Power Protection Manager (PPM) Manual
NEXT UPS Systems
Power Protection Manager (PPM) for Proxmox VE - v1.1.0 (build pve.20250625)

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Telephone: +32(0)25408914

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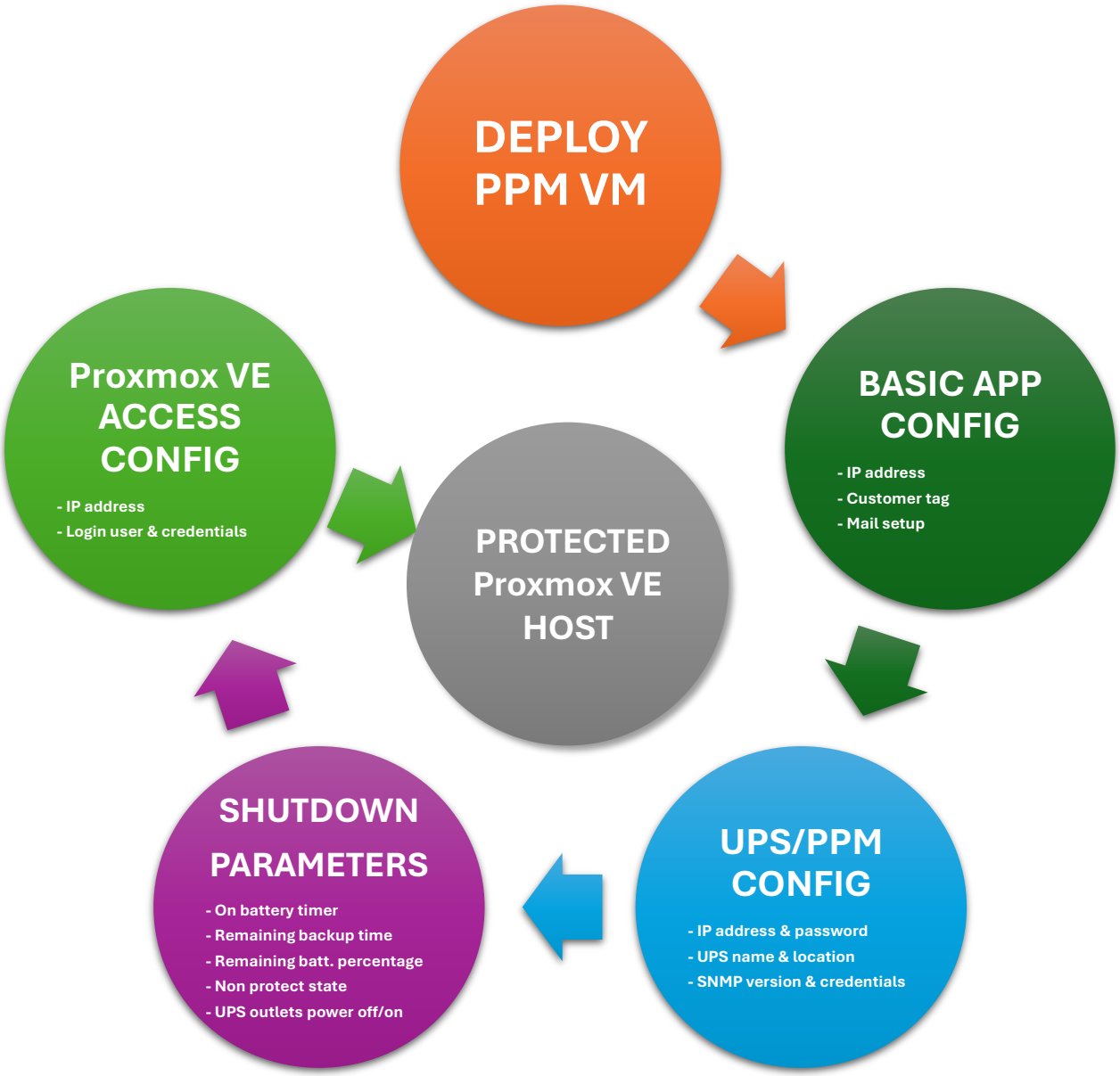
1. Overview of the software and its features

NEXT UPS Systems Power Protection Manager (PPM) is a virtual appliance which communicates with SNMP/WEB Interface II (Network Monitoring Card) for UPSs. PPM provides event logs, user notification and protects operation systems to shutdown gracefully. With PPM, applications can save data and documents before the operating system shuts down.

Installation & configuration overview:



2. Requirements for pre-installation (system requirements)

- The PPM virtual appliance can be installed on Proxmox VE 8 and up.
- 2 vCPU
- 2GB vMemory
- 25GB free space on storage

3. Steps and instructions for installation

For deploying a virtual appliance in Proxmox VE to install Power Protection Manager (PPM), you need to:

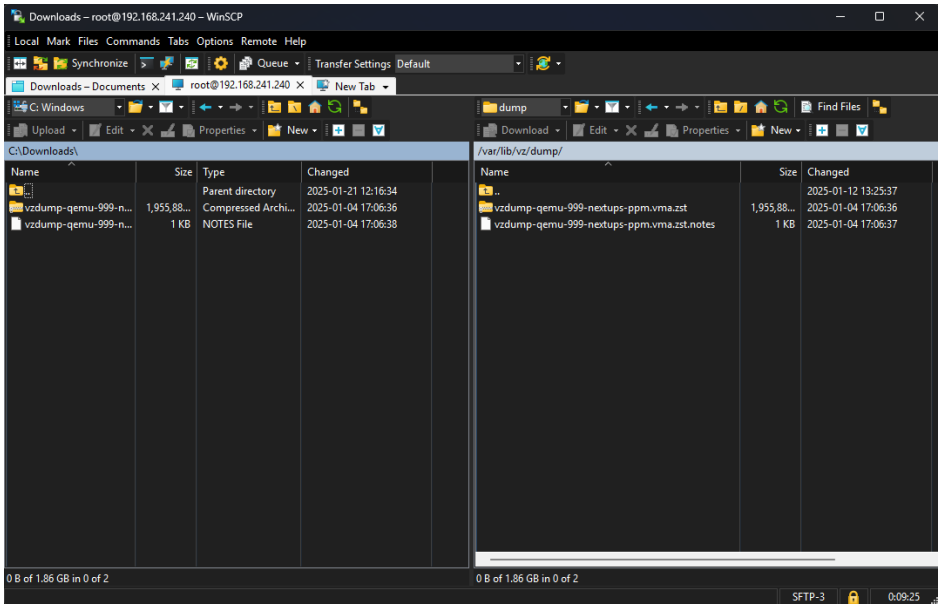
STEP 1.
Download the PPM zip file on https://nextups.eu/software/ppm-proxmox/#downloads

Extract the files from the downloaded file NEXTUPS-PPM-PROXMOX_v1.1.0.zip to an accessible location.

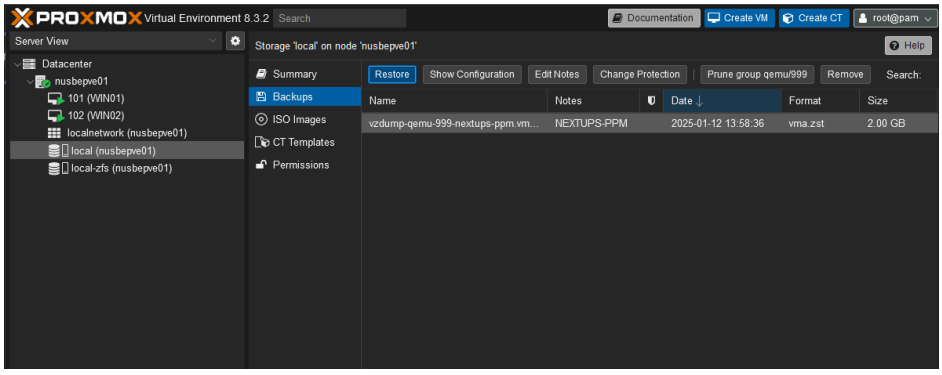
- vzdump-qemu-999-nextups-ppm.vma.zst
- vzdump-qemu-999-nextups-ppm.vma.zst.notes

[IMPORTANT] do not change these filenames.

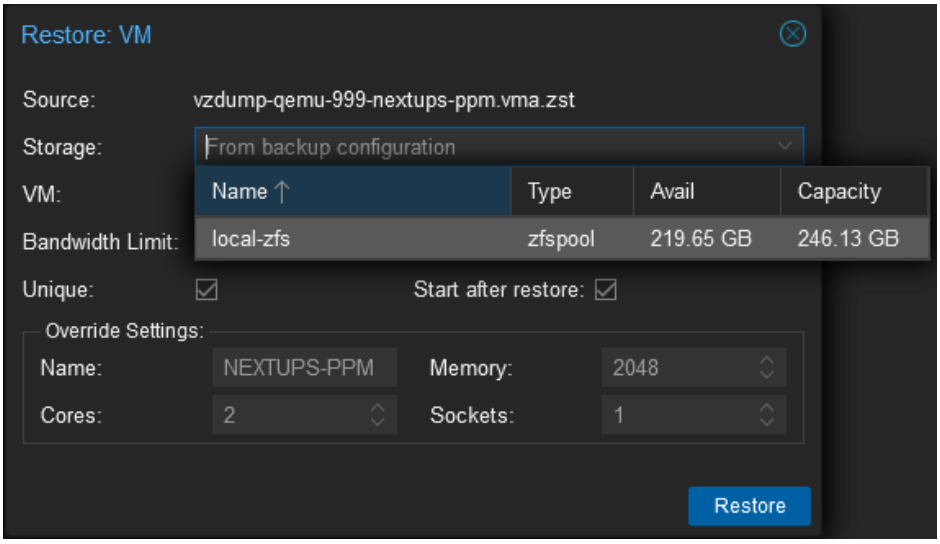
STEP 2.
Connect to Proxmox VE from your client computer using a file manager such as WINSCP and copy these 2 files into the /var/lib/vz/dump directory on the Proxmox VE host's local storage.



