

 iTtelecom <small>Information Technology &amp; Telecom co., Ltd</small>	WAVE OBE Manual				
	Document Type	Doc. Manager	Document Code	First Draft	Last Mod. Date
	Manual	Hyun-Soon Lee	1.3	2011-09-26	2014-09-30

# WAVE OBE Manual

ITT-VAD-SH2-ET



 <small>Information Technology &amp; Telecom Inc. Ltd</small>	Subject	Document Code	last modification date
	WAVE OBE Manual	1.3	2014-09-30

## Document Information

Section	Affiliation	name	Remarks
Title	WAVE OBE Manual		
Writer and Reviewer	ITT	Hyun-Soon Lee	
		Geon-Wook Lee	
# of Document	1.3		
Status			
Owner of Document	ITT		

 <small>Information Technology &amp; Telecom Inc. Ltd</small>	Subject	Document Code	last modification date
	WAVE OBE Manual	1.3	2014-09-30

## Revision

Changing Date	Amender	Ver.	Contents
2011-09-26	Hyun-Soon Lee	1.0	Making first draft
2011-11-22	Geon-Wook Lee	1.1	Supplement
2012-03-05	Geon-Wook Lee	1.2	Supplement
2014-04-17	Geon-Wook Lee	1.3	Addition of TX non-modulation mode Addition of setting more than 5.90GHz

 iTtelecom Information Technology & Telecom Co., Ltd	Subject	Document Code	last modification date
	WAVE OBE Manual	1.3	2014-09-30

## Index

1. Introduction .....	5
2. OBU Interface .....	6
3. Connect with terminal.....	8
4. Basic Commands .....	11

 <small>Information Technology &amp; Telecoms Ltd</small>	Subject	Document Code	last modification date
	WAVE OBE Manual	1.3	2014-09-30

## 1. Introduction

Wireless Access in Vehicle Environments (WAVE) is communication standard that provides Vehicle to Vehicle communication (V2V) and Vehicle to Infra-structure (V2I) and is proposed by IEEE. This standard considers ITS service and application of vehicle safety service. On Board Equipment (OBE) is vehicle device.

WAVE sends packet frame and receives packet frame at short time in the radio environment that vehicle moves high speed. This standard is communication scheme that IEEE 802.11p scheme changed to vehicle environment. WAVE needs device platform and communication module in vehicle, vehicle antenna, and antenna and communication module on the road. This document is user manual about WAVE OBE in vehicle.

 <small>Information Technology &amp; Telecoms Ltd</small>	Subject	Document Code	last modification date
	WAVE OBE Manual	1.3	2014-09-30

## 2. OBU Interface

### 2-1. Appearance



[picture 1] WAVE OBU Front View

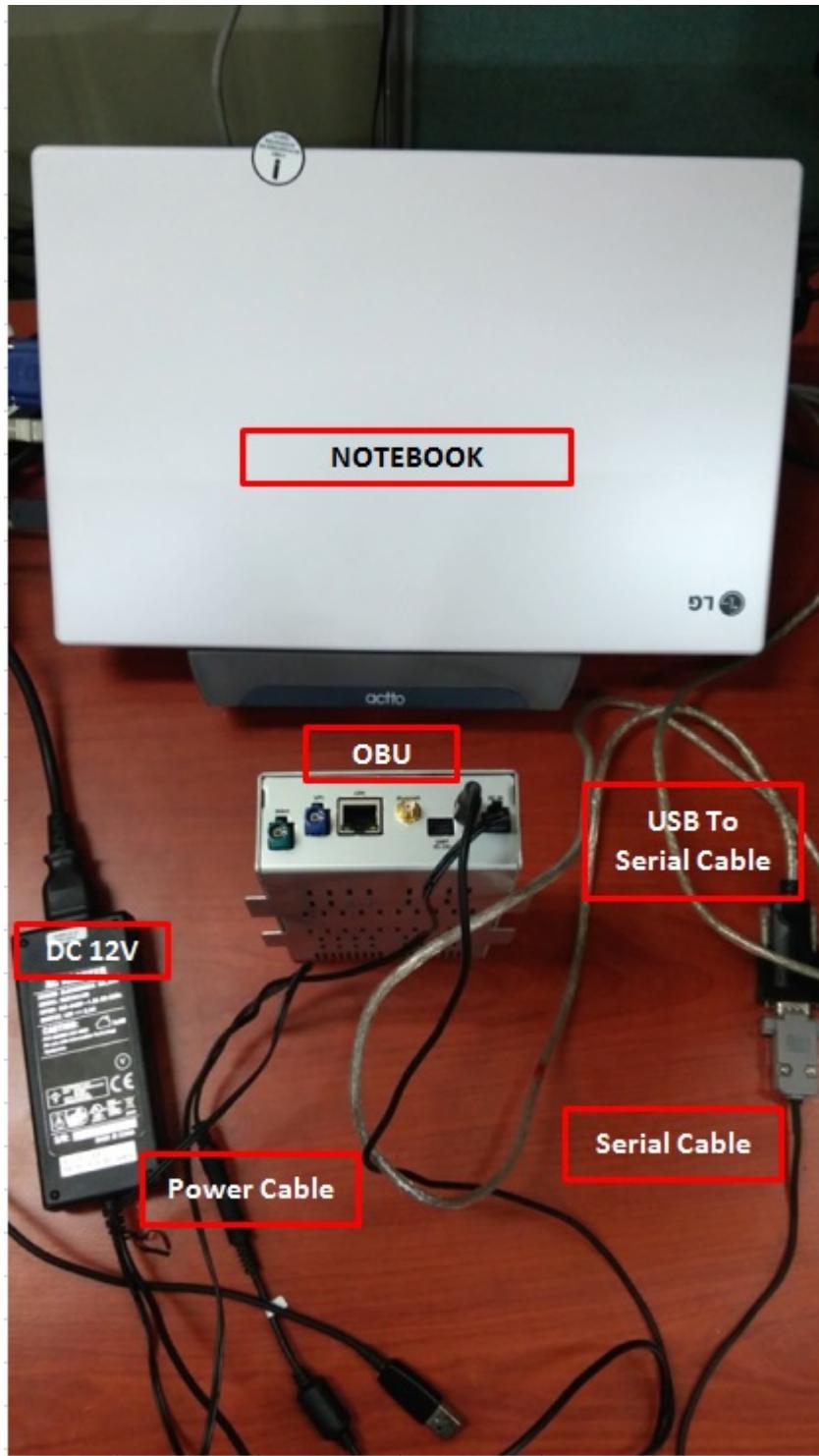


[picture 2] WAVE OBU Behind View

At the right , there is Power Switch,SD CARD connector at the behind, 12v power port, Ethernet port, UART port, RF Antenna connector, GPS Antenna connector. Terminal connection in chapter 3 is using UART port at [picture 1].

