**Guidance Document**

**Cost of Implementing eduroamBottom of Form**

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1. Scope

Since each deployment situation is different it is only possible to provide general pointers in regard of the cost of implementing eduroam. For instance, if services are contracted out there will obviously be an impact on costs that we cannot provide for guidance on. This document sets out the components needed to deploy a service and the factors that should be considered, together with indicative costs. Whilst the following may look daunting, if carried out in a step by step fashion it is quite achievable.

This document should be read in conjunction with the high level eduroam Management Briefing guide <https://community.jisc.ac.uk/library/janet-services-documentation/management-briefing-eduroam> which covers concepts and benefits; the www.eduroam.org website may also be of interest.

eduroam services can be ‘Visited’ (Wi-Fi), ‘Home’ (IdP) or both ‘Visited and Home’. The type of service to be offered will significantly affect the cost of provision:

* ‘Visited’ services whereby a Wi-Fi service for guests only is provided is quick and easy to do
* ‘Home’ service (IdP) add-on, together with associated ‘on-boarding’/device set up of user devices, can add significant complexity and on-going support overhead – but no more than alternative non-eduroam services for home users.
1. Pre-requisites

It is assumed that there is already an effective Wi-Fi infrastructure place that provides the required wireless coverage, data bandwidth capacity (i.e. 802.11n/ac), IP address pool and backhaul internet bandwidth for the anticipated number of users and their pattern of usage (you have to cater for peak demand, which furthermore may be localised).

1. Identification of Cost Elements

The only costs that will then be incurred are those relating to:

* provision of a RADIUS server
* provision of/bandwidth reallocation for an internet feed for the service
* engineering/system configuration time
* hosting of a service information web page
* ‘on-boarding’ of own users if you are providing a service for your own members
* ongoing support

All member organisations are different in terms of equipment already deployed, equipment/platform selection, technical expertise, internet connectivity, and the anticipated numbers of visitors that need to be accommodated. Therefore any cost we suggest can only be very broad.

1. Evaluation/Estimation of Cost Elements

***For Visited-only deployments, cost elements i – vi and ix(a) below apply.***

***For Home and Visited deployments, cost elements i – vi and ix(a) apply and in addition cost elements vii, viii and ix(b) also apply.***

1. Membership of eduroam(UK)

One cost is fixed – and that is the cost of membership of eduroam(UK), which is nil. To join, you simply need to submit the application form on: <https://community.jisc.ac.uk/library/janet-services-documentation/how-does-organisation-join-service>

Cost of eduroam(UK) membership: nil

1. RADIUS Server Platforms (needed for both Visited and Home services)

RADIUS server(s) – you ideally should have two similar systems for resilience. Hardware need be only ‘lightweight server’ specification, but should be resilient. You may choose a virtual server platform, and whilst there will still be costs for this, they are hard for us to quantify. Alternatively you might opt for an appliance solution such as Aruba ClearPass. The latter cost is heavily dependent on the number of licences since the cost is per-subscriber based and this would be a matter for negotiation with suppliers.

Ballpark estimates:

Two lightweight rack-mount servers (e.g. hardware purchase) £ 4,000

Annual maintenance £ 400 pa

Rack space £ 800 pa

2 days of engineering/sys admin time to install/set up TBA

1. RADIUS Software (needed for both Visited and Home services)

The software choice you make for your RADIUS servers also has a significant bearing on cost.  FreeRADIUS is open source and has a nil capital cost; whilst appliance based solutions can be expensive. Radiator works out at approximately £ 750 per server pa., but since two are required and the minimum purchase is two the minimum cost is c.£1,500pa. (Radiator Mini Pack:  Euro 1,786 for 2 server license for Radiator AAA Server Software 1 year 3 hour e-mail support.)   Windows NPS comes bundled with Microsoft Windows Server – the cost for this is highly variable and depends on the procurement deal that your organisation may have struck with your supplier.

Ballpark estimate:

e.g. RADIUS software £ 1,500 pa

1. Internet feed (needed for both Visited and Home (Wi-Fi) services)

Visited services: you will need to estimate how many visitors you will be supporting and the likely ongoing bandwidth requirement their devices will need. Say you have eduroam 400 visitors a day, at peak times you might expect 50 of these to have a requirement for 2 Mbps. So a suggestion would be that you provide 100M. But this should be carefully monitored and you may find you will be able to adjust this up of down depending on usage.  Note that you will also need to provide IP addresses. These may be NATed, but there may be a cost associated with these.

