JANET *News*

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Editorial

When JANET began 25 years ago it linked a collection of university and Research Council sites. The cables that physically created the JANET backbone went into specific locations, therefore that was where users had to be to get JANET access.

Even then no one thought that education and research are just about learning in an ivory tower. Sometimes the ivory tower must be left behind. People need to get out of the office to collaborate, or research in the field, or simply access information and other IT resources not available locally. Access to information could be solved by inter-library loans, possibly taking up to a couple of weeks; access to other IT resources could mean a visit to the regional or national computing centre to get at data and processing power, or possibly having to send data and programmes in the post and getting output back in the same way. (In 1974 the academic world was spending at least £15,000 per annum on courier services, swapping data on disc or tape by the vanful: poor latency but an excellent data rate.) The fact remained that even simply going home in the evening could inevitably cut you off from the network.

Various technologies helped ease this limitation over the years, not least the World Wide Web and peering with other networks. Just lately, however, technological advances have meant a whole sea change in the ways the network can be accessed.

A feature in this issue focuses on three projects under the JANET Network Access banner: mobile learning, remote access in the field, and the different strategies employed by the Kent Public Service Network for reaching users right at the network's edge. We also report on developments in JANET Roaming, the service that lets you access JANET using another organisation's facilities, and the recent Network Access event held in London by JANET in November. Delegates here were shown how technologies such as mobile broadband, mobile IP and local loop unbundling are eroding the limitations on gaining network access. Put another way, even though much still needs to be done before adequate broadband becomes universal, those limitations are becoming invisible.

October's FOTE 2009 conference (Future of Technology in Education: www.fote-conference.com), chaired by JANET(UK)'s CEO, had as its core themes Cloud Computing, Social Media and Mobile Learning. Speakers highlighted the different models of education that are emerging: models that are as far from the traditional ivory tower as can be imagined but which highlight the importance of invisible, effortless network access as never before.

The Lisbon Treaty, which came into effect on 1 December, contains the principle of there being a freedom of knowledge, whereby knowledge can be accessed and exploited without barriers. This is similar to other European Community freedoms such as free movement of people and of goods and services. Networks such as JANET and GÉANT are seen as exemplars of this principle, with the potential to achieve much more in this respect.

Education and research are the constants in this rapidly changing field, and JANET continues to research and develop new technologies so that we can always meet users' expectations and requirements – however far they may have come from when it all began.

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Third Generation GÉANT Launched

GN3, the third generation of the GÉANT network, was officially launched on 1 December. The project will run to 2013 and has been awarded funding of €93 million from the European Commission under the EU's 7th Framework Programme, with a matching amount from European National Research and Education Networks (NRENs). The new project means that JANET users can share vast quantities of data and collaborate across multiple disciplines with much of the rest of the world with even greater ease.

GÉANT is the dedicated high-bandwidth pan-European network that links 40 million research and education users through Europe's NRENs, providing advanced interconnectivity through 50,000 kilometres of mostly optical fibre. The network is managed collaboratively by 32 NRENs across Europe, which fund it jointly with the European Commission. It was built and is operated by DANTE on behalf of these NRENs. GÉANT and the national networks including JANET form the GÉANT Service Area, a 'network of networks' that offers reliable, seamless and transparent end-to-end connectivity and support services to create the most advanced international research network in the world. The portfolio of services offered includes virtual private networks with reserved bandwidth capacity for specific project requirements, network performance monitoring tools, and secure roaming and authorisation services.

Notable user projects enabled by GÉANT include a telemedicine project to bring essential healthcare services to remote parts of South America, and the Large Hadron Collider (LHC), the largest scientific experiment ever undertaken which will generate some 15 petabytes (15 million gigabytes) of data annually. This huge amount of data is distributed to 11 primary processing centres around the world including the Rutherford Appleton Laboratory in Oxfordshire, which connects to GÉANT via JANET's high capacity Lightpath service into London.

GÉANT also extends its reach through links to NRENs in other world regions including North America, the Asia-Pacific region (TEIN), Latin America (RedCLARA), Central Asia (CAREN), the Mediterranean (EUMEDCONNECT), China (ORIENT), sub-Saharan Africa (Ubuntunet Alliance) and the Black Sea region (BSI). These links are continually being improved, as shown by the recent announcement of dedicated high-speed links between South Asia (in Mumbai) and both the TEIN3 network (at Singapore) and GÉANT. Many JANET-connected users are already making excellent use of these connections: for example, UK research institutions at the Rutherford Appleton Laboratory, the European Bioinformatics Institute and the European Centre for Medium-Range Weather Forecasts between them account for a significant part of the overall GÉANT traffic which comes from South East Asia. The project will also seek to address the digital divide faced by the research and education community, by working towards stabilising the cost of connectivity and improving network links across Europe.

Presentations, photos and other details from the launch event are available at:

http://www.geant.net/Events/LaunchEvent/pages/home.aspx

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JANET and GÉANT

JANET(UK) staff and members of the UK academic community have been involved with the new programme in various ways from the outset, and many were at the launch event. Their work has helped place the UK at the heart of European networking and enables us to influence its direction to the benefit of our own community.

- Bob Day, CTO of JANET(UK), is a member of the Board of DANTE, the Cambridge-based organisation which runs the GÉANT network and several other similar joint programmes to provide connected networks in other parts of the world (e.g. ORIENT with China, TEIN with S.E. Asia). The Board's role is to ensure that these programmes meet the collective needs of the participating NRENs' stakeholders in the most cost-effective manner.

- Josh Howlett, JANET(UK)'s Middleware Architect, has been seconded to the GÉANT programme to lead a key activity on federated end-user services.

- As an indication of the regard JANET(UK) is held in by the European research and education network community, our Head of International Relations, Steve Hogger, has recently been elected to the GN3 Executive Committee which is responsible for ensuring successful delivery of the programme.

- A team from Essex University Photonics Research Laboratory, led by Professor Dimitra Simeonidou, is working on another key GN3 task relating to photonics research.

