



Logging into Windows domain with eID smart card

Technical overview

Document information	
Date of creation	21.01.2019
Receivers	RIA
Author	Urmas Vanem, OctoX
Version	23.12/1

Version information		
Date	Version	Changes/Notices
21.01.2019	19.01/1	Public version, based on software version 18.12.
10.03.2022	22.03/1	Updated version, based on software version eID-22.1.0.1922. Changed by: Urmas Vanem
14.09.2022	22.09/1	Added description of new requirements from Microsoft for mapping user and eID card certificate. Changed by: Urmas Vanem
11.12.2023	23.12/1	Removed ESTEID-SK 2015 chain + minor changes. Changed by: Urmas Vanem



eID login into Windows domain

Technical overview

Background

Since Windows Server 2008 SP2 and Windows Vista SP2 combination we can use Estonian eID cards for Windows domain login. This possibility has been actual since autumn 2008, when the first successful tests were made. This document describes platforms and configurations which enable Windows domain login, we can do it using only standard Microsoft and ID-software.

Logging into computer using eID card is currently quite popular in Estonian enterprises. Using smart card for domain logging has many benefits, like users do not need remember their password and change it regularly, two factor authentication is more secure etc. Creating technical configuration is also not too hard using the guidance you currently read.

Windows domain logging with eID smart card is supporter and tested on following platforms:

- Servers: All supported Windows Server versions including Windows Server 2022.
- Clients: All supported Windows operating systems including Windows 11.

Implementation

Configuring ID login requires a set of systemic preparations for both the domain and client computers. In addition, domain user accounts must be linked to eID authentication certificates.

To enable eID card logging into Windows domain following options must be enabled:

- Domain controllers must have a specific certificate to identify themselves, the certificate must also be trusted by clients/computers.
- Domain controllers must trust root and intermediate level certificates from eID card chains.
- Client computers must have ID-software installed (today, December 2023, we recommend the most recent version 23.7.0.1943).
- Client computers must support certificates that do not have a special Smart Card Logon ECU property and the use of ECC certificates for logging purposes into computers must also be allowed.
- In the domain, the authentication certificate of the eID card must be linked to a specific user.

In the following chapters, we describe exact steps to create a working configuration for eID domain logging.

Domain settings

To prepare Windows domain for eID logging we must create specific policies for domain controllers and client computers. As prerequisite domain controller must have specific certificate (*server authentication, smart card logon*) to identify itself and allow smart card logon.

Domain controller certificate

As already mentioned, domain controllers need certificates, with which they can prove their identity and enable smart card logon for client clients/computers. The most common way to ask for these certificates is to use the local PKI solution. If PKI services have been implemented in Windows domain, it will be easy to assign mandatory certificate to domain controllers. By default, *Domain Controller Authentication* certificate template,

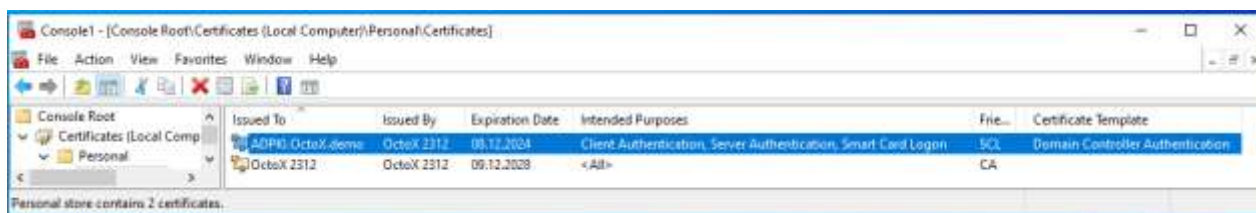


eID login into Windows domain

Technical overview

which fulfills all needs for eID logging, can be published for domain controllers. If certificate autoenrollment for domain controllers is enabled (and if certificate template is published in domain of course), then all domain controllers automatically install mandatory certificate. If not, a certificate can be requested manually.

Domain controller certificates can be found from domain controller certificates personal store:



Picture 1 – domain controller authentication certificate in personal store

If PKI services are not implemented in the domain, it could be a good idea to change the situation now. It can also be possible to get mandatory certificates from other sources.

Policies

Publishing certificates

To use eID cards and related certificates for domain logging, domain controllers must trust those certificates. Both root and intermediate certificates form eID certificate chains must be trusted and installed into correct certificate containers. Domain controllers must also have access to the OCSP service described in certificates to check the validity of certificates.

To enable domain logging with an eID card, intermediate level certificate (ESTEID2018) must be installed in the NTAuthCertificates container of the domain. We can do this with the command "certutil -dspublish -f 'CERTIFICATE NAME' NTAuthCA". We can also add a root-level certificate to the domain container with the command "certutil -dspublish -f 'CERTIFICATE NAME' RootCA".

