USER MANUAL

FIPLEX REPEATER

FIPLEX BIDIRECTIONAL AMPLIFIER - USER MANUAL

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TECHNICALL SPECIFICATIONS

Mechanical dimensions

CABINET A1
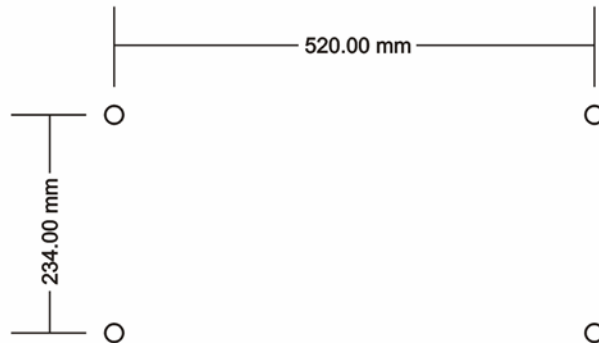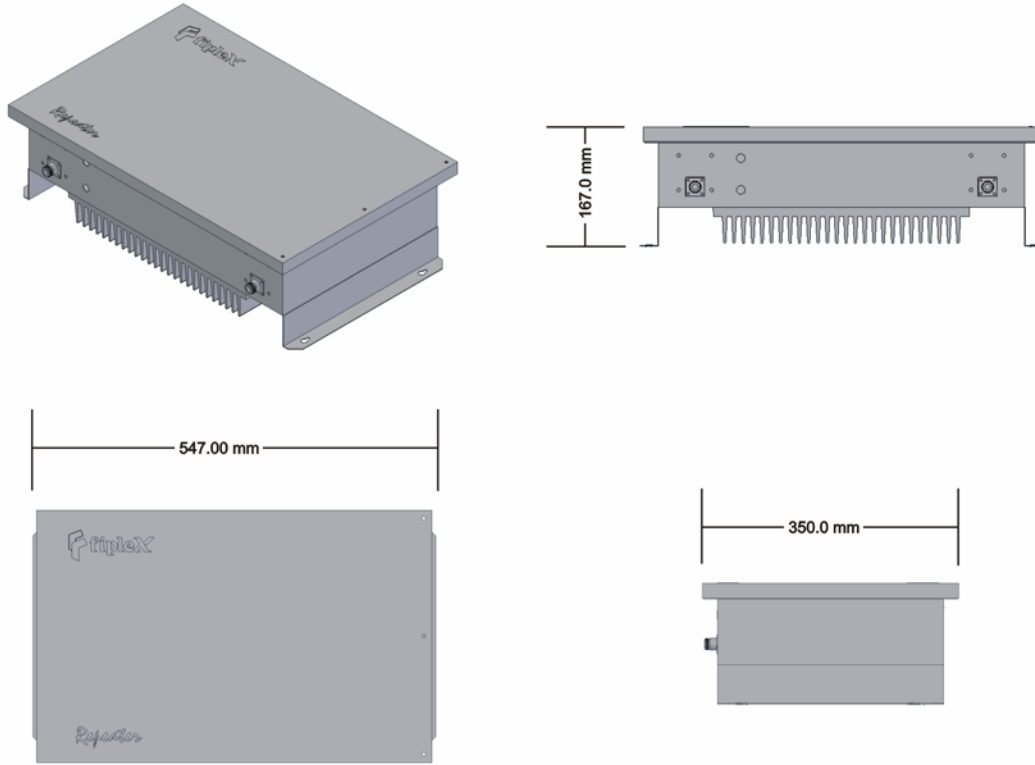
167.0 mm

547.00 mm

350.0 mm

520.00 mm

234.00 mm

Drill pattern for mounting

CABINET B1

595.0 mm

535.0 mm

258.0 mm

556.0 mm

195.0 mm

195.0 mm
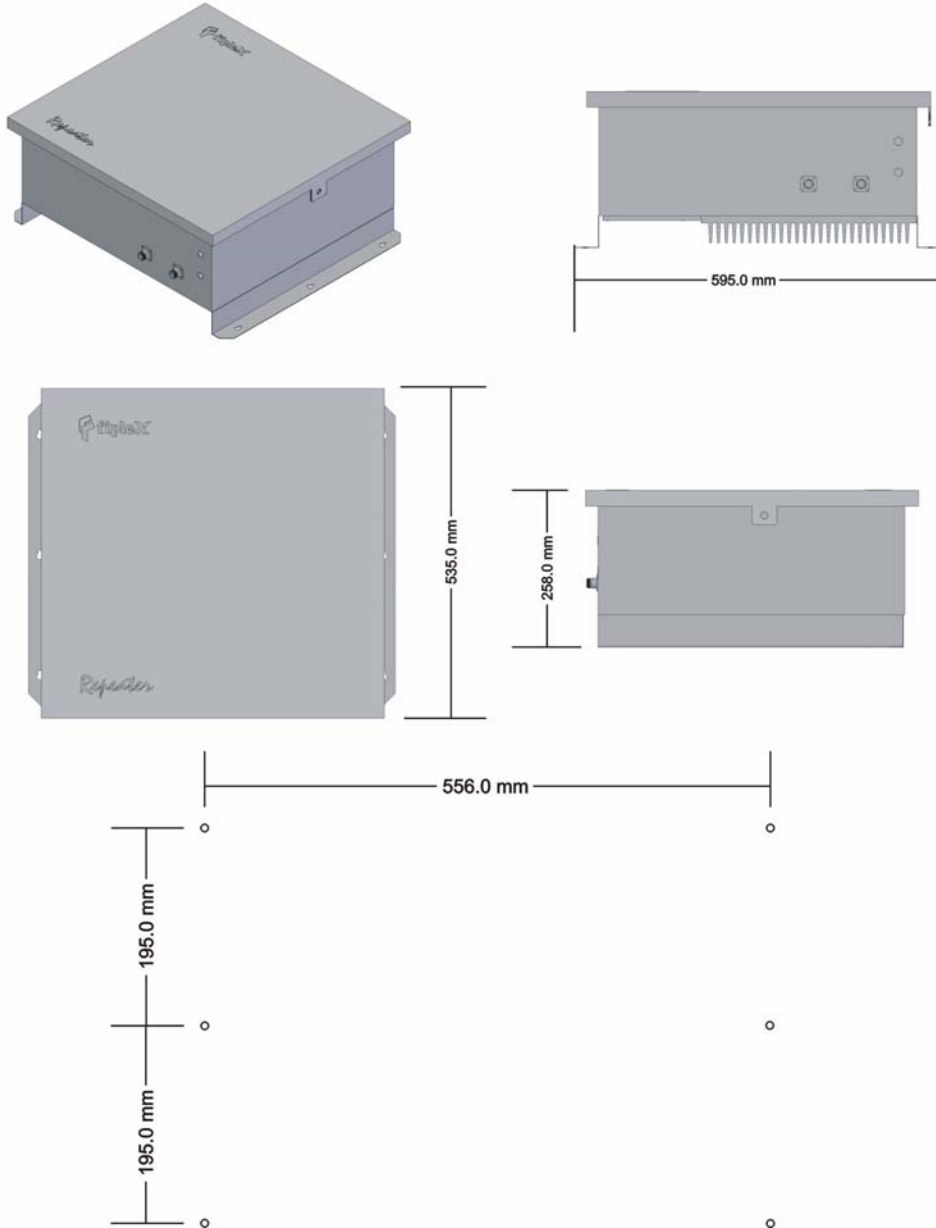
Drill pattern for mounting

INSTALLATION INSTRUCTIONS

Mounting considerations.

