VENTUS 2.0 manual

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TRADEMARKS & COPYRIGHT

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Environmental Issues

Thank you for buying a product which contributes to a reduction in pollution and thereby helps save the environment.
Our products reduce the need for travel and transport and thereby reduce pollution. Our products have either no or few consumable parts (chemicals, toner, gas, paper). Our products are low energy consuming products.

Waste handling:

There is need to send material back to LUMANTEK. Please contact your local dealerfor information on recycling the product by sending the main parts of the product for disassembly at local electronic waste stations.

Production of products:

Our factories employ the most efficient environmental methods for reducing waste and pollution by ensuring that
the products are recyclable.

OPERATOR SAFETY SUMMARY

For your protection, please read these safety instructions completely before operating the equipment and keep this manual for future reference. The information in this summary is intended for operators. Carefully observe all warnings, precautions and instructions both on the apparatus and in the operating instructions.

Equipment Markings

The lighting flash symbol within an equilateral triangle is intended to alert the user to the presence of un insulated "dangerous voltages" within the product's enclosure that may be of sufficient magnitude to constitute a risk of electrical shock. The exclamation mark within an equilateral triangle is intended to alert the user to the presence of important operating and maintenance (servicing) instructions within literature accompanying the equipment.

Warnings

Water and Moisture :

Do not operate the equipment under or near water - for example near a bathtub, kitchen sink, or laundry tub, in a wet basement, near a swimming poor or in areas with high humidity. Cleaning - Unplug the apparatus from the wall outlet before cleaning or polishing. Do not use liquid cleaners or aerosol cleaners. Use a lint-free cloth lightly moistened with water for cleaning the exterior of the apparatus.

Ventilation :

Do not block any of the ventilation openings of the apparatus. Install in accordance with the installation instructions. Never cover the slots and openings with a cloth or other material. Never install the apparatus near heat sources such as radiator, heat registers, stoves, or other apparatus (including amplifiers) that produce heat.Grounding or Polarization - Do not defeat the safety purpose of the polarized or grounding-type plug. A polarized plug has two blades with one wider than the other. A grounding type plus has two blades and a third grounding prong.

The wide blade or third prong is provided for your safety. If the provided plug does not fit into your outlet, consult an electrician. Power-Cord Protection - Route the power cord so as to avoid it being walked on or pinched by items placed upon or against it, paying particular attention to the plugs, receptacles, at the point where the cord exits form the apparatus.

Attachments :

Only use attachments as recommended by the manufacture.

Accessories :

Use only with a cart, stand, tripod, bracket, or table specified by the manufacturer, or sold with the apparatus. When a cart is used, use caution when moving the cart/apparatus combination to avoid injury from tip-over.

Lighting :

Unplug this apparatus during lightning storms or when unused for long periods of time.

ISDN cables :

CAUTION - to reduce the risk of fire, use only No. 26 AWG or larger telecommunication line cord.

Servicing :

Do not attempt to service the apparatus yourself as opening or removing covers may expose you to dangerous voltages or other hazards, and will void the warranty. Refer all servicing to qualified service personnel.

Damaged Equipment :

Unplug the apparatus from the outlet and refer servicing to qualified personnel under the following conditions - When the power cord or plug is damaged or frayed If liquid has been spilled or objects have fallen into the apparatus If the apparatus has been exposed

to rain or moisture If the apparatus has been subjected to excessive shock by being dropped, or the cabinet has been damaged If the apparatus fails to operate in accordance with the operating instruction

Warranty Period

Lumantek Test & Measurement and Broadcasting products normally carry a 1-year limited warranty (including labor and parts) Unless noted, Lumantek Digital Media products normally carry a 1-year limited warranty (including labor and parts).

Return Material Authorization Policy

No product may be returned directly to Lumantek without first contacting Lumantek for a Return Material Authorization ("RMA") Code. If it is determined that the product is defective, you will be given an RMA Code and instructions for product return for servicing or replacement. An unauthorized return such as where an RMA Code has not been issued, the product will be returned to you at your expense. Authorized returns are to be shipped prepaid and insured to the address on the RMA in an approved shipping container (original box and packaging materials or similar). To request an RMA Code, please visit on http://www.lumantek.com/support/rma_services_instruction.html

Warranty Limitations

Lumantek's limited warranty provides that, subject to the following limitations, each product will be free from defects in material and workmanship and will conform to Lumantek's specification for the particular product.

Limitation of Remedies

Your exclusive remedy for any defective product is limited to the repair or replacement of the defective product.

Lumantek may elect which remedy or combination of remedies to provide in its sole discretion. Lumantek shall have a reasonable time after determining that a defective product exists to repair or replace a defective product. Lumantek's replacement product under its limited warranty will be manufactured from new and serviceable used parts. Lumantek's warranty applies to repaired or replaced products for the balance of the applicable period of the original warranty or ninety days from the date of shipment of a repaired or replaced product, whichever is longer.

Limitation of Damages

Lumantek's entire liability for any defective product shall in no event exceed the purchase price for the defective product. This limitation applies even if Lumantek cannot or does not repair or replace any defective product and your exclusive remedy fails of its essential purpose.

No Consequential or Other Damages

Notwithstanding anything else in this policy or otherwise, Lumantek will not be liable with respect to the products under any contract, negligence, strict liability or other legal or equitable theory (i) for any amount in excess of the purchase price for the defective product or (ii) for any general, consequential, punitive, incidental or special damages. These include loss of recorded data, interruption of use, the cost of recovery of lost data, lost profits and the cost of the installation or removal of any products, the installation of replacement products, and any inspection, testing, or redesign caused by any defect or by the repair or replacement of products arising from a defect in any product. This section does not limit liability for bodily injury of a person.

Your Use of the Product

Lumantek will have no liability for any product returned if Lumantek determines that:

The product was stolen from Lumantek.

The asserted defect:

- Is not present,
- Cannot reasonably be fixed because of damage occurring when the product is in the possession of someone other than Lumantek, or
- Is attributable to misuse, improper installation, alteration (including removing or obliterating labels and opening or removing external covers (unless authorized to do so by Lumantek), accident or mishandling while in the possession of someone other than Lumantek.

The product was not sold to you as new.

The product was not used in accordance with Lumantek specifications and instructions.

The product was not used for its intended function.

Additional Limitations on Warranty

Lumantek's warranty does not cover products which have been received improperly packaged, altered, or physically damaged.

VENTUS 2.0

USB 2.0 Multi-Standard SIGGEN / Modulator

Frequency 30MHz ~ 2.5GHz

1. VENTUS 2.0 / Introduction

1.1 / VENTUS System Overview

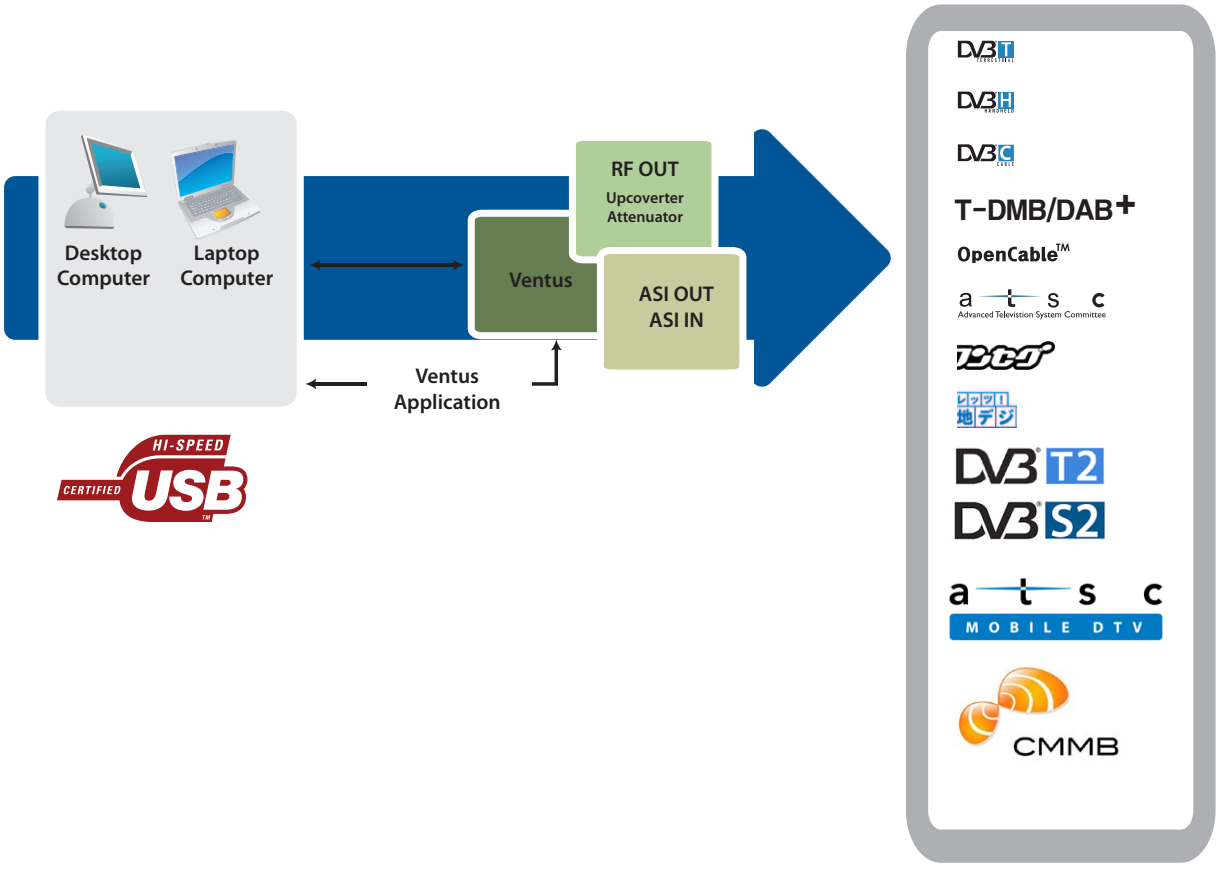
VENTUS is a product that broke away from the existing measurement system. It is designed so that it can be connected to the user's PC or notebook USB interface. It is a portable measurement system unlike the existing Signal Generator. It can be used for many purposes such as development, product demonstration, marketing, and domestic and overseas business trip purposes.

Basically, it consists of ASI-INPUT, ASI-OUTPUT port, RF Modulator, and RF Upconverter. If the user wants, any DTV SD format in the world can be used. DTV SD formats supported by VENUS are as follows.

DVB-T/H, DVB-C (A,C), ATSC(8VSB), ATSC-M/H, OpenCable, ISDB-T/Tb, T-DMB/DAB+, CMMB, DTMB, DVB-T2, DVB-S2

1.2 / VENTUS Development Concept

VENTUS solution can be used to test all DTV SD formats in the world. It is a All-in-One type measurement solution. As it is a portable product, it has maximized user convenience.



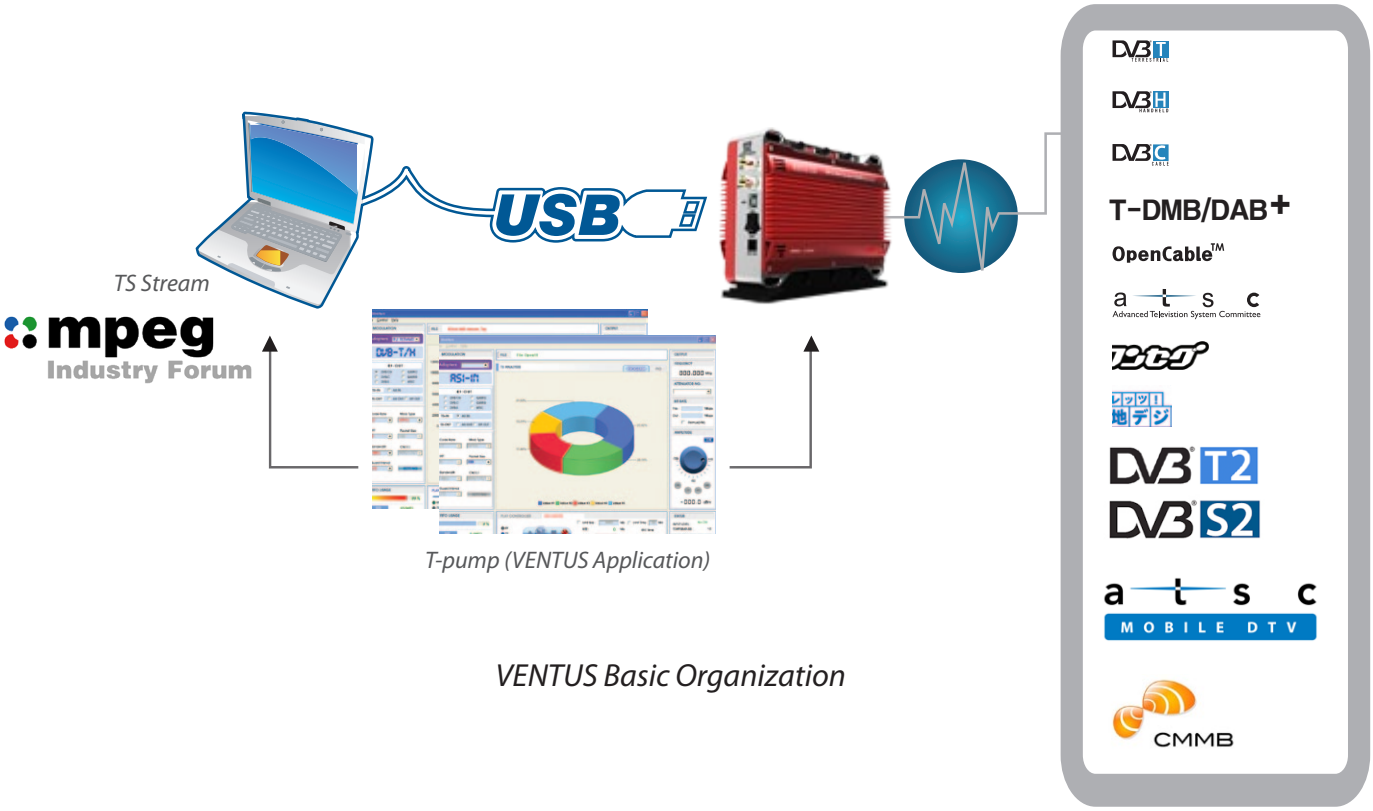
1.3 / T-Pump Mode

Pump has the interface for USB IN/OUT and ASI IN/OUT RF OUT(Data). Also it has 8M Byte or 16M Byte's Hardware Buffer inside the pump. Pump's mode are RF OUT. RF OUT Raw. ASI OUT. ASI IN. ASI IN to RF OUT. Please reference below explains, VTS_PumpMode_t type declaration and the PumpSet Mode function.

- RF OUT Mode: This mode is that MPEG transmit stream (TS, Transport Stream), ports by USB IN, sends it as RF OUT(Data) through H/W buffer.
- RF OUT Raw Mode: This mode is received the reated byte stream at software through USB INand sends it as RF OUT (date) through H/W buffer.
- ASI OUT Mode: This mode is to get MPEG TS by USB IN, then put it out as ASI OUT through H/W buffer.
- ASI IN Mode: This mode is to get MPEG TS by ASI IN, then put it out to USB OUT through H/W buffer. Also, this mode is possible to output as selective ASI OUT at the same time.
- ASI IN to RF OUT Mode: This mode is to get MPEG TS by ASI IN, then put it out to RF OUT. Also, this mode is possible to output as selective ASI OUT at the same time.

1.4 / VENTUS Basic Organization

VENTUS device is possible to transmit DTV Skill Standard by RF through USB Interface between VENTUS and PC or Notebook.



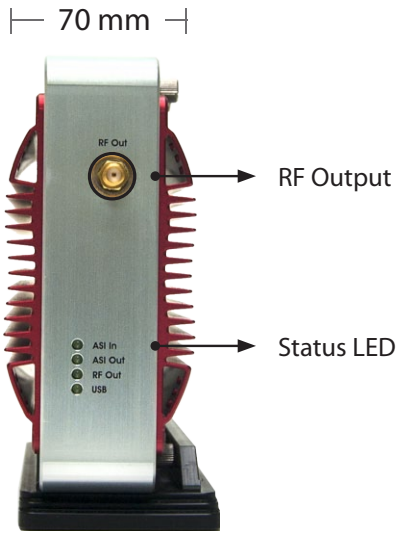
VENTUS Basic Organization

2. VENTUS 2.0 / Product Description

2.1 / Product Views and Dimensions

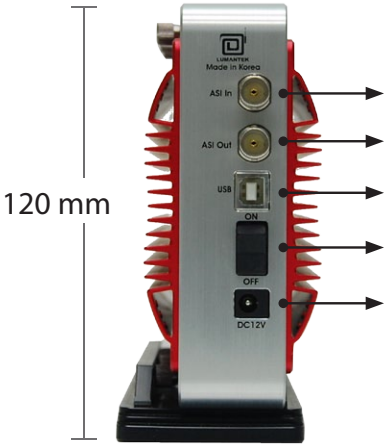
FRONT

Perspective



Right Side Panels Interface

- USB LED: (On) when connected USB
- RF OUT LED: (On) under normal RF Output
- ASI IN LED: (On) when using ASI Input Port
- ASI OUT LED: (On) when using ASI Output Port
- RF OUT (-20dBm) : RF Output Port



Left Side Panels Interface

- POWER SW: VENTUS power Switch
- POWER port
- Attenuator Power : Power connecting port
  -> When using Amp & Attenuator, it controls by USB port
  -> USB port connects Ventus
- ASI-OUT : ASI Out port
- ASI-IN : ASI Input port

2.2 / VENTUS 2.0 Package Contents

VENTUS 2.0 Body

VENTUS Portable Case

AC Power Adapter & AC Power Cord

USB Flash Memory & Strap

VENTUS Driver / T-pump /
Software / Manual
Calibration Report

Antenna USB Cable : A-B Type

3. VENTUS 2.0 / SYSTEM OPERATING

3.1 / VENTUS Hardware Install

As explained in Chapter 2, after checking VENTUS components, the user can use it after just connecting power and installing T-pump without installing the hardware. Connect Power and PC or Notebook's USB cable(A-B Type) to VENTUS' USB port.

USB Port

Power Cord

3.2 / VENTUS Driver Operation

For operating VENTUS, you have to install DVB-ASI In/Out Module Driver and VENTUS Modulator Driver.
-> Insert the USB Flash Memory and download the Driver from USB.

Driver Name	Folder name	Description	OS
USB DTV Signal Generator (LUMANTEK)	Driver.install	VENTUS 2.0 DTV Signal Generator	Window XP / 2000 /2003 / Window7

*** VHF/UHF RF Attenuator (Optional)**

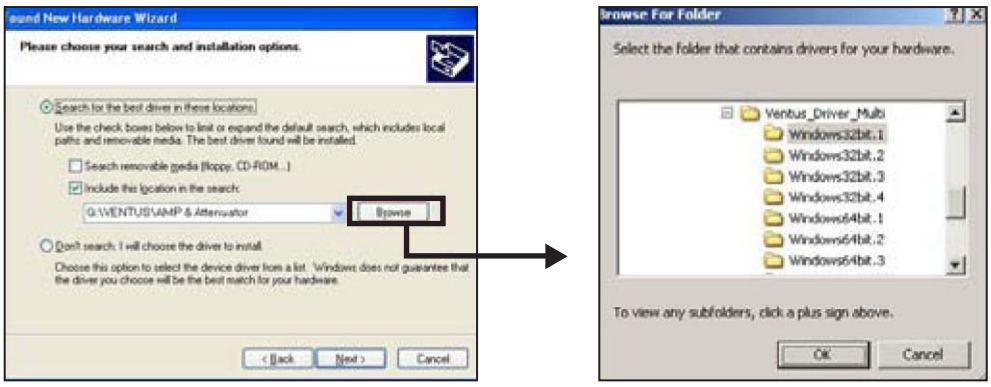
Item	Unit	Min.	Type	Max
Input Range	dBm	-	-20	-
Output Control Range	dBm	-110	-	+7 dBm(+3dbm over frequency of 1GHz)
Output Control Step	dB	-	0.1	-
Frequency Control Range	MHz/GHz	30MHz	-	2.5GHz
Frequency Control Step	MHz	-	0.001	-
Valid Temperature	Celsius (°C)	25	38	60
Power Supply Voltage	V	-	12V	-
Power Supply Current	mA	-	1A	1.3A

3.3 / VENTUS Driver Installation

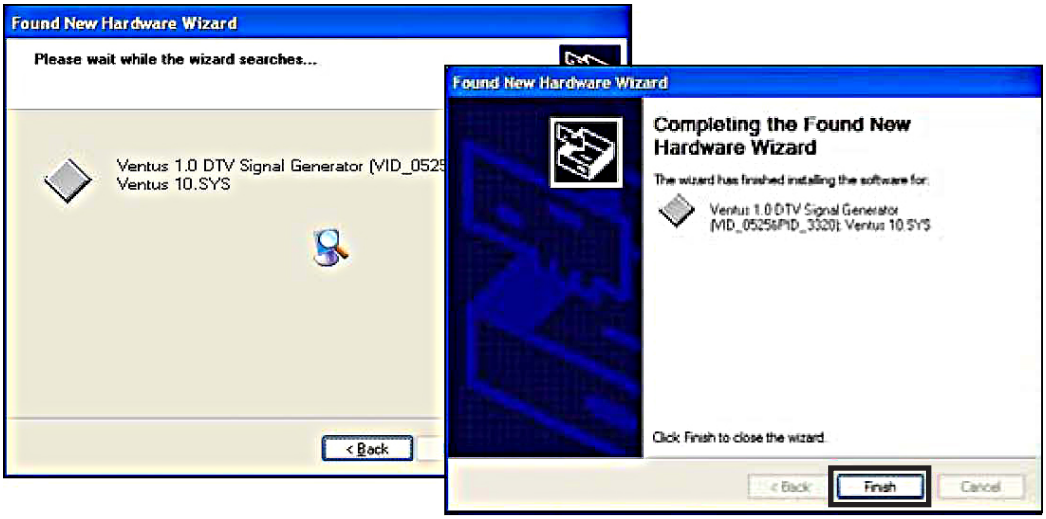
Upon connecting the VENTUS for the first time, "Found New Hardware Wizard" window will pop up. Check "No, not this time", then click "Next".

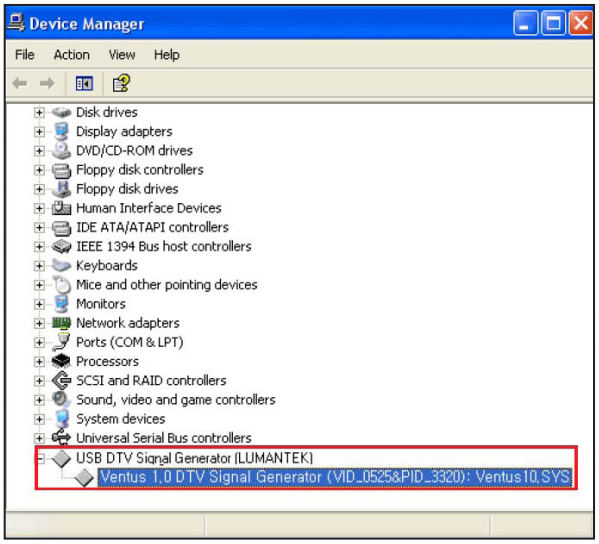
Select "Install from a list or specific location(Advanced)", then click "Next".

Click [Browse] and go to the file location. It's placed at [..\VENTUS\Driver.install] in supplied USB Flash Memory. Choose the one folder between Window OS 32bit and 64 bit.



Continue installing.





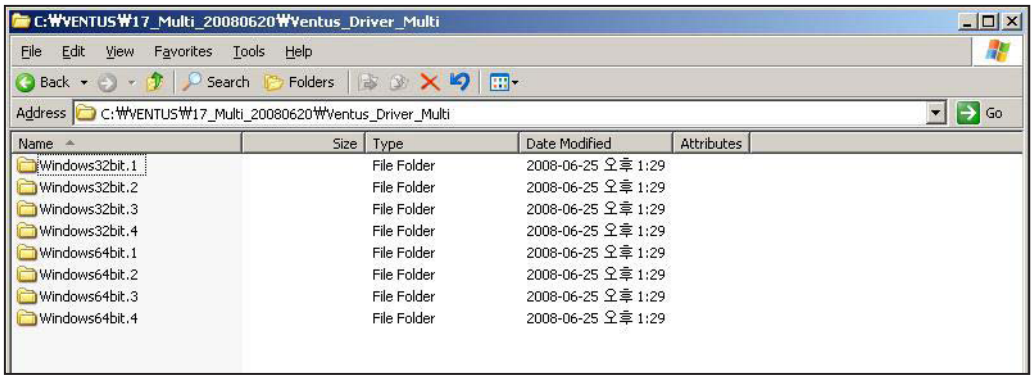
Once you've finished installing driver, you need to check out the device manager. On windows XP, you can check it by going to the Control Panel, click System. And click Hardware. A Device Manager should look like the picture below.

3.4 / VENTUS Multi Driver Installation

In case you need to operate more than 2 VENTUS on one computer, you must use different drivers for operating. Other USB. USB device has 2 type of VID(Vendor ID) and PID(Product ID). However, you may use separated drive for instance. In this case you need a different driver file and installation file(*.inf).

You can operate them upto 4 Ventus depend on your computer's spec.

- **Package Contents**



In the latest T-pump is possible to install driver per each number like above image.

Windows 32bit(1-4): Windows 2000, XP, 2003, Vista(32 bit).
Windows 64 bit(1-4): Windows XP, 2003, Vista(64 bit).

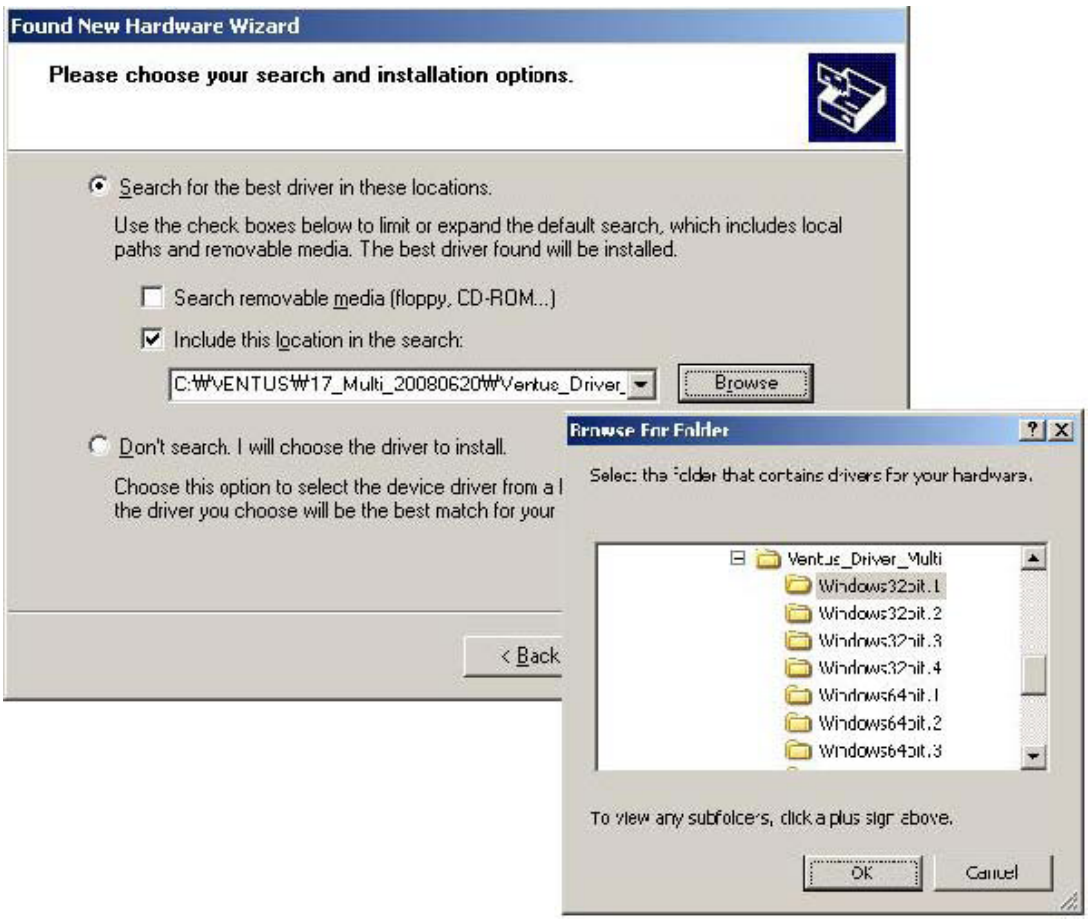
For the reference, USB device will read different devices as the port. if you connect them through PC's same port using outside hub, it will read as a different device and install driver again.

Multi- Driver installation processes same as 3.3

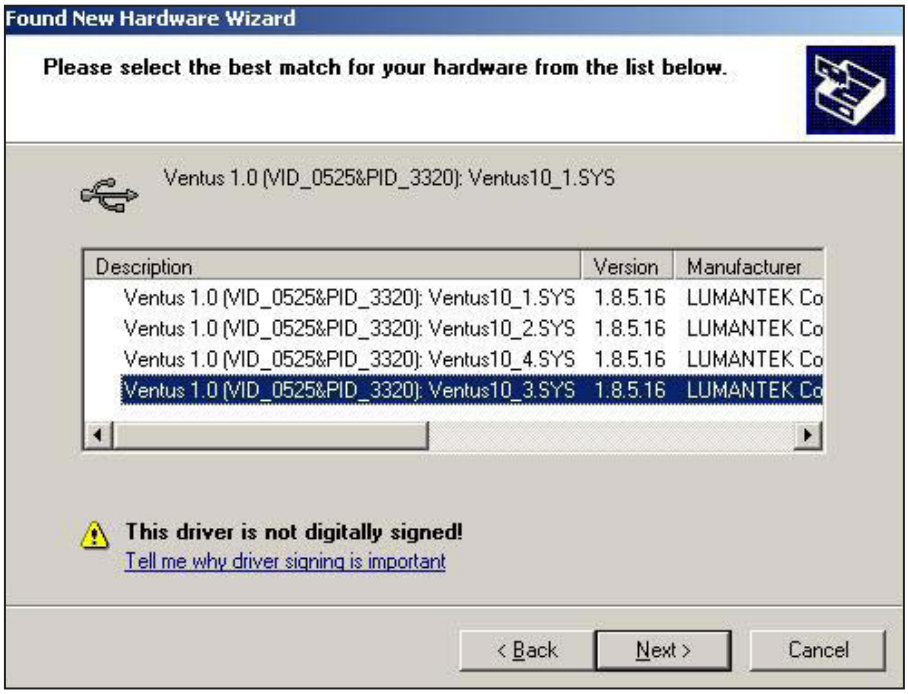
Windows will recognize it as a new hardware component and open the "Found New Hardware Wizard". Click on 'No, not this time', then Click 'Next'.

Check 'Install from a list or specific location (Advanced)'. Then click 'Next'.

Select 'Search for best driver in these locations'. Then, Click 'Browse'



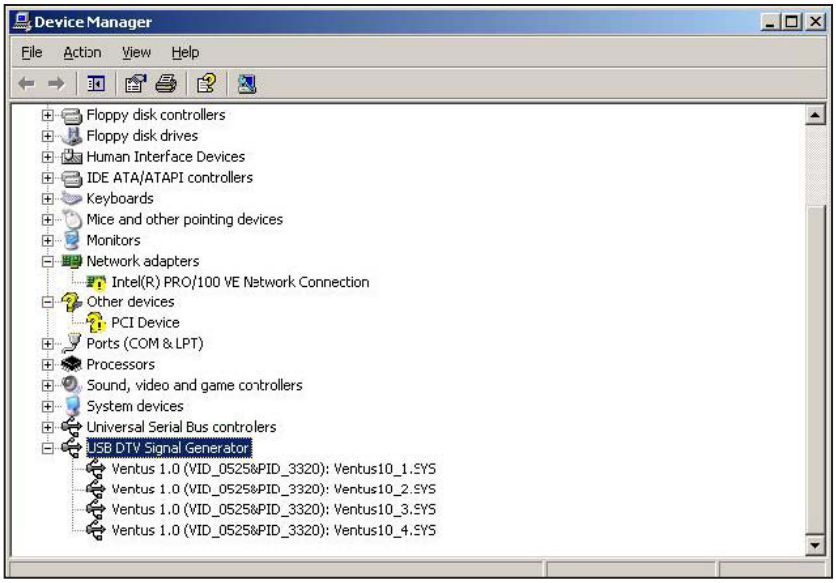
Navigate to the correct installation search path and assign the Driver path which doesn't use before.4. Assign the driver except the existing ports.



For instance, if you assian driver No.1 before, you have to choose other driver numbers. We recommand use same number of drivers to number of devices.

The Wizard shows that the installation has been completed.

Expand the USB DTV Singal Generator Driver in the Windows Device Manager (Control Panel > System > select Hardware tab> click on Device Manager).

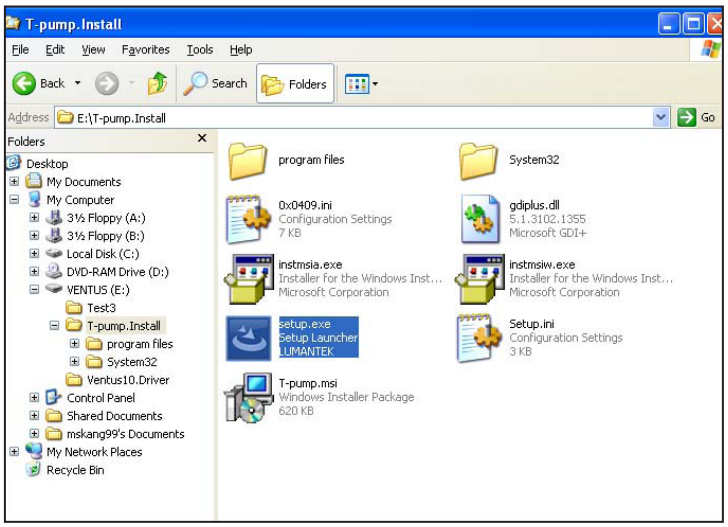


You can find your installed several VENTUS drivers.

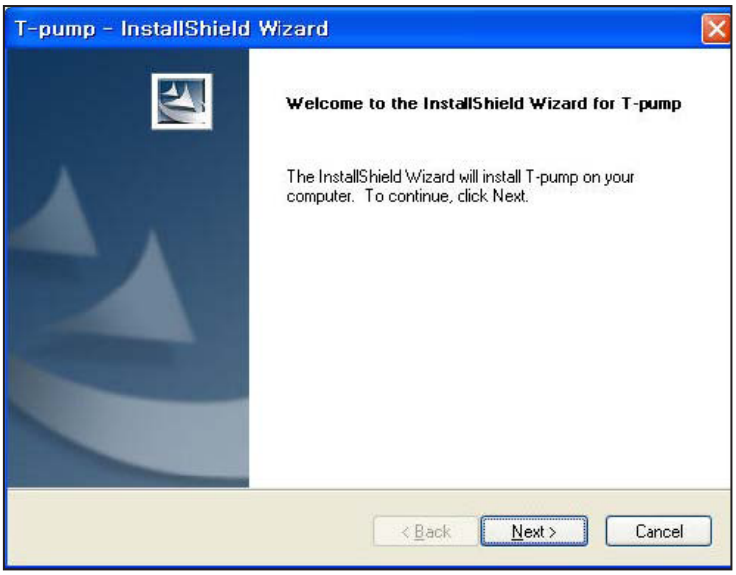
3.5 / VENTUS T-pump Install

After completing the installation of VENTUS device driver, install T-pump software, which is provided for the operation of VENTUS, in the PC or notebook. T-pump is a program that controls all VENTUS interfaces. It controls recording, RF transmission, ASI transmission, and DTV selection functions.

