



JANET Roaming Benefits: A toolkit for making the business case

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Executive summary

This document provides JANET-connected organisations with the information and tools to assess and develop their own business case for the implementation of JANET Roaming.

It is intended that JANET-connected organisations will be able to use this material, with suitable adjustments to suit individual circumstances, to build and develop their own business cases for the implementation of JANET Roaming. We encourage interested organisations to cut and paste the relevant sections to suit their particular business case.

By helping organisations interested in the service to put together a detailed and quantified business case, the aim of this document is to extend uptake of provision of the service, thereby widening availability and increasing the value of the service to all members.

A **brief description** of some the issues surrounding provision of network services for guests is followed by an introduction to JANET Roaming. More **detailed implementation scenarios** then follow, leading to 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 are followed by an indication of actual usage of the service, which shows that it is already proving of real benefit and value to many members of the community. Finally some brief case studies are provided that highlight the experiences of representative institutions that have implemented JANET Roaming.

Introduction

Many organisations recognise the benefits of offering guest network facilities for visitors from other JANET-community organisations, and increasingly visitors have come to expect such a service when they visit top level institutions. Organisations also recognise the benefits for their staff of being able to utilise network connectivity when they visit other organisations.

There are a number of widely implemented ways of providing guest network services, most of which have drawbacks of cost or security weakness. JANET documentation¹ is available which describes these in detail. JANET Roaming solves the problems and provides the solution for JANET-connected organisations that want to offer high quality secure guest network service via their JANET network connection for visitors from fellow education and research organisations.

User authentication is a prerequisite for access to the JANET network and most academic networks across the world. This creates the costly administrative problem of issuing and managing temporary network access accounts for guests. It also results in frustrating delay and inconvenience for visitors. JANET Roaming can reduce or eliminate this problem.

Through the JANET Roaming infrastructure and world-wide links to other national education networks resulting from our membership of the worldwide eduroam confederation, logon authentication requests using the user's existing username and password are tunnelled securely from the visited organisation's network to the guest's home organisation for evaluation. Once evaluated, the response is returned to the visited network access server and the user admitted or denied access, as appropriate, to the network. The immediate benefit for IT Support teams is that the administrative workload of managing guest accounts is minimised. The service is highly convenient for end-users since guest accounts do not need to be set up and their own username and password is used regardless of location. This leads to huge time savings for both user and host organisation. There are also considerable cost savings compared to alternative solutions, since the service is free of charge at point of use.

Visitors to participating JANET Roaming/eduroam sites quickly gain straightforward, secure access to full JANET network service, enabling access to the Internet, home organisation networks via VPN, web mail etc., and to such resources on the visited site network as the host organisation wishes to provide. Connectivity for own laptops, handhelds and other mobile devices is generally made available by wireless network and often also through hard-wired network outlets for users with more demanding network requirements. Additionally many organisations decide to provide network-connected workstations for guest use.

JANET Roaming is a federated service and is built on a standards-based implementation. This has contributed to its growing success which is further encouraged by the increasing participation of many like-minded organisations. One result of this is the emergence of a wide community knowledgebase which complements the support service provided by JANET. There are now over 100 registered participating organisations in the UK alone which means that the service is already widely available throughout the whole of the UK ([see map of JRS locations](#)) and, through our membership of the global [eduroam](#) confederation (see below), [across Europe \(map\)](#) and in many countries [around the world](#).

¹ Network Access for Guests. <http://www.ja.net/documents/publications/technical-guides/network-access-for-guests.pdf>

Introduction - main points

- JANET Roaming solves the problem of how to provide secure guest network service via the JANET network connection for guests from other JANET-connected organisations.
- Guest logon authentication requests are tunnelled securely from the visited organisation's network to the guest's home organisation.
- Benefit for IT Support teams: minimisation of the administrative workload of managing guest accounts.
- Benefit for users: no need for guest accounts to be set up.
- Visitors have straightforward secure access to full guest network service over JANET.
- Visitors utilise their home organisation username and password, regardless of location.
- Huge time and cost savings for both user and host organisation.
- JANET Roaming is based on standards-based implementation.
- Service is already widely available throughout the UK: maps of locations are available on JANET website.
- Through eduroam, the service is also available in many countries around the world.

