# UNIT 8
# COMMUNICATIONS & NETWORKS (ADVANCED)

**AVCE Information and Communications Technology**

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# Contents

**Section 1      Introduction**

- Overview of the unit
- Links with other units

**Section 2      Overview of Learning and Assessment Strategies**

- Teaching and learning strategies
- Assessment strategies
- Key skill development

**Section 3      Suggested delivery and activity schedule**

**Section 4      Suggested learning activities**

**Section 5      Suggested assessment activities**

- Notes for Teachers

**Section 6      Additional resources**

- Textbooks
- Internet Web Sites

# SECTION 1     INTRODUCTION

Until very recently, the concept of computer networks lay outside the experience of most people. The arrival of the Internet and the World Wide Web has suddenly provided access to a vast and expanding store of information both at home and at work. This access is in both directions, allowing individuals to communicate via electronic mail (E-mails) and to set up their own 'Web Site'.

Most companies now operate their own internal networks or LANs providing employees with access to computing facilities on a 'One Per Desk' basis. These networks are usually connected to other LANs via the Internet yielding world wide communication for all.

Of course, somebody has to establish the needs of the company, design a network, specify and purchase the components, assemble them, install computer software and finally, configure individual computers to suit each user. After the students have completed this unit, they will be in a position to tackle these tasks with confidence. In practice, their role within a company is likely to be one of establishing requirements and then employing a contractor to install cabling. However they must be familiar with each stage of a network installation in order to produce detailed specifications and supervise the work.

## SUMMARY OF LEARNING OUTCOMES

The student will:

- Understand how to establish computer users' needs and relate these to a specification for a computer network.

- Be able to construct a basic Local Area Network (LAN) and understand how it may be connected to the Internet.

- Be able to install and use appropriate software for the purpose of obtaining information on a specified topic from the World Wide Web.

- Understand legislation governing health and safety, the downloading of pornographic or offensive material and the storage of personal information.

## LINKS WITH OTHER UNITS

*Unit 4: System Installation & Configuration (Advanced)*. These two units taken together cover most aspects of setting-up both computers and computer networks.

*Unit 12: The Internet: Systems and Services*. This unit enlarges on the specific aspect of connecting to the Internet. In some situations this may be seen to be of greater importance than the local network.

*Unit 18: User Support (Advanced)*. This unit provides valuable extra help in activities requiring the student to ascertain user needs.

# SECTION 2    OVERVIEW OF LEARNING AND ASSESSMENT STRATEGIES

## TEACHING AND LEARNING STRATEGIES

Students will need to acquire a good understanding of computer network and communications practice before attempting to select and install hardware and software themselves. This implies a fair amount of classroom teaching, augmented by presentations from IT staff both from inside and outside the institution.

Students must have access to hardware and software that reflects current developments in
communications and computer network technology. It is likely (but not essential) that computer and network operating systems purchased will be based on Microsoft Windows products.

As students will be taking the covers off the computers to install interface cards, it is recommended that each work area be provided with an earthed anti-static mat as a minimum to prevent static damage to the computer chips. Ideally the students should wear an earthed 'cuff' as well while handling the cards.

Simple network 'starter kits' are available and provide the necessary hardware and software. The only action required after installing and configuring the network interface cards, is the configuration of network clients, protocols and network services. These are all available in the Windows OS via the control panel and network facility.

The students will also need access to the Internet via a high-speed link: a telephone modem connection will not be adequate. The installation of network cards could be an integral part of this unit and of Unit 4: System installation & configuration (Advanced).

Technology in this area changes very rapidly and it is important that new developments are incorporated. For example, the use of short-range wireless communication (IrDA, Bluetooth) reduces the need for cabling.

It is suggested that students work in small groups for most activities. This relaxes the demand on hardware provision, but also reflects the need for working as a team when working on projects for real. However, it is important that each student's evidence clearly shows how their individual contribution to the group work meets the requirements of the assessment criteria.

## ASSESSMENT STRATEGIES

Learning should be supported by the assessment programme. Opportunities should be available for peer and self-assessment in order to develop students' skills in being responsible for their own learning and development.

As this unit is assessed by portfolio, students must be encouraged to document all their work in a clear and concise manner. Each student should maintain a log book of all their practical work. It should be emphasised to the student that such log books are kept by the professionals and are a valuable resource when a particular sequence of steps needs to be repeated sometimes months later.

