



Tools Security Roadmap

As of February 19, 2021

- Updated PKI rollout timeline
- Updated Impact Details for PKI
- Added slide on single sign upgrades

Product - Action Required	Dates	Who May Be Affected
<p>Implementation for ExSchedule & OASIS (Train)</p> <ul style="list-style-type: none"> • Obtain valid PKI certificates from approved Certificate Authorities • Rewrite Browserless/API authentication code • Use PJM provided command line interface (CLI) • Make sure 2-Way SSL Connections, Client Certificates & Connection Renegotiation are enabled at Firewall & Security devices for outgoing PJM SSO traffic 	<p>March 2 4 p.m. to 7 p.m.</p>	<ul style="list-style-type: none"> • Users of ExSchedule and OASIS • 3rd party Vendors for ExSchedule and OASIS • Developers of ExSchedule and OASIS Browserless/API code



2021												
	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
PKI for OASIS & ExSchedule			Train– Mar 2 		Production – May 4 							
Browserless/API 2 Factor Authentication						Train(opt-in) 	Production (Opt-In) 					
Single Sign On Upgrades						Train 		Production 				


ExSchedule &
OASIS Public
Key Infrastructure
(PKI)

Browser-less/API
2 Factor
Authentication

SSO Upgrades

- PKI
 - On February 4, 2020 FERC issued an order to comply with NAESB 3.2 changes
 - Implement PKI to provide secure access to
 - OASIS
 - E-Tagging applications (ExSchedule)
 - Existing certificates that meet NAESB requirements will be accepted
 - When:
 - Train: March 2
 - Production: May 4

- Leverage PKI solution
- Scope
 - Included: All PJM Tools that are part of Single Sign On and have Browserless APIs
 - Excluded: ExSchedule and OASIS
- Users can opt-in from Account Manager by requesting access to “Certificate Based Authentication Opt-In” role during the opt-in period

 > Account Access > Request Access

1

Select Access


2

Review

Request Access

Accounts

PJM Interconnection [PJM]

 Certificate Based Authentication

Access

Certificate Based Authentication Opt-In

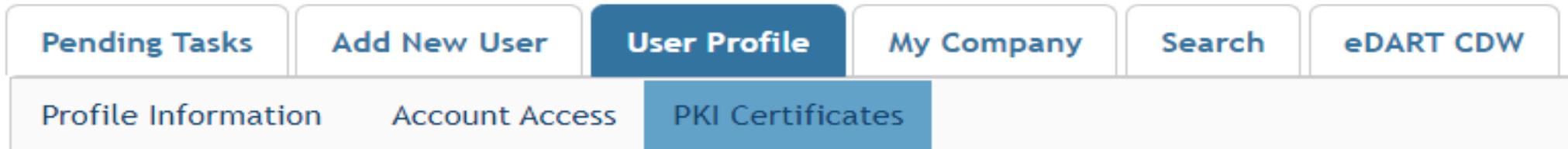


- Once opted in, the user is required to provide a valid certificate for
 - Markets Gateway
 - InSchedule
 - Power Meter
 - FTR Center
 - Capacity Exchange
 - DR Hub
- When:
 - Train – June
 - Production – July
- MSRS opt-in will be implemented in Q3 2021
- The mandatory cut-over will take place later in 2021

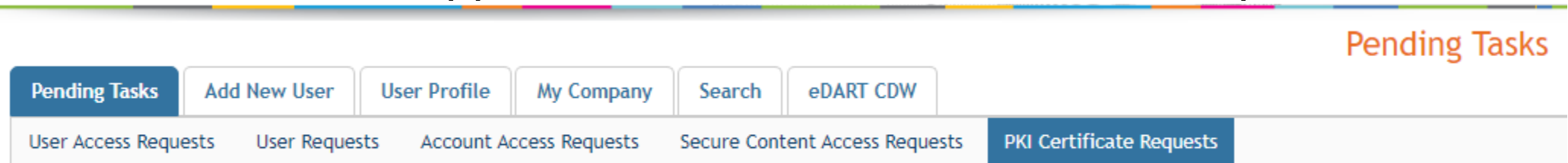
- Single Sign On (SSO) System upgrades
 - When:
 - Train: June
 - Production: August
- Impacts
 - Details will be shared at the March 15 Tech Change Forum meeting

Appendix

- Uploading Certificate
 - The User can upload the certificate or the CAM can associate certificates with user account from Account Manager PKI Tab