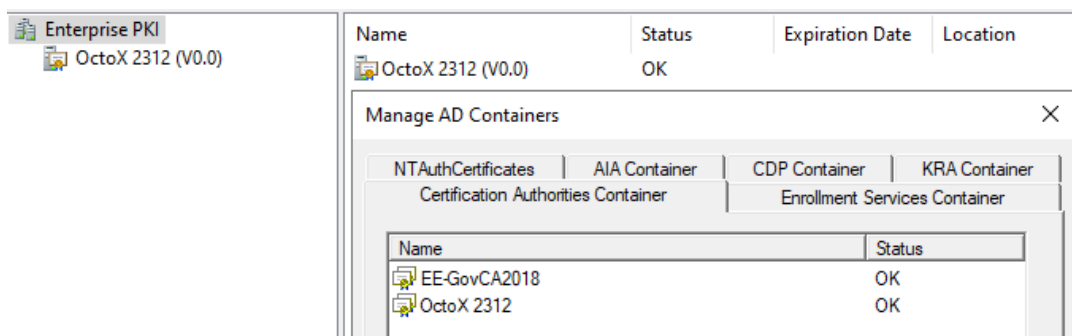
Certificates can be downloaded from <https://www.skidsolutions.eu/resources/certificates/>. As of today, we need the following certificates:

- EE-GovCA2018 - trusted root certificate;
 - ESTEID2018 - intermediate level certificate.



eID login into Windows domain

Technical overview



Picture 2 – root certificates in AD containers

In addition, both SK root and intermediate certificates can be published in the domain for domain controllers and/or all other Windows computers or computer groups using group policies.¹

So, if we want to publish certificates to domain controllers automatically with group policy, we recommend that you modify the Default Domain Controllers or any other OU-level policy for domain controllers. Certificates must be placed into containers according to the list and type, root certificates into *Trusted Root Certification Authorities* and intermediate certificates into *Intermediate Certification Authorities* container.

Here's how to publish root and intermediate certificates. To publish certificates in the Trusted and Intermediate Certificate stores on domain controllers:

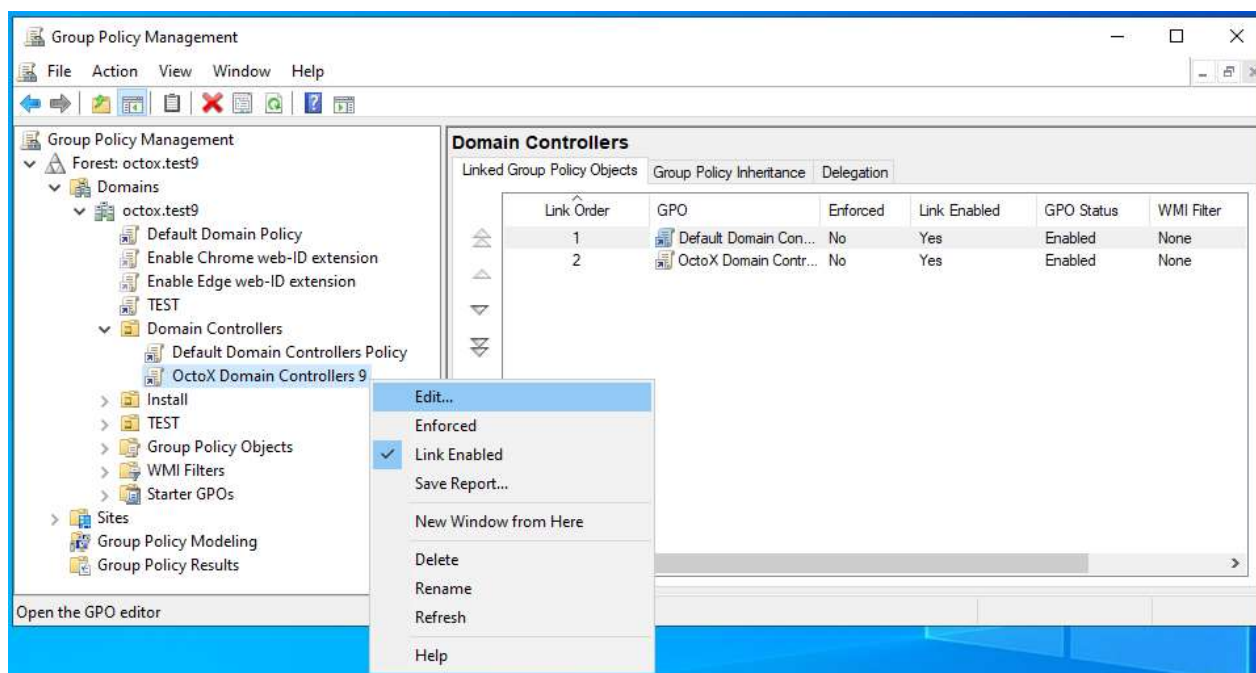
1. Open the Group Policy Management console and select the appropriate GPO, click Edit ...:

¹ If we have already published both the middle and root level certificates in the domain using the previously described method, there is no direct need for republishing. We can, however, publish the intermediate certificate by placing it in the domain NTAuthCertificates container and the root certificate with a normal domain policy, as described below. It's actually a bit confusing, because although in theory Microsoft requires that the CA certificate that issued the card certificate belongs to the NTAuthCertificates container in the domain (check <https://docs.microsoft.com/en-us/troubleshoot/windows-server/windows-security/enabling-smart-card-logon-third-party-certification-authorities>), then in practice the login with the eID card works even if it hasn't been done and the chain is simply trusted. Anyway, we recommend to follow Microsoft's technical requirements when creating eID login configuration.



