Prescription Monitoring Program
Information Exchange

RxCheck State Routing Service

SRS Installation & Setup Guide

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Introduction

Overview

The PMIX service provides state PMP systems with the capability to retrieve interstate prescription drug history and display it to their in-state end users (requestor) to assist in the identification of potential abuse and diversion. The service can provide the requested drug history as a direct response to a request containing person identifiers. Multiple requests can be issued in sequence by a state PMP system to provide prescription drug histories from as many states as needed.

Specifications

PMIX Architecture

The Prescription Drug Monitoring Program Training and Technical Assistance Center (PDMP TTAC) and other stakeholders have undertaken the development of a consensus, national PMIX Architecture to enable the interstate sharing of PMP data. The use of open, consensus standards promotes interoperability. The National Information Exchange Model (NIEM) and the Global Reference Architecture (GRA) are foundational standards of the PMIX Architecture.

The PMIX architecture requires

1. Common NIEM exchange data and metadata,
2. Hub connections (and hub to hub capability) and
3. End-to-end security (including encryption key management).

The architecture will result in a shared infrastructure to support certificate/key management capabilities and basic directory services, specifically the PMIX Directory Service. The PMIX Directory, also known as the PMIX LDAP Server, provided for X.509 certificate management and public key exchange as well as PMP contact and service requirement information.

![Figure 1: PMIX Overview](image-url)
RxCheck / SRS Connection

The PMIX service interface utilizes standards-based web services to facilitate communication through hubs to the endpoint systems. The following diagram shows a state PDMP system connecting to the PMIX RxCheck Hub via the PMIX State Routing Service (SRS). The PMIX SRS enables PDMPs to “offload” PMIX functionality such as PMIX compliant service hosting, request/response message validation, role-based site authorization, full message routing and message translation.

![Diagram showing PMIX RxCheck/SRS Architecture Detail](image)

The web service interfaces are protected by a combination of secure socket layer, which provides transport level encryption and service authentication and message level encryption, which ensures message privacy and integrity. The PMIX SRS handles all X.509 certificate-based message encryption/decryption involved in communicating over the PMIX secure web service interface.
Installation Procedure

The steps listed below are intended to provide PDMP technical staff with general guidance to which serves to augment the information contained in the PMIX SSP documentation. Please note that implementation may vary depending upon a PDMP’s computer system. The IJIS Institute is available to provide technical assistance as needed.

Step 1: Download Package and Prepare the pre-installation checklist
  - *jre-8u171-windows-x64.exe*
  - *rxcheck2.0-apache-tomcat-8.5.32-windows-x64.zip*
- Fill out and prepare the pre-installation checklist defined in Appendix A

Step 2: Network Preparation
- Configure and validate network connectivity between the State Routing Service and the two endpoint systems:
  - “External” - RxCheck Central Hub
  - “Internal” – PDMP System
- The following steps, which are based on a typical configuration process, reflect general network configuration guidance and may need to be tailored to apply to specific environments.
  - **Network Access**
    - Enable the SRS to access the RxCheck Hub
      - Provide the PMIX RxCheck Administrator with the SRS external IP address, so they can configure the IJIS network firewall
      - Configure the networking components:
        - Add the necessary network address translation (NAT)
        - Add the routing rules needed to route outbound traffic
        - If necessary, add any outbound firewall rules
        - If the external IP address is “virtual”, ensure any added routing provisions are implemented
    - Enable the SRS to access the State PDMP
      - Configure the networking components:
        - Add the necessary network address translation (NAT)
        - Add the routing rules needed to route outbound traffic
        - If necessary, add any outbound firewall rules
        - If the external IP address is “virtual”, ensure any added routing provisions are implemented
- Enable the RxCheck Hub to access the SRS
  - Provide the PMIX RxCheck Administrator with the SRS externally accessible IP address used to connect to the listener
  - Configure the networking components:
    - Add the necessary inbound firewall rules
    - If the external IP address is “virtual”, ensure any added routing provisions are implemented
  - **Domain Name Resolution**
    - **RxCheck Hub**
      - Identity the domain name and network address
      - Ensure the SRS is able to resolve the domain name to the IP
    - **State PMP System**
      - Identity the domain name and network address
      - Ensure the SRS is able to resolve the domain name to the IP
Step 3: Security
The following outline provides instructions (Windows Server) to help acquire and install the X.509 certificate for the PMIX SRS:

- Generate SSL/TLS Custom CSR self-signed certificate (if necessary)
  - Open Microsoft Powershell Window (in Administrator mode)
  - Create the certificate using the following command that will be placed under the local machine and export the PFX and CER version of the certificate to be used in the installer
    
