CX ◯ ENGINE

INSTRUCTION MANUAL

FOR CX-ENGINE VERSION 1.2.1

Content

Changelog

Version 1.2.1
- Note on the installation of HP Aruba 2530 switches
- Note on the firmware version of the devices

Version 1.2

New
- New UI appearance
- SSH as new communication adapter
- HTTP as new communication adapter
- Desired communication adapter can be selected in the device
- Device configurations can now be compared and queried directly in the device menu in the inventory
- Function to query a user input during rollout
- Function to use inventory variables during roll-out
- 'Network switch' device type
    - Add 1, 2 or 4 VLANs at the same time
    - Add 1, 2 or 4 ports at the same time
    - Select the created VLANs via drop-down menu
    - Port and VLAN IDs are automatically incremented
- New device type 'DMX node'
    - Supported devices
        - Swisson XND-8
- New device type 'DMX router'
    - Supported devices
        - Luminex LumiCore

Product description

These operating instructions will guide you through the functions and features of the CX-Engine. It explains the functionalities of the software, the application and the configuration.

What is the CX-Engine?

The CX-Engine is a software product that is used to automatically configure devices in a network. As a central management interface, it is used to configure several devices from different manufacturers at the same time. This means that a setting is only defined once and can be applied to a wide variety of devices. The CX-Engine thus becomes a central component in the use of devices in a network. It is the engine that runs the network, so to speak, hence the name.

It divides devices into device types and summarises them in this way. For example, all devices of the type 'lighting console' or 'network switch' are considered together. The CX-Engine defines common properties of the device types and makes them available to the user (e.g. the SessionID or VLAN settings). This functionality offers the user the option of applying a setting to devices from several manufacturers. The settings can be applied to several devices at the same time. By creating an

inventory and defining presets, several devices can be assigned to a preset and configured simultaneously.

The inventory and the defined default settings as well as the mapping between them can be saved and downloaded in projects. This means that the CX Engine can be used in the office when preparing an event and the project can be uploaded again at the event and applied to the devices.

What can the CX-Engine be used for?

The CX-Engine is used to configure and manage devices that are operated together in a network. By creating the devices centrally in an inventory, you can keep track of the devices in a network and identify them more easily by giving them individual names. Created devices can be linked to individual default settings. This means that presets are applied uniformly to multiple devices. The created devices and presets can then be downloaded as a project, e.g. to use them again at the next event.

What hardware does the CX-Engine run on?

The software is operated on a device. This device is distributed by CX-Networks GmbH and can be purchased directly from the online shop. The hardware is available in two versions:

Small Form Factor variant

The small-form-factor device is ideal for carrying in a rucksack, tool case or suitcase due to its small design. The SFF device has two integrated network ports and a WLAN module.

Rack variant

The rack variant is suitable for installation in existing racks for integration into an existing ecosystem. Companies that already have a specific procedure for setting up their infrastructure can therefore integrate the CX-Engine very easily. The rack variant has an in-built WLAN module and four network ports.

The CX-Engine can also be installed on a laptop as an option. Please contact info@cx-networks.com for this application.

Application examples

Simultaneous configuration of multiple devices

If several devices are used at an event, all devices must be configured manually with the same setting. The CX-Engine can configure these devices simultaneously with the same setting. Creating the setting once and applying it at the same time saves a lot of time.

Simultaneous configuration of devices from different manufacturers

If several devices from different manufacturers are used at an event, e.g. if network switches from Cisco and Netgear are used simultaneously, all devices must be configured manually with the same settings. Due to the differences between the manufacturers and the very individual interfaces, a technician must be trained and confident in each interface. By categorising the devices into device types, it is no longer necessary to differentiate between manufacturers. The CX-Engine can configure these devices simultaneously with the same setting. No technician with trained knowledge of both manufacturers is required. Creating the setting once and applying it at the same time saves a lot of time.

Preparation in the warehouse

The CX-Engine can be used in the warehouse to configure the network and its devices. The devices are created in the CX-Engine and provided with the necessary default settings. After preparation, the project file is downloaded and saved. When the event is set up, the system is thus prepared and can be easily customised on site using the CX-Engine. The clear arrangement of the settings and the display of which setting is applied to which device gives the user quick feedback on the current status of their devices.

