

# 123 Manual, Configuration Guide for the VULCAN Series LP-V495823a Radios

LPV495823a\_CG\_ENB01W

## INTRODUCTION TO THE LANPRO LP-V495823a RADIO:

The LP-V495823a model of the Vulcan Series Radios by LanPro is especially designed for its use in PtP applications such as *backhaul*. This radio operates in the unlicensed 5 GHz band (4920 MHz – 5875 MHz).

Another characteristic of this radio is that it operates based on OFDM – TDMA technology, whose main benefit, besides its efficiency and its low packet collision behavior is its 54 Mbps transmission speed.

In addition to those characteristics, the LP-V495823a outputs up to 23 dBm of power to the antenna enabling its use in long distance links. This is due to the connection of different types of antennas (operating in 5 GHz band) allowed by the equipment, which adds additional gain to the link quality depending on the antenna used. Each radio is powered via PoE injector (Do not use other equipment in the PoE circuit). The network topology is based in a Base Station (BS) - Client (CPE) configuration.

This guide will focus on the configuration of the LP-V495823a used in a PtP link and in the Web management capabilities designed in it.

## CONFIGURATION OF THE LP-V4958A FOR PTP AS A BACKHAUL LINK:

### How to access the LP-V4958a management software?

Once all physical connections are established, the user will be able to access the embedded management software taking the following aspects into account:

- The LP-V495823a radio does not work as a DHCP server, hence the user must configure first a fixed IP Address (in the laptop or PC) and it shall be inside the default IP Address segment of the equipment.
- The radio management software is accessed via WEB, hence the user requires a browser program for HTTP and HTTPS.

These two steps are described in the following paragraphs:

## 1

**Configure a fixed IP in your PC or laptop:** Locate in your PC or laptop the Properties of your Local Area Connection in your network card as shown in **Figure 1**.

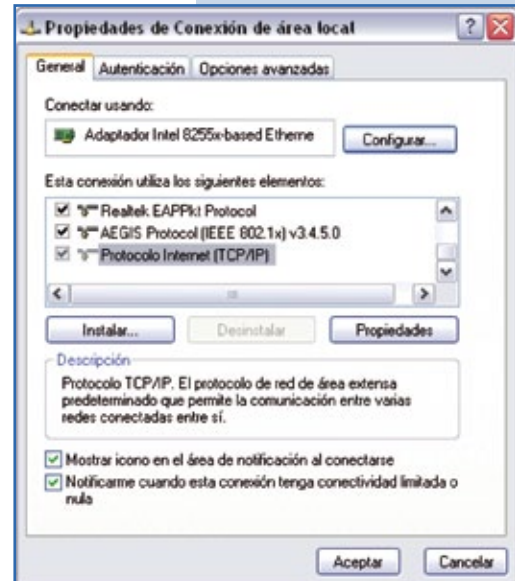


Figure 1

## 2

Select **Internet Protocol (TCP/IP)** option, and then click on **Properties**. A window as in **Figure 2** will pop-up:

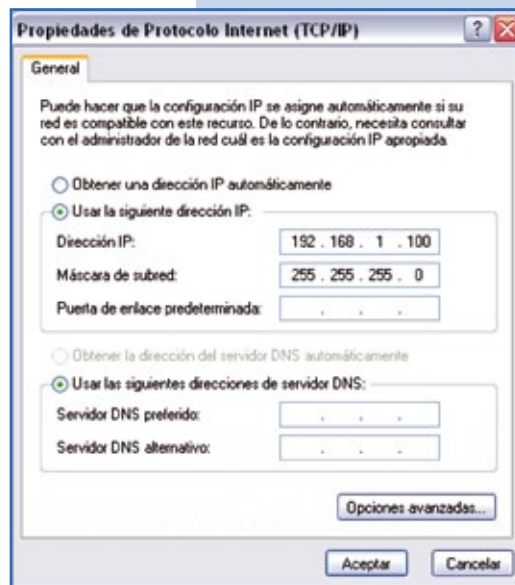


Figure 2

## 3

Note that in **Figure 2** you must enter an IP Address inside the default IP segment of the LP-V495823a (which is 192.168.1.1). In order to do that, please select **Use the following IP address**, and then enter one IP Address inside the segment 192.168.1.2 to 192.168.1.254. (Save changes by clicking on the Accept button).

**Enter the management software of the radio via WEB (HTTP):** Proceed to open the web browser of your preference and type the default IP address of the LP-V495823a, as shown in **Figure 3**.

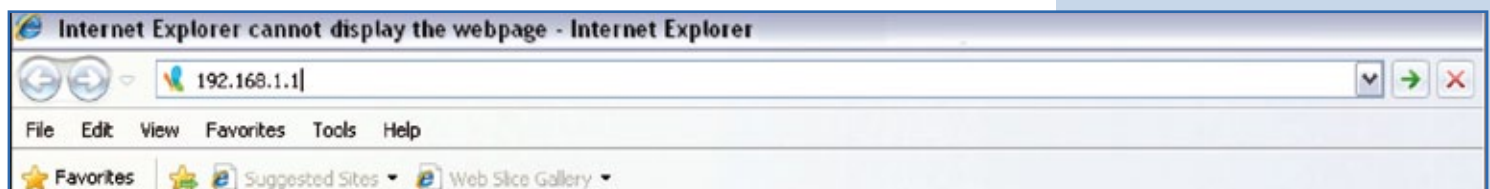


Figure 3

## 4

**NOTE:** It is possible that the browser shows the following message when trying to access the radio through the default IP Address.