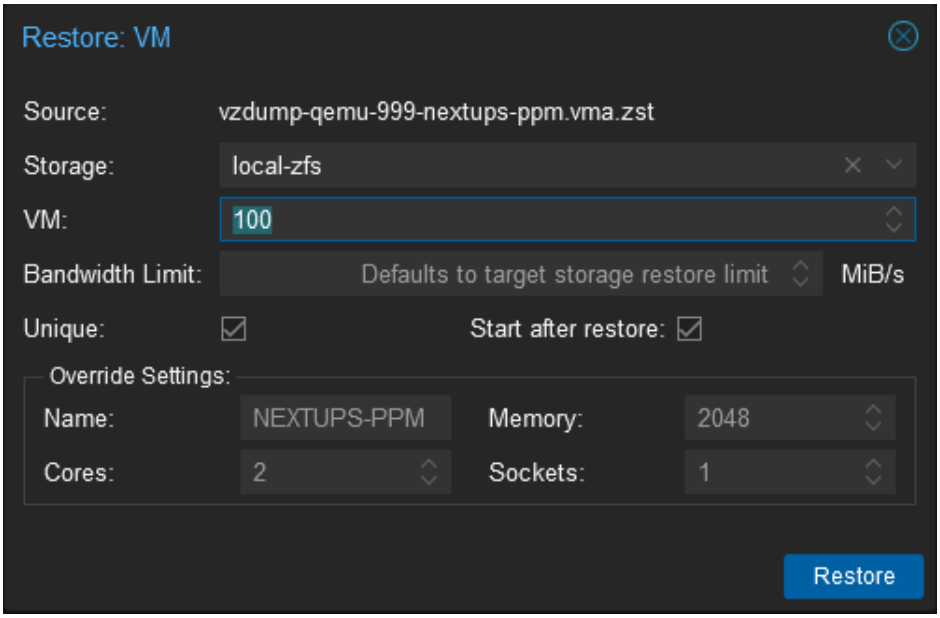
STEP 3.
Connect to Proxmox from your client computer using a web browser and log in as a user that has permission to create, start, and stop virtual machines.
On the local storage – Backups directory look for the vzdump-qemu-999-nextups-ppm.vma.zst file and click the 'Restore' button.



STEP 4.
In the pop up window select the storage location where to deploy the VM for PPM.

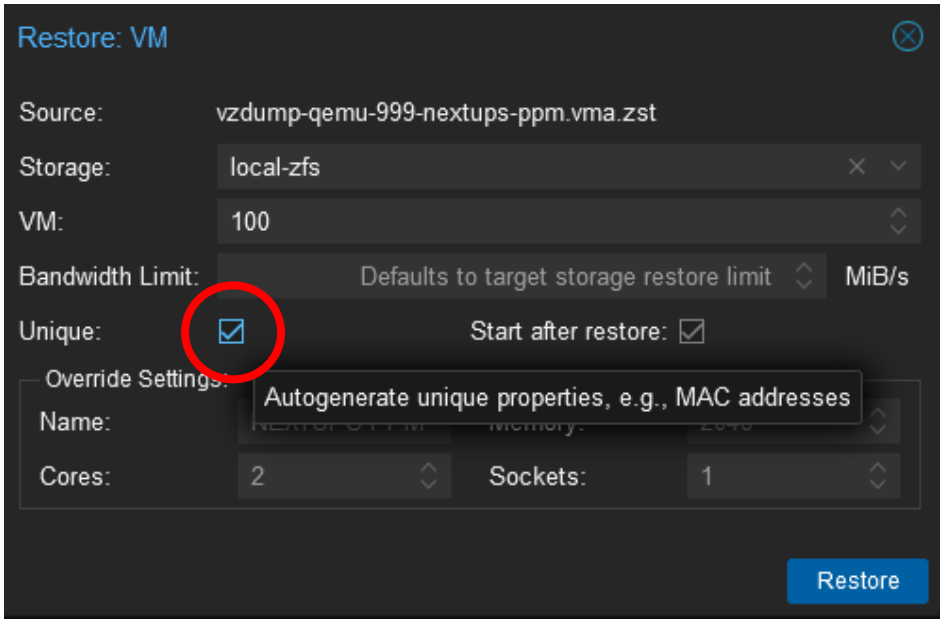


STEP 5.
Proxmox will propose the next available VM ID number (eg. 100), but it can be changed to any available VM ID.



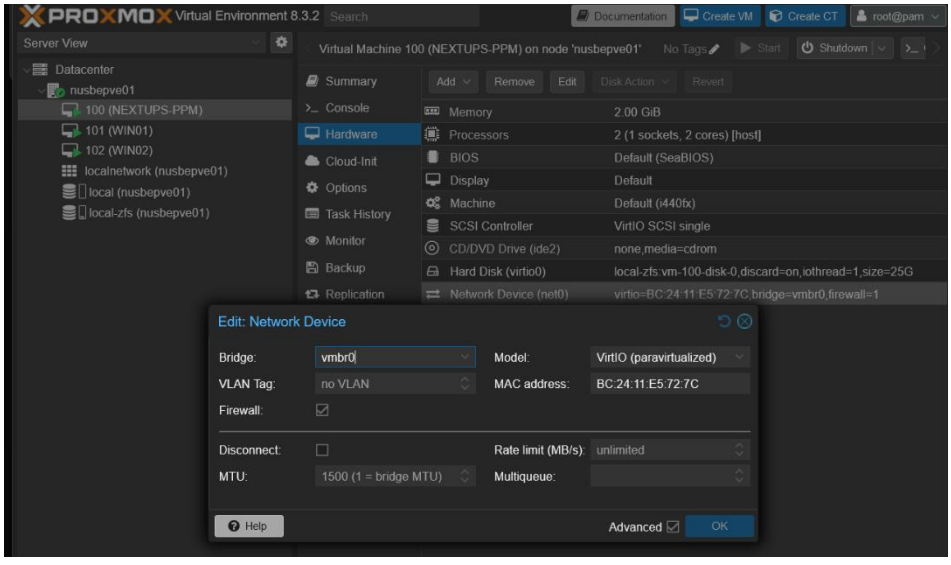
STEP 6.
Enable both 'Unique' and 'Start after restore' checkboxes.

[IMPORTANT] It is mandatory to enable the **'Unique'** checkbox to autogenerate unique properties for the VM.

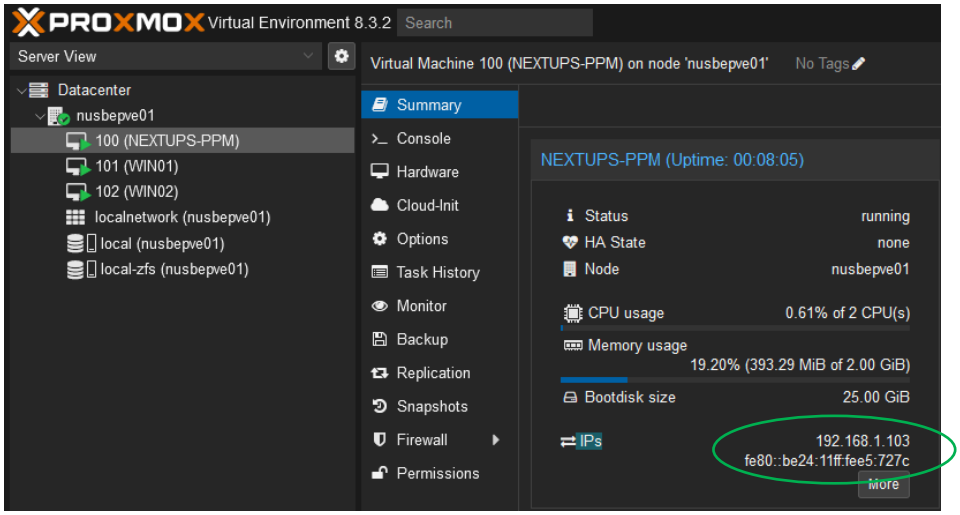


Click the Restore button to proceed

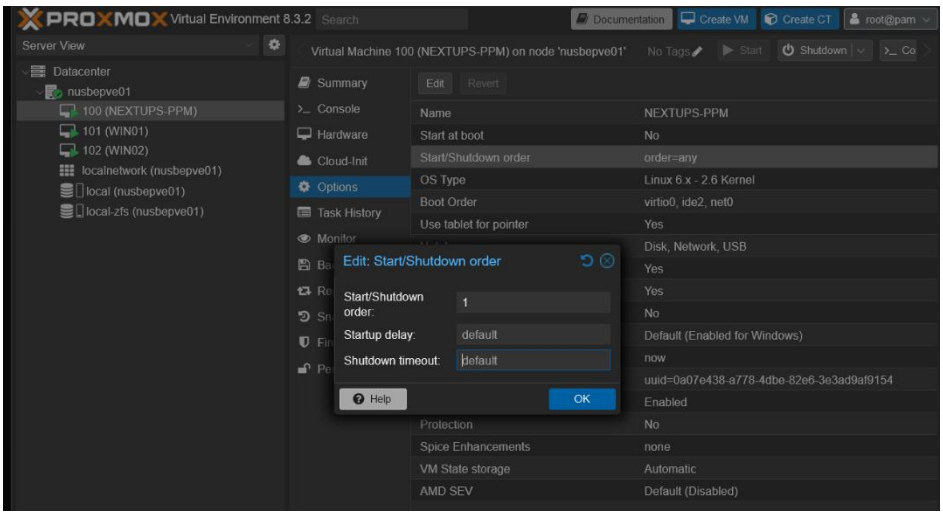
STEP 7.
Wait for the VM to be imported and review your VM's bridge and network settings.
Select the appropriate virtual network device and set bridge and optional VLAN, according to your configuration.



STEP 8.
Check the IP address of the NEXTUPS-PPM virtual machine and proceed to **4.2 CONFIGURATION** for configuration of PPM, UPS(s), Proxmox VE host(s) and shutdown parameters.



STEP 9.
For optimized protection, and in the case of shutting down multiple hosts, it is recommended to set the start/Shutdown order of the NEXTUPS-PPM virtual machine to '1'. For more information on the start/shutdown order in Proxmox VE, please see the 'Automatic Start and Shutdown of Virtual Machines' section of the Proxmox VE manual.



4. Configuration and instructions for setup

4.1 PPM COMMMANDS INDEX

-h, --help	Display this help message
--release-notes	Display release notes
--set-appliance-ip-dhcp	Set appliance DHCP IP configuration
--set-appliance-ip-static	Set appliance STATIC IP configuration
--set-ppm-password	Set ppm user password
--mail-setup	Set mail configuration
--mail-test	Test mail configuration
-S, --start	Start PPM monitoring
-R, --restart	Restart PPM monitoring
-K, --stop	Stop PPM monitoring
-s, --status	Display UPS system information
-l, --logs	Display all logs
-c, --clear	Clear all logs
-e, --export	Export log file
-c, --config	Display configuration file
-u, --update	Update (edit) configuration file
customer_tag	Customer tag (name) for use with mail communication
timezone	SNTP time zone
ups1_ip	UPS1 IPv4 address
ups1_pass	UPS1 root password
ups2_ip	UPS2 IPv4 address
ups2_pass	UPS2 root password
upssnmp_version	UPS SNMP version
upssnmpv2c_community	UPS SNMP v2c private configured community string
upssnmpv3_user	UPS SNMP v3 user
upssnmpv3_userauth	UPS SNMP v3 user authentication
upssnmpv3_userauthprotocol	UPS SNMP v3 user authentication protocol: MD5
upssnmpv3_userpriv	UPS SNMP v3 user private password
upssnmpv3_seclevel	UPS SNMP v3 security level
upsnonprotectstate_action	Action to take when UPS state is 'Unknown', 'Off/Standby' or 'On Bypass'
upsonbattery_timer	Timer to elapse before executing shutdown procedure
upsremaining_minutes	UPS minimum remaining backup time in minutes before executing shutdown procedure
upsremaining_percentage	UPS minimum remaining backup percentage before executing shutdown procedure
upsoutlets_timeroff	Timer in minutes (m) to elapse before UPS power outlets are powered off
upsoutlets_timeron	Timer in minutes (m) to elapse before UPS power outlets are powered on
pve_user	PVE root user
pve1_ip	PVE1 IPv4 address
pve1_pass	PVE1 root password
pve2_ip	PVE2 IPv4 address
pve2_pass	PVE2 root password
pve3_ip	PVE3 IPv4 address
pve3_pass	PVE3 root password
mail_recipient1	Alert mail recipient1
mail_recipient2	Alert mail recipient2
-i, --import	Import configuration from given file
-e, --export	Export configuration file