Quick configuration when setting up an event

The ability to define default settings in the CX-Engine and roll them out to several devices at the same time saves a lot of time. When setting up an event, for example, each network switch no longer needs to be configured individually; instead, all network switches can be configured at the same time. It is

very easy to customise the settings. If, for example, ports 1-4 are required in the 'Sound' VLAN, a default setting is created and rolled out to the affected devices.

Maintenance and care in the warehouse

The CX-Engine can be used in the warehouse to configure the network and its devices.

When devices go into or come out of hire, they can be provided with a defined default setting. Thanks to a simple visual display and direct feedback, this is also possible for untrained personnel.

Supported device types, manufacturers and devices
The CX-Engine supports the following device types, manufacturers and devices:

Networkswitches

Cisco
- SG250 (Firmware Version: 2.5.9.54)
- SG300 (Firmware Version: 1.4.7.6)
- SG350 (Firmware Version: 2.5.9.4)
- SG500
- CBS350 (Firmware Version: 3.2.0.84)

Netgear
- M4250 (Firmware Version: 13.0.5.10)

Hewlett Packard Enterprise / Aruba
- proCurve 2530
- Aruba 2530 (Firmware Version #YA.16.04.0008, #YA.16.11.0024)

DMX-Nodes

Swisson
- XND-8

DMX-Router

Luminex
- LumiCore

Technical data

Small-Form-Factor UNO-2271G V2

General	
Certificates	CE, FCC, UL, CCC, BSMI
Dimensions (W x D x H)	100 x 70 x 30 mm
Weight (W x D x H)	0,5kg
Housing	Aluminum
Electronics	
Power supply	10 ~ 30V$_{DC}$
Power consumption	12W (typical), 24W(maximal)
Hardware	
LAN-Ports	2x RJ45 Port 10/100/1000 Mbps IEEE 802.3u **Port A** Static IP: 192.168.250.250/24 **Port B** Dynamic IP (Can be set via the web interface) Standard address: 10.1.12.100/24
WLAN	SSID: cxengine Password: cxengine
Environment	
Operating temperature	0 ~ 50°C @ 5 - 85% relative humidity at 0.7 m/s
Storage temperature	
Relative humidity	-40 - 85°C
IP classification	10 - 95% @ 40°C, non-condensing
Shock protection	IP30
Vibration protection	Operating, IEC 60068-2-27, 50G, half sine, 11 ms

Note: The USB ports and the HDMI port are intended for maintenance purposes and have no functionality.

The information given is taken from the original data sheet and is updated regularly. For exact details, please visit the website of the manufacturer Advantech.

Further information can be found on the Advantech website. The original data sheet can be downloaded here:

https://advdownload.advantech.com/productfile/PIS/UNO-2271G%20V2/file/UNO-2271G-V2_DS(042623)20230426111044.pdf

Rack variant: RA3558-4-6-F

General information	
Certificates	CE, FCC, UL, CCC, BSMI
Dimensions (W x D x H)	220 x 160 x 44 mm
Weight (W x D x H)	? kg
Electronics	
Power supply	12 VDC
Power consumption	36W
Hardware	
LAN ports	4x RJ45 port 10/100/1000 Mbps IEEE 802.3u
WLAN	2x SFP+
Environment	Port A
Operating temperature	Static IP: 192.168.250.250/24
Relative humidity	
IP classification	Port B
Shock protection	Dynamic IP (can be set via web interface)
Vibration protection	Standard address: 10.1.12.100/24

Note: The USB ports, the console RJ45 port and the HDMI port are intended for maintenance purposes and have no functionality.

The information provided is taken from the original data sheet and is updated regularly. For exact details, please visit the website of the manufacturer Thomas-Krenn.

