Introduction

How do websites work? How do emails get to your computer? How does the use of computer applications affect your daily life? This unit provides an introduction to the modern online world. Starting with your own experiences, you will extend your knowledge of online services and investigate the technology and software that support them. You will learn more about a range of services, including email, online data storage, collaborative software, search engines and blogging.

You will also gain an understanding of the main technologies and processes behind the internet and investigate how they come together to let you view websites and send information around the world.

Considering a range of devices, including smartphones and digital music players, you will investigate the technology that enables digital devices to share and exchange information.

This unit will help prepare you for the next phase of the internet revolution, ‘the internet of objects’ or also known as ‘ubiquitous computing’. By 2020, it is estimated that there will be 50 billion interconnected devices (objects) on the planet. These will include everyday devices embedded into clothing and domestic appliances.

This technology has created new concerns regarding security and privacy. You will investigate these concerns and consider how users should behave online to safeguard themselves and respect others.

Assessment: You will be assessed by an onscreen test lasting 1 hour.

Learning aims

In this unit you will:
A investigate online services and online communication
B investigate components of the internet and how digital devices exchange and store information
C investigate issues with operating online.

I use my laptop and smartphone all the time – for keeping in touch with friends, shopping, listening to music and sometimes for schoolwork. I find it hard to imagine what the world was like before life online. I love the technology and would like to know more about it. I am not sure yet what I want to do when I leave school, but knowing more about the online world is bound to help me in the future.

Zoe, 15-year-old student
Introduction

Every time that you connect to the internet, you are using online services. If you are passing information to other people or exchanging information with them, then you are using online communications. Online services and online communications can be used on any type of equipment: desktop computer, laptop, palmtop, mobile telephone or tablet.

In this section you will look at the use of online services and investigate the use of online document systems.

How online services can be used

Table 1.1 provides a summary of the different online services that are available. It lists some examples of everyday uses of these services and the advantages of using the service.

<table>
<thead>
<tr>
<th>Service</th>
<th>Types</th>
<th>Example uses</th>
<th>Benefits</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Communication</td>
<td>Email, messaging, news groups, social networks, conferencing, blogs, vlogs</td>
<td>Talking to friends on Skype™, Using social networking applications like Facebook or Google+ to exchange information</td>
<td>Instant responses to someone who is remote from you, at no additional cost to your broadband fees. Socialising.</td>
</tr>
<tr>
<td>2. Real-time information</td>
<td>Timetables, news, sport updates, weather reports, travel news</td>
<td>Checking an airport website for estimated arrival times of flights</td>
<td>Provides up-to-date information when picking people up from an airport. Companies can use real-time information about customers’ reactions to an advertisement to improve the effectiveness of the advert.</td>
</tr>
<tr>
<td>3. Commerce</td>
<td>Banking, auctions, online sales and purchases, publishing</td>
<td>Selling something through a service such as ebay™ or Amazon®</td>
<td>Allows users to carry out transactions seamlessly (without the need to use physical money) and globally.</td>
</tr>
<tr>
<td>4. Government</td>
<td>Tax returns, e-voting, applications for grants or benefits</td>
<td>Applying for your first provisional driving licence</td>
<td>Saves time and is more convenient – saves you a visit to the Post Office and means can take your time filling in the form and can easily amend any errors.</td>
</tr>
</tbody>
</table>

Continued
<table>
<thead>
<tr>
<th>Service</th>
<th>Types</th>
<th>Example uses</th>
<th>Benefits</th>
</tr>
</thead>
<tbody>
<tr>
<td>5. Education</td>
<td>Online learning, online training, manufacturers’ online tutorials</td>
<td>Using the Microsoft® training package for Windows® 7</td>
<td>Allows you to do training from the comfort of your own computer and at your own pace.</td>
</tr>
<tr>
<td>6. Virtual learning environment (VLE)</td>
<td>VLEs such as Moodle</td>
<td>Your school or college may use a VLE for you to access lecture notes and assignments, and for you to submit assignment work</td>
<td>Cost effective for the school/college and allows the school/college to track the submission of learners’ work.</td>
</tr>
<tr>
<td>7. Business (different types of organisations)</td>
<td>Business networks, collaborative working, video conferencing</td>
<td>Using a price comparison website is an example where you touch on business usage</td>
<td>Allows you to get the best price on purchases.</td>
</tr>
<tr>
<td>8. Entertainment</td>
<td>Multi-user games, radio and TV players, video streaming</td>
<td>Playing a game with other people over the internet</td>
<td>Enhances the gaming experience by allowing you to play against people you may not know.</td>
</tr>
<tr>
<td>9. Download services</td>
<td>Music, films, new software, software upgrades, games</td>
<td>Downloading music from a service such as iTunes or Amazon®</td>
<td>Makes purchasing easier and more affordable.</td>
</tr>
</tbody>
</table>

You will notice in Table 1.1 that there are overlaps between many of the services; for example, ‘conferencing’ could appear in both the Communication and Business sections.