Students should receive clear briefings on the methods of assessment and clear feedback concerning the outcomes of all assessed work. Guidance on the requirements for the higher grades should also be provided.

## KEY SKILLS DEVELOPMENT

There may be opportunities to create evidence for their **Application of Number** portfolio:
when they are investigating the costs of constructing a computer network.

There may be opportunities to create evidence for their **Communications** portfolio:
when they are investigating network systems and interviewing relevant personnel from industry. Taking part in group discussions and debate will assist in providing evidence for this portfolio.

There may be opportunities to create evidence for their **Information Technology** portfolio:
when they are accessing information via the internet or from CD based information systems. They will be writing reports which will involve the use a word-processor.

There may be opportunities to create evidence for their **Improving Own Learning Performance** portfolio:
when they are investigating and evaluating networks as part of a group, setting deadlines and targets for system operation and report production.

# SECTION 3      SUGGESTED DELIVERY & ACTIVITY SCHEDULE

| TOPIC | TEACHING SCHEDULE | ACTIVITIES | RESOURCES |
|:---:|---|---|---|
| 1 | Computer Networks<br>• Introduction<br>• Examples of real systems<br>• Advantages of networked computers<br>• Drawbacks of networking<br>• Types | Activity 1<br>Group research<br>Guest speakers<br>Site visits<br>Presentation | Websites<br>Industrial and Educational IT departments |
| 2 | Running a Computer Network<br>• Establishing each user's needs<br>• Role of the Administrator | Activity 2<br>Guest speakers<br>Interviews<br>Discussion<br>Report production<br>Presentation | Network Managers<br>Computer users in industry and education |
| 3 | Using Computer Networks<br>• Accessing the Internet<br>• Advanced searching methods using a Search Engine<br>• Sending and receiving E-mail<br>• Posting to Newsgroups | Activity 3<br>Individual activity<br>Searching the WWW | Sufficient networked computers<br>Internet connection<br>Browser and E-mail software installed |
| 4 | Network Design<br>• Selecting architecture<br>• Selecting topology<br>• Specifying protocols and netware<br>• Specifying network services | Activity 4<br>Group research | Duck Ch 2, 9 |
| 5 | Network Hardware & Software<br>• Function of servers<br>• Interconnection methods<br>• Interconnection devices | Activity 5<br>Group research into cable and wireless systems | Websites<br>Manufacturers' literature |
| 6 | Linking two computers<br>• Installing cables<br>• Installing software<br>• Simple file transfers<br>• Remote operation | Activity 6<br>Group activity<br>Install and test simple data transfer link | LapLink® software and cables |

| 7 | Peer-to-Peer Networks<br>• Installing interface cards<br>• Installing cables<br>• Installing software | Activity 7<br>Group activity<br>Install and test | Peer-to-Peer network kits |
|---|---|---|---|
| 8 | Client-Server Networks<br>• Installing network interfaces<br>• Installing cables<br>• Installing software<br>• Setting up directories<br>• Setting up access rights | Activity 8<br>Group activity<br>Assemble and test computer network | Computers, network starter kits<br>Installation manuals |
| 9 | Documentation<br>• Keeping a configuration log<br>• Keeping a fault log | Activity 9<br>Linked with Activities 6, 7 and 8 | Up and running network<br>Software installation manuals |
| 10 | Network Management<br>• Day-to-day problems of keeping a network running | Activity 10<br>Group activity<br>Maintain a client-server network | Up and running network<br>Users |
| 11 | Standard Ways of Working<br>• Keeping backups<br>• Health and Safety Issues | Activity 11<br>Backup essential data<br>Study government legislation<br>Presentation by Safety Officer<br>Create checklist | Backup hardware and software<br>Correct furniture and lighting for computer room<br>Institution Safety Officer |

# SECTION 4    SUGGESTED LEARNING ACTIVITIES

## ACTIVITY 1:  COMPUTER NETWORKS
**Key Skills: C3.1a, C3.1b, C3.2, IT3.3**

Computers can be divided into two types: stand-alone or networked. For many years the personal computers or PCs on office desks remained isolated. Nowadays most are linked together both within the company and to others across the world via the Internet. There are advantages and disadvantages to this world-wide connection. Students should investigate the different sorts of network available and make a case for installing a network.

**Tasks**

1.    Students should practice finding information using a web browser such as Netscape or IE5. They should use simple searches at this stage, attempting more advanced techniques in a later activity.