Further information can be found on the Thomas-Krenn website. The original data sheet can be downloaded here:
https://www.thomas-krenn.com/redx/tools/mb_download.php/ct.ZIAoXw/sst.1/mid.y70bd968547691564/RA3558-4-6-F_datasheet.pdf

IP addresses

In both versions, the CX Engine has different IP addresses via which it communicates with the network and via which the web interface can be visited. These are listed below:

SFF variant

LAN-Ports	2x RJ45 port 10/100/1000 Mbps IEEE 802.3u **Port A** Static IP: 192.168.250.250/24 **Port B** Dynamic IP (can be set via web interface) Default address: 10.1.12.100/24
WLAN	SSID: cxengine Password: cxengine Static IP: 192.168.255.254 WLAN contains a DHCP server

Rack variant

LAN-Ports	4x RJ45 port 10/100/1000 Mbps IEEE 802.3u 2x SFP+ **Port A** Static IP: 192.168.250.250/24 **Port B** Dynamic IP (can be set via web interface) Standard address: 10.1.12.100/24 Port C and Port D Not used
WLAN	SSID: cxengine Password: cxengine Static IP: 192.168.255.254 WLAN contains a DHCP server

Precautionary measures and safety instructions

It is recommended to use the CX-Engine in a controlled environment.

Use before events

If the CX-Engine is used before an event, e.g. when planning or setting up the event, the following instructions should be observed:

- Only devices that will be used at the event should be created in the inventory. A faulty roll-out process due to the inaccessibility of devices can lead to confusion when troubleshooting.

Use during events

It is not recommended to use the CX-Engine during an event. If the CX-Engine is used to make settings during operation, these settings should be created in a separate preset. When rolling out, only the affected devices should be assigned.

After use

The following must be observed after using the CX-Engine:

- The SFF version of the CX-Engine becomes very warm during operation. When dismantling the CX-Engine, care should be taken to ensure that the housing acts as a heat sink.

Product descriptions

The CX-Engine is a software product developed and distributed by CX-Networks GmbH. It enables centralised, automated configuration and management of devices in a network. With its ability to simultaneously configure multiple devices from different manufacturers, the CX-Engine offers an efficient solution for controlling network infrastructures.

The CX-Engine acts as a kind of engine for the network by categorising devices by type and defining common settings such as SessionID or VLAN. These can be applied to devices from different manufacturers, ensuring standardised configurations across the entire network. In addition, users can create an inventory and define presets that can be applied to multiple devices simultaneously. These presets can be saved as a project and downloaded for future use.

The CX-Engine is operated on specific hardware, which is available in two variants: a small form factor variant for mobile use and a rack variant for integration into existing infrastructures. Both variants have integrated network ports and a WLAN module.

Using the CX-Engine saves time and resources by creating devices and settings in advance. With the ability to download and save projects, they can easily upload and apply presets at the event. At the same time, the CX-Engine provides a centralised overview and allows users to name their devices individually and identify them more easily.

The application area of the CX-Engine extends beyond the event area. In the warehouse, the network and devices can be configured with the software before they are sent to the event. In addition, the CX-Engine can be used during maintenance and servicing to provide devices with defined standard settings when they go into or come out of hire. With visual representations and direct feedback, this task is easy to handle even for untrained personnel.

Overall, the CX-Engine is a powerful solution for overcoming the challenges of network management and configuration by providing an efficient, customisable and user-friendly platform.

Installation

After receiving the CX-Engine, individual components must be prepared in order to put the CX-Engine into operation.

SFF variant

Power supply

The SFF version is supplied with an external power supply unit. The supplied 2-pin terminal block plug must be fitted to the power supply unit cable before the CX-Engine can be supplied with power. The black wire of the open cable is fitted to the negative side and the white wire to the positive side of the plug. The 2-pin terminal block can be fixed to the CX-Engine using the screws inside the connector.

ATTENTION: It is recommended to fix the plug to the CX-Engine at all times during operation to prevent the plug from slipping out and thus interrupting the power supply. If the plug slips out during operation, sparks and arcing may occur.