About JANET Roaming and eduroam®

JANET Roaming is a RADIUS-based authentication service built on IEEE 802.1X technology that securely forwards a guest's authentication request to their home organisation, so eliminating the need to manage guest network accounts at the visited site. This is achieved seamlessly over the JANET national infrastructure of RADIUS servers and similar infrastructures throughout eduroam. Authentication of the guest is achieved by utilising the same authentication system at the home organisation that is used when the user connects to the network on their home site.

Eduroam is the international confederation of national research and education networks which have implemented parallel initiatives worldwide. Users from any eduroam partner country can gain network authentication at education and research organisations in 34 European countries, 5 countries in the Asia-Pacific region, and in Canada.

Depending on their current infrastructure, there are a number of ways that organisations can begin to participate in JANET Roaming / eduroam and benefit from the service:

- a) **Where RADIUS and 802.1X already form part of the authentication system**, the major requirement is for the RADIUS server to be peered with the JANET national RADIUS servers and for the requirements of the JANET Roaming technical specification to be met. These include the establishment of a guest network (VLAN) with access control provided through 802.1X. In such situations, both 'Home' (identity provider) and 'Visitor' (guest network service provider) services can easily be provided.
- b) **Where RADIUS is not already deployed**, JANET Roaming can most simply be implemented on a 'Home' organisation-only (identity provider) basis. This requires deployment of a RADIUS server and integration with the organisation's user database. This will allow users to make use of the service at other participating organisations they visit. Provision of network services for guests can be implemented as a second stage.
- c) **Where 802.1X is being rolled out to underpin the wireless network for an organisation's own users**, RADIUS will form a part of the infrastructure and JANET Roaming can be implemented as an integral part of the project. Such organisations will be able to take advantage of the technical advisory support provided through the JANET Roaming and JANET Wireless Technology Advisory services.

To make implementation of Home organisation service as straightforward as possible, whilst it is not mandatory, participating organisations should ideally have a centralised authentication system to underpin single network logon rather than disparate department-based user databases for local networks. In this regard parallels can be drawn to an extent with the UK Access Management Federation which requires centralised user identity management systems at federated organisations.

For end-users to make use of the eduroam service all that is required is for them to belong to an organisation that participates in JANET Roaming and they must have a network logon account. They can then access the service from any workstations that the visited organisation may provide for guests, or from their laptops and portable devices through a guest wireless network. Straightforward configuration of the 'supplicant' element of the wireless connectivity software on their laptops is all that will be needed.

To support organisations' implementation of JANET Roaming, JANET has produced comprehensive documentation; a 'JANET Roaming fundamentals' training course; a dedicated support, monitoring and control server; and a joining and technical support process. To support end-users JANET maintains a web site which includes a locations map with pop-ups of the service details at each site.

There are various alternative means of providing network services for guests but all of these have serious security, administrative or cost drawbacks as detailed overleaf.

The key differentiators between JANET Roaming/eduroam and commercial 'open' access systems are:

- the **security of the technology** that eduroam is based on – preventing eavesdropping of usernames or passwords through the interception of authentication traffic
- the fact that **eduroam is the only administration-free system** that enables organisations to provide guest network facilities over the JANET network
- eduroam is **free of cost at point of use**, since it uses the organisation's JANET connection and in many cases existing 802.1X infrastructure

For further information on the provision of guest networks see the JANET technical guide: [Network Access for Guests](#).

Commercial 'open' access systems are based on web redirection technology that is inherently insecure. In JANET Roaming and eduroam, communication between the access point and the user's home organisation is based on the IEEE 802.1X standard. 802.1X encompasses the use of EAP, the Extensible Authentication Protocol, which allows for different authentication methods. EAP provides the best defence against authentication eavesdropping currently available. Depending on the EAP method that the organisation chooses to employ, either a secure tunnel will be established from the user's computer to the home organisation through which the actual authentication information (username/password etc.) will be carried (EAP-TTLS or PEAP) or alternatively EAP-TLS will be used, which utilises mutual authentication by totally secure public X.509 certificates.

About JANET Roaming – main points

- JANET Roaming is a RADIUS-based authentication service built on 802.1X technology.
- Forwarding authentication requests to home organisations eliminates the need to manage guest accounts at the visited site.
- Organisations can begin to participate in JANET Roaming in a variety of ways at varying levels of complexity depending on their current level of 802.1X deployment.
- JANET provides comprehensive documentation; a 'JANET Roaming fundamentals' training course; a dedicated support, monitoring and control server; and a joining and technical support process.
- The JANET Roaming web site includes a locations map with pop-ups of the service details at each site.
- Unlike commercial open access web-redirect based systems, JANET Roaming offers state of the art security based on the IEEE 802.1X standard.

