21-04-2016

Deliverable D8.3
Production Services Report

Abstract
This document is a report on services operated in GN4-1 by SA4 T2. The report for each service includes a description of the service, the users, a technical description, KPIs where it has been possible to measure these, activities and issues with the service, the NRENs closely involved and contact details.

Table of Contents

Table of Tables

Executive Summary

Within GÉANT there are a number of services that are developed and run by GÉANT and the NRENs for the community. Within the Product Management Lifecycle (PLM) process, services progress from strategy and design, through a pilot phase and into production. A strong gate is maintained between Development and Production by NA1 T3 (Product Management) and reported through the PLM portal.

In GN4-1 a new activity was introduced: SA4 T2 (Production and Support), which focuses on Production Application Services and Infrastructure. At the beginning of the project, the activity had two services in production – eduPKI and perfSONAR, and during Y1 one more service transitioned from development into production – Federation as a Service (FaaS). A further service, MDVPN, has not yet transitioned to production in Y1. The current status of these services is presented in this document.

SA4 T2 Production and Support ensures that the application services in production operated in this task are provided with the infrastructure and support needed to run at the level required by the design of the service. Besides that, the task maintains the services, monitoring their operations and usage.

The report for each service includes a description of the service, the users, a technical description, KPIs where it has been possible to establish metrics for these, activities and issues with the service, the NRENs closely involved and contact details. The document covers the period from the beginning of the project (M1) until the time of writing (M11).

1 Introduction

The following document is a report on the services operated by SA4 T2 in Y1 of the GN4-1 project.

The new activity in GN4-1, SA4 T2 (Production and Support) operates services developed fully or partially within the GÉANT project and that are already in production. At the start of GN4-1, only eduPKI and perfSONAR were in production, but during the one-year project, Federation as a Service (FaaS) transitioned from a development activity in SA5 to production in SA4 T2.

The objective of SA4 T2 is to ensure that the services in production are operated and maintained at the required level. It makes certain that the necessary infrastructure and support is provided and that the relevant procedures are followed so that downtime is minimised. The task aims to support and maintain daily operations and to monitor the performance and use of GÉANT services in production.

Of the services run in this task, eduPKI and FaaS rely on the infrastructure and support provided by GÉANT partners (European NRENs), while perfSONAR is based on the international cooperation of ESnet, GÉANT, Indiana University and Internet2, together with many other contributing organisations.

2 Services

SA4 T2 now maintains, monitors and manages services in production, their infrastructure, operations and usage. This report would like to highlight two things:

- Some services, being new to this Activity, did not have Key Performance Indicators (KPIs) that could be measured from the beginning.
- From this time on, the Activity will monitor service provision and other KPIs for each service and provide Continual Service Improvement (CSI) activities; all of these will shape the future of the service.

The services that entered production in SA4 T2 during the GN4-1 project period are:

- eduPKI.
- perfSONAR.
- perfSONAR Consultancy and Expertise.
- FaaS.

The report for each service includes a description of the service, the users, a technical description, KPIs where it has been possible to measure these, activities and issues with the service, the participating NRENs and contact details.

Note that KPIs provided in this document are those that are important for service operations, ones that measure the quality of work of the operating teams. The KPIs are therefore not necessarily the same as the indicators reported by the Project Lifecycle Management (PLM) team. The PLM team are concerned with how much the service is used, while the operations team might measure how much the service was available.

Within the reporting period, Task members also worked on the formalisation of business processes, the creation of a knowledge database that defines service assets and provides guidelines for use by operational team members.

2.1 eduPKI

eduPKI is a certificate service offered by GÉANT and run by DFN, the German NREN.

2.1.1 Service Description

eduPKI CA is a Certification Authority that issues X.509 digital certificates to participants of GÉANT Services who are not able to obtain suitable certificates for these services from a CA local to them. The certificates are issued in accordance with the Trust Profiles defined by eduPKI Policy Management Authority (PMA) to meet the demands of GÉANT Services.

2.1.2 Users

Users of the eduPKI service are operators of services and tools from GÉANT project that need to have valid and up-to-date certificates.

The main user of eduPKI is currently the eduroam service, with 119 valid certificates at the time of writing.

