Mars 400 Firmware Burning Tool

A BMC Program to Burn the Switch & Microserver Firmware

Note:
This manual can be used for newer BMC version since:
U-BOOT Version: U-Boot 2013.04-rc2 (Jan 23 2019 - 15:27:55) MARS200: 1.1.2
LINUX Version: #1 PREEMPT Wed Jul 10 15:26:19 CST 2019
ROOTFS Version: 4.2.7

Please contact Ambedded for burning Switch and Microserver modules

Revision History

| Version	Date of Release	Notes
1.0	2019/07/11	Initial release

Table of Contents

Before Burning

Before you burn the firmware of microservers or switches, you need to set up the environment first. There are 4 key points you need to know.

- Prepare a PC for operating the BMC through SSH
- Check the network connections on Mars 400
- Extract & check the upgraded file
- Deploy the TFTP and HTTP servers

1. Check the network connections on Mars 400

A. Please connect the BMC ethernet port #14 (marked BMC) in the following picture to a 100/100Mbps switch which can reach your PC.

B. If you are going to burn the switch firmware, please connect the switch ports #7 and #13 (marked SWITCH) on Mars 400 to an external switch which can communicate with your PC and TFTP server. 1Gbps link will be good enough for file transferring.

C. If you are going to burn the microserver node firmware, please connect the switch port #9 (or #11 for SFP+) on switch #1 to an external switch which can communicate with your PC, HTTP, and TFTP servers. Please do not connect other port except for port #9 (or #11) because that will cause failure for burning the node image. 10Gbps connection speed is recommended to shorten the time and failure rate for burning the image.
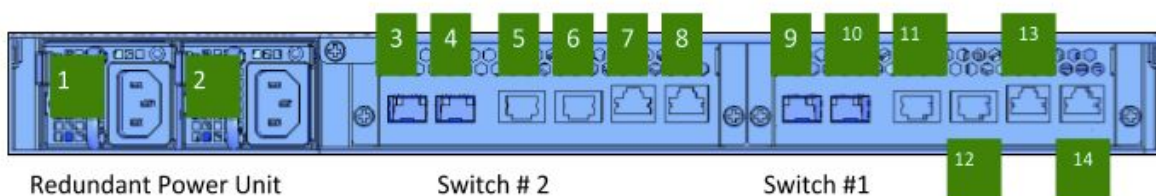
2. Extract & check upgraded files

The upgraded file delivered by Ambedded is compressed in the tar.gz or zip format, such as "release-20190701.tgz" or "release-20190701.zip". You should extract it and compare the checksum of these files. The tables below list the files that after extraction. Please check the MD5 of each file with the hash values provided in the "files.md5" file.

For Switch Burning	
u-boot-switch-uart.bin	uImage
u-boot.bin	temp_ubifs_rootfs.img
files.md5	

For Node Burning		
flash-image.bin	initramfs.img	setupMS.sh
Image.ramfs	Image	files.md5
armada-7020-mars400.dtb	ceph-mars400.tar.gz	

3. Deploy TFTP & HTTP servers

When burning a switch or microserver, a **TFTP server is a must**. BMC will try to download the file from it. Also please consider to set up an additional HTTP server to speed up the microserver node firmware burning.

Example:

TFTP Server Root: tftp://192.168.1.22/release-20190701

HTTP Server Root: http://192.168.1.22:80/release-20190701

1. For Linux User

1.1. Install the TFTP server.

CentOS: sudo yum -y install xinetd tftp-server

Ubuntu: sudo apt-get install xinetd tftpd tftp

1.2. Edit the TFTP configuration and put the upgrade file on the correct

path.

sudo vi /etc/xinetd.d/tftp

-- Change default path for "*server_args*" (default is /var/lib/tftpboot)

