MegaCell Installation Guide
Version 1.0

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NOTE:

This equipment has been tested and found to comply with the limits for class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However there is no guarantee that interference will not occur in particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the CPE
- Consult the dealer or an experienced radio technician for help.

Any changes or modification to the CPE not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

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Introduction

The MegaCell System is a platform that allows wireless transmission of data over ISM band frequencies. The MegaCell Link consists of two stand alone transceivers, which is called Customer Premise Element (CPE). The CPE is installed outdoors at line of sight with the remote CPE. Both CPEs use the same frequency to transmit the data. Therefore it is necessary that the both CPEs will be synchronized with each other, means when one side transmits data the other CPE operates as receiver and don't transmit anything till the former finishes its transmission, and at the other direction is the same procedure. In order to determine when each CPE can transmit, one of the CPE is configure as a Master CPE, and the other CPE is configured as Slave CPE. The Slave CPE, which normally operates as receiver, waits for acknowledge from the Master CPE, to Transmit.

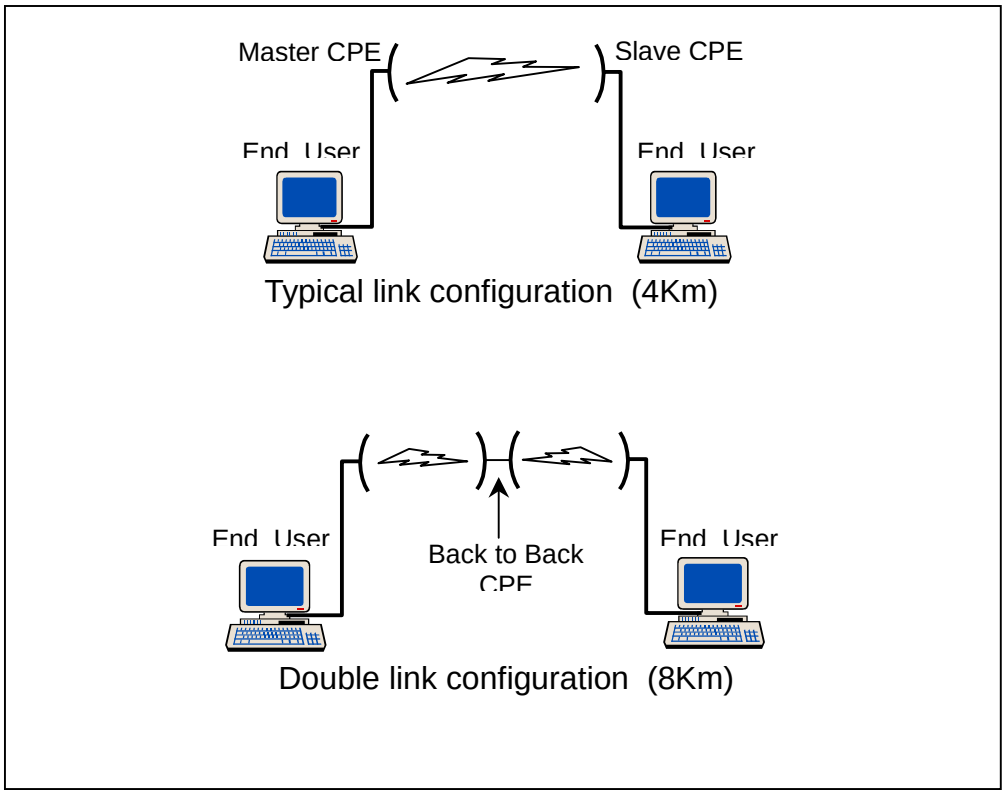

Figure 1. MegaCell Links configuration

The End user Interface is a 10BASET, that can be connected to the user workstation or to any network element that have a 10BASET interface. The CPE can handle up to 50 Mac Address at time at each side of the link. The available data bandwidth is separate between the users by their use requires. The Maximum range of single CPE link can reach till 4Km. In double Link configuration (using back to back CPE configuration) the range is doubled to 8Km.

This document contains instructions for installation of the CPE. The document is arranged in the logical order that would normally be used for installation of these units. The system specifications are included at the end of the document.

Preparing for installation

Unpacking

> Caution: When handling the CPE cards, make sure you are wearing Electrostatic Protection to avoid damage to the cards.