LEDs

The SFF version has three LEDs on the back of the device. The LEDs are labelled 'PWR', 'RUN' and 'RST'. The PWR LED has the following statuses:

- Yellow: Power supply is present but the CX-Engine is switched off
- Green: The CX-Engine is switched on

WLAN

Both versions of the CX-Engine have a WLAN module. The WLAN module is used to visit the web interface of the CX-Engine. The WLAN can also be used to access the connected networks of the CX-Engine.

The following WLAN signal is emitted:

SSID: cxengine
Password: cxengine

The WLAN has a built-in DHCP server that assigns the addresses of individual clients. The CX-Engine has the **IP address 192.168.255.254** in the WLAN, which can be used to access the web interface.

The CX-Engine sets up a NAT network from the WLAN to the connected networks. This means that the CX-Engine can also be used as an access point for the connected network.

Putting into operation

Accidents can occur during commissioning, maintenance, conversion, cleaning and dismantling due to electrical hazards. Switch off all connected peripheral devices before carrying out any work on the server system.

Danger from sharp corners and edges

Sharp corners and edges can occur on the sheet metal housing despite careful selection of the components. Plastic parts can also break during assembly or disassembly and leave sharp corners and edges. This can result in injuries.

- Be careful when working and avoid sharp corners and edges.
- Wear protective gloves, especially when working on the housing and when installing rack systems!

Hazard due to hot components

The installed processors and heat sinks can become very hot during operation. Burns can be the result.

- Wait until the system has cooled down completely before carrying out any further work!
- Take care when removing or installing hot-plug components to avoid coming into contact with hot components!

Prevention of damage due to unsuitable cooling and insufficient air flow

Ensure that the ventilation slots are not covered. Route all cables carefully to avoid disruption to the air flow and cooling problems. To ensure proper cooling and airflow behaviour, the system may only be operated with the housing covers in place.

Notes on the commissioning of end devices

Here you will find information on the commissioning of end devices that are to be configured by the CX-Engine.

HP Aruba 2530

This switch is supplied by the manufacturer without a standard IP and attempts to obtain an IP address via DHCP during initial commissioning. As soon as it has received this IP address, it can be configured via SSH and the website. When logging on to the respective interfaces for the first time, a user and a password must be assigned. These login details must match those in the CX-Engine. The IP address can be set via the console, via SSH and via the web interface.

Here is the standard configuration in firmware version 16.11.0024:

```
; J9776A Configuration Editor; Created on release #YA.16.11.0024
; Ver #14:41.44.00.04.19.02.13.98.82.34.61.18.28.f3.84.9c.63.ff.37.27:05
hostname "HP-2530-24G"
no telnet-server
no web-management
web-management ssl
snmp-server community "public"
vlan 1
   name "DEFAULT_VLAN"
   untagged 1-28
   ip address dhcp-bootp
exit
no tftp server
no dhcp config-file-update
no dhcp image-file-update
password manager
```

The IP address of the switch can be set in the CLI (console or SSH) using the following commands:

```
configure terminal
vlan 1
   ip address <your IP address> <your subnet mask>
exit
ip default-gateway <your gateway>
write memory
```

Type of utilisation

Devices

All devices that you want to configure with the CX-Engine are created in the 'Inventory' menu.

Adding a device

To add a device, click on the blue 'New Device' button in the 'Inventory' menu. A window opens in which you must enter all the necessary information to configure the device. The device must be assigned a device type, a manufacturer and a model.

Delete a device

If a device is to be deleted, select the device in the 'Inventory' menu. A window opens in which you can click on the 'Delete Device' button at the bottom. The device is deleted from the inventory.

ATTENTION: All data for this device, including previous configurations, will be deleted. The assignment to presets is also deleted. No presets are deleted.

Customise a device

If a device is to be customised, select the device in the 'Inventory' menu. A window opens in which you can adjust the desired setting. The changes are only saved when the 'Save Changes' button at the bottom is clicked.

View the current device configuration

To view the current configuration, the current configuration can be opened in the device menu using the 'View Config' button and queried using the 'Get Current' button.

Groups

The groups are managed in the 'Inventory' menu.