JANET Support for Internet Watch Foundation

JANET(UK) is pleased to announce that its Chief Regulatory Adviser, Andrew Cormack, has been elected as Chair of the Internet Watch Foundation's Funding Council. As part of its commitment to safe and responsible use of networks, JANET(UK) has been a funding member of the IWF for several years.

The Internet Watch Foundation (www.iwf.org.uk) is the independent self-regulatory body that operates the UK's hotline for reporting illegal content (indecent images of children, criminally obscene images and incitement to racial hatred) on the Internet. The IWF works with UK network and hosting providers and peer organisations in other countries to minimise the availability of such content. Since the founding of the IWF in 1996 the proportion of such material hosted in th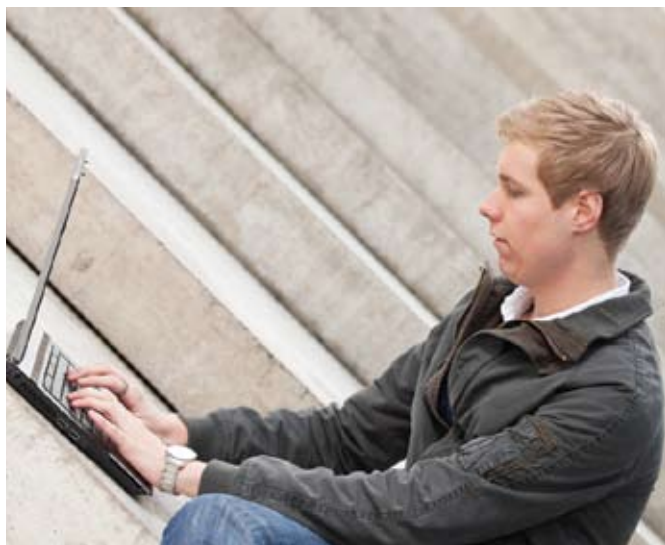e UK has dropped from 18% to under 1%; over the past four years the availability of material from international sources has also decreased significantly.

The Funding Council consists of all members who fund the IWF – currently more than 90 organisations from across the Internet industry – and is responsible for advising on the IWF's budget, providing input to the IWF Board on industry views on IWF policy and approving the IWF members' Code of Practice.

JANET Roaming Update

The number of participating organisations in JANET Roaming is now at 110 and use of the service during October reached the highest level ever. New developments in terms of service development and documentation aim to increase this even further.

Participating organisations can now enter details about the service they offer at individual sites into the JANET Roaming Support database. This information feeds through to the service availability maps on the JANET Roaming web site and the eduroam international locations availability maps (see Roaming Online). Visitors find such information very useful since it includes the exact location of the site, the wireless ciphers necessary to configure portable devices to connect at the particular site, the number of wireless access points, and whether hard-wired connection is possible.

Meanwhile, in response to demand from the community, further technical advances mean that IT departments can now make the multi-RADIUS server implementations that underpin the service more efficient by dedicating servers to the specific roles of authentication or accounting. This will be of tremendous help in the context of testing and development as such servers will not be sent production traffic but they will be sent test traffic that has been specifically addressed to them. For example, when a replacement server is being commissioned, it can be connected to the JANET infrastructure and tested to ensure that its configuration is correct and that it is handling authentication traffic successfully without disturbing the operational service at the organisation. Software upgrades can also be tested before being brought into production: sometimes these require a significantly different approach to the configuration and server administrators cannot simply migrate their previous configurations.

On the documentation front, two business case papers have been produced and are available on the JANET website for download. **JANET Roaming Benefits: A Toolkit for Making the Business Case** is for managers building the case for the introduction of the JANET Roaming service at their organisations. It contains a brief description of some the issues surrounding provision of network services for guests; an introduction to JANET Roaming; more detailed implementation scenarios; a discussion of the benefits afforded by JANET Roaming for both the individual and the organisation; quantified cost and effort estimates of implementing and supporting a JANET Roaming-based guest access service; and some brief case studies that highlight the experiences of representative institutions that have implemented JANET Roaming.

Meanwhile **Executive Summary – the JANET Roaming Service** will be useful to members of IT departments who wish to inform senior management about JANET Roaming. It comprises a concise two-page statement of what the service does, why it is desirable, what the key benefits are for both organisation and users, and how these map on to typical institutional high-level strategic objectives. A detailed diagram is included to help explain the technical operation of the service.

The new documents are available at: www.ja.net/services/authentication-and-authorisation/janet-roaming/documentation.html#putting_business_case

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Roaming Online

A useful development on the European eduroam front is a zoomable map of Europe detailing the various site locations of all eduroam-enabled organisations. Zoom in on a site, represented by an eduroam logo and a pop-up bubble displays the institution name, address, SSID and wireless network encryption methods at the site. The URL of the map is: http://monitor.eduroam.org/eduroam_map.php?kml=europe_capital

The information available through the European zoomable map system is sufficient to enable users to configure their laptops and portable devices to connect to the guest networks at the sites. For the UK, far more detailed information is available through the JANET Roaming maps pages at: http://www.ja.net/services/authentication-and-authorisation/janet-roaming/participating-organisations-map.html. These show the site locations, the postcode, a link to the institution's 'how to use eduroam at this site' web page; the number of wireless access points; the wireless encryption methods; whether wired connection service is available; NAT, proxy and port limitations; and the status and type of eduroam service offered.

Eduroam European map

http://monitor.eduroam.org/eduroam_map.php?kml=europe_capital

JANET Roaming maps

http://www.ja.net/services/authentication-and-authorisation/janet-roaming/participating-organisations-map.html

New JANET Certificate Service

The new JANET Certificate Service was launched on Wednesday 18 November 2009 as the successor to JANET's highly successful Server Certificate Service.

A server certificate guarantees that communications between a browser and server are encrypted and cannot be read in transit by a third party, so that confidential information can be passed across the network safely. It also gives some assurance of server identity: users can trust that the web site to which they are passing information is the one they intended to visit. Through the JANET Certificate Service, certificates are issued via the Comodo Certification Authority.