BDA is provided in a closed cabinet, with six fixing holes for wall mounting (Mounting brackets are not provided with BDA).

⚠️ BDA should be mounted with input/output connectors facing down in order to preserve water tightness.

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Hot air

Cold air

Natural convection flow should be guaranteed trough heat dissipator in order to keep repeater temperature between safety margins (-30°C to +60°C).
Keep minimum distance of 15 cm between heat dissipator and any object that could avoid free airflow circulation.

Safety

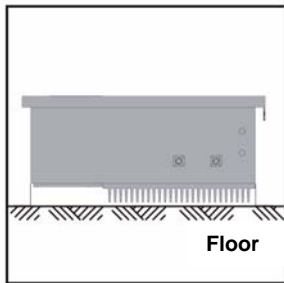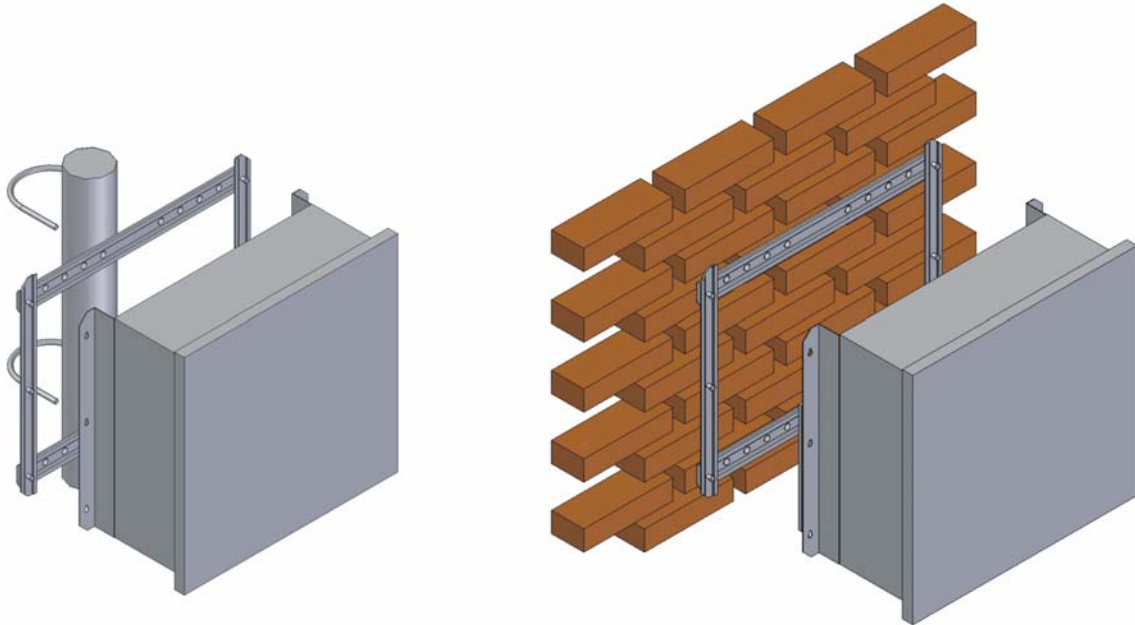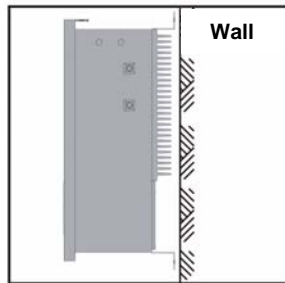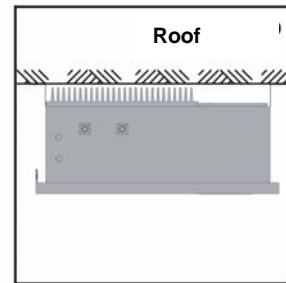Any personnel involved in installation, operation or service of Fiplex repeaters **must** understand and obey the following:

Repeaters are designed to receive and amplify signals from one or more base stations and retransmit the signals to one or more mobile stations, and vice versa. The repeaters must be used exclusively for these purposes and nothing else

- Repeaters supplied from AC voltage must be connected to ground to guarantee safety operational conditions and to preserve the equipment.

- Repeaters generate radio signals and thereby give rise to electromagnetic fields that could be hazardous to the health of any person who is extensively exposed to the signals at the immediate proximity of the repeater antennas.

Coaxial cables insulation is made of polytetrafluoro ethylene, that could gives off small quantities of hydrogen fluoride when heated. Hydrogen fluoride is poisonous. Do not use heating tools when stripping coaxial cables insulation.

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AC Power

THE POWER SUPPLY UNIT CONTAINS DANGEROUS VOLTAGE THAT CAN CAUSE ELECTRIC SHOCK.
DISCONNECT THE MAINS PRIOR TO ANY WORK IN THE REPEATER.
AUTHORIZED SERVICE PERSONNEL ONLY ARE ALLOWED TO SERVICE REPEATERS WHILE THE MAINS IS CONNECTED.

Mains should be 110-220 VAC 50-60 Hz with ground terminal connection (yellow and green cable).

A good ground connection must be done in order to preserve the equipment and system reliability.

A 2 Amps fuse (5 x 20mm) is used as power supply protection against severe failure in mains power.

DANGER
ALWAYS REMOVE MAINS POWER BEFORE CHECKING OR CHANGING FUSES. 120 VAC CAN BE LETHAL.

DC Power

There is an alternative way to power the repeater, this is by means of a DC power source. DC power must be feed to the repeater main board by means of a specific connector (please see figure below). Accessing the repeater from the outside with the DC power cord must be done through the cable gland labeled "BATERY BACKUP".

Nominal DC voltage is specified in the repeater datasheet specifications.

When DC voltage goes under the 80% of the nominal voltage, system will be in BATTERY FAIL status.