eID login into Windows domain

Technical overview



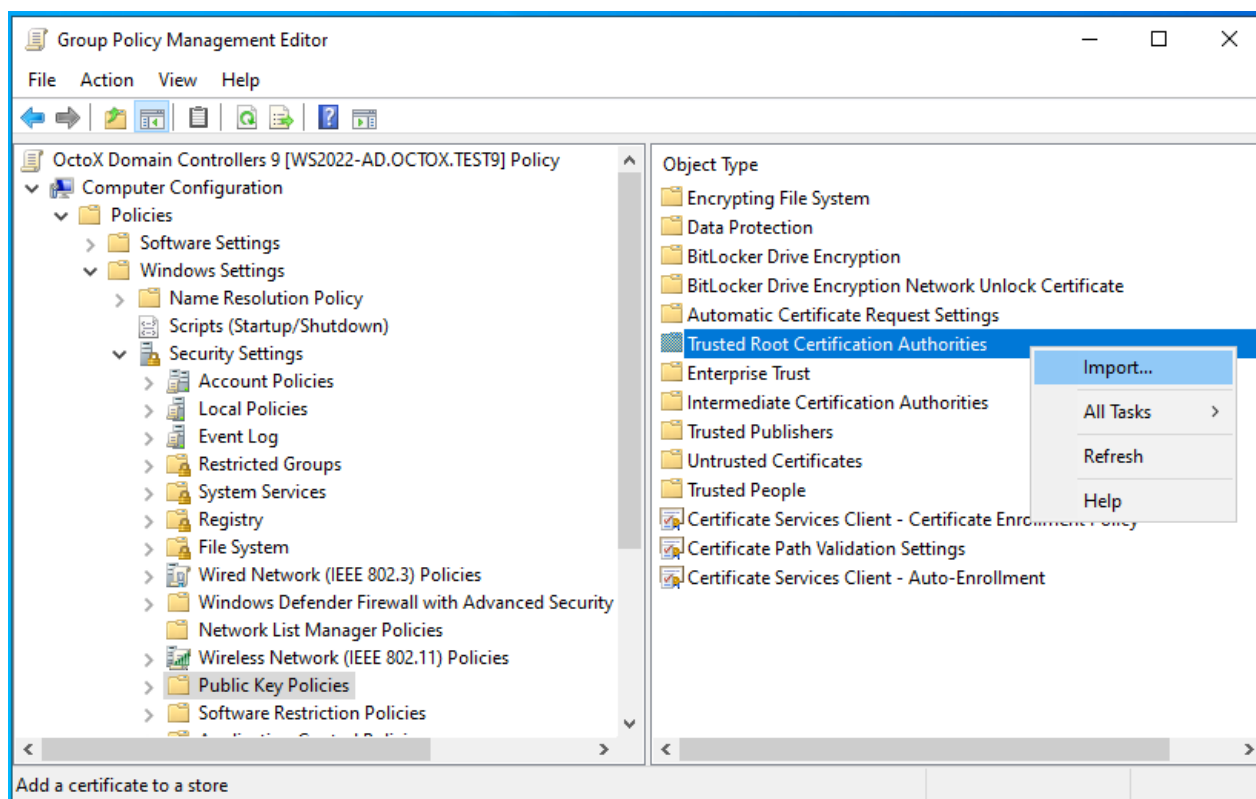
Picture 3 – starting GPO editing

2. Select folder „Computer Configuration/Policies/Windows Settings/Security Setting/Public Key Policies“



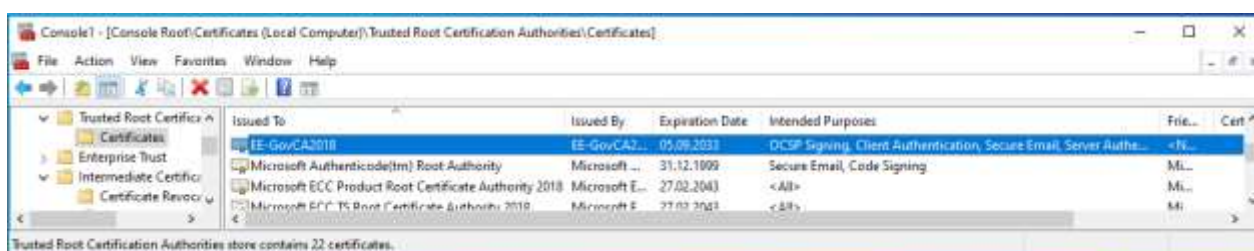
eID login into Windows domain

Technical overview



Picture 4 – starting certificate import

3. To import EE-GovCA2018 certificate:
 - a. Right-click on folder *Trusted Root Certification Authorities* and select *Import*;
 - i. Click *Next*, select „EE-GovCA2018“ certificate and import it.