-- Change "*disable*" to "**no"** (default is yes)

sudo mkdir -p /var/lib/tftpboot

cd /var/lib/tftpboot

sudo tar zxf ~/Downloads/release-20190701.tar.gz

sudo systemctl restart xinetd

```
[root@centos ~]# sudo mkdir -p /var/lib/tftpboot/
[root@centos ~]# cd /var/lib/tftpboot/
[root@centos tftpboot]# sudo tar zxf ~/Downloads/release-20190701.tar.gz
[root@centos tftpboot]# ls
release-20190625   release-20190701
[root@centos tftpboot]#
```

```
[root@centos ~]# cat /etc/xinetd.d/tftp
# default: off
# description: The tftp server serves files using the trivial file transfer \
#       protocol.  The tftp protocol is often used to boot diskless \
#       workstations, download configuration files to network-aware printers, \
#       and to start the installation process for some operating systems.
service tftp
{
        socket_type             = dgram
        protocol                = udp
        wait                    = yes
        user                    = root
        server                  = /usr/sbin/in.tftpd
        server_args             = -s /var/lib/tftpboot
        disable                 = no
        per_source              = 11
        cps                     = 100 2
        flags                   = IPv4
}
```

1.3.   SELinux & Firewall (CentOS only)

sudo setsebool -P tftp_home_dir 1

sudo setsebool -P tftp_anon_write 1

sudo firewall-cmd --zone=public --add-service=tftp --permanent

sudo firewall-cmd --reload

1.4.   There are kinds of web servers on Linux, such as "apache2" or "nginx". The convenient way to build a web server for temporary use is "python HTTP server". Go to the data folder and execute python command and you will see the server running.

python -m http.server 80

OR

python -m SimpleHTTPServer 80

```
[root@centos tftpboot]# ls
release-20190625   release-20190701
[root@centos tftpboot]# python -m SimpleHTTPServer 80
Serving HTTP on 0.0.0.0 port 80 ...
```

2. For Windows User

2.1. We recommend using TFTPd64 portable edition as TFTP server. Put

the upgraded file and TFTP server together.
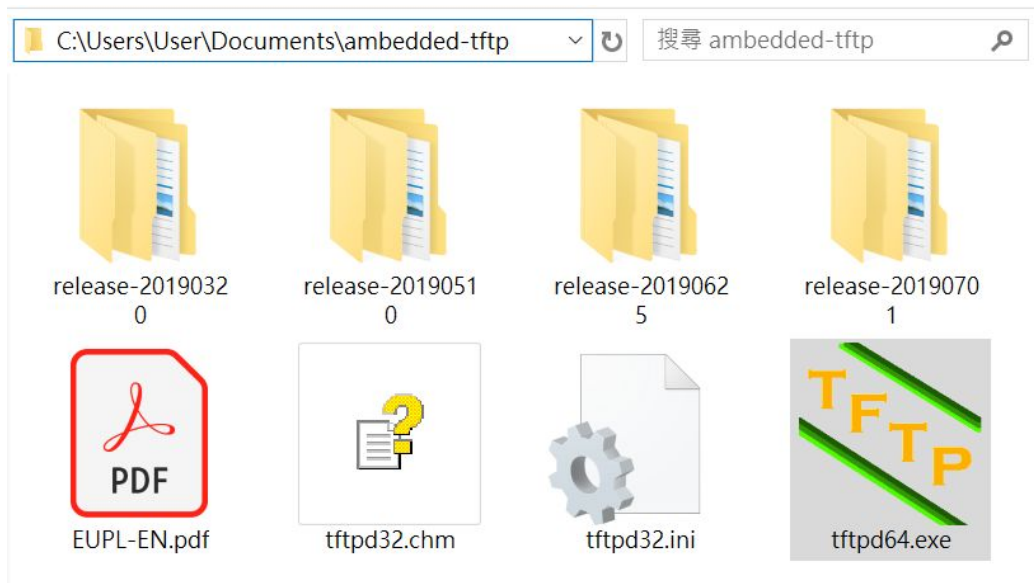
2.2. You don't have to do any settings. Make sure your PC have correct IP