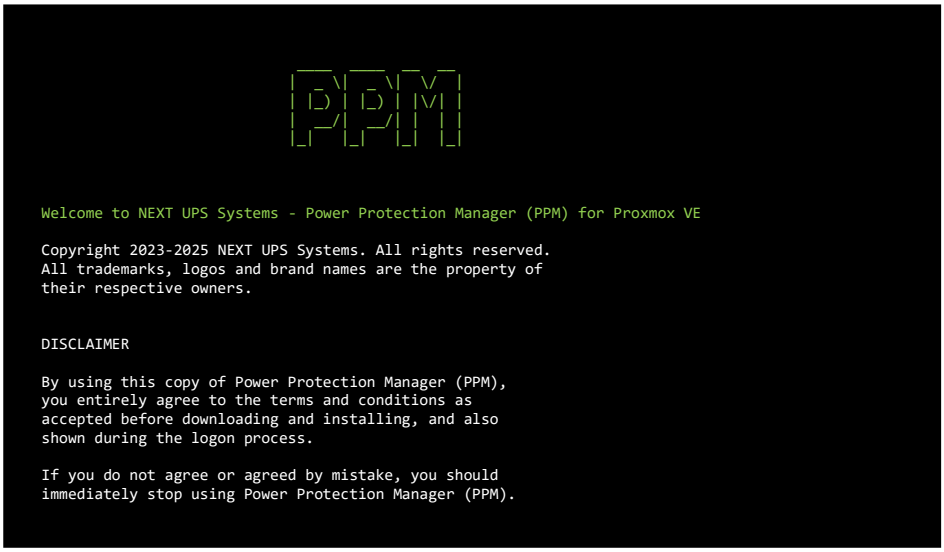
4.2 CONFIGURATION

4.2.1 BASIC APPLIANCE CONFIGURATION

This section covers all commands for configuring the PPM appliance and email notification.

Enter the appliance through a SSH connection:
-Set Function keys and keypad to Linux or VT100+ (applies when using PuTTY as SSH client)
-Log in on the virtual appliance using its IP address and port 22

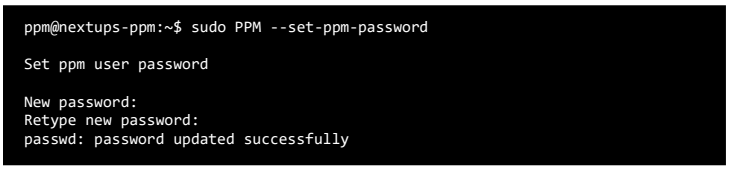
Log in using 'ppm' as user and 'ppm' as default password.



- **Set the PPM password**

After the first log in, it is recommended to change the default password by use of the command:

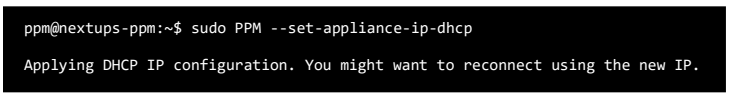
Command: sudo PPM --set-ppm-password
Return Output:



- **Set the appliance DHCP or STATIC IP address**

It is strongly advised that the IP address of the appliance is set to a static configuration, however a DHCP setting is also possible:

Command: sudo PPM --set-appliance-ip-dhcp
Return Output:



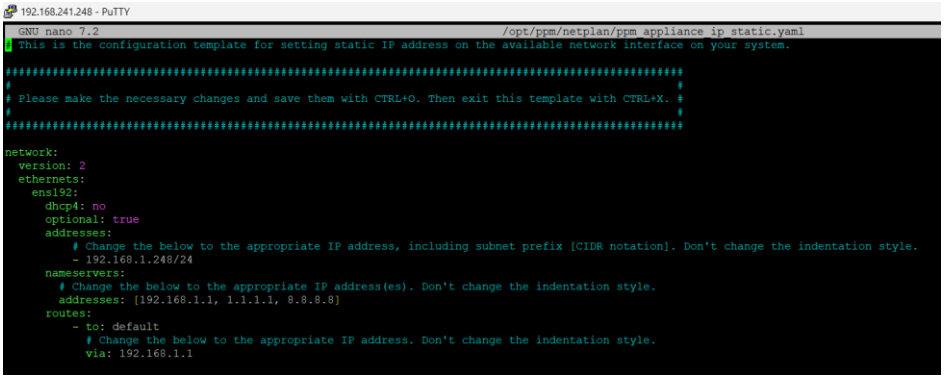
Check your DHCP server to retrieve the assigned IP address.

To set the IP settings manually, use the following command:

Command: sudo PPM --set-appliance-ip-static

Change the IP address/subnet mask/DNS/routes(gateway) according to your network settings in the pop-up editor window by changing the corresponding values and save with Ctrl-O, exit with Ctrl-X.

Return Output:



- **Set customer tag**

The customer tag (name) is a variable to identify your configuration. It will be used in the configuration files and in the subject field for mail communication:

Command: sudo PPM -c -u customer_tag '<value>'

[IMPORTANT] Only alphanumeric and _- characters are allowed.

Return Output:

```
sudo PPM -c -u customer_tag 'NUS-EMEA'

PPM: customer_tag option has been updated.
PPM: Restarting service to apply new value...
```

- **Set the SNTP time zone**

Default setting is 'Europe/Brussels'. Change if desired according to your current time zone:

Command: sudo PPM -c -u timezone 'Europe/Brussels'

[IMPORTANT] Possible values are only the official TZ identifier names, see:
https://en.wikipedia.org/wiki/List_of_tz_database_time_zones for the full list.
Example values are: Europe/Brussels | Europe/Amsterdam | Europe/Paris | GB | UTC | Etc/GMT+3 | CET | CEST

Return Output:

```
ppm@nextups-ppm:~$ sudo PPM -c -u timezone 'Europe/Brussels'

PPM: timezone option has been updated.
```

- **Set mail notification**

For configuring the mail notifications, an SMTP server, TLS encryption port, sender account, password and at least 1 recipient must be configured:

Command: sudo PPM --mail-setup

Return Output:

```
ppm@nextups-ppm:~$ sudo PPM --mail-setup

Enter the SMTP server: smtp.office365.com
Enter the SMTP port (TLS): 587
Enter the sender account address: service@nextups.eu
Enter the sender account password:

Enter the mail recipient1 address: service@nextups.eu
Enter the mail recipient2 address or press [ENTER] to leave blank:

Sending test mail From: service@nextups.eu, To: service@nextups.eu, SMTP:
smtp.office365.com, Port: 587
Please check your inbox.
```

A test mail will be sent, check the inbox of the provided recipient.
Both mail recipients can be reconfigured separately:

Command: sudo PPM -c -u mail_recipient1 '<value>'
sudo PPM -c -u mail_recipient2 '<value>'

Return Output:

```
ppm@nextups-ppm:~$ sudo PPM -c -u mail_recipient2 'service@nextups.eu'

PPM: mail_recipient2 option has been updated.
PPM: Restarting service to apply new value...
```

After configuration of the mail recipients, the settings can be checked by sending a test mail:

Command: sudo PPM --mail-test
Return Output:

```
ppm@nextups-ppm:~$ sudo PPM --mail-test

Sending test mail From: service@nextups.eu, To: service@nextups.eu
Please check your inbox.
```

Check the configuration file

After modifying the values, the settings can be checked by displaying the configuration file:

Command: sudo PPM -c
Return Output:

```
ppm@nextups-ppm:~$ sudo PPM -c

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Configuration file:

CUSTOMER TAG                                          :   NUS-EMEA
SNTP TIMEZONE                                         :   Europe/Brussels

UPS1 IP ADDRESS                                       :
UPS1 PASSWORD                                         :
UPS2 IP ADDRESS                                       :
UPS2 PASSWORD                                         :
UPS SNMP VERSION                                      :   3
UPS SNMP V2C COMMUNITY                                :   private
UPS SNMP V3 USER NAME                                 :
UPS SNMP V3 USER AUTHENTICATION PASSWORD              :
UPS SNMP V3 USER AUTHENTICATION PROTOCOL              :   MD5
UPS SNMP V3 USER PRIVATE PASSWORD                     :
UPS SNMP V3 USER SECURITY LEVEL                       :   noAuthNoPriv

UPS NON PROTECT STATE ACTION                          :   donothing
UPS ON BATTERY TIMER (seconds | minutes)              :   disabled
UPS MINIMUM REMAINING BACKUP TIME THRESHOLD (minutes) :   disabled
UPS MINIMUM REMAINING BACKUP PERCENTAGE THRESHOLD (%) :   30

UPS OUTLETS POWER-OFF TIMER (minutes)                 :
UPS OUTLETS POWER-ON TIMER (minutes)                  :

PVE USER                                              :   root
PVE1 IP ADDRESS                                       :
PVE1 PASSWORD                                         :
PVE2 IP ADDRESS                                       :
PVE2 PASSWORD                                         :
PVE3 IP ADDRESS                                       :
PVE3 PASSWORD                                         :

MAIL SENDER                                           :   service@nextups.eu
MAIL RECIPIENT1                                       :   service@nextups.eu
MAIL RECIPIENT2                                       :
```
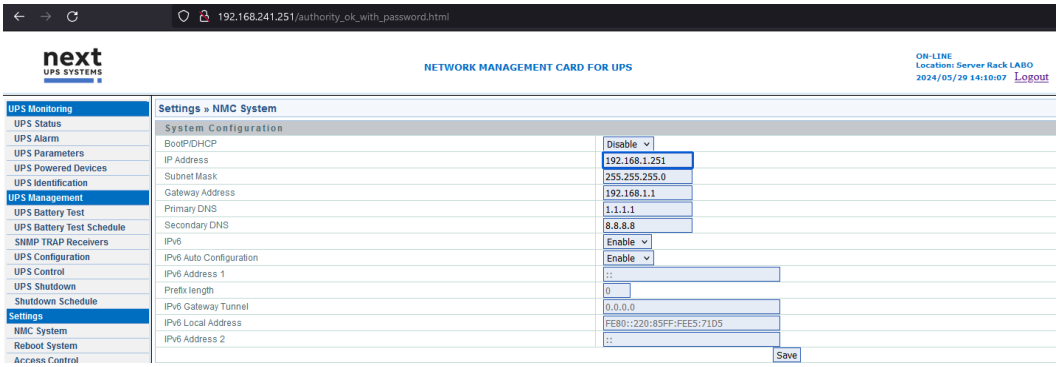

4.2.2 UPS/PPM CONFIGURATION

This section covers the configuration for communications with one or two UPSs. See chapter 4.2.3 SHUTDOWN CONFIGURATION for more info on how to configure the timings for the shutdown.