**Activity 1.1**

Think about how you use the internet and online services.

Working independently, list all the online services you use and provide examples of how you use each service. Swap your list with a partner and compare them. Discuss the different types of services you have both listed.

Working in small groups, discuss which services are most popular and why you think this is. Decide on which services are most important for:

- businesses
- schools and colleges
- people wanting to communicate with friends and family.

**Assessment tip**

The uses and benefits of different types of online services is an important topic. Make sure you read Table 1.1 carefully and include it in your revision.
Online advertising is a means of promoting products and services using the internet. It can be used to spread marketing messages widely to customers. Online data storage is another example of an online service.

**Online advertising**

Online advertising uses a number of methods to promote products and services. The most commonly used methods include:

- **Search engine results pages.** Companies can register with the bigger search engines (Google™, Bing, Yahoo!) so that their websites appear high up in a list of keyword searches or pay for links that appear when a user does a search.

- **Banner and pop-up advertisements.** These are advertisements that appear at the top of web pages or pop up on web pages. These are often animated to capture attention.

- **Email marketing.** Uses email to send advertisements to customers (both potential customers and existing customers). However customers often see this type of marketing as spam if it is sent as unsolicited bulk emails.

Online advertising is becoming a very popular means of promoting products and events, but it isn’t always effective. In order to ensure that online advertising is effective, companies need to make sure that it:

1. Captures the attention of the target market through the use of design features (colour, layout, graphics, animation, e.g. in banner advertisement) and is easily accessible.

2. Retains consumers’ interest. For example, by directing consumers to additional interactive information about a product, such as a video demonstration of a product. The speed with which the information loads is also important to make sure that consumers don’t lose interest.

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**Discussion point**

Discuss in a small group what effect the increase in online advertising is likely to have on television.

Consider revenue, output, quality of advertising, etc.
Pay-per-click advertising

Pay-per-click (PPC) advertising is a form of online advertising. It involves websites or web pages hosting ads for other companies. If a surfer clicks on an ad, they will be re-directed through to the advertiser’s website. The website or web page provider will receive a payment for every ad which is clicked on.

Pay-per-click advertising uses what is known as an affiliate model. Advertisements or links to a company’s website are placed on other websites (affiliates) and in return the affiliate site receives a percentage of the income for any customer that clicks through. Google™ AdWords, Yahoo! Search Marketing and Microsoft® adCenter are all big players in this field.

Online data storage

Data storage is another type of online service. Many organisations are providing facilities for you to store and back up your data on their computers, and to make files available to share with others. The current term used for online data storage is ‘cloud storage’ (see page 15).

Data backup is a method of making copies of files. These copies can then be retrieved if disaster recovery is needed.

Key terms

Spam – Junk email where identical messages are sent to a number of recipients.
Unsolicited bulk emails – Emails that are sent to a large number of people who haven’t requested them.
Affiliate model – An ‘affiliate’ website is one that is attached to another company’s website via a link. The affiliate website receives a percentage of the revenue for customers clicking through from their website to the other company’s website.

Research

1. List three different ways of advertising online. Explain the differences between each type.
2. What is ‘pay-per-click’ advertising?
3. What is another term for online data storage?

Assessment tips

Find out more about per-per-click advertising and how companies use it. Produce a short leaflet which describes the pay-per-click structure and gives reasons for and against this form of advertising. You can find helpful information on sites including Google™ AdWords and Per Per Click Universe. (You can access these websites by going to www.pearsonhotlinks.co.uk and searching for this title.)

Data backup is dealt with in more detail in the Online documents section (see pages 8–10).

File access, types of access and sharing of files are also dealt in the Online documents section (see pages 8–10).
Compressing files

Working with online documents means that local files frequently need to be uploaded for sharing, or downloaded to be used for local processing. Files may be extremely large, which can cause problems with transmission (delivery) in terms of speed and network usage. To reduce this problem, files have to be compressed (i.e. reduced in size) before transmission and then expanded after transmission. A common method of doing this is to convert them to zip files (.zip format).