that Mars400 could connect to.
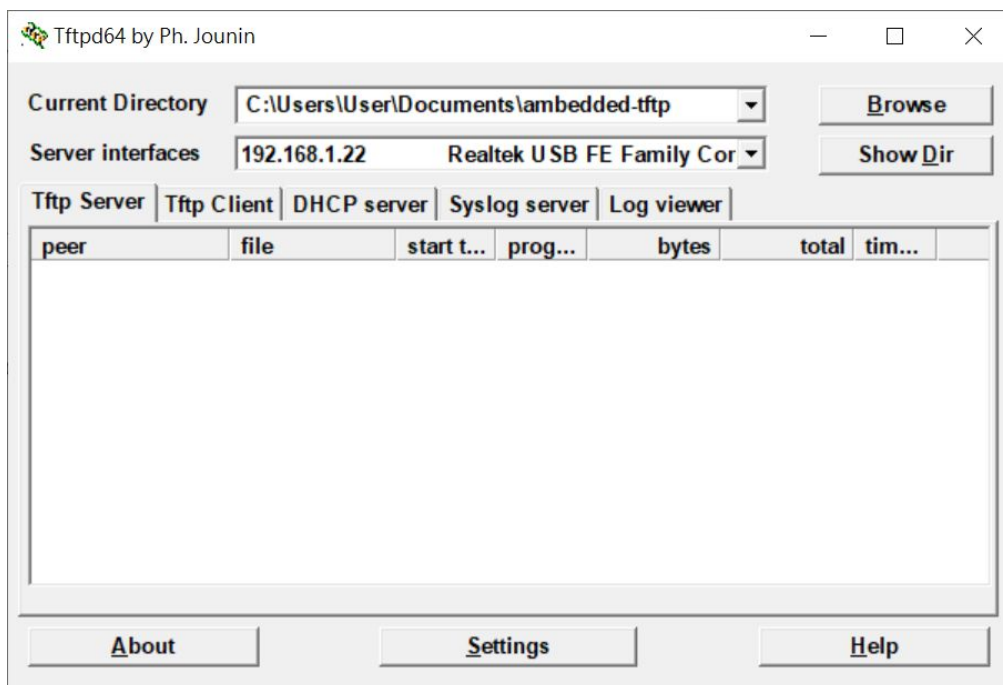
2.3. **Enable ICMP, allow Mars400 to ping your PC**. For Win10, go to "control panel" -> "System and Security" -> "Windows Defender Firewall" -> click "Advanced Settings" -> click "Inbound Rules" -> select "File and Printer Sharing (Echo Request – ICMPv4 – In)" -> Enable Rule.

2.4. You could build HTTP server to speed up microserver node burning. We have tested "miniweb", put the upgraded file to the htdoc folder. After execute miniweb, you will see the web server address on the console.
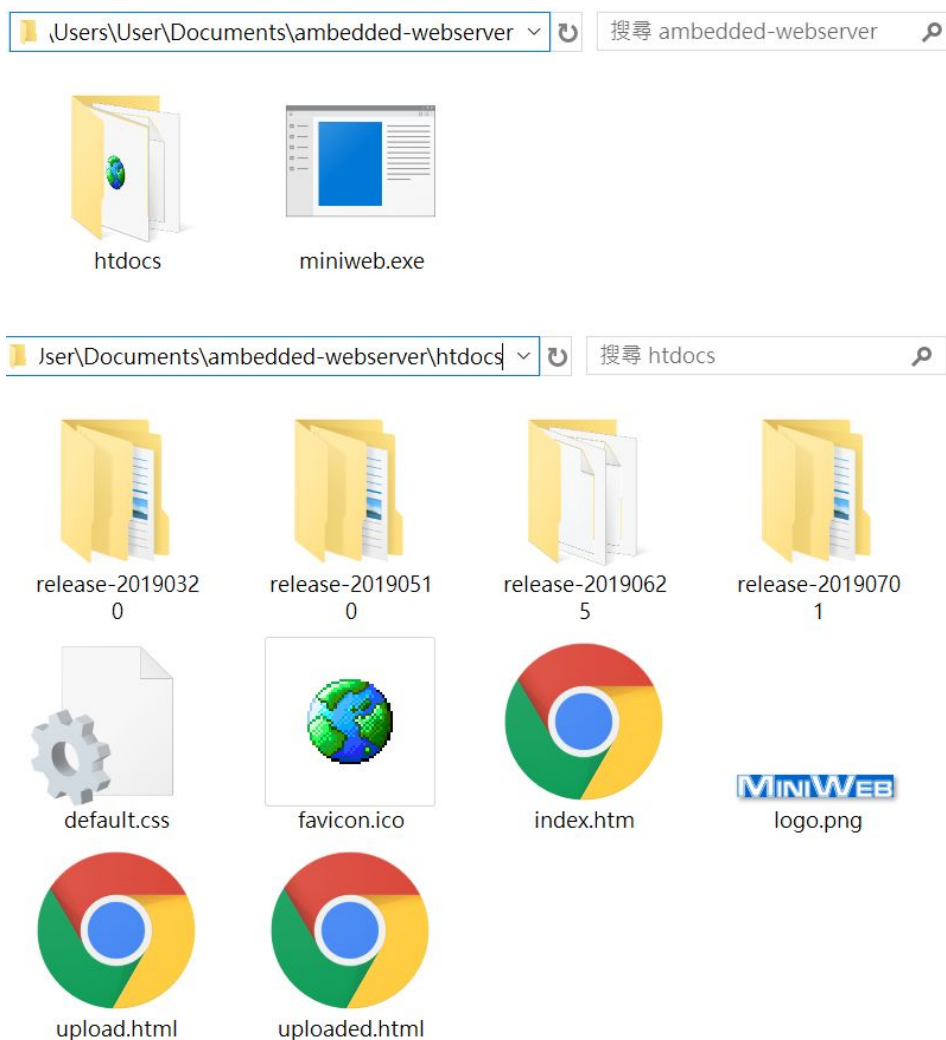
C:\Users\User\Documents\ambedded-webserver\miniweb.exe

```
MiniWeb (build 300, built on Feb 28 2013)
(C)2005-2013 Written by Stanley Huang <stanleyhuangyc@gmail.com>

Host: 192.168.1.22:8000
Web root: C:\Users\User\Documents\ambedded-webserver\htdocs
Max clients (per IP): 32 (16)
URL handlers: 2
Dir listing enabled
```

