UKERNA

THE **JANET** REPORT

2005|06

Contents

Foreword

Supporting UK competitiveness and learning by delivering information and communication technology services to enable research and education.

If you are close to teenage children you will be only too aware of the pervasive and constant impact that digital media have on their lives – a generation who communicate and form communities in a way not seen before and one barely comprehensible to their parents. In the broader community that we now serve all these young people are today's JANET users, whether they be students at school, college or university, or the new generation of researchers. Can creativity and innovation live alongside security and resilience? One way to ensure that we respond to this challenge effectively is to have a flexible and resilient information and communications infrastructure capable of meeting the needs of all users across education and research.

At the heart of our enterprise is the importance of JANET to UK and international research collaboration. It is essential that researchers can easily work together, irrespective of location, whether sharing knowledge or resources. Research is a key driver for the very existence of the UK's national research and education network. From this core purpose, however, many other benefits flow to the whole community. The new SuperJANET5 network provides an infrastructure based on five core principles – reliability, scalability, separability, flexibility and transparency. These qualities enable a vast range of high-end opportunities, whether it be the carriage of HD video from cameras deep in the ocean, vast quantities of data from the Large Hadron Collider at CERN or the provision of advanced test environments to serve the specific needs of network researchers in ways not previously possible.

This report describes a network that is technologically far advanced from its origins over twenty years ago when a small group of visionary academics saw the need for a dedicated network to provide a resource that could not be obtained from the market. Nevertheless, the original vision still holds true. Today that vision, like the world we live in, has moved forward to a fast and resilient high capacity network flexible enough to meet the needs of a broad user community. Users range from primary school children using videoconferencing in the classroom to particle physicists who are exploring the very beginnings of time itself. SuperJANET5 is truly a network of the 21st century, and throughout its lifecycle will continue to be developed to ensure that those involved in UK education and research are able to retain their competitiveness in a fast changing world.

Tim Marshall

Chief Executive Officer

A step ahead

JANET has always progressed by a systematic series of upgrades in order to guarantee that it stays at the leading edge of networking technology. This year has seen the culmination of the procurement of the state-of-the-art SuperJANET5, the upgrade to the JANET network backbone that will become operational in late 2006 with complete coverage across the UK. The new JANET network will link 19 Regional Networks across the UK and support a potential user base of over 18 million.

SuperJANET5 topology
(SuperJANET5 is scheduled to
become operational in
late 2006)
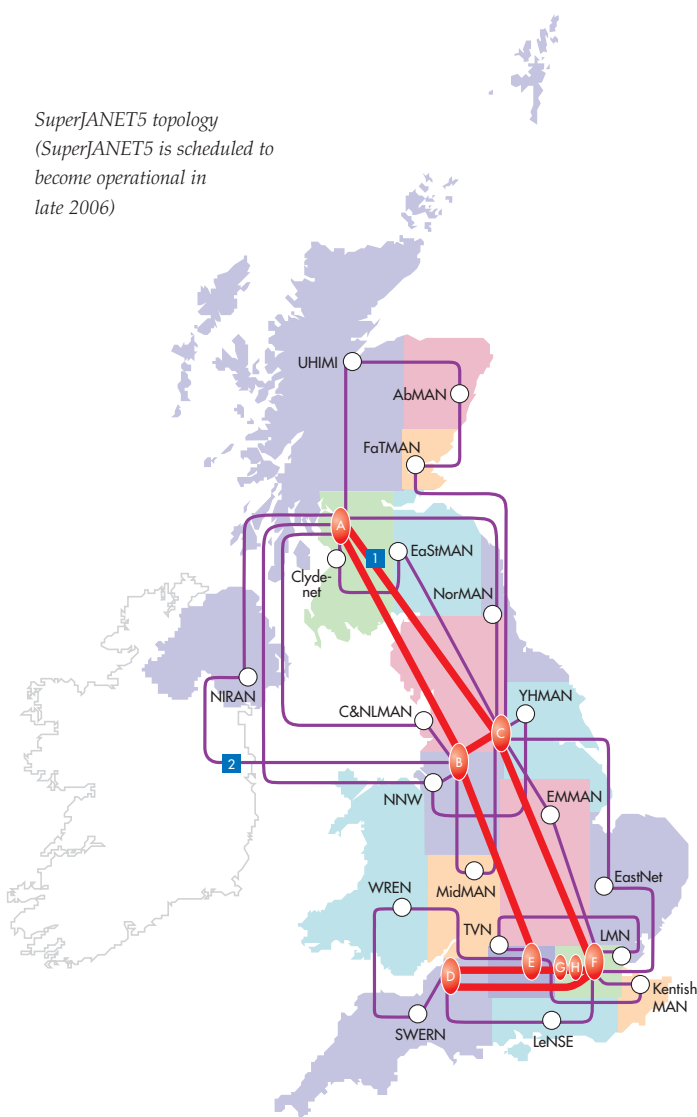
Core Points of Presence