This message only warns that the security certificate is not international; hence it is not recognized as valid and prevents you from accessing the page. The reason for this is that the radio generates a proprietary certificate for a secure connection (the password and user are encrypted). In order to manage the equipment, the user must select **Continue to this website (not recommended)**.

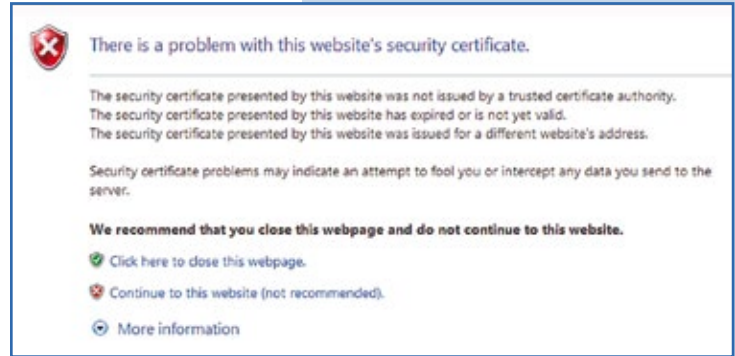


Figure 4

## 5

After this action, the initial page of the LanPro LP-V495823a radio will be displayed in order to type the default username and the password of the equipment. Please see **Figure 5**.

**NOTE:** The default user and password of the LP-V4958a are **ADMIN** and **PASSWORD** respectively.

After you enter the default values, the software will show the settings that must be configured to establish the point to point link.

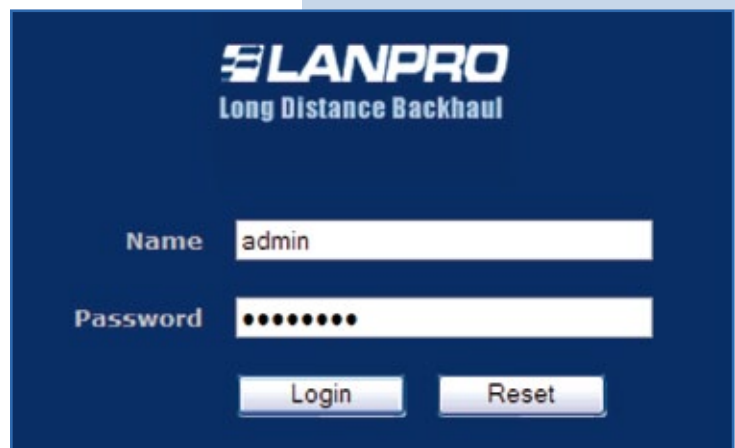


Figure 5

## 6 CONFIGURATION SETTINGS AND INFORMATION OF THE LANPRO LP-V495823a RADIO:

First of all, look at the option **About**. Please see **Figure 6**.

As the name suggests, the window named **About** shows information about the LP-V495823a radio. In **Figure 6** you can see in a red frame the equipment MAC address, which the user must take note of for establishing the point to point link. We will call this MAC address as "MAC Local".

**NOTE:** In order to be able to setup a Point to Point link between two LanPro LP-V495823a radios, the user must take into consideration that one of the radios will identify its paired radio with the MAC address.

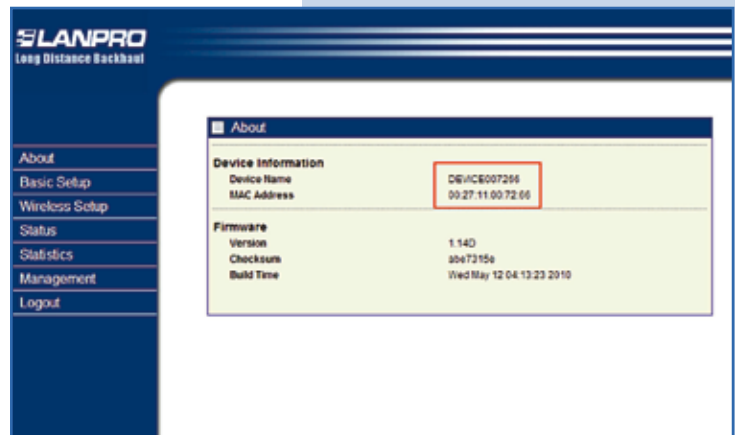


Figure 6

Additionally, the **About** option lets you observe information like the **Device Name** and the most relevant firmware characteristics (E.g.: version).

## 7

Following that, there is an option called **Basic Setup** that shows IP Setup and STP Setup options, as shown in **Figure 7**.