    **Create Self-Signed Certificate**
    
    ```powershell
    PS > New-SelfSignedCertificate -Subject "CN=_SITEID_" -KeyLength 2048 -NotBefore (Get-Date) -NotAfter (Get-Date).AddMonths(36) -CertStoreLocation "cert:\LocalMachine\My"
    ```

    **Note:** Copy the certificate Thumbprint to be used in the following steps.

- Export the Private Key of the Certificate in PFX format
  ```powershell
  PS > $mypwd = ConvertTo-SecureString -String "password" -Force -AsPlainText
  PS > Get-ChildItem -Path cert:\localMachine\my\[CERTIFICATE-THUMBPRINT] | Export-PfxCertificate -FilePath e:\temp\_SITEID_.pfx -Password $mypwd
  ```

- Export the Public Key of the Certificate in DER format
  ```powershell
  PS > Get-ChildItem -Path cert:\localMachine\my\[CERTIFICATE-THUMBPRINT] | Export-Certificate -Type CERT -FilePath "e:\temp\_SITEID_.cer"
  ```
Step 4: Install Application

Install Java Runtime

Install Java JRE by executing the `jre-8u171-windows-x64.exe` file

Click on the Install button to start the installation

Click “Close” to complete the Java JRE Setup
Configure the JRE

- Update system variables to add JRE_HOME environment variable pointing to the JRE installation folder.
  - Open Control Panel and go to Control Panel\System and Security\System
  - Click on Advanced System Settings
  - Click on “New…” under System Variables
  - Add JRE_HOME to point to the JRE install path
    (Default: C:\Program Files\Java\jre1.8.0_171)
Install RxCheck SRS Package

- Unzip `rxcheck2.0-apache-tomcat-8.5.32-windows-x64.zip` file to a folder.

- Open command prompt and change directory to `C:\rxcheck\apache-tomcat-8.5.32\bin`

- Install RxCheck SRS 2.0 as Windows Service by executing below command.
  
  ```
  C:\rxcheck\apache-tomcat-8.5.32\bin>service.bat install "RxCheckSRS_2.0"
  ```
Configure RxCheck SRS

- Go to folder `C:\rxcheck\apache-tomcat-8.5.32\conf`
- Rename `application.yml.template` file to `application.yml` file
- Edit `application.yml` using applications like MS WordPad or Notepad++ and replace the variables with values listed in the table.

<table>
<thead>
<tr>
<th>Variable Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>APIKEY</em></td>
<td>API Key provided by RxCheck</td>
</tr>
<tr>
<td><em>SITEID</em></td>
<td>Site Id provided by RxCheck</td>
</tr>
<tr>
<td><em>FULLPATH_KEYSTORE_FILE</em></td>
<td>Full path to PFX certificate file containing the Private Key that was</td>
</tr>
<tr>
<td></td>
<td>created in Step 3 of the installation.</td>
</tr>
<tr>
<td><em>KEYPASSWORD</em></td>
<td>Password for KeyEntry (entered in Step 3)</td>
</tr>
<tr>
<td><em>STOREPASSWORD</em></td>
<td>Password for the KeyStore (default is the same password as key password,</td>
</tr>
<tr>
<td></td>
<td>entered in Step 3)</td>
</tr>
</tbody>
</table>
Step 5: Complete SRS Configuration on the RxCheck Console

- Login to RxCheck Console using the credentials provided.

- Setup SRS Outbound Endpoint

<table>
<thead>
<tr>
<th>Field Name</th>
<th>Description</th>
<th>Default Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Protocol</td>
<td>Select http or https</td>
<td>http</td>
</tr>
<tr>
<td>Domain</td>
<td>This is an optional entry, if you are using a domain name for accessing the SRS Outbound from the PDMP server then enter the domain name of the server</td>
<td></td>
</tr>
<tr>
<td>Port Number</td>
<td>HTTP port for SRS Outbound service</td>
<td>8080</td>
</tr>
<tr>
<td>IP Address</td>
<td>IP address of the server or the external gateway from where the SRS would be calling the RxCheck Hub</td>
<td></td>
</tr>
<tr>
<td>URL Path</td>
<td>This is the relative path of the application URL suffix</td>
<td>/rxoutbound/service/outbound</td>
</tr>
</tbody>
</table>

**Note:** Firewall rule will be added to the Hub server to only allow traffic coming from the IP address configured in this section.
• Setup RxCheck Hub Endpoint

Enter the RxCheck hub details for the SRS Outbound service to connect to the RxCheck Hub