2.1.3 Technical Description

To achieve its goal, eduPKI offers four main facilities:

- A Policy Management Authority (PMA). This defines procedures to assess GÉANT services' requirements and categorises them into profiles and procedures to assess existing national CA operations against agreed profiles.
- A dedicated Certification Authority (eduPKI CA). This is operated for test purposes and to support those NREN users that cannot rely on a national CA service.
- A TACAR (Trusted Academic Certificate Authority Repository). This stores and distributes the eduPKI-participating Certificate Authority's root certificates (including the eduPKI CA root) in a secure manner.
- Service desk. The eduPKI service operates a website (www.edupki.org) which hosts all the documentation related to the eduPKI PMA work. This includes any Trust Profile, the eduPKI CA Certificate Policy (CP) and Certification Practice Statement (CPS); it also provides links to the eduPKI CA and TACAR websites. The eduPKI website also provides a contact email address that provides a single point of contact for the participating CAs and GÉANT services. The TACAR and eduPKI CA websites also offer an email address for requests that are specific to those services.

2.1.4 Key Performance Indicators

KPIs for eduPKI are shown in Table 2.1.

Name of the KPI	Baseline	Target	Measured
Availability (%) of www.edupki.org	99.4	99.9	99.95
RA Service (certificate application & approval) availability (%)	99.7	99.9	99.94
CA Service (certificate & CRL issuance) availability (%)	99.7	99.9	99.96
Certificate Status Check Availability (%) (CRL Download & OCSP)	99.9	99.99	100

Table 2.1: eduPKI KPIs over the period 1 May 2015–29 February 2016

Table 2.1 shows that the servers are running with minimum disruption and performing better than the target figure set. Certificate availability is calculated through measuring the Certificate Revocation List (CRL) and the Online Certificate Status Protocol (OCSP).

2.1.5 Activities and Issues

In the reporting period, the operations and management team dealt with standard activities related to the service, as explained in the previous Sections. No service operation-related issues were reported.

The 17 NRENs using the eduPKI service directly are: ACOnet, Belnet, CARNet, CESNET, DFN, FCCN, GRNET, HEAnet, Janet/Jisc, NIIF/HUNGARNET, NORDUnet, PIONIER, RedIRIS, RENATER, RESTENA, SURFnet, SWITCH and GÉANT. All NRENs (worldwide) that participate in eduroam are using eduPKI CA certificates indirectly.

2.1.6 Participating NRENs

Two NRENs participate in the service management and maintenance of eduPKI service: DFN and CESNET. DFN takes care of the infrastructure and the service offering, while the role of CESNET is to engage in the eduPKI Policy Management Authority (PMA) process.

2.1.7 Contact details

Contact details for eduPKI available for the users and all interested parties are:

- Official website: [eduPKIwebsite]
- Email: contact@edupki.org

2.2 perfSONAR

perfSONAR is an open-source, modular and flexible architecture for active network monitoring that provides a view of network performance across multiple domains. This allows NOC and PERT engineers to seamlessly analyse and diagnose network behaviours across an entire end-to-end path.

The tools provided in the perfSONAR suite perform active measurements of throughput, packet loss, delay and jitter, as well as traceroute outputs. Measurement Points (MPs), installed independently on selected network paths or coordinated within a single organisation can be used together, thanks to the lookup service so that all available MPs are made visible within a domain. An MP can be made visible outside of its domain and its measurements and status made available for stakeholders from external domains, thus creating a multi-domain monitoring environment. The perfSONAR suite contains all necessary mechanisms for an active monitoring dashboard.

Two types of services related to perfSONAR are offered by the SA4 T2 team:

- perfSONAR software, developed, maintained and supported by the international perfSONAR team that SA4 T2 team participates in.
- perfSONAR expertise and consultancy, where advice, training and support is provided in designing and deploying a perfSONAR-based measurement architecture.

2.2.1 Service Description

perfSONAR is an open source project supported by four international partners: Internet 2, ESnet, Indiana University and GÉANT. The global perfSONAR team is developing, maintaining and providing support for multiple perfSONAR tools that are distributed, installed and used on many network links of interest to perform active measurements. Through its participation in a global team, SA4 T2 members contribute to the development and maintenance of the perfSONAR solution and provide support to perfSONAR users worldwide.

perfSONAR tools enable network and performance engineers of one or multiple domains of a federated environment to scope and focus on a particular problem on a particular path recognised by the network monitoring tool, thus speeding up problem resolution.