<b>itTtelecom</b> Information Technology & Telecom Co., Ltd	Subject	Document Code	last modification date
	WAVE OBE Manual	1.3	2014-09-30

## 2-2. OBE connection view



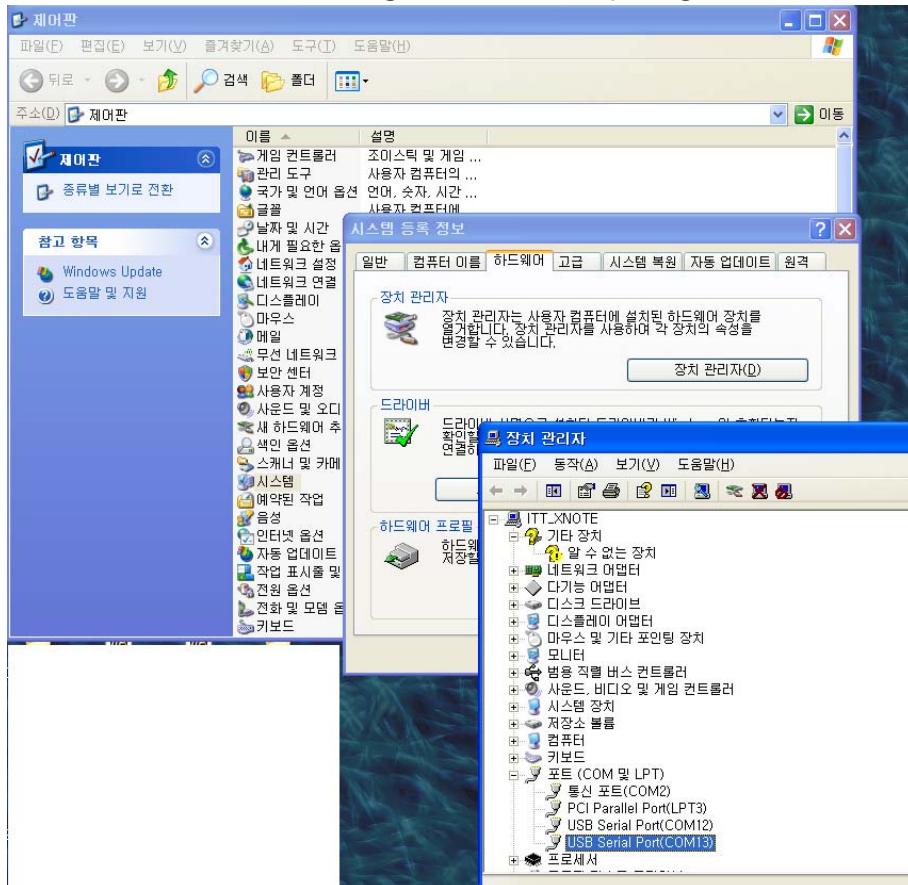
connect each components like above.

<b>ITtelecom</b> Information Technology & Telecom Inc., Ltd	Subject	Document Code	last modification date
	WAVE OBE Manual	1.3	2014-09-30

### 3. Connect with terminal

#### 3-1. Check port

After connect USB2Serial Cable with notebook, move to "Start" -> "Control Panel" -> "System" -> "Hardware" -> "Device Manager" -> "Port". (It assumed that USB2Serial Cable PC Driver already installed, it can be installed using CD within cable package).



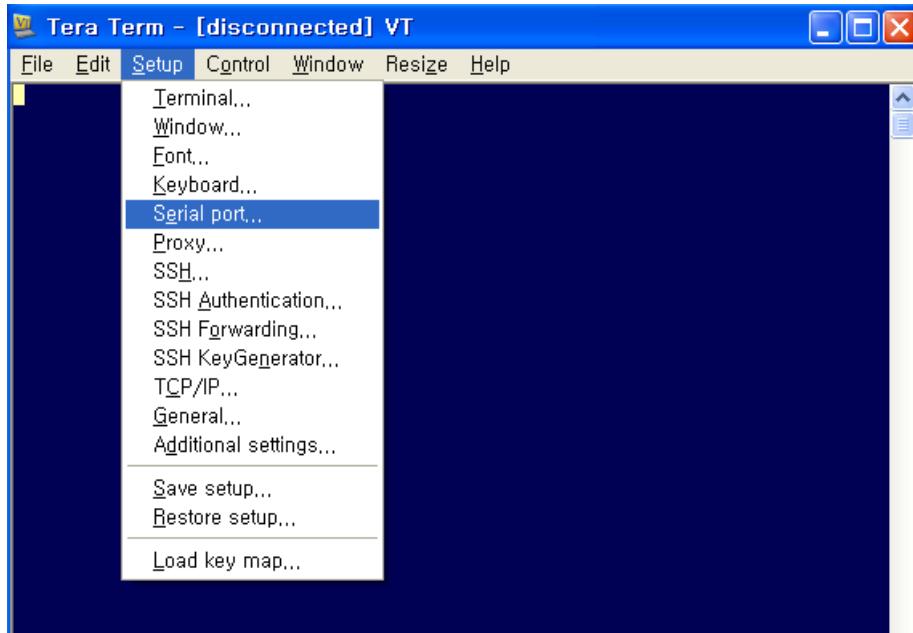
Check the USB Serial Port(COMxx).