A	Glasgow	E	Reading
B	Warrington	F	London
C	Leeds	G	Telehouse (based in London)
D	Bristol	H	Telecity (based in London)

1	Sco-locate
2	Dublin

SuperJANET5 provides JANET users with leading-edge network services for learning, teaching and research. It delivers a national network which will stimulate the development of ever more cost-effective ways of conducting its users' many and varied activities. A baseline bandwidth model has been agreed based upon present JANET traffic, with the flexibility to add additional bandwidth at marginal costs. In other words the new JANET network will have capacity to support all the requirements placed upon it, whether by production service requirements or by other traffic, to support research and development activities.

SuperJANET5 is a truly world leading network and the challenge now rests with the users of the network in maximising the full potential of this powerful network infrastructure. This does not mean that UKERNA will sit back and wait for this to happen. In addition to an active programme of applications and services development, we will be continuing to support and encourage all users of JANET to ensure the network is utilised to the full benefit of education and research across the UK.

Authentication & Authorisation

In partnership with JISC and Becta, UKERNA will roll out the UK Access Management Federation for Education and Research during the last quarter of 2006. The federation will be implemented and managed by UKERNA, which will be working with JISC and Becta to establish outreach and assisted take-up services. This three-way collaboration ensures a consistent approach to access management throughout the UK education sector.

A UKERNA-led Technical Advisory Group will help define the technical standards to which the federation and its members will operate. A Policy and Governance Group, made up of representatives from the funding councils, will be responsible for endorsing federation standards and policy. A website that will act as the central repository for information on the federation is now in place at **http://www.ukfederation.org.uk**. The website will evolve as the service is rolled out.

Meanwhile, JANET Roaming was launched in May. The new service provides an automated means by which visitors to an organisation can gain network access to the visited organisation's network, authenticated by their credentials from their home organisation.

Quality of Service (QoS)

http://www.ja.net/development/qos

Phase 2 of the JANET QoS Project was launched in September 2005, to run for 24 months. The first 18 months are focusing on development and testing of a QoS (Quality of Service) service model, and producing recommendations for the community. The final six months will look at the actual deployment of QoS services on JANET. Recommendations on the JANET QoS production service will be made at the end of December 2006, based on the results of the project. A Network Performance Survey has been carried out to gather up-to-date information about the JANET community's requirements. The results of the survey will help UKERNA to define the QoS service needed.

The QoS monitoring and measurement system was launched in May 2006, consisting of a central probe at the JANET C-PoP in Reading, with responders installed within the project participants' site networks. The system will be used in several QoS trials carried out during September-November 2006.

IPv6

http://www.ja.net/development/ipv6

As IPv4 and IPv6 are likely to co-exist for many years, activity in this area focuses on providing support for both services and encouraging IPv6 take-up within the JANET community. UKERNA held a hugely successful IPv6 hands-on workshop in September 2005 at the University of Southampton, and another is planned at the University of Lancaster for September 2006. JANET production services are being evaluated for how they can best support IPv6; support for IPv6 has been enabled on the five JANET Domain Name Servers; and dual stack (running IPv4 and IPv6) will be enabled on SuperJANET5 from day one. Guidance is being provided to Regional Networks and sites to deploy dual stack on their network infrastructure. Technical guides have been published on IPv6 and IPv6 Multicast, and an IPv6 tunnel broker facility has been launched to enable automated IPv6 access over existing IPv4-only infrastructure.