Burn Mars Switch Firmware

1. Login BMC and enter burnControl. >>>burnControl

```
===========================================
    BMC Simple Command Line Interface
===========================================
Input Command.  Enter 'H' or 'help' to display available commands.
       {C} console        : Console access to module/switch
       {S} status         : Show current machine status
       {A} advance        : Advance module control functions
       {M} maintenance     : Advance device maintenance helper comamnds
       {Q} logout         : Logout
       {V} version        : Show software version
       {H} help           : Show help message
===========================================
Enter command >>>burnControl
```

2. Selcet option "1" for Mars switch firmware burning. >>>1

```
Available method:
===========================================
       1: switch           : Burn switch code
       2: ms_node          : Burn node code
       3: ramfs            : Boot ramfs
       q: quit             : Exit burn program
===========================================
Enter command number >>>1
```

3. Select option "0" for burning both switches in the Mars400. >>>0

    Or select option "a" or "b" to burn a single switch that you assigned. >>>a,or >>>b

```
Select burn switch's console number:
===========================================
       0:   all            : Burn all switch
       a|b: switch          : Burn single switch
       r:   return          : Return to previous page
       q:   quit            : Exit burn program
===========================================
Enter command number >>>0
```

```
Select burn switch's console number:
===========================================
       0:   all            : Burn all switch
       a|b: switch          : Burn single switch
       r:   return          : Return to previous page
       q:   quit            : Exit burn program
===========================================
Enter command number >>>a
```

4. You have options to burn only the uboot, only the system, or both. We recommend to burn both system and bootloader. It won't take too much time to burn the whole image. Select option **"0"** for burning both. >>>0

```
Select switch burn type:
==========================================
        0: all                  : Burn firmware and bootloader
        1: system               : Burn firmware
        2: boot-loader          : Burn bootloader
        r: return               : Return to previous page
        q: quit                 : Exit burn program
==========================================
Enter command number >>>0
```

5. Enter a temporary IP address for the switch to download files from TFTP server. If you are burning all switches, the program will use two consecutive IP address automatically.

>>> 192.168.1.111

Enter gateway address in your network enviroment. You could left it blank if the gteway is not required.