<b>HiTtelecom</b> Information Technology & Telecom Inc., Ltd	Subject	Document Code	last modification date
	WAVE OBE Manual	1.3	2014-09-30

### 3-2. Terminal Program Setting

#### 3-2-1. Run the terminal program

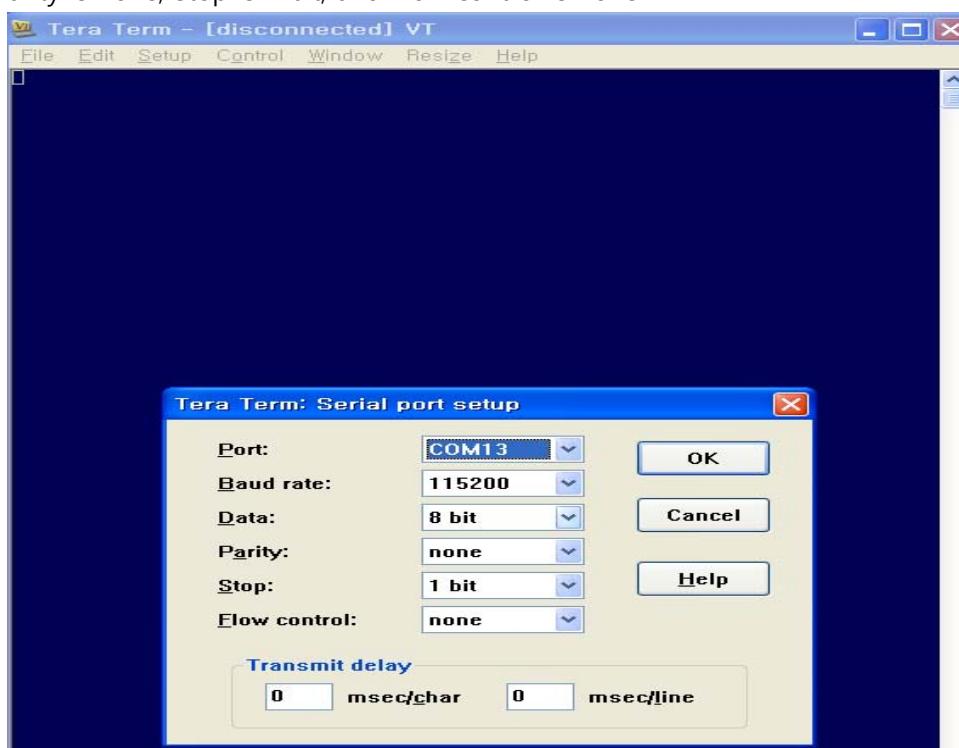
In this manual, Explain using teraterm s/w. (free license, it can be downloaded from internet)



After run Teraterm, move to Setup->Serial port at the top menu..

#### 3-2-2. Port setting

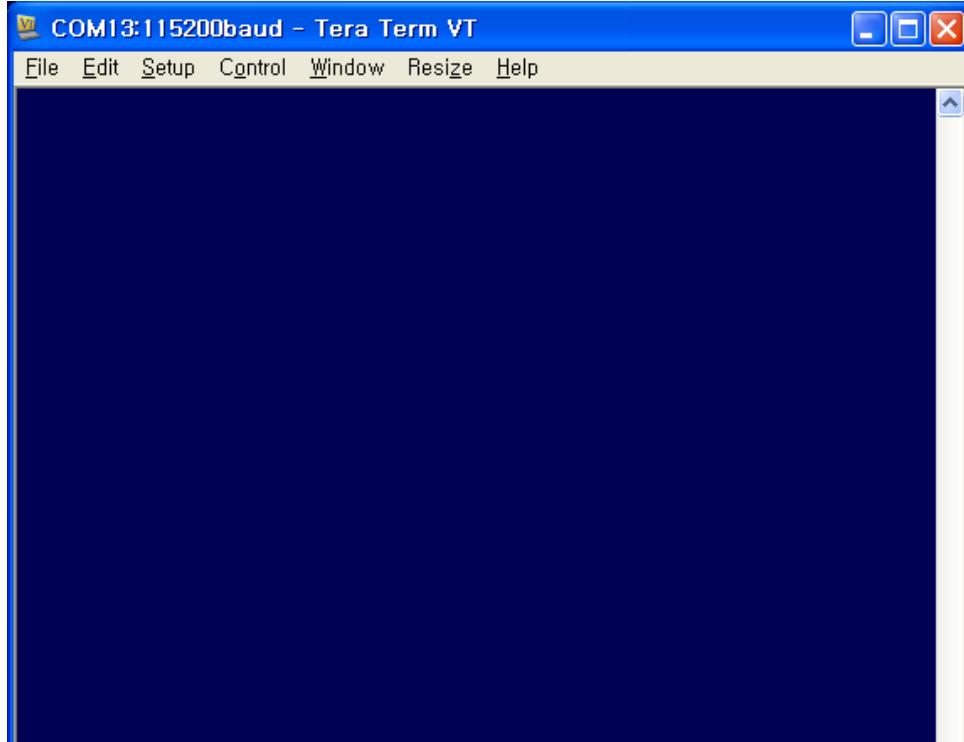
Set the port same as that checked with Device Manager, and Baud rate is 115200, Data is 8bit, Parity is none, Stop is 1 bit, and Flow control is none



iTtelecom Information Technology & Telecom co., Ltd	Subject	Document Code	last modification date
	WAVE OBE Manual	1.3	2014-09-30