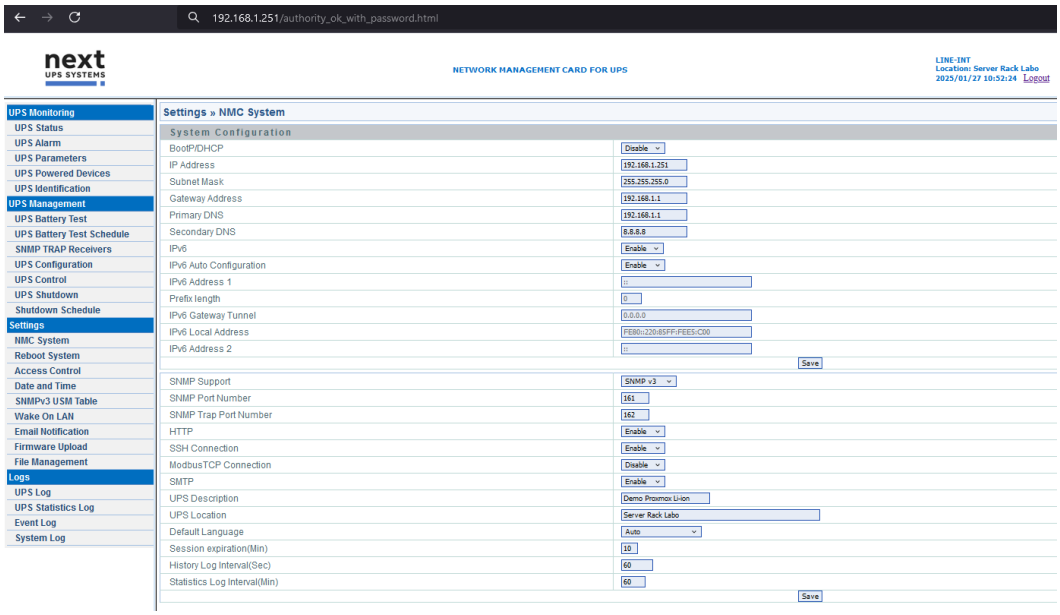
- **Set up the UPS IP address/password and UPS name/location**

First configure the SNMP settings in the **UPS network interface – *NMC System* page**. It is strongly recommended to configure both UPS and PPM with a static IP address in your network. Set the IP address, subnet mask, gateway and DNS and click the save button.



In addition to the IP address, a UPS description (name) and UPS location can be set in the **UPS network interface – *NMC System* page**. Fill in an appropriate name and location for the UPS and click the below save button.

[IMPORTANT] any blank characters (space) in these settings will be converted to _ (underscore) in the PPM.



After configuring the UPS IP address, up to 2 UPSs can be monitored in the PPM, if two UPSs are configured both will be monitored simultaneously for executing the shutdown settings. See chapter 4.2.3 SHUTDOWN CONFIGURATION for more information on the shutdown configuration.

Set the UPS(s) IP address(es) in PPM

To set the IP address(es) of the monitored UPS(s) in PPM:

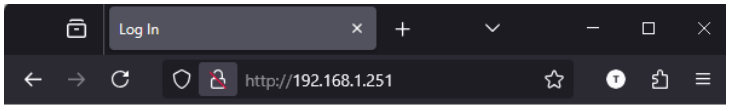
Command: sudo PPM -c -u ups1_ip '<value>'
sudo PPM -c -u ups2_ip '<value>'

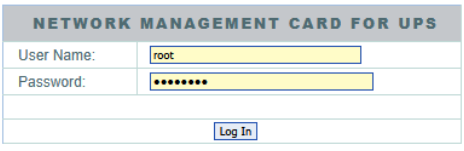
Return Output:

```
ppm@nextups-ppm:~$ sudo PPM -c -u ups1_ip '192.168.1.251'

PPM: ups1_ip option has been updated.
PPM: Restarting service to apply new value...
```

Set the UPS(s) password(s) in PPM (optional)

In order to use the UPS power outlets off/on control after the shutdown command, it is mandatory to configure the SNMP interface password for the root user, as used in the web interface login.





To set the UPS root password(s) of the monitored UPS(s) in PPM:

Command: sudo PPM -c -u ups1_pass '<value>'
sudo PPM -c -u ups2_pass '<value>'

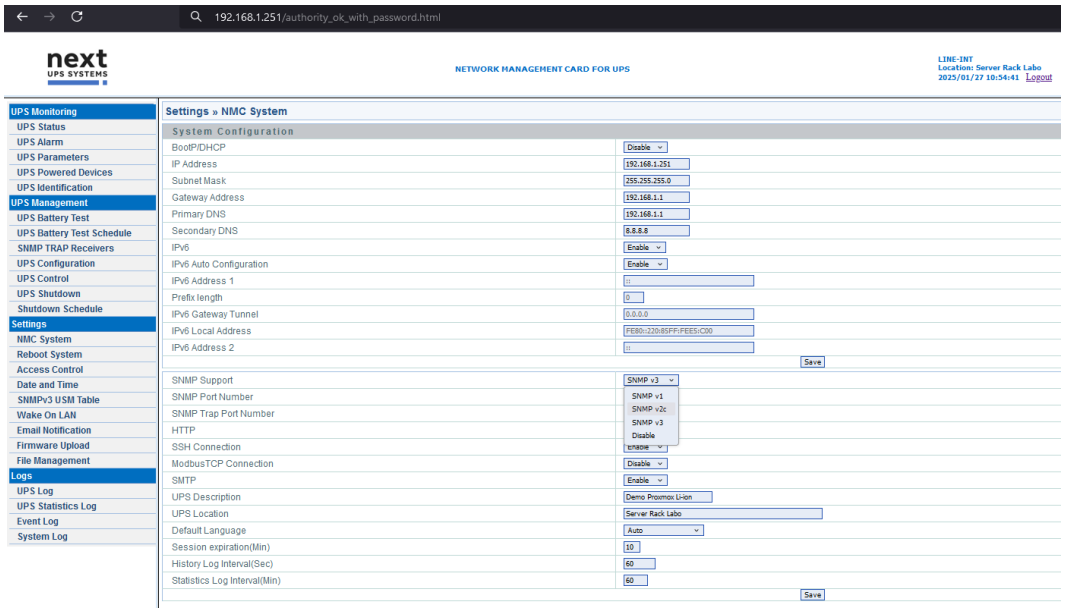
[IMPORTANT] Only alphanumeric and !*#$&:_- characters are allowed

Return Output:

```
ppm@nextups-ppm:~$ sudo PPM -c -u ups1_pass 'password'

PPM: ups1_pass option has been updated.
PPM: Restarting service to apply new value...
```

- **Set up the UPS SNMP version**

For secure communication with the UPS either SNMP v2c or SNMP v3 can be used.
Default setting on the network card of the UPS is version SNMP v3 but it can be changed to SNMP v2c. However, for security reasons it is recommended to use SNMP v3.
Set accordingly to the settings in the **UPS network interface – *NMC System* page**, parameter *SNMP Support*: (default setting SNMP v3).
For both communication methods additional settings are mandatory, first configure those on the SNMP interface of the UPS before proceeding the config of the PPM.



Set the selected SNMP version in PPM

Default setting is SNMP v3 but can be changed to SNMP v2c. However, for security reasons it is recommended to use SNMP v3:

Command: sudo PPM -c -u upssnmp_version '<value>'

[IMPORTANT] Valid values are: 2c | 3

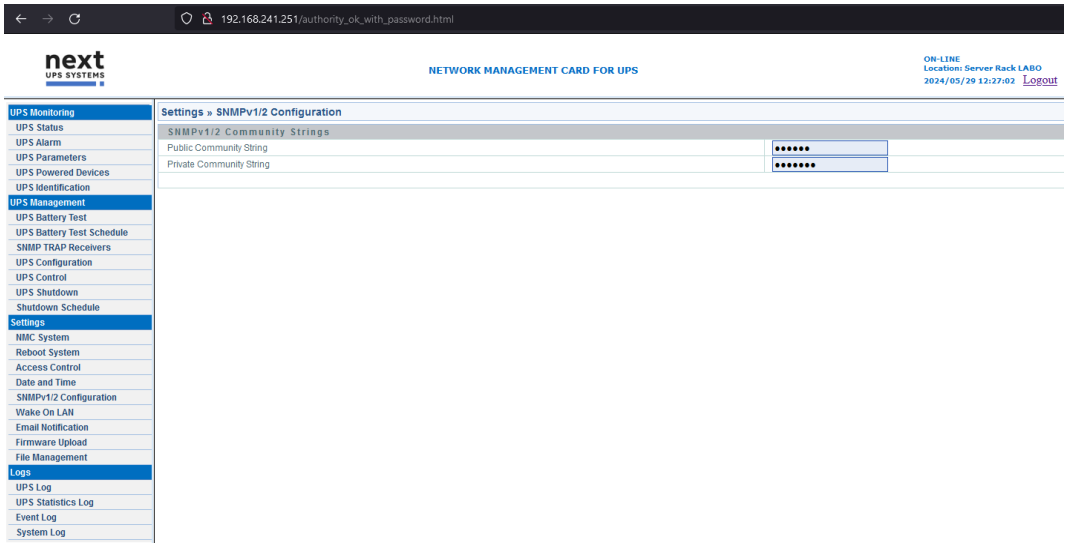
Return Output:

```
ppm@nextups-ppm:~$ sudo PPM -c -u upssnmp_version '3'

PPM: upssnmp_version option has been updated.
PPM: Restarting service to apply new value...
```

- **Set up the SNMP v2c parameters**

By selecting the SNMP v2c communication the Private Community String is mandatory.

Set accordingly to the settings in the **UPS network interface – *SNMPv1/2 Configuration* page**. Only the Private Community String in the network interface is accepted. This community string can be changed in the **UPS network interface – *SNMPv1/2 Configuration* page**, parameter *Private Community String*. The default setting in the interface is 'private'.



Set the community string in PPM

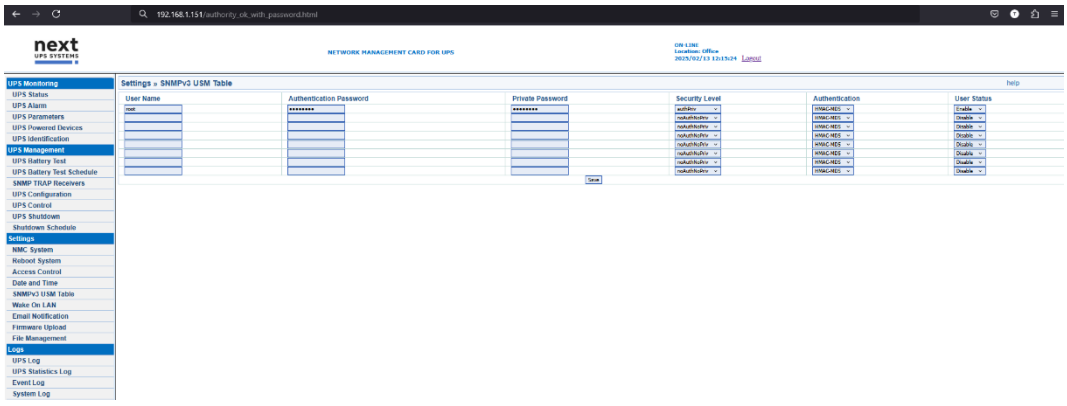
Set the community string in PPM accordingly to the **private** community string in the UPS network interface.