>>>192.168.1.1

```
==========================================
Enter switch's IP      :
==========================================
        burn multi nodes:
                enter          : 192.168.1.109
                switch 1    IP: 192.168.1.109
                switch 2    IP: 192.168.1.110
        Tips:
                If there are no gateway between node and tftp server,
                node's gateway is empty.

                enter          : 192.168.1.100
                gateway     IP: 192.168.1.100
==========================================
Enter switch 1   IP range<xxx.xxx.xxx.xxx> >>> 192.168.1.111
Enter Gateway IP(Options)<xxx.xxx.xxx.xxx> >>>192.168.1.1_
```

6. Enter TFTP server IP address and the directory of the update files on TFTP server.

>>>TFTP://192.168.1.243/release-20190701

```
========================================
Enter switch 1   IP range<xxx.xxx.xxx.xxx> >>> 192.168.1.111
Enter Gateway IP(Options)<xxx.xxx.xxx.xxx> >>>192.168.1.1
========================================
        You need to enter target system files path on tftp server
        For example,
            Release diretory URL:
                  TFTP                      : tftp://tftp-ip/release_dir
========================================
Please enter target release directory >>>tftp://192.168.1.243/release-20190701
```

7.   This is the last chance to check informations. If you want to edit some settings, just

go to edit mode. >>>E If everything looks good, please enter "y" to confirm and

continue. >>>y

```
========================================
Burn information:
BMC IP                  : 192.168.1.119
========================================
Select method           : switch
Select nodes            : 9 10
Program type            : all
========================================
Switch's IPs            : 192.168.1.111;192.168.1.112
Used Gateway            : yes
Used gateway IP         : 192.168.1.1
========================================
TFTP Server's IP        : 192.168.1.243
========================================
Only support TFTP
UART bootloader path  : release-20190701/u-boot-switch-uart.bin
Upload bootloader path: release-20190701/u-boot.bin
========================================
Target kernel path     : release-20190701/uImage
Target system path     : release-20190701/temp_ubifs_rootfs.img
========================================
Enter "E" to edit info, "y" to continue [q|y|E] >>>y
```

7.1.   In edit mode, select which value you want to edit. Press enter to save.

```
========================================
Select value:
========================================
        0: nodes                       : 9 10
========================================
        1: node's IP                   : 192.168.1.111;192.168.1.112
        2: Gateway IP                  : 192.168.1.1
========================================
        3: TFTP Server's IP            : 192.168.1.243
========================================
        4: UART bootloader path        : release-20190701/u-boot-switch-uart.b
in
        5: Upload bootloader path      : release-20190701/u-boot.bin
========================================
========================================
        9: Target kernel path          : release-20190701/uImage
        12: Target system path         : release-20190701/temp_ubifs_rootfs.im
g
        q:  quit                       : Exit burn program
========================================
Select value number to changed >>>
```

8.   Burning & Result

```
========================================
Enter "E" to edit info, "y" to continue [q|y|E] >>>y
Starting to get uart file   ...   done!
Burn switch a ...
Starting to burn boot-loader ...
burn from uart ... .........10.........20.........30.........40.........50.....
....60.........70.........80........done
burn to disk ............10.........20.........30done
Starting to burn switch ...
.........10.........20.........30..done
Burn switch b ...
Starting to burn boot-loader ...
burn from uart ... .........
```

```
Burn result:
========================================
switch 1:
        boot-loader: ok
        firmware: ok

switch 2:
        boot-loader: ok
        firmware: ok

========================================
Press any key to continue..>>>
```

If there is any error, please check the last section about **Troubleshooting & Error**

Messages.

You can re-do the burning only on the failed ones.

Burn Microserver Node Firmware

1. Login BMC and enter burnControl. >>>burnControl

```
============================================
     BMC Simple Command Line Interface
============================================
Input Command.  Enter 'H' or 'help' to display available commands.
        {C} console           : Console access to module/switch
        {S} status            : Show current machine status
        {A} advance           : Advance module control functions
        {M} maintenance       : Advance device maintenance helper comamnds
        {Q} logout            : Logout
        {V} version           : Show software version
        {H} help              : Show help message
============================================
Enter command >>>burnControl
```

2. Selcet option "2" for microserver node burning. >>>2

```
Available method:
============================================
        1: switch             : Burn switch code
        2: ms_node            : Burn node code
        3: ramfs              : Boot ramfs
        q: quit               : Exit burn program
============================================
Enter command number >>>2
```

