages are typically done in the lab prior to shipment enabling easily plug-and play by the customer (typically attenuators are connected to the RF ANT jacks in a basic unit configuration without antenna). Nevertheless, this procedure can be done after installation as well.

3.2 Installation

- 1) The MCU-100 can be installed in two ways:
 - Installed using the 4 peripheral mounting holes – mainly used on large surfaces such as walls, car top or ceilings. Schematics can be supplied by Mobilicom
 - Installed using the back mounting holes via mounting arm (such as MT-120018/A) – mainly used on poles. Schematics can be supplied by Mobilicom.
- 2) **Antennas installation:**

The antennas should be as close to the MCU-100 as possible and can be connected to it directly into its ANT powers #1 and #2.
- 3) Cables should be chosen according to their attenuating (best ones should be chosen) and flexibility (according to the path they pass through). Each cable should have TNC-Male connector on one end and connector matching to the antenna on the other (most common are N-Type Male/Female). Recommended cable standards can be supplied by Mobilicom.
- 7) Before powering up the MCU-100 the antennas should be connected to it (alternatively attenuators can be connected to the RF ANT jacks for basic setups).

8) In order to verify that the MCU-100 is working (when there is no link) the MCU-100 can be connected to a PC via Ethernet or RS232. When connected to a PC EMA can be run and get some of the indications. The rest of the indications such as Link status, CINR, RSSI and bandwidth are not relevant and will not be displayed.

9) Power Feed:

a. The device can be powered only via battery and not via AC/DC transformer.

b. The device can be marketed as battery powered only.

c. Communication and power harness can be supplied by Mobilicom as an auxiliary cable, but can also be manufactured according to Mobilicom's spec. The cable should contain at least a 1GE and one power as a minimum, yet it is recommended that the RS232 will be added as well. The Power line must contain a 4A fuse.

d. Voltage Regulation: 33% $= (12-9)/9 * 100\%$

e. Battery Types that can be used:

Voltage: 12VDC

Max Current: 3A

Recommended AH: 24AH (for 8 hours operation)

f. Connecting the Battery:

Connect the Black Cable labeled -12VDC to the - of the Battery

Connect the Red Cable labeled +12VDC to the + of the Battery

g. Disconnecting the Battery:

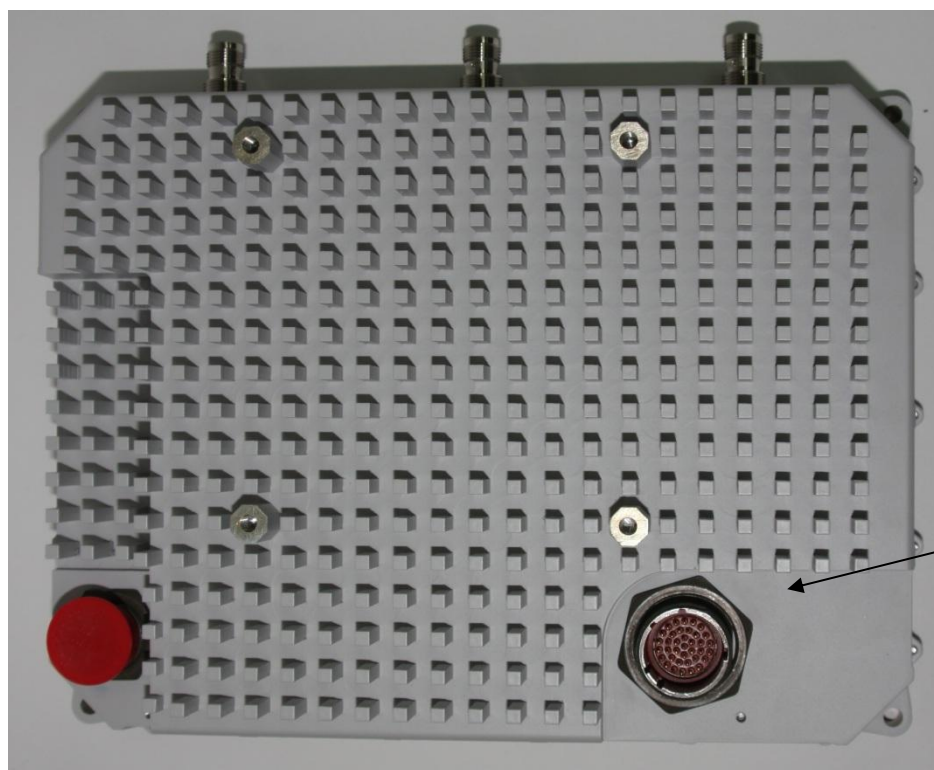
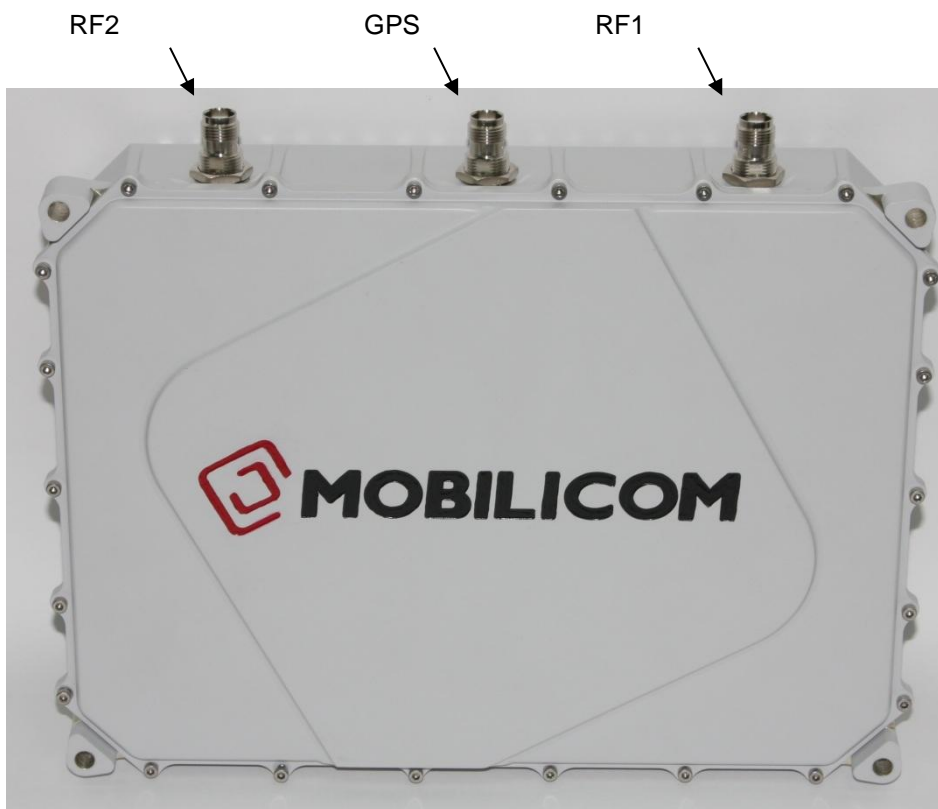
Disconnect the Red Cable labeled +12VDC to the + of the Battery