Zip files are basically stores of data files which may have been compressed. There are many different algorithms for doing the compression – with most compression software supporting several of these. The last item in a zip file is an index, which shows the placement of each of the data files and allows other files to be added. Quite often the zip file will also contain some program code (a sequence of instructions) to allow the files within the zip file to be unzipped (known as self-extracting files).

There is a wide range of software available for zipping files, with one of the most popular being WinZip.

The advantages of using online software

The biggest advantage of using online document software is that you can allow many people to share a version of a document and work on it at the same time as other people (known as collaborative working). You can also access content:

- anywhere there is an available internet connection
- via different devices (e.g. PC, smartphone, tablet)
- on different operating devices (e.g. Windows® and Mac).
Online documents can also have automatic backup. Backing up files means that you save a copy of the file at a known point in time. This means that you can always go back to that version if you lose or corrupt the present version.

Some software programs will automatically make a copy of the file you have open and are working on at set time intervals. In Microsoft® Word®, you can set how often you would like the file to automatically backup (every 30 minutes, every 60 minutes, etc). Automatic backup of online documents is just an extension of this concept.

**Activity 1.3**

Consider how file sharing can impact on collaborative working practices.

What are the advantages and disadvantages of using:
- online document sharing software
- standalone software

when working on a collaborative project?

**Controls over online documents**

**Version control**

Version control is important when users are sharing documents online, as all users need to be working from the most up-to-date version of the same document. One of the simplest ways of implementing version control is to allow just one user to open a document, or part of the document, for update at any one time. When one user has the document open and someone else tries to access it, the document will be locked. It is only unlocked when the original user has completed updating the file and has closed it again.

Other methods of version control include the software allocating the latest version number showing the time and identity of the person making the changes. If, for any reason, a document does become corrupt (damaged) or is missing important updates, it is possible to roll back to a commonly agreed version number.

**Levels of access and file permissions**

The system administrator within an organisation can control the levels of access users have to a particular document. They can allocate access to individuals or particular groups of documents by using file permissions. Some users may only be able to read documents but not edit them. Other users may be allowed to read and edit documents some may be allowed to add new documents and some will be allowed to delete documents.

File permissions can be used to restrict access to certain documents and to restrict what can be done to them. An example within an accountancy business is shown in Figure 1.3 on page 10.
Figure 1.2 Examples of different levels of access required

- **Read-only access.** This allows a user to look at and read a document but not to change it. A university lecturer could use a Word® document to create a test for their class, if the document was set as ‘read-only’ then the class would not be able to make any changes to the wording.
- **Read/Write access.** This allows a user to look at and read a document, but also to make changes to it.
- **Full control.** This allows users to retrieve a document, read it, edit it, add a new document or delete or archive an existing document. Full control is usually given to people who administer the system. They may be senior people within the organisation or senior administrators who report directly to senior management.

**Activity 1.4**

Using the internet to help you, make some brief notes on the reasons why particular protection levels need to be allocated to various users of an online document system.

**Assessment tip**

You will need to know about compressing files.
Revise the advantages of using online software as compared to standalone software.
Understand the controls which are used with online documents.

**Just checking**

1. Name a common format for compressing files.
2. What is the main advantage of using online software?
3. List two different methods of controlling online documents.
Technology has changed the ways people communicate with each other. Find out what the most common forms of communication were 50 years ago, 100 years ago, and 150 years ago. How do these methods compare with modern forms of communication?

Contemporary social media

People with common interests tend to gather together to exchange views and put forward ideas. Often this takes the form of a club such as a sports club, or a society such as an historical society. However, the internet has had a dramatic impact on the way people communicate and share information.

Online communities

People who are computer literate, and have the equipment, can form groups or ‘societies’ online. These groups are known as online communities, and they provide a place for people with similar interests to come together and exchange views. Where the community involves a group of people who keep in up-to-date contact with each other, they may be referred to as a network of friends.

Sometimes the communities exist in a virtual world online. This is an unreal world created by the computer. Popular examples include SecondLife, Twinity and Habbo. The World of Warcraft virtual world is another popular example of a large interactive gaming virtual world which supports multi-player gaming.

Communicating online requires a special behaviour or etiquette, known as netiquette. This is a set of rules designed to prevent abusive behaviour online. If a user breaks netiquette then other users can report them.

Information exchanges

Online communities make use of contemporary social media to publish, access and exchange information. They use several online tools to do this:

- **Web logs (blogs).** These are frequently updated online journals with diary-like entries which allow people to express their thoughts and feelings and give details of their daily activities. Typically, a blog includes text, photos and sometimes video.

- **Microblogging sites.** These are sites which allows users to create and exchange really short text entries. A popular example of this type of site is Twitter™.