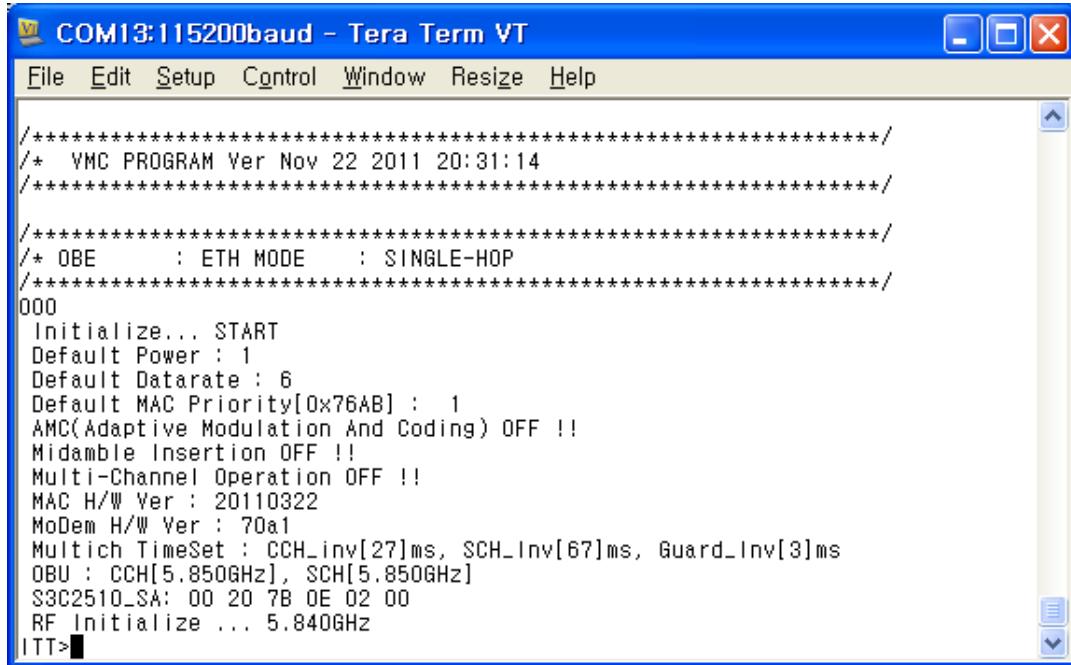
### 3-2-3. Terminal setting complete

If screen shows like below, it is ready..



### 3-2-4. OBE power on

Turn on OBE, and screen shows these messages below, booting is successful, and terminal is connected, too. It is normal state can be operated commands in chapter 4.



<b>iTtelecom</b> Information Technology & Telecom Co., Ltd	Subject	Document Code	last modification date
	WAVE OBE Manual	1.3	2014-09-30

## 4. Basic Commands

- **rst**

this command for “reboot”.



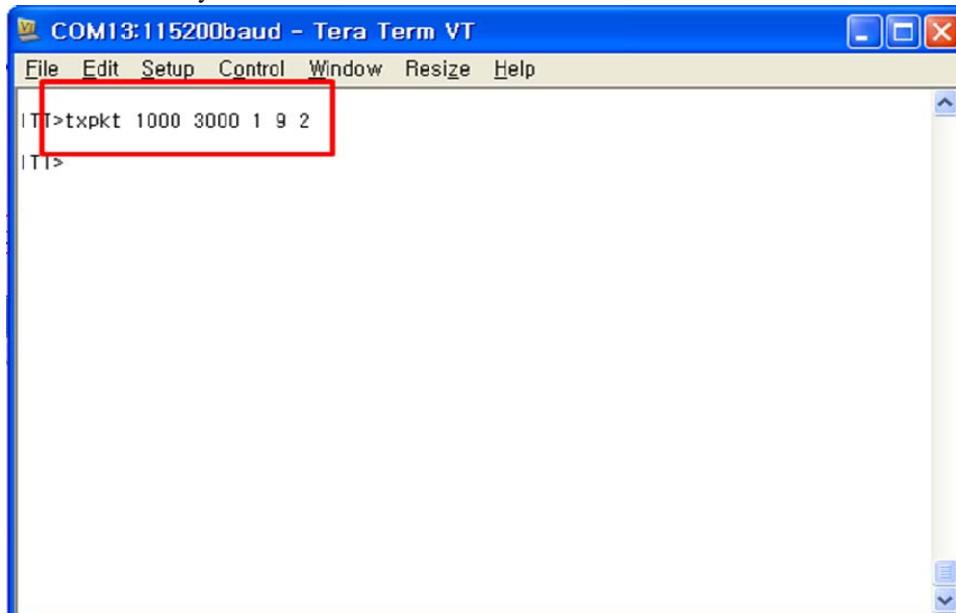
IT>rst

- **txpkt**

Send optional packets.

The usage is, txpkt [length] [#of frame] [pwr level] [rate] [time-tick]

There is an example, sending packet is 1000 bytes, frame count 3000, RF Tx power 1, datarate 9Mbps, and 2ms time delay.



