



Institute of IT Training
Accredited e-Learning Provider



[learntelecoms](#) interactive e-learning suite of courses from **PTT**:

StarTel v3 Introduction to telecommunications

StarTel

- is a suite of interactive, e-learning courses designed to run under Windows™ 98, 2000 or XP.
- provides an introduction to the technical and service aspects of modern telecommunications.
- consists of four separate but integrated courses:

- | | |
|---|---|
| A | Telecommunications fundamentals |
| B | Principles of voice processing and transmission |
| C | Telecoms networks |
| D | Telecoms services |

Training delivery:

standalone installation from CDROM or study on-line.

Each **StarTel** course:

- gives a choice of depth of treatment: The "Overview" level is suitable for sales, marketing and managerial staff. The "Technical introduction" level is designed for operations, installation and maintenance staff and supports the achievement of a telecoms or ICT National Vocational Qualification at level 3.
- employs interactive simulations, hypertext links and question sessions to fully involve the trainee in the learning experience.
- provides personalised training with each trainee able to make his/her own notes and place bookmarks. A record of progress and level of achievement is recorded for each trainee.
- provides a structured assessed course and can also be used to browse for revision or reference.

Target audience:

The **StarTel** suite of courses have been designed for those who:

- are studying in preparation for a career in the telecoms or ICT sector
- have recently joined the telecoms sector
- are in the telecoms or ICT sector and want to develop their knowledge of modern networks and services

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Course A: Telecommunications fundamentals

Pre-requisite: Secondary (high) school education in Physics and/or general electronics/electrical engineering background.

In the UK, appropriate pre-requisite qualifications are General Certificate of Secondary Education (GCSE) in Physics or BTEC National Vocational Qualification (NVQ) at level 2 in Electronics.

Course Aim: After completing this course a trainee will be able to explain the fundamental principles of the technologies that are the basis of modern telecommunications networks.

The topics covered by this course are:

Analogue signals: Explanations of the terms frequency, phase, amplitude, power, decibels and bandwidth.

Analogue impairments: Explanations of the terms crosstalk, distortion, delay, echo, loss and noise; demonstrations of the different impairments.

Digital signals: Advantages of digital signals versus analogue; explanations of the terms bits, bytes and bit rate.

Digital impairments: Causes of errors; explanation of the term BER; explanation of error detection and error correction (FEC); demonstration of the effects of errors.

Basic data: Components of a simple data link inc. DTE and DCE; functional aspects of physical interfaces; role of and interaction between application, communication and network protocols; the structure of the OSI model.

Synchronous and asynchronous operation: Principles and comparison between synchronous and asynchronous links; transport of asynchronous traffic over synchronous links.

Modulation and line codes: Principles and typical applications of AM, FSK, PSK, QAM, HDB3, 2B1Q and GMSK.

Multiplexing Part 1: Principles and typical applications of SDM and TDM.

Multiplexing Part 2: Principles and typical applications of WDM, TDMA, FDMA;

Packet switching: Principles of address (packet) multiplexing, statistical multiplexing gain, principles and advantages of packet switching, connectionless operation.



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Course B: Principles of voice processing and transmission

Pre-requisite: Understanding of the characteristics of analogue and digital signals and the impairments that affect those signals. Study of **StarTel** Course A “Telecoms fundamentals” recommended.

Course Aim: After completing this course a trainee will be able to describe the signal processing required to provide a telephony service over circuit-switched and packet-switched networks and describe video compression techniques.

The topics covered by this course are:

A/D conversion: Principles of PCM, A-law and μ -law compression; cause and effects of quantisation distortion; comparison of the quality of the different encoding techniques.

Basic telephony: Components of a telephone; function of hybrids; minimising echo; restriction of speech bandwidth; relative measurements (dBr, dBmO).

Speech and Music: Bandwidth requirements of different types of audio traffic; principles of ADPCM and hybrid vocoders; sub-band encoding; relevance of QD units; demonstrations of the quality of ADPCM, sub-band encoding and vocoders.

Video: bit rate and delay requirements of video traffic; compression techniques inc. H.261, JPEG, and MPEG.

Voice transport: Introduction to the role of exchanges and signalling in setting up a voice call over a circuit-switched network; extra signal processing required for a “Voice over IP” (VoIP) call; introduction to the system components involved in an Internet telephony (VoIP) call.



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Course C: Telecommunications networks

Pre-requisite: Understanding of the subjects covered in StarTel course A “Telecoms fundamentals” and course B “Principles of voice processing and transmission”.

Course Aim: After completing this course a trainee will be able to describe the basic components, operation and features of modern telecommunications networks.

The topics covered by this course are:

Line transmission: Balanced and unbalanced pairs; basic structure and capabilities of coaxial cable and optical fibre cable; structure of the local access network of a PSTN; basic components of a submarine cable system.

Radio transmission: Basic components of a fixed microwave link, a mobile radio link and satellite systems.

Switching: Principles of space and time switching as used in circuit-switched networks; basic components of a telephone exchange inc. the switching matrix.

Types of connection: Capabilities and applications of leased lines, circuit switched connections and packet-switched virtual circuits. Principles of connectionless (Internet) operation.

Transmission networks: The basic components of networks based on the PDH and the SDH; benefits of SDH networks versus PDH; comparison between SDH and SONET.

Circuit switched networks: The switching hierarchy; role and operation of intelligent networks; numbering issues; introduction to teletraffic engineering.

Packet switched networks: Basic principles and operation of X25, Frame Relay and ATM networks; introduction to the Internet protocols.



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Course D: Telecommunications services

Pre-requisite: It is recommended to those considering studying this course as a “technical introduction” that StarTel course C “Telecoms networks” is studied first.

Course Aim: After completing this course a trainee will be able to describe the services provided by modern telecommunications networks.

The topics covered by this course are:

PSTN services: Capabilities and features of a POTS service and modern PSTN services; PABX and Centrex services.

ISDN equipment and services: Basic components of ISDN inc. NTU and TE; typical applications of the 2B + D channels.

Wide Area Networks: Applications and features of public X25, Frame Relay and ATM services; explanations of CIR, Class of Service and Quality of Service.

Local access to data services: Capabilities of analogue modems, ISDN, ADSL, SDSL and HDSL broadband connections; features and capabilities of cable modem access to the Internet.

Introduction to the Internet: Open standards; Internet administration; the role of ISPs and NSPs; basic structure of the Internet; function of Web and name servers; WAP based mobile radio data services.

Mobile radio: GSM and PCS networks and services; PSTN interfacing; roaming; tariffs; enhanced data services inc. GPRS and HSCSD.

Introduction to 3G mobile services: The need for 3rd Generation (3G) mobile systems; differences between GSM and 3G systems; 3G services including enhanced messaging and location services and faster Internet access.