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**Release Date:** November 2017
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Preface

Applicability

The information in this document applies to:

- **SafeNet Authentication Service (SAS) - Service Provider Edition (SAS-SPE)**—Used by service providers to build an authentication service.

- **SafeNet Authentication Service (SAS) - Private Cloud Edition (SAS-PCE)**—Used to implement an authentication service on the customer premises.

Audience

This document is intended for personnel responsible for maintaining your organization's security infrastructure. This includes SafeNet Authentication Service (SAS) users and security officers, key manager administrators, and network administrators. It is assumed that the users of this document are proficient with security concepts.

All products manufactured and distributed by Gemalto are designed to be installed, operated, and maintained by personnel who have the knowledge, training, and qualifications required to safely perform the tasks assigned to them. The information, processes, and procedures contained in this document are intended for use by trained and qualified personnel only.
Support Contacts

If you encounter a problem while installing, registering, or operating this product, refer to the documentation. If you cannot resolve the issue, contact your supplier or Gemalto Customer Support.

Gemalto Customer Support operates 24 hours a day, 7 days a week. Your level of access to this service is governed by the support plan arrangements made between Gemalto and your organization. Please consult this support plan for further information about your entitlements, including the hours when telephone support is available to you.

Customer Support Portal

The Customer Support Portal, at https://supportportal.gemalto.com, is a where you can find solutions for most common problems. The Customer Support Portal is a comprehensive, fully searchable database of support resources, including software and firmware downloads, release notes listing known problems and workarounds, a knowledge base, FAQs, product documentation, technical notes, and more. You can also use the portal to create and manage support cases.

NOTE: You require an account to access the Customer Support Portal. To create a new account, go to the portal and click on the REGISTER link.

Telephone Support

If you have an urgent problem, or cannot access the Customer Support Portal, you can contact Customer Support by telephone. Calls to Customer Support are handled on a priority basis.

<table>
<thead>
<tr>
<th>Region</th>
<th>Telephone number</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(Subject to change. An up-to-date list is maintained on the Customer Support Portal)</td>
</tr>
<tr>
<td>Global</td>
<td>+1-410-931-7520</td>
</tr>
<tr>
<td>Australia</td>
<td>1800.020.183</td>
</tr>
</tbody>
</table>
| China  | North: 10800-713-1971  
<pre><code>    | South: 10800-1301-932 |
</code></pre>
<p>| France | 0800-912-857     |
| Germany| 0800-181-6374    |
| India  | 000.800.100.4290 |
| Israel | 180-931-5798     |
| Italy  | 800-786-421      |
| Japan  | 0066 3382 1699   |</p>
<table>
<thead>
<tr>
<th>Country</th>
<th>Phone Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Korea</td>
<td>+82 2 3429 1055</td>
</tr>
<tr>
<td>Netherlands</td>
<td>0800.022.2996</td>
</tr>
<tr>
<td>New Zealand</td>
<td>0800.440.359</td>
</tr>
<tr>
<td>Portugal</td>
<td>800.863.499</td>
</tr>
<tr>
<td>Singapore</td>
<td>800.1302.029</td>
</tr>
<tr>
<td>Spain</td>
<td>900.938.717</td>
</tr>
<tr>
<td>Sweden</td>
<td>020.791.028</td>
</tr>
<tr>
<td>Switzerland</td>
<td>0800.564.849</td>
</tr>
<tr>
<td>United Kingdom</td>
<td>0800.056.3158</td>
</tr>
<tr>
<td>United States</td>
<td>(800) 545-6608</td>
</tr>
</tbody>
</table>
## Environment