The CPE come as complete unit. Unpack the CPE carefully and make sure that the components enclosed match the order placed with TelesciCOM Ltd.

Enclosed components

TelesciCOM Ltd. packages most of the parts used in the installation.

CPE

The following components are enclosed with each CPE unit:

- CPE box (Outdoor Unit)
- Bracket for attaching CPE to a pole, including 2 screws and nuts.
- 30 meter cable for attaching outdoor and indoor unit.
- Power supply converter (Ac to DC converter)
- Consul cable.

Customer-supplied components

To install the MegaCell, the customer must supply the items listed in this section.

CPE

- Pole for affixing the Outdoor Unit.
- AC power cable.
- Cable for attaching Indoor Unit to the end-user equipment.
- Grounding cable of at least 5 mm circumference.
- Equipment for affixing the cable between the Outdoor and Indoor unit to the building.

The poles supplied must be strong enough to withstand the force of the wind and weather conditions which apply force to the antenna. The force on the pole is calculated by the formula:

$$F = L (3.5S +10)$$

Where

F is the force on the pole (kg units).

L is the length of the pole (m units).

S is the maximum speed of wind (m/s units).

Required tools

To install the MegaCell unit, the installer must supply the following tools:

- A crimper for attaching the RJ-45 plug
- A flat head screwdriver
- Spanner
- cutter

CPE installation

The Master CPE and the User CPE installation procedure is the same, the main difference between them is the firmware, that determines which of the CPEs is the Master and which is the Slave. It is recommended to install first The Master CPE and then the Slave CPE, in that way the line of sight adjustments are more efficient. It is recommended to start with the outdoor installation and than finish with the indoor installation. The CPE has manufacture default settings, usually those setting don't have to be change, however when there is need to change configuration settings it is recommended to carry out those changes before the installation, in laboratory conditions, and then check those changes. Those changes can be made in the field too but this procedure is inconvenience for the technician.

Figure2 shows a schematic diagram of the CPE.

