iservices THE UNIVERSITY of NOTTINGHAM	**Student Network Service 2005/06**
A report to the Student Union	**Richard Smeeton, Head of Network & Systems** **19 November 2006**

Introduction

In 2005/2006, a petition was collated by three 1st Year undergraduate students, Tom Lachecki Alkis Tsapanidis and Iain Lane. A list of issues was compiled, and from the 145 responses obtained a number of areas were identified where it was felt Information Services could improve. This document provides a full response to the issues raised, details how service has improved since the petition was circulated, and describes the planned initiatives that will further enhance the digital infrastructure for students in halls of residence during the current session 2006/7.

Executive Summary

The constructive feedback provided in the petition is welcomed. Information Services was already aware of many of the issues highlighted, and actions to address them have either been completed or are still under way. In the last year Information Services has doubled the bandwidth available to the Student Network, and has removed the need for separate payment for the service. Further strategic developments are imminent, and these will significantly enhance the student experience for students resident in Nottingham's halls, including wireless network provision and additional capacity upgrades.

In 2005 it was recognised that the GroupWise email service was becoming increasingly unnacceptable for all members of the University. Following detailed investigation and a full consultation, funds were secured to migrate the whole University to Outlook on Microsoft Exchange. This work is now over 75% completed, and all staff and students will benefit from a highly resilient Outlook email service by early 2007.

Information Services is aware that access to network services prior to registration would be of benefit to students who arrive early. This year over 2,000 free wireless vouchers were provided to early arrivers, and further development of pre-registration network service is planned for next year.

It is recognised that Information Services needs to make further improvements in how we communicate with our customers. In the past we have relied too much on email and messages posted in the Portal, however these communications have not always reached all of our users. We recognise that when services are disrupted, user frustration is compounded by not knowing what the problem is or when it will be fixed.

Having recently reviewed the communication channels, Information Services would welcome the establishment of more regular dialogue with appropriate student representatives in order to further align the development of the residential network to meet the requirements and expectations of service users

Analysis of Issues Raised

1. Broadgate Park

Students complained that extensive downtime had been experienced at Broadgate Park during October and November 2005, and that after this students could not access GroupWise and NetWare servers for the whole year. An average transfer speed of 100Kbp/s was noted compared to ~3Mb/s st Other halls. Some students in the lower court noted that they were only receiving a 10Mb/s connection, whereas a 100Mb/s connection was expected.

IS Response.

Whilst every endeavor has been made for all parts of the Student Network to operate seamlessly, the new halls of residence at Broadgate Park which opened in September 2005 are owned by UPP, not The University. The network equipment there is owned and operated by a 3rd party in conjunction with Information Services. Initial problems at Broadgate were due to configuration and performance of the web cache service, and an incorrect setting on the traffic shaping. The Web Cache service was upgraded with new more powerful servers, and as soon as the bandwidth configuration error was realised, this was corrected. The SNS team continues to work very closely with Nottingham Hospitality and its partners to ensure that consistent network connectivity to all halls of residence is delivered.

When the original Student Network was installed in 1996, this was done using 10Mbp/s Ethernet hubs. A rolling programme of equipment replacements is taking place, and only a few hundred rooms now have the legacy equipment. All student rooms will benefit from switched 100Mb/s connectivity by the end of July 2007.

2. Raleigh Park

Users at Raleigh Park have been subjected to more regular downtime than other parts of the network.

IS Response

We accept that reliability and performance at Raleigh Park has been poor. This is because of a number of factors which include equipment failures, and an unfortunate high level of vandalism to network equipment. As Raleigh Park is on the other side of a railway line, it is not possible to lay a direct fibre connection and network services are currently delivered by a line of sight laser from Jubilee Campus. The laser link provides fast connection at 1Gb/s, but unfortunately it is susceptible to interruption in foggy conditions. In addition to this, a fault developed with the equipment which led to an extended loss of service. This has been remedied, but the underlying constraint remains.

In addition, we experienced problems with the router servicing Raleigh Park intermittently locking up. Due to the nature of the fault, this proved difficult to diagnose, however this has now been resolved by installation of new software.

Finally, we have had at least two instances of deliberate vandalism to network equipment at Raleigh Park that has resulted in loss of Internet. This includes the communications cabinet being forced open and tampered with, and a 24 hour loss of service when the cable feed to the Laser head was yanked off, apparently by someone leaning out of a Raleigh Park common room window.