In the global team, the GÉANT project team also provides user support following the perfSONAR international collaboration agreement through the perfSONAR-user mailing list, the documentation on the official perfSONAR website (www.perfsonar.org) and perfSONAR software distribution through a European repository, both for Debian and RHEL versions of the package.

2.2.2 Users

Network active measurements are generally useful to network engineers, PERT engineers, system administrators, researchers and students. Making perfSONAR MP available along an entire network path gives more opportunities for active measurements, and the more likely that the perfSONAR ecosystem is being useful to all users.

perfSONAR users include:

- Organisations (e.g. Universities, NRENs and GÉANT itself) that want to provide active network measurement possibilities, including multi-domain measurements, to their users or to any collaborating organisations' users.
- Organisations that want to perform active measurements within their own domain or to any other perfSONAR-enabled domain.
- Individual users who want to monitor end-to-end performance or performance on particular links of interest.

perfSONAR users are located worldwide and make up the global perfSONAR community.

2.2.3   Technical Description

perfSONAR software enables active network measurement in the network on selected links within one or multiple domains. Individual tools perform measurements of delay, jitter, packet loss and throughput on a network path. It also enables a measurement archive (MA) database and on-demand measurement retrieval for detailed visualisation via a web interface or dashboard. Additional tools enable users to look up and search installed MPs and MAs from anywhere.

The perfSONAR suite provides measurement and visualisation tools, and depending on the usage scenario, these four bundles enable different usage scenarios [psInstallOptions].

- The perfSONAR testpoint – provides all that is necessary to run an MP.
- The perfSONAR toolkit – provides the testpoint, an MA and a web interface for configuration, measurement setup and local measurements visualisation.
- The perfSONAR central management – provides administrative tools to maintain a collection of MPs and a mesh of measurements, along with a dashboard to monitor and visualise measurements for the MPs.
- The perfSONAR UI (psUI) – for visualising distributed multi-domain archived measurements and performing multi-domain measurements on demand.

perfSONAR can be used for network performance testing and troubleshooting in general, for centrally managed test mesh that includes central measurement archive in a single-domain or larger multi-domain network. Visualisation of the network measurement results is by a dashboard or data visualisation tool such as perfSONAR UI.

The perfSONAR suite is provided with comprehensive documentation:

- General usage documentation and detailed installation instructions, provided through the collaboratively-maintained perfsonar.net website.
- Developer documentation, source code and issue tracking, provided through a github.com dedicated project account, shared between partners.
- User support for installation, measurement setup and general use, provided through a dedicated public mailing list.

perfSONAR software is available and supported for CentOS and Debian OS platforms. Those packages are available for public download from the main website, with multiple mirrors worldwide.

2.2.4 Key Performance Indicators

There are several indicators monitored within the global team, including the number of public perfSONAR nodes registered into the global Lookup Service servers and the number of current perfSONAR versions deployed. The data are available from: [psDeployment]. Apart from these measures, the SA4 T2 team did not set additional KPIs.

2.2.5 Activities and Issues

In the reporting period, the perfSONAR global team issued one major release (perfSONAR 3.5.0) and one minor release (perfSONAR 3.5.1). The next major release (perfSONAR 3.6.0) is planned for October 2016. Independently, there have been two releases of the user interface module (psUI 1.5 and 1.6).

There were no issues recorded. The support provided via the mailing list was mostly related to the first installations by new users.

2.2.6 Participating NRENs

The GÉANT project partners that have provided resources in this project are AMRES, CARNet, DFN, PSNC and GÉANT.

2.2.7 Contact details

Contact details for the perfSONAR project in general are:

- The main website: [psWebsite]
- The user mailing list as the entry point for any support request: perfsonar-user@internet2.edu or https://lists.internet2.edu/sympa/info/perfsonar-user (a login is required with the InCommon Federation).
- The developers' resources are available at [psDeveloper].

2.3   perfSONAR Consultancy and Expertise

perfSONAR Consultancy and Expertise aims at promoting perfSONAR usage within the GÉANT community.

2.3.1   Service Description

The Consultancy service is geared towards four different activity types:

- Helping design measurement architectures and infrastructures based on perfSONAR to fit the monitoring and measurement needs of the requesting party.
- Providing specific training for perfSONAR deployments, usage and best practices.
- Providing extra support in deploying and operating perfSONAR to GÉANT and NRENs whenever requested.
- Maintaining and operating a small set of perfSONAR services appropriate to the perfSONAR community in general and to GÉANT network perfSONAR users in particular.