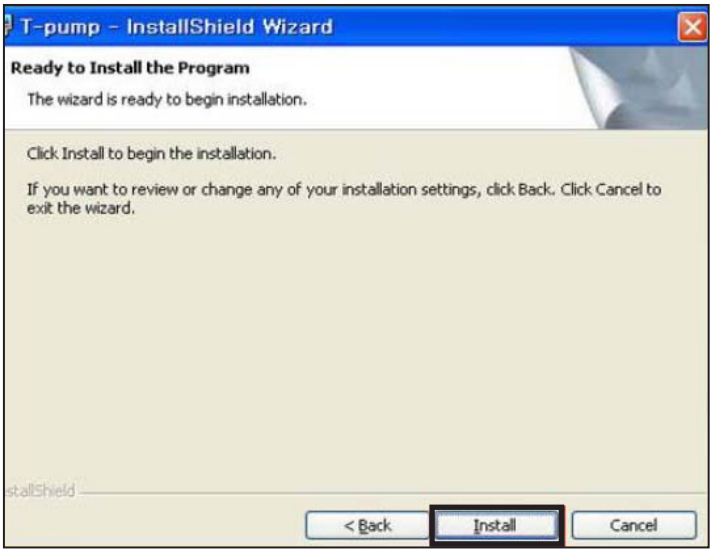
Program Name	Folder Name	Description
Setup.exe	T-pump Install	VENTUS Application



Firstly, double click "Setup.exe".
Including in the USB provided



T-Pump install program will run.



Continue T-pump installing.

The T-pump installation has been completed.

T-pump Program location :
[C:\Program Files\(C)LUMANTEK\T-Pump]

4. VENTUS 2.0 / T-PUMP OPERATION

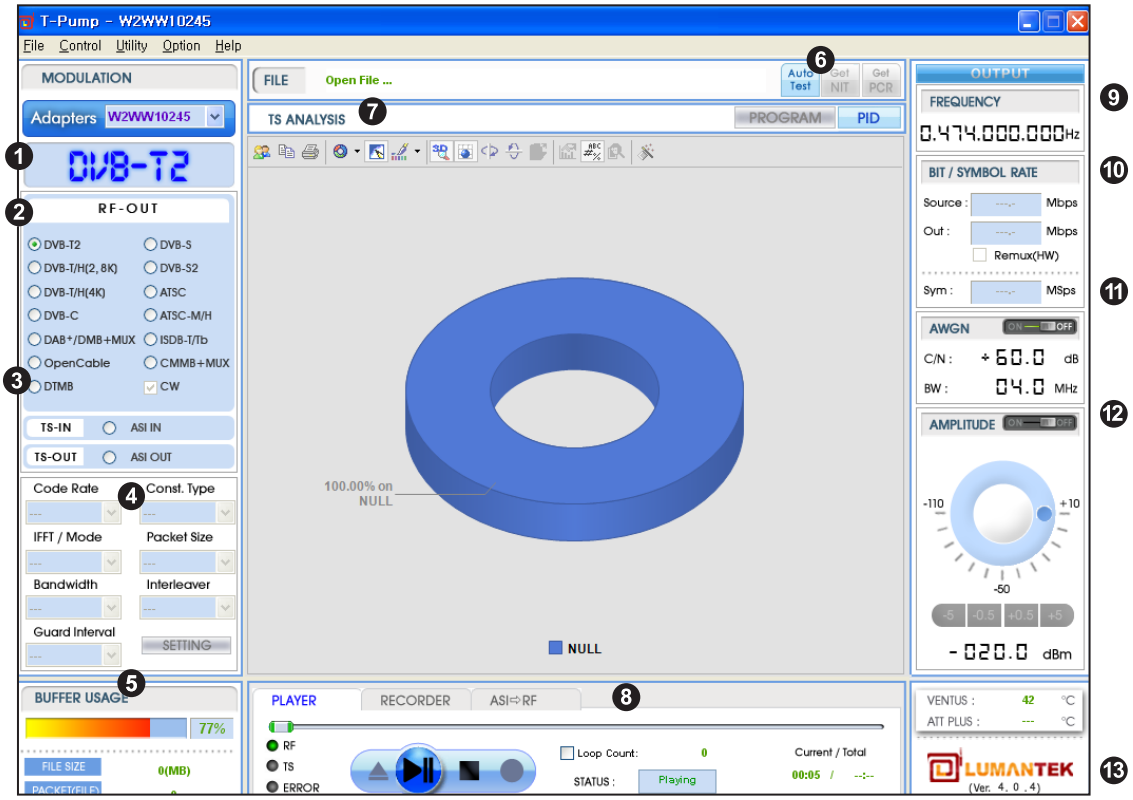
After completing the installation of VENTUS device driver and T-pump software, test DTV signal transmission, and capturing and transmission using ASI input/out using the T-pump software.

- **Upgrade Information (Version 3.1.0)**

• Auto Test program works, When turn off the Ventus with ASI card.
• New option for T-DMB Mode
  -> TM2, TM3, TM4 can transmits
• New option for CMMB Mode
  -> Added EMM sign on Data field.
  -> Add CAS field
  -> The T-pump works, even CLCH information and the actual form does not match each other.
  -> Fixed no padding data sync error rountine
  -> Fixed the problem to apply in order the MF-ID when the Multi-MFS is deleted.
• Edit the problem when Lower than the range of frequency settings, it sets automatically set to the value of the minimum
• Full-seg stream as a stream of TMCC information without modification to the output when 1 seg
• From this version, it supporting Window Vista for USB Driver

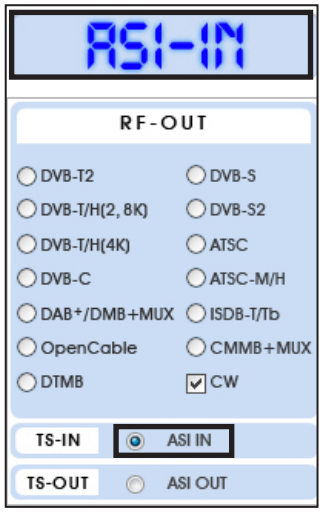
- **T-pump UI Overview**

No	Items	Description
1	ASI-IN, OUT, DVB-T/H etc.	Display selected Interface
2	RF-OUT	DTV Option-> When this option is selected, the interface will change
3	TS-IN / OUT	Select ASI INPUT, OUTPUT Port
4	RF Parameter	Set DTV Parameter, RF OUTPUT Mode in detail
5	BUFFER USAGE	Display hardware buffer information usage of current selected interface stream
6	Get NIT, Get PCR	Check DVB-T,H stream's NIT information
7	TS ANALYSIS	Analyses per Program and PID
8	Play / Record / ASI to RF	TS Play control, Capturing by ASI INPUT, ASI Input -> RF output
9	Frequency	Set frequency for testing
10	Bit rate	Bit Rate of the testing TS File(source, output)
	From File	Check DVB-T stream's NIT
11	Symbol rate	Input Symbol Rate under DVB-C mode
12	Amplitude	Power Level Control
13	Version Display	T-PUMP Version



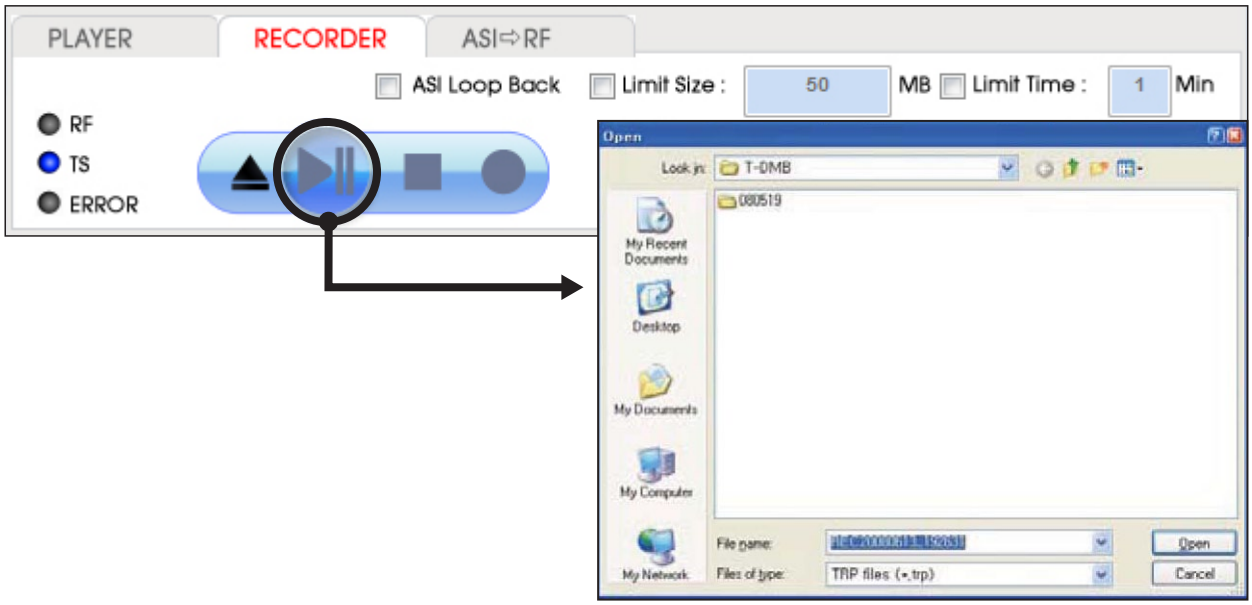
4.1 / TS-IN Option : ASI Input

1. ASI Input is for input real time stream from other ASI Output Port.

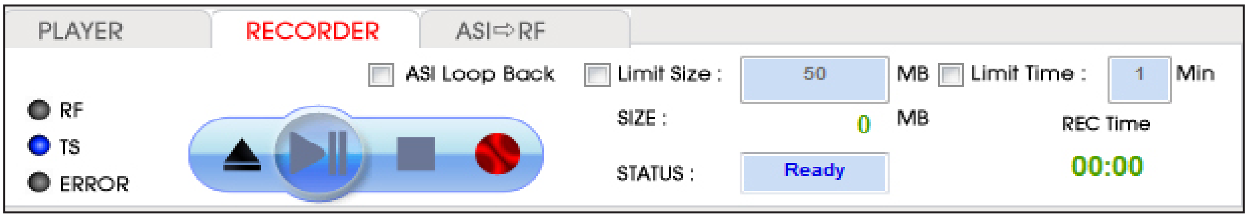


2. First, run T-pump application. -> Then on your left side menu, click TS-IN. -> On Top Left Menu will change to ASI-IN signal.

3. When you want to capture the signal which is entering through ASI Input, Click Open icon. File browse window will pop up.

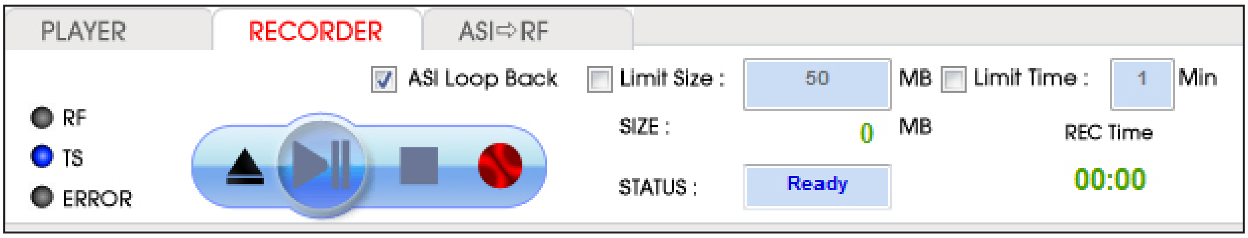


4. Click Rec button under RECORDER tab.

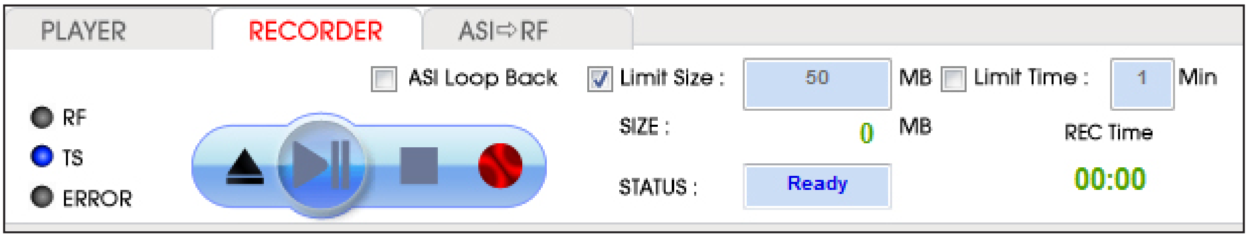


- **Detail View of RECODER tab**

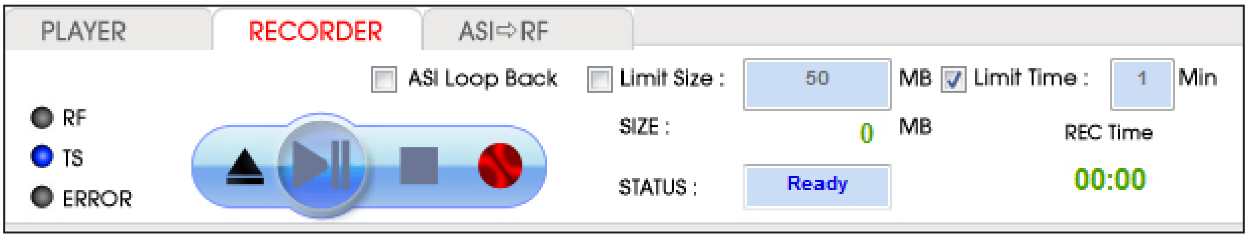
- ASI Loop Back



- ASI Loop Back



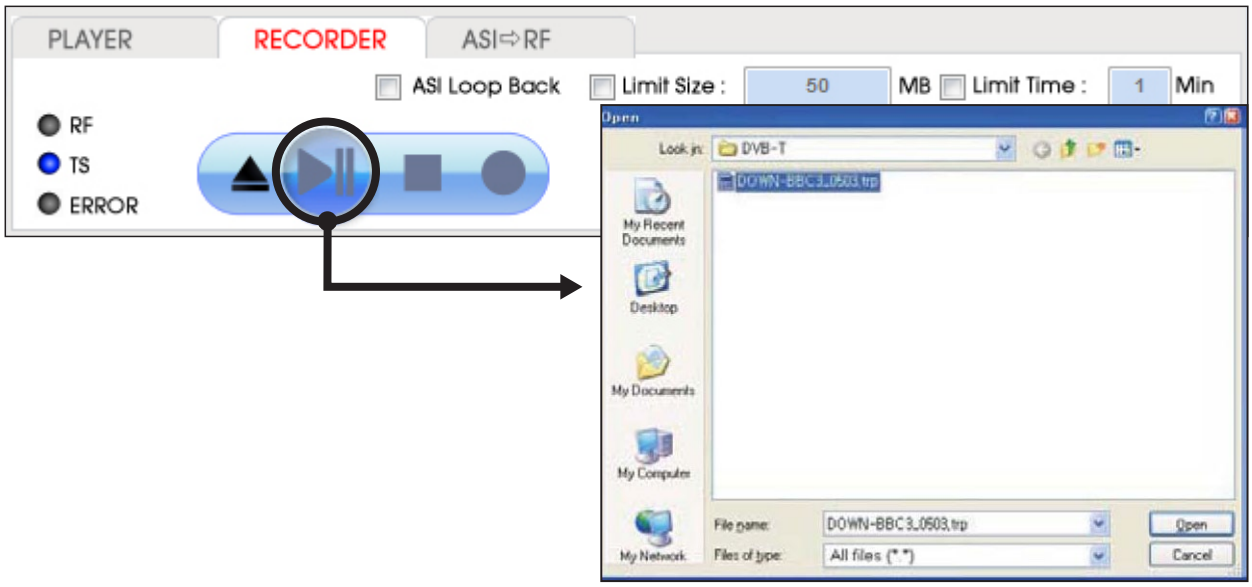
- ASI Loop Back



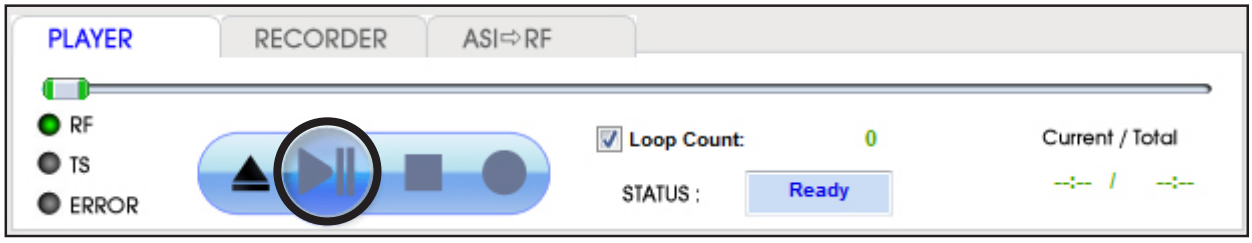
5. When you want to transmit ASI Input Signal as RF, go to [ASI->RF] tab. Then you can Select RF-OUT Modulation.

4.2 / TS-OUT Option : ASI Output

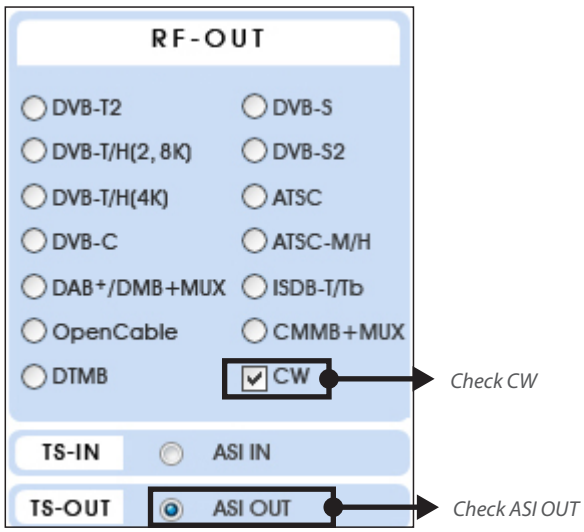
1. ASI Output is for transmitting the saved file [*.trp, *.tp] through ASI Output Port.
2. Top Left Menu in T-pump will change ASI-OUT when select TS-OUT option.
3. Click file open button( ) and select *.trp or *.tp to do ASI Out.



4. T-pump displays Stream file analysis per Program or PID. Status is Ready on PLAYER tab.



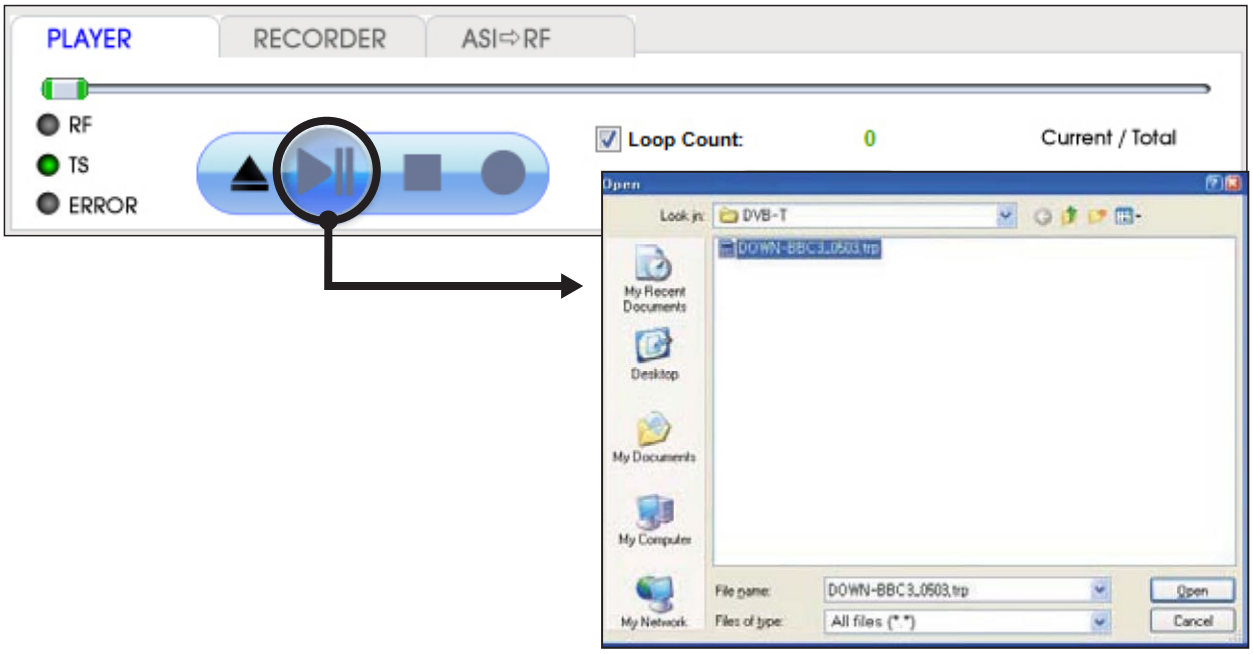
4.3 / RF Output option : CW



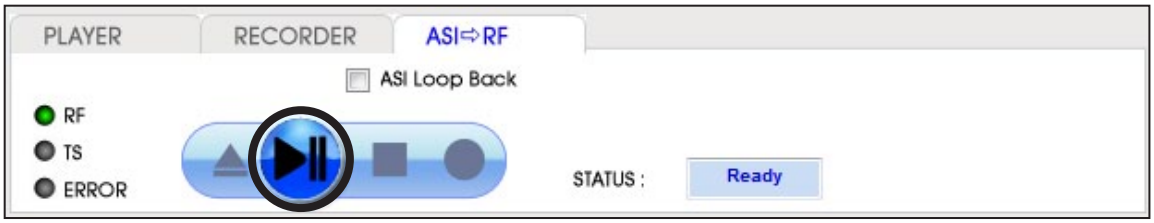
1. To use CW mode, first you have to check CW under ASI-OUT. It is NOT able to checking CW option under RF-OUT.

ASI Output Port

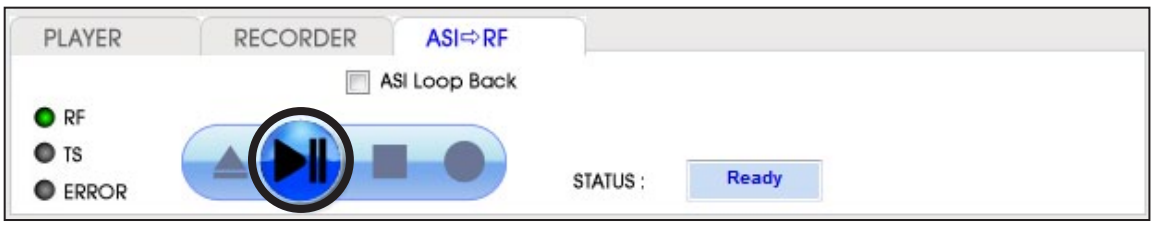
2. Select Modulation Option in RF-OUT menu, then CW option will active.



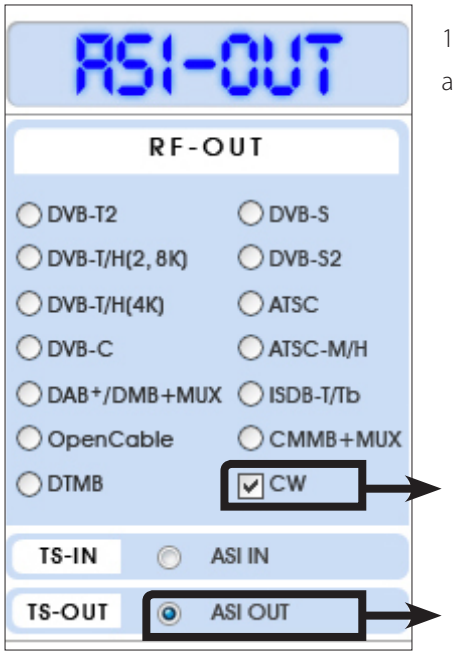
3. Select Modulation Option in RF->OUT menu, then CW option will active.



4. Move from [PLAY] to [ASI->RF] tab, then click play button. It will transmit as CW.



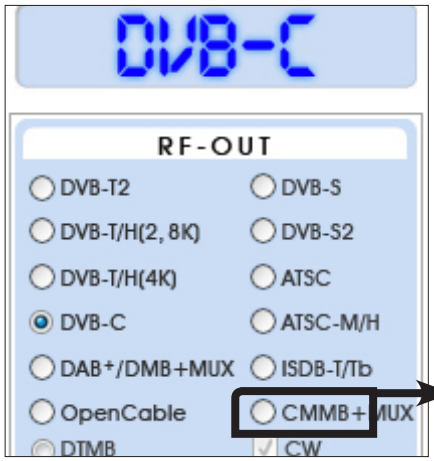
4.4 / RF Output option : CW Operation



Check CW

Check ASI OUT

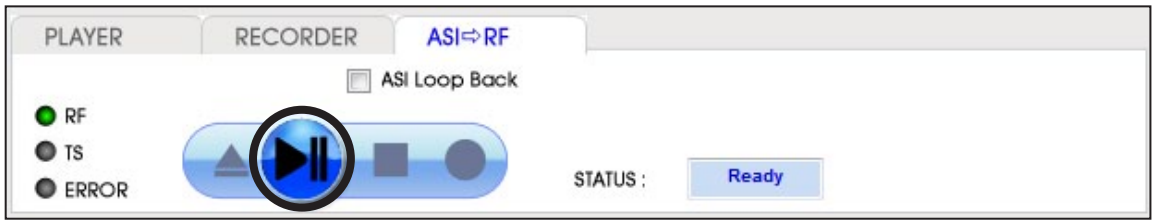
1. To use CW mode, first you have to check CW under ASI-OUT. It is NOT able to checking CW option under RF-OUT.



Check CW

2. Select Modulation Option in RF-OUT menu, then CW option will active.

3. Move from [PLAY] to [ASI->RF] tab, then click play button. It will transmit as CW.

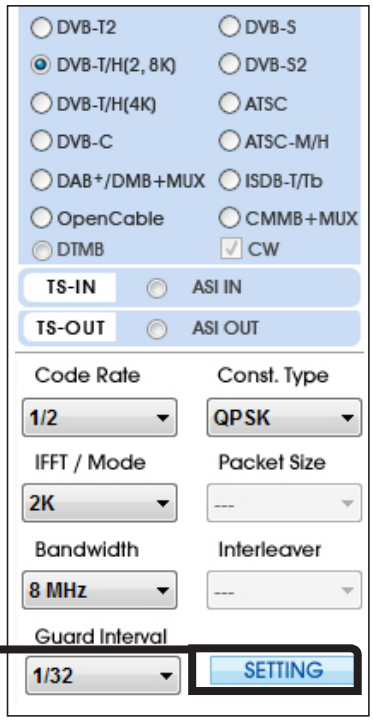


4.5 / RF Output Option : DVB-T/H(2, 8K)

1. DVB-T/H option is divided by 2, 8k and 4k. Select suitable option for you. Select DVB-T/H (2, 8K) on the top left of RF OUT menu in T-pump, DVB-T will be shown.

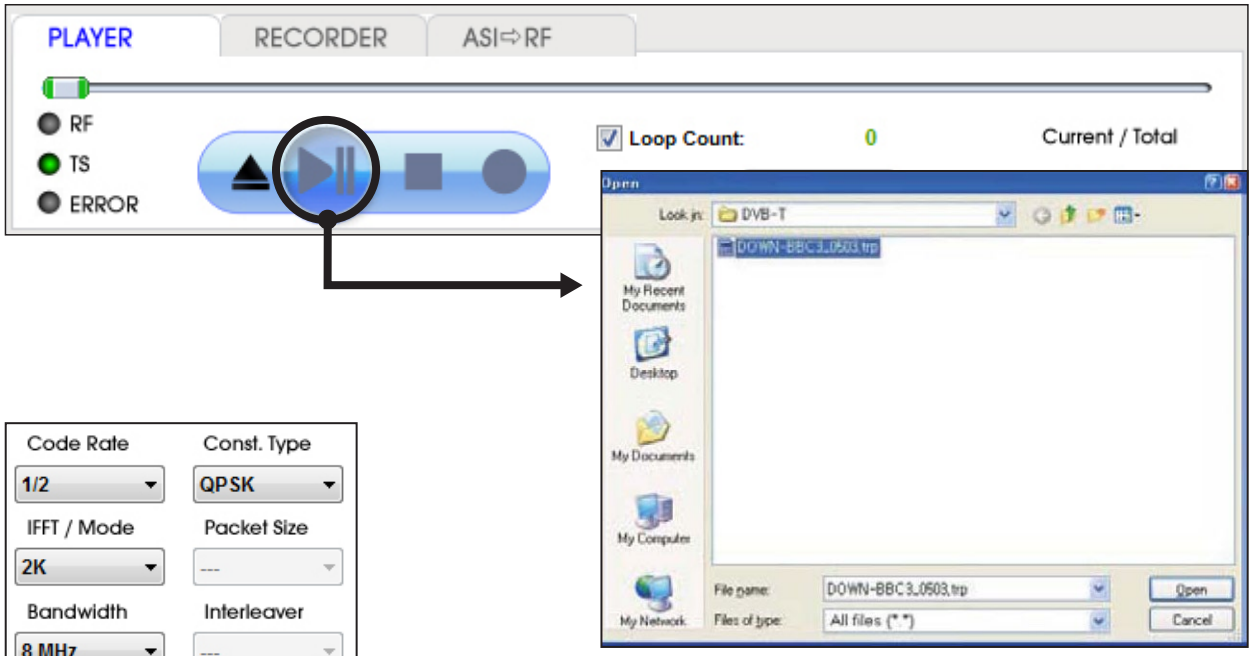
• DVB-T Parameter Value

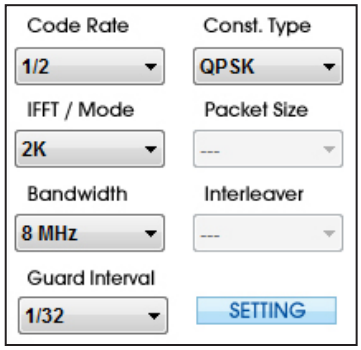
Items	Value
Code Rate	1/2, 2/3, 3/4, 5/6, 7/8
Const. Type	QPSK, 16 QAM, 64 QAM
IFFT	2K, 8K, 4k
Bandwidth	5, 6, 7, 8 MHz
Guard Interval	1/32, 1/16, 1/8, 1/4



Do not use under DVB-T/H(2, 8k) option
(Only for DVB-T/H(4k))

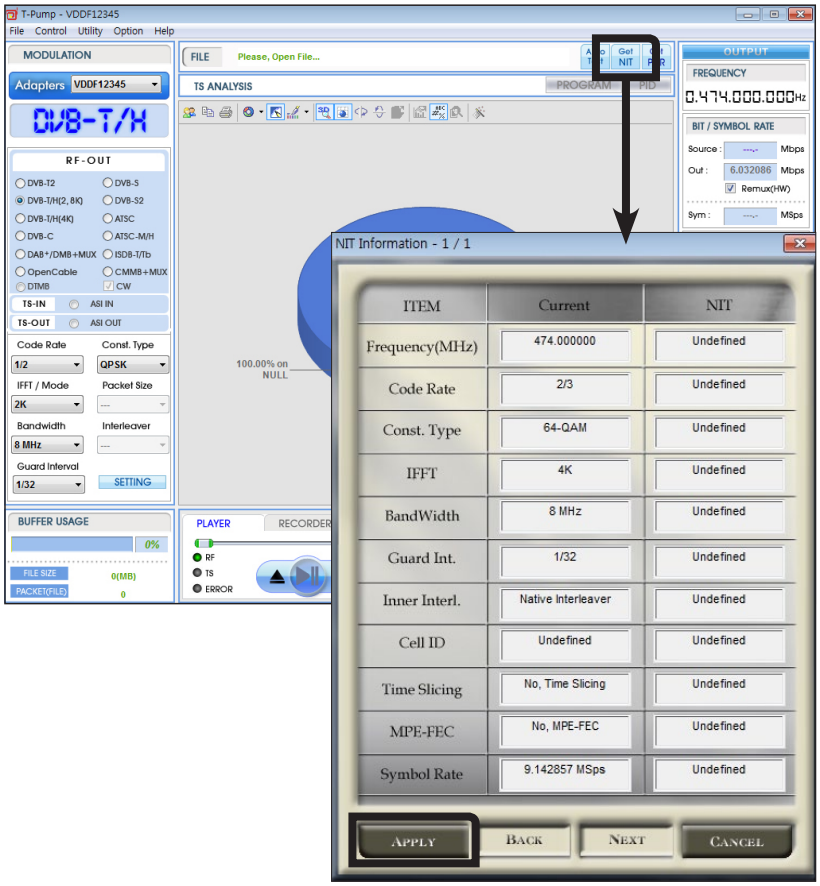
2. Select DVB-T option, Click file open button(and select [*.trp or *.tp] to do RF Output test.





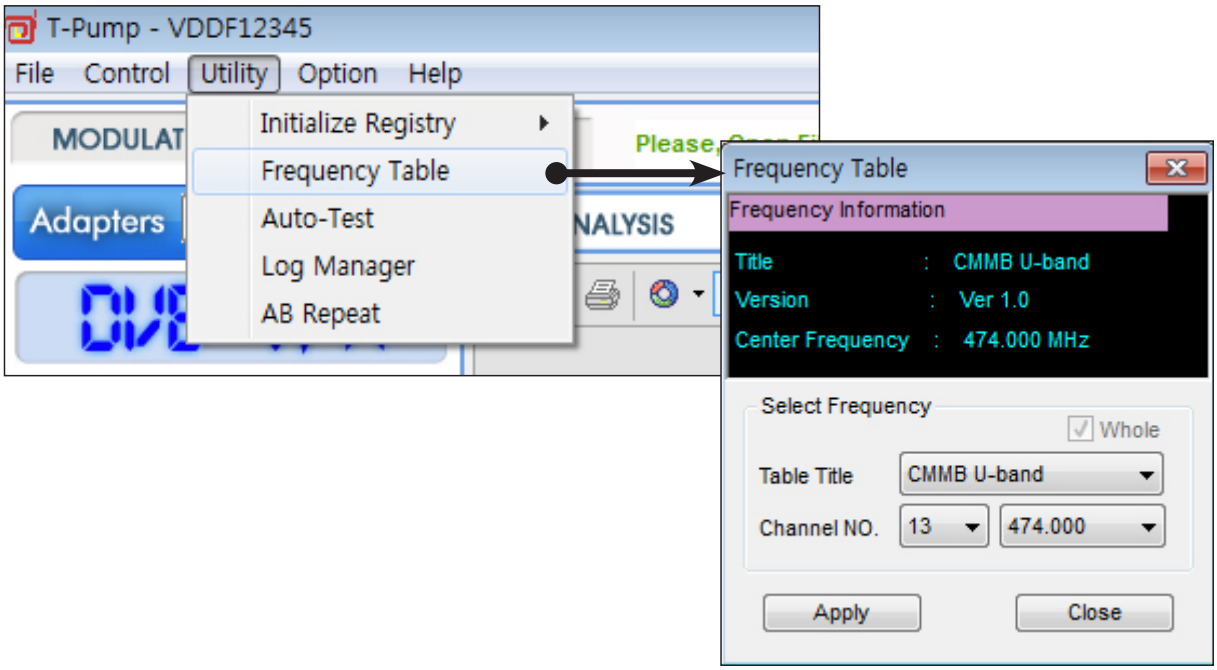
3. Once you've selected a file, you can set RF Parameter as you need.

4. If you have information to the multi-NIT with 2.4.0 version, you can check RF parameter. Like the picture below, if you click From File bottom, you will get ts file's NIT information. After, Click [Apply], automatically set all the options.

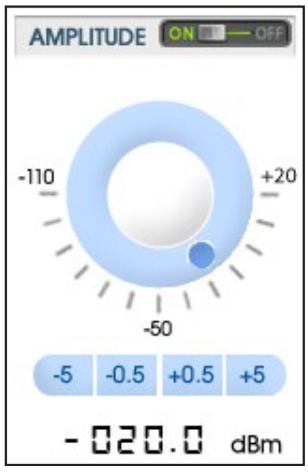


5. After select a stream file, set frequency under OUTPUT menu.
   * You can set frequency by direct keyboard input

* Or by [Frequency Table] under [Utility[menu.



