Advantech IIoT Group

Advantech TPC-100W Software

User Manual

Version <1.19>

Revision History

Date	Version	Description
2024/09/11	1.19	1. Support import certificate in Settings tool 2. Support enable/disable hardware acceleration in Chromium in Settings tool 3. Support config Chromium download directory in Settings tool
2024/07/08	1.18	Add Yocto 4.2 Add more details of Yocto 4.2 installation.
2024/06/05	1.17	Update Settings Tool images Add start_custom.sh option in Settings Tool Support export downloads
2024/01/23	1.16	1. Add Password page in Settings tool 2. Add Exit button in Settings tool 3. Add how to change keyboard layout for terminal
2023/11/08	1.15	1. Add Logo page in Settings tool 2. Add Firewall tab in Network page
2023/10/05	1.14	Add third-party software license
2023/08/24	1.13	Add Yocto 4.0 Add factory reset mode Update First login Update Settings tool： 1. System Support enable/disable ethernet/USB/system virtual keyboard for chromium Support reboot system automatically Support open home page for chromium 2. Security Support authentication with system user 3. Operate Support export screenshots Support open terminal

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2023/05/31	1.12	Add the installation from top bar icon Add the note for docker Add Q&A for opcua certificate
2023/04/12	1.11	Add how to import/export Settings config by command line interface
2023/02/24	1.10	1. Add how to backup eMMC rootfs to Micro SDCard and restore system 2. Add how to create .swu image and restore system 3. Add change logo chapter 4. Add how to start Weston(desktop service) and startup Application as non-root user
2023/01/30	1.9	1. Add the FTP page of GUI Settings tool 2. Add Static Page option in Startup
2022/11/09	1.8	1. Add the Backup page of GUI Settings tool 2. Update Gesture
2022/10/06	1.7	1. Update the Update page of GUI Settings tool 2. Update Gesture 3. Add Watchdog chapter
2022/09/14	1.6	1. Add USB storage chapter.
2022/08/16	1.5	1. Change the Startup to System page of GUI Settings tool 2. Add readonly and COM setting in System page of GUI Settings tool
2022/07/28	1.4	1. Add Yocto 3.3 2. Add more detailed information for "Install Yocto Software"
2022/07/04	1.3	Update the method of install Yocto 3.0 to emmc.
2022/06/17	1.2	Add the OPCUA page of GUI Settings tool
2022/05/24	1.1	Add the detailed information of GUI Settings tool
2022/05/19	1.0	First version

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1. ARM Yocto

TPC-100W platform is an embedded system with Linux Yocto 3.0/3.3/4.0/4.2. It contains system-required commands and drivers ready. The Yocto Project is an open source collaboration project that helps developers create custom Linux-based systems that are designed for embedded products regardless of the product's hardware architecture. Yocto Project provides a flexible toolset and a development environment that allows embedded device developers across the world to collaborate through shared technologies, software stacks, configurations, and best practices used to create these tailored Linux images.

2. ARM Yocto Software Support

2.1. System Default Software

ARM Yocto 4.2 support complete IIoT function as default including:

- SSH
- Wayland Terminal
- Qt6.5.0
- Gstreamer1.22.5
- Imx-gpu-viv 6.4.11.p2.2
- Wayland 1.22.0-r0
- Weston 12.0.4.imx-r0
- Weston-xwayland 12.0.4.imx-r0
- VNC
- TPM SLB9670
- GUI Settings Tool
- Recovery
- Security boot
- Watchdog
- Openssh-sftp-server 9.8p1-r0

ARM Yocto 4.0 support complete IIoT function as default including:

- SSH
- Wayland Terminal
- Qt6.4.3
- Gstreamer1.20.3
- Imx-gpu-viv 6.4.3.p4.8
- Wayland 1.20.0-r0
- Weston 10.0.3.imx-r0
- Weston-xwayland 10.0.3.imx-r0
- VNC
- TPM SLB9670
- GUI Settings Tool
- Recovery
- Security boot
- Watchdog
- Openssh-sftp-server 8.9p1-r0

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ARM Yocto 3.3 support complete IIoT function as default including:

- SSH
- Wayland Terminal
- Qt5.15.2
- Gstreamer1.18.5
- Imx-gpu-viv 6.4.3.p2.6
- Wayland 1.18.0-r0
- Weston 9.0.0.imx-r0
- Weston-xwayland 9.0.0.imx-r0
- VNC
- TPM SLB9670
- GUI Settings Tool
- Recovery
- Security boot
- Watchdog
- Openssh-sftp-server 8.5p1-r0

ARM Yocto 3.0 support complete IIoT function as default including:

- SSH
- Wayland Terminal
- Qt5.15.0
- Gstreamer1.0
- Imx-gpu-viv 6.4.3.p1.4
- Wayland 1.18.0-r0
- Weston 9.0.0.imx-r0
- Weston-xwayland 9.0.0.imx-r0
- VNC
- TPM SLB9670
- GUI Settings Tool
- Recovery
- Security boot

2.2. GPU Accelerations

Vivante GPU accelerations for Wayland; The Hantro Video Processing Unit supports the following decoders:

- video/x-h265
- video/x-vp9
- video/x-h264
- video/x-vp8
- video/x-vp6-flash
- video/mpeg
- video/x-h263
- video/x-flash-video
- video/x-divx
- video/x-xvid
- video/x-cavs
- video/x-wmv
- video/x-pn-realvideo
- video/x-raw

2.3. Install Yocto Software

Firstly, burning image to microSD card and instruction as below. If you already have the microSD card with Yocto image, you can go to the second part directly.

Note. Recommend the microSD card is more than 16GB storage interface to avoid not enough storage space. If you install Yocto 4.2, please read [1] first.

If your PC is Linux environment:

1. Prepare the Linux environment that can use “dd” command. (Below uses ubuntu 18.04 as example.)
2. Use “sudo dd if=imgfile of=SDpartition bs=4096” to burn the img file to your microSD card. (Note: You should check which partition is your microSD card firstly and you can format your microSD card before this step to avoid compatibility issue.)

```
$ sudo dd if=TPC-100W-2g-v1.5.img of=/dev/sdc bs=4096
```

If your PC is Windows:

1. Use the Rufus or Raspberry Pi Imager provided by Raspberry Pi to burn the img file to your microSD card. You can refer to below link for the usage of the tools.
   Raspberry Pi Imager:
   https://www.raspberrypi.com/news/raspberry-pi-imager-imaging-utility/

   Burn image to microSD steps：
   1. Launch Raspberry Pi Imager
   2. Click Choose OS

   3. Select Use custom to write an unlisted image

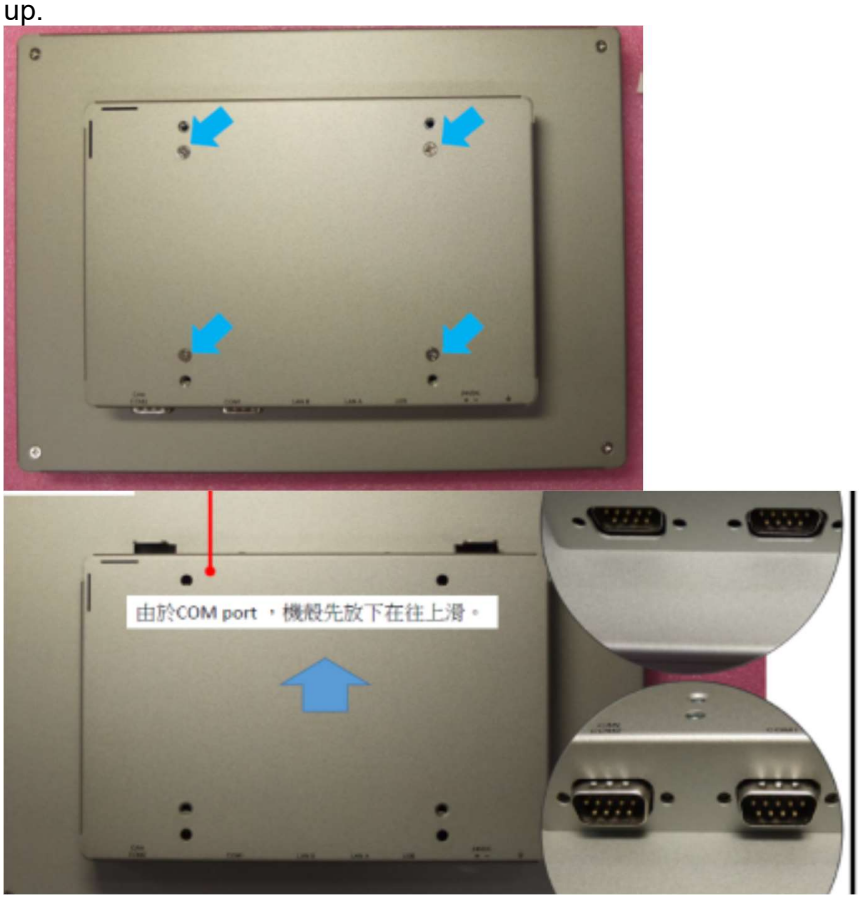
   4. Click Choose SD card

5. Select from the list the SD card you want to write to
6. Click Write to begin the image writing process

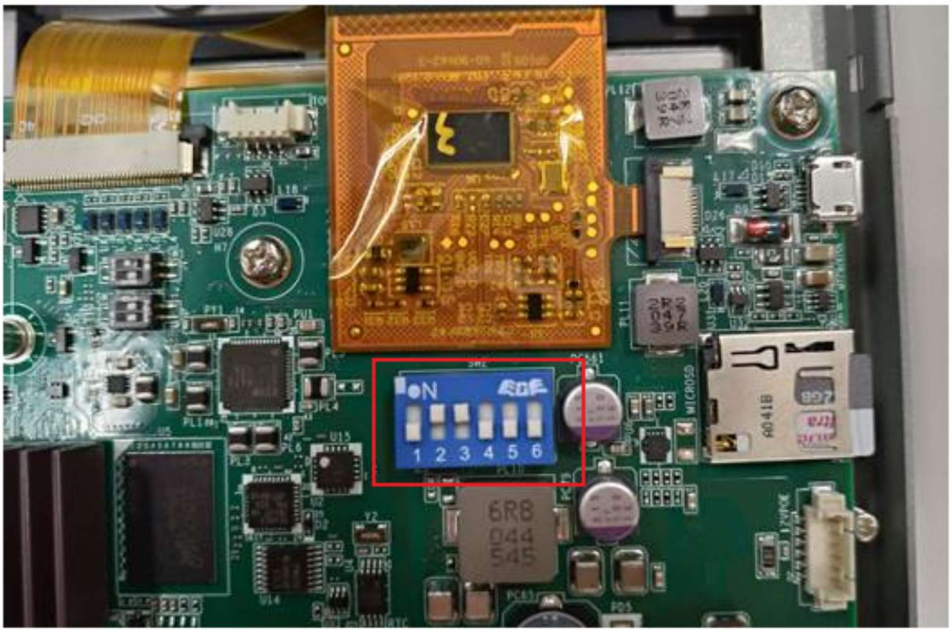
Rufus:
https://rufus.ie/en/

Second, after image is put into microSD card, use microSD card to update the image.

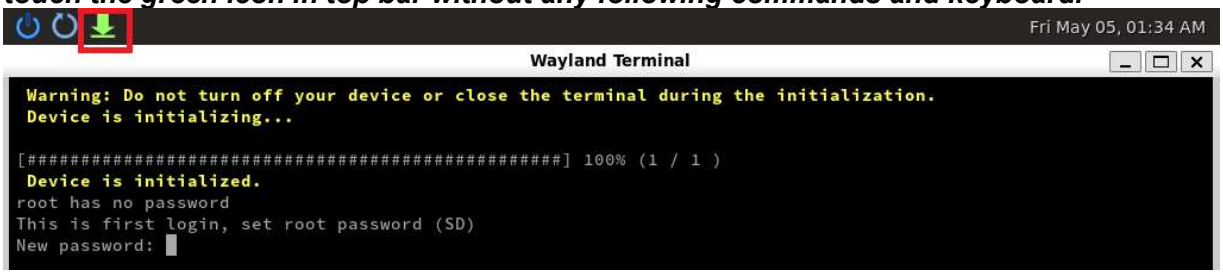
1. Remove the screws from back cover. Due to COM port cover need to put down, then slide up.



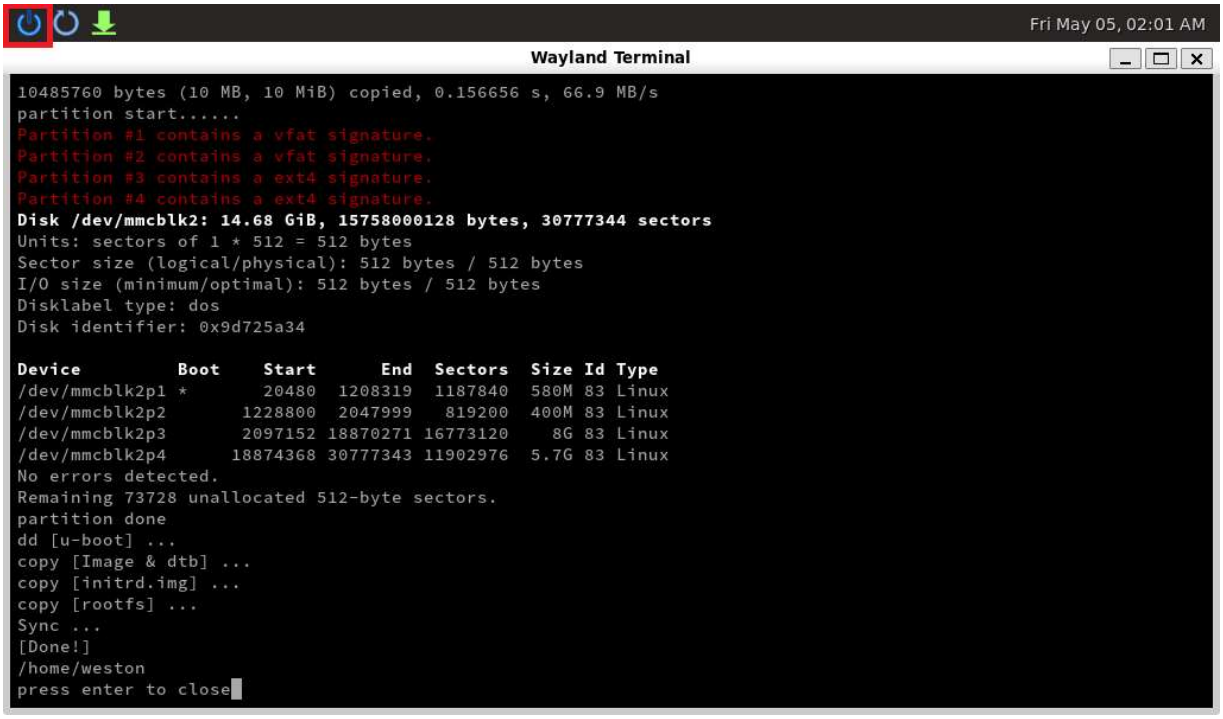
2. Insert microSD card, then adjust switch as below order (red remark).



3. Power on the system. ***SD card is used only for installing image to eMMC. You can touch the green icon in top bar without any following commands and keyboard.***



After installation, you just power off device and skip to 7.

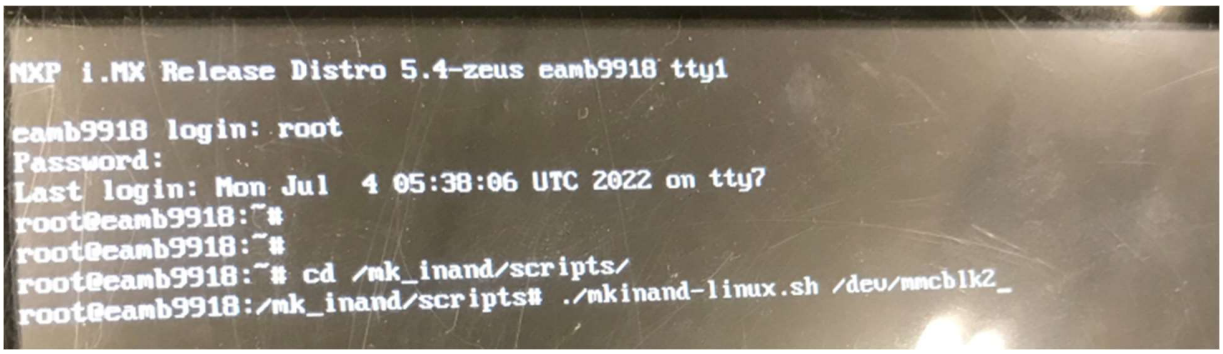


4. (Optional for Yocto3.0)After login the system with desktop UI, open Terminal and input below commands. (This will close the desktop UI because it will cause the next process abnormally.)

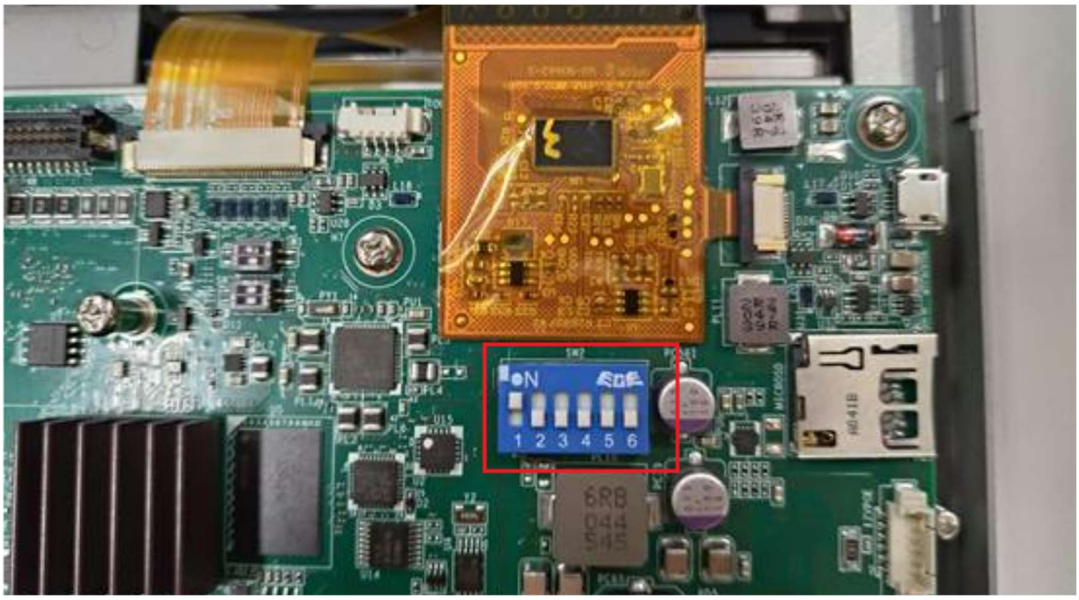
```
sh-5.0# systemctl stop weston@root.service
```

5. Login the system with root account if need and enter below commands.

```
root@eamb99918:~# cd /mk_inand/scripts
root@eamb99918:/mk_inand/scripts# ./mkinand-linux.sh /dev/mmcblk2
```



6. Waiting for update is finished. Then power off the system.
7. Adjust switch as below location, remove microSD card.



8. Power on again from eMMC. Then it will ask you to setup the password of operator system in eMMC. Please refer to chapter 2.4 First login for more information.

2.4 First login

If you are the first time to login the system, you would need to setup the password. Please connect the physical keyboard or use on screen keyboard and use the account “root” to login.

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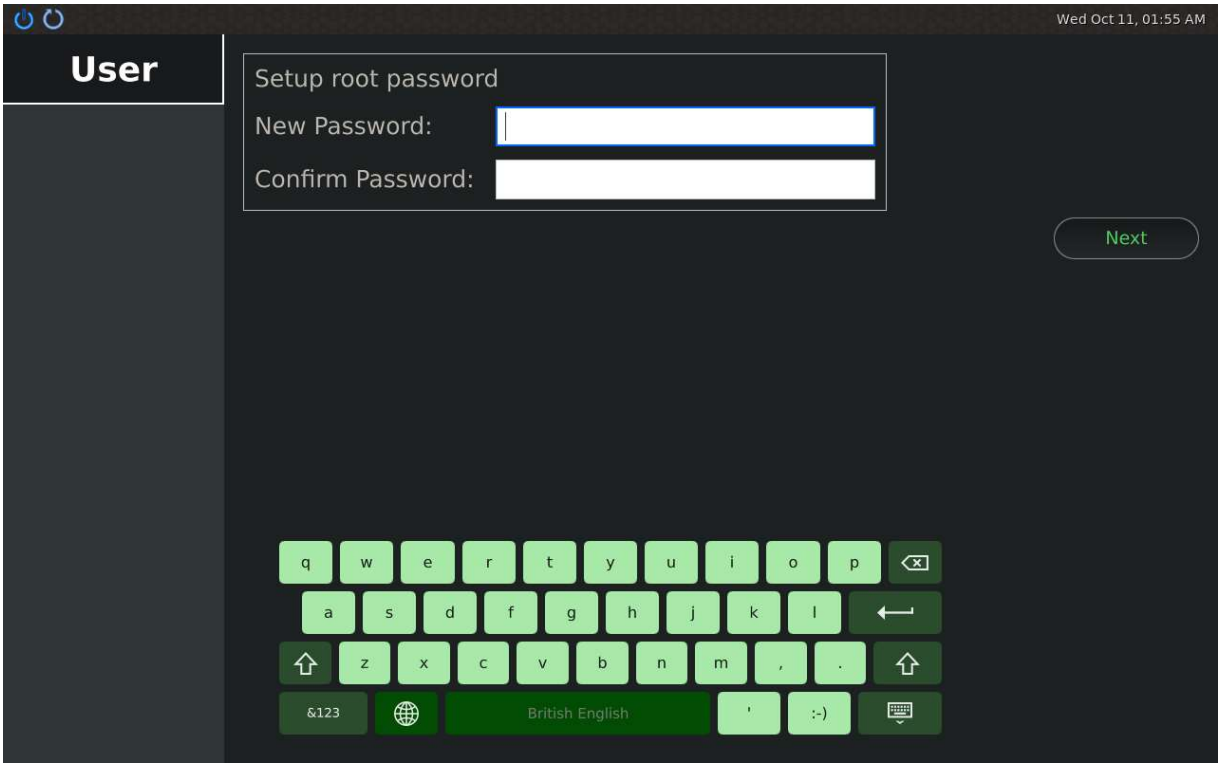
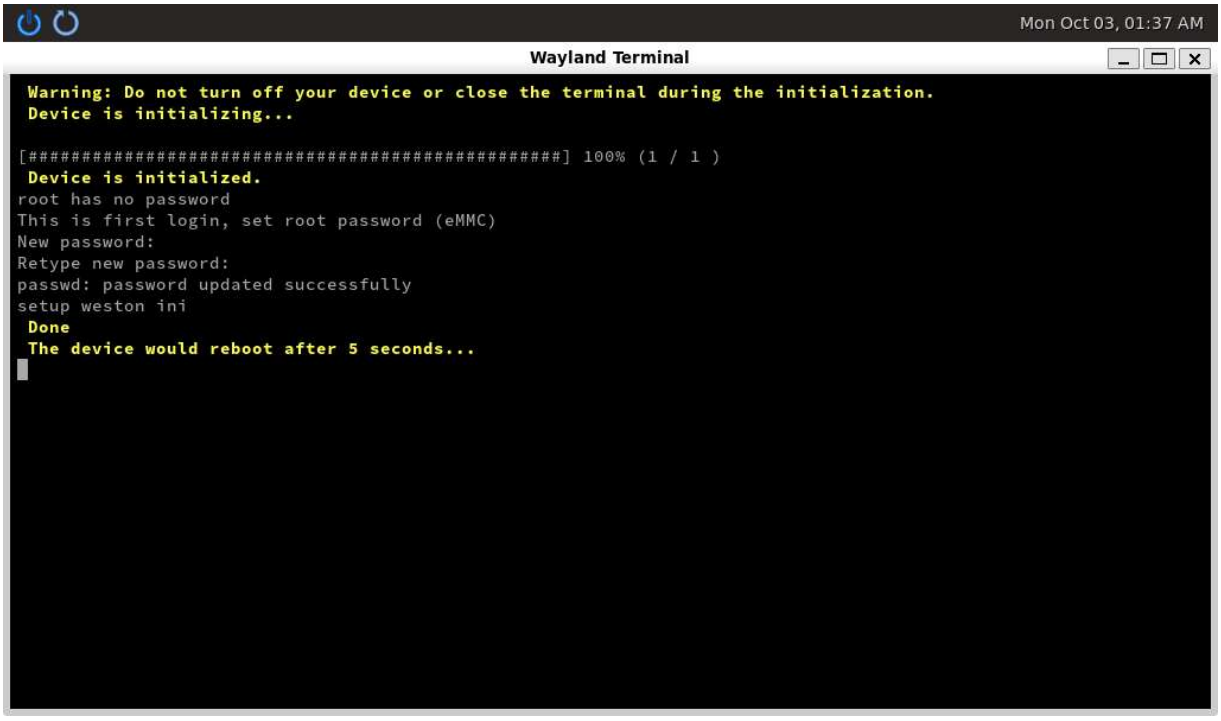
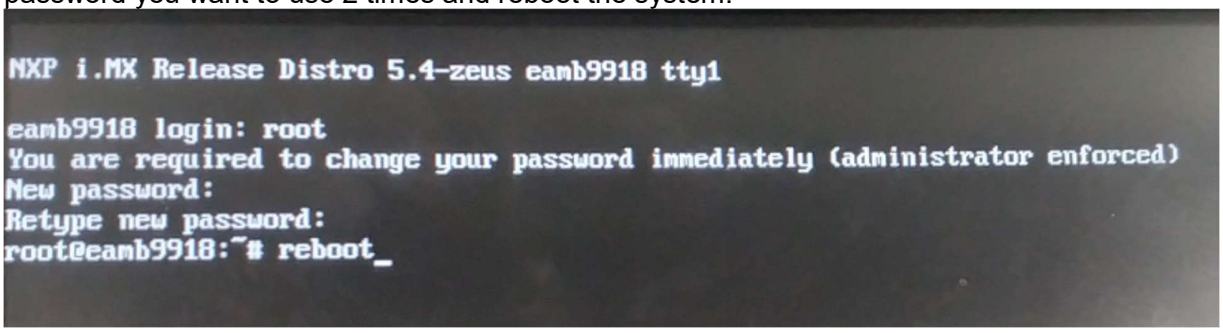
If your screen displays this, please input the password you want to use 2 times for root. After setup password, it would auto reboot after 5 seconds.



If your screen displays this, please input the password you want to use 2 times for root. Then it would auto reboot after 5 seconds.



If your screen displays this, please use the account “root” to login, Then you have to input the password you want to use 2 times and reboot the system.



Now you can use the Yocto system with GUI.

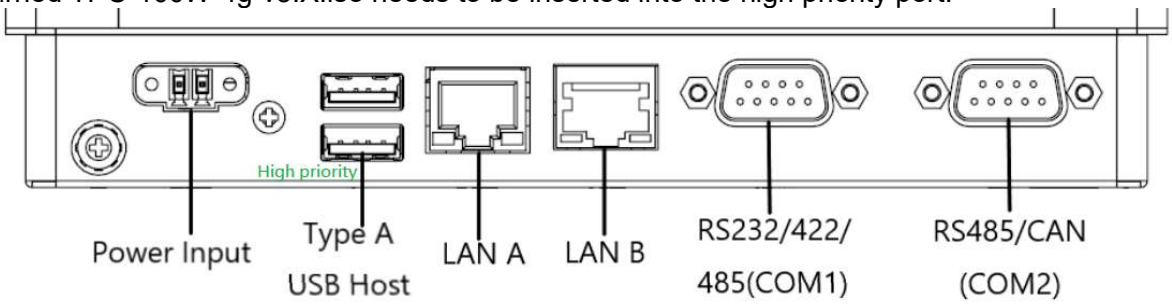
[1] You can get the files from Yocto 4.2.