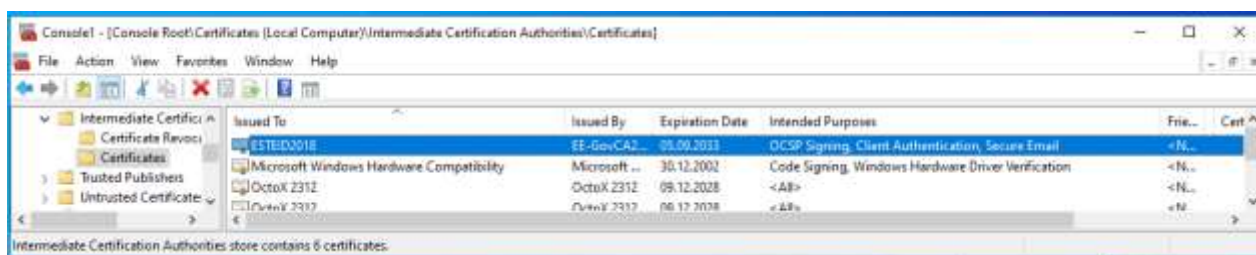
Picture 5 - root level certificates are correctly published

4. To add intermediate certificate:
 - a. Right-click on folder *Intermediate Certification Authorities* and select *Import*;
 - ii. Click *Next*, select „ESTEID2018“ certificate and import it.



eID login into Windows domain

Technical overview



Picture 6 - intermediate level certificate is correctly published

As you can see in the previous illustrations, the certificates become visible in the *Trusted Root Certification Authorities* and *Intermediate Certificate Authorities* containers, respectively. With next policy cycle the settings will be applied to all domain controllers. We can force policies by running `gpupdate (/force)` on domain controllers. And as already said, in the same way the required certificates can be published to all other Windows workstations and servers, if necessary.

Configuring eID card properties in domain

To support eID card domain logging centrally on all client computers, we use a domain-level policy in our example ²:

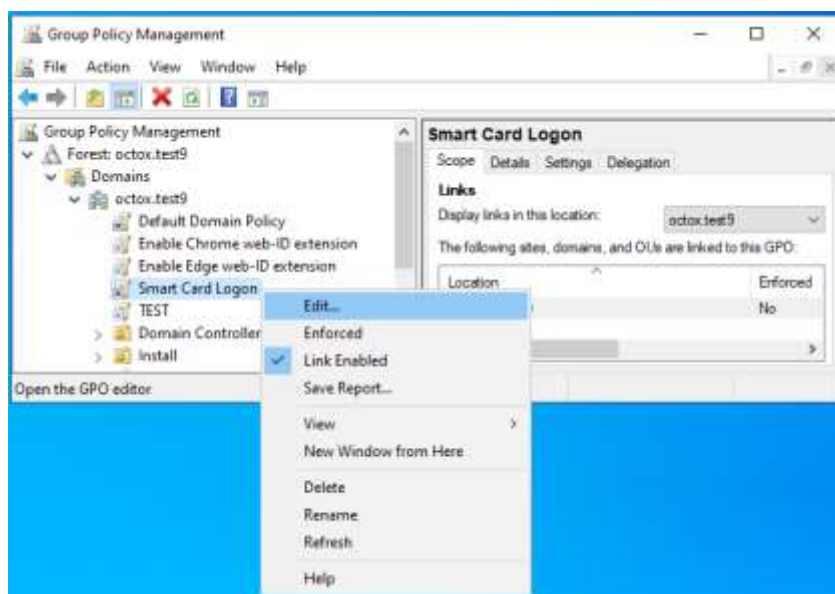
1. Open the Group Policy Management console and select the appropriate GPO to add properties, click Edit:

² Of course, we can apply policy from any level or group we like, for only client computers for example.



eID login into Windows domain

Technical overview



Picture 7 - selecting GPO, starting editing

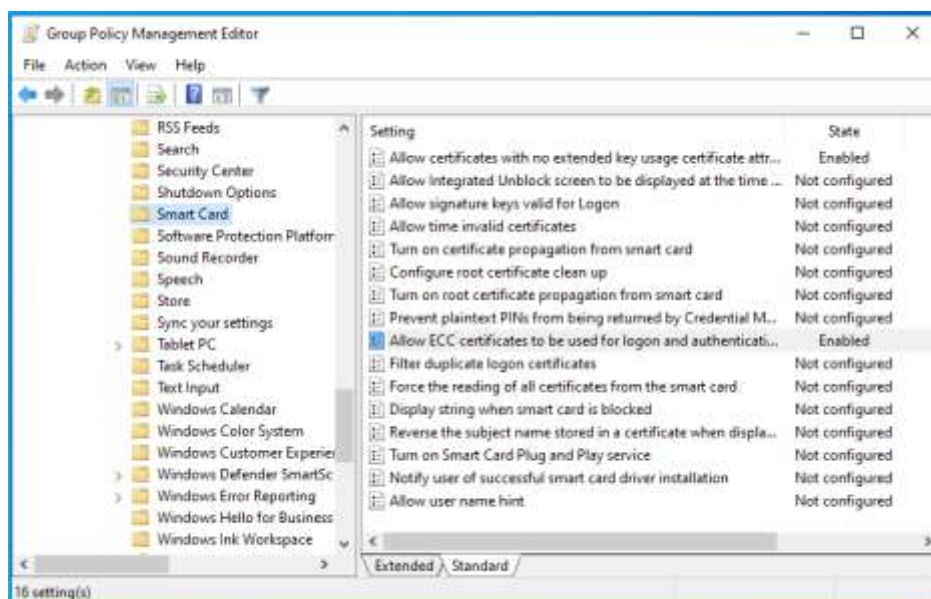
2. Select folder „Computer Configuration/Policies/Administrative Templates/Windows Components/Smart Card“ and add following configuration:
 - a. „Allow certificates with no extended key usage certificate attribute = Enabled“ – to enable certificates without „Smart Card Logon“ setting in ECU;
 - b. „Allow ECC certificates to be used for logon and authentication = Enabled“ – to enable using certificates based on ECC cryptography for logon.