A sample *.dat file will give Frequency Table information. Create a sample file and save in [C:\Program Files\(C) LUMANTEK\T-pump\FreqTable] folder. Now you can search on the frequency table window if you save it at.

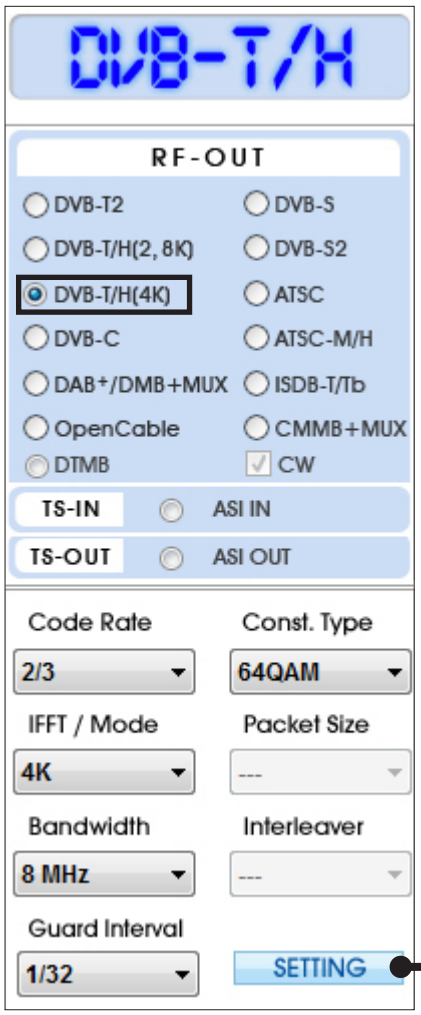


6. When you use AMP & Attenuator, you must click [ON] on the amplitude window. Power level changes between +7 dBm(+3dbm over frequency of 1GHz) ~ -110 dBm per 0.5dB step by Jog Shuttle or per 0.1dB by keyboard input.

* Maximum level is +7dBm under the frequency range of 1GHz or less
  Maximum level is +3dBm from the frequency range of 1GHz or more

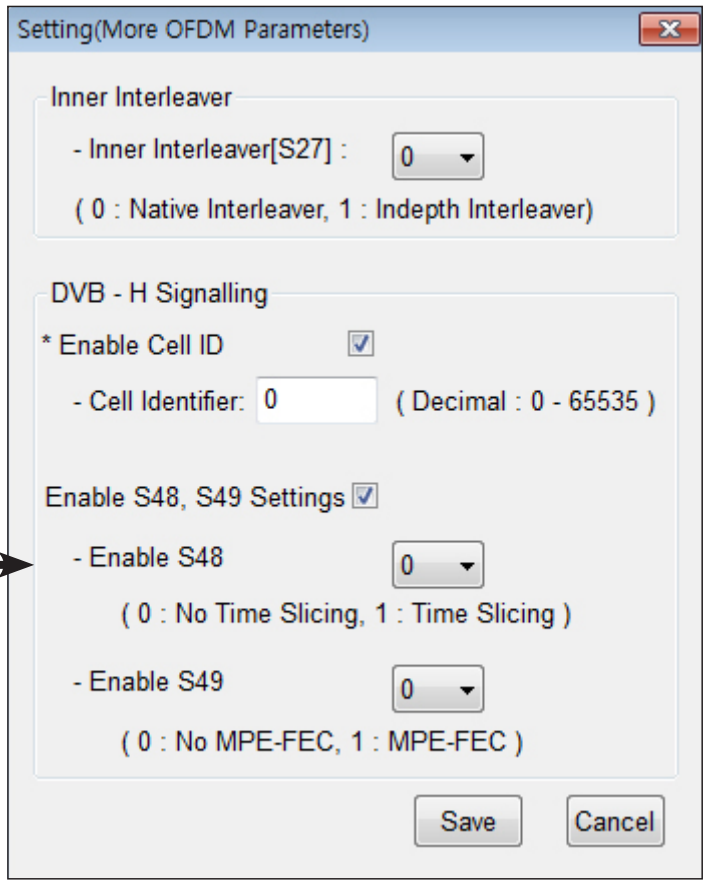
4.6 / RF Output Option : DVB-T/H(4K)

1. When you select DVB-T/H(4K), DVB-T/H will appear on display window.



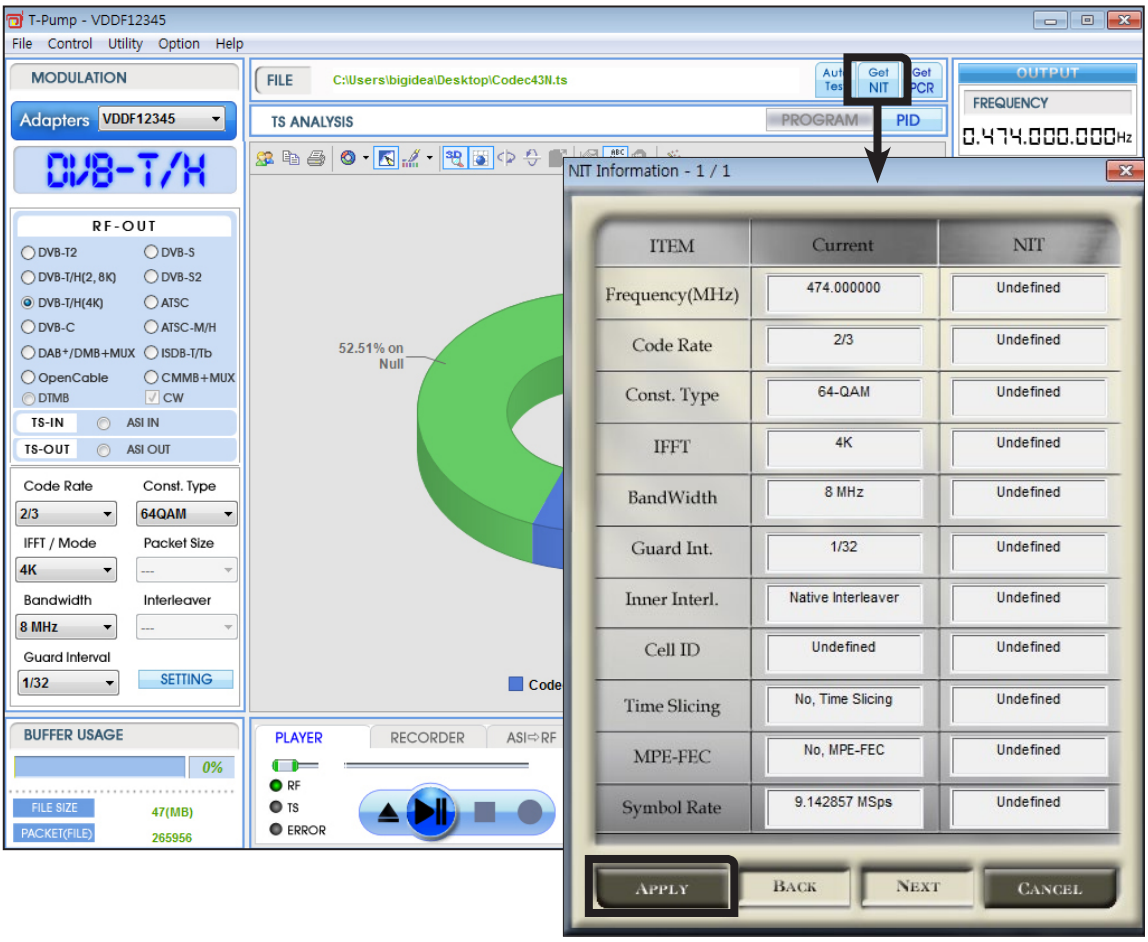
2. Click [SETTING] button and set like below image.

- Inner Interleaver [S27] : 0 (Native Interleaver)
- DVB-H Signaling
- Select Enable Cell ID
- Cell Identifier : Input suitable stream file Cell ID.(0~65535)
- Select Enable S48, S49 Setting
- Enable Cell ID S48 : 1 (Time Slicing)
- Enable Cell ID S49 : 1 (MPE-FEC)

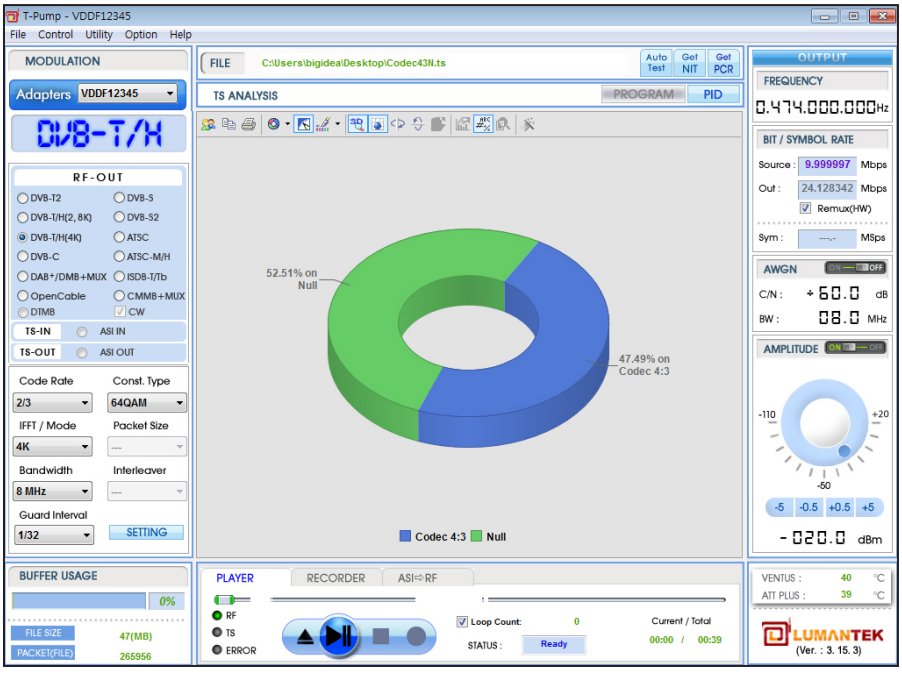


* Above setting is only for a sample stream file. Thus you can change options as you need.

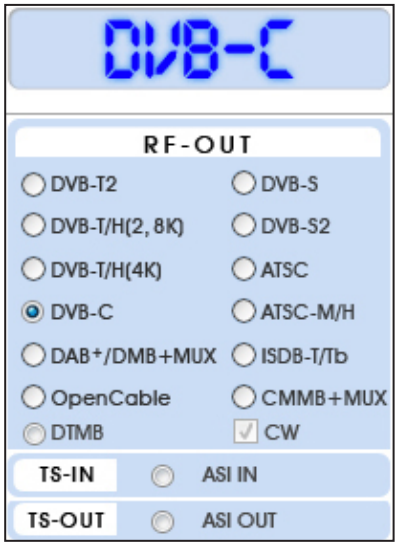
3. T-pump Ver 2.2.0 updated as you could check NIT information. Click [From File] in[BIT/ SYMBOL RATE] box, then check the information of an opened *.ts file like below images. Click [Apply], automatically set all the options.



4. Rest of process is same as DVB-T/H(2K, 8K) operating.



4.7 / RF Output Option : DVB-C

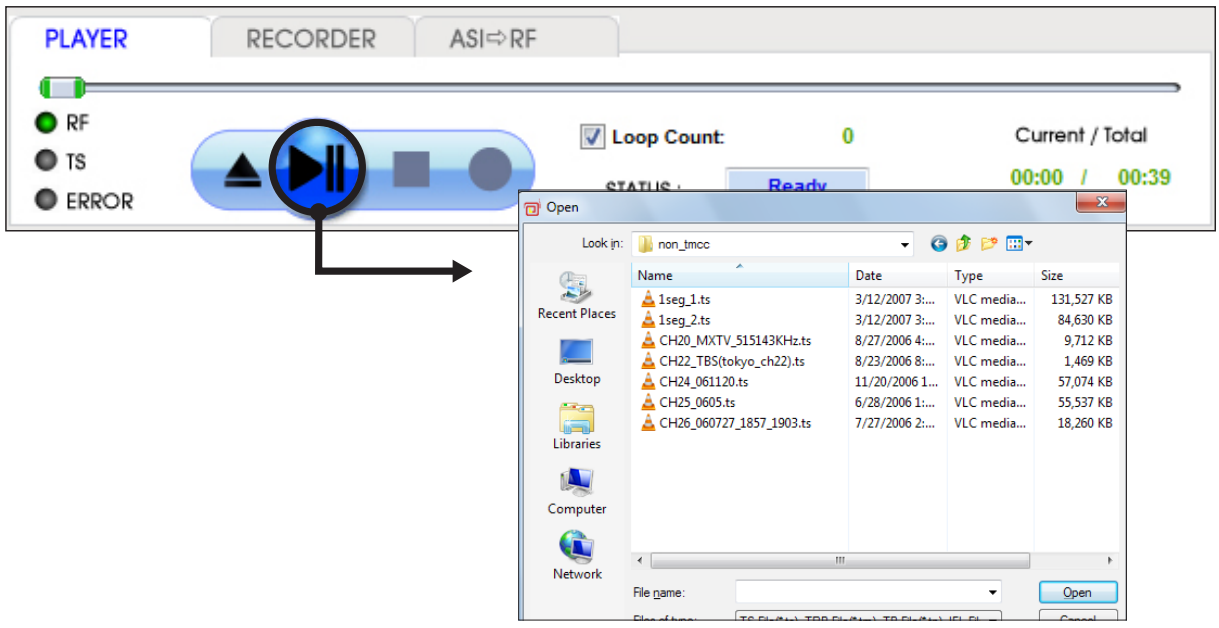


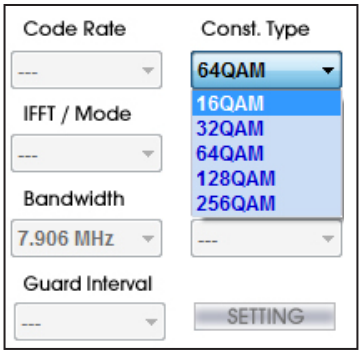
1. Top Left Menu in T-pump will change DVB-C when select DVB-C option.

• DVB-C Parameter Value

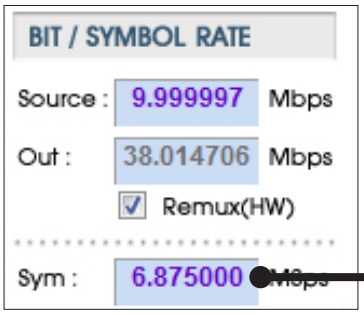
Items	Value
Const. Type	16 QAM
	32 QAM
	64 QAM
	128 QAM
	256 QAM

2. Select DVB-C option, Click file open button( ) and select .trp or .tp to do RF Output.





3. Set Const. Type under RF sub menu.

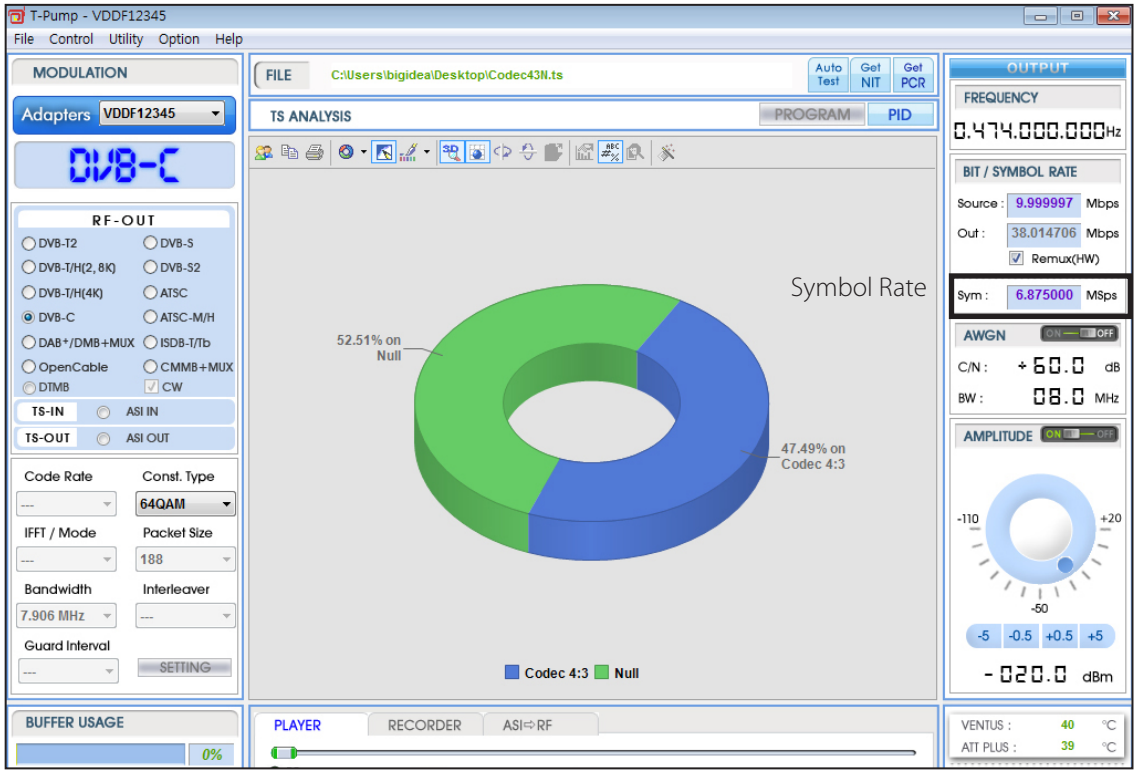


4. DVB-C needs to set Symbol Rate. You can input symbol rate by keybord input.

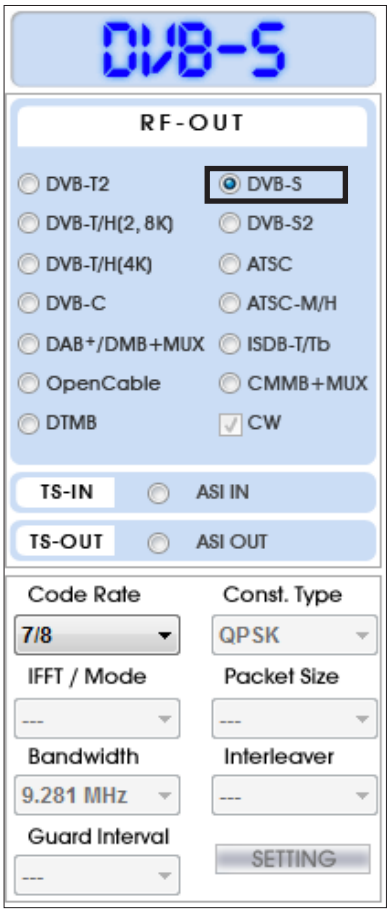
→ Input Symbol Rate Value

5. After setting symbol rate, rest processing is same as DVB-T mode.

6. When you use AMP & Attenuator, you must click [ON] on the amplitude window. Power level changes between +7 dBm(+3dbm over frequency of 1GHz)~ -110 dBm per 0.5dB step by Jog Shuttle or per 0.1dB by keyboard input.



4.8 / RF Output Option : DVB-S



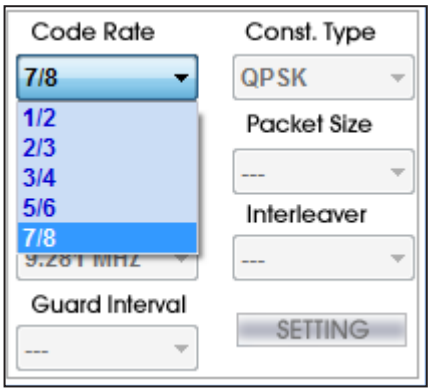
1. Top Left Menu in T-pump will change as DVB-S when select DVB-S option.

*DVB-S2 Parameter Value

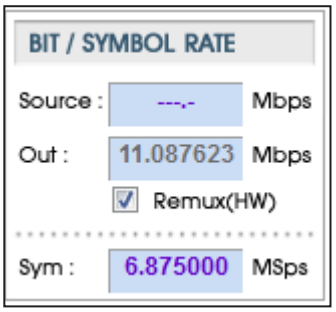
Items	Value
Code Rate	QPSK : 1/2, 2/3, 3/4, 5/6, 7/8
Const. Type	Mode(QPSK)
IFFT	Roll-Off(0.35)
Bit / Symbol Rate	Symbol Rate(1Msps to 45MSps)

2. Select DVB-S2 option, Click file open button( ) and select [*.ts] to do RF Output test.

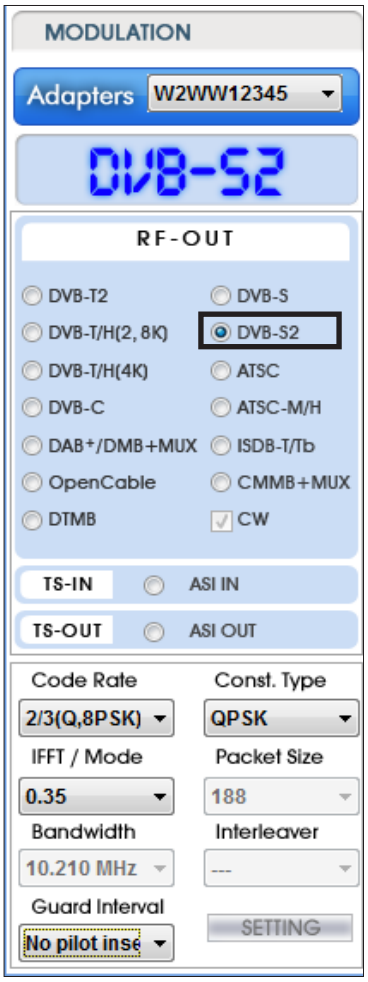
* Code rate



* Symbol Rate



4.9 / RF Output Option : DVB-S2



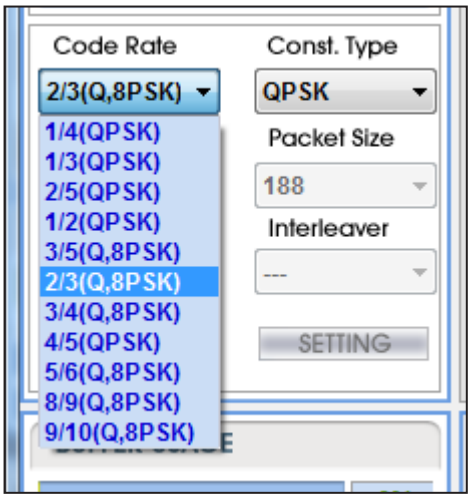
1. Top Left Menu in T-pump will change as DVB-S2 when select DVB-S2 option.

*DVB-S2 Parameter Value

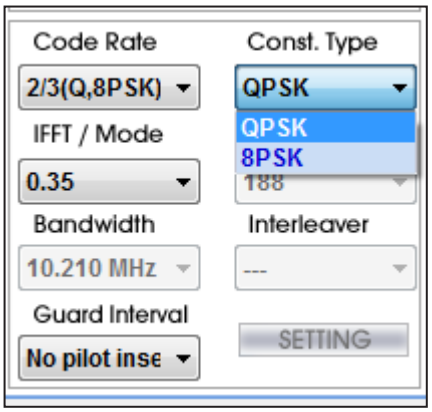
Items	Value
Code Rate	QPSK : 1/4, 1/3, 2/5, 1/2, 3/5, 2/3, 3/4, 4/5, 5/6, 8/9, 9/10 8PSK : 3/5, 2/3, 3/4, 5/6, 8/9, 9/10
Const. Type	Mode(QPSK, 8PSK)
IFFT	Roll-Off(0.20, 0.25, 0.35)
Bit / Symbol Rate	Symbol Rate(1Msps to 45MSps)
Guard Interval	No Pilot Insert / Pilot Insertion

2. Select DVB-S2 option, Click file open button( ) and select [*.ts] to do RF Output test.

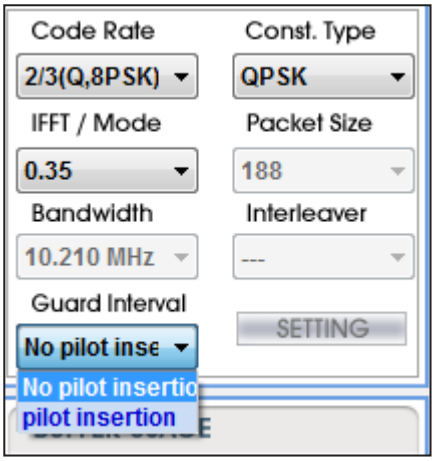
* Code rate



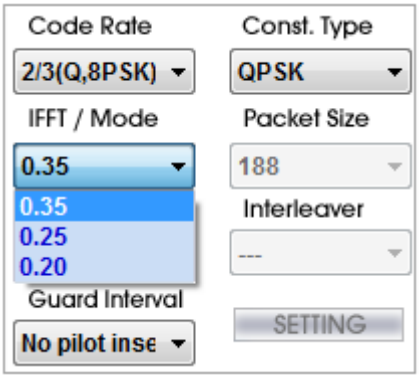
* Const_type



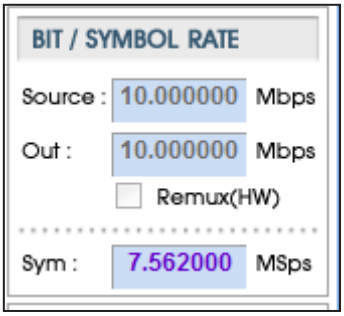
* Guard Interval



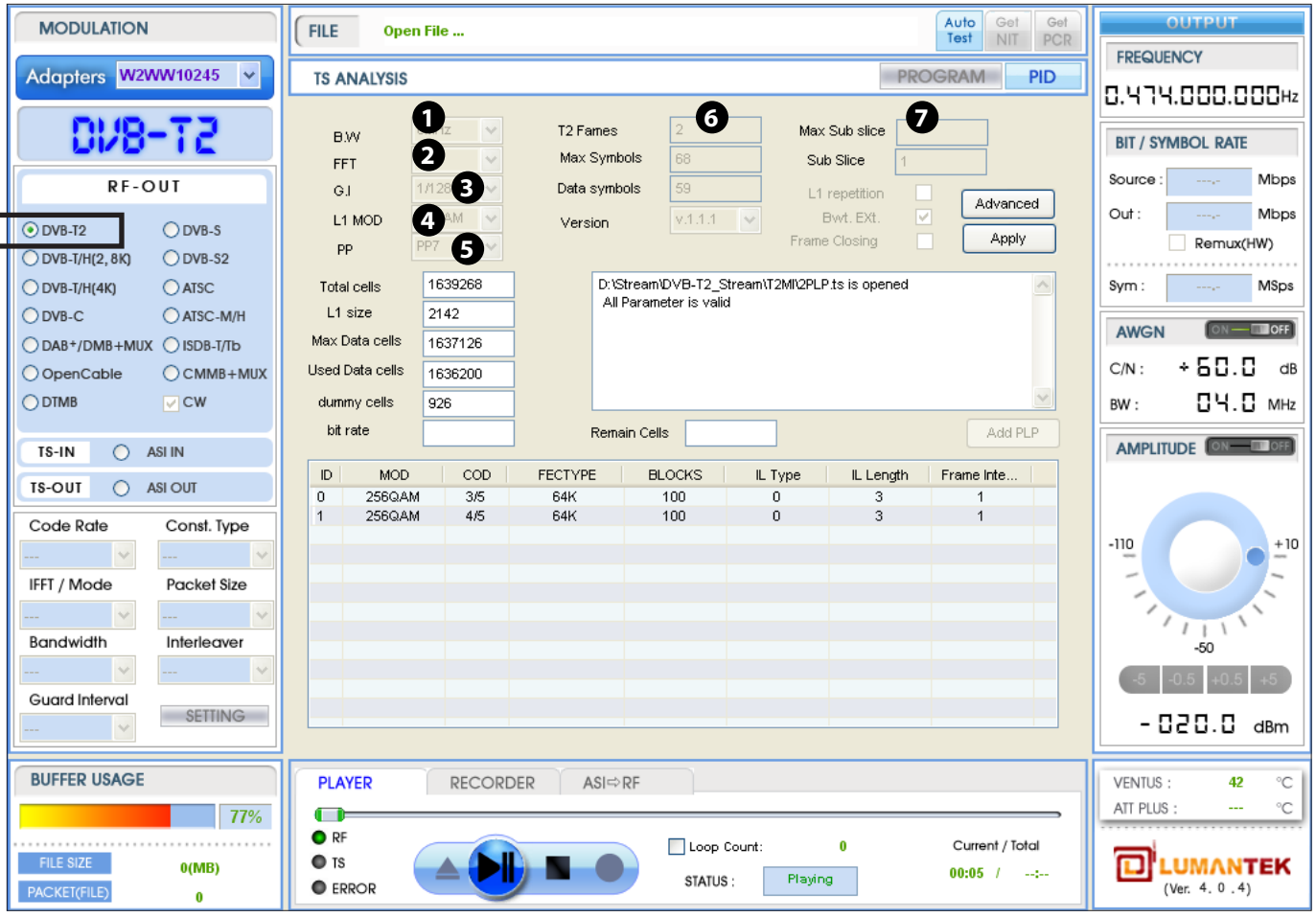
* IFFT Mode



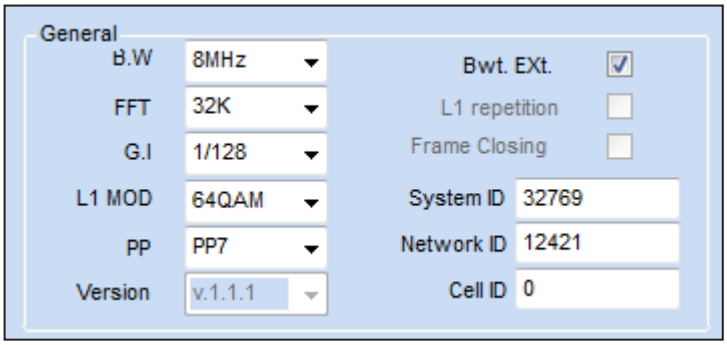
* Symbol Rate



4.10 / RF Output Option : DVB-T2

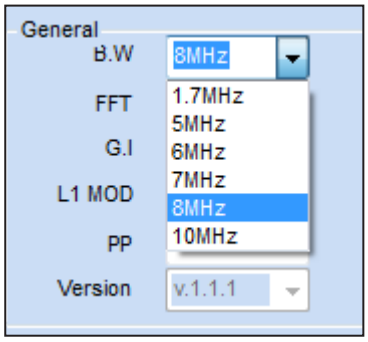


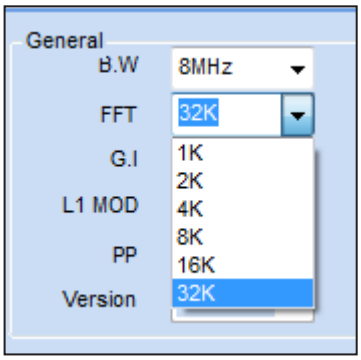
1. Top Left Menu in T-pump will change as DVB-T2 when select DVB-T2 option.



1 BW

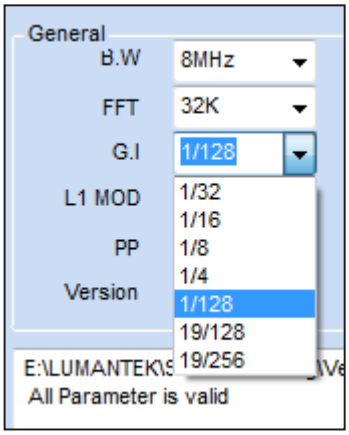
- The bandwidth of the channel
- 1.7MHz, 5MHz, 6MHz, 7MHz, 8MHz, or 10MHz





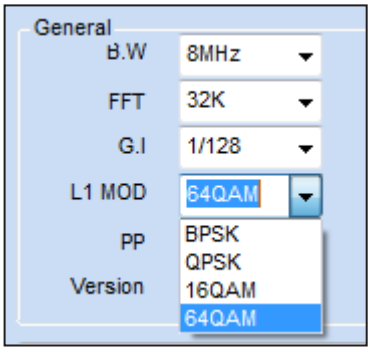
2 FFT

- FFT size in the channel
- 1K, 2K, 4K, 8K, 16K, or 32K



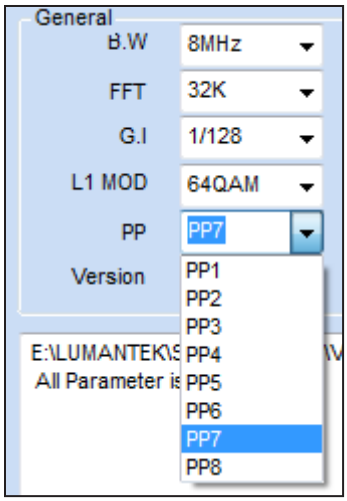
3 GI

- Guard Interval
- 1/32, 1/16, 1/8, 1/4, 1/128, 19/128, or 19/256



4 L1 MOD

- The constellation of the L1-post signalling data block.
- BPSK, QPSK, 16QAM, or 64QAM



5 PP Pilot Pattern

PP1, PP2, PP3, PP4, PP5, PP6, PP7, or PP8

Version DVB-T2 version

v.1.1.1

BwtExt Bandwidth Extension

Normal carrier mode, or Extended carrier mode

L1 repetition L1 repetition flag

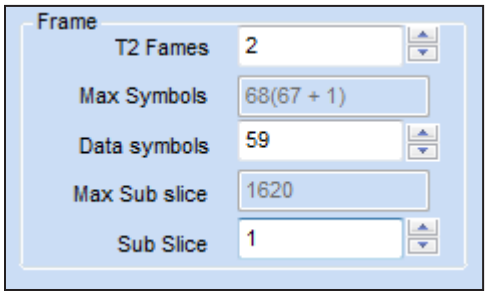
Frame Closing

System ID T2 System ID.

Uniquely identifies the T2 system within the DVB network

Network ID Uniquely identifies the current DVB network.

Cell ID Uniquely identifies a geographic cell in a DVB-T2 network.



6 T2 Frames

- Numbers of T2 frame Per Super frame

Max Symbols

- The maximum number of OFDM symbols in a T2 frame including P2 symbol(s).

Data Symbols

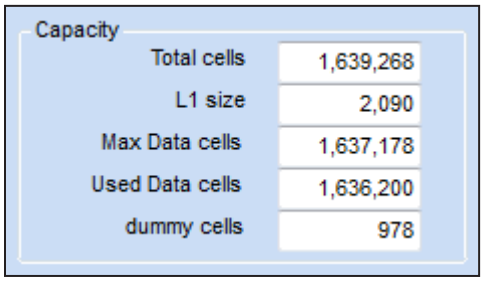
- The number of data OFDM symbols

Max Sub Slice

- The maximum number of sub slices for type 2 data PLPs

Sub Slice

- The total number of sub-slices for the type 2 data PLPs



7 Total cells

- The total number of OFDM cells per T2 frame.