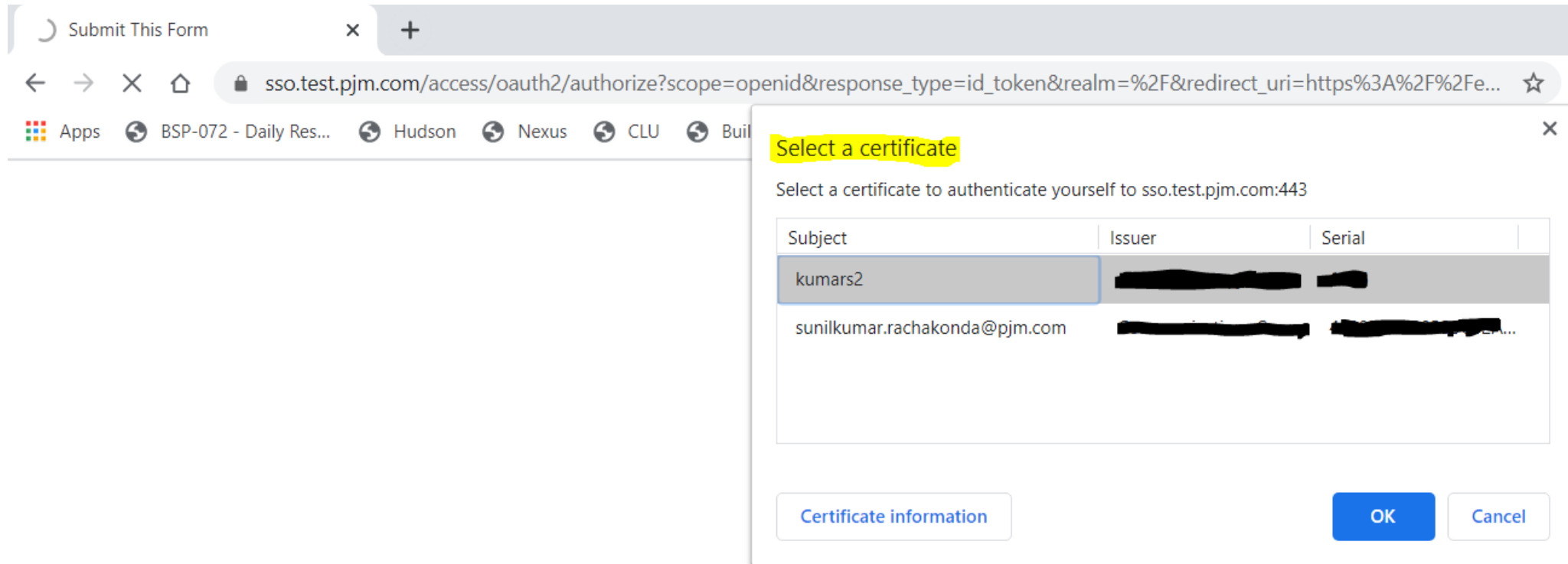


- The CAM has to approve the certificate after the user upload



- The user must Install the certificate in user's browser if logging into the UI

- Using certificate
 - On login to ExSchedule/OASIS the user will be prompted for a certificate



- Changes to Authentication process
- Associate certificates with user account from accountmanager PKI Tab
- Authenticate against 'sso.pjm.com/access/authenticate/pjmauthcert' with 2 way ssl connection (mutual authentication) to get a SSO token-id
- Call to Application REST API still same, pass token-id as header

Authentication:

```
curl --request POST --key testcert.key.pem --cert 'testcert.crt:<privatekeypassword>' --header "X-OpenAM-Username: <sso_username>" --header 'X-OpenAM-Password: <sso_password>' 'https://sso.pjm.com/access/authenticate/pjmauthcert'
```

```
{"tokenId": "<tokenid>", "successUrl": "/access/console", "realm": "/"}
```

Application REST API

```
curl --request GET --header "Cookie: pjmauth=<tokenid>" 'https://exschedule.pjm.com/exschedule/rest/secure/download/xml/schedules'
```

- New version 1.5.0
- Java version 8 Patch 165 or higher is required
- Available at <https://pjm.com/-/media/etools/pjm-command-line-interface-java-8.ashx?la=en>
- No changes to usage of Application CLI commands
- A new property (below) was added to setenv.cmd file
`set CERTIFICATE=-r “.pfx/.p12 file_location|privatekeypassword“`

- Java Sample
 - <https://www.pjm.com/-/media/etools/security/pki-certificate-authentication-java-code-sample.ashx?la=en>
- .Net Sample
 - <https://www.pjm.com/-/media/etools/security/pki-certificate-authentication-net-code-sample.ashx?la=en>

- FAQs for PKI Certificates and Two-Step Verification Browserless/API: <https://www.pjm.com/-/media/etools/security/pki-faqs.ashx?la=en>
- PKI-Based Authentication Guide: <https://www.pjm.com/-/media/etools/security/pki-authentication-guide.ashx?la=en>
- Exporting public keys from pfx/p12 : <https://www.pjm.com/-/media/etools/security/pki-export-public-keys.ashx?la=en>