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Deliverable DS5.2.1,3: Service Report 3



Deliverable DS5.2.1,3

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Abstract

This Deliverable is the third service report of the European eduroam service. It contains service information for the period September 2008 through February 2009.

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0 Executive Summary

eduroam is a secure international roaming service for members of the European eduroam confederation (a confederation of autonomous roaming services). The European eduroam confederation is based on a set of defined organisational and technical requirements that each member of the confederation must agree to (by signing the eduroam policy GN2-07-328 “European eduroam confederation policy” [GN2-07-328]) and follow.

As part of GEANT2, the European eduroam service is managed by the National Research and Educational Network Policy Committee (NREN PC), which delegates the supervision of the European eduroam service to the SA5 group. In turn, SA5’s eduroam Operational Team (OT) carries out the day-to-day operations of eduroam, and runs the eduroam confederation service.

The eduroam service has been in operation since September 2007, with institutions formally joining the confederation from January 2008.

This Deliverable provides information on the operation of eduroam in the period September 2008 through February 2009. It is the third and final report.

This Deliverable is more detailed than previous Reports [DS5.2.1,1], [DS5.2.1,2] especially in the areas of service usage.

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1 Introduction

This report provides information on the deployment and usage of the European eduroam service during the period September 2008 through February 2009.

The eduroam service (please see GN2-07-327v2, DS5.1.1 “eduroam Service Definition and Implementation Plan” [DS5.1.1] for a full definition) is made up of:

- Technology infrastructure: This is based on a distributed set of Authentication, Authorisation, and Accounting (AAA) servers. The current configuration uses RADIUS as the AAA protocol, and is implemented as a hierarchy of RADIUS servers.
- Supporting infrastructure, which includes:
 - Monitoring and diagnostics facilities (monitoring service).
 - eduroam Web site.
 - eduroam database.
 - Trouble ticketing system (TTS).
 - Mailing lists.

Full and functional implementation of all service elements is vital for providing a reliable service. This report illustrates how well the different elements performed over the relevant period, providing also the detailed information on eduroam usage.

Following the service implementation plan [DS5.1.1] the European eduroam service has been in regular operation from the end of August 2008.

This document is organised as follows:

- Section 2 contains information about the eduroam infrastructure status.
- Section 3 deals with eduroam policy implementation
- Section 4 provides information on maintenance and improvement of the supporting services.

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2 eduroam Infrastructure status

The eduroam infrastructure includes:

- The European RADIUS hierarchy:
 - European Top Level RADIUS Servers (ETLRS servers).
 - Federation Level RADIUS Servers (FLRS servers).
 - Identity Provider (IdP) and Service Provider (SP) RADIUS servers.
- Network access elements at SP's site.

This report focuses on the confederation part of the infrastructure (the ETLRS servers and their connectivity with European FLRSs).

2.1.1 eduroam confederation service status

The European eduroam service has two ETLRS servers:

- ETLRS1 (IP address 192.87.106.34), maintained by SURFnet.
- ETLRS2 (IP address 130.225.242.109), maintained by UNI-C.

Data on the “in-service time” of each ETLRS is shown in Table 2.1:

Month	ETLRS1 in-service time (%)	ETLRS2 in-service time (%)
September 2008	100%	99,73%
October 2008	96,66%	100%
November2008	100%	100%
December 2008	100%	100%
January 2009	99,96%	100%
February 2009	97,57%	100%

Table 2.1: ETLRS in-service performance figures

The in-service time “seen” from the monitoring service’s perspective is shown in Table 2.2. Note that these figures illustrate the “ETLRS health” as seen from the perspective of the monitoring service and therefore include other possible problems (for example network failures). Therefore, it is expected that the in-service time is the same or lower than measured at the ETLRS site. Also, it is important to take into account that the monitoring probe tests each ETLRS once per hour.

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server ID	month	OK	Possible problem	Wrong response	No response
ETLRS1 (nl)	2008-09	98,20%	0,00%	0,00%	1,80%
ETLRS2 (dk)	2008-09	99,86%	0,00%	0,00%	0,14%
ETLRS1 (nl)	2008-10	96,11%	0,00%	0,00%	3,89%
ETLRS2 (dk)	2008-10	100,00%	0,00%	0,00%	0,00%
ETLRS1 (nl)	2008-11	99,58%	0,42%	0,00%	0,00%
ETLRS2 (dk)	2008-11	100,00%	0,00%	0,00%	0,00%
ETLRS1 (nl)	2008-12	99,61%	0,13%	0,00%	0,25%
ETLRS2 (dk)	2008-12	99,60%	0,26%	0,00%	0,13%
ETLRS1 (nl)	2009-01	100,00%	0,00%	0,00%	0,00%
ETLRS2 (dk)	2009-01	100,00%	0,00%	0,00%	0,00%
ETLRS1 (nl)	2009-02	94,94%	0,00%	0,00%	5,06%
ETLRS2 (dk)	2009-02	100,00%	0,00%	0,00%	0,00%

Table 2.2: In-service metrics from the monitoring service

As explained in [DS5.3.1], the monitoring service recognises four different statuses, depending on the data acquired by the monitoring probe:

- **OK:** Percentage of the time the server was registered by the monitoring service as running OK
- **Possible Problems:** Percentage of the time the server was registered by the monitoring service as running with possible problems. This means that at a given time the monitoring probe did not receive all expected responses. Note that this is just an indication of possible problems in operations.
- **Wrong Response:** Percentage of the time the server was registered by the monitoring service as sending wrong responses. This means that at a given time the monitoring probe received only wrong responses. Note that this is strong indication of problems in operations.
- **No Response:** Percentage of the time the server was registered by the monitoring service as sending no responses. That means that at a given time the monitoring probe received no responses. Note that this is strong indication of the server being unreachable from the monitoring probe.

2.1.2 Connected federations

As of 1 March 2009, 34 NRENs/NROs were connected to the ETLRSs. Table 2.3 provides detailed information on these connections. Andorra was connected as the new member of European eduroam confederation in October 2008.

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Country	Domain	NREN/NRO
Andorra	ad	U.Andorra
Austria	at	ACOnet
Belgium	be	BELNET
Bulgaria	bg	BREN
Croatia	hr	CARNet/Srce
Cyprus	cy	CYNET
Czech Republic	cz	CESNET
Denmark	dk	Nordunet/UNI-C
Estonia	ee	EENet
Finland	fi	Nordunet/FUNET
France	fr	RENATER/CRU
Germany	de	DFN
Greece	gr	GRNET
Hungary	hu	HUNGARNET
Iceland	is	Nordunet/RHnet
Ireland	ie	HEAnet
Israel	il	IUCC
Italy	it	GARR
Latvia	lv	Sigmanet/LANET
Lithuania	lt	LITNET/KTU
Luxembourg	lu	RESTENA
Malta	mt	U.Malta
Netherlands	nl	SURFnet
Norway	no	Nordunet/UNINET
Poland	pl	PIONIER/PSNC
Portugal	pt	FCCN
Romania	ro	RoEduNet
Slovakia	sk	SANET
Slovenia	si	ARNES
Spain	es	RedIRIS
Sweden	se	Nordunet/SUNET
Switzerland	ch	SWITCH
Turkey	tr	ULAKBIM

Table 2.3: NRENS/NROs connected to the ETLRSs

ETLRSs also provided interconnection for the eduroam service in the APAN region and in Canada (.ca), thereby providing European roamers with the ability to use the eduroam service in Canada and the APAN countries that support eduroam service. Interconnection for a few institutions in the .edu domain (USA) has been provided primarily for testing purposes.

The in-service time for FLRSs (i.e. national roaming services) “seen” from the monitoring service’s perspective is shown in the Table 2.4. These figures illustrate the “federation’s health” as seen from the perspective of the monitoring service and therefore include other possible problems (e.g. network failures). Thus, it is expected that the in-service time is the same or lower than that measured at the FLRS’s site. It is also important to take the frequency of monitoring tests into account (the monitoring probe tests the FLRSs once per hour).

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Furthermore misconfigured FLRSs might lead to false alerts from the monitoring service. Finally, data is provided only for the 29 federations that are currently actively tested.

Table 2.4 shows the “FLRSs’ health” (i.e. data acquired using server monitoring scenario [DS5.3.1])

