BAT Controller Synchronization

Contents

1. Interoperability test document between BAT-Controller Virtual and BAT-Controller WLC

This lesson describes step by step how to achieve a "cluster sync" in between BAT-Controller Virtual and BAT-Controller WLC which is similar to the cluster sync in between BAT-WLC, and how to configure the "config synchro function" between controllers with the same license.

Here we create a cluster with BAT-Controller Virtual and BAT-WLC located in the same LAN.
BAT-WLC with IP address: 192.168.11.42/24
BAT-Controller Virtual with IP address: 192.168.11.43/24

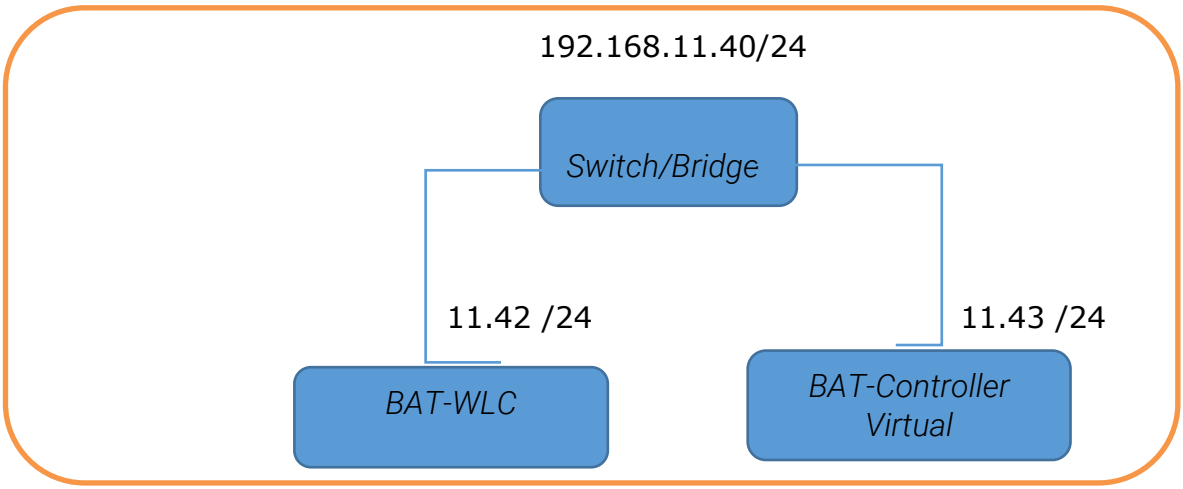


Figure 1.

Later we'll configure the config synchro function between the controllers to synchronise the part of the configuration related to the profiles and the managed Aps.

2. Introduction

As an example, the configuration is done using Controllers:
BAT-Controller WLC (192.168.11.42) represents the device with the root-CA and;
BAT-Controller Virtual (192.168.11.43) is the device which obtains a certificate from the root-CA in order to issue further certificates as a sub-CA from WLC.
BAT-Controller Virtual (192.168.11.44) is the 3rd device which obtains a certificate from the root-CA in order to issue further certificates as a sub-CA from WLC.

In order to operate multiple WLAN controllers in a WLC cluster, they must all have identical configurations. This also includes the certificates used within the WLC cluster. The solution lies in establishing a certificate hierarchy, also known as a CA hierarchy: This involves defining the CA of a WLC as the root-CA and the other BAT-Controller Virtual retrieve this certificate for their sub-CA.

Here BAT-WLC acting as a root ca creates a certificate with issuer: /CN=WLC_MAIN CA/O=Hirschmann Automation and Control GmbH/C=DE

```
admin@BAT-WLC_F7577D:/
> show ca cert
File /minifs/scep_ca_pkcs12_int was read successfully
No CA Chain available!

Certificate:
    Data:
        Version: 3 (0x2)
        Serial Number: 7238862 (0x6e74ce)
    Signature Algorithm: sha256WithRSAEncryption
        Issuer: CN=WLC_MAIN CA,O=Hirschmann Automation and Control GmbH,C=DE
```

BAT-Controller Virtual acting as a sub ca retrieve this certificate which can be verified as below:

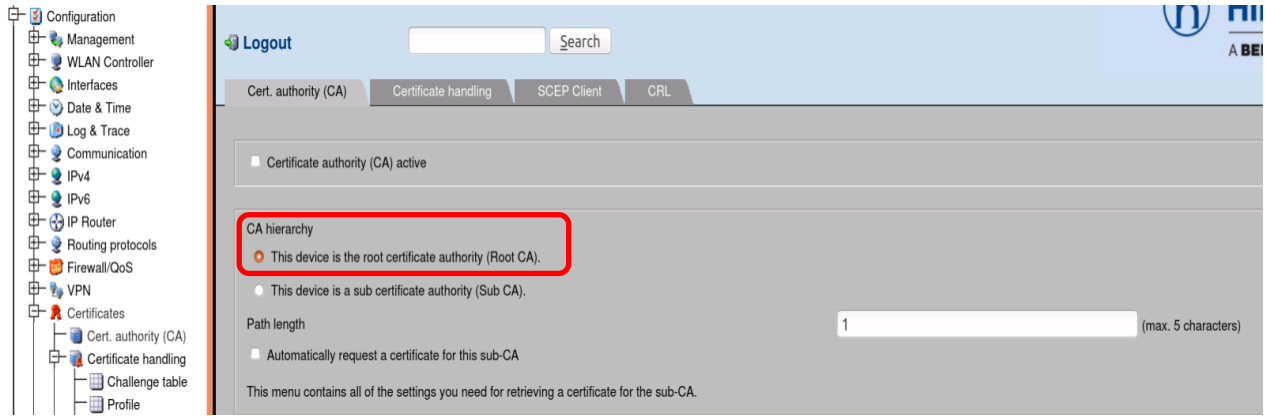
```
admin@BAT-Controller_Virtual_52D1BD:/
> show ca cert
File /flash/security/scepca/scep_ca_pkcs12_int was read successfully
Stack consists of 2 certificates, showing only CA certificates

Certificate 1:

Certificate:
    Data:
        Version: 3 (0x2)
        Serial Number: 7238862 (0x6e74ce)
    Signature Algorithm: sha256WithRSAEncryption
        Issuer: CN=WLC_MAIN CA,O=Hirschmann Automation and Control GmbH,C=DE
Certificate:
    Data:
        Version: 3 (0x2)
        Serial Number: 2080783 (0x1fc00f)
    Signature Algorithm: sha256WithRSAEncryption
        Issuer: CN=WLC_MAIN CA,O=Hirschmann Automation and Control GmbH,C=DE
        Validity
            Not Before: Nov 20 15:51:01 2020 GMT
            Not After : Nov 18 15:50:37 2030 GMT
        Subject: CN=WLC_SUB CA,O=Hirschmann Automation and Control GmbH,C=DE
        Subject Public Key Info:
```

3. Preliminary step

- *Update the controllers to the latest Firmware and reset the controllers to Default Configuration.*
- *Make the controllers reachable via IP address.*
  Refer to the lesson "How to give an Open BAT or a WLC an IP address?" if necessary.
- *Synchronize the time between the controllers.*
  Refer to the lesson "How to set the date and time on an Open BAT or a WLC" if necessary.
- *Make sure both the controllers are reachable to each other.*

4. Creating cluster between BAT-Controller WLC and BAT-Controller Virtual

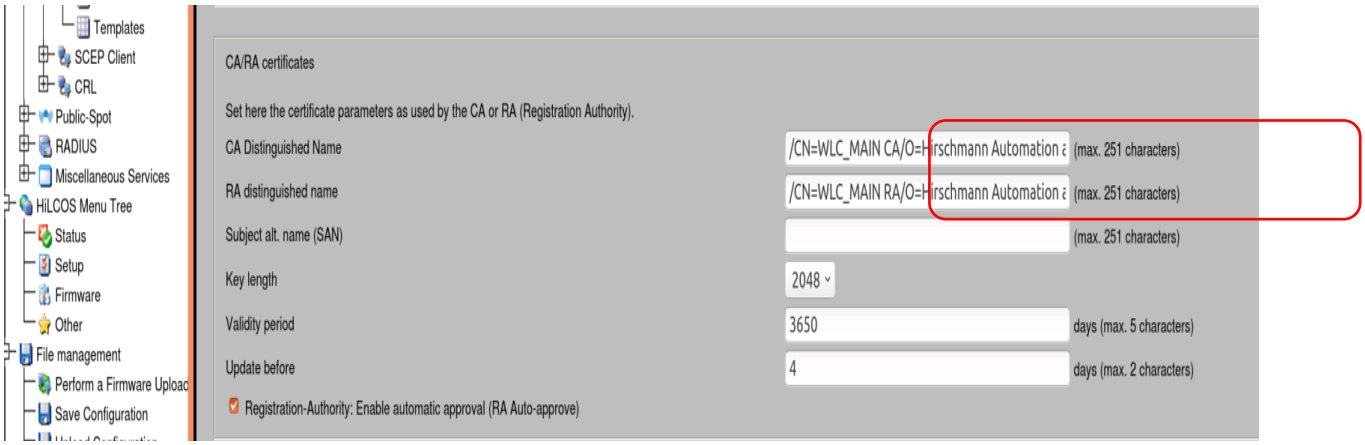
Configure BAT-Controller WLC as Root CA



Configuration > Certificates > Cert. authority (CA)

- *In the CA hierarchy menu, select "This device is the root certificate authority (Root CA).*

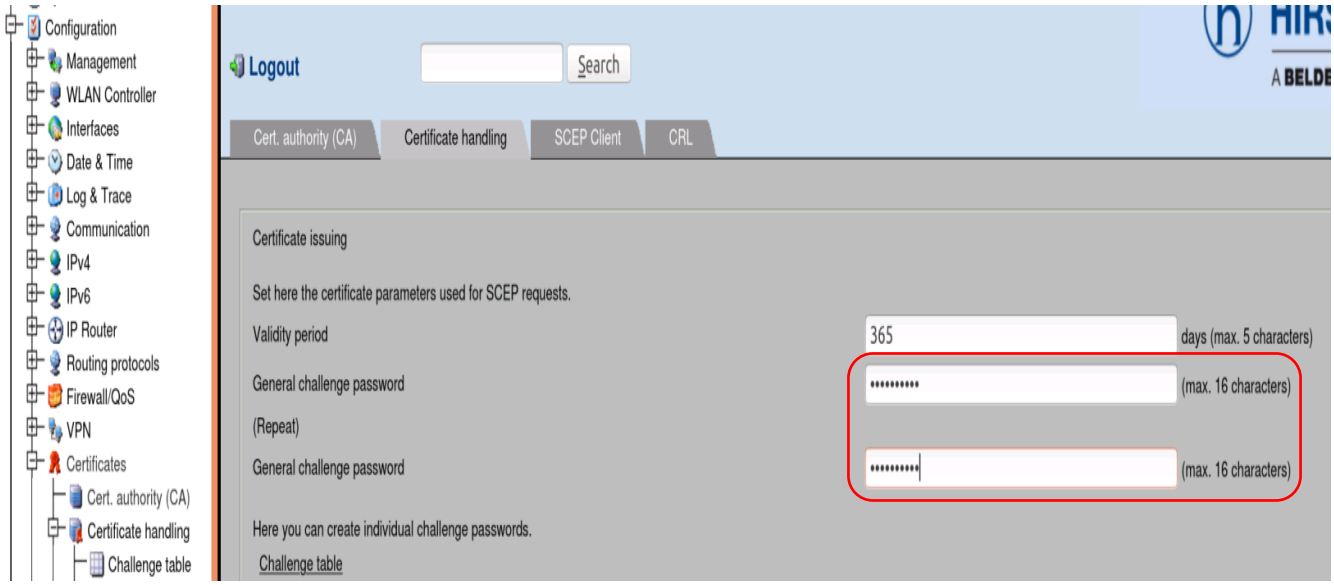
Configure CA/RA certificates in BAT-Controller WLC



Configuration > Certificates > Cert. authority (CA)

- *In the menu CA/RA certificates, customize the name of the certificate authority (CA) and the registration authority (RA). In our example for the CA: /CN=WLC_MAIN CA/O=Hirschmann Automation and Control GmbH/C=DE*
  For the RA: /CN=WLC_MAIN RA/O=Hirschmann Automation and Control GmbH /C=DE

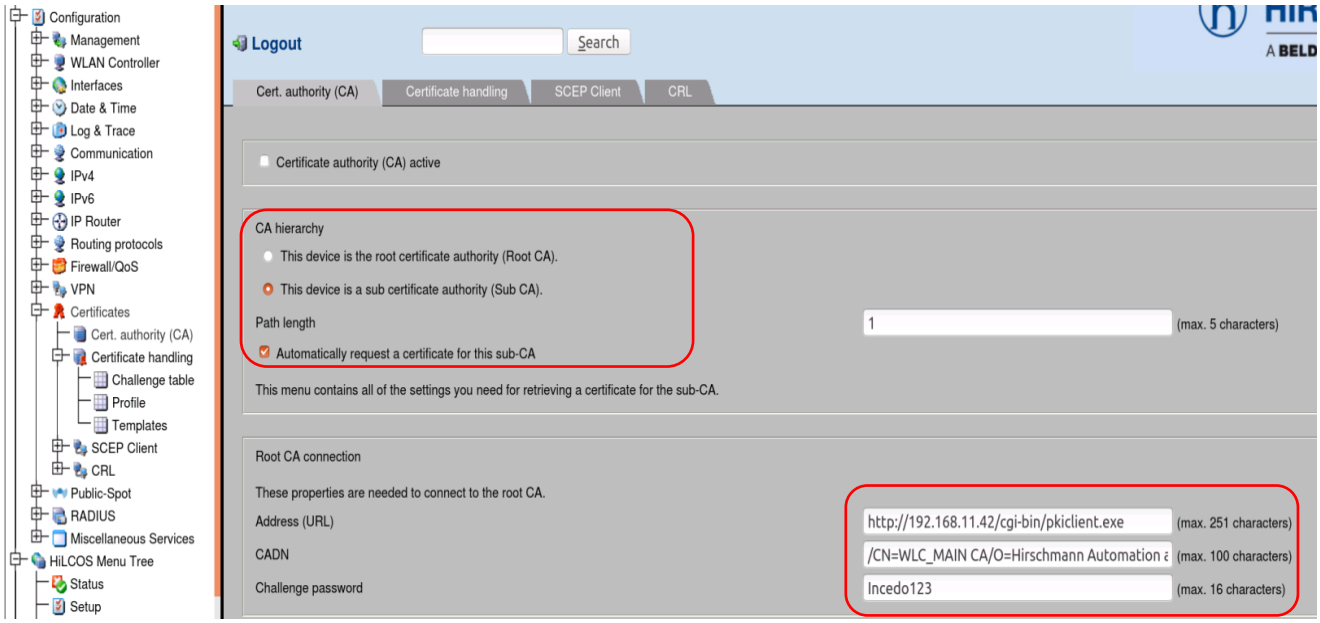
Set a challenge password on BAT-Controller WLC



Configuration > Certificates > Certificate handling

Set a General challenge password (in our example: Incedo123")
This password is used when certificates must be issued via SCEP (Simple Certificate Enrollment Protocol) which is the case when configuring 2 controllers in a cluster.

