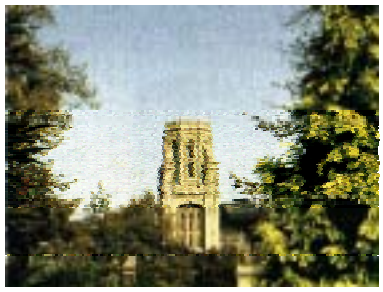


Appendix J
University of Bristol

The University of Bristol is successor of the University College of Bristol which opened in 1876. The university college was mainly funded by the Fry and Wills families. These families made their fortunes with chocolate and tobacco, respectively. The university takes pride in being the "first college in the country to admit men and women on an equal footing."

1. Introduction

Bristol University is part of the Janet network, which is a network of educational institutions in the UK. Janet is a very large and well-funded network, more a part of the core Internet infrastructure than something that is connected to the Internet. Bristol University has a 2.5 Gbps link into the Janet network.

1. The Network

2.1 Janet

JANET (www.ja.net) is the network operated and developed by the United Kingdom Education and Research Networking Association (UKERNA) under supervision of the Joint Information Systems Committee (JISC) of the UK Higher and Further Education Funding Councils.

The JANET network is constructed around eight core points of presence (C-PoPs) of which Bristol is one. A representation of the topology can be viewed at http://www.ja.net/topology/JANETBackboneKey.pdf. The core and regional points of presence, are themselves metropolitan area networks to which many institutions connect.

JANET has its own links to education and research networks in other countries (see www.ja.net/topology/WorkingwiththeWorld.pdf) and to many commercial networks in the UK and the rest of the world, forming part of the global Internet. These links between large networks are called peering.

The network links connecting the C-PoPs currently operate at 10 Gbps, although the network is upgraded regularly. The network connecting the 8 C-PoPs is referred to as SuperJANET. Other networks connect to the Janet network at the SuperJanet hub. These peering connections are to

- Linx -the London Internet Exchange (www.linx.net),
- Ireland - Heanet (www.heanet.ie)
- Europe – GEANT (www.dante.net/geant)
- China - Cernet (www.edu.cn/HomePage/english/cernet/index.shtml)
- The US (www.sprintworldwide.com and www.level3.com)

JANET also has peering arrangements with organisations such as the BBC, BT (British Telecom), AboveNet, Planet, Abilene via GÉANT, and ESnet via GÉAN.

More about this interconnectivity is at http://www.ja.net/topology/external.html

2.2 Bristol University Network

The Bristol Janet metropolitan area network (MAN), of which the University is the largest participant, has a 2.5 Gbps connection to the Janet backbone.

The university has around 22,000 computer users, 16,000 computers, and its bandwidth use is between 4000 and 5000 GB per month.

There are more than one network associated with the University.

- ResNet provides access to the University network and the Internet to members of the University living in University accommodation. Currently, 60% of residents (2500 users) are subcribers to this network. Resnet also provides a proxy server, and mail servers. Users who are away can also dial in. 15 Mbps of the University's connection to the Internet is reserved for ResNet, but this will be upgraded to 20 Mbps soon. Although this is a large amount of bandwidth for students to have in their rooms, the bandwidth is not enough. This is mainly because they leave their computers switched on, with peer-to-peer networking such as KaZaa running, sharing files with other people on the Internet.
- The departmental and library networks.

The University of Bristol places a high priority on user education, and the Information services provides a comprehensive web site that encourages responsible Internet usage while informing users why certain activities are not recommended. See www.bristol.ac.uk/is, and www.bristol.ac.uk/is/selfhelp. This web site is an excellent source of information, and was built using Zope and Apache.

There is also a code of conduct for users of the computing facilities:
www.bristol.ac.uk/is/selfhelp/documentation/code-g1/code-g1.html

3. Optimisation

3.1 Mail

Over a million mail messages per week are handled by the University's mail servers.

3.1.1 Recommended practices

Users are educated about good email practices, including not sending large emails, including not sending text email as Word attachments (the text can be entered in the email program):

> Non-textual files, such as Word documents or spreadsheets, are generally quite large. For instance, a file of 2000 characters (about 300 words) could become a 20KB file when saved as a Word document, so attaching such files to messages should be avoided as far as possible.

3.1.2 Mail sizes

The following limits are placed on email sizes:

The maximum size of messages sent via the central SMTP servers (smtp-srv.bris.ac.uk) is 5MB. Other SMTP servers may impose their own limits (or none at all). The ResNet SMTP server, for example, restricts the maximum message size to 2MB.

The central staff IMAP server does not accept messages larger than 10MB, while the central student IMAP server does not accept messages larger than 5MB. Other message delivery systems may impose their own limits (or none at all).

The Web/email gateway (SilkyMail) restricts the overall size of messages to 5MB and has a limit of 1MB for attachments.

3.1.3 Junk mail

Guidelines about Junk mail include:

- Never pass on junk email messages, including chain email messages.
- Never respond in any way to junk email messages even when the message suggests you reply to remove yourself from the list. Responding will not help to reduce the amount of junk email you receive, and may increase it.

