



**DesignNews**

# Embedded Linux Primer

**Day 2:**

**Generate a Custom Minimal STM32MP157F Yocto Image**

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## Webinar Logistics

- Turn on your system sound to hear the streaming presentation.
- If you have technical problems, click “Help” or submit a question asking for assistance.
- Participate in ‘Attendee Chat’ by maximizing the chat widget in your dock.

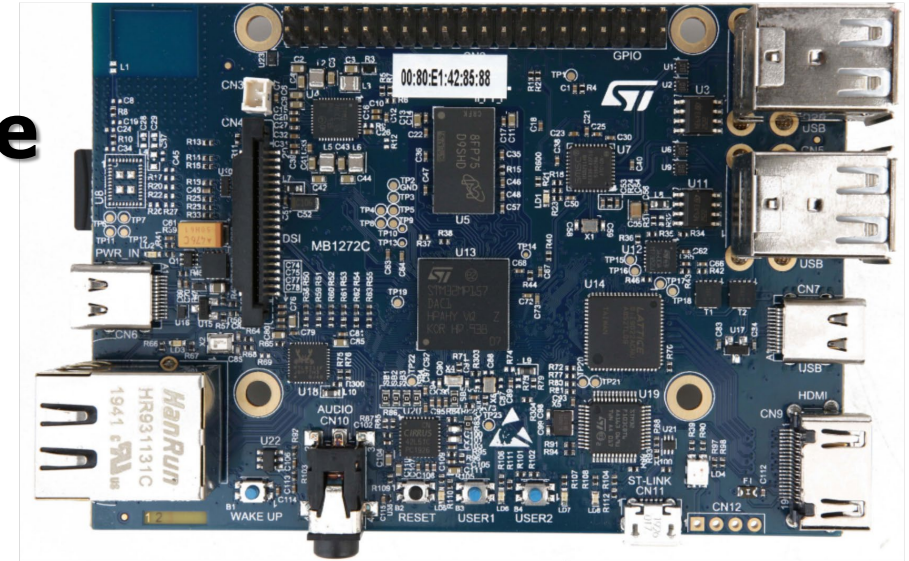


## Fred Eady

Visit 'Lecturer Profile' in your console for more details.

