

# Technical University of Cartagena



**Telecommunications Engineering School**

## **FUNDAMENTALS OF TELEMATICS**

**Laboratory Content 3A. Testing and Validation of  
Wiring**

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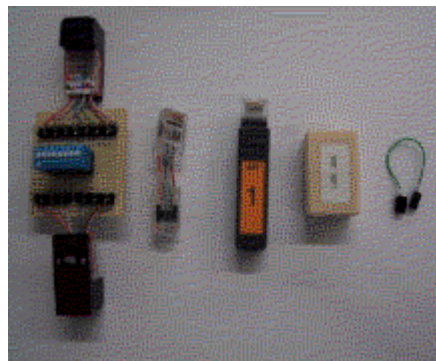
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## 1. Objectives

- Knowledge about the typical faults and the procedures for its diagnosis. Know the basic instrumentation for the determination of faults or malfunction of the wiring.
- Understanding and analyze the operation of a cablemeter device.
- Knowledge about the different performance offered by commercial equipment.
- Know and handle the mechanisms of test in the installation of a structured cabling network.
- Diagnose faulty or damaged cables.
- Determine and locate faults in the wire cables of a structured cabling network.

## 2. Elements

- A cablemeter model “Fluke Cablemeter 620” for LAN networks.
- A conventional digital multimeter.
- A circuit board simulating faults.
- Connectors to simulate short-circuit and resistive short-circuit.
- A set of wire cables with different connections with their terminals.
- Two pattern cables of one meter long.



### **3. Implementation of the Laboratory Content**

#### **3.1 Configuration of the language and the measurement units**

To handle the cablemeter device, the student has to set the language and measurement units. Within the same drop-down list, the student can select the network filter and if the device will carry out self-diagnosis operations. Initially, we will set the following configuration:

- Language: English.
- Length Unit: Meters.
- Units of the cable diameter: mm.
- Filter: 50 Hz.
- Self-diagnosis: No.

#### **3.2 Configuration of the cable type.**

The cablemeter device must be configured [1] to accomplish measurements and checks referred to the following cable:

- UTP type EIA/TIA, containing 4 pairs in category 5.

#### **3.3 Calibration of cables.**

For the calibration of wiring, the student will use a cable of known length. To perform the calibration, the student will operate according to the manual [2].

In the following sections, the student will use cables corresponding to the pre-recorded by the manufacturer and, therefore, they have to be calibrated with the cablemeter device.

#### **3.4 Checking of cables. (Mode TEST)**

Using the circuit board, the student will simulate faults observing the response of the cablemeter. The faults to simulate are the following ones [3]:

- Far short-circuit in the cables of a same pair and between different pairs.
- Near short-circuit in the cables of a same pair and between different pairs.
- Short-circuit in the middle of a cable.
- Resistive short-circuit in the middle of a cable.
- Open circuit in the middle of a cable.

Done the aforementioned tests, the student will check different cables. These cables are numbered through an identified label. It is necessary to check each of them and determine its state. These verifications have to accomplish using or without using the “probe” of the cablemeter device determining, if case, the reason why the results are different [4].

### 3.5 **Measurements of length of cables. (Mode LENGTH)**

The measurement of length of cables have to carry out with the same cables used in the section “check of cables”. These measurements will furnish through the cablemeter device showing them in meters and feet. These measurements have to accomplish with and without the *probe* in the end of the cable. Obviously, the student will have to verify the coherence of the measurements and offer a justification in the case of that some of them is anomalous [5].

### 3.6 **Checking of the connection. (Mode WIRE MAP)**

Using the circuit board simulating faults, the student will simulate malfunctioning connections observing the response of the cablemeter device. The connections to simulate are the following ones:

- Far short-circuit in the cables of a same pair and between different pairs.
- Near short-circuit in the cables of a same pair and between different pairs.
- Short-circuit in the middle of the cables of a same pair and between different pair.
- Open circuits of cables and pairs.

The checking of cables will be accomplished by using of the same cables than in the section “checking of cables” determining their connection. Finished the test **MAP** of a cable, the student will furnish a test using the option **TEST**, commenting the difference of trigger in the alarms of both modes [6].

### 3.7 **Identification of cables between a workplace and the Rack.**

This exercise aims to identify both ends of a same cable in a ready-made installation. For the exercise, it is necessary to include the ID accessory in each of the data gathering of the Rack. Then, using the cablemeter device, the student will determine the data gathering of the workplace, which is joined to the Rack.