After changes our policy should look like presented on following picture:



eID login into Windows domain

Technical overview



Picture 8 - smart card settings in policy

Supporting eID card domain logging in single computer

If you want to support eID card to log in from a non-domain, for example from home computer to any domain server over an RDP connection, you must configure the home computer to support eID cards. To do this, run the local policy manager `gpedit.msc` as an administrator on the computer. In the policy manager, the exact same change as described in the upper chapter (setting the properties of the eID card) must be made in the computer configuration, "Allow certificates with no extended key usage certificate attribute" and "Allow ECC certificates to be used for logon and authentication" must be enabled! After making the described change, you must wait for policy to apply, update the policies with the `gpupdate / force` command or restart the computer. Now it is possible to log into domain servers with an eID card (if supported by domain and server of course).

Requiring OCSP revocation check

For eID cards currently in use, it is no longer necessary for us to describe the OCSP path centrally, as it is already included in the certificate. There is no CRL path in these certificates, so by default the certificate's validity is checked only against the free access AIA OCSP service (<http://aia.sk.ee/esteid2018>).

If you have a need for a high-quality OCSP, you can get more information on the page <https://orderforms.skidsolutions.eu/en/services/validity-confirmation-services/>. However, if you have already ordered this service, you can use the OCSP service address <http://ocsp.sk.ee>. To change the OCSP address, you must again use the central policies options.

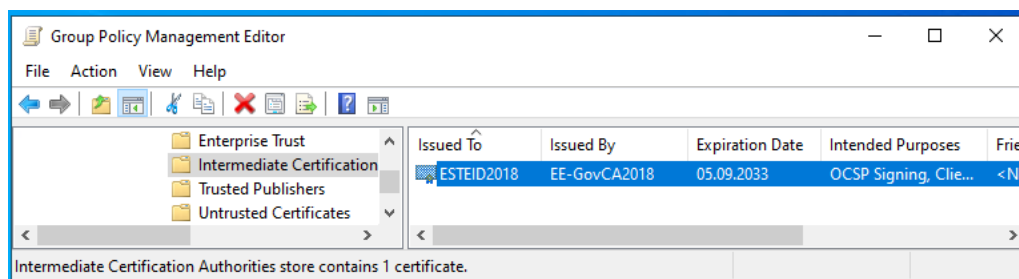
If we want to change the address of the OCSP service, the properties of intermediate certificates published centrally to domain controllers must be changed as follows:



eID login into Windows domain

Technical overview

1. Open the policy where intermediate eID certificates are described for domain controllers and select „Computer Configuration / Policies / Windows Settings / Security Settings / Public Key Policies / Intermediate Certification Authorities / Certificates" folder:



Picture 9 – policy with published intermediate certificate

2. Open properties for certificate „ESTEID2018“ and select tab *OCSP*. Add path <http://ocsp.sk.ee> to define OCSP server (and disable certificate revocation lists if you like³):



Picture 10 - intermediate certificate settings, defining OCSP server

³ In fact, CRL paths still exist to check the validity of certificates, they are just not described in the certificate.



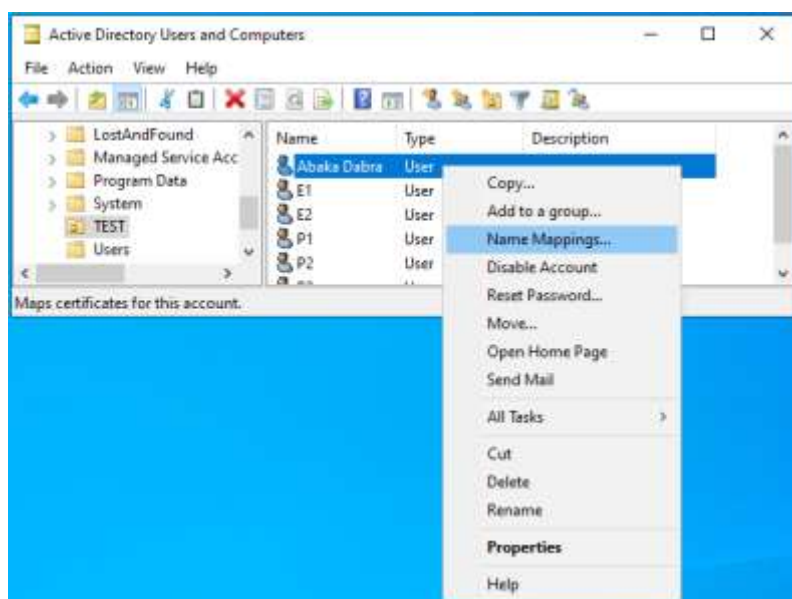
eID login into Windows domain

Technical overview

- Note: If using OCSP, familiarize yourself with the concept of OCSP magic number also⁴.

Mapping users and certificates

Due to the Microsoft software updates described in article [KB5014754](https://support.microsoft.com/en-us/topic/changes-to-certificate-mapping-in-active-directory-2014-01-29), it is no longer recommended to use the AD GUI to associate a user with a certificate. With AD GUI the *issuer* and *subject* fields from user certificate are mapped to user. From now on, however, it is considered insecure. Recommended way is to map user account with *issuer* and *serialnumber* fields of the certificate.