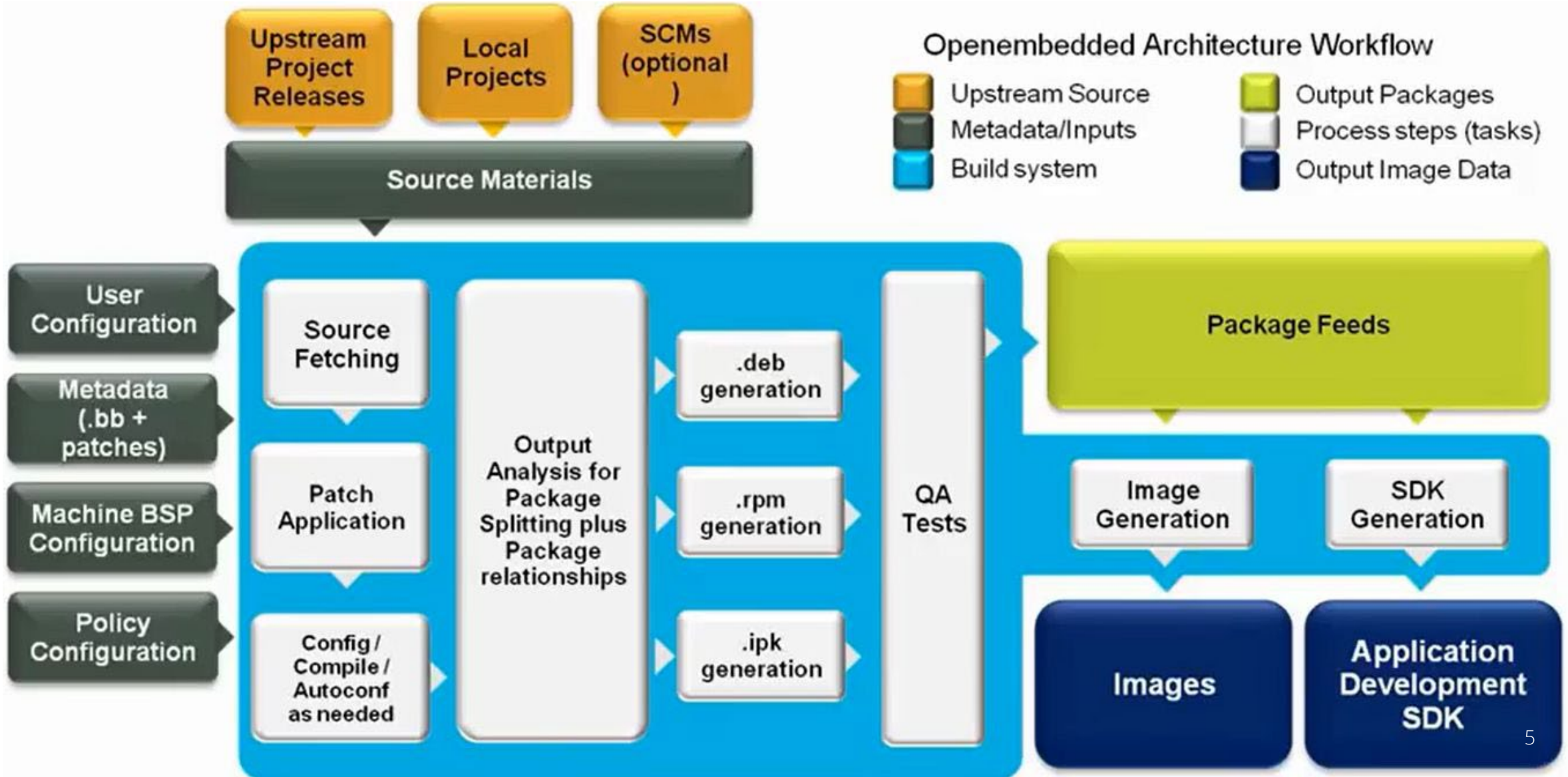
# AGENDA

- **Yocto Minimal Image Configuration**
- **Cook Our Yocto Minimal Image**
- **Load and Boot Our Yocto Minimal Image**
- **FileZilla Pro**



yocto  
PROJECT

**Yocto Workflow**

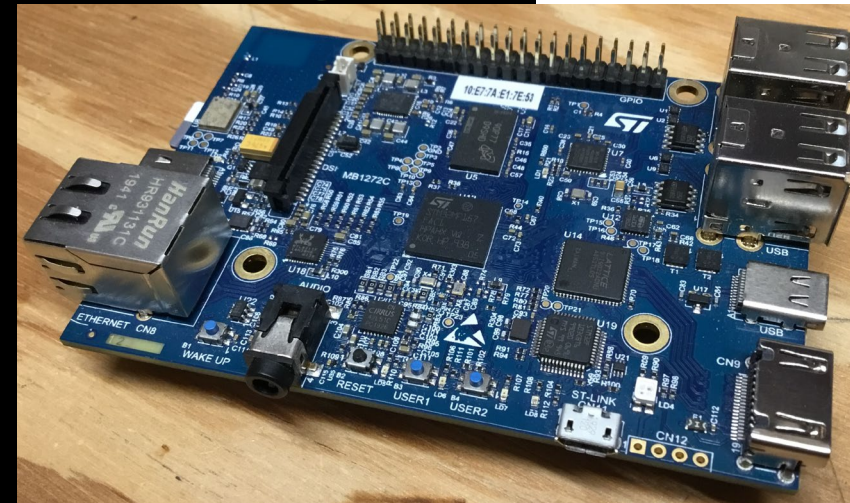


## bblayers.conf

⚙️ bblayers.conf ✕

yocto &gt; build-157minimal &gt; conf &gt; ⚙️ bblayers.conf

```
1 # STM32MP157F-DK2
2 # 07/16/2025
3 # working
4 # minimal build with nano and ssh only - Day 2
5 # optional /home/fred/X57project/yocto/meta-openembedded/meta-networking \
6 #
7 # POKY_BBLAYERS_CONF_VERSION is increased each time build/conf/bblayers.conf
8 # changes incompatibly
9 POKY_BBLAYERS_CONF_VERSION = "2"
10
11 BBPATH = "${TOPDIR}"
12 BBFILES ?= ""
13
14 BBLAYERS ?= " \
15 /home/fred/X57project/yocto/poky/meta \
16 /home/fred/X57project/yocto/poky/meta-poky \
17 /home/fred/X57project/yocto/poky/meta-yocto-bsp \
18 /home/fred/X57project/yocto/meta-openembedded/meta-oe \
19 /home/fred/X57project/yocto/meta-openembedded/meta-python \
20 /home/fred/X57project/yocto/meta-st-stm32mp \
21 "
```