Disconnect the Black Cable labeled -12VDC to the - of the Battery



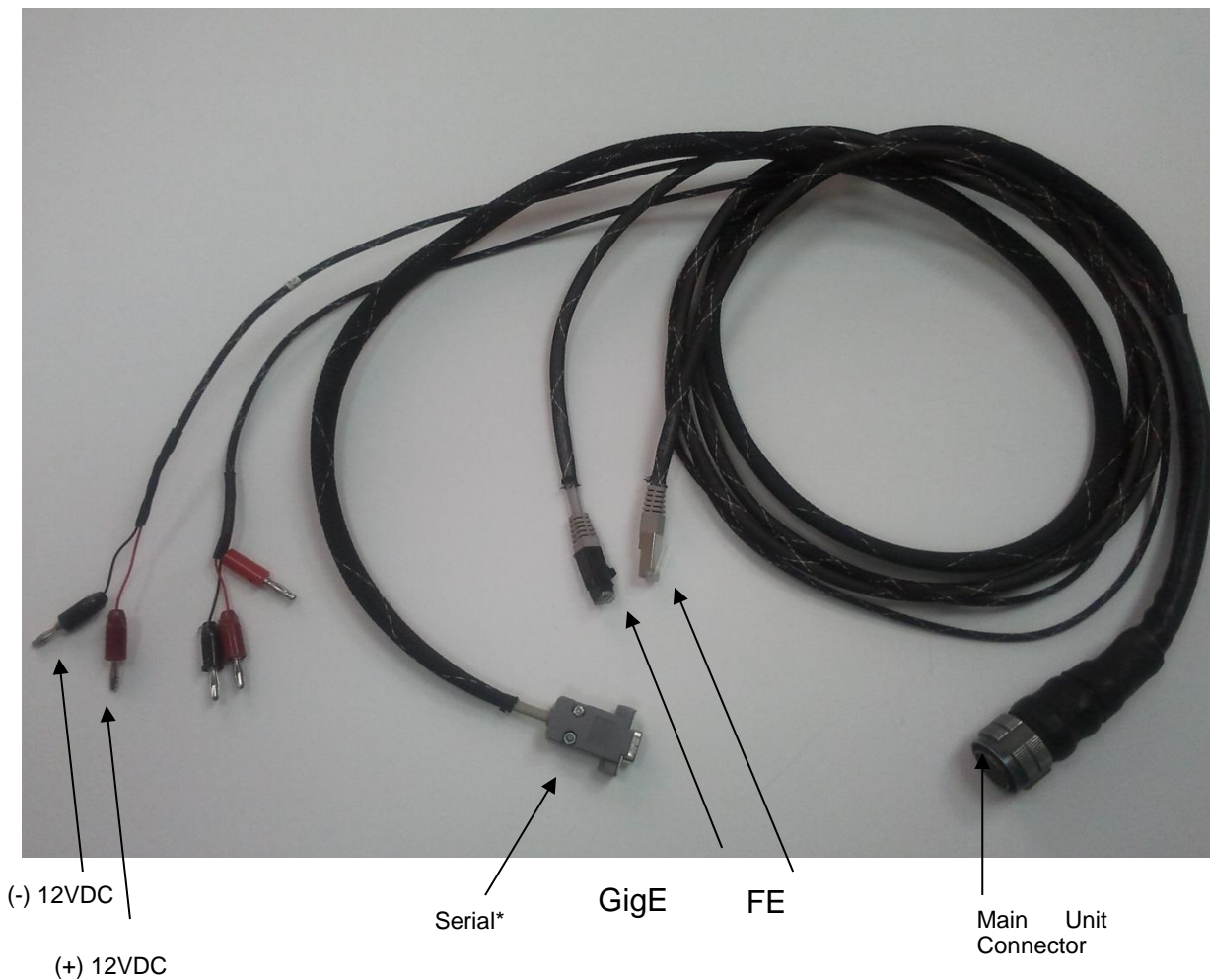
Output power is conducted. This device must not be sold to the general public. This device is not approved for use when being powered by the AC power lines either directly, or indirectly, through another device. Professional installation of this device is required. The antenna(s) used for this device must be installed to provide a separation distance of at least 20 cm from all persons, and must not be co-located or operating in conjunction with any other antenna or transmitter except in accordance with FCC multi-transmitter product procedures.

g.



MAIN Cable
Power &
Ethernet to
Host (User PC,
Remote Cam,
Vessel Host
Control Unit)

Figure 1: MCU-100 Unit Connectors (Front \ Back)



* Optional

Figure 2: MCU-100 Auxiliary Cable

4 Units' Bring Up

4.1 MCU Bring Up

- 1) Once the MCUs are initialized as described in section 3.1, only power feed is needed for the system. When powered up it starts its operation as a simple plug-and-play device
- 2) Firmware update is described in the MC-EMA section

5 Installing and Connecting the MC-EMA

5.1 Connecting MC-EMA to Units

This section describes the method of connection between the MC-EMA to a specific unit.