3.1.4 Web based email

A web-based email system is available at https://webmail.bris.ac.uk. This is based on SilkyMail (see www.cyrusoft.com/silkymail)

3.1.5 Keeping email viruses at bay

Bristol has comprehensive user education on protecting against viruses:

- AV main page: www.bris.ac.uk/is/services/computers/virus
- Strategy: www.bristol.ac.uk/is/selfhelp/documentation/av-r1/av-r1.htm
- Tutorial: www.bristol.ac.uk/is/services/computers/virus/tutorial

However, the IT department considers their most effective defence against viruses the fact that the use Outlook and Outlook Express is actively discouraged. This is because so many viruses spread via these programs. Bristol not only warns against their use, but also offer no support for either.

3.1.6 Avoiding Spam

Spamassasin is used to filter spam. The user creates a folder called **possiblespam** in his email program (which can be any email client). Spamassasin marks the email as spam and sends it directly into that mailbox.

Currently, SpamAssassin is run on the message stores (post offices). However, the intention is to run it on the mail hubs, in future.

Users are also educated about keeping their email address private. This education includes this tip:

> Don't put your email address on a Web site anywhere. The easiest way for spammers to harvest email addresses to use is to use computer programs to search the web. You could be very surprised where your email address turns up. Try a web search for your email address to find out, and if it is on the web email the maintainer of the page and ask if it can be removed or obscured. There are some ways to hide your email address but still allow people to email you, including a form to create a mailto link hidden from spammers.

The Mailto generator is at:
www.bris.ac.uk/is/services/computers/nwservices/mail/hidden-mailto.html

Its operation is shown in the screenshot below:

This tool encodes the email address, ceating a coded hyperlink in the form of

mailto:person@university.com When a user clicks on this, his email program should launch, and the correct email address appears in the To: field.

Unfortunately, the script creates a hyperlink name in the form that is an email address (person@university.com in this example), instead of calling it something like “Email me”. So, unmodified, the email address would appear in clear text. However, this can be easily modified using a text editor.

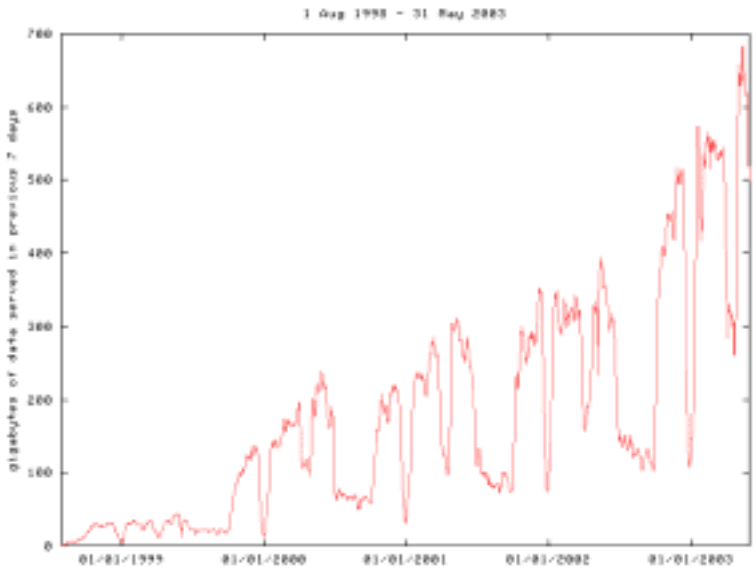
3.2 Facility for the Upload of Large Files (FLUFF)

The FLUFF system enables a user to make a large file available for download to anyone else on the network or the Internet. A user uploads the file, using his web browser. Shortly afterwards, he receives a URL via email. He can send this URL to someone else who can then download the file. The files uploaded to are kept for seven days before being automatically removed.

The FLUFF system was developed Martin Radford, and the file-upload routines come from http://cgi-lib.berkeley.edu (written in Perl). It is available at www.bristol.ac.uk/fluff/

3.3 Proxy server

There is a Squid proxy server – see http://wwwcache.bris.ac.uk/squid To access web sites outside the University, users must configure their web browsers to use the University's proxy server. Statistics for this server is available since 1998. The graph below shows how the amount Gigabytes per week has risen since 1998. The troughs in the graph represent holidays. This graph shows a steep rise in bandwidth requirements, possibly due to a slightly growing user base, but mainly due to Internet resources becoming more bandwidth hungry every year.



3.4 Bandwidth limitation

Currently, ResNet users are limited to a maximum of 800 Kbps for external sites.

3.5 Software Update Service

A Microsoft Software Update Server (SUServer) has been installed. However, its use is not enforced or even strongly recommended:
www.bris.ac.uk/is/services/computers/operatingsystems/sus/

A document outlining the problems with SUServer has also been made available on the web site:
www.bris.ac.uk/is/services/computers/operatingsystems/sus/sus-1.0-gold.html

4. Conclusion

The University of Bristol has a vast amount of bandwidth compared to the other institutions in this study. The university does not need to take many imaginative steps to maximise its use of a very small Internet connection. However, the university has very good user education, an excellent information services web site, and email practices that are worth attention from institutions where bandwidth is constrained.

Case Study Contact

Richard Hopkins - Richard dot Hopkins at bristol.ac.uk