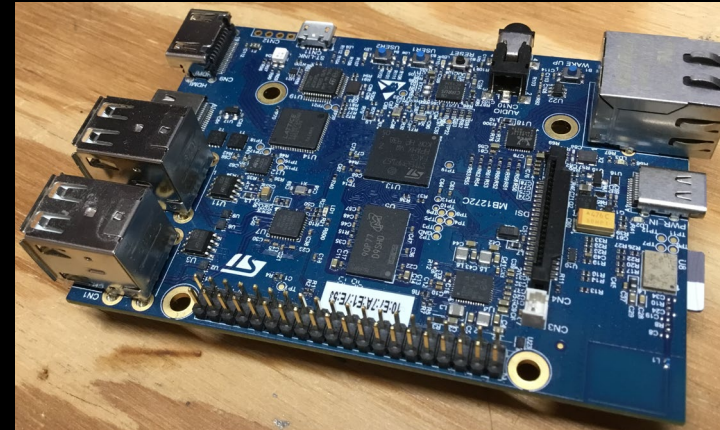


## local.conf

local.conf

yocto &gt; build-157minimal &gt; conf &gt; local.conf

```
23 # You need to select a specific machine to target the build with. There are a selection
24 # of emulated machines available which can boot and run in the QEMU emulator:
25 #
26 #MACHINE ?= "qemuarm"
27 #MACHINE ?= "qemuarm64"
28 #MACHINE ?= "qemumips"
29 #MACHINE ?= "qemumips64"
30 #MACHINE ?= "qemuppc"
31 #MACHINE ?= "qemux86"
32 #MACHINE ?= "qemux86-64"
33 #
34 # There are also the following hardware board target machines included for
35 # demonstration purposes:
36 #
37 #MACHINE ?= "beaglebone-yocto"
38 #MACHINE ?= "genericarm64"
39 #MACHINE ?= "genericx86"
40 #MACHINE ?= "genericx86-64"
41 #
42 # This sets the default machine to be qemux86-64 if no other machine is selected:
43 MACHINE ??= "stm32mp15-disco"
```



## local.conf

local.conf X

yocto &gt; build-157minimal &gt; conf &gt; local.conf

```
286 # CONF_VERSION is increased each time build/conf/ changes incompatibly and is used to
287 # track the version of this file when it was generated. This can safely be ignored if
288 # this doesn't mean anything to you.
289 CONF_VERSION = "2"
290
291 IMAGE_INSTALL:append = " \
292     nano \
293     openssh \
294     "
295
296 ACCEPT_EULA_$MACHINE = "1",e.g.:ACCEPT_EULA_stm32mp1 = "1"
```

## Invoke BitBake

```
fred@shop-ubuntu-1660: ~/157project/yocto/build-157minimal
File Edit View Search Terminal Help

fred@shop-ubuntu-1660:~/157project/yocto/build-157minimal$ bitbake core-image-minimal
Loading cache: 100% | ETA: --:--:--
Loaded 0 entries from dependency cache.
Parsing recipes: 100% |#####| Time: 0:01:06
Parsing of 2521 .bb files complete (0 cached, 2521 parsed). 4402 targets, 153 skipped, 0 masked, 0 errors.
NOTE: Resolving any missing task queue dependencies

Build Configuration:
BB_VERSION      = "2.8.0"
BUILD_SYS      = "x86_64-linux"
NATIVELSBSTRING = "ubuntu-22.04"
TARGET_SYS     = "arm-poky-linux-gnueabi"
MACHINE       = "stm32mp15-disco"
DISTRO        = "poky"
DISTRO_VERSION = "5.0.10"
TUNE_FEATURES = "arm vfp cortexa7 neon vfpv4 thumb callconvention-hard"
TARGET_FPU    = "hard"
meta
meta-poky
meta-yocto-bsp = "scarthgap:b8f8125f05e8ece078ba6bf01eebb2900cf2f9bf"
meta-oe
meta-python   = "scarthgap:727811eaf256b88fd135be99559f2cbf14c82fce"
meta-st-stm32mp = "scarthgap:8b449a5ffe02a4622a1d404ede53ea9a5e6303d6"
```