3. Select option "0" for burning all 8 nodes in the Mars400. >>>0

    Or select option "s" to burn only the selected nodes that you assigned. >>>s

```
Select burn node's console number:
============================================
        0:   all              : Burn all nodes
        s:   select node      : Burn select nodes
        r:   return           : Return to previous page
        q:   quit             : Exit burn program
============================================
Enter command number >>>0
```

```
Select burn node's console number:
============================================
        0:   all              : Burn all nodes
        s:   select node      : Burn select nodes
        r:   return           : Return to previous page
        q:   quit             : Exit burn program
============================================
Enter command number >>>s
```

3.1. For option "select node", you could choose multiple nodes between 1 ~ 8.

For example, if you would like to select node 1, 4, 5, and 2, enter numbers

one by one. Enter "Y" to end the node selection.

>>>1 >>>4 >>>5 >>>2 >>Y

```
Select burn node's console number:
==========================================
      0:   all              : Burn all nodes
      s:   select node      : Burn select nodes
      r:   return           : Return to previous page
      q:   quit             : Exit burn program
==========================================
Enter command number >>>s
Enter node numbers or "Y" to next step >>>1
Select nodes:  1
Enter node numbers or "Y" to next step >>>4
Select nodes:  1  4
Enter node numbers or "Y" to next step >>>5
Select nodes:  1  4  5
Enter node numbers or "Y" to next step >>>2
Select nodes:  1  4  5  2
Enter node numbers or "Y" to next step >>>Y
Burn 4 nodes in parallel? [YES/NO] >>>YES
```

3.2. If you select "all" or multiple nodes to burn, we suggest you do it parallelly.

>>>YES

```
Select burn node's console number:
==========================================
      0:   all              : Burn all nodes
      s:   select node      : Burn select nodes
      r:   return           : Return to previous page
      q:   quit             : Exit burn program
==========================================
Enter command number >>>0
Burn 8 nodes in parallel? [YES/NO] >>>YES
```

4. Select which component that you want to burn. For the completely update all

microserver nodes, please **select option "0"** to burn both system and bootloader.

>>>0

```
Select node burn type:
=========================================
      0: all                    : Burn system and bootloader
      1: system                 : Burn system
      2: boot-loader            : Burn bootloader
      r: return                 : Return to previous page
      q: quit                   : Exit burn program
=========================================
Enter command number >>>0
```

4.1.   In some cases, the microserver nodes already have bootloader, you could

select option "1" to burn the system only and skip the bootloader bruning.

>>>1

```
Select node burn type:
=========================================
      0: all                    : Burn system and bootloader
      1: system                 : Burn system
      2: boot-loader            : Burn bootloader
      r: return                 : Return to previous page
      q: quit                   : Exit burn program
=========================================
Enter command number >>>1
```

5.   Enter a temporary IP for microserver nodes to download files from TFTP & HTTP

server. Please note that, **use eight consecutive IP** when you are burning, because

we desire to simplify the tool and avoid complicating things.

>>> 192.168.1.111

Enter gateway address in your network enviroment. You could left it blank if the

gateway is not required.

>>>192.168.1.1

In the following example, node 1, 2, 4, 5 are selected, and you entered

192.168.1.111 as the IP address of the first selected node. The software will

automatically assigned the IP of the other 3 nodes as 102.168.1.**102, 104 and 105**.

```
===========================================
Select nodes        : 1 2 4 5
===========================================
        burn multi nodes:
                enter       : 192.168.1.101
                node 1   IP: 192.168.1.101
                node 2   IP: 192.168.1.102
                node n   IP: 192.168.1.(101 + n - 1)
        Tips:
                If there are no gateway between node and tftp server,
                node's gateway is empty.

                enter       : 192.168.1.100
                gateway  IP: 192.168.1.100
===========================================
Enter node 1   IP range<xxx.xxx.xxx.xxx> >>> 192.168.1.111
Enter Gateway IP(Options)<xxx.xxx.xxx.xxx> >>>192.168.1.1
```

6. Next step is to enter the IP address and target folder of HTTP server.

>>>HTTP://192.168.1.243:80/release-20190701

```
===========================================
        You need to enter target system files path on tftp server
        For example,
          Release diretory URL:
                TFTP                    : tftp://tftp-ip/release_dir
                HTTP|FTP                : http://http-ip/release_dir
===========================================
Please enter target release directory >>>http://192.168.1.243:80/release-201907
01
```