SuperJANET5 – the technical facts

http://www.ja.net/sj5

- Built upon 5500 kilometres of high specification fibre optical cabling connecting state-of-the-art Wave Division Multiplexing transmission equipment from Ciena and high performance core IP routing equipment from Juniper Networks.

- Six key locations at the heart of the new network where traffic is routed between Regional Networks and JANET's external links, plus two London-based network hubs providing the majority of JANET's external connectivity to the general Internet and to GÉANT.

- A high speed core operating initially using 10Gbit/s channels but with the capability of using 40Gbit/s channels at a later stage. The core network has a huge scaling capability, supporting 96 channels with a total initial operating capacity of 200Gbit/s.

Virtual Private Network (VPN)

http://www.ja.net/development/vpn

UKERNA launched the JANET VPN (Virtual Private Network) project in November 2005 to investigate the use of and requirement for VPNs within the JANET community. A survey was undertaken in March 2006 to investigate the current state of VPN use within the JANET community, and to understand what the community would need or expect in a possible centrally managed VPN service. The project is investigating a broad spectrum of possible VPN services and technologies, both those that are already available and those that will be in the near future.

Multicast

http://www.ja.net/development/multicast

- UKERNA held a two day hands-on Multicast Workshop on 3 and 4 April 2006 (prior to Networkshop 34) at the University of Hertfordshire's de Havilland Campus.

- The JANET IPv4 Multicast technical guide has been revised and a new JANET IPv6 Multicast technical guide published.

Reliability, resilience and security

JANET's reliability, resilience and security are of critical importance to our customers.

Network Availability

Average overall availability to Primary Connections. May 2005 – June 2006


Reliability and Resilience

JANET continues to provide a stable and highly reliable network service to researchers, educators and scholars (see graph). A significant amount of maintenance was carried out on the core network between May-July of 2006 as Verizon was busy with provision of SuperJANET5, but IP resilience built into the current JANET core meant that the work did not affect service.

Security

UKERNA continues to work with Government and law enforcement authorities to improve the law and its implementation. We have been actively lobbying the Home Office to improve the definition of the proposed offence of supplying hacking tools, to clarify that those performing legitimate security research and providing advice on good security practice will not accidentally be criminalised by a law intended to help prosecute those who assist in computer misuse. Draft legislation in this area has been improved following our comments, as has a proposed law on extreme pornography. UKERNA has also been invited to join an ACPO (Association of Chief Police Officers) working group on the preservation of logfiles following terrorist attacks and other serious incidents.

UKERNA continues to play an important role in disseminating security information to the JANET community. UKERNA Training provides three security related training courses with associated publications which have been run several times already this year: 'Managing IT Security', 'Monitoring Network Performance and Security' and 'Information Security Toolkit' which is based on the
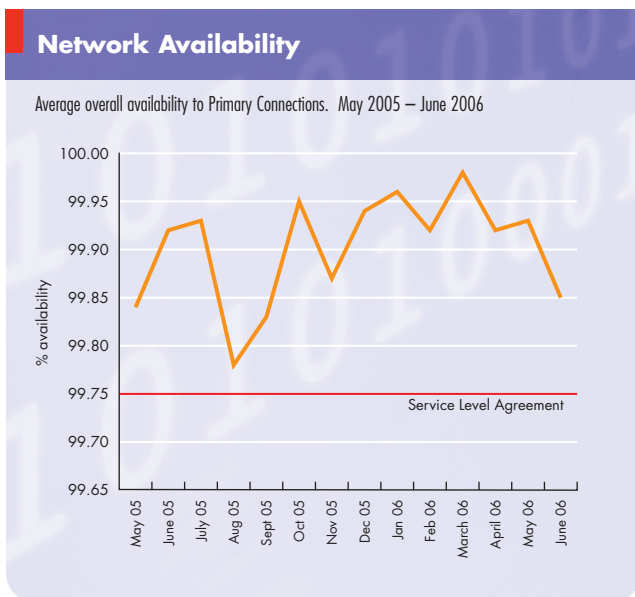
Connectivity

- Following a European procurement carried out in the summer of 2005, two global transit providers – Sprint® and TeliaSonera – were selected to provide JANET with access to the global Internet. Each company provides one 10Gbit/s connection to a JANET C-PoP at Telehouse® and Telecity in London.