**Load the microSD Card With Our New Minimal Image**

STM32CubeProgrammer

Memory & File editing

Partitions FlashLayout\_sdcard\_stm32mp157f-dk2-opteemin.tsv

Se...	Opt	Id	Name	Type	IP	Offset	Binary
<input checked="" type="checkbox"/>	-	0x1	fsbl-boot	Binary	none	0x0	arm-trusted-firmware/tf-a-stm32mp157f-dk2-opt...
<input checked="" type="checkbox"/>	-	0x3	fip-boot	FIP	none	0x0	fip/fip-stm32mp157f-dk2-opteemin-programmer
<input checked="" type="checkbox"/>	P	0x4	fsbl1	Binary	mm...	0x000044...	arm-trusted-firmware/tf-a-stm32mp157f-dk2-opt...
<input checked="" type="checkbox"/>	P	0x5	fsbl2	Binary	mm...	0x000444...	arm-trusted-firmware/tf-a-stm32mp157f-dk2-opt...
<input checked="" type="checkbox"/>	PD	0x6	metadata1	FWU_MD...	mm...	0x000844...	arm-trusted-firmware/metadata.bin
<input checked="" type="checkbox"/>	PD	0x7	metadata2	FWU_MD...	mm...	0x000C4...	arm-trusted-firmware/metadata.bin
<input checked="" type="checkbox"/>	P	0x8	fip-a	FIP	mm...	0x001044...	fip/fip-stm32mp157f-dk2-opteemin-sdcard.bin

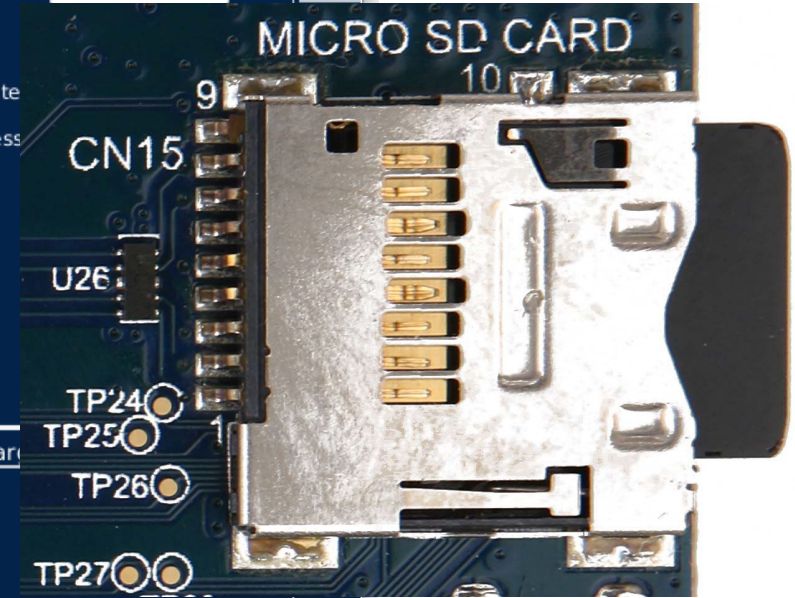
Binaries ... /home/fred/157project/yocto/build-157minimal/tmp/deploy/images/stm32mp15-disco

Log

```

12:28:08 : Time elapsed during download operation: 00:01:26.928
12:28:08 : RUNNING Program ...
12:28:08 : PartID: :0x13
12:28:08 : Start operation done successfully at partition 0x13
12:28:08 : Flashing service completed successfully
12:28:15 : Disconnected from device.
  
```

0%



## Login as root

```
fred@shop-ubuntu-1660: ~  
[ 5.564699] stm32-dwmac 5800a000.ethernet eth0: No Safety Features support fo  
und  
[ 5.572131] stm32-dwmac 5800a000.ethernet eth0: IEEE 1588-2008 Advanced Times  
tamp supported  
[ 5.581067] stm32-dwmac 5800a000.ethernet eth0: registered PTP clock  
[ 5.588496] stm32-dwmac 5800a000.ethernet eth0: configuring for phy/rgmii-id  
link mode  
udhcpc: started, v1.36.1  
udhcpc: broadcasting discover  
udhcpc: broadcasting discover  
[ 9.834393] stm32-dwmac 5800a000.ethernet eth0: Link is Up - 1Gbps/Full - flo  
w control rx/tx  
udhcpc: broadcasting discover  
udhcpc: broadcasting select for 192.168.1.67, server 192.168.1.1  
udhcpc: lease of 192.168.1.67 obtained from 192.168.1.1, lease time 86400  
/etc/udhcpc.d/50default: Adding DNS 192.168.1.1  
ip: SIOCGIFFLAGS: No such device  
Starting OpenBSD Secure Shell server: sshd  
done.  
Starting syslogd/klogd: done  
  
Poky (Yocto Project Reference Distro) 5.0.10 stm32mp15-disco /dev/ttySTM0  
stm32mp15-disco login:
```