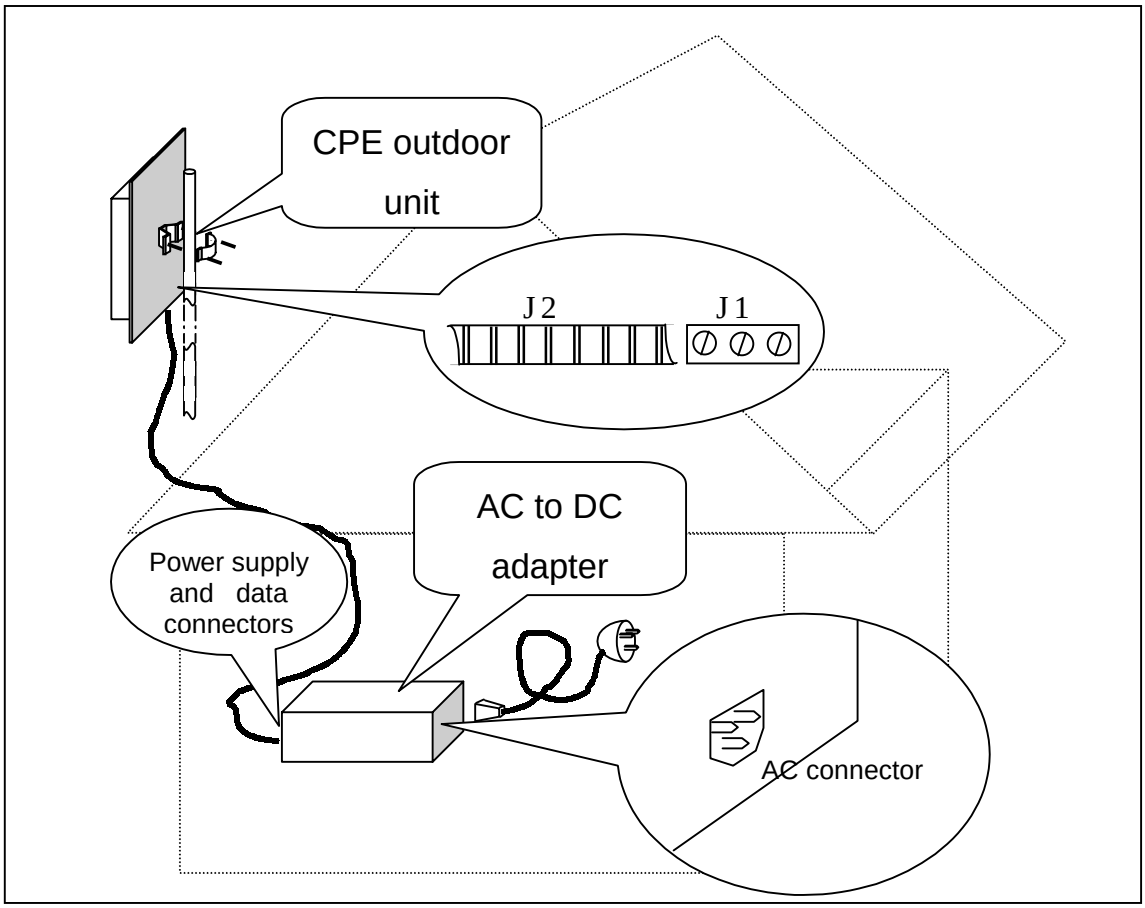

Figure 2. CPE equipment

Installation

The installation procedure is the same for all links configuration. As mentioned at the introduction, normal link has to be consist of Master CPE and Slave CPE. In case of double Link configuration, the two end users CPE has to be Slave CPEs, and the repeaters CPEs has to be Master CPE. One of those Master CPEs has to be configured as Master-Master CPE (which determine the transmission periods for the entire link) and the other as Master-Slave CPE.

Figure 3. CPE front view

The installation procedure is broken down into several sub-procedures according to the order in which they should be performed. To install the CPE, perform the following procedures in the order below.

Unpacking

Unpack the components from the shipping cartons. The components included and prerequisites for installation are outlined in “Preparing for installation,” page7.

Identifying an appropriate location for outdoor installation

Before installing the CPE, you must select the proper location for the CPE.

The following criteria should be taken into account in placing the Outdoor Unit:

- The CPE must be in the line of sight to the other CPE Unit.
- The 10BaseT cable between the Indoor and Outdoor Units cannot be longer than 50 meters.
- The Outdoor Unit is waterproof and insulated, so there is no need to find a sheltered location.
- The Outdoor Unit should be placed at an elevated location.

Performing mechanical installation

Once you have chosen a location for the CPE, you can proceed with the mechanical installation. The mechanical installation in broken down into a number of steps, which should be performed in the order as follows.

Connecting the Outdoor Unit to the pole

To connect the CPE Outdoor Unit to the pole:

1. Install the pole. The pole should conform to the standards outlined in “Customer-supplied components,” page8.
2. Affix the antenna to the pole using the enclosed bracket and screws, as shown in Figure4, page12.
3. Adjust the antenna so that it is facing the direction of the CPEs.

Setting up the cable

Before making any connections, it is advisable to lay out the cable as it will be installed.

To set up the cable:

1. Lay the TelesciCOM cable.

   Make sure that at each end there is at least 1 meter of spare cable for making the connections.