- JANET was connected to GÉANT2 in the second half of December 2005. The connection has been upgraded from 2.5Gbit/s to 10Gbit/s, and peak traffic over the new connection now reaches 1.5Gbit/s.

- 163 new or enhanced connections were brought into service this year.

International Traffic over JANET

Peak traffic across GÉANT into Europe
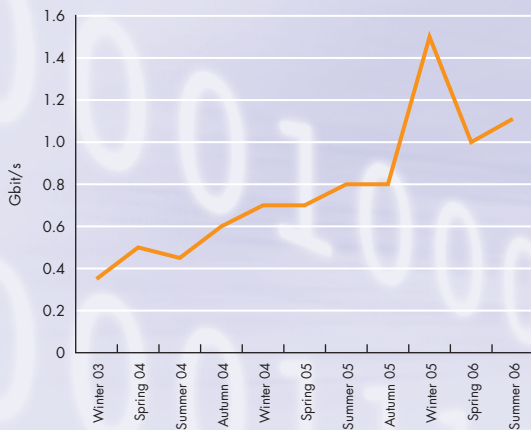
Peak traffic over connections to Telehouse and Telecity into the global Internet
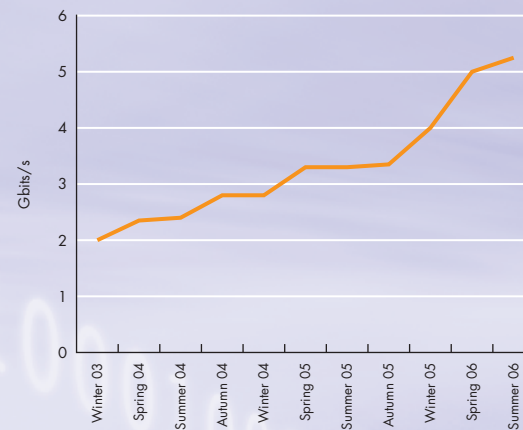
UCISA Information Security Toolkit. A revision of the Toolkit to reflect the 2005 version of the ISO standard 17799 is in progress. UKERNA has also published a guide to good practice for organisations that wish to support the use of Grid technologies, using material from the National Grid Service and other JANET sites.

JANET-CERT

http://www.ja.net/cert/

The JANET-CERT team is taking a proactive stance towards unwanted activity across the JANET core. Good anti-virus protection policies promoted by JANET-CERT and adopted throughout the JANET community have meant little disruption, even though the Nyxem/Mywife virus attack involved ninety systems over fifty JANET sites.

Spam notifications have risen, due in part to Regional Network teams taking a more active role in recording, investigating and reporting such issues. Botnets continue to be of concern, with at least one active controller being detected at a JANET site in March and another in April. JANET-CERT is working closely with external ISPs to minimise the impact of this activity.

JANET connects the UK's education and research organisations to each other, and also to the rest of the world through links to the global Internet. The latest JANET backbone upgrade will ensure that the UK can participate at the cutting edge of international research.

Research Links

UKERNA continues to strengthen its links with the research community. Discussions have begun with the radio astronomy community about potential locations for connecting the antenna arrays that will let the community become involved in the LOFAR (low frequency array) project. Dialogue continues with the Distributed European Infrastructure for Supercomputing Applications project regarding their requirements for dedicated capacity over JANET. The HPCx facility at CLRC Daresbury will be connected to JANET. Three new 1Gbit/s links have been ordered by the European Centre for Medium-Range Weather Forecasts at Reading, taking advantage of new lower tariffs for self-funded connections introduced on 1 August.

Measurement and Monitoring

Thames Valley Network will serve the Diamond Synchrotron light source

Due to the success of the JANET Netsight system in providing network measurement data to JANET connected organisations, work has been underway to review and propose a new system that will build on the strengths of Netsight. Following the results of the JANET Performance Measurement Trial which concluded in mid 2006, it is proposed that the new system will include additional and more granular data that will help users better understand the utilisation and performance of their JANET connection. The new system is proposed for the end of 2007.

UKERNA currently provides network research groups in some UK universities with access to network performance and utilization data from JANET. This work is being extended and will be integrated with SuperJANET5, along with additional facilities that will allow enhanced access to performance data from the core of the network. This work aims to support ongoing and new research into networking in general as well as the future of the JANET network.