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Connectors:
1 - Power Source
2 - Battery Backup
3 - PA Uplink Power
4 - PA Downlink Power
5 - Filters
6 - RC Module
7 - DC Backup RC Module
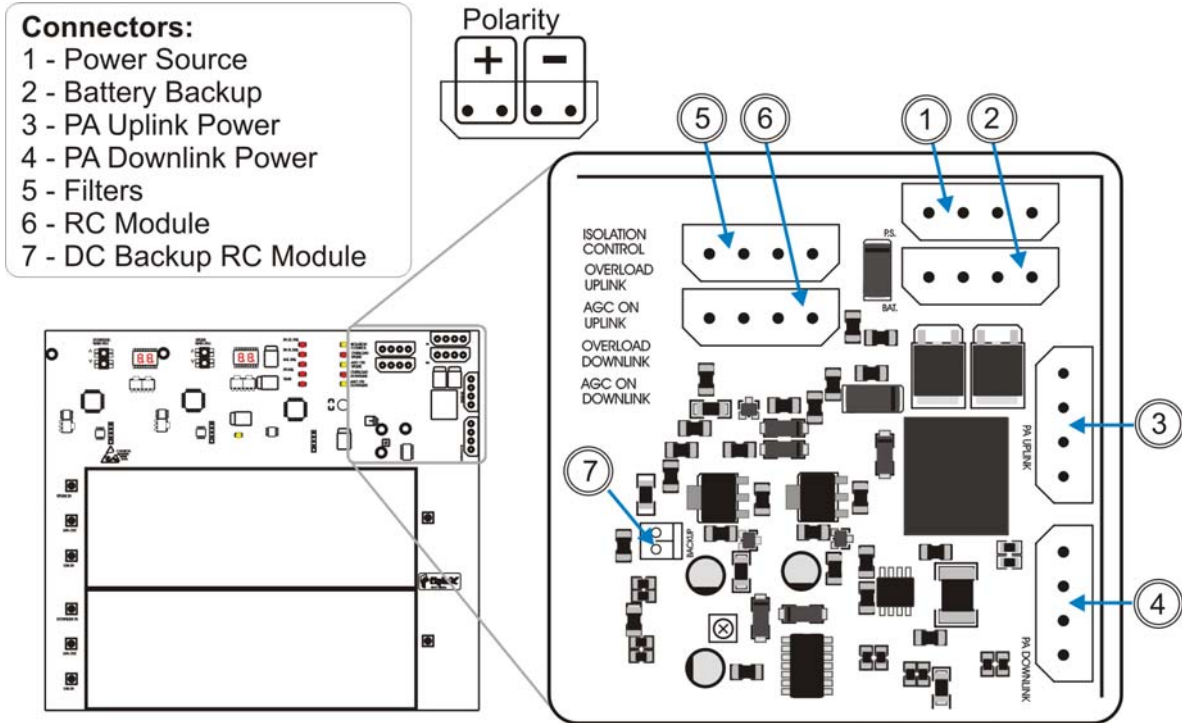
Power connectors – Check polarity before connect

In the presence of AC power, the system switchs automatically from DC power to AC power in order to preserve battery charge.

Battery backup system is not provided with the repeater, nominal voltages and currents should be observed in order to prevent from malfunction. See specification sheet. For further assistance please contact factory.

⚠️ VERIFY THAT CABLE GLAND IS WELL FITTED IN ORDER TO PRESERVE WHEATER TIGHTNESS OF THE REAPETER.

Static electricity means a potential source of permanent damage for essential parts of the repeater, if not handled carefully.

NEVER TOUCH PRINTED CIRCUIT BOARDS OR UNINSULATED CONDUCTIVE SURFACES WITHOUT PROPER ELECTROSTATIC DISCHARGE PROTECTION.

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COMMISSIONING

Repeater powers on when the mains is connected to the AC line, or if it's available, when connected to a DC power source.

No further field calibration or tune up of the repeater is needed to work properly.
Repeaters are factory aligned and calibrated and are designed to retain calibration throughout the life of the product.

Cover of the repeater must be always closed in order to preserve it from the environment and to assure reliability.

When sited outdoors, repeater must not be opened in the following bad weather conditions such as:
- Intense rainfall, snowfall or hail.
- Storm or high wind.
- Extremely low or high temperature.
- High humidity of the air.

Connection

Connect the service antenna to the input/output N type female connector labeled "TO MOBILES".
Connect the donor antenna to the input/output N type female connector labeled "TO BASE".

Radiant system, antennas and coaxial cables to be used with the repeater must be adequate to work properly in the operation frequency bandwidth of the repeater.
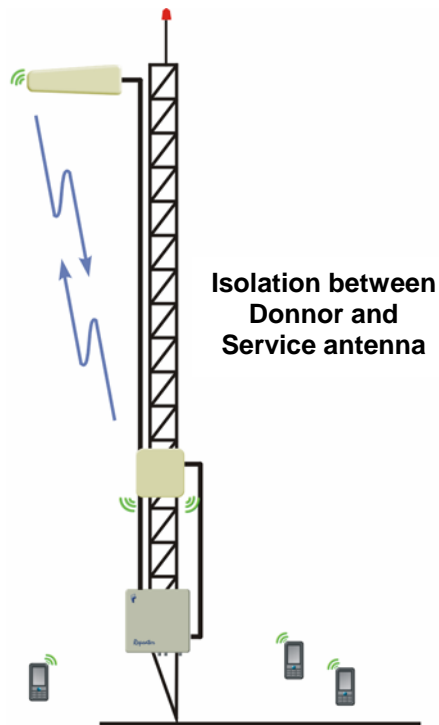At least 18dB return loss value should be observed at the service and donor antennas connectors.

Antenna Isolation

ISOLATION BETWEEN DONOR AND SERVICE ANTENNAS MUST BE 20 dB HIGGER THAN THE MAXIMUM GAIN OF THE REPEATER.

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Isolation between Donnor and Service antenna

If the isolation is less than the amplifier gain plus 20dB safety margin, then positive feedback sufficient for oscillation is present in the system. Such oscillations will overdrive one or both amplifier chains and continuously activate the AGC and overload circuitry, shutting down amplifiers in order to prevent them from damage.

Poor isolation can cause permanent damage to the repeater and automatically voids warranty conditions.

DO NOT POWER THE REPEATER IF "TO BASE" AND "TO MOBILE" CONNECTORS ARE NOT CONNECTED TO A RADIANT SYSTEM OR IF THEY ARE NOT TERMINATED WITH PROPER LOADS.

Every time the repeater is powered on, it starts an automatic antenna isolation control procedure. This procedure takes around 30 seconds, during this time the repeater is not available for traffic, after the procedure is finished two things can occur:

- Good isolation between antennas, in this case isolation control alarm will not be present and the repeater can be operated at maximum gain.

- Poor or bad isolation between antennas, isolation control alarm will be present and the system will set repeater gain to a safe value, the repeater can not be operated at maximum gain.