## Display the Ethernet Connection

```
fred@shop-ubuntu-1660: ~  
own distribution for production use.  
  
root@stm32mp15-disco:~# ifconfig  
eth0      Link encap:Ethernet  HWaddr 10:E7:7A:E1:7E:53  
          inet addr:192.168.1.67  Bcast:192.168.1.255  Mask:255.255.255.0  
          inet6 addr: fe80::12e7:7aff:fe01:7e53/64  Scope:Link  
          inet6 addr: 2600:6c5a:c7f:f2a6:12e7:7aff:fe01:7e53/64  Scope:Global  
          UP BROADCAST RUNNING MULTICAST  MTU:1500  Metric:1  
          RX packets:7273 errors:0 dropped:1 overruns:0 frame:0  
          TX packets:182 errors:0 dropped:0 overruns:0 carrier:0  
          collisions:0 txqueuelen:1000  
          RX bytes:667721 (652.0 KiB)  TX bytes:17236 (16.8 KiB)  
          Interrupt:53 Base address:0xa000  
  
lo        Link encap:Local Loopback  
          inet addr:127.0.0.1  Mask:255.0.0.0  
          inet6 addr: ::1/128  Scope:Host  
          UP LOOPBACK RUNNING  MTU:65536  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)  
  
root@stm32mp15-disco:~#
```



## nano

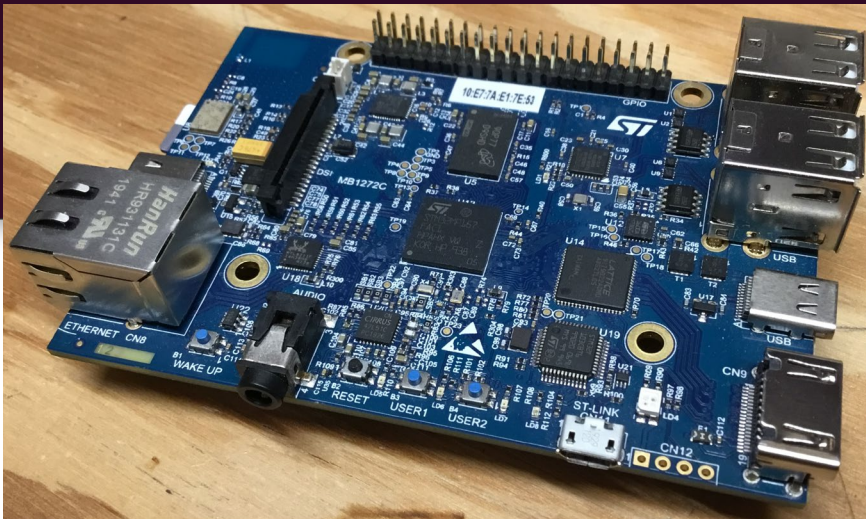
```
fred@shop-ubuntu-1660: ~  
File Edit View Search Terminal Help  
GNU nano 7.2 /etc/network/interfaces  
# /etc/network/interfaces -- configuration file for ifup(8), ifdown(8)  
  
# The loopback interface  
auto lo  
iface lo inet loopback  
  
# Wireless interfaces  
allow-hotplug wlan0  
auto wlan0  
iface wlan0 inet dhcp  
    wireless_mode managed  
    wireless_essid any  
    wpa-driver wext  
    wpa-conf /etc/wpa_supplicant.conf  
  
iface atml0 inet dhcp  
  
# Wired or wireless interfaces including predictable names  
auto eth0  
iface eth0 inet dhcp  
  
[ Read 37 lines ]  
^G Help      ^O Write Out  ^W Where Is   ^K Cut        ^T Execute    ^C Location   M-U Undo  
^X Exit      ^R Read File  ^\ Replace    ^U Paste      ^J Justify    ^/ Go To Line  M-E Redo
```

```
fred@shop-ubuntu-1660: ~  
File Edit View Search Terminal Help  
root@stm32mp15-disco:~# nano /etc/network/interfaces
```