The new service, like the old, is provided free of charge but is now much faster, as a new simple online interface replaces the old paper-based applications procedure. The interface also offers a range of new features that enable the automated processing of certificate requests, along with the ability to monitor and manage new certificates that are issued. It also includes certificate revocation and automated alerts when these certificates are close to their expiry dates. The online interface allows federated access for nominated contacts: once registered, nominated contacts will be able to access the service by authenticating with their home institution's Identity Provider rather than relying on the username / password combination provided by JANET(UK).

Migration

Existing customers are being helped to migrate to the new service in order to take advantage of these additional features. These changes will not affect the high levels of service provided to customers with existing certificates.

Under the old Server Certificate Service, certificates were issued via the GlobalSign Certification Authority. JANET(UK) is pleased to be able to announce that all GlobalSign certificates issued as part of the original service will now continue to be valid for their stated lifespans. This means that organisations in possession of certificates issued as part of this service will not need to replace these certificates by April 2010. Please note, however, that any additional certificate requests for the old service will not be accepted after 11 December 2009.

Customers who did not use the old service but now wish to join the new JANET Certificate Service for the first time should refer to the service overview on the JANET website at: http://www.ja.net/services/jcs/service-overview.html

'The new service, like the old, is provided free of charge but is now much faster, as a new simple online interface replaces the old paper-based applications procedure.'

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JANET Certificate Service
http://www.ja.net/scs/
If you have any questions about the new service please contact the JANET Service Desk – telephone **0300 300 2212** or email **service@ja.net.**

N3 JANET Gateway Upgrade Ordered

NHS Connecting for Health formally agreed the business case in September for a jointly funded full N3 JANET Gateway service to follow on from the current early adopter. This has now been ordered and delivery is expected by April 2010.

Unlike the current early adopter N3 JANET Gateway the new service will take all network traffic between N3, the core network for the NHS in England and Scotland, and JANET, rather than only the traffic of selected early adopter services. It will be resilient with an active and standby link incorporating geographical separation by using POPs in London and Manchester. The existing early adopter N3 JANET Gateway will continue until the new service takes over. As the current route through the N3 Internet gateway is overloaded through most of the working day, the main initial benefit will be a much improved response to University web services accessed from N3.

The new N3 JANET Gateway will provide the infrastructure for future developments for sessions initiated in JANET to access N3 services. The information governance for this is being tackled as a parallel project. Any developments with early adopter use by NHS Trusts across the N3 JANET Gateway will also be subject to a separate business case.

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November NHS HE Forum
The latest NHS HE Forum took place on 19 November. Programme and presentations are available at www.nhs-he.org.uk/forum.html. The next Forum is planned for 19 May 2010.

Internationalised Top Level Domains

As one of the world's leading research and education networks, JANET contributes to and tracks international development, governance and standardisation forums associated with the Internet. Rob Evans, JANET(UK)'s Senior Technical Specialist, reports on some recent changes to Internet domain names.

The Internet Corporation for Assigned Names and Numbers (ICANN) has made a decision to engage in a trial of country-code top-level domains in character sets other than the simple ASCII most of us type into our web browsers and e-mail clients today. An example of an existing country-code top level domain is the .uk in the web address of a UK-based organisation. What this means is that next year domains will start appearing with Unicode characters in the top-level domain, for example 中国 for China.

To reach this point has taken over a decade of work in the engineering and policy communities.

Internationalised Domain Names (IDNs) have already been around for several years. Some countries in Europe have allowed accents and umlauts in second level domains and further down the hierarchy. Many countries in Asia allow registrations in local scripts – 35% of domain names in Taiwan use IDNs. The decision by ICANN takes this to the next logical step, allowing domain names that can be represented entirely in a local script. This is a trial and is limited to countries with existing two-letter top-level domains so that its impact can be studied. Allowing generic top-level domains such as the equivalents of '.com', '.net', '.biz' and '.museum' in non-ASCII characters is still some way off, and is unlikely to happen until the impact of the country registrations is studied and the demand for such top-level domains is understood.

The process is far from over and there are still political decisions that are coming back for technical solutions. For example CNNIC, the registry for the Chinese top-level domain, would like to ensure that if China is represented by both the traditional and simplified Chinese characters at the top level ('中國' and '中国' respectively), then a query for a name in either will resolve identically. Enhancements to support for scripts that are read from right to left are also incorporated into newer revisions of the IDN specifications that are almost complete in the IETF.

There may be limited demand for IDNs within the UK but some JANET institutions are already starting to register internationalised versions of their names in other top-level domains. Many foreign students choose to study here and they may well be using IDNs regularly for communication with home, leading to support issues that JANET sites will have to deal with. For example, most modern web browsers will be able to display IDNs correctly if the relevant fonts are installed, but if they are not then the browser might display the punycode – a means of representing Unicode in the ASCII character set – question marks, or empty boxes. The story with e-mail clients is even more mixed, with few of them understanding punycode in the 'From:' line. There is also the potential for phishing attacks that register names using internationalised characters that look like ASCII characters but take the customer to a completely different website if they just click on a link. These are unsolved problems at the moment; however JANET staff are developing practical advice to assist organisations affected by this change.

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The Future of Ultra HD

Broadcasters, television networks and equipment manufacturers have fully embraced High Definition television, but researchers are now looking beyond this to technologies that offer significantly higher resolution content, stereoscopic video and multi channel sound way beyond that offered today. Streaming the emerging media formats over the Internet today is not possible without a substantial deterioration of their quality. One of the challenges facing JANET(UK) is how we address the ever-increasing demands of network delivery and the distribution of Ultra High Definition and other emerging media formats beyond present day HD.

JANET(UK) is a key infrastructure partner for the University of Essex, which opened its new Media Laboratory – the first European facility to offer an 8K node – to researchers, networkers and media professionals on 12 November. Through funding by HEFCE via JISC, JANET provides the JANET Aurora facility, an optical fibre testbed connecting the photonics laboratories of five UK universities including Essex. JANET also provides the lightpaths that let the university link to its collaborative partners internationally.

The new laboratory offers unique transmission and visual capabilities, with the ability to stream

currently classified as High Definition. Advanced presentation facilities, including 3D imaging, combined with a high performance experimental network enable the design and

implementation of services specifically created for high quality, large-scale digital media, including support for extremely high volume media streams (this can vary between 150 Mbit/s to 10Gbit/s). The university is equipped to study real convergence between next generation networks and very high quality media by delivering content-aware networks and network-aware media solutions.