To protect user privacy, UKERNA has developed a policy on research use of JANET data, and a contract that must be signed by any researchers and their organisations before they are given access to data from the JANET network. The policy is to protect the interests of customers and users of the network, whilst allowing JANET to be used for research into networking where this can provide useful information for the future operation or design of the network. Results such as automated detection of errors and attacks, or better understanding of the interaction between existing traffic and new versions of the IP protocol, could clearly benefit the whole JANET community.

UKLight

http://www.uklight.ac.uk

The UKLight network has matured significantly during the year with further extensions to the infrastructure. It now reaches ten of JANET's nineteen Regional Networks and 25 circuits are in operation for use by projects within the UK and internationally. The major user communities are particle physics, radio astronomy and high-performance computing, but this is broadening to include network research, medical and health projects and real-time video. Although UKLight will not continue as a separate project, equipment will be retained and the network will become an integral part of SuperJANET5, with the range of circuit-oriented services (bandwidth channels) extended to reach down into the optical transmission layer. Service scope will also be extended to reach all of the Regional Networks. Further take-up of these facilities is expected as they become embedded in the standard JANET service.

Grids

JANET provides the UK element of the international Grid and connectivity to other NRENs through its connection to the pan-European GÉANT network, in which UKERNA is a stakeholder. Grids, which enable the seamless integration of international computer networks, are key components of e-Science. There was a marked but expected increase in use of Access Grid Services in the first quarter of this year – so much so that the Access Grid Virtual Venue Server reached its capacity and was upgraded.

Access Grid Support Centre
http://www.agsc.ja.net/

The JANET Access Grid Booking Service is due to launch in September 2006, and will provide facilities to book multi-site meetings, save configuration files and book Quality Assurance Tests. Meanwhile the Access Grid Online Assessment Tool project, known as Access Grid Check, is now in its first stages of development and the equipment is in the process of calibration by the consultant suppliers nuVIDEO.

Videoconferencing

The VRVS (Virtual Room Videoconferencing System) was launched in February, letting users collaborate more effectively with the international high energy and nuclear physics communities. VRVS reflectors distribute video and audio streams among videoconference users by creating IP tunnels between the reflectors through which the data travels more efficiently. There were 1500 connections in the last quarter and a variety of organisations including CERN, Imperial College London, and Durham and Bristol universities are accessing the servers.

Thames Valley Network

http://www.ja.net/sj5/tvnprocurement.html

- The new dark fibre Thames Valley Network, managed by UKERNA, will come into operation at the end of 2006 and provide a 10Gbit/s wavelength to the Rutherford Appleton Laboratory, supporting (amongst others) their involvement in the Atlas experiment at CERN. Thames Valley Network will also serve the Diamond Synchrotron light source, the largest scientific facility to be built in the UK for nearly thirty years, when it becomes operational in early 2007.

Enriching learning

Videoconferencing

http://www.ja.net/development/video/

The Higher Quality Videoconferencing project began in November 2005 for those sectors of the JANET community that require higher resolution video and audio for videoconferencing, including groups within the arts, music, scientific and medical disciplines.

The project will specifically test MPEG-based videoconferencing equipment that can provide higher resolution audio and video streams than conventional H.323 IP based videoconferencing.

A number of organisations will be equipped with Higher Quality Videoconferencing CODECs and will be tasked with providing feedback on the performance of the videoconferencing equipment and the impact on their local networks.

Meanwhile, as a result of additional funding from the Department for Education, Lifelong Learning and Skills, videoconferencing studios have been procured and deployed in eight Welsh medium schools. Four schools that already had videoconferencing equipment have received technical assistance to develop dedicated rooms suitable for videoconferencing.

JVCS
http://www.jvcs.ja.net/

The Management Centre of JVCS (the JANET Videoconferencing Service) is testing videoconference recording and streaming solutions, as a first step towards an intended service for JVCS. UKERNA also continues to develop a number of related national services, including an ISDN Invoicing Service for launch in September 2006.

Voice

http://www.ja.net/development/voip/

The possibilities offered by VoIP (Voice over IP) for cheaper and more convenient communication have attracted a lot of attention within the community.