2.    Visits to commercial sites should be arranged so students can see large office installations in action. The Novell web site (See Additional Resources) has a whole section on case studies of installed networks.

3.    Guest speakers should be invited to discuss with the students the benefits and problems of their particular networks. These should be 'users' rather than installers or administrators.

4.    Divided into groups, the students should discuss what they have learned and present their findings to the class. Each group could represent a particular type of user: Typist, secretary, teacher, research scientist, manager, etc.

## ACTIVITY 2:  RUNNING A COMPUTER NETWORK
**Key Skills: C3.1a, C3.1b, C3.2, IT3.3**

Before rushing to buy and install computer network hardware and software it is essential that two groups of people are widely consulted: users, so that the system improves their working efficiency rather than detracting from it, and the management who will authorise the expenditure. When costing the scheme, allowance must be made for system administration which involves staff training and perhaps the recruitment of new staff.

**Tasks**

1.    Invite network managers or administrators to talk to the students about their work. If your school or college has a network manager then get him or her

involved. If they are reluctant, point out that educated students (their 'users') are less likely to bring the system down if they know what they are doing. The personal contact should also result in fewer malicious 'hacking' attempts, as students come to realise that everything they are likely to come up with has been done before, and that it is in their own interests to have a working network.

2.    Groups of students should take it in turns to play the roles of users and network 'consultants', conducting interviews and keeping notes to be used in the design of the final system.

3.    Having carried out interviews, the students should produce a report and a presentation to 'management' (the rest of the class). Ideas should be discussed, once again involving a real network manager if possible.

## ACTIVITY 3:    USING COMPUTER NETWORKS
**Key Skills: C3.1a, C3.2**

Most students will use the college LAN to access the World Wide Web. They should now be made aware of the most efficient ways of using it.

**Tasks**

1.    Working as individuals the students should attempt to find out as much as they can about a topic of personal interest to them. They should be encouraged to use the 'Advanced Search Techniques' available with most search engines. This will involve logic (AND, OR & NOT) to home in on the data and reduce the number of 'hits' to a manageable level.

2.    Try giving each student a topic and conducting a time trial to assess speed and usefulness of results.

3.    Each student should set up and use their own version of an E-mailer. They should be encouraged to use it, keeping a log of all mail sent and received for their portfolio. As they use it more and more they will come to appreciate this resource and be less tolerant of colleagues who enjoying trying to 'crash' the system!

4.    A valuable interactive web resource is the newsgroup. These are available on a vast array of subjects and allow the student to consult experts and other students across the world. Students should investigate newsgroups on subjects of interest and add them to their E-mail account. The school/college network manager can show them how to do this.

## ACTIVITY 4:      NETWORK DESIGN
**Key Skills: C3.1a, C3.2, IT3.1, IT3.2**

Armed with knowledge of what the 'users' require of a network, the students now need to know how this translates into physical reality. The results of their investigations should form part of their portfolio.

**Tasks**

1.      As groups they should research into the type of network topology and architecture best suited to the identified needs. The main factors here will be the number of users, the likely intensity of use, and the site layout.

2.      The students should investigate the range of network protocols available and understand their various merits and drawbacks. It will inevitably be a bit 'historical' as new ideas rapidly replace old ones. This means that many existing systems are technically obsolete even though they might only have been installed last year!

3.      Students should identify the main suppliers of network software and understand the necessity for keeping up to date with developments. Suppliers' web sites are ideal for this purpose.

## ACTIVITY 5:      NETWORK HARDWARE & SOFTWARE
**Key Skills: C3.1a, C3.1b, C3.2, IT3.3**

There is a lot of hardware associated with setting up a network, in addition to the users' own desktop computers. Even linking just two PCs together for the purposes of transferring files will involve a piece of cable with appropriate multi-pin plugs on each end. At the other extreme you might need miles of cable, special interconnection devices, hubs, routers and of course, server computers which the user may never see.

**Tasks**

1.      Groups should conduct research into the various methods by which users' computers are physically linked together and perhaps to server machines providing mass storage or centralised printing facilities. They should consult manufacturers' web sites and obtain any printed literature available.

2.      Recent developments in 'Wireless' technology such as Bluetooth should be investigated, along with more traditional methods using Infra Red light.

3.    Students should establish specifications for any server computers that may be required: including a mass storage file server, printer server(s) and perhaps an Internet server. The latter is only feasible if an 'always-on' high-speed link to the Internet is available at the site.

