Vantron

VT-M2M-TC
User's Manual

Vantron Technology
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Revision History:

No.	Version	Description	Date
1	V1.0	First release	May 10, 2011
2	V1.1	Add GPIO Information	Dec. 22, 2011
3	V1.2	Modify order information	Nov. 18, 2011
4	V1.3	Modify order information	Jan. 10, 2012
5	V1.4	Update the logo of cover	May 16, 2012
6	V1.5	Add 1xHalf PCIe slot	July 20, 2012
7	V1.6	Add FCC and IC warning statement	Dec. 2, 2013
8	V1.7	Change power input description as DC9-36V(default 12V)	Dec. 16, 2013
9	V1.8	Appended contents of how to do software setup	Jan 16, 2014

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Part I：Hardware Platform

1 Foreword

1.1 Copyright Notice

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1.2 Notes

Applicable notes are listed in the following table:

Sign	Notice Type	Description
▷i	Notice	Important information and regulations
⚠	Caution	Caution for latent damage to system or harm to personnel

1.3 Statement

It is recommended to read and comply with this manual before operating VT-M2M TC which provides important guidance and helps decreasing the danger of injury, electric shock, fire, or any damage to the device.

1.4 Disclaimer

Vantron assumes no legal liability of accidents resulting from failure of conforming to the safety instructions.

1.5   Limitation of Liability/Non-warranty

For direct or indirect damage to this device or other devices of Vantron caused by failure of conforming to this manual or the safety instructions on device label, Vantron assumes neither warranty nor legal liability even if the device is still under warranty.

The VT-M2M-TC should be installed, debugged and maintained by professional people.

1.6   Safety Instructions

✧   Keep and comply with all operation instructions, warnings, and information.
✧   Pay attention to warnings on this device.
✧   Read the following precautions so as to decrease the danger of injury, electric shock, fire, or any damage to the device.

1.7 Precautions

✧ Pay attention to the product labels/safety instructions printed on silk screens.
✧ Do not try repairing this product unless declared in this manual.
✧ Keep away from heat source, such as heater, heat dissipater, or engine casing.
✧ Do not insert other items into the slot (if any) of this device.
    • Keep the ventilation slot ventilated for cooling.
    •System fault may arise if other items are inserted into this device.
✧ Installation: ensure correct installation according to instructions from the manufacturer with recommended installation tools.
✧ Ensure ventilation and smoothness according to relevant ventilation standard.

1.8   Safety Instructions for Power Cables and Accessories

⚠️Proper power source only

Start only with power source that satisfies voltage label and the voltage necessary according to this manual. Please contact technical support personnel of Vantron for any uncertainty about the requirements of necessary power source.

⚠️Use tested power source

This product still contains a button lithium battery as a real-time clock after its external power source is removed and therefore should not be short-circuited during transportation or placed under high temperature.

⚠️ Place cables properly:

Do not place cables at any place with extrusion danger.

⚠️ Cleaning Instructions

✧ Please power off before cleaning the device.
✧ Do not use spray detergent.
✧ Clean with a damp cloth.
✧ Do not try cleaning exposed electronic components unless with a dust collector.
✧ Support for special fault: Power off and contact technical support personnel of Vantron in case of the following faults:
  ➢ The device is damaged.
  ➢ The temperature is excessively high.
  ➢ Fault is still not solved after the operation according to the manual.

2   Overview

2.1 Introduction

Thank you for choosing Vantron. It is our commitment to provide our valued customers with the embedded devices equipped with the state-of-the-art technology and the best product services.

Vantron's M2Mproducts are based on the most advanced ARM and Intel Atom processors and have low-power consumption and high integration. The products are designed for applications of M2M in industrials, medicals, financial, retail, vehicle, and transportations etc.

2.2   Product Series

2.2.1 Product Order Coding Rule

Order Code

VT-M2M-TC-4-1GM-8GF-GWZP-V

Version:

I: Extended Temperature

Blank:Commercial temperature

Wireless Module Option: 2G: 2G, 3G: 3G, W: WiFi, Z: Zigbee, P: GPS

SSD Memory Size: 8G:8GB, 16G: 16GB

DDR Memory Size: 5:512MB , 1G:1GB, 2G: 2GB

CPU Speed: 2:600MHz, 4:1GHz, 6:1.3GHz:8:1.6GHz
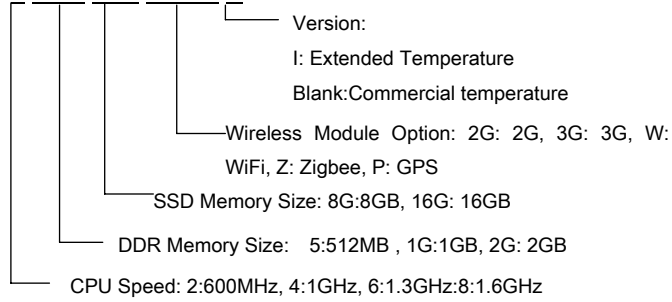
2.2.2 Ordering Information

Order Examples:

VT-M2M-TC-4-1GM-8GF	ATOM E640 Processor, 1GHz CPU, 1GB DDR2
VT-M2M-TC-6-1GM-8GF-W	ATOM E640 Processor, 1.3GHz CPU, 1GB DDR2, 8G Flash, WLAN
VT-M2M-TC-8-1GM-8GF-3GW	ATOM E640 Processor, 1.6GHz CPU, 1GB DDR2, 8G Flash , 3G,WLAN

Accessories:

Install Mechanical tools,1pc
Power Adapter with locked connector (Optional),1pc
IO Terminal (12x3.81mm) (Optional),1pc
3G Antenna(Optional),1pc
WiFi Antenna(Optional),1pc
Zigbee Antenna(Optional),1pc
GPS Antenna(Optional),1pc

3   M2M-TC Hardware Instructions

3.1   Product Appearance

Front Side View

Back Side View

View for all optional embedded modules and antennas

Bottom View for optional embedded modules
(1xHalf PCIe slot under the 1xPCIe slot)

Bottom View for optional embedded modules

3.2   Specifications

Specifications		
CPU	Processor	Intel® ATOM™, E640(T)1GHz, E660(T)1.3GHz, E680(T),1.6GHz 32KB Instruction cache +23KB L1 cache, 512KB L2 cache
Memory	On Board	DDR 1GB (up to 2GB), 533MHz
	ROM Internal	1.8"SATA SSD Module Internal (8GB, or others)
Display	Chipset	Intel® Platform Controller Hub EG20T. Support LCD/SDVO, Simultaneous/dual view display
	Resolution	Up to 1280 x 1024 @ 60Hz for VGA Decode:H.264,MPEG4, MPEG2,VC1,WMV-9, Div-X Encode:H.264,MPEG4,
	Interface	1xVGA (DB15) 1xLVDS (Optional Internal)
Wireless Communication	WLAN	Optional 802.11 b/g/n Wireless Module, external antenna , Support 1x Half PCIe Wireless card
	3G Module	Optional1x mini PCIe 3G Broad Band Module with SIM slot
	ZigBee	Optional low power Zigbee Module, external antenna
	GPS	Optional GPS module, external antenna
Peripheral Interfaces	Ethernet	1x10/100/1000-BaseT(RJ45)
	USB	2xUSB2.0 Host (Type A)
	Audio	HD Audio, 1xMIC in 3.5mm, 1xline Out 3.5mm

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	COM Port	1xDB9 External, 1xRS232 Internal 1xCAN 2.0b
	Alarm	Buzzer Out
	SD card	1xSD card Slot (Optional)
	RTC	Supported
	Control	Reset Button on the top
	GPIO	Reserved GPIO (Terminal)
	UART	1x full function UART use DB9
Security	security	On board Registration Serial Number, and SHA-1 Encrypt/Decrypt Chip DS28E01 (Optional)
Software	OS	Linux
	Applications	SDK Available
Power	Input	DC9-36V(default 12V), Locked Power Jack
	Consumption	6W (Pulse8W), Sleep 2W. (without 3G,GPS,Zigbee,WLAN)
Mechanical	Dimensions	138x102x52mm (Box)
	Install	160x102x52mm
	Weight	0.6Kg (1.2KKg package Kit)
	Enclosure	Aluminum Alloy with Black Color
Environment Condition	Temperature	Operating:-0°C ~ +60°C (ETR:-40°C ~ +80°C Optional)
		Storage: -20°C ~ +70°C, (ETR:-40°C ~ +85°C Optional)
	Humidity	5-95%RH at 25-35 (Non-Condensation)
	Cooling Mode	Fan less, Heat Sink
	Approvals	UL, FCC Class A, and CE

3.3   Interface Instructions

3.3.1 Front View

3.3.2 Back View

3.4 Dimension
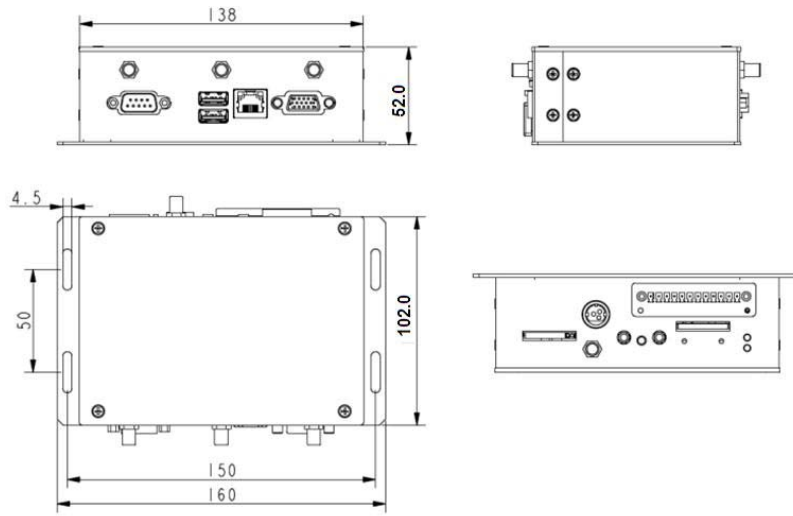
3.5 Interface Description

3.5.1 Wide-Range Power Interface
Power JACK with lock

Pin	Description
1,3	DGND (ground pin)
2	Power (+12 DC,UP to 36V)

3.5.2 Ethernet Interface
Standard RJ45 interface, supporting 10M/100M/1000M
self-adaptation, this is a standard RJ45 ethernet port

3.5.3 D Sub-9 RS232 Connector

Standard vertical DB-9 male connector
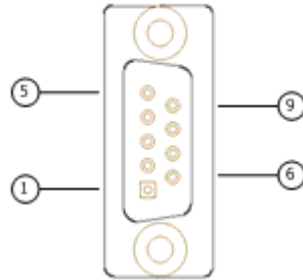
Pin	Description	Remarks
1	DCD1/422TX+/485_A	BIOS set
2	RXD1/422TX-/485_B	BIOS set
3	TXD1/422RX+	BIOS set
4	DTR1/422RX-	BIOS set
5	DGND (ground pin)	
6	DSR1	
7	RTS1	
8	CTS1	
9	RI1	