File name	Target device	Description
TPC-100W-4g-v3.X-fw.img	SD	Automatically install firmware(u-boot).
TPC-100W-4g-v3.X.img (non-EFI boot)	SD	Manually install firmware(u-boot), Linux kernel and root file system to EMMC.
TPC-100W-4g-v3.X-efi.img (EFI boot)	SD	Automatically install firmware(u-boot), EFI file, Linux kernel and root file system to EMMC
TPC-100W-4g-v3.X.iso (EFI boot)	USB	Automatically Install EFI file, Linux kernel and root file system to EMMC.

Only in Yocto 4.2, TPC-100W can support USB installation and secure boot in EFI boot. As with other X86 architectures, there is the following fixed order of boot devices.

order	**device**
#1	USB#1
#2	SD
#3	EMMC

If TPC-100W is plugged into two USB storage devices during USB installation, the USB storage burned TPC-100W-4g-v3.X.iso needs to be inserted into the high priority port.



3. TPC-100W Module Extension

TPC-100W supports one M.2 E-Key slot which allows users to expand the functionality. There are pre-configured Wi-Fi modules ready to use. This chapter will take Wi-Fi module as an example to demonstrate how to use a module on TPC-100W.

3.1 Module Information

- P/N: 968DD00086
  M.2 2230 RYWDB02 802.11a/b/g/n+BT5
  Cable: 17cm~20cm

- P/N: EWM-W194M201E
  M.2 2230 SDIO-UART Module IEEE 802.11ac/a/b/g/n, Bluetooth 5.0, 2T2R
  Cable: 17cm~20cm

3.2 The Configuration and Connection of WIFI Module

Configure by Command mode

1. Check the WIFI device exists.

```
$ ifconfig wifi
wifi0     Link encap:Ethernet HWaddr 88:da:1a:76:38:bc
          inet6 addr: fe80::8ada:1aff:fe76:38bc/64 Scope:Link
          UP BROADCAST MULTICAST DYNAMIC MTU:1500 Metric:1
          RX packets:0 errors:0 dropped:0 overruns:0 frame:0
          TX packets:0 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:1000
          RX bytes:0 (0.0 B) TX bytes:0 (0.0 B)
or
$ ifconfig mlan0 (or wlan0)
mlan0: flags=-28669<UP,BROADCAST,MULTICAST,DYNAMIC>  mtu 1500
          ether 48:e7:da:78:20:01  txqueuelen 1000  (Ethernet)
          RX packets 0  bytes 0 (0.0 KiB)
          RX errors 0  dropped 0  overruns 0  frame 0
          TX packets 0  bytes 0 (0.0 KiB)
          TX errors 0  dropped 0 overruns 0  carrier 0  collisions 0
```

Or you can use below command to check.

```
ls /sys/class/net/
can0 can1 eth0 eth1lo wifi0 (or mlan0, wlan0)
```

If the WIFI node exists, the WIFI driver works normally.

2. Enable WIFI.

```
$ connmanctl technologies
/net/connman/technology/p2p
    Name = P2P
    Type = p2p
    Powered = False
    Connected = False
    Tethering = False
/net/connman/technology/wifi
    Name = WiFi
    Type = wifi
    Powered = True
    Connected = False
    Tethering = False
/net/connman/technology/bluetooth
    Name = Bluetooth
    Type = bluetooth
    Powered = True
    Connected = False
    Tethering = False
/net/connman/technology/ethernet
    Name = Wired
    Type = ethernet
    Powered = True
    Connected = True
    Tethering = False
```

If “Powered = True”, it means WIFI is enabled.
If WIFI is disabled, please use below command to enable it.

```
$ connmanctl enable wifi
```

3. Scanning WIFI hotspot.

```
$ connmanctl scan wifi
$ connmanctl services
*AO Wired                ethernet_c400ad7d091c_cable
      advanxxx           wifi_88da1a7638bc_616476616e74656368_managed_psk
      TP-LINK_A990       wifi_88da1a7638bc_54502d4c494e4b5f41393930_managed_psk
      QA-Test            wifi_88da1a7638bc_51412d54657374_managed_psk
      TP-LINK_603854     wifi_88da1a7638bc_54502d4c494e4b5f363033383534_managed_none
      PCCWS_LOCAL        wifi_88da1a7638bc_50434357535f4c4f43414c_managed_psk
      QA-Test-5G         wifi_88da1a7638bc_51412d546573742d3547_managed_psk
      php                wifi_88da1a7638bc_706870_managed_psk
                         wifi_88da1a7638bc_hidden_managed_none
                         wifi_88da1a7638bc_hidden_managed_psk
      KOALXA-AP-2.4      wifi_88da1a7638bc_4b4f414c58412d41502d322e34_managed_psk
      PCCWS_GDCN         wifi_88da1a7638bc_50434357535f4744434e_managed_psk
      ChinaNet-APUU      wifi_88da1a7638bc_4368696e614e65742d41505555_managed_psk
      DIRECT-8CAXA-JIANFENGmsMZ  wifi_88da1a7638bc_4449524543542d38434158412d4
                                 a49414e46454e476d734d5a_managed_psk
      HP-HOTSPOT-98-LaserJet M1218  wifi_88da1a7638bc_48502d484f5453504f542d39382d4c
                                    617365724a6574204d31323138_managed_none
      KoalXARd@6         wifi_88da1a7638bc_4b6f616c584152644036_managed_psk
      TP-LINK_F8FE       wifi_88da1a7638bc_54502d4c494e4b5f46384645_managed_none
      KOALXA-AP-5        wifi_88da1a7638bc_4b4f414c58412d41502d35_managed_psk
```

4. Connect to WIFI hotspot.
   If the WIFI hotspot needs password, it will remind you to input.

```
connmanctl
connmanctl> agent on
Agent registered
connmanctl> connect wifi_88da1a7638bc_616476616e74656368_managed_psk
Agent RequestInput wifi_88da1a7638bc_616476616e74656368_managed_psk
    Passphrase = [ Type=psk, Requirement=mandatory ]
Passphrase? ******
Connected wifi_88da1a7638bc_616476616e74656368_managed_psk
connmanctl> quit
```

5. Now you can browse the internet by WIFI.

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6. Disable WIFI. Require disconnect WiFi before disable WiFi, otherwise connmanctl would be abnormal.

```
$ connmanctl disconnect wifi_88da1a7638bc_616476616e74656368_managed_psk
$ connmanctl disable wifi
```

3.3 The Configuration and Connection of Bluetooth Module

Configure by Command mode

1. Check the Bluetooth device status.

```
root@Qing:~# hciconfig
hci0: Type: BR/EDR Bus: USB
BD Address: 00:1A:7D:DA:71:13 ACL MTU: 310:10 SCO MTU: 64:8
UP RUNNING
RX bytes:574 acl:0 sco:0 events:30 errors:0
TX bytes:368 acl:0 sco:0 commands:30 errors:0
```

If there is no device showed, it means no driver or device.

2. Enable Bluetooth service.

```
systemctl status bluetooth
## 如果没有active， 你需要执行以下指令， 否则，无须执行
systemctl enable bluetooth.service
systemctl start bluetooth
```

```
connmanctl enable bluetooth
#or
# hciconfig hci0 up
```

3. Open Bluetooth.

```
bluetoothctl

    [bluetooth]# power on
    [bluetooth]# pairable on
```

4. Scanning Bluetooth device.

Start scanning

```
## 扫描设备
    [bluetooth]# scan on
Discovery started
[CHG] Controller 00:19:88:5E:10:B1 Discovering: yes
[NEW] Device 98:39:8E:1B:D8:88 Galaxy A5 (2016)
[CHG] Device 98:39:8E:1B:D8:88 RSSI: -86
Now, Copy the MAC Address of your PC
```

Stop scanning:

```
## 结束扫描
[bluetooth]# scan off
```

Please record the MAC address you want to connect.

5. Pair and connect to the Bluetooth device.
Pair the device by MAC address. If the device is paired before, you can ignore this.

```
[bluetooth]# pair 98:39:8E:1B:D8:88
Attempting to pair with 98:39:8E:1B:D8:88
[CHG] Device 98:39:8E:1B:D8:88 Connected: yes
Request confirmation
[agent] Confirm passkey 117022 (yes/no):
```

Connect the device by MAC address.

```
[bluetooth]# connect 98:39:8E:1B:D8:88
Attempting to connect to 98:39:8E:1B:D8:88
[CHG] Device 98:39:8E:1B:D8:88 Connected: yes
Connection successful
[CHG] Device 98:39:8E:1B:D8:88 ServicesResolved: yes
```

Trust the device by MAC address.

```
[bluetooth]# trust 98:39:8E:1B:D8:88
```

Now the connection is successful. You can exit the bluetoothctl.

```
[bluetooth]# quit
```

6. Using Obex profile to test the file transmission by Bluetooth.

```
$ echo "helloworld" > /home/root/test.txt
$ export $(dbus-launch)
$ /usr/libexec/bluetooth/obexd -r /home/root -a -d &
```

```
obexctl
[obex]# connect 98:39:8E:1B:D8:88
[obex]# send <file>
[obex]# quit
```

4. Time and Date Setting

Set system time (2021/10/07 09:00:00):

```
sh-5.0# date -s "2021/10/07 09:00:00"
```

Synchronize time from the NTP server:

```
sh-5.0# ntpdate <NTPSERVERIP>
```

Reset RTC hardware clock time (use current system time):

```
sh-5.0# hwclock -w
```

Reset system time (use RTC hardware clock time):

```
sh-5.0# hwclock -s
```

Set system time zone (use Taipei time):

```
sh-5.0# cp /usr/share/zoneinfo/Asia/Taipei /etc/localtime
sh-5.0# sync
```

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5. CAN Setting

TPC-100W support FINTEK CAN. The below table shows the detailed information of CAN on TPC-100W and here we list the basic command to use CAN on TPC-100W.

HW	DEVICE	MODE
Fintek CAN0	can0	socket can

Setting: Open CAN device (The following examples will configure “can0” to bit-rate 250000, sample-point 0.875 and error restart with 100ms.)

```
sh-5.0# ifconfig can0 down
sh-5.0# ip link set can0 type can restart-ms 100
sh-5.0# ip link set can0 type can bitrate 250000 sample-point 0.875
sh-5.0# ip link set can0 type can berr-reporting on
sh-5.0# ifconfig can0 txqueuelen 1000
sh-5.0# ifconfig can0 up
```

We’ll use “candump” to receive data, “cangen” & “cansend” to send data. The “cangen” will send random data & ID and “cansend” will send specific data & ID to CANBUS.

Send message (“123#R") to can0:

```
sh-5.0# cansend can0 123#R
```

Receive message from can0:

```
sh-5.0# candump can0
```

6. Brightness Setting

1. Get brightness value:

```
sh-5.0# cat /sys/class/backlight/lvds_backlight\@0/brightness
```

2. Set brightness value: You can set the value from 0~100. Please notice that value 0 will let the screen be black.

Note: If the value is 0~4, it will be reset to 5 by systemd-backlight service after reboot.

```
Value 1
sh-5.0# echo 1 >> /sys/class/backlight/lvds_backlight\@0/brightness
Value 100
sh-5.0# echo 100 >> /sys/class/backlight/lvds_backlight\@0/brightness
```

Note: You have to save brightness in systemd-backlight service if you cut off the power directly. At the next boot, systemd-backlight service would restore brightness to the previous state.

```
sh-5.0# /lib/systemd/systemd-backlight save backlight:lvds_backlight@0
sh-5.0# sync
```

7. COM Setting

TPC-100W supports 2 COM port. One is RS232/422/485 and another is RS485. Below commands can be used to change the settings. Please note these settings will back to default after reboot. If you want to keep the settings after reboot, you can use “GUI Settings Tool”. (Please check chapter 9.3.5 for more information.)

Set COM1 as RS232 mode and baud rate 115200.

```
sh-5.0# echo out > /sys/class/gpio/gpio85/direction
sh-5.0# echo out > /sys/class/gpio/gpio86/direction
sh-5.0# echo 1 > /sys/class/gpio/gpio85/value
sh-5.0# echo 0 > /sys/class/gpio/gpio86/value
sh-5.0# stty -F /dev/ttymxc0 -echo -onlcr 115200
```

Set COM1 as RS422 mode and baud rate 115200.

```
sh-5.0# echo out > /sys/class/gpio/gpio85/direction
sh-5.0# echo out > /sys/class/gpio/gpio86/direction
sh-5.0# echo 1 > /sys/class/gpio/gpio85/value
sh-5.0# echo 1 > /sys/class/gpio/gpio86/value
sh-5.0# stty -F /dev/ttymxc0 -echo -onlcr 115200
```

Set COM1 as RS485 mode and baud rate 115200.

```
sh-5.0# echo out > /sys/class/gpio/gpio85/direction
sh-5.0# echo out > /sys/class/gpio/gpio86/direction
sh-5.0# echo 0 > /sys/class/gpio/gpio85/value
sh-5.0# echo 1 > /sys/class/gpio/gpio86/value
sh-5.0# stty -F /dev/ttymxc0 -echo -onlcr 115200
```

Set COM2 baud rate 115200.

```
sh-5.0# stty -F /dev/ttymxc2 -echo -onlcr 115200
```

You need to set the flags of “struct serial_rs485” for hardware design before v1.6 of image. The logical level for RTS pin equal to 0 when sending and equal to 1 after sending. Here is the sample code as below.

```
#include <unistd.h>
#include <stdio.h>
#include <stdlib.h>
#include <string.h>
#include <fcntl.h>
#include <errno.h>
#include <linux/serial.h>
#include <sys/ioctl.h>    //Include definition for RS485 ioctls: TIOCGRS485 and TIOCSRS485

int main(int argc, char *argv[])
{
   struct serial_rs485 rs485conf;
   char* dev_path = "/dev/ttymxc2";          //change to /dev/ttymxc0 for COM1
   int fd = open(dev_path, O_RDWR);
   if (fd < 0) {
      fprintf(stderr, "ERROR Can't open the device %s (%s)\n", dev_path, strerror(errno));
      goto end;
   }
   if (ioctl(fd, TIOCGRS485, &rs485conf) < 0) {
      fprintf(stderr, "ERROR Can't get the device %s config (%s)\n", dev_path, strerror(errno));
      goto end;
   }
   rs485conf.flags |= SER_RS485_RTS_AFTER_SEND;    //Set logical level for RTS pin equal to 0 when sending
   rs485conf.flags &= ~SER_RS485_RTS_ON_SEND;      //Set logical level for RTS pin equal to 1 after sending
   rs485conf.flags &= ~SER_RS485_RX_DURING_TX;   //Do not send data while receiving data
   if (ioctl(fd, TIOCSRS485, &rs485conf) < 0) {
      fprintf(stderr, "ERROR Can't set the device %s config to rs485 (%s)\n", argv[1], strerror(errno));
      goto end;
   }
end:
   if (fd > 0) close(fd);
   return 0;
}
```

You can reference “RS485 Serial Communications” for more details.

8. Network Setting

TPC-100W using ConnMan to manage network. Below commands can be used to change the settings.

1. Get Network services:

```
sh-5.0# connmanctl services
*AO Wired            ethernet_c400ad971b0b_cable
```

2. Set Network IP address:

```
sh-5.0# connmanctl config ethernet_{your_service} --ipv4 manual 192.168.10.2 255.255.255.0
192.168.10.1
or
sh-5.0# connmanctl config ethernet_{your_service} --ipv4 dhcp
```

3. Set Network domain name servers:

```
sh-5.0# connmanctl config ethernet_{your_service} --nameservers 8.8.8.8 4.4.4.4
```

TPC-100W has two LAN to connect to different local networks. It maybe connects failure due to routing table. For example, LAN A (eth0) is local network without internet and LAN B (eth1) is local network with internet.

```
root@eamb9918-cc827f3bbcf5:~# route -n
Kernel IP routing table
Destination     Gateway         Genmask         Flags Metric Ref    Use Iface
0.0.0.0         192.168.1.1     0.0.0.0         UG    0      0        0 eth0
0.0.0.0         192.168.1.1     0.0.0.0         UG    10     0        0 eth0
0.0.0.0         172.17.9.254    0.0.0.0         UG    10     0        0 eth1
172.17.8.0      0.0.0.0         255.255.254.0   U     0      0        0 eth1
172.17.9.254    0.0.0.0         255.255.255.255 UH    0      0        0 eth1
172.17.9.254    0.0.0.0         255.255.255.255 UH    10     0        0 eth1
172.20.1.100    172.17.9.254    255.255.255.255 UGH   0      0        0 eth1
172.20.1.100    172.17.9.254    255.255.255.255 UGH   10     0        0 eth1
172.22.2.99     172.17.9.254    255.255.255.255 UGH   0      0        0 eth1
172.22.2.99     172.17.9.254    255.255.255.255 UGH   10     0        0 eth1
192.168.1.0     0.0.0.0         255.255.255.0   U     0      0        0 eth0
192.168.1.1     0.0.0.0         255.255.255.255 UH    0      0        0 eth0
192.168.1.1     0.0.0.0         255.255.255.255 UH    10     0        0 eth0
root@eamb9918-cc827f3bbcf5:~# connmanctl services
*AR Wired               ethernet_cc827f3bbcf5_cable
*AR Wired               ethernet_aecfb9f4d529_cable
```

You can use move-before / move-after of connman to adjust routing table.

```
root@eamb9918-cc827f3bbcf5:~# connmanctl move-before ethernet_aecfb9f4d529_cable
 ethernet_cc827f3bbcf5_cable
Moved ethernet_aecfb9f4d529_cable before ethernet_cc827f3bbcf5_cable
root@eamb9918-cc827f3bbcf5:~# route -n
Kernel IP routing table
Destination     Gateway         Genmask         Flags Metric Ref    Use Iface
0.0.0.0         172.17.9.254    0.0.0.0         UG    0      0        0 eth1
0.0.0.0         172.17.9.254    0.0.0.0         UG    10     0        0 eth1
172.17.8.0      0.0.0.0         255.255.254.0   U     0      0        0 eth1
172.17.9.254    0.0.0.0         255.255.255.255 UH    0      0        0 eth1
172.17.9.254    0.0.0.0         255.255.255.255 UH    10     0        0 eth1
172.20.1.100    172.17.9.254    255.255.255.255 UGH   0      0        0 eth1
172.20.1.100    172.17.9.254    255.255.255.255 UGH   10     0        0 eth1
172.22.2.99     172.17.9.254    255.255.255.255 UGH   0      0        0 eth1
172.22.2.99     172.17.9.254    255.255.255.255 UGH   10     0        0 eth1
192.168.1.0     0.0.0.0         255.255.255.0   U     0      0        0 eth0
192.168.1.1     0.0.0.0         255.255.255.255 UH    0      0        0 eth0
192.168.1.1     0.0.0.0         255.255.255.255 UH    10     0        0 eth0
```

Please reference https://wiki.archlinux.org/title/ConnMan for more details.

9. Firewall Setting

Linux Yocto image for TPC-100W enable 22 SSH, 80 HTTP, 443 HTTPS, 8080 SWUPDATE by default for usage. You can follow below command to change it.

1. Check the list of iptables.

```
sh-5.0# iptables -L
```

2. Modify the /etc/iptables/iptables.rules and reboot the system.

```
# Generated by iptables-save v1.8.3 on Wed Feb 23 10:16:51 2022
*filter
:INPUT DROP [3652:224108]
:FORWARD ACCEPT [0:0]
:OUTPUT ACCEPT [8:1414]
-A INPUT -i lo -j ACCEPT
-A INPUT -m state --state RELATED,ESTABLISHED -j ACCEPT
-A INPUT -p tcp -m state --state NEW -m tcp --dport 22 -j ACCEPT
-A INPUT -p tcp -m state --state NEW -m tcp --dport 80 -j ACCEPT
-A INPUT -p tcp -m state --state NEW -m tcp --dport 443 -j ACCEPT
-A INPUT -p tcp -m state --state NEW -m tcp --dport 8080 -j ACCEPT
-A INPUT -p icmp -m icmp --icmp-type 8 -j ACCEPT
COMMIT
# Completed on Wed Feb 23 10:16:51 2022
```

10. Device Information

TPC-100W provide atcc.info to get device information. Below commands can be used to show the information.

Get Device Information :

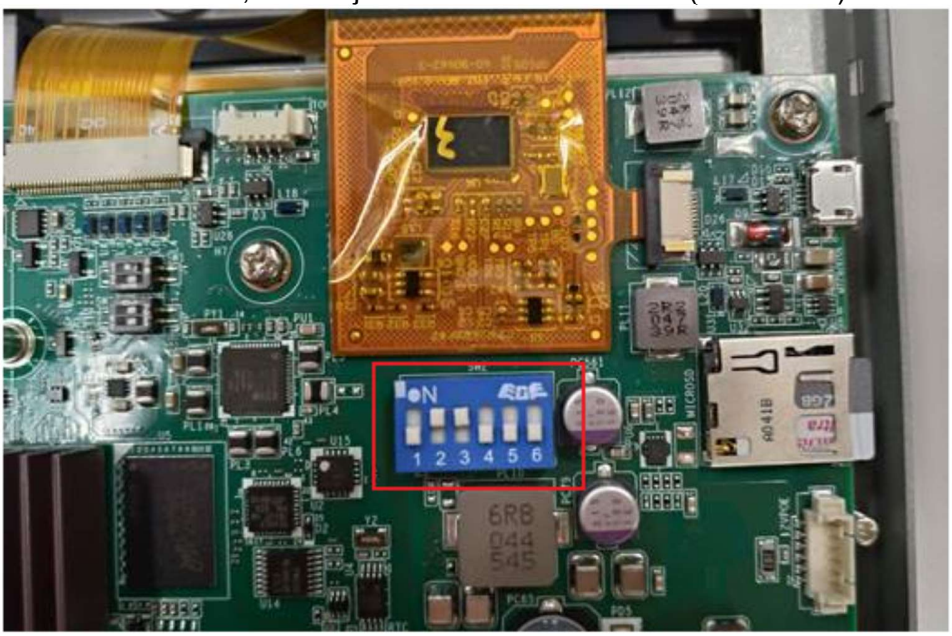
```
sh-5.0# atcc.info
Board Information:
      BOARD VERSION: 1.0
      SERIAL NUMBER: 123456789
  MANUFACTURING TIME: 2023/02/16 00:00:00
Image Information:
            NAME: "NXP i.MX Release Distro"
         VERSION: "5.10-hardknott (hardknott)"
       VERSION_ID: 5.10-hardknott
      PRETTY_NAME: "NXP i.MX Release Distro 5.10-hardknott (hardknott)"
     IMAGE_VERSION: "TPC-100W-Yocto3.3.3-v1.0"
    KERNEL_VERSION: "Linux version 5.10.72"
     UBOOT_VERSION: "U-Boot 2021.04"
```

11. Backing up system

There are two ways to back up current system.

11.1 Backing up eMMC rootfs to Micro SD Card

1. Clone the system but with clean settings, such as re-create the ssh-key for other device,default hostname….etc..
2. Insert microSD card, then adjust switch as below order (red remark).



3. Power on the system , login with root account and enter below commands.

```
root@eamb99918:~# cd /mk_inand/scripts
root@eamb99918:/mk_inand/scripts# ./backup_emmc_rootfs_to_sdcard.sh /dev/mmcblk2
```

4. It will format /dev/mmcblk1b4 partition of the microSD card to store the backup rootfs file , please wait for the script to finish ,then the backup rootfs file 'rootfs.tar.gz' is in the folder '/userdata'.
5. Power off the device.You can use this microSD card to burn the backup system to other device
6. If you want to restore system with this microSD card , Please follow the instructions below:
   6.1 Insert the microSD card into the device you want to restore the system and power it on .
   6.2 If microSD card already has a backup rootfs file ,enter below commands and respond to the question , enter "y" to restore the system with backup rootfs file, enter "n" to restore to original .

```
root@eamb99918:~# cd /mk_inand/scripts
root@eamb99918:/mk_inand/scripts# ./mkinand-linux.sh /dev/mmcblk2
backup files detected in /userdata/rootfs.tar.gz ,
Do you want to use this backup file to restore the system?[y/n]
```

6.3 Currently, only the legacy system can perform this backup operation. If you want to back up the EFI system rootfs, ,please refer to **11.2 Generate a Field Update file** for detail.

```
root@eamb9918-cc827f47d993:/mk_inand/scripts#  ./backup_emmc_rootfs_to_sdcard.sh /dev/mmcblk2
The backup system has EFI files. Unlike current non-EFI systems, backup operations are prohibited.
```

11.2 Generate a Field Update file (.swu image)

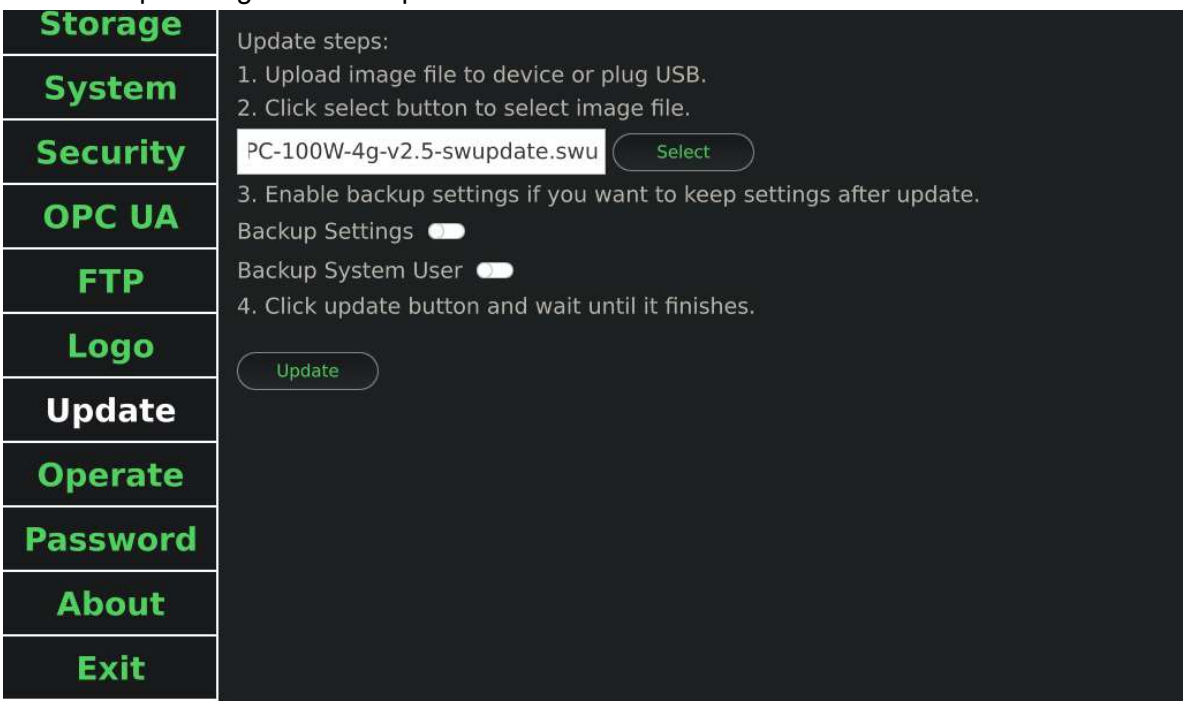
1. Please connect to system using SSH ,log in to the system with root account.
2. Insert the usb-drive , and check the usb drive name of the partition is /dev/sda

```
root@eamb9918-c400ad971ad5:~# lsblk
NAME         MAJ:MIN RM  SIZE RO TYPE MOUNTPOINT
sda            8:0    1 29.4G  0 disk
`-sda1         8:1    1 29.4G  0 part /run/media/sda1
```

3. Enter below commands and respond to the question , enter "y" to start backup system, enter "n" to cancel it

```
root@eamb9918:~# atcc.sys-backup /dev/sda --reboot
[Backup] Start backup current system to /dev/sda
[Backup]All data on /dev/sda now will be destroyed! Continue? [y/n]
```

4. After system restarted , system enter recovery mode , format usb-drive and create a backup swu file “swupdate-image_xx.swu “ in usb-drive ,then reboot again .
5. If you want to restore system with this swu image ,please refer to **12.3.10 Update Configuration to update system** for detail.
   5.1 Because this swu image has backup settings , it is invalid to set these two options “Backup Settings” 、“Backup root User”.