L1 size

- The number of L1 signalling cells in a T2 frame

Max Data cells

- The maximum number of data cells excluding L1 signalling cells

Used Data cells

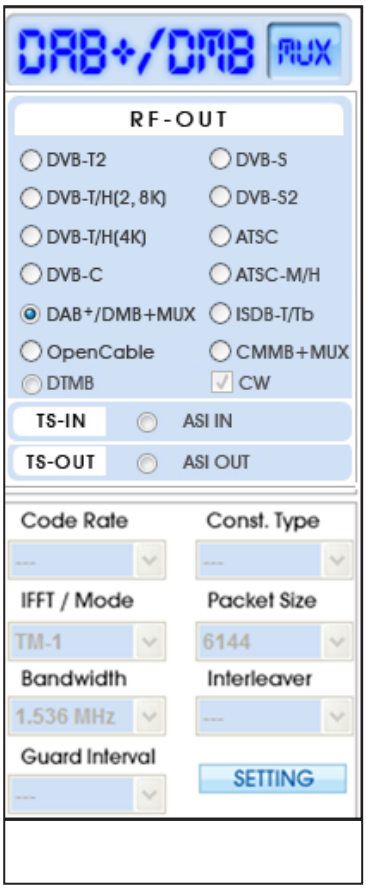
- The number of used data cells in a T2 frame

Dummy cells

- The number of dummy cells in a T2 frame

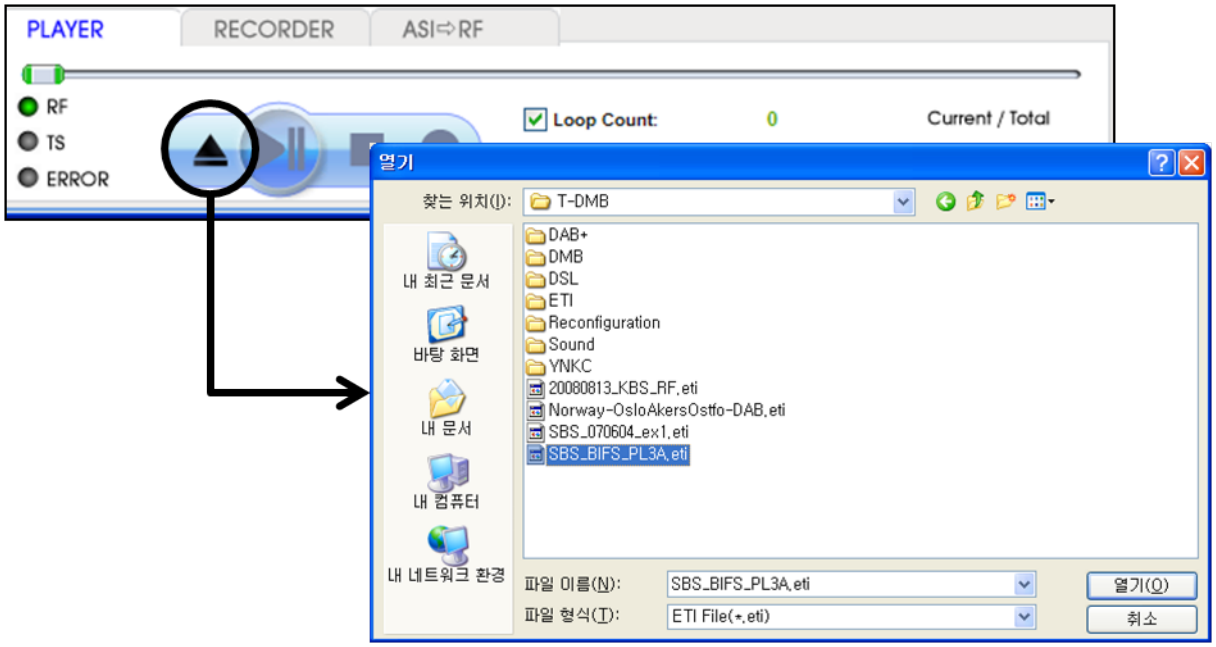
4.11 / RF Output Option : DAB+/DMB+MUX

- Modulator Only

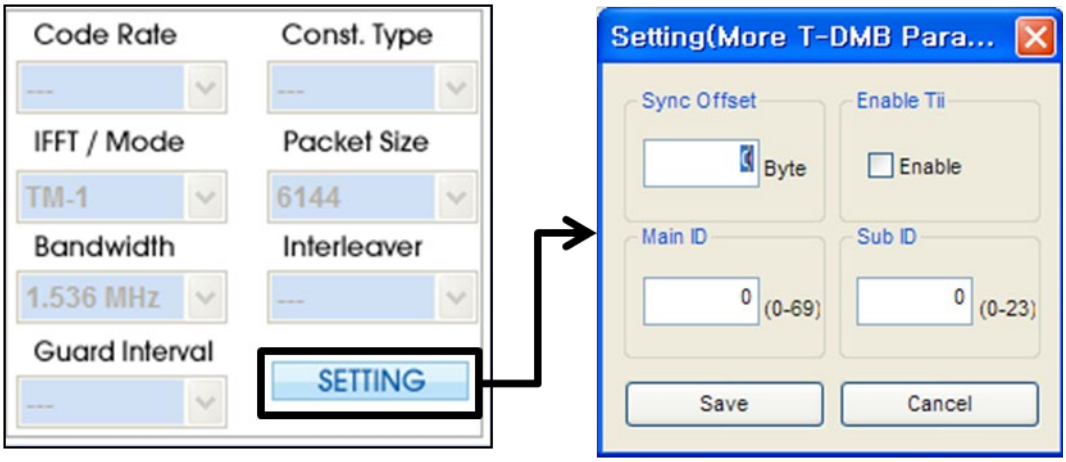


1. Upper left menu in the T-pump will be changed T-DMB when T-DMB option is selected.

2. Select T-DMB option, then click file open button [⏏] and select [*.eti] to do RF Output.



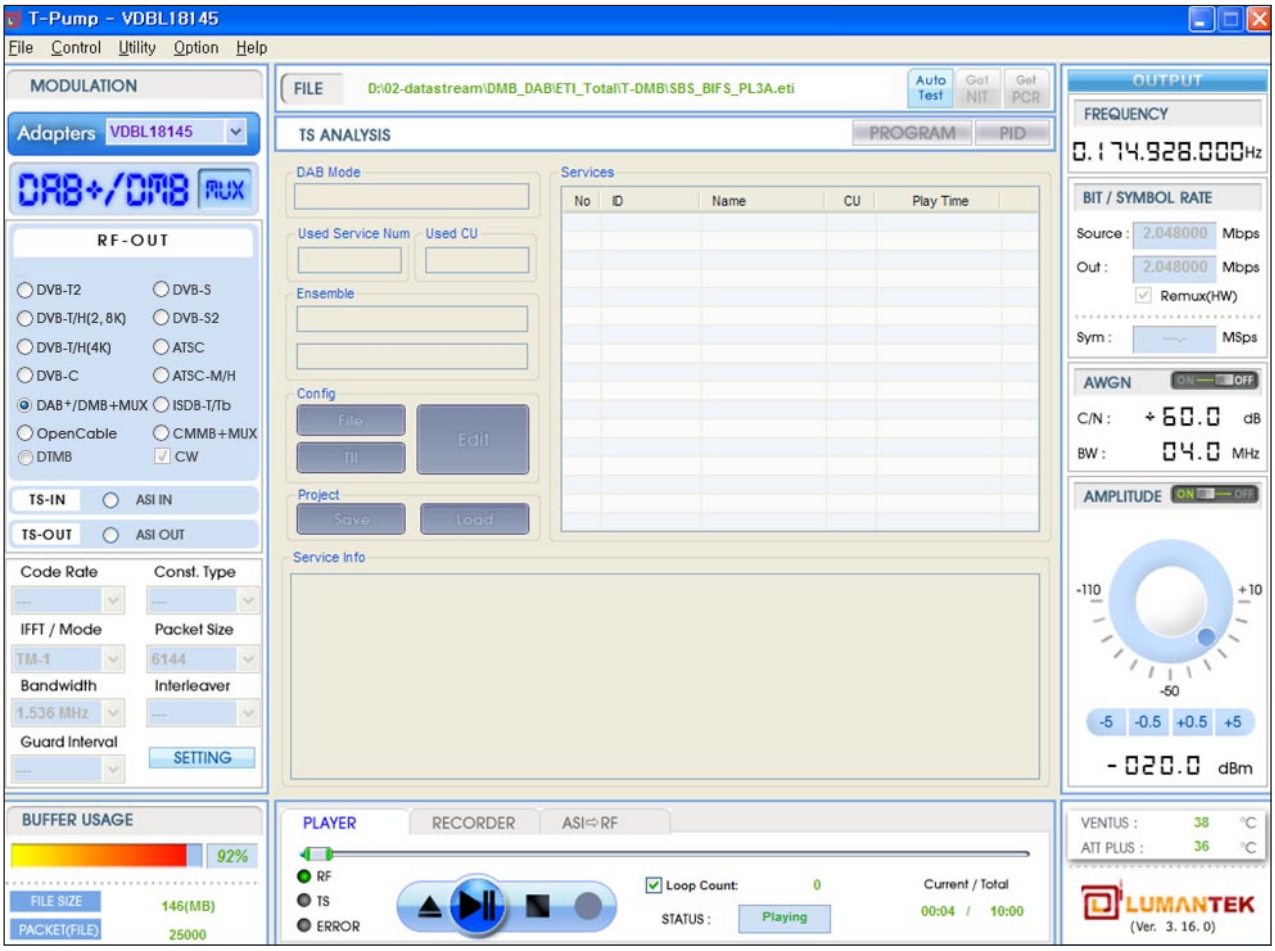
3. Click 'SETTING' button if you need TII(Transmitter Identification Information) control.



4. This RF Output option doesn't need to RF setting. Simply open stream file and set frequency and then play under PLAYER tab.

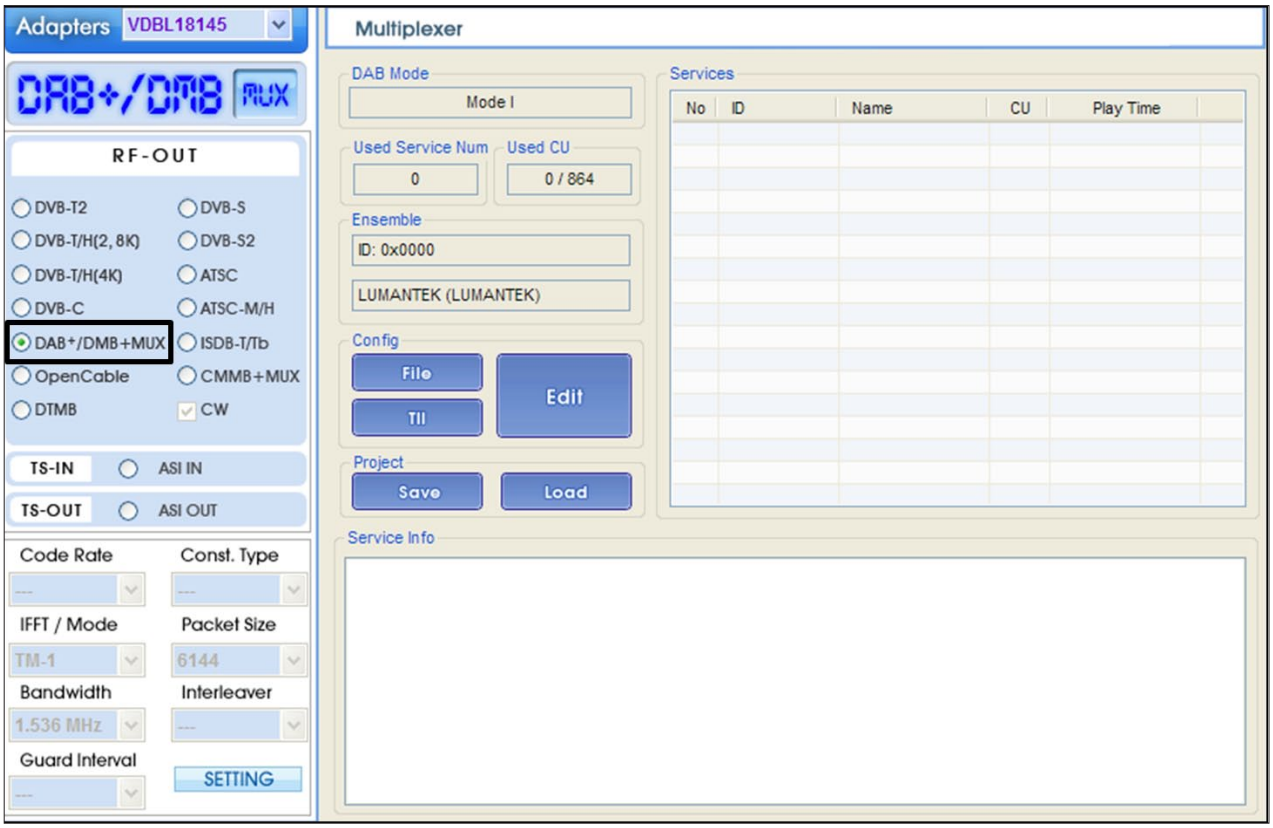
5. Set frequency in the Output panel then start to transmit it as RF. In the case of using AMP & Attenuator, you can adjust power level in the Amplitude menu.

6. For using the AMP & Attenuator, user must click [ON] on the amplitude window. Power level is changed between +7 dBm(+3dbm over frequency of 1GHz) ~ -110 dBm per 0.5dB step by Jog Shuttle or per 0.1dB by keyboard input.

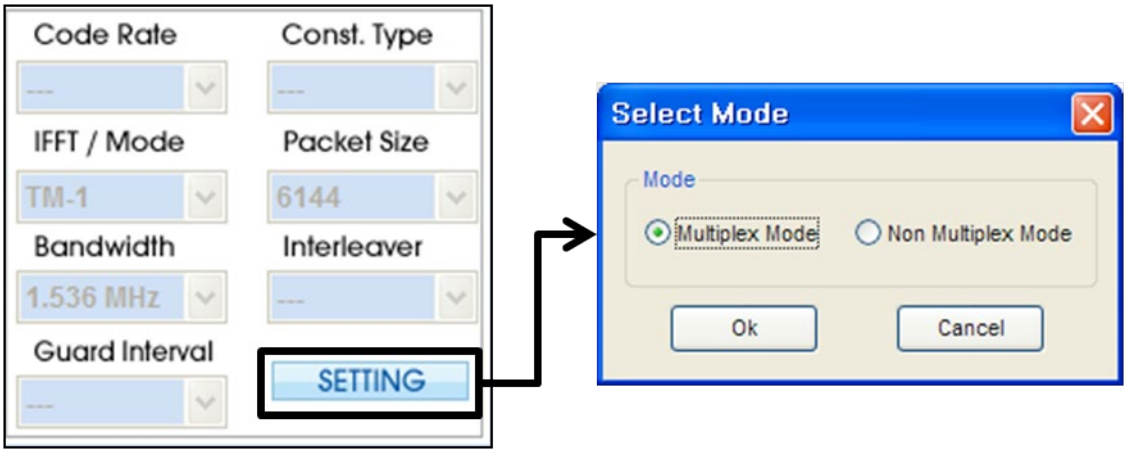


- Multiplexer + Modulator

1. Upper Left Menu in the T-pump will be changed T-DMB when T-DMB option is selected.

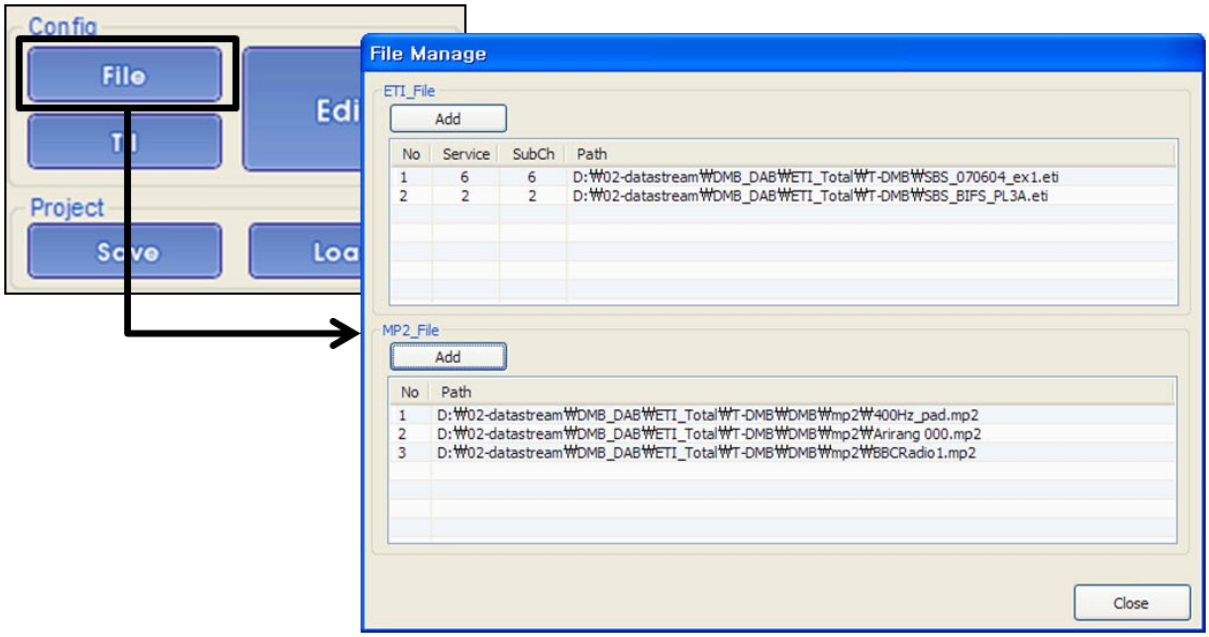


2. Choose multiplex mode or non-multiplex mode
Select 'setting' button for choosing between multiplex mode and non-multiplex mode.
Non-multiplex mode usage is same <4.8.1 / Modulator Only>.



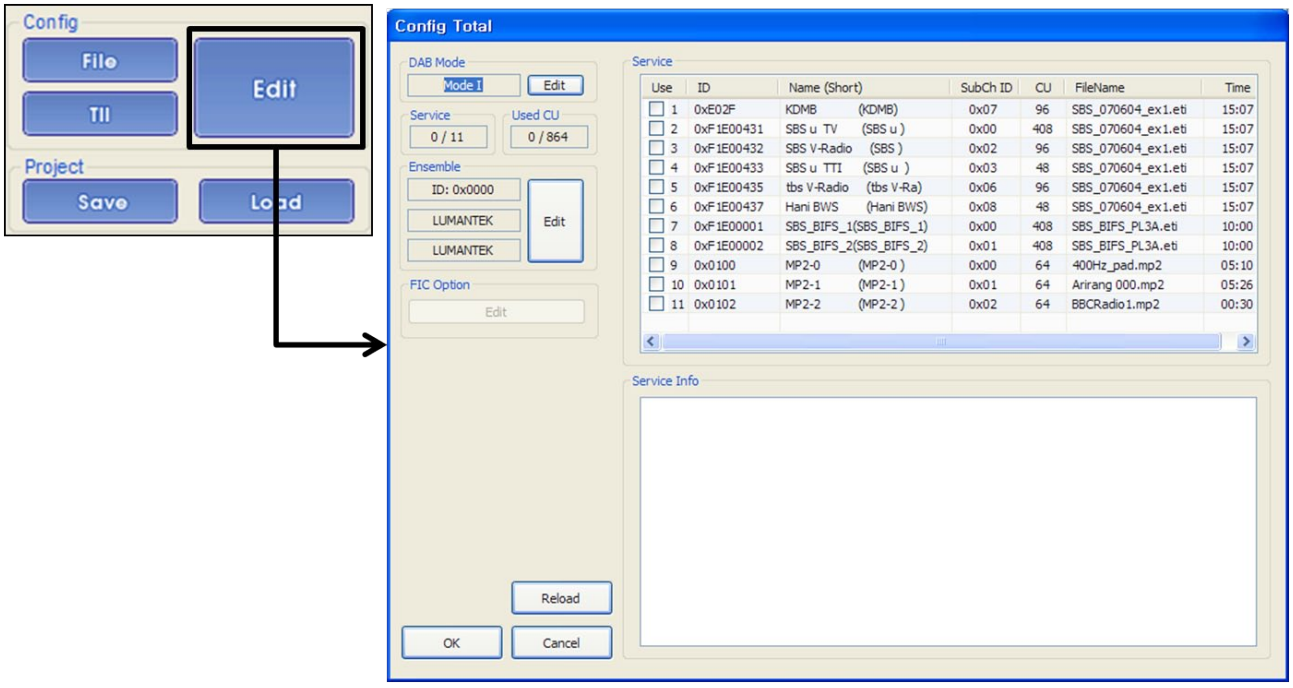
3. File Manage Window

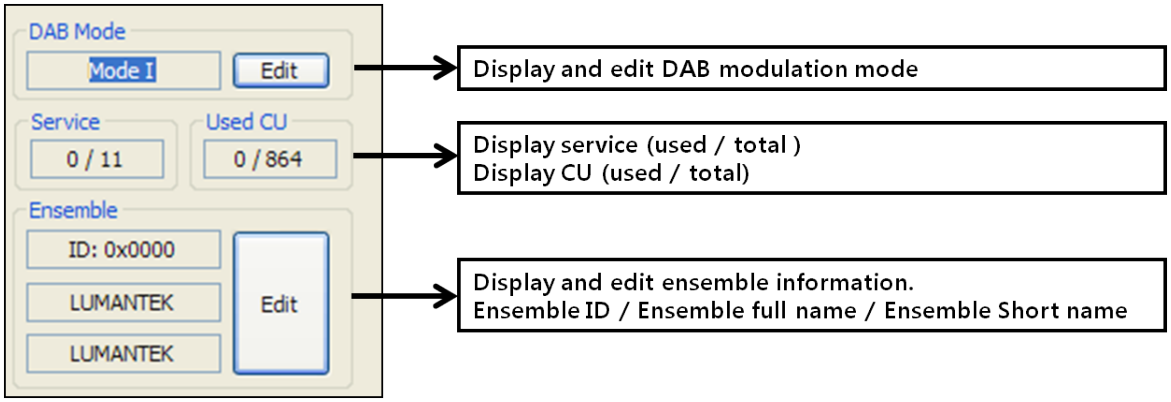
Click 'File' Button for adding files.ETI file(*.eti), MP1L2 file(*.mp2) supported.

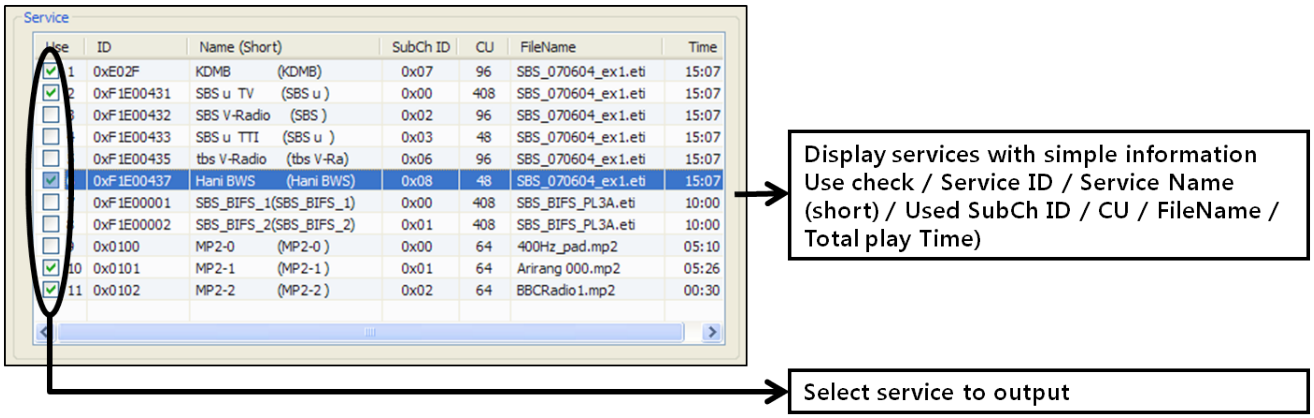


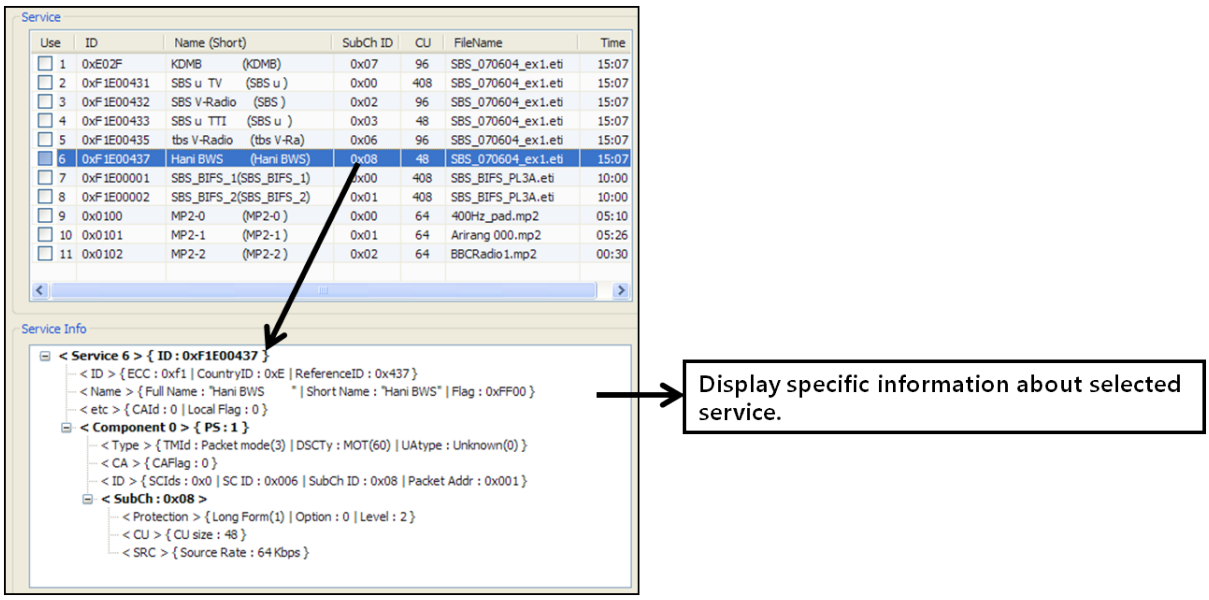
4. Edit Window

Select 'Edit' button for editing configurations.

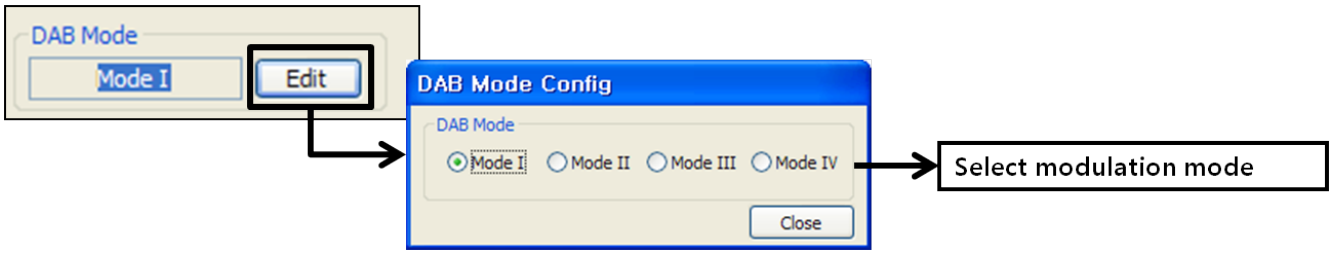



DAB Mode
Mode I
Edit
Service
0 / 11
Used CU
0 / 864
Ensemble
ID: 0x0000
LUMANTEK
LUMANTEK
Edit
Display and edit DAB modulation mode
Display service (used / total)
Display CU (used / total)
Display and edit ensemble information.
Ensemble ID / Ensemble full name / Ensemble Short name

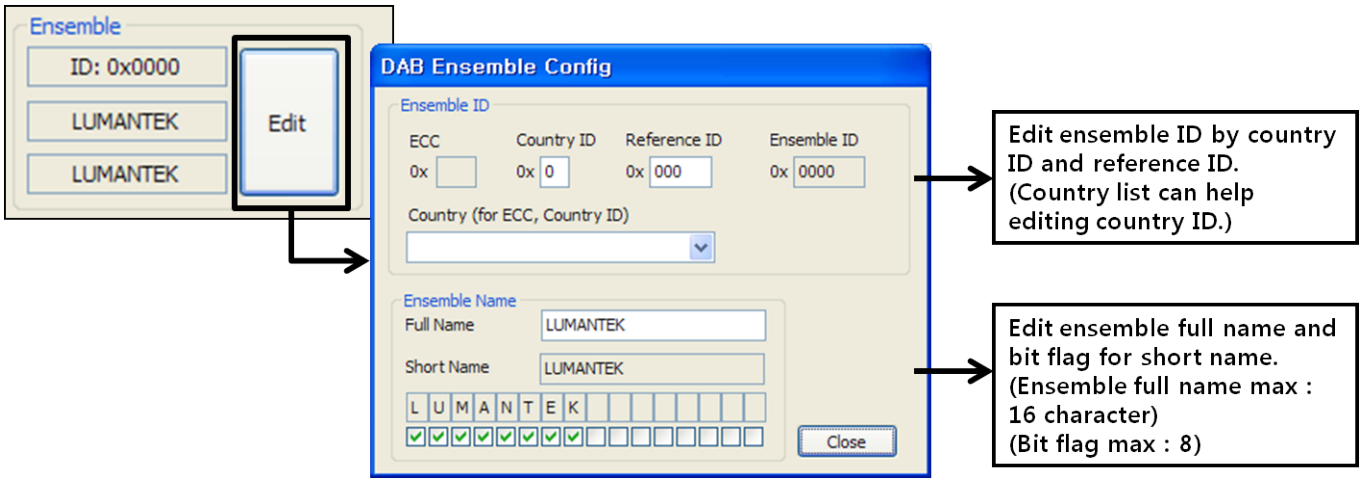

Service
Use ID Name (Short) SubCh ID CU FileName Time
1 0xE02F KDMB (KDMB) 0x07 96 SBS_070604_ex1.eti 15:07
2 0xF1E00431 SBS u TV (SBS u) 0x00 408 SBS_070604_ex1.eti 15:07
3 0xF1E00432 SBS V-Radio (SBS) 0x02 96 SBS_070604_ex1.eti 15:07
4 0xF1E00433 SBS u TTI (SBS u) 0x03 48 SBS_070604_ex1.eti 15:07
5 0xF1E00435 tbs V-Radio (tbs V-Ra) 0x06 96 SBS_070604_ex1.eti 15:07
6 0xF1E00437 Hani BWS (Hani BWS) 0x08 48 SBS_070604_ex1.eti 15:07
7 0xF1E00001 SBS_BIFS_1(SBS_BIFS_1) 0x00 408 SBS_BIFS_PL3A.eti 10:00
8 0xF1E00002 SBS_BIFS_2(SBS_BIFS_2) 0x01 408 SBS_BIFS_PL3A.eti 10:00
9 0x0100 MP2-0 (MP2-0) 0x00 64 400Hz_pad.mp2 05:10
10 0x0101 MP2-1 (MP2-1) 0x01 64 Arirang 000.mp2 05:26
11 0x0102 MP2-2 (MP2-2) 0x02 64 BBCRadio1.mp2 00:30
Display services with simple information
Use check / Service ID / Service Name (short) / Used SubCh ID / CU / FileName / Total play Time)
Select service to output


Service
Use ID Name (Short) SubCh ID CU FileName Time
1 0xE02F KDMB (KDMB) 0x07 96 SBS_070604_ex1.eti 15:07
2 0xF1E00431 SBS u TV (SBS u) 0x00 408 SBS_070604_ex1.eti 15:07
3 0xF1E00432 SBS V-Radio (SBS) 0x02 96 SBS_070604_ex1.eti 15:07
4 0xF1E00433 SBS u TTI (SBS u) 0x03 48 SBS_070604_ex1.eti 15:07
5 0xF1E00435 tbs V-Radio (tbs V-Ra) 0x06 96 SBS_070604_ex1.eti 15:07
6 0xF1E00437 Hani BWS (Hani BWS) 0x08 48 SBS_070604_ex1.eti 15:07
7 0xF1E00001 SBS_BIFS_1(SBS_BIFS_1) 0x00 408 SBS_BIFS_PL3A.eti 10:00
8 0xF1E00002 SBS_BIFS_2(SBS_BIFS_2) 0x01 408 SBS_BIFS_PL3A.eti 10:00
9 0x0100 MP2-0 (MP2-0) 0x00 64 400Hz_pad.mp2 05:10
10 0x0101 MP2-1 (MP2-1) 0x01 64 Arirang 000.mp2 05:26
11 0x0102 MP2-2 (MP2-2) 0x02 64 BBCRadio1.mp2 00:30
Service Info
< Service 6 > { ID : 0xF1E00437 }
< ID > { ECC : 0xf1 | CountryID : 0xE | ReferenceID : 0x437 }
< Name > { Full Name : "Hani BWS " | Short Name : "Hani BWS" | Flag : 0xFF00 }
< etc > { CAId : 0 | Local Flag : 0 }
< Component 0 > { PS : 1 }
< Type > { TMId : Packet mode(3) | DSCTy : MOT(60) | UAtype : Unknown(0) }
< CA > { CAFlag : 0 }
< ID > { SCIds : 0x0 | SC ID : 0x006 | SubCh ID : 0x08 | Packet Addr : 0x001 }
< SubCh : 0x08 >
< Protection > { Long Form(1) | Option : 0 | Level : 2 }
< CU > { CU size : 48 }
< SRC > { Source Rate : 64 Kbps }
Display specific information about selected service.

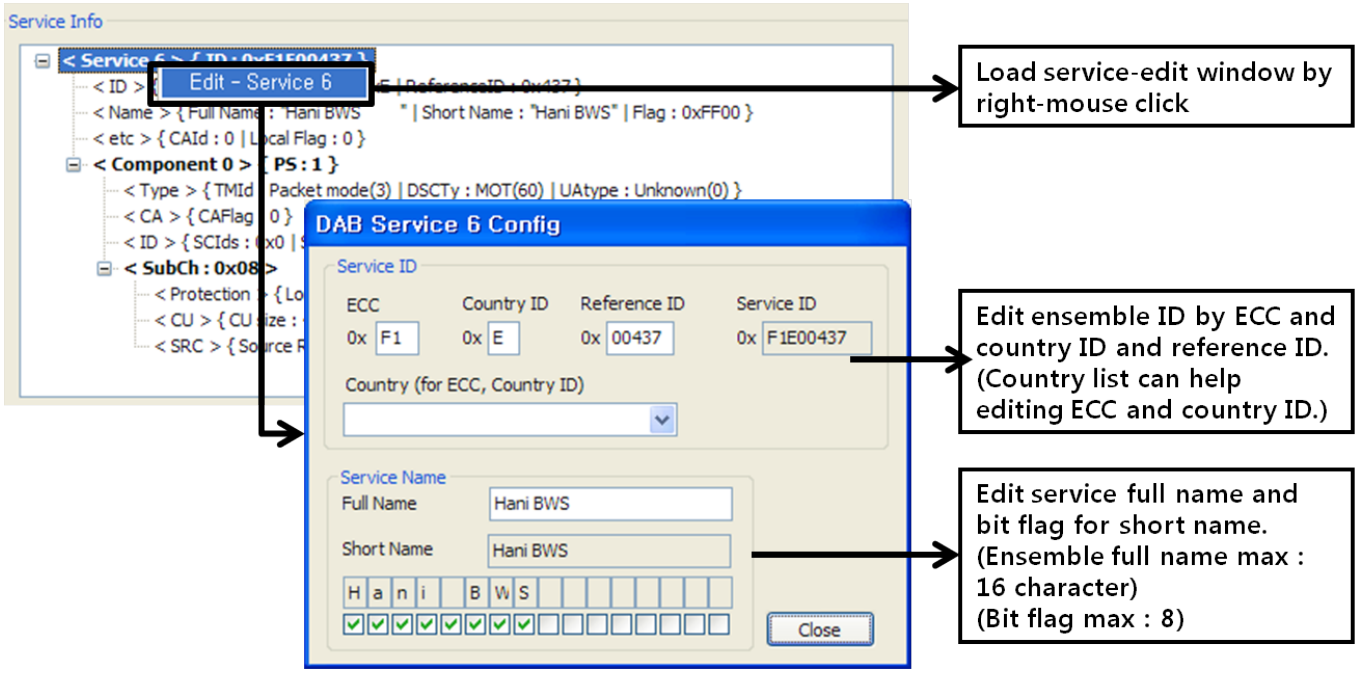
4-1. Click DAB mode 'edit' button for dab mode change.