2. Affix the cable to the building using straps spaced at a maximum of every 2 meters.

3. Affix a strap at any location where the cable bends.

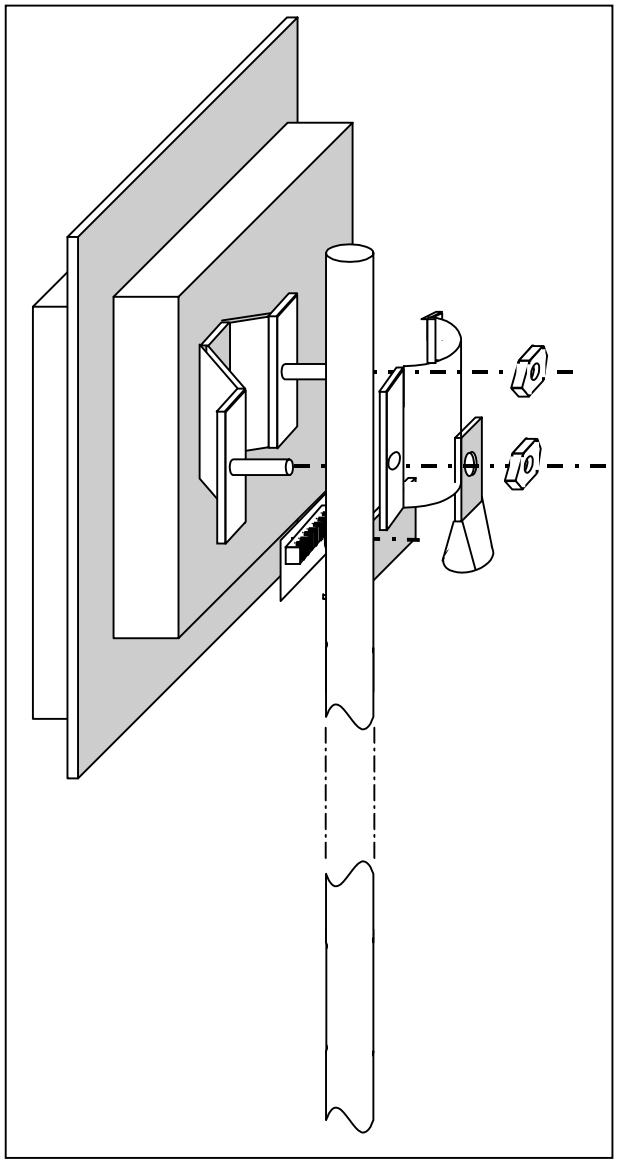

Figure 4.CPE outdoor installation

Connecting the grounding

Ground connection is crucial for reducing lightning and EMC damages. Make sure the ground cable is at least 5 mm thickness.

To connect the grounding cable:

1. Attach the ground cable to the Outdoor Unit as shown in Figure4.
2. Lay out the grounding cable to make sure there is the shortest possible distance between the building and the CPE.
3. Connect the ground cable to the building ground.

Attaching connectors to wiring

The wire connections need to be patched and crimped by the installation technician. These steps should be performed only after the locations of the outdoor and indoor units are determined, and after the cable is lain out.

The CPE has one cable connection between the indoor unit and the outdoor unit . The cable consists of one pair of DC power supply cable and 4 twisted pair cables for data transmission. Figure5, page14 shows the end to end plug connectivity of this cable. Table1, page15 shows the pin connections for the CPE Outdoor Unit end of the cable. The Indoor connection should be set according to Table2, page15 and Table3, page16.

To attach the end connectors to the cable:

1. Attach the CPE side of the cable T2 to J2 as shown in Figure5, page14.

   Make sure that the DC power is connected in the correct polarity.

   Table1, page15 shows the function of the pins in the CPE unit.

   You are now finished installation of the outdoor unit, except for antenna adjustment (“Adjusting the antenna,” page17). Continue this procedure from indoors.

2. Attach the connector to the User side RJ-45 plug, as shown in Figure5, page14.

   Use Table1, page15, Table2, page15 and Table3, page16 to create the proper connections.

Connecting the indoor units

To attach the indoor units:

1. Attach the power supply unit to a stable shelf at least 10 cm above the floor.

   It is recommended to place the power supply near the user equipment.