In **Figure 7**, IP configuration of the radio and the Data Rate through the Ethernet interface of the device are shown. In this section, the default **IP Address** and the default **IP Subnet Mask** are framed in a red. The user can change the administration address and mask depending on the requirements. Besides, the DHCP option can be selected as to permit this device to obtain its IP address automatically through a DHCP server (this feature is not recommended as the equipment can obtain different and changing IP Addresses automatically depending on the DHCP configuration parameters making it difficult to access the radio management).

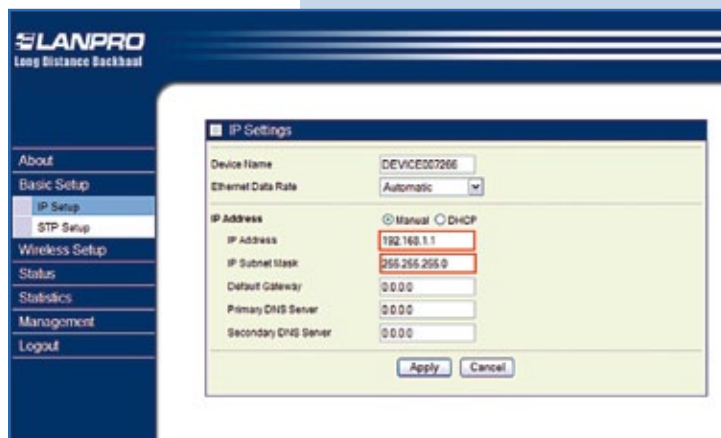


Figure 7

**NOTE:** It is important that both LP-V495823a radios that are to be linked in a PtP configuration have administration IP Addresses different from each other, e.g.: Radio A IP→192.168.1.1, Radio B IP→192.168.1.2. While the radios are linked through their MAC Addresses, you must change the IP's to be able to access (and differentiate) each radio to avoid duplicated IP Addresses inside the LAN network of the user.

**Save the changes of the configuration by clicking on "Apply" button.**

Additionally, extra IP Addresses of the devices can be configured in the network (see **Figure 7**).

**Default Gateway:** The IP Address is established in the device inside the network operating as gateway to other networks (a router, for instance).

**Primary and Secondary DNS Server:** IP Addresses of DNS servers are established for resolution of domain names.

## 8

Finally, in this section you can find **Ethernet Data Rate**, as shown in **Figure 8**.

Note that in **Figure 8** it is possible to select the transmission rate through the Ethernet interface of the LP-V4958a. It is recommended to set this value as automatic; however, there are some options to set the speed depending on the requirements of the user network.

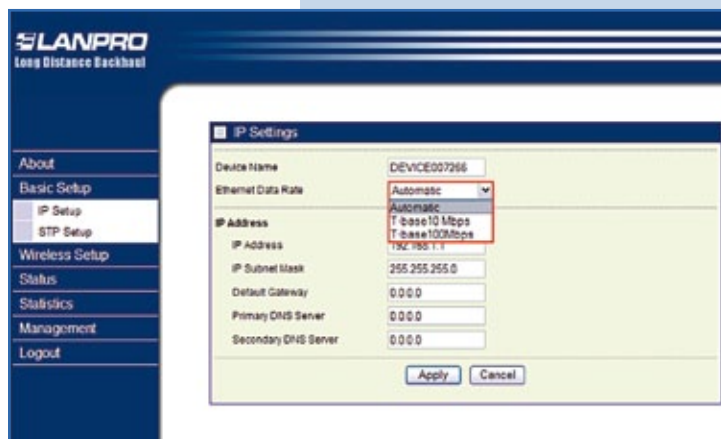


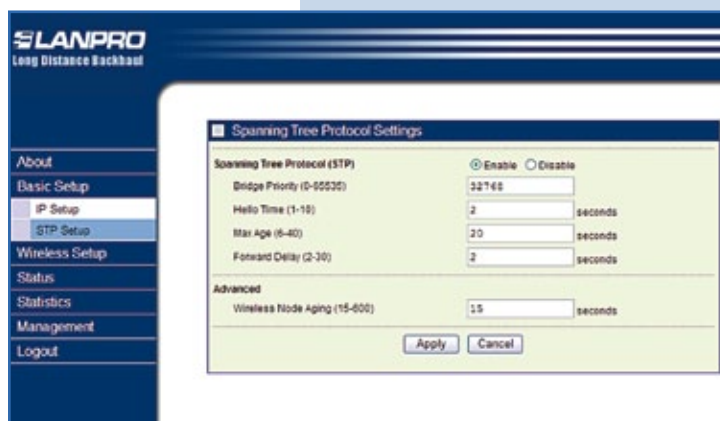
Figure 8

## 9

The following option is **STP Setup** or Spanning Tree Protocol Setup. In this option you can configure the STP protocol parameters, which avoid layer 2 loops in Ethernet networks that can significantly damage the network performance. Enter **STP Setup** option as shown in **Figure 9**.