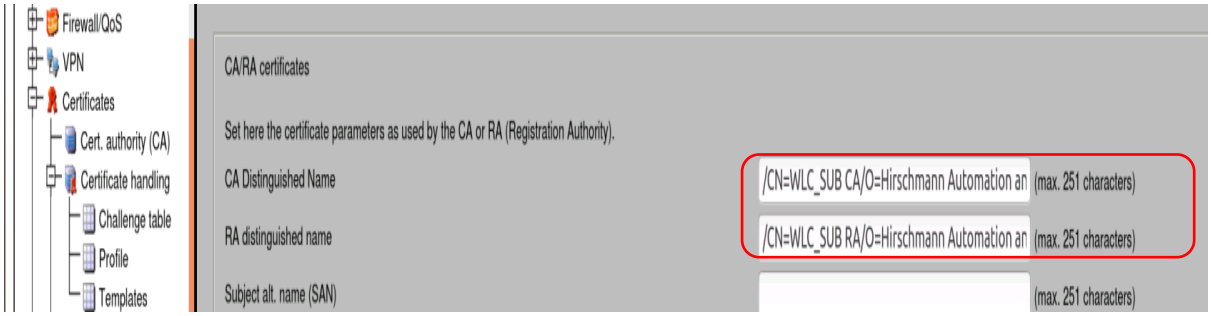
Configure BAT-Controller Virtual as Sub CA



Configuration > Certificates > Cert. authority (CA)

- *In the CA hierarchy menu, select "This device is a sub certificate authority (Sub CA). Check the box "Automatically request a certificate for this sub-CA".*
- *For Root CA connections enter: http://[IP address of the Root CA]/cgi-bin/pkiclient.exe In our example: http://192.168.11.42/cgi-bin/pkiclient.exe*
- *For CADN, enter the name of the CA (as configure on BAT-Controller Virtual at the step " Configure CA/RA certificates in BAT-Controller Virtual") .In our example: /CN=WLC_MAIN CA/O=Hirschmann Automation and Control GmbH /C=DE*
- *Enter the password configured on the BAT-Controller Virtual at the step "Set a challenge password on BAT-Controller Virtual". In our example : "Incedo123"*

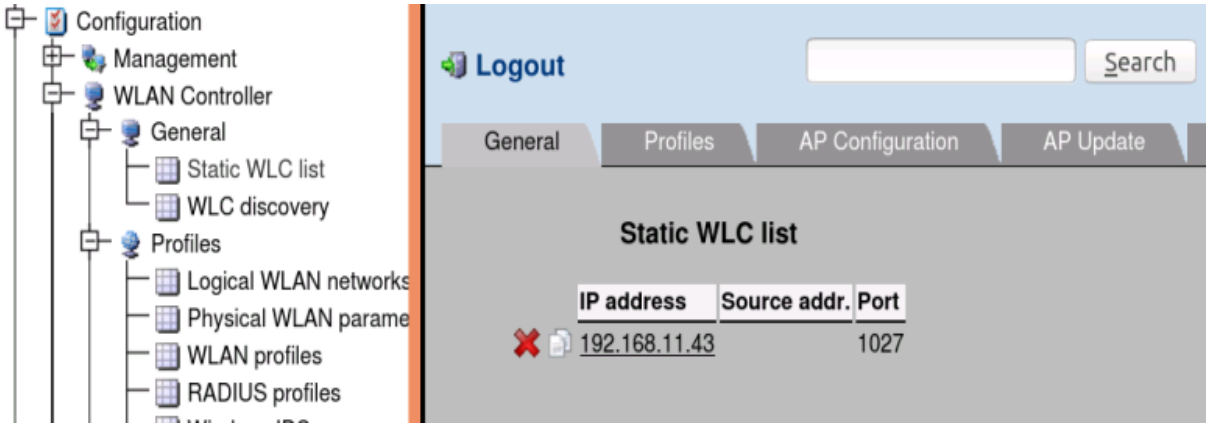
Configure CA/RA certificates in BAT-Controller Virtual



Configuration > Certificates > Cert. authority (CA)

- *In the menu CA/RA certificates, customize the name of the certificate authority (CA) and the registration authority (RA). In our example for the CA: /CN=WLC_SUB CA/O=Hirschmann Automation and Control GmbH /C=DE For the RA: /CN=WLC_SUB RA/O=Hirschmann Automation and Control GmbH /C=DE. Apply the settings.*

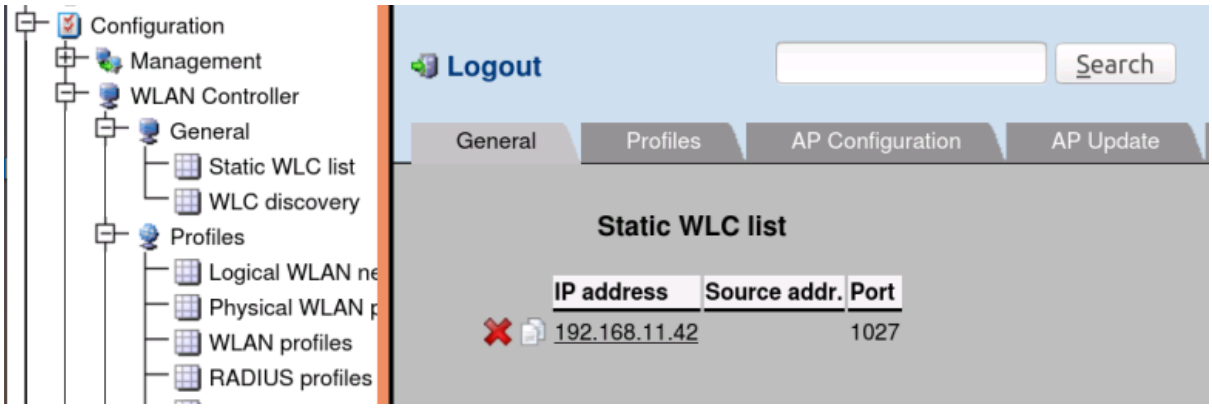
Enter IP address of BAT-Controller Virtual in the static WLC list of BAT-Controller WLC



Configuration > WLAN Controller > General > Static WLC list

- *On BAT-Controller WLC, enter the IP address of BAT-Controller Virtual: 192.168.11.43*
- *The port in use per default is 1027*

Enter IP address of BAT-Controller WLC in the static WLC list of BAT-Controller Virtual



Configuration > WLAN Controller > General > Static WLC list

- *On the BAT-Controller Virtual enter the IP address of BAT-Controller WLC : 192.168.11.42*
- *The port in use per default is 1027*

Enable the clustering on the BAT-Controller WLC

Configuration > WLAN Controller > General

- *Check the box "Wireless LAN controller enabled"*
- *Check the box "WLC tunnel active".*

We must now make sure that the WLCs find each other, there are 3 options:

- *If they are in the same LAN, "WLC discovery" can be used.*
- *If they are in different LANs, Check additionally "WLC data tunnel active" and enter them statically in "Static WLC list..."*
- *If they are in the same LAN but you prefer to enter them statically, let the box "WLC data tunnel active" unchecked and enter them statically in "Static WLC list..."*

Apply the settings.

Enable the clustering on the BAT-Controller Virtual

Configuration > WLAN Controller > General

- *Check the box "Wireless LAN controller enabled"*
- *Check the box "WLC tunnel active".*

We must now make sure that the WLCs find each other, there are 3 options:

- *If they are in the same LAN, "WLC discovery" can be used.*
- *If they are in different LANs, Check additionally "WLC data tunnel active" and enter them statically in "Static WLC list..."*
- *If they are in the same LAN but you prefer to enter them statically, let the box "WLC data tunnel active" unchecked and enter them statically in "Static WLC list..."*

Apply the settings.

Check the controller state at BAT-Controller WLC

```
admin@BAT-WLC_F7577D:/
> ls Status/WLAN-Management/

AP-Configuration                MENU:
AP-Status                       MENU:
Central-Firmware-Management     MENU:
Client-Steering                 MENU:
WLC-Cluster                     MENU:
Wireless-IDS                    MENU:
AP-Connections                  TABINFO: 128 x [Job,AP-LAN-MAC,IP-Address,..]
Failover-AP-Data-Connections    TABINFO: 5 x [IP-Address,MAC-Address,Port,..]
Net-Count                       TABINFO: 0+ x [Name,SSID,Num-Radios,..]
Networks                        TABINFO: 0+ x [BSSID,AP-LAN-MAC,AP-WLAN-MAC,..]
PMK-Caching                     TABINFO: 0 x [Supplicant,SSID,..]
Scan-Results                    TABINFO: 0+ x [BSSID,AP-Name,IP-Address,..]
Seen-Clients                    TABINFO: 0+ x [Client-MAC,AP-LAN-MAC,AP-Name,..]
Station-Table                   TABINFO: 0+ x [Client-MAC,AP-WLAN-MAC,..]
WLC-Bridge-Interfaces           TABINFO: 33 x [Bridge-Interface,..]
Client-Count                    INFO:    0
Client-Count-24GHz              INFO:    0
Client-Count-5GHz               INFO:    0
Connected-expected-AP           INFO:    0
Connected-managed-AP            INFO:    0
Connected-new-AP                INFO:    0
Controller-State                INFO:    Ready
```

Connect per telnet and verify the controller state at path:

ls /Status/WLAN-Management

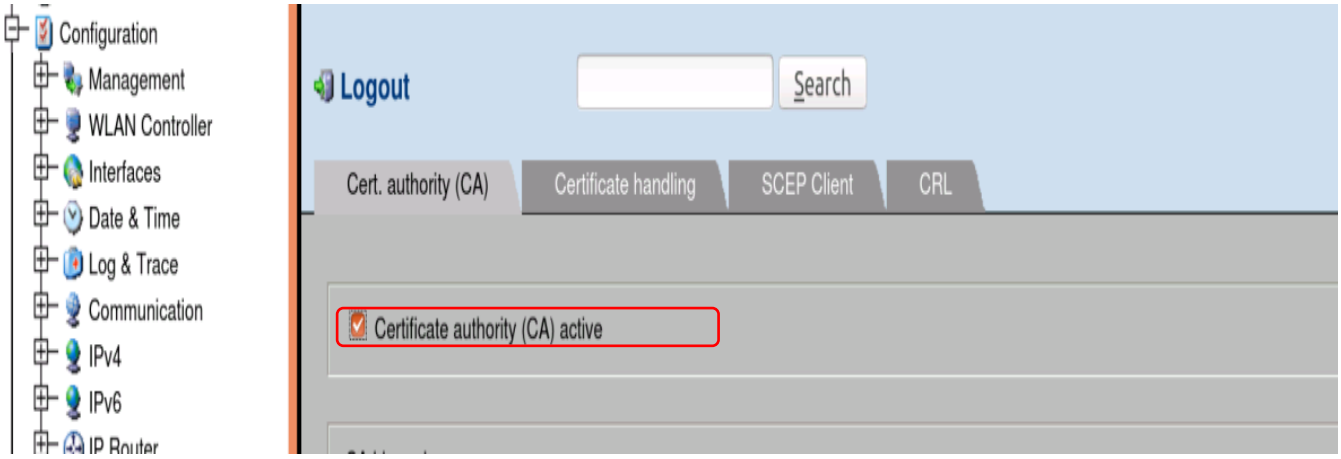
Check the controller state at BAT-Controller Virtual

```
admin@BAT-Controller_Virtual_52D1BD:/
> ls /Status/WLAN-Management/

AP-Configuration                MENU:
AP-Status                       MENU:
Central-Firmware-Management     MENU:
Client-Steering                 MENU:
WLC-Cluster                     MENU:
Wireless-IDS                    MENU:
AP-Connections                  TABINFO: 128 x [Job,AP-LAN-MAC,IP-Address,..]
Failover-AP-Data-Connections    TABINFO: 5 x [IP-Address,MAC-Address,Port,..]
Net-Count                       TABINFO: 0+ x [Name,SSID,Num-Radios,..]
Networks                        TABINFO: 0+ x [BSSID,AP-LAN-MAC,AP-WLAN-MAC,..]
PMK-Caching                     TABINFO: 0 x [Supplicant,SSID,..]
Scan-Results                    TABINFO: 0+ x [BSSID,AP-Name,IP-Address,..]
Seen-Clients                    TABINFO: 0+ x [Client-MAC,AP-LAN-MAC,AP-Name,..]
Station-Table                   TABINFO: 0+ x [Client-MAC,AP-WLAN-MAC,..]
WLC-Bridge-Interfaces           TABINFO: 33 x [Bridge-Interface,..]
Client-Count                    INFO:    0
Client-Count-24GHz              INFO:    0
Client-Count-5GHz               INFO:    0
Connected-expected-AP           INFO:    0
Connected-managed-AP            INFO:    0
Connected-new-AP                INFO:    0
Controller-State                INFO:    Ready
```

Connect per telnet and verify the controller state at path:

ls /Status/WLAN-Management

Enable the "Certificates authority (CA) active on BAT-Controller WLC



Configuration > Certificates > Cert. authority (CA)

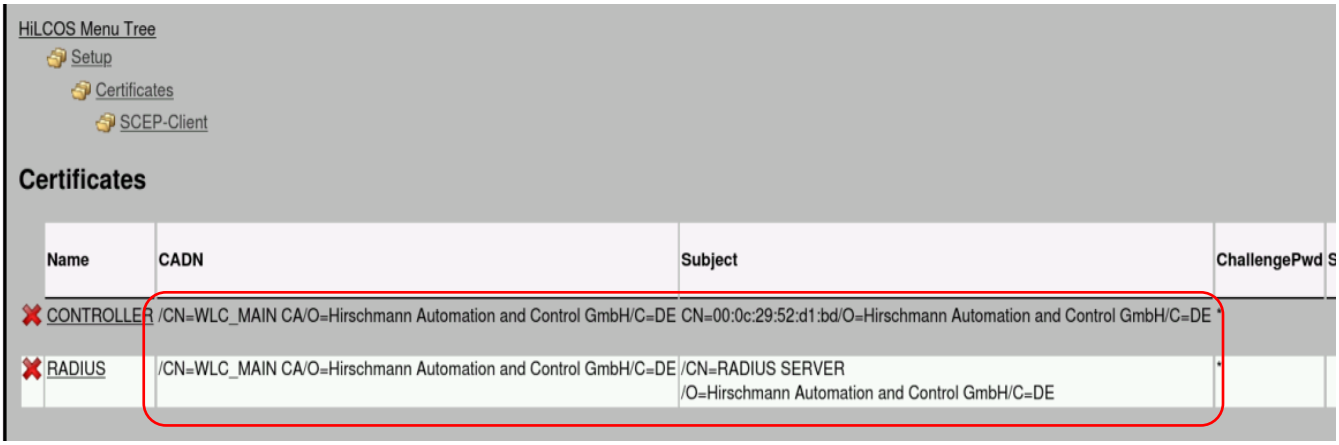
- *Enable Certificate authority (CA) active at BAT-Controller WLC.*

Enable the "Certificates authority (CA) active on BAT-Controller Virtual

Configuration > Certificates > Cert. authority (CA)

- *Enable Certificate authority (CA) active at BAT-Controller Virtual.*

Verify that certificate has been created for BAT-Controller WLC



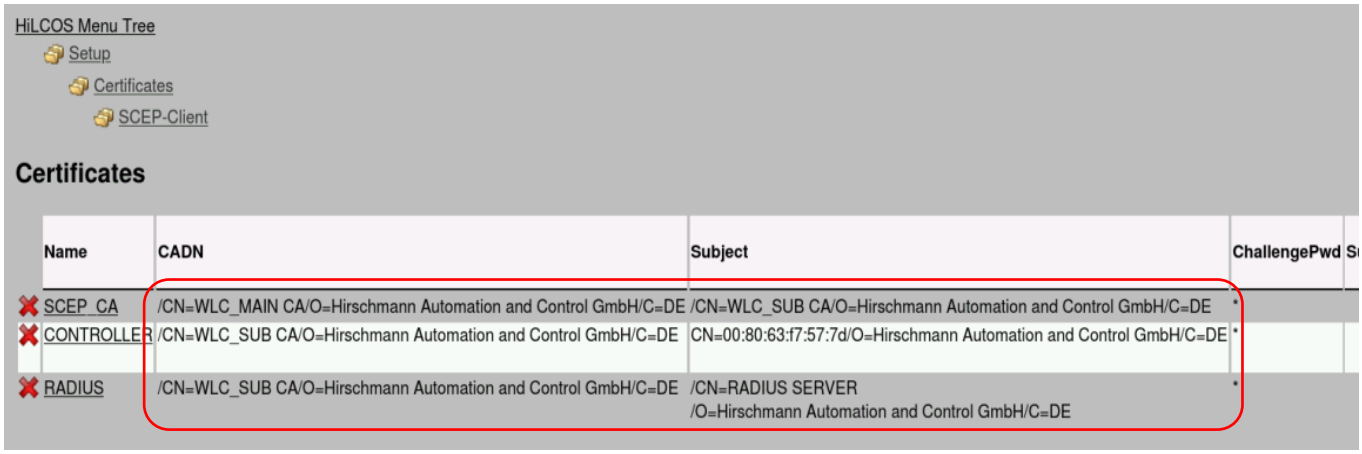

```
BAT-WLC_F7577D, Connection No.: 002 (LAN)


admin@BAT-WLC_F7577D:/
> show ca cert
File /minifs/scep_ca_pkcs12_int was read successfully
No CA Chain available!

Certificate:
    Data:
        Version: 3 (0x2)
        Serial Number: 7238862 (0x6e74ce)
    Signature Algorithm: sha256WithRSAEncryption
        Issuer: CN=WLC_MAIN CA,O=Hirschmann Automation and Control GmbH,C=DE
        Validity
            Not Before: Dec  6 01:13:07 2020 GMT
            Not After : Dec  4 01:13:07 2030 GMT
        Subject: CN=WLC_MAIN CA,O=Hirschmann Automation and Control GmbH,C=DE
        Subject Public Key Info:
            Public Key Algorithm: rsaEncryption
                Public-Key: (2048 bit)
                Modulus:
                    00:b6:77:fa:45:9b:c9:e2:ee:ae:12:50:94:8e:7d:
                    8f:0f:05:60:94:5c:b8:7f:aa:39:a6:58:93:f0:d3:
                    51:ba:17:b2:12:3f:b2:66:5b:7c:5f:2b:d4:e5:21:
                    16:c6:89:2e:a6:da:cd:0b:a6:42:1e:6e:46:28:ae:
```

To verify created certificates on BAT-Controller WLC, it can be verified at path :

HiLCOS Menu Tree > Setup > Certificates > SCEP-Client > Certificates

And by connecting telnet session and type the command: show ca cert.