2. Attach the indoor unit to a stable shelf or cabin, using the enclosed screws

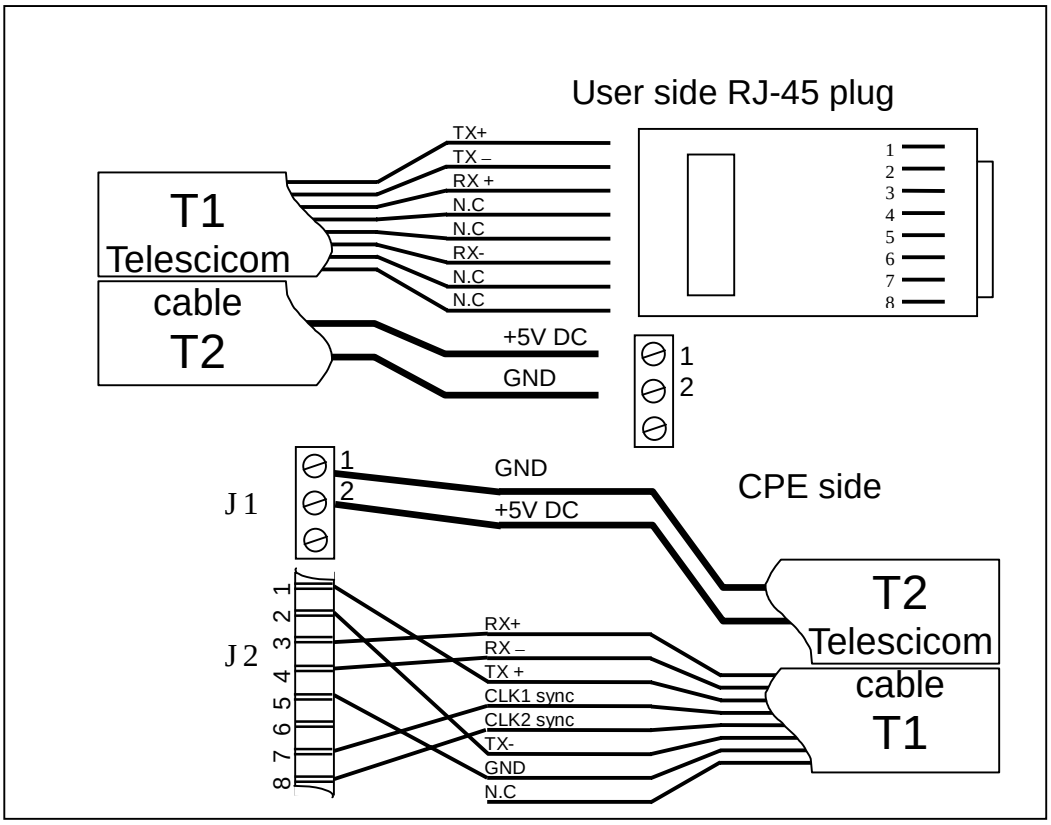

Figure 5 CPE connection wire diagram.

Connecting the Users to the customer's equipment

To connect the users units to the customer's equipment:

1. For DTE units, such as a computer or server, make the cable connections shown in Table2, page15.
2. For MAU interfaces, such as Hub or Ethernet switches, make the cable connections shown in Table3, page16.
3. Use a cable of a maximum of 500 meters to connect the Indoor Unit to the customer equipment.
4. Connect the Indoor Unit to the power supply using a standard AC power supply cable.

Table 1. CPE pin functionality

Pin no	Function
1	RX+ has to be connected to TX+ at user side.
2	RX- has to be connected to TX- at user side.
3	TX+ has to be connected to RX+ at user side.
4	TX- has to be connected to RX- at user side.
5	Digital GND (Used in double link configuration) has to be connected to pin No 5 at the nearby CPE.
7	CLK1 sync (Used in double link configuration) has to be connected to pin 7 at the nearby CPE.
8	CLK2 sync (Used in double link configuration) has to be connected to pin 7 at the nearby CPE.

Table 2. Wire connection between CPE and DTE

Cable	Color	User Interface		CPE	
		Plug	Pin no	Plug	Pin no
T1	Orange	RJ-45	1	J1	3
T1	White/orange	RJ-45	2	J1	4
T1	Blue	RJ-45	3	J1	1
T1	White/green	RJ-45	4	N.C	N.C
T1	Green	RJ-45	5	N.C	N.C
T1	White/blue	RJ-45	6	J1	2
T1	Brown	RJ-45	7	N.C	N.C
T1	White/brown	RJ-45	8	N.C	N.C
T2	Blue	DC plug	1	J2	1
T2	Brown	DC plug	2	J2	2

Table 3. Wire connection between CPE and MAU interface

Cable	Color	User Interface		CPE	
		Plug	Pin no	Plug	Pin no
T1	Blue	RJ-45	1	J1	1
T1	White/blue	RJ-45	2	J1	2
T1	Orange	RJ-45	3	J1	3
T1	White/green	RJ-45	4	N.C	N.C
T1	Green	RJ-45	5	N.C	N.C
T1	White/orange	RJ-45	6	J1	4
T1	Brown	RJ-45	7	N.C	N.C
T1	White/brown	RJ-45	8	N.C	N.C
T2	Blue	DC plug	1	J2	1
T2	Brown	DC plug	2	J2	2

Table 4. Wire connection between CPE Master-Master and CPE Master-User in double link configuration

Cable	Color	CPE Master-Master		CPE Master-User	
		Plug	Pin no	Plug	Pin no
T1	Blue	J1	1	J1	3
T1	White/blue	J1	2	J1	4
T1	Orange	J1	3	J1	1
T1	White/green	J1	4	J1	2
T1	Green	J1	5	J1	5
T1	White/orange	N.C	6	N.C	6
T1	Brown	J1	7	J1	7
T1	White/brown	J1	8	J1	8

If the CPE must be connected to a Patch Panel inside the communication cabin, use Table1, page15, which shows the connector pin functionality at connector J1 in the CPE.