Picture 11 – example of AD GUI

The following options are available for obtaining the content of the user's certificate:

1. Request a user certificate from the central [LDAP directory](#) using personal identification code. This can also be done using the DigiDoc4 Client.
2. If the ID-card has been previously registered on the computer, the certificate can also be obtained from the user certificate store using MMC (Certificates snap-in, Personal / Certificates).
3. With the command "certutil.exe -scinfo" if the eID card is in the reader.
4. ...

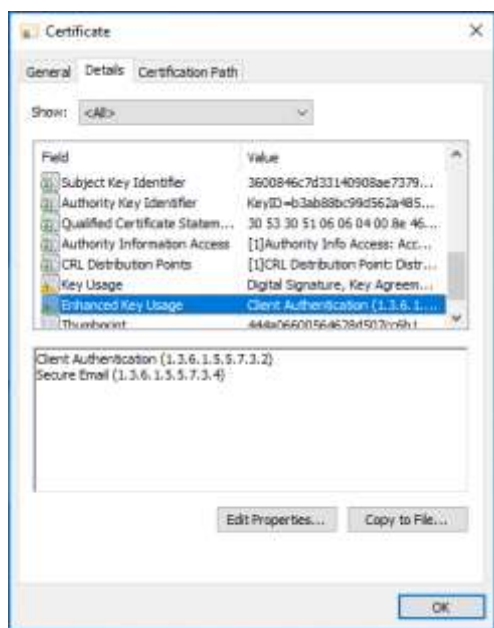
I would like to draw attention to the fact that eID cards have two certificates. To log into domain with eID card, we must use the certificate with *Client Authentication* described under EKU.

⁴ [https://docs.microsoft.com/en-us/previous-versions/windows/it-pro/windows-server-2008-R2-and-2008/ee619754\(v=ws.10\)](https://docs.microsoft.com/en-us/previous-versions/windows/it-pro/windows-server-2008-R2-and-2008/ee619754(v=ws.10))



eID login into Windows domain

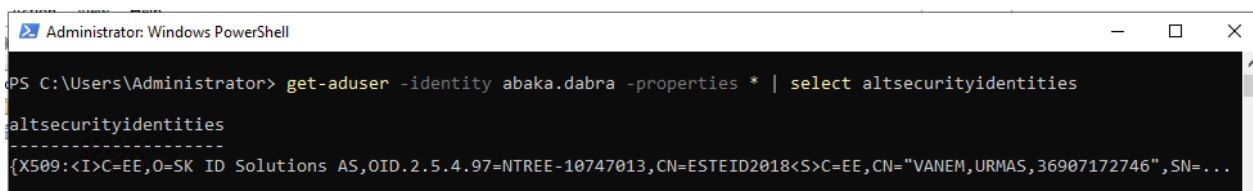
Technical overview



Picture 12 – EKU contains Client Authentication

How to map user and authentication eID certificate

As already stated, using the AD GUI, the certificate is associated with the user using the *Issuer* and *Subject* fields, and this combination is no longer recommended by Microsoft. In addition, in the case of Estonian eID cards, *issuer* field is identical at least on the ID-card and on the Digi-ID card.



Picture 13 - <I> ja <S> are pointing to certificate fields Issuer ja Subject.

So, it is probably reasonable to follow Microsoft's recommendation and associate the certificate with the user using the *issuer* and *serialnumber* fields. We can do this via the *ADSI Edit* GUI. It should be noted that both *issuer* and *serialnumber* strings must be reversed when pairing! This means that if:

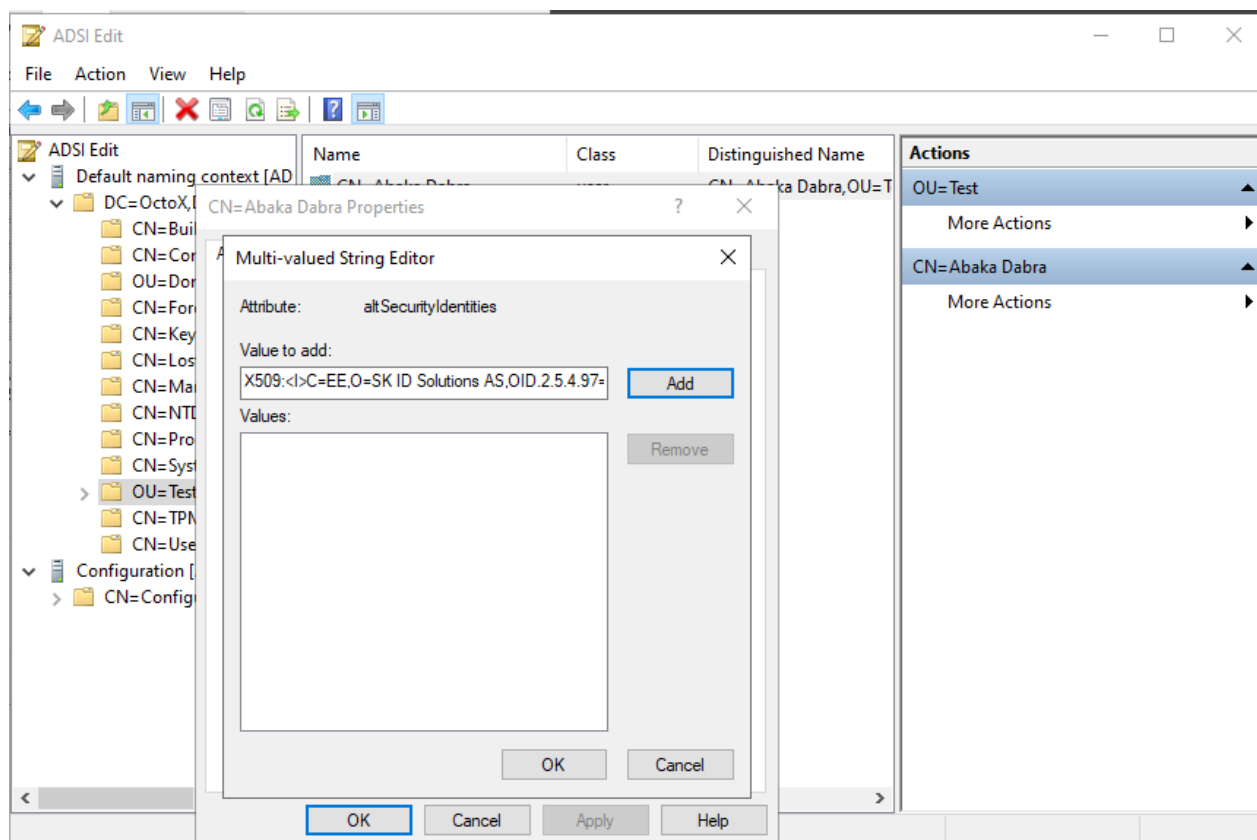
1. Issuer is described in the certificate as " CN = ESTEID2018 / 2.5.4.97 = NTREE-10747013 / O = SK ID Solutions AS / C = EE ", in AD it must be "<I>C=EE,O=SK ID Solutions AS,OID.2.5.4.97=NTREE-10747013,CN=ESTEID2018";
2. The serial number is described in the certificate as 8958ee38a565845e9107720de61ca64d, in AD it must be 4da61ce60d7207915e8465a538ee5889. Please also pay attention to the fact that the reversal takes place two symbols at a time!



eID login into Windows domain

Technical overview

The correct user and certificate binding string in the *ADSI Edit* utility looks like this: "X509:<I>C=EE,O=SK ID Solutions AS,OID.2.5.4.97=NTREE-10747013,CN=ESTEID2018<SR>4da61ce60d7207915e8465a538ee5889".⁵



Picture 14 – modifying *altSecurityIdentities* value with *ADSI Edit*

⁵ If, as a rule, we have the *issuer* as a constant (across the chain), then the *serialnumber* must be changed for every user. There are certainly several automation measures here, but as an example, I'll give Excel's way to make this change: "=CONCAT(MID(B4;31;2);MID(B4;29;2);MID(B4;27;2);MID(B4;25;2);MID(B4;23;2);MID(B4;21;2);MID(B4;19;2);MID(B4;17;2);MID(B4;15;2);MID(B4;13;2);MID(B4;11;2);MID(B4;9;2);MID(B4;7;2);MID(B4;5;2);MID(B4;3;2);MID(B4;1;2))", where B4 is then the cell where the original serial number is located.



eID login into Windows domain

Technical overview

```
Administrator: Windows PowerShell
PS C:\Users\Administrator> get-aduser -identity abaka.dabra -properties * | select altsecurityidentities
altsecurityidentities
-----
{X509:<I>C=EE,0=SK ID Solutions AS,OID.2.5.4.97=NTREE-10747013,CN=ESTEID2018<SR>4da61ce60d7207915e8465a538ee5889}
```

Picture 15 - <I> ja <SR> are pointing to certificate fields Issuer ja SerialNumber.

For larger environments and bigger number of users, you must definitely think about automating the previously described activities!

Preparing client computers

Software

The ID-software must be installed on client computers (today, December 2023, we recommend the most recent version 23.7.0.1943). In fact, the correct functioning of the eID card minidriver is also sufficient, but the entire ID-software is usually installed as standard.

Settings


All required configurations apply to client computers at the domain level with the predefined central policies described above.

Final implementation

To implement the eID login, just do it as it is described previously. Obvious prerequisites are:

1. Testing the solution in a test and/or development environment;
2. Implementation of the solution in the work environment;
3. Training of administrators;
4. Training of users.