3.5.4 RS232/485 ,CAN,External IO Connector

12pins 3.81 pitch terminal with screw lock

Load capacity: more than 128 nodes/RS485 channel

Pin	Description	Remarks
1	TXD2/485_2_A	BIOS set
2	RXD2/485_2_B	BIOS set
3	DGND	
4	CANH	
5	CANL	
6	DGND	
7	EXTIO0	3.3V Level
8	EXTIO1	3.3V Level
9	EXTIO2	3.3V Level
10	EXTIO3	3.3V Level
11	EXTIO4	3.3V Level
12	EXTIO5	3.3V Level

3.5.5 VGA Interface

Standard vertical DB-15 Female VGA connector
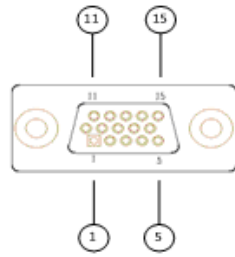
Pin	Description
1	RED
2	GREEN
3	BLUE
4	N.C.
5	GND
6	GND
7	GND
8	GND
9	+5VDC
10	GND
11	N.C.
12	SD_DDC
13	HSYNC
14	VHYNC
15	SC_DDC

3.5.6 USB Host Connector
Dual vertical USB A type interface, USB2.0
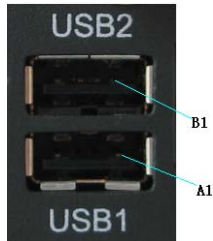
Pin	Description
A1	USB1_VCC(+5VDC)
A2	USB1_D-
A3	USB1_D+
A4	USB1_DGND(ground pin)
B1	USB2_VCC(+5VDC)
B2	USB2_D-
B3	USB2_D+
B4	USB2_DGND(ground pin)

3.6   Operation Notice

3.6.1 Change SIM Card

Push the small button on the left of SIM Card Holder, and install the SIM card to the holder. Then push the holder into the Slot.

3.6.2 Power Supply

Please make sure using adapter in the accessory, or the power is not reversed when powered by other adapter.

4   Tips

⚠ Waste Disposal

It is recommended to disassemble the device before abandoning it in conformity with local regulations. Please ensure that the abandoned batteries are disposed according to local regulations on waste disposal. Do not throw batteries into fire (explosive) or put in common waste canister. Products or product packages with the sign of "explosive" should not be disposed like household waste but delivered to specialized electrical & electronic waste recycling/disposal center. Proper disposal of this sort of waste helps avoiding harm and adverse effect upon surroundings and people's health. Please contact local organizations or recycling/disposal center for more recycling/disposal methods of related products.

Comply with the following safety tips:

⚠ Do not use in combustible and explosive environment

Keep away from combustible and explosive environment for fear of danger.

⚠ Keep away from all energized circuits.

Operators should not remove enclosure from the device. Only the group or person with factory certification is permitted to open the enclosure to adjust and replace the structure and components of the device. Do not change components unless the power cord is removed. In some cases, the device may still have residual voltage even if the power cord is removed. Therefore, it is a must to remove and fully discharge the device before contact so as to avoid injury.

⚠ Unauthorized changes to this product or its components are prohibited.

In the aim of avoiding accidents as far as possible, it is not allowed to replace the system or change components unless with permission and certification. Please contact the technical department of Vantron or local branches for help.

⚠ Pay attention to caution signs.

Caution signs in this manual remind of possible danger. Please comply with relevant safety tips below each sign. Meanwhile, you should strictly conform to all safety tips for operation environment.

Notice

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FCC Warning

This device complies with FCC class A Rules. Operation is subject to the Following conditions.

This device may not cause harmful interference.

This device must accept any interference received, including interference that may cause undesired operation.

Note: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

—Reorient or relocate the receiving antenna.
—Consult the dealer or an experienced radio/TV technician for help.

Any modification to the product is not permitted unlessauthorized by Vantron.It's not allowed to disassemble theproduct, it is not allowed to replace the system or change components unless with permission and certification. Please contact the technical support department of Vantron or local branches for help.

IC statement

This device complies with IC class A Rules.

Disclaimer:

Operation is subject to the following two conditions:

(1) This device may not cause interference, and

(2) This device must accept any interference, including interference that may cause undesired operation of the device.

Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes : (1) l'appareil ne doit pas produire de brouillage, et (2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

RF exposure warning

This equipment must be installed and operated in accordance with provide instructions and the antenna used for this transmitter must be installed to provide a separation distance of at least 20 cm from all persons and must not be co-located or operation in conjunction with any other antenna or transmitter. End-users and installers must be provide with antenna installation instructions and transmitter operating conditions for satisfying RF exposure compliance.

Part II：Software Reference

1 Introduction

Thank you for choosing Vantron. It is our commitment to provide our valued customers with the embedded devices equipped with the state of the art technology and the best product services.

Vantron's M2M products are based on the most advanced ARM and Intel Atom processors and have low power consumption and high integration. The products are designed for applications of M2M in industrials, medicals, financial, retail, vehicle, and transportations etc.

1.1 About This Manual

This manual is for user how to use sample programs in Linux system and how to use device in Linux system.

We support three kinds of Linux system, and they have same sample programs, but each system has different, so when they have different we will specially note.