Verify that BAT-Controller Virtual has retrieved the certificate correctly from the Root CA




```
admin@BAT-Controller_Virtual_52D1BD:/
> show ca cert
File /flash/security/scepca/scep_ca_pkcs12_int was read successfully
Stack consists of 2 certificates, showing only CA certificates

Certificate 1:

Certificate:
    Data:
        Version: 3 (0x2)
        Serial Number: 7238862 (0x6e74ce)
    Signature Algorithm: sha256WithRSAEncryption
        Issuer: CN=WLC_MAIN CA,O=Hirschmann Automation and Control GmbH,C=DE
        Validity
            Not Before: Dec  6 01:13:07 2020 GMT
            Not After : Dec  4 01:13:07 2030 GMT
        Subject: CN=WLC_MAIN CA,O=Hirschmann Automation and Control GmbH,C=DE
        Subject Public Key Info:
```

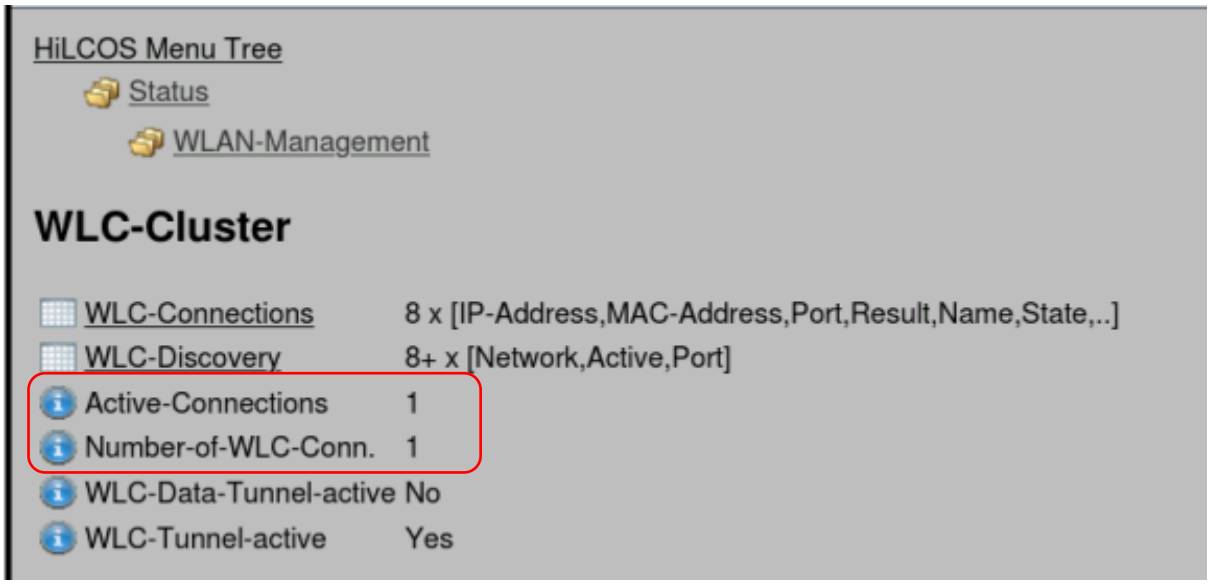
```
Certificate:
    Data:
        Version: 3 (0x2)
        Serial Number: 2080783 (0x1fc00f)
    Signature Algorithm: sha256WithRSAEncryption
        Issuer: CN=WLC_MAIN CA,O=Hirschmann Automation and Control GmbH,C=DE
        Validity
            Not Before: Nov 20 15:51:01 2020 GMT
            Not After : Nov 18 15:50:37 2030 GMT
        Subject: CN=WLC_SUB CA,O=Hirschmann Automation and Control GmbH,C=DE
        Subject Public Key Info:
```

To verify created certificates on BAT-Controller Virtual, it can be verified at path: HiLCOS Menu Tree > Setup > Certificates > SCEP-Client > Certificates

And by connecting telnet session and type the command: show ca cert.

2 certificates will be displayed. The first one is the certificate of the root CA and the second one is the certificate of the sub-CA.

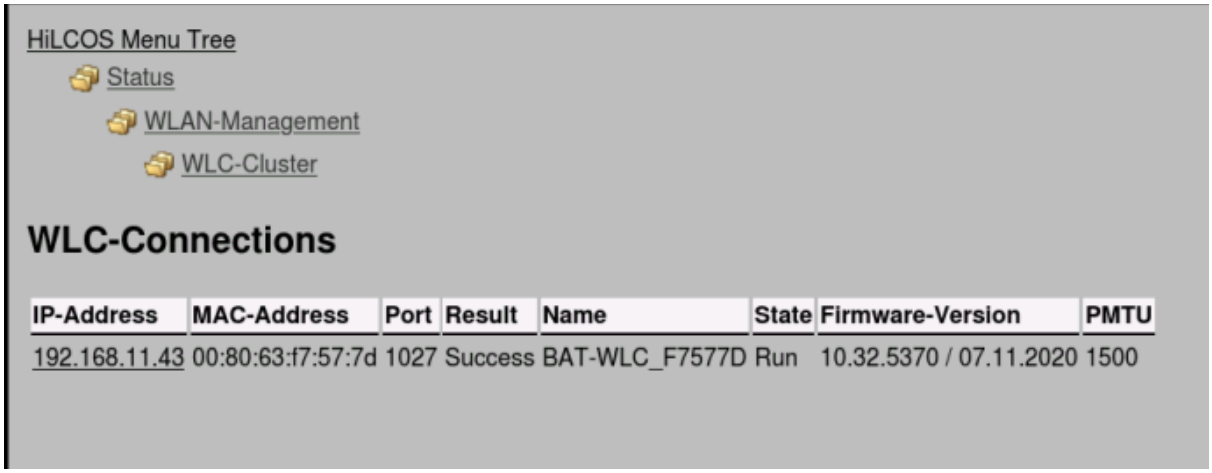
Verify that the cluster is active



Check number of active wlc-connections and controllers recognise the other members of the cluster at path:

HiLCOS Menu Tree > Status > WLAN Management > WLC-Cluster.

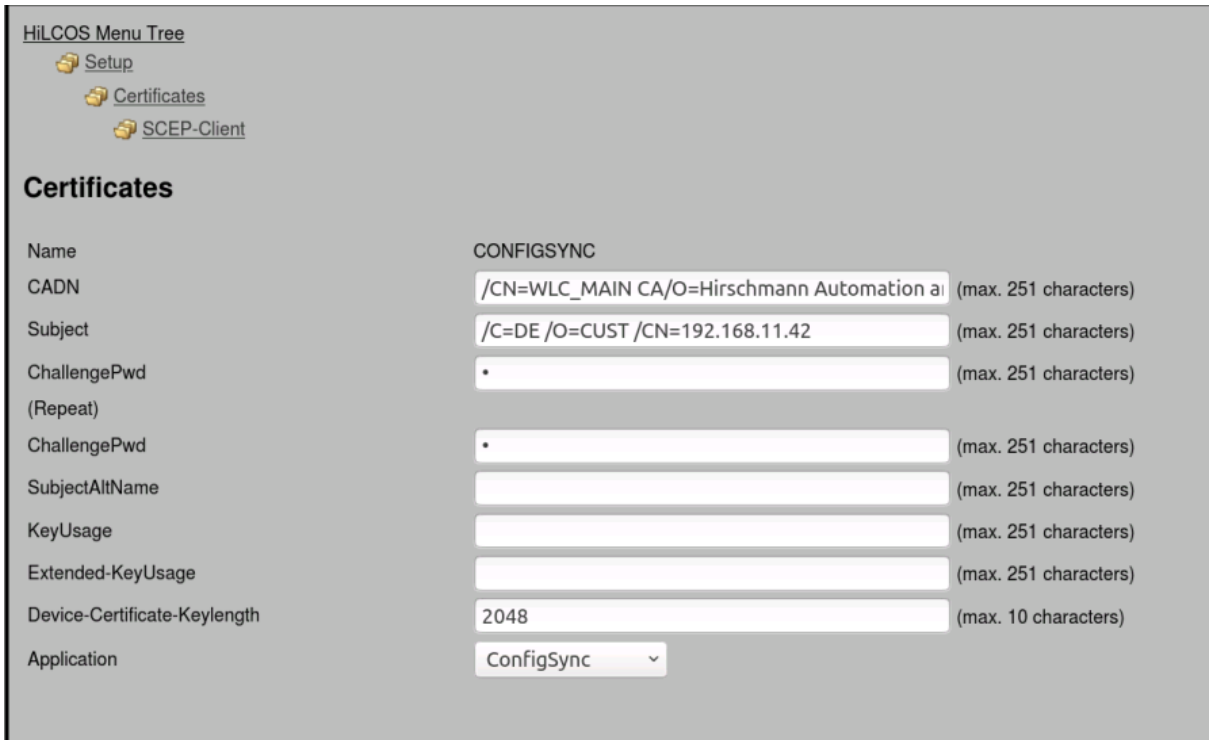
Verify that the cluster is UP and in running state



Check number of active wlc-connections and controllers recognise the other members of the cluster at path:
HiLCOS Menu Tree > Status > WLAN Management > WLC-Cluster > WLC-Connections.

5. Config Synchro function between BAT-Controller WLC and BAT-Controller Virtual

Generate Config Sync certificate on BAT-Controller WLC



HiLCOS Menu Tree > Setup > Certificates > SCEP-Client > Certificates > Add

Name: CONFIGSYNC (but give the most relevant name for you)
CADN: Distinguished Name configured as Certification authority.
In our example: /CN=WLC_MAIN RA/O=Hirschmann Automation and Control GmbH /C=DE

Subject: Fullfill the line following our detailed example:

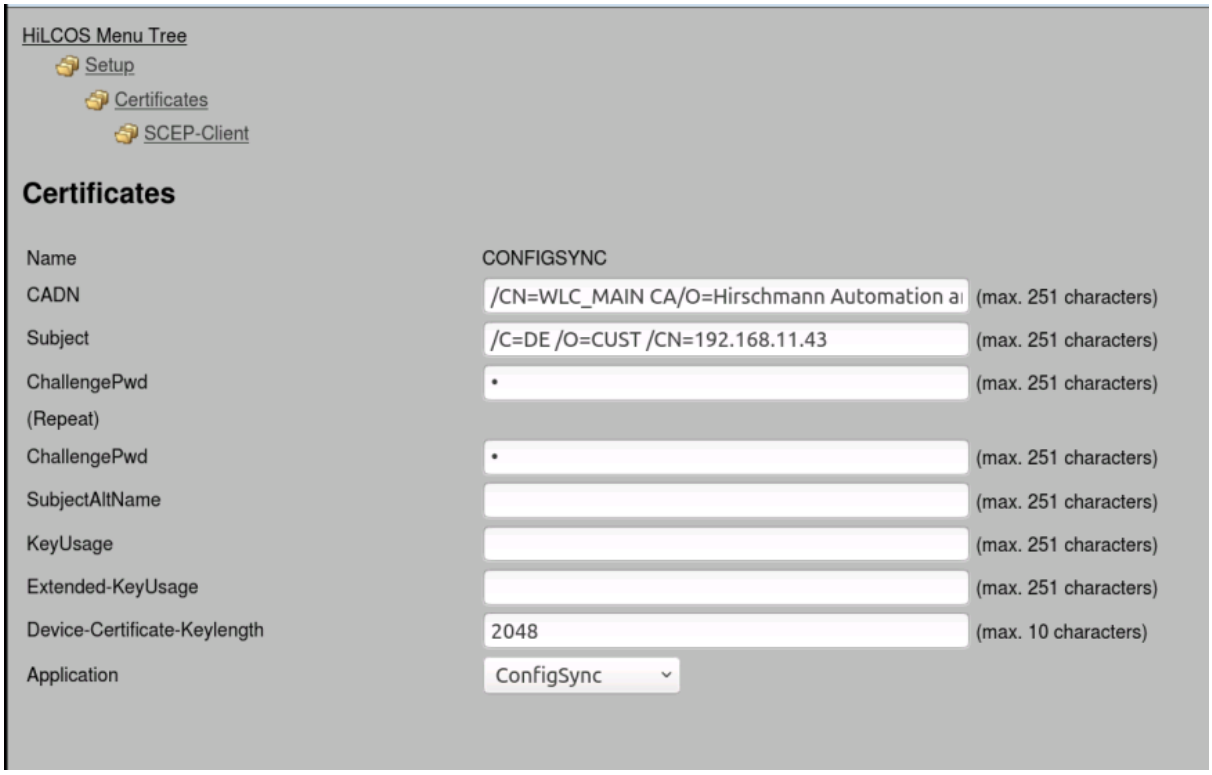
- */C: country (in our example, DE for Deutschland)*
- */ST: state*
- */L: locality*
- */O: organisation (in our example "CUST")*
- */OU: organisation unit*
- */CN= Common Name. Enter the WLC IP address (in our example 192.168.11.42 which is the IP address of WLC)*

The subject in our example: /C=DE /O=CUST /CN=192.168.11.42

ChallengePwd: Enter the challenge password configured in "General Challenge Password" on the root CA (described while creating cluster i.e "Incedo123")
Device-Certificate-Keylength: 2048

Apply the setting.

Generate Config Sync certificate on BAT-Controller Virtual



HiLCOS Menu Tree > Setup > Certificates > SCEP-Client > Certificates > Add

Name: CONFIGSYNC (but give the most relevant name for you)
CADN: Distinguished Name configured as Certification authority.
In our example: /CN=WLC_MAIN RA/O=Hirschmann Automation and Control GmbH /C=DE

Subject: Fullfill the line following our detailed example:

- */C: country (in our example, DE for Deutschland)*
- */ST: state*
- */L: locality*
- */O: organisation (in our example "CUST")*
- */OU: organisation unit*
- */CN= Common Name. Enter the IP address (in our example 192.168.11.43 which is the IP address of BAT-Controller Virtual)*

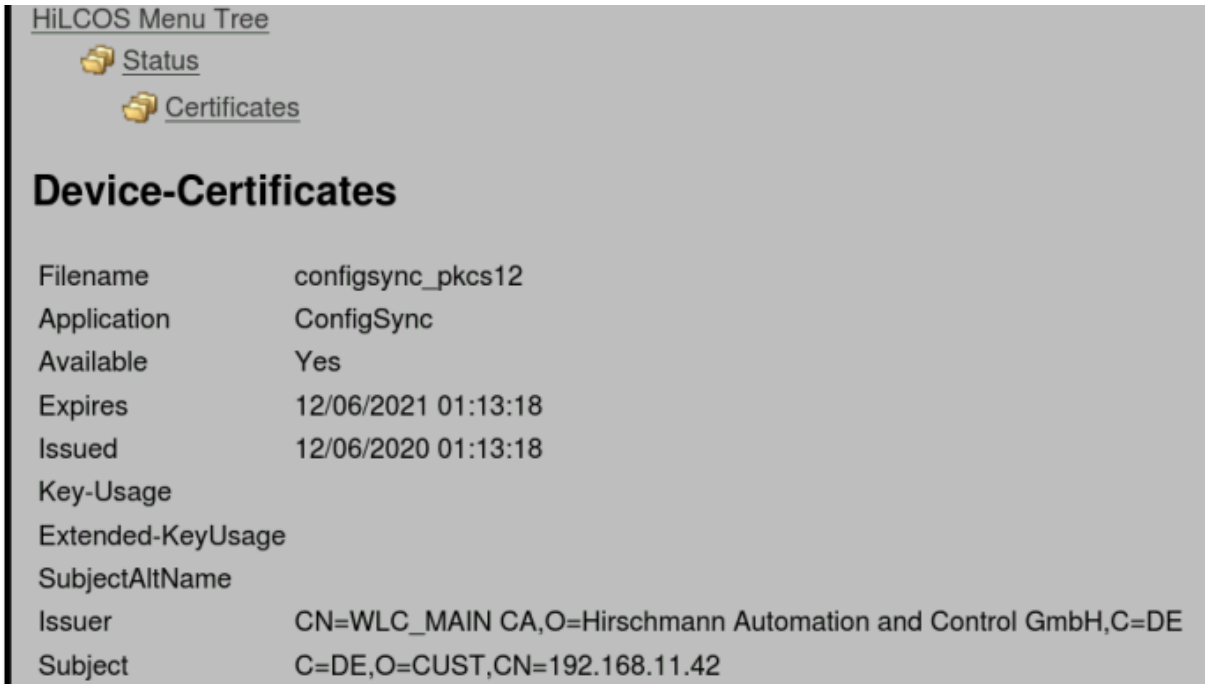
The subject in our example: /C=DE /O=CUST /CN=192.168.11.43

ChallengePwd: Enter the challenge password configured in "General Challenge Password" on the root CA (described while creating cluster i.e Incedo123)

Device-Certificate-Keylength: 2048

Apply the settings.