In **Figure 8** you can see the default settings for STP protocol. A brief explanation of each parameter will be given below:

Figure 9



**Bridge Priority:** The user can configure a priority number between 0 and 65535, which permits to define if this radio works as Root of the STP process. The root device will send link status notifications in the Ethernet network in case a failure occurs. This device will have the lowest priority in comparison to the other equipment in STP domain.

**Hello Time:** This is the time in seconds between each BPDUs (Bridge Protocol Data Unit) sent through the Ethernet port of the radio. The BPDUs are used to inform the devices in the STP domain if there is a change affecting the network. Time is set in 2 seconds by default, but the user can choose between 1 and 10 seconds.

**Max Age:** This parameter is a counter that defines the maximum time that will elapse before the radio saves the information about a BPDUs received in the Ethernet port. This time is 20 seconds by default, but the user can set it between 6 and 40 seconds.

**Forward Delay:** Time the radio consumes when is in "listening" and "learning" mode in the Ethernet network. It is 2 seconds by default, but the user can change this value between 2 and 30 seconds.

**Wireless Node Aging:** This parameter is similar to **Max Age**, but it only works for the wireless interface of the radio (**Max Age** is for Ethernet port). It varies between 15 and 160 seconds.

## 10

The following option available comprises the configuration of the LP-V495823a wireless settings. To access these settings, enter **Wireless Setup** and the screen shown in **Figure 10** will be displayed.

In **Figure 10** you can observe different configuration settings. **Radio Frequency (RF)** must be **enabled** in order to activate the wireless interface of the radio. Otherwise disable it.

Figure 10





**Remote MAC Address** option is of great importance to establish the radio link. In this option the user will enter the MAC address of the remote device used to establish the radio link.

Do not forget that **Figure 6** shows the radio information that includes the MAC Address of this device (address defined as MAC Local). Similarly, the remote radio has an associated MAC address that can be also observed in **About** option, which will be named Remote MAC. The idea is to enter the Remote MAC Address in the corresponding box.

Likewise, if the user later works with the remote radio, he shall enter the local radio MAC Address in the **Remote MAC Address** box (in this example it is 00:27:11:00:72:66 which is the local MAC Address).

## 11

Other configuration settings are presented below:

Security configuration for wireless channel cipher of the radio link between the two LP-V495823a radios: To configure these settings you must define first the cipher type by selecting the Cipher option, as shown in **Figure 11**. As shown in Figure 10, the cipher type may be:

1. **NONE**: Not recommended, because the channel would be open (exposed) to any wireless client in "listening" mode.
2. **WEP**: Basic security protocol for wireless networks.
3. **WAP2 (AES 128 bits)**: Robust security protocol for wireless networks (recommended).

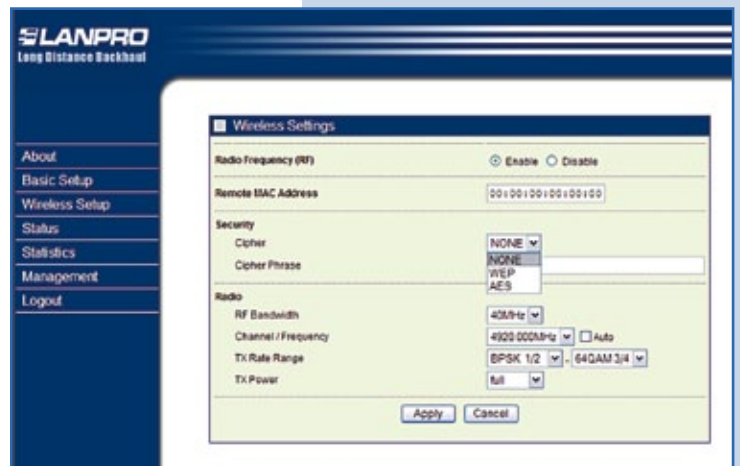


Figure 11

In case the user selects option 2 or 3, a shared phrase must be defined to encode the data through the point to point radio link between the LP-V495823a. This phrase is selected according to the user requirements and it must be entered in the **Cipher Phrase** box.

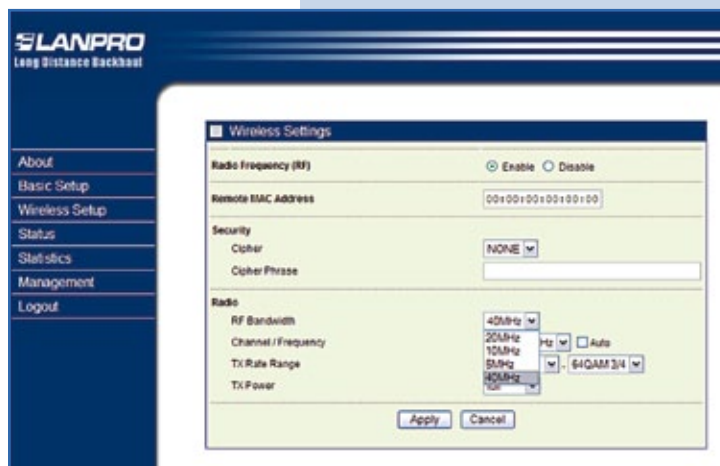
**NOTE:** It is very important that both the cipher type and the cipher phrase are the same in the two radios in point to point link. If any of these parameters is not the same, the link will NOT be established.