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1.2 Sample Programs

Vantron supports many sample programs for TV-M2M-TC. You can test device modules through these sample programs, and can be the reference that you develop.

client   CAN data send program

loopback   CAN data receive program

gpioctl   GPIO test program

power   Power control for modules in the set

serialdemo   Serial testing and send AT Command program

gps   Get the gps information

zigbee   Zigbee testing program(zigbee module)

Digixbee testing programs

notices:

The directory that sample programs isn't fixed. The directory path of place is different under the different operating system, and concretely please according to 2 Starting The System.

1.3 Functionalities layout

The below table lists VT-M2M-TC features.

Chips or Interfaces	Details

UART	VT-M2M-TC has 4 UART ports: /dev/ttyS0 :DB9 COM Port (only Wind River is DEBUG SERIAL) /dev/ttyS1 :Green Terminal Pin 1,2 /dev/ttyS2 :GPS /dev/ttyS3 : ZIGBEE
USB Host portx2	
1xEthernet	# ifconfig eth0 192.168.16.143
Audio MIC IN	ALSA audio device #arecord–t wav test.wav
Audio Out	ALSA audio device #aplay test.wav
Green Terminal	1 :TXD2 2 :RXD2 3 :GND 4 :CANH 5 :CANL 6 :GND 7 :EXTIO0 8 :EXTIO1 9 :EXTIO2 10 :EXTIO3 11 :EXTIO4

	EXTIO5

1.4   Linux OS Support

The TV-M2M-TC supports the following Linux operating systems.

Timesys*   Fedora Remix 14

Ubuntu   12.04

Starting The System：

The all Linux systems have the same sample programs. There different will be explained in each module.

The systems version file:

Linux System	Version file
Timesys* Fedora Remix 14	/home/vantron/version
Ubuntu	/home/vantron/version

The systems user and password:

Linux System	User name	Passwd
Timesys* Fedora Remix 14	vantron	vantron
	root	vantron
Ubuntu	vantron	vantron

The sample programs path:

Linux System	Path name
Timesys* Fedora Remix 14	/home/vantron/demo Digi bee: /home/vantron/xbee_driver/samples/posix/
Ubuntu	/home/vantron/demo Digixbee: /home/vantron/xbee_driver/samples/posix/

Parts of programs need root level, if you are not that please changing, example:

```
$sudosu
[sudo] password for vantron:
#
```

2   Base Control

The all programs in the sample programs path.

2.1   Power Control

power [usb_wifi|can|gps|zigbee|3g]   [on|off]

wifi**:**   Power control of usbWiFiModule

can**:**   Power control of CANModule

gps**:**   Power control of GPSModule

zigbee**:**   Power control of ZigBeeModule

3g**:** Power control of 3GModule

ex1**:** Turn on Power of ZigBee Module

#./power zigbee on

ex2: Turn off Power of ZigBee Module

#./power zigbee off

2.2 Can Control

a. Close device

#ifconfig can0 down

b. Configure CAN, set CAN's baud rate to 1Mbps, or 100000(100kbps)

#ip link set can0 type can bitrate 100000

#ifconfig can0 up

c. Receive CAN data, it will receive CAN data which from other side

#./loopback

d. Send CAN data, it will send CAN package with ID of 0x02

#./client

2.3   Gpio Control

gpioctl<dirin|dirout|get|set|clear><gpionum>

     dirin: Set specified GPIO as input type

     dirout: Set specified GPIO as output

     get   Read GPIO input level. Need set the GPIO as input first.

     set: Set GPIO as high level. Nee set the GPIO as output first.

     clear: Clear GPIO to low level, need set the GPIO as output first.

     gpionum: The GPIO be operated. 0 to 5 is EXTIO, 6 is zigbee burning signal, 9 is 3G internal power, 10 is intrnalpcie power, 11 is DIGI Xbee burning signal

ex1:   Set EXTIO1   to high

#./gpioctldirout1

#./gpioctl set 1

ex2:   Read level of EXTIO1

#./gpioctldirin1

#./gpioctl get 1

2.4   Serial COM Control

a.   DB9 COM Port(Wind River is DEBUG serial):

Short Pin 2, 3 of DB9.

```
#./serialdemo–d /dev/ttyS0 –b 9600 –r –w "hello"
```

Can display some"hello" outputs

b.   COM port on green terminal

Short Pin 1, 2 of green terminal

```
#./serialdemo–d /dev/ttyS1 –b 9600 –r –w "hello"
```

Can display some "hello" outputs

2.5 Audio Control

a.   Audio arecord

```
#arecord–t wav test.wav
```

b.   Audio aplay

```
#aplay test.wav
```

2.6 SD card Control

a.   Insert SD card ,then look over device:

```
#fdisk–l
```

b.   mount SD card device:

```
#mount /dev/mmcblk0 /mnt
```

2.7   ADXL345 Control

The test program path: /home/vantron/ADXL345_test/

a.   Init ADXL345:

```
#./adxinit
```

b.   Get the x,y,zdriction output:

```
#./adxtest
X:    233
Y:      2
Z:    3ed
```

3 WIFI Module

3.1 BaseConfig

The Timesys and ubuntu system can through GUI connecting WIFI network.