Verify Config Sync certificate on BAT-Controller WLC

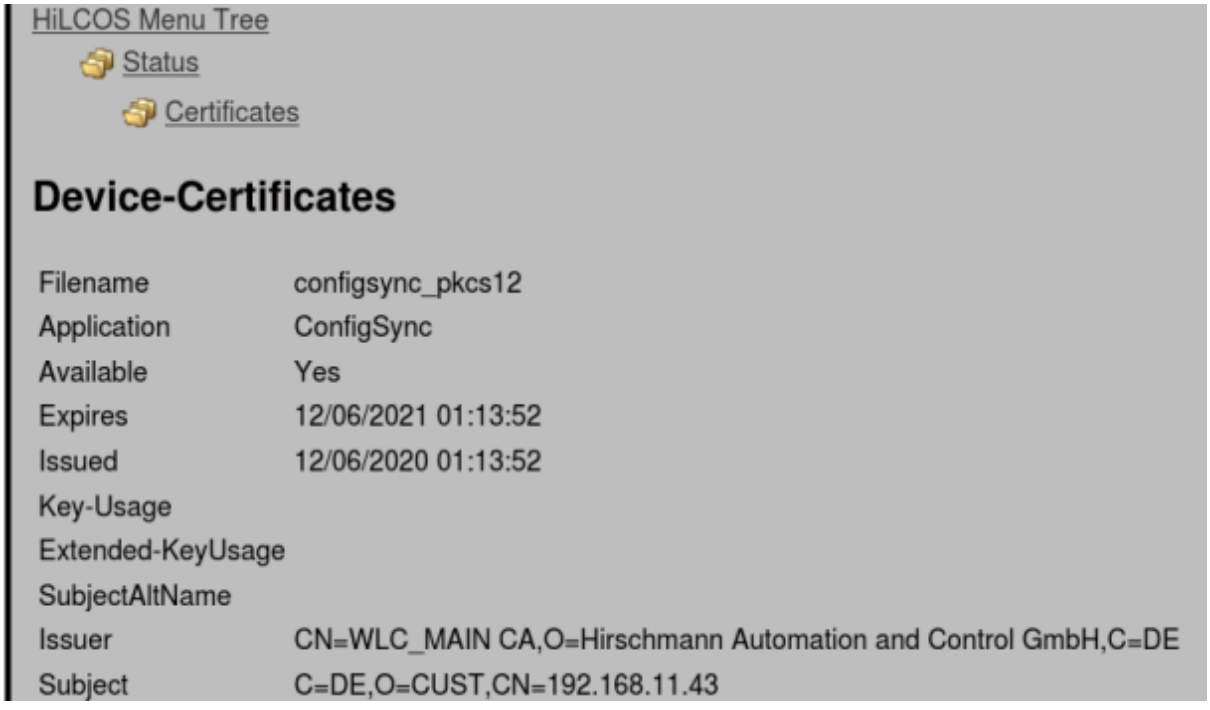


HiLCOS Menu Tree > Status > Certificates > Device certificates

Application: "ConfigSync"

- *A Certificate for the application "ConfigSyc" must be available.*

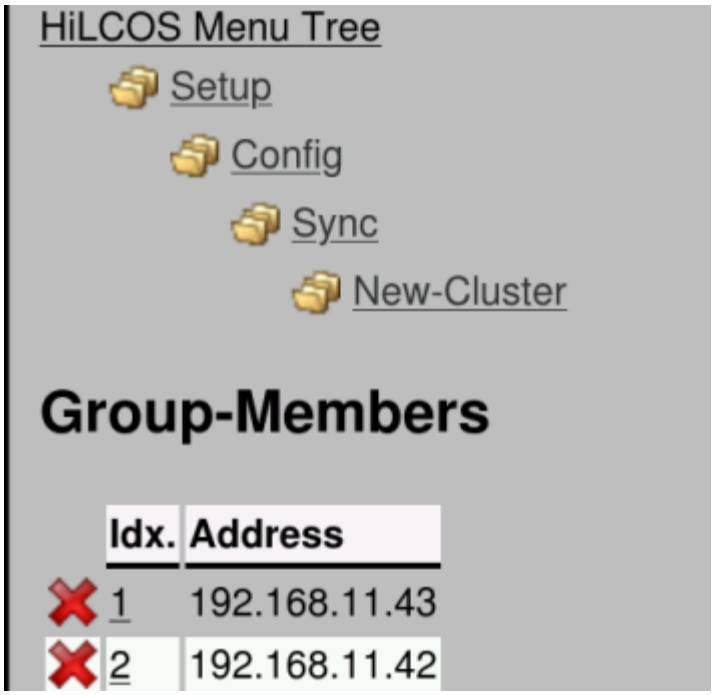
Verify Config Sync certificate on BAT-Controller Virtual



HiLCOS Menu Tree > Status > Certificates > Device certificates
Application: "ConfigSync"

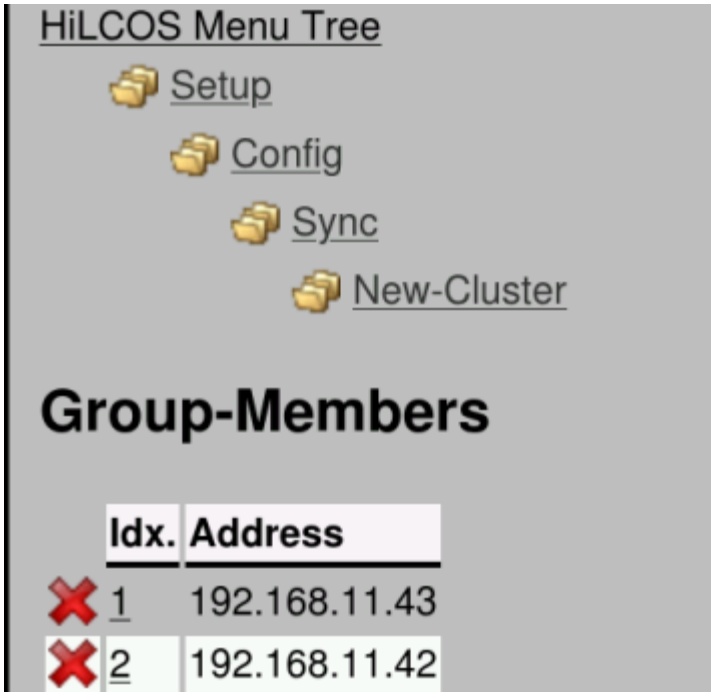
- *A Certificate for the application "ConfigSyc" must be available.*

Configure the cluster group members in BAT-Controller WLC



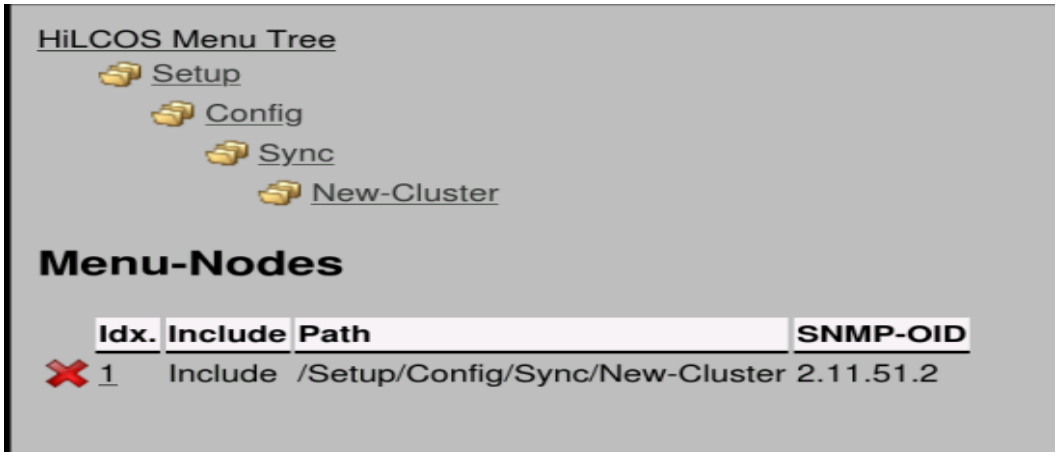
HiLCOS Menu Tree > Setup > Config > Sync > New-Cluster > Group-Members

Configure the cluster group members in BAT-Controller Virtual



HiLCOS Menu Tree > Setup > Config > Sync > New-Cluster > Group-Members

Configure the configuration parts to be synchronised (1/2) in BAT-Controller WLC

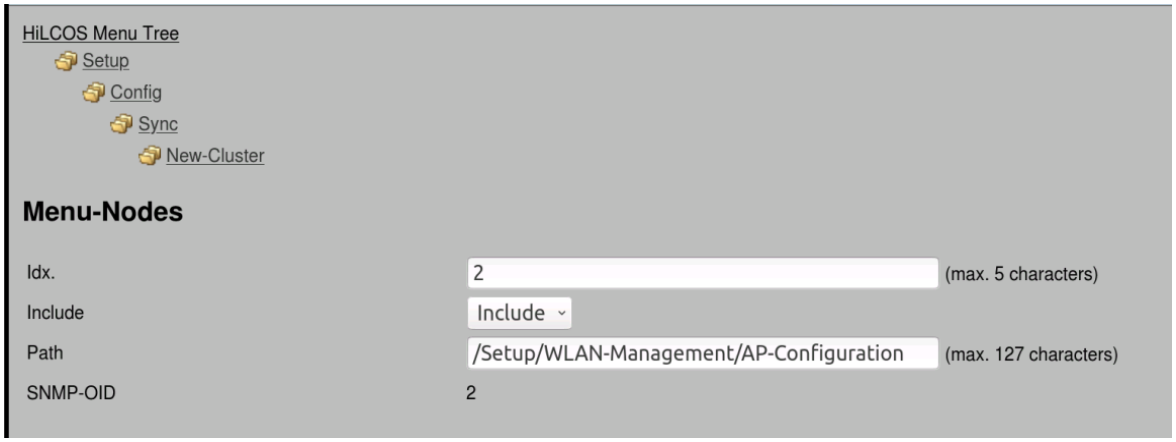


HiLCOS Menu Tree > Setup > Config > Sync > New-Cluster > Menu-Nodes

As per default there is already 1 entry related to the config sync function configuration.
Let it in the list, it means that each time a config change will be done on a controller regarding the config sync configuration, the change will be automatically reported on the other controller.

Select Add.

Configure the configuration parts to be synchronised (2/2) in BAT-Controller WLC



Enter a new Index.
Select Include or Exclude (in our example, include). Exclude could be chosen if we choose to synchronise a whole menu excluding a sub-menu.

The configuration related to the profiles and the AP configuration is located under:
/Setup/WLAN-Management/AP-Configuration
In our example we don't want to synchronise more parts of the configuration.

Enable the Config Synchro function in BAT-Controller WLC

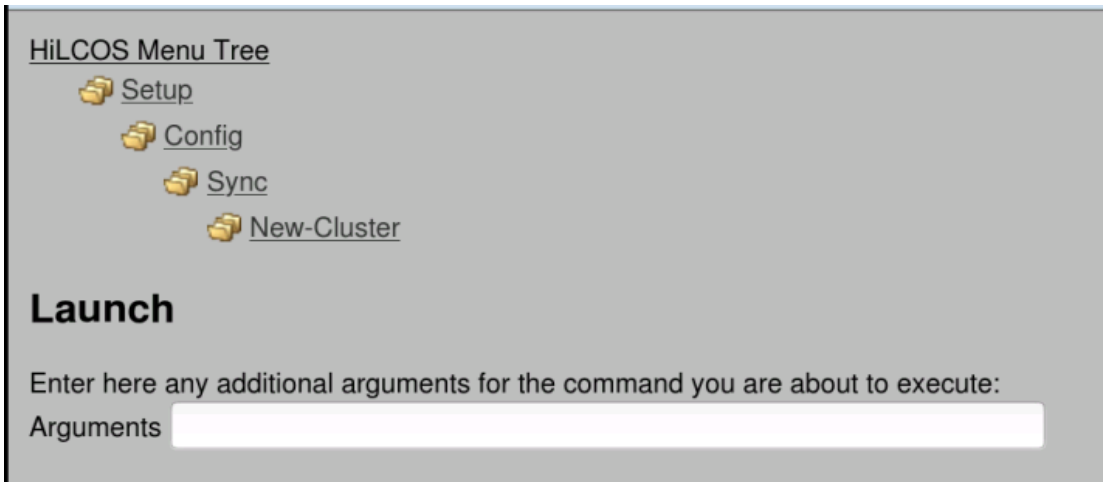
HiLCOS Menu Tree > Setup > Config > Sync > Operating

Select Yes

Enable the Config Synchro function in BAT-Controller Virtual

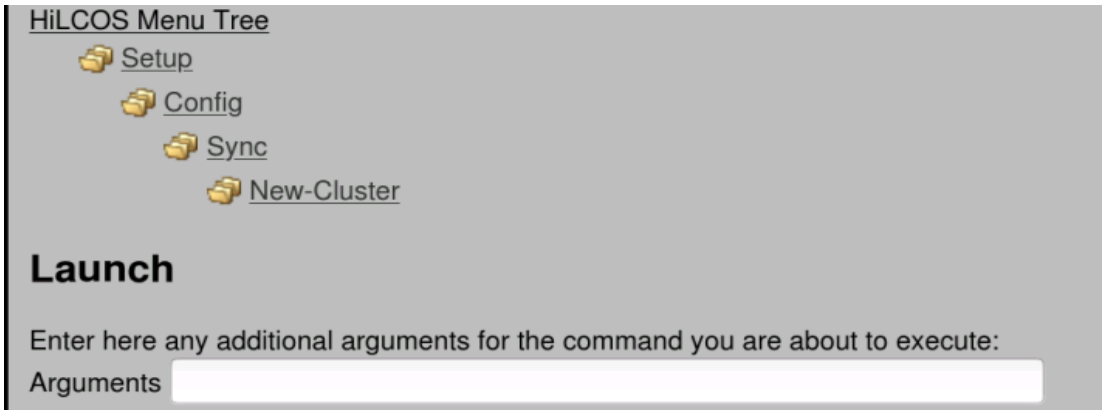
HiLCOS Menu Tree > Setup > Config > Sync > Operating
Select Yes

Launch the config Synchro on BAT-Controller WLC



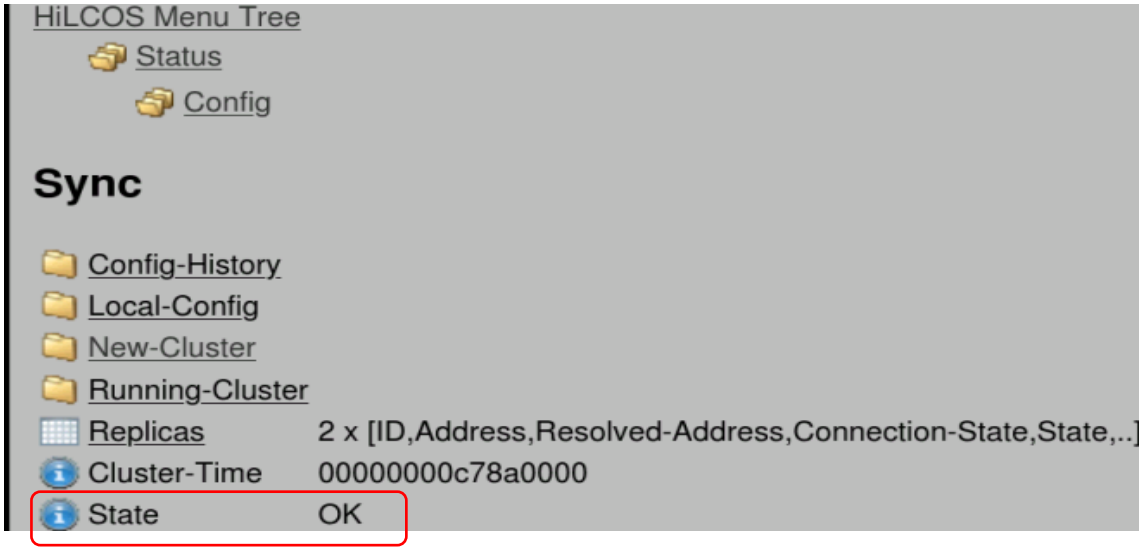
HiLCOS Menu Tree > Setup > Config > Sync > New-Cluster > Launch
Select Execute (no arguments needed)

Launch the config Synchro on BAT-Controller Virtual

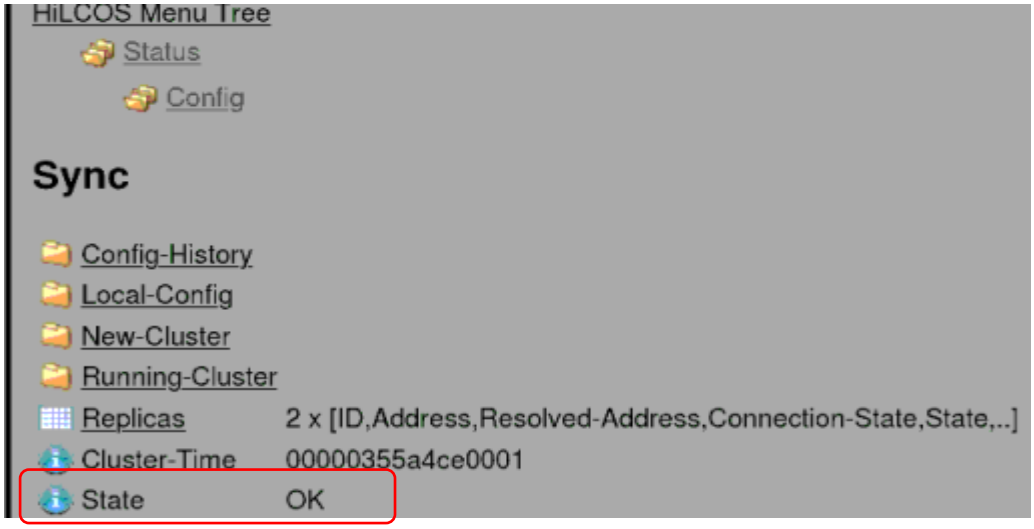


HiLCOS Menu Tree > Setup > Config > Sync > New-Cluster > Launch
Select Execute (no arguments needed)