Command: sudo PPM -c -u upssnmpv2c_community '<value>'
Return Output:

```
ppm@nextups-ppm:~$ sudo PPM -c -u upssnmpv2c_community 'private'

PPM: upssnmpv2c_community option has been updated.
PPM: Restarting service to apply new value...
```

- **Set up SNMP v3 parameters**

By selecting the SNMP v3 communication a username, authentication method and password(s) needs to be set.
First configure the credentials and security level in the **UPS network interface – *SNMPv3 USM Table* page**.



[IMPORTANT] Only minor alphanumeric characters are allowed for the SNMPv3 user name.

Set the SNMP v3 parameters of the PPM accordingly to the settings in the UPS network interface.

Set SNMP v3 user name

Set accordingly to the settings in the **UPS network interface – *SNMPv3 USM Table* page**:

Command: sudo PPM -c -u upssnmpv3_user '<value>'

[IMPORTANT] Only minor alphanumeric characters are allowed for the SNMPv3 user name.

Return Output:

```
ppm@nextups-ppm:~$ sudo PPM -c -u upssnmpv3_user 'root'

PPM: upssnmpv3_user option has been updated.
PPM: Restarting service to apply new value...
```

Set SNMP v3 user authentication password

Set accordingly to the settings in the **UPS network interface – *SNMPv3 USM Table* page**:

Command: sudo PPM -c -u upssnmpv3_userauth '<value>'

[IMPORTANT] Only alphanumeric and _- characters are allowed and needs to have a minimum of 8 characters.

Return Output:

```
ppm@nextups-ppm:~$ sudo PPM -c -u upssnmpv3_userauth 'password'

PPM: upssnmpv3_userauth option has been updated.
PPM: Restarting service to apply new value...
```

Set SNMP v3 authentication protocol

Only valid value is 'MD5', set accordingly to the settings in the **UPS network interface – *SNMPv3 USM Table* page**:

Command: sudo PPM -c -u upssnmpv3_userauthprotocol '<value>'
Return Output:

```
ppm@nextups-ppm:~$ sudo PPM -c -u upssnmpv3_userauthprotocol 'MD5'

PPM: upssnmpv3_userauthprotocol option has been updated.
PPM: Restarting service to apply new value...
```

Set SNMP v3 user private password

Set accordingly to the settings in the **UPS network interface – *SNMPv3 USM Table* page**:

Command: sudo PPM -c -u upssnmpv3_userpriv '<value>'

[IMPORTANT] Only alphanumeric and _- characters are allowed and needs to have a minimum of 8 characters.
Return Output:

```
ppm@nextups-ppm:~$ sudo PPM -c -u upssnmpv3_userpriv 'Password'

PPM: upssnmpv3_ userpriv option has been updated.
PPM: Restarting service to apply new value...
```

Set SNMP v3 security level

Default value is 'noAuthNoPriv'. Set accordingly to the settings in the **UPS network interface – *SNMPv3 USM Table* page**:

Command: sudo PPM -c -u upssnmpv3_seclevel '<value>'

[IMPORTANT] Valid values are: noAuthNoPriv | authNoPriv | authPriv'

Return Output:

```
ppm@nextups-ppm:~$ sudo PPM -c -u upssnmpv3_seclevel 'authPriv'

PPM: upssnmpv3_ seclevel option has been updated.
PPM: Restarting service to apply new value...
```

Check the configuration file

All settings can be checked in the configuration file or with below command:

Command: sudo PPM -c
Return Output:

```
ppm@nextups-ppm:~$ sudo PPM -c

NEXT UPS Systems - Power Protection Manager (PPM) for Proxmox VE - 1.1.0 (build pve.20250625)

Configuration file:

CUSTOMER TAG                                              :   NUS-EMEA
SNTP TIMEZONE                                             :   Europe/Brussels

UPS1 IP ADDRESS                                           :   192.168.1.251
UPS1 PASSWORD                                             :   ********
UPS2 IP ADDRESS                                           :   192.168.1.252
UPS2 PASSWORD                                             :   ********
UPS SNMP VERSION                                          :   3
UPS SNMP V2C COMMUNITY                                    :   private
UPS SNMP V3 USER NAME                                     :   root
UPS SNMP V3 USER AUTHENTICATION PASSWORD                  :   password
UPS SNMP V3 USER AUTHENTICATION PROTOCOL                  :   MD5
UPS SNMP V3 USER PRIVATE PASSWORD                         :   Password
UPS SNMP V3 USER SECURITY LEVEL                           :   authPriv

UPS NON PROTECT STATE ACTION                              :   donothing
UPS ON BATTERY TIMER (seconds | minutes)                  :   disabled
UPS MINIMUM REMAINING BACKUP TIME THRESHOLD (minutes)     :   disabled
UPS MINIMUM REMAINING BACKUP PERCENTAGE THRESHOLD (%)     :   30

UPS OUTLETS POWER-OFF TIMER (minutes)                     :   disabled
UPS OUTLETS POWER-ON TIMER (minutes)                      :   disabled

PVE USER                                                  :   root
PVE1 IP ADDRESS                                           :
PVE1 PASSWORD                                             :
PVE2 IP ADDRESS                                           :
PVE2 PASSWORD                                             :
PVE3 IP ADDRESS                                           :
PVE3 PASSWORD                                             :

MAIL SENDER                                               :   service@nextups.eu
MAIL RECIPIENT1                                           :   service@nextups.eu
MAIL RECIPIENT2                                           :
```

Check the UPS Status and Communication

After configuring the SNMP settings, the UPS status can be checked by using the status command. It will show the status of the PPM service and configured UPS. Also, the last 10 log entries will be shown.

Command: sudo PPM -s
Return Output:

```
ppm@nextups-ppm:~$ sudo PPM -s

NEXT UPS Systems - Power Protection Manager (PPM) for Proxmox VE

Service status                      :   Running
Service version                     :   1.1.0 (build pve.20250625)
Mail agent status                   :   Running

Customer tag                        :   NUS-EMEA

UPS1
----
UPS IP address                      :   192.168.1.251
UPS status                          :   On Line
UPS time on battery                 :   00:00:00 (hh:mm:ss)
UPS battery status                  :   Normal
UPS battery voltage                 :   84.4V
UPS battery capacity                :   100%
UPS battery remaining backup time   :   86 minutes
UPS battery temperature             :   25 degrees Celsius
UPS output load                     :   23%
UPS name                            :   Demo_Proxmox_Li-Ion
UPS location                        :   Server_Rack_LABO
UPS technology                      :   ON-LINE
UPS SNMP card firmware              :   3.7.0.3
UPS serial number                   :   CP10P3312980004

Last 10 logs:
-------------
21-01-2025 12:16:01 - The status of UPS "Demo_Proxmox_Li-Ion" with IP "192.168.1.251" is Not Detected
21-01-2025 12:16:07 - The status of UPS "Demo_Proxmox_Li-Ion" with IP "192.168.1.251" is On Line --
no timer activated (anymore)
21-01-2025 12:16:19 - The status of UPS "Demo_Proxmox_Li-Ion" with IP "192.168.1.251" is Not Detected
21-01-2025 12:16:25 - The status of UPS "Demo_Proxmox_Li-Ion" with IP "192.168.1.251" is On Line --
no timer activated (anymore)
21-01-2025 12:19:39 - The status of UPS "Demo_Proxmox_Li-Ion" with IP "192.168.1.251" is On Line --
no timer activated (anymore)
21-01-2025 12:43:05 - The status of UPS "Demo_Proxmox_Li-Ion" with IP "192.168.1.251" is On Line --
no timer activated (anymore)
21-01-2025 13:03:07 - The status of UPS "Demo_Proxmox_Li-Ion" with IP "192.168.1.251" is On Line --
no timer activated (anymore)
21-01-2025 13:03:51 - The status of UPS "Demo_Proxmox_Li-Ion" with IP "192.168.1.251" is On Line --
no timer activated (anymore)
```

4.2.3 SHUTDOWN CONFIGURATION

This section covers the configuration of the parameters that will trigger a shutdown procedure for the Proxmox VE host(s).
In case of a power failure and UPS working on battery power, 3 events can trigger the shutdown procedure for the configured Proxmox VE host(s):

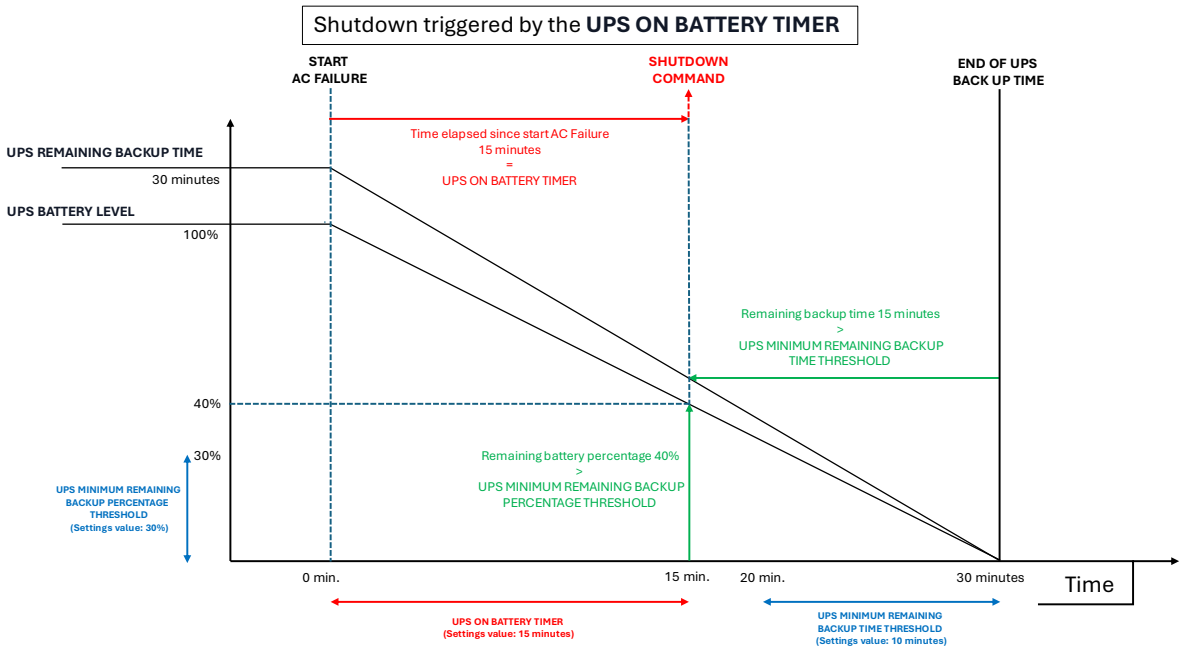
- **UPS ON BATTERY TIMER** (seconds/minutes) reaching a specified value
- **UPS MINIMUM REMAINING BACKUP TIME THRESHOLD** (minutes) drops below a specific value
- **UPS MINIMUM REMAINING BACKUP PERCENTAGE THRESHOLD** (%) drops below a specific value

These 3 events that can trigger the shutdown procedure can be set individually in PPM; any event that occurs first will trigger the shutdown procedure to be sent to the Proxmox VE host(s).