The Wind River has not GUI, so must through command:

Open WIFI network:

>*ifup wlan0*

Close WIFI network:

>*ifdown wlan0*

The WIFI config file:

>*cat /etc/sysconfig/network-scripts/ifcfg-wlan0*

MODE=Managed

DEVICE=wlan0

BOOTPROTO=dhcp

ONBOOT=yes

NM_CONTROLLED=no

TYPE=Wireless

ESSID=kkk   #Change it into your essid, this is Public network

3.2   OpenConfig

a.   Stop service network-manager, Ubuntu service name is network-manager, Fedora service name is NetworkManager, Wind River can skip.

```
#service network-manager stop
```

b.   Open wlan0

```
#ifconfig wlan0 up
```

c.   Set essid and key

```
#iwconfig wlan0 essid"KKK"
```

d.   Look over the config

```
#iwconfig wlan0
```

e.   Get ip through DHCP

```
#dhclient wlan0
```

f.   Cancel DHCP

```
#dhclient–r wlan0
```

g.   Start networkmanager

```
#service network-namager start
```

3.3   WPA-PSK/WPA2_PSK Config

a.   Stop service network-manager, Ubuntu service name is

network-manager, Fedora service name is NetworkManager, Wind River can skip.

#service network-manager stop

b.   Open wlan0

#ifconfig wlan0 up

c.   Set essid and passwd

#wpa_passphrase ESSID PWD >wpa_supplicant.conf

d.   Connect the network

#wpa_supplicant–B –iwlan0 –Dwext–c ./wpa_supplicant.conf

e.   Look over the config

#iwconfig wlan0

f.   Get ip through DHCP

#dhclient wlan0

g.   Cancel DHCP

#dhclient–r wlan0

h.   Start networkmanager

#service network-namager start

4　3G Module

4.1　BaseConfig

The Timesys and ubuntu system can through GUI connecting 3G network.

The Wind River doesn't have GUI, so must through command.

Looking over the device ,   HUAWEI em770w is ppp0, Telit HE910 is ppp1, Telit DE910 is ppp2. Sierra AirPrime SL8082 is ppp3.

Open 3G network:

```
>ifup ppp0
```

Close 3G network:

```
>ifdown ppp0
```

The 3G config file:

```
>cat /etc/sysconfig/network-scripts/ifcfg-ppp0
DEVICE=ppp0
NAME=test
MODEMPORT=/dev/ttyUSB0
LINESPEED=115200
PAPNAME=test
USERCTL=true
ONBOOT=no
```

```
PERSIST=no
DEFROUTE=yes
PEERDNS=yes
DEMAND=no
IDLETIMEOUT=600
```

The other devices configuration file, see /etc/sysconfig/network-scripts/ifcfg-ppp* .

4.2   ScriptConfig

4.2.1 WCDMA Script

a.   The pppd scripts default in /etc/ppp/peers/. Create the "wcdma" script.

```
>vim wcdma
```

b.   Add the following content in wcmda file, if you want to knowmore , please man pppd:

```
#/etc/ppp/peers/wcdma
#This is pppd script, used Huawei EM770W(Union)
/dev/ttyUSB0    #Telit HE910 is /dev/ttyACM0
115200
crtscts
modem
debug
```

```
#nodetach
usepeerdns
defaultroute
user "3gnet"
0.0.0.0:0.0.0.0
connect        '/usr/sbin/chat      -s      -v      -f
/etc/ppp/peers/wcdma-connect-chat'
```

c. Create the chat script

```
>vim wcdma-connect-chat
```

d. Add the following content in wcdma-connect-chat file:

```
#/etc/ppp/peers/wcdma-connect-chat
TIMEOUT 5
ABORT "DELAYED"
ABORT "BUSY"
ABORT "ERROR"
ABORT "NO DIALTONE"
ABORT "NO CARRIER"
#"AT
#'OK-+++\c-OK' ATH0
TIMEOUT 5
''          AT
OK          AT+CGDCONT=1,"IP","3gnet",,0,0
OK          ATDT*99#
CONNECT     ''
```

e. Start pppd program

```
>pppd call wcdma
```

5ZigBee Module

5.1DigiXbee Module

Digixbee module sample programs are Digi supply, please looking into readme.txt. There has detail description. Here is basic operation.

Open zigbee power (default open).

```
#./power zigbee on
```

Config and communication, more AT command. Please looking into Digixbee S2C user's manual:

The one device will set coordinator (default is route):

```
#./at   9600   /dev/ttyS3
+++OK
atce 1
atnd
…….. (the route information , if return error   add into network fail)
atdh 0
OK
atdlffff
OK
```

```
atcn
OK
Hello world!
```

This device is route:

```
#./at   9600   /dev/ttyS3
+++OK
atnd
…….. (the route information , if return error   add into network
fail)
atdh 0
OK
atdlffff
OK
atcn
OK
Hello world!
```

The AT command

+++   into AT model

atmy   see network address

atce 1   0 route , 1 coordinator

atdh 0   set destination high address 0x00000000

atdlffff   set destination low address 0x0000ffff

atnd   see route tables

atcn exit AT model

"Hello world !" is input world the other Xbee will get.

cmodule update:

```
#./install_ebl    XB24-S2C_401E.ebl   /dev/ttyS3
firmware update completed successfully
```

6   GPS Module

6.1   Get GPS Data

Open /dev/ttyS2 , read GPS data

```
#./gps 38400 /dev/ttyS2
```

6.2   GPS Data Format

6.2.1   GPGGA

Global Positioning System Fix Data

Name	Example Data	Description
Sentence Identifier	$GPGGA	Global Positioning System Fix Data
Time	170834	17:08:34 Z
Latitude	4124.8963, N	41d 24.8963' N or 41d 24'