UKERNA has produced a positioning statement in collaboration with UCISA which shows the potential pitfalls of the technology and lists means by which JANET-connected organisations can reasonably and safely manage Skype™ on their systems. The statement is available at: **http://www.ja.net/development/voip/skype&janet.pdf**

UKERNA has also published a JANET Voice Strategy that describes the areas in which it will undertake development of voice technologies. Work will focus on gaining insight into VoIP as a technology, and as a resource for

JANET Voice Strategy
http://www.ja.net/development/voip/janet-voice-strategy-feb06.pdf

the JANET community. During this year work included trialling a JANET directory and testing central voice switching equipment which will let users locate each other and communicate using a software client. An initial service offering, based on these trials, is scheduled for 2007. Work is also underway to create a JANET Voice Technical Advisory Service which will be operational in late 2006.

A JANET Voice event was held on 16 November 2005 to disseminate the results of recent work and to help UKERNA further understand the voice requirements of the JANET community.

Delivery of Media-Rich Content

http://www.ja.net/development/content/content.html

UKERNA is helping the JISC Moving Pictures and Sound Working Group with project scoping, procurement and service architecture design for content services. The main content provision projects on which UKERNA is now working are the JISC portal demonstrator, the British Library's audio and newspapers projects, the future EMOL (Education Media Online) service scoping study, and the newsfilm online project.

A Content Access Service has been developed to provide UK-wide access for schools to licensed online educational content, such as British Pathé, Audio Network and the National Archives Learning Curve. Development of the service is overseen by a Content Management Group consisting of representatives from UKERNA, Becta and Regional Broadband Consortia. JANET Customer Service maintains, manages and supports the Content Access Registry of IP addresses.

Serving a broader community
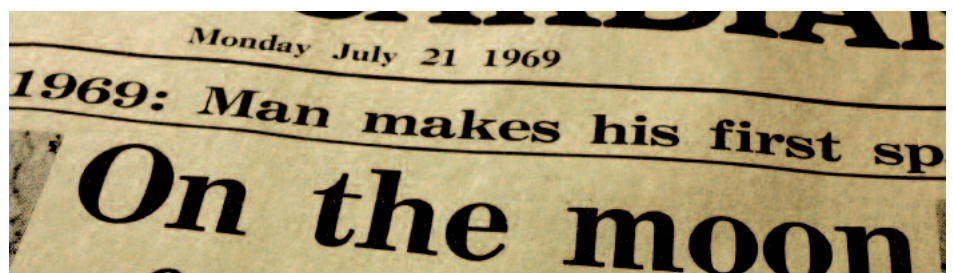
JANET's reach has broadened hugely since its inception over twenty years ago. From its initial brief of providing a network to Universities and Research Councils, JANET now connects Universities, Higher Education Institutions, FE Colleges, Research Councils, Specialist Colleges and Personal and Community Development Learning providers, while its connections to the Regional Broadband Consortia extend its reach into the schools sector.

Schools
http://www.ja.net/community/schools/

Over 3000 schools videoconferences were managed by the JANET Videoconferencing Service (JVCS) during the highly successful Phase 2 of the Videoconferencing Services Project. Most of these were for teaching, tutorials and related activities, with the remainder for administration, system testing and quality assurance. Local authorities joined from England, Northern Ireland, Scotland, Wales and Jersey, and well over 1500 schools sector endpoints are now registered with JVCS.

Over 100 venues took part in London Live, an event organised by London Grid for Learning in association with UKERNA. As well as many schools, contributors included the Science Museum, the London Symphony Orchestra, the National Archives and the National Maritime Museum. Operational support was provided throughout the event by the JVCS Management Centre in Edinburgh.

Over twenty national museums and other key educational content providers are now registered with JVCS. The sessions on offer range from the National Space Centre's e-Missions to the

- The JANET web-based services, Web Mail, Web Filtering and Web Hosting have been extended to the wider JANET community.
- WVN-RhI (WVN-Rhwydiaith), which supports the simultaneous translation of videoconferences into a second language, has also come into operation.
- Indicative of how international recognition of the UK AGSC services is increasing, the Access Grid Support Centre (AGSC) has been extending help to AG nodes from Europe, US and Japan that work in collaboration with UK nodes.