Default settings are that only a UPS MINIMUM REMAINING BACKUP PERCENTAGE THRESHOLD of 30% will trigger the shutdown action. The default settings for the UPS ON BATTERY TIMER and UPS MINIMUM REMAINING BACKUP TIME THRESHOLD are blank and will not be considered.
The settings can be changed by configuring the values for these 3 parameters:

- **UPS ON BATTERY TIMER**

In case of a power failure and the UPS is working on battery power, PPM will launch a timer before sending the shutdown procedure to the Proxmox VE host(s). The UPS ON BATTERY TIMER setting is a value in seconds (s) or minutes (m) to elapse before executing the shutdown procedure.



The timer can be set in seconds or minutes using unit ‘s’ or ‘m’ in the parameter value:

Command: sudo PPM -c -u upsonbattery_timer '<value>'
Example: sudo PPM -c -u upsonbattery_timer '600s'
sudo PPM -c -u upsonbattery_timer '10m'

[IMPORTANT] Default setting is blank. Valid settings are numeric values with additions 's' or 'm' and blank. If set to blank (sudo PPM -c -u upsonbattery_timer '') the UPS ON BATTERY TIMER will not be considered to trigger the shutdown of the Proxmox VE host(s).

Return Output:

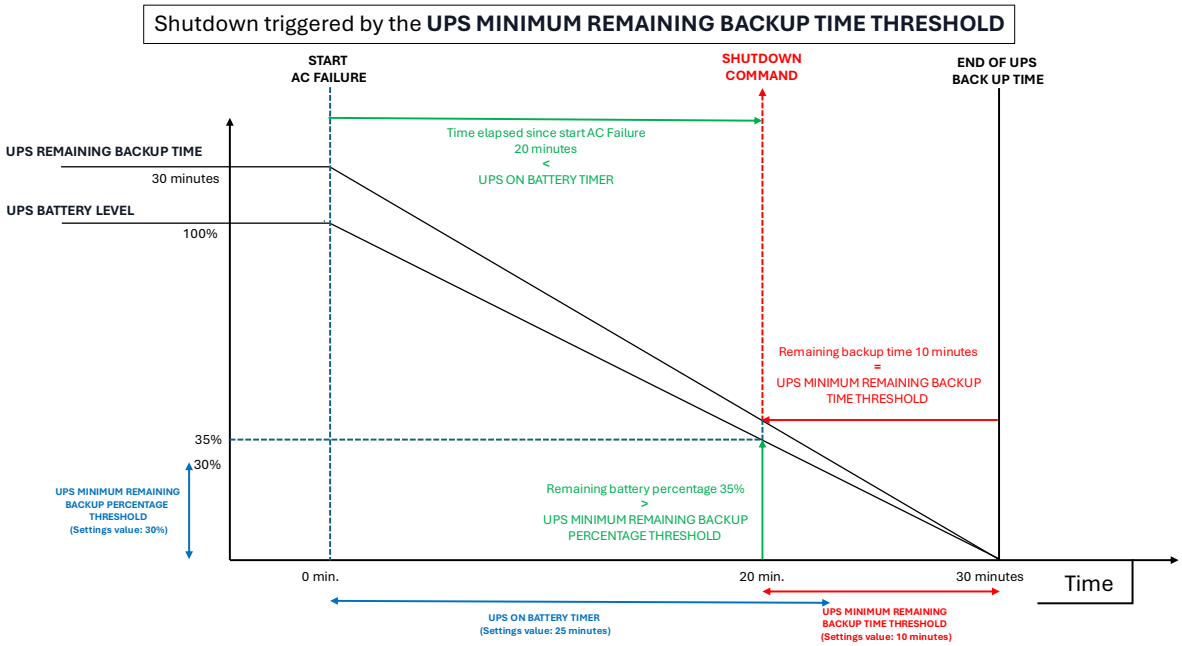
```
ppm@nextups-ppm:~$ sudo PPM -c -u upsonbattery_timer '15m'

PPM: upsonbattery_timer option has been updated.
PPM: Restarting service to apply new value...
```

- **UPS MINIMUM REMAINING BACKUP TIME THRESHOLD**

Depending on the actual load and battery level, the UPS will calculate an estimated remaining *Backup Time*. This time can be checked in the status command (sudo PPM -s) and on the **UPS network interface – *UPS STATUS* page**.

- If two UPSs are configured, the remaining *Backup Times* for both UPSs will be add up to compare with the configured value of the UPS MINIMUM REMAINING BACKUP TIME THRESHOLD.

The UPS MINIMUM REMAINING BACKUP TIME THRESHOLD, as set in PPM, is the minimum value for the remaining backup time before executing the shutdown procedure.



This threshold is being set in minutes (m) in the parameter value:

Command: sudo PPM -c -u upsremaining_minutes '<value>'

[IMPORTANT] Default setting is blank. Valid settings are numeric values and blank. If set to blank (sudo PPM -c -u upsremaining_minutes '') the UPS MINIMUM REMAINING BACKUP TIME THRESHOLD will not be considered to trigger the shutdown of the Proxmox VE host(s).

Return Output:

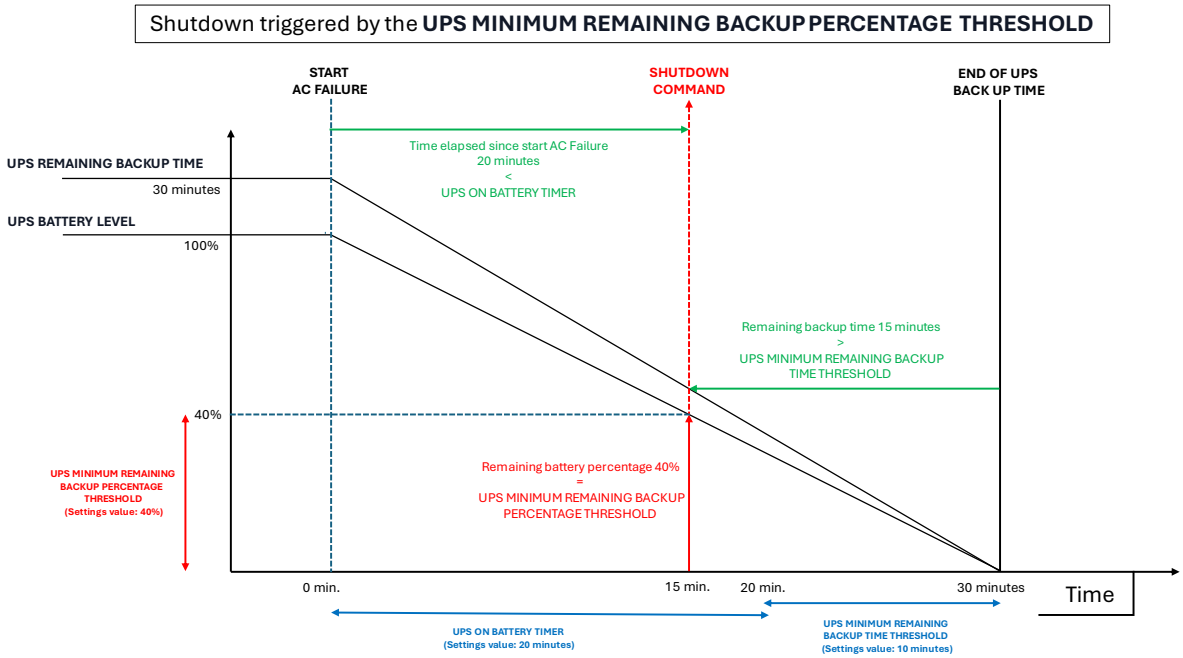
```
ppm@nextups-ppm:~$ sudo PPM -c -u upsremaining_minutes '25'

PPM: upsremaining_minutes option has been updated.
PPM: Restarting service to apply new value...
```

- **UPS MINIMUM REMAINING BACKUP PERCENTAGE THRESHOLD**

The battery level of the UPS depends on the actual state of the battery. This battery level can be checked in the status command (sudo PPM -s) and on the **UPS network interface – *UPS STATUS* page**.

- If two UPSs are configured, the percentages for both will be add up to compare with the configured value of the UPS MINIMUM REMAINING BACKUP PERCENTAGE THRESHOLD.

The UPS MINIMUM REMAINING BACKUP PERCENTAGE THRESHOLD, as set in PPM, is the minimum value for the UPS battery level in percentage (%) before executing the shutdown procedure.



This threshold is being set in percentage (%) in the parameter value:

Command: sudo PPM -c -u upsremaining_percentage '<value>'

[IMPORTANT] Default setting is 30. Valid settings are numeric values from 0 to 100. This value cannot be left blank. If desired not to be used this value can be set to 0.

Return Output:

```
ppm@nextups-ppm:~$ sudo PPM -c -u upsremaining_percentage '50'

PPM: upsremaining_percentage option has been updated.
PPM: Restarting service to apply new value...
```

- **UPS NON PROTECT STATE ACTION**

[IMPORTANT] - UPS NON PROTECT STATE ACTION:

In addition to the configuration of the shutdown procedure in case of a power failure, it is also possible to trigger the shutdown when the UPS is in a 'non protective' state. This will be the case if the UPS is in one of these states:

'Unknown', **'Off/Standby'** or **'On Bypass'**, even if the mains supply (UPS input) is still present.
In these states the UPS will not switch to battery power in case of a power failure and therefore the attached devices are not protected.