<table>
<thead>
<tr>
<th>Description</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Supported Operating Systems</strong></td>
<td>• Windows Server 2008 R2 SP1**</td>
</tr>
<tr>
<td></td>
<td>• Windows Server 2012***</td>
</tr>
<tr>
<td></td>
<td>• Windows Server 2012 R2****</td>
</tr>
<tr>
<td></td>
<td>• Windows Server 2016 (64-bit)</td>
</tr>
<tr>
<td><strong>Supported Database Servers</strong></td>
<td>• PostgreSQL 9.6 (PostgreSQL 9.6.4), default</td>
</tr>
<tr>
<td></td>
<td><strong>Note:</strong> PostgreSQL should be used only for test and proof-of-concept installations. It is not supported in HA configurations.</td>
</tr>
<tr>
<td></td>
<td>The default database shipped with SafeNet Authentication Service is PostgreSQL. Any other supported database must be purchased separately.</td>
</tr>
<tr>
<td></td>
<td>HA support requires MySQL 5.7 or later</td>
</tr>
<tr>
<td></td>
<td><strong>Note:</strong> In other words, MySQL versions prior to 5.7, are not be supported, and thus may not work with the SAS solution.</td>
</tr>
<tr>
<td></td>
<td>• MS SQL 2008, MS SQL 2012, MS SQL 2014, MS SQL 2016</td>
</tr>
<tr>
<td><strong>Supported LDAP Directories</strong></td>
<td>• Active Directory</td>
</tr>
<tr>
<td></td>
<td>• Novell eDirectory 8.x</td>
</tr>
<tr>
<td></td>
<td>• SunOne 5.3</td>
</tr>
<tr>
<td><strong>Supported Architecture</strong></td>
<td>64-bit</td>
</tr>
</tbody>
</table>

*PostgreSQL should be used only for test and proof-of-concept installations. It is not supported in HA configurations.*

*The default database shipped with SafeNet Authentication Service is PostgreSQL. Any other supported database must be purchased separately.*

*HA support requires MySQL 5.7 or later*  
*Note: In other words, MySQL versions prior to 5.7, are not be supported, and thus may not work with the SAS solution.*

*MS SQL 2008, MS SQL 2012, MS SQL 2014, MS SQL 2016*

**Notes:**  
For replication, an active/active (multi-master) configuration needs to be deployed. On MS SQL, this is transactional peer-to-peer replication. In addition, peer-to-peer replication is also supported for Enterprise editions of MS SQL 2014 and MS SQL 2016.  
AlwaysOn Availability Groups Feature is now supported for MS SQL 2012, MS SQL 2014, MS SQL 2016  
Only an MS internal (SQL only) user account needs to be used to connect SAS to the database. Also, MS SQL needs to be configured in the mixed mode. An MS SQL Windows User is not supported.
**Description**

**Supported RADIUS Authentication Protocols**
- PAP
- MSCHAPv2

**Additional Software Components**
- Internet Information Services (IIS) 8.5
- .NET 4.6.2 (download, [here](#))
- .NET Framework 3.5 Features

*Note*: IIS 6 compatibility roles and ASP.NET role services must be installed in order for the SAS website to appear. For Windows Server 2016 (64-bit), IIS 10 compatibility roles and ASP.NET role services are needed.

**MySQL Components**
- MySQL Connector 6.9.9 (download, [here](#))

*Note*: The MySQL Connector is required only if the database in use is MySQL.

**Processor**
2.6 GHz processor (or above)

**Memory**
16 GB RAM (or greater)

<table>
<thead>
<tr>
<th>Number of Users Range</th>
<th>Recommended RAM</th>
<th>Number of Processor Core (v2.60 GHz or above)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Till 10000</td>
<td>16 GB</td>
<td>2</td>
</tr>
<tr>
<td>10000-20000</td>
<td>32 GB</td>
<td>4</td>
</tr>
<tr>
<td>20000+</td>
<td>64 GB</td>
<td>6</td>
</tr>
</tbody>
</table>

**Disk Space**
300 MB

*Note*: Minimum disk space required for installation is 300MB; additional disk space would be required if logging is enabled.