## SSH – shop-ubuntu-1660 -&gt; STM32MP157F-DK2

```
fred@shop-ubuntu-1660: ~  
File Edit View Search Terminal Help  
  
root@stm32mp15-disco:~# ifconfig eth0  
eth0  Link encap:Ethernet  HWaddr 10:E7:7A:E1:7E:53  
       inet addr:192.168.1.71  Bcast:192.168.1.255  Mask:  
       inet6 addr: fe80::12e7:7aff:fe01:7e53/64 Scope:Link  
       inet6 addr: 2600:6c5a:c7f:f2a6:12e7:7aff:fe01:7e53  
       UP BROADCAST RUNNING MULTICAST  MTU:1500  Metric:1  
       RX packets:5396 errors:0 dropped:0 overruns:0 frame:  
       TX packets:203 errors:0 dropped:0 overruns:0 carrier:  
       collisions:0 txqueuelen:1000  
       RX bytes:1230150 (1.1 MiB)  TX bytes:32306 (31.5 KiB)  
       Interrupt:53 Base address:0xc000  
  
root@stm32mp15-disco:~#
```

```
fred@shop-ubuntu-1660: ~  
File Edit View Search Terminal Help  
  
fred@shop-ubuntu-1660:~$ ssh root@192.168.1.71  
Last login: Sat Mar 10 13:41:40 2018 from 192.168.1.72  
  
WARNING: Poky is a reference Yocto Project distribution that should be used for  
testing and development purposes only. It is recommended that you create your  
own distribution for production use.  
  
root@stm32mp15-disco:~# ls  
stmprojects  
root@stm32mp15-disco:~# cd stmprojects/  
root@stm32mp15-disco:~/stmprojects# ls  
testyoctomultiple_app  
root@stm32mp15-disco:~/stmprojects#
```





# Create an STM32MP157-DK2 FileZilla Pro Site

The screenshot shows the FileZilla Site Manager dialog box. On the left, under 'Select entry:', there is a tree view with 'My Sites' containing 'Google', 'stm157\_ethernet\_67' (highlighted in orange), and 'ubuntu\_laptop'. Below this are buttons for 'New site', 'New folder', 'New Bookmark', 'Rename', 'Delete', and 'Duplicate'. A red arrow points to the 'New site' button. On the right, the 'General' tab is selected, showing the following settings: Protocol: SFTP - SSH File Transfer Protocol; Host: 192.168.1.67; Port: (empty); Logon Type: Normal; User: root; Password: (empty); Background color: None; Comments: (empty text area). At the bottom right are 'Connect', 'OK', and 'Cancel' buttons.



# Connect to the STM32MP157-DK2

stm157\_ethernet\_67 - sftp://root@192.168.1.67 - FileZilla Pro

File Edit View Transfer Server Bookmarks Help

Host:  Username:  Password:  Port:  Quickconnect

Status: Using username "root".  
 Status: Connected to 192.168.1.67  
 Status: Retrieving directory listing...  
 Status: Listing directory /home/root  
 Status: Directory listing of "/home/root" successful