WHILE ISOLATION CONTROL IS PERFORMED THE PRESENCE OF UPLINK SIGNALS SHOULD BE MINIMIZED. AVOID DE USE OF MOBILE DEVICES NEARBY THE REPEATER DURING ISOLATION CHECK.
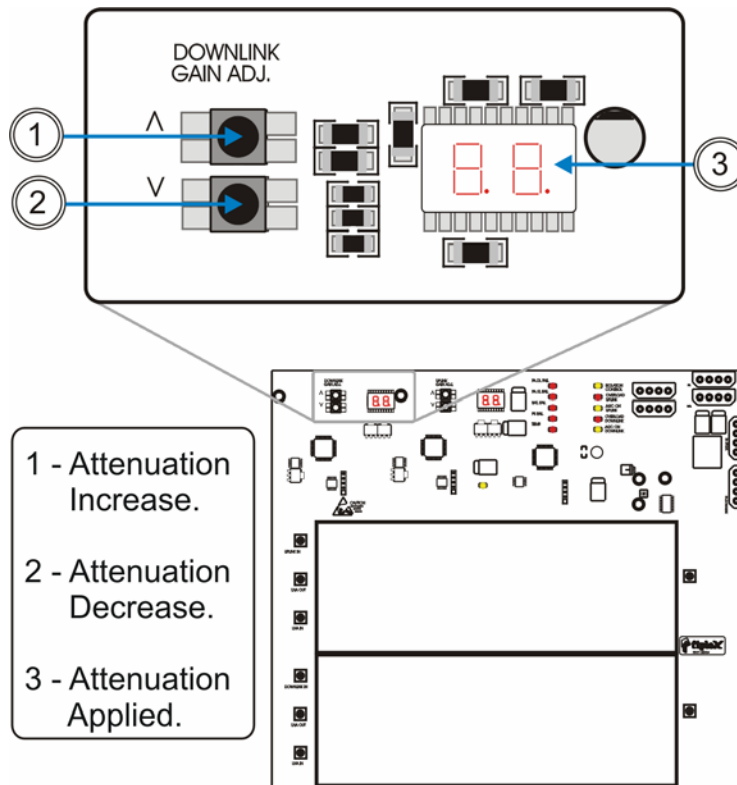
DOWNLINK GAIN SETUP

Manual Gain Setup

Downlink gain control is achieved setting up the desired attenuation value by means of tact switches, value of attenuation is displayed in two seven segments displays located at the right of the attenuation controls (please see figure below).

Attenuation values runs from 0dB (nominal gain condition), up to 25dB (maximum attenuation or minimum gain), in steps of 1dB. If isolation level between antennas is not enough, repeater automatically sets the maximum gain value allowed in order to prevent unwanted oscillations. Under this circumstances user will not be able to set attenuation values that may take the repeater to a non secure operating condition (usually nominal gain is never achieved).

Downlink gain manual control

If "AGC ON" led indicator is on when the repeater starts operating, this means that signal received from the donor site is above minimum signal level required for nominal gain operation so AGC circuitry is active.

Under this condition of operation user should attenuate the gain level of the repeater using DOWN control, decreasing gain until "AGC ON DOWNLINK" indicator turns off.

This operation is recommended in order to release dynamic range to the AGC circuitry.

Automatic Gain Control (AGC)

Automatic Gain Control circuitry is intended to keep repeater's output power at a fixed level when input signals exceed maximum values, avoiding quality signal degradation by intermodulation generation.

If "AGC ON Downlink" led is on this means that signal level from donnor site plus repeater gain produces an output power that is above the maximum composite output power of the repeater. This should not be considered an undesired working condition, far from that; this is the best operating condition because you are getting the maximum composite output power available from the repeater.

Anyway is a good practice (if manual attenuator is set to a value different from zero), to increase attenuation (reducing gain), until AGC led turns off, this operation releases AGC circuitry dynamic range.

Also is a good practice to check signals from donor site to ensure that undesired signals are not being amplified by the repeater, or even desired signal levels are not excessively high taking repeater to an overload condition.

Overload Protection

When the automatic gain control circuit reaches its limit (20 dB), the power amplifier stage is shut down to prevent harmful distortion and potential damage to the repeater. After approximately ten seconds the system checks if overload condition is still present, if this happens amplifiers will remain off. This cyclic check will continue until condition that makes AGC circuitry reach its limits desapears.

Conditions that can cause AGC to reach its limits include the presence of one or more very strong channels, a strong in-band noise source, or amplifier oscillation due to poor antenna isolation.

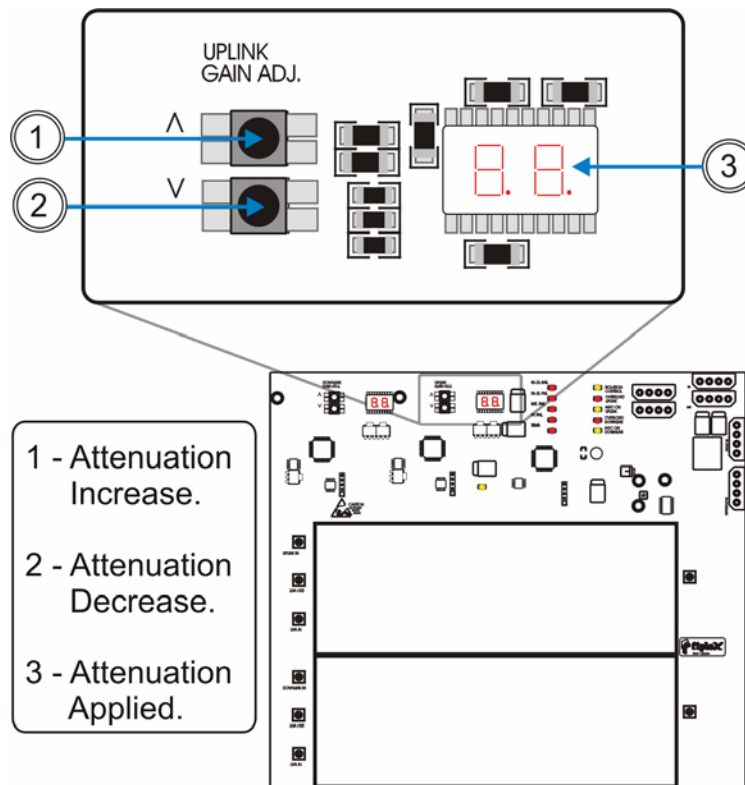When overload protection is active led labeled "OVERLOAD DOWNLINK" is on.

UPLINK GAIN SETUP

Manual Gain Setup

Uplink gain control is achieved setting up the desired attenuation value by means of tact switches, value of attenuation is displayed in two seven segments displays located at the right of the attenuation controls (please see figure below).

Attenuation values runs from 0dB (nominal gain condition), up to 25dB (maximum attenuation or minimum gain), in steps of 1dB. If isolation level between antennas is not enough, repeater automatically sets the maximum gain value allowed in order to prevent unwanted oscillations. Under this circumstances user will not be able to set attenuation values that may take the repeater to a non secure operating condition (usually nominal gain is never achieved).

Uplink gain manual control

Automatic Gain Control (AGC)

Automatic Gain Control circuitry is intended to keep repeater's output power at a fixed level when input signals exceed maximum values, avoiding quality signal degradation by intermodulation generation.

