Wireless connection of an oscilloscope to a PC

Ethernet communication is recommended for installation in a network because it provides fast communication without requiring installation of a driver. This wired link which can convey thousands of data items between several measuring instruments ensures that interchange remains fluid. Furthermore, Ethernet allows you to use multiple means of communication (web, email, FTP, etc.).

If each measuring instrument possesses its own IP (Internet Protocol) address to distinguish it, this type of multiple data transmission is made possible by the "port" connection technology.

In the current context, however, this situation is changing, as computers now communicate with a network via wired links (RJ45) or wireless radio (Wifi) links. The replacement of wired networks is accelerating exponentially, thoroughly changing communication methods. Networks are becoming increasingly complex and difficult to maintain, even though their efficiency and ease of use are essential factors for users.

This Case Study explains the parameter settings necessary to implement wireless communication between an access point and a Scopix® oscilloscope.

Network

Wireless

Access point

Complexity of the network

Cohabitation of all the new wireless technologies is leading to a "melting pot" which boosts the diversity of the Ethernet network but also increases its complexity. Wireless networks are particularly complex. When a fault occurs on a wireless network, it is difficult to identify the origin of the problem (transmitter, receiver or connection), so troubleshooting is often long and tiresome.

The network may be divided into sub-networks. To provide a concrete example, we could connect a Scopix® portable oscilloscope using wired Ethernet and a computer using Wifi on the same sub-network via an access point.

Transmission

ETHERNET

Reception

WiFi™ board

Access point

WiFi™ board

Configuration

1. In this example, the sub-network comprises a computer, an oscilloscope and an access point. The access point enables connection to the internet network (remote) or the company network (local):

    - connect the access point to the company's network using an RJ45 cable.
    - connect your PC to the company's network using an RJ45 cable.
    - as the IP address of the access point in this case is 192.168.0.227, temporarily change the PC's IP address to 192.168.0.1.
    - use your preferred browser (IE, Firefox, Opera, Chrome, Safari) to configure the access point by entering its IP address (192.168.0.227) in the address bar.
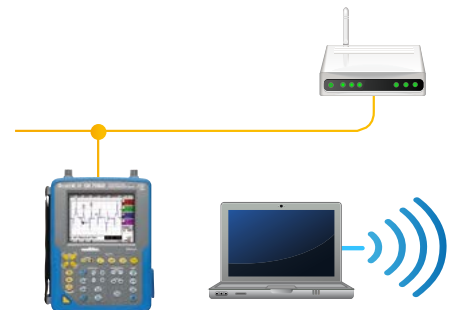
Information	IP Settings	
Setup		
· IP Settings	Access Point Name	metrix1
· Wireless Settings		
· Security Settings	**IP Address**	
· Access Control	DHCP Client	○ Enable ◉ Disable
Management	IP Address	14.3.200.200
· Change Password	IP Subnet Mask	255.255.0.0
· Upgrade Firmware	Default Gateway	0.0.0.0
· Restore Factory Default		
· Station List	Spanning Tree Protocol	○ Enable ◉ Disable
· Reboot AP		
Advanced		Apply Cancel

Example of the setup page for our Netgear access point

By default, the user name to enter is "admin" and the password is "password". These can be modified subsequently.

On the setup page for our access point, go to the "**IP settings**" page if you want to enter the name of the access point (not mandatory but recommended) and change the IP address.

Within a company network or private network, the IP addresses must be compatible. What this means is that the beginning of each corresponding IP address must be identical. Only the end of each address will be different. This is what we call the subnet mask.

If a PC has the address 192.168.0.15 and its mask is 255.255.255.0, it means that it will only be able to communicate with instruments whose addresses start with 192.168.0 (255 means that the value is fixed, while 0 means that it can vary).
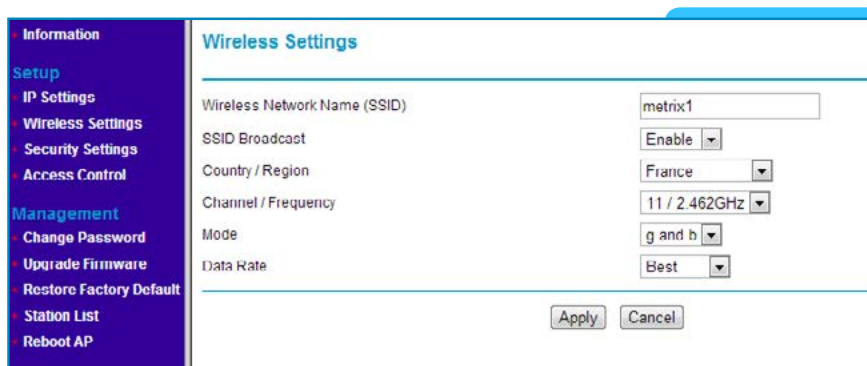
The access point will then no longer be accessible with its default address http://netgearxxxxxx but via http://name entered. To be able to enter a fixed IP address, all you have to do is leave the DHCP parameter set to "Disable". Otherwise the router on the local network will automatically assign an IP address to the access point.

To confirm the modified information, click on **Apply**.

2. On the "**Wireless Settings**" page, configure the access point in the Europe region (for the geographical region), and then enter the same SSID for each of the wireless adapters (metrix1 in this case). It is then possible to broadcast the SSID so that the device is visible when searching for wireless equipment (SSID Broadcast = Enable).

Make sure that the access point is configured in "g and b" mode because it allows any 802.11b wireless adapters to link to it.

Click on the **Apply** button to save the changes.

Note: in the event of poor Wifi performance, you can try to change the channel (Channel/ Frequency) of the access point. Only channels 1, 6 and 13 do not overlap.

3. For optimum application security, configure the "**Security Settings**" page because, by default, data exchanges on wireless networks are not secure. You are strongly advised to set up encryption using a WEP, WPA or, even better, WPA2 key.

4. Lastly, to change the password for the access point, go to the "**Change Password**" page. You are strongly advised to modify the default password.

5. Restore the initial configuration of the PC (IP address).

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Equipment used

The access point is totally configurable, allowing phenomenal modularity for the applications. As a result, all sorts of network architectures can be considered and implemented, such as Ad-Hoc networks, for example, which are widely used in telephony for Bluetooth (point-to-point) applications.

Metrix supplies a Wifi access point which is ideally designed for this type of application: the product reference is HX0090. It links the sub-network to the global network while taking into account the devices connected using Wifi.

Other applications are possible:

It is possible to connect the Scopix® using Wifi via a bridge (not supplied by Metrix) and then to connect the PC to the Wifi.
From there, the oscilloscope and PC are wireless-connected to the sub-network. In this setup, the access point is configured as infrastructure and is automatically recognized by the equipment.

Another application is possible with the HX0090 in Ad-Hoc mode. The PC and the oscilloscope can communicate directly. Ad-hoc networks are wireless networks capable of organizing themselves without a predefined infrastructure. However, there are numerous problems with Ad-Hoc networks, including limited bandwidth, data loss, very limited security, interference, etc.

We propose oscilloscopes with built-in Wifi transmitters in the **SCOPEin@BOX** range:
2 channels 60 MHz MTX162UEW,
2 channels 200 MHz MTX1052CW-PC,
4 channels 200 MHz MTX1054CW-PC.
The configuration of the Wifi module remains identical for all the models.

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