National Maritime Museum's KS1 Literacy module on 'Trim the Cat'. Distance learning providers also deliver a number of A Level courses and tutorials to schools via JVCS. The content providers have welcomed the quality assurance testing of all links by JVCS, which enables them to focus on the delivery of educational content to schools.

Meanwhile, UKERNA is leading TERENA's European Videoconferencing in Schools Initiative (VISIT), along with ARNES (the Slovenian NREN). The aim is to enable and encourage IP videoconferencing in and between schools throughout Europe.

Personal and Community Development Learning

http://www.ja.net/community/acl.html

Seventy six PCDL (Personal and Community Development Learning – formerly Adult & Community Learning) organisations – over half of those in England – were funded for JANET connections in the financial year 2005-2006 and the eleven regional centres of the Workers Educational Association, with 100,000+ learners, have also been connected. The Association is also migrating its existing VPN infrastructure to JANET. Traffic levels in PCDL are increasing as e-learning activities become embedded into the PCDL curriculum. UKERNA is now two years into the three-year LSC funded project to provide JANET connectivity and services for this sector.

NHS-HE Connectivity

There has been close liaison with the NHS in England on their technical plans for the National Library for Health, in particular to make sure that the education and research community's plans for Shibboleth are well understood.

Two well attended NHS-HE Forum meetings took place in the last year. As part of the NHS-HE Connectivity Project, UKERNA also attended the British Healthcare Computing conference in Harrogate in March 2006 and an article about the project appeared in the September edition of the *British Journal of Healthcare Computing and Information Management.*

A survey of existing and required NHS-HE connectivity has been undertaken to support this work and the main results have been presented to the NHS-HE Forum. The approval has now been given for an N3/JANET national gateway to support these requirements. A gateway will now be commissioned, initially to support the applications requirements of selected early adopters.

Specialist and Further Education Colleges

The two-year English FE bandwidth upgrade project has completed with 386 upgrades provided over the project's lifetime. The programme to upgrade Specialist College connections to 2Mbit/s has also completed, and a survey of Specialist Colleges connected to JANET found that an overwhelming number would recommend a JANET connection to a similar Specialist College. UKERNA's account managers have visited FE Colleges across the UK this year with a particular focus on Northern Ireland.

Self-funded Organisations

JANET now connects over twenty self-funded organisations, including the British Library, Cancer Research UK and the DTI. With the new lower tariffs the self-funded community on JANET is growing.

Multimedia

UKERNA has been working with content providers such as the BBC and content services providers such as INUK to understand how to use multicast technology to deliver content to JANET sites. INUK is currently running a Freeview multicast content trial in the JANET community, with UKERNA providing a multicast peer to ensure that this is carried out in the best way possible. In the future UKERNA will be working with other providers who have material appropriate for delivery over JANET.

Total new and upgraded connections 2005-2006	
HE	4
FE	102
Research Councils	4
Specialist	5
PCDL	28
Other	17

Supporting JANET users

JANET's 18 million users cover a wide range of backgrounds and demands upon the network and its support services. UKERNA seeks to support them all through its web site and a programme of training, publications and events, while JANET Customer Service provides essential support to the computer centres of JANET-connected organisations.

JANET Customer Service

JANET Customer Service received over 6000 queries in the last year, most of them relating to the Domain Name registration service, requests and applications for JANET Connections, or queries relating to other JANET services.

Training

UKERNA Training has continued to expand over the past year, with six new courses added to the portfolio during 2006 and another six planned for the New Year. As well as a basic introduction to JANET, present courses cover a range of topics including wireless networks, videoconferencing, networking, security and router configuration. Courses under development include areas such as firewalls, multicast, IPv6 and JANET Roaming.

Each course is run at venues across the country to allow wider participation, and is accompanied by a programme of promotional activities designed to ensure that the community is aware of them. This includes the creation of a course portfolio document and CD. Other developments include the implementation of a new online support and learning facility.

Part of the global network

JANET is the UK's education and research network, but education and research do not stop at a country's borders. They are truly international ventures and JANET is a full member of the global networking community.

Linking to the World

JANET now links to the European NRENs at 10Gbit/s through the newly upgraded GÉANT2.