realm	server ID	status	2008-09	2008-10	2008-11	2008-12	2009-01	2009-02
at	FLRS 1	OK	90,14%	100,00%	99,58%	99,47%	99,60%	99,71%
		Possible problem	0,00%	0,00%	0,13%	0,12%	0,00%	0,00%
		Wrong response	0,14%	0,00%	0,29%	0,41%	0,27%	0,15%
		No response	9,72%	0,00%	0,00%	0,00%	0,13%	0,15%
	FLRS 2	OK	90,28%	99,60%	99,87%	99,60%	99,73%	100,00%
		Possible problem	0,00%	0,00%	0,13%	0,00%	0,00%	0,00%
		Wrong response	0,14%	0,40%	0,00%	0,40%	0,27%	0,00%
		No response	9,58%	0,00%	0,00%	0,00%	0,00%	0,00%
be	FLRS 1	OK	100,00%	100,00%	100,00%	99,85%	100,00%	100,00%
		Possible problem	0,00%	0,00%	0,00%	0,15%	0,00%	0,00%
		Wrong response	0,00%	0,00%	0,00%	0,00%	0,00%	0,00%
		No response	0,00%	0,00%	0,00%	0,00%	0,00%	0,00%
	FLRS 2	OK	100,00%	100,00%	100,00%	100,00%	100,00%	100,00%
		Possible problem	0,00%	0,00%	0,00%	0,00%	0,00%	0,00%
		Wrong response	0,00%	0,00%	0,00%	0,00%	0,00%	0,00%
		No response	0,00%	0,00%	0,00%	0,00%	0,00%	0,00%
bg	FLRS 1	OK	59,99%	99,87%	99,86%	99,74%	99,60%	99,41%
		Possible problem	0,00%	0,00%	0,14%	0,12%	0,13%	0,15%
		Wrong response	0,00%	0,00%	0,00%	0,00%	0,00%	0,45%
		No response	40,01%	0,13%	0,00%	0,13%	0,27%	0,00%
	FLRS 2	OK	0,00%	0,00%	0,00%	0,00%	0,00%	0,00%
		Possible problem	0,00%	0,00%	0,00%	0,00%	0,00%	0,00%
		Wrong response	0,00%	0,00%	0,00%	0,00%	0,00%	0,00%
		No response	100,00%	100,00%	100,00%	100,00%	100,00%	100,00%
ch	FLRS 1	OK	99,86%	100,00%	99,86%	99,87%	100,00%	99,70%
		Possible problem	0,00%	0,00%	0,00%	0,00%	0,00%	0,00%
		Wrong response	0,00%	0,00%	0,14%	0,13%	0,00%	0,00%
		No response	0,14%	0,00%	0,00%	0,00%	0,00%	0,30%
	FLRS 2	OK	99,87%	100,00%	99,45%	100,00%	100,00%	100,00%
		Possible problem	0,00%	0,00%	0,00%	0,00%	0,00%	0,00%
		Wrong response	0,00%	0,00%	0,42%	0,00%	0,00%	0,00%
		No response	0,13%	0,00%	0,14%	0,00%	0,00%	0,00%
cy	FLRS 1	OK	0,13%	82,53%	76,25%	99,72%	0,00%	94,46%
		Possible problem	0,00%	0,00%	0,00%	0,00%	0,00%	0,00%
		Wrong response	98,22%	9,53%	23,47%	0,13%	70,83%	5,39%
		No response	1,65%	7,94%	0,28%	0,15%	29,17%	0,15%
	FLRS 2	OK					99,60%	97,02%
		Possible problem					0,00%	0,00%
		Wrong response					0,00%	0,00%
		No response					0,40%	2,98%
cz	FLRS 1	OK	99,87%	100,00%	99,72%	99,33%	100,00%	97,77%
		Possible problem	0,00%	0,00%	0,00%	0,00%	0,00%	0,15%

realm	server ID	status	2008-09	2008-10	2008-11	2008-12	2009-01	2009-02
		Wrong response	0,00%	0,00%	0,28%	0,13%	0,00%	0,45%
		No response	0,13%	0,00%	0,00%	0,54%	0,00%	1,63%
de	FLRS 1	OK	68,89%	99,87%	100,00%	96,78%	99,87%	96,43%
		Possible problem	0,14%	0,00%	0,00%	0,00%	0,00%	0,00%
		Wrong response	30,42%	0,00%	0,00%	0,13%	0,00%	0,00%
		No response	0,56%	0,13%	0,00%	3,09%	0,13%	3,57%
	FLRS 2	OK					49,58%	99,11%
		Possible problem					0,00%	0,00%
		Wrong response					50,42%	0,00%
		No response					0,00%	0,89%
dk	FLRS 1	OK	99,86%	100,00%	99,58%	99,73%	100,00%	100,00%
		Possible problem	0,00%	0,00%	0,14%	0,00%	0,00%	0,00%
		Wrong response	0,00%	0,00%	0,00%	0,00%	0,00%	0,00%
		No response	0,14%	0,00%	0,28%	0,27%	0,00%	0,00%
	FLRS 2	OK	99,86%	100,00%	99,72%	99,73%	100,00%	100,00%
		Possible problem	0,00%	0,00%	0,00%	0,13%	0,00%	0,00%
		Wrong response	0,00%	0,00%	0,00%	0,00%	0,00%	0,00%
		No response	0,14%	0,00%	0,28%	0,13%	0,00%	0,00%
es	FLRS 1	OK	22,21%	95,73%	95,85%	95,32%	95,56%	94,36%
		Possible problem	0,28%	0,80%	0,69%	0,80%	1,51%	1,19%
		Wrong response	18,50%	0,00%	0,00%	0,00%	0,13%	0,74%
		No response	59,01%	3,47%	3,46%	3,88%	2,80%	3,71%
	FLRS 2	OK	79,61%	95,06%	94,74%	97,62%	97,97%	96,74%
		Possible problem	0,14%	0,67%	0,55%	0,27%	0,27%	0,89%
		Wrong response	0,83%	0,00%	0,00%	0,00%	0,00%	0,30%
		No response	19,42%	4,28%	4,71%	2,11%	1,76%	2,07%
fi	FLRS 1	OK	99,87%	100,00%	99,72%	99,88%	100,00%	99,70%
		Possible problem	0,00%	0,00%	0,14%	0,00%	0,00%	0,00%
		Wrong response	0,00%	0,00%	0,14%	0,12%	0,00%	0,15%
		No response	0,13%	0,00%	0,00%	0,00%	0,00%	0,15%
fr	FLRS 1	OK	99,86%	97,18%	99,58%	99,85%	100,00%	100,00%
		Possible problem	0,14%	0,00%	0,00%	0,00%	0,00%	0,00%
		Wrong response	0,00%	0,00%	0,00%	0,00%	0,00%	0,00%
		No response	0,00%	2,82%	0,42%	0,15%	0,00%	0,00%
	FLRS 2	OK		100,00%	99,31%	99,71%	100,00%	99,70%
		Possible problem		0,00%	0,14%	0,14%	0,00%	0,15%
		Wrong response		0,00%	0,00%	0,00%	0,00%	0,00%
		No response		0,00%	0,55%	0,15%	0,00%	0,15%
gr	FLRS 1	OK	97,64%	98,12%	99,58%	99,86%	99,87%	100,00%
		Possible problem	0,00%	0,00%	0,14%	0,14%	0,00%	0,00%
		Wrong response	0,00%	0,00%	0,00%	0,00%	0,00%	0,00%
		No response	2,36%	1,88%	0,28%	0,00%	0,13%	0,00%
hr	FLRS 1	OK	99,86%	100,00%	100,00%	100,00%	100,00%	100,00%
		Possible problem	0,00%	0,00%	0,00%	0,00%	0,00%	0,00%
		Wrong response	0,00%	0,00%	0,00%	0,00%	0,00%	0,00%
		No response	0,14%	0,00%	0,00%	0,00%	0,00%	0,00%
	FLRS 2	OK	100,00%	100,00%	100,00%	100,00%	100,00%	100,00%
		Possible problem	0,00%	0,00%	0,00%	0,00%	0,00%	0,00%

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realm	server ID	status	2008-09	2008-10	2008-11	2008-12	2009-01	2009-02
		Wrong response	0,00%	0,00%	0,00%	0,00%	0,00%	0,00%
		No response	0,00%	0,00%	0,00%	0,00%	0,00%	0,00%
	FLRS 3	OK	100,00%	100,00%	100,00%	100,00%	100,00%	100,00%
		Possible problem	0,00%	0,00%	0,00%	0,00%	0,00%	0,00%
		Wrong response	0,00%	0,00%	0,00%	0,00%	0,00%	0,00%
		No response	0,00%	0,00%	0,00%	0,00%	0,00%	0,00%
	FLRS 4	OK	100,00%	100,00%	100,00%	100,00%	100,00%	100,00%
		Possible problem	0,00%	0,00%	0,00%	0,00%	0,00%	0,00%
		Wrong response	0,00%	0,00%	0,00%	0,00%	0,00%	0,00%
		No response	0,00%	0,00%	0,00%	0,00%	0,00%	0,00%
	FLRS 5	OK	83,34%	100,00%	100,00%	100,00%	95,16%	100,00%
		Possible problem	0,00%	0,00%	0,00%	0,00%	0,40%	0,00%
Wrong response		0,00%	0,00%	0,00%	0,00%	0,00%	0,00%	
No response		16,66%	0,00%	0,00%	0,00%	4,43%	0,00%	
hu	FLRS 1	OK	99,87%	100,00%	100,00%	100,00%	100,00%	100,00%
		Possible problem	0,00%	0,00%	0,00%	0,00%	0,00%	0,00%
		Wrong response	0,00%	0,00%	0,00%	0,00%	0,00%	0,00%
		No response	0,13%	0,00%	0,00%	0,00%	0,00%	0,00%
	FLRS 2	OK	99,87%	100,00%	100,00%	100,00%	100,00%	100,00%
		Possible problem	0,00%	0,00%	0,00%	0,00%	0,00%	0,00%
		Wrong response	0,00%	0,00%	0,00%	0,00%	0,00%	0,00%
		No response	0,13%	0,00%	0,00%	0,00%	0,00%	0,00%
ie	FLRS 1	OK	49,05%	81,67%	99,86%	99,74%	99,60%	100,00%
		Possible problem	0,00%	0,27%	0,14%	0,00%	0,00%	0,00%
		Wrong response	0,00%	0,00%	0,00%	0,00%	0,00%	0,00%
		No response	50,95%	18,06%	0,00%	0,26%	0,40%	0,00%
	FLRS 2	OK	55,57%	81,67%	99,72%	99,74%	99,60%	100,00%
		Possible problem	0,00%	0,13%	0,14%	0,12%	0,00%	0,00%
		Wrong response	0,00%	0,00%	0,00%	0,00%	0,00%	0,00%
		No response	44,43%	18,20%	0,14%	0,13%	0,40%	0,00%
il	FLRS 1	OK	99,86%	100,00%	100,00%	99,72%	100,00%	100,00%
		Possible problem	0,14%	0,00%	0,00%	0,14%	0,00%	0,00%
		Wrong response	0,00%	0,00%	0,00%	0,00%	0,00%	0,00%
		No response	0,00%	0,00%	0,00%	0,14%	0,00%	0,00%
it	FLRS 1	OK	99,86%	95,71%	99,59%	99,06%	100,00%	96,58%
		Possible problem	0,00%	0,00%	0,00%	0,00%	0,00%	0,00%
		Wrong response	0,00%	1,61%	0,41%	0,13%	0,00%	3,42%
		No response	0,14%	2,68%	0,00%	0,81%	0,00%	0,00%
It	FLRS 1	OK	100,00%	100,00%	99,87%	99,73%	99,60%	99,11%
		Possible problem	0,00%	0,00%	0,13%	0,27%	0,13%	0,59%
		Wrong response	0,00%	0,00%	0,00%	0,00%	0,00%	0,00%
		No response	0,00%	0,00%	0,00%	0,00%	0,27%	0,30%
	FLRS 2	OK	100,00%	100,00%	99,32%	99,86%	99,60%	99,70%
		Possible problem	0,00%	0,00%	0,55%	0,14%	0,13%	0,00%
		Wrong response	0,00%	0,00%	0,00%	0,00%	0,00%	0,00%
		No response	0,00%	0,00%	0,13%	0,00%	0,27%	0,30%
lu	FLRS 1	OK	99,86%	100,00%	100,00%	100,00%	100,00%	100,00%
		Possible problem	0,00%	0,00%	0,00%	0,00%	0,00%	0,00%