'JANET(UK) is keen to work with Essex on this significant piece of media technology research.' says Tim Marshall, CEO at JANET(UK). 'JANET was developed 25 years ago in support of the research community and it is they who continue to drive the ongoing development of the network. Network development and media capture technologies are changing at a rapid rate, and with new applications and delivery mechanisms emerging daily, it is essential that the network can respond to the "real" needs of its users.'

'JANET(UK) is keen to work with Essex on this significant piece of media technology research'

Research in this area will represent a major departure from traditional Internet-based digital media systems, which have limited capabilities for supporting very high-capacity streams. The new laboratory offers an open test-bed for future digital media innovation and data-intensive applications with advanced visual requirements.

This technology has attracted interest from the entertainment world (TV networks, Hollywood and Bollywood) and the highly advanced visualisation features will be of particular interest to the medical and scientific worlds which need ultra high resolution images to be transferred in real time, without losing quality. The world of architecture, and the car industry, have also been investigating Ultra HD technology for virtual modelling.

Essex has already been involved in a variety of international Ultra HD projects, and during the launch event of the new laboratory a Ultra HD video was streamed in real time to the university from Poznan Supercomputing and Networking Centre in Poland, using a dedicated 1Gbit/s high speed link through national and European research network infrastructures. The Essex team has also collaborated on projects with Korea and Japan and three new EU projects plan to use the media lab for testing new network technologies in January 2010.

Ultra HD Special Interest Group

JANET's Ultra HD Special Interest Group was set up to help drive future networking requirements in this area and build up community expertise and interest. Group member Karen Padmore is Director of Visualization at CAST (Centre for Advanced Technology), based at Bangor University. CAST has been working with the University of Essex to provide 8K content using real-time computer graphics converted to high resolution movie files. 'The lack of 8K content available demonstrates one of the real challenges facing Ultra HD technology at the present time,' says Karen.

'At present there are no commercially live 8K resolution cameras available, so lower grade material is being captured, then manipulated for display on 8K projectors.'

Another major consideration facing Ultra HD technology, says Karen, is how the content is distributed and stored: 'With the demand on existing Internet resources already stretched, the delivery mechanisms required for high speed media streams will need to be considered when developing this technology; as will storage, if vast amounts of footage needs to be amassed.' To drive this technology forward, Karen expresses the need for the standardisation of protocols and an infrastructure capable of seamlessly converging media acquisition, storage, delivery and presentation devices. It is also important to note that the media requirements are now being driven by the users themselves, demanding a richer, more interactive experience and a variety of ways in which to access media content. It is therefore important to gauge user perspectives.

The JANET Special Interest Group, says Karen, 'will help CAST keep abreast of what's happening in the field of Ultra HD, as well as giving us the opportunity to collaborate with others and see how the computer graphics side of this technology fits in with Ultra HD video. It is a great opportunity to use our high resolution, real-time content to exercise the system and exploit the capabilities.'

JANET(UK) is currently in the planning stages for the next generation of the JANET network which will need to take into account delivery requirements for these and other emerging media formats.

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JANET provides the lightpaths that let Essex link to its collaborative partners internationally. Essex is also a partner organisation for the JANET Aurora network, a dedicated dark-fibre infrastructure which provides a platform to support photonics and optical systems research and development without the constraints of normal production network traffic.

Network Access Focus

This edition of JANET News contains a number of articles from participants in JANET(UK)'s Network Access programme. Their common characteristic is that they describe work whose main thrust was locally driven but whose scope was expanded and captured for the community by participation in a Network Access project. Two of them give a flavour of using wireless networking in innovative contexts 'off-grid' and the third sketches some of the issues around edge connectivity to large regional networks. The projects to which these articles relate will start to publish results early next year, so hopefully these tasters will encourage readers to come and visit the Network Access pages on the JANET(UK) website to get the full story.

There is also a report on the Network Access Event 2009 in London. This free one day conference sold out in the first couple of days of booking, and sold out again after the available places were nearly doubled. It consisted of a mix of reporting of JANET's activities in the area, technical talks on relevant topics, and an opportunity to provide direct feedback to JANET(UK)'s strategy around future Network Access activities. The presentations for this day were filmed and are at **www.ja.net/development/network-access. html**

Readers also may have been contacted recently (or be about to be contacted) by a consultancy group acting on JANET(UK)'s behalf, looking at the ways in which mobile broadband is used in their organisation. Our grateful thanks go to all readers who were able to give their input: the more feedback we can gather, the better focused our plans for these technologies and development of JANET services will be.

If you have any enquiries arising from recently published results, current or future projects, or general issues around network access technologies in general, don't hesitate to contact Mark O'Leary. We would especially like to hear from anyone who plans or is doing something innovative in the Network Access area!

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Rural Communities benefit from Mobile Learning Centres run by Northumberland College

Rural communities and businesses will no longer have to travel long distances to access Northumberland College's courses – its new £200,000 state-of-the-art mobile learning centre will come to them.

The new mobile learning centre (MLC), which had proved so popular with businesses that it could not meet the demand, serves people living and working in the north and west of Northumberland, whilst the existing vehicle continues to provide training to the south east of the county. The custom-built vehicle transforms into a fully IT-equipped mobile training venue at the touch of a button, with layouts including conference mode, classroom and even a mini hair and beauty salon.

One of the challenges was to provide high speed Internet connectivity to the mobile learning centre users in remote areas where 3G is not available. The college looked into using high gain antennas and multiplexing low strength 3G but it was not enough to be shared among multiple users.

The satellite Internet connection, on the other hand, has proven to be fast and reliable in rural areas lacking the facility of 3G. The satellite equipment on the MLC searches for the GPS, aligns the dish automatically (according to the parked location of the vehicle) and provides broadband equivalent Internet speed.

The Internet service is distributed to the mobile users outside the vehicle as well as laptop users inside the MLC, using wireless access points and in effect acts as a mobile

wireless hot spot. The satellite Internet service is not reliant on any mobile network services such as 3G and provides fast data transfers in rural and remote areas.