5.2 If you try this recovery file on other platforms to restore the file system, you may encounter some issues about user/system settings. Please reset them. Here are some suggestions.
In order to avoid server name collision in opcua discovery.Enter the following command to change the system hostname.
You should replace <hostname> with another hostname

```
root@eamb9918:~# hostnamectl set-hostname <hostname>
```

12. GUI Settings Tool

12.1 Introduction of Advantech TPC-100W Settings Tool

Advantech TPC-100W Settings Tool is a Linux-based utility. Settings Tool helps user to get image version, get/set network configuration, get/set time configuration, and get/set screen configuration. There is a binary in Settings Tool: settings.

- settings
  A GUI program provides GUI interface for user. User can configure Screen, Network, Time of TPC-100W via this program. Execution of settings relies on Qt and OpenGL libraries, connmanctl and timedatectl command line tools.

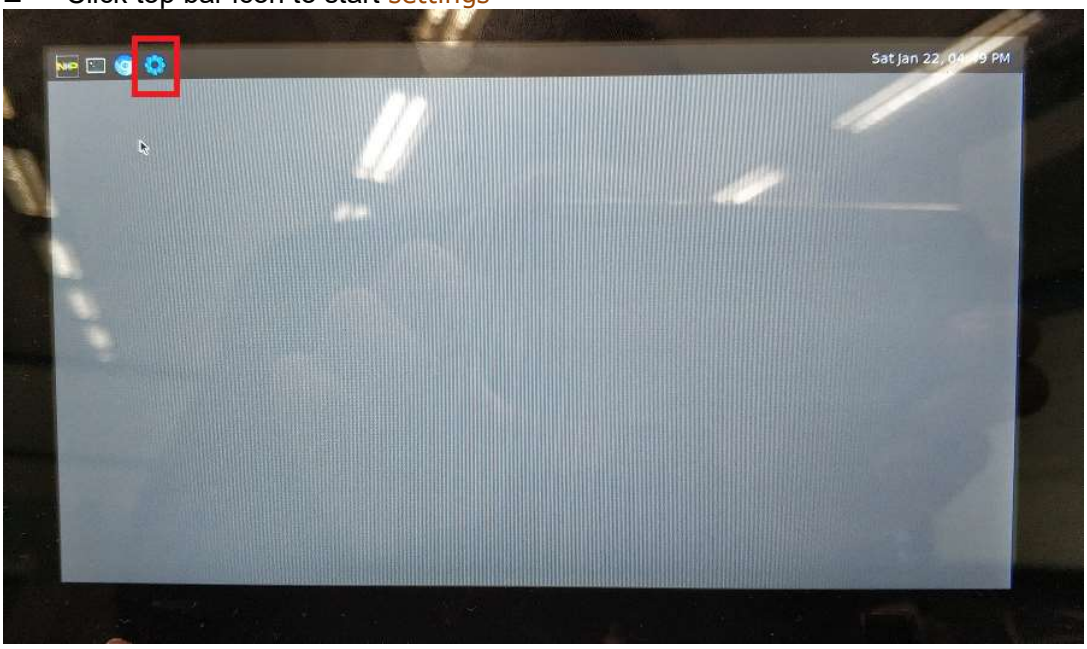
12.2 Platform Supported

Linux, arm64

12.3 How to Use TPC-100W Settings Tool

There is one binary in TPC-100W Settings Tool, “settings”. “settings” is a GUI program. This section will explain how to use the GUI program, where to find logs.

- Click top bar icon to start settings



- To start settings by command line

```
sh-5.0# /usr/bin/settings
```

12.3.1 Screen Configuration

All screen related configuration is in Screen page. After adjusted the brightness, it would be updated effective immediately. After adjusted the screensaver, hide cursor, gesture, you should click apply button to apply setting.

■ To adjust brightness. You can use slider or spinbox to adjust value.

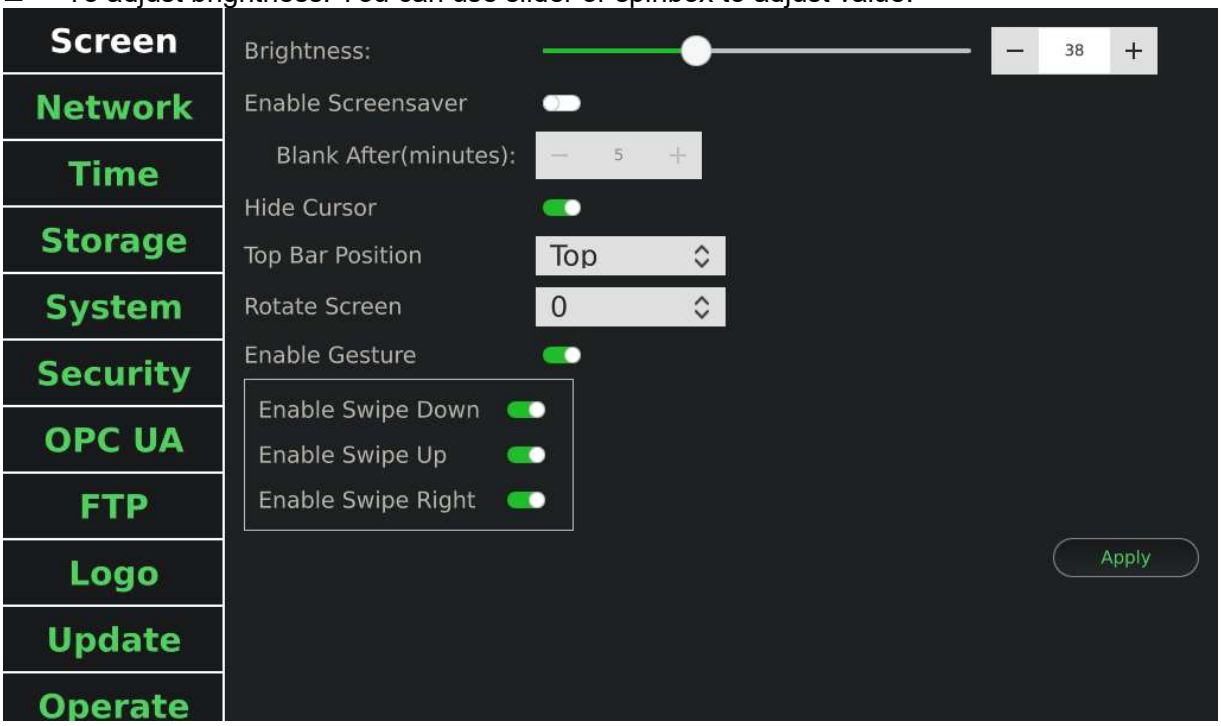


Figure Sample of Screen Page

- To enable/disable screensaver. You can press switch button. You can use spinbox to adjust blank after minutes.

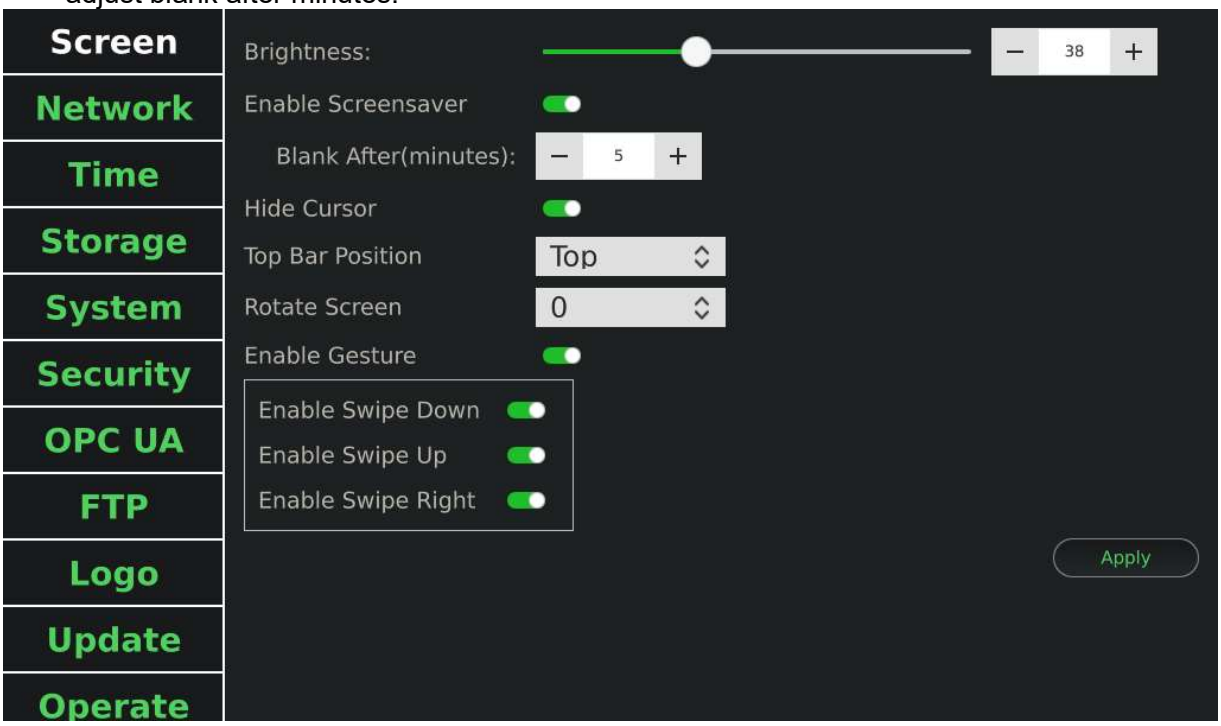


Figure Sample of Enable Screensaver Screen Page

- To enable/disable hide cursor. You can press switch button.

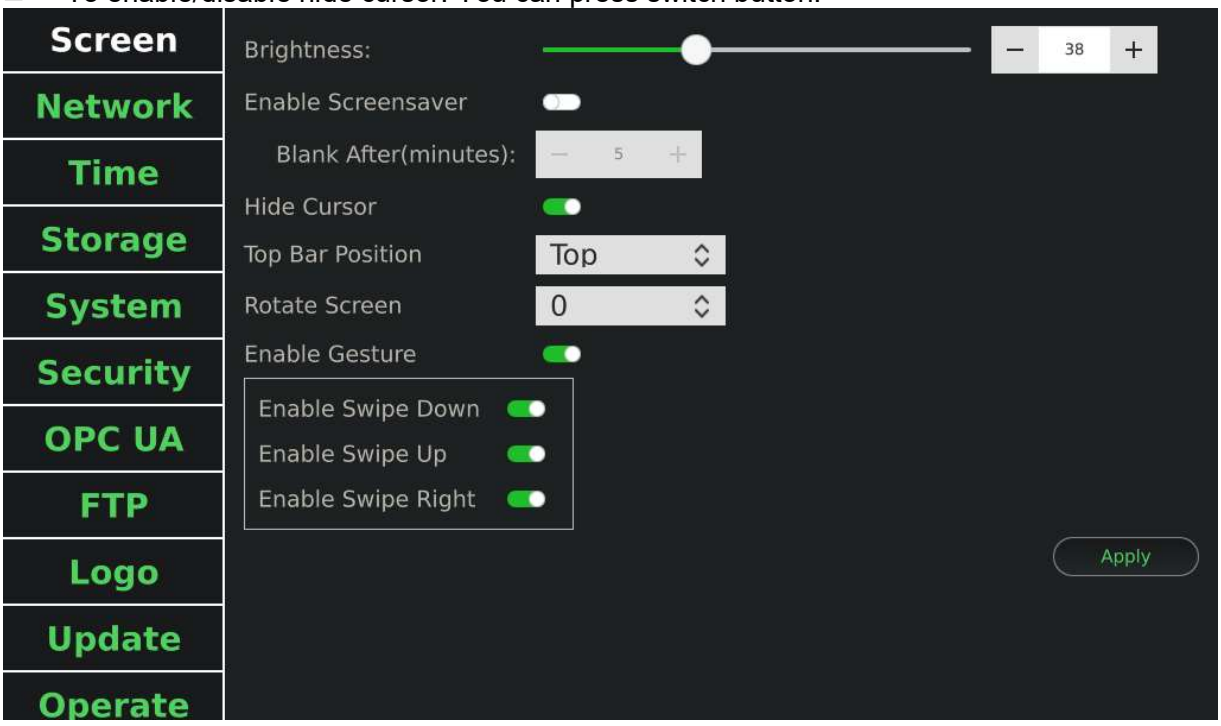


Figure Sample of Enable Hide Cursor Page

■ To set top bar position. You can press top bar position combobox.

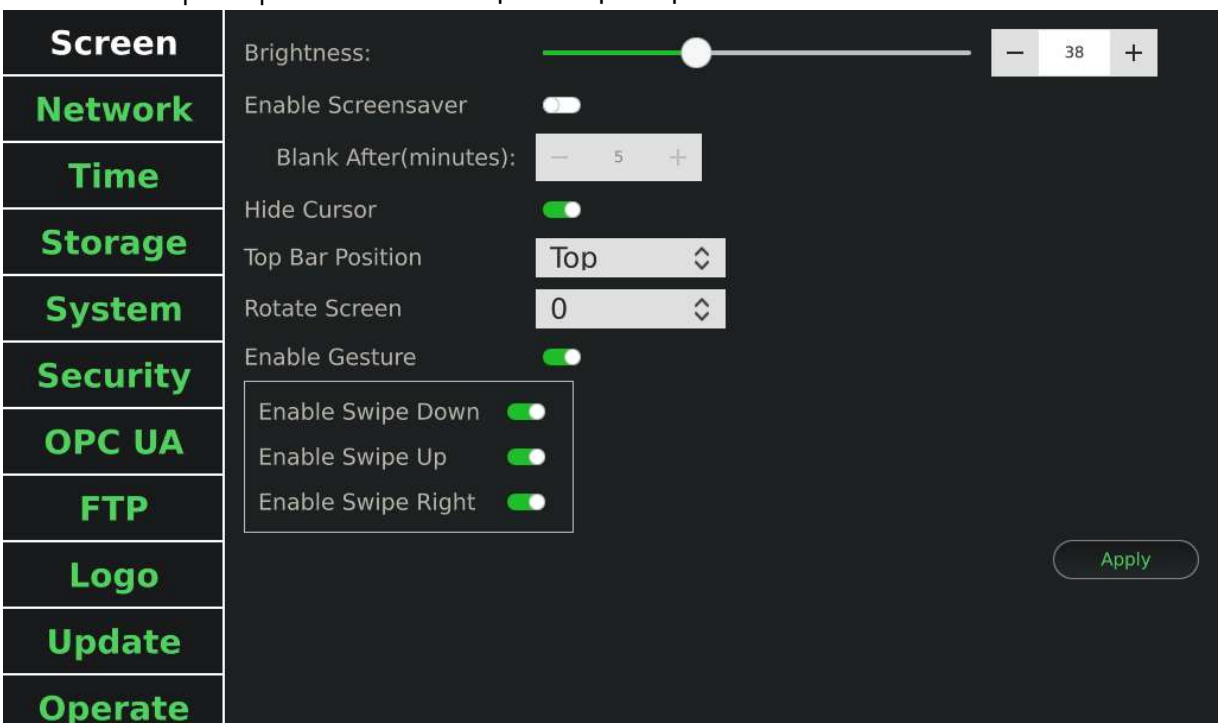


Figure Sample of Top Bar Position Page

■ To set rotate screen. You can press rotate screen combobox.

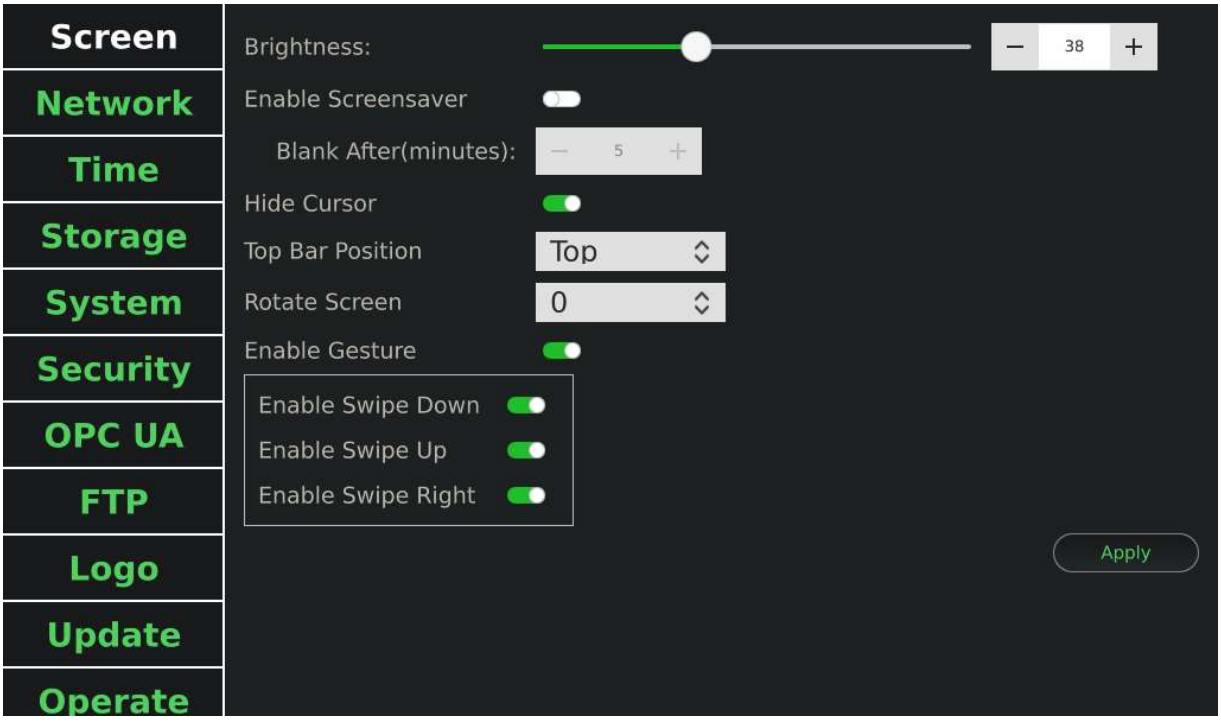


Figure Sample of Rotate Screen Page

■ To enable/disable gesture. You can press switch button.

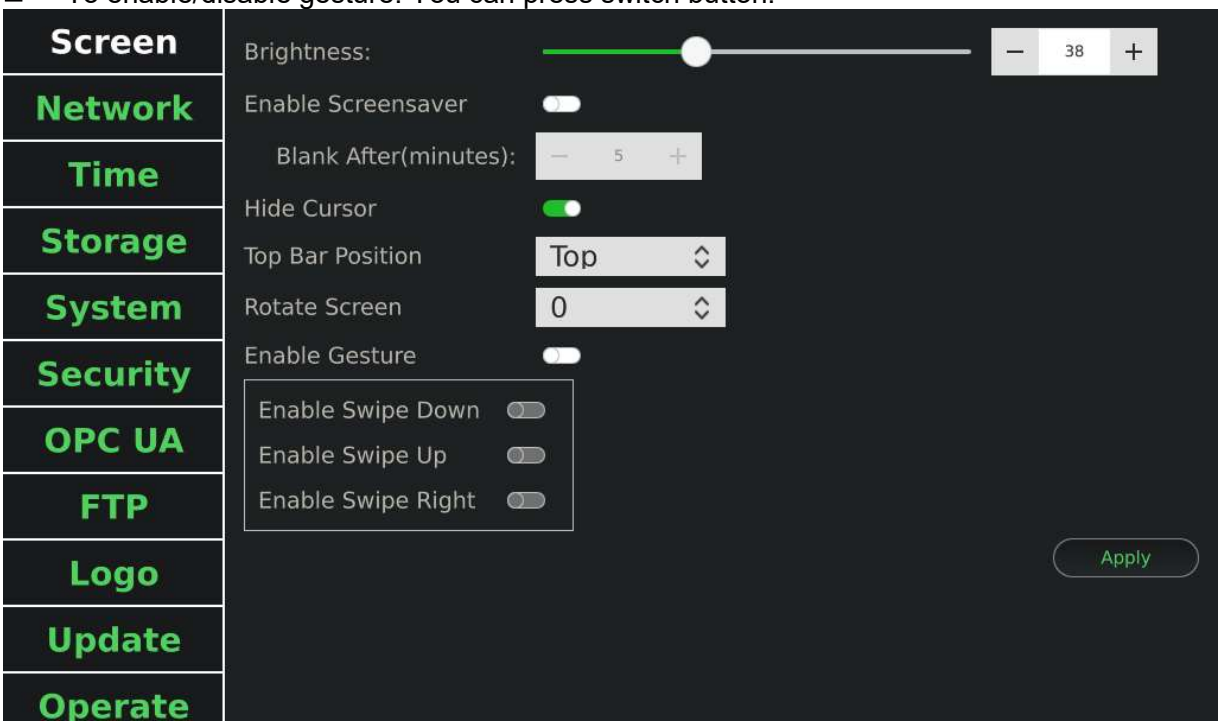


Figure Sample of Disable Gesture Page

12.3.2 Network Configuration

All network related configuration is in Network page. The “Wired 1” tab is mapping to eth0 network interface and “Wired 2” tab is mapping to eth1 network interface. You can use the network settings whatever the network cable is connected or not. After adjusted the configuration, you should press Apply button to save configuration.

Note: The ifconfig interface of TPC-100W LAN A is eth1, and LAN B is eth0 on the image: eamb9918-sdcard_1.1.0.img.tar.xz.

- You can view wired 1/2 information. To edit it, you can press config button.

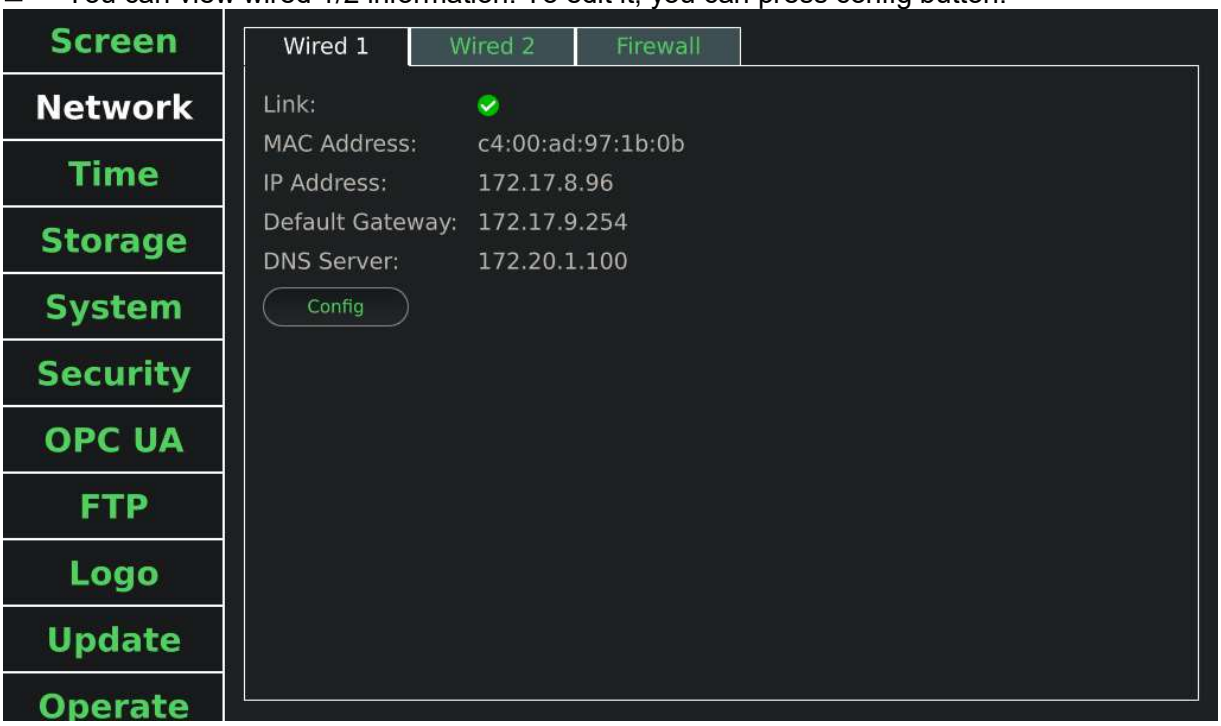


Figure Sample of View Network Page

■ To enable/disable DHCP. You can press switch button.

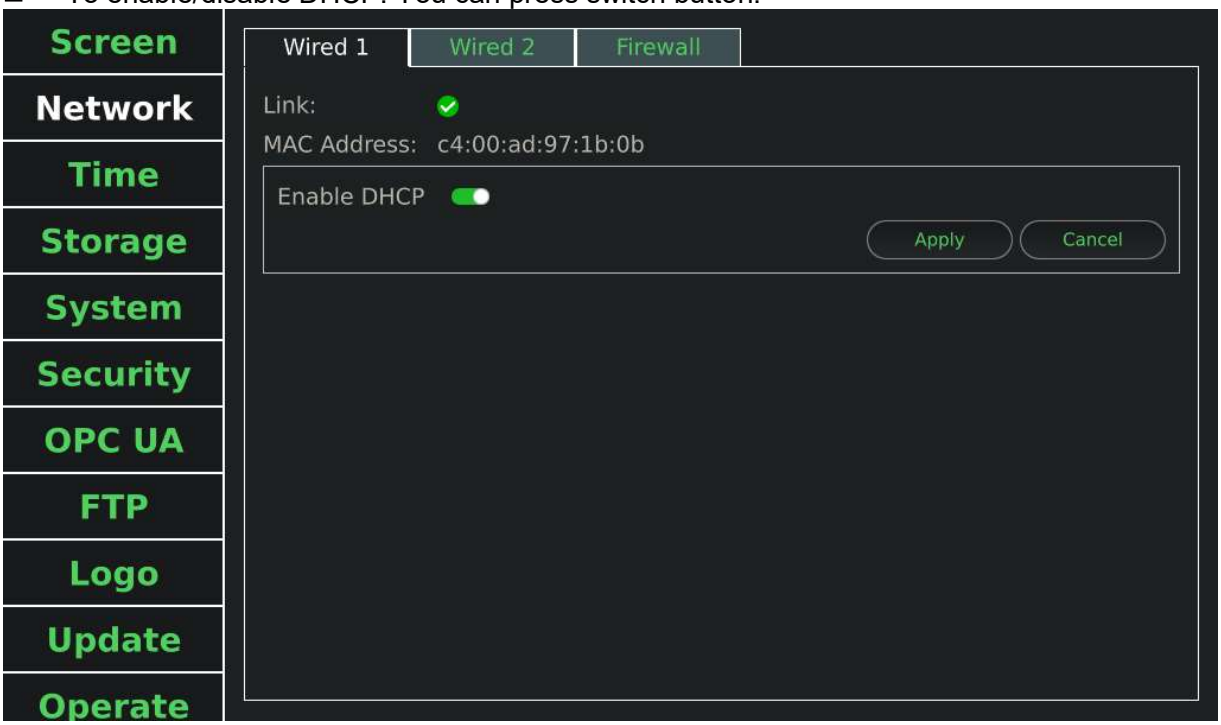


Figure Sample of Enable DHCP Network Page

■ To set static IP. You should disable DHCP, then set the IP address, network mask, default gateway, and DNS server.