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realm	server ID	status	2008-09	2008-10	2008-11	2008-12	2009-01	2009-02
	FLRS 2	Wrong response	0,00%	0,00%	0,00%	0,00%	0,00%	0,00%
		No response	0,14%	0,00%	0,00%	0,00%	0,00%	0,00%
		OK	78,07%	78,64%	99,72%	27,70%	62,62%	89,73%
		Possible problem	0,00%	0,00%	0,14%	0,00%	0,00%	0,15%
		Wrong response	0,14%	0,00%	0,14%	0,00%	0,13%	0,00%
		No response	21,79%	21,36%	0,00%	72,30%	37,25%	10,12%
nl	FLRS 1	OK	99,59%	99,33%	100,00%	99,74%	100,00%	100,00%
		Possible problem	0,00%	0,13%	0,00%	0,00%	0,00%	0,00%
		Wrong response	0,14%	0,00%	0,00%	0,13%	0,00%	0,00%
		No response	0,27%	0,53%	0,00%	0,13%	0,00%	0,00%
	FLRS 2	OK	99,60%	99,06%	99,87%	99,74%	100,00%	99,85%
		Possible problem	0,14%	0,00%	0,00%	0,13%	0,00%	0,00%
		Wrong response	0,00%	0,00%	0,13%	0,00%	0,00%	0,00%
		No response	0,27%	0,94%	0,00%	0,13%	0,00%	0,15%
no	FLRS 1	OK	99,86%	99,87%	100,00%	99,87%	99,87%	100,00%
		Possible problem	0,00%	0,00%	0,00%	0,00%	0,13%	0,00%
		Wrong response	0,00%	0,00%	0,00%	0,13%	0,00%	0,00%
		No response	0,14%	0,13%	0,00%	0,00%	0,00%	0,00%
	FLRS 2	OK	100,00%	99,87%	99,72%	99,73%	100,00%	100,00%
		Possible problem	0,00%	0,00%	0,14%	0,00%	0,00%	0,00%
		Wrong response	0,00%	0,00%	0,14%	0,27%	0,00%	0,00%
		No response	0,00%	0,13%	0,00%	0,00%	0,00%	0,00%
pl	FLRS 1	OK	97,78%	100,00%	99,86%	99,74%	99,73%	100,00%
		Possible problem	0,00%	0,00%	0,00%	0,00%	0,00%	0,00%
		Wrong response	0,00%	0,00%	0,14%	0,26%	0,00%	0,00%
		No response	2,22%	0,00%	0,00%	0,00%	0,27%	0,00%
	FLRS 2	OK			95,84%	90,96%	91,41%	90,34%
		Possible problem			0,69%	1,21%	1,47%	1,93%
		Wrong response			3,47%	7,83%	7,12%	7,58%
		No response			0,00%	0,00%	0,00%	0,15%
pt	FLRS 1	OK	99,59%	98,80%	99,31%	99,74%	98,20%	98,22%
		Possible problem	0,00%	0,00%	0,14%	0,12%	0,00%	0,44%
		Wrong response	0,14%	1,07%	0,55%	0,14%	0,73%	0,00%
		No response	0,27%	0,13%	0,00%	0,00%	1,07%	1,33%
	FLRS 2	OK	99,74%	97,99%	99,31%	84,14%	80,43%	99,56%
		Possible problem	0,00%	0,00%	0,14%	0,00%	0,00%	0,00%
		Wrong response	0,00%	1,21%	0,14%	0,54%	0,21%	0,15%
		No response	0,26%	0,80%	0,41%	15,32%	19,35%	0,30%
ro	FLRS 1	OK	99,74%	98,79%	96,81%	96,51%	98,39%	99,55%
		Possible problem	0,00%	0,13%	0,42%	0,26%	0,13%	0,15%
		Wrong response	0,00%	0,00%	0,00%	0,00%	0,00%	0,15%
		No response	0,26%	1,07%	2,78%	3,22%	1,48%	0,15%
	FLRS 2	OK	46,27%	0,00%	0,00%	64,63%	78,49%	100,00%
		Possible problem	0,00%	0,00%	0,00%	0,00%	0,00%	0,00%
		Wrong response	0,00%	0,00%	0,00%	0,00%	0,00%	0,00%
		No response	53,73%	100,00%	100,00%	35,37%	21,51%	0,00%
se	FLRS 1	OK	100,00%	100,00%	99,86%	99,85%	100,00%	100,00%
		Possible problem	0,00%	0,00%	0,00%	0,00%	0,00%	0,00%

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realm	server ID	status	2008-09	2008-10	2008-11	2008-12	2009-01	2009-02		
		Wrong response	0,00%	0,00%	0,14%	0,15%	0,00%	0,00%		
		No response	0,00%	0,00%	0,00%	0,00%	0,00%	0,00%		
		FLRS 2	OK	100,00%	100,00%	99,59%	99,73%	99,86%	100,00%	
		Possible problem	0,00%	0,00%	0,14%	0,00%	0,00%	0,00%		
		Wrong response	0,00%	0,00%	0,27%	0,27%	0,14%	0,00%		
		No response	0,00%	0,00%	0,00%	0,00%	0,00%	0,00%		
		si	FLRS 1	OK	99,86%	100,00%	100,00%	100,00%	99,87%	99,85%
		Possible problem	0,14%	0,00%	0,00%	0,00%	0,00%	0,00%		
		Wrong response	0,00%	0,00%	0,00%	0,00%	0,13%	0,00%		
		No response	0,00%	0,00%	0,00%	0,00%	0,00%	0,15%		
	sk	FLRS 1	OK	100,00%	99,87%	99,86%	100,00%	100,00%	91,54%	
			Possible problem	0,00%	0,13%	0,00%	0,00%	0,00%	0,00%	
			Wrong response	0,00%	0,00%	0,00%	0,00%	0,00%	8,46%	
			No response	0,00%	0,00%	0,14%	0,00%	0,00%	0,00%	
	FLRS 2	OK	100,00%	100,00%	100,00%	100,00%	100,00%	100,00%		
		Possible problem	0,00%	0,00%	0,00%	0,00%	0,00%	0,00%		
		Wrong response	0,00%	0,00%	0,00%	0,00%	0,00%	0,00%		
		No response	0,00%	0,00%	0,00%	0,00%	0,00%	0,00%		
	tr	FLRS 1	OK	99,59%	99,60%	85,70%	99,07%	99,60%	99,85%	
			Possible problem	0,28%	0,27%	0,14%	0,28%	0,27%	0,15%	
			Wrong response	0,00%	0,13%	13,14%	0,26%	0,00%	0,00%	
			No response	0,14%	0,00%	1,03%	0,39%	0,13%	0,00%	
	FLRS 2	OK			41,09%	99,88%	99,92%	100,00%		
		Possible problem			0,29%	0,12%	0,08%	0,00%		
		Wrong response			55,01%	0,00%	0,00%	0,00%		
		No response			3,61%	0,00%	0,00%	0,00%		
	uk	FLRS 1	OK	96,39%	97,05%	86,83%	95,98%	87,49%	79,32%	
			Possible problem	0,14%	2,95%	12,91%	4,02%	12,51%	20,68%	
			Wrong response	0,00%	0,00%	0,27%	0,00%	0,00%	0,00%	
			No response	3,47%	0,00%	0,00%	0,00%	0,00%	0,00%	
	FLRS 2	OK	96,67%	90,89%	90,27%	72,96%	99,86%	86,16%		
		Possible problem	0,27%	9,11%	9,60%	27,04%	0,14%	13,84%		
		Wrong response	0,00%	0,00%	0,13%	0,00%	0,00%	0,00%		
		No response	3,05%	0,00%	0,00%	0,00%	0,00%	0,00%		
	FLRS 3	OK	92,78%	97,46%	99,59%	96,78%	76,48%	98,81%		
		Possible problem	0,55%	2,54%	0,13%	2,94%	23,52%	1,19%		
		Wrong response	0,00%	0,00%	0,28%	0,00%	0,00%	0,00%		
		No response	6,66%	0,00%	0,00%	0,28%	0,00%	0,00%		

Table 2.4: FLRS data acquired using server monitoring scenario

Table 2.5 shows information on federations' (realms') health (i.e. data acquired using infrastructure monitoring scenario [DS5.3.1]). In this case the health of the infrastructure has been tested (i.e. the path between ETLRSs and respective federations has been examined).