Benefits for the user

Feature	Benefit
No need to go through the process of getting a guest account set up at every organisation visited	Convenience and avoidance of lost time
Same username and password regardless of location	Enhanced convenience
Guaranteed availability of broad set of protocols from guest network	Access to Internet, e-mail, VPN etc. services provided by home organisation, leading to improved efficiency
Network access at all participating organisations – worldwide, helping to meet need for ubiquitous network access	Facilitates mobility, collaboration, secondments, meetings and study
Free of charge at point of use: no subscription or usage charge	No subscription or airtime charges to pay
High security – credentials are never exposed and authentication interface cannot be hijacked	Assured security of credentials when utilising eduroam guest (or home) networks

It can be difficult to quantify the above benefits to the end-user as users have widely differing usage patterns and many of the benefits are intangible or hard to evaluate. However, as can be seen, the benefits are considerable.

Just to focus on the time saving when it comes to getting access to a guest network: if we estimate that it takes half an hour to go through the process of getting a guest account set up and the user makes half a dozen visits a year, then it can be seen that **for just one user, three hours time saving can easily be realised in a year.**

Benefits to the user – main points

- Convenience and avoidance of lost time – a user making 6 visits per year could save 3 hours on guest account administration per annum.
- Enhanced convenience through use of same username and password at all eduroam-enabled institutions.
- Improved efficiency and more effectiveness when visiting eduroam-enabled institutions due to access to Internet, e-mail, VPN etc. services.
- Collaboration, secondments, meetings, mobility, and study facilitated.
- Free of charge at point of use – no subscription or airtime charges to pay.
- Assured security of credentials when utilising guest eduroam networks.

Benefits for the host organisation and network manager

Feature	Benefit
Facilitates setup of JANET-compliant network facilities for guest visitors – including for ad hoc visits, pre-arranged visits and conference attendance	Attract visitors and meet the expectations of visitors from eduroam-enabled organisations (now in excess of 100 across the UK, not forgetting the wider international eduroam community)
Removes administrative burden of guest account setup	Improve productivity of IT Support staff
Enables provision of secure remote authentication service for own staff and students when visiting other organisations	Enables network users to connect to eduroam guest networks when at remote locations and so to benefit from guest network services when away from home site
Sets common security standards and enables traceability	Meeting need for common security standards and facilitates malware/misuse problem investigation
Fully supported JANET service	Risk of project time overrun or failure eliminated and efficiency of implementation improved

The benefits for an organisation in providing network facilities for guests of the organisation are self-evident. Increasingly visitors expect a guest network service when they come to an organisation on a one-off visit or for more extended periods of working. Whilst there are a number of ways of supplying this, JANET Roaming offers a secure way of providing such a service through the JANET network and has the significant advantage of no per-user administration effort.

By implementing JANET Roaming a participating organisation will attract visitors, meet their expectations of an eduroam guest network service being available and enrich the experience of their visit to the organisation. As a Home organisation (identity provider) the organisation will also provide a valuable service for its own users for when they travel to other organisations.

Quantifying the above benefits to the organisation is difficult as many of the benefits are intangible. Whilst it is self-evident that the provision of network facilities for guests is beneficial to an organisation, the administrative cost of managing individual guest account credentials is not trivial. To focus on the time involved in managing guest network user accounts, if we estimate that it takes 10 minutes to set up and distribute the credentials for just one guest account and the IT department is required to service 1 request per day, this amounts to some 43 hours per year – 6 working days. With JANET Roaming, this per-user management is eliminated. Therefore **just one eduroam visitor per day would result in savings of 6 IT department working days**, making the investment in deploying JANET Roaming worthwhile on time saving grounds alone.

The rationale for implementing JANET Roaming becomes even more compelling if an 802.1X infrastructure is already in place or is planned. Utilising 802.1X is in many cases the sensible solution when enhancing security on a network and in many cases will be a cornerstone of a secure wireless network. Having installed a RADIUS server for this purpose, most of the work will have been done on the path to implementing JANET Roaming. Introduction of JANET Roaming is then a small step and will provide a valuable service to users and guests.