## 12

Now we have the radio frequency, power, and transmission rate options of the radio. **Figure 11** shows the first parameter that must be considered for the transmission channel configuration. This parameter is **RF Bandwidth**. See **Figure 12**.

As seen in the figure above, the options list shows four (4) different bandwidth values selected by the user.

Figure 12



**NOTE:** The bandwidth in radio frequency is the transmission channel width in the radio spectrum. The higher the bandwidth, the more information that can be transmitted because more subcarriers can be added in the transmission channel; for instance: If the frequency is 5520 MHz (central frequency) and a 40 MHz bandwidth is selected, the transmission channel would range from 5500 MHz and 5540 MHz. In other words:  $5540 \text{ MHz} - 5500 \text{ MHz} = 40 \text{ MHz} = \text{transmission channel bandwidth}$ .

## 13

The following configurable value is the transmission frequency (**Channel / Frequency**). Please see **Figure 13**.

In the figure above there are different frequencies in which the LP-V495823a can operate. This frequency was previously called central frequency. The selection of the proper frequency depends on its availability; in other words, this frequency has to be unique in the geographical area covered by the PtP link in order to avoid interference problems.

The best manner to select the proper frequency is with a frequency survey in field through a spectrometry study.

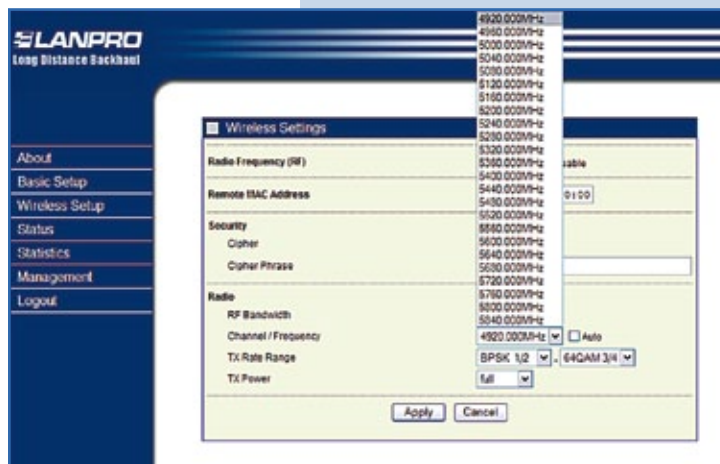


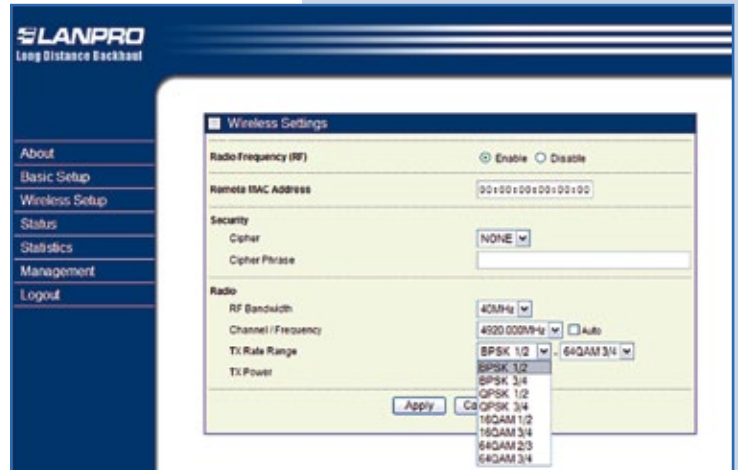
Figure 13

14

The next value is TX Rate Range. Please see **Figure 14**.

In **Figure 14** the transmission rate range is expressed according to the type of modulation to be used. This is because the amount of information you want to transmit is directly related to the type of modulation to be used in the carrier signals comprising the transmission channel.

Figure 14



The relationship between the bit rate sent and the type of modulation exists because this defines the number of states the modulating signal can modulate in phase to the carrier signal. In other words, if the carrier signal can modulate in a higher number of states, the bigger will be the amount of information that can be transmitted using the same bandwidth. This relationship is defined in the following chart:

Type of modulation	Transmission rate
64QAM	Up to 54 Mbps
16QAM	Up to 36 Mbps
QPSK	Up to 18 Mbps
BPSK	Up to 6 Mbps

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**NOTE:** It is important for the user to consider that the effectiveness of the type of modulation in data transmission is directly related to the quality of the radio link. A higher transmission rate can be obtained with the use of more sophisticated modulations (16QAM or 64QAM, for instance). However, this type of modulation is very sensitive to noise and interference, therefore the quality of the radio link is not optimal. This does not occur with lower modulations such as QPSK or BPSK, which are more robust to noise and interference, but they also provide a lower transmission rate.

Finally, in this **Wireless Settings** section there is an option for changing the transmitter power. See **Figure 15**.