Home services: unless you are an embedded/hosted organisation you will want to provide Wi-Fi services for your own users. The above considerations apply, just as they would for a non-eduroam service.

A meaningful estimate of internet connectivity costs is very difficult to provide since this entirely depends on whether you already have a Janet connection or if you need to provision an independent feed; then on how close your site is to an ISP POP for a new circuit or if you already have an independent feed, whether you have any spare/upwardly negotiable bandwidth.

Ballpark estimates:

e.g. EAD installation (3 year contact) nil

Annual cost 100M £ 4,500 pa

1. Networking, Wi-Fi Configuration and RADIUS Configuration (needed for both Visited and Home)

The cost here is expertise and time dependent. If you have your own in house staff then the costs will clearly be minimal, only time. If you have outsourced Wi-Fi networking then there will probably be costs associated with configuration.

You will need to carry out the following Wi-Fi/network configuration:

* Wi-Fi APs need eduroam SSID and 802.1X configuration to work with your RADIUS server and your eduroam VLAN (\*)
* the network needs an eduroam VLAN hooked to your firewall/internet router (\*)
* the firewall will need config to permit the necessary ports and protocols (\*)

The same cost considerations apply to RADIUS configuration. You will need to:

* install RADIUS
* peer with the eduroam(UK) national proxies
* peer with your Wi-Fi network (\*)
* configure forwarding of visitor authentication requests to the eduroam(UK) NRPS (\*)

Ballpark estimates:

 3 days of engineering/sys admin time to carry out a Visited eduroam deployment from

 scratch. (But it has been done in two days for a small network, and in fact if a larger network

 is in good heart, then eduroam can be rolled out across an entire estate very rapidly

 regardless of size) TBA

(\*) not needed if you are an embedded/hosted organisation with no Wi-Fi service

1. Your eduroam service information web page (needed for both Visited and Home)

Ballpark estimate: 2 days of engineering/sys admin time to create and publish web content to advertise and

 inform users about your service including guidance on device setup/ links to any automated

 on-boarding tool you may deploy TBA

1. RADIUS Configuration (needed for Home services)

If you wish your own users (those associated with learning, research, teaching and training) to utilise eduroam and be able to roam to other eduroam sites, further RADIUS configuration will be needed. You will need to determine and decide the authentication method(s) that your users will utilise and consider/implement a system to ‘on-board’ your users, getting their devices correctly set up – as indicated in the next heading.

You will need to:

* Configure RADIUS – network user database (AD/LDAP) interoperation for authentication of your own users
* Configure handling of local users’ authentications when connecting locally, possibly involving VLAN assignment and authentication of users when roaming to other eduroam locations

Ballpark estimate:

 4 days of engineering/sys admin time to carry out a Home eduroam deployment from

 Scratch TBA

1. On-boarding for your users’ devices (needed for Home services)

Ballpark estimate: 2 days of engineering/sys admin time to document device setup for all required platforms

 and possibly configure an automated on-boarding tool such as eduroam CAT £ TBA

1. On-going Support (needed for both Visited and Home)

RADIUS and eduroam service maintenance/development will be needed together with support of your users (if providing a Home service). The latter can be handled via existing user helpdesk functions.

Ballpark estimate:

a) RADIUS and eduroam service maintenance/development 0.1 days per month

b) Helpdesk services for Home service own users dependent on number of users

 /use of self-help systems

1. Proceeding to Deployment

To join the eduroam(UK) federation, you simply need to complete the application form, which can be found via a link on: <https://community.jisc.ac.uk/library/janet-services-documentation/how-does-organisation-join-service>

A full step by step technical guide to implementing eduroam is available on: <https://community.jisc.ac.uk/library/janet-services-documentation/implementing-eduroam-roadmap>

Technical support is available from eduroam(UK) via e-mail to help you with any problems you may experience <https://community.jisc.ac.uk/library/janet-services-documentation/what-tech-support-available>

You can also contact service@ja.net if you have any queries about the contents of this guide.