5.1.1 Local MC-EMA connection

The MC-EMA can be connected locally to an MCU unit as shown below:



Figure 3: Local connection of MC-EMA on PDA (Left) and Laptop\PC (right)

5.1.2 Remote MC-EMA connection

The MC-EMA can be connected over the air to a remote MCU unit as shown below:

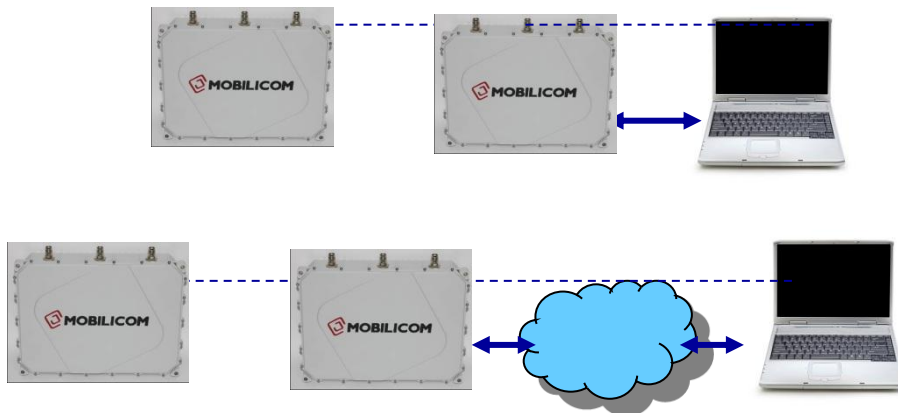


Figure 4: Remote connection over the air via another device (top) from NOC (down)

5.2 MC-EMA Software Installation

5.2.1 Installing MC-EMA on a Laptop\PC

Following is the procedure to install the MC-EMA application on Laptop\PC:

- 1) Java Runtime Environment should be installed on your device.
- 2) Unzip the EMA package.
- 3) In order to run the EMA run the ema.bat file.
- 4) Use your EMA Manual to configure/use it.

5.3 Updating Firmware to an MCU Unit

Following are the steps for updating MCU firmware

- 1) Make sure that the MC-EMA is set to the box you wish to update.
- 2) Load the Zip file of the version you want to upgrade to.
- 3) Power down the MCU unit.
- 4) Power up the MCU unit.
- 5) Confirm the version number on the MC-EMA general screen.

6 MC-EMA Overview

6.1 MC-EMA Element Management Application

Mobilicom's MC-Element Management Application (MC-EMA) is optional, technical software tool that runs on computer or portable device (PDA) and uses to test specific MCU node in the network. It enables ease of configuration and maintenance and logs data for analysis, configuration and maintenance purposes. This software can run on a computer or portable device directly connected to a specific unit within the communications network or over the air-link to remote devices via their IP address.

The MC-EMA enables:

- Fault** alarms for critical parameters
- Configuration** of the unit and its monitoring maintenance for online diagnostics
- Performance** of unit throughput and link status
- Monitoring with online diagnostics
- Logging data for offline analysis

The MCU-100 is a plug-and-play unit for the end-user, where the MC-EMA tool can be used by Field Application Engineers (FAE's), technical support and R&D Engineering on first installation and maintenance purposes.

6.1.1 General Screen View

MC-EMA General Screen view (shown below) is the main EMA screen showing various unit info, modem info configuration and firmware update info.