Add a group

To add a group, click on the blue 'New Group' button in the 'Inventory' menu. A window opens in which you can set the name of the group and assign devices to the group. To do this, click on the desired devices. The devices are highlighted in blue. As soon as all the desired settings have been made, confirm the creation with the 'Save Changes' button.

Delete a group

If a group is to be deleted, select the group in the 'Inventory' menu. A window opens in which you can click on the 'Delete Group' button at the bottom. The group is deleted from the inventory.

ATTENTION: All data for this group will be deleted. The assignment to presets is also deleted. No presets are deleted.

Customise a group

If a group is to be customised, select the group in the 'Inventory' menu. A window opens in which you can adjust the desired setting. The changes are only saved when the 'Save Changes' button at the bottom is clicked.

Device type

A device type is a generic category into which the devices that can be configured with the CX-Engine are categorised. Device types are independent of the manufacturer. The device type 'network switch', for example, is not dependent on the manufacturer such as Cisco or Netgear. Each device type has certain settings that can be configured. The settings are generalised and can be applied to devices from any manufacturer.

The supported device types are listed below:

Network switch

The network switch is the device type for L2 and L3 network switches. It has the following settings:

Setting: Hostname

This setting is used to set the host name of the switch. The host name must not contain any special characters or spaces.

Setting: VLAN

VLANs are virtual LANs and can be set per port on a network switch. The VLAN ID indicates the LAN in which the port is located. Trunks are used to connect switches to each other and to share the VLANs between switches.

Add VLAN

A VLAN is first created before it is assigned to a port. If you add the device types, you can create the VLANs in the 'VLANs' area using the 'Add +1', 'Add +2', 'Add +4' button and delete them again using the 'Trash' button.

Each VLAN has a specific type. A type is a profile that contains certain settings to support the protocol or application. The CX-Engine ensures that the desired application is configured in the same way on all switches. The CX-Engine supports the following VLAN types:

VLAN types

- Data
  The VLAN type 'Data' is the default setting of a VLAN in the CX-Engine. A data VLAN is created in the switch, which corresponds to a standard VLAN.
- sACN
  The VLAN type 'sACN' supports the sACN protocol, in which it sets all the necessary settings for multicast and IGMP snooping.
- ArtNet
  The VLAN type 'ArtNet' supports the ArtNet protocol, in which it sets all the necessary settings for broadcast.
- Dante
  The 'Dante' VLAN type supports the Dante protocol, in which it sets all the necessary settings for multicast, IGMP snooping and packet prioritisation.
- NDI
  The VLAN type 'NDI' supports the NDI protocol, in which it sets all the necessary settings for multicast, IGMP snooping and packet prioritisation.

Assign VLAN to a port

You can then define the ports that you want to assign to a VLAN. The ports are defined in the 'Ports' area. Use the 'Add +1', 'Add +2', 'Add +4' button to add new ports. Assign the desired port number to each port and specify the mode (Access or Trunk). Finally, specify the desired VLAN of the port via the

drop-down menu. Only specified ports are configured. Other ports are not configured. If a port is configured in trunk mode, the VLANID specifies the native VLAN.

Setting: Save configuration

This setting determines whether the configuration is to be saved afterwards.

DMX-Node

Setting: Hostname

This setting is used to set the host name of the node. The host name must not contain any special characters or spaces.

Setting: Ports

This setting is used to define the DMX output ports of the device. The port number, the desired protocol (sACN or ArtNet) and the universe must be specified.

DMX-Router

Setting: Routings

This setting is used to set the routing of the DMX router.

This includes:

- Input Group: The input VLAN to be used.
- Process Engine: The process engine to be used.
- Protocol: The protocol to be used as input (sACN or ArtNet).
- Universe: The input universe to be used.
- Protocol: The protocol to be used as output (sACN or ArtNet).
- Universe: The output universe to be used.

Preset

A preset is a collection of settings from device types that can be applied together to devices.

Adding a Preset

To add a preset, click on "Preset" in the left menu section and then on "Add Preset" in the upper right corner. A window will open where you can create the preset. The "Preset Name" field allows you to assign a name to the preset. In the upper right section, multiple device types can be added via the dropdown menu. The settings for the selected device type will appear in the window and can now be configured.