Signals received from mobiles have a different nature that the ones received from donor site or BTS, so it is rare that "AGC ON Uplink" led keeps on, if this occur, repeater gain should be decreased. Is a good practice to set identical gain values in both (uplink and downlink) paths to keep a good link budget balance, so is very recommended to take downlink manual gain value as a reference for the uplink path. This balanced operation mode prevents BTS desensitation or saturation from uplink signals amplified by the repeater.
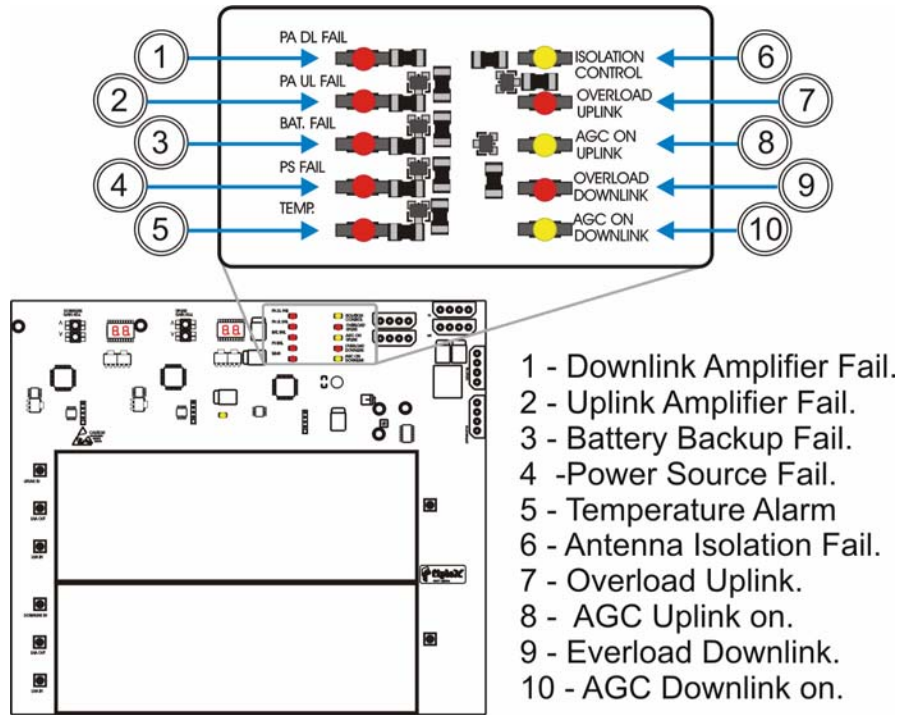
Overload Protection

When the automatic gain control circuit reaches its limit (20 dB), the power amplifier stage is shut down to prevent harmful distortion and potential damage to the repeater. After approximately ten seconds the system checks if overload condition is still present, if this happens amplifiers will remain off. This cyclic check will continue until condition that makes AGC circuitry reach its limit desapears.

Conditions that can cause AGC to reach its limit include the presence of one or more very strong channels, a strong in-band noise source, or amplifier oscillation due to poor antenna isolation.

When overload protection is active led labeled "OVERLOAD UPNLINK" is on.

ALARMS

1 - Downlink Amplifier Fail.
2 - Uplink Amplifier Fail.
3 - Battery Backup Fail.
4 - Power Source Fail.
5 - Temperature Alarm
6 - Antenna Isolation Fail.
7 - Overload Uplink.
8 - AGC Uplink on.
9 - Everload Downlink.
10 - AGC Downlink on.

Alarm led indicators

The following alarms are available for this repeater:

- PA (DL/UL) FAIL: ON condition indicates amplifier failure condition and/or overload.
- TEMP: ON when maximum temperature operation condition is reached.
- BAT FAIL: ON when voltage is below nominal value, no battery conection is indicated as a fail condition.
- PS FAIL: ON indicates power supply failure.
- ISOLATION CONTROL: ON when not enough isolation is achieved. Repeater can not be operated at nominal gain.

REMOTE CONTROL MODULE (RC)
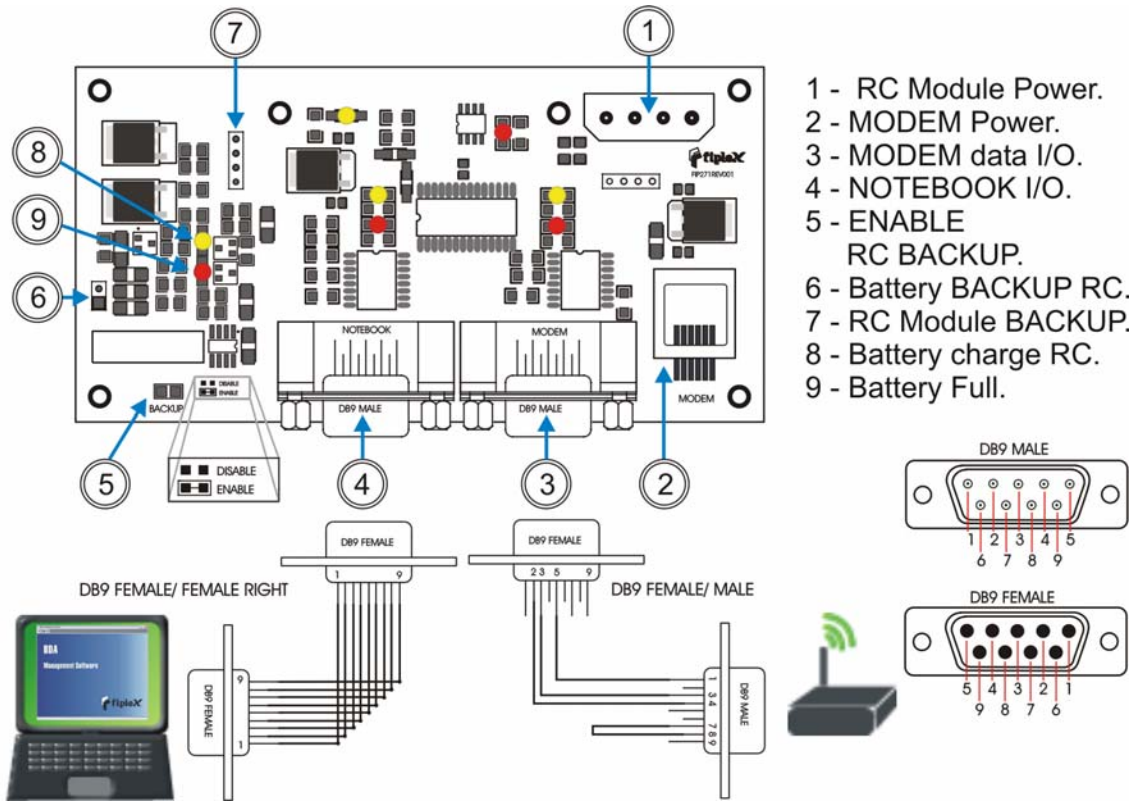
1 - RC Module Power.
2 - MODEM Power.
3 - MODEM data I/O.
4 - NOTEBOOK I/O.
5 - ENABLE
    RC BACKUP.
6 - Battery BACKUP RC.
7 - RC Module BACKUP.
8 - Battery charge RC.
9 - Battery Full.

Remote control module has an RS-232 interface with a D-Sub type 9 posittions male connecto labeled as "NOTEBOOK" that allows a notebook conection by means of a DB9 female straight cable.

Configuration of the repeater can be accomplished using *BDA Local Management Software* (please see BDA LOCAL MANAGEMENT SOFTWARE section for further details).

A modem conection is also available in the same module allowing the repeater to be controlled and configured remotely by means of a wireless conection.