2.3.2   Users

The users of this service are teams and individuals from the GÉANT community. Since active network measurements and network performance monitoring require specific and advanced knowledge, it is expected that potential users will come from Network Operating Centres (NOCs), NRENs' Performance Emergency Response Teams (PERTs), or cross-domain projects that NREN constituents might participate in. However, the service is not limited to a specific user group.

2.3.3   Technical description

The perfSONAR Consultancy and Expertise service is comprised of the following elements:

- A Jira-based service desk system where users can enter their service requests and from where the team can answer them and provide guidance, advice or help in deploying their perfSONAR systems.
- A GÉANT area public instance of the perfSONAR Simple Lookup Service (SLS), where European perfSONAR deployments will generally register their services. The registration service is automatic and the closest SLS is usually selected.
- A public psUI instance, providing a demonstration and testing facility of the perfSONAR features and their usefulness in troubleshooting network performance.

2.3.4 Key Performance Indicators

For this area of work, no KPIs have been recorded so far. Some of the indicators that could be measured in the future are:

- The number of organisations calling for this service.
- The number of requests per organisation.
- Customer satisfaction ratings.
- The number of presentations or training instances provided to the community.

The measurement of these indicators has started recently, so there is no data is available for reporting in this deliverable.

2.3.5 Activities and Issues

During the reporting period, the SA4 T2 perfSONAR team was providing this service on request and in a best-effort manner. Support was provided to the GÉANT network team through the cooperation with SA1 in their efforts to install perfSONAR and perfSONAR UI.

A presentation about the perfSONAR update and perfSONAR UI was provided at the Service and Technology Forum (STF), held during 24–25 February 2016 in Amsterdam, the Netherlands.

No issues were recorded in this reporting period.

2.3.6 Participating NRENs

GÉANT NRENs providing resources in this project are: AMRES, CARNet, DFN, PSNC and GÉANT itself.

2.3.7 Contact details

- Service desk: [psServiceDesk].
- The main website: [psWebsite].
- The demo psUI instance: [psDemoUI].

2.4   FaaS

Federation as a Service (FaaS) is a Trust and Identity service offered to Federation operators in NRENs.

2.4.1   Service Description

FaaS delivers a service that supports NRENs by providing them with the infrastructure needed to operate a classic identity federation (i.e. web-based Single Sign-on) and access to eduGAIN.

The FaaS offering can be accessed via an NREN-chosen server name and the Web UI can be localised as desired, maintaining the appearance of a service provided for NREN members by the NREN.

2.4.2   Users

Users of FaaS are GÉANT partners that have not yet deployed, or are in the early stage of operating a SAML2-based Federation, and that can benefit from a hosted set of tools (SaaS – Software as a Service) that significantly lowers the barriers to creating and maintaining a secure Identity Federation.

At the time of writing, the main users of FaaS are: LitNET, MREN, GRENA, and ASNET-AM.

2.4.3   Technical Description

FaaS offers a toolbox for the management of Identity federation metadata and for exchanging metadata with other federations through the eduGAIN service. The toolbox uses open source software and is provided as a hosted single tenant service, where each FaaS customer gets its own FaaS instance that can be localised and branded as desired.

FaaS has both front-end and a back-end components. The front-end is a web UI where Federation Operators and administrators of IdPs and SPs can register SAML entities into the federation registry application. The web UI makes the registration of SAML entities as simple as pasting the entity's metadata in a text box. The application then transforms raw SAML metadata into a rich UI that gives the option of adding a variety of additional data (such as metadata user interface elements, entity categories, etc.) In this process, the Federation Operator has the role of checking and approving the registration. After an IdP/SP is registered, it can become a member of a local federation and/or eduGAIN.

The back-end is metadata aggregator, which inputs metadata from local federation entities (registered in the front-end web UI) with eduGAIN metadata, and produces two metadata streams:

- Federation upstream for publishing to eduGAIN.
- Federation downstream for publishing to Federation members.

The metadata aggregator performs signing of the metadata in each of the streams using a Hardware Security Module (HSM), which is an advanced technology used for secure signing. The key used for signing is securely stored in hardware.

2.4.4 Key Performance Indicators

The KPIs for FaaS have been measured during the time when the service was considered fully in production: from October 2015 to the end of February 2016. The availability of both the infrastructure where the Virtual Machines are running and the Virtual Machines themselves have been measured for this time period.