The college is also engaged in JANET's Portable Wireless LAN project and plans to involve the MLCs to extend the WLAN for the field courses. The objective will be to provide Internet access to users on field courses by using line of sight repeater stations that connect back to the satellite on the MLC.

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ERA: Extending Remote Access to Science Fieldwork

The Open University's Enabling Remote Activity (ERA) project (projects.kmi.open. ac.uk/era) has been investigating the use of a rapidly deployable temporary WLAN for connecting students and lecturers in fieldwork locations. Several of the OU's geology students are not able to reach some of the locations on their fieldwork courses: in response to this the project has been developing mobile and networking technologies to enable students to work remotely with a field geologist.

Since the ERA project began in 2006 it has looked at the use of a portable WLAN to support remote access to field locations as well as remote collaboration between field and lab based students over a backhaul Internet connection. The JANET Portable WLAN Programme has helped the project improve its network configuration and investigate alternate backhaul connections.

ERA's work is distinct from other forms of virtual fieldwork in that the technology enables live remote access to field locations and geologists. The educational experience relies heavily on the interaction between the remote student and field geologist. Therefore, continuous two way voice data is critical to maintain the dialogue. Video images further support a sense of presence and

'ERA's work is distinct from other forms of virtual fieldwork in that the technology enables live remote access to field locations and geologists'

photographs can be used to relay a significant amount of detail. By working as close to the field locations as possible, students get a sense of context and by embedding the use of the Portable WLAN technology within a course along with other fieldwork resources, such as rock samples, they are able to develop the practical skills of fieldwork.

Previously, the project's Wi-Fi network used Mesh and Wireless Distributed System (WDS) configurations: however, the bandwidth distribution across these networks did not support voice data very well. The Portable WLAN programme has helped the project investigate alternate network configurations and it is now using pairs of WDS configured routers on separate radio channels to act as relay points, one receiving data connected by an Ethernet cable to the second which then transmits the data. This approach improves the throughput of each network node as the routers' radios are only being used to receive or transmit the data (but not both). This has allowed VoIP (audio and video) calls to be made reliably between locations several kilometres apart (although further distances are possible) on a local network with an available bandwidth of 20 to 30Mbit/s.

Locating students close to fieldwork sites is not always practical, particularly for field trips outside the UK. The backhaul trials the project has been able to do through the Portable WLAN Programme have let it investigate the potential of live links to distant fieldwork sites. Mobile phone coverage is rapidly extending and becoming a realistic option for data links to field locations. Satellite tariffs are also becoming more affordable. As well as the backhaul link itself the project has been investigating server technologies for streaming voice and video data, along with images and other data, from the (limited bandwidth) field link to anyone on the Internet. By having a single link to the field which is then webcast on an OU server, the project hopes to maximise the use of the bandwidth available to the distant location.

Copper or Glass at the Edge?
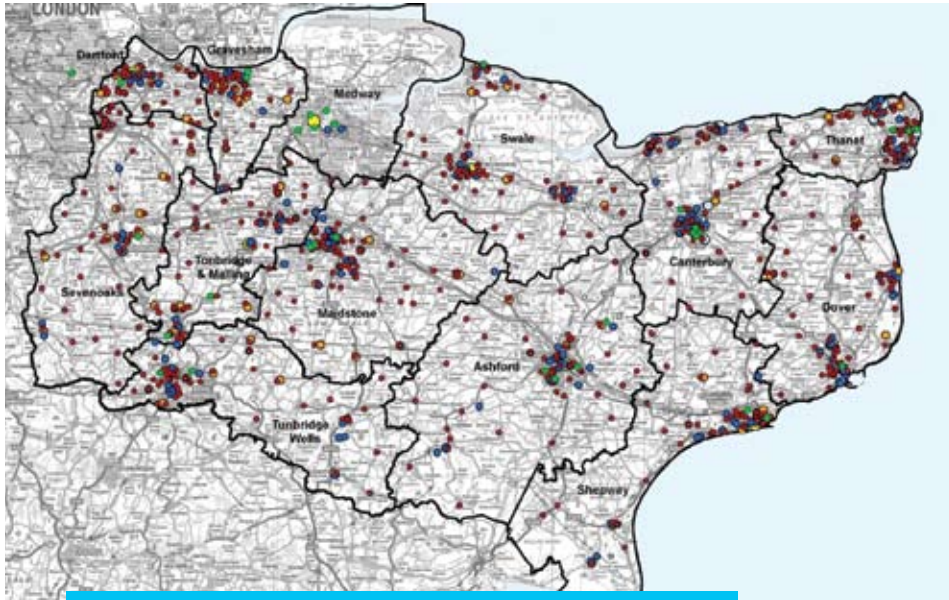
KPSN Connected establishments

Red = Schools   Blue = District Council
Orange = Libraries   Yellow = Local Gov.
Black = youth clubs   Green = HE + FE

The Kent Public Service Network (KPSN – www.kpsn.net) is a partnership of 12 District Councils, the County Council and schools: 1188 establishments in all. JANET provides the Internet transit via the Kentish MAN with dual, diverse 10Gbit/s connections. Here we explore the selection of edge circuit technologies as part of the JANET Local Loop Unbundling (LLU) Project.

Optimising edge circuit cost is an interesting challenge as it comprises half the cost of a wide area network. In Kent, Higher and Further Education are reaching out by placing establishments at over 30 locations nearer to the student, mostly in towns. Of the county's 597 schools, 40% are in rural areas and can be up to 15km from a network node. 380 Local Government connections include libraries, youth clubs, offices and an increasing number of health related establishments.

