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# OBU & RSU Firmware



Peter Hierholzer

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## Logging In

For Login ssh is used.

The Login credentials for OBU (or non-US RSU) are:

- Login username:
- Login password:

The Login credentials for RSU-4.x (US DOT-4.x RSU) are:

- Login username:
- Login password:

The RSU-4.x image is a super image and it does not allow much of free space available in the Root File System (RFS). Hence you cannot make any updates to the RFS. If at all you do make any updates, then they will not be retained after reboot.

For more information on RSU-4.x see the file "[CWD-P0178-RSU-USRM-CW01-650-RSU\\_1609\\_Software\\_User\\_Manual](#)" in [IEEE1609-RSU](#) (this is for the latest **Release-16**). If you are unable to access this site then please contact [support@cohdawireless.com](mailto:support@cohdawireless.com) to gain access.

The login user/user automatically elevates the user to root.

Advantage is all commands can be issued without taking care whether *sudo* is needed or not.

Disadvantage is that working with root privileges is considered as security risk

By default the root account is disabled

For security reasons in devices deployed in the field

- Should be deployed behind a firewall
- The account "user" should be disabled or removed
- A new account should be created

For accessing the MK5 please look at the article [Connecting via USB or Ethernet connection](#)

**Note: telnet and ftp are not configured**

## Operating system, tools and services

### Linux

- Kernel is Freescale iMX.6 kernel 4.1.15
- Patches from Cohda adding drivers and union file system
- Ubuntu armhf
  - Based on Xenial Xerus (16.04 LTS)
  - Packages can be installed with *apt-get install* as long as they are in the Ubuntu repository for ARM
- Preinstalled Packages
  - openssh, busybox, apt-utils, snmp, tcpdump, netcat, ...
  - A full list is in the file /etc/mk5-package

### Services

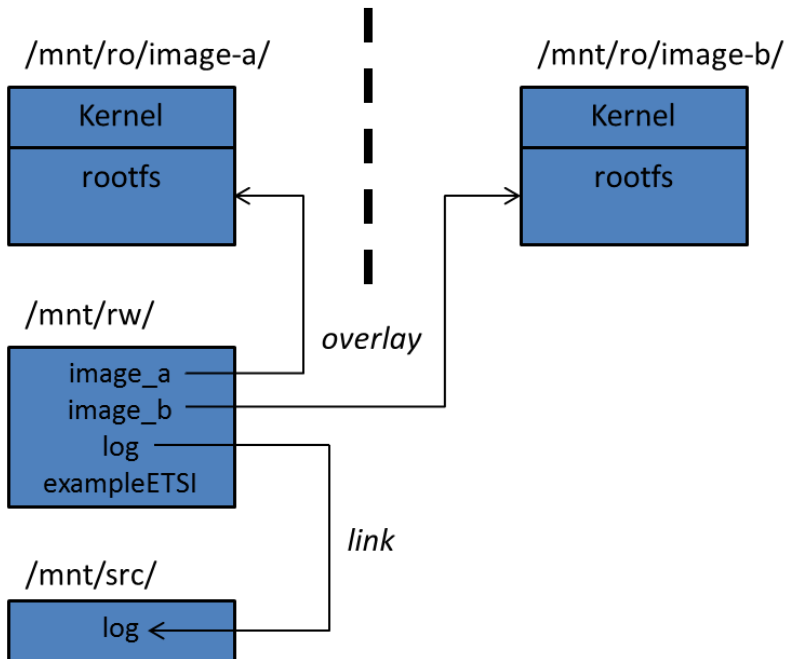
- Ethernet over USB (Requires direct connection to PC USB port)
- read/write general file-system storage available on `/mnt/rw` and `/mnt/src`
- ssh server, for remote command shell access
- scp, for file transfers
- gpsd server for access to position data from GNSS module
- chronyd server for local time synchronization with the GNSS module via gpsd
- udev for automatic mounting of microSD cards at boot
- snmpd for access through snmp

### Boot system

Bootting is done through uboot. uboot console can be access through the internal console port.

For details pls look at [Connect-MK5-via-serial-port](#)

### File System



The MK5 has 3 filesystems

- `/mnt/ro/`
  - Read only on-board flash memory
  - 3 Linux images & rootfs (factory, image-a, image-b) are hold in parallel
  - The inactive Linux image & rootfs is overwritten when firmware gets upgraded
- `/mnt/rw/` (a.k.a. `/mnt/ubi` )
  - Read/Write on-board flash memory
  - It is persistent across firmware upgrades
  - Storage for applications
  - `mnt/rw/image_x` overlays root file system
  - Writing into the rootfs is actual stored in the overlaying filesystem in `/mnt/rw/image_x`
- `/mnt/src/`
  - uSD card automatic mount point
  - Used for logging and firmware upgrades
  - For formatting see article [Formatting microSD card](#)

## Resetting to factory default

See HowTo article [Resetting to factory default](#)

**Warning:** Changing the access rights of `/mnt/rw/ssh` (e.g. giving write access to world) prevents further access through ssh. The ssh considers this as a breach of security and refuses all subsequent connection requests.