This module is able to work under mains failure condition by means of its own backup battery, allowing the repeater to report this critical condition.
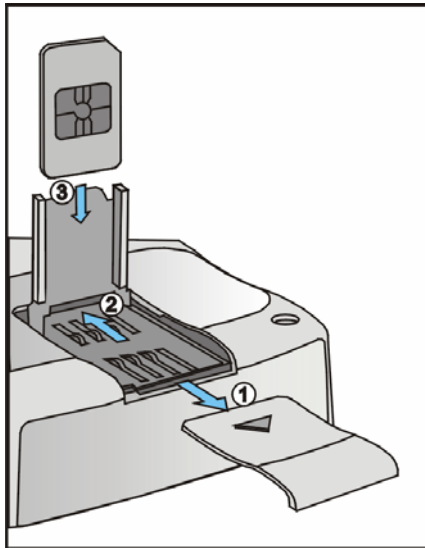
Backup battery must be enabled taking the jumper to the "ENABLE" position (see above figure), factory default condition is disabled.

Battery provides autonomy of approximately 3 hours of continuous operation approximately.

In repeaters with GSM modem (RC-G option) SIM card must be inserted as described in the following picture.

SIM card insertion.

1- Remove SIM card cover.
2- Pull back and lift cardholder.
3- Insert SIM card into cardholder.
4- Push down and backwards cardholder and place cover.

A repeater network could be managed and controlled using *FIPLEX BDA Remote Management Software.* With this software centralized remote alarm monitoring and repeater configuration is possible (see *FIPLEX BDA Remote Management Software* section for further details).
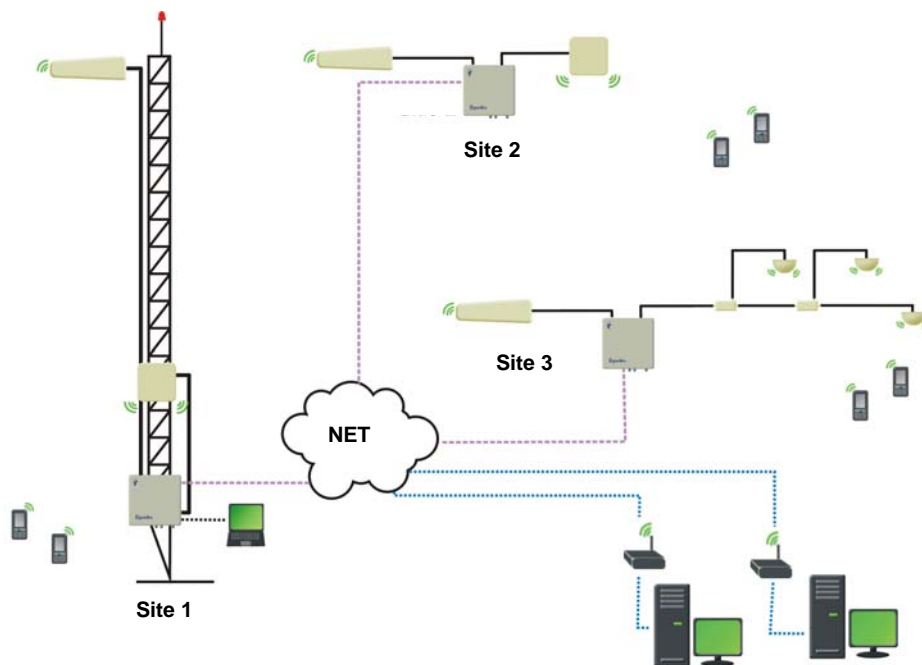
BDA LOCAL MANAGEMENT SOFTWARE

OVERVIEW

The BDA Local Management Software is a PC computer program that allows controlling a BDA repeater locally using a Laptop computer.

INSTALLATION

Follow these steps to install the software:

1) Insert the Installation CD.

2) Execute BDAManagerSetup.exe.

3) Fill the user and organization Information.

4) Choose the folder where the software will be installed. You can use the default folder or modify it by clicking in "Change".

Continue clicking in the Next button until the installation is completed.
You could also receive The BDA Manager software alone which doesn't require to be installed.

OPERATION

1) Execute the BDA Manager software and click in Connect to BDA Icon

2) Choose the communication port to which you intend to connect the BDA, then click in the continue button.

Note: In order to connect to the BDA you should use a straight serial cable with DB9 female connectors on both sides.
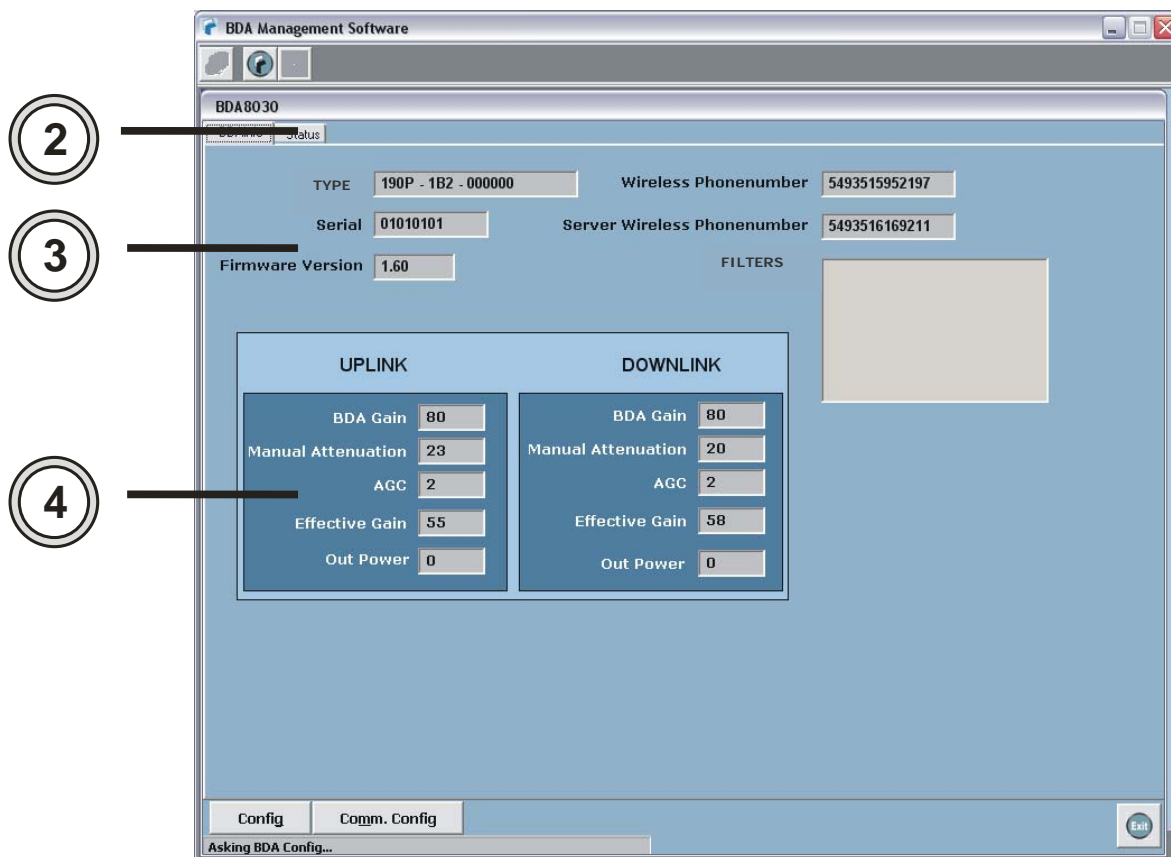
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The software will start communicating automatically with the BDA showing the device and status information.