Name of the KPI	Baseline	Target	Measured
Availability of the infrastructure (%)	99.0	99.0	98.8
Availability of the Virtual Machines (%)	99.0	99.0	99.77

Table 2.2: FaaS KPIs over the period 1 October 2015–29 February 2016

2.4.5 Activities and Issues

In the reporting period, the development (SA5) and operation teams (SA4) looked after the transition of the service from the pilot phase to production. The transition started in May 2015, following the Service Validation and Testing Process as described in Deliverable 'D8.1 Service Validation and Testing Process'. The service was considered fully handed over in October 2015.

After October 2015, the operation and management teams dealt with standard production activities. No issues were reported relating to the service operations.

2.4.6 Participating NRENs

Three NRENs participate in the service management and maintenance of FaaS: PSNC, AMRES and NORDUnet. PSNC hosts and manages the virtual machines where the FaaS instances run, NORDUnet provides HSM, and AMRES manages and supervises the whole service.

2.4.7 Contact details

First level support sits rests with SA5. The contact details for FaaS available for users and all other interested parties are:

- Web site: [FaaSWiki]
- Email address: faas@lists.geant.org

3 Conclusions

Production Application Services and Infrastructure is a new activity in the GN4-1 project that takes care of services mainly developed within the GÉANT Project. At the time of writing, the production services in SA4 were eduPKI, perfSONAR, perfSONAR Consultancy and Expertise, and FaaS. A further service, MDVPN, is not considered to have transitioned to production in Y1, so it has not yet been allocated a Service Manager.

FaaS is a new service that was in development in SA5 at the beginning of GN4-1 and transitioned into production under SA4 T2. Once the production environment for the services was established, the business procedures and processes could be determined, together with the service assets and supporting documentation for use by operational teams.

It can be seen that these services differ significantly in their nature, target users and scope. While eduPKI and FaaS fall into the Trust & Identity service category, perfSONAR and perfSONAR Consultancy and Expertise enable active monitoring across multi-domains and with users being drawn from individuals, NOCs or PERT teams and organisations worldwide. The eduPKI service, developed within GÉANT, aims to support other GÉANT services in defining their security requirements and providing them with digital certificates. FaaS was developed for GÉANT NRENs that have not yet established their own Identity Federation.

The infrastructure for the supported services is provided by different organisations, both from within and outside of the GÉANT community. The provisioning and daily operation of these services successfully involves the voluntary effort of interested parties on other continents, within a federated management.

References

[eduPKIwebsite]	www.edupki.org
[FaaSWiki]	https://wiki.edugain.org/FaaS
[psDemoUI]	http://psui.geant.net
[psDeployment]	https://www.perfsonar.net/about/who-is-uisng
[psDeveloper]	http://github.com/perfsonar/
[psInstallOptions]	http://docs.perfsonar.net/install_options.html
[psServiceDesk]	https://issues.geant.net/jira/projects/PSSUPPORT
[psWebsite]	http://www.perfsonar.net/

Glossary

CA	Certification Authority
CP	Certificate Policy
CPS	Certification Practice Statement
CRL	Certificate Revocation List
CSI	Continual Service Improvement
eduPKI	The eduPKI CA is a Certification Authority that issues X.509 digital certificates to participants of GÉANT Services who are not able to obtain suitable certificates for these services from a CA local to them.
ESnet	Energy Sciences Network. A high-speed computer network serving the US Department of Energy (DOE) scientists and their collaborators worldwide.
FaaS	Federation as a Service
HSM	Hardware Security Module
IdP	Identity Provider
KPI	Key Performance indicator
MA	Measurement Archive
MP	Measurement Point
NOC	Network Operations Centre
OCSP	Online Certificate Status Protocol
perfSONAR	Performance focused Service Oriented Network monitoring Architecture. An open source toolkit for running network tests across multiple domains, and used extensively by the R&E network community
PERT	Performance Emergency Response Team
PLM	Project Lifecycle Management
PMA	Policy Management Authority
psUI	perfSONAR User Interface
RA	Registration Authority
RHEL	Red Hat Enterprise Linux
SaaS	Software as a Service
SAML	Security Assertion Markup Language
SLS	Simple Lookup Service
SP	Service Provider
TACAR	Trusted Academic Certificate Authority Repository