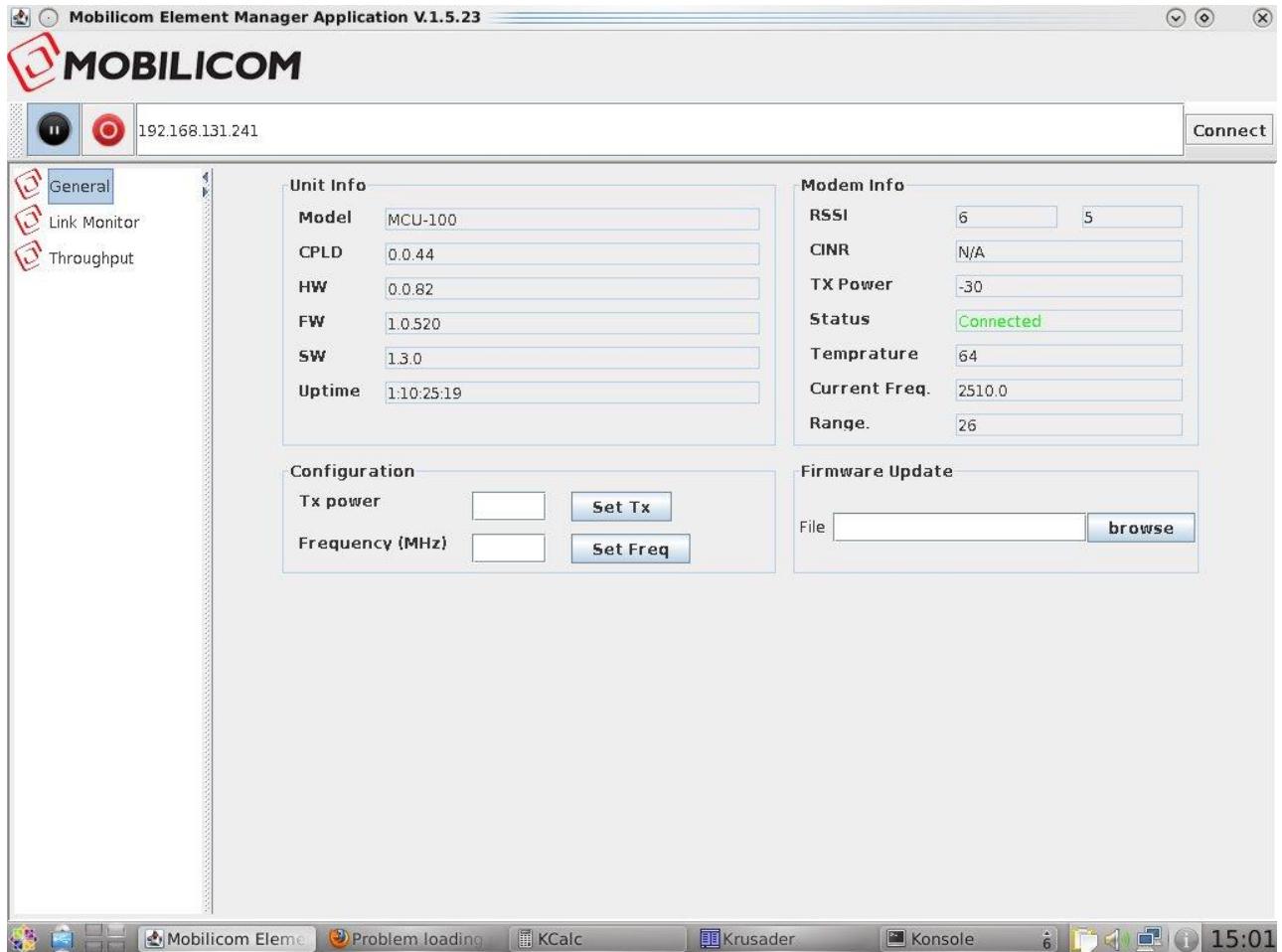


Figure 5: MC-EMA General Screen View

Following fields and parameters are shown in the general screen:

Unit Info field shows the following parameters:

- Unit Model Type – MCU-100
- CPLD – CPLD version
- HW – Hardware version
- FW – Firmware Version
- SW – Software Version
- Uptime – Amount of time the system is up and running