4.    All specifications must be justifiable and groups should have to defend their decision to the rest of the class.

# ACTIVITY 6:     LINKING TWO COMPUTERS
**Key Skills: C3.1a, C3.2, IT3.1**

As a first hands-on exercise, the relatively simple task of transferring long files between two PCs provides some basic experience of making two machines work together. Obviously it is only worthwhile going to this trouble if there are many large files to be copied or moved which won't fit on a normal floppy disk.

**Tasks**

1.    Each group should be provided with two PCs and a copy of LapLink (or similar). The latter is supplied with serial or parallel port cables, the students deciding which to use after reading the installation manual. The PCs need not be high-spec machines as long as they have serial (COM) and parallel (Printer) sockets.

2.    They should demonstrate that they can install and configure the software.

3.    Demonstrate successful file transfers between the machines.

4.    Another feature of this type of software is the ability to 'drive' one machine from the other in a Master-Slave mode. This is often used to control an office machine from a laptop PC at home or elsewhere via a telephone modem. The modem is not necessary for the setting up and understanding of this type of remote operation and the students should set up such a link on the bench and be able to demonstrate it.

# ACTIVITY 7:     PEER-TO-PEER NETWORKS
**Key Skills: C3.1a, C3.2, IT3.1**

This represents the next step up in complexity. There are many situations where there is a need to share information and resources within in a small office, but the costs of a full network with dedicated file servers is not justified. This is often the case within a small company with only a few staff, often sharing the same room.

Students should be able to recognise these situations and specify and install a peer-to-peer network.

Groups of students should be provided with sufficient interface cards and cabling to link two or three computers together. Complete 'starter kits' are available from suppliers and should be suitable for this purpose.

**Tasks**

1.    Identify all the hardware and components needed.

2.    After checking for any electrical safety hazards, the interface cards should be installed.

3.    Before the computer covers are put back on the cabling should be attached.

4.    Any software that came with the cards should be installed if necessary (Sometimes the operating system already contains the correct 'drivers'). Detailed instructions for setting up this type of network can also be found at the Brother web site (See Additional Resources).

5.    Once the network is running, the students should attempt some qualitative assessment of performance. The aim of a peer-to-peer network is to share resources without interfering with the work of each individual user. The students should check out the system's ability to achieve this.

# ACTIVITY 8:    CLIENT-SERVER NETWORKS
**Key Skills: C3.1a, C3.2, IT3.1**

The client-server approach is the system of choice for all medium to large network installations, and many smaller ones, simply because there is a practical limit on the size of a peer-to-peer network. The user who has the group printer attached to their PC might find that the machine is too busy servicing all the printer requests from colleagues to do anything else!

There will be a minimum of one server computer whose sole function is to control the network and maintain a central store of programs and data files for all the users or 'clients'.

The server computer will not be physically accessible to the users, and often resides in a special 'server room' tended only by the network manager. The students should now familiarise themselves with this concept and working in groups, put together and run a small client-server network.

**Tasks**

1.    Each student group should prepare an action plan to perform the following tasks:

2.    Each group should be provided with at least three PCs, one to be set up as a file server and the other two as clients. A selection of cables should be available, together with appropriate interface cards. The first task will be to read installation manuals, design the interconnections, install the cards and fit the cables.

3.    The network operating system (NOS) software should now be installed on the server machine.

4.    Install the client operating systems on the two user PCs.

5.    The group as a whole will play the part of network administrator and learn how to set up the NOS, setting up directories on the server hard disk and assigning passwords and access rights to 'users'.

6.    If the network installation is successful, then the group could use and manage it themselves, installing word processing and presentation software for producing portfolio reports instead of using the school/college network. Activities 9 and 10 will then be much more relevant.

# ACTIVITY 9:     DOCUMENTATION
## Key Skills: C3.1a, C3.3

A network administrator or manager must keep detailed logs of network settings and modifications, and a record of all reported faults.

Networks are so complex that relying on human memory is a sure recipe for wasted time and duplicated effort.

**Tasks**

1.     Each student should keep a logbook recording all the steps taken at every stage of installation and configuration of each of the network activities 6, 7 and 8. The tutor should inspect these at intervals to make sure they are of an acceptable standard – that is, legible and informative!