7. Here is your last chance to check the information. If you want to edit some settings,

just go to the edit mode. >>>E If everything looks good, please confirm and

continue by entering "y". >>>y

```
============================================
Burn information:
BMC IP               : 192.168.1.119
============================================
Select method        : node
Select nodes         : 1 2 4 5
Program type         : all
============================================
Node's IPs           : 192.168.1.111;192.168.1.112;192.168.1.114;192.168.1.115
Used Gateway         : yes
Used gateway IP      : 192.168.1.1
============================================
TFTP Server's IP     : 192.168.1.243
HTTP|FTP Server's IP : http://192.168.1.243:80
============================================
Only support TFTP
UART bootloader path : release-20190701/flash-image.bin
Upload bootloader path: release-20190701/flash-image.bin
Ramfs kernel path    : release-20190701/Image.ramfs
Ramfs dtb path       : release-20190701/armada-7020-mars400.dtb
Ramfs system path    : release-20190701/initramfs.img
============================================
Target kernel path   : release-20190701/Image
Target dtb path      : release-20190701/armada-7020-mars400.dtb
Target initrd path   :
Target system path   : release-20190701/ceph-mars400.tar.gz
============================================
Enter "E" to edit info, "y" to continue [q|y|E] >>>y
```

7.1. In edit mode, select which value you want to change. Press enter to save

and proceed the firmware burning.

```
========================================
Select value:
========================================
        0: nodes                       : 1 2 4 5
========================================
        1: node's IP                   : 192.168.1.111;192.168.1.112;192.168.1
.114;192.168.1.115
        2: Gateway IP                  : 192.168.1.1
========================================
        3: HTTP|FTP Server's IP        : http://192.168.1.243:80
========================================
        4: UART bootloader path        : release-20190701/flash-image.bin
        5: Upload bootloader path      : release-20190701/flash-image.bin
========================================
        6: Ramfs kernel path           : release-20190701/Image.ramfs
        7: Ramfs dtb path              : release-20190701/armada-7020-mars400.
dtb
        8: Ramfs system path           : release-20190701/initramfs.img
========================================
        9: Target kernel path          : release-20190701/Image
        10: Target dtb path            : release-20190701/armada-7020-mars400.
dtb
        11: Target initrd path         :
        12: Target system path         : release-20190701/ceph-mars400.tar.gz
        q:  quit                       : Exit burn program
========================================
Select value number to changed >>>
```

8. Burning & Result

```
================================================
Enter "E" to edit info, "y" to continue [q|y|E] >>>y
Starting to get uart file   ...  done!
Starting to get md5sum file   ...  done
Process node 1 in parallel, please wait...
Process node 2 in parallel, please wait...
Process node 4 in parallel, please wait...
Process node 5 in parallel, please wait...
.........10.........20.........30.........40.........50.........60.........70..
.......80.........90.........100.........110.........120.........130.........14
0.........150.........160.........170.........180.........190.........200......
...210.........220.........230.........240.........250.........260.........270.
........280.........290.........300.........310.........320.........330.
```

```
Burn result:
================================================
node 1:
        boot-loader: ok
        system: ok

node 2:
        boot-loader: ok
        system: ok

node 4:
        boot-loader: ok
        system: ok

node 5:
        boot-loader: ok
        system: ok

================================================
Press any key to continue..>>>
```

If there is any error, please check the last section about Troubleshooting & error message.

You can re-do the burning only on the failed ones.

Error Messages & Troubleshooting

Error message	Why happened	How fixed
burn from uart failed	can not access node's	Use BMC modreset to reset the node.
upload uboot failed	network problem	Disconnect all LAN on switch, switch #1 shall have single port being connected. Or check if there is IP conflict.
TFTP get failed	network problem	
failed to download xxx file	network problem	
failed to format emmc partition	node's mmc may be broken	Please contact Ambedded
failed to create install script	command send through node's uart is broken	Use console login to node and check if the /tmp/install.sh file exists
failed to install system	Fail to extract compressed file.	Use BMC to login node console and uncompress system file into root partition, then reboot
failed to login system	system cannot boot	Check file correctness
earse nand failed	NAND flash maybe broken	Please contact Ambedded