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realm	tested via	Data	2008-09	2008-10	2008-11	2008-12	2009-01	2009-02
at	ETLRS1 (nl)	OK	90,01%	96,01%	99,85%	99,87%	99,87%	94,83%
		Possible problem	0,27%	0,12%	0,15%	0,00%	0,00%	0,00%
		Wrong response	0,14%	0,13%	0,00%	0,13%	0,13%	0,00%
		No response	9,58%	3,73%	0,00%	0,00%	0,00%	5,17%
	ETLRS2 (dk)	OK	90,30%	99,73%	100,00%	99,87%	99,60%	100,00%
		Possible problem	0,00%	0,00%	0,00%	0,00%	0,00%	0,00%
		Wrong response	0,00%	0,27%	0,00%	0,13%	0,40%	0,00%
		No response	9,70%	0,00%	0,00%	0,00%	0,00%	0,00%
be	ETLRS1 (nl)	OK	98,22%	96,53%	100,00%	99,76%	99,87%	94,82%
		Possible problem	0,13%	0,00%	0,00%	0,24%	0,00%	0,00%
		Wrong response	0,00%	0,00%	0,00%	0,00%	0,00%	0,00%
		No response	1,65%	3,47%	0,00%	0,00%	0,13%	5,18%
	ETLRS2 (dk)	OK	99,88%	100,00%	99,86%	99,88%	100,00%	100,00%
		Possible problem	0,00%	0,00%	0,00%	0,12%	0,00%	0,00%
		Wrong response	0,00%	0,00%	0,14%	0,00%	0,00%	0,00%
		No response	0,12%	0,00%	0,00%	0,00%	0,00%	0,00%
bg	ETLRS1 (nl)	OK	0,00%	0,00%	0,00%	0,00%	0,00%	0,00%
		Possible problem	0,00%	0,00%	0,00%	0,00%	0,00%	0,00%
		Wrong response	0,00%	0,00%	0,00%	0,00%	0,00%	0,00%
		No response	100,00%	100,00%	100,00%	100,00%	100,00%	100,00%
	ETLRS2 (dk)	OK	0,00%	0,00%	0,00%	0,00%	0,00%	0,00%
		Possible problem	0,00%	0,00%	0,00%	0,00%	0,00%	0,00%
		Wrong response	0,00%	0,00%	0,00%	0,00%	0,00%	0,00%
		No response	100,00%	100,00%	100,00%	100,00%	100,00%	100,00%
ch	ETLRS1 (nl)	OK	97,95%	96,65%	99,87%	99,87%	100,00%	94,81%
		Possible problem	0,00%	0,00%	0,00%	0,00%	0,00%	0,00%
		Wrong response	0,00%	0,00%	0,00%	0,00%	0,00%	0,00%
		No response	2,05%	3,35%	0,13%	0,13%	0,00%	5,19%
	ETLRS2 (dk)	OK	99,45%	100,00%	99,86%	99,87%	100,00%	99,85%
		Possible problem	0,14%	0,00%	0,00%	0,00%	0,00%	0,15%
		Wrong response	0,00%	0,00%	0,00%	0,13%	0,00%	0,00%
		No response	0,41%	0,00%	0,14%	0,00%	0,00%	0,00%
cy	ETLRS1 (nl)	OK	0,00%	78,59%	75,84%	99,75%	93,69%	94,54%
		Possible problem	0,00%	0,41%	0,27%	0,25%	0,00%	0,14%
		Wrong response	96,09%	9,27%	23,47%	0,00%	0,54%	0,00%
		No response	3,91%	11,73%	0,41%	0,00%	5,77%	5,32%
	ETLRS2 (dk)	OK	0,00%	82,19%	75,97%	99,89%	93,82%	99,55%
		Possible problem	0,00%	0,13%	0,14%	0,11%	0,00%	0,15%
		Wrong response	92,20%	9,27%	23,47%	0,00%	0,54%	0,15%
		No response	7,80%	8,40%	0,42%	0,00%	5,64%	0,15%
cz	ETLRS1 (nl)	OK	97,95%	96,65%	99,73%	99,34%	100,00%	92,88%
		Possible problem	0,27%	0,00%	0,00%	0,13%	0,00%	0,30%
		Wrong response	0,00%	0,00%	0,00%	0,00%	0,00%	0,30%
		No response	1,78%	3,35%	0,27%	0,53%	0,00%	6,53%
	ETLRS2 (dk)	OK	99,87%	100,00%	99,73%	99,60%	100,00%	98,22%

realm	tested via	Data	2008-09	2008-10	2008-11	2008-12	2009-01	2009-02
		Possible problem	0,00%	0,00%	0,00%	0,00%	0,00%	0,45%
		Wrong response	0,00%	0,00%	0,00%	0,00%	0,00%	0,15%
		No response	0,13%	0,00%	0,27%	0,40%	0,00%	1,19%
de	ETLRS1 (nl)	OK	67,22%	96,11%	99,86%	96,91%	99,87%	94,79%
		Possible problem	0,00%	0,13%	0,00%	0,00%	0,00%	0,00%
		Wrong response	30,14%	0,13%	0,14%	2,96%	0,13%	0,00%
		No response	2,64%	3,62%	0,00%	0,13%	0,00%	5,21%
	ETLRS2 (dk)	OK	68,75%	99,87%	99,59%	96,91%	99,87%	100,00%
		Possible problem	0,14%	0,00%	0,28%	0,00%	0,00%	0,00%
		Wrong response	30,14%	0,13%	0,14%	3,09%	0,13%	0,00%
		No response	0,97%	0,00%	0,00%	0,00%	0,00%	0,00%
dk	ETLRS1 (nl)	OK	98,06%	96,38%	100,00%	99,74%	100,00%	94,65%
		Possible problem	0,00%	0,00%	0,00%	0,13%	0,00%	0,15%
		Wrong response	0,00%	0,00%	0,00%	0,00%	0,00%	0,00%
		No response	1,94%	3,62%	0,00%	0,13%	0,00%	5,20%
	ETLRS2 (dk)	OK	99,86%	99,87%	100,00%	99,87%	100,00%	100,00%
		Possible problem	0,00%	0,00%	0,00%	0,13%	0,00%	0,00%
		Wrong response	0,00%	0,13%	0,00%	0,00%	0,00%	0,00%
		No response	0,14%	0,00%	0,00%	0,00%	0,00%	0,00%
es	ETLRS1 (nl)	OK	60,35%	93,87%	96,83%	97,35%	97,73%	90,81%
		Possible problem	0,40%	0,80%	0,55%	0,67%	0,67%	0,74%
		Wrong response	19,01%	0,66%	0,27%	0,79%	0,40%	1,19%
		No response	20,24%	4,67%	2,35%	1,19%	1,20%	7,26%
	ETLRS2 (dk)	OK	62,00%	97,19%	96,96%	96,93%	96,39%	95,24%
		Possible problem	14,67%	0,94%	0,27%	1,20%	1,07%	1,04%
		Wrong response	3,60%	0,27%	0,41%	1,07%	1,47%	1,94%
		No response	19,72%	1,60%	2,36%	0,80%	1,08%	1,78%
fi	ETLRS1 (nl)	OK	98,35%	96,39%	99,59%	99,63%	99,73%	94,67%
		Possible problem	0,00%	0,27%	0,28%	0,12%	0,27%	0,00%
		Wrong response	0,00%	0,00%	0,00%	0,00%	0,00%	0,00%
		No response	1,65%	3,34%	0,13%	0,26%	0,00%	5,33%
	ETLRS2 (dk)	OK	99,87%	99,87%	100,00%	99,75%	100,00%	100,00%
		Possible problem	0,00%	0,13%	0,00%	0,13%	0,00%	0,00%
		Wrong response	0,00%	0,00%	0,00%	0,00%	0,00%	0,00%
		No response	0,13%	0,00%	0,00%	0,12%	0,00%	0,00%
fr	ETLRS1 (nl)	OK	97,96%	93,72%	99,46%	100,00%	99,87%	94,83%
		Possible problem	0,00%	0,00%	0,40%	0,00%	0,00%	0,00%
		Wrong response	0,28%	2,42%	0,14%	0,00%	0,00%	0,00%
		No response	1,76%	3,87%	0,00%	0,00%	0,13%	5,17%
	ETLRS2 (dk)	OK	99,74%	97,45%	99,59%	100,00%	100,00%	99,85%
		Possible problem	0,00%	0,00%	0,41%	0,00%	0,00%	0,15%
		Wrong response	0,00%	0,00%	0,00%	0,00%	0,00%	0,00%
		No response	0,26%	2,55%	0,00%	0,00%	0,00%	0,00%
gr	ETLRS1 (nl)	OK	93,92%	94,39%	99,47%	98,95%	99,33%	94,38%
		Possible problem	1,65%	0,27%	0,27%	0,11%	0,13%	0,15%
		Wrong response	0,00%	0,00%	0,00%	0,00%	0,00%	0,00%
		No response	4,43%	5,34%	0,27%	0,94%	0,53%	5,47%
	ETLRS2 (dk)	OK	94,75%	97,86%	98,76%	97,22%	98,39%	98,50%