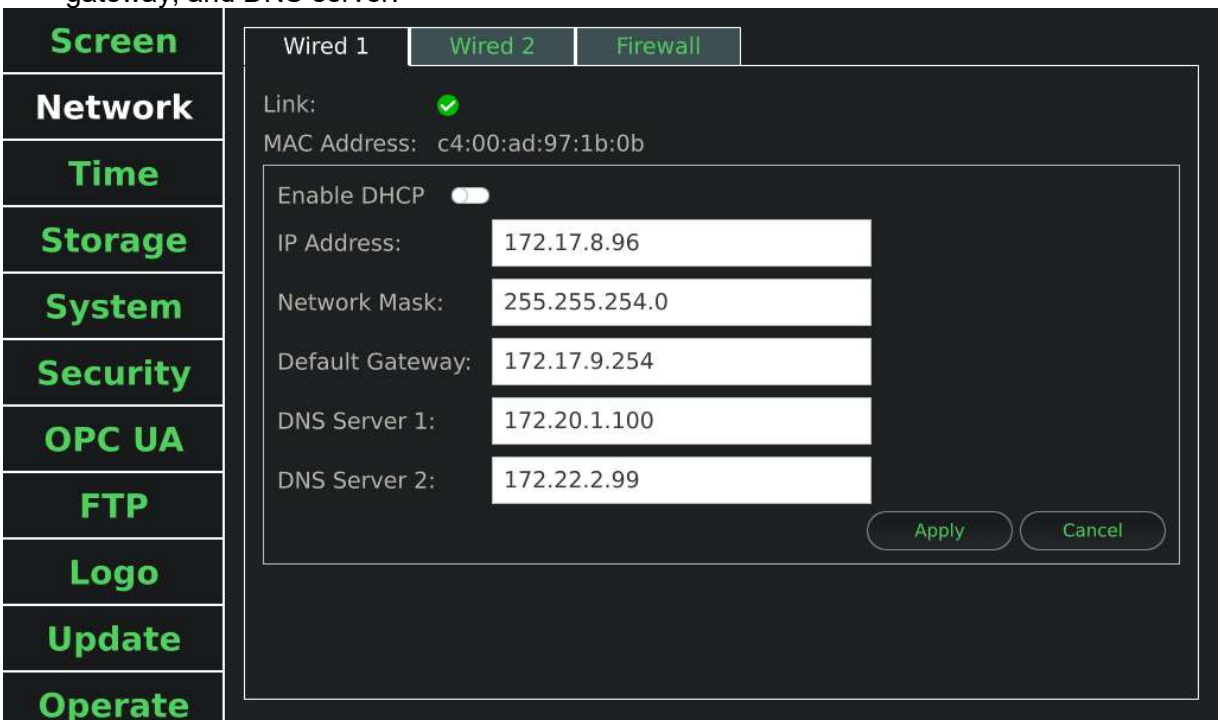


Figure Sample of Disable DHCP Network Page

- To set Wired 2. You could press Wired 2 tab to change the page. If there is no connection on wired 2, you still can set DHCP or static IP. If you apply settings when the status is offline, it would save to app config. When the status back to online, it would take effect only once.

Figure Sample of View Wired 2 Network Page

Figure Sample of Edit Wired 2 Network Page

- You can view/edit firewall rules which are added by Settings tool. Firewall rule settings are based on whitelist logic. You can add a rule to allow tcp/udp port.

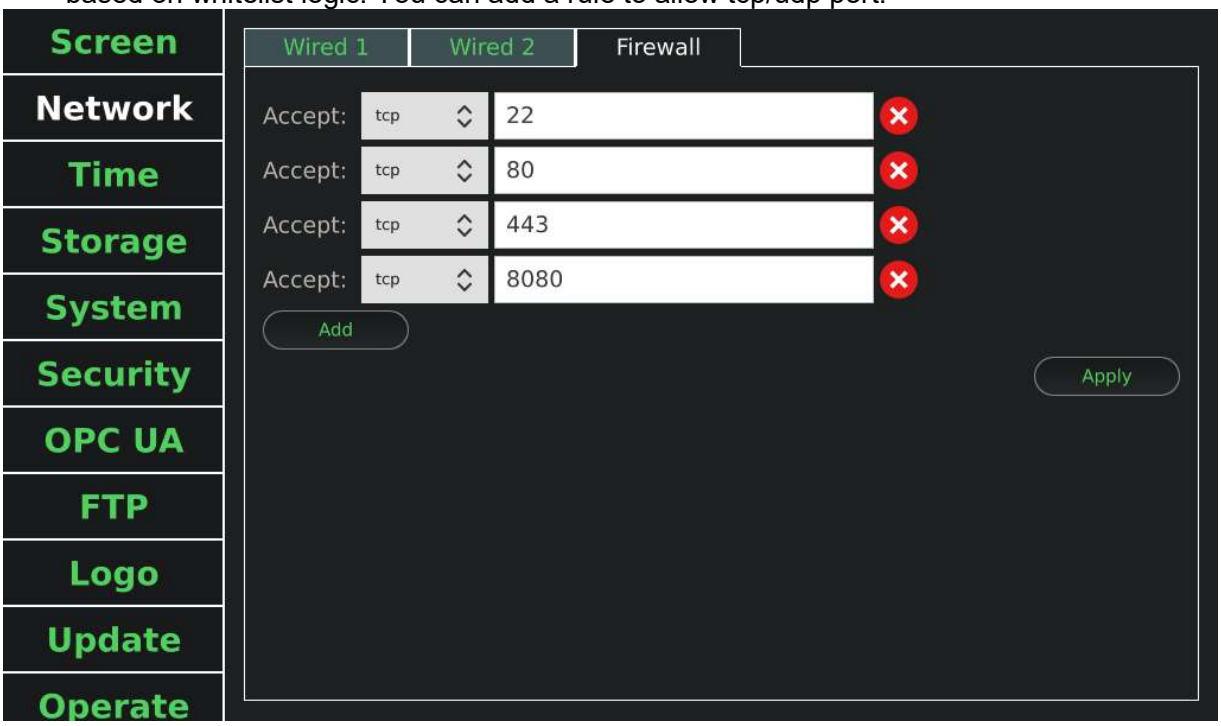


Figure Sample of Firewall Network Page

12.3.3 Time Configuration

All time related configuration is in time page. After adjusted the configuration, you should press Apply button to save configuration.

■ To set timezone. You can press timezone combobox.

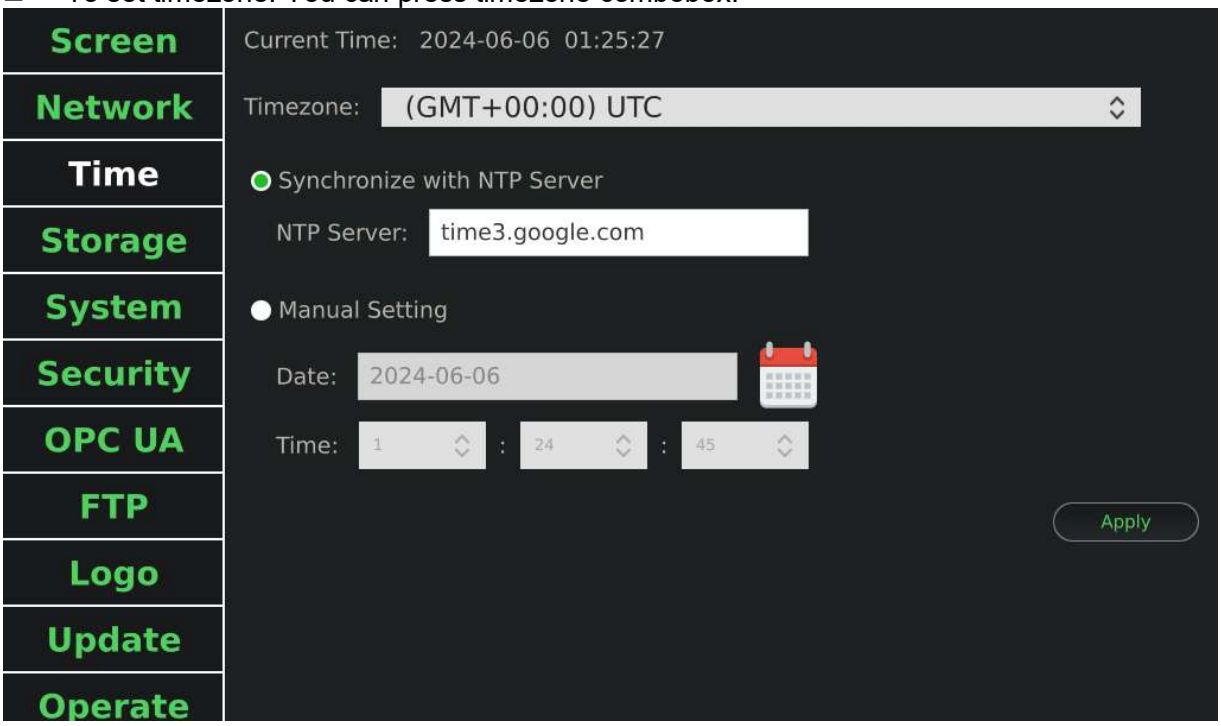


Figure Sample of Timezone Time Page

- To set synchronize with NTP server. You can press synchronize with NTP server radio button. NTP server is optional, default obtain from DHCP.

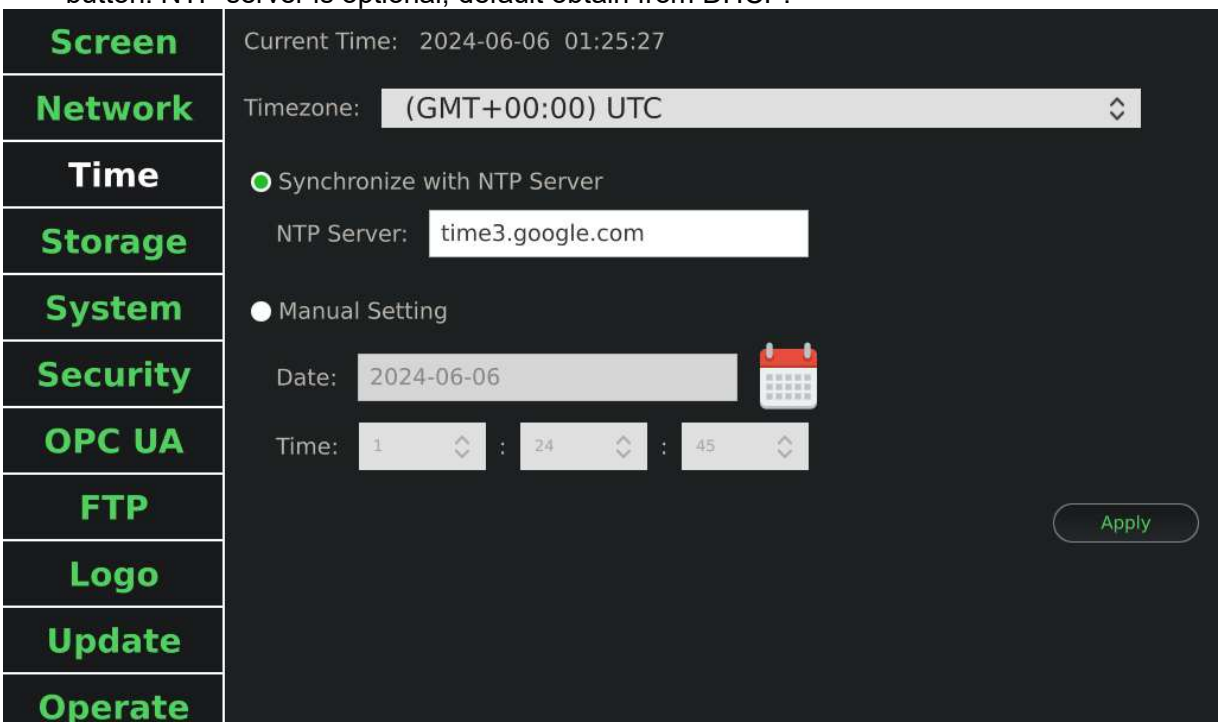


Figure Sample of Synchronize with NTP Server Time Page

- To set manual setting. You could press manual setting radio button. There is calendar button to set date. There are hour, minute, and second comboboxes to set time.

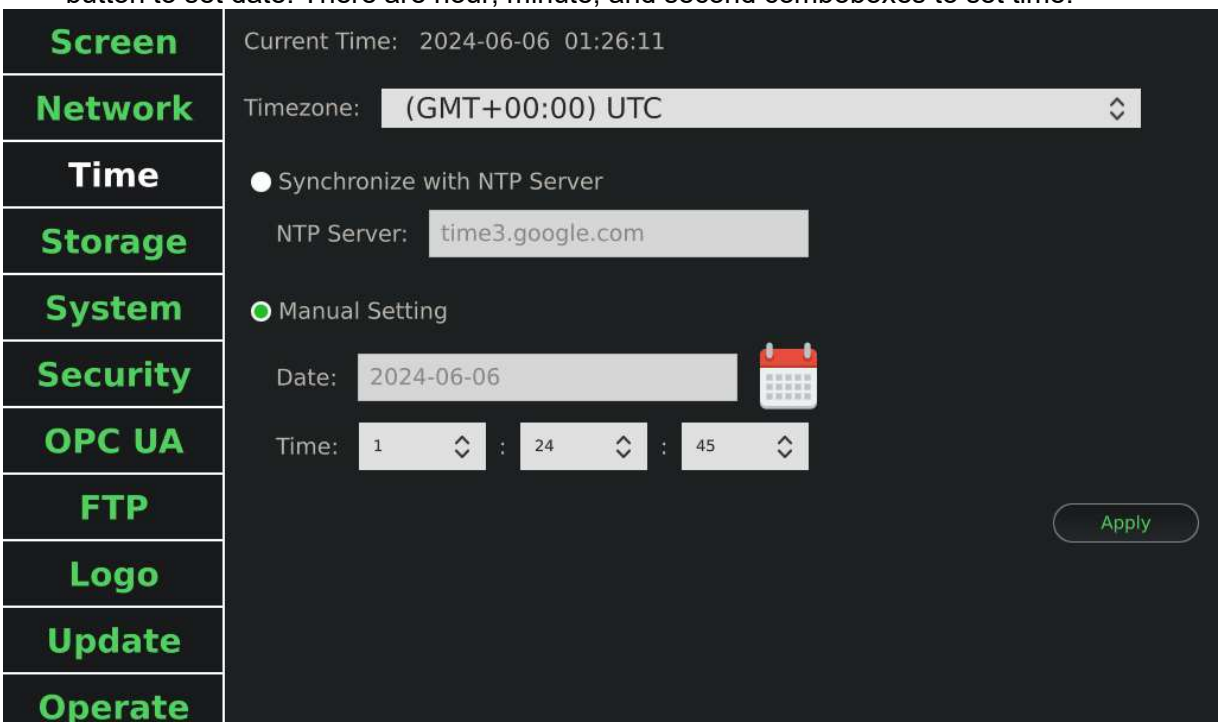


Figure Sample of Manual Setting Time Page

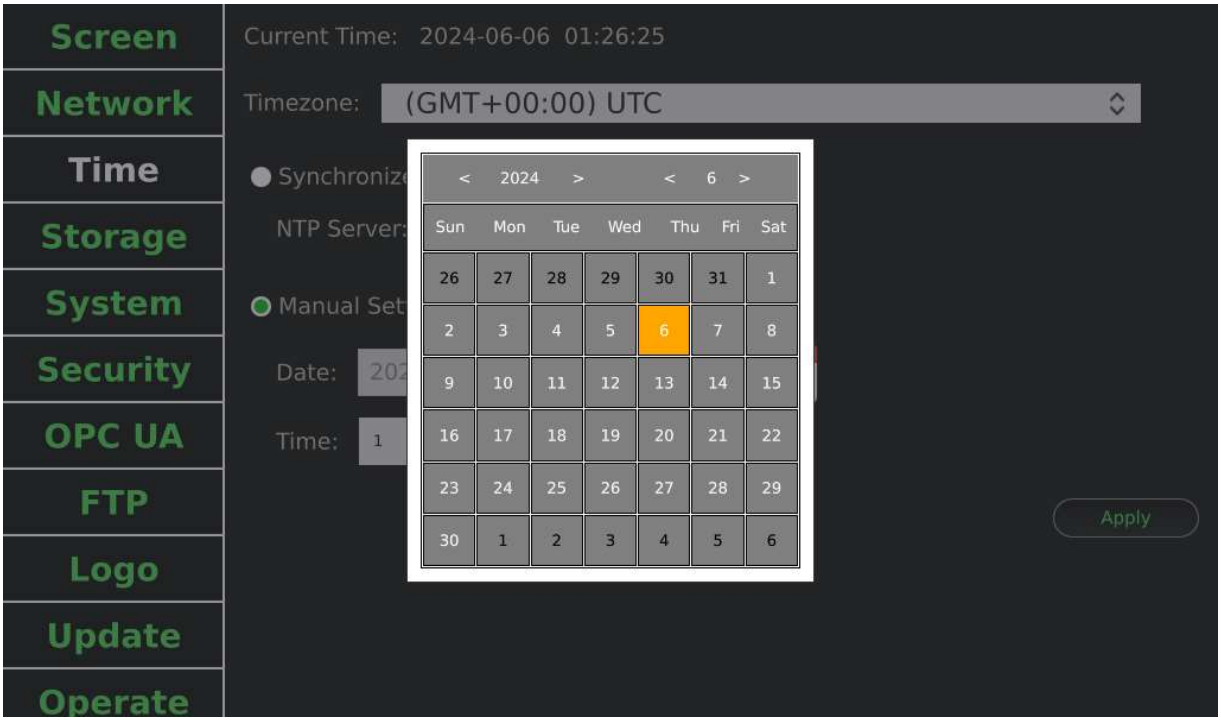


Figure Sample of Calendar Popup

12.3.4 Storage Information

All storage related information is in storage page.

■ To see eMMC information.

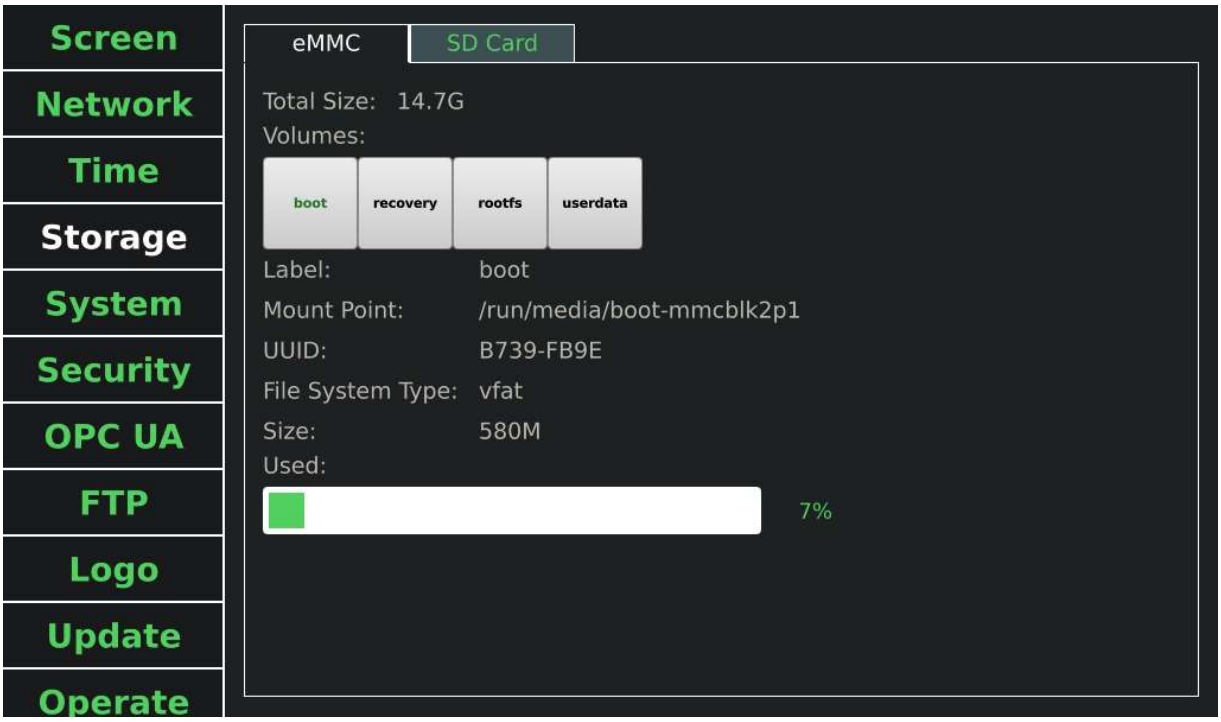


Figure Sample of eMMC Page

■ To see SD card information.

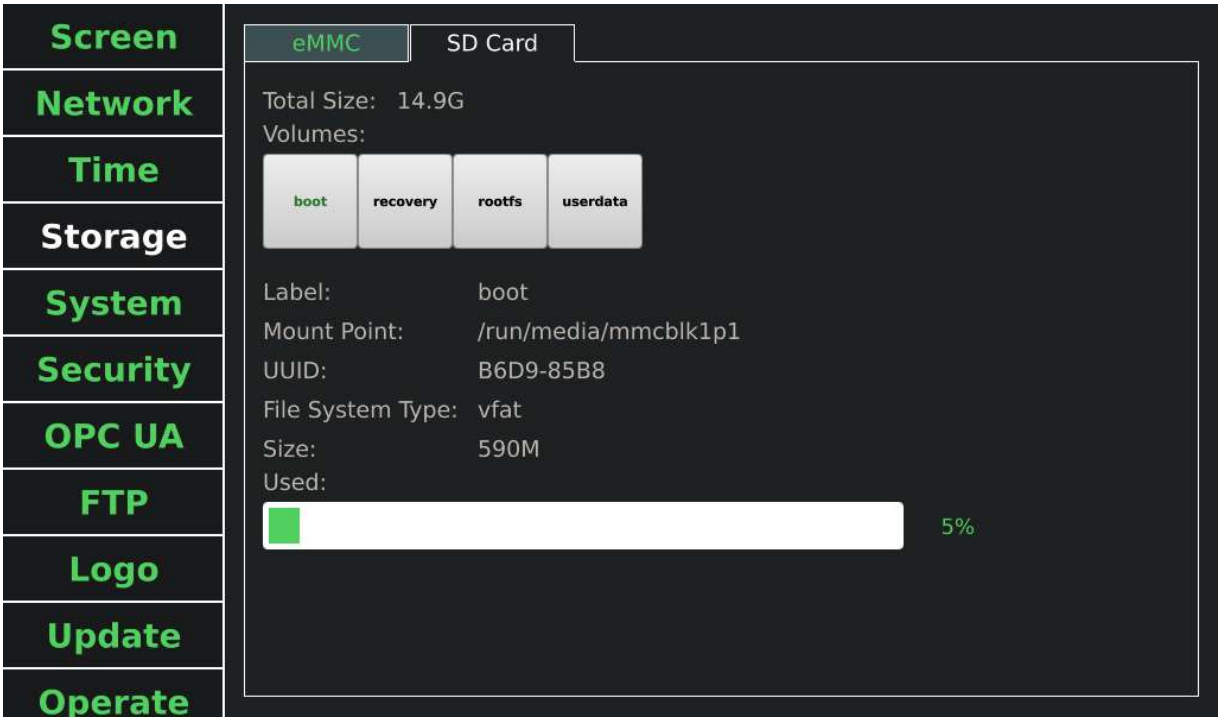


Figure Sample of SD card Page

12.3.5 System Configuration

All system related configuration is in system page. After adjusted the configuration, you should press Apply button to save configuration. If you enable/disable default login as user or read-only file system, you need to reboot device for them to take effect.

- To set startup application. You can press application dropdown list. Default is settings tool.
  Note: If startup application is VNC viewer, you should setup VNC configuration first at 13.3.7 VNC page. When VNC viewer start, it would start the monitor program first. The monitor program would check VNC server availability every 30 seconds. It would start VNC viewer only when VNC server is available to be connected.

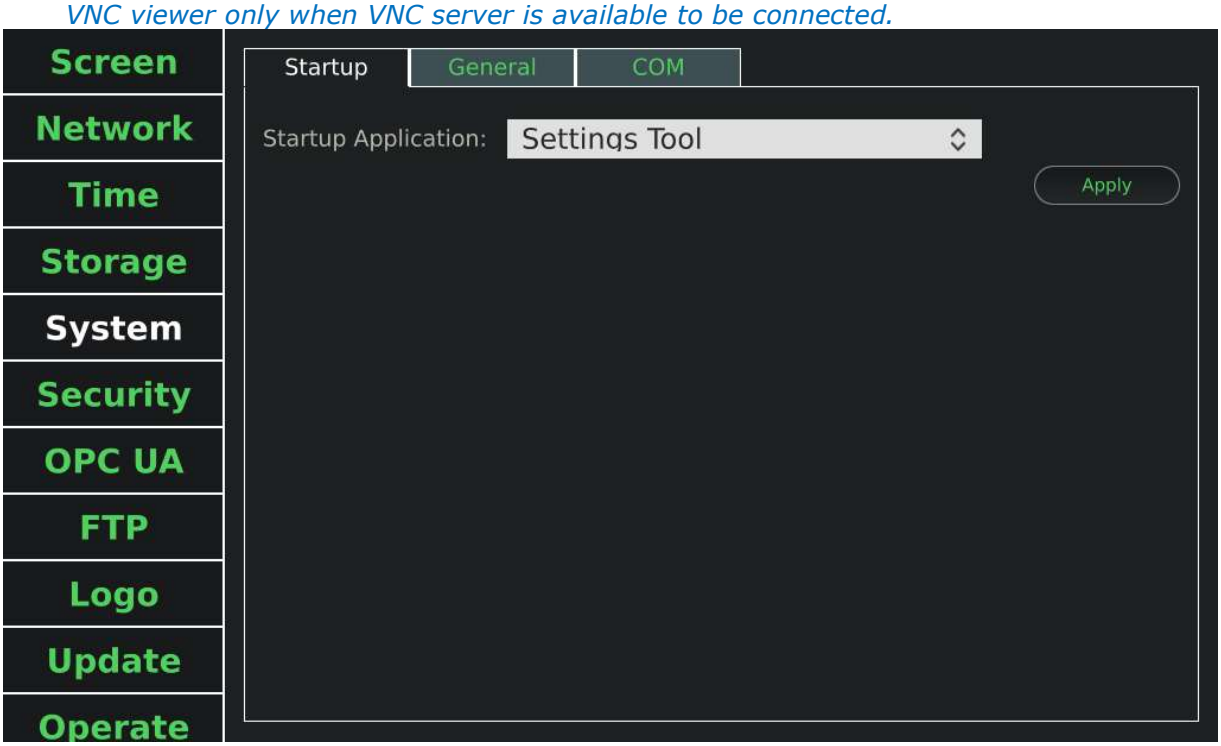


Figure Sample of System Page

- To set static page. You can adjust timeout and URL. Or you can use custom static page.
  Note: Static page would started by chromium. It would infinite retry each connection with timeout. You can use it to connect to your device.