**Display**
SVGA (1280 x 1024), 24-bit color or higher

**Windows Server 2008 R2 SP1 – Installing Microsoft Root Certificate**

For a smooth installation of SAS with .NET 4.6.2 Framework, the administrators have to install the Microsoft Root certificate manually, prior to running the setup.
a. Install Web Server (IIS) and select additional Role Services using Add Roles Services, as illustrated below:

![Add Role Services](image)

b. Download and import the Microsoft Root certificate (Download [here](#)).

c. Initiate the SAS installer to continue with .NET 4.6.2 Framework installation, followed by SAS installation.  
   **Note:** After .NET installation, a prompt to restart the system will be displayed. After the restart, the installation process will resume to complete the SAS installation.

### Windows Server 2012 – Installing Server Manager Roles

For a smooth installation of SAS with .NET 4.6.2 Framework, the administrators have to install the required server manager roles:

a. Install .NET Framework 3.5 Features.

b. Install Web Server (IIS) and select additional Role Services using Server Manager Roles and Features, as illustrated in the Internet Information Services Role Services Required section on page 9.

c. Initiate the SAS installer to continue with .NET 4.6.2 Framework installation, followed by SAS installation.  
   **Note:** After .NET installation, a prompt to restart the system will be displayed. After the restart, the installation process will resume to complete the SAS installation.
****Windows Server 2012 R2 – Installing Microsoft Updates

For a smooth installation of SAS with .NET 4.6.2 Framework, the administrators have to install the following Microsoft updates.

a. Install .NET Framework 3.5 Features.

b. Install Web Server (IIS) and select additional Role Services using Server Manager Roles and Features, as illustrated in the Internet Information Services Role Services Required section on page 9.

c. Install the following Windows updates, in the following order:
   i.  Windows8.1-KB2919442-x64.msu (64-bits) (Download here)
   ii. Windows8.1-KB2919355-x64.msu (64-bits) (Download here)

d. Initiate the SAS installer to continue with .NET 4.6.2 Framework installation, followed by SAS installation.

   Note: After .NET installation, a prompt to restart the system will be displayed. After the restart, the installation process will resume to complete the SAS installation.

Internet Information Services Role Services Required

Windows Server 2012 and Windows Server 2012 R2

To successfully install and run SAS 3.7 on Windows Server 2012 and Windows Server 2012 R2, include the IIS role services as specified in the images below:
Windows Server 2016

To successfully install and run SAS 3.7 on Windows Server 2016, include the IIS role services as specified in the images below:
Select server roles

Before You Begin
Installation Type
Server Selection

Select one or more roles to install on the selected server.

Roles
- Web Server (IIS) (16 of 43 installed)
  - Common HTTP Features (4 of 6 installed)
  - Health and Diagnostics (1 of 6 installed)
  - Performance (1 of 2 installed)
  - Security (1 of 9 installed)
- Application Development (7 of 11 installed)
  - .NET Extensibility 3.5 (Installed)
  - .NET Extensibility 4.6 (Installed)
  - Application Initialization
  - ASP (Installed)
  - ASP.NET 3.5 (Installed)
  - ASP.NET 4.6 (Installed)
  - CGI
  - ISAPI Extensions (Installed)
  - ISAPI Filters (Installed)
  - Server Side Includes
  - WebSocket Protocol

Description
Application Development provides infrastructure for developing and hosting Web applications. Use these features to create Web content or extend the functionality of IIS. These technologies typically provide a way to perform dynamic operations that result in the creation of HTML output, which IIS then sends to fulfill client requests.
Select features

Before You Begin
Installation Type
Server Selection
Server Roles
Features
Confirmation
Results

Description

.NET Framework 3.5 combines the power of the .NET Framework 2.0 APIs with new technologies for building applications that offer appealing user interfaces, protect your customers' personal identity information, enable seamless and secure communication, and provide the ability to model a range of business processes.
System Sizing

NOTE: The system sizing information is provided as a general guide. It is strongly recommended that you make an assessment of your specific requirements based on your infrastructure setup before implementation.
Minimum Recommended Configuration

The information in the table below is based on the following minimum recommended configuration (for up to 5000 users):

- CPU: Intel® Xeon(R) Processor CPU E5-2650 v2.60GHz (2 core)
- RAM: 16 GB
- Primary measurement: Authentications per second

Under stable testing conditions, the average time to complete one authentication successfully is 15 milliseconds. Below are the comparative performance metrics differentiated on various RAM and Processor Core sizes.