		54" N
Longitude	08151.6838, W	81d 51.6838' W or 81d 51' 41" W
Fix Quality: - 0 = Invalid - 1 = GPS fix - 2 = DGPS fix	1	Data is from a GPS fix
Number of Satellites	05	5 Satellites are in view
Horizontal Dilution of Precision (HDOP)	1.5	Relative accuracy of horizontal position
Altitude	280.2, M	280.2 meters above mean sea level
Height of geoid above WGS84 ellipsoid	-34.0, M	-34.0 meters
Time since last DGPS update	blank	No last update
DGPS reference station id	blank	No station id
Checksum	*75	Used by program to check for transmission errors

ex:$GPGGA,hhmmss.ss,llll.ll,a,yyyyy.yy,a,x,xx,x.x,x.x,M,x.x,M,x.x,xxxx

hhmmss.ss = UTC of position
llll.ll = latitude of position
a = N or S

yyyyy.yy = Longitude of position

a = E or W

x = GPS Quality indicator (0=no fix, 1=GPS fix, 2=Dif. GPS fix)

xx = number of satellites in use

x.x = horizontal dilution of precision

x.x = Antenna altitude above mean-sea-level

M = units of antenna altitude, meters

x.x = Geoidal separation

M = units of geoidal separation, meters

x.x = Age of Differential GPS data (seconds)

xxxx = Differential reference station ID

6.2.2   GPGSA

GPS DOP and active satellites

ex1: $GPGSA,A,3,,,,,,16,18,,22,24,,,3.6,2.1,2.2*3C

ex2: $GPGSA,A,3,19,28,14,18,27,22,31,39,,,,,1.7,1.0,1.3*35

ex3:

$GPGSA,<1>,<2>,<3>,<4>,,,,,<11>,<12>,<13>,<14>,<15>,<16>,<17>*<
18>

1   = Mode:

     M=Manual, forced to operate in 2D or 3D

     A=Automatic, 3D/2D

2   = Mode:

          1=Fix not available

          2=2D

          3=3D

3-14 = IDs of SVs used in position fix (null for unused fields)

15   = PDOP

16   = HDOP

17   = VDOP

18   = cheaksum

6.2.3   GPGSV

GPS Satellites in view

ex:

$GPGSV,3,1,11,03,03,111,00,04,15,270,00,06,01,010,00,13,06,292,00
*74

$GPGSV,3,2,11,14,25,170,00,16,57,208,39,18,67,296,40,19,40,246,00
*74

     $GPGSV,3,3,11,22,42,067,42,24,14,311,43,27,05,244,00,,,,*4D

     $GPGSV,1,1,13,02,02,213,,03,-3,000,,11,00,121,,14,13,172,05*67

1   = Total number of messages of this type in this cycle

2   = Message number

3   = Total number of SVs in view

4   = SV PRN number

5   = Elevation in degrees, 90 maximum

6   = Azimuth, degrees from true north, 000 to 359

7   = SNR, 00-99 dB (null when not tracking)

8-11 = Information about second SV, same as field 4-7

12-15= Information about third SV, same as field 4-7

16-19= Information about fourth SV, same as field 4-7

6.2.4   GPRMC

Recommended minimum specific GPS/Transit data

ex1:

$GPRMC,081836,A,3751.65,S,14507.36,E,000.0,360.0,130998,011.3,E
*62

ex2:

$GPRMC,225446,A,4916.45,N,12311.12,W,000.5,054.7,191194,020.3,
E*68

225446	Time of fix 22:54:46 UTC	
A	Navigation receiver warning A = OK, V = warning	
4916.45,N	Latitude 49 deg. 16.45 min North	
12311.12,W	Longitude 123 deg. 11.12 min West	
000.5	Speed over ground, Knots	

054.7	Course Made Good, True	
191194	Date of fix 19 November 1994	
020.3,E	Magnetic variation 20.3 deg East	
*68	mandatory checksum	

ex3:
$GPRMC,220516,A,5133.82,N,00042.24,W,173.8,231.8,130694,004.2,
W*70

                    1   2   3 4   5   6   7   8   9
10   11 12

1	220516	Time Stamp
2	A	validity - A-ok, V-invalid
3	5133.82	current Latitude
4	N	North/South
5	00042.24	current Longitude
6	W	East/West
7	173.8	Speed in knots
8	231.8	True course
9	130694	Date Stamp
10	004.2	Variation
11	W	East/West
12	*70	checksum

ex4: $GPRMC,hhmmss.ss,A,llll.ll,a,yyyyy.yy,a,x.x,x.x,ddmmyy,x.x,a*hh
1   = UTC of position fix

2   = Data status (V=navigation receiver warning)

3   = Latitude of fix

4   = N or S

5   = Longitude of fix

6   = E or W

7   = Speed over ground in knots

8   = Track made good in degrees True

9   = UT date

10   = Magnetic variation degrees (Easterly var. subtracts from true course)

11   = E or W

12   = Checksum

6.2.5   GPVTG

Track Made Good and Ground Speed.

ex1: $GPVTG,360.0,T,348.7,M,000.0,N,000.0,K*43
ex2: $GPVTG,054.7,T,034.4,M,005.5,N,010.2,K

054.7,T	True track made good
034.4,M	Magnetic track made good
005.5,N	Ground speed, knots
010.2,K	Ground speed, Kilometers per hour

ex3: $GPVTG,t,T,,,s.ss,N,s.ss,K*hh

1 = Track made good

2 = Fixed text 'T' indicates that track made good is relative to true north

3 = not used

4 = not used

5 = Speed over ground in knots

6 = Fixed text 'N' indicates that speed over ground in in knots

7 = Speed over ground in kilometers/hour

8 = Fixed text 'K' indicates that speed over ground is in kilometers/hour

9 = Checksum

The actual track made good and speed relative to the ground.