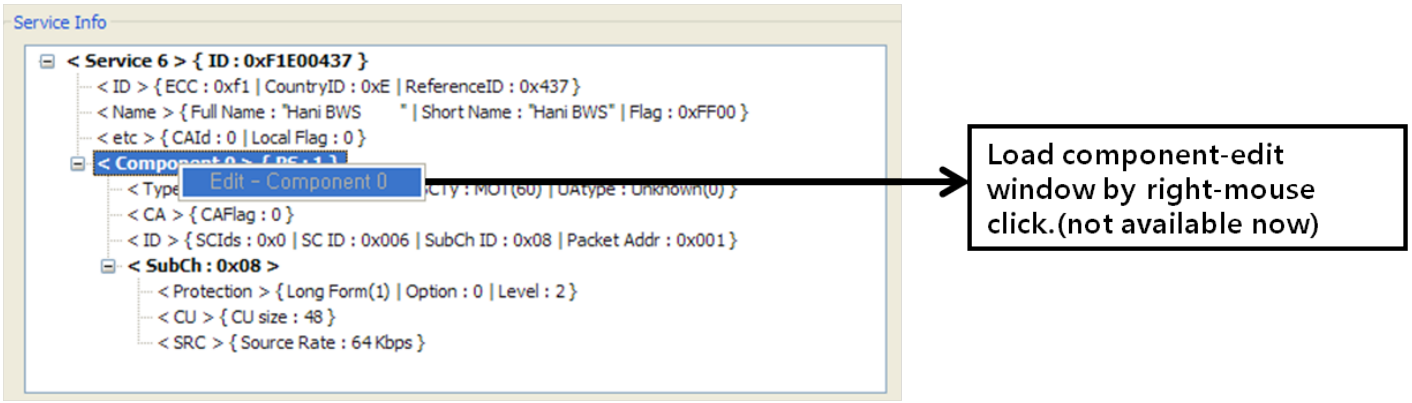
4-2 Click ensemble 'edit' button for ensemble edit.



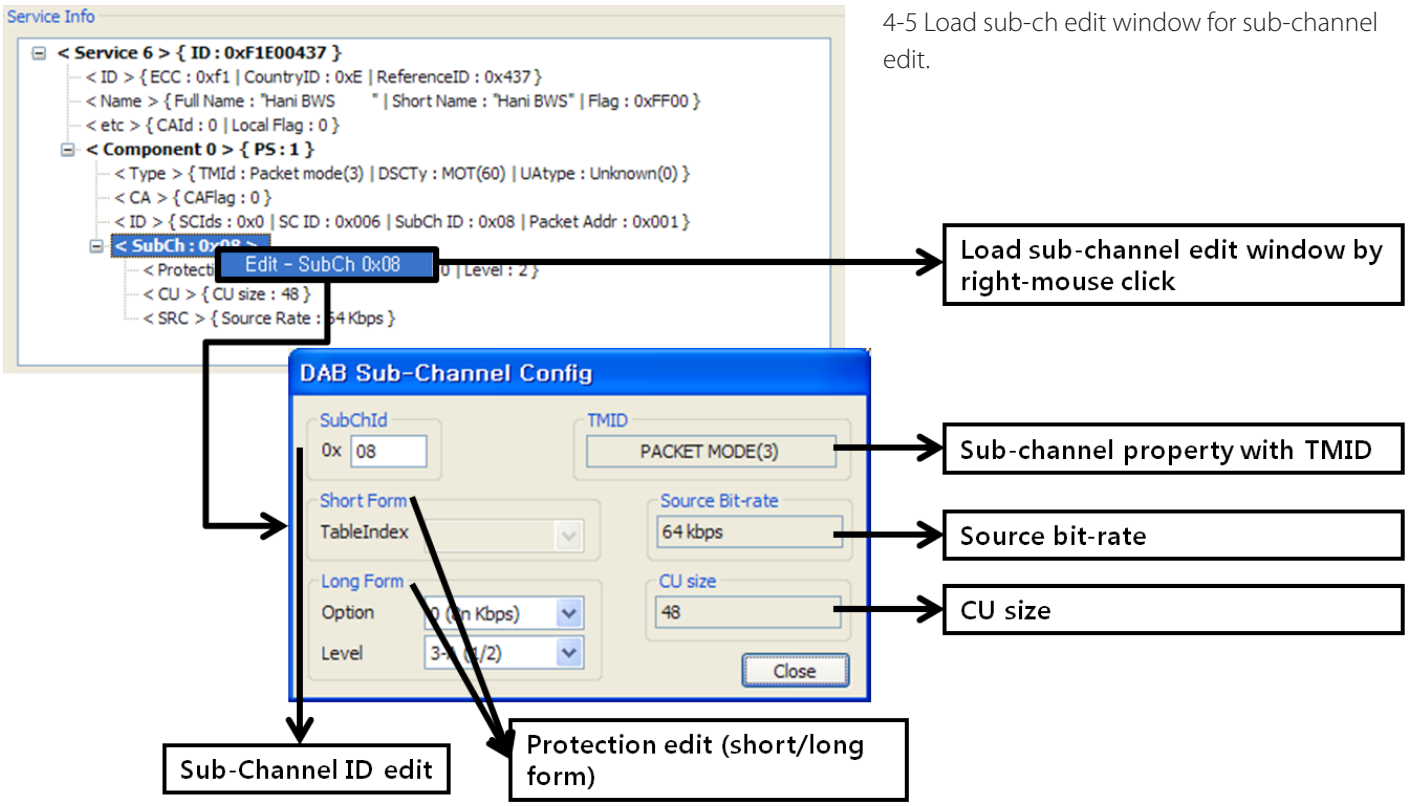
4-3 Load service edit window for service edit.



4-4 Load component edit window for component edit.

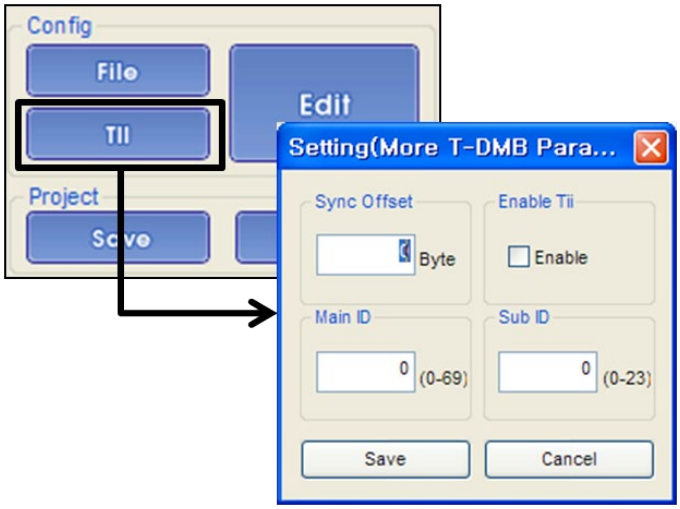


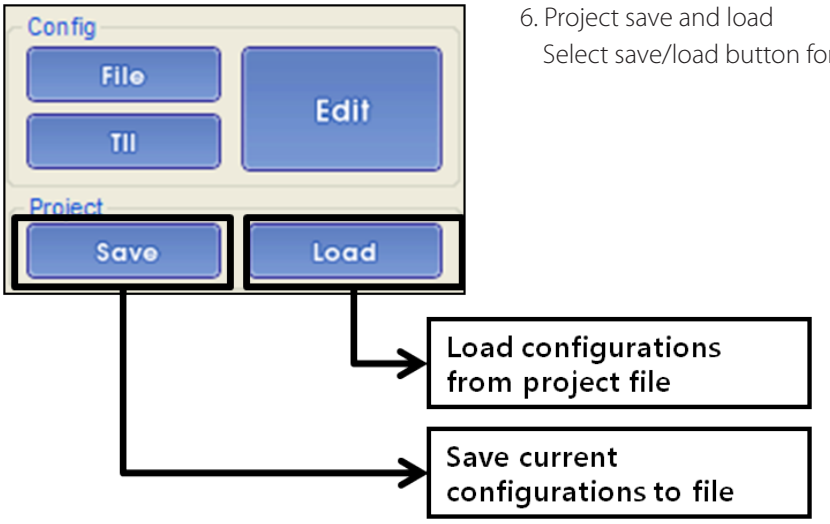
4-5 Load sub-ch edit window for sub-channel edit.



5. TII Window

Select TII Button for edit TII information.

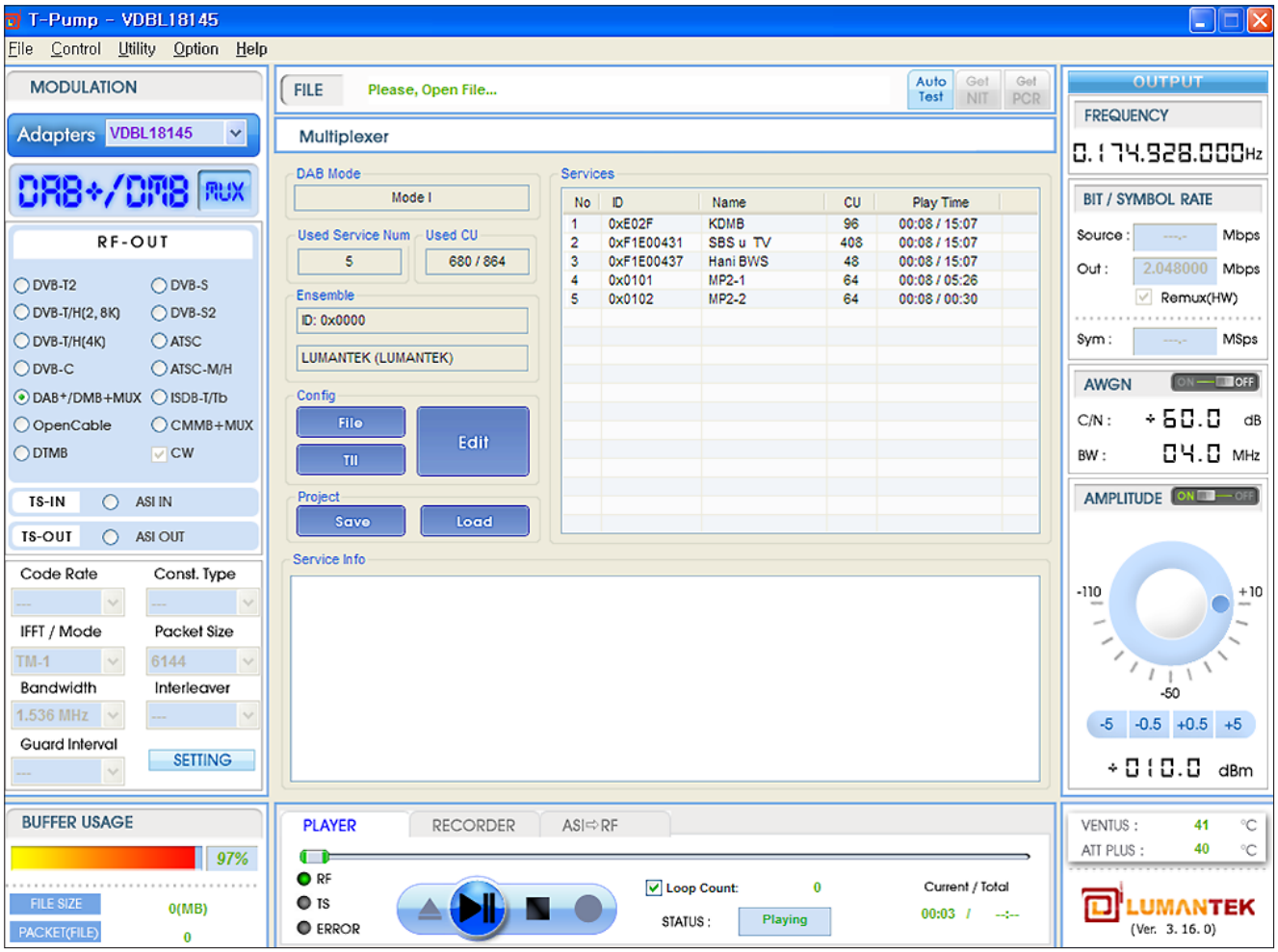




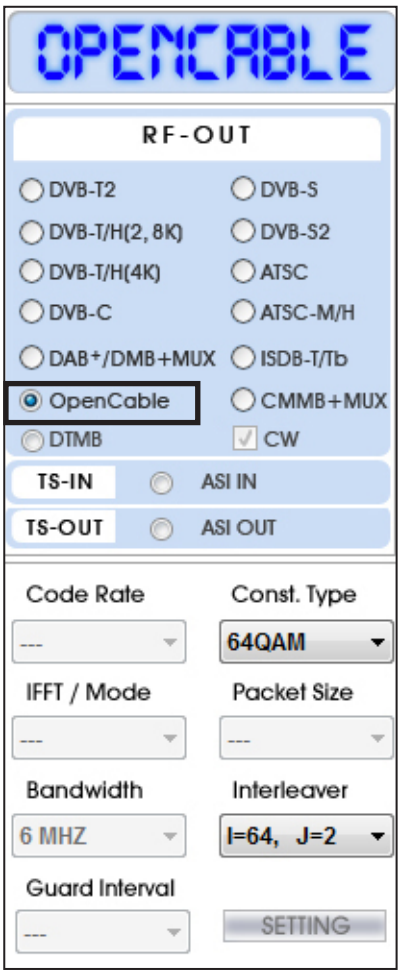
6. Project save and load
Select save/load button for project save/load to/from file.

7. Set frequency in the Output panel then start transmitting it as RF. In the case of using AMP & Attenuator, you can adjust power level in the Amplitude menu.

8. When AMP & Attenuator is used, a user must click [ON] on the amplitude window. Power level changes between +7 dBm(+3dbm over frequency of 1GHz) ~ -110 dBm per 0.5dB step by Jog Shuttle or per 0.1dB by keyboard input.



4.12 / RF Output Option : OpenCable

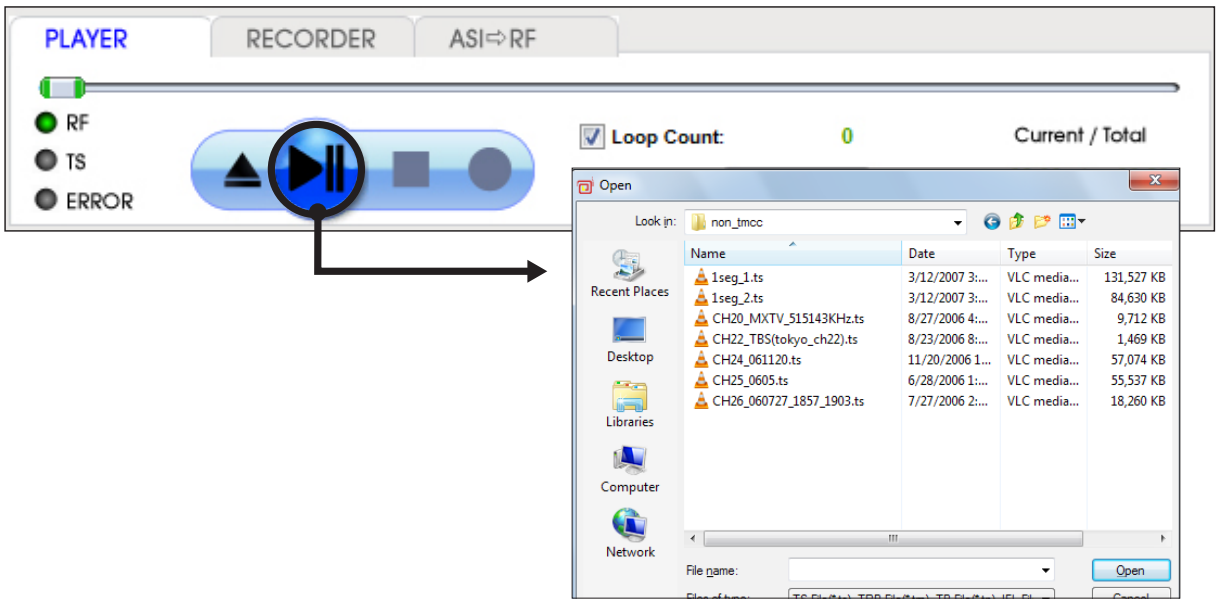


1. Top Left Menu in T-pump will change QAM-B when select OpenCable option.

*

Items	Value
Const. Type	64 QAM 256 QAM
CW/I/J	I=128 J=1
	I=128 J=2
	I=64 J=2
	I=128 J=3
	I=32 J=4
	I=128 J=4
	I=16 J=8
	I=128 J=5
	I=8 J=16
	I=128 J=6
	I=128 J=7
	I=128 J=8

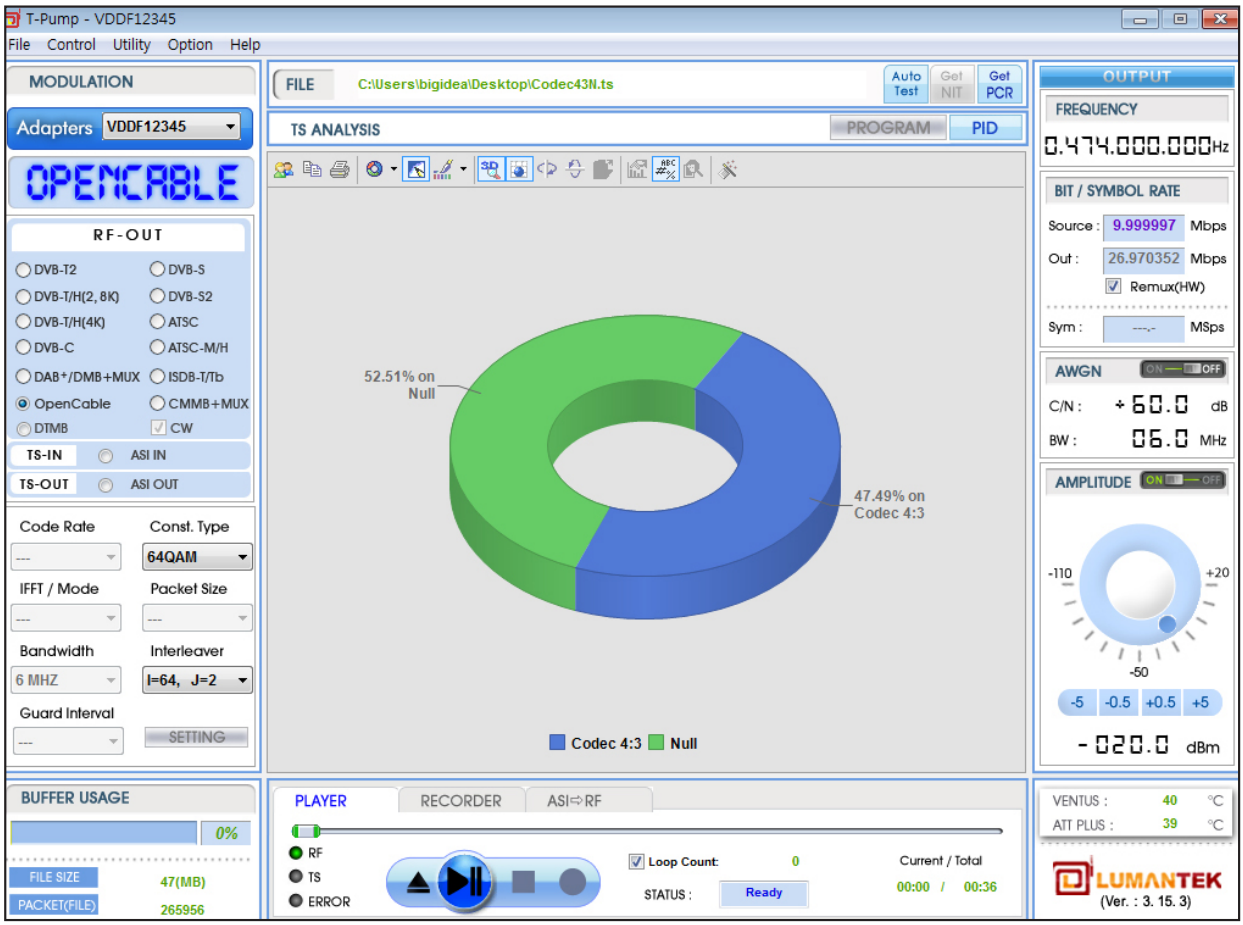
2. Select OpenCable option, then click file open button(and select [*.trp, *.tp] to do RF Output.



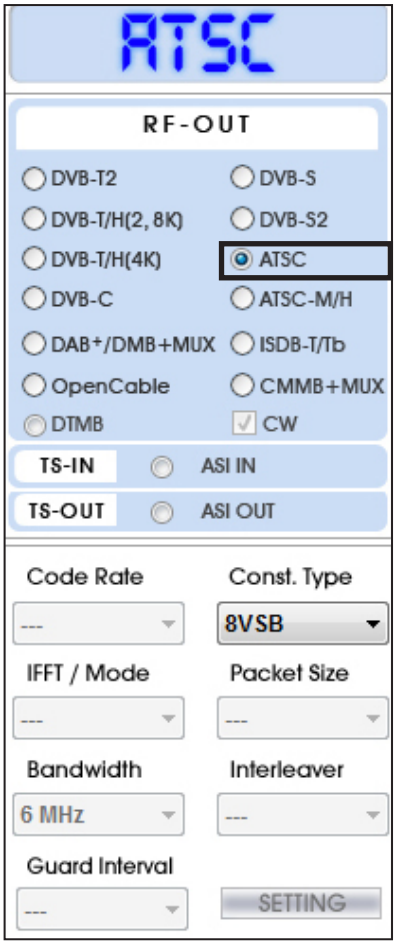
3. After selecting the file, you need to set value among 64QAM, 256QAM and CW/I/J under RF sub menu.

4. Set frequency in the Output panel then start transmit it as RF. In the case of using AMP & Attenuator, you can adjust power level in the Amplitude menu.

5. When you use AMP & Attenuator, you must click [ON] on the amplitude window. Power level changes between +7 dBm(+3dbm over frequency of 1GHz) ~ -110 dBm per 0.5dB step by Jog Shuttle or per 0.1dB by keyboard input.



4.13 / RF Output Option : ATSC

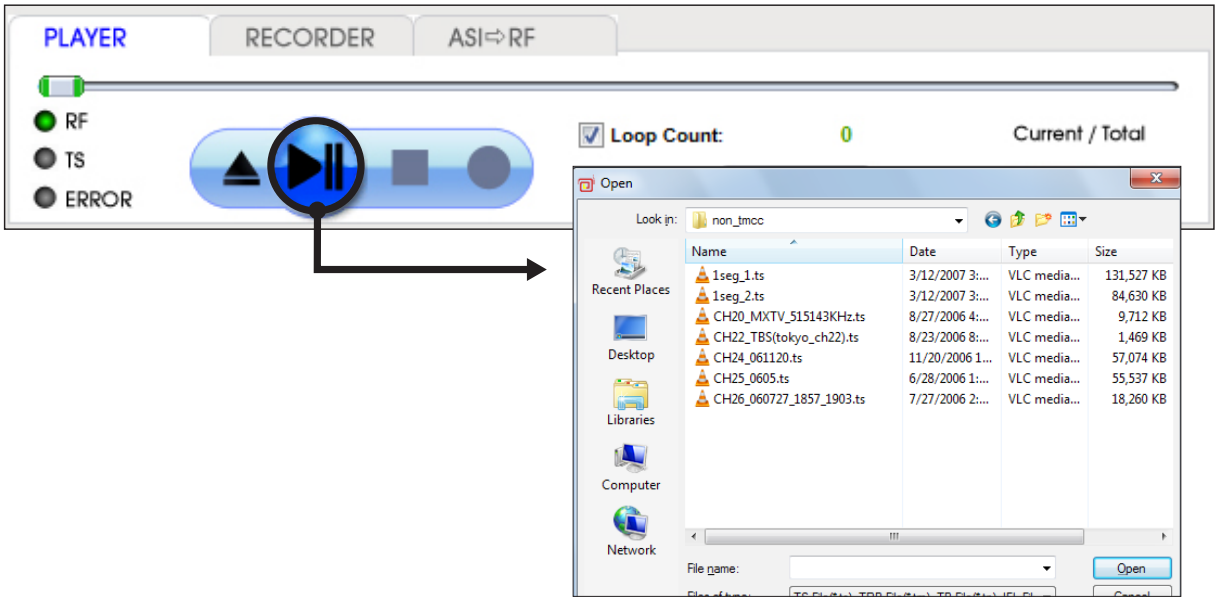


1. Top Left Menu in T-pump will change as ATSC when select ATSC option.

* ATSC Parameter Value

Items	Value
Const. Type	8VSB

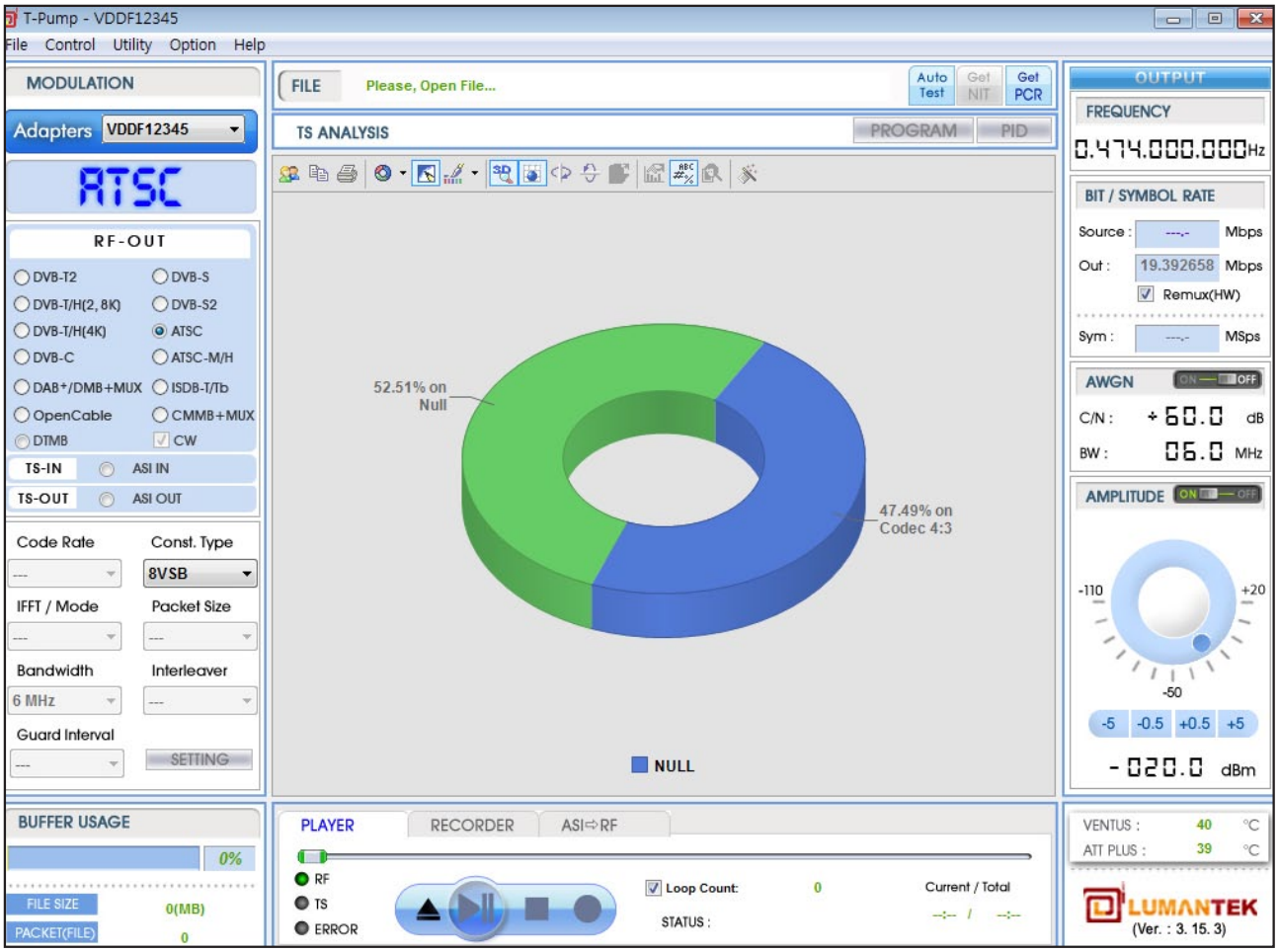
2. Select ATSC option, Click file open button(⏏) and select [*.trp] or [*.tp] to do RF Output.



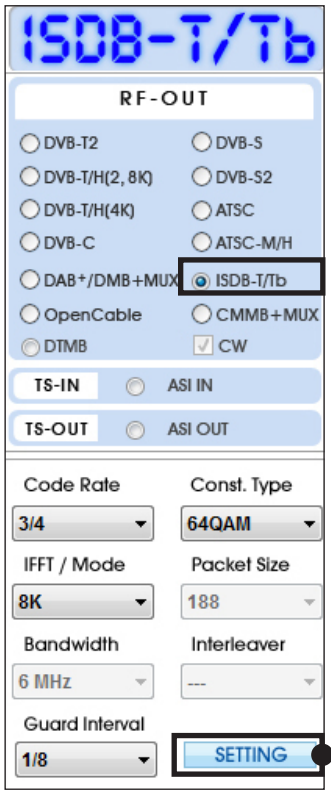
3. This RF Output option can set only 8VSB. Simply open stream file and set frequency and then play under PLAYER tab.

4. Set frequency in the Output panel then start transmit it as RF. In the case of using AMP & Attenuator, you can adjust power level in the Amplitude menu.

5. When you use AMP & Attenuator, you must click [ON] on the amplitude window. Power level changes between +7 dBm(+3dbm over frequency of 1GHz) ~ -110 dBm per 0.5dB step by Jog Shuttle or per 0.1dB by keyboard input.



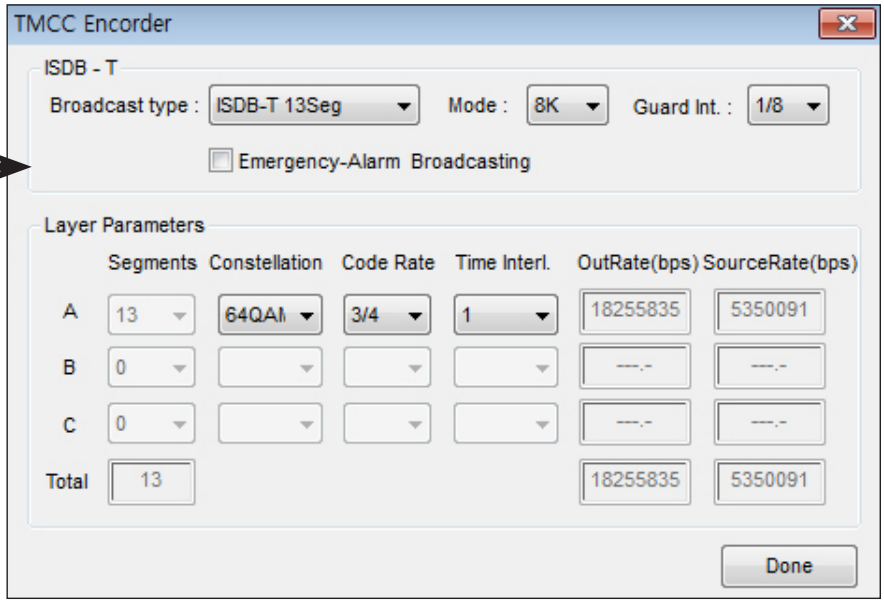
4.14 / RF Output Option : ISDB-T/Tb



1. Top Left Menu in T-pump will change as ISDB-T /B when select ISDB-T/B option.

* ISDB-T/Tb Parameter Value

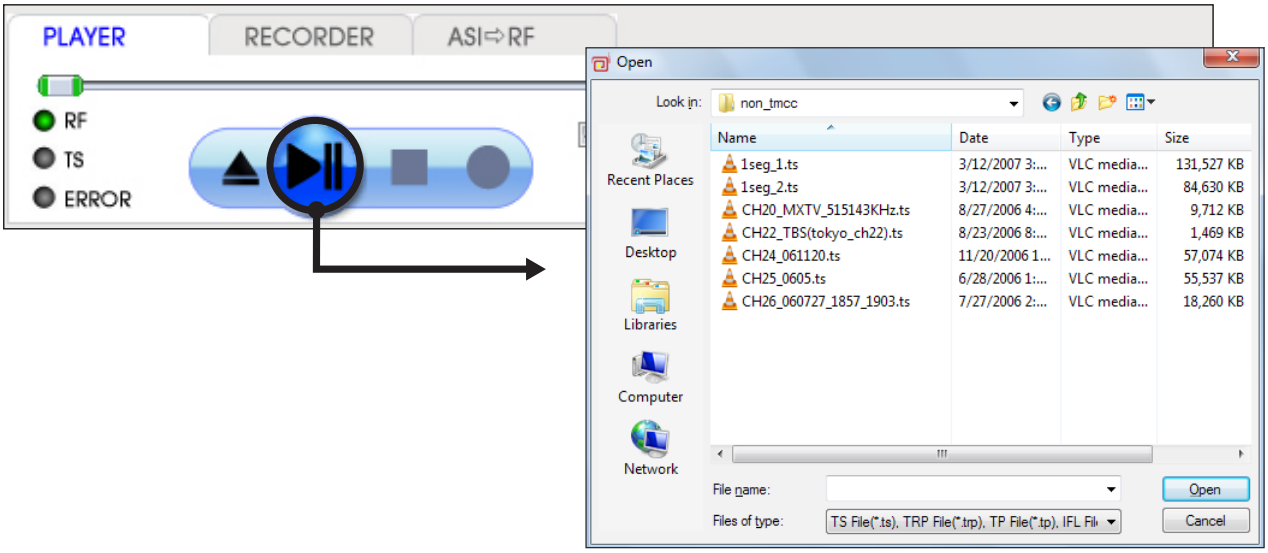
Items	Value
Code Rate	1/2, 2/3, 3/4, 5/6, 7/8
Const. Type	QPSK, 16 QAM, 64 QAM
IFFT /Mode	2K, 8K, 4k
Guard Interval	1/4, 1/8, 1/16, 1/32



2. T-pump Ver 2.2.0 supports the ISDB-T 1, 3, 13 Seg mode. However, 13 Seg (Full Seg) mode need to play it after creat the seperated file. In the 1 Seg , open the file and set options like above images then click [Done].

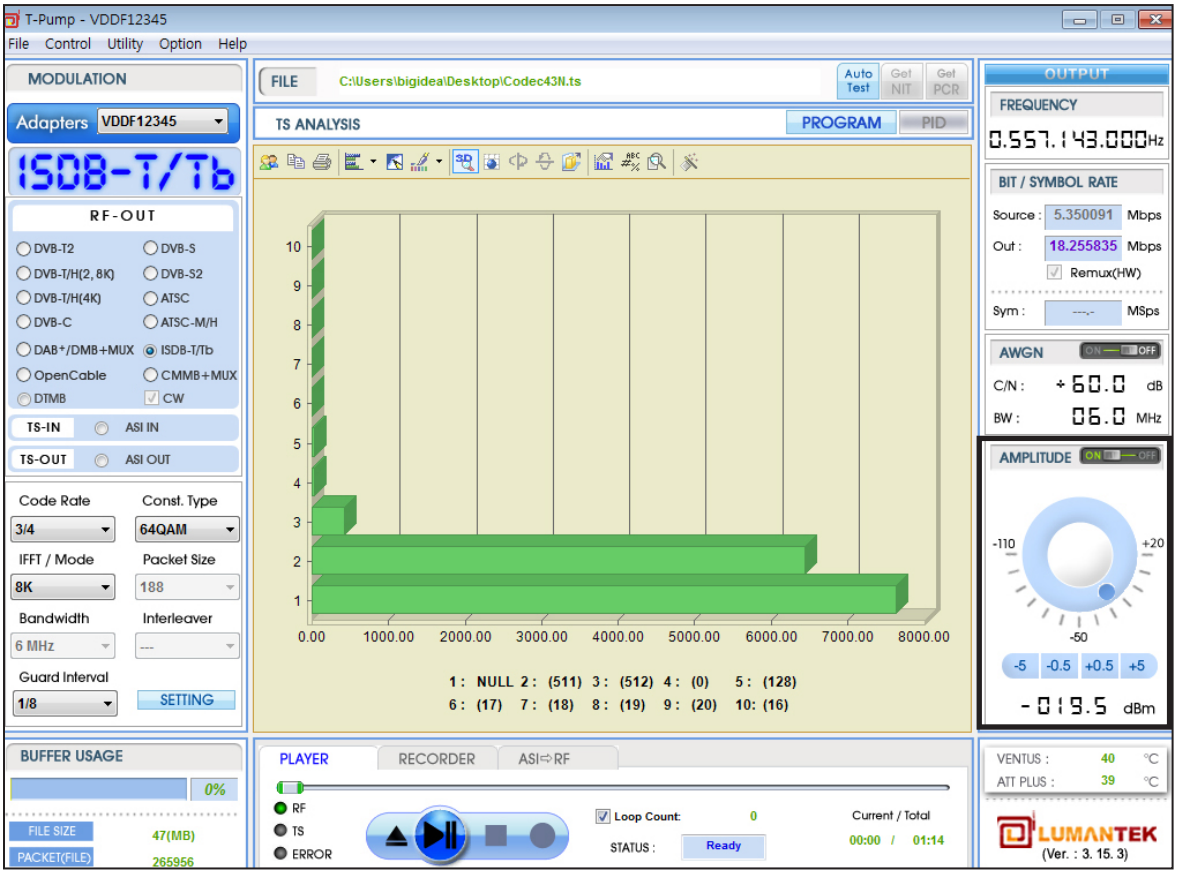
* This supports all Non-TMCC and TMCC stream files.