Powering up

To power up:

1. Turn on the power of the CPE.
2. Return to the Outdoor Unit to check if the system is functioning properly.

   If the cable connection T1 is correct and the indoor unit is connect correctly then the integrity LED should light on. See Table5, page18 shows the LED locations.

Adjusting the antenna

After connecting all the wires and powering up the system, you can adjust the antenna to make sure there is communication between the Base Station and the CPE.

To adjust the antenna:

1. Open the cover of the CPE box so that you can see the indicators shown in Figure6, page18.
2. Loosen the screw which affixes the Outdoor Unit to the pole.
3. Turn the box around the pole to the left until the RF Power Receive (Green LED) flashes slower.
4. Slowly turn the box to the right, until the blinking of the green LED is at the fastest rate.
5. Tighten the screw and the grabbing rings.
6. Close the CPE interface cover.

LED Indicators

The outdoor unit has 3 LEDs with different color as shown in Figure6. Table5 describes the LED indicators.

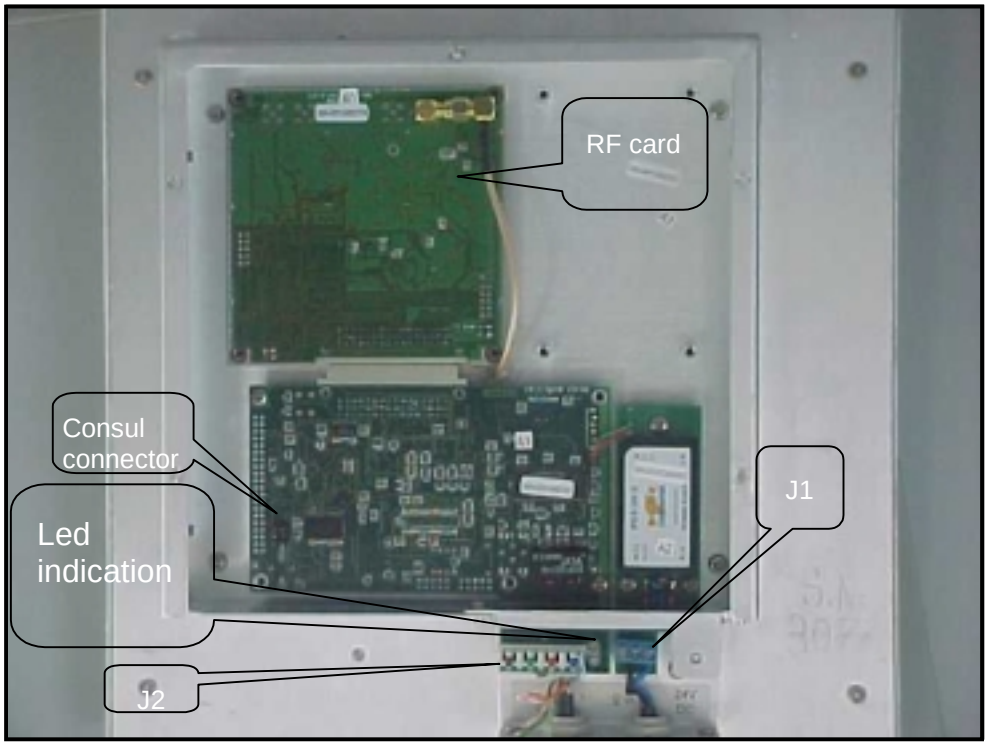

Figure 6. CPE LED locations

Table 5. CPE LED description.

Color	Indication
Red	Indicates power is on and the CPE is operating.
Yellow	Integrity indication: Indicate the CPE senses the Ethernet carrier.
Green	RF receive power: Blinks according to the RF level that the unit receives from the Base Station. As the level is higher, the light blinks faster.

Double link configuration

In case of double link configuration the both ends users CPEs has to be Slave CPE, the repeaters CPEs (see figure 1 back to back CPE) has to be configured as Master-Master CPE and Master-Slave CPE. The determination, which of the CPE has to be Master-Master and Master-Slave, is arbitrary. To configure the CPE follow this steps:

Connect the PC to the CPE.

