

The objective of this document is to specify the materials required to give a training course of LigoWave. The material considered in this document is for a single team, which is composed of a maximum of 2 participants.

LigoWave equipment:

Item	Equipment	Quantity	Description
1	LigoPTP 5N PRO or LigoPTP 5N UNITY	2	Radio in 5 GHz with external N Connectors
2	PoE (48 Volts)	2	Power supply (PoE) for the radios.

Example for 1 radio:



LigoPTP 5N PRO



LigoPTP 5N UNITY



48V AC-DC PoE

Image 1

Important Note: Is recommended that the LigoWave radios are already upgraded to the last SW version available on the LigoWave website.

LigoWave equipment for Bonding LAB

There is a specific LAB for the Bonding functionality, this LAB could be performed as general demo for all the class or could be performed by 2 teams (4 people) according to the equipment available:

<i>Item</i>	Equipment	Quantity	Description
1	LigoPTP 5N UNITY	2	Radio in 5 GHz with external N Connectors
2	LigoPTP 5N PRO or LigoPTP UNITY	2	Radio in 5 GHz with external N Connectors
3	PoE (48 Volts)	4	Power supply (PoE) for the radios.

RF equipment

<i>Item</i>	Equipment	Quantity	Description
1	80 dB of attenuation	2	The commercial values of attenuators are 10 dB, 20 dB or 30 dB. A mixture of attenuators is required to achieve the 80 dB of attenuation. The attenuator requires N connectors.
2	Coaxial cable	2	The recommended length of the cable is 0.6 meters (2 ft.). The required connector is N Male on both ends.

Example:



Attenuator



Coaxial cable

Network equipment

Item	Equipment	Quantity	Description
1	UTP cable (1.2 meters)	2	Straight UTP cable (TIA/EIA-568-B) of 1.2 meters (4 ft.).
2	UTP cable (6 meters)	2	Straight UTP cable (TIA/EIA-568-B) of 6 meters (20 ft.).
3	VLAN Switch.	1	<p>The students require 3 ports in the VLAN Switch:</p> <ul style="list-style-type: none"> *1 trunk port (1, 2, 10, 20) *1 port as an access with VLAN 2 *1 port as an access with VLAN 10 *1 port as an access with VLAN 20 <p>The switch can be shared with more than 1 team, the UTP cables of 6 meters can be used to share the same switch.</p> <p>The students do not have to worry about the switch configuration, the ports should be already configured.</p>
4	Laptop	2	Each student should have a personal Laptop with administrator rights, Ethernet port, Wi-Fi interface, Java and Flash installed.

Example:



UTP Cable



Switch



Laptop

Important Note: The minimum requirement that the Switch has to comply is the 802.1q standard for VLANs. Another option is to provide Ethernet cards (USB Adaptors) that support the 802.1q standard, for example: StarTech.com USB 3.0 to Gigabit Ethernet NIC Network Adapter - 10/100/1000 Network Adapter.

Classroom facilities

<i>Item</i>	Equipment	Quantity	Description
1	Projector	1	Used by the instructor to teach the class.
2	Whiteboard and markers	1	Used by the instructor to make annotations during the class.
3	Table	1	Used by the students to attend the class.
4	Chair	2	Used by the students to attend the class.
5	Power outlet	4	A power strip could be used to provide the required contacts: *2 for the laptops *3 for the radios *1 for the switch
6	Wireless internet access with a 2.4 GHz AP. The APC 2Mi is recommended.	250 kbps	Is recommended to have a minimum of 250 kbps per team. A backup scenario with 4G Router has to be considered in case of a failure.
7	APC 5Mi	1	This equipment will be used as a backup to provide internet access to the radios.