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realm	tested via	Data	2008-09	2008-10	2008-11	2008-12	2009-01	2009-02
		Possible problem	2,07%	0,40%	1,11%	1,74%	0,94%	0,89%
		Wrong response	0,00%	0,00%	0,00%	0,00%	0,00%	0,00%
		No response	3,18%	1,74%	0,13%	1,04%	0,67%	0,61%
hr	ETLRS1 (nl)	OK	98,06%	96,38%	99,45%	99,47%	100,00%	94,79%
		Possible problem	0,14%	0,00%	0,00%	0,00%	0,00%	0,00%
		Wrong response	0,00%	0,00%	0,42%	0,13%	0,00%	0,00%
		No response	1,80%	3,62%	0,14%	0,40%	0,00%	5,21%
	ETLRS2 (dk)	OK	99,86%	100,00%	99,72%	99,87%	100,00%	100,00%
		Possible problem	0,00%	0,00%	0,00%	0,00%	0,00%	0,00%
Wrong response		0,00%	0,00%	0,14%	0,13%	0,00%	0,00%	
No response		0,14%	0,00%	0,14%	0,00%	0,00%	0,00%	
hu	ETLRS1 (nl)	OK	97,95%	96,65%	99,86%	99,75%	100,00%	94,81%
		Possible problem	0,27%	0,00%	0,14%	0,12%	0,00%	0,00%
		Wrong response	0,00%	0,00%	0,00%	0,00%	0,00%	0,00%
		No response	1,78%	3,35%	0,00%	0,13%	0,00%	5,19%
	ETLRS2 (dk)	OK	95,57%	96,25%	97,09%	97,20%	96,11%	95,10%
		Possible problem	4,30%	3,75%	2,77%	2,80%	3,89%	4,90%
Wrong response		0,00%	0,00%	0,00%	0,00%	0,00%	0,00%	
No response		0,13%	0,00%	0,13%	0,00%	0,00%	0,00%	
ie	ETLRS1 (nl)	OK	47,20%	81,67%	99,73%	99,87%	99,46%	94,81%
		Possible problem	0,00%	0,13%	0,14%	0,13%	0,27%	0,00%
		Wrong response	50,20%	14,58%	0,00%	0,00%	0,00%	0,00%
		No response	2,59%	3,62%	0,13%	0,00%	0,27%	5,19%
	ETLRS2 (dk)	OK	48,70%	81,67%	99,73%	99,62%	99,73%	100,00%
		Possible problem	0,14%	0,13%	0,14%	0,26%	0,00%	0,00%
Wrong response		6,67%	0,00%	0,00%	0,00%	0,00%	0,00%	
No response		44,49%	18,20%	0,13%	0,12%	0,27%	0,00%	
il	ETLRS1 (nl)	OK	98,23%	96,01%	100,00%	99,64%	99,74%	94,84%
		Possible problem	0,00%	0,13%	0,00%	0,23%	0,00%	0,00%
		Wrong response	0,00%	0,00%	0,00%	0,00%	0,00%	0,00%
		No response	1,77%	3,86%	0,00%	0,13%	0,26%	5,16%
	ETLRS2 (dk)	OK	99,47%	100,00%	100,00%	99,75%	99,87%	100,00%
		Possible problem	0,14%	0,00%	0,00%	0,12%	0,00%	0,00%
Wrong response		0,00%	0,00%	0,00%	0,00%	0,00%	0,00%	
No response		0,39%	0,00%	0,00%	0,13%	0,13%	0,00%	
it	ETLRS1 (nl)	OK	0,00%	0,00%	0,00%	0,00%	0,00%	0,00%
		Possible problem	0,00%	0,00%	0,00%	0,00%	0,00%	0,00%
		Wrong response	98,35%	93,73%	100,00%	99,19%	99,87%	94,83%
		No response	1,65%	6,27%	0,00%	0,81%	0,13%	5,17%
	ETLRS2 (dk)	OK	0,00%	0,00%	0,00%	0,00%	0,00%	0,00%
		Possible problem	0,00%	0,00%	0,00%	0,00%	0,00%	0,00%
Wrong response		99,88%	97,32%	100,00%	99,19%	100,00%	100,00%	
No response		0,12%	2,68%	0,00%	0,81%	0,00%	0,00%	
lt	ETLRS1 (nl)	OK	63,20%	50,99%	51,72%	55,13%	64,71%	68,79%
		Possible problem	35,19%	45,28%	48,14%	44,35%	34,89%	25,75%
		Wrong response	0,00%	0,00%	0,00%	0,00%	0,00%	0,00%
		No response	1,61%	3,73%	0,14%	0,52%	0,40%	5,46%
	ETLRS2 (dk)	OK	40,54%	25,22%	19,71%	32,15%	38,09%	34,24%

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realm	tested via	Data	2008-09	2008-10	2008-11	2008-12	2009-01	2009-02
		Possible problem	59,34%	74,65%	80,15%	67,58%	61,64%	65,61%
		Wrong response	0,00%	0,00%	0,00%	0,00%	0,00%	0,00%
		No response	0,12%	0,14%	0,14%	0,27%	0,27%	0,15%
lu	ETLRS1 (nl)	OK	98,08%	96,65%	99,59%	100,00%	100,00%	94,80%
		Possible problem	0,00%	0,00%	0,27%	0,00%	0,00%	0,00%
		Wrong response	0,00%	0,00%	0,00%	0,00%	0,00%	0,00%
		No response	1,92%	3,35%	0,14%	0,00%	0,00%	5,20%
	ETLRS2 (dk)	OK	99,59%	100,00%	99,73%	99,87%	100,00%	100,00%
		Possible problem	0,28%	0,00%	0,14%	0,00%	0,00%	0,00%
		Wrong response	0,00%	0,00%	0,00%	0,00%	0,00%	0,00%
		No response	0,13%	0,00%	0,14%	0,13%	0,00%	0,00%
nl	ETLRS1 (nl)	OK	98,11%	96,66%	100,00%	100,00%	100,00%	94,81%
		Possible problem	0,12%	0,00%	0,00%	0,00%	0,00%	0,00%
		Wrong response	0,00%	0,00%	0,00%	0,00%	0,00%	0,00%
		No response	1,77%	3,34%	0,00%	0,00%	0,00%	5,19%
	ETLRS2 (dk)	OK	99,87%	99,73%	99,73%	100,00%	100,00%	100,00%
		Possible problem	0,00%	0,00%	0,27%	0,00%	0,00%	0,00%
		Wrong response	0,00%	0,00%	0,00%	0,00%	0,00%	0,00%
		No response	0,13%	0,27%	0,00%	0,00%	0,00%	0,00%
no	ETLRS1 (nl)	OK	98,06%	96,38%	99,86%	99,87%	100,00%	94,65%
		Possible problem	0,00%	0,00%	0,14%	0,00%	0,00%	0,15%
		Wrong response	0,00%	0,00%	0,00%	0,00%	0,00%	0,00%
		No response	1,94%	3,62%	0,00%	0,13%	0,00%	5,20%
	ETLRS2 (dk)	OK	99,86%	100,00%	100,00%	100,00%	100,00%	99,85%
		Possible problem	0,00%	0,00%	0,00%	0,00%	0,00%	0,00%
		Wrong response	0,00%	0,00%	0,00%	0,00%	0,00%	0,15%
		No response	0,14%	0,00%	0,00%	0,00%	0,00%	0,00%
pl	ETLRS1 (nl)	OK	95,73%	96,65%	99,73%	99,60%	100,00%	94,66%
		Possible problem	0,14%	0,00%	0,14%	0,13%	0,00%	0,15%
		Wrong response	0,00%	0,00%	0,00%	0,13%	0,00%	0,00%
		No response	4,14%	3,35%	0,14%	0,13%	0,00%	5,20%
	ETLRS2 (dk)	OK	97,65%	100,00%	99,86%	99,87%	100,00%	100,00%
		Possible problem	0,00%	0,00%	0,00%	0,00%	0,00%	0,00%
		Wrong response	0,00%	0,00%	0,00%	0,13%	0,00%	0,00%
		No response	2,35%	0,00%	0,14%	0,00%	0,00%	0,00%
pt	ETLRS1 (nl)	OK	98,09%	94,78%	99,30%	99,87%	98,52%	93,79%
		Possible problem	0,12%	0,00%	0,00%	0,00%	0,00%	0,00%
		Wrong response	0,14%	1,88%	0,70%	0,13%	0,41%	0,74%
		No response	1,65%	3,34%	0,00%	0,00%	1,07%	5,47%
	ETLRS2 (dk)	OK	99,87%	98,12%	99,72%	99,47%	98,66%	99,41%
		Possible problem	0,00%	0,14%	0,28%	0,13%	0,00%	0,15%
		Wrong response	0,00%	1,74%	0,00%	0,40%	0,13%	0,15%
		No response	0,13%	0,00%	0,00%	0,00%	1,21%	0,29%
ro	ETLRS1 (nl)	OK	97,52%	92,11%	95,57%	96,27%	98,26%	94,52%
		Possible problem	0,83%	2,95%	1,24%	3,34%	0,00%	0,15%
		Wrong response	0,00%	0,00%	0,00%	0,00%	0,00%	0,00%
		No response	1,65%	4,94%	3,19%	0,39%	1,74%	5,33%
	ETLRS2 (dk)	OK	98,90%	96,25%	96,12%	96,40%	98,25%	99,41%

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realm	tested via	Data	2008-09	2008-10	2008-11	2008-12	2009-01	2009-02
		Possible problem	0,83%	2,68%	0,82%	3,34%	0,13%	0,45%
		Wrong response	0,00%	0,00%	0,00%	0,00%	0,00%	0,00%
		No response	0,27%	1,07%	3,05%	0,26%	1,61%	0,15%
se	ETLRS1 (nl)	OK	98,35%	96,53%	100,00%	99,87%	99,87%	94,82%
		Possible problem	0,00%	0,00%	0,00%	0,13%	0,00%	0,00%
		Wrong response	0,00%	0,00%	0,00%	0,00%	0,00%	0,00%
		No response	1,65%	3,47%	0,00%	0,00%	0,13%	5,18%
	ETLRS2 (dk)	OK	99,87%	100,00%	100,00%	100,00%	100,00%	100,00%
		Possible problem	0,00%	0,00%	0,00%	0,00%	0,00%	0,00%
		Wrong response	0,00%	0,00%	0,00%	0,00%	0,00%	0,00%
		No response	0,13%	0,00%	0,00%	0,00%	0,00%	0,00%
si	ETLRS1 (nl)	OK	97,94%	96,39%	100,00%	100,00%	100,00%	94,50%
		Possible problem	0,14%	0,00%	0,00%	0,00%	0,00%	0,00%
		Wrong response	0,00%	0,00%	0,00%	0,00%	0,00%	0,00%
		No response	1,92%	3,61%	0,00%	0,00%	0,00%	5,50%
	ETLRS2 (dk)	OK	99,73%	100,00%	99,72%	100,00%	100,00%	99,70%
		Possible problem	0,00%	0,00%	0,14%	0,00%	0,00%	0,00%
		Wrong response	0,00%	0,00%	0,00%	0,00%	0,00%	0,00%
		No response	0,27%	0,00%	0,14%	0,00%	0,00%	0,30%
sk	ETLRS1 (nl)	OK	98,25%	96,53%	99,87%	99,73%	99,60%	86,29%
		Possible problem	0,11%	0,00%	0,00%	0,13%	0,00%	0,00%
		Wrong response	0,00%	0,00%	0,00%	0,13%	0,27%	8,54%
		No response	1,65%	3,47%	0,13%	0,00%	0,13%	5,18%
	ETLRS2 (dk)	OK	99,88%	100,00%	100,00%	100,00%	100,00%	91,46%
		Possible problem	0,00%	0,00%	0,00%	0,00%	0,00%	0,00%
		Wrong response	0,00%	0,00%	0,00%	0,00%	0,00%	8,54%
		No response	0,12%	0,00%	0,00%	0,00%	0,00%	0,00%
tr	ETLRS1 (nl)	OK	97,53%	95,08%	83,07%	98,82%	99,60%	94,53%
		Possible problem	0,40%	0,53%	0,28%	0,25%	0,40%	0,30%
		Wrong response	0,00%	0,00%	15,69%	0,00%	0,00%	0,00%
		No response	2,07%	4,39%	0,97%	0,94%	0,00%	5,17%
	ETLRS2 (dk)	OK	98,77%	99,60%	82,92%	98,70%	99,46%	99,85%
		Possible problem	0,83%	0,13%	0,42%	0,63%	0,40%	0,00%
		Wrong response	0,00%	0,00%	2,50%	0,00%	0,00%	0,00%
		No response	0,40%	0,27%	14,16%	0,67%	0,13%	0,15%
uk	ETLRS1 (nl)	OK	95,61%	96,13%	99,72%	99,20%	98,54%	94,39%
		Possible problem	0,29%	0,00%	0,00%	0,00%	0,66%	0,00%
		Wrong response	0,00%	0,27%	0,14%	0,00%	0,00%	0,00%
		No response	4,10%	3,60%	0,14%	0,80%	0,80%	5,61%
	ETLRS2 (dk)	OK	96,55%	99,87%	99,45%	99,19%	99,46%	99,55%
		Possible problem	0,00%	0,00%	0,27%	0,00%	0,00%	0,00%
		Wrong response	0,00%	0,13%	0,00%	0,00%	0,00%	0,00%
		No response	3,45%	0,00%	0,28%	0,81%	0,54%	0,45%