- **Wikis.** These are websites that provide information that visitors to the site can extend and edit. They allow users to share information and are useful for research. The best-known example of a wiki is Wikipedia, the online encyclopaedia which can be updated by contributors.

- **Chatrooms.** Online communication within communities is sometimes referred to as chat. Some of the large interactive communities where people take part in the same conversation or type of chat at the same time are known as chatrooms.
Podcasts

Podcasts are a series of audio or video files that can be downloaded from the internet. If video is published in episodes like a blog, then this process is known as a vlog (video blogging). YouTube is an example of a video-sharing website where individuals can share vlogs.

Virtual learning environments

A school community may make use of a virtual learning environment (VLE) to distribute resources, support learning and assess progress online. A VLE is an education system based on web facilities. The system is a virtual world which mirrors the real world of education – it contains learning materials, tests, projects, lectures/lessons and allows interaction between teachers and learners. The system also records and tracks learners’ progress and performs other class management functions.

Sometimes the system can work in real time. Learners can communicate using microphones and speakers, or by text exchanges. At other times learners can be left to work at their own pace to meet specified deadlines. Lectures and lesson notes, as well as exercises are all held on the system and can be accessed by the learner.

Learners ‘hand in’ their work to their teacher electronically using the VLE. Teachers assess the work online and give feedback electronically via the VLE.

Social networking websites

Social networking sites, such as Facebook, Twitter™, LinkedIn, Google+ and MySpace, allow members of the online community to interact and communicate by setting up a profile. Users can then add links to friends’ profiles and post personal information, including photographs, videos, favourite music and blog entries.

Network of friends – A collection of people who jointly keep up-to-date contact online. Sometimes this may be a specific network, such as The National Youth Science Forum, or it may be more general, like a group of friends keeping in touch through Facebook.

Netiquette – Short for ‘internet etiquette’ or ‘network etiquette’. It is a set of conventions covering the use of networks used to interact with other people. The conventions are designed to prevent people causing annoyance or offence to others.

Chat – In this context, refers to any kind of online real-time communication over the internet.

Chatroom – Large-scale interactive conferencing with many people involved in the same conversation at the same time.

Virtual world – An online community which meets in a computer-generated world; for example, the large multi-player online games.

Profile – A user profile is a collection of personal data about a specific person. This may include biographical information, lists of interests and photographs.
Introduction
Online technology has radically impacted on the way people communicate. Not only has it changed the speed with which people communicate, but it has also had a positive impact on people’s finances, as instant messaging and internet telephone services like Skype™ are often cheaper than telephone calls.

Implications of online communication

Social networking
Social networking websites have changed the way that we communicate. They allow people to communicate interactively in real time anywhere in the world. Groups of like-minded people can share information, opinions and interests cheaply, normally for the cost of a broadband connection. Social networking provides a great way of staying in touch with friends and business contacts.

Instant messaging
Instant messaging provides a way to exchange textual messages as an alternative to the telephone and at a fraction of the cost. As messages are sent in real time, responses can be received instantaneously.

However, instant messaging does have its disadvantages:
- emotions are better expressed in person and can sometimes be miscommunicated within an instant message that is sent quickly
- viruses can be spread by instant messaging.

Did you know?
Instant messages can also include basic images, the most common of which are faces which show different expressions. These are referred to emoticons. Smiley faces are represented as :) and sad faces are represented as :( . You can also use emoticons to express a range of other expressions, such as laughing, crying, winking, happiness and anger.

Take it further
In pairs, create a series of instant messages to each other. You should use both text and emoticons in your messages.

Research
Some of the first social networking sites included Friendster, MySpace and Bebo. How do these sites compare with Facebook and Google+? What features are different? Are people using social networking sites differently from when they first started?

Figure 1.5 Instant messaging is used by businesses as well as between people socially
Voice over Internet Protocol (VoIP)

Voice over Internet Protocol (VoIP) allows people to interact in real time using voice and/or video messaging, and is available between any two points in the world. For internet-only conversations, there is no additional cost at either end. Skype™ is an example of a service that uses VoIP.

Being able to contact relatives and business colleagues on the other side of the world at relatively low cost is the biggest benefit. VoIP software is often used by businesses for online conferences and meetings. This reduces travel costs, travel time (and therefore loss of productivity during this time) and the cost of hiring a venue.

As with all new technology, VoIP has its limitations:

- **Reliability.** VoIP service is dependent on the quality and reliability of your broadband service and may not work if there is a power cut.
- **Voice quality.** Voices can sometimes be distorted or there may be long pauses between questions and answers.
- **Security.** As with all internet technologies, identity theft, viruses, spamming and phishing are all potential threats.