Modem Info field shows the following parameters:

6) RSSI – Received Power on each channel in dBm (-105 ÷ -20)

- CINR – Signal To Noise Ratio for each channel in dB (0 ÷ 30)
- Tx Power – Current Tx Power in dBm (updates each 5 seconds)
- Status – Unit Status (Link Up/ Link Down)
- Temperature – Unit temperature
- Current Frequency – in MHz (will be updated after reboot if a freq was changed)
- Range – in meters between 2 units

Configuration

- Tx Power
- Frequency in MHz

Firmware Update

- Loading a ZIP file burns a new Software (and FPGA/Firmware) – Needs power down in order to take effect

6.1.2 Link Monitor Screen View

The link monitor screen view shows the unit links performance as shown herein:

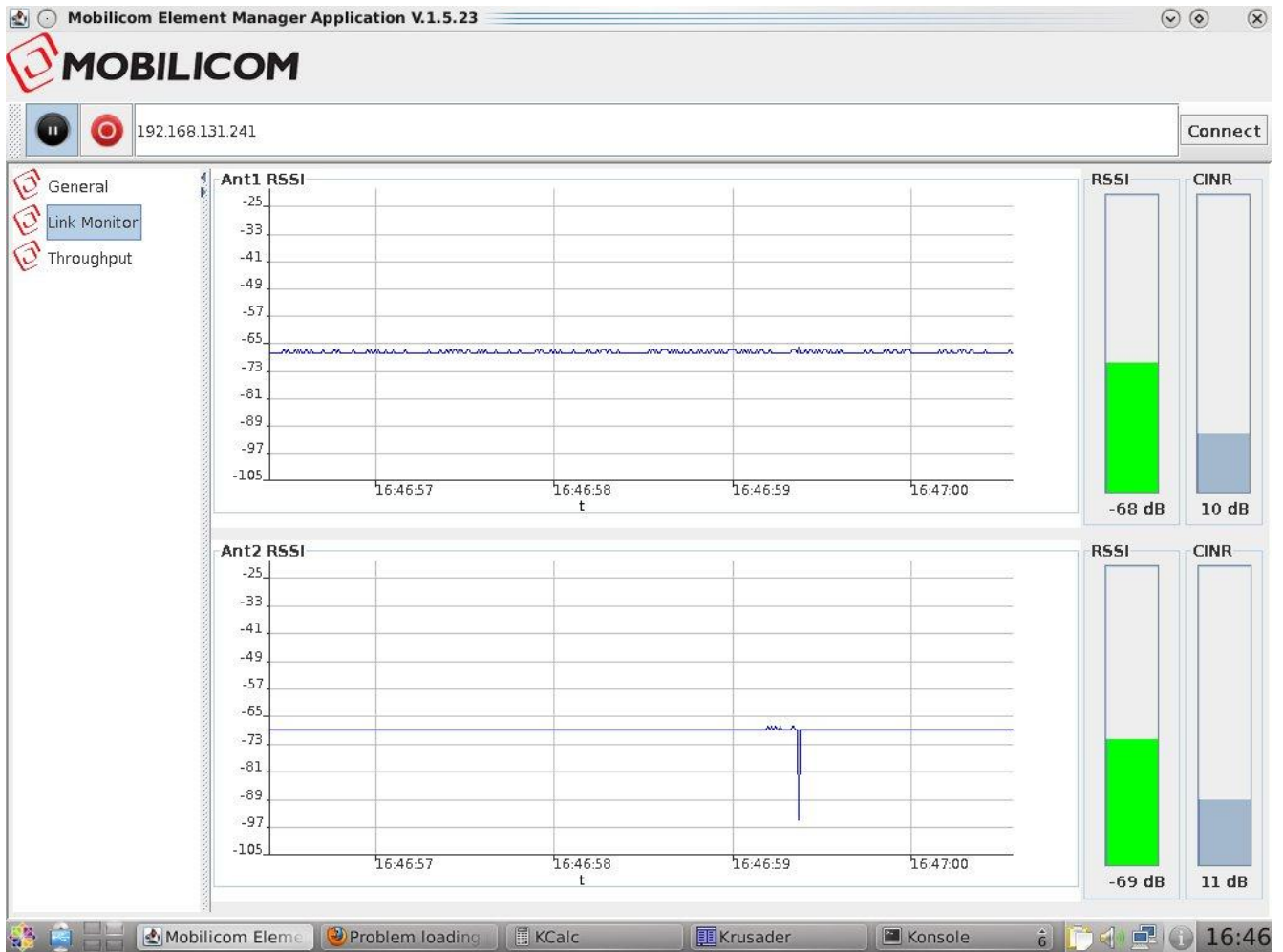


Figure 6: Link Monitor Screen View

Following graphics are shown in the link monitor screen:

- Two sliding graphs of RSSI received power on each channel antenna
- RSSI bar and value for each antenna channel
- CINR bar and value for each antenna channel

6.1.3 Throughput Screen View

The throughput screen view shows sliding graphs of Downlink and Uplink unit capacity in Mbps as shown herein:

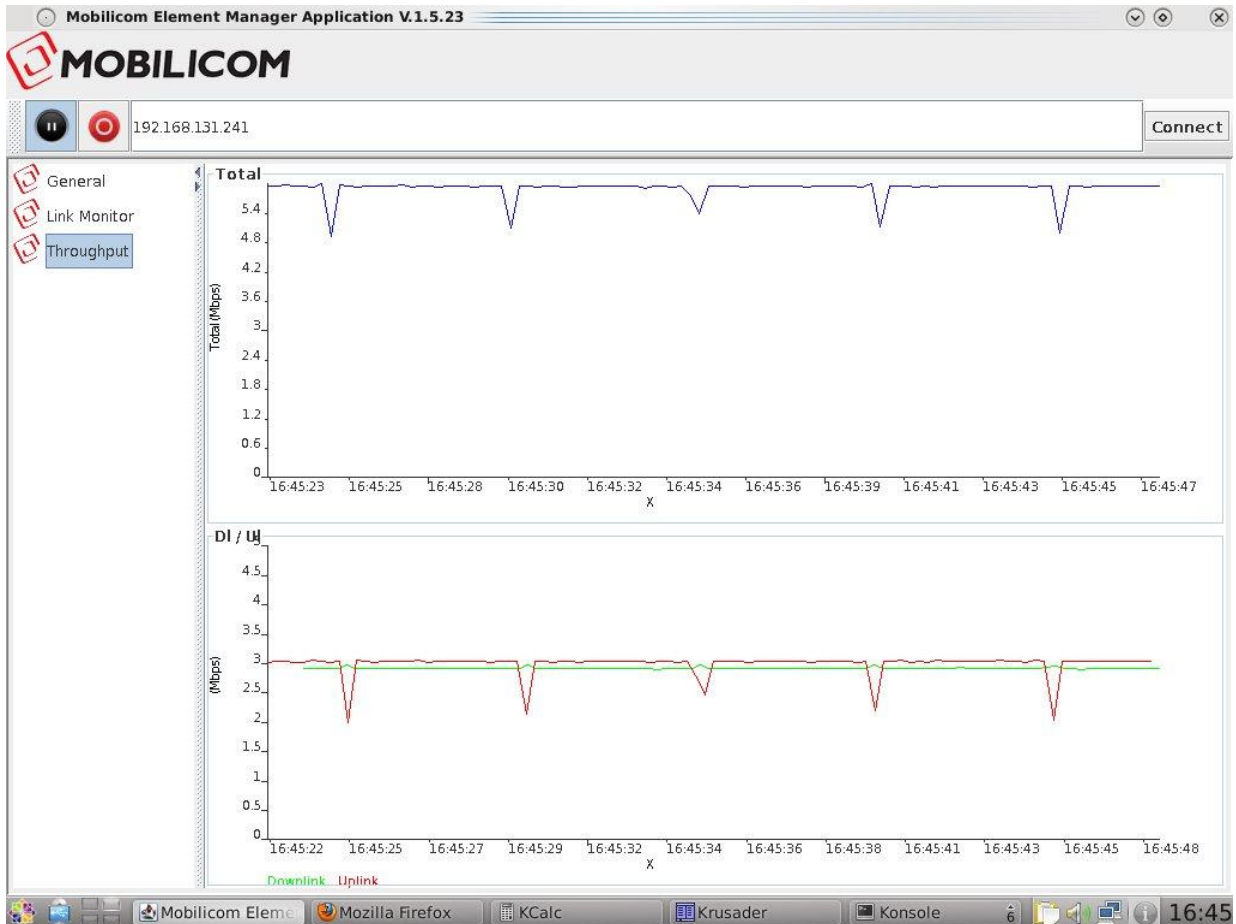


Figure 7: MC-EMA Throughput Screen View

7 Standardization

7.1 Declaration of Conformity

Manufacturer's Name: *MOBILICOM*

Declares under our sole responsibility that the products:

Product Name: MCU-100

Conform(s) to the following standard(s) or other normative document(s):

FCC Part 15 Class A

FCC Part 15 Subpart C (15.247)

EN 300-328



This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:

- The device may not cause harmful interference.
- This device must accept any interference received, including interference that may cause undesired operation.



Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes :

- (1) l'appareil ne doit pas produire de brouillage, et
- (2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement



This equipment has been approved for mobile applications where the equipment should be used at distances greater than 20cm from the human body (with the exception of hands, wrists, feet and ankles). Operation at distances less than 20 cm is strictly prohibited.

Changes or modification to device not expressly approved by MOBILICOM LTD is strictly prohibited and could avoid the user's authority to operate the equipment.

7.2 Professional Installation Attestation

MOBILICOM (the manufacturer) addresses the following items to ensure that the above referenced equipment is professionally installed:

1. The MCU-100 will only be sold by MOBILICOM or one of its authorized dealers. MOBILICOM and its authorized dealers will be under strict marketing control and will only market and sell the MCU-100 to professionals.
2. Professional installation is required for the MCU-100 and will be performed only by someone knowledgeable of its use.
3. MOBILICOM will ensure that the MCU-100 is only marketed and sold to professionals.