Experience to date

While KPSN is optimistic about the future, funding is becoming tighter. Kent has traditionally invested in fibre connections to schools despite the cost. Its experience of ADSL copper circuits was poor; although far cheaper, they were unreliable, slow to repair and failed to deliver the bandwidth required. Recently KPSN has installed 255 LLU circuits to Council premises at under a quarter of the circuit cost of fibre.
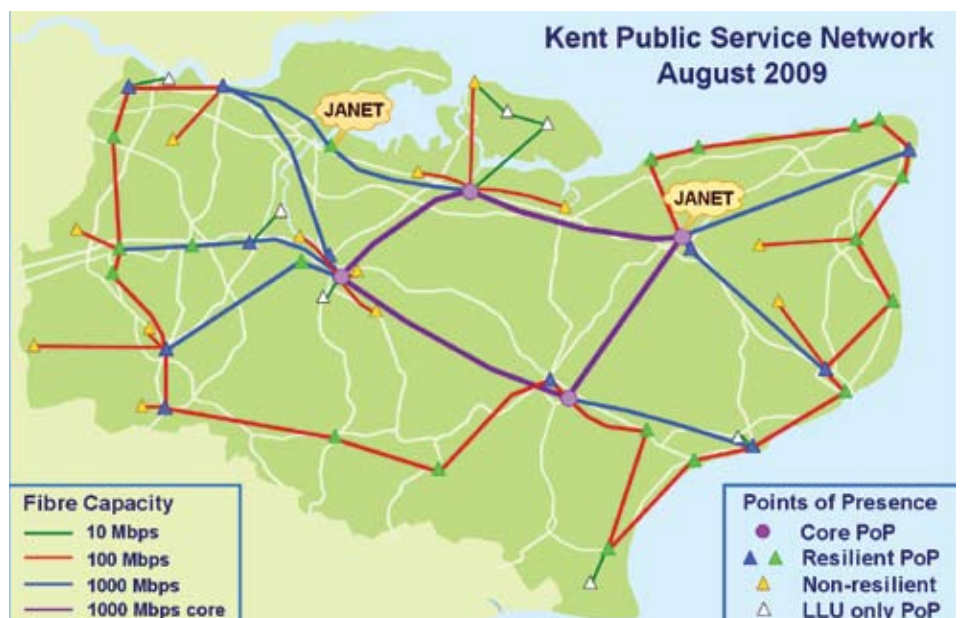
The JANET LLU Trial

The Trial has enabled KPSN to exchange experience of LLU circuits with colleagues in Yorkshire and Humber, East Midlands, Cumbria and Lancashire. Early results from practical installations show that single LLU circuits can deliver up to 6Mbit/s symmetric at 1.5km route distance from a telephone exchange and up to 6km at reduced bandwidth. It is also clear that many establishments require the higher bandwidth, greater distance or the higher reliability available from fibre.

Schools' interest in LLU has also been demonstrated by the National Education Network survey which showed that in May 2009, 17% of all UK schools were connected using LLU, the most popular single connection technology.

A key requirement of LLU is a core network to backhaul equipment placed in telephone exchanges. Fortunately the KPSN core connects 51 of the 137 telephone exchanges in Kent. This backbone is a significant investment and KPSN is exploring ways that its capacity can be shared more widely across the whole public sector.

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Kent Public Service Network August 2009

Fibre Capacity
— 10 Mbps
— 100 Mbps
— 1000 Mbps
— 1000 Mbps core

Points of Presence
● Core PoP
▲ Resilient PoP
△ Non-resilient
△ LLU only PoP

Network Access Event 2009

Enabling 'anytime, anywhere' access to campus network resources is becoming increasingly important as new ways of working, supported by new devices and applications, become not just popular but the norm. In particular, the range of available wireless technologies can prove the key to helping organisations develop network access strategies to meet these challenges. In such a rapidly changing environment, IT managers need up-to-date information to help them maintain a secure, flexible and responsive network that meets their users needs.

At the recent JANET Network Access event in London, delegates came together to focus on ways to extend the reach of their networks outside the normal campus perimeter and make them more responsive to changing usage patterns within it. Delegates were invited to impart their experiences and influence JANET(UK)'s future network access strategy, as well as benefiting from feedback on the existing programme of activities .

John Hagerty from Forescout reaffirmed the need for Network Access Control (NAC) within organisations, not only to address the growing threat to network security from external sources (such as USB sticks, smart phones, laptop mobility, guest access etc.) but also highlighting other less obvious uses of the technology. In his presentation he outlined the differing approaches to NAC and how organisations need to take a wider view of this, from identifying potential threats to securing their LAN, modifying user behaviour and deploying techniques to control and manage networks.

Stuart Bailey from Infoblox continued the focus on secure access control, with a fascinating introduction to IF-MAP, a protocol initially designed to enable 'next generation' NAC but increasingly finding a wider range of applications. He described the system as 'social networking for machines, where everyone tells everyone else what they are doing.' By enabling standardised infrastructure coordination through the publication of dynamic state information, a much richer aggregated dataset is available to inform policy-based decisions such as access control and network management. IF-MAP was previously unknown to many delegates and this introduction stimulated a lot of discussion about its potential applications in education.

Mark O'Leary gave a taste of the results from recent JANET network access trials in Local Loop Unbundling, Mobile IP and Location Awareness, providing an overview of JANET(UK)'s position on these various technologies and showing how these very different technologies all contribute towards a unified approach to network access. In the second part of his talk, Mark set out the planned future activities in this development programme. A major theme to emerge from this was the potential value of ubiquitous mobile broadband off-campus.

'The Irish education and research community is a step ahead in delivering mobile broadband to staff and students'

The Irish education and research community is a step ahead in delivering mobile broadband to staff and students. Nick Murray from HEAnet shared his experiences of creating a subsidised national wireless broadband service based around 3G dongles by partnership with a major telephony provider. At the current stage of rollout of this service, education users constitute some 6% of the mobile broadband market in Ireland, with take-up expected to double this year; clearly the service is popular.

Overall, the event offered a balance of reporting current experience, discussing future directions, and encounters with some novel technologies that may impact the future development of network access. Videos of all the presentations, and technology overviews, case studies and reports from trials referred to in them, are available at the JANET website: http://www.ja.net/development/network-access.html

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JANET at Community Events

Event attendance

JANET staff attended a wide range of events throughout the various sectors of the JANET community during the last quarter, such as the GÉANT launch event reported elsewhere. The list below is an example of some of our other activities.

Regional Support Centres

The Regional Technical Forums for IT Managers, hosted by the JISC RSCs, are very active events offering presentations by suppliers, college demonstrations of developments, and JANET updates. JANET staff attend these events to ensure that attendees are aware of the services offered with their JANET connection.