Host organisation and network manager benefits – main points

- Attract visitors from eduroam-enabled organisations and meet their expectations of guest network facilities.
- Improve productivity of IT Support staff through reduction of guest account management.
- Just one eduroam visitor per day could result in savings of 6 IT department working days.
- Improve productivity of own network users when away from home site by enabling connection to eduroam guest networks when at remote locations.
- Meet need for common security standards and facilitate malware/misuse problem investigation.
- JANET Roaming support service eliminates risk of guest network implementation project time overrun or failure and reduces overall implementation timeframe.

Capital Cost and Effort Estimates

Description – hardware/software	Example configuration	Cost	Notes/Alternatives
Purchase and deployment of a RADIUS server	Hardware – standard specification 1U server	£1,000	The implementation of a single organisational RADIUS server is the lowest cost solution. A cost saving option would be the selection of a non-Intel-based platform. Options for more enhanced deployments include the provision of multiple RADIUS servers for load sharing, fault tolerance or to permit dedicated roles – e.g. for front end proxying only or load sharing. The cost estimate does not include any allowance for rack mounting or network connection/switches etc.
Server OS	RedHat – Basic subscription	£217	Standard subscription (with phone support) £497
RADIUS software licence	Radiator – Single server software only, 1 year	£527	Radiator 2 server licence with e-mail support: £1,002 FreeRADIUS server software only (open source): £nil Other RADIUS platforms include Microsoft IAS/NPS and Cisco Secure ACS
Sub-total:		£1,744	

Description – staff effort	Example configuration	Cost	Notes/Alternatives
Planning	Decide type of service you want to offer and technical details including: EAP authentication method, RADIUS server, wireless encryption method (if relevant), preferred supplicant software and whether you wish to distribute it to users (where relevant) and provide end-user support.	3 days effort	An extensive Campus Deployment Guide to help with planning service implementation is available in the JANET Roaming Documentation section of the JANET website.

<p>Implementation of service.</p> <p>There are a number of implementation scenarios and estimated effort depends on which scenario/required service level a, b or c is applicable. Effort will also vary according to the level of in-house expertise and existing level of 802.1X/RADIUS deployment.</p>	<p>a) Home and Visited: RADIUS/802.1X already forms part of the authentication system – only peering with JANET national RADIUS servers, 802.1X controlled guest network VLAN setup and firewall configuration is needed.</p>	<p>5 days effort</p>	<p>The following services - applicable in all implementation scenarios - are available from JANET(UK) to ensure that staff effort involved in the project is utilised as effectively as possible, keeping staff time required to a minimum.</p> <p>Extensive support documentation is published in the JANET Roaming Documentation section of the JANET website.</p> <p>Comprehensive e-mail based technical support from dedicated JANET Roaming technical staff is available through JANET Service Desk.</p> <p>The JANET Roaming Fundamentals training course is of particular benefit to staff involved in supporting the service and especially in supporting end-users.</p>
	<p>b) Home: RADIUS is not already implemented: deployment of RADIUS server, integration with user ID database and peering with JANET national RADIUS server and firewall configuration needed.</p>	<p>5 days effort</p>	<p>Once a Home service is operational, a Visited service can be added once internal 802.1X access control (forming part of a wider campus access control system) has been established. The additional JANET Roaming-specific effort involved will be very small, comprising configuring firewall and RADIUS attribute filtering.</p>
	<p>c) Home and Visited: 802.1X is in the process of being rolled out to underpin campus WLAN or general network access control. RADIUS will form part of this so the additional work involved in implementing JANET Roaming will be very small and the only additional work will relate to peering with JANET national RADIUS servers, 802.1X-controlled guest network VLAN setup and firewall configuration.</p>	<p>8 days effort</p>	<p>There is an extensive 802.1X Implementation Guide to help with planning and implementation of 802.1X infrastructure available in the JANET Roaming Documentation section of the JANET website.</p> <p>The organisation can benefit from the expertise on hand through the JANET technology advisory and JANET Roaming services.</p>
<p>Sub-total:</p>		<p>8 – 11 days</p>	