<table>
<thead>
<tr>
<th>Number of processor Cores</th>
<th>16 GB RAM (Minimum Recommended)</th>
<th>32 GB RAM</th>
<th>16 GB RAM</th>
<th>32 GB RAM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximum number of authentications per second</td>
<td>80</td>
<td>87</td>
<td>90</td>
<td>102</td>
</tr>
<tr>
<td>Maximum CPU utilization</td>
<td>90%</td>
<td>85%</td>
<td>40%</td>
<td>38%</td>
</tr>
<tr>
<td>Average number of authentications per second</td>
<td>70</td>
<td>73</td>
<td>82</td>
<td>88</td>
</tr>
</tbody>
</table>

**RAM Memory Utilization**

| % of available RAM used | 1% | 1% | ~1% | ~1% |
| Available RAM | 16220 MB | 32440 MB | 16220 MB | 32440 MB |

**Physical Disk**

| Average latency * | 16ms | 14ms | 10ms | 10ms |
| Throughput * | 174 MB/sec | 188 MB/sec | 342 MB/sec | 348 MB/sec |
| Maximum CPU utilization by MySQL process | 34% | 30% | 20% | 10% |
| Network I/O activity | 6 Mbps | 6.5 Mbps | 6 Mbps | 7 Mbps |
| Physical memory used | 196 MB | 232 MB | 210 MB | 245 MB |
| Users loaded | 5000 | 5000 | 5000 | 5000 |

* Average latency – It is the latency between start and completion of server read/write request on the physical disk, and is measured in milliseconds.
* Throughput – It is the amount of data that the physical disk has received from the server at any given second, and is measured in megabytes.

Additional Requirements

- The system administrator installing SAS must have administrative privileges on the local system.
SafeNet Authentication Service Ports

SAS may require the use of several ports, depending upon the location of external directories, databases, or RADIUS servers. The following is a list of default port values. SAS can be configured to use alternate ports. SSL requires that a valid certificate is installed on the SAS server.

<table>
<thead>
<tr>
<th>Port (TCP/UDP)</th>
<th>Usage</th>
</tr>
</thead>
<tbody>
<tr>
<td>80/443</td>
<td>Port 80 and/or 443 can be used for management sessions, provisioning, self-enrollment, self-service, and for servicing of encrypted authentication requests from configured agents. For security purposes, port 443 (SSL) is recommended.</td>
</tr>
<tr>
<td>1812/1813</td>
<td>Ports 1812/1813 are standard ports for RADIUS authentication and RADIUS accounting respectively.</td>
</tr>
<tr>
<td>389/636</td>
<td>Ports 389/636 are standard ports for LDAP and LDAPS connections respectively. For security purposes, port 636 (SSL) is recommended.</td>
</tr>
<tr>
<td>5432</td>
<td>The port number for connection to the default PostgreSQL database.</td>
</tr>
<tr>
<td>1433</td>
<td>The default port number for connection to an MS SQL database.</td>
</tr>
<tr>
<td>25</td>
<td>The default port for SMTP email.</td>
</tr>
<tr>
<td>8456</td>
<td>The default port number for LDAP synchronization traffic to/from SAS and LDAP.</td>
</tr>
<tr>
<td>8458 (Inbound)</td>
<td>The default incoming port number for the Logging Agent.</td>
</tr>
<tr>
<td>8459 (Outbound)</td>
<td>The default outgoing port number for the Logging Agent.</td>
</tr>
<tr>
<td>11012</td>
<td>The default port for communication between SAS and SAS HA Controller Service.</td>
</tr>
</tbody>
</table>

SAS Synchronization Agent Ports

- TCP Port 8456 – Incoming on the SAS server
- TCP Port 389
- TCP Port 636 (optional) – Outgoing from the SAS Synchronization Agent

SAS Logging Agent Ports

- Agent > SAS TCP Port 8459
- SAS > Agent TCP Port 8458
- Agent -> Syslog UDP Port 514
Virtualization

SAS is designed for virtualization and has been extensively tested with VMWare®.