Check the config Sync Status on BAT-Controller WLC



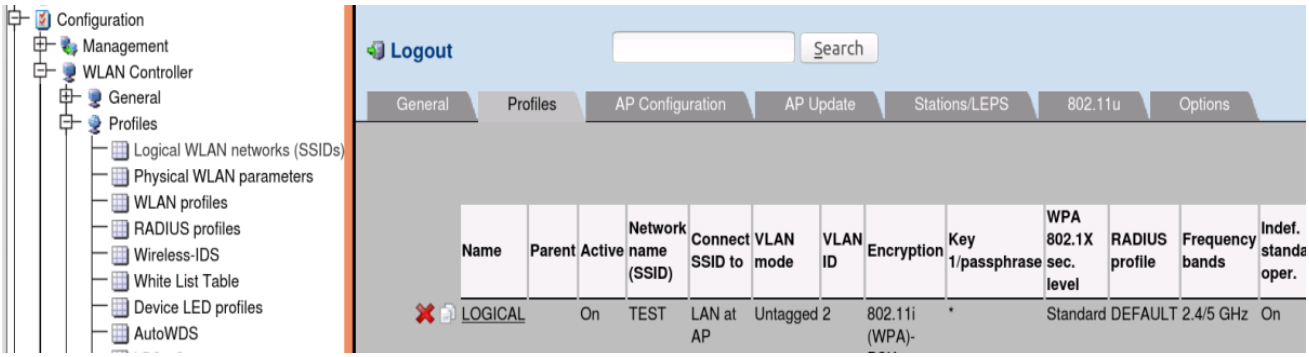
Check the config Sync Status on BAT-Controller Virtual



State must be OK at path: HiLCOS Menu Tree > Status > Config > Sync

Config Sync feature verification between BAT-Controller WLC and BAT-Controller Virtual

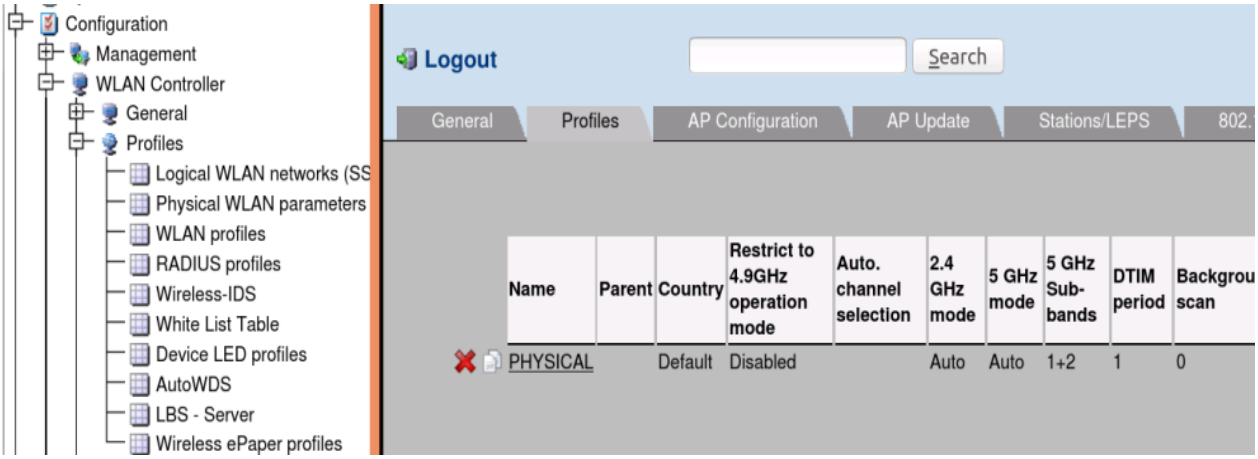
Creating Logical profile on BAT-Controller WLC



Configuration > WLAN Controller > Logical WLAN networks (SSIDs)

- *In our example logical profile Name: LOGICAL ;and other arguments are taken as default.*

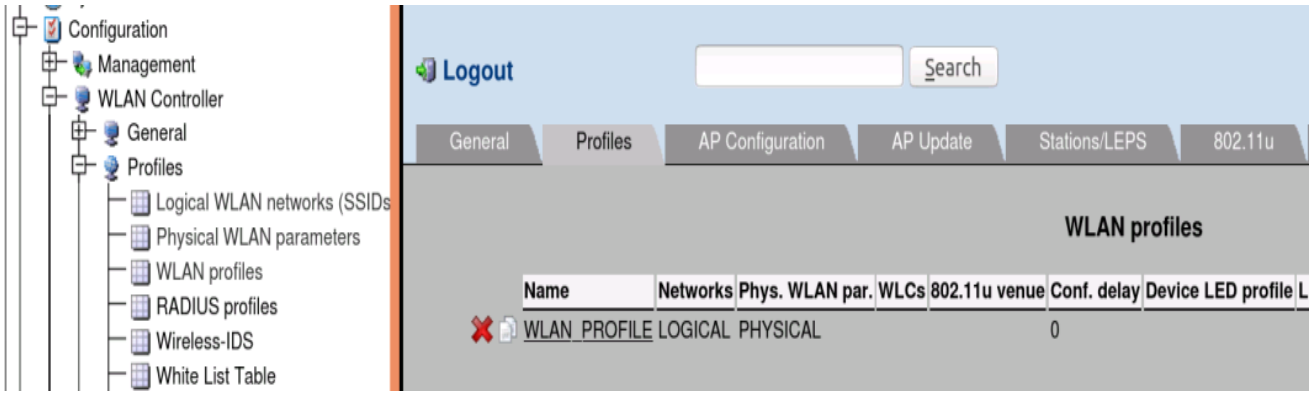
Creating Physical profile on BAT-Controller WLC



Configuration > WLAN-Controller > Physical WLAN parameters

- *In our example physical profile Name: PHYSICAL ;and other arguments are taken as default.*

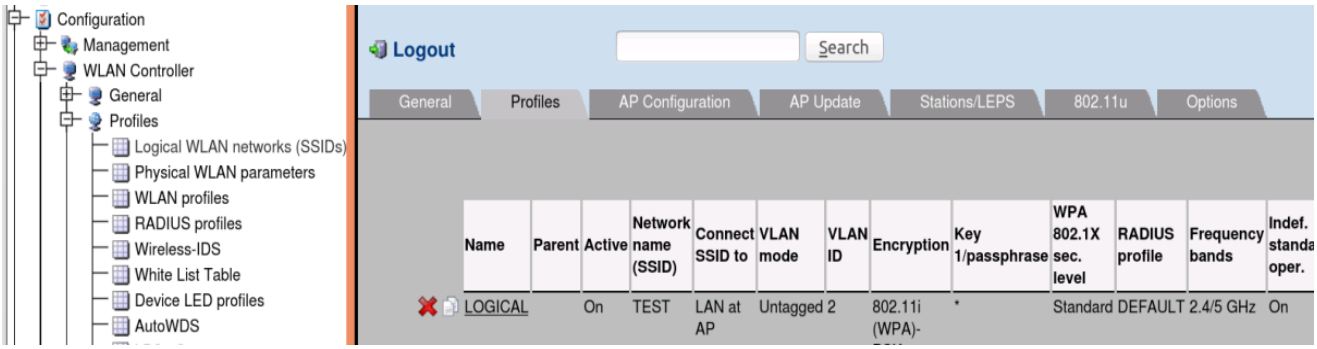
Creating WLAN profile on BAT-Controller WLC



Configuration > WLAN Controller > WLAN profiles

- *In our example WLAN profile Name : WLAN_PROFILE*
- *logical profile Name : LOGICAL*
- *physical profile Name : PHYSICAL*

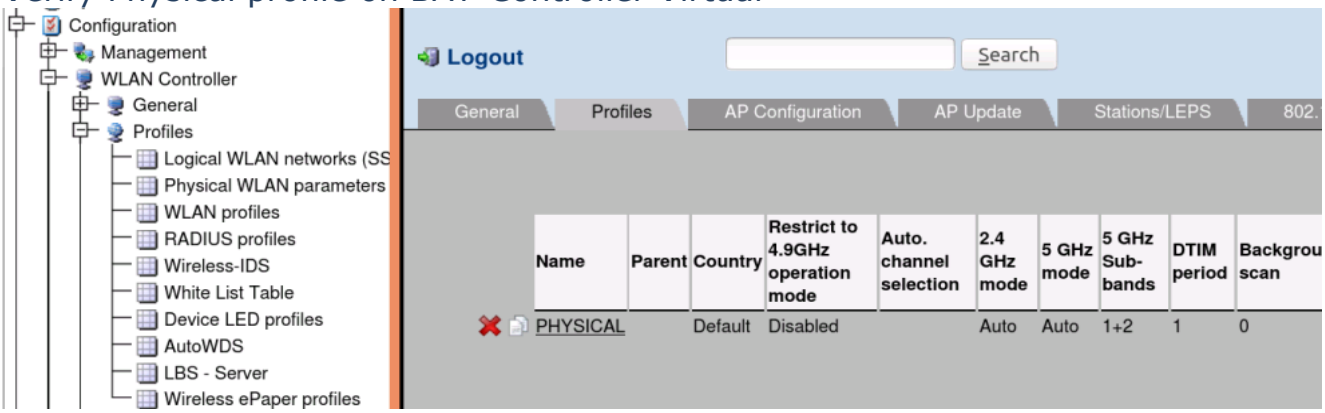
Verify Logical profile on BAT-Controller Virtual



Configuration > WLAN Controller > Logical WLAN networks (SSIDs)

- *Verify that Logical profile with in BAT-Controller WLC are available in BAT-Controller Virtual.*

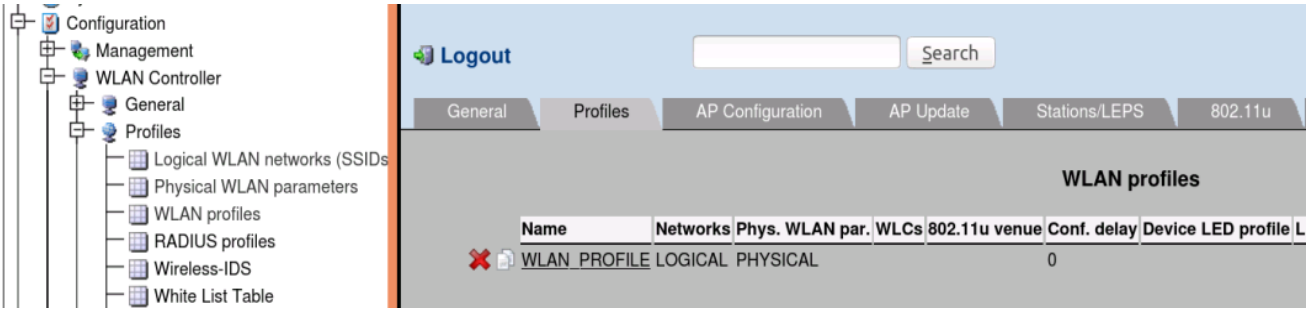
Verify Physical profile on BAT-Controller Virtual



Configuration > WLAN-Controller > Physical WLAN parameters

- *Verify that Physical profile with in BAT-Controller WLC are available in BAT-Controller Virtual.*

Verify WLAN profile on BAT-Controller Virtual



Configuration > WLAN Controller > WLAN profiles

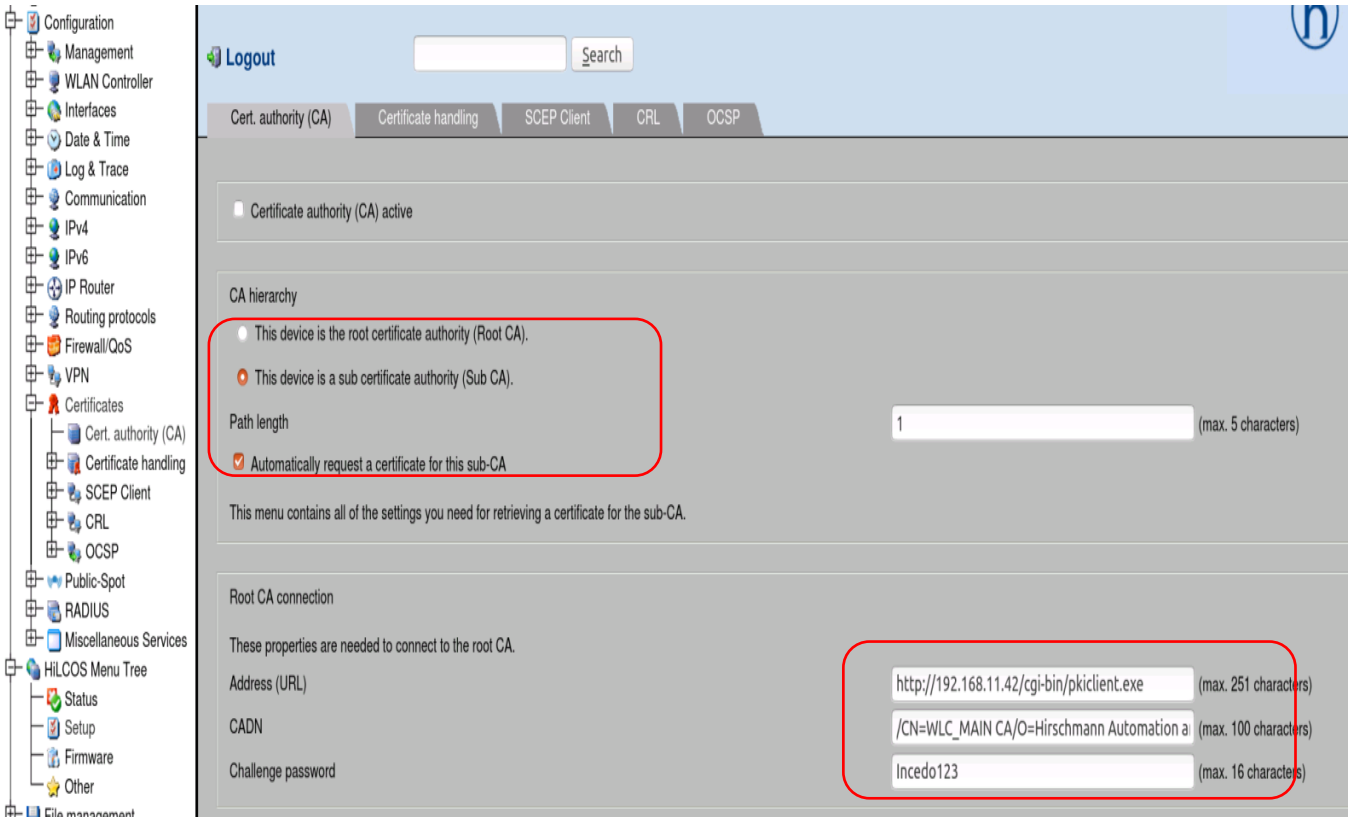
- *Verify that WLAN profile with in BAT-Controller WLC are available in BAT-Controller Virtual.*

6. Configure 3rd BAT-Controller Virtual in existing Config Sync set-up

Here we configure the config synchro function between the controllers to synchronise the part of the configuration related to the profiles and the managed Aps in between 2 BAT-Controller Virtual and Bat-Controller WLC on the existing set-up.

