

## EBB: Structured cabling

### Online course specification

**Target audience:**

Those responsible for the installation and maintenance of Ethernet local area networks.

**Course aim:**

To describe the structure, components, installation requirements and testing of cabling systems employed in local area networks (LANs) with reference to the published standards and requirements for high speed data communications.

**Course level:** Introductory

*An explanation of PTT course levels is given at the end of this document*

**Pre-requisites:**

A basic understanding of the characteristics and capabilities of the signals used in communications systems and the impairments that limit communications. It is recommended that the PTT courses PAA: "Analogue and digital signals" and PAB: "Signal impairments" are studied before attempting this course.

**Course structure:**

The course consists of the following four modules:

1. Local area networks
2. LAN cables
3. Cabling systems
4. Cabling system tests

**Module 1:** Local area networks

Module aim: To introduce the structure and capabilities of local area networks and associated cabling and the role of the various standards bodies in the evolution of standards for Ethernet LANs and their cable connections.

After completing this module, a trainee will be able to:

- describe the role and basic structure of a local area network (LAN).
- describe the capabilities of modern LANs in terms of the achievable data transfer rates and maximum distance covered.
- describe the role of the various bodies responsible for formulating standards for LANs and associated cabling and the relationship between these bodies.
- compare the applications and capabilities of copper and optical cables.
- describe the basic structure of a cable containing twisted wire pairs.
- describe the role of patch panels and patch cords and explain that the TIA has defined their wiring configuration.
- describe the role of a structured cabling system.

## **Module 2:** LAN cables

Module aim: To describe the properties, structure and applications of copper and optical cables used in local area networks with reference to the role of the relevant ISO, GENELEC and TIA/EIA standards.

After completing this module, a trainee will be able to:

- explain the cause and effect of crosstalk and compare NEXT and FEXT measurements.
- explain how a balanced twisted pair minimises the effects of interference including crosstalk.
- explain the significance of the cable properties: attenuation to crosstalk ratio, characteristic impedance, minimum bending radius, lay length and fire rating.
- explain that the characteristics of cables can be degraded by incorrect handling and installation.
- describe and compare the structure and features of the various types of unshielded and shielded cable.
- describe and compare the significance of categories and classes as defined in ISO, GENELEC and ANSI/TIA standards.
- compare the applications of the various categories of copper and optical cable.

## **Module 3:** Cabling systems

Module aim: Describe the benefits, and components of, and installation requirements for, structured cabling.

After completing this module, a trainee will be able to:

- explain the benefits of structured cabling.
- describe the structure and components of a structured cabling system.
- describe the precautions that are necessary when laying cable to ensure the cable's electrical and mechanical properties are not degraded.
- describe the role of standards relating to cable separation distances and the factors that influence the minimum separation between communications and power cables.
- describe the termination of a cable at a patch panel with reference to the use of an IDC tool, the grounding of metallic shields and the preservation of wire twists.
- describe the structure of a cabling system in a data centre with reference to the role of zone distributors and the main distributor.
- compare the role of optical fibre and Cat8 copper cables in data centres with reference to the capabilities and advantages of each.
- describe and compare the roles of Protection Earthing and Functional Earthing.
- describe the role of the main components of an earthing system.

## **Module 4:** Cabling system tests

Module aim: Describe the various tests carried out on data links and explain the significance of the test results.

After completing this module, a trainee will be able to:

- explain the importance of testing
- choose appropriate test equipment.
- define the concept of links and channels.
- describe various test configurations give examples of their use.
- explain the role of the various standards relevant to testing.

- explain the significance of the various test parameters.
- describe common causes of test failure.

**Course access requirements:**

To access the course, a computer/tablet running a browser such as Chrome, Safari, Edge etc is required. The device should have an active Internet connection and a screen resolution of at least 1024x768.

**Learning facilities:**

This online course employs interactive simulations, hypertext links to an online glossary and multiple-choice question sessions to fully involve the trainee in the learning experience. Each module provides revision links to previously studied, relevant topics. A record of progress and level of achievement is recorded for each trainee. Once studied as a structured, assessed course, the content can be browsed for revision or reference.

**PTT course levels:**

PTT online courses are categorised by one of three levels according to the depth of treatment they provide:

**1. Introductory:**

PTT Introductory courses are designed for those with no previous experience or knowledge of telecommunications. These courses provide an overview of telecommunications or discuss the fundamentals of electronic communications. The study of general science at secondary (high) school is a typical pre-requisite for PTT Introductory courses.

PTT Introductory courses are suitable for those joining the telecommunications sector particularly those in an apprenticeship programme.

**2. Intermediate:**

PTT Intermediate courses are designed for technicians and engineers requiring an understanding of a certain aspect of digital technology. Those planning to study an Intermediate course should understand the basic principles of computing or electronic communications.

The depth of treatment provided by Intermediate courses is typically equivalent to level 3 of a UK national vocational qualification (NVQ).

PTT Intermediate courses can be used to support level 3 digital apprenticeships.

**3. Advanced:**

PTT Advanced courses are designed for those who require an in-depth treatment of a certain aspect of telecommunications. Such courses are suitable for system designers as well as those who will be responsible for the maintenance of the system described in the course.

Those planning to study a PTT Advanced course should have a background in telecommunications, and an understanding of telecommunications fundamentals and the principles of the type of telecommunications system described in the course.

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