Table 2.5: Federation/realm data acquired using infrastructure monitoring scenario

As explained in [DS5.3.1], the monitoring service recognises four different statuses depending on the data acquired by the monitoring probe:

- **OK:** Percentage of the time the server/realm was registered by the monitoring service as running OK.
- **Possible Problems:** Percentage of the time the server/realm was registered by the monitoring service as running with possible problems. This means that at a given time the monitoring probe did not receive all expected responses. Note that this is just an indication of possible problems in operations.
- **Wrong Response:** Percentage of the time the server/realm was registered by the monitoring service as sending wrong responses. That means that at a given time the monitoring probe received only wrong responses. Note that this is strong indication of problems in operations.
- **No Response:** Percentage of the time the server/realm was registered by the monitoring service as sending no responses. That means that at a given time the monitoring probe received no responses. Note that this is strong indication of server being unreachable from the monitoring probe.

Discrepancies between figures on respective FLRSs (Table 2.4) and federation health (Table 2.5) are expected because of the different monitoring scenarios used [DS5.3.1]. Data presented in Table 2.5 is closer to the end user's experience. Note that a misconfigured FLRS can cause an error recorded by the monitoring service although the FLRS itself is working.

By the end of February 2009 the eduroam database was not fully populated. Some NRO's provided the full set of data as expected, while others provided only limited information (for various technical and organisational reasons). This is indicated in Table 2.6.

Country	Domain	NREN/NRO	Federation (realm) info	Info on SPs/IdPs	Federation: demographic info	Federation: usage info	Institution (SP): usage info
Andorra	ad	U.Andorra	No	No	No	No	No
Austria	at	ACOnet	No	No	No	No	No
Belgium	be	BELNET	No	No	No	No	No
Bulgaria	bg	BELNET	No	No	No	No	No
Croatia	hr	CARNet/Srce	Yes	Yes	Yes	Yes	No
Cyprus	cy	CYNET	No	No	No	No	No
Czech Republic	cz	CESNET	Yes	Yes	Yes	Yes	Yes
Denmark	dk	Nordunet/UNI-C	Yes	No	Yes	No	No
Estonia	ee	EENet	No	No	No	No	No
Finland	fi	Nordunet/FUNET	Yes	Yes	Yes	No	No
France	fr	RENATER/CRU	Yes	Yes	Yes	No	No
Germany	de	DFN	Yes	Yes	Yes	Yes	No
Greece	gr	GRNET	No	No	No	No	No
Hungary	hu	HUNGARNET	Yes	Yes	Yes	Yes	Yes
Iceland	is	Nordunet/RHnet	No	No	No	No	No
Ireland	ie	HEAnet	Yes	Yes	Yes	Yes	Yes
Israel	il	IUCC	No	No	No	No	No
Italy	it	GARR	Yes	No	Yes	No	No
Latvia	lv	Sigmanet/LANET	No	No	No	No	No
Lithuania	lt	LITNET/KTU	No	No	No	No	No

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Country	Domain	NREN/NRO	Federation (realm) info	Info on SPs/IdPs	Federation: demographic info	Federation: usage info	Institution (SP): usage info
Luxembourg	lu	RESTENA	Yes	Yes	Yes	Yes	Yes
Malta	mt	U.Malta	No	No	No	No	No
Netherlands	nl	SURFnet	Yes	Yes	No	No	No
Norway	no	Nordunet/UNINET	Yes	Yes	No	No	No
Poland	pl	PIONIER/PSNC	Yes	Yes	No	No	No
Portugal	pt	FCCN	Yes	Yes	Yes	No	No
Romania	ro	RoEduNet	No	No	No	No	No
Slovakia	sk	SANET	No	No	Yes	Yes	No
Slovenia	si	ARNES	No	No	No	No	No
Spain	es	RedIRIS	Yes	Yes	Yes	No	No
Sweden	se	Nordunet/SUNET	Yes	Yes	No	No	No
Switzerland	ch	SWITCH	Yes	Yes	Yes	Yes	Yes
Turkey	tr	ULAKBIM	Yes	Yes	Yes	Yes	Yes
United Kingdom	uk	JANET	Yes	Yes	Yes	No	No

Table 2.6: Availability of demographic information (01 March 2009)

The columns in Table 2.6 provide information about the data availability in the eduroam database, as follows:

- **Federation (realm) info:** Basic data on the member federation (NRO).
- **Info on SPs/IdPs:** Data on individual SPs and IdPs (includes data on eduroam service locations).
- **Federation: demographic info:** Basic data on federation's size (e.g. number of SPs, IdPs, end users).
- **Federation: usage info:** Basic data on service usage at the federation level.
- **Institution (SP): usage info:** Basic data on service usage per SP inside a federation.

Table 2.7 provides a summary report on data availability.

NRO count	Federation (realm) info	Info on SPs/IdPs	Federation: demographic info	Federation: usage info	Institution (SP): usage info
data provided	19	17	16	9	6
data not provided	15	17	18	25	28

Table 2.7: Summary report on data availability

Only 17 NROs (50%) provided data on individual SPs and IdPs, and only 13 provided further data on eduroam service locations. In total those NROs provided information on 457 SPs with 733 service locations. Based on this information a user-oriented map (based on Google maps technology) with all service locations registered in the eduroam database is produced. The map is available at <http://monitor.eduroam.org/gmap.php> (for more details see section 4 "eduroam Supporting Infrastructure").

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2.1.3 Traffic information

Due to technological constraints, it is not possible to provide the exact number of individual roaming users per day. Instead, the number of authentication requests handled by the ETRLSs is provided, starting from April 2008 for ETRLS2 and from May 2008 for ETRLS1. In addition, from 01 December 2008, the RADIUS attribute *Calling-Station-ID* (CSI) has been properly registered within the ETRLSs logs. This allows the use of another type of report in which only one authentication request is counted per day per CSI (i.e. per client). The assumption is that one client is used only by one user, and therefore the number of different users per day can be estimated. Consequently, when analyzing monthly traffic we can provide the number of client daily sessions per month. In the following text we will use term “user session” instead of “client daily session”.

Figure 2.1: provides information about cumulative, monthly traffic, and shows the number of successful authentication requests:

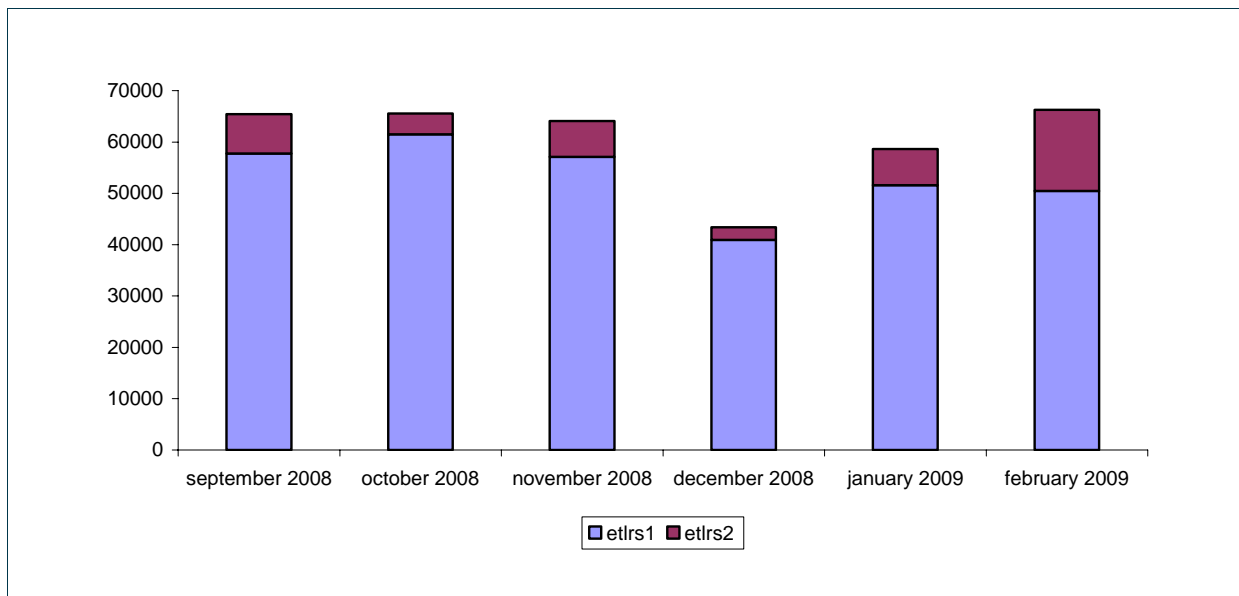


Figure 2.1: Total number of successful authentication requests (per month)

Figure 2.2 provides a comparison between the total number of successful authentication requests and the number of user sessions:

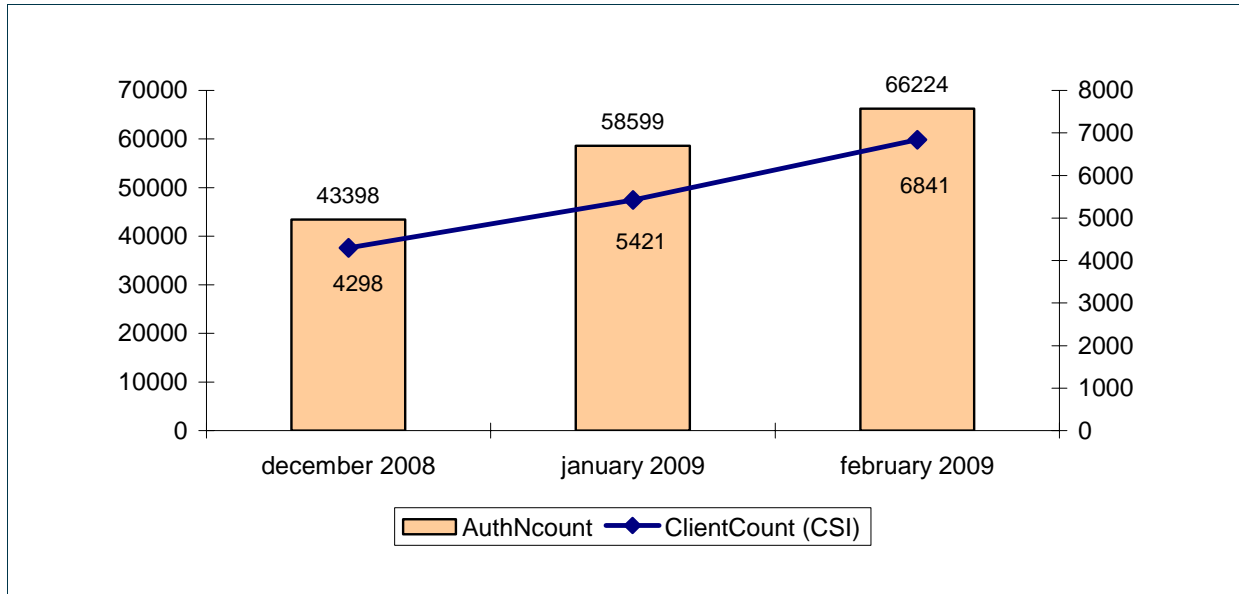


Figure 2.2: Total number of successful authentication requests vs. number of user sessions (per month)

Based on the methodology explained above it can be safely estimated that during the period December 2008 through February 2009, the average number of user sessions was at least 180 per day. In December 2008 the average number of user sessions was at least 143 per day, rising to 221 in February 2009.

Table 2.8 shows the number of successful authentications per federation performed via ETLRSs in the period September 2008 through February 2009. It is clear that not all connected federations are represented. Table 2.8 indicates that the roaming users came from 35 countries (30 from the European confederation), and 33 countries (“RadSec” + 30 countries from European confederation) were visited and provided service. The column labelled “RadSec” cumulatively represents countries in which RadSec is used on the SP side (e.g. Netherlands (.nl)).

It should be noted that Table 2.8 also provides information on roaming outside the European confederation, and on roamers coming from countries outside European confederation (these figures are presented in lighter colour).

It has to be emphasised that no conclusion on the number of users, or even user sessions, can be drawn from these figures. This is because the numbers show only the “successful authentication traffic”. For example, a user can, due to working habits, deliberately set-up their computer or SP’s equipment to initiate a number of successful authentication messages, while another user may only initiate one successful authentication message. Nevertheless it is expected, over time, that administrators will find those misconfigured devices and fix or disable them. Also, the more mature 802.1X implementations get, the fewer problems will be apparent.

However, as explained earlier in this section, usage of the CSI attribute provided the possibility to count the number of different clients (i.e. computers) that used the services. Table 2.9 shows a comparison between the

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number of successful authentications and number of user sessions, in the period December 2008 through February 2009.

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userfrom	Data	incountry																											Total						
		AD	AT	AU	BE	CH	CY	CZ	DE	DK	EDU	EE	ES	FI	FR	GR	HR	HU	IE	IS	IT	LT	LV	MT	NO	PL	PT	RadSec		RO	SE	SI	SK	TR	UK
at	ClientCount	11	1	5			13	149					109	20					6	1	59				45	7	26	5	8	7		33			
	AuthNCount	79	2	30			217	612					770	20					2	6	1	59			244	26	305	64	18	13		128			
au	ClientCount	10							43	6			24												6	1	10	1				31			
	AuthNCount	112							71	7			73												25	13	20	5				155			
be	ClientCount	4		12	1				44				14	54	27	1			6					14	10	44	4				7				
	AuthNCount	1		146	1				436				116	1066	27	1			88					1069	64	298	1	48			38				
cat	ClientCount																							2							2				
	AuthNCount																							14								14			
ch	ClientCount	3	5	7			1	1	23				22	2	13	2						6									9				
	AuthNCount	10	55	34			1	1	130				135	4	13	2						6			21						39				
cy	ClientCount																		1												1				
	AuthNCount																		1													2			
cz	ClientCount	86	38	40	4				165	129		1	185	14	110										56	4	114	53	30	21	78	1	153		
	AuthNCount	911	117	499	9				2478	461		11	1237	83	4478				1	51	19			25	353	14	1768	490	103	101	548	1	856		
de	ClientCount	209	355	10	42	1	45		117			514	4	112	9	18	2							48	22	43	87	142	118		208				
	AuthNCount	1872	2439	43	664	1	288		561			3256	49	754	96	67	5							356	57	936	633	1364	160		1471				
dk	ClientCount	79	3	4			11	19				41	5	9										73	2	71	61				84				
	AuthNCount	849	40	14			135	236				226	67	32										576	215	830	229				363				
ee	ClientCount						3					1	1						3												9				
	AuthNCount						11					1	1						6												108				
es	ClientCount	1	84	25	35	128		62	387	39											8	4	4	4	12	176	105	36	3	8		384			
	AuthNCount	1	863	332	185	1077		491	4954	171				3	680						162	69	13	7	18	332	1146	577	407	4	36	3039			
fi	ClientCount	2			2							5		28										6			5								
	AuthNCount	2			9							54		372										65			73								
fr	ClientCount	1		87	28		1	27				111												10			21	48	1		35				
	AuthNCount	4		217	34		1	185				560												70			272	447	1		720				
gr	ClientCount						1	4	9	1		5		4																	4				
	AuthNCount						1	17	70	1		19		39																	14				
hk	ClientCount	5										1	1	1													4		41		55				
	AuthNCount	18										2	3														20		248		338				
hr	ClientCount	7	1		5		1	36																		5			51		4				
	AuthNCount	119	5		9		7	182																		40		1038		1330		9			
hu	ClientCount	8			13		2	7	16					3													9				2				
	AuthNCount	301			109		8	32	35					3													105				8				
ie	ClientCount				6			2																			6				14				
	AuthNCount				62			2																			3				2				
it	ClientCount							6				112		2																	2				
	AuthNCount							14				116		4													16				12				
jp	ClientCount																														2				
	AuthNCount																														4				
lt	ClientCount	1		36								1	1														16	6	1	2		2			
	AuthNCount	1		1282								36	1														61	8	3	6		12			
lu	ClientCount	2		44	2		8	30	9			24		74														9	35	12		21			
	AuthNCount	2		3970	5		50	274	49			143		2049														51	150	3909		495			
nl	ClientCount	21	157	71	10		1	147	101	6		195		11		22	1	12							38	1	56	135	114	2	2	1	130		
	AuthNCount	165	1136	884	39		1	1252	232	18		892		420		114	2	136								298	15	551	813	2280	5	2	1	1402	
no	ClientCount	9	21	6	13		16	30	65			15		35	2												8	20			57	33			
	AuthNCount	32	110	19	82		75	135	449			38		366	2													363	61	503		545			
pl	ClientCount	13		8	16		13	123	41			146		10		4												8	1		21	26			
	AuthNCount	133		58	224		118	1843	250			927		96		14												57	2		21	274			
pt	ClientCount	98	30	100	100		376	257	259		4	2059	24	152	12			64	1		3	90			2	51	9		207	1	83	128	3	4	214
	AuthNCount	696	143	2182	1434		3746	5414	3577		5	14706	228	1615	40			3521	3		11	1001			4	3190	33	1117	1	1426	618	16	4	1711	
ro	ClientCount	1																																	
	AuthNCount	8							336																										
se	ClientCount	43		1	9		8	132	5			9	19	12	3											22	5	2	15			9	9		
	AuthNCount	419		5	14		274	3515	35			172	126	118	14											144	578	17	58			9	154		
si	ClientCount	85	7	14	1		67	12	106			5	39	1	22																	2	9		
	AuthNCount	806	107	158	3		1310	221	532			305	242	2	112																	6	29		
sk	ClientCount	2						84							12																		99		
	AuthNCount	21						5505							55																		5582		
tr	ClientCount																																		
	AuthNCount																																	24	
uk	ClientCount	73	131	13	15		23	279	206			285	10	36	3											86	3	79	113	29	2	2	6	1446	
	AuthNCount	835	1421	99	240		92	2845	1864			1005	29	117	3											5	1810	11	912	667	281	3	4	6	12303
Total ClientCount		1	762	861	477	415	4	745	1970	1112	6	20	3927	72	795	66	55	73	153	5	126	111	6	6	458	77	595	1078	2	627	336	102	42	1475	
Total AuthNCount		1	7330	6797	9678	4204	4	12327	25310	8271	18	529	24610	580	12347	181	292	3580	719	14	210	1092	9	9	8264	1141	6679	8072	12	10938	2242	625	42	12094	

3 eduroam Policy Implementation

GN2-07-327v2:, DS5.1.1 “eduroam Service Definition and Implementation Plan” was published (together with the European eduroam Policy GN2-07-328: “European eduroam Confederation Policy”) in January 2008. Therefore, the Policy signing process only started in the second part of January.