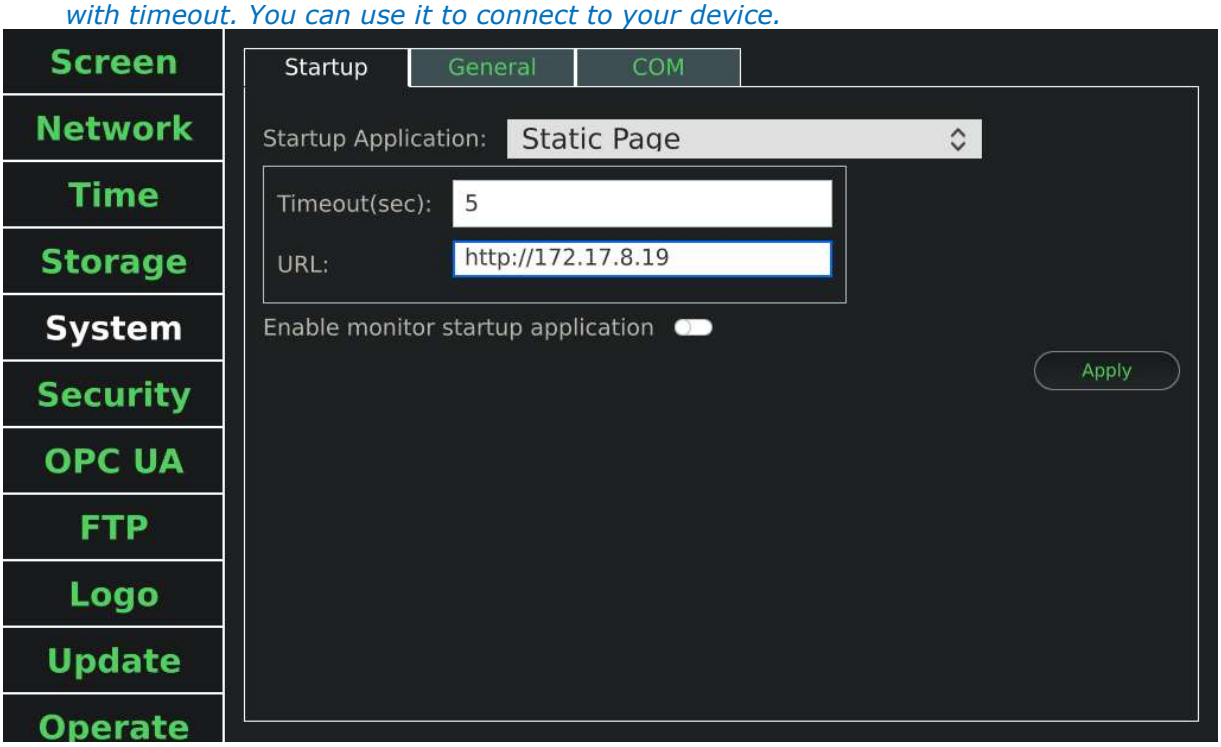


Figure Sample of Static Page System Page

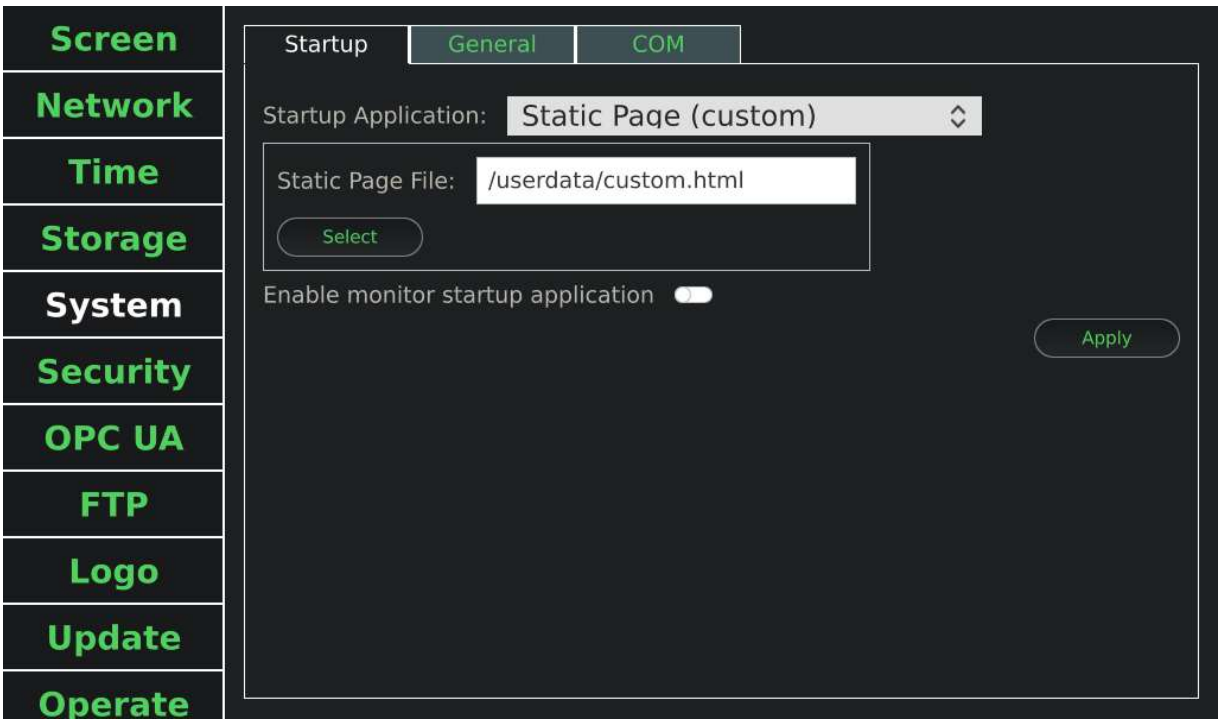


Figure Sample of Custom Static Page System Page

- To set Chromium(kiosk). You can set multiple URLs as your startup pages, and click radio button to be the home page. To enable/disable monitor startup application. You can press switch button.

  Note:

  If startup application is kiosk chromium 、Static page 、Static page(custom), It automatically restart chrome browser after a crash by enabling monitor startup application.

  It is recommended that if enable monitor startup application is set, do not launch chromium on the top bar at the same time. please refer chapter 12.3.1 , set "Top bar position" to "None" to hide the top bar.

  It is recommended that if you change your startup application and also enable monitor startup application, please restart your device for it to work properly.

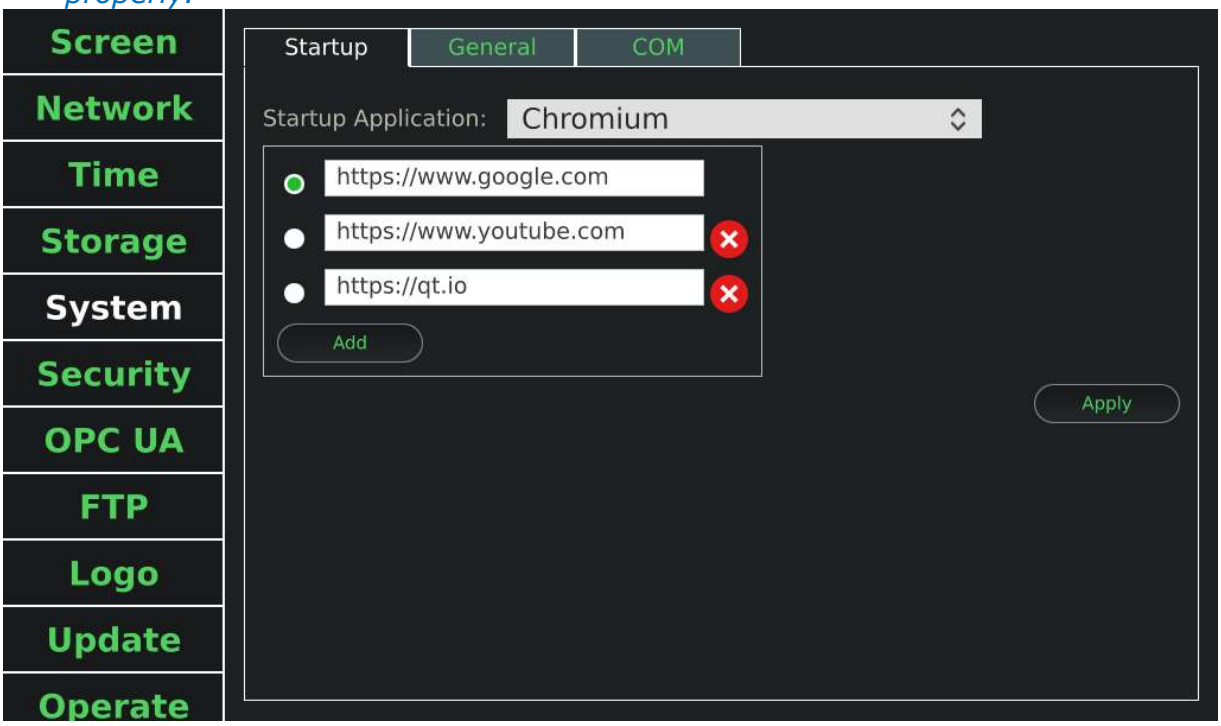


Figure Sample of Chromium(kiosk) System Page

- To set start_custom.sh. You can modify /usr/bin/start_custom.sh to run your application.

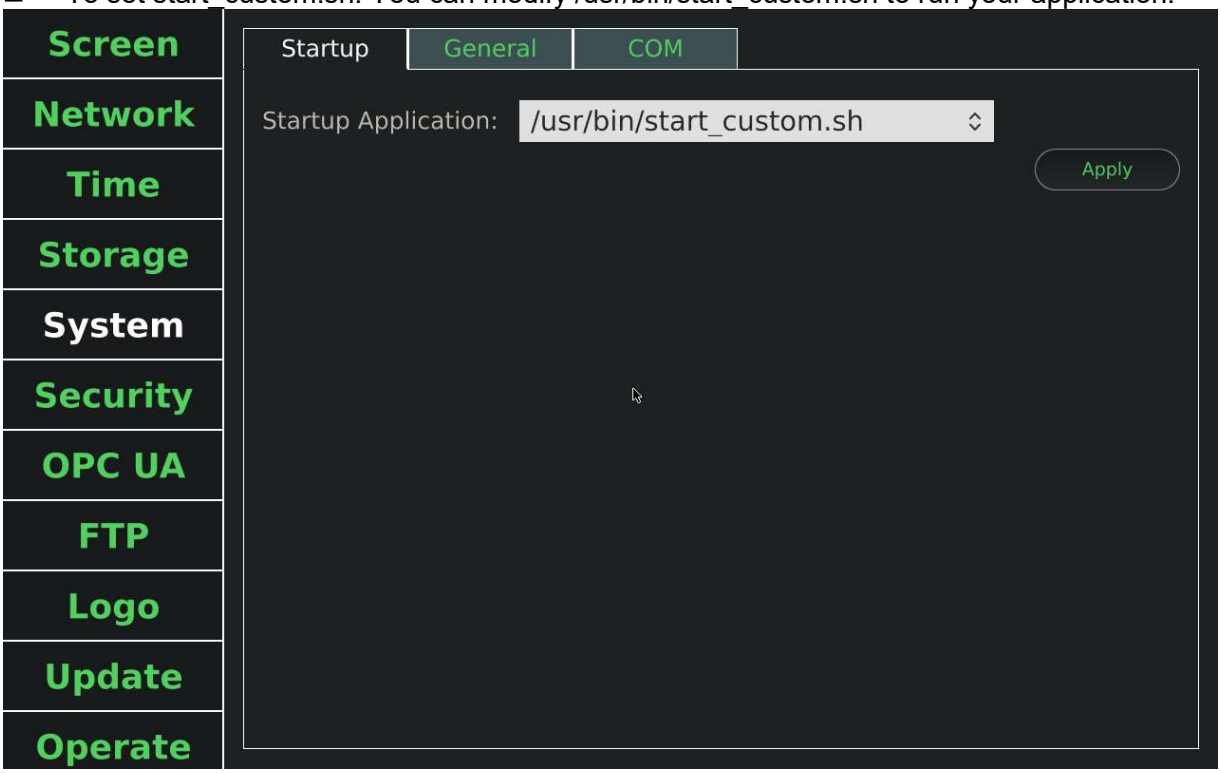


Figure Sample of Start Custom System Page

- To enable/disable default login desktop as user. You can press switch button.
  Note: You have to enable security first. Make sure that the user using the Settings tool have been authenticated. Also user has no permission to use swipe up (close application), and swipe right (switch application).

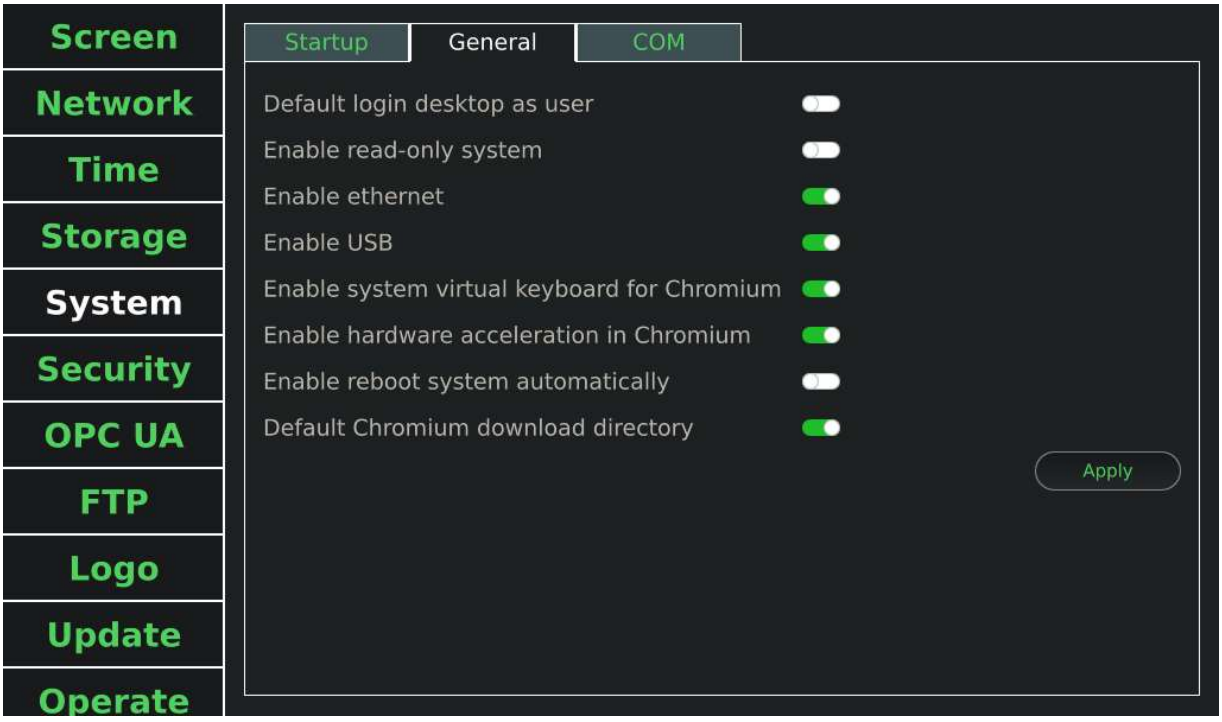


Figure Sample of Enable Default Login Desktop as User Page

- To enable/disable read-only system. You can press switch button.
  Note: It only makes your root file system to be read-only.

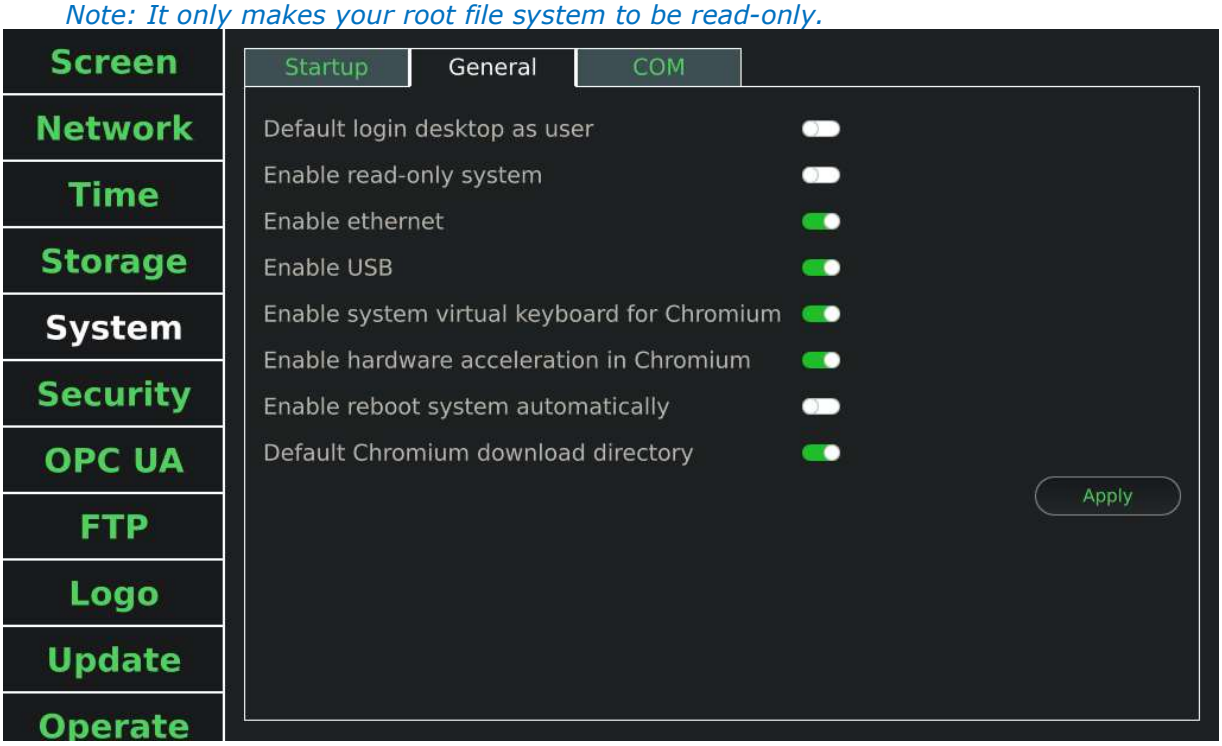


Figure Sample of Enable Read-only System Page

- To enable/disable ethernet/USB/system virtual keyboard for Chromium/hardware acceleration in Chromium. You can press switch button.
  Note: When you disable USB, it does not affect USB that have been plugged in. It only takes effect afterwards. When you disable system virtual keyboard, it does not affect chromium that have been opened. It only takes effect afterwards.

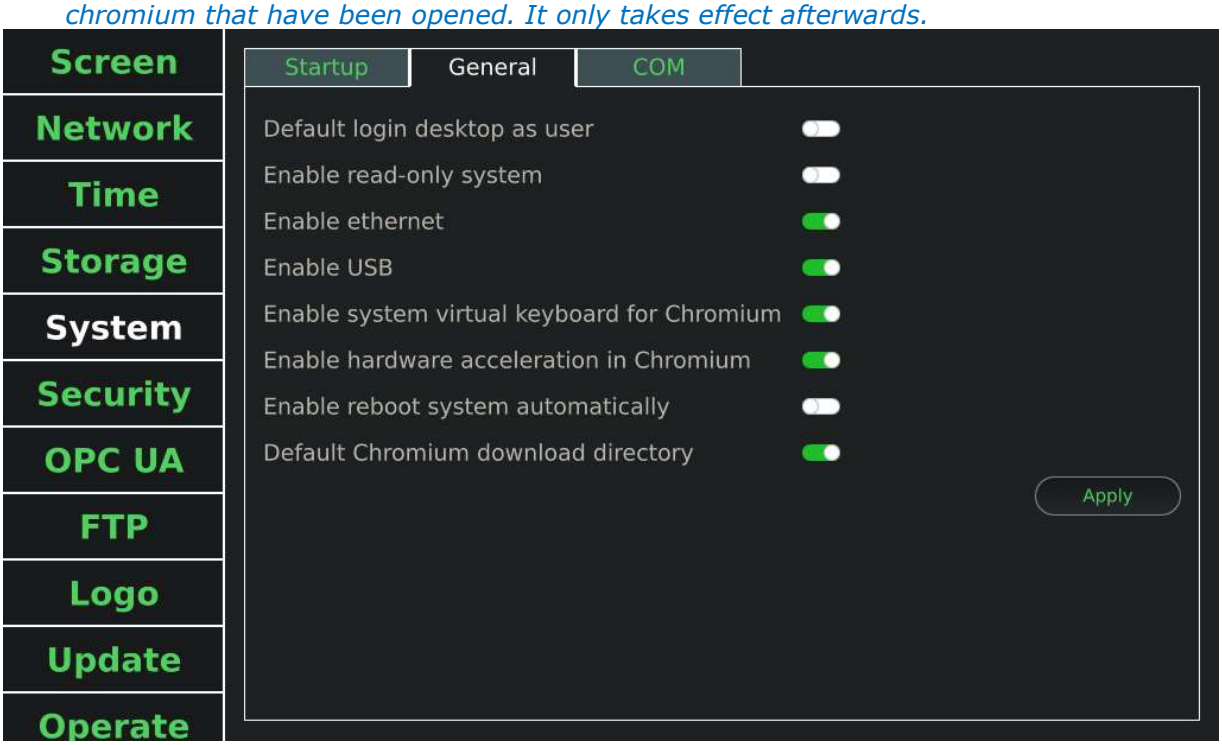


Figure Sample of Enable Ethernet Page

- To enable/disable reboot system automatically. You can press switch button and setup schedule.
  Note: If you change timezone after enable this, please reboot to take effect.

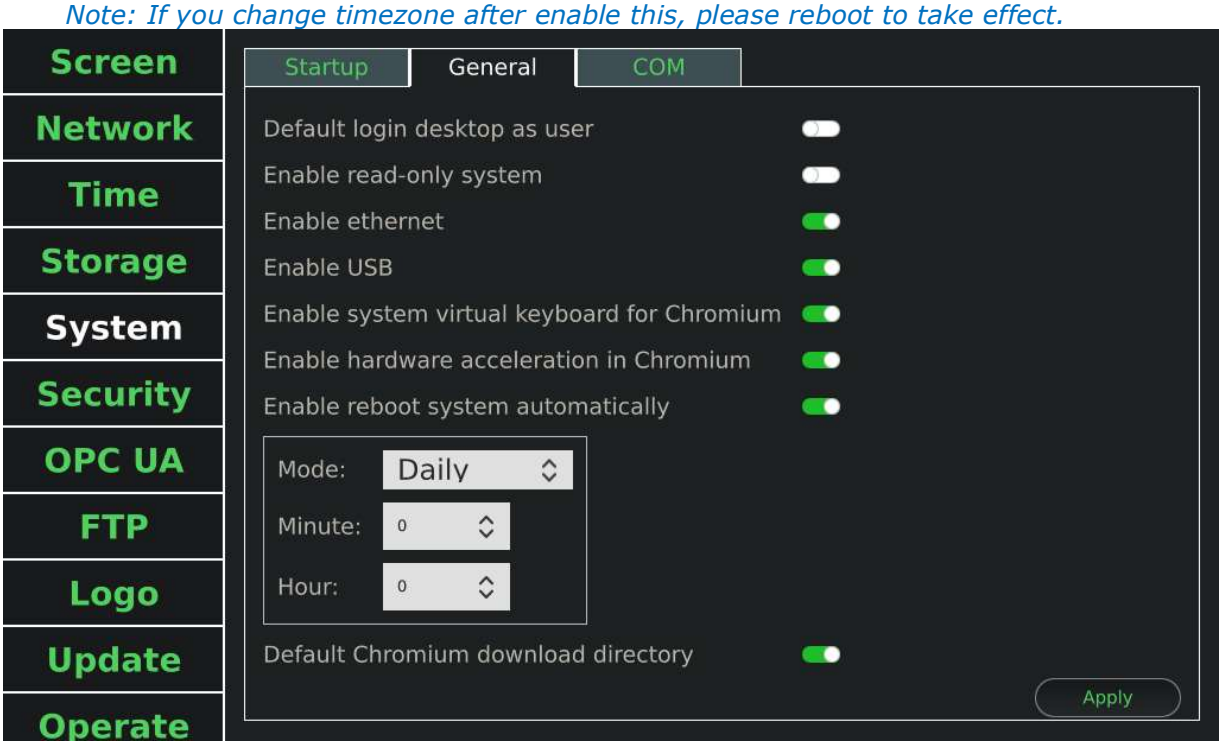


Figure Sample of Enable Reboot System Automatically Page

- To enable/disable default Chromium download directory. You can press switch button and setup download directory.
  Note: If you change download directory, please restart Chromium to take effect.

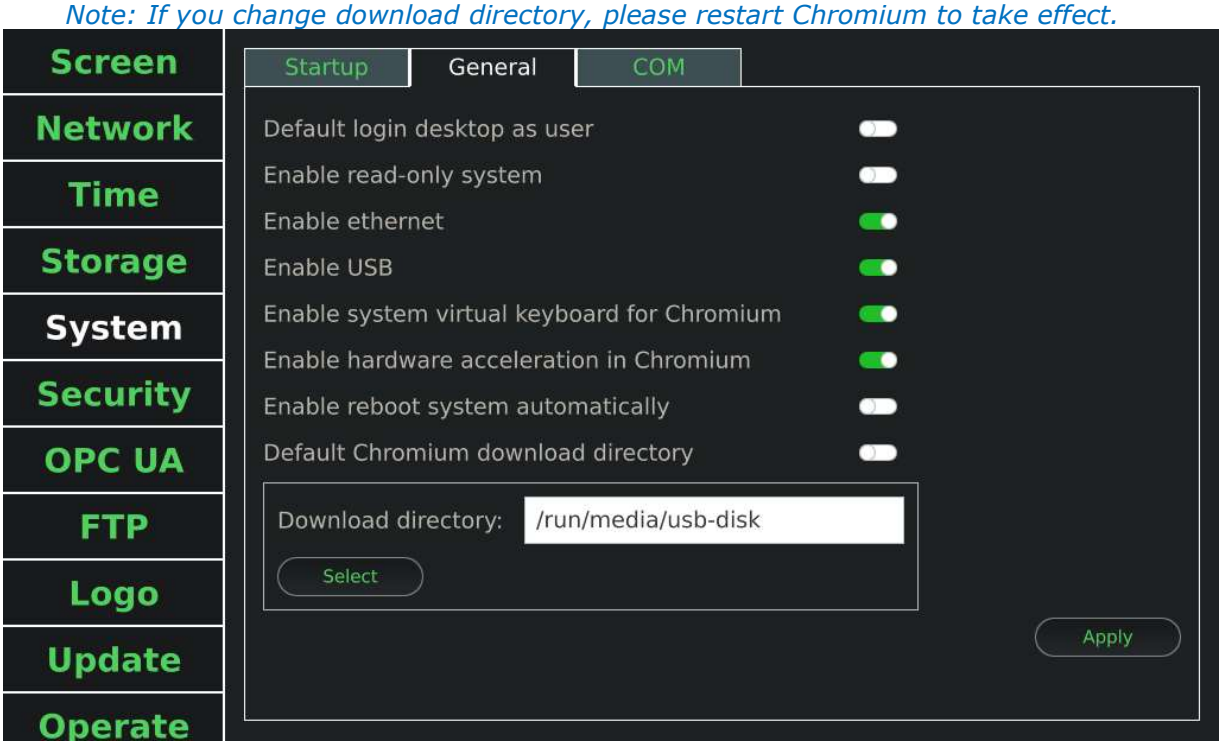


Figure Sample of Setup Chromium Download Directory Page

- To set COM port. You can set COM1 mode to RS232, RS422, RS485. And you can set COM1 and COM2 baud rate.