To improve the network reliability at Raleigh Park Information Services is planning the provision of a 100 Mb/s backup link, either using point to point radio or a Telecom Carrier circuit with an automatic transfer mechanism. We are also seeking to identify a new secure wiring centre and cabling routes that would be more difficult to vandalise. It is expected that this further work will be completed as soon as possible within the next 6 months.

3. Inaccessibility of Web Services

Access to the World Wide Web provided through wwwcache to the JANET network is normally incredibly swift, but it was noted that during 2004/5 access was inexplicably lost 2-3 times a day. In 2005/6 the wwwcache service was observed to be inaccessible at precisely 12.03am for 15-30 minutes. This was reported but IS didn't seen to take this seriously.

IS Response.

We did investigate this. Web traffic has been growing far faster than the increase in student numbers, and continuous upgrades are required to keep pace. Performance of the web cache service is addressed with the regular installation of more powerful server hardware. A total of 4 servers provide the wwwcache, and we upgrade and replace these at regular intervals.

Most web traffic from the Student Network is routed via JANET. If students do not set the proxy parameters as instructed, then Internet access will be delivered through a slower NTL connection.

Until the summer of 2006, Internet Access via JANET was reliant on a single 100Mb/s connection. This was upgraded in August to a bonded 200Mb/s service, and in December 2006, the SuperJANET 5 backbone will be delivered, providing a 1Gb/s interface for The University's Off Site link.

The wwwcache service generates log files, which are rolled over on a daily basis shortly after midnight. Whilst we have verified that this does not affect web access, there may be some interruption to streaming audio and video and on line games. IS has agreed to stagger the timing of this scheduled event so that if service on one server in the wwwcache cluster is being affected then other servers would be available to take over.

A review of the wwwcache service commenced in June 2006, and funding has been identified to replace all the existing equipment. We are planning to implement a high speed resilient proxy solution early in 2007.

4 & 5. Student Portal

The Student Portal was inaccessible at several crucial times, specifically exams when students require access to timetables, but also at other times. Availability of the service was only 50-60% during examination periods. Students also remarked that the Portal's introductory lecture at the start of the year was far too detailed.

IS Response

Successfully commissioned in 2004, the Portal has been used increasingly to deliver key services to Students. In 2005, performance issues began to be experienced when the number of concurrent users exceeded 1,000. Unfortunately, this coincided with periods of peak demand such as exams.

Following extensive analysis with the vendor, it was decided to upgrade the portal "front end" service hardware from a single high performance server to a cluster of up to 8 servers, each with a capacity of handling 700 concurrent sessions. This work was completed during summer 2006, and at the same time more powerful "back end" server hardware was introduced.

The new Portal cluster environment has been proven to be a significant improvement, with concurrent sessions during on line registration for 2006 having exceeded 2,000 without service failure. Further work is being undertaken to refine the load balancing of the Portal web servers, and performance will be closely monitored in particular when exam timetables are published.

The feedback about the introductory lecture is noted, and will be taken into account for future years.

6. Quarantine System

The quarantine system is conceptually a sound way of ensuring that viruses and unwanted traffic are kept off the University network, but its introduction suffered from poor timing, insufficient notice, technical faults and unautorised modification of users system configuration. Adding the popular "Spybot" software to the list of permitted anti-spyware programs was requested.

IS Response

Following a number of virus outbreaks that affected the performance of the Student Network in 2004, Information Services sought to deploy a system that would prevent this from happening in future years. Following a detailed tender exercise, The "Campus Manager" system was purchased in the summer of 2005, and a phased introduction was planned during the 2005/6 session.

We then experienced problems with network service during the first two weeks of October 2005 caused by "Denial of Service" (DoS) traffic being generated from compromised systems within the SNS itself. This had the effect of both reducing the bandwidth for existing connections on the Internet link and also causing a high proportion of legitimate connection attempts to fail. Users in the immediate vicinity of the compromised systems were particularly affected. The nature of the DoS traffic made it very difficult to track the source of the traffic without causing further disruption.

In order to improve our ability to track down compromised systems, we accelerated the roll out of Campus manager and also replaced a central router on the SNS backbone with a more powerful model which provided additional capacity and functionality.

The initial installation of the quarantine solution went well, with no significant complaints being received. As the roll out of the system continued, we did run into the exam period, and this generated a number of complaints. Information Services responded by immediately deferring the further deployment until after the exams had completed. It is recognised that exams are a critical time for The University, and a change freeze policy now applies to all key services during these periods.