Table 3.1 provides a list of the NRENs/NROs that had signed the Policy by the end of February 2008. The column *www.eduroam.<tld>* indicates whether national eduroam website (as requested by the Policy) is provided.

Country	Domain	NREN/NRO	Policy	www.eduroam.<tld>
Andorra	ad	U.Andorra	signed	No
Austria	at	ACOnet	signed	Yes
Belgium	be	BELNET	signed	Yes
Bulgaria	bg	BREN	signed	No
Croatia	hr	CARNet/Srce	signed	Yes
Cyprus	cy	CYNET	Lol	www.eduroam.ac.cy
Czech Republic	cz	CESNET	signed	Yes
Denmark	dk	Nordunet/UNI-C	signed	Yes
Estonia	ee	EENet	signed	No
Finland	fi	Nordunet/FUNET	signed	Yes
France	fr	RENATER/CRU	signed	Yes
Germany	de	DFN	signed	Yes
Greece	gr	GRNET	signed	Yes
Hungary	hu	HUNGARNET	signed	Yes
Iceland	is	Nordunet/RHnet	signed	Yes
Ireland	ie	HEAnet	signed	Yes
Israel	il	IUCC	signed	No
Italy	it	GARR	signed	Yes
Latvia	lv	Sigmanet/LANET	signed	Yes
Lithuania	lt	LITNET/KTU	signed	Yes
Luxembourg	lu	RESTENA	signed	Yes
Malta	mt	U.Malta	NOT signed	No
Netherlands	nl	SURFnet	signed	Yes
Norway	no	Nordunet/UNINET	signed	Yes
Poland	pl	PIONIER/PSNC	signed	Yes

Country	Domain	NREN/NRO	Policy	www.eduroam.<tld>
Portugal	pt	FCCN	signed	Yes
Romania	ro	RoEduNet	signed	Yes
Slovakia	sk	SANET	signed	Yes
Slovenia	si	ARNES	signed	Yes
Spain	es	RedIRIS	signed	Yes
Sweden	se	Nordunet/SUNET	signed	Yes
Switzerland	ch	SWITCH	signed	Yes
Turkey	tr	ULAKBIM	signed	www.eduroam.org.tr
United Kingdom	uk	JANET	Lol	www.eduroam.org.uk

Table 3.1: NRENS/NROs policy signing status

4 eduroam Supporting Infrastructure

The eduroam service definition document [DS5.1.1] envisaged the deployment of several supporting services to provide a real and useful service to the GEANT2 community. These supporting services include:

- Monitoring and diagnostics facilities (monitoring service).
- eduroam Web site.
- eduroam database.
- Trouble ticketing system (TTS).
- Mailing lists.

Following the implementation plan [DS5.1.1], all of the supporting elements were in place by the end of August 2008.

Although the database population process started in mid-April 2008 it is not yet finished (see section 2.1.2 for details). This was due to the fact that the majority of NRENs/NROs provided data slower than initially planned, mainly due to problems with data collection inside their own federations. Note that this process is continuous and should reflect the development of the eduroam service inside each of the confederation members.

Based on the database content, a user-oriented map (based on Google maps technology) with all service locations registered in the eduroam database is being regularly (re)generated once per day. The map points to over 700 different service locations across Europe (see section 2.1.2 for details) and is available at <http://monitor.eduroam.org/gmap.php>.

On-line information on the monitoring service is available at <http://monitor.eduroam.org>, and on the database at <http://monitor.eduroam.org/database>. These web sites also provide access to monitoring data and the content of the eduroam database. By the end of February 2009, the monitoring service had been enhanced with two additional features:

- The RadSec monitoring capability.
- Testing on demand scenario (see [DS5.3.1]) available via eduGAIN protected web page at http://monitor.eduroam.org/inter/test_otm.php.

An example of the results of the testing on demand scenario is shown in Figure 4.1:

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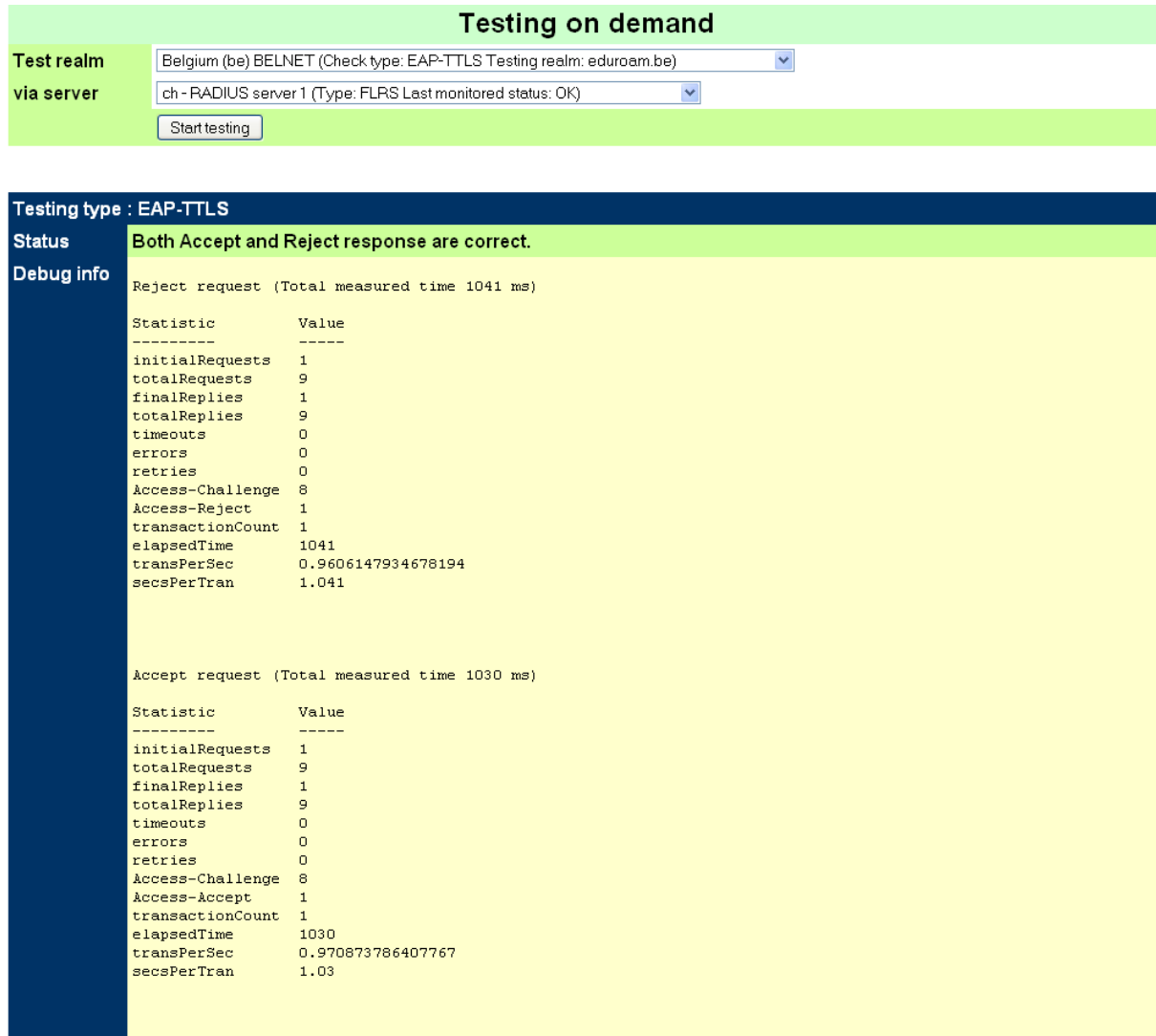


Figure 4.1: Example result of testing on demand

The TTS system, based on eduGAIN protected OTRS software, has been made available via the address <http://tts.eduroam.org/> which holds more documentation for newcomers.

An internal Wiki, based on eduGAIN protected MediaWiki software, has been setup. It is available only to SA5 members via <http://wiki.eduroam.org/> .

The eduroam web site (<http://www.eduroam.org>) was regularly maintained and updated.

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5 Events

During the period September 2008 through February 2009, SA5 had one videoconference meeting and a one-day, face-to-face meeting in Zurich in January 2009.

The main aim of these meetings was to discuss the status of the service and possible enhancements.

SA5 actively participated in GN2/NA8 training efforts. Group members participated in the preparation and delivery of eduroam training course held in Zagreb in September 2008. SA5 group members also participated in development of an online training course for setting up client supplicants, released in January 2009 (http://cbt.geant2.net/repository/eduroam_supplicants/setting_up_eduroam_supplicants.html).

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6 Conclusions

The main conclusions that can be drawn from the data presented here are:

- The eduroam confederation infrastructure has proved to be reliable.
- Traffic analysis indicates a significant increase in use.
- Although all of the service support elements are in place, more time will be needed to witness the full benefits of the services. Active participation of all member NRENs/NROs is essential here.
- The process of members signing the eduroam policy can be considered as finished. 31 out of 34 members have signed the policy, and two of the members have signed the Letter of Intention.
- Communication between members of the Service Activity group has been very successful.

7 References

[GN2-07-328]	GN2-07-328 "European eduroam confederation policy"
[DS5.1.1]	GN2-07-327v2.; DS5.1.1 "eduroam Service Definition and Implementation Plan"
[DS5.2.1,1]	GN2-09-022: DS5.2.1,1 - Service Report 1
[DS5.2.1,2]	GN2-09-049: DS5.2.1,2 - Service Report 2
[DS5.3.1]	GN2-09-008v2 : DS5.3.1 - Report on Introduction of Monitoring System and Diagnostic Tools

8 Acronyms

AAA	Authentication, Authorisation, and Accounting
EAP	Extensible Authentication Protocol
eduGAIN	GÉANT Authorisation Infrastructure for the research and education community
ETLRS	European Top Level RADIUS Server
FLRS	Federation Level RADIUS Server
IdP	Identity Provider
IPv6	Internet Protocol Version 6
NRO	National Roaming Operator
OT	Operational Team
SA5	Service Activity 5
SP	Service Provider
TLRS	Top Level RADIUS Server
TTLS	Tunnelled Transport Layer Security
TTS	Trouble Ticketing System