Socitm Annual Conference

The Society of Information Technology Management (Socitm) is the professional association for ICT managers working in and for the public sector. Members are currently drawn primarily from Local Authorities, the police and fire services, housing authorities and other locally delivered public services.

The JANET stand was very busy over the three days of the conference, and was visited by new and familiar faces. The theme of the conference was 'Re-inventing local public services – radical thinking, practical solutions'. This was particularly apt in today's economic climate with the prospect of public spending cuts and concerns over how to mitigate the impact on all public sector services.

JANET, as a world-leading, publicly funded network built specifically to provide services for the education and research sector, will be able to provide the necessary infrastructure to enable greater innovation in these challenging times. It already supplies connections to more than 100 Local Authorities and is able to offer them very cost effective, highly reliable, high bandwidth access to the National Education Network and to the Internet. It has been designed primarily for education traffic but it can carry a Local Authority's other traffic too.

Scottish Learning Festival

JANET(UK) exhibited at the Scottish Learning Festival held in the SECC in Glasgow in September. The SLF is now firmly established as the pivotal event on the Scottish education calendar. It was attended over the two days by over 7000 educationalists from Scotland, the rest of the UK and overseas.

Delegates enjoyed an extensive conference programme, a range of discussions and presentations, and a dynamic exhibition, as well as a wealth of materials in the Learning in Practice area. Together these attractions showcased the exciting and innovative practice that is abundant within the Scottish educational community. Delegates also had the opportunity to hear about new initiatives and approaches to teaching and learning from across the world.

JANET(UK) provides an interconnect for Glow (previously known as the Scottish Schools Digital Network) and, as in England, Scottish Local Authorities and schools benefit from the services JANET can offer. The JANET stand received many visitors from HE, FE, Local Authorities and schools with services such as videoconferencing and JANET txt attracting a lot of interest.

Scotland's Colleges

JANET(UK) attended a meeting organised by Scotland's Colleges in Stirling for the ICT Communities of Practice group. David Rose from Open Group considered the role of IT in times of change and thought about possible future scenarios for IT in colleges. Other presentations addressed issues such as wireless networking and virtualisation. JANET's Wireless Advisory Services and the new Virtualisation Fundamentals training course may be able to assist colleges thinking about implementing these technologies.

Association of Colleges Conference

The Association of Colleges aims to be the authoritative voice of colleges, existing to represent and promote their interests and provide members with professional support services. With attendance at the event reaching over 1200 participants, along with access to key stakeholders, college senior management teams and Government Ministers such as Kevin Brennan and Lord Mandelson, it is essential JANET(UK) participates, particularly within the current, changing political and economic landscape.

FOTE 2009

Chaired by JANET(UK)'s CEO Tim Marshall at the Royal Geographic Society, and managed by ULCC, the Future of Technology in Education 2009 event had a focus on Cloud Computing, looking at the issues for the community and debating if this was a way forward.

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UK federation in Practice – Case Studies from the Community

The UK Access Management Federation
FOR EDUCATION AND RESEARCH

Members of the community shared their experiences of implementing federated access management at a successful cross-sector event held by the UK federation on 14 October. Delegates listened to presentations from HE, FE, schools and service providers that highlighted the different approaches required for each sector.

As well as the service provider view, Nicole Harris gave an update on JISC-funded work on identity and federated access management within HE and FE, and Paul Shoesmith presented initiatives by Becta that are reinforcing its commitment to rolling out federated access management in the schools sector. It was also very encouraging to see how schools sector service providers are working to

implement and promote federated access management, with Britannica, Just2Easy and EducationCity providing a small exhibition of their federated services.

Simon Cooper, UK federation service manager at JANET(UK) said 'It was great to have representations from all sectors at one event. We can all learn from the differing solutions deployed across the community.'

Andy Swiffin, a speaker at the event from Dundee University, echoed this view. '[It was] very exciting to see the way federated access management is rolling out in places like schools.'

Video presentations are available on the UK federation website at http://www.ukfederation.org.uk/content/Documents/Presentations. To be kept up-to-date

with information from the UK federation or involved in discussions, readers can sign up to the mailing lists UK Federation Announce and UK Federation Announce Discuss at http://www.ukfederation.org.uk/content/Documents/MailingLists.

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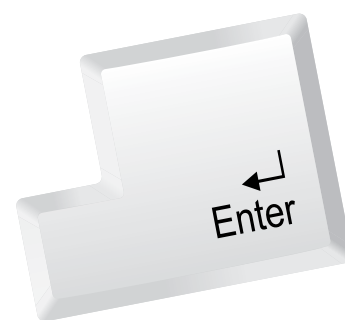
Access Grid Puts MAGIC into Maths

An Access Grid project set up to increase the number of courses offered in mathematics is now in its third year of a full programme of postgraduate lectures covering all areas of the subject, and the original 14 partner universities have increased to 19 with more wishing to join. Funded by the Engineering and Physical Sciences Research Council and using Access Grid technologies, the MAGIC project broadcasts maths lectures to postgraduate students based at all of the partner sites.

The project uses the IOCOM commercial software that is supported by the Access Grid Support Centre (AGSC). Systems have been set up in each room used for the lectures to enable all students attending to register their attendance and log in to the session. All students are then able to see not only the lecturer but the students at all of the other sites. An interactive whiteboard is used so that lecturers can annotate as they would in a usual face-to-face lecture, and a presentation

is shared to all sites. All participants can communicate with each other and the lecturer either by speaking or by use of the instant messaging tool included in the software.

The scalability of Access Grid technologies has meant that the MAGIC project has been a tremendous success. Professor Jitesh Gajjar, one of the project leaders said, 'The project is creating a culture change in the way that we train our PhD students. Before MAGIC only a few of the large institutions had the resources to give postgraduate lecture courses. The smaller institutions with just a handful of research students were not in a position even to contemplate giving such training. Post-MAGIC, PhD students not only in the UK but also worldwide have access to live lectures and online resources in every area of mathematics.'

