Project

Module number: MM32021/CO32006
Module name: Computer Networks and Distributed Systems
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WWW reference: http://www.dcs.napier.ac.uk/~bill/cnds/index.html

BACKGROUND

The UK offers an excellent model for the future connection to the Internet, as it contains many institutions of Higher Education which have developed high-speed MANs. Table 1 outlines some of the currently developed MANs around the UK.

<table>
<thead>
<tr>
<th>Network</th>
<th>Universities connected</th>
<th>WWW link</th>
</tr>
</thead>
<tbody>
<tr>
<td>EASTMAN</td>
<td>Edinburgh, Heriot Watt, Stirling, Napier and Queen Margaret College.</td>
<td><a href="http://www.eastman.net.uk">http://www.eastman.net.uk</a></td>
</tr>
<tr>
<td>FaTMAN</td>
<td>Dundee, St Andrews, Abertay and Northern College</td>
<td><a href="http://www.dundee.ac.uk/itservices/fatman">http://www.dundee.ac.uk/itservices/fatman</a></td>
</tr>
<tr>
<td>AbMAN</td>
<td>Aberdeen, Northern College of Education, Robert Gordon’s University, Aberdeen College and Scottish Agricultural College.</td>
<td><a href="http://www.abman.net.uk">http://www.abman.net.uk</a></td>
</tr>
<tr>
<td>CLYDENET</td>
<td>University of Glasgow, University of Strathclyde, University of Paisley, Glasgow Caledonian University</td>
<td><a href="http://greenock-bank.clyde.net.uk">http://greenock-bank.clyde.net.uk</a></td>
</tr>
<tr>
<td>London MAN</td>
<td>ULCC, UCL, Telehouse, Greenwich, South Bank, Imperial College</td>
<td><a href="http://www.lonman.net.uk">http://www.lonman.net.uk</a></td>
</tr>
<tr>
<td>Bristol and West of England</td>
<td>Bristol</td>
<td><a href="http://www.bwe.net.uk/">http://www.bwe.net.uk/</a></td>
</tr>
<tr>
<td>South Wales MAN</td>
<td>University of Wales, University of Glamorgan, University of Wales College, University of Wales Institute, University of Wales College of Medicine, Swansea Institute of Higher Education</td>
<td><a href="http://www.cf.ac.uk/uwcc/infos/services/man">http://www.cf.ac.uk/uwcc/infos/services/man</a></td>
</tr>
<tr>
<td>NorMAN</td>
<td>Newcastle and Northumbria Universities on Tyneside linking the Universities of Sunderland, Durham, Teesside, and Durham’s University College Stockton.</td>
<td><a href="http://www.norman.net.uk/">http://www.norman.net.uk/</a></td>
</tr>
<tr>
<td>Net North West</td>
<td>Liverpool University, Salford University Kelee University, Staffordshire University, Liverpool John Moores University , Manchester University, UMIST, Manchester Metropolitan University</td>
<td><a href="http://www.netnw.net.uk/">http://www.netnw.net.uk/</a></td>
</tr>
</tbody>
</table>
JANET and SuperJANET

JANET is the UK’s academic and research network, which is funded by the JISC (Joint Information Systems Committee) of the Higher Education Funding Councils of England (HEFCE), SHEFC (Scotland), Wales (HEFCW) and the Department of Education for Northern Ireland (DENI). JANET is managed and developed by UKERNA.

The JANET network connects to many higher education and research institutes. It also provides a connection onto the Internet, other National Research Networks (NRNs) in Europe, the US and the rest of the world. Gateways out of the network to the rest of the world are located within SuperJANET.

SuperJANET was initiated in 1989 and provided a broadband fibre optic based network. It was envisaged as a network of networks formed by a national network complemented by a number of regional networks (MANs) serving areas where several HE institutions are located closely together. The SuperJANET project has transformed the JANET network from one primarily handling data to a network capable of simultaneously transporting video and audio as well as data.

EaStMAN

The EaStMAN (Edinburgh and Stirling MAN) network connects all of the universities around Edinburgh. It consists of two rings on ATM and FDDI, which run around the Edinburgh sites. This also connects to the University of Stirling through a 155Mbps SDH connection. The main connection to the SuperJANET network is at the University of Edinburgh.

The 100Mbps FDDI dual rings link 10 Edinburgh city sites. This ring provides for IP traffic on SuperJANET and also for high-speed metropolitan connections. Initially a 155Mbps ATM network connected five Edinburgh sites and the University of Stirling. Figure 1 shows the current connections onto the EaStMAN network. The main connected sites are:

- University of Edinburgh (King’s Buildings/ Old College/ New College/ Pollock Halls).
- Heriot Watt University (Riccarton Campus).
- Napier University (Sighthill/ Merchiston).
- Edinburgh College of Art.
- Moray House (Holyrood Campus).
- Queen Margaret’s College (Corstorphine).

The network is now being expanded to connect the other Scottish MANs, such as FatMAN, AbMAN and ClydeNET. This will support a Virtual Campus around Scotland. With this lectures can be transmitted from one of the sites, and viewed by students on other campuses and institutions.

ASSIGNMENT/COURSEWORK AIMS

The aims of the assignment are:

- To investigate the connection of Napier University to the Internet.
- To investigate how TCP/IP data is routed from Napier University onto the Internet.

ASSIGNMENT/COURSEWORK BRIEF

Investigations should include:

- Practical trace routes between Napier and the external Internet.
- Measurements of time delays for TCP/IP data packets, possibly with a measure of how they vary over time.

There are many sites that can be visited which outline the architecture of SuperJANET, such as:

- http://www.eastman.net.uk/  http://www.ja.net/janet-sites/MANs/
Figure 1  EaStMAN ring connections Phase II

Figure 2  EaStMAN phase I connections
RESOURCES

- TCP/IP programs, such as ping, telnet, and so on.
- Windows 95/NT network utilities (such as NetLab 1.4, Wsock, Ping Pro, and so on).
- PCs.
- Network connection.

ASSESSMENT CRITERIA

A report should be submitted which will normally have less than 20 pages of typed A4 (quality is more important than quantity). This report should investigate the connection of the Napier network to the global Internet, from its connection to a LAN within Napier to a remote host.

MARKING SCHEDULE

The assignment will count for 60% for the final mark of the module. An example marking schedule is:

<table>
<thead>
<tr>
<th>Introduction</th>
<th>[10%]</th>
<th>Theory</th>
<th>[15%]</th>
</tr>
</thead>
<tbody>
<tr>
<td>Network Connections</td>
<td>[20%]</td>
<td>Test Results</td>
<td>[35%]</td>
</tr>
<tr>
<td>Conclusions</td>
<td>[20%]</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

A possible structure for the report could be:

1. **Introduction**
   - Objectives, background.
2. **Theory**
   - TCP/IP, TCP/IP commands (Ping, nslookup, tracert).
3. **Network connections**
   - SuperJANET backbone, Connections onto SuperJANET, External connections from SuperJANET.
4. **Test results**
5. **Conclusions**