A recovery through the serial interface and removal of the `/mnt/rw/ssh` directory will be needed

## File Transfer

scp is used for transferring files to/from the MK5. It replaces the insecure ftp.

scp command from an external Linux copying into the MK5

```
$ scp test user@192.168.8.222:test
```

scp command from an external Linux copying from the MK5

```
$ scp user@192.168.8.101:test ./
```

For scp using IPv6 address, see [scp-on-IPv6](#)

For example:

```
duser@172.16.1.227:~/temp$ scp temp.txt user@[fe80::6e5:48ff:fe20:2324%eth0]
The authenticity of host 'fe80::6e5:48ff:fe20:2324%eth0' (fe80::6e5:48ff:fe20:2324%eth0) can't be
ECDSA key fingerprint is SHA256:1vWnkF/FfAv/zufQ9PYb6h01thqM5HKv5ZeP4M
Are you sure you want to continue connecting (yes/no)? yes
Warning: Permanently added 'fe80::6e5:48ff:fe20:2324%eth0' (ECDSA) to the list of known hosts.
user@fe80::6e5:48ff:fe20:2324%eth0's password:
temp.txt
duser@172.16.1.227:~/temp$
```

or

```
duser@172.16.1.227:~/temp$ scp -6 temp.txt user@[fe80::6e5:48ff:fe20:2324%eth0]
user@fe80::6e5:48ff:fe20:2324%eth0's password:
temp.txt
duser@172.16.1.227:~/temp$
```

You have to specify eth0 or eth1 or ... depending upon which eth on the VM has the IPv6 link local address

### scp from Windows

Windows doesn't have a native scp client. [WinSCP](#) or pscp (from putty) are alternatives

## Editor

Since the MK5 has no graphical user interface vi is used as standard editor.

The most important commands for vi are

- Editing mode
  - i changes to insert mode
  - <ESC> leaves insert mode
  - x deletes chars
  - dd deletes line

- Move around
  - arrows move around with cursor keys
  - G bottom of the document
  - 1G top of the document
  - /text/ find <text> in document
  - / or n next occurrence of <text>
- Command mode
  - :w write changes
  - :q exits
  - :q! exits and throws away all changes

As alternative Nano can be installed. For installing the MK5 needs an internet connection

```
# apt-get update
```

```
# apt-get install nano
```

```

192.168.8.230:22 - root@MK5: /mnt/ubi VT
GNU nano 2.2.6 File: etsa.conf

# *****
# * ETSI ES 202 663 ITS-G5
# *****

ItsG5CchChanNum      = 182;      172, 184      # Channel number to use for radio A
# Even channel number applicabl$
# Odd channel numbers applicabl$

ItsG5CchTxPwrLevel   = 10;      0, 33         # Valid values: 0 to 33 in increment$

ItsG5CchTxDataRate    = 12;      6, 54         # Configuration parameter is twice t$
# Configuration parameter is the $
# Valid values: 6, 9, 12, 18, 2$

ItsG5SchChanNum      = 176;      172, 184      # Channel number to use for radio B
# Even channel number applicabl$
# Odd channel numbers applicabl$

^G Get Help  ^O WriteOut  ^R Read File  ^V Prev Page  ^K Cut Text  ^C Cur Pos
^X Exit      ^J Justify   ^W Where Is   ^U Next Page  ^U UnCut Text ^T To Spell
  
```

### Editing from Windows or Linux VM.

Another alternative is to log into the MK5 either from a Windows or a Linux PC and edit from there.

From Windows, you can use WinSCP to access the file and edit it using a text editor ( e.g NotePad++)

From Linux you can run "*nautilus*" and do sftp into the MK5 and access the file and edit it using any of the Linux text editors (emacs or gedit).

Note that if you want to access the file and edit it remotely you will need to set its permission to "o+rw".

```
sudo chmod o+rw <file_name>
```

Nautilus can be run in the Linux VM as follows to access the MK5:

```
duser@172.16.0.228:~$ nautilus sftp://user@MK5_IP_address
```

Password for login is " `user` "

(For RSU-4.x, use " `rsu` " as user name and password as " `rsuadmin` ")



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