Hall managers were informed of the planned implementations, but some appeared not to have passed messages on. As we do not have email distribution groups for each Hall, the use of posters and flyers would be considered in the future as a means to supplement our communications for such a project.

The quarantine service was disrupted on one occasion by the failure of a disk in one of the servers. A hot standby configuration has since been deployed to prevent service outage in the event of a repeat occurrence.

"Spybot" was not included in the list of permissible anti-spyware tools in 2005 as at that time it was inferior to the Ad-Aware and Windows Defender alternatives. This has changed during 2006, and it is being added to the list of permitted anti-spyware programs for 2007.

With regard to the registry changes made to force auto-updates, we can confirm that it was not our intention for the quarantine system to implement any such change. However, it transpired that the default setting of the scanning agent did force a fixed configuration for Auto-Updates to approximately 1,000 users. Whilst IS genuinely believed at first that this was not the case, this behaviour was subsequently corrected, and a patch was made available on request.

7. Irresponsible Recommendations

It is a widely held opinion in the security and technical communities that Internet users should be encouraged to use "new generation" browsers such as Firefox and Opera. IS recommends IE6 SP2 which is prone to viruses and worms, whereas CS&IT advocates the use of Mozilla.

IS Response

For services on which the business of the University depends, including email, corporate systems, and the portal, Information Services strategy is to adopt commercially supported corporate solutions. Use of other standards and open source solutions may be appropriate for technically advanced advanced users but for consistent support and interoperability with University-wide applications, the Microsoft browser is a necessary and appropriate standard.

Microsoft solutions have been selected to ensure maxiumum compatibility and ease of support. Because supportability of the overall service is paramount we have developed a strong relationships with Microsoft, re-inforced by membership of their Enterprise Support Centre. Both Information Services and Microsoft take security very seriously indeed. When correctly configured and patched there are no significant vulnerabilities in Microsoft products. Further strengthening of The University's information security policies and procedures is planned, and the additional security features of new products such as IE7 and Vista will be leveraged. The advice of JANET Cert and industry security standards is incorporated into the formulation of the Computing and IT standards.

Information Services also enjoys a strong collaborative relationship with the school of Computer Science & IT. We agree that advanced researchers should not be constrained by use of Microsoft products alone, but we also expect expert users to be able to determine their own requirements and address any compatibility issues that arise following deployment of non-standard solutions.

8. SNS line Capacity

It is understood that there is a separate internet line being used by the SNS, separate from the JANET connection. The maximum throughput is extremely low and it seemingly cannot handle FTP connections. Some traffic shaping must be in effect because the only protocols that work well over this line are SSH, RDP and POP3. Quite why these services have priority is unknown. The capacity of this line is not appropriate for access by 10,000 paying students, and students are prohibited from accessing the superior JANET line for protocols other than HTTP by tunneling.

IS Response

There is a separate commercial internet connection for the Student Network. This was done in order to provide students with the widest possible range of applications and services, beyond those permitted on JANET. The most common requirement when the SNS was first established was to allow ICQ and chat. This contravened JANET regulations, hence the separate leased line.

As the numbers of students using SNS has grown, the NTL connection has been progressively upgraded. 3 years ago the bandwidth was just 8Mb/s. This was upgraded to 20Mb/s in 2005, and in 2006 we doubled this again to 40Mb/s. However, at peak times we recognise that demand from over 8,000 registered users exceeds supply, and for this reason it is necessary to apply traffic shaping. This is done in order to ensure that users receive a fair share of bandwidth.

This is achieved in two ways: firewall session limits, and application and subnet traffic shaping.

The firewall on SNS restricts users to a maximum of 30 sessions per person. When uncapped, we observed single users opening up to 2,000 sessions each, which would effectively deny service to other network users. Typically such use would be indicative of the use of unauthorised peer to peer downloading activity, and it is a condition of acceptable use that individuals do not undertake activity that is detrimental to other service users.

Application and subnet shaping is also necessary to deliver fair share of services to everyone. The appliance used is an Allot Netenforcer. We are constantly striving to fine tune this appliance to provide optimum throughput, and to this end we have an Alpha test partnership with the vendor. The Netenforcer works by identifying application signatures from the packet contents, however this does create a lag between new applications being launched and having them recognised by the Netenforcer. There was an issue during 2005 when FTP traffic was incorrectly identified as "other", which would have led to it being given a lower priority than intended. This has been addressed. Subnet shaping provides minimum guarantees to protect bandwidth provision for different areas of the network.