3. Select ISDB-T option, Click file open button( ) and select *.trp or *.tp to do RF Output.

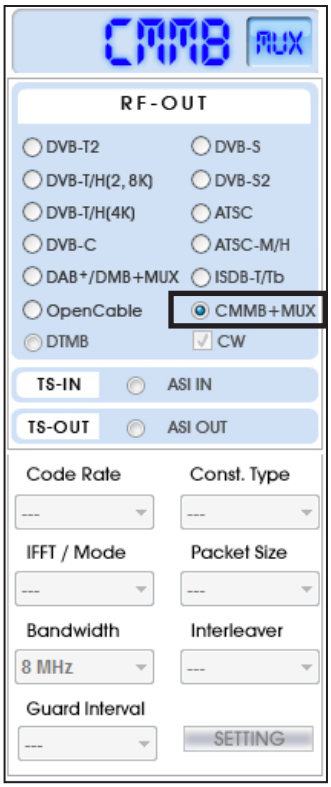


4. Set frequency in the Output panel then start transmit it as RF. In the case of using AMP & Attenuator, you can adjust power level in the Amplitude menu.

5. When you use AMP & Attenuator, you must click [ON] on the amplitude window. Power level changes between +7 dBm(+3dbm over frequency of 1GHz) ~ -110 dBm per 0.5dB step by Jog Shuttle or per 0.1dB by keyboard input.



4.15 / RF Output Option : CMMB

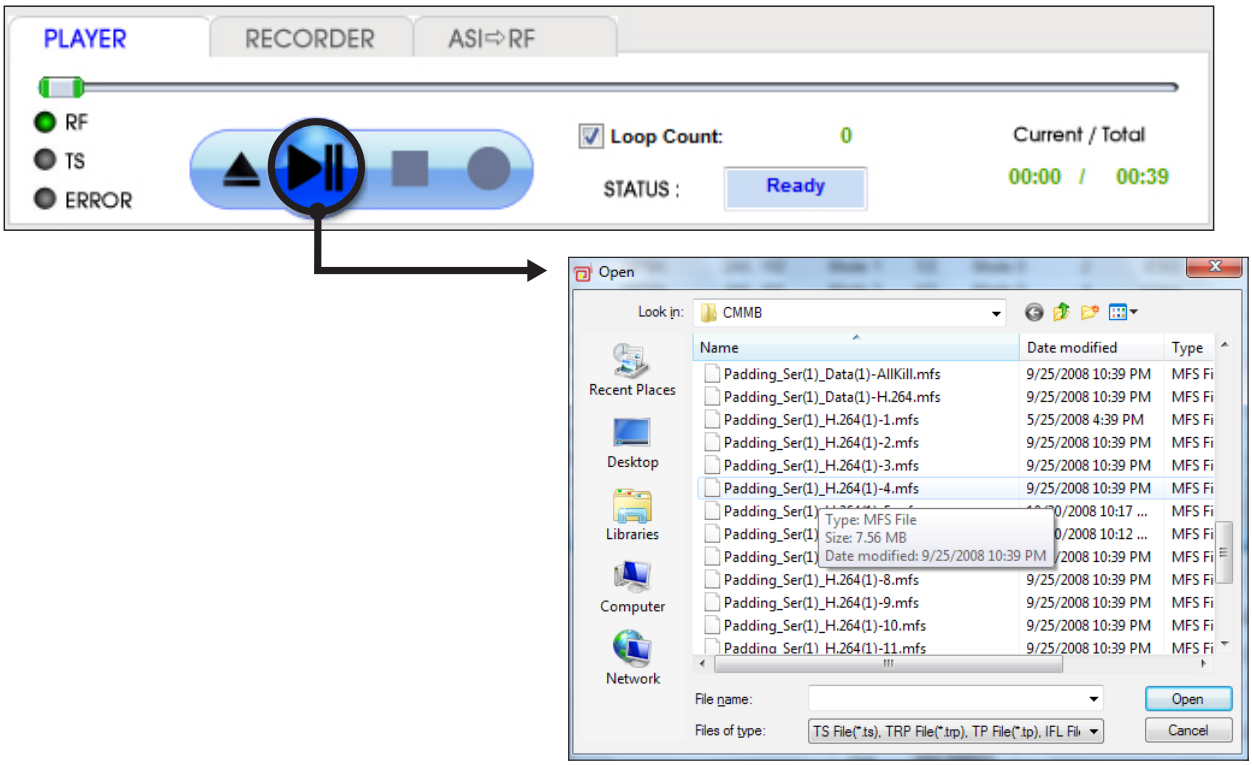


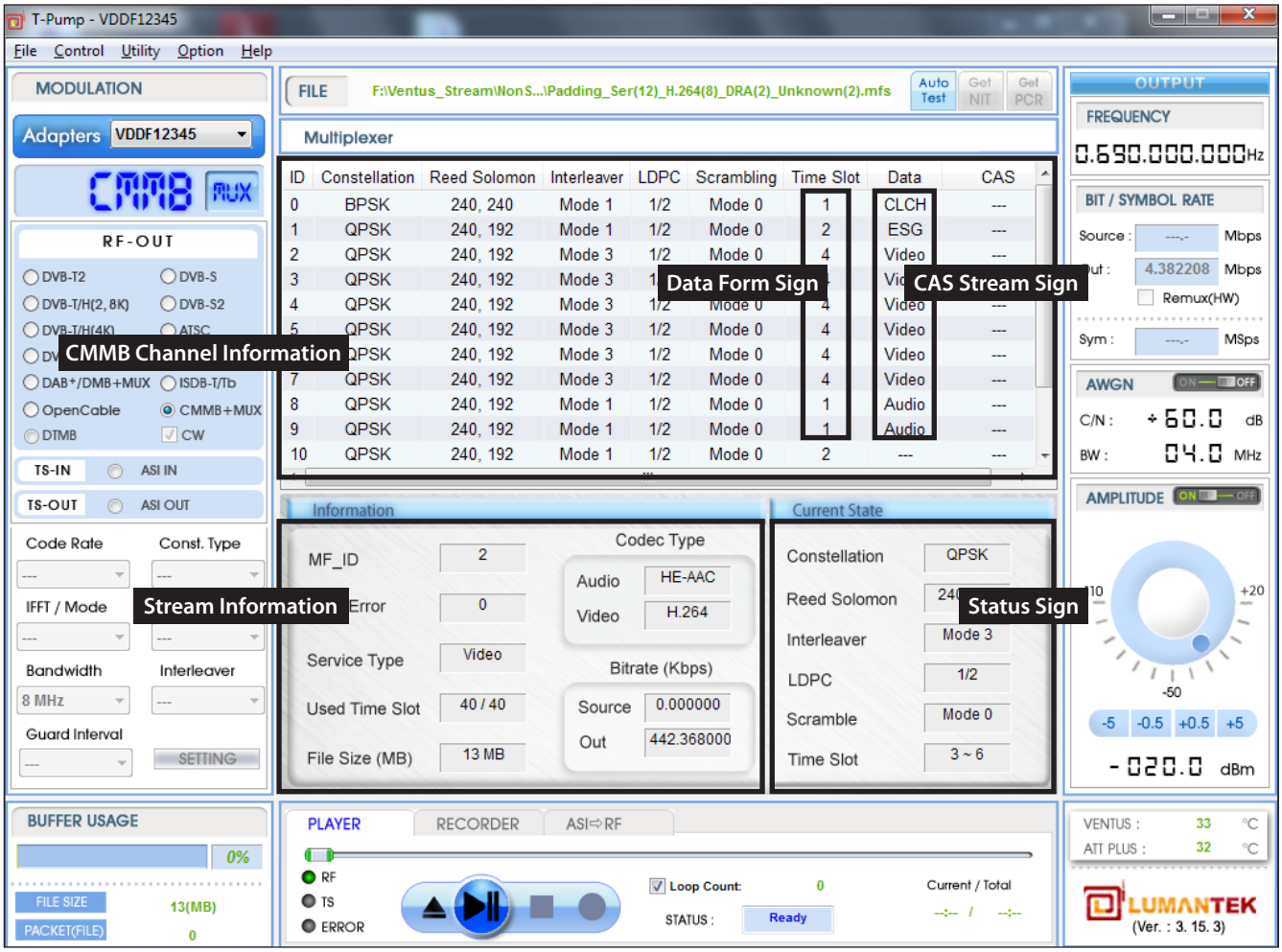
1. Top Left Menu in T-pump will change as CMMB when select CMMB option.

*CMMB Parameter Value

Items	Value
Constellation	BPSK, QPSK, 16QAM
Reed Solomon	240.240 240.224 240.192 240.176
Interleaver	Mode1, Mode2, Mode3
LDPC	1/2, 3/4
Time Slot	Organized and freely use # 40.
Codec Type	Audio, Video
Bit rate	Source, out Bitrate

2. After Selecting CMMB option, Once you've selected for testing of CMMB mfs, mmx RF output to a file, on the Open button and then click the file, select the file you want.





CMMB UI can intuitively check the each of the stream channel information for the file MFID, type of service, Time Slot, the file size, codec information, and transmission status.

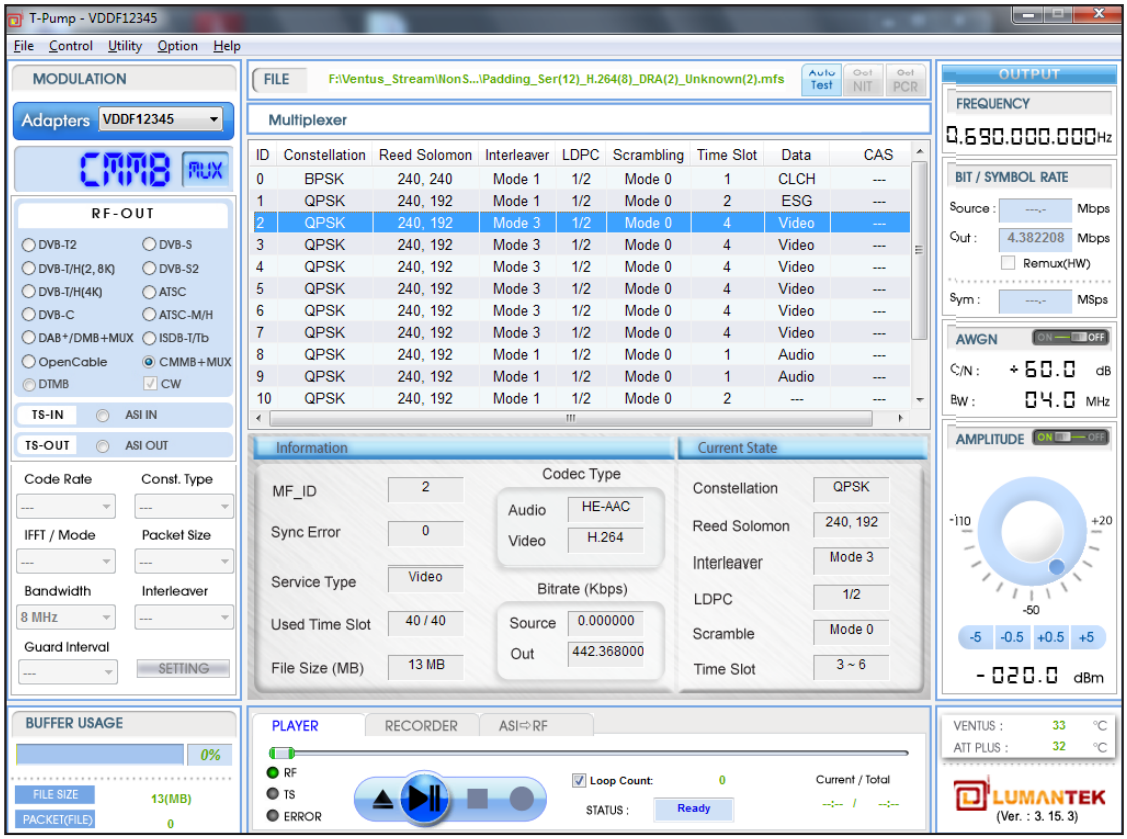
3. When you are testing manual for each channel of the CMMB, you can select the channels you want.

Constellation	BPSK, QPSK, 16QAM
Reed Solomon	240.240 / 240.224 240.192 / 240.176
Interleaver	Mode1, Mode2, Mode3
LDPC	1/2, 3/4
Time Slot	Organized and freely use # 40.
Data	CLCH, ESG, Video
Scrabling	--

- **Constellation**

Modulation Method : BPSK, QPSK, 16QAM B etween each frame can be set up independently, but the frame with MF_ ID 0 is set up with BPSK.

Constellation is relate to the amount of data that can carry the load (bps), 16 QAM is 2 times of QPSK, and 2 times of BPSK. In these circumstances, If 3 in the ID of the frame to Constellation, such as the following to change the BPSK will be displayed in red.

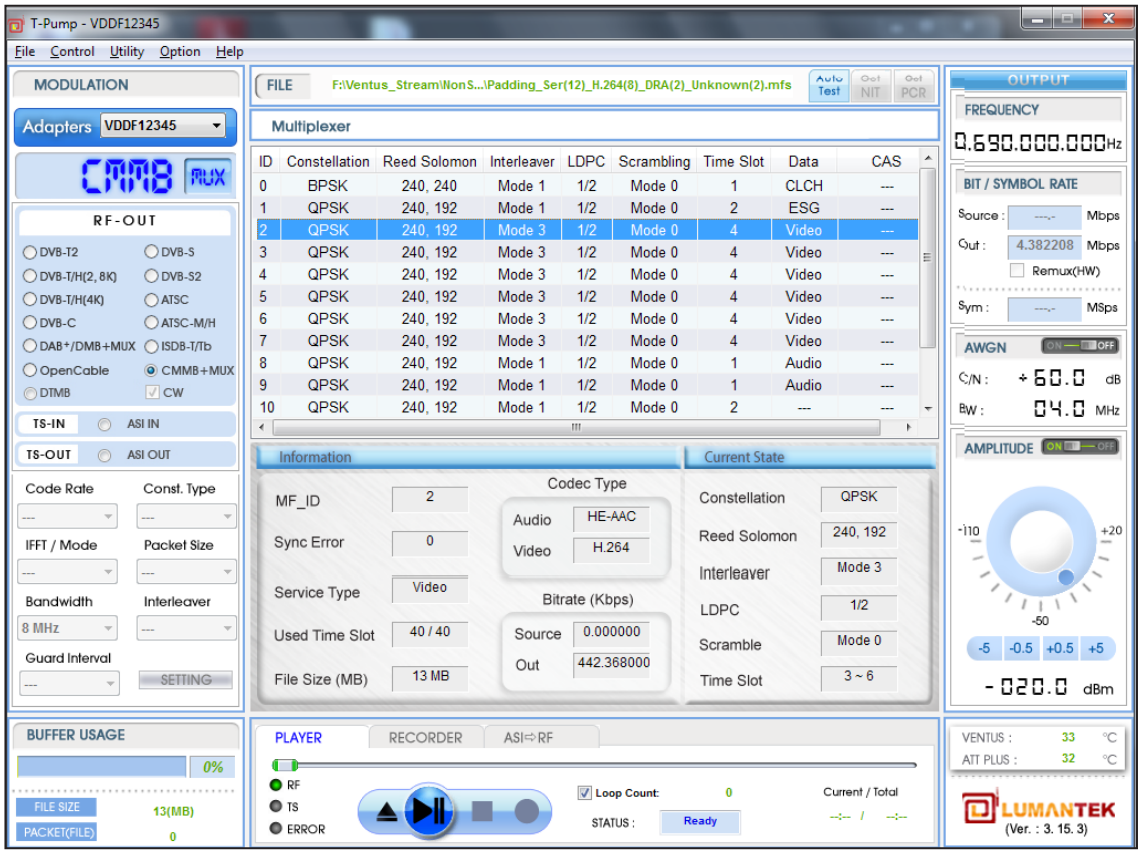


It change to rad line when you change QPSK to BPSK. Because of the data reduce to half Size, it can not handle the source rate.

- **Reed Solomon**

In (240, k) k = 172, 196, 224, 240, k is the data that entered in the Reed Solomon. It can be set each frame independently, but 0 in the CLCH MF_ID is sent to (240, 240).

(240, 196) is 196 bytes of 240 bytes, and 16 bytes is the parity Check bit. If the K become larger, the data weights will be higher in 240 bytes. So, the out bit rate become Higher.



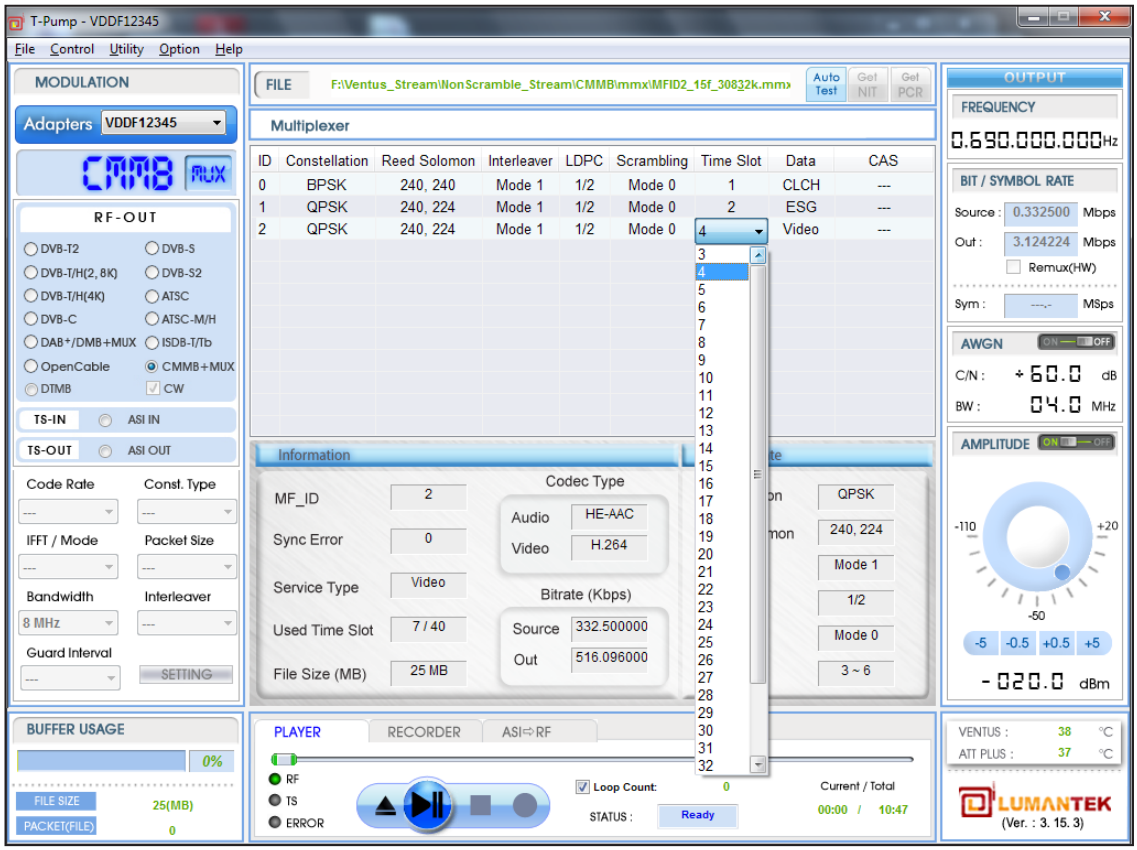
Once made 240,240 higher the out bit rate, When the data capacity reduced replace in QPSK BPSK can not fill yet still receive the red line.

- **LDPC**

LDPC is error-correction techniques in the CMMB Method. B etween each frams, any values can be set, but 0 in the CLCH MF_ID is transmite 1 / 2. LDPC has two parameters(1/2. 3/4).

In conceptual theory, the 1/2 is add up 1 bite of parity input per 1 bite of input, totally make 2 bite of output.

And every per 2 bit of output transports 1 bit of information, and final, become 1/2 bit rate. And 3/4 is add up 1 bite of parity per 3 bit of input, totally make 4 bit of output, and every per 4 bit of output transports 3 bit of information, and final, become 3/4 bit rate.



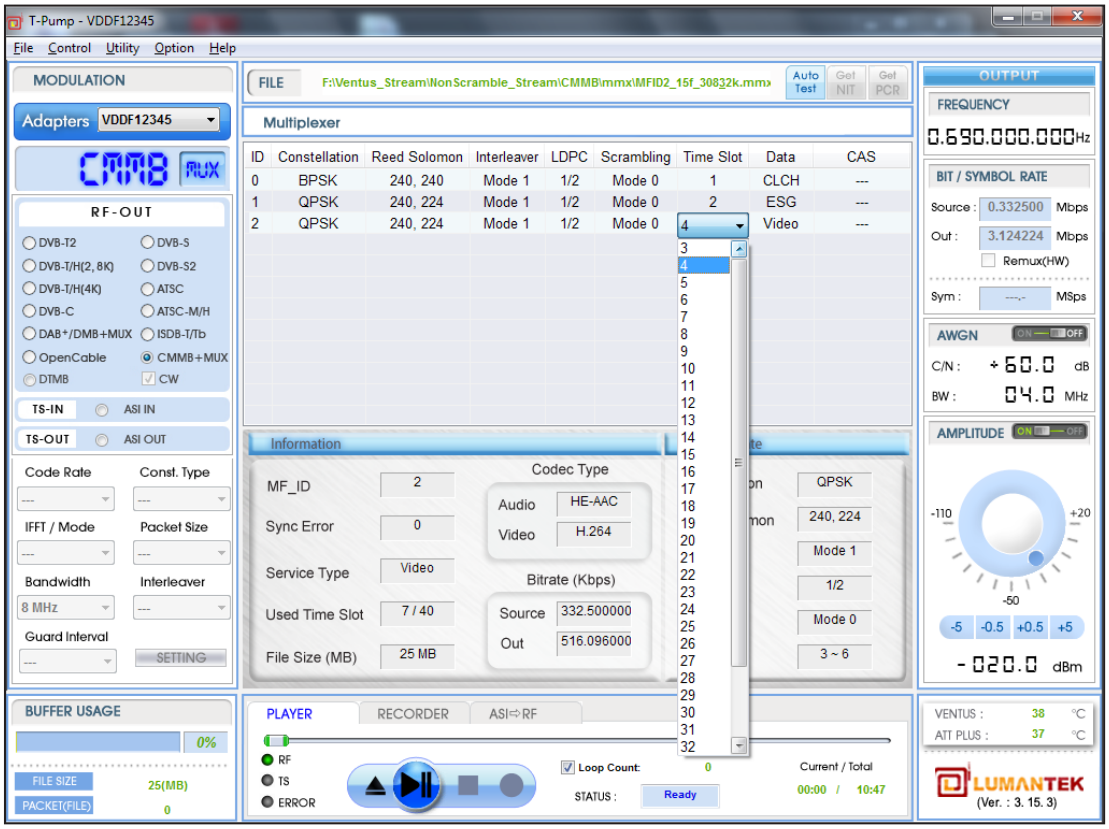
Once made 240,240 higher the out bit rate, When the data capacity reduced replace in QPSK BPSK can not fill yet still receive the red line.

- **Time Slot**

CMMB is transfer 1 divided by 40 seconds unit. This unit is called Time Slot.

This means that an early time slot is 40. Intuitively, If you have a lot of time slot, you can send more data.

A Time slot can have a number of frames. There are some limitations depending on Interleaving Mode.



It tells about the list of the number of time slot. However, as it says, the value can not be the same as always.
When selecting 6 from the list, out rate has been higher than Source rate, the setting is not properly operate.

Interleaver

Interleaving is a data mixing process. The buffer change depending on the size of mode. It's just because Interleaving mixing data does not affect the bit rate.

Scramble

Scramble is the process to random the data. It generates a random number of random columns, and the original data is added to the process. A random group of the number has column eight.
Selecting this group called the scrambling mode . Some do not care if you select a value, the scramble mode to be 0 CLCH that are set forth in the standard.

Now, the group is ready.

1. Output from the menu to test the transmission frequencies will be set up after the RF.
   -> If you are using AMP & Attenuator Amplitude button, you can adjust the power level.
2. AMP & Attenuator AMPLITUDE ON, this must be used, must make sure that you are after.
   P ower level control to be controlled, +7 dBm(+3dbm over frequency of 1GHz) ~-110dBm, and minor changes in the shuttle and a 0.5dB If you enter a number directly Adjustable unit is 0.1 dB.
3. One Multi-channel from channel to channel stream files, if you need to add a T-PUMP Multiplexer in the middle of the menu when you click the right mouse button to add or delete channels are available.

❹ One channel stream file open button, select Open, then again, you receive the following pop-up menu.
--> When adding Channel: (Yes), When reset the Chennel: (NO)

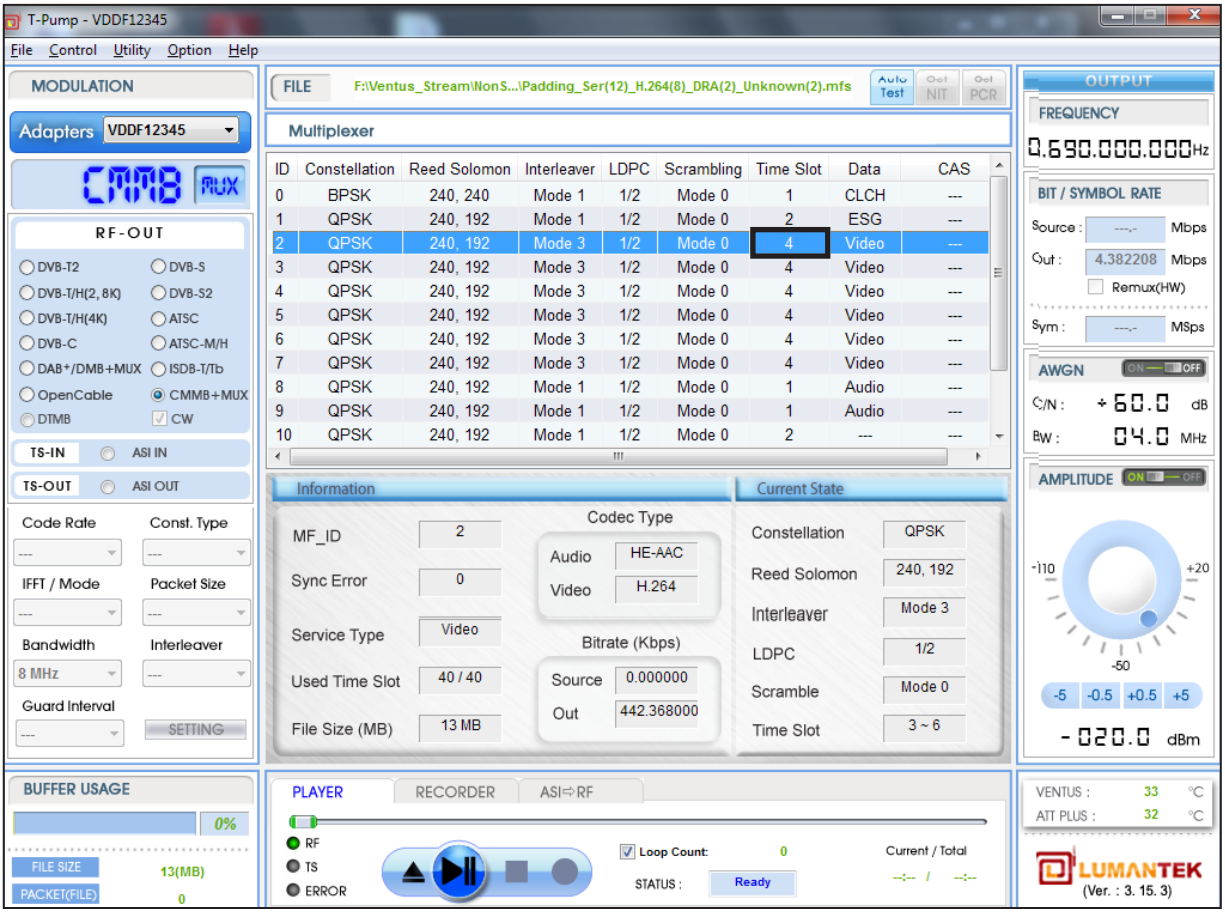
❺ In 3.1.0 Version, if the CLCH's channel information and the actual multi mfs. stream does not match with service number, then the pop up window will show as below.

*** How to bitrates Setting example case with Alarm functioning.**

If User set to BPSK, then see the Red BAR on time-slot, that means, try to shows "Error Alarm " ,Cause by user's current setting,
bring up Output Bitrates bigger then Source bitrates. And need to re-configuration again. 16 QAM. And please re-scan, then enable to decode again.

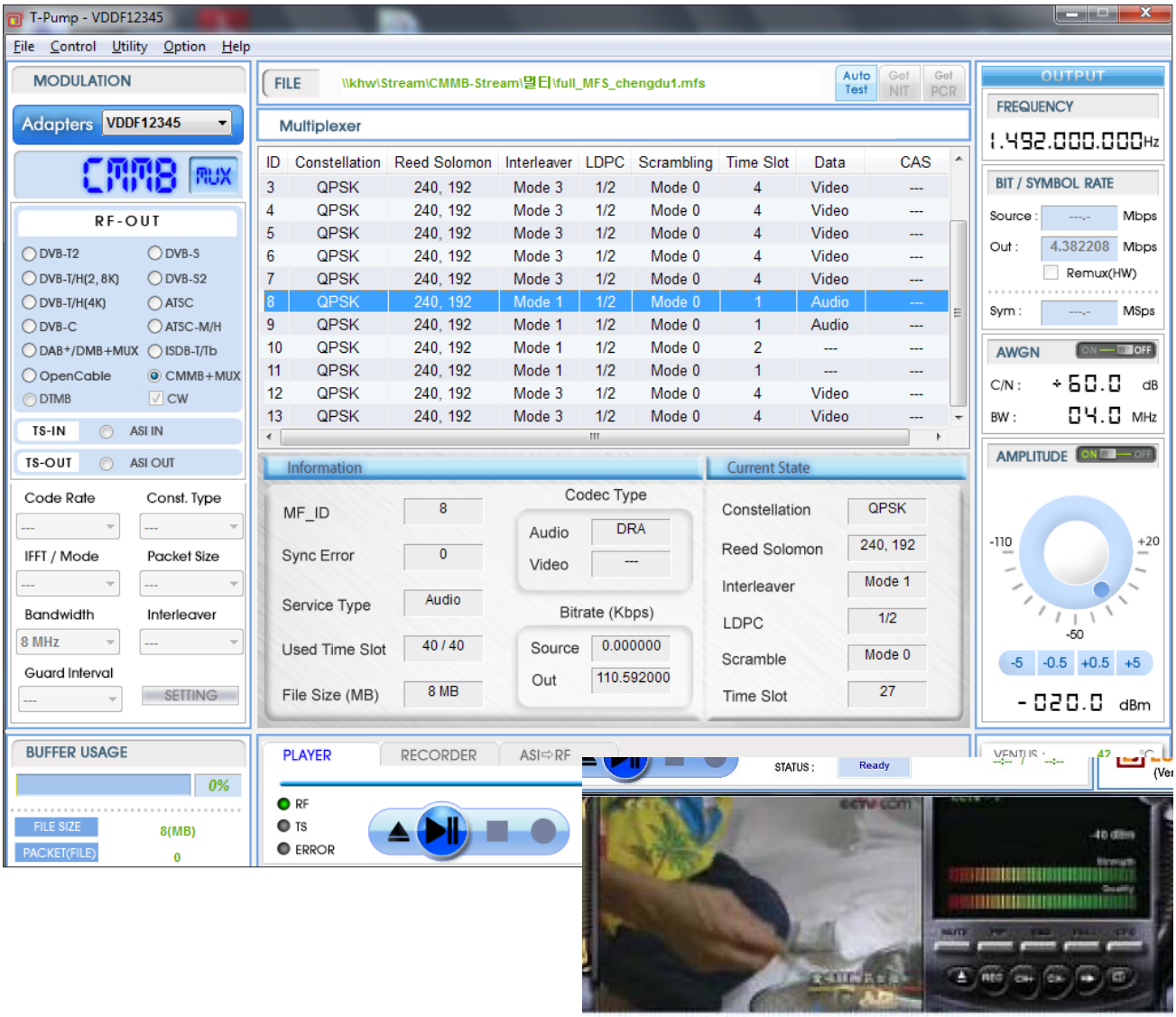
Change set 16 QAM to BSPSK in Constellation section, Alarm (Red-Bar) is appeared, due to Bitrates Error.
Then mean User's source (file) bitrates Is bigger than output bitrates, and need to be resetting.

BPSK is low bitrates, then 16 QAM and required more time slot for fulfill. But the current slot is already 40 slot, and no more Slot space avalible..



Then Delete one service (MUX FRAME) ID: 13 or whatever slot has 4 time-slot, and now, time-slot changed to 36/40
Then, We have extra 4 slot space now from Max 40 slot

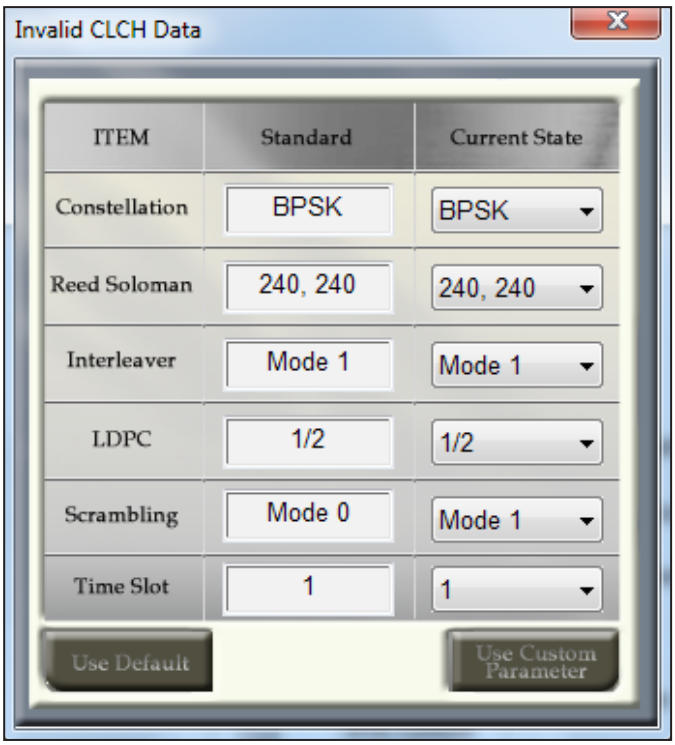
Then now, source bitrates is equal or less then output bitrates, then decoding is properly working.