At present the MAGIC project is part of a pilot project that is recording the lectures, building on work from the Collaborative

Research Events on the Web Project (CREW) based at the University of Manchester. This will ultimately allow the users to see the recordings using Flash. As well as showing the presentation and the speaker, this tool will also show the whiteboard and convert the video streams automatically, minimising the overall effort of the user.

The support of the AGSC and the ongoing commitment of the individuals and institutions involved will allow this project to continue to succeed. With more Universities waiting to join the MAGIC project, and the exciting prospect of being able to record sessions easily and securely, the future of Access Grid technologies in teaching looks set to be highly successful.

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Strategic Briefing Day
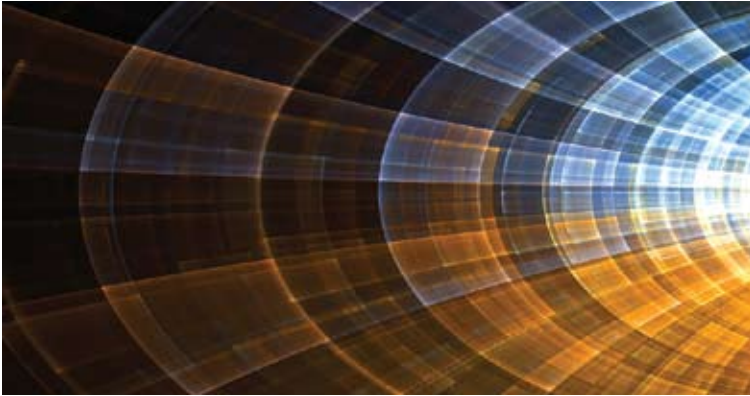
JANET(UK)'s Strategic Briefing day took place at the Institute of Physics on 30 November. Over 110 delegates attended the event and a further 10 watched the event over the videostream. The day comprised a number of presentations with plenty of discussion time throughout

Roger McClure, the chair of JANET(UK), opened the day by reminding the audience of the constraints that the whole community is working under in this difficult economic climate. Tim Marshall, Chief Executive Officer, followed with a stimulating talk on JANETUK)'s Corporate Strategy for 2010/12, detailing the changes which would have to take place as the company goes forward in what will be challenging times in the future.

Jeremy Sharp, Head of Strategic Technologies, gave an update on the JANET Backbone changes to extend the SuperJANET5 contract to 2013. Mark O'Leary then updated the audience on mobile networking while Dan Perry, Head, Strategic Business, presented the current status of JANET's work in shaping a sector-wide strategy for shared data centres.

The afternoon session was devoted to Regional Network delivery in the UK. A consultation paper had been distributed to the audience the week before the event: see **http:// www.ja.net/services/connections/janet-sites/ mans/.** Bob Day led with a presentation on 'Improving the Regional Network Delivery Model' which was followed by a panel session with discussion. The audience was given the opportunity to discuss the planned model in groups before the general discussion.

Copies of the presentations can be found at: **http://www.ja.net/services/events/2009/ strategic_briefing/programme.html**

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Forthcoming Event: BETT Show 2010

JANET will be demonstrating the power of videoconferencing at the BETT Show, Olympia, London in January 2010.

Visitors will be invited to experience the rich and varied videoconferencing content available from providers such as National Archives, Direct Education, Burnley and Pendle Faith Centre, Clitheroe Castle, Lancaster Castle and the National Space Centre.

If you are interested in finding out how videoconferencing can enhance teaching and learning at your school, make sure you visit us on Stand J50. You can find out more about the recently launched Recording, Streaming and JVCS Desktop features of the JANET Videoconferencing Service, and see why schools all over the UK have taken part in over 12,000 videoconferences over the last 12 months.

The show will take place at Olympia, London on 13-16 January 2010.

Forthcoming Courses

ja.net Training

Forthcoming Events 2010

BETT Show 2010

13th - 16th January 2010
Olympia, London
Come and see JANET on stand J50

Networkshop 38

30th March - 1st April 2010
University Place,
The University of Manchester

JISC Conference

13th April 2010
QEII Conference Centre,
London

JANUARY

Introduction to DNS	**January 7th 2010 - Glasgow**
JANET Roaming Fundamentals	**January 7th 2010 - Glasgow**
Wireless LAN Fundamnetals	**January 26th 2010 - Bristol**
Using Logfiles for Security	**January 26th 2010 - Bristol**

FEBRUARY

Managing IT Security	**February 2nd 2010 - Bristol**
Virtualisation Fundamentals	**February 12th 2010 - Belfast**
Introduction to the UK Federation	**February 23rd 2010 - Birmingham**
Implementing a Shibboleth 2 Identity Provider	**February 24th 2010 - Birmingham**
Implementing a Shibboleth 2 Identity Provider	**February 25th 2010 - Birmingham**

MARCH

Introduction to JANET	**March 9th 2010 - Glasgow**
Introduction to DNS	**March 16th 2010 - Birmingham**
JANET Roaming Fundamentals	**March 17th 2010 - Birmingham**
Computers, Privacy and the Law	**March 25th 2010 - Cambridge**

Dates and online booking for all courses are available on our website.

A mailing list is available for the distribution of information regarding JANET training courses. Discussion of training requirements relating to the JANET network, suggestions for new courses, locations or course frequencies are also welcomed. To join this list, access the JISCmail site at: **http://www.jiscmail.ac.uk/lists/janet-training.html**

Events Calendar

http://www.ja.net/services
/events/calendar-2009.html

Reports

Quarterly Report to the Community (August-October 2009)
http://www.ja.net/services/publications/reports/quarterly-report/qr-autumn09

The JANET Report 2008-2009
http://www.ja.net/documents/publications/reports/janet-report/report2009.pdf

Newsletters

JANET News 9
http://www.ja.net/documents/publications/news/news-9.pdf

Leaflets

Videoconferencing (38 (10/09))
http://www.ja.net/documents/services/video/videoconferencing.pdf

The Benefits of Videoconferencing (39 (10/09))
http://www.ja.net/documents/services/video/benefits-of-videoconferencing.pdf

Supporting Research (010 (11/09))
http://www.ja.net/documents/development/support-for-research/research-booklet-09.pdf

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