Annual Cost and Effort Estimates

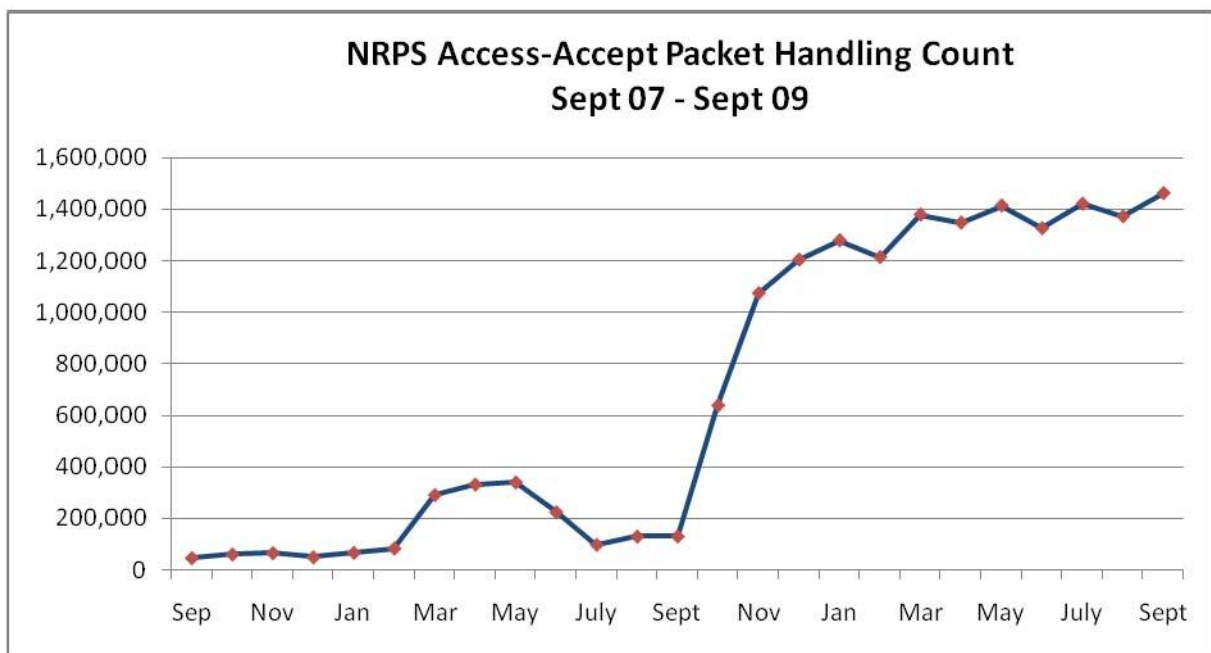
Description	Example configuration	Cost	Notes/Alternatives
Maintenance of a single RADIUS server	Hardware	£260 pa	
Server OS	RedHat – Basic subscription	£217 pa	Std subscription (with phone support): £497 pa.
RADIUS software	Radiator – Single server software only, 1 year	£395 pa	Radiator two server with e-mail support: £466 pa. FreeRADIUS server software only (open source) £nil.
Effort estimate to maintain the service	Routine OS/RADIUS software updates, normal server support, certification for RADIUS server. Administration of the organisation's sites information on JRS Support server and compliance with JRS Technical specification.	2 days	Effort involved in maintaining and supporting service will be more than compensated for by significant savings in the effort of managing guest user accounts.
Effort estimate to support end-users and promote the service throughout organisation	Provide information on internal web site, direct support of end-users.	2 days	Depends to an extent on the priority given to service by organisation. JANET(UK) has developed the JANET Roaming Fundamentals training course which would be of benefit to staff involved in supporting the service and particularly in supporting end-users. This one day intensive training course covers concepts, infrastructure, configuration of client software and service support systems. The cost of the JANET Roaming Fundamentals course is £180.
Sub-total:		£872 4 days	

Projections for typical institutional user numbers

It is difficult to give an estimated figure for the potential number of users that may benefit from the service at any one institution due to the wide variety in typical user profiles from institution to institution. However, as an indication of possible usage for an organisation considering implementing the service, we can look at the national usage figures and authentication traffic trends.

The number of unique devices that authenticate over the JANET national RADIUS infrastructure during the month is roughly equivalent to the actual number of users roaming away from their home organisations. The UK usage of the service by the 109 registered participant organisations is approximately 9,000 unique devices in total each month, which is a healthy figure, particularly when bearing in mind that a number of the registered participants have not yet put in place an operational service and some of those only participate as Home organisations, not offering guest network facilities themselves.

The following graph of access-packet counts shows that there is a growing level of RADIUS authentication traffic over the JANET network, clearly indicating a strong uptake in the service.