1. Full CMMB U-Band Frequency table on T-PUMP

2. Correct Wrong Audio Codec info

3. When User open up MRF file, which has out of CMMB standard at CLCH, and pops up right standard CLCH MFS parameter for Comparing, automatically, and give Selection to user as below picture.



We found a lot wrong parameters MFS file, who intend to make for error testing (could be chipset designer), or whatever reason.

That MFS is Out of CMMB standard. So When User open up unknown MFS stream from HDD, and if the MFS stream's is out of CMMB standard, and will automatically pop up the above GUI form T-PUMP. And give User Comparing table current unknown MFS with real standard MFS spec.

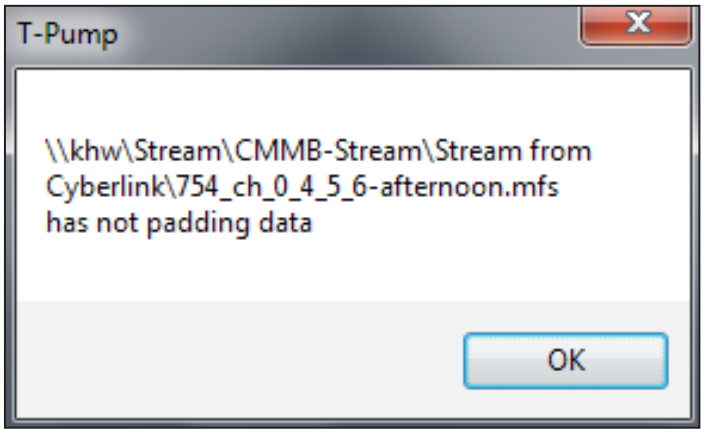
Customer can select one of either case, If User just intent to error testing, or possibly we could correct right standard parameter at the Popup Menu or can do Multiplexer Frame in T-PUMP. The problem, most of user (Receiver manufacture) don't know what is standard parameter of CMMB, And give them right guide. That is quite user Fridley.

CMMB mode

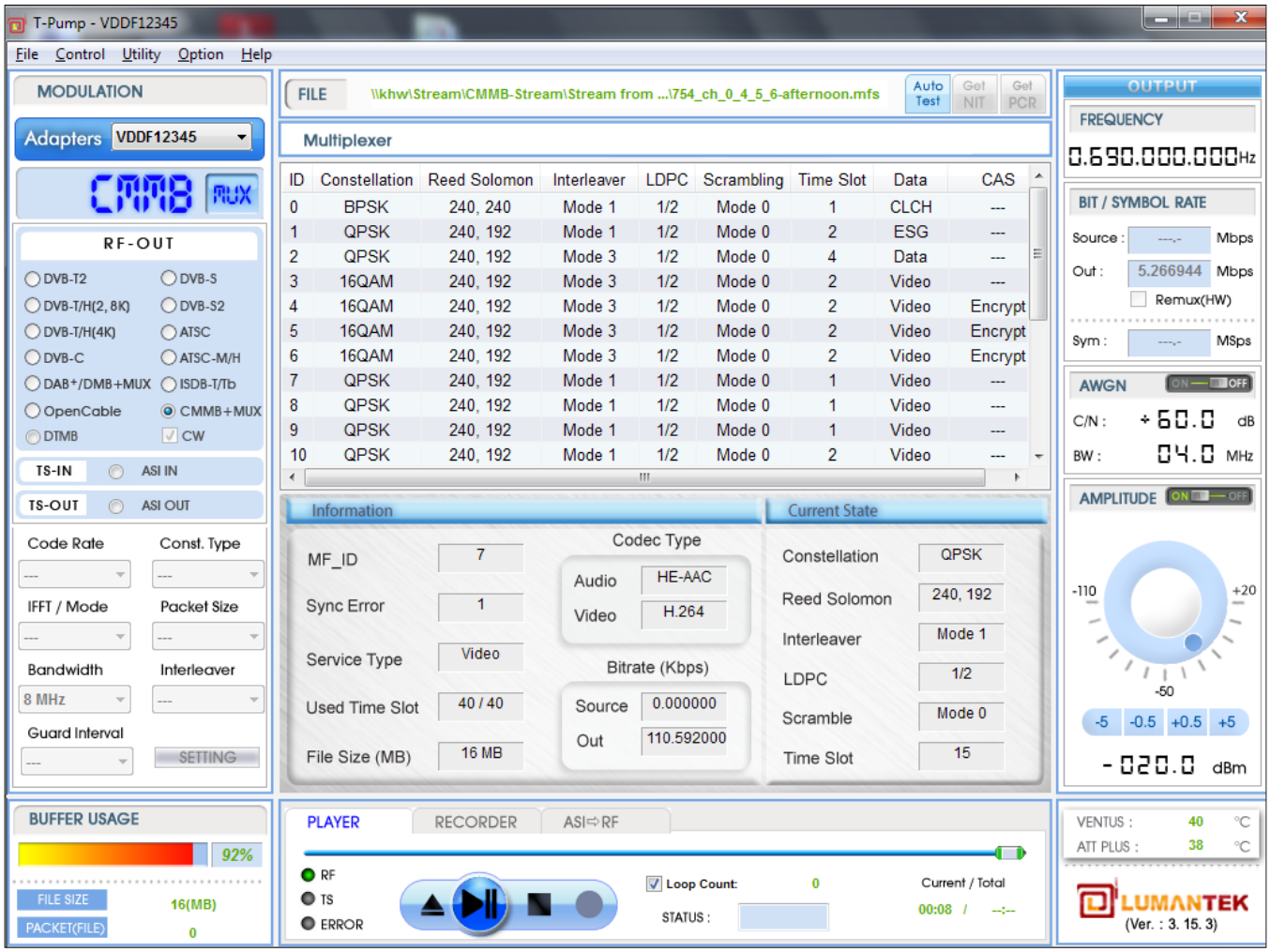
The recent USB CMMB receiver has trash out all FF date while on recording of on-air CMMB service for own optimizing of size, In Demodulator side, don't need FF data for own decoding but In modulator Side ,cannot be played if the stream has no FF data. (means not exact fit on standard PAD size) "

When User open up recorded one-air signal S-MFS, and enable to play out from VENTUS, And T-PUMP will pop up the massage as below when you try to open up " No Padding data file ", and automatically, recovered " standard PAD size " for CMMB modulation.

1. Enable to open, and play out with MFS which has no padding data (Both of S-MFS/M-MFS)
2. Enable to insert S-MFS which has no Padding data for multiplexing
3. Enable to mutiplexe in combination of S-MFS which No-padding data and S-MGS which has padding data.
4. Only CLCH is open up, and play out possible.
(Chipset company requirment)

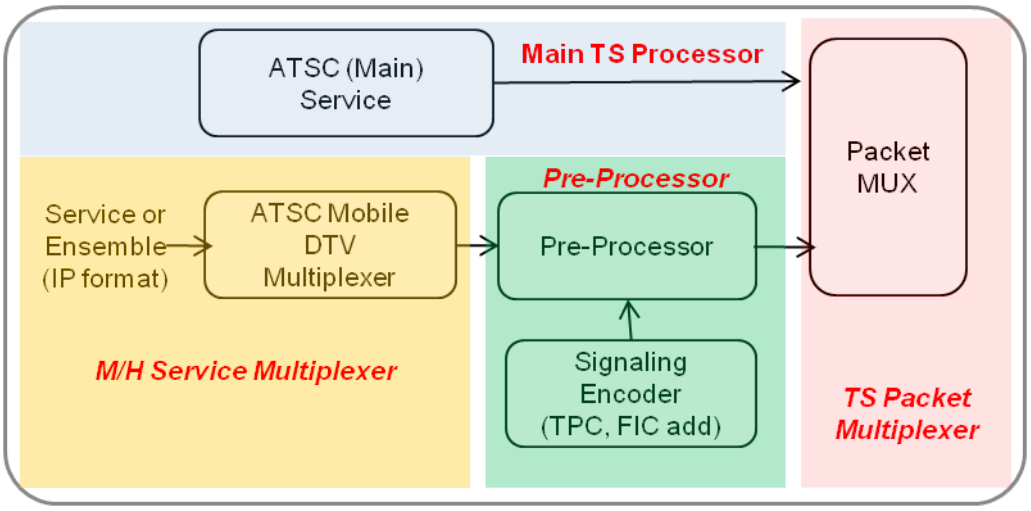


The time slot is increased "8 " then become full 40 slot now.



4.16 / ATSC-M/H / Introduction of M/H Multiplexer Part in VENTUS 1.0

- **Block Diagram of M/H Multiplexer in VENTUS 1.0**



Main TS Processor
- automatically controls main TS packet about timing & PCR adjustment.

M/H Service Multiplexer (associated Ensemble configuration)
- multiplex service streams with automatically building SSC tables.
- modify & re-multiplex Ensemble stream.

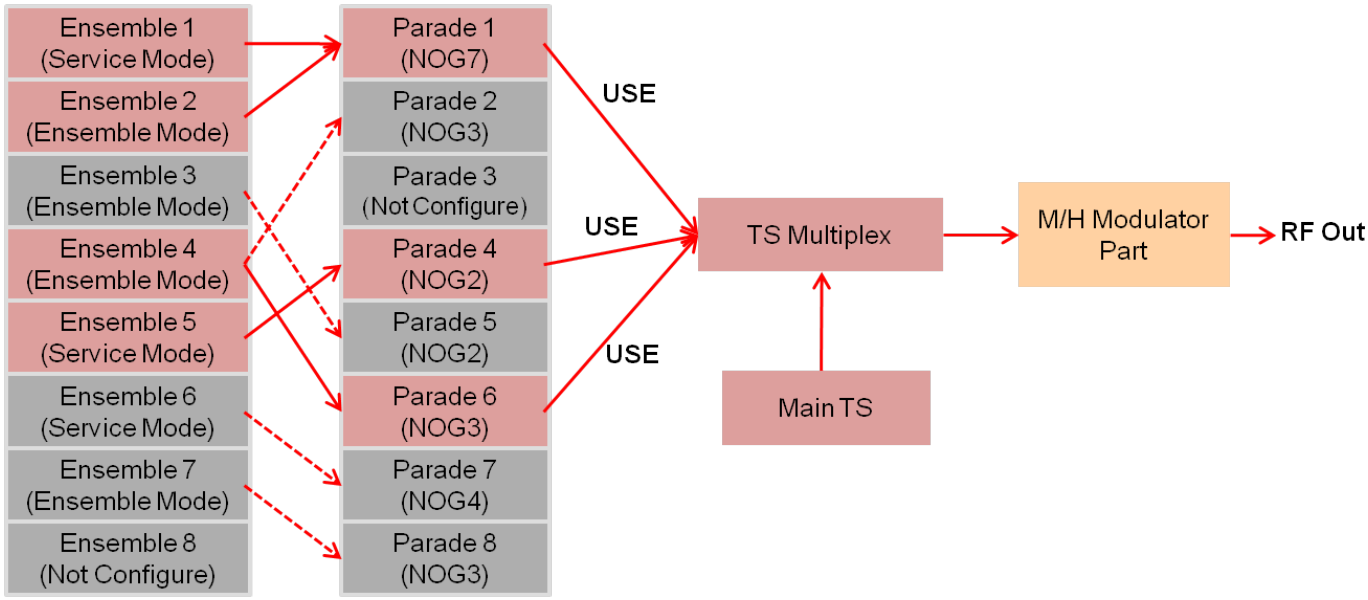
Pre-Processor (associated Parade configuration)
- process by configured M/H FEC parameters.

TS Packet Multiplexer
- multiplex main TS packet and M/H TS packet
- output TS stream(packets) with 19.392 Mbps

- **Concept of M/H Multiplexer in VENTUS 1.0**

Ability, Just exact simulate condition like ATSC Mobile DTV on US. Air
Through editing Ensemble configuration with editing Parade configuration and choosing Parades,User enable to generate a Signal form without any limitation for broadcasting in ATSC-Mobile DTV standards specification

GUI Procedure -Setting Ensembles -> Setting Parades -> Selecting output Parades -> Starting RF output



- **Ensemble GUI in T-Pump GUI**

❶ Ensemble GUI - Feature

Support Input file
Single service stream (IP Packet based) - Service Mode
Multiplexed ensemble stream (IP Packet based) - Ensemble mode

Support Editing
Editing of the service ID, service Name, destination IP address from each service is supported.
In service mode, the settings in the codec information (as component descriptor) is required. (ATSC A/153 Part3. 7.8.1 Reference)
- Editing support in SMT-> Service-> Component-> Component descriptor as in the Hex Code.
- A Method to transform SDP to Component descriptor can be found in ATSC A/153 Part7. Annex A.

* Note
ATSC Main TS stream (for multiplexing with M/H TS) and Multiplexed TS stream(Main & M/H) can be used by T-Pump GUI`s "File Open" button.

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Support Input file
Single service stream (IP Packet based) - Service Mode
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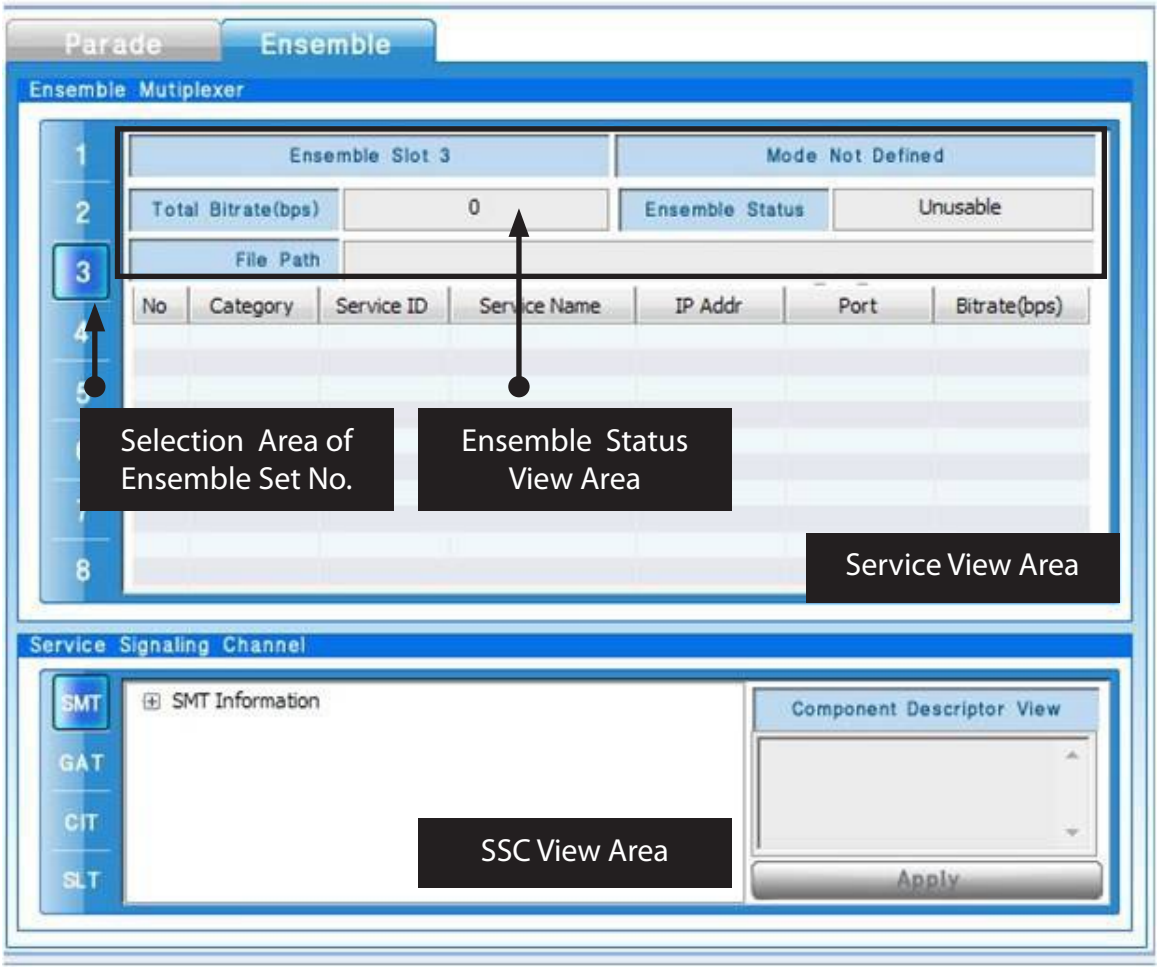
* Note
ATSC Main TS stream (for multiplexing with M/H TS) and Multiplexed TS stream(Main & M/H) can be used by T-Pump GUI`s "File Open" button.

❸ Ensemble GUI – Area Summary



❹ Ensemble GUI – Feature on Each Area (1)

Selection Area of Ensemble Set No.
- Ensemble Status View Area, Service View Area and SSC View Area about selected Ensemble set No. is loaded.

Ensemble Status View Area
- Mode, Total Bit-rate, Status, File Path of the selected numbers on Ensemble Set are displayed.
- Depending on the status of Mode, 'Mode Not defined', 'Service Mode', 'Ensemble Mode' is displayed.
- Status of Ensemble is displayed as 'Usable' or 'Unusable'.

❺ Ensemble GUI – Feature on Each Area (2)

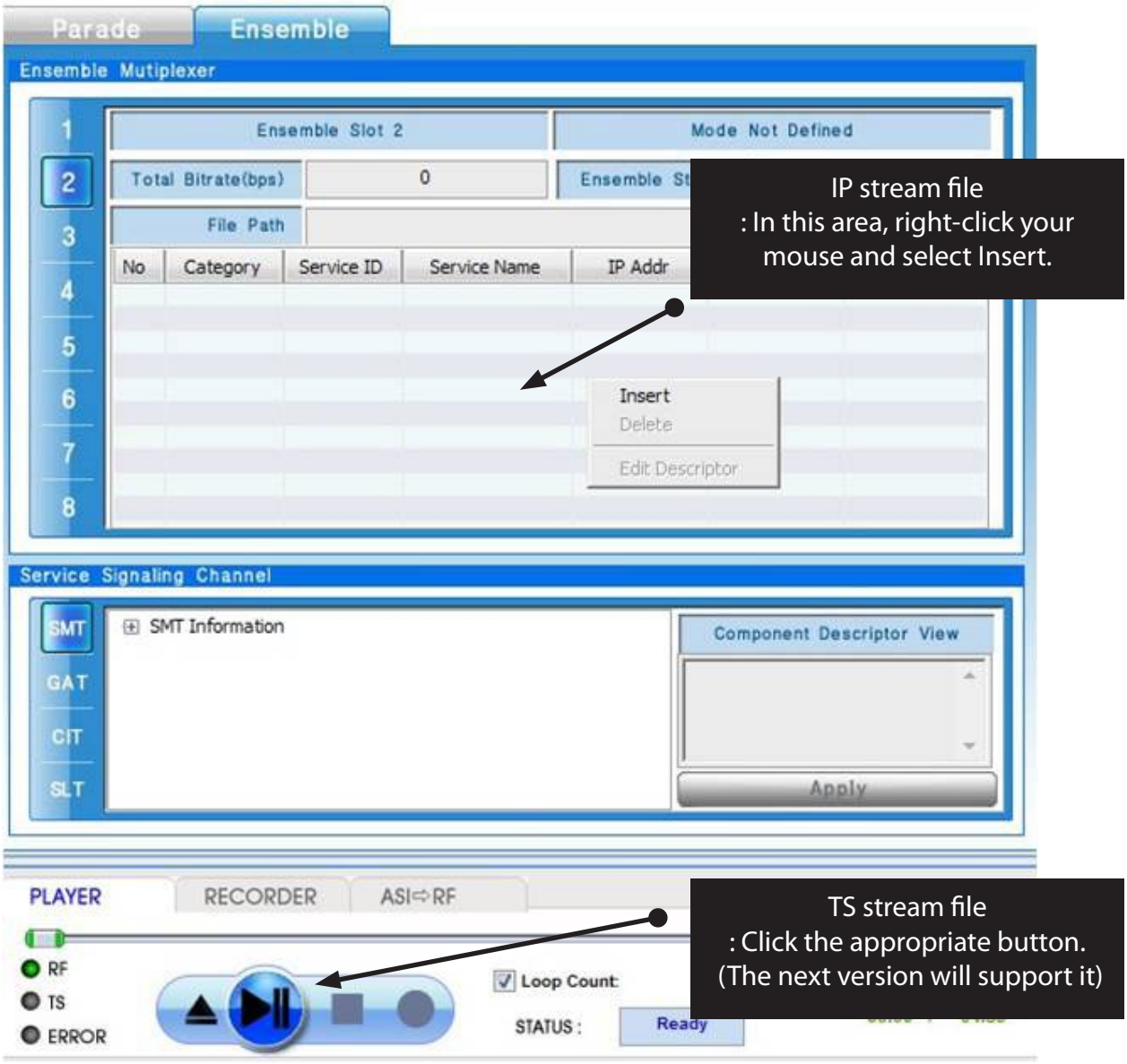
Service View Area
- Belonging to the selected settings of each service in Ensemble Set, 'Service Type', 'Service ID', 'Service Name', 'Destination IP Address', 'Destination UDP Port', 'Bit-rate' are displayed.
- Loading File (Ensemble or Service)
  - "Click right mouse -> Click Insert" (Service or Ensemble file can be loaded.)
  - In Service Mode, user can load additional service files "Click right mouse -> Click Insert"
    (To remove service, do "Click right mouse -> Click Delete"

- Service ID, Service Name, Destination IP Address can be edited by 'mouse left-click' in the area.
And if edited value is not allowed, the value returns to its previous value. Edited value immediately applies to the SSC View area table.

❻ Ensemble GUI – Feature on Each Area (3)

SSC View area
- SSC tables(SMT, SLT, CIT, GAT) display. (RRT will be supported)
- In Ensemble mode, SSC tables show when the information is already included in the file (SMT is a mandatory table, another table may not exist in the file.)
- In Service mode, the SMT, SLT is automatically built.
- In Service mode, Component Descriptor in the "SMT Table – Service – Component" must input the hex values about codec information.

❼ Edit Ensemble GUI - Example (1): File Input



8 Edit Ensemble GUI- Example (2): Service ID, Service Name, IP Address

No	Category	Service ID	Service Name	IP Addr	Port	Bitrate(bps)
1	0x01 [TV]	2-1	0	239.168.1.2	49160-49163	442344
2	0x01 [TV]	2-2	1	239.168.1.4	49160-49163	296948
3	0x01 [TV]	2-3	2	239.1.35.1	8000-8003	387960
4	0x01 [TV]	2-4	3	239.1.35.1	8000-8003	385543

No	Category	Service ID	Service Name	IP Addr	Port	Bitrate(bps)
1	0x01 [TV]	2-1	0	239.168.1.2	49160-49163	442344
2	0x01 [TV]	2-2	1	239.168.1.4	49160-49163	296948
3	0x01 [TV]	2-3	2	239.1.35.1	8000-8003	387960
4	0x01 [TV]	2-4	3	239.1.35.1	8000-8003	385543

Edit Service ID
click left mouse on Service ID area and modify the value

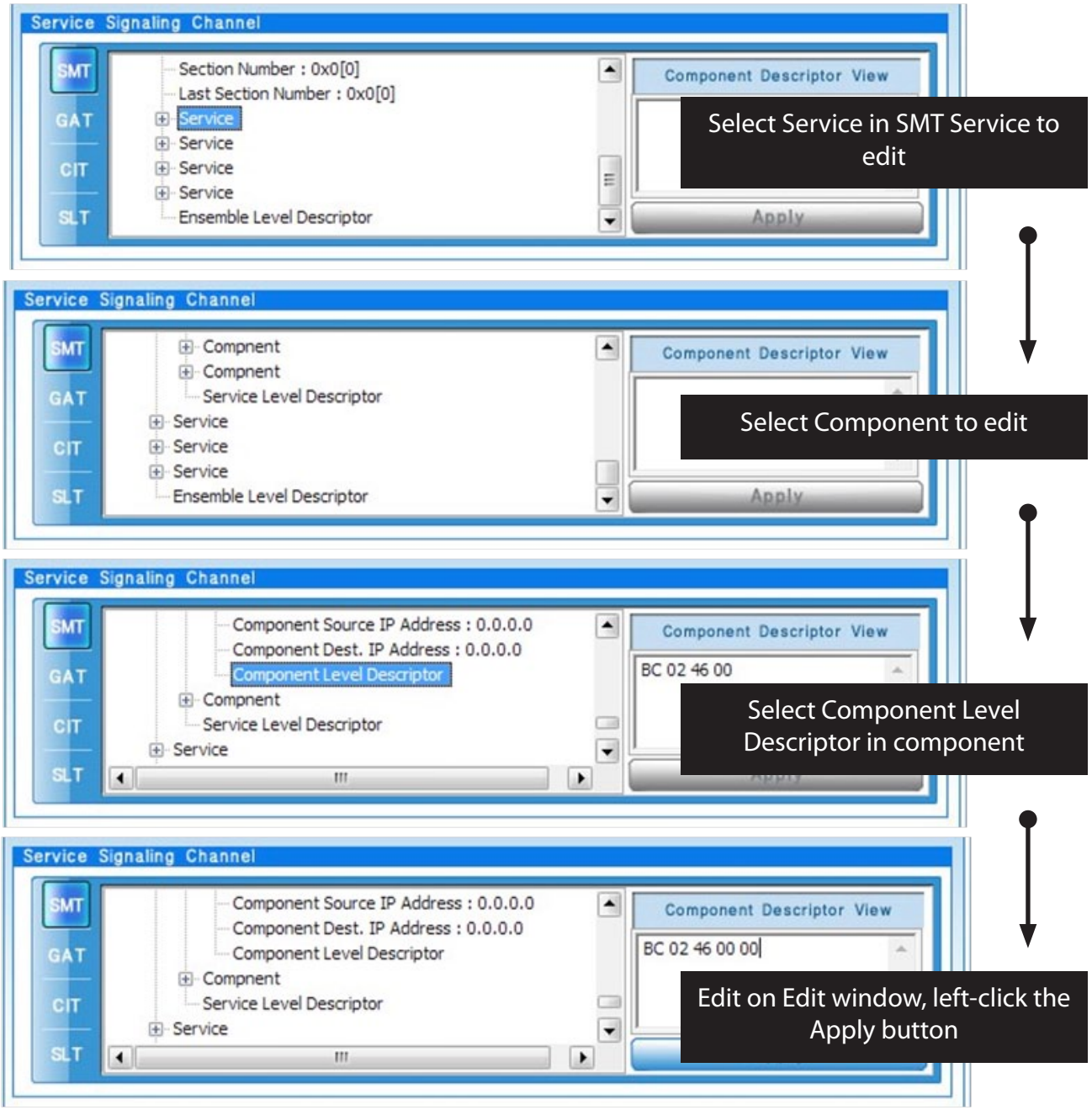
No	Category	Service ID	Service Name	IP Addr	Port	Bitrate(bps)
1	0x01 [TV]	2-1	0	239.168.1.2	49160-49163	442344
2	0x01 [TV]	2-2	1	239.168.1.4	49160-49163	296948
3	0x01 [TV]	2-3	2	239.1.35.1	8000-8003	387960
4	0x01 [TV]	2-4	3	239.1.35.1	8000-8003	385543

Edit Service Name
click left mouse on Service Name area and modify the name

No	Category	Service ID	Service Name	IP Addr	Port	Bitrate(bps)
1	0x01 [TV]	2-1	0	239.168.1.2	49160-49163	442344
2	0x01 [TV]	2-2	1	239.168.1.4	49160-49163	296948
3	0x01 [TV]	2-3	2	239.1.35.1	8000-8003	387960
4	0x01 [TV]	2-4	3	239.1.35.1	8000-8003	385543

Edit Service IP Addr.
click left mouse on Service IP Addr. Area and modify the value

❾ Edit Ensemble GUI - Example (3): Add Component Descriptor in Service Mode



- **Parade GUI in T-Pump GUI**

❶ Parade GUI - Feature(1)

Parade Set Support

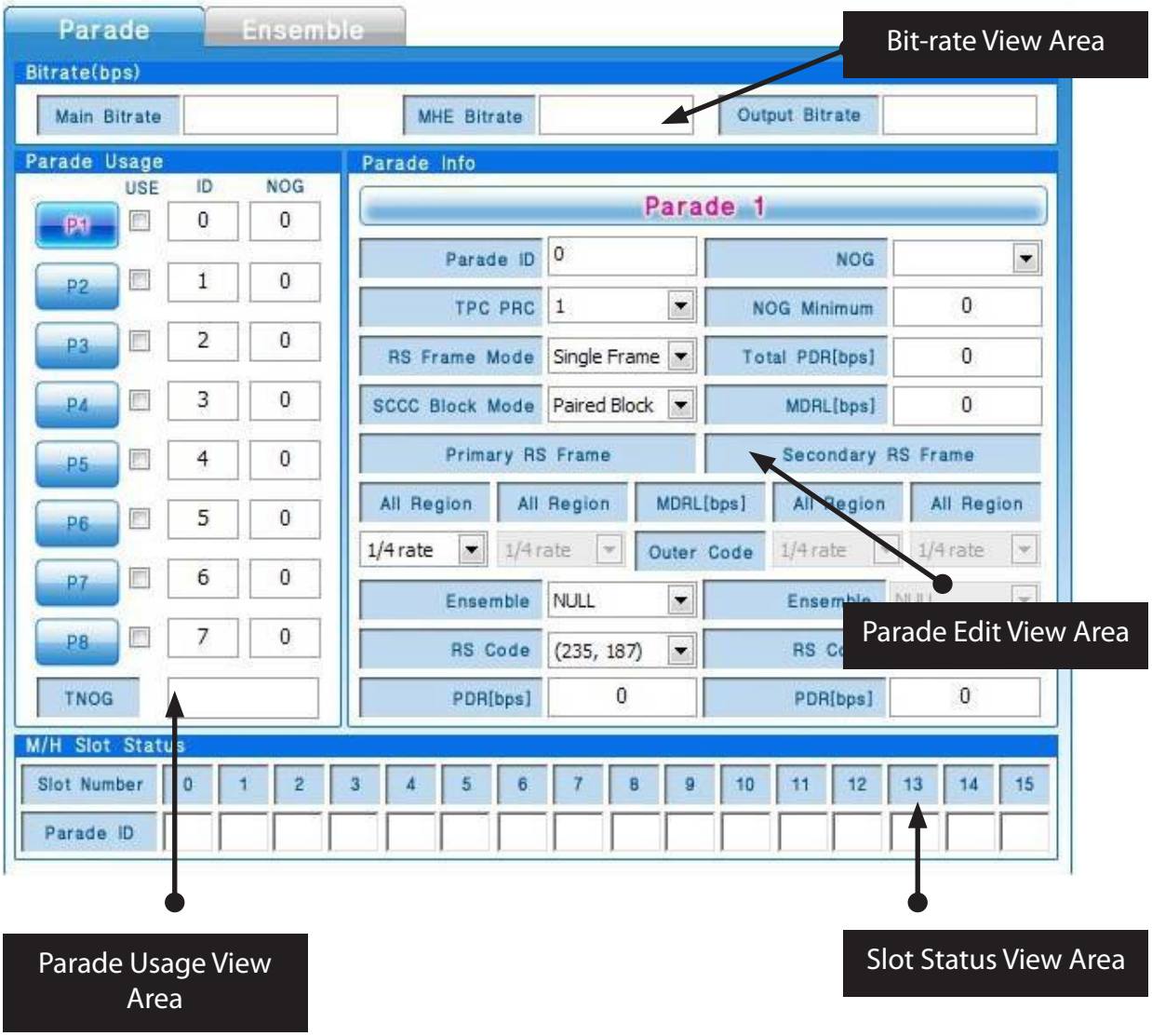
- Support to select Parade ID, NoG, TPC PRC, RS Frame Mode, SCCC Block Mode, Primary & Secondary RS Code Mode, and Select Ensemble.
- Parade ID : 0 ~ 127 specifies the ID of the range. If Parade ID set the same value, Only one can be used as the RF output at the same time.
- NoG : Number of Group can be selected from Minimum NoG to 8.
- TPC PRC : Some kind of burst mode. Can be selected from 1 to 8.
  (Parade is transmitted once every (x) M/H Frame with the data for (x) M/H Frame.)
- RS Frame Mode : "Single Frame (Primary RS Frame use only)" or "Dual Frame (Primary and Secondary RS Frame with)" can be chosen.
- SCCC Block Mode : 'Separated Block' or 'Paired Block' can be chosen.
  - In the Separated Block Mode, User can choose code rate ½ or ¼ in 'SCCC Block Region A ~ D'
  - In the Paired Block Mode, User can choose code rate ½ or ¼ in 'SCCC Block Region All'
- RS Code Mode : may choose one from (211,187), (223,187), (235,187) .

❷ Parade GUI - Feature(2)

* Notice for setting Parade
  - Depending on the setting values in Parade, PDR and Total PDR, MDRL will change.
  - PDR (Payload Data Rate) : PDR represents how many bit-rate can be included as Ensemble bit-rate. If select Ensemble to connect, T-Pump automatically calculate NoG minimum and NoG will increase NoG minimum.

  It will print error message when calculated NoG minimum is over 8.
  - Total PDR : Sum of Primary RS Frame`s PDR and Secondary RS Frame`s PDR.
  - MDRL (Main Data Rate Loss) : TS bit-rate of current Parade. That represents how much the TS bit-rate in fixed output TS bit-rate as 19.392Mbps takes . It depends on NoG values.

❸ Parade GUI – Area Summary



❹ Parade GUI – Feature on Each Area (1)

Parade Usage View area

- Loads Parade Edit View area depending on the selected Parade number.
- Shows NoG, Parade ID, Check box for RF output of each Parades. And whether Parade to RF output can be selected.
- Represents the status of the Slot Status View area by Check box for RF output.

Bit-rate View area

- Main (Legacy) TS bit-rate, Total M/H TS bit-rate and TS output bit-rate are displayed. TS output bit-rate is fixed to 19.392Mbps.

❺ Parade GUI – Feature on Each Area (2)

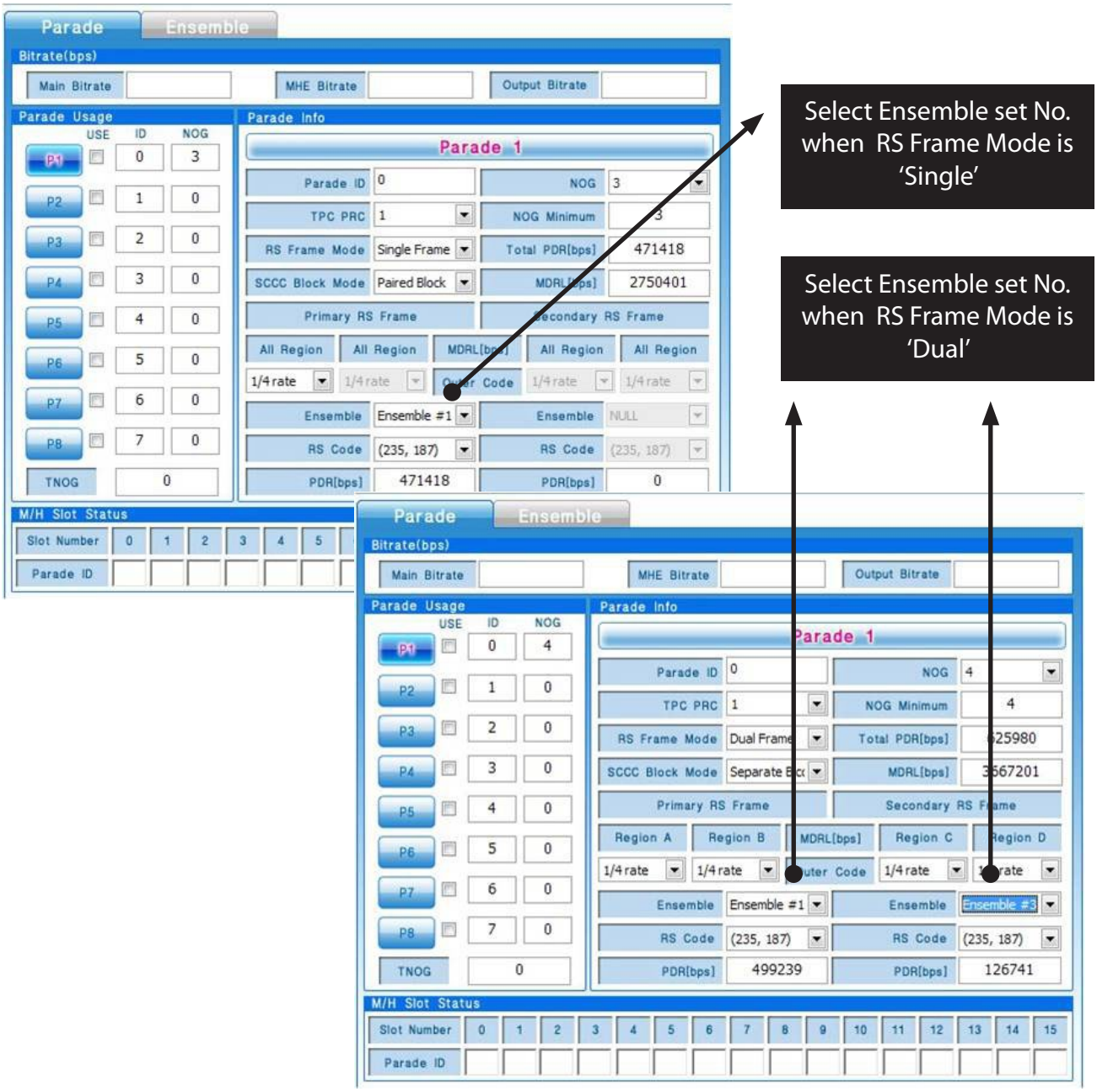
Parade Edit View area

- Parade Edit View area is for the setting zone. If RS-frame Ensemble is not selected, Parade cannot be activated for RF output. Each item is described in "Parade GUI – Feature" page.