**Activity 1.5**

1. Set up a wiki web page with content about online communities and explaining what a social networking site involves.
2. Invite a partner to join your wiki and ask them to add information about instant messaging.
3. Update the content of the wiki, making any changes or corrections that you think are necessary.
4. Review your wiki. Consider how useful it has been for sharing information and note any limitations or difficulties you have experienced.

**Just checking**

1. Give three examples of social media used online.
2. What does the term `netiquette` mean?
3. What are the benefits and limitations of using VoIP?
Cloud computing and ubiquitous computing systems

Introduction
Exciting and relatively new technologies allow computing to be a seamless part of our everyday lives. Cloud computing allows users to save their files to 'the cloud' rather than their own computer so they can access their files anywhere, even on the move. Ubiquitous or 'the internet of objects', describes how computers are embedded into all sorts of objects we use in our daily lives, such as cars, kitchen appliances and even clothes.

Cloud computing and cloud storage
Cloud computing means using computer services on another organisation’s computers, which are known as hosts. The services are provided by organisations known as hosting companies.

Some well-known hosting companies for cloud computing include Amazon®, Microsoft®, Google™ and RackSpace. Cloud users can access software, data and storage on the host computers, which will be at a remote location. Users do this through a web browser or mobile app, without ever directly accessing the servers that the information is stored on.

Cloud storage is related to cloud computing – it is where only the storage, access and retrieval facilities are provided by the host provider, often via the internet.

The benefits to the customer and some concerns about cloud computing and storage are shown in Figure 1.5.

Key
B = Benefit
C = Concern

Cost and convenience (B)
You only pay for the storage that you have used. You don’t have to provide and maintain the hardware locally.

Availability (B)
Data and files may be available anywhere in the world where there is an internet connection.

Reliability of the network (C)
You need to be able to get through to the host to access and process data.

Security of data (C)
As the files are being stored by the host, you have no control over them. You need to be aware of their security terms and policies.

Software (C)
The host might not be using the latest, fastest and most secure version.

Potentially lower performance (C)
The speed of retrieval of data may be slower than it would be on a local database held in-house.

Did you know?
The term ‘cloud’ is often used as a metaphor for the internet. The exact origin of where the term cloud computing comes from is unclear but many believe it relates to drawings which used clouds to denote networks in diagrams of computing and communications systems.

Research
Research how cloud computing and storage work and what they are used for. You could start by looking at the How Stuff Works website. (You can access this website by going to www.pearsonhotlinks.co.uk and searching for this title.) Then produce a poster which provides details about cloud computing and storage, and their uses.

Research aim A

Cloud computing and ubiquitous computing systems
Ubiquitous computing systems

Ubiquitous means ‘existing everywhere’. Processors can be embedded in any device, including clothing, appliances, vehicles, buildings and people, to connect them to the internet so that the data generated by the processors will be readily available.

Radio frequency identification (RFID)

Currently, objects within a ubiquitous computing environment usually contain radio frequency identification (RFID) chips. RFID is a technology that uses radio waves to transfer data to a tag on a person or an object so that the person/object can be identified and tracked. These tags contain information that is stored electronically and which can be transmitted. It is similar to the bar code systems used in supermarkets, but unlike a bar code, RFID does not need to be scanned. An example of a use of RFID is the cat flaps that only open for the animal that has the correct chip in its collar.

Applications of ubiquitous computing

Currently, there are computing systems in place which monitor the shelf and warehouse stock. This technology is used by many industries (supermarkets, book and DVD suppliers, car part manufacturers, etc). When the stock reaches a certain minimum level, an order is automatically placed with the appropriate supplier electronically. Mainly this is done by a process where the tills feed product sales to a central computer, which then calculates the present stock. Currently manual checks still have to be made to allow for ‘shrinkage’ (i.e. loss due to theft or damage).

However, there are now experimental systems involving products which contain RFID. The RFIDs register when any product leaves the premises. Some futuristic examples of ubiquitous computing include:

- a car that can inform the owner when it needs servicing, book itself into the garage and place orders for any parts needed
- a refrigerator that can monitor its contents, compile an order as food is used and add the items to the user’s online shopping account.

Assessment tip

Ensure that you understand the terms ‘cloud computing’ and ‘cloud storage’.

Understand the concept of ubiquitous computing.

Just checking

1. What do the terms ‘cloud computing’ and ‘cloud storage’ mean?
2. Give three advantages and three disadvantages of cloud computing/storage?
3. What does the acronym RFID stand for? What is it used for?