Internal Database

The internal database contains all system configuration, application and policy data, token information, and history and activity information used by SAS. User-specific information, such as user IDs and coordinates are also stored in the database (possibly synchronized from an original user source).

Where LDAP/AD integration is configured, the unique GUID property of the LDAP user account is stored in the database, providing a consistent link between the user’s LDAP account and tokens associated with the user in SAS. The UserID is stored with authentication activity for reporting purposes. This allows SAS to provide audit trails and authentication activity reports even after a user (and therefore the GUID) has been deleted from LDAP.

The database can be installed on the machine hosting SAS, on a separate machine, or as a cluster. Every SAS implementation can be configured for a primary database instance with failover to an alternate instance. In addition, multiple SAS servers can use the same database.

LDAP External User Sources

SAS supports the use of one or more LDAP directories for the user, account status, and group membership data. Each LDAP must be configured for a specific virtual server. Alternatively, an LDAP forest can be connected to one virtual server if needed. When there are multiple domains within one virtual server, SAS must be able to read the LDAP forest via the Global Catalog Server (port 3268), and all domains in a forest must be fully trusted (AD only).
Supported Browsers

A browser is the standard interface for use with SAS or components such as self-enrollment or user self-service. The following browsers are supported:

- Chrome 33 and later
- Firefox 3.5 and later
- Internet Explorer 8 and later
- Microsoft Edge

Certain functions may require ActiveX controls and/or JavaScript.

Maintaining Accurate Time Settings

SAS operation and authentication services are not dependent on accurate time settings. However, it is recommended to maintain accurate time to enable reliable and consistent reporting and audit trails. In some cases, SAS licensing may restrict certain functions based on dates or date ranges. Modifying the server date after license installation may cause these functions to become unavailable.

It is recommended that the SAS time is set to the local time zone and that the server time is UTC coordinated. For more information, visit http://www.time.gov.

Installation Types

An SAS site is defined as an instance of the SAS authentication engine. The number of sites and configuration options are determined by licensing, redundancy, and performance requirements. Assuming that SAS is installed on the recommended hardware, the factor that has the largest bearing on performance is the database I/O, primarily determined by the amount and frequency by which authentication history is written. In most cases, it is acceptable to have SAS and the database installed on the same server.

The scenarios described in the following sections are provided as guidelines and examples. Many different configurations are possible. For example, it is perfectly acceptable to install the database, enrollment, self-service, and directory components on separate computers.

NOTE: In the following diagrams, “site” refers to an SAS instance that connects to the same database or database cluster. This can be at the same physical location or spread across different data centers.
Small, Single-Site Deployments

You may choose to install all SAS components on a single server, with a secondary instance providing redundancy and failover.

**Small Deployments with Failover**

![Diagram of Small Deployments with Failover]

You may choose to install all SAS components on a single server, with a secondary instance providing redundancy and failover.

**Small Deployments with Failover and Site Specific Database**

![Diagram of Small Deployments with Failover and Site Specific Database]
Authentication and management functions can be distributed across sites if necessary. SAS agents can failover to the alternate site. The connections between LDAP and SAS can be local or remote. If there is a primary and secondary LDAP server, each SAS instance would typically be configured for LDAP failover.

**Medium Site Deployments**

Medium site deployments are typically required for organizations with dedicated LDAP, web, and RADIUS servers.

**Medium Deployments with Failover**

![Diagram of Medium Deployments with Failover]

**Medium Deployments with Failover and Site Specific Database**

![Diagram of Medium Deployments with Failover and Site Specific Database]
Large Deployments

For sites requiring support for up to 250,000 users and several hundred authentications per second, a database cluster fronted by multiple SAS sites is recommended.

Large Deployments with Failover