2.     Assuming that each group has a running network of some kind, each student should keep a logbook of faults, 'crashes', user complaints and any remedial action. A suggested format for each page is shown below:

| WORKSTATION ID | USER | DATE | SOFTWARE | VERSION |
|---|---|---|---|---|
|  |  |  |  |  |
| **REPORTED FAULT** | | | | |
| **ACTION TAKEN** | | | | |

## ACTIVITY 10:   NETWORK MANAGEMENT
**Key Skills: C3.1a, C3.2, IT3.1, IT3.2**

There is more to running a computer network than just installation and initial configuration: regular maintenance is essential as with any kind of system.

**Tasks**

1. Invite a Network Manager or Administrator to give a presentation on his or her experiences of typical network problems, characteristics and the demands made by users after a network is installed and running.

2. As a class activity, there should be periodic discussions to swap ideas and experiences of running a network.

3. Research should be conducted into hazards such as computer viruses and 'hackers' and a report prepared on defences and disaster recovery.

## ACTIVITY 11:   STANDARD WAYS OF WORKING
**Key Skills: C3.1a, C3.2, C3.3, IT3.1, IT3.2**

- The manager of a client-server network has the special responsibility of ensuring that users' programs and data held on the server disk drive(s) are secure from accidental or deliberate corruption. The performance of the network manager will be judged not only by reliability (how often the network is 'down'), but also by his or her ability to ensure that user data is not lost or read by others without permission.
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- He or she is also responsible for the working conditions in any rooms dedicated to client computers.

**Tasks**

1. Research and prepare a report on the various methods of 'backing-up' data. The report should include not only the hardware technology available, but also the administration of it: for example how often back-ups are made and how they are stored.

2. Each group should decide upon a back-up strategy for their own network and implement it.

3. Each student should conduct research into the Health and Safety issues covering computer rooms. These issues include furniture and lighting. A class discussion could precede this research to establish the extent of existing knowledge about the effects of poor sitting posture and Repetitive Strain Injury (RSI).

4.    The school/college Safety Officer could give a presentation to the class to emphasise the points made above.

# SECTION 5 SUGGESTED ASSESSMENT ACTIVITIES

## NOTES FOR TEACHERS

### Assessment Activity 1: DESIGNING A NETWORK

This activity gives students the opportunity to build on the knowledge gained in Learning Activities 1 to 5. It allows students artistic licence to present their research findings in a creative way, using a variety of media and provides opportunities for key skills development.

The students should be encouraged to play the role seriously, visualising and understanding the problems of both actual and potential computer users. The key to success here is understanding how to select a system that best fits the users' needs rather than building something and then trying to force people to use it.

In order to achieve higher grades, students must provide evidence of independent research and provide comprehensive information showing their depth of understanding. They will need to demonstrate the ability to analyse the information they receive and provide realistic proposals and specifications.

### Assessment Activity 2: ADMINISTRATOR'S HANDBOOK

This exercise should enable the student to demonstrate not only an in-depth understanding of the technical material, but also their ability to communicate this understanding to others in a clear and concise manner.

Students should be encouraged to include photographs (scanned or from a digital camera), diagrams and tables.

The student whose is already familiar with web page authoring might like to present the guide as a set of web pages viewed using a suitable Browser. Sound and video could then be included where relevant, and the whole submitted on a CD ROM.

### Assessment Activity 3: CONSTRUCTING A NETWORK

This activity gives students the opportunity to build on the knowledge gained in Learning Activities 7 and 8. In this case the student will have put a system together alone. The assessor should be on hand to monitor progress and help if the student is in difficulty. Such help should be the minimum necessary to get them going again, and they should realise that such intervention will affect their final grading.

If several students are being assessed at the same time in the same room, some sort of partitioning should be provided for each work area and any help given by the assessor should be non-verbal where possible.

# ASSESSMENT ACTIVITY 1: DESIGNING A NETWORK
**Key Skills: C3.1a, C3.1b, C3.2, C3.3, IT3.1, IT3.2, IT3.3, N3.1, N3.2, N3.3**

## Situation

As the newly appointed network manager at Bash Street College, you arrive to find that you have inherited an old classroom full of PCs of various ages, but no network. There is money available to install a network, but it is up to you to sort it out. To add to your problems, subject heads are disgruntled because they feel more deserving of the money that has been made available to you.

## Tasks

1. Study how a computer network could benefit other subject areas within the college. You should look at all areas, not just the obvious technology-based ones. For example, how could student access to the Internet improve the quality of History lessons?

2. Interview school/college staff to get their opinions. Find out how and why they make use of your existing computer facilities. More importantly perhaps, if they don't use them, why not?