BAT-Controller WLC with IP address: 192.168.11.42/24
BAT-Controller Virtual with IP address: 192.168.11.43/24
BAT-Controller Virtual2 with IP address: 192.168.11.44/24

Configure BAT-Controller Virtual2 as Sub CA



Configuration > Certificates > Cert. authority (CA)

- *In the CA hierarchy menu, select "This device is a sub certificate authority (Sub CA). Check the box "Automatically request a certificate for this sub-CA".*
- *For Root CA connections enter: http://[IP address of the Root CA]/cgi-bin/pkiclient.exe In our example: http://192.168.11.42/cgi-bin/pkiclient.exe*
- *For CADN, enter the name of the CA (as configure on BAT-Controller WLC at the step " Configure CA/RA certificates in BAT-Controller WLC") .In our example: /CN=WLC_MAIN CA/O=Hirschmann Automation and Control GmbH /C=DE*

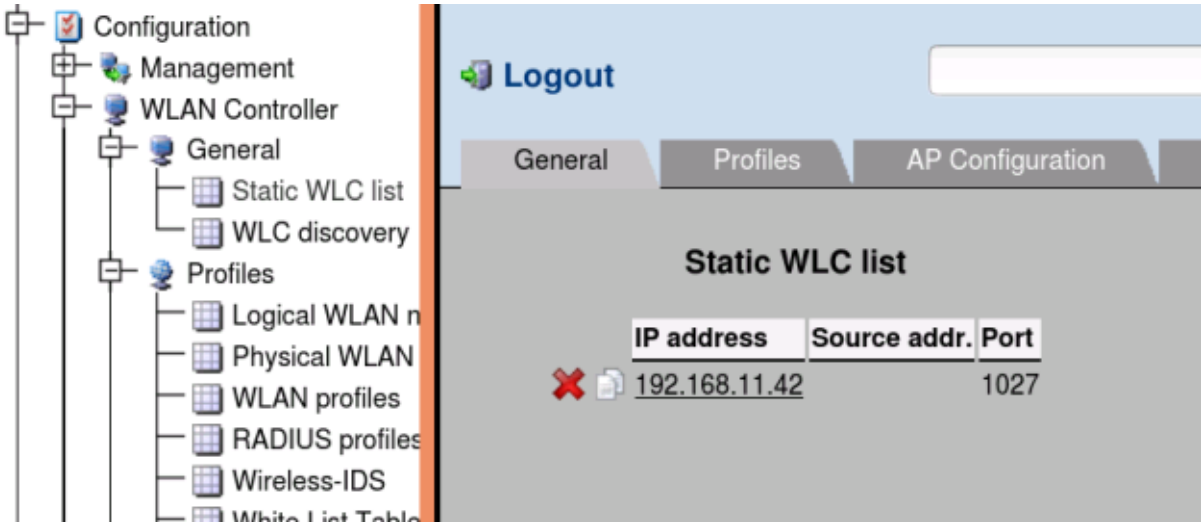
➢ *Enter the password configured on the BAT-Controller WLC at the step "Set a challenge password on BAT-Controller WLC". In our example : "Incedo123"*

Configure CA/RA certificates in BAT-Controller Virtual2

Configuration > Certificates > Cert. authority (CA)

➢ *In the menu CA/RA certificates, customize the name of the certificate authority (CA) and the registration authority (RA). In our example for the CA: /CN=WLC_SUB2 CA/O=Hirschmann Automation and Control GmbH /C=DE For the RA: /CN=WLC_SUB2 RA/O=Hirschmann Automation and Control GmbH /C=DE. Apply the settings.*

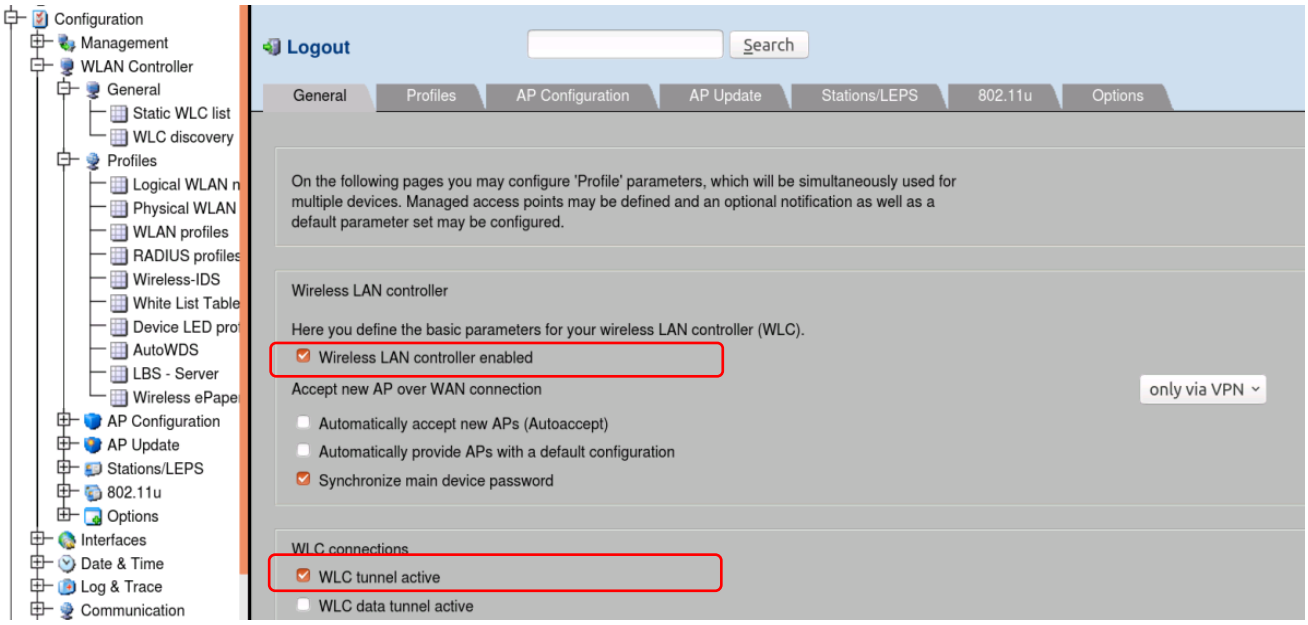
Enter IP address of BAT-Controller WLC (Root CA) in the static WLC list of BAT-Control Virtual2



Configuration > WLAN Controller > General > Static WLC list

➢ *On the BAT_Controller Virtual2 enter the IP address of BAT-Controller WLC which is active as root CA : 192.168.11.42*
➢ *The port in use per default is 1027*

Enable the clustering on the BAT-Controller Virtual2



Configuration > WLAN Controller > General

- *Check the box "Wireless LAN controller enabled"*
- *Check the box "WLC tunnel active".*

We must now make sure that the WLCs find each other, there are 3 options:

- *If they are in the same LAN, "WLC discovery" can be used.*
- *If they are in different LANs, Check additionally "WLC data tunnel active" and enter them statically in "Static WLC list..."*
- *If they are in the same LAN but you prefer to enter them statically, let the box "WLC data tunnel active" unchecked and enter them statically in "Static WLC list..."*

Apply the settings.

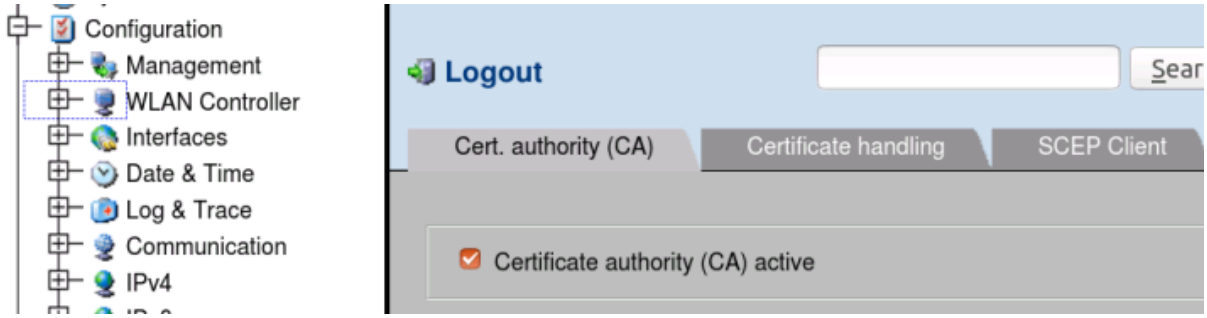
Verify the controller state at BAT-Controller Virtual2

```
admin@BAT-VROUTER_000000:/
> ls /Status/WLAN-Management/

AP-Configuration                MENU:
AP-Status                       MENU:
Central-Firmware-Management     MENU:
Client-Steering                 MENU:
WLC-Cluster                     MENU:
Wireless-IDS                    MENU:
AP-Connections                  TABINFO: 128 x [Job,AP-LAN-MAC,IP-Address,..]
Failover-AP-Data-Connections    TABINFO: 5 x [IP-Address,MAC-Address,Port,..]
Net-Count                       TABINFO: 0+ x [Name,SSID,Num-Radios,..]
Networks                        TABINFO: 0+ x [BSSID,AP-LAN-MAC,AP-WLAN-MAC,..]
PMK-Caching                     TABINFO: 0 x [Supplicant,SSID,..]
Scan-Results                    TABINFO: 0+ x [BSSID,AP-Name,IP-Address,..]
Seen-Clients                    TABINFO: 0+ x [Client-MAC,AP-LAN-MAC,AP-Name,..]
Station-Table                   TABINFO: 0+ x [Client-MAC,AP-WLAN-MAC,..]
WLC-Bridge-Interfaces           TABINFO: 33 x [Bridge-Interface,..]
Client-Count                    INFO:    0
Client-Count-24GHz              INFO:    0
Client-Count-5GHz               INFO:    0
Connected-expected-AP           INFO:    0
Connected-managed-AP            INFO:    0
Connected-new-AP                INFO:    0
Controller-State                INFO:    Ready
Expected-AP                     INFO:    0
```

Connect per telnet and verify the controller state at path:

ls /Status/WLAN-Management

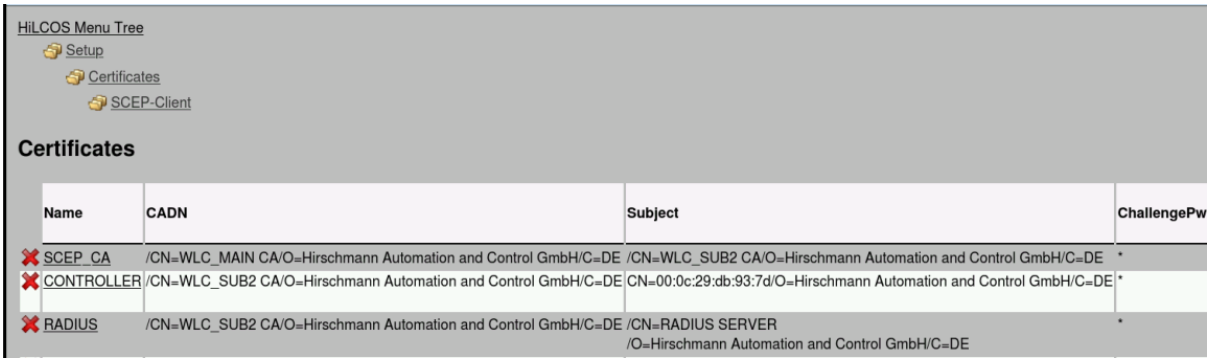
Enable the box "Certificates authority (CA) active on BAT-Controller Virtual2



Configuration > Certificates > Cert. authority (CA)

- *Enable Certificate authority (CA) active at BAT-Controller Virtual.*

Verify that certificate has been created for BAT-Controller Virtual2

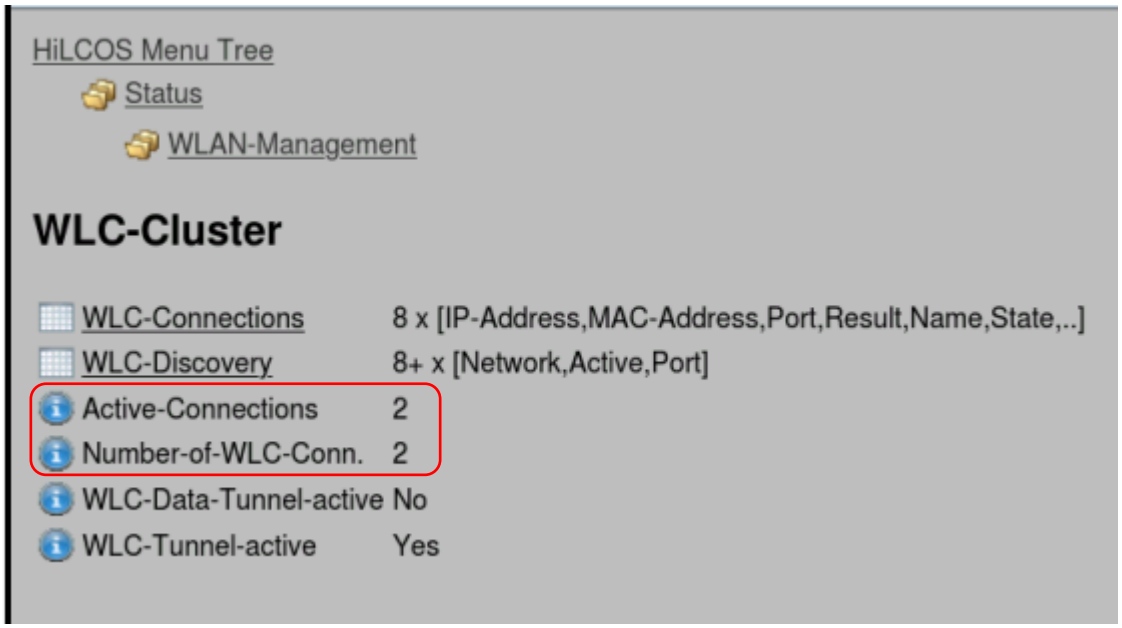



```
admin@BAT-VROUTER_000000:/
> show ca cert
File /flash/security/scepca/scep_ca_pkcs12_int was read successfully
Stack consists of 2 certificates, showing only CA certificates

Certificate 1:

Certificate:
    Data:
        Version: 3 (0x2)
        Serial Number: 2080779 (0x1fc00b)
    Signature Algorithm: sha256WithRSAEncryption
        Issuer: CN=WLC_MAIN CA,O=Hirschmann Automation and Control GmbH,C=DE
        Validity
            Not Before: Nov 20 15:50:37 2020 GMT
            Not After : Nov 18 15:50:37 2030 GMT
        Subject: CN=WLC_MAIN CA,O=Hirschmann Automation and Control GmbH,C=DE
        Subject Public Key Info:
            Public Key Algorithm: rsaEncryption

Certificate:
    Data:
        Version: 3 (0x2)
        Serial Number: 2080786 (0x1fc012)
    Signature Algorithm: sha256WithRSAEncryption
        Issuer: CN=WLC_MAIN CA,O=Hirschmann Automation and Control GmbH,C=DE
        Validity
            Not Before: Nov 24 00:28:20 2020 GMT
            Not After : Nov 18 15:50:37 2030 GMT
        Subject: CN=WLC_SUB2 CA,O=Hirschmann Automation and Control GmbH,C=DE
        Subject Public Key Info:
            Public Key Algorithm: rsaEncryption
                Public-Key: (2048 bit)
```

At Path : HiLCOS Menu Tree > Setup > Certificates > SCEP-Client > Certificates

And by connecting telnet session and type the command: show ca cert.2 certificates will be displayed. The first one is the certificate of the root CA and the second one is the certificate of the sub-CA.

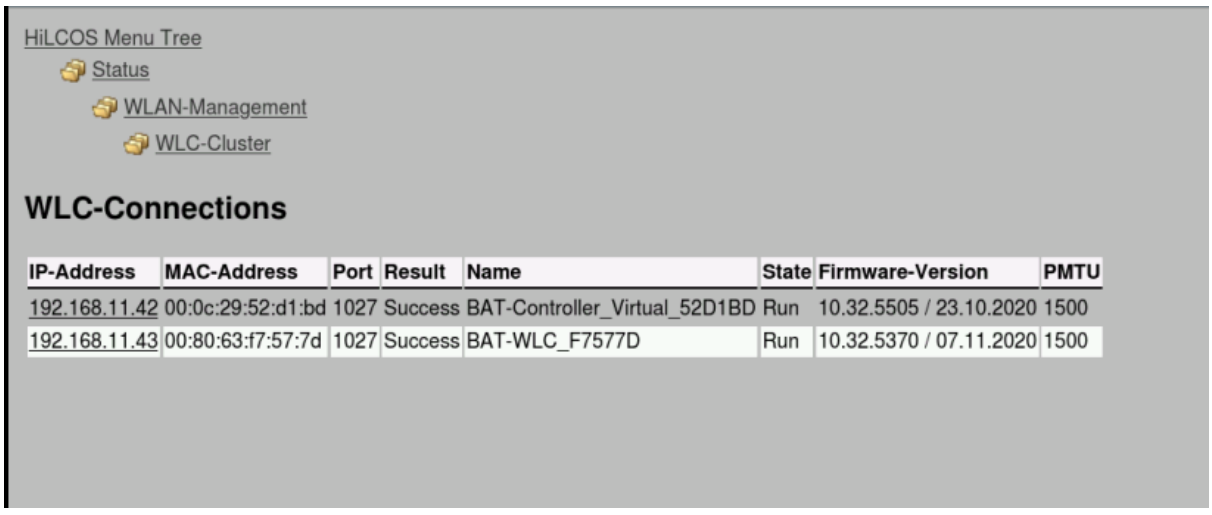
Verify that the cluster is active



At Path : HiLCOS Menu Tree > Status > WLAN Management > WLC-Cluster.

Check number of active wlc-connections.