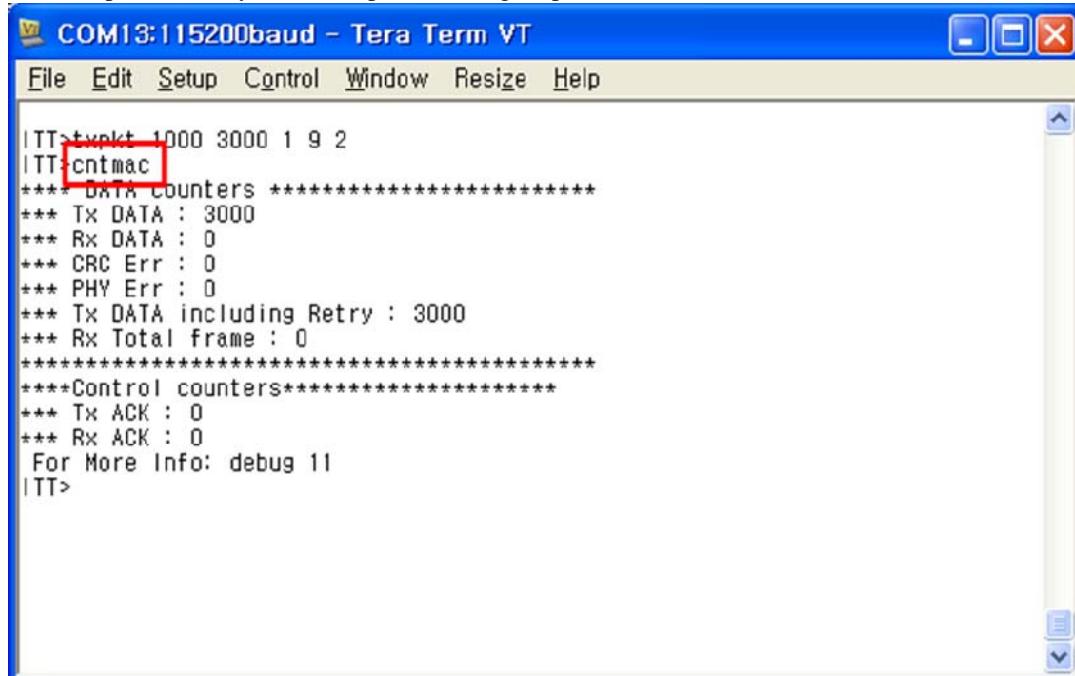
IT>txpkt 1000 3000 1 9 2

<b>iTTelcom</b> Information Technology & Telecom Co., Ltd	Subject	Document Code	last modification date
	WAVE OBE Manual	1.3	2014-09-30

### ● cntmac

Printout Tx or Rx packet count.

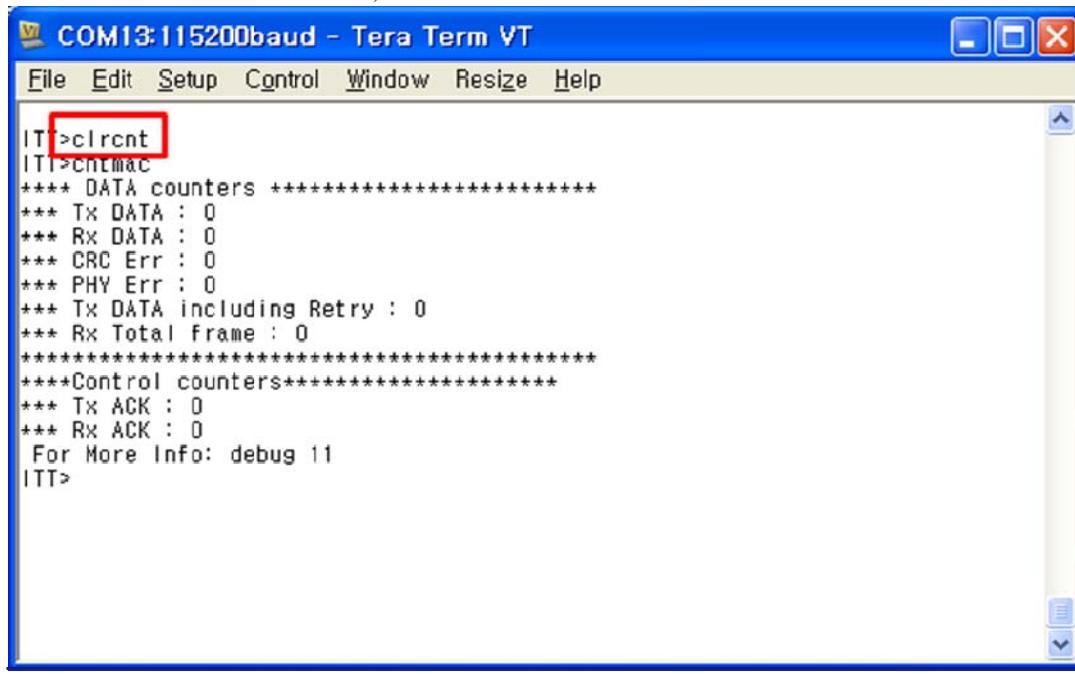
For example, it already sent 3000 packets using “txpkt” above, screen shows below.



```
IT>txpkt 1000 3000 1 9 2
IT>cntmac
**** DATA counters ****
*** TX DATA : 3000
*** Rx DATA : 0
*** CRC Err : 0
*** PHY Err : 0
*** Tx DATA including Retry : 3000
*** Rx Total frame : 0
*****
****Control counters*****
*** Tx ACK : 0
*** Rx ACK : 0
For More Info: debug 11
IT>
```

### ● clrcnt

Reset counted numbers. after reset, screen shows below.



```
IT>clrcnt
IT>cntmac
**** DATA counters ****
*** TX DATA : 0
*** Rx DATA : 0
*** CRC Err : 0
*** PHY Err : 0
*** Tx DATA including Retry : 0
*** Rx Total frame : 0
*****
****Control counters*****
*** Tx ACK : 0
*** Rx ACK : 0
For More Info: debug 11
IT>
```

 iTtelecom <small>Information Technology &amp; Telecom Co., Ltd</small>	Subject	Document Code	last modification date
	WAVE OBE Manual	1.3	2014-09-30