<table>
<thead>
<tr>
<th>Field Name</th>
<th>Description</th>
<th>Default Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Protocol</td>
<td>Select the protocol (http or https)</td>
<td>https</td>
</tr>
<tr>
<td>Domain</td>
<td>The domain name of the RxCheck hub service instance (test or production)</td>
<td>test.rxcheck.org</td>
</tr>
<tr>
<td>Port Number</td>
<td>The port number of the RxCheck hub service instance</td>
<td>18803</td>
</tr>
<tr>
<td>IP Address</td>
<td>IP address of the RxCheck hub service instance (Optional)</td>
<td>13.92.255.192</td>
</tr>
<tr>
<td>URL Path</td>
<td>This is the relative path of the application URL suffix</td>
<td>/RxCheck/hub</td>
</tr>
</tbody>
</table>

• Setup SRS Inbound Endpoint

Enter the SRS inbound configuration details for the RxCheck hub to connect to the Inbound SRS service

<table>
<thead>
<tr>
<th>Field Name</th>
<th>Description</th>
<th>Default Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Protocol</td>
<td>Select http or https</td>
<td>https</td>
</tr>
<tr>
<td>Domain</td>
<td>Enter a domain name for the SRS Inbound Service instance (Optional – If no domain is specified the system would use the IP Address)</td>
<td></td>
</tr>
<tr>
<td>Port Number</td>
<td>Enter the port number for the SRS inbound service instance (This would be the external port number if there is a firewall NAT)</td>
<td>8443</td>
</tr>
<tr>
<td>IP Address</td>
<td>IP address of the server or the external gateway IP address for the SRS inbound Service instance</td>
<td></td>
</tr>
<tr>
<td>URL Path</td>
<td>This is the relative path of the application URL suffix</td>
<td>/rxinbound/service/outbound</td>
</tr>
</tbody>
</table>
**Setup PDMP Application Endpoint**

<table>
<thead>
<tr>
<th>Field Name</th>
<th>Description</th>
<th>Default Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Protocol</td>
<td>Select http or https</td>
<td></td>
</tr>
<tr>
<td>Domain</td>
<td>Enter a domain name for the PDMP Service instance (Optional – If no domain is specified the system would use the IP Address)</td>
<td></td>
</tr>
<tr>
<td>Port Number</td>
<td>Enter the port number for PDMP service instance</td>
<td></td>
</tr>
<tr>
<td>IP Address</td>
<td>IP address of the server of the PDMP service instance</td>
<td></td>
</tr>
<tr>
<td>URL Path</td>
<td>This is the relative path of the application URL suffix</td>
<td></td>
</tr>
</tbody>
</table>

**Upload SRS Public Key to RxCheck Console PKI database**

- Enter Subject name used in Step 3 in the *Private Key Subject* field. Eg: TT

- Upload the public key. This certificate must be in DER encoded binary X.509 (.cer) format.

- Click “Save” button on the Site Configurations page.
Step 6: Starting RxCheck SRS

- Open Windows Services Manager. To open Windows Services, Run services.msc to open the Services Manager. Here you will be able to start, stop, disable, delay Windows Services.

- Find Service “Apache Tomcat 8.5 RxCheckSRS_2.0” and change the Start Type to “Automatic”

- Right click on the service name and “Start” the service.

- Open the following Service URLs in a browser to verify the services are running

<table>
<thead>
<tr>
<th>Inbound SRS</th>
<th><a href="https://localhost:8443/rxinbound/service/inbound?wsdl">https://localhost:8443/rxinbound/service/inbound?wsdl</a></th>
</tr>
</thead>
<tbody>
<tr>
<td>Outbound SRS</td>
<td><a href="http://localhost:8080/rxoutbound/service/outbound?wsdl">http://localhost:8080/rxoutbound/service/outbound?wsdl</a></td>
</tr>
</tbody>
</table>

Note: Enter appropriate hostname and port numbers if the default tomcat server configuration was modified.
Step 7: Conduct Simulator Testing

- Perform a simulator test in which a PDMP sends a message to the simulator with state code “GG” and the simulator can respond back with a message. As such, the PDMP sends the PMIX request to the simulator endpoint via either the PMIX SRS
- Note: The response will follow the same steps in the reverse direction

Step 8: Integration Testing

- Perform integration testing with an exchange partner; the request will flow from the requesting-state PDMP application to the requesting-state SRS (Option 1) or the Custom Proxy (Option 2), to the RxCheck Hub, to the disclosing-state PDMP application (note: the response will follow the same steps in the reverse direction)
Appendix A: Pre-Installation Checklist

The following architecture diagram and pre-installation checklist table will orient the deployment team by identifying important system information prior to the software installation and configuration.