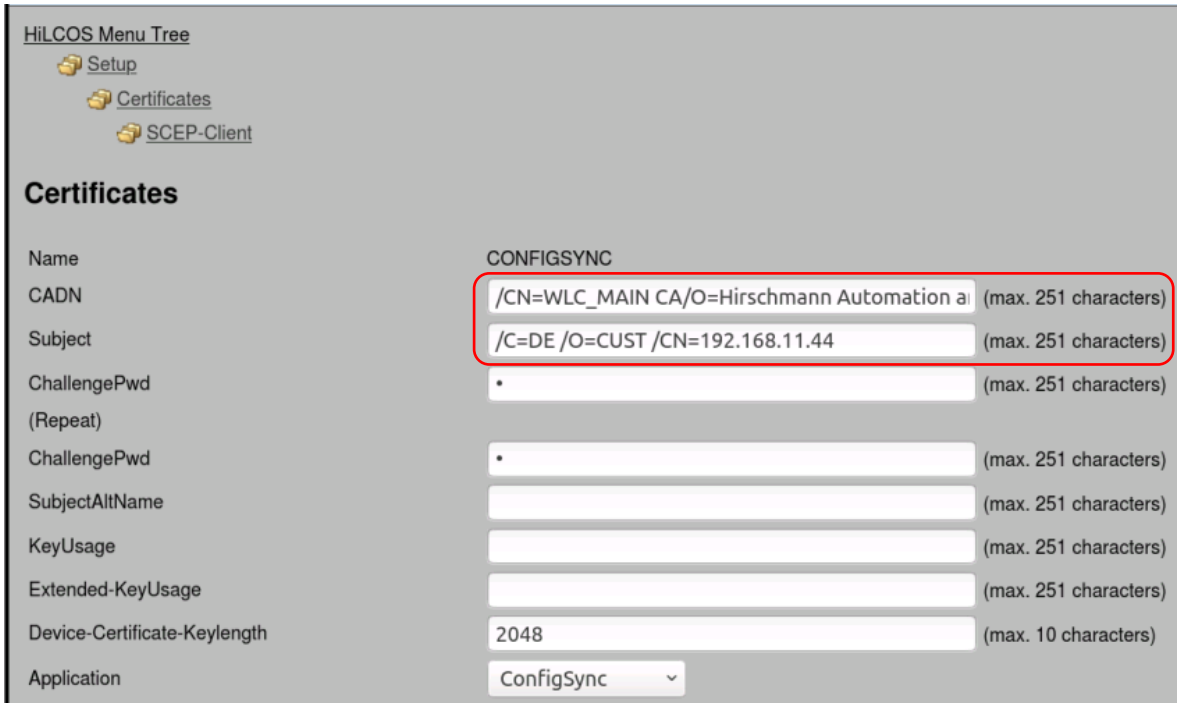
Verify that the cluster is UP and in running state



At path: HiLCOS Menu Tree > Status > WLAN Management > WLC-Cluster > WLC-Connections.

Check controllers recognise the other members of the cluster.

Generate ConfigSync certificate on BAT-Controller Virtual2



HiLCOS Menu Tree > Setup > Certificates > SCEP-Client > Certificates > Add

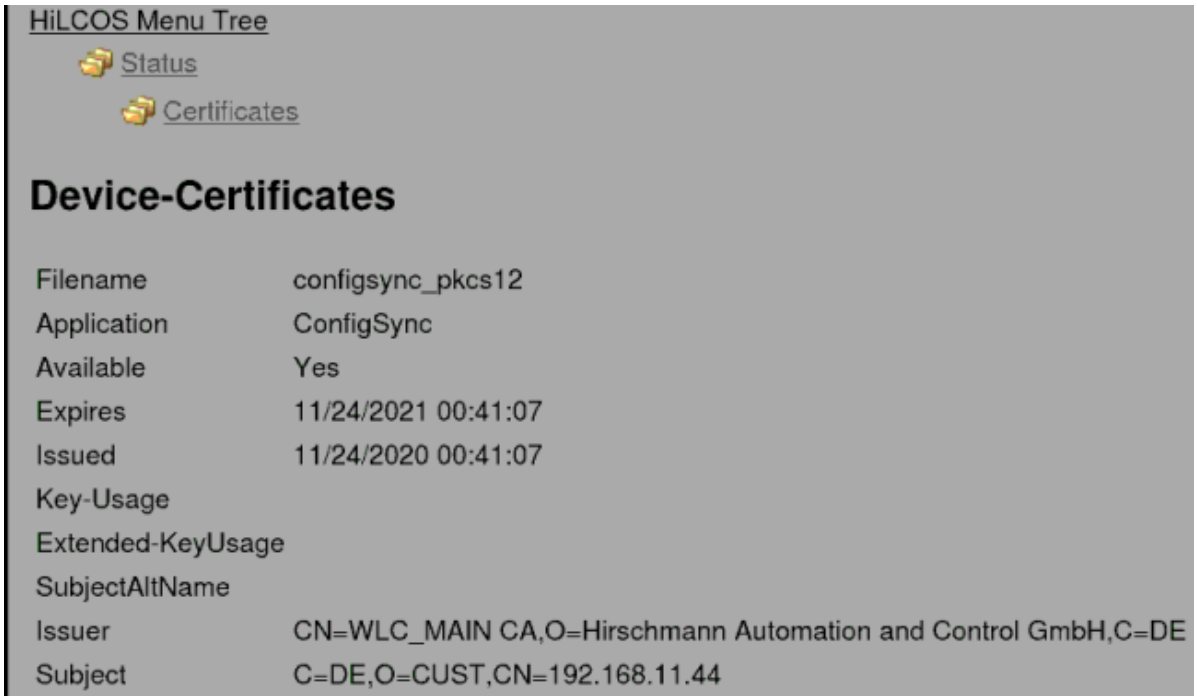
Name: CONFIGSYNC (but give the most relevant name for you)
CADN: Distinguished Name configured as Certification authority.
In our example: /CN=WLC_MAIN RA/O=Hirschmann Automation and Control GmbH /C=DE
Subject: Fullfill the line following our detailed example:

- */C: country (in our example, DE for Deutschland)*
- */ST: state*
- */L: locality*
- */O: organisation (in our example "CUST")*
- */OU: organisation unit*
- */CN= Common Name. Enter the vWLC IP address (in our example 192.168.11.42)*

The whole subject is in our example:
/C=DE /O=CUST /CN=192.168.11.44
ChallengePwd: Enter the challenge password configured in "General Challenge Password" on the root CA (described while creating cluster i.e Incedo123)
Device-Certificate-Keylength: 2048

Apply the settings.

Verify Config Sync certificate on BAT-Controller Virtual2

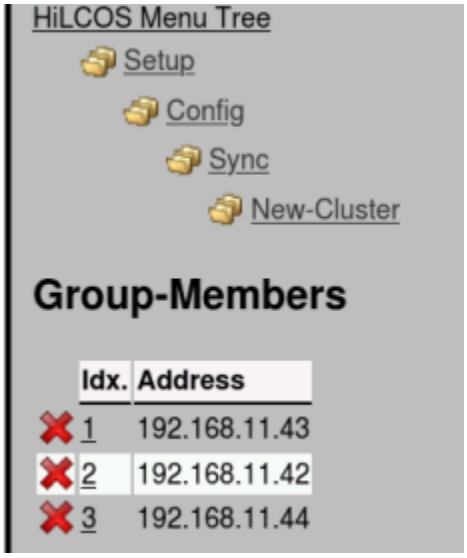


HiLCOS Menu Tree > Status > Certificates > Device certificates

Application: "ConfigSync"

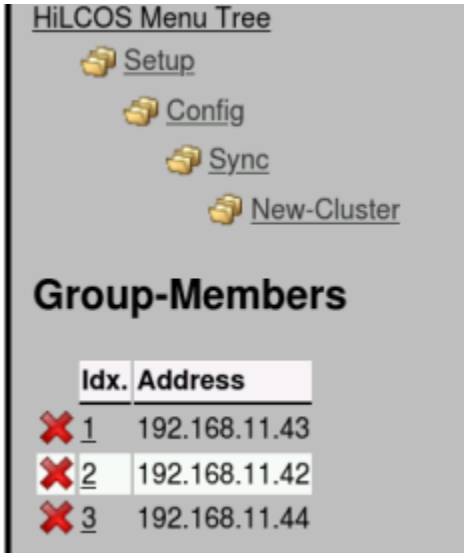
- *A Certificate for the application "ConfigSyc" must be available.*

Configure the cluster group members in BAT-Controller WLC



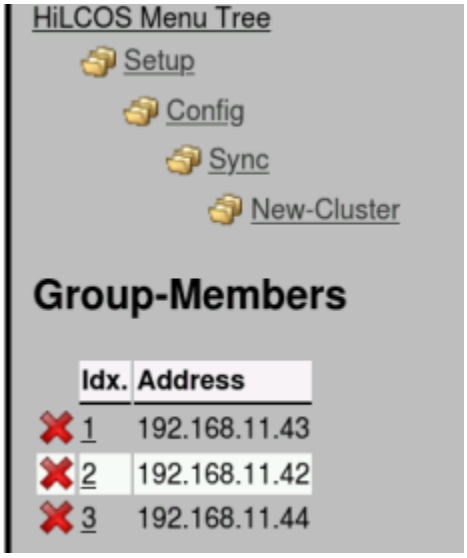
Path: HiLCOS Menu Tree > Setup > Config > Sync > New-Cluster > Group-Members

Configure the cluster group members in BAT-Controller Virtual



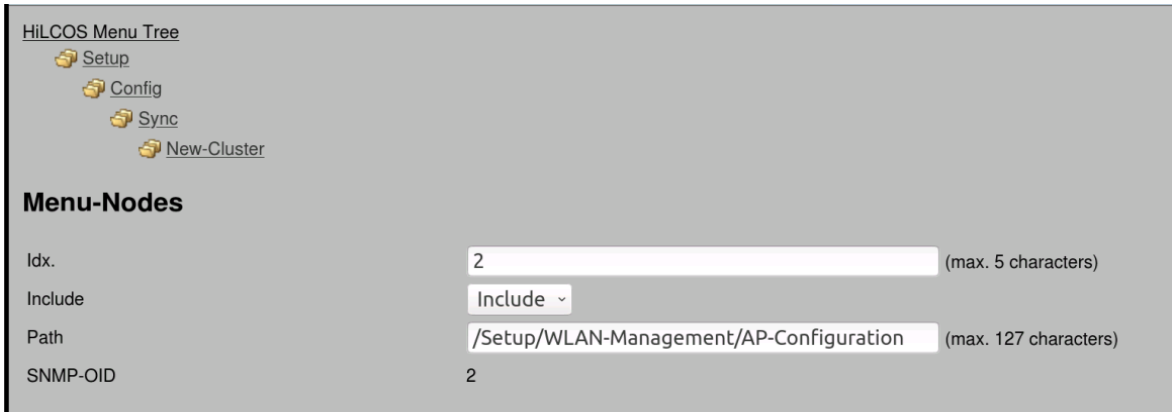
Path: HiLCOS Menu Tree > Setup > Config > Sync > New-Cluster > Group-Members

Configure the cluster group members in BAT-Controller Virtual2



Path: HiLCOS Menu Tree > Setup > Config > Sync > New-Cluster > Group-Members

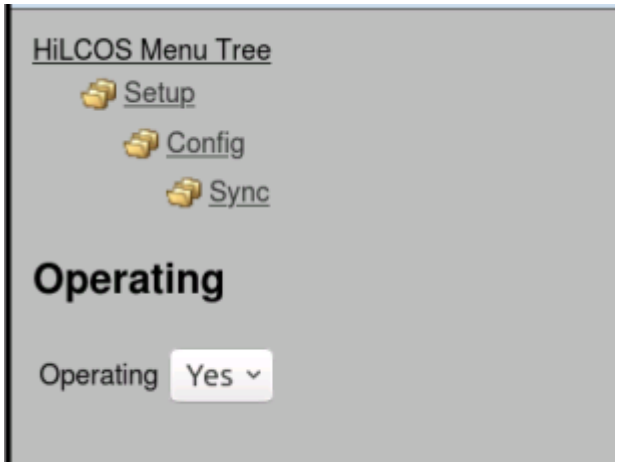
Check the configuration parts to be synchronised with BAT-Controllers in BAT-Controller WLC



HiLCOS Menu Tree > Setup > Config > Sync > New-Cluster > Menu-Nodes

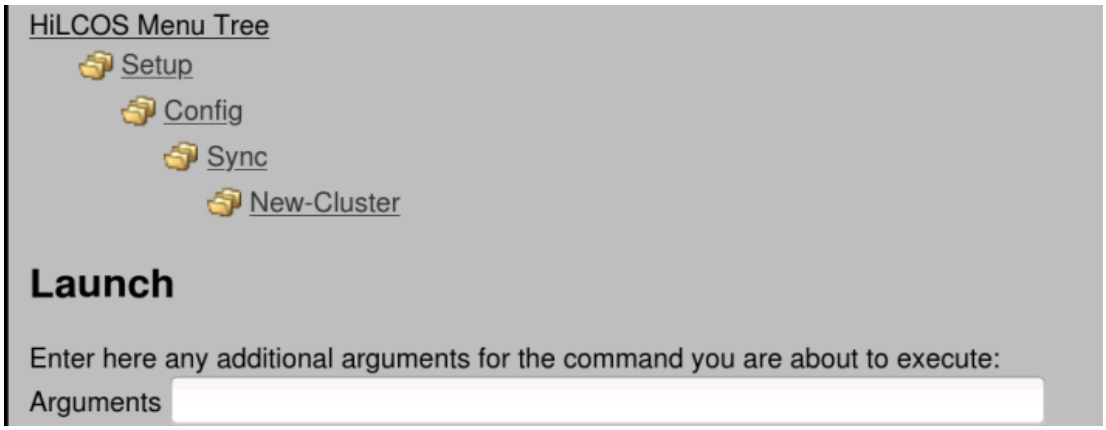
This steps needs to verified in BAT-Controller Virtual, because non-availability of this will not synchronize the desired parameters.

Enable the Config Synchro function in BAT-Controller Virtual2



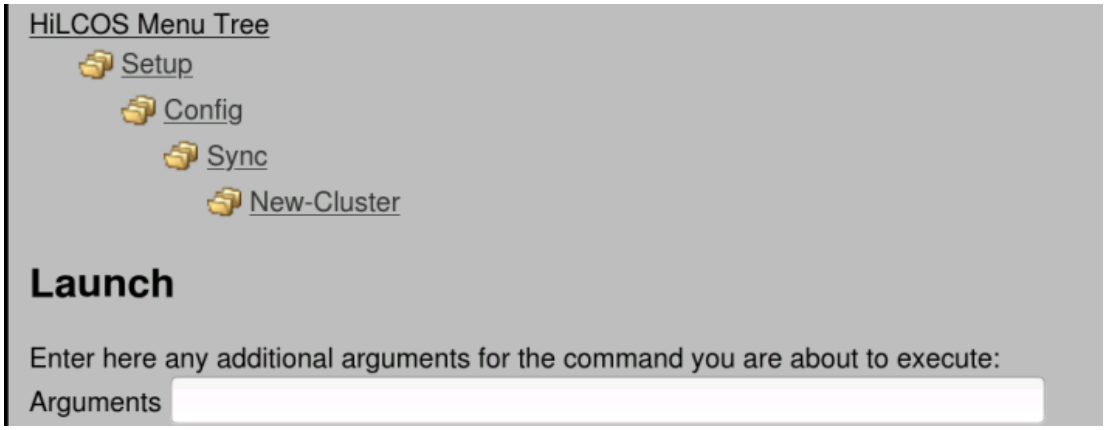
HiLCOS Menu Tree > Setup > Config > Sync > Operating
Select Yes

Launch the config Synchro on BAT-Controller WLC



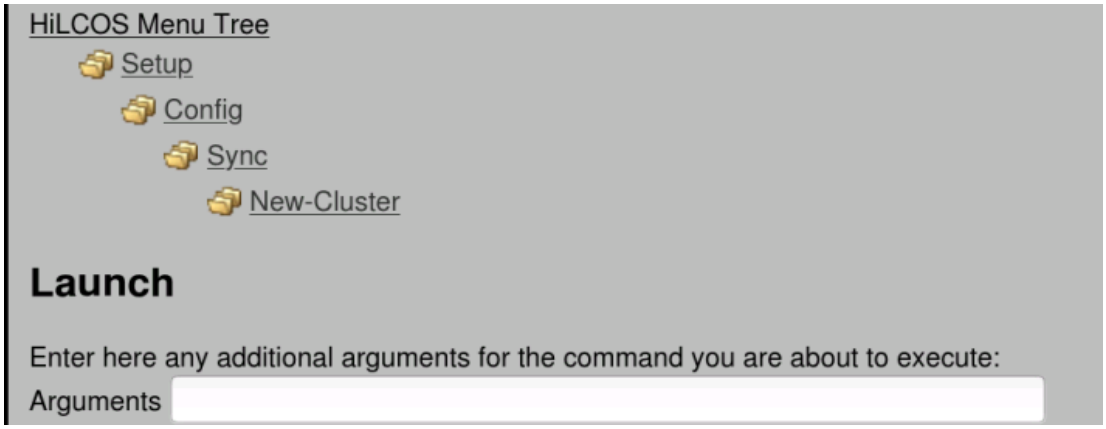
Path: HiLCOS Menu Tree > Setup > Config > Sync > New-Cluster > Launch
Select Execute (no arguments needed)