The information is organized in two tabs (2), you can click in them to switch among the tab sheets.

BDAINFO TAB

In (3) you can watch device specific information as BDA Type/Model, Serial Number, firmware version, the BDA mobile number (Wireless Phone Number) and the Server Phone Number (Server Wireless Phone Number).


In (4) there's information about the RF power chains. You can visualize the BDA Gain, manual attenuation, AGC attenuation level, Effective Gain and Composite Output Power indicated in dbm.

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STATUS TAB

In (5) you can see the alarm status information:

. *Status:* ON or OFF , indicates if they are active or not.

. *Generate Event*: is an option to activate/deactivate if the BDA should generate an automatic message to the Server when the alarm is activated.

. *Configuration:* This option is useful to enable/disable the alarm, allowing doing maintenance on the device.

. *Acknowledge: indicates if the Server acknowledged the alarm*.
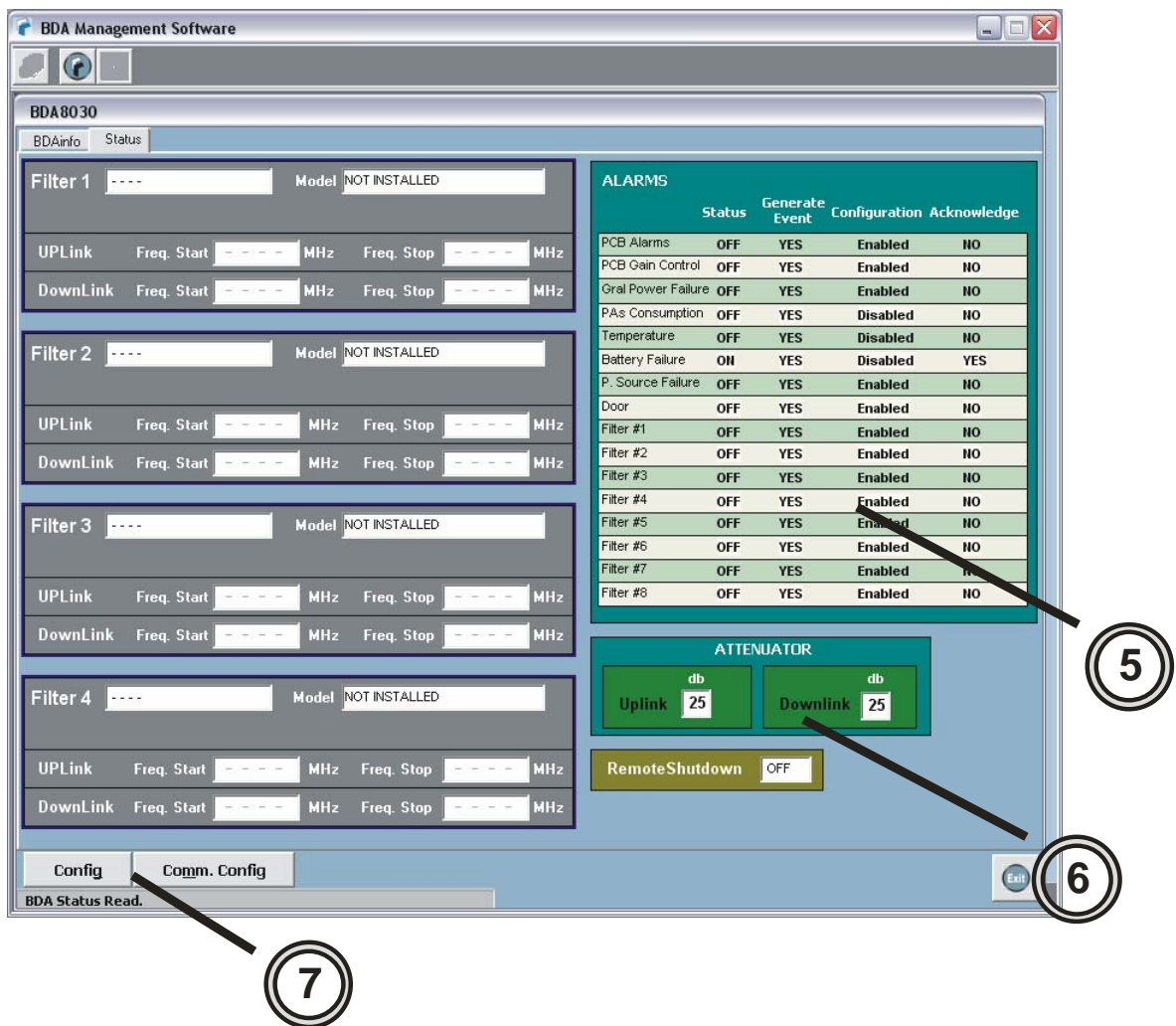
In (6) is shown the manual attenuation information in Uplink and Downlink. You can check if the BDA PA's are intentionally set OFF or ON with in Remote Shutdown field.

In (7) there are 2 buttons.

. *Config.* : once clicked it will open a Configuration TAB that allows to configure the manual attenuation, alarms, remote shutdown and/or Heterodyne filter configurations (if present).

. *Comm. Config*: once clicked it will open a Communication Configuration tab allowing the user to change the BDA Phone Number and the Server Phone Number to be properly linked.