This setting can be configured through the 'upsnonprotectstate_action' parameter and can be set to:

donothing: PPM will not consider the non-protective state of the UPS. Only in case of a power failure and the UPS is on battery power, it launches the UPS ON BATTERY TIMER and/or checks both values for:
- UPS MINIMUM REMAINING BACKUP TIME THRESHOLD (minutes)
- UPS MINIMUM REMAINING BACKUP PERCENTAGE THRESHOLD (%)

shutdown: In case the UPS is in a 'non protective' state, PPM will act as if the UPS is working on battery power and starts the shutdown procedure for the Proxmox VE host(s) by launching the UPS ON BATTERY TIMER and/or checking both values for:
- UPS MINIMUM REMAINING BACKUP TIME THRESHOLD (minutes)
- UPS MINIMUM REMAINING BACKUP PERCENTAGE THRESHOLD (%)

Command: sudo PPM -c -u upsnonprotectstate_action '<value>'

[IMPORTANT] Default setting is donothing. Valid settings are: donothing | shutdown

Return Output:

```
ppm@nextups-ppm:~$ sudo PPM -c -u upsnonprotectstate_action 'donothing'

PPM: upsnonprotectstate_action option has been updated.
PPM: Restarting service to apply new value...
```

- **UPS OUTLETS POWER OFF/ON TIMER**

After triggering the shutdown procedure, PPM can also control the UPS power outlets. This can be done to preserve the remaining battery capacity and/or auto power-on of the server(s) when AC power returns.
The UPS outlets can be controlled by configuring two timers:

- **UPS OUTLETS POWER-OFF TIMER** in minutes
- **UPS OUTLETS POWER-ON TIMER** in minutes

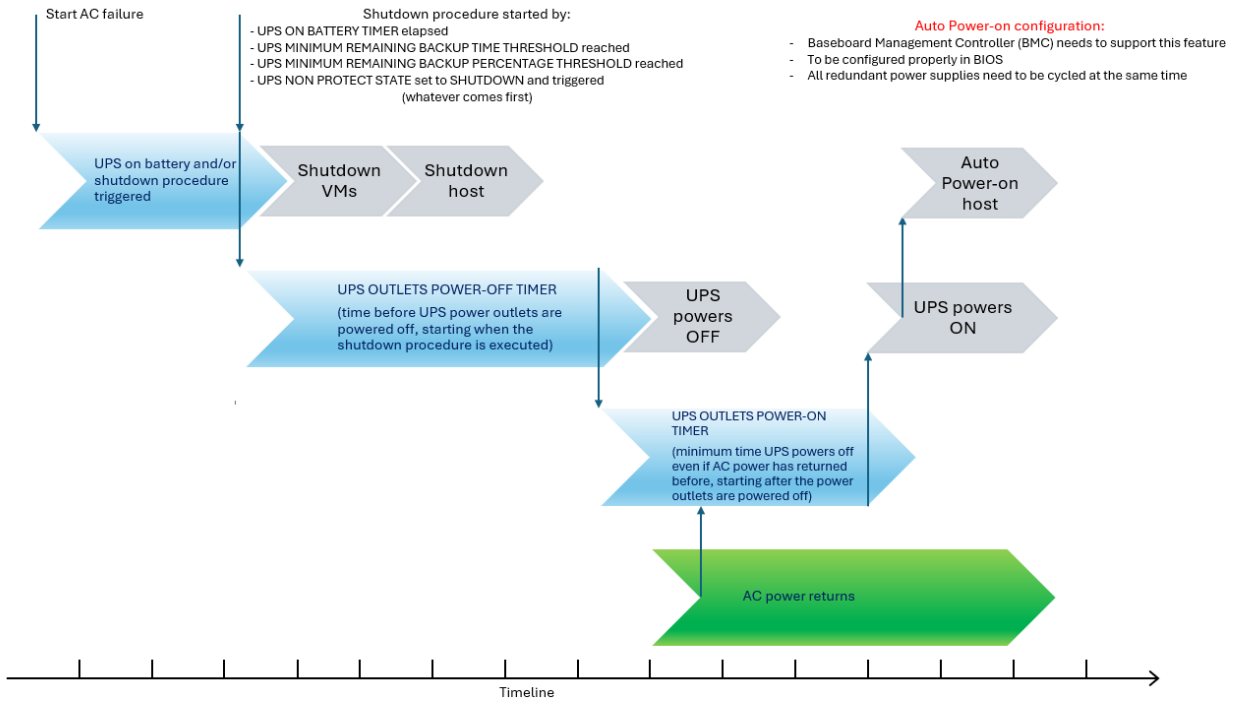
[IMPORTANT] Great care should be taken by setting these timers because of the risk of cutting off the power to the host prior to the complete shutdown of the VMs and the host itself.

To configure these timers, the UPS root password and correct SNMP V2C/V3 settings need to be set in PPM. Otherwise, the configuration overview will show 'unavailable' at these settings.
The **UPS OUTLETS POWER-OFF TIMER** is the time in minutes to elapse before the UPS power outlets are powered off, starting when the shutdown procedure is started.

[IMPORTANT] Consider the maximum time needed for shutting down all VMs and the host itself before setting this timer, as this function will cut off the power to the host when the timer expired.

The **UPS OUTLETS POWER-ON TIMER** is the minimum time in minutes to elapse before the UPS power outlets are powered back on, starting after the power outlets are being powered off. Even if the AC power returns before this timer has elapsed, the UPS will wait the configured amount of time before power on the outlets.

The configuration of the auto power-on function must be set separately in the server BIOS and needs a Baseboard Management Controller (BMC) that supports the auto power-on. In case of multiple power supplies in the host's chassis, all power supplies need to be cycled at the same time for the auto power-on to be effective.



Set the UPS OUTLET POWER-OFF TIMER by this command:

Command: sudo PPM -c -u upsoutlets_timeroff '<value>'

[IMPORTANT] Default setting is disabled. Valid settings are depending on UPS technology. On-line UPSs supports values from 5 to 60, in increments of 5. Line-interactive UPSs supports values from 5 to 10, in increments of 5.

Return Output:

```
ppm@nextups-ppm:~$ sudo PPM -c -u upsoutlets_timeroff '15'

PPM: upsoutlets_timeroff option has been updated.
PPM: Restarting service to apply new value...
```

Set the UPS OUTLET POWER-ON TIMER by this command:

Command: sudo PPM -c -u upsoutlets_timeron '<value>'

[IMPORTANT] Default setting is disabled. Valid settings are depending on UPS technology. On-line UPSs supports values from 5 to 60, in increments of 5. Line-interactive UPSs supports values from 5 to 10, in increments of 5.

Return Output:

```
ppm@nextups-ppm:~$ sudo PPM -c -u upsoutlets_timeron '5'

PPM: upsoutlets_timeron option has been updated.
PPM: Restarting service to apply new value...
```

Check the configuration file

All settings can be checked in the configuration file or with below command:

Command: sudo PPM -c
Return Output:

```
ppm@nextups-ppm:~$ sudo PPM -c

NEXT UPS Systems - Power Protection Manager (PPM) for Proxmox VE - 1.1.0 (build pve.20250625)

Configuration file:

CUSTOMER TAG                                                :   NUS-EMEA
SNTP TIMEZONE                                               :   Europe/Brussels

UPS1 IP ADDRESS                                             :   192.168.1.251
UPS1 PASSWORD                                               :   ********
UPS2 IP ADDRESS                                             :   192.168.1.252
UPS2 PASSWORD                                               :   ********
UPS SNMP VERSION                                            :   3
UPS SNMP V2C COMMUNITY                                      :   private
UPS SNMP V3 USER NAME                                       :   root
UPS SNMP V3 USER AUTHENTICATION PASSWORD                    :   password
UPS SNMP V3 USER AUTHENTICATION PROTOCOL                    :   MD5
UPS SNMP V3 USER PRIVATE PASSWORD                           :   Password
UPS SNMP V3 USER SECURITY LEVEL                             :   authPriv

UPS NON PROTECT STATE ACTION                                :   donothing
UPS ON BATTERY TIMER (seconds | minutes)                    :   15
UPS MINIMUM REMAINING BACKUP TIME THRESHOLD (minutes)       :   25
UPS MINIMUM REMAINING BACKUP PERCENTAGE THRESHOLD (%)       :   50

UPS OUTLETS POWER-OFF TIMER (minutes)                       :   15
UPS OUTLETS POWER-ON TIMER (minutes)                        :   5

PVE USER                                                    :   root
PVE1 IP ADDRESS                                             :
PVE1 PASSWORD                                               :
PVE2 IP ADDRESS                                             :
PVE2 PASSWORD                                               :
PVE3 IP ADDRESS                                             :
PVE3 PASSWORD                                               :

MAIL SENDER                                                 :   service@nextups.eu
MAIL RECIPIENT1                                             :   service@nextups.eu
MAIL RECIPIENT2                                             :
```

4.2.4 PROXMOX VE CONFIGURATION

This section covers the configuration for the SSH access to the Proxmox VE host(s) to be shut downed in case of a power failure. See chapter 4.2.3 SHUTDOWN CONFIGURATION for more info on how to configure the triggers for the shutdown.

- **Set Proxmox VE IP address**

Set the IPv4 address(es) of the Proxmox VE host(s) that will be powered by the monitored UPS. Up to 3 Proxmox VE hosts can be configured.

Command: sudo PPM -c -u pve1_ip '<value>'
sudo PPM -c -u pve2_ip '<value>'
sudo PPM -c -u pve3_ip '<value>'

Return Output:

```
ppm@nextups-ppm:~$ sudo PPM -c -u pve1_ip '192.168.1.101'

PPM: pve1_ip option has been updated.
PPM: Restarting service to apply new value...
```

- **Set Proxmox VE login user**

Set the username to login on the Proxmox VE host(s):

Command: sudo PPM -c -u pve_user '<value>'

[IMPORTANT] Only 1 user can be defined for all Proxmox VE hosts.

Return Output:

```
ppm@nextups-ppm:~$ sudo PPM -c -u pve_user 'root'

PPM: pve_user option has been updated.
PPM: Restarting service to apply new value...
```

- **Set Proxmox VE password**

Set the password(s) to login on the Proxmox VE host(s):

Command: sudo PPM -c -u pve1_pass '<value>'
sudo PPM -c -u pve2_pass '<value>'
sudo PPM -c -u pve3_pass '<value>'

[IMPORTANT] Only alphanumeric and !*#$&:_- characters are allowed

Return Output:

```
ppm@nextups-ppm:~$ sudo PPM -c -u pve1_pass 'N3xt3M3A*-'

PPM: pve1_pass option has been updated.
PPM: Restarting service to apply new value...
```

Check the configuration file

All settings can be checked in the configuration file or with below command:

Command: sudo PPM -c

Return Output:

```
ppm@nextups-ppm:~$ sudo PPM -c

NEXT UPS Systems - Power Protection Manager (PPM) for Proxmox VE - 1.1.0 (build pve.20250625)

Configuration file:

CUSTOMER TAG                                                :   NUS-EMEA
SNTP TIMEZONE                                               :   Europe/Brussels

UPS1 IP ADDRESS                                             :   192.168.1.251
UPS1 PASSWORD                                               :   ********
UPS2 IP ADDRESS                                             :   192.168.1.252
UPS2 PASSWORD                                               :   ********
UPS SNMP VERSION                                            :   3
UPS SNMP V2C COMMUNITY                                      :   private
UPS SNMP V3 USER NAME                                       :   root
UPS SNMP V3 USER AUTHENTICATION PASSWORD                    :   password
UPS SNMP V3 USER AUTHENTICATION PROTOCOL                    :   MD5
UPS SNMP V3 USER PRIVATE PASSWORD                           :   Password
UPS SNMP V3 USER SECURITY LEVEL                             :   authPriv

UPS NON PROTECT STATE ACTION                                :   donothing
UPS ON BATTERY TIMER (seconds | minutes)                    :   15
UPS MINIMUM REMAINING BACKUP TIME THRESHOLD (minutes)       :   25
UPS MINIMUM REMAINING BACKUP PERCENTAGE THRESHOLD (%)       :   50

UPS OUTLETS POWER-OFF TIMER (minutes)                       :   15
UPS OUTLETS POWER-ON TIMER (minutes)                        :   5

PVE USER                                                    :   root
PVE1 IP ADDRESS                                             :   192.168.1.101
PVE1 PASSWORD                                               :   ********
PVE2 IP ADDRESS                                             :   192.168.1.102
PVE2 PASSWORD                                               :   ********
PVE3 IP ADDRESS                                             :   192.168.1.103
PVE3 PASSWORD                                               :   ********

MAIL SENDER                                                 :   service@nextups.eu
MAIL RECIPIENT1                                             :   service@nextups.eu
MAIL RECIPIENT2                                             :
```

4.3 STATUS

After configuring the PPM and SNMP settings, the service and UPS status can be checked by using the status command. It will show the status of the PPM service, and actual values for the monitored parameters of the configured UPSs.
Also, the last 10 log entries will be shown.