We estimate that there are some institutions whose JANET Roaming users number in the low tens, but equally there are others who heavily rely on the JANET RADIUS infrastructure to carry all of their off-site authentication traffic with users numbering in the hundreds, as can be seen in the case experiences below. There are also a growing number of institutions that offer eduroam as the primary network access service, for both guests and internal users. (It is possible to allocate users to the appropriate VLN through RADIUS based on user ID.) This simplifies the SSID broadcasts from wireless access points making for a simple to use, uncomplicated network service.

Projections for typical institutional user numbers – main points

- The wide variety in typical user profiles makes it difficult to estimate the number of potential beneficiaries of the service at any one organisation – ranges from tens to thousands.
- Usage trend indicator: there is a strongly growing level of RADIUS authentication traffic over the JANET network.
- Approximately 9,000 unique devices use the service over the JANET network each month.
- The number of organisations offering eduroam as their primary network access service is growing. The driver for this trend is simplification and improved wireless network efficiency.

Experiences of representative institutions that have implemented JANET Roaming

A number of case studies are in preparation which will be published on the Documentation pages of the JANET Roaming web site.

In the meantime the following shows the range of scenarios that have been encountered and satisfied by the implementation of JANET Roaming:

- Universities at Medway** Universities at Medway is a joint venture initiative by three regional higher education organisations in which the campus at Medway is shared by students from the partner institutions (the University of Greenwich, University of Kent and Canterbury Christ Church University). At the Greenwich learning resource campus, upon successful authentication Kent and Canterbury students are moved into VLANs dedicated to their particular parent institution, while Greenwich students remain on the default eduroam SSID and VLAN because the university chose to grant those access rights and no more.
- Shared Teaching** The above scenario is a large-scale version of a situation that many FE and HE institutions experience – e.g. an FE college running an accredited degree course from a HE site or the case where students are registered at one organisation and teaching is split with another organisation. In these circumstances JANET Roaming would avoid the need for students to have separate network credentials for both sites.
- Oxford Brookes University** the JANET Roaming scenario at the University is fairly typical of higher education service implementation with the additional nuance that the in-house students are free to use the eduroam network and regularly use this as their preferred network.
- Workshop 37** JANET Roaming was provided for the 3-day event attended by some 326 visitors from universities and colleges throughout the UK. Whilst traditional admin-intensive guest accounts were made available for visitors from non-eduroam-enabled organisations, authentication statistics reveal that there were 135 individual devices that successfully used the service during the conference. Judging from the amount of authentication traffic, substantial use was made of the eduroam guest network during the time. Some visitors could of course have used more than one mobile device but the figures indicate that approximately 40% of the delegates made use of the service. This represents a substantial proportion and it can be concluded that this level of usage resulted in a very significant reduction in administration overhead for the organisers of the conference in the management of guest accounts.
- Loughborough University** The ubiquitous availability of JANET Roaming throughout its facilities at Loughborough University has played no small part in the increase seen in conferencing bookings in the academic sector by Imago, the University's commercial conferencing brand. This trend has coincided with the completion of the rollout of the service to all areas of the Loughborough network. As the result of the network infrastructure already being in place, coupled with the facility for administration-free guest account services provided by eduroam, conference organisers have been able to reduce the workload of providing network access to their delegates and to concentrate their efforts on other aspects of the event.
- JANET Roaming provides academic guests to Loughborough University with access to the JANET network throughout the University; from their on-campus accommodation and conference facilities to all open access areas. The vision for the future is to provide eduroam at Loughborough railway station and on the University shuttle bus all the way to the campus.

Conclusion

In conclusion, the business case presented above demonstrates that JANET Roaming is a valuable service that should be implemented by a wide range of JANET-connected organisations, particularly Higher Education institutions. The benefits for both organisation and users far outweigh the moderate cost and effort involved in establishing and running the service.

The factors recommending early implementation are:

- an established local 802.1X authentication infrastructure (i.e. there is no reason to not adopt JANET Roaming since there is already 802.1X in place now) – JANET Roaming is achievable through straightforward peering with the JANET RADIUS infrastructure
- the imminent rollout of a wireless network that will use 802.1X port-level access control – JANET Roaming is achievable through employment of same technology
- the desire to enable the organisation's staff and students to benefit from JANET Roaming/eduroam guest services provided by other organisations – this is achievable by straightforward implementation of RADIUS technology.

As more and more organisations join JANET Roaming and offer the eduroam service, so the expectation of eduroam availability, demand for the service and usage will grow at an accelerating rate. Organisations should endeavour not to be left behind by this trend.

For further information about the service, implementation and user guides and application details, please visit: www.ja.net/roaming.

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