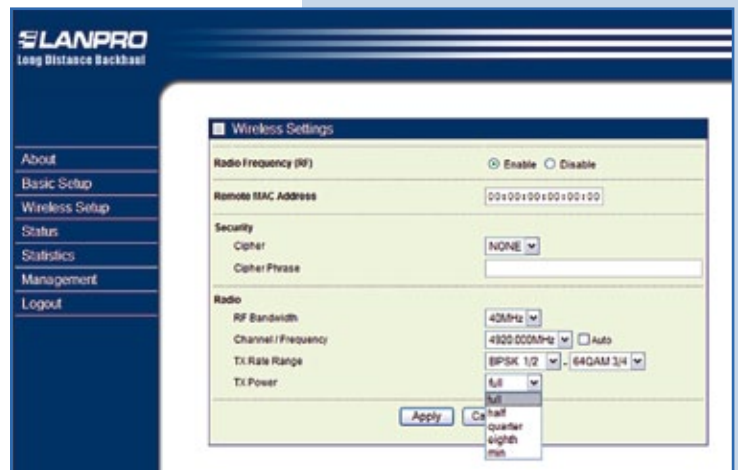


Figure 15

In this figure, there are different transmitter power levels which can be adjusted depending on the client needs and the type of modulation to be used (remember that depending on the type of modulation the quality of the radio link must be higher. Consequently, one of the factors that influence the quality of the radio link is the output power of the transmitter). According to the technical specifications of this device, the radio emits a maximum output power of 30 dBm or 1 W.



## 16

The following figure is an example of the radio configuration in **Wireless Settings** section intended to show how the user can make the adjustments. See **Figure 16**.

Summary of the configuration in **Figure 16**:

- 1) **Remote MAC Address:** The MAC Address of the LP-V495823a remote device for PtP link is entered manually.
- 2) **Cipher:** AES encryption as protocol for transmission channel security is selected in both radios.
- 3) **Cipher Phrase:** A shared phrase for both radios is defined (selection made by the user).
- 4) **RF Bandwidth:** For selecting the broadest bandwidth, 40 MHz.
- 5) **Channel / Frequency:** Transmission frequency for the equipment in PtP link.
- 6) **TX Rate Range:** It covers the whole range possible; in this way the radio adjust the rate depending on the quality of the radio link.
- 7) **Tx Power:** Output power of the signal, set in full (maximum value) = 1 W.

**NOTE:** The configuration shown above may not necessarily be the same as the one applied by the user. This configuration serves is only as an example. An optimal configuration that meets the user requirements depends on a number of factors that determine the quality of the radio link, such as other signals interference, electromagnetic interferences (noise), line of sight between radios, type of data to be transmitted (voice, video, data), etc.

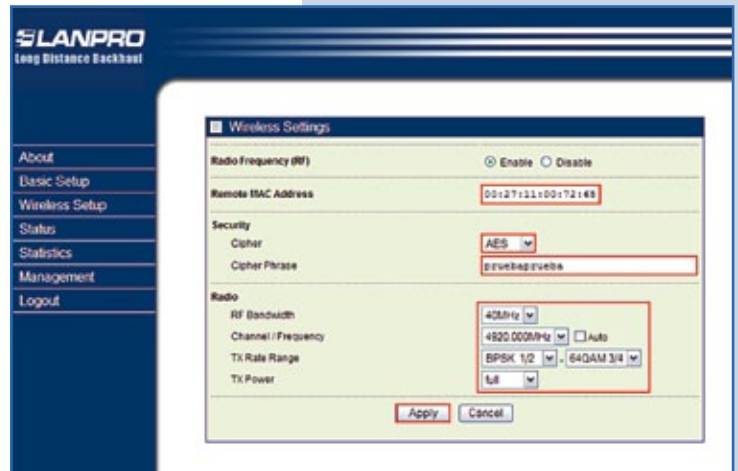


Figure 16

## 17

Remember to save changes with the **Apply** button at the end of the footnote. The following message will be displayed.



Figure 17

Once the required parameters for the radio link have been configured in both LP-V495823a radios, and the alignment and line of sight is obtained, there are diverse options for verifying the equipment connectivity. Two of these options are available for the user in the configuration page of the equipment:

- 1) **Status:** It offers a summary of the power levels in both sides of the radio link and the type of modulation used.
- 2) **Statistics:** It offers a chart with the statistics of the different packages transmitted and received by the radios in both sides of the radio link.

**18**

To observe the values of the first option, select **Status** just below **Wireless Setup**. A screen like **Figure 18** will be displayed.