CONFIGURATION TAB

After clicking in the config button, a Configuration TAB will open as seeing in the below image.
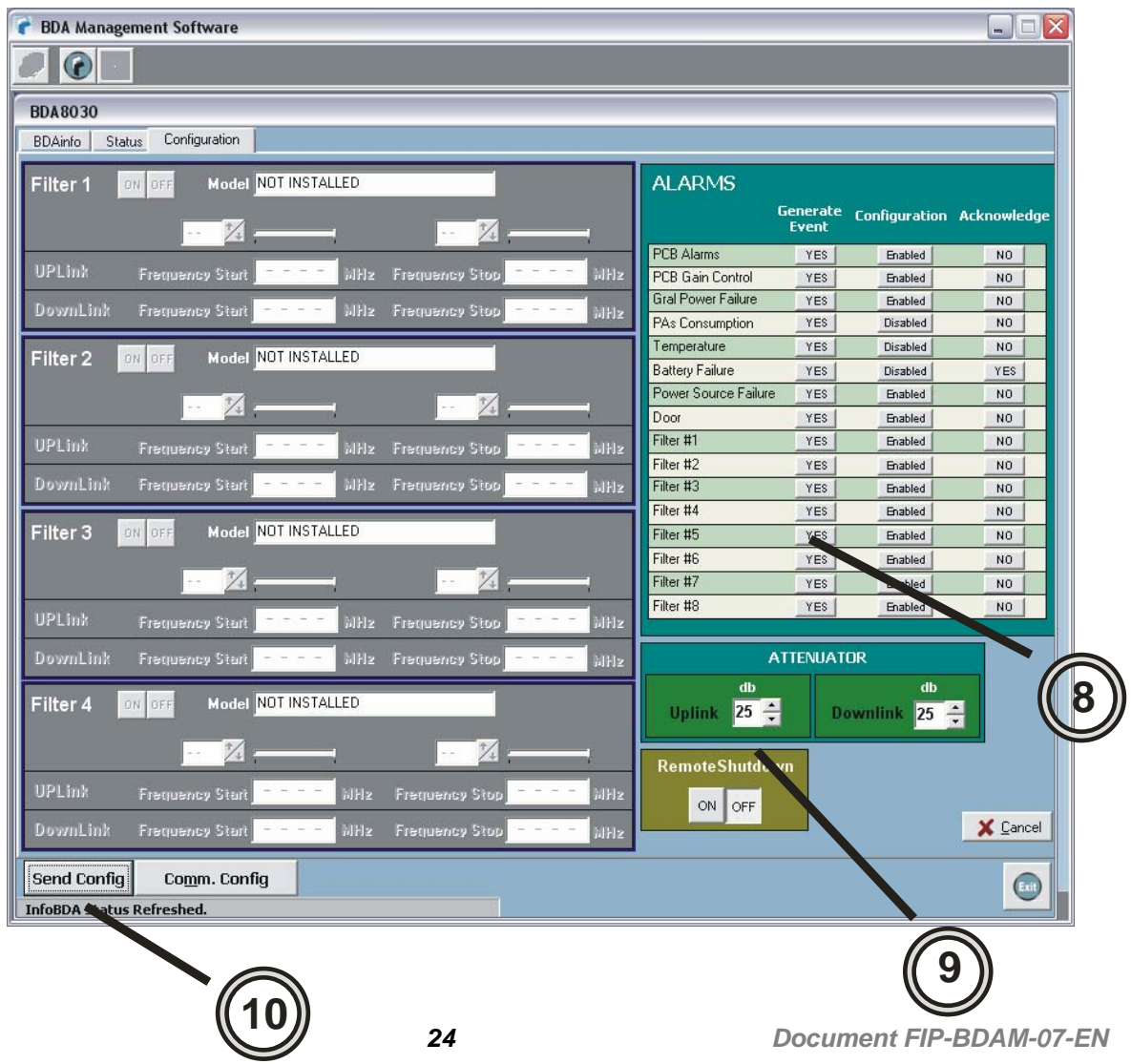
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In (8) the user can modify if an alarm is enabled/disabled, if it will generate and event when activated and if the alarm is acknowledged or not by the server.

The acknowledge field is important when the technician goes to the BDA and solves the problem. For example: The repeater generates and alarm event due to a power failure, the server receives the message and acknowledges it to the BDA. If the technician solves the problem and power is restored then it should set the Power Failure Acknowledge to "NO" in order enable the BDA to send another message if the power fails again. If the acknowledge remains in YES the BDA won't send a message and the OMS won't be noticed of the alarm.

The acknowledge Field should be set to "NO" every time the alarm cause is solved.

In (8) the user can modify the manual attenuation in Uplink and Downlink. It can turn on or off the Power Amplifier if desired.

The user can send the new desired configuration to the BDA by clicking in the "Send Config." Button.

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COMMUNICATION CONFIGURATION

After clicking in Comm. Config you should see a new Tab Sheet named Communication Configuration. There you can edit the Wireless Phone Number which is the telephone number of the modem installed in the BDA, and the Server Wireless Phone number which is the number of the modem installed in the OMS.
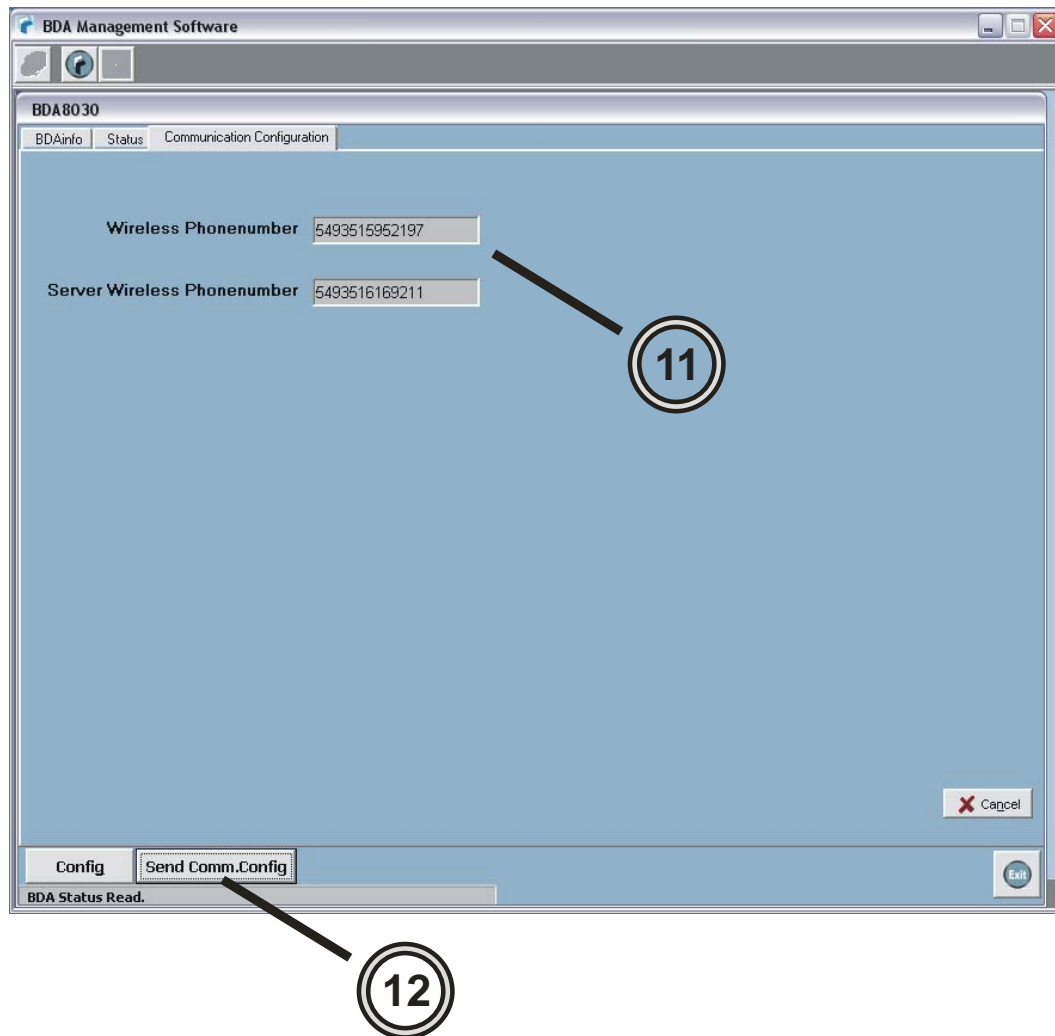
The software admits only international GSM numbering plan.

Once edited you can save the new data in the BDA by clicking in the "Send Comm. Config" button (12).

Click in EXIT to close the Communication Window.

fiplex ®