$GPVTG,x.x,T,x.x,M,x.x,N,x.x,K

x.x,T = Track, degrees True

x.x,M = Track, degrees Magnetic

x.x,N = Speed, knots

x.x,K = Speed, Km/hr

7Update System

7.1 Make USB boot Stick and Copy Image to USB stick

Create PC condition:

Create a bootable USB stick on Windows XP/ Win7, the first thing you need to do is insert a USB stick with at least 2GB of free space into your PC.

Here use an USB installer tool to write the image ISO to USB stick. Please copy the file **SW/tools/Universal-USB-Installer-1.9.3.5.exe** to your PC anywhere.

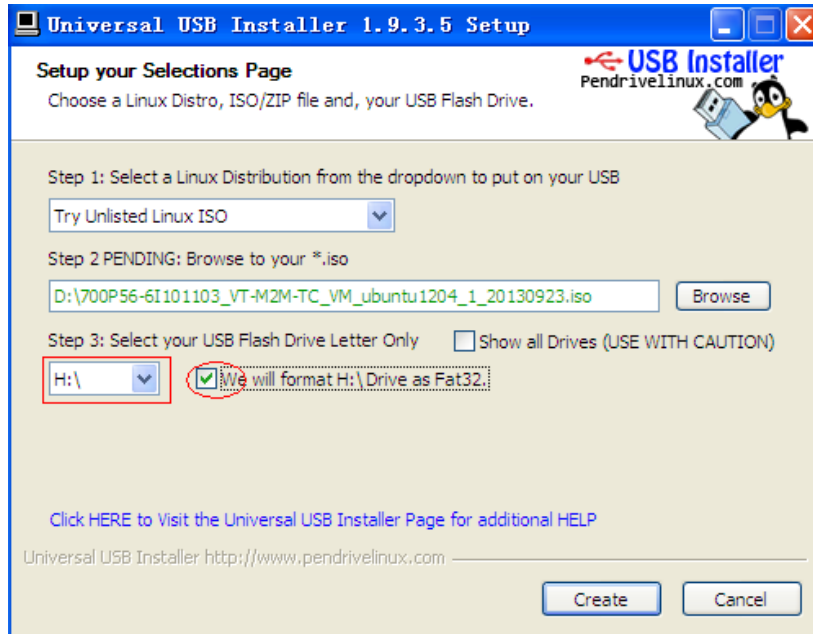USB stick making steps in detail as follows:

Copy **SW/image/xxx.iso** image into your PC.

Select the "Try Unlisted Linux ISO"from the dropdown list.
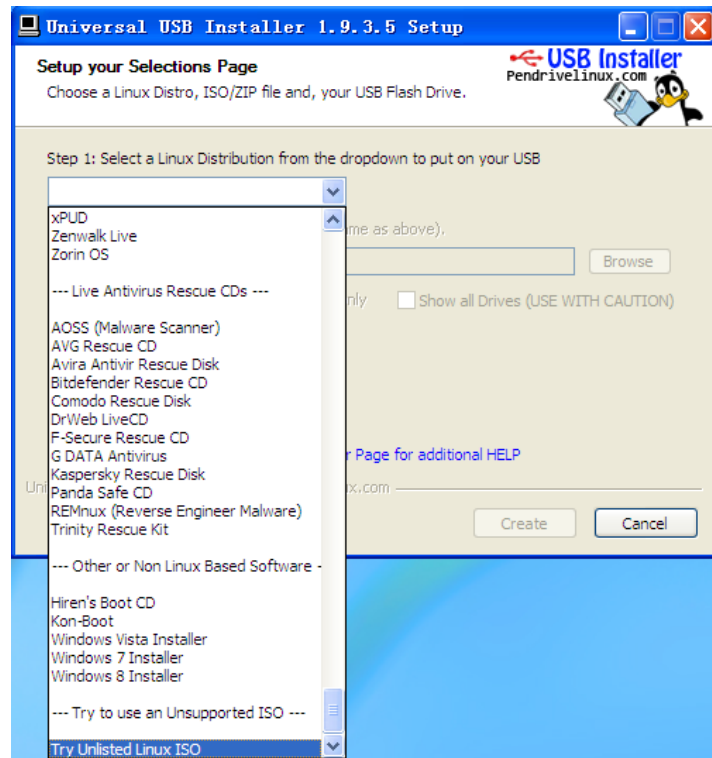
Click **'Browse'** and select the image ISO file.
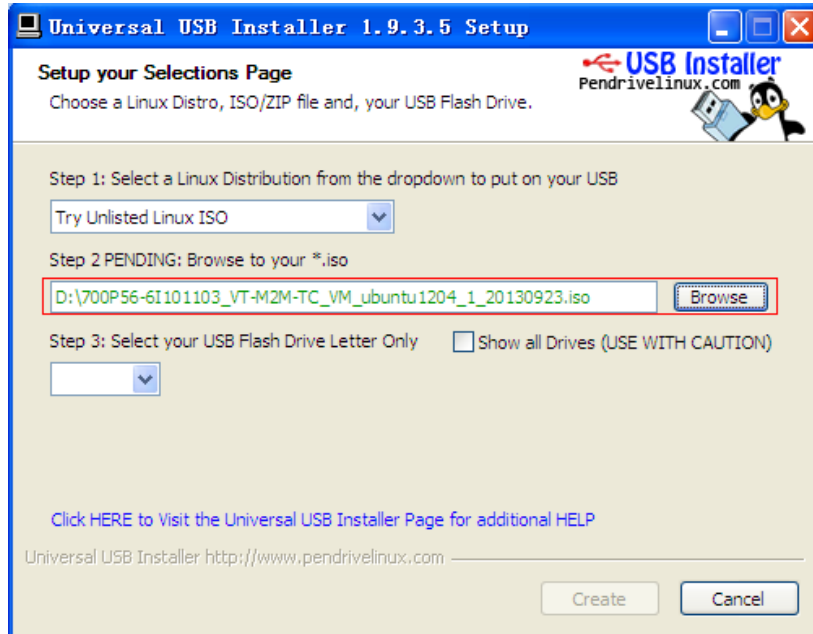
Choose the USB drive and click **'Create'**.