Figure Sample of COM System Page

12.3.6 Security Configuration

All security related configuration is in security page. You can enable security function and set password or authentication with system user. Then you would need to enter password when start the settings tool. After adjusted the configuration, you should press Apply button to save configuration

.

■ To enable security function. You can press enable switch button and set password.

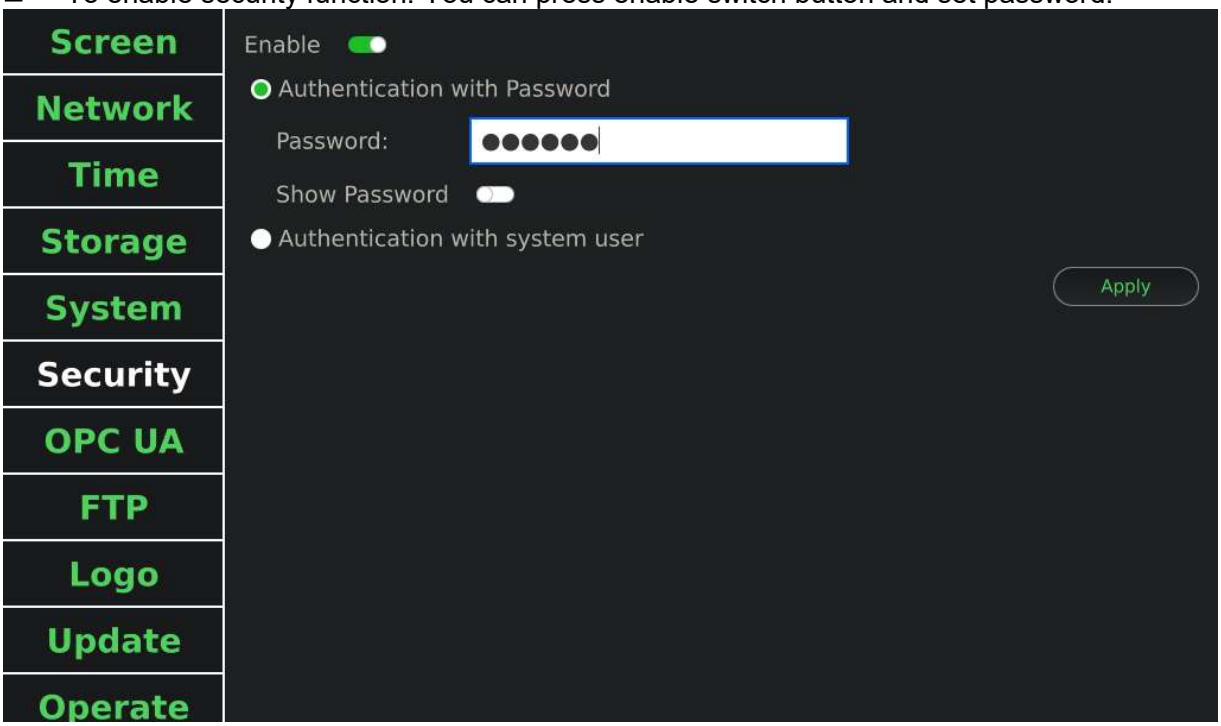


Figure Sample of Security Page

- After you enable security. You would need to enter password when you open Settings Tool next time.

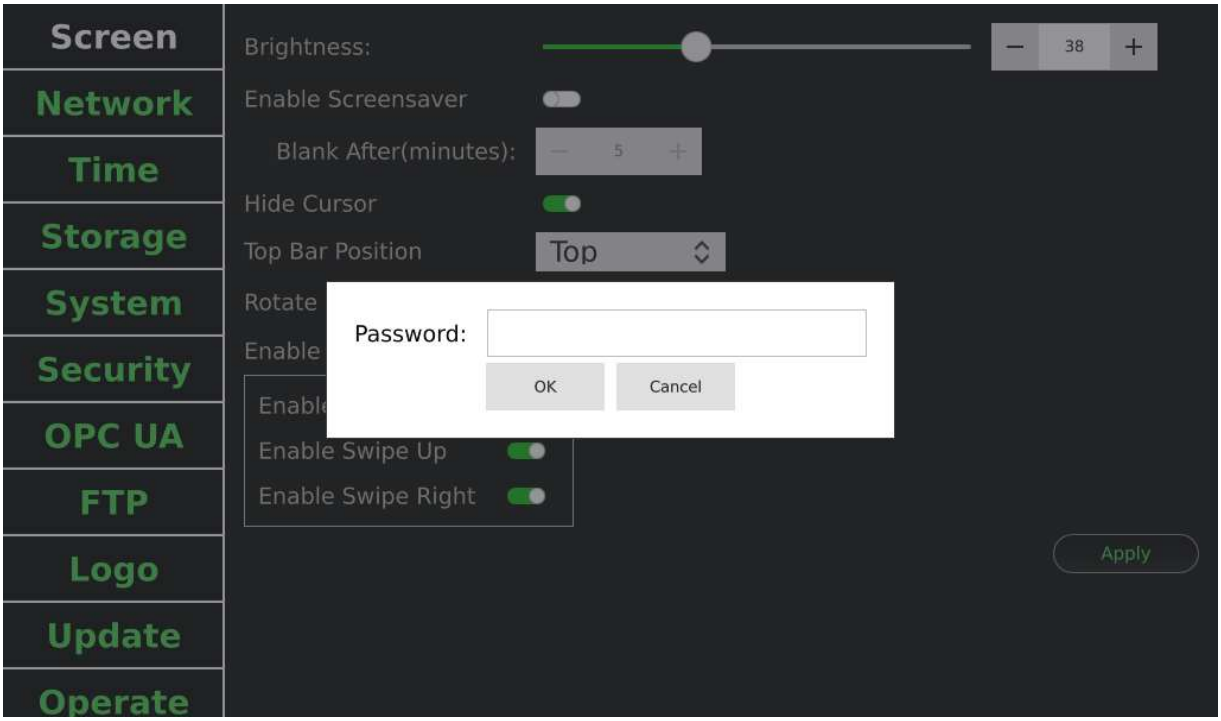


Figure Sample of Login with Password

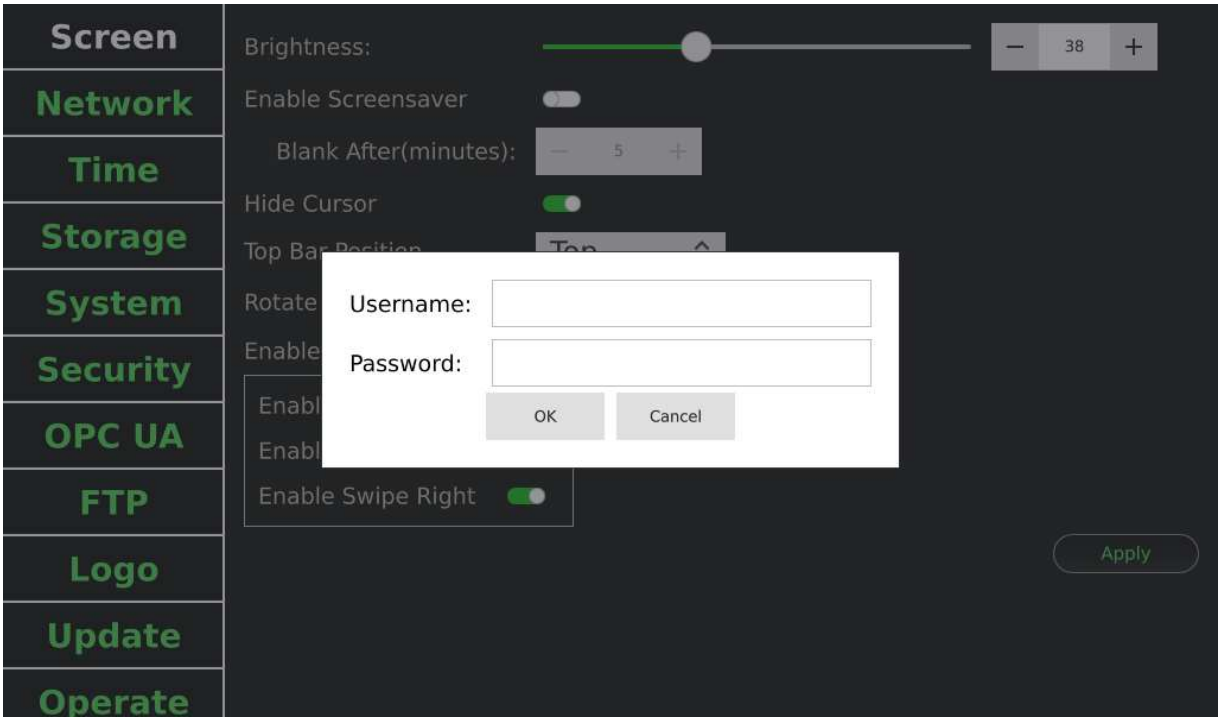


Figure Sample of Login with System User

12.3.7 VNC Configuration

All VNC related configuration is in system page's startup application. After adjusted the configuration, you should press Apply button to save configuration. This configuration is used for VNC viewer which is one of the startup applications.

- To set VNC server setting. You can set VNC server address with port and password. You can enable show password to see plain text. You can enable view only mode to ignore inputs. You can enable full screen/fit window mode of VNC viewer. You can set image quality of JPEG compression.

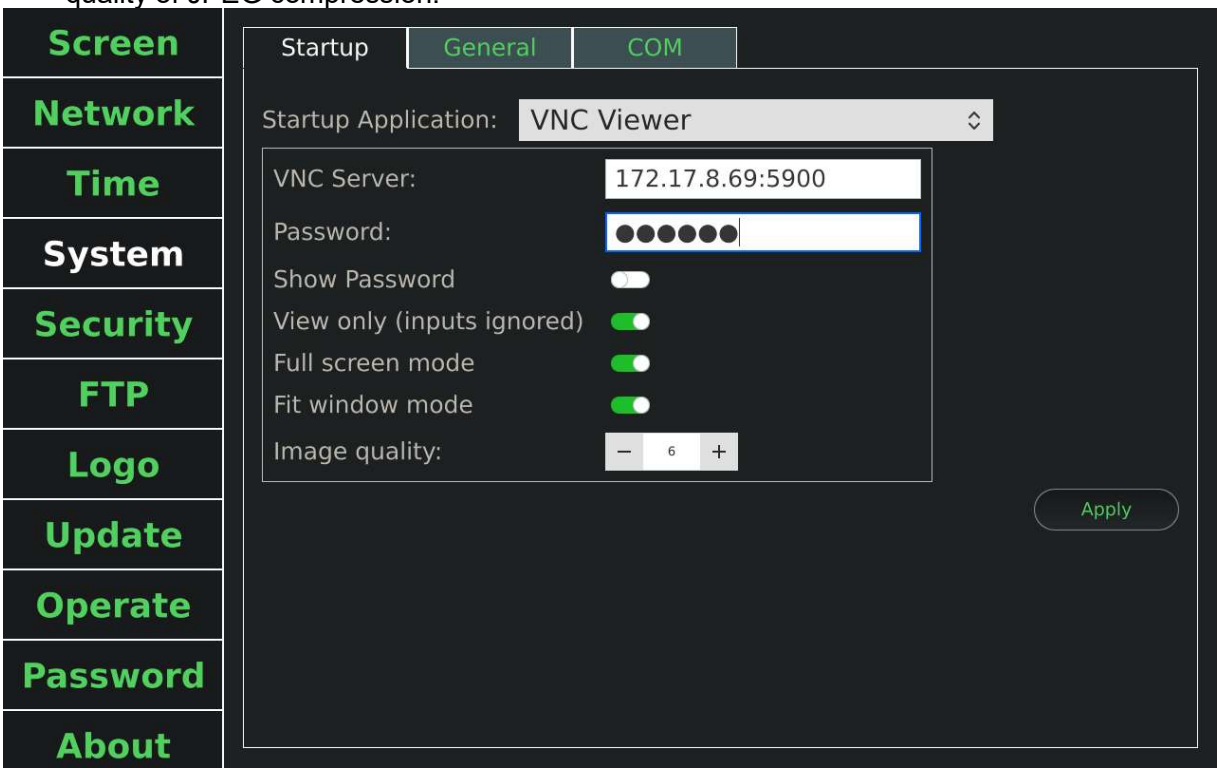


Figure Sample of VNC Page

12.3.8 OPC UA Configuration

All OPC UA related configuration is in OPC UA page. After adjusted the configuration, you should press Apply button to save configuration. This configuration is used for OPC UA server.

- To enable OPC UA server. You can press enable switch button. You can set OPC UA server port number and identity token. When you select “Username/Password” type, you can set custom username and password.

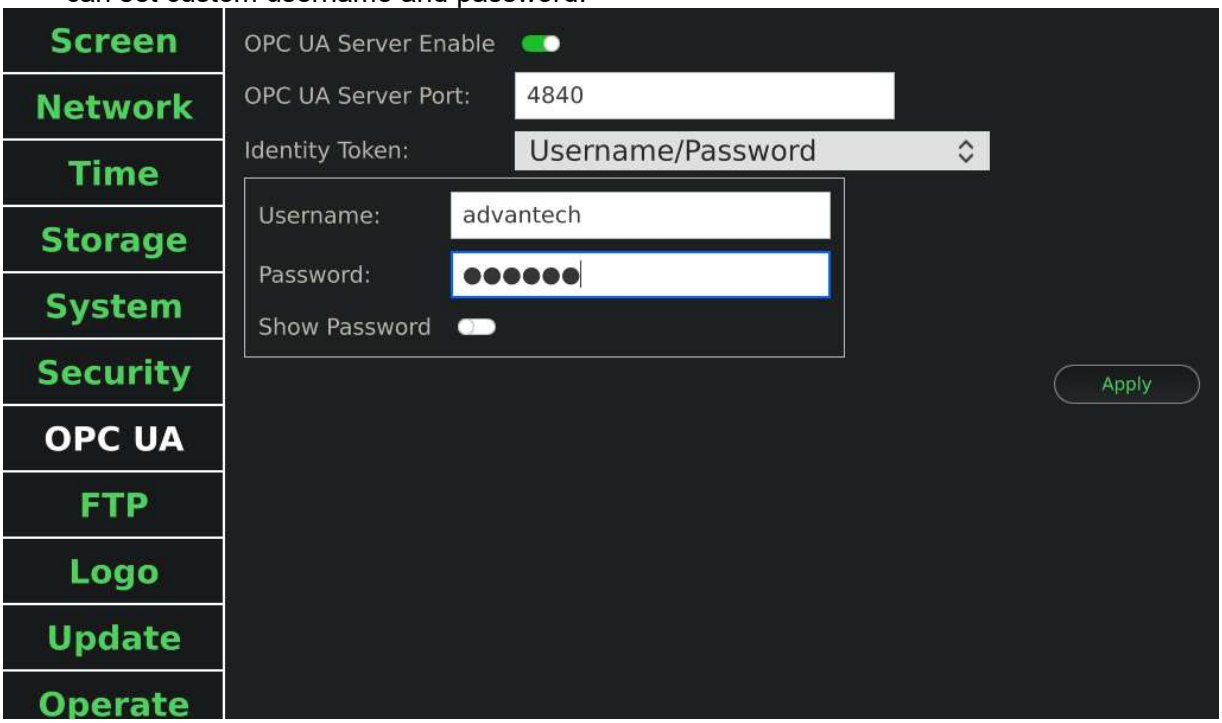


Figure Sample of OPC UA Page

12.3.9 FTP Configuration

All FTP related configuration is in FTP page. After adjusted the configuration, you should press Get button to download file from FTP server. This configuration is used for FTP client.

- To use FTP client. You can set FTP server IP address, port number, username, password, remote file path, and local path. Remote file path must be a file on FTP server, not a folder. Local path can be a folder or a file name.

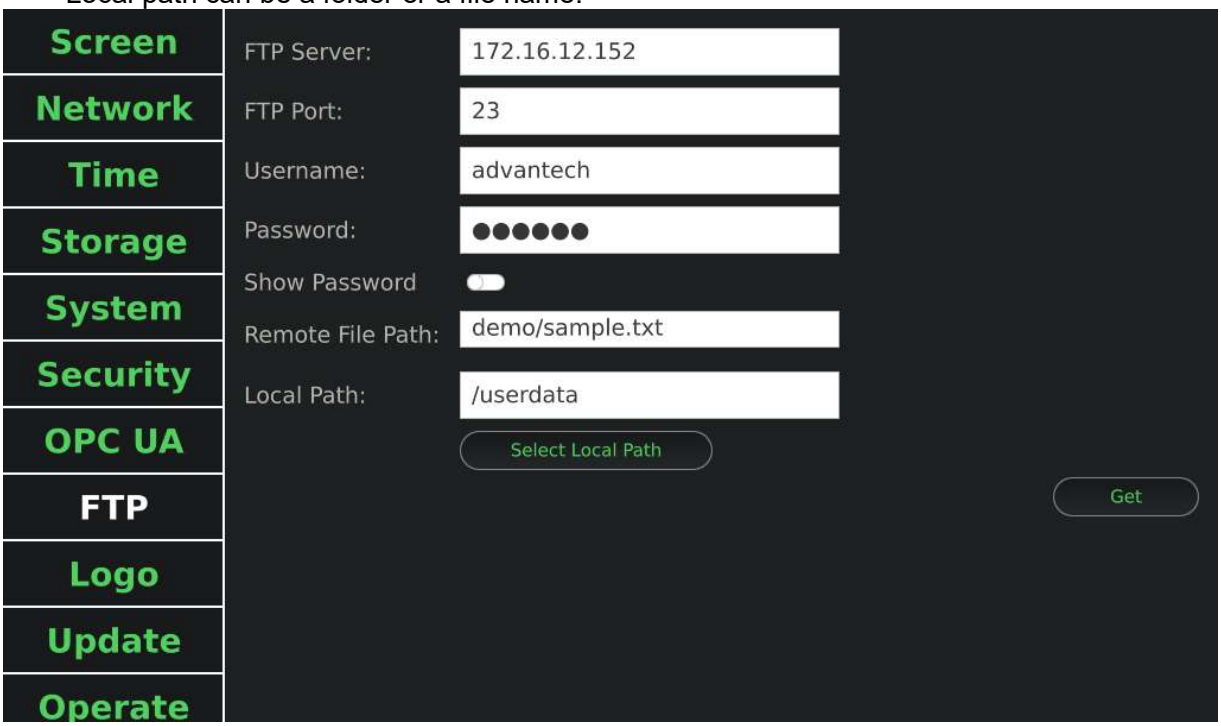


Figure Sample of FTP Page

12.3.10 Logo Configuration

All logo related configuration is in logo page. Logo image only support 24-bit bmp format. Background color should be two digit hexadecimal format for red, green and blue (0xRRGGBB). And it cannot be 0x000000 for design reason. After adjusted the configuration, you should press apply button to update boot logo.

- To update boot logo. You can upload image to device or plug USB. Then you should press select button to select your image file.

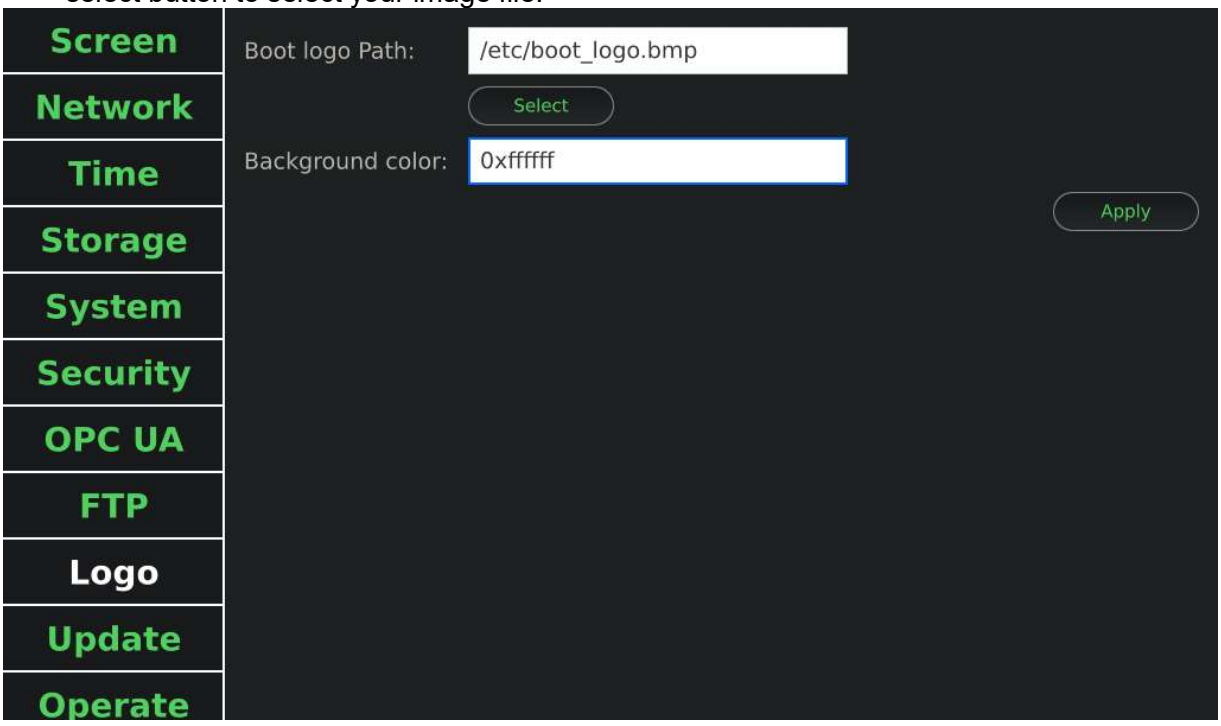


Figure Sample of Logo Page

12.3.11 Update Configuration

All update related configuration is in update page. After selected the image and adjusted the configuration, you should press Update button to start. If you want to keep settings after update, you can enable backup settings, root user.

- To update device. You can upload image to device or plug USB. Then you should press select button to select your image file.

Figure Sample of Update Page

■ For example, select image file from USB.

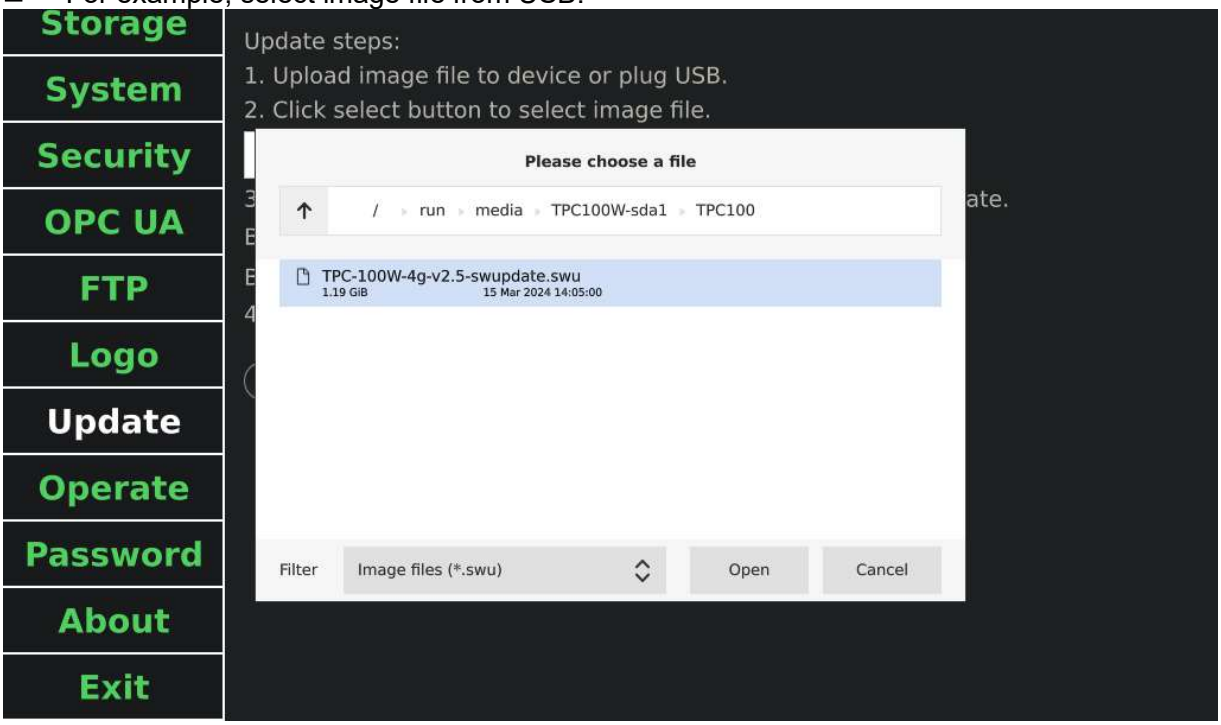


Figure Sample of Select File

■ To enable/disable backup settings and user. You can press switch button.
Note: The "Settings" means the configuration in Settings Tool. The "System User" means system root and weston user.

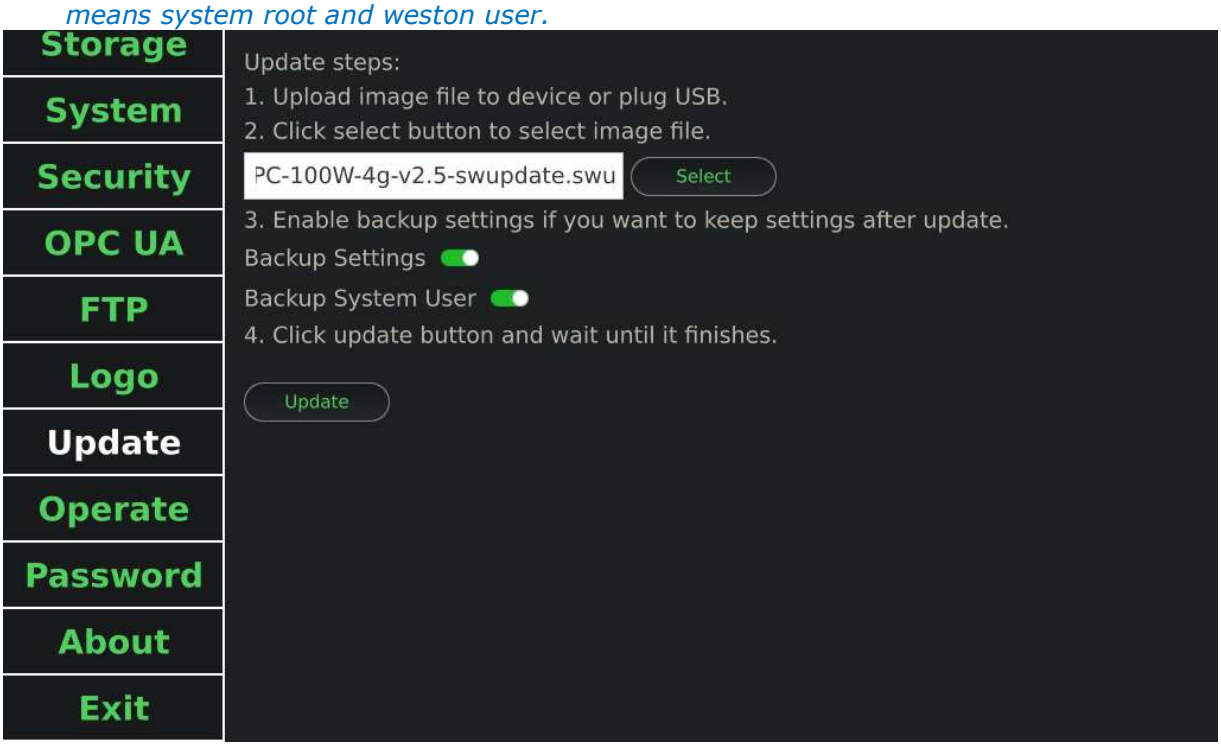


Figure Sample of Update

- Press update button after selected image file.