Local site: /home/fred/ Remote site: /home/root

- cdrom
- dev
- etc
- home
  - fred
  - .STM32CubeProgrammer
  - .cache

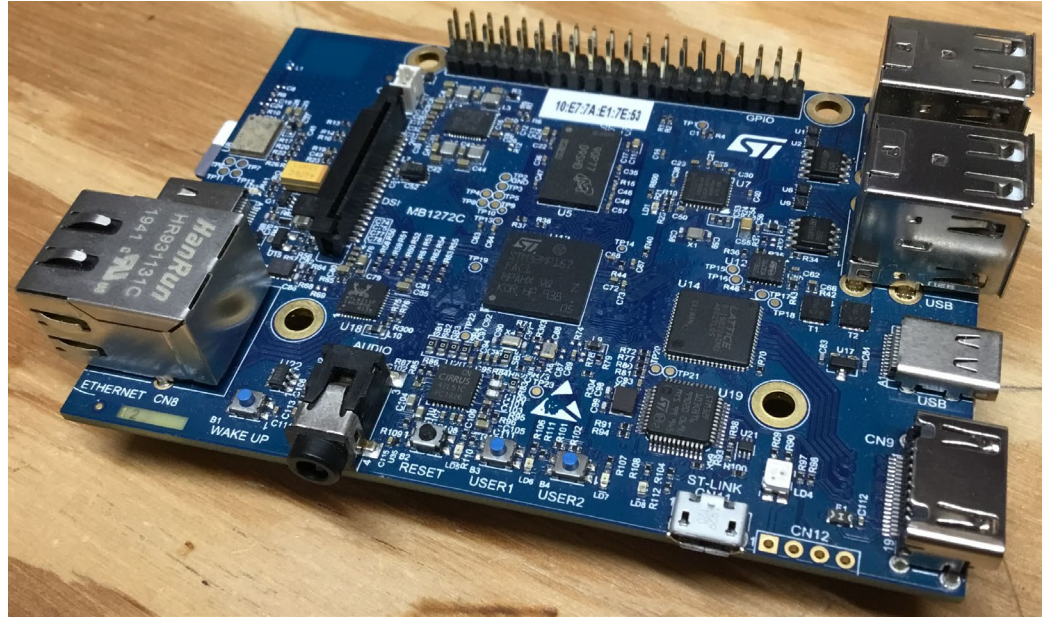
- home
  - root

Filename ^	Filesize	Filetype	Last modified	Permission	Owner/Group
..					
Empty directory listing					
Empty directory.					

Server/Local file	Directory	Remote file	Size	Priority	Status

Queued files Failed transfers Successful transfers

Queue: empty



# Upload a File to the STM32MP157-DK2

The screenshot shows the FileZilla Pro interface connected to a remote host at 192.168.1.67. The local site is /home/fred/157project\_saves/conf/ and the remote site is /home/root. A context menu is open over the file 'conf-notes.txt' in the local site pane.

Filename	Filesize	Filetype	Last modified
..			
bblayers.conf	621	conf-file	07/14/2025 02:...
<b>conf-notes.txt</b>	516	txt-file	07/06/2025 03:...
conf-summary.txt			025 03:...
local.conf			025 06:...
templateconf.cfg			025 03:...

The context menu for 'conf-notes.txt' includes the following options: Upload, Add files to queue, Open, Edit, Create directory, Create directory and enter it, Refresh, Delete, and Rename.

## Edit the Uploaded File Using FileZilla Pro

The screenshot shows the FileZilla Pro interface with the following details:

- Title Bar:** stm157\_ethernet\_67 - sftp://root@192.168.1.67 - FileZilla Pro
- Menu Bar:** File, Edit, View, Transfer, Server, Bookmarks, Help
- Toolbar:** Standard FileZilla icons for navigation and operations.
- Host/Connection:** Host: [empty], Username: [empty], Password: [empty], Port: [empty], Quickconnect: [dropdown]
- Status Bar:**
  - Status: Starting upload of /home/fred/157project\_saves/conf/conf-notes.txt
  - Status: File transfer successful, transferred 516 bytes in 1 second
  - Status: Retrieving directory listing of "/home/root"...
  - Status: Listing directory /home/root
  - Status: Directory listing of "/home/root" successful
- Local Site:** /home/fred/157project\_saves/conf/
  - Directory listing: .stm32cubox, .subversion, .swt, .vscode, 157project, 157project\_saves, **conf**
- Remote Site:** /home/root
  - Directory listing: /, home, **root**
- Local File List:**

Filename	Filesize	Filetype	Last modified
..			
bblayers.conf	621	conf-file	07/14/2025 02:...
<b>conf-notes.txt</b>	516	txt-file	07/06/2025 03:...
conf-summary.txt	77	txt-file	07/06/2025 03:...
local.conf	13,017	conf-file	07/09/2025 06:...
templateconf.cfg	33	cfg-file	07/06/2025 03:...
- Remote File List:**

Filename	Filesize	Filetype	Last modified	Permission	Owner/Group
..					
<b>conf-notes.txt</b>			07/17/2025 ...	-rw-r--r--	root root
- Context Menu (over remote file):**
  - Download
  - Add files to queue
  - View/Edit**
  - Create directory
  - Create directory and enter it
  - Create new file
  - Refresh
  - Delete
  - Rename
  - Copy URL(s) to clipboard
  - File permissions...
- Bottom Panel:**
  - Selected 1 file. Total size: 516 bytes
  - Server/Local file | Directory | Remote file | Size | Priority | Status
  - Queued files | Failed transfers | Successful transfers (1)
  - Queue: empty