4. The MCU-100 is not sold to the general public and is sold only for industrial or commercial use by professional installers.
5. List of approved antennas and power settings used shown on FCC grant. Installer shall be responsible for ensuring that the proper antenna is employed so that the limits in FCC Part 15 are not exceeded.
6. **Power Feed:**
 - a) **The device can be powered only via battery and not via AC/DC transformer.**
 - b) **The device can be marketed as battery powered only.**
 - c) Communication and power harness can be supplied by Mobilicom as an auxiliary cable, but can also be manufactured according to Mobilicom's spec. The cable should contain at least a 1GE and one power as a minimum, yet it is recommended that the RS232 will be added as well. The Power line must contain a 4A fuse.
 - d) Voltage Regulation: 33% $= (12-9)/9 * 100\%$
 - e) Battery Types that can be used:

Voltage:	12VDC
Max Current:	3A
Recommended AH:	24AH (for 8 hours operation)

- f) Connecting the Battery:
Connect the Black Cable labeled -12VDC to the - of the Battery
Connect the Red Cable labeled +12VDC to the + of the Battery
- g) Disconnecting the Battery:
Disconnect the Red Cable labeled +12VDC to the + of the Battery
Disconnect the Black Cable labeled -12VDC to the - of the Battery



Output power is conducted. This device must not be sold to the general public.
This device is not approved for use when being powered by the AC power lines either directly, or indirectly, through another device.
Professional installation of this device is required.
The antenna(s) used for this device must be installed to provide a separation distance of at least 20 cm from all persons, and must not be co-located or operating in conjunction with any other antenna or transmitter except in accordance with FCC multi-transmitter product procedures.