  NOTE: If swu file version >= v3.0, installation of swu files prior to v2.x is not allowed. If this happens, a message will be displayed and the update will be aborted

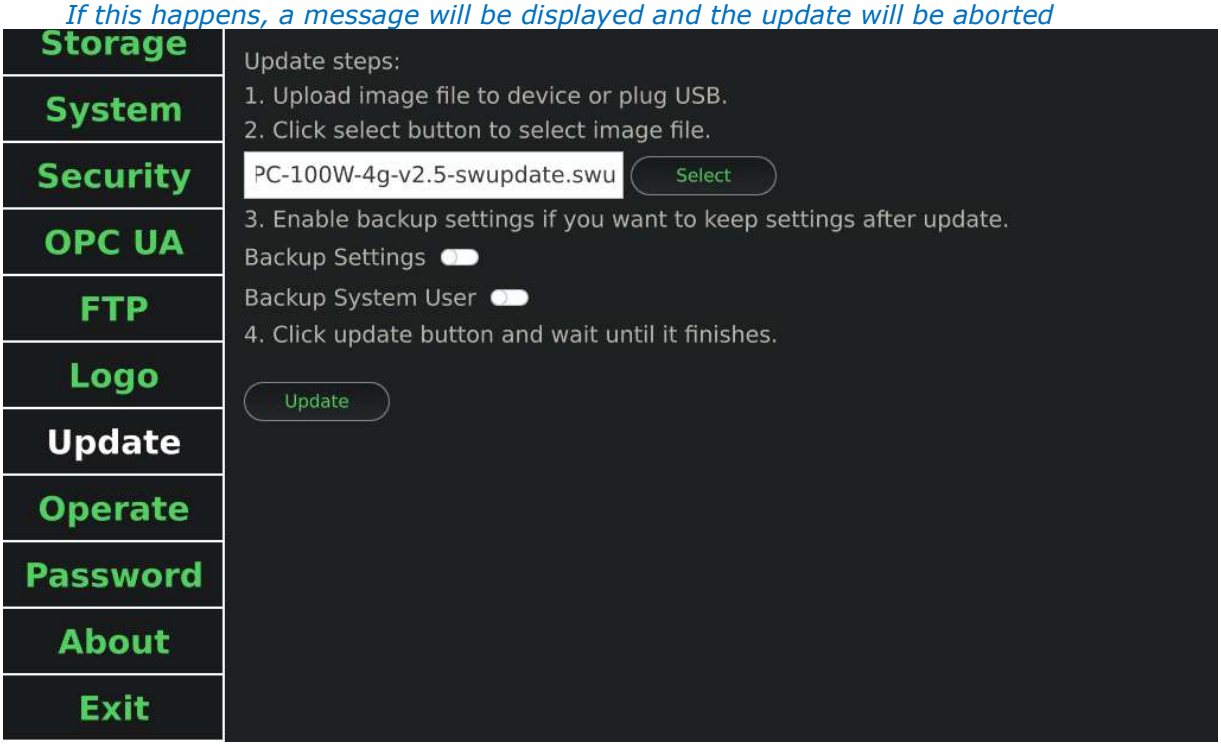


Figure Sample of Update

12.3.12 Operate Actions

All operate related actions are in operate page. You can press Export button to export settings to a folder. And you can press Import button to import settings from exported file. You can press Export Screenshots button to export screenshots to a folder. You can press Reboot button to reboot system. You can press Shutdown button to shutdown system. You can press Exit button to exit application. You can press Open button to open terminal. You can press Reset button to factory reset(it only workable on emmc boot). You can press Export Downloads button to export downloads from Chromium to a folder.

Note: Import actions would not affect "read-only system" in System. If you want to keep import settings after reboot, you should disable "read-only system" first.
Factory reset will restore your device to the factory default version, or the version you manually burned using an SD card.

- To export settings. You can export file to device or plug USB.

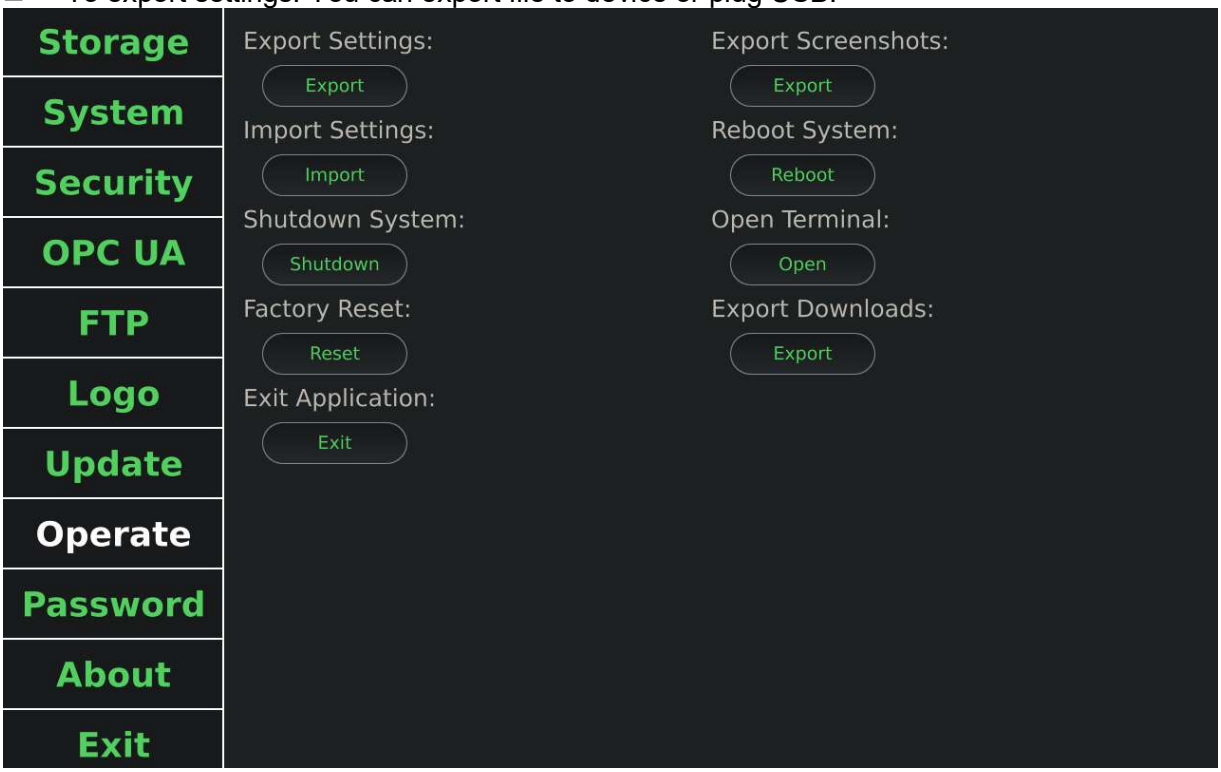


Figure Sample of Operate Page

- For example, press Export button to select export folder.

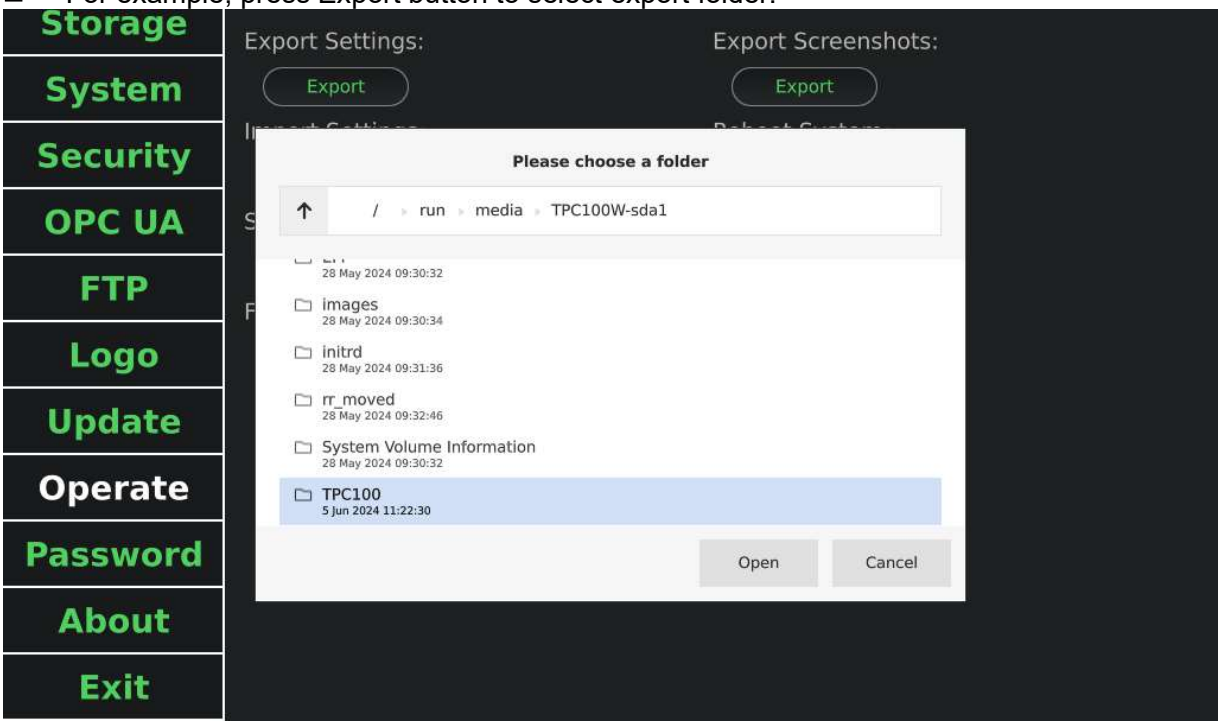


Figure Sample of Select Folder

- To import settings. You can upload file to device or plug USB. Then you should press Import button to select your exported file.

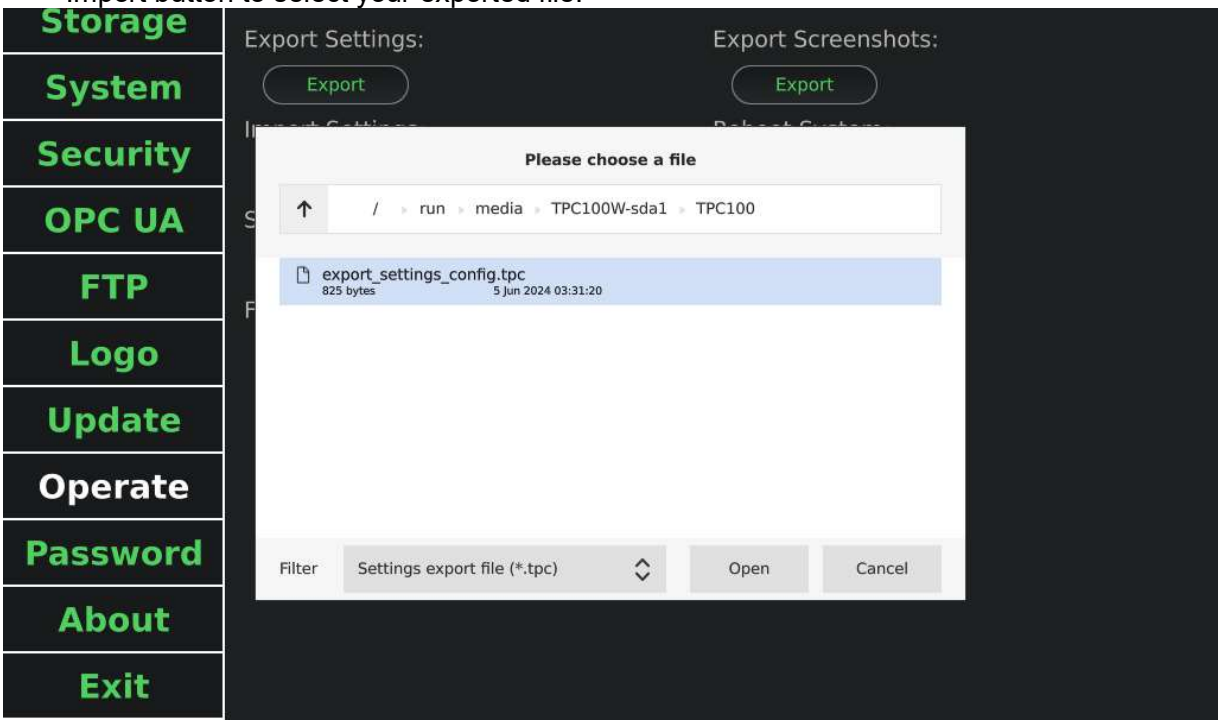


Figure Sample of Import Exported File

■ To exit settings. You can press exit button in Operate page or left side bar.

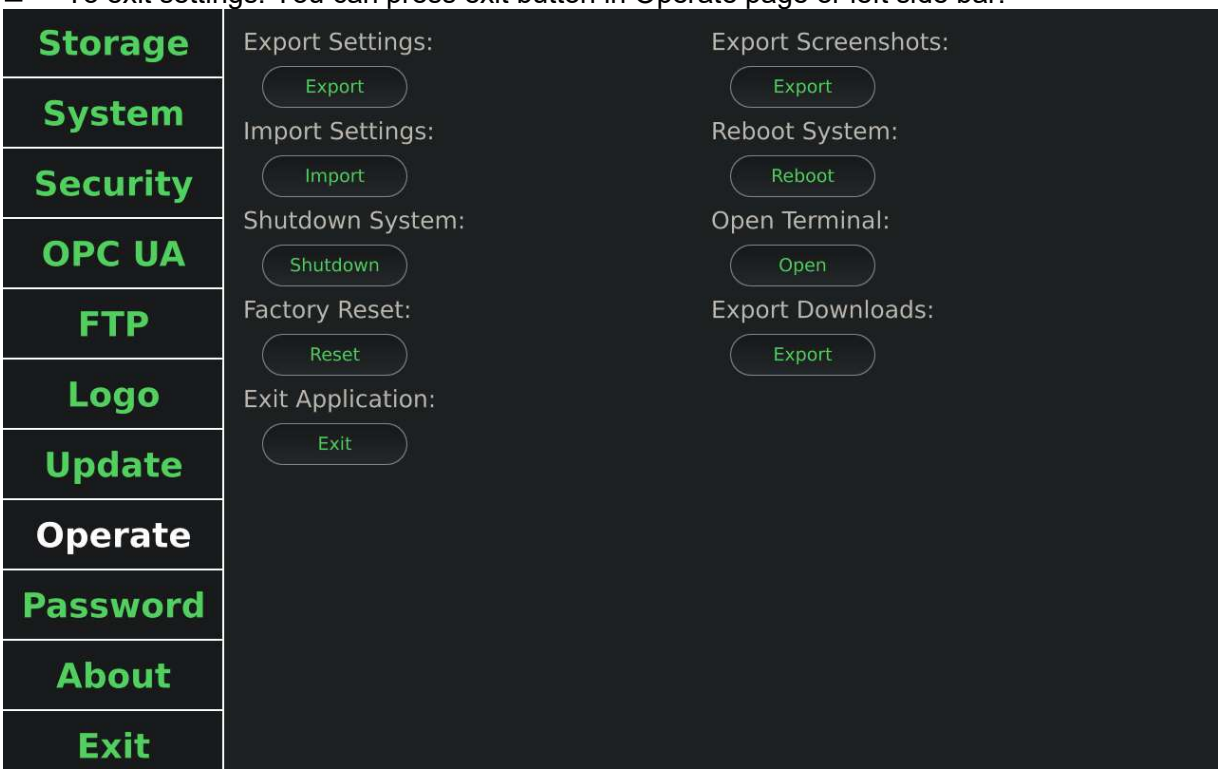


Figure Sample of Operate Page

12.3.13 Change Password

You can change root password in Password page.

- To change password. You have to set current password. The new password can be set only if the authentication is success.

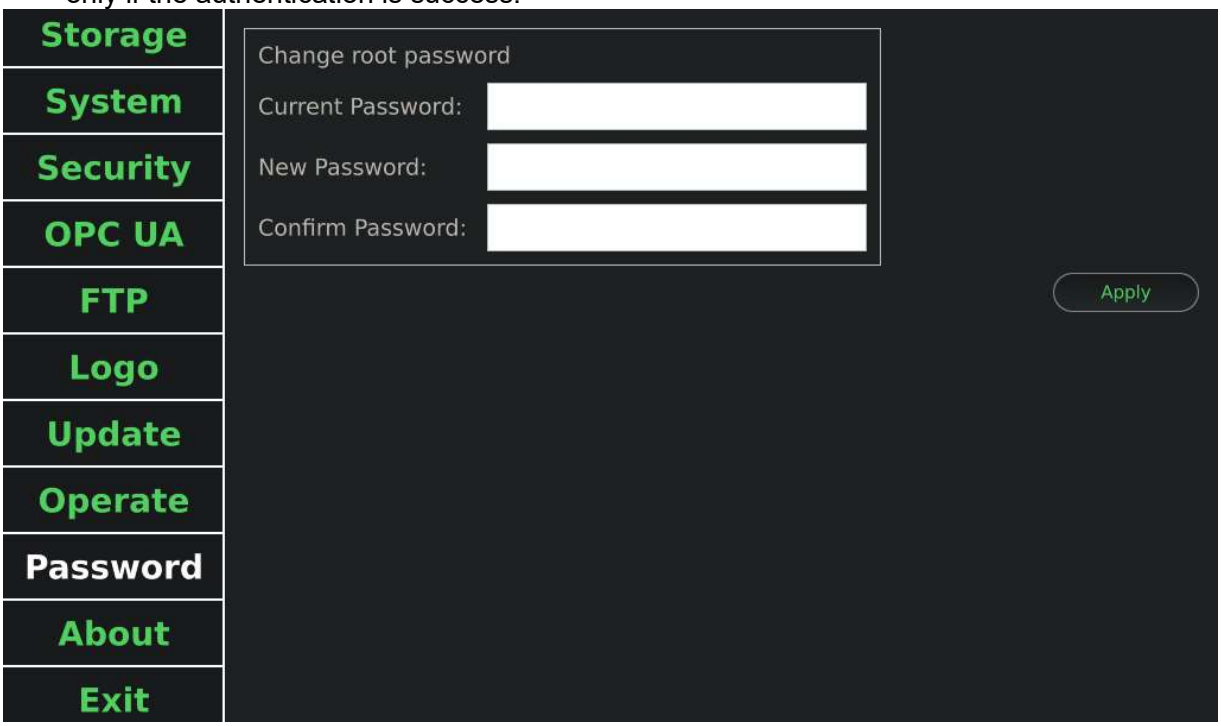


Figure Sample of Password Page

12.3.14 Import Certificate

When you connect to a website with a self-signed certificate using Chromium, you might see a security warning. You can import the certificate in Certificate page to avoid security warning.
Note: This is for root user now.

- To import certificate. You have to set nickname for certificate and choose certificate file. Then press Add button to import certificate.

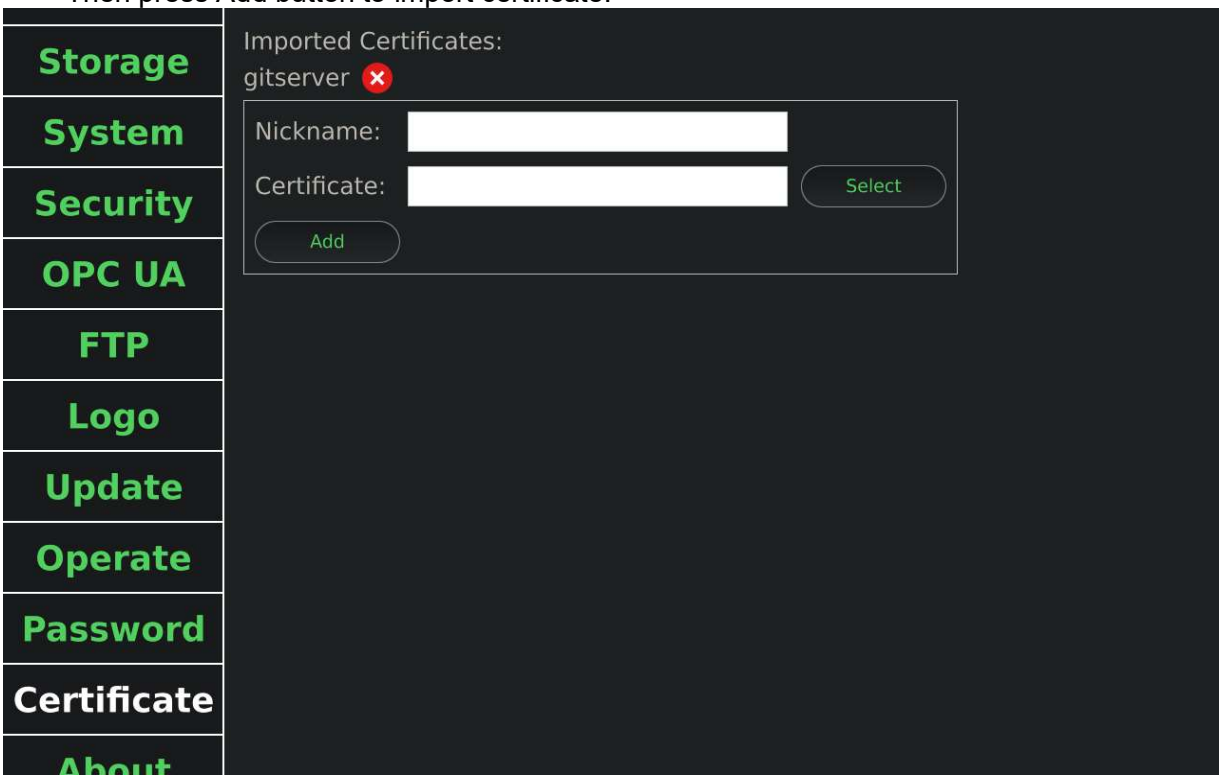


Figure Sample of Certificate Page

12.3.15 About Information

All version and device related information is in about page.

- To see image, app, and important package version. To see CPU temperature.

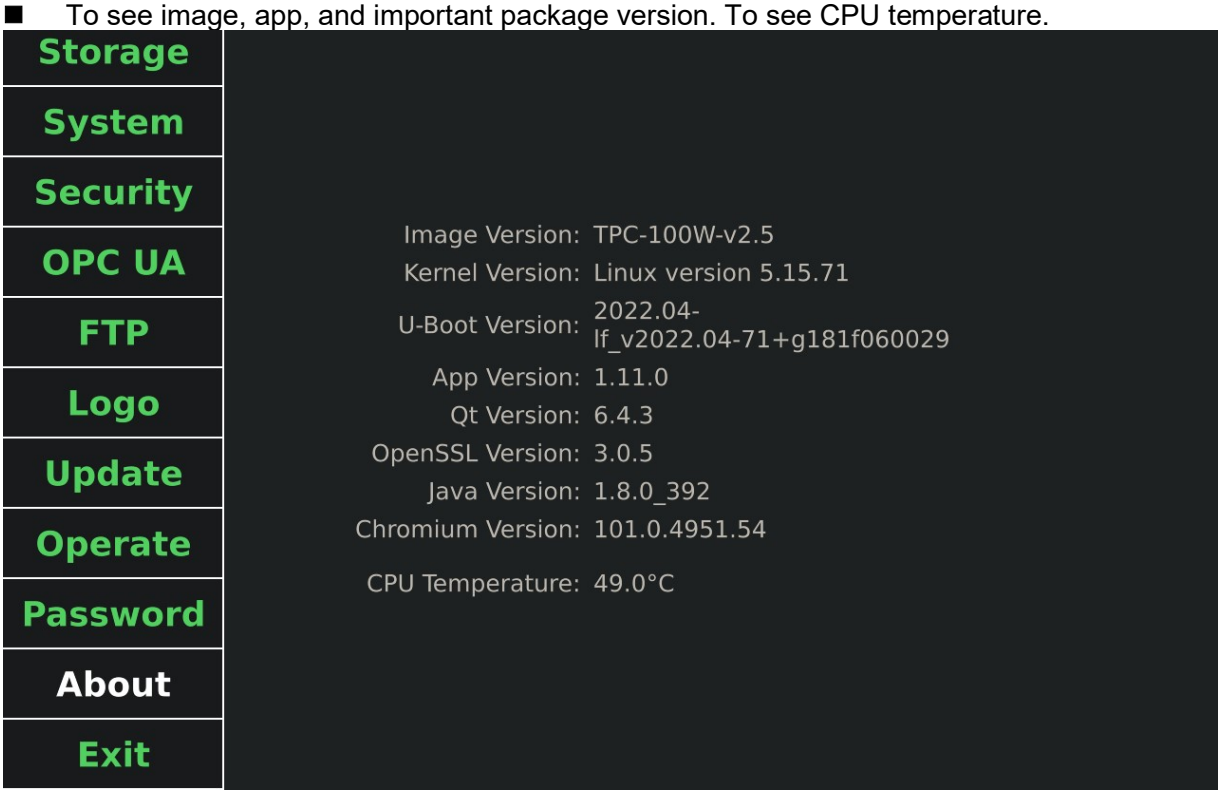


Figure Sample of About Page

12.3.16 About Logs

- TPC-100W Settings Tool Log

TPC-100W settings tool records debug message in log. Log path is “/tmp/settings.log“.

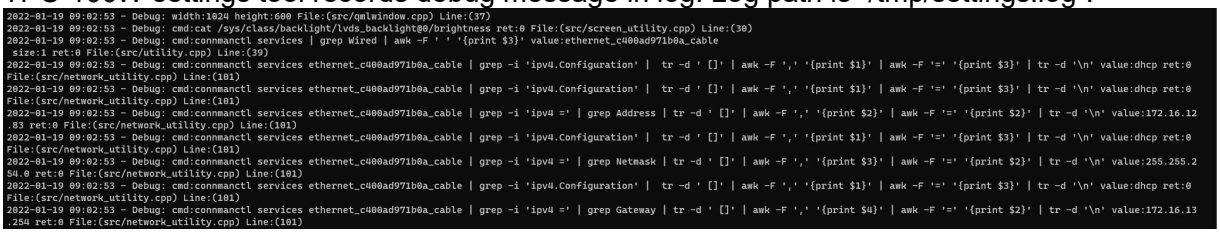


Figure Log

The monitor program of VNC server records debug message in log. Log path is “/tmp/runapp.log“.