7.2 Update steps

When the bootable USB stick create over, insert the USB stick into VT-M2M-TC. And connect a USB keyboard on the M2M-TC.

Power ON the VT-M2M-TC, and step into BIOS by press the "Delete" key on the keyboard.

In the BIOS, set the first boot option for boot up by USB stick. The user guidance of the BIOS is in the package of **HW/700N16-6Bxxxxxx_VT-M2M-TC_VM_xxx.zip**.
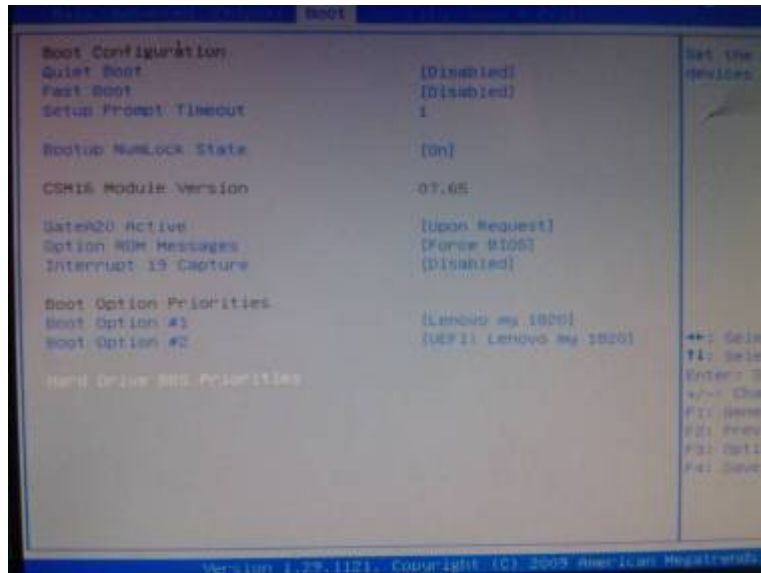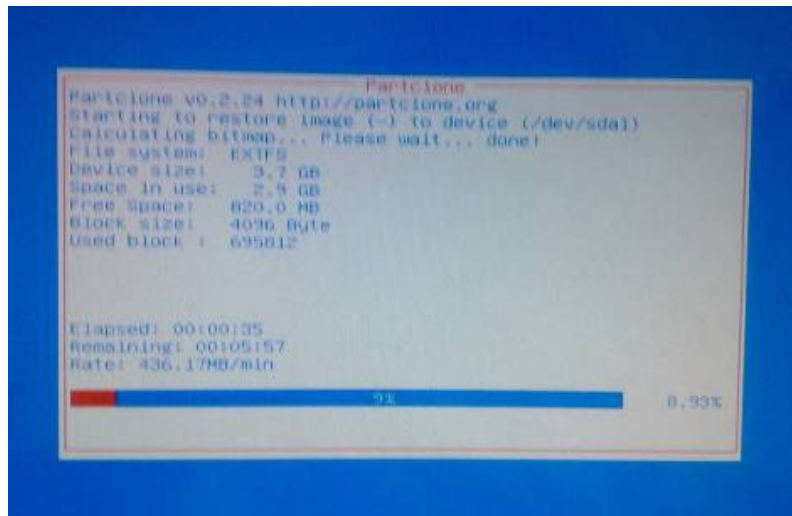

Select the first option "clonezilla live with img 700Pxxxxxx".
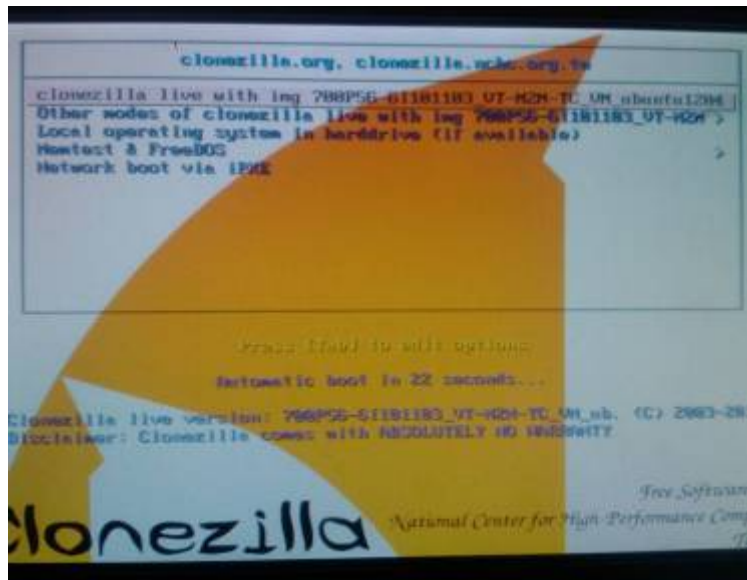
When ask "Are you sure want to continue??" or "Let me ask you again, Are you sure you want to continue??" , please input 'y' all.

The system is updating.

When update over, the system will power off.

Re-power VT-M2M-TC, and step into the BIOS, and restore the first boot option to hard disk.

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