After the configuration takes effect on the client computer, we can select the smart card as the login method

in the login window .



eID login into Windows domain

Technical overview

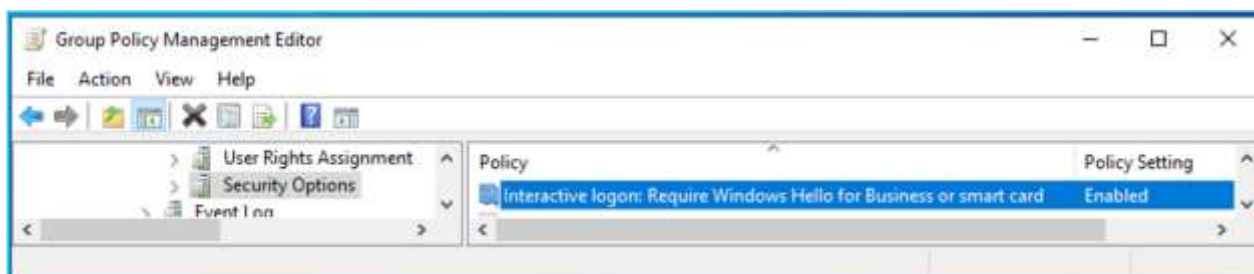


Picture 16 – eID card domain login window, waiting for PIN

Requiring eID card for domain logging

Sometimes we may want users to be able to log in to systems only with an eID card (in other words, we prohibit the use of user passwords). This can be applied to common or specific workstations and/or RDP servers. To apply the requirement, the following policy must be applied to the desired computers:

"Computer Configuration / Policies / Windows Settings / Security Settings / Local Policies / Security Options : Interactive logon: Require Windows Hello for Business or Smart Card" = Enabled.



Picture 17 – a username and password are no longer enough to log into a computer or server!



eID login into Windows domain

Technical overview



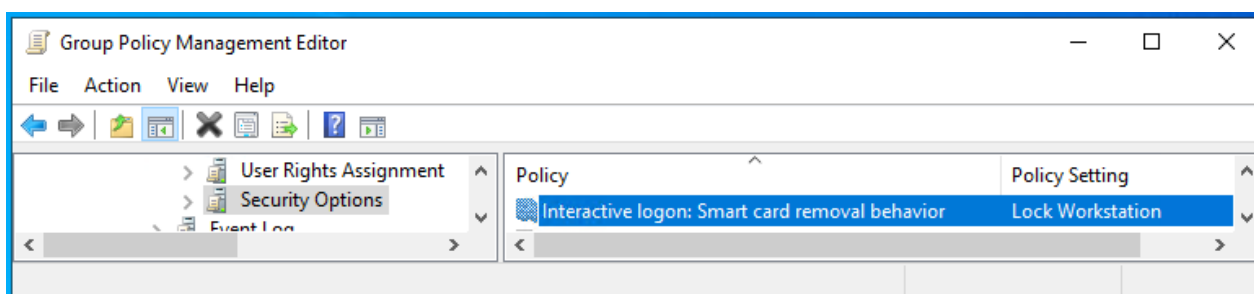
Picture 18 – error message in case user tries to log into domain with username and password, but smart card is required

Controlling the behavior of the computer when the smart card is removed

We can also configure the behavior of a computer or a group of computers when the smart card is removed. (It works of course only, when we use smart card for domain logon.) Options include:

1. No Action (default);
2. Lock Workstation;
3. Force Logoff;
4. Disconnect if a remote Remote Desktop Services session.

To apply the change, one of the above values must be set to the policy "Computer Configuration / Policies / Windows Settings / Security Settings / Local Policies / Security Options : Interactive logon: Smart card removal behavior".



Picture 19 – in this example, after applying the policy, removing the smart card from reader the computer locks



eID login into Windows domain

Technical overview

Possible problems

Proxy

If the domain has a proxy configured to access external HTTP sites and this policy also applies to the domain controllers' system account, the certificate will not be validated and the login will fail.

What to do: Create a proxy setup for your domain controllers. See netsh.exe options.

Same certificate is mapped to more than one user

If one authentication certificate is associated with more than one user in the domain, logging into domain with eID card will fail.

What to do: Remove the certificate association from the "wrong" user(s).

Mess with 2018 certificates and RDP login

There may be a problem of "certificate confusion" for the first portions of certificates issued from the 2018 chain. Under certain conditions, the certificate cannot be associated with the correct user and the user may be shown a description of other logged in user while trying to log on. This problem is mainly detected on RDP (terminal) servers.

You must disable the use of caching in Idemia software to overcome this problem. To do this, modify parameter "CacheData Activate" value to 0 in the OCSMiddlewareConf.xml configuration file on the RDP server or workstation. The configuration file can be found in "C:\Program Files (x86)\IDEMIA\AWP" or "C:\Program Files\IDEMIA\AWP" folder. You must restart your computer or server for the change to take effect.

```
<?xml version="1.0"?>
<Middleware>
  <Configuration>
    <Log Activate="0" Path="" DebugLevel="NO"></Log>
    <CachePin Activate="1" ></CachePin>
    <SessionTimeout Activate="0" Time="60"> </SessionTimeout>
    <CacheData Activate="0"></CacheData>
    <ContainerCreation EmptyAuthorized="1">
  </ContainerCreation>
    <DialogBox WaitDialogBox="1"></DialogBox>
    <CSP Optimize="1"></CSP>
    <PKCS11 VirtualSlot="1"></PKCS11>
```

Picture 20 – disabling caching in Idemia software

Summary

Domain login based on eID smartcards is a good way to simplify user domain logging process and increase system security at the same time.

In the users' view, it is definitely a convenient feature to avoid forgetting the password - all you need to remember is the authorization PIN (which eID card users probably know anyway).



eID login into Windows domain

Technical overview

The experience of system administrators and support persons is also expected to be positive, as in addition to the increase in security, there are fewer problems with users who forget their passwords. Creating such a configuration is also quite easy. And interesting :)