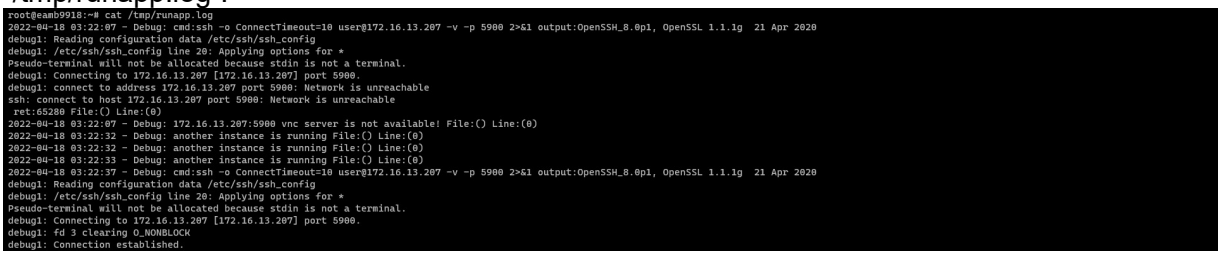


Figure Log

12.3.17 Known issues

- “ComboBox.qml:56: TypeError: Cannot read property 'width' of null”

This is a Qt bug at version 5.15.0. When UI dropdown combobox, it would show “ComboBox.qml:56: TypeError: Cannot read property 'width' of null” in log.
Reference: https://bugreports.qt.io/browse/QTBUG-86131?attachmentOrder=asc

Figure Error Log

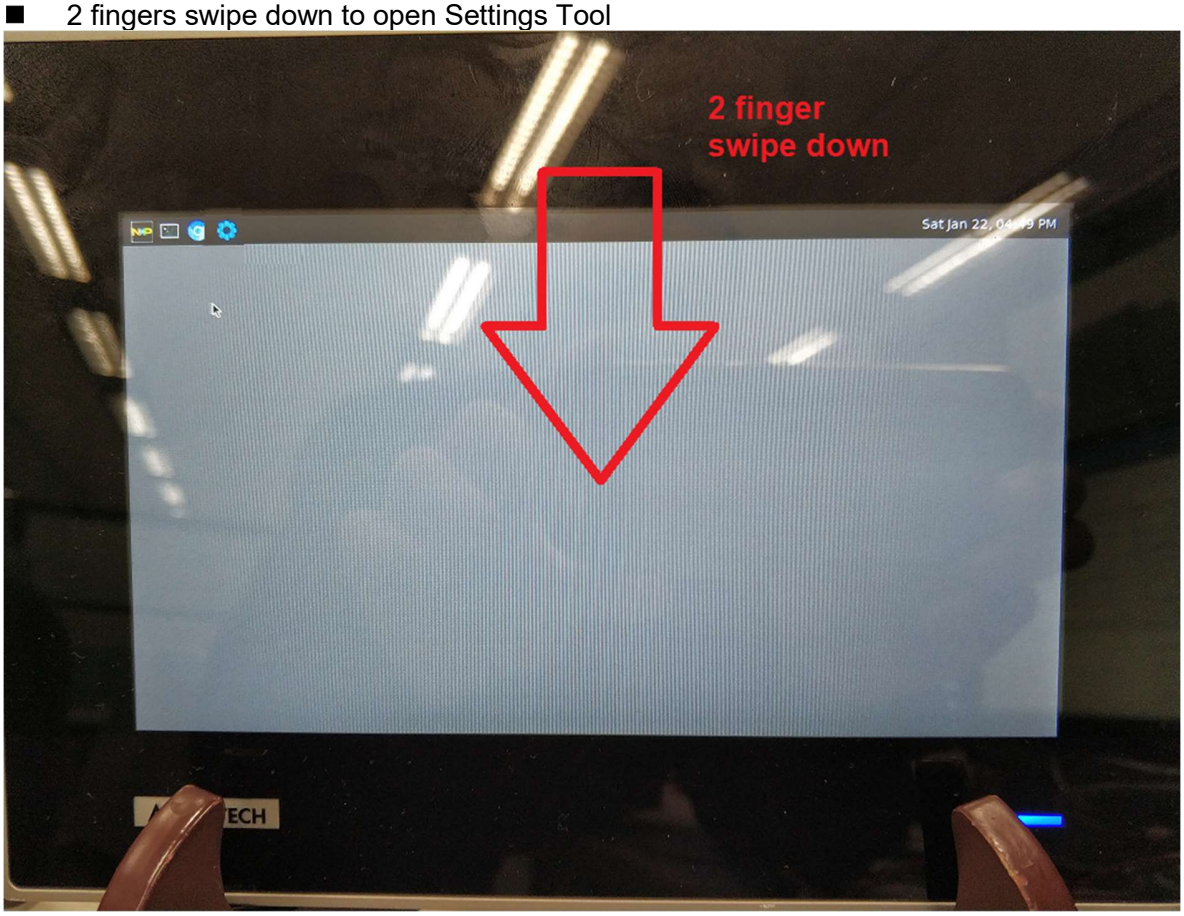
- Desktop Status Bar Time is Not Synced

When you clicked apply button at time configuration page, it would update time immediately. But it takes about 1 minute to update on desktop status bar.

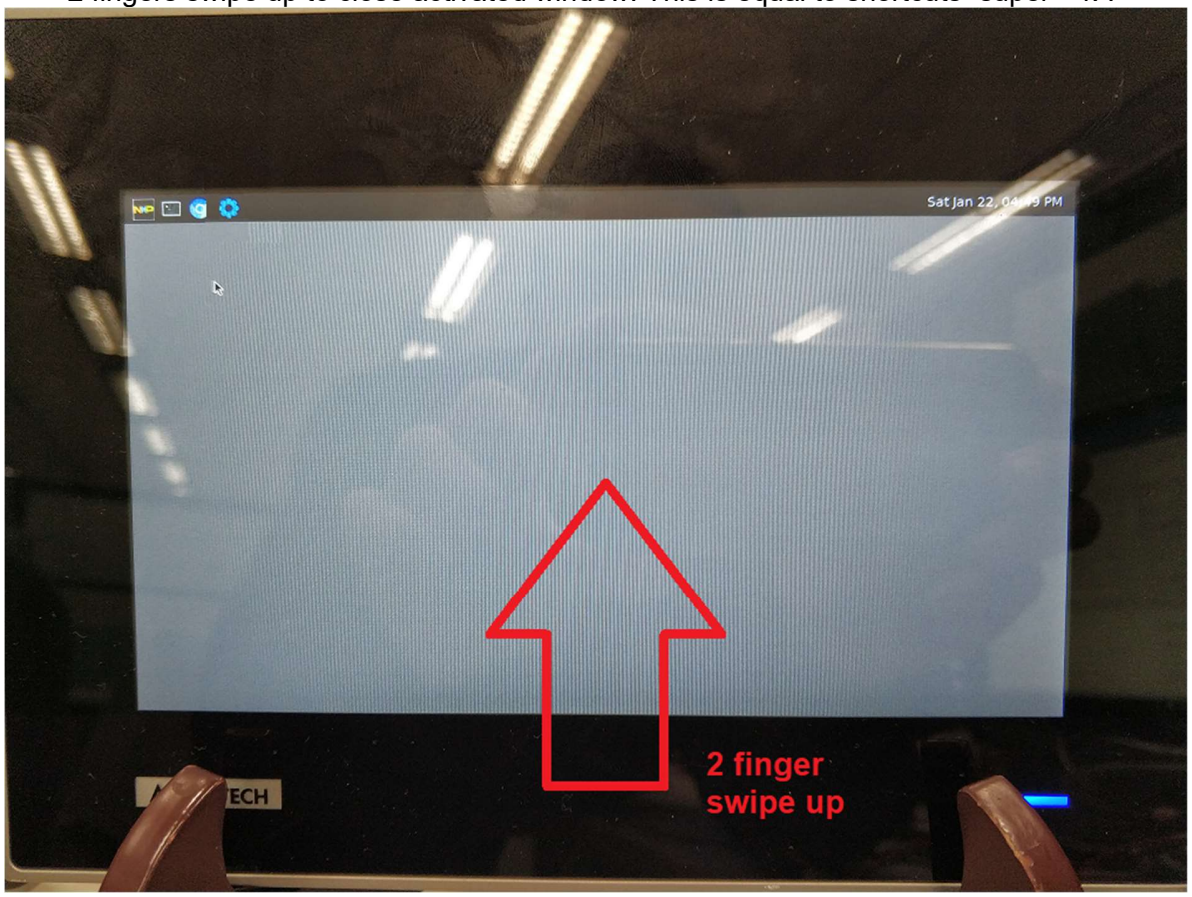
12.4 How to Use Gesture

There are predefined gestures on TPC-100W. This section will explain how to use gesture to open/close Settings Tool.

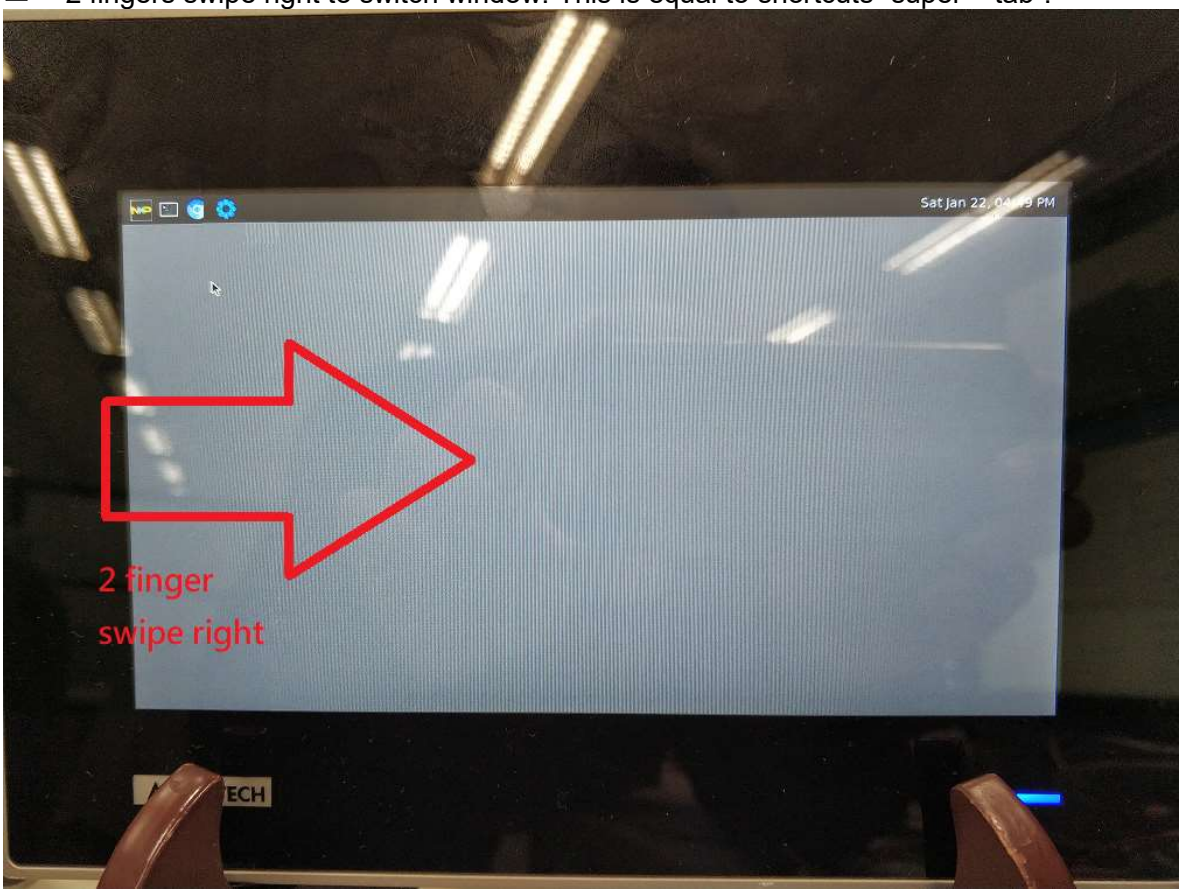
■ 2 fingers swipe down to open Settings Tool



■ 2 fingers swipe up to close activated window. This is equal to shortcuts “super + k”.



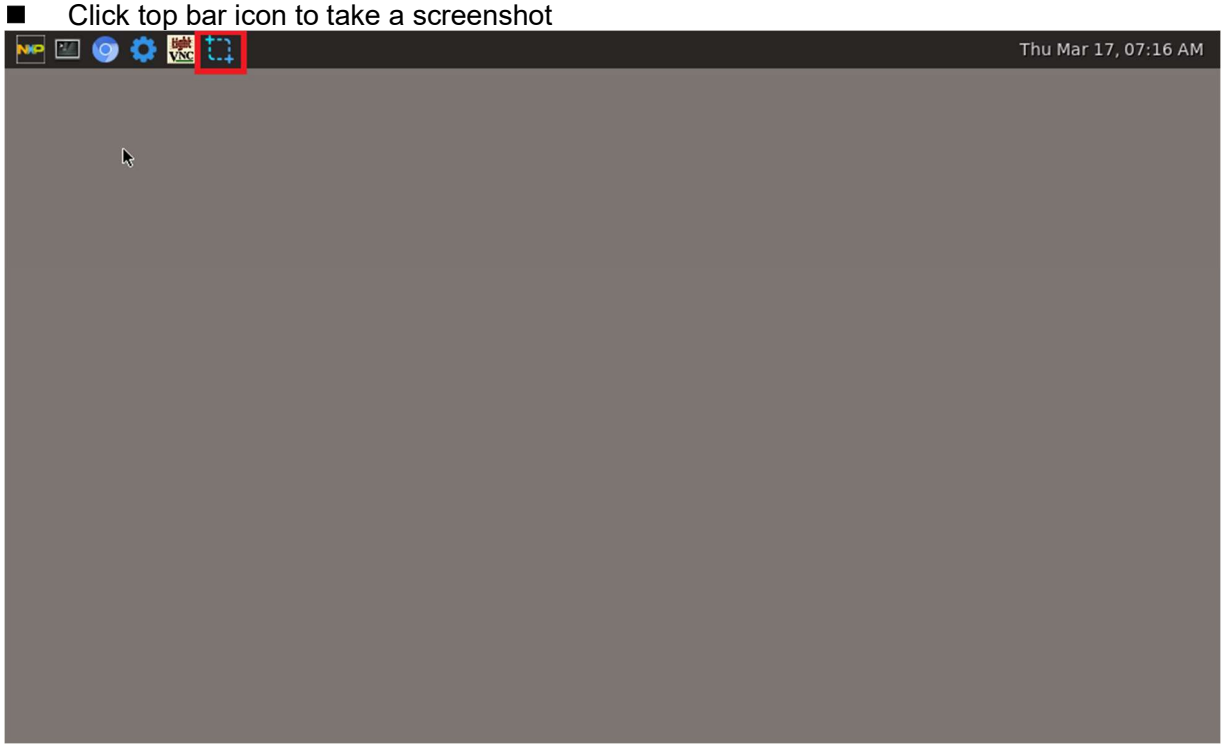
■ 2 fingers swipe right to switch window. This is equal to shortcuts “super + tab”.



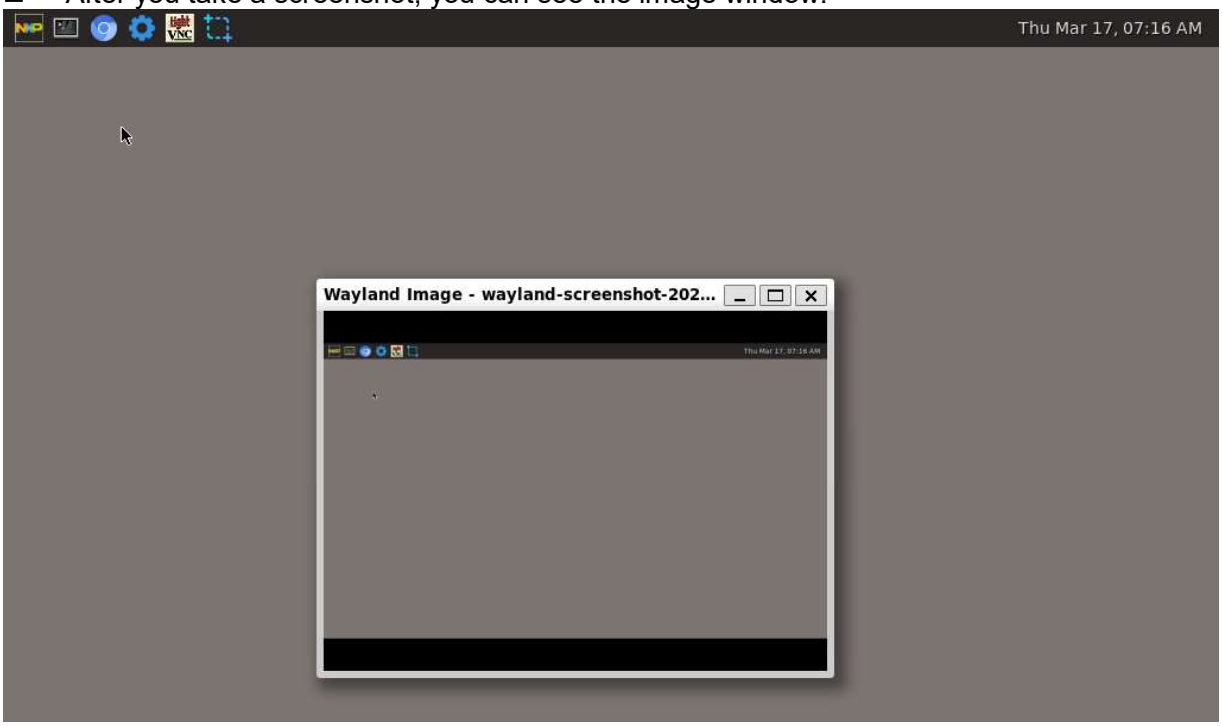
12.5 How to Take Screenshots

It is able to take a screenshot on TPC-100W. This section will explain how to take a screenshot, where to find screenshots.

■ Click top bar icon to take a screenshot



■ After you take a screenshot, you can see the image window.



You can find the screenshot under “/userdata “.

```
root@eamb9918:~# ls -al /userdata/
total 60
drwxr-xr-x  3 root root  4096 Mar 17 07:16 .
drwxr-xr-x 21 root root  4096 Mar 16 08:11 ..
drwx------  2 root root 16384 Mar 16 08:10 lost+found
-rw-r--r--  1 root root 12187 Mar 17 07:16 wayland-screenshot-2022-03-17_07-16-48.png
-rw-r--r--  1 root root 21799 Mar 17 07:16 wayland-screenshot-2022-03-17_07-16-51.png
root@eamb9918:~#
```

13. Weston Keyboard Shortcuts

The table below lists the actions that can be performed through Weston keyboard shortcuts, when the TPC-100W is connected to a keyboard. "super", i.e. Windows key between "ctrl" and "alt" (default value)

Command	Action	Condition(s)
ctrl + scroll	Zoom in / out the desktop	Keyboard + mouse
super + shift + f	Put activated window fullscreen	Keyboard
super + left mouse button	Move activated window	Keyboard + mouse
super + middle mouse button **(Not support)**	Rotate activated window **(Not support)**	Keyboard + mouse
super + right mouse button	Resize activated window	Keyboard + mouse
super + shift + left mouse button	Resize activated window	Keyboard + mouse
super + tab	Switch windows	Keyboard
super + k	Kill activated window	Keyboard
super + s	Capture a screenshot (see details below)	Keyboard

- Capture a screenshot

Refer to the table above for the command to be used. The captured picture (PNG format) is automatically stored in /home/weston/wayland-screenshot-2022-03-08_01-48-19.png.

14. Playing video

Playing the mp4 video with below command.

```
sh-5.0# gst-launch-1.0 filesrc location=/4k.mp4 ! decodebin ! imxvideoconvert_g2d ! autovideosink
```

15. USB storage

To use USB sticks for storing image file(.swu), you need to format them to FAT32 or EXT4. After plugging in the USB storage to TPC-100W, it will be mounted to /run/media/sdx1, where x=a, b or c …

You can check the USB storage contents by below command. We use sda1 as example.

```
sh-5.0# ls  /run/media/sda1
```

If you want to safely eject USB, you can umount first by below command.

```
sh-5.0# umount  /run/media/sda1
```

16. Watchdog

If you want to test watchdog, you can go to /usr/src/device/watchdog and make. You would get watchdog-test binary to test.

Go to /usr/src/device/watchdog and make.

```
sh-5.0# cd  /usr/src/device/watchdog
sh-5.0# make
```

Set watchdog timeout to 20 seconds. It would strobe every fixed period.

```
sh-5.0# ./watchdog-test -d -t 20 -e
```

You can kill watchdog-test to check system would reboot after 20 seconds.

```
sh-5.0# killall watchdog-test
```

Please reference https://github.com/torvalds/linux/blob/master/tools/testing/selftests/watchdog/watchdog-test.c for more details.

17. Change boot logo

The boot logo is configured in /etc/psplash.conf

```
IMAGE_PATH=/etc/boot_logo.bmp
BACKGROUND_COLOR=0xffffff
TEXT_COLOR=0x004280
```

IMAGE_PATH is the path of logo image and only support 24-bit bmp format.
BACKGROUND_COLOR and TEXT_COLOR is the color code in a two digit hexadecimal format for red, green and blue (0xRRGGBB) and it cannot be 0x000000 for design reason.
If image or color is invalid, it will show the default image or color of psplash.

18. About LICENSE

19.1 Advantech TPC-100W Settings Tool

Please reference https://github.com/Advantech-IIoT/settings/blob/master/LICENSE for more details.

19.2 Qt Browser

Please reference https://github.com/Advantech-IIoT/quicknanobrowser/blob/master/LICENSE for more details.

19.3 Chromium

Please reference https://www.chromium.org/chromium-projects/ for more details.

19.3.1 Chromium Extension

- Virtual Keyboard

Please reference https://chrome.google.com/webstore/detail/virtual-keyboard/pflmllfnnabikmfkkaddkoolinlfninn?hl=zh-TW for more details.
Please reference https://github.com/xontab/chrome-virtual-keyboard/blob/master/LICENSE for more details.

19.4 ydotool

Please reference https://github.com/Advantech-IIoT/ydotool/blob/master/LICENSE for more details.

19.5 Java

We are using Adoptium prebuilt OpenJDK binaries.
Please reference Adoptium https://adoptium.net/ for more details.
Please reference OpenJDK https://github.com/openjdk/jdk/blob/master/LICENSE for more details.

19.6 TightVNC Java Viewer

Please reference https://www.tightvnc.com/licensing-jviewer.php for more details.
Please reference https://github.com/Advantech-IIoT/tvnjviewer/blob/master/LICENSE.txt for more details.

19.7 Docker

Please reference https://docs.docker.com/engine/ for more details.

19. Appendix

20.1 FAQ

Q: How to access FTP service?
Ans: The FTP service is based on SFTP (SSH File Transfer Protocol) is a secure file transfer protocol. It runs over the SSH protocol. It supports the full security and authentication functionality of SSH. You can use the ftp client with supported sftp, like FileZilla and direct access via sftp://ip-address.
Reference https://wiki.filezilla-project.org/FileZilla_Client_Tutorial_%28en%29%20%20

Q: How to enable NTP server?
Ans: NTP (Network Time Protocol) is a suite of applications that allows computers to coordinate their system time. You should edit configuration file /etc/ntp.conf for your situation. For example：

- Add reference clock peers in ntp.conf

```
server time1.google.com iburst
```

- To allow hosts to query the time and statistics in ntp.conf

```
restrict 172.16.12.0 mask 255.255.255.0 nomodify notrap
```

- To allow NTP port

```
$ iptables -A INPUT -p udp --dport 123 -j ACCEPT
$ iptables -A OUTPUT -p udp --sport 123 -j ACCEPT
```

- To enable and start the NTP server

```
$ systemctl enable ntpd
$ systemctl start ntpd
```

Reference https://docs.ntpsec.org/latest/ntp_conf.html

After setup server, you can test it with NTP client.

```
$ ntpdate -vd 172.16.12.6
```

Q: How to exit fullscreen application when gestures are disabled?
Ans: You can use the shortcut key to switch or kill application with keyboard, please refer to **13. Weston Keboard Shortcuts**. Or you can ssh into device and enter kill command.

Q: How to enable docker service?
Ans: You can use systemctl command to enable docker service. Then docker service would start at boot.

- To enable and start the docker

```
$ systemctl enable docker
$ systemctl start docker
```

Note. The docker service is depend on network-online.target. It needs take 2 minutes to timeout without online ethernet device. You can skip it by follow command.

```
$ systemctl mask connman-wait-online
# Use follow command if v1.5 before
$ systemctl mask systemd-networkd-wait-online
```

Note. If you want to enable docker service under read-only system, you should setup docker data folder to /userdata. Create /etc/docker/daemon.json with following content.

```
{
    "data-root": "/userdata/docker-data"
}
```

Q: How to start Weston(desktop service) and startup Application as non-root user?
Ans: You can use Settings tool to change default login desktop as user or run the script to switch user. You can use your own user.

example：

- Add new user

```
$ useradd testuser
```

- Start Weston as non-root user
  - use your user

```
$ /usr/bin/adv_run_weston_as_user.sh testuser
$ reboot
```

- To check running by testuser

```
$ ps aux | grep testuser
```

Q: How to import/export Settings config by command line interface?
Ans: You can use built-in tool.

example：

- Export Settings config

```
$ atcc.restore_settings -m export -c /userdata
```

- Import Settings config

```
$ atcc.restore_settings -m import -c /userdata/export_settings_config.tpc
```

Q: How to enable communication with the certificate in opcua server?
Ans: You can generate the certificate file and private key by follow commands.

```
# make sure the network is ok
$ cd /opt/adv-opcua
$ ./create_self-signed
```

It will create self-signed server_cert.der and server_key.der after commands. Of cause, you can generate them by your policy.

Q: How to accept self-signed certificate to avoid not secure when connect to the website by using chromium?
Ans: You can use command line to import self-signed certificate's root CA.

example：

- Import root CA

```
$ certutil -d sql:$HOME/.pki/nssdb -A -t "C,," -n "ca_nickname" -i /your/rootCA.crt
```

- Delete root CA

```
$ certutil -d sql:$HOME/.pki/nssdb -D -n "ca_nickname"
```

- List

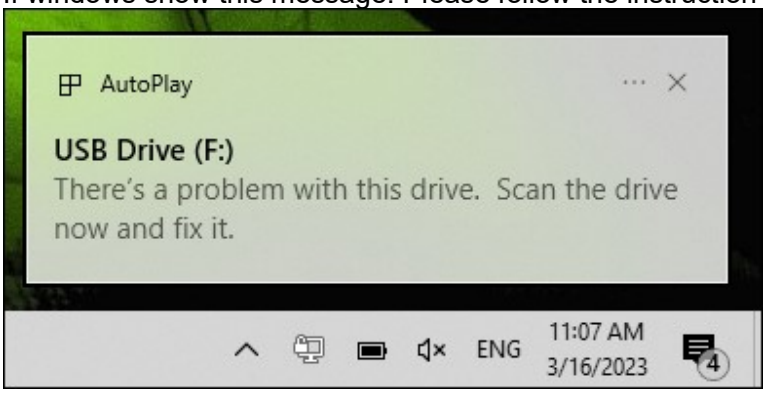
```
$ certutil -d sql:$HOME/.pki/nssdb -L
```

Reference https://manpages.ubuntu.com/manpages/xenial/en/man1/certutil.1.html
Reference
https://chromium.googlesource.com/chromium/src/+/master/docs/linux/cert_management.md

Q: Why can't I find my USB storage when I plug it on TPC-100W?
Ans: If you plug in a USB storage but can't find the disk, here are some things you can do.

- Check your USB disk format is FAT32 or EXT4.
- Check your USB disk is not corrupted. Please plug in your USB on windows to check.

If windows show this message. Please follow the instruction to fix it or re-format it.



Q: How to change keyboard layout for terminal from English to another language?
Ans: You can change the value of the keymap_layout variable in the KEYBOARD section of the weston.ini.

example：

- Change to French language

```
$ nano /etc/xdg/weston/weston.ini
…
[keyboard]
keymap_layout=fr
```

- Restart Weston

```
$ systemctl restart weston
```

Reference https://man.archlinux.org/man/weston.ini.5.en#KEYBOARD_SECTION
Reference https://man.archlinux.org/man/xkeyboard-config.7