Among the more significant values of **Figure 18 (Status)** we have:

**MAC Address:** Of the remote radio.

**Channel Info:** Shows the bandwidth and the operation frequency in the following format: AnchoDeBanda@Frecuencia.

**Rx Rate:** Reception rate.

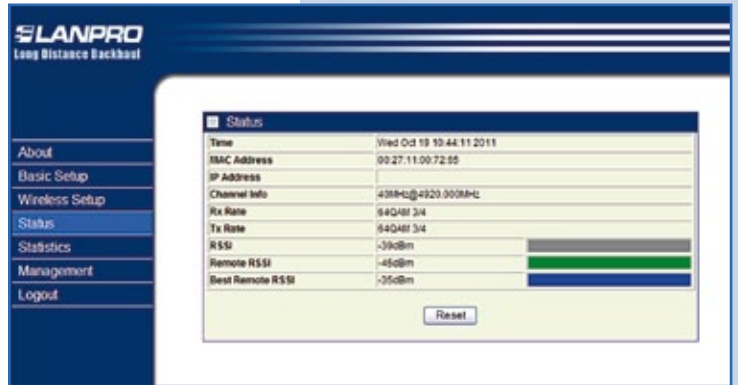
**TX Rate:** Transmission rate.

**RSSI:** The Received Signal Strength Indication is a measure in dBm that indicates the power levels of the received signal. Likewise, the blue bar indicates a maximum power level if it is totally full.

**Remote RSSI:** It is the Received Signal Strength Indication on the remote side.

**Best Remote RSSI:** It is the best value of the Received Signal Strength detected so far on the remote side.

**NOTE:** The Status display refreshes the values automatically; however, the user can refresh these values manually by clicking on Refresh button.



**Figure 18**

**19**

The values of the second option can be observed if you select Statistics just below Status. See **Figure 19**.

The statistics, as the name suggests, show different counters which make possible to see the number of packages sent and received during the radio link connection. The user can choose this option to observe the flow of packages transmitted and received in the LP-V4958a detector radio.

The following are the options for the radio management, which only have effect on the radio you are configuring. It means, they are particular functions to each radio and do not have influence on the radio link operation. For access to these options, select the **Management** tab just below **Statistics**.



**Figure 19**

## 20

By selecting this option, a window with the following parameters the user can configure will display: **Change Password**: It is used to change the default password of the LP-V495823a radio. See **Figure 20** for more details.

Remember that the default password of the LanPro LP-V495823a radio is **PASSWORD**. In case the user wants to change it for one of his preference, follow these steps:

- In **Current Password** box enter the default password of the equipment (the default password is typed under the assumption that the equipment is configured with its factory default values; however, if the radio was configured with a password, type it in this box).
- In **New Password** box enter the new password you want for the equipment.
- In **Repeat New Password** box type the password entered in the box above (**New Password**) to confirm the change.

**NOTE:** The password you define is case-sensitive. Take this into account by the time you change the password.

Finally, there is an option to **Restore** the **Default Password** automatically. Check **Yes** and remember to save changes with **Apply** button.

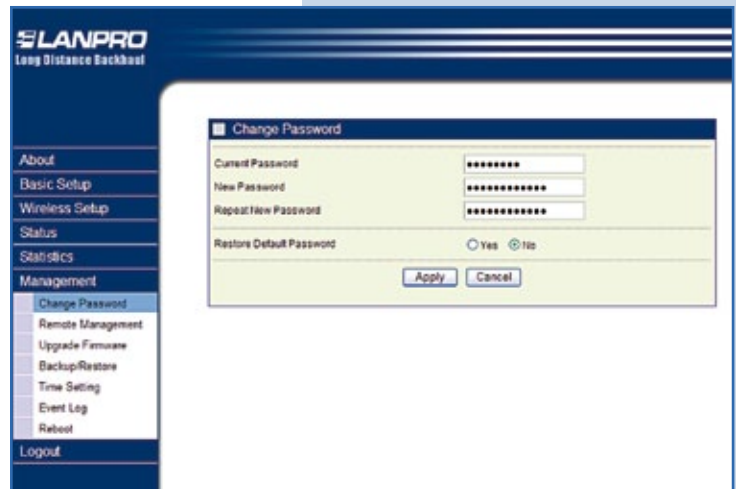


Figure 20

## 21

Another management option is **Remote Management**, which allows the access to the radio configuration in two ways. See **Figure 21**. The figure shows the two ways the radio can be managed without using a browser to access via WEB (HTTPS). These ways are: by means of a secure SSH session or a Simple Network Management Protocol (SNMP).

Both ways are **Enabled** in the corresponding option by default. In case the user wants to disable them for security reasons, he may click on **Disable** in any of them. Additionally, the SNMP has the option of defining the IP Address for a device within the network (a server, for instance) to capture the informative TRAPS issued by the radio. In **IP Address to Receive Traps** type the IP Address of the device where the TRAPS are going to be sent.

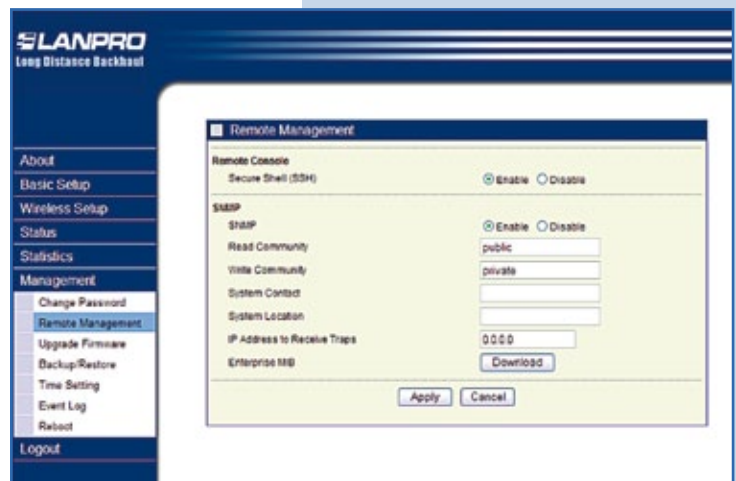


Figure 21

The user also has the option of downloading the proprietary MIBs for this radio in **Download** button of **Enterprise MIB**, in this way a list of the radio MIBs is obtained if the user so requires.