Command: sudo PPM -s
Return Output:

```
ppm@nextups-ppm:~$ sudo PPM -s

NEXT UPS Systems - Power Protection Manager (PPM) for Proxmox VE

Service status                      :   Running
Service version                     :   1.1.0 (build pve.20250625)
Mail agent status                   :   Running

Customer tag                        :   NUS-EMEA

UPS1
----
UPS IP address                      :   192.168.1.251
UPS status                          :   On Line
UPS time on battery                 :   00:00:00 (hh:mm:ss)
UPS battery status                  :   Normal
UPS battery voltage                 :   84.4V
UPS battery capacity                :   100%
UPS battery remaining backup time   :   86 minutes
UPS battery temperature             :   25 degrees Celsius
UPS output load                     :   23%
UPS name                            :   Demo_Proxmox_Li-Ion
UPS location                        :   Server_Rack_LABO
UPS technology                      :   ON-LINE
UPS SNMP card firmware              :   3.7.0.3
UPS serial number                   :   CP10P3312980004

UPS2
----
UPS IP address                      :   192.168.1.252
UPS status                          :   On Line
UPS time on battery                 :   00:00:00 (hh:mm:ss)
UPS battery status                  :   Normal
UPS battery voltage                 :   84.4V
UPS battery capacity                :   100%
UPS battery remaining backup time   :   82 minutes
UPS battery temperature             :   25 degrees Celsius
UPS output load                     :   25%
UPS name                            :   Demo_Proxmox_Li-Ion
UPS location                        :   Server_Rack_LABO
UPS technology                      :   ON-LINE
UPS SNMP card firmware              :   3.7.0.3
UPS serial number                   :   CP10P3312980005


Last 10 logs:
-------------
21-01-2025 12:16:01 - The status of UPS "Demo_Proxmox_Li-Ion" with IP "192.168.1.251" is Not Detected
21-01-2025 12:16:07 - The status of UPS "Demo_Proxmox_Li-Ion" with IP "192.168.1.251" is On Line --
no timer activated (anymore)
21-01-2025 12:16:19 - The status of UPS "Demo_Proxmox_Li-Ion" with IP "192.168.1.251" is Not Detected
21-01-2025 12:16:25 - The status of UPS "Demo_Proxmox_Li-Ion" with IP "192.168.1.251" is On Line --
no timer activated (anymore)
21-01-2025 12:17:04 - The status of UPS with IP "192.168.1.251" is Not Detected
21-01-2025 12:19:39 - The status of UPS "Demo_Proxmox_Li-Ion" with IP "192.168.1.251" is On Line --
no timer activated (anymore)
```

4.3.1 PPM Service status values

Service status	: shows the status of the PPM Service: 'Running' or 'Not running'
Service version	: version of the PPM service
Mail agent status	: shows the status of the mail agent
Customer tag	: the customer tag (PPM name) as set in the PPM configuration. This is a variable to identify (name) your configuration. It will be used in the configuration files and in the subject field for mail communication

4.3.2 UPS status values

UPS IP address	: IP address of the monitored UPS. Can be set in the UPS configuration
UPS status	: shows the status/output of the monitored UPS. Depending on the UPS technology this can be: - On Line - On Bypass - Boosting - Reducing - Off/Standby - On battery - Unknown
UPS time on battery	: time the UPS is working on battery power
UPS battery status	: status of the UPS battery
UPS battery voltage	: actual battery voltage of the UPS battery
UPS battery capacity	: actual battery percentage of the UPS battery
UPS battery remaining backup time	: remaining backup time, calculated by the UPS depending on load and battery level
UPS battery temperature	: actual UPS temperature
UPS output load	: actual load of the UPS in percentage of its maximum
UPS name	: UPS description as defined in the UPS network card
UPS location	: UPS location as defined in the UPS network card
UPS technology	: type of UPS, ON-LINE or LINE-INTERACTIVE
UPS SNMP card firmware	: shows the FW version of the network card in the UPS
UPS serial number	: shows the Serial no of the monitored UPS

4.3.3 PPM Service commands

The PPM service can be started (-S), restarted (-R) or stopped (-K):

Commands: sudo PPM -S
sudo PPM -R
sudo PPM -K

Return Output:

```
ppm@nextups-ppm:~$ sudo PPM -R

PPM has restarted.
```

4.4 LOGS

PPM will log all events (status changes) from the UPSs and events from the PPM service into a log file. This log can be checked in the console or exported into a text file.

4.4.1 Display all logs

To view all log entries the sudo PPM -l command can be used:

Command: sudo PPM -l
Return Output:

```
ppm@nextups-ppm:~$ sudo PPM -l

There are no available logs.
```

If no logs are available it will state 'There are no available logs', otherwise it will list all log entries stored in the log file.

4.4.2 Clear logs

To clear all log entries the sudo PPM -l -c command can be used:

Command: sudo PPM -l -c
Return Output:

```
ppm@nextups-ppm:~$ sudo PPM -l –c

Logs have been cleared.
```

4.4.3 Export log file

For backup or evaluation purposes the log entries are saved in a log file. This log file can be exported as a text file.
The file 'ppm_log_export' will be placed in the '/home/ppm/' directory and with the use of an SCP client (e.g. WinSCP), it can be transferred to your local device for reviewing.

Command: sudo PPM -l -e
Return Output:

```
ppm@nextups-ppm:~$ sudo PPM -l –e

PPM: Logs have been exported. A file called 'ppm_log_export' is placed in
'/home/ppm/' directory.
```

4.5 EXPORT/IMPORT CONFIG FILE

All configuration settings for PPM, UPS, Proxmox VE and Shutdown parameters can be exported to a configuration file.

4.5.1 EXPORT

For backup or editing purposes it is possible to export the configuration settings as a text file. The file 'ppm_config_export' will be placed in '/home/ppm/' directory and with the use of an SCP client (e.g. WinSCP), it can be transferred to your local device.

Command: sudo PPM -c -e
Return Output:

```
ppm@nextups-ppm:~$ sudo PPM -c -e

PPM: Configuration has been exported. A file called 'ppm_config_export' is
placed in '/home/ppm/' directory.
```

example of a ppm_config_export file:

```
# Customer tag (name)
CUSTTAG="NUS-EMEA"

# SNTP timezone
TIMEZONE="Europe/Brussels"

# Path to script
UPSONBATTERYTIMERSCRIPT="/opt/ppm/scripts/upsonbatterytimershutdownPVE.sh"
UPSBATTCRITMINREMAINSCRIPT="/opt/ppm/scripts/upsbattcritminremainshutdownPVE.sh"
UPSBATTCRITPCNTSCRIPT="/opt/ppm/scripts/upsbattcritpcntshutdownPVE.sh"

# Value in seconds (s)
POLLINGINTERVAL="5s"

# UPS1 IP address (IPv4)
UPS1IP="192.168.1.251"

# UPS2 IP address (IPv4)
UPS2IP="192.168.1.252"

# UPS SNMP version
UPSSNMPVERSION="3"

# UPS SNMP v2c community
UPSSNMPV2CCOMMUNITY="private"

# UPS SNMP v3 authentication
UPSSNMPV3USER="root"
UPSSNMPV3USERAUTHPASS="password"
UPSSNMPV3USERAUTHPROTOCOL="MD5"
UPSSNMPV3USERPRIVPASS="Password"
UPSSNMPV3USERPRIVPROTOCOL=""
UPSSNMPV3USERSECLEVEL="noAuthNoPriv"

# Action when UPS state Unknown, Off/Standby or On Bypass
UPSNONPROTECTSTATEACTION="donothing"

# Value in seconds (s) or minutes (m)
UPSONBATTERYTIMER="15m"

# Value in minutes (m)
UPSBATTCRITMINREMAIN="25"
UPSONLINEPOWEROUTLETSCONTROLOFFTIMER="15"
UPSONLINEPOWEROUTLETSCONTROLONTIMER="5"
UPSLINEINTPOWEROUTLETSCONTROLOFFTIMER=""
UPSLINEINTPOWEROUTLETSCONTROLONTIMER=""

# Value in percentage
UPSBATTCRITPCNT="50"

# PVE root user
PVEUSER="root"

# PVE IP addresses (IPv4)
PVE1IP="192.168.1.101"
PVE2IP="192.168.1.102"
PVE3IP="192.168.1.103"

# Alert mail sender
MAILSENDER="service@nextups.eu"

# Alert mail recipients
MAILRECIPIENT1="service@nextups.eu"
MAILRECIPIENT2=""
```

4.5.2 IMPORT

With the use of an SCP client (e.g. WinSCP) a saved configuration file can be transferred from your local device to the '/home/ppm/' directory and reloaded to the PPM service.

[IMPORTANT] Great care in the syntax and layout of the config file must be taken to ensure a good function of the PPM service

Command: sudo PPM -c -i '/home/ppm/new_ppm_config_file'
Return Output:

```
ppm@nextups-ppm:~$ sudo PPM -c -i '/home/ppm/new_ppm_config_file'

PPM: Restarting service to apply new value...
```

5. Release notes

Release notes for the Power Protection Manager (PPM) for Proxmox VE - Software:

Date	Changes	Version No	Build version
21/01/2025	Initial release	1.0	build 20241206
28/02/2025	Cosmetic enhancement to configuration overview	1.0.1	build pve.20250226
01/07/2025	Add UPS power outlets control option	1.1	build pve.20250625

The software release notes and changes can be checked with the following command.

Command: sudo PPM --release-notes
Return Output:

```
ppm@nextups-ppm:~$ sudo PPM --release-notes

Release notes:
--------------
v1.0     - build 20241206 - Initial release
v1.0.1   - build pve.20250226 - Cosmetic enhancement to configuration overview
v1.1     - build pve.20250625 - Add power outlets control option
```

Release notes for the Power Protection Manager (PPM) for Proxmox VE - Manual:

Date	Changes	Version No
22/01/2025	First draft PPM manual	1.01
28/02/2025	Cosmetic enhancement to configuration overview	1.02
16/05/2025	Layout enhancement and corrected typos	1.03
01/07/2025	Add UPS power outlets control option	1.04