3. Prepare a report to department heads outlining your findings from tasks 1 and 2.

4. Decide how many 'workstations' you need and plan the layout of the new computer room. Remember that any server computers will need their own secure space.

5. Decide on the type of network and research suppliers' literature in order to select the best system for the job.

6. Draw up a specification for the cabling requirements.

7. Specify the type of furniture and lighting needed for the room to comply with health and safety legislation.

8. Using information gleaned from your interviews with subject heads, select software applications programs to run on the network.

9. Prepare a report outlining all your plans in detail.

## Assessment

The situation described is fairly typical of those you may encounter when you are in employment. You have been asked to produce a number of reports for your assessment portfolio and these too are similar to the kind of documents you may be

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called upon to write for real. Good presentation and structure are essential and in order to achieve the higher grades there will need to be evidence of in-depth research and understanding.

## ASSESSMENT ACTIVITY 2: ADMINISTRATOR'S HANDBOOK
**Key Skills: C3.1a, C3.1b, C3.2, C3.3, IT3.1, IT3.2, IT3.3**

### Situation

Having gained experience in the setting up and running of a computer network you have been asked to produce a handbook providing a step by step guide. The aim of this handbook is to provide an up-to-date resource for a student and a useful reference work for the newly qualified administrator. It should be word processed and written in a reader-friendly, logical and consistent manner.

### Tasks

1.  Clearly define the role of the Network Manager or Administrator within an organisation.

2.  List and describe the services that a computer network can offer an organisation over and above those provided by 'stand-alone' machines.

3.  Identify and describe the various components that go to make up a Local Area Network (LAN).

4.  Provide an action plan for eliciting users' requirements and establishing priorities for the provision of services.

5.  Write a step by step guide to the physical assembly of the network hardware components in a typical installation. Include photographs and diagrams.

6.  Write a step by step guide to the software installation, based on your own experience. Include 'screen dumps' as appropriate. Don't just copy out the installation manual!

7.  Provide hints and tips on problems you encountered and how to deal with them.

8.  At the end, include an annotated list of all web site and book references you have used.

**Assessment**

Good presentation and structure are essential. Remember, this not a dry textbook, it is a reference work in which a pressured administrator dealing with an urgent problem must be able to find quick and clear answers. In order to achieve the higher grades there will need to be evidence of in-depth research and understanding.

## ASSESSMENT ACTIVITY 3: CONSTRUCTING A NETWORK
**Key Skills: C3.2, IT3.1**

### Situation

You are provided with a pile of computer hardware, software on disks and installation manuals. Your job is quite simple: put it all together and create a useable LAN.

### Tasks

1.    Identify all the various components you have been given

2.    Establish the type of network you can construct from these parts, making sure that nothing is missing.

3.    Taking note of any electrical hazards, install interfaces cards in the computers.

4.    Link the machines with the supplied cables.

5.    Install the network operating system software using the manuals for reference.

6.    Configure the user workstation(s) and set up directory rights and passwords.

7.    Establish that the system is useable and stable by running it for a period of time set by your assessor.

### Assessment

You will need to convince your assessor that you understand all the basic principles involved and can work methodically towards a successful outcome. Reference to manuals will not be taken as a sign of weakness. On the contrary, treating the supplied information with disdain and proceeding in an illogical and sloppy way will result in a poor assessment grade. In order to achieve the higher grades you will need to demonstrate an in-depth understanding of the principles and be able to justify all your actions.

# SECTION 6    ADDITIONAL RESOURCES

**Textbooks**

Data Communications for Engineers
M.Duck, P.Bishop, R.Read
Addison-Wesley
ISBN 0201427885

Networking Complete
Sybex
ISBN 0782129145

Essential Windows NT System Administration
A.Eleen Frisch
O'Reilly
ISBN 1565922743

**Internet Web Sites**

The LapLink® site at **http://www.laplink.com/** contains a very useful 'knowledge base' as well as detailed support for their products.

Novell is a major supplier of network software and their site at **http://www.novell.co.uk** provides a very useful and interesting set of case studies.

A useful index site can be found at **http://computing.net/** containing links to a wide range of computer and network technical support sites.

The Brother site at **http://www.brother.com/european/networking/** has a series of tutorials on Internet protocols and a complete step by step guide to setting up a peer-to-peer network under Windows.

All you need to know about the Linux network operating system can be found at the following URL: **http://new.linuxnow.com**