TEIN2 (Trans-Eurasia Information Network) has established two 622Mbit/s Europe-Asia connections to GÉANT2 and this has replaced the former link providing private peering between JANET and CERNET (China Education and Research Network). UKERNA

is a project partner in ORIENT, which is working with TEIN2 to connect academic networks in China and Europe, and to upgrade the connection to 2.5Gbit/s, enabling e-Science collaborations. The project will support a range of potential e-Science areas including radio astronomy, Grid computing, meteorology, sustainable development and space science.

The UKLight component of JANET is also linked directly to similar facilities in Amsterdam and Chicago. The Amsterdam link is being replaced with equivalent facilities now available via GÉANT2.

TERENA

European research and education networks are at the forefront of networking technology with the provision of the GÉANT2 network, and the development work taking place within the TERENA Task Forces and the GN2 Joint Research Activities. UKERNA will continue to participate with both DANTE (who operate the GÉANT2 network) and TERENA at all levels to ensure that new initiatives will benefit UK users.

UKERNA was represented at the annual TERENA conference in Catania, Sicily in May 2006 and presented a number of papers. A paper on UK and European Videoconferencing Services for Schools was presented to the TERENA Technical Advisory Council.

SuperJANET5 will bring with it many opportunities for the delivery of new and enhanced JANET services. One of the high priority developments for the coming year will be to package its bandwidth capabilities into a managed bandwidth service to support the needs of research groups across the UK. This will build upon the excellent achievements of UKLight, as this facility is integrated fully into SuperJANET5.

The efficient provision of bandwidth on demand will continue to be a strategic development. Presently bandwidth needs to be provisioned manually, at the request of an individual research group, and it is a time-consuming business. The vision is to exploit the optical technologies now appearing on the horizon to automate this process and, ultimately, for it to be under the control of the individual application requiring the bandwidth. These technologies will also be fundamental to the design of SuperJANET6. Therefore it is essential that a vigorous programme of development in optical technologies is put in place. A start on this will be made over the next twelve months.

The capabilities of SuperJANET5 will also need to be integrated with the many other strands of network engineering and associated developments that are already well established. New multimedia content and services such as voice and TV, delivered over the IP network, will become increasingly important. Underpinning technologies such as IP multicast will be essential enablers, and their development will be continued. These will need to be augmented by appropriate security and access control. Tools to provide identity management such as the UK Access Management Federation will be vital to this; so will means of providing network access to each user of JANET, regardless of location, via the further development of support infrastructures exemplified by the JANET Roaming Service. The overall purpose of these developments will be to build and improve JANET continually as the environment for delivery of a diverse range of high quality content and services.

These, and the many other activities that will be undertaken over the next year, will only be possible by strengthening and deepening UKERNA's delivery partnerships. Work already under way to build a more focused delivery partnership with the Regional Network Operators will be completed. Partnerships with other regional and national networks, such as those delivering broadband to schools and to the NHS, will also continue to be developed. Third-party services and content providers will be encouraged to deliver innovative and cost-effective services across JANET. Increasingly, with the advent of federated services, an individual organisation connected to JANET will need to take on greater responsibility in playing its part in delivering services to members of other organisations.
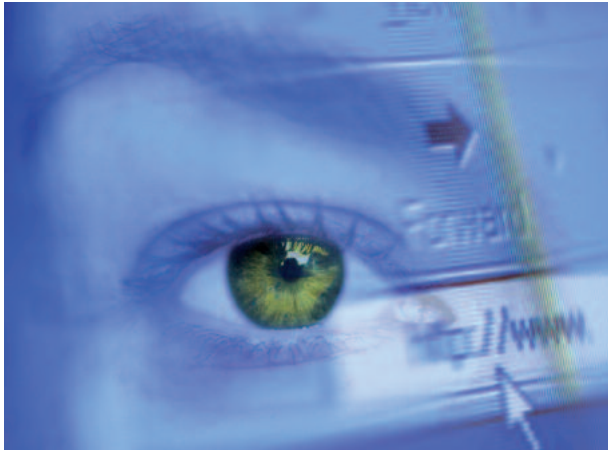
In each of these relationships UKERNA will always seek to ensure that the roles and expectations of all partners are properly defined. Equally, its own contributions will always be made in a spirit both of transparency and of inclusiveness.

Bob Day

Chief Technology Officer

Image Credit

Image on page 6 courtesy of Diamond Light Source Ltd.