Launch the config Synchro on BAT-Controller Virtual



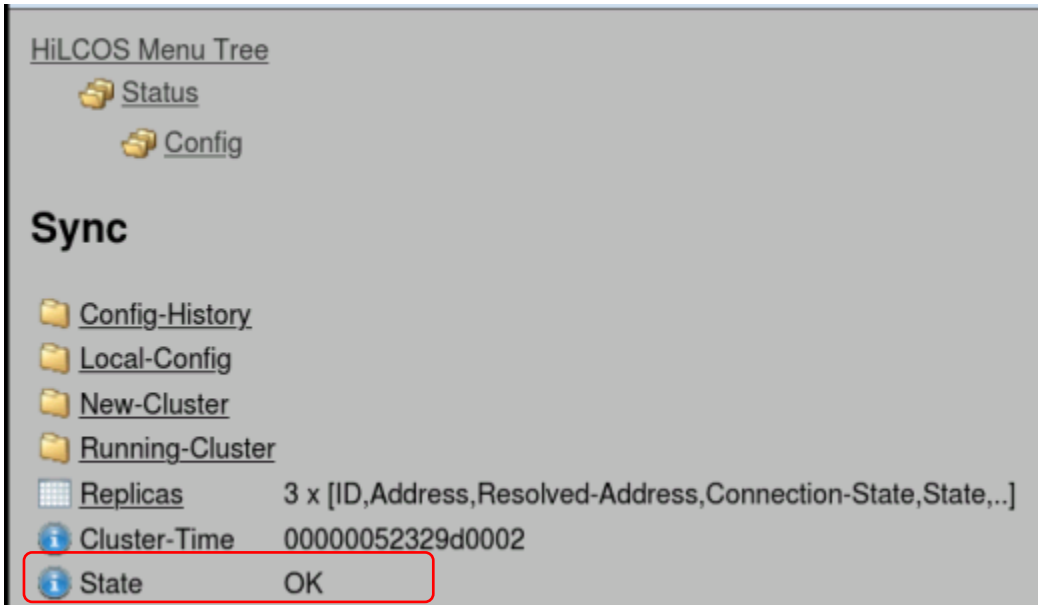
Path: HiLCOS Menu Tree > Setup > Config > Sync > New-Cluster > Launch
Select Execute (no arguments needed)

Launch the config Synchro on BAT-Controller Virtual2



Path: HiLCOS Menu Tree > Setup > Config > Sync > New-Cluster > Launch
Select Execute (no arguments needed)

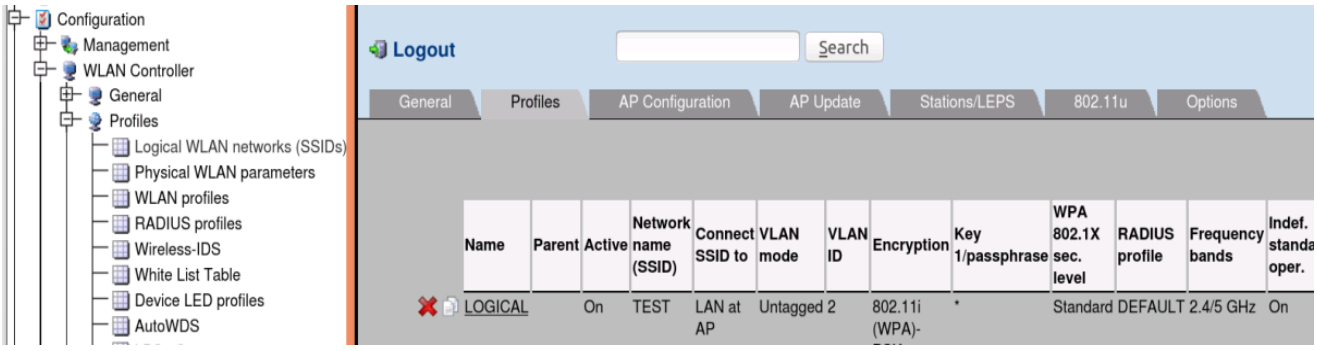
Check the config Sync Status on BAT-Controller Virtual2



HiLCOS Menu Tree > Status > Config > Sync

State must be OK
You can also check that all the settings in the path given have been synchronised between all the controllers.

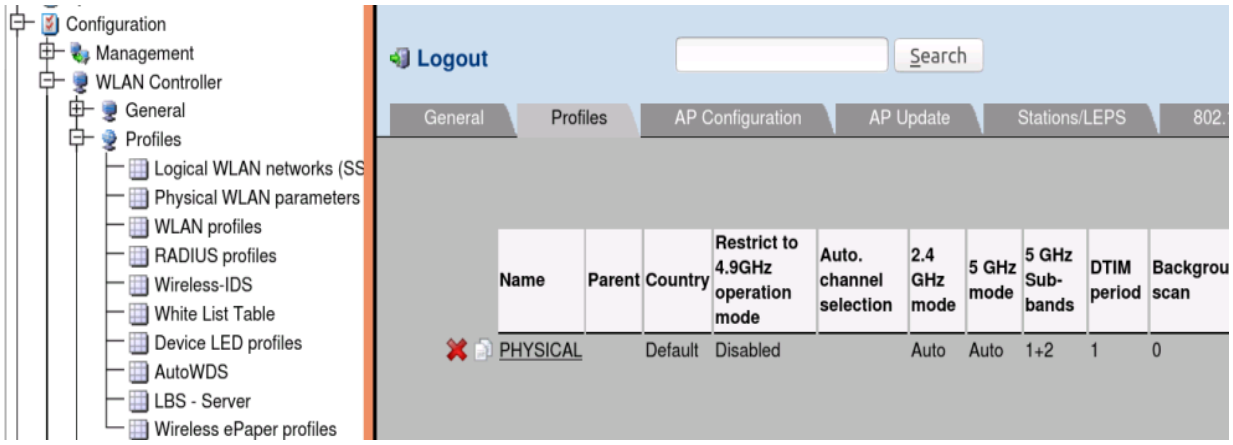
Verify Logical profile on BAT-Controller Virtual2



Configuration > WLAN Controller > Logical WLAN networks (SSIDs)

- *Verify that Logical profile with in BAT-Controller WLC are available in BAT-Controller Virtual2.*

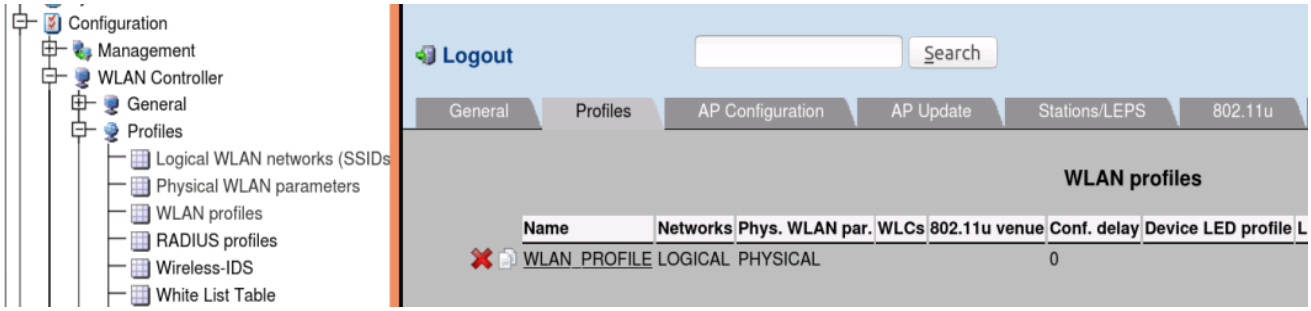
Verify Physical profile on BAT-Controller Virtual2



Configuration > WLAN-Controller > Physical WLAN parameters

- *Verify that Physical profile with in BAT-Controller WLC are available in BAT-Controller Virtual2.*

Verify WLAN profile on BAT-Controller Virtual2



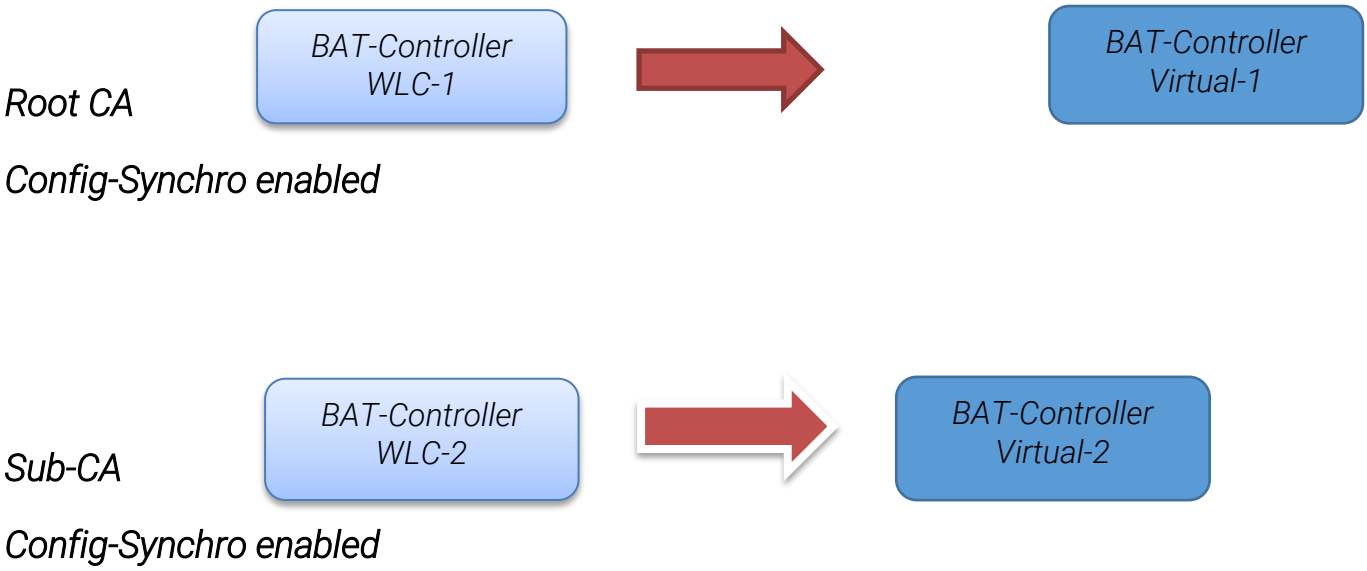
Configuration > WLAN Controller > WLAN profiles

- *Verify that WLAN profile with in BAT-Controller WLC are available in BAT-Controller Virtual2.*

7. Troubleshooting

- *Verify whether the time is being synchronized between the controllers.*
- *Verify the Challenge password is correct in all the controllers.*
- *Verify that Address (URL) in Root CA certificate menu is the IP address of the controller active as a root CA. For reference check at "Configure BAT-Controller Virtual as Sub CA"*
- *Verify that the controller state is in "Ready" state which can be verified at path: /Status/WLAN-Management.*
- *Verify the generated certificates on the controllers.*

8. How to migrate BAT-Controller WLC configurations to the BAT-Controller Virtual



In order to configure BAT-controller Virtual in a manner such that the configuration within BAT-Controller WLC resembles with the configuration in BAT-Controller Virtual, we have to follow few steps which are listed below:

- *Save configuration script of the BAT-Controller WLC-1 acting as a "Root CA" from the path: File management –-> Save Configuration script.*
- *Change IP-address of BAT-Controller WLC-1 whose configuration has been saved (such that in our example 192.168.11.42 is acting as root-ca we have to change its IP-address).*
- *Update the BAT-Controller Virtual-1 to the latest Firmware and reset the controller to Default Configuration.*
- *Upload downloaded configuration into the BAT-Controller Virtual-1 whom we want to act as "Root CA".(And now the BAT-Controller Virtual-1 can be accessed with the IP-address 192.168.11.42)*
- *Save configuration script of the BAT-Controller WLC-2 acting as a "SUB CA" from the path: File management –-> Save Configuration script.*
- *Change IP-address of BAT-Controller WLC-2 whose configuration has been saved (such that in our example 192.168.11.43 is acting as sub-ca).*
- *Update the BAT-Controller Virtual-2 for sub ca to the latest Firmware and reset the controller to Default Configuration.*
- *Upload downloaded configuration into the BAT-Controller Virtual-2 whom we want to act as "SUB CA".*
- *Then we have to launch from both the BAT-Controller Virtual acting as root-ca as well as sub ca at path: Setup -> Config –-> Sync –-> New-Cluster –-> Launch and then Select "Execute" without any argument.*

Note: After following above mentioned steps BAT-Controller Virtual can be replaced from the existing BAT-Controller WLC setup.

9. Test-Report

Cluster between BAT-Controller WLC and BAT-Controller Virtual

Configuration

1. *Update the controllers to the latest Firmware and reset the controllers to Default Configuration.*
2. *Synchronize the time between the controllers which can be synchronized at path: Extras > Set date and time.*
3. *Configure Root-CA and Sub-CA in controllers as mentioned in 1.3.1 and 1.3.4.*
4. *Configure CA/RA certificates in controllers as mentioned in 0 and 0 with the challenge password.*
5. *Enter IP address in static WLC list of BAT-Controller WLC in BAT-Controller Virtual and vice-versa as mentioned in 0 and 0.*
6. *Enable clustering on both the controllers as mentioned in 0 and 0.*
7. *Enable the Certificates authority (CA) active on both controllers as mentioned in 00and 0.*

Expected Result

1. *Verify the controller state is in ready state.*
2. *Verify that the correct certificates are being created.*
3. *Verify that the cluster is active and in running state.*

Observed Result

1. *Controller state is in ready state as mentioned in 0 and 0.*
2. *Correct certificates are being created as mentioned in 0 and 0.*
3. *Cluster is active and in running state as mentioned in 1.3.16 and 1.3.17*

Config Synchro function between BAT-Controller WLC and BAT-Controller Virtual.

Configuration

1. *Generate config sync certificate on both controllers as mentioned in 0 and 0.*
2. *Configure the cluster group member on both controllers as mentioned in 0 and 0.*
3. *Configure the configuration part to be synchronized with the controllers in root-ca as mentioned in 0 and 0.*
4. *Enable the config synchro function on both controllers as mentioned in 0 and 0.*
5. *Launch the config synchro on both the controllers as mentioned in 0 and 0.*

Expected Result

1. *ConfigSync certificate are being created on both controllers.*
2. *Config sync state is OK.*

Observed Result

1. *Config Sync certificates are being created on both controllers at path :HiLCOS Menu Tree > Status > Certificates > Device certificates as mentioned in 0 and 0.*
2. *Config sync state is OK at path: HiLCOS Menu Tree > Status > Config > Sync as mentioned in 0 and 0.*

Configure WLAN profile and verify Config Synchro function between BAT-Controller WLC and BAT-Controller Virtual.

Configuration part

1. *Create logical profile in BAT-Controller WLC at path: Configuration > WLAN Controller > Logical WLAN networks (SSIDs) as mentioned in 0.*
2. *Create physical profile in BAT-Controller WLC at path: Configuration > WLAN-Controller > Physical WLAN parameters as mentioned in 0.*
3. *Create WLAN profile in BAT-Controller WLC at path: Configuration > WLAN Controller > WLAN profiles as mentioned in 0.*

Expected Result

1. *Same profiles get created on BAT-Controller Virtual.*

Observed Result

1. *Logical profile, Physical profile and WLAN profile are in BAT-Controller Virtual as mentioned in 0, 0 and 0*

Configure 3rd Controller in the existing config sync set-up

Configuration

1. *Update the controller to the latest Firmware and reset the BAT-Controller Virtual2 to Default Configuration.*
2. *Synchronize the time between the controllers which can be synchronized at path: Extras > Set date and time.*
3. *Configure Sub-CA in BAT-Controller Virtual2 as mentioned in 0.*
4. *Configure CA/RA certificates in controller as mentioned in 0 with the challenge password.*
5. *Enter IP address in static WLC list of BAT-Controller WLC in BAT-Controller Virtual2 as mentioned in 0.*
6. *Enable clustering on the BAT-Controller Virtual2 as mentioned in 0.*
7. *Enable the Certificates authority (CA) active on BAT-Controller Virtual2 as mentioned in 0.*
8. *Generate config sync certificate on BAT-Controller Virtual2 as mentioned in 0.*
9. *Configure the cluster group member on all the controllers as mentioned in 0,0and 0.*
10. *Check the configuration part to be synchronized with the controllers in root-ca as mentioned in 0.*
11. *Enable the config synchro function on BAT-Controller Virtual2 as mentioned in 0.*
12. *Launch the config synchro on all the controllers as mentioned in 0, 0and 0*

Expected Result

1. *Correct certificates are being created which can make cluster creation feasible.*
2. *Cluster is active and in running state.*
3. *Config sync status is OK.*
4. *Logical profile, Physical profile and WLAN profile are synchronized in between controllers.*

Observed Result

1. *Correct certificates are being created which makes cluster feasible as mentioned in 0.*
5. *Cluster is active and in running state as mentioned in 0.*
6. *Config sync status is 'OK' at path: HiLCOS Menu Tree > Status > Config > Sync as mentioned in 0.*
7. *Logical profile, Physical profile and WLAN profile are received in BAT-controller Virtual2 which means config sync as mentioned in 0to 0.*