Together these traffic shaping measures continue to be necessary in order to prevent misuse and ensure equal access to resources by all.

Information Services is currently reviewing how the projected bandwidth demands can be met in the future, and is giving serious consideration to re-architecting the connectivity to allow virtually all traffic to use the JANET network following the upgrade scheduled to take place in December 2006.

9. Support Quality

The SNS team has not lived up to expectations. Emails often go unanswered giving the impression that no response was even attempted. Long wait times on the SNS help lines have been experienced, and it takes too ling to fix faulty data points.

IS Response

The SNS Help Line team have benefited from investment in additional resource and systems capacity. At start of session additional temporary staff are hired – and trained - to cope with the extra calls. The vast majority of enquiries are handled in a fully satisfactory manner. Our experience indicates that the vast majority of students are able to connect easily and enjoy a fully satisfactory service, with just 12% of students in halls placing a call to the helpline in the first month of term. However, at peak times it is recognised that callers may not always be able to get through to an agent, and whilst we aim to respond within 24 hours, replies to email may not be made the same day. Information Services strives to further improve the service provided by all our help lines, and in 2007 it is planned to converge the SNS help line with the other IT help lines in order to provide a greater pool of resources better able to cope with the peaks of demand.

The issue of repairs to faulty data points is acknowledged. This work is the responsibility of NTL, and during 2005/6 repairs have taken an average of 6 weeks to complete, which is unacceptable. Information Services is working hard to manage the supplier relationship and improve this service. At the start of the 2006/7 session we recorded around 50 suspected cabling faults. A detailed procedure was developed in conjunction with NTL to first eliminate other potential causes of an apparent cable fault, then to expedite repairs. It is expected that the repair service will show a significant improvement this year.

10. Example of Support Quality

The domain depspace-5.org, used by one student for private email and web was inaccessible through the SNS line. FTP and Pop3 connections failed, and the help received from the SNS and IS was less then satisfactory. The tone of the SNS representative was found to be rude, disparaging, and entirely uncalled for.

IS Response

It is disappointing that the significant effort undertaken by Information Services staff to attempt to resolve this particular problem has not been recognised.

The student concerned refused to believe our diagnosis that the fault arose as a result of two parts of the Internet refusing to peer with each other. The University of Nottingham took the matter up with NTL, but neither they nor ourselves were able to influence the two parties concerned, cogneto and everyone.net. After every possible avenue had been exhausted, the student still refused to accept that nothing could be done, and continued to email us. Information Services acknowledges that the use of capitals in an email response from one member of the SNS team was ill advised, but the standard of service were otherwise professional and courteous. Subsequently, the public internet routing relating to these parties was resolved, so it would appear that the two parties came to a deal. Information Services believes that this verifies that the IS diagnosis was accurate.

11. Conclusion

The above problems have all been reported by more than one individual. So far complaints have all resulted in disbelief and no action being taken. Students are asked to "bring in" their machines for inspection, when in most cases this would alter the test conditions.

The issues show that IS is not meeting industry standards. Far better service is possible from outside the University, but there is only one provider inside the University, and it has monopoly power which is being abused. We would appreciate if the above concerns would be taken seriously and investigated as a matter of importance.

IS Response

Students are asked to bring their equipment in for inspection when telephone support has been exhausted. Room visits have been attempted in the past, but are no longer offered due to the difficulties that arise scheduling and resourcing these. The SNS team at the Cripps Computing Centre has connections which are configured in the same way as the residential network, which allows fault conditions to be easily replicated.

Our survey of users taken at registration indicates that over 80% of machines connected to the SNS are now laptops, which should reduce the logistical difficulty for the majority of owners.

Information Services aims to provide fair and professional support services to all its customers. Whilst it is acknowledged that some of our users have advanced technical knowledge, the majority of students are relative novices to computing, and the service configuration has to be managed accordingly.

The issues reported in the petition have all be thoroughly investigated, and this paper sets out the necessary actions that are being undertaken. We would welcome further input from student representatives to tell us what new services they would like to see, and how the experience can be improved. Students also need to help us by complying with policy and co-operating in providing the necessary information when raising an issue.

Information Services understands the inconvenience caused by loss of systems and services. We acknowledge that the reliability of some parts of the student network during 2004 and 2005 has not been at acceptable level, and that some but not all of the issues reported in the survey have impacted wider groups of students. Our goal is to constantly strive to raise service levels and enhance communications and we would welcome further constructive feedback from the students in highlighting areas where improvements can still be made.