

1.1.4 Social Issues

Computer networks, like the printing press 500 years ago, allow ordinary citizens to distribute and view content in ways that were not previously possible. But along with the good comes the bad, as this new-found freedom brings with it many unsolved social, political, and ethical issues. Let us just briefly mention a few of them; a thorough study would require a full book, at least.

Social networks, message boards, content sharing sites, and a host of other applications allow people to share their views with like-minded individuals. As long as the subjects are restricted to technical topics or hobbies like gardening, not too many problems will arise.

The trouble comes with topics that people actually care about, like politics, religion, or sex. Views that are publicly posted may be deeply offensive to some people. Worse yet, they may not be politically correct. Furthermore, opinions need not be limited to text; high-resolution color photographs and video clips are easily shared over computer networks. Some people take a live-and-let-live view, but others feel that posting certain material (e.g., verbal attacks on particular countries or religions, pornography, etc.) is simply unacceptable and that such content must be censored. Different countries have different and conflicting laws in this area. Thus, the debate rages.

In the past, people have sued network operators, claiming that they are responsible for the contents of what they carry, just as newspapers and magazines are. The inevitable response is that a network is like a telephone company or the post office and cannot be expected to police what its users say.

It should now come only as a slight surprise to learn that some network operators block content for their own reasons. Some users of peer-to-peer applications had their network service cut off because the network operators did not find it profitable to carry the large amounts of traffic sent by those applications. Those same operators would probably like to treat different companies differently. If you are a big company and pay well then you get good service, but if you are a small-time player, you get poor service. Opponents of this practice argue that peer-to-peer and other content should be treated in the same way because they are all just bits to the network. This argument for communications that are not differentiated by their content or source or who is providing the content is known as **network neutrality** (Wu, 2003). It is probably safe to say that this debate will go on for a while.

Many other parties are involved in the tussle over content. For instance, pirated music and movies fueled the massive growth of peer-to-peer networks, which did not please the copyright holders, who have threatened (and sometimes taken) legal action. There are now automated systems that search peer-to-peer networks and fire off warnings to network operators and users who are suspected of infringing copyright. In the United States, these warnings are known as **DMCA takedown notices** after the **Digital Millennium Copyright Act**. This

search is an arms' race because it is hard to reliably catch copyright infringement. Even your printer might be mistaken for a culprit (Piatek et al., 2008).

Computer networks make it very easy to communicate. They also make it easy for the people who run the network to snoop on the traffic. This sets up conflicts over issues such as employee rights versus employer rights. Many people read and write email at work. Many employers have claimed the right to read and possibly censor employee messages, including messages sent from a home computer outside working hours. Not all employees agree with this, especially the latter part.

Another conflict is centered around government versus citizen's rights. The FBI has installed systems at many Internet service providers to snoop on all incoming and outgoing email for nuggets of interest. One early system was originally called Carnivore, but bad publicity caused it to be renamed to the more innocent-sounding DCS1000 (Blaze and Bellovin, 2000; Sobel, 2001; and Zacks, 2001). The goal of such systems is to spy on millions of people in the hope of perhaps finding information about illegal activities. Unfortunately for the spies, the Fourth Amendment to the U.S. Constitution prohibits government searches without a search warrant, but the government often ignores it.

Of course, the government does not have a monopoly on threatening people's privacy. The private sector does its bit too by **profiling** users. For example, small files called **cookies** that Web browsers store on users' computers allow companies to track users' activities in cyberspace and may also allow credit card numbers, social security numbers, and other confidential information to leak all over the Internet (Berghel, 2001). Companies that provide Web-based services may maintain large amounts of personal information about their users that allows them to study user activities directly. For example, Google can read your email and show you advertisements based on your interests if you use its email service, **Gmail**.

A new twist with mobile devices is location privacy (Beresford and Stajano, 2003). As part of the process of providing service to your mobile device the network operators learn where you are at different times of day. This allows them to track your movements. They may know which nightclub you frequent and which medical center you visit.

Computer networks also offer the potential to increase privacy by sending anonymous messages. In some situations, this capability may be desirable. Beyond preventing companies from learning your habits, it provides, for example, a way for students, soldiers, employees, and citizens to blow the whistle on illegal behavior on the part of professors, officers, superiors, and politicians without fear of reprisals. On the other hand, in the United States and most other democracies, the law specifically permits an accused person the right to confront and challenge his accuser in court so anonymous accusations cannot be used as evidence.

The Internet makes it possible to find information quickly, but a great deal of it is ill considered, misleading, or downright wrong. That medical advice you

plucked from the Internet about the pain in your chest may have come from a Nobel Prize winner or from a high-school dropout.

Other information is frequently unwanted. Electronic junk mail (spam) has become a part of life because spammers have collected millions of email addresses and would-be marketers can cheaply send computer-generated messages to them. The resulting flood of spam rivals the flow messages from real people. Fortunately, filtering software is able to read and discard the spam generated by other computers, with lesser or greater degrees of success.

Still other content is intended for criminal behavior. Web pages and email messages containing active content (basically, programs or macros that execute on the receiver's machine) can contain viruses that take over your computer. They might be used to steal your bank account passwords, or to have your computer send spam as part of a **botnet** or pool of compromised machines.

Phishing messages masquerade as originating from a trustworthy party, for example, your bank, to try to trick you into revealing sensitive information, for example, credit card numbers. Identity theft is becoming a serious problem as thieves collect enough information about a victim to obtain credit cards and other documents in the victim's name.

It can be difficult to prevent computers from impersonating people on the Internet. This problem has led to the development of **CAPTCHAs**, in which a computer asks a person to solve a short recognition task, for example, typing in the letters shown in a distorted image, to show that they are human (von Ahn, 2001). This process is a variation on the famous Turing test in which a person asks questions over a network to judge whether the entity responding is human.

A lot of these problems could be solved if the computer industry took computer security seriously. If all messages were encrypted and authenticated, it would be harder to commit mischief. Such technology is well established and we will study it in detail in Chap. 8. The problem is that hardware and software vendors know that putting in security features costs money and their customers are not demanding such features. In addition, a substantial number of the problems are caused by buggy software, which occurs because vendors keep adding more and more features to their programs, which inevitably means more code and thus more bugs. A tax on new features might help, but that might be a tough sell in some quarters. A refund for defective software might be nice, except it would bankrupt the entire software industry in the first year.

Computer networks raise new legal problems when they interact with old laws. Electronic gambling provides an example. Computers have been simulating things for decades, so why not simulate slot machines, roulette wheels, blackjack dealers, and more gambling equipment? Well, because it is illegal in a lot of places. The trouble is, gambling is legal in a lot of other places (England, for example) and casino owners there have grasped the potential for Internet gambling. What happens if the gambler, the casino, and the server are all in different countries, with conflicting laws? Good question.