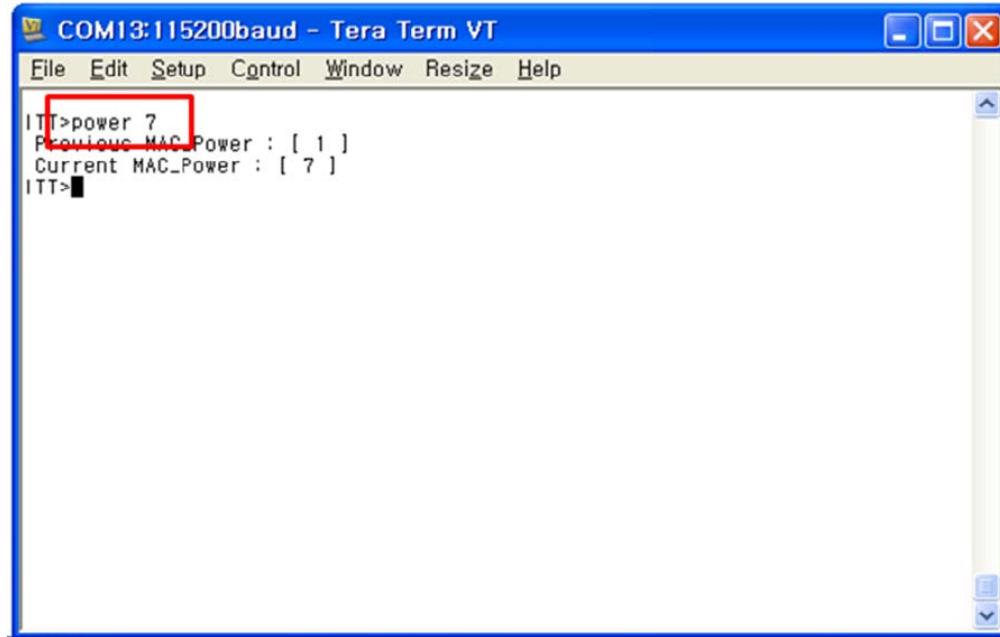
### ● Change TX power

#### 1) Temporary Change 'power'

Change RF Tx power level. Arguments is one of numbers from 1 to 8.

There is an example change Tx level to level 7.

It will be adjust immediately during operation, and **reset after reboot**.

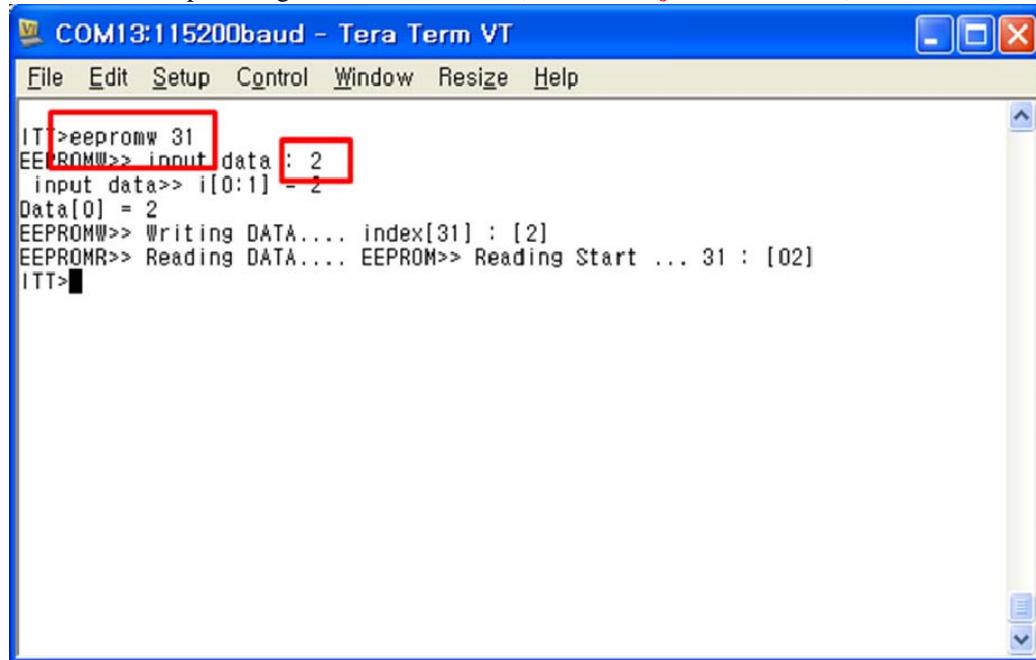


IT>power 7  
 Previous MAC\_Power : [ 1 ]  
 Current MAC\_Power : [ 7 ]  
 ITT>

#### 2) Permanent Modification

Change RF Tx power level. Arguments is one of numbers from 1 to 8.

There is an example change Tx level to level 2. (**It will be adjust after reboot**)



IT>EEPROMW 31  
 EEPROMW>> input data : 2  
 input data>> i[0:1] = 2  
 Data[0] = 2  
 EEPROMW>> Writing DATA.... index[31] : [2]  
 EEPROMR>> Reading DATA.... EEPROM>> Reading Start ... 31 : [02]  
 ITT>

 iTtelecom Information Technology & Telecom Co., Ltd	Subject	Document Code	last modification date
	WAVE OBE Manual	1.3	2014-09-30

### ● Change frequency

#### 1) temporary change 'fchange'

Change the RF frequency. Argument is one of 40, 50, 60, 70, 80, 90, 900, 910, 920, **800**.

Argument 40 means 5.840Ghz, 50 means 5.850Ghz, 60 means 5.860Ghz, 70 means 5.870Ghz, 80 means 5.880Ghz, 90 means 5.890Ghz, 900 means 5.900Ghz, 910 means 5.910Ghz, 920 means 5.920Ghz, and **800 means 5.8000GHz**.

There is an example changing frequency to 5.870GHz below.

It will be adjust immediately during operation, and **reset after reboot**.



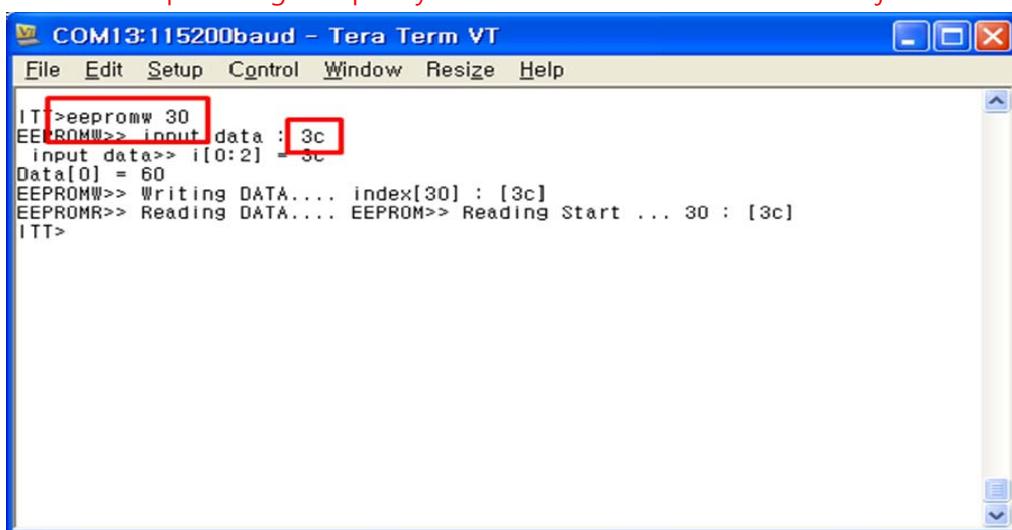
```
IT1>fchange 70
*** Frequency changed to 70
IT1>
```

#### 2) Permanent Modification(**5.90Ghz, 5.8000GHz not supported**)

Change the RF frequency. Argument is one of 0x28, 0x32, 0x3c, 0x46 and 0x50.

Argument 0x28 means 5.840Ghz, 0x32 means 5.850Ghz, 0x3c means 5.860Ghz, 0x46 means 5.870Ghz and 0x50 means 5.880Ghz.

there is example change frequency to 5.860Ghz below. and it will be adjust after reboot.

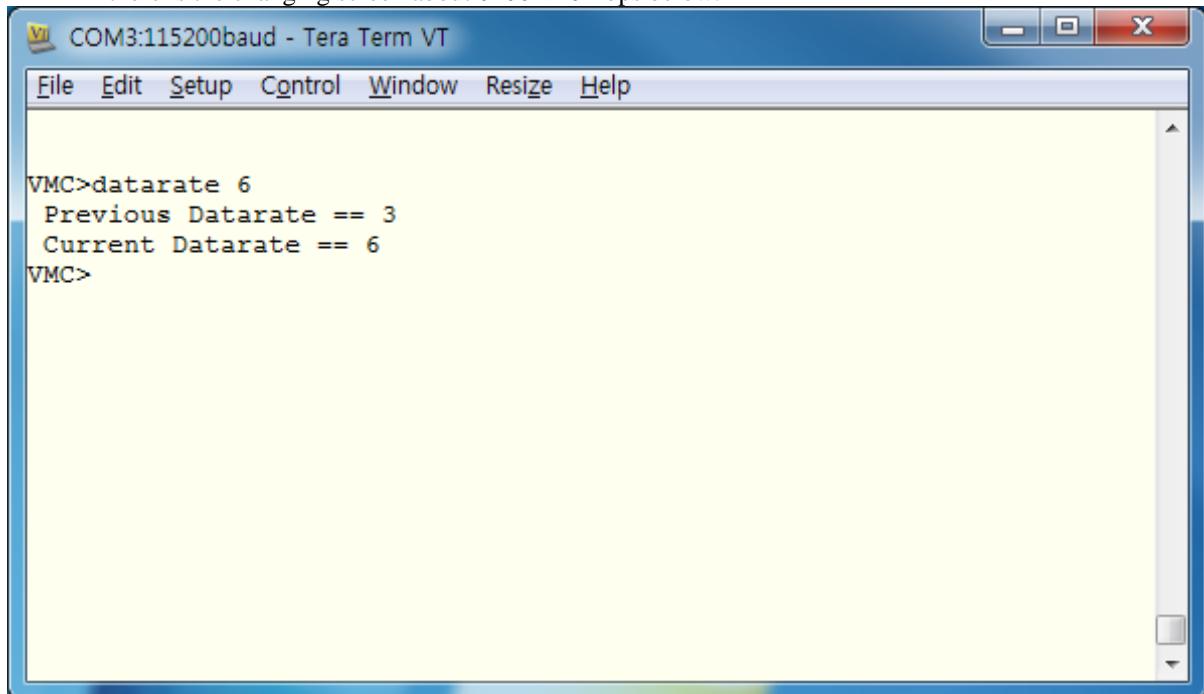


```
IT1>EEPROMW 30
EEPROMW>> input data : 3c
input data>> i[0:2] = 3c
Data[0] = 60
EEPROMW>> Writing DATA.... index[30] : [3c]
EEPROMR>> Reading DATA.... EEPROM>> Reading Start ... 30 : [3c]
IT1>
```

 iTtelecom <small>Information Technology &amp; Telecom Co., Ltd</small>	Subject	Document Code	last modification date
	WAVE OBE Manual	1.3	2014-09-30

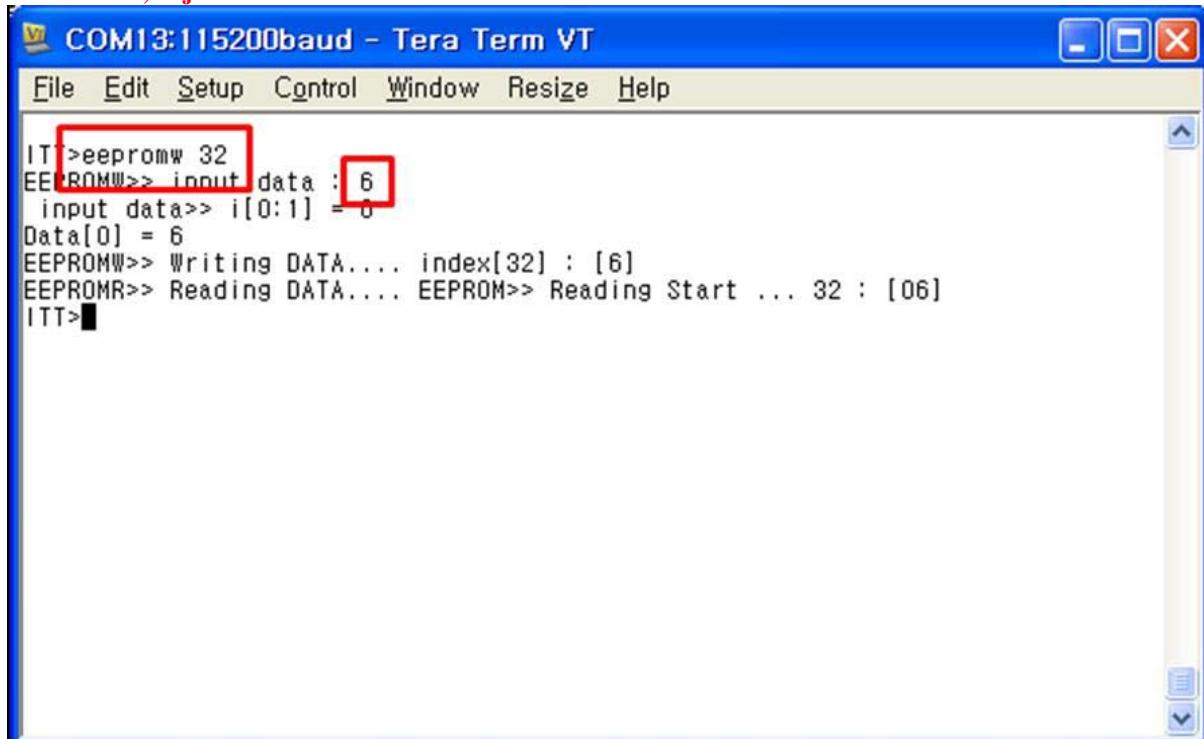
● **Change Datarate**

arguments are 0x03, 0x06, 0x09 and 0xC  
 0x03 is 3Mbps, 0x06 is 6Mbps, 0x09 is 9Mbps and 0xC is 12Mbps.  
 there is the changing screen about 0x06 -> 6Mbps below.



```
VMC>datarate 6
Previous Datarate == 3
Current Datarate == 6
VMC>
```

after reboot, adjust below.

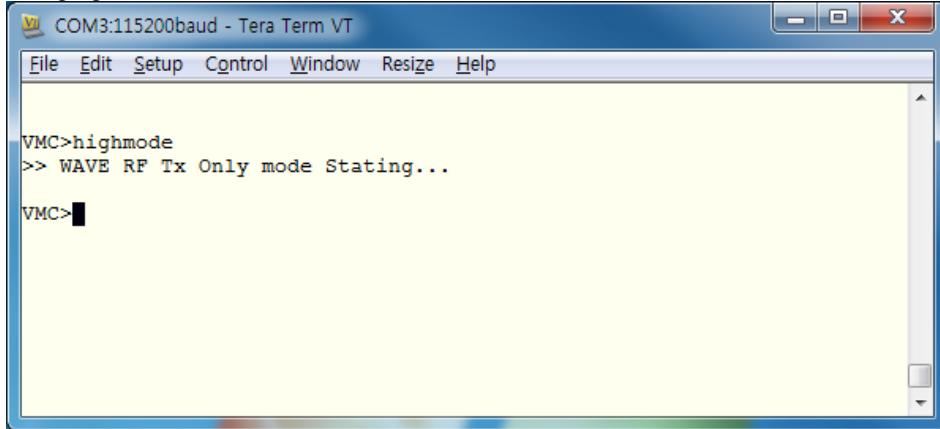


```
IT>EEPROMW 32
EEPROMW>> input data : 6
input data>> i[0:1] = 0
Data[0] = 6
EEPROMW>> Writing DATA.... index[32] : [6]
EEPROMR>> Reading DATA.... EEPROM>> Reading Start ... 32 : [06]
ITT>
```

 iTtelecom Information Technology & Telecom Co., Ltd	Subject	Document Code	last modification date
	WAVE OBE Manual	1.3	2014-09-30

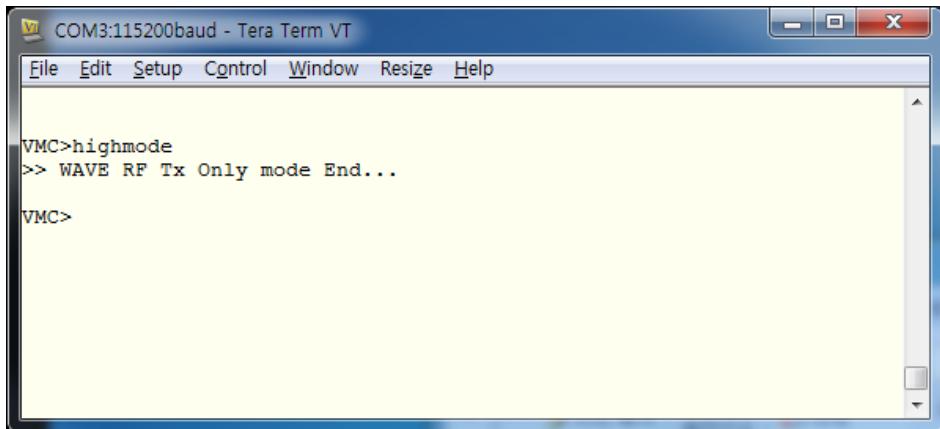
- **Change TX only Mode (non modulation)**

Change to the TX only Mode. Command is toggle type. There is the terminal message of mode changing.



VMC>highmode  
>> WAVE RF Tx Only mode Stating...

VMC>



VMC>highmode  
>> WAVE RF Tx Only mode End...

VMC>

 iTtelecom Information Technology & Telecoms Ltd	Subject	Document Code	Last modification date
	WAVE OBE Manual	1.3	2014-09-30

### **Radiofrequency radiation exposure Information:**

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance of 20 cm between the radiator and your body. This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

The availability of some specific channels and/or operational frequency bands are country dependent and are firmware programmed at the factory to match the intended destination. The firmware setting is not accessible by the end user.

### **Wireless 5 GHz Band Statements:**

This equipment could only been operated at 5860-5920 MHz frequency band.