You can also assign a custom colour to the preset to improve identification. Clicking the "Save Preset" button will save the preset, which will then be added to the preset pool.

To delete a device type from the preset, click the "Delete Device Type" button in the upper corner of the respective device type. During the confirmation process, the device type to be deleted will be highlighted in red.

Deleting a Preset

The preset can be deleted while editing by clicking the "Delete Preset" button.

Change a Preset

In the left menu, select the "Preset" menu. The preset pool will open. Click on a preset item to edit it.

Applying Presets

Once a preset has been created, it can be applied to existing devices. To do this, open the "Preset Mapping" menu.

Assigning Presets to Devices

To assign a preset to a device, select the desired preset by clicking on it on the left side. On the right side, you can then select a group (at the top) or individual devices (at the bottom) for assignment by clicking on them. The selected devices will be highlighted in colour.

Now, click the "Map Preset" button in the lower right corner to assign the preset. The preset is only assigned and not yet applied to the device.

Deploying Presets to Devices

To apply a preset to a device, select the desired preset by clicking on it on the left side. On the right side, you can then select a group (at the top) or individual devices (at the bottom) by clicking on them. The selected devices will be highlighted in colour.

Next, click the "Deploy Preset" button in the lower right corner to apply the preset to the devices. If the preset contains information that should be set during the deployment, the CX Engine will prompt for this information.

Comparing Configurations

Once a preset has been deployed, a new configuration of the device is downloaded and saved. This configuration can be viewed and compared with older configurations. In the "Preset Mapping" menu, click the "Config Version Control" button in the lower right corner to open a new window. Here, you can specify two devices and a date for the desired configuration. The configurations will then be displayed side by side, with the differences highlighted.

Projects

Die komplette Konfiguration mit Geräten und Presets kann als Projekt gespeichert werden. Somit kann man die Konfiguration speichern und mitnehmen und wieder öffnen. Die Projekte können im Menüpunkt „Projects" eingesehen werden. Die aktuelle Konfiguration „Current Config" wird immer als erstes angezeigt.

Save projects

To save the current configuration as a project, click on the "Current Config" item, give the project a name, and then click on "Save Project."

Load projects

To load a project, click on the "Load Project" button, select your project from the file explorer, and then click on "Import Project." The project will be added as an item in the pool. You can then open this item by clicking on it and load the project by clicking the "Load Project" button. All devices and presets from the project will be added to the current project.

Download projects

To download a project, click on the desired project or the "Current Config" item, then click on the "Download Project" button. Select a target folder for the project and click "Save."

Maintenance / Update

The maintenance of the hardware is carried out by CX-Networks GmbH. For maintenance, please contact support, and a maintenance appointment will be scheduled.

The CX Engine distinguishes between two types of updates. The application is updated separately from the device types. "Application" refers to the functionality and interface of the CX Engine, while "Data" refers to the supported device types and manufacturers.

Application Update

To update the application, go to the "Settings" menu and click on "Update Software." This may take some time, during which the CX Engine will not be usable or accessible. If you experience any issues with the update, please contact info@cx-networks.com.

Data Update

To update the data, go to the "Settings" menu and click on "Update Data." This may take some time, during which the CX Engine will not be usable or accessible. If you experience any issues with the update, please contact info@cx-networks.com.

Decommissioning

After use, the CX Engine can be safely disconnected from the power supply and does not need to be shut down. Projects should be downloaded beforehand.

Caution: The SFF device gets very warm and should not be packed directly!

Malfunction

In case of a malfunction with the CX Engine, please contact support at info@cx-networks.com or call the support hotline at +49 172 7124468.

Disposal

The rack and SFF variants, as well as the included batteries, must be properly disposed of as electronic waste at the end of their use. Disposal of electrical and electronic equipment is regulated by specific waste disposal laws. Local regulations must be observed. Disposal via household waste or regular commercial waste is not permitted. Many of the materials contained are recyclable. By following this guideline, you are making an important contribution to environmental protection.