## Edit the Uploaded File Using FileZilla Pro

The screenshot shows the FileZilla Pro interface connected to a remote host. A text editor window titled 'conf-notes.txt' is open, displaying the following content:

```
1
2 ### Shell environment set up for builds. ###
3
4 You can now run 'bitbake <target>'
5
6 Common targets are:
7   core-image-minimal
8   core-image-full-cmdline
9   core-image-sato
10  core-image-weston
11  meta-toolchain
12  meta-ide-support
13
14 You can also run generated qemu images with a command like 'runqemu qemu86-64'.
15
16 Other commonly useful commands are:
17 - 'devtool' and 'recipetool' handle common recipe tasks
18 - 'bitbake-layers' handles common layer tasks
19 - 'oe-pkgdata-util' handles common target package tasks
```

# Rename the Uploaded File Using FileZilla Pro

The screenshot shows the FileZilla Pro interface connected to a remote server at 192.168.1.67. The local site is /home/fred/157project\_saves/conf/ and the remote site is /home/root. A file named 'conf-notes.txt' (516 bytes, txt-file) is selected in the local site pane. A context menu is open over this file, with the 'Rename' option highlighted. The status bar at the bottom shows 'Selected 1 file. Total size: 516 bytes'.

Filename	Filesize	Filetype	Last modified
..			
bblayers.conf	621	conf-file	07/14/2025 02:...
<b>conf-notes.txt</b>	<b>516</b>	<b>txt-file</b>	<b>07/06/2025 03:...</b>
conf-summary.txt	77	txt-file	07/06/2025 03:...
local.conf	13,017	conf-file	07/09/2025 06:...
templateconf.cfg	33	cfg-file	07/06/2025 03:...

## Download the Renamed File Using FileZilla Pro

The screenshot shows the FileZilla Pro interface with the following details:

- Title Bar:** stm157\_ethernet\_67 - sftp://root@192.168.1.67 - FileZilla Pro
- Status Bar:**
  - Status: Starting download of /home/root/conf-notes.txt
  - Status: File transfer successful, transferred 516 bytes in 1 second
  - Status: Renaming '/home/root/conf-notes.txt' to '/home/root/we\_renamed\_this'
  - Status: /home/root/conf-notes.txt -> /home/root/we\_renamed\_this
  - Status: Disconnected from server
- Local site:** /home/fred/157project\_saves/conf/
- Remote site:** /home/root
- Local File List:**

Filename	Filesize	Filetype	Last modified
..			
bblayers.conf	621	conf-file	07/14/2025 02:...
conf-notes.txt	516	txt-file	07/06/2025 03:...
conf-summary.txt	77	txt-file	07/06/2025 03:...
local.conf	13,017	conf-file	07/09/2025 06:...
templateconf.cfg	33	cfg-file	07/06/2025 03:...
- Remote File List:**

Filename	Filesize	Filetype	Last modified	Permission	Owner/Group
..					
home					
root					
we_renamed_this	516	txt-file	07/17/2025 ...	-rw-r--	root root
- Context Menu:** A context menu is open over the file 'we\_renamed\_this' in the remote site, with 'Download' selected.
- Bottom Panel:** Shows 'Queued files', 'Failed transfers', and 'Successful transfers (3)'. The status 'Queue: empty' is visible at the bottom right.





Next Time...

MORE TO COME..

# Thank you for attending!!!

Please consider the resources below:

- [Today's Download Package](#)
- [www.st.com](http://www.st.com)
- [digikey.com](http://digikey.com)

```
fred@shop-ubuntu-1660: ~  
File Edit View Search Terminal Help  
root@stm32mp15-disco:~/stmprojects# ./testyoctomultiple_app  
13=Active 14=Inactive  
13=Inactive 14=Active  
13=Active 14=Inactive  
13=Inactive 14=Active  
13=Active 14=Inactive  
13=Inactive 14=Active  
13=Active 14=Inactive  
13=Inactive 14=Active  
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13=Active 14=Inactive  
13=Inactive 14=Active
```



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