![Figure 2: Typical PMIX Component Architecture Overview](image)

<table>
<thead>
<tr>
<th>ID</th>
<th>Description</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>SRS Outbound Host Base URL Address</td>
<td>http://_____:8080/rxoutbound/service/outbound</td>
</tr>
<tr>
<td>1.1</td>
<td>Domain Name:</td>
<td></td>
</tr>
<tr>
<td>1.2</td>
<td>IP Address:</td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td>RxCheck Hub Service Host URL Address</td>
<td><a href="https://test.rxcheck.org:18803/RxCheck/hub">https://test.rxcheck.org:18803/RxCheck/hub</a></td>
</tr>
<tr>
<td>2.1</td>
<td>Domain Name:</td>
<td>test.rxcheck.org</td>
</tr>
<tr>
<td>2.2</td>
<td>IP Address:</td>
<td>13.192.255.192</td>
</tr>
<tr>
<td>3.</td>
<td>SRS Inbound Host Base URL Address</td>
<td>https://_____:8443/rxinbound/service/inbound</td>
</tr>
<tr>
<td>3.1</td>
<td>Domain Name:</td>
<td></td>
</tr>
<tr>
<td>3.2</td>
<td>IP Address:</td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td>New site PDMP Application URL Address</td>
<td></td>
</tr>
<tr>
<td>4.1</td>
<td>Domain Name:</td>
<td></td>
</tr>
<tr>
<td>4.2</td>
<td>IP Address:</td>
<td></td>
</tr>
<tr>
<td>5.</td>
<td>New site unique qualifier (NW)</td>
<td></td>
</tr>
<tr>
<td>6.</td>
<td>Exchange partner unique qualifier (EP)</td>
<td></td>
</tr>
<tr>
<td>A.</td>
<td>The new site’s PMIX SRS certificate</td>
<td></td>
</tr>
<tr>
<td>B.</td>
<td>The partner site’s PMIX SRS certificate</td>
<td></td>
</tr>
<tr>
<td>#</td>
<td>Network Configuration (Firewall, Router)</td>
<td></td>
</tr>
</tbody>
</table>

Table 1: Pre-Installation Checklist
Appendix B: Customizing SRS

1. Changing Server Ports

By default, the RxCheck SRS service runs on ports 8080 (http) and 8433 (https). If necessary, different ports can be configured in server.xml file located in `c:\rxcheck\apache-tomcat-8.5.32\conf` folder.

- For HTTP port, modify the below XML element. Change the port 8080 to a desired port.
  
  ```xml
  <Connector port="8080" protocol="HTTP/1.1" connectionTimeout="20000" redirectPort="8443" />
  ```

- For HTTPS port, modify the below XML elements. Change the port 8443 to a desired port.
  
  ```xml
  <Connector port="8080" protocol="HTTP/1.1" connectionTimeout="20000" redirectPort="8443" />
  <Connector SSLEnabled="true" clientAuth="false" keystoreFile="conf/keystore.jks" keystorePass="rxchecksrs" maxThreads="150" port="8443" protocol="HTTP/1.1" scheme="https" secure="true" sslProtocol="TLS"/>
  <Connector port="8009" protocol="AJP/1.3" redirectPort="8443" />
  ```

2. Changing Server Certificate

A default self-signed certificate is included in the package for SSL/TLS transport layer. This must be replaced by either a new self-signed certificate or a certificate purchased from a CA in production environment.

- Creating a self-signed certificate.
  
  ```bash
  C:\keytool -genkey -keyalg RSA -alias selfsigned -keystore keystore.jks -storepass rxchecksrs -validity 720 -keysize 2048
  ```

- Copy the self-signed certificate keystore `keystore.jks` file to `c:\rxcheck\apache-tomcat-8.5.32\conf` folder

3. Separate instances for Outbound and Inbound Services

If desired, separate instances of Outbound and Inbound SRS’s can be installed on the same server or on a different sever by following the steps 1 through 6. This might be required due to the local network security requirements or for achieving higher performance throughput.

Based on the type of service you are installing, delete the other .war file from `c:\rxcheck\apache-tomcat-8.5.32\webapps` folder.

4. Increasing JVM memory

By default, the Java process heap size is set for minimum 512KB and maximum 1024MB. This must be changed to higher memory for production environment.
Memory parameters can be changed in service.bat file located in c:\rxcheck\apache-tomcat-8.5.32\bin. You may need to uninstall and reinstall the service.

```bash
if "%JvmMs%" == "" set JvmMs=512
if "%JvmMx%" == "" set JvmMx=1024
```

5. Uninstalling RxCheck SRS

To uninstall SRS process, execute command.

```bash
c:\rxcheck\apache-tomcat-8.5.32\bin>service.bat uninstall "RxCheckSRS_2.0"
```