## 22

The following option is to upgrade the LP-V495823a radio firmware. To do so, select Upgrade Firmware as shown in **Figure 22**.

In **Upgrade Firmware** option is the **Browse...** button for locating the file. If the user has an updated firmware for this equipment, he may load it in this page.

The next function is quite important when making changes in the equipment configuration; this is the backup option for the LP-V495823a setup. To access it, the user must select **Backup / Restore Settings** option as shown in **Figure 22**.



Figure 22

A setup copy can be saved in a file by pressing **Backup** button in **Backup current settings to a file** option shown in the figure above. (This is highly recommended in case several changes in the setup are going to be made, in this way the user will have a backup file of the previous setup in case the new one fails).

If the user already has a backup copy of the setup, he may retrieve it with **Retrieve** button in **Retrieve backed up settings from a file** option. Locate the backup setup file with **Browse...** and load this setup with **Retrieve** button.

The last button of this section is **Restore**, in **Restore factory default settings** option. The user must be cautious when selecting this option, because it makes an automatic setup of the radio restoring its factory default values (all changes will be lost and the equipment will have the default configuration in its settings).

## 23

The following option is **Time Setting** for configuring the time zone of the LP-V495823a radio. Select it as shown in **Figure 23**.

In Time Settings there is the option for synchronization of the device date through an NTP server (Network Time Protocol). The user must configure the following information in the boxes:

- **Time Server:** IP Address of NTP server.
- **Time Server Port:** Port for NTP service of the server.

In case the user does not have an NTP server, he can configure a time zone from the list in the **Time Zone**.

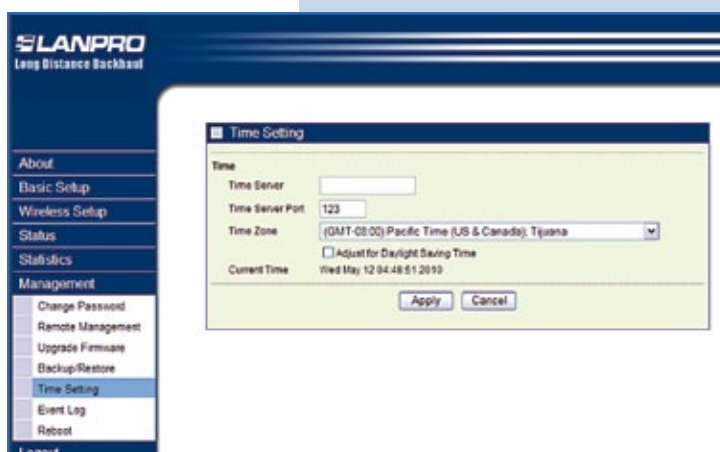


Figure 23

An important tool to detect mistakes in LP-V495823a radios or in the wireless interface of the radio link is **Event Log** option. As the name suggests, with this option the user can get a list of the events occurred in the LP-V4958a when enabling it.

## 24

If the user wants to reboot the equipment for any reason, he can do it with **Reboot** option just below Event log. See **Figure 24**.

By executing **Reboot** option, the user only turns off or turns on the radio. With this action, the changes made in the radio will not be lost.

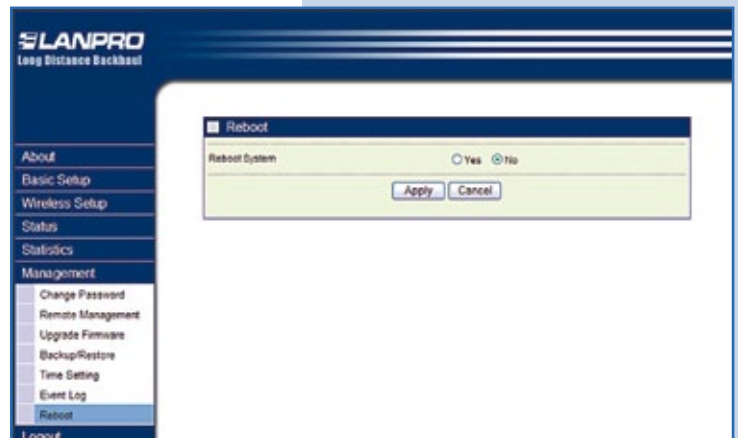


Figure 24

***We hope that the information contained herein is very useful for the user to configure the point to point links with the VULCAN Series LP-V495823a radios by LanPro. To log out of the equipment configuration, please select Logout.***