Run “local control”.

Select from main menu “Option” (see figure 7).

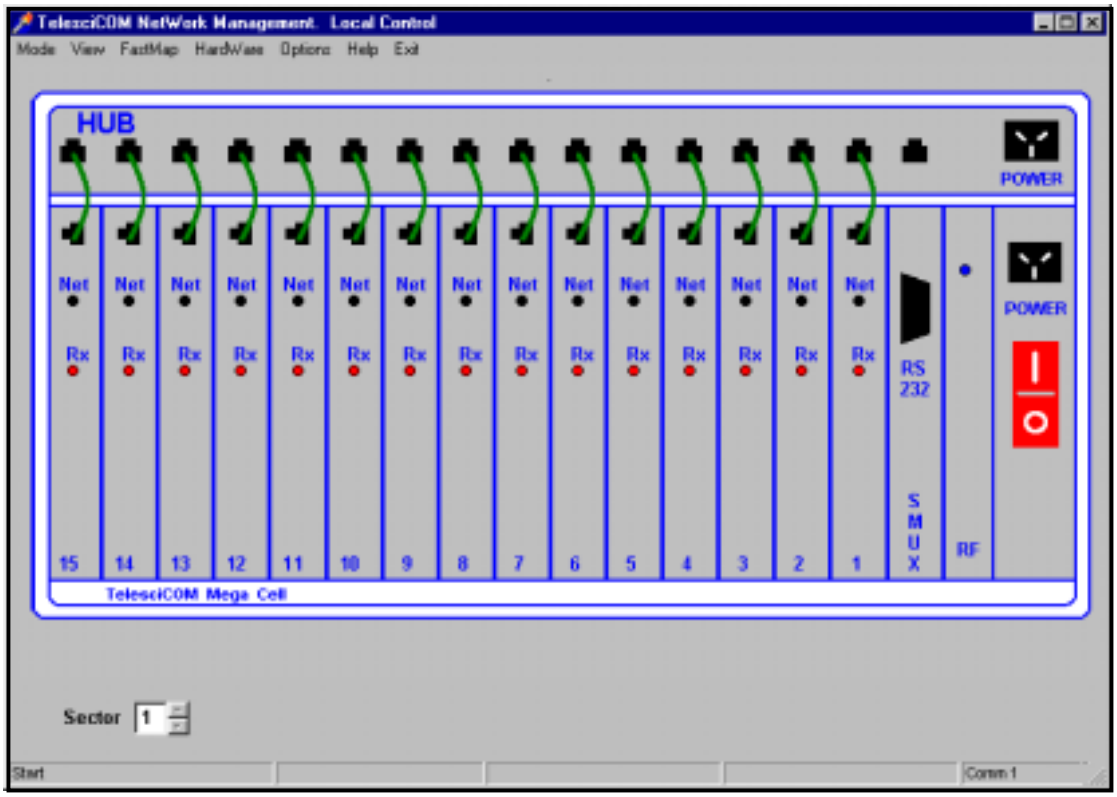

Figure 7. “Local control” main window

From the option dialog box select the “Hardware Settings” tab strip (see figure 8).

Change in the Timing field the wanted value (Master or Slave).