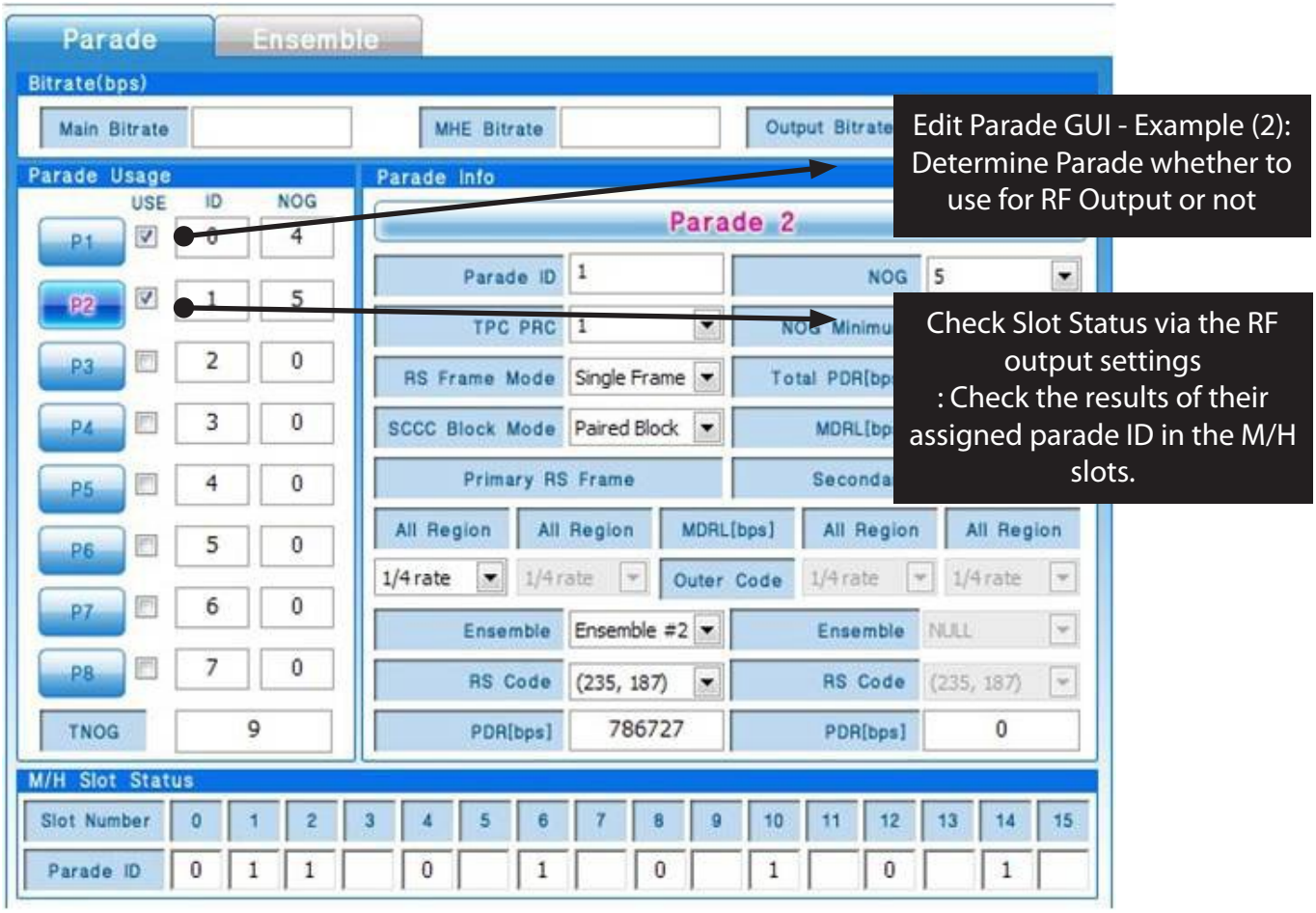
Slot Status View area

- Slot Status View area shows M/H slot status of M/H Frame.
- Slot allocation order is (0, 4, 8, 12, 2, 6, 10, 14, 1, 5, 9, 13, 3, 7, 11, 15) according to standard (A/153 Part 2: 5.3.1.3 Reference)

❻ Edit Parade GUI - Example (1): Link to Ensemble



❼ Edit Parade GUI - Example (2): Determine Parade whether to use for RF Output or not



8 Edit Parade GUI - Example (3): Change According to RS Frame Mode

RS Frame Mode : Single Frame : Primary RS Frame zone is activated.

RS Frame Mode : Dual Frame : Primary RS Frame and Secondary RS Frame area is activated.

❾ Edit Parade GUI - Example (4): Change According to the SCCC Block Mode

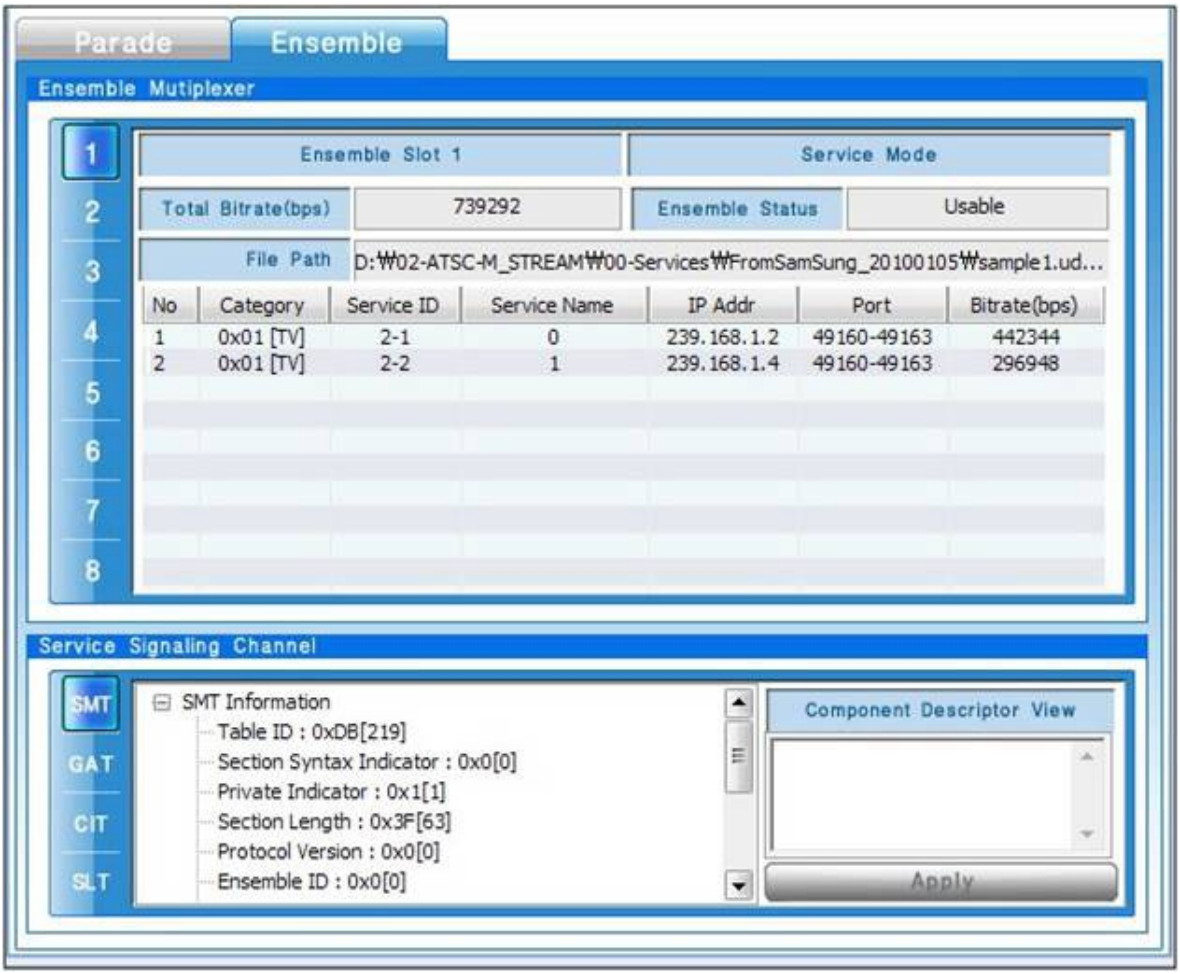
SCCC Block Mode : Separate Block
: The Region set is separated to Region A~D

SCCC Block Mode : Paired Block
: The Region change to ALL Region

- **ATSC-M/H : Appendix : User Friendly GUI Example For User Centric Mind**

❶ User Friendly GUI Example (1)

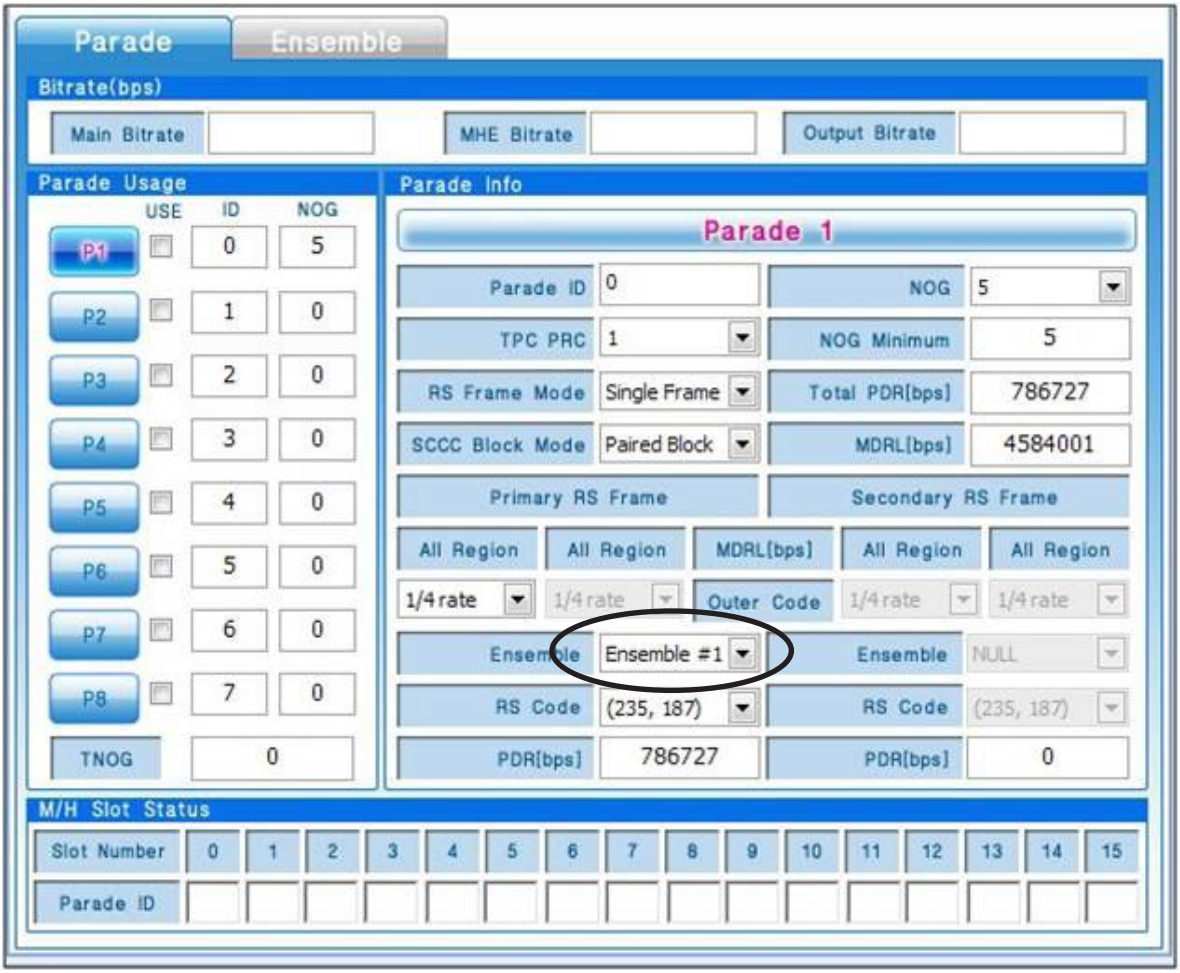
Set Ensemble ▶ Set Parade ▶ Select Output Parade ▶ Start RF Output



1. Open file (Required)
2. In Service Mode, Component Descriptor should be added. (Required)
3. Edit Service ID, Name, IP Address (Optional)

❷ User Friendly GUI Example (2)

Set Ensemble ▶ Set Parade ▶ Select Output Parade ▶ Start RF Output



1. Link Ensemble (Required)
2. Setting Parade ID, NOG, PRC, RS Frame Mode, SCCC Block Mode (Optional)

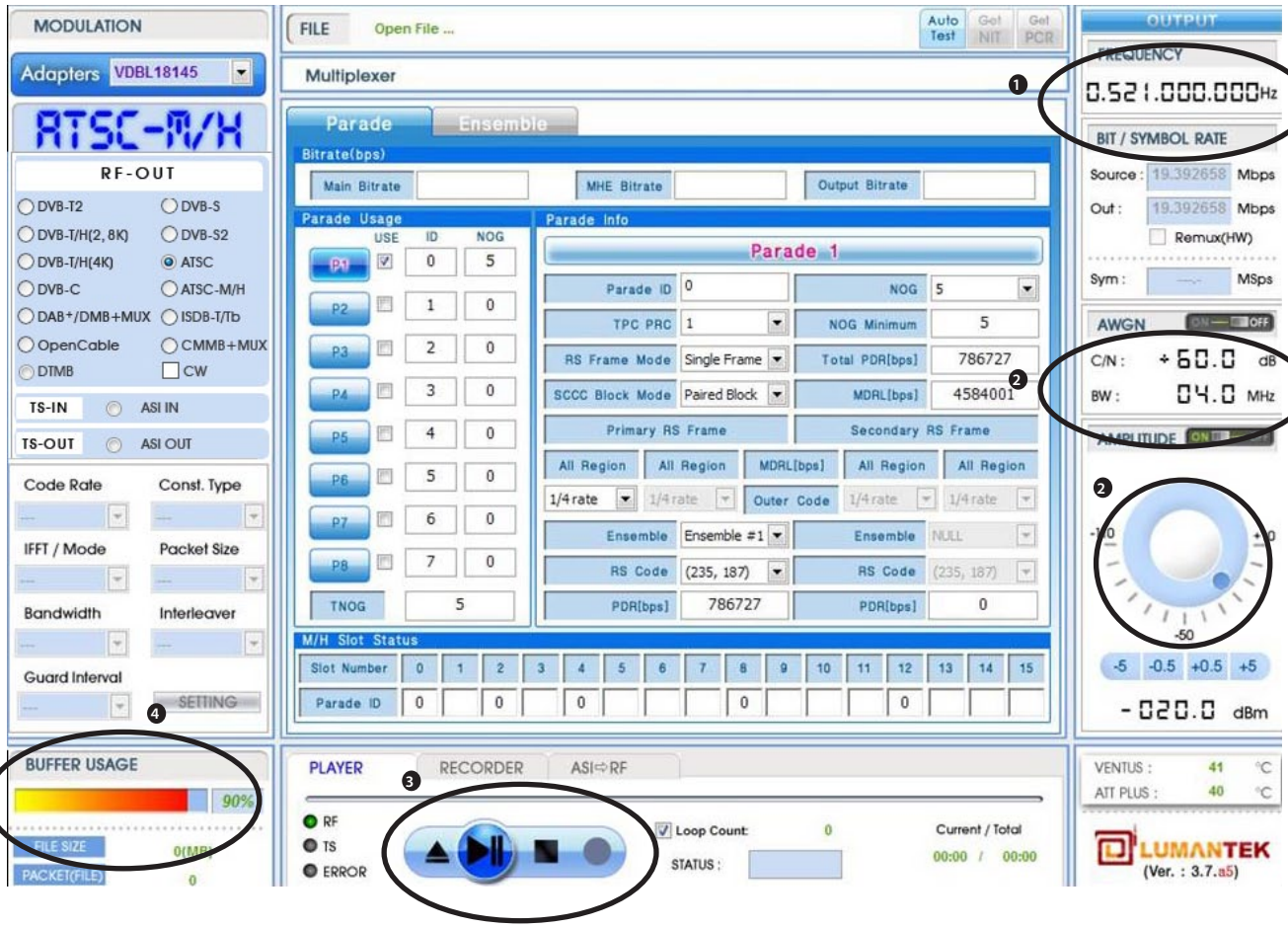
❸ User Friendly GUI Example (3)

Set Ensemble ▶ Set Parade ▶ Select Output Parade ▶ Start RF Output

1. Select Output Parade (Required)

❹ User Friendly GUI Example (4)

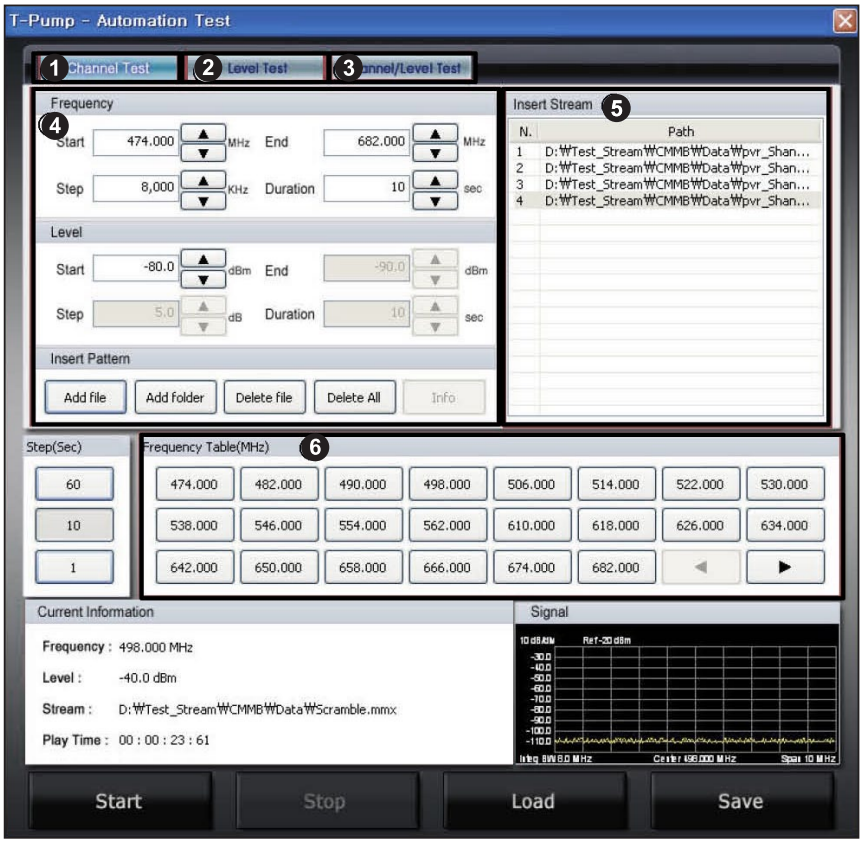
Set Ensemble ▶ Set Parade ▶ Select Output Parade ▶ Start RF Output



1. Set the center frequency
2. Set AWGN(option) and Set Amplitude(option)
3. With the Play/STOP button, User can select RF output start/stop
4. Buffer status is used during playing

4.17 / AUTO TEST

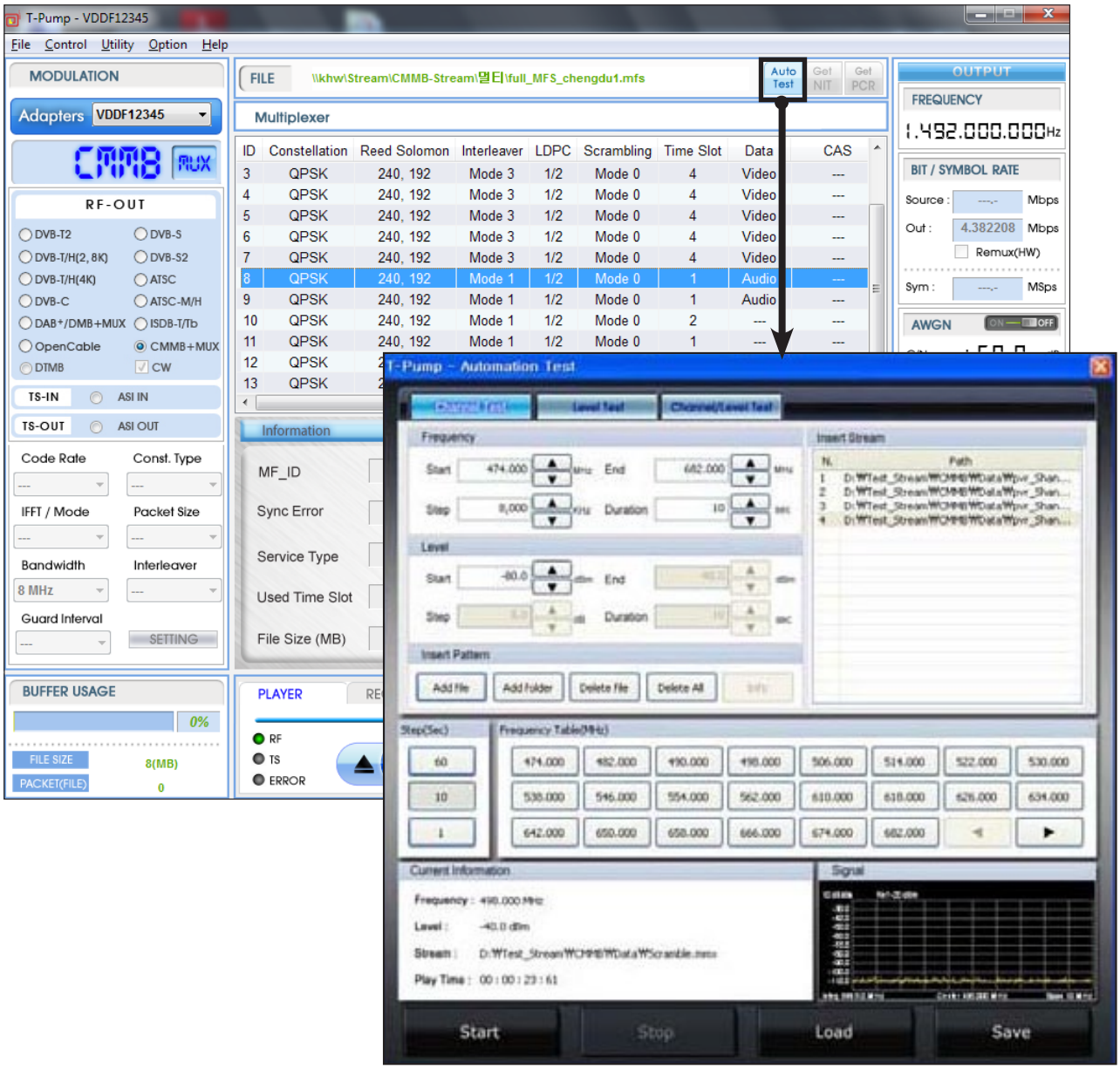
- Automated test menu is applied on over T-PUMP Version 2.7.
- Regardless of Modulation option, When you select an Modulation and the Auto-Test, then the Auto option is available to the test.
- Channel Test, Level Test, Channel/Level Test menu is available.



Items	Description
❶ Channel Test	When testing the frequency Scan
❷ Level Test	If testing the Power Level
❸ Channel /Level Test	When testing Frequency and Power Level at the same time
❹ Frequency, Level, Insert Pattern	Frequency, Level Set window, specify the stream
❺ Insert Stream	Specify Test Stream
❻ Current Information	Current status

Channel Test

- When testing to specify the frequency range at regular intervals channel scan.



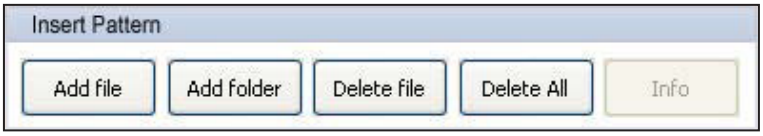
❶ From the main menu when you select Auto-Test Automation Test is a pop-up menu.

❷ Frequency Channel Test Tab menu item specifies the start frequency and end frequency.

-> When you select an item under the Start and End, Frequency Table entries can be select from list.

❸ On Level entry, select the specified time to test and exit points then Specifies the interval, and the cycle.
-> Start, Stop entry, Step items, Duration, select the item you will receive the following example.

❹ Specifies the stream file to test.
-> You can specify multiple stream files, and specify the stream for the entire folder



❺ Set the auto-test is complete, select the button at the bottom of the test will start.
-> To save the settings when you test again with the test load

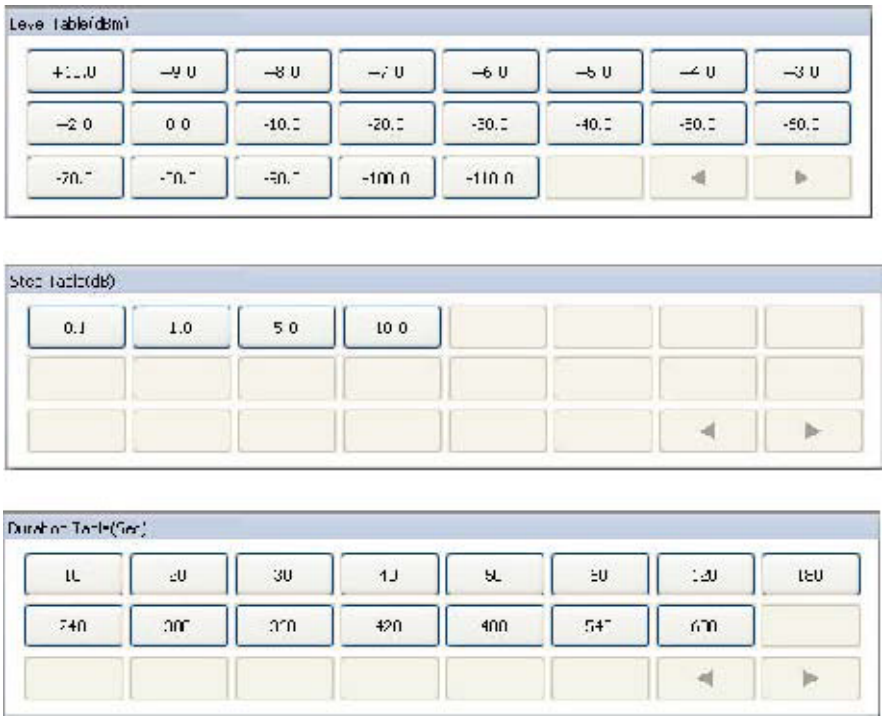
Level Test

- To test at regular intervals by specifying a range of Level Power Level test case.

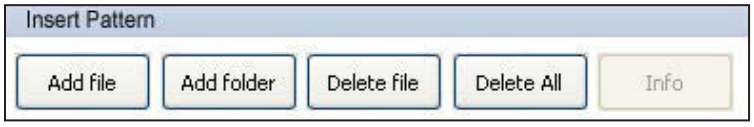
1. From the main menu when you select Auto-Test Automation Test is a pop-up menu.

2. In Level Test Tab menu, Specifies the start frequency in Frequency entries.
   -> When you select an item under the Start and End, Frequency Table entries can be select from list.

❸ On Level entry, select the specified time to test and exit points then Specifies the interval, and the cycle.
-> Start, Stop entry, Step items, Duration, select the item you will receive the following example.



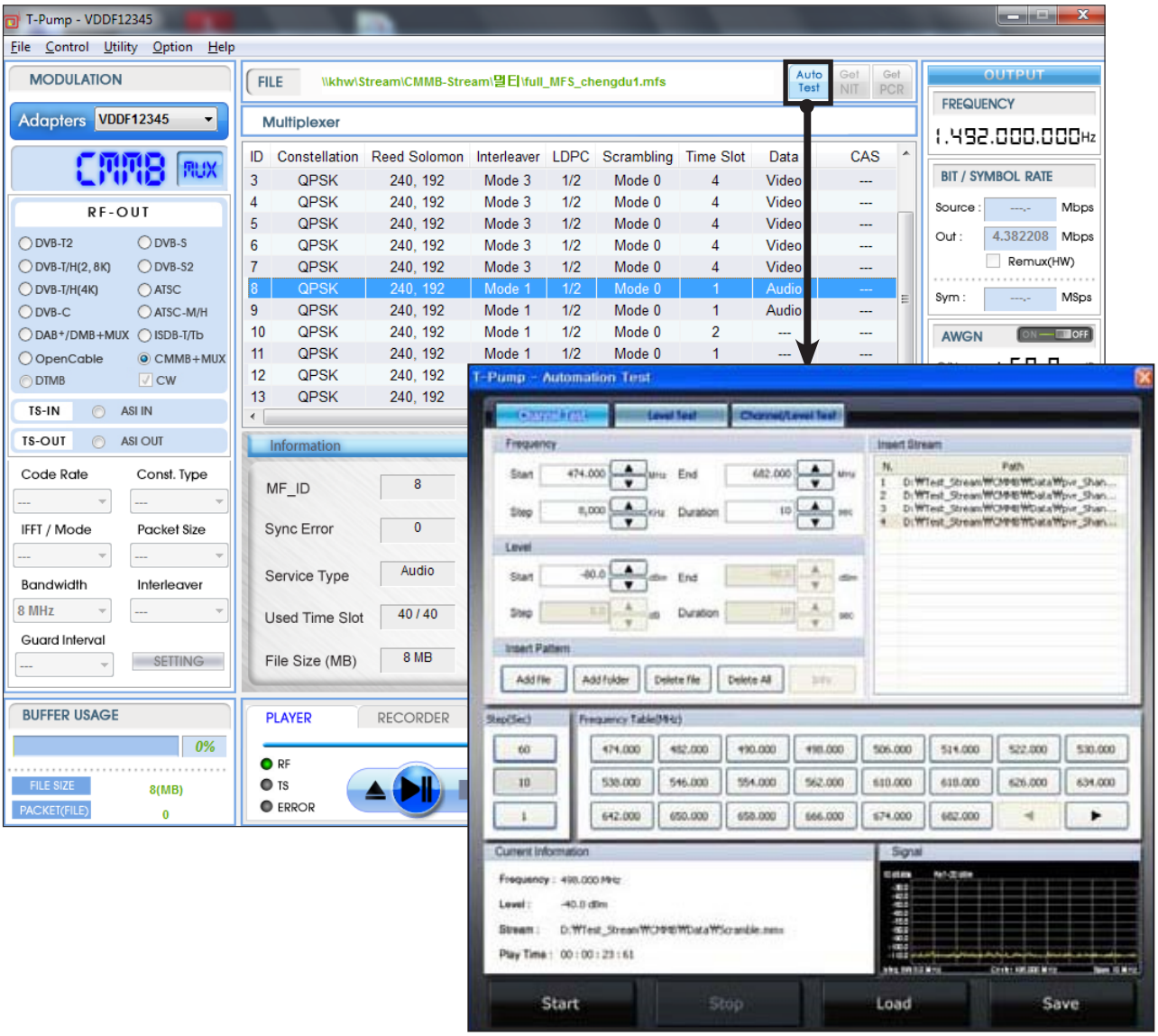
❹ Specifies the stream file to test.
-> You can specify multiple stream files, and specify the stream for the entire folder



❺ Set the auto-test is complete, select the button at the bottom of the test will start.
-> To save the settings when you test again with the test load

Channel / Level Test

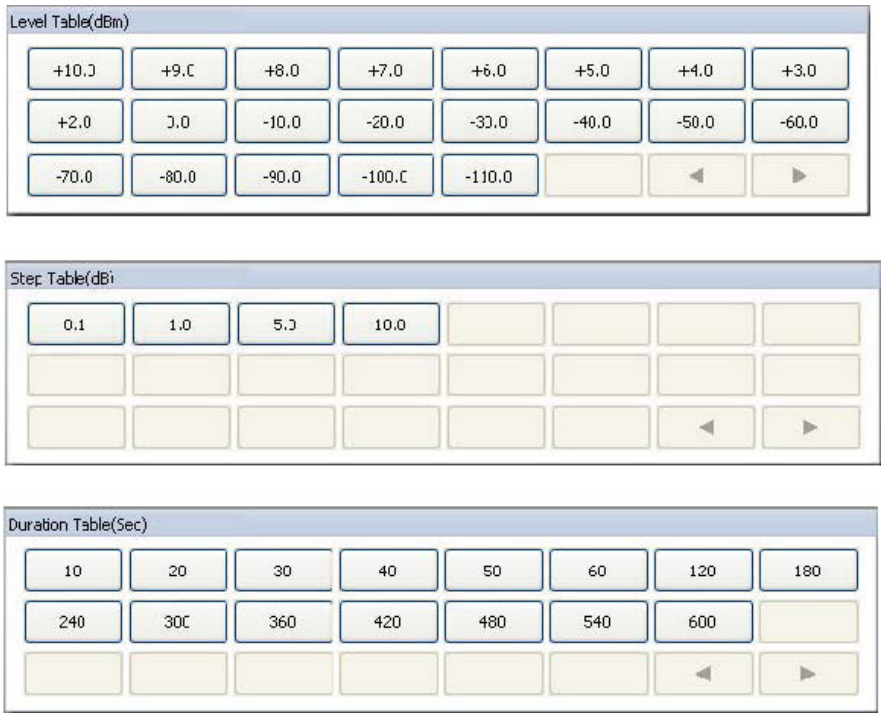
- When testing the channel and level in both time.



❶ From the main menu when you select Auto-Test Automation Test is a pop-up menu.

❷ In Channel/Level Test Tab menu, After you specify the start and end step, specify the frequency.
-> When you select an item under the Start and End, Frequency Table entries can be select from list.

❸ On Level entry, select the specified time to test and exit points then Specifies the interval, and the cycle.
-> Start, Stop entry, Step items, Duration, select the item you will receive the following example.



❹ Specifies the stream file to test.
-> You can specify multiple stream files, and specify the stream for the entire folder

❺ Set the auto-test is complete, select the button at the bottom of the test will start.
-> To save the settings when you test again with the test load

4.18 / AWGN(Addictive White Gaussian Noise)

White ?

- Including All frequency spectrum.
- White Light include red, green, yellow.
- Flat Spectrum at frequency domain.