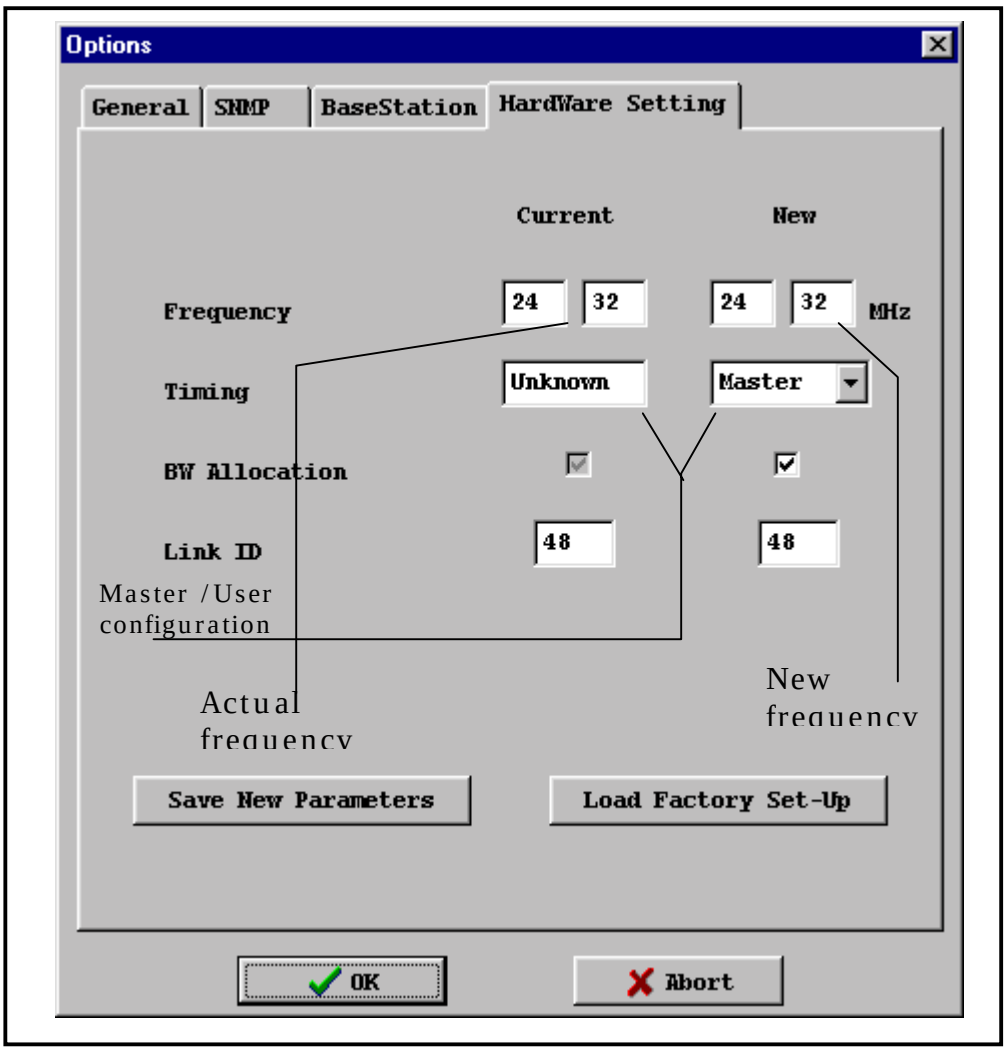

Figure 8. "Option" dialog box

Connecting the PC to the CPE

To connect the PC to the CPE follow this steps:

Open the rear closure of the CPE.

Connect the consul cable to the consul connector (see figure 6)

Connect the other end of the consul cable to the PC.

Power on the CPE and check the red light on the consul cable.

Changing frequency

The CPE operation frequency can be changed by software. The software supplied with the CPE "Local Control" is deal with more details in the "User Manual" document. To change the frequency, follow these steps:

Connect the PC to the CPE (see "connecting the PC to the CPE" Page 19).

Run the "Local control" program (see figure 7 Page 18).

Select "Options" from the main menu.

Select "Hardware Setting" tab strip from the option dialog Box (see figure 8 Page 19).

Enter the wanted frequency (range available 2.411Ghz to 2.472Ghz) at the new frequency edit box.

Click the "OK" button.

CPE Specifications

The CPE unit can be used for any customer configuration as is, without any change of cards or configuration.

The CPE contains the digital interface, the modulation mechanism and the antenna.

The CPE dissembled. If there is any malfunction, the whole unit must be replaced.

Electric features

Table6: Outdoor unit

Unit	Specification
Power supply	24V DC
Digital interface	ANSI/IEEE Std 802.3
Data rate capacity	2Mbps
Temperature range	-40° - 70°
Modulation	direct spread spectrum
Frequency	2.40 – 2.483Ghz
RF Output	6dbm
RF sensitive	-90dbm
Antenna gain	15dbi
Antenna angle	35°

Mechanical features

Table7: Outdoor unit

Unit	Specification
Weight	800gr
Length	289mm
High	289mm
Width	70mm

Wiring and cabling

The wiring and cabling information is distributed in the document according to the needs of the installer during installation.

Unit	Description	Reference
CPE	Indoor unit connection to DTE interface	Table2, page15
CPE	Indoor unit connection to MAU interface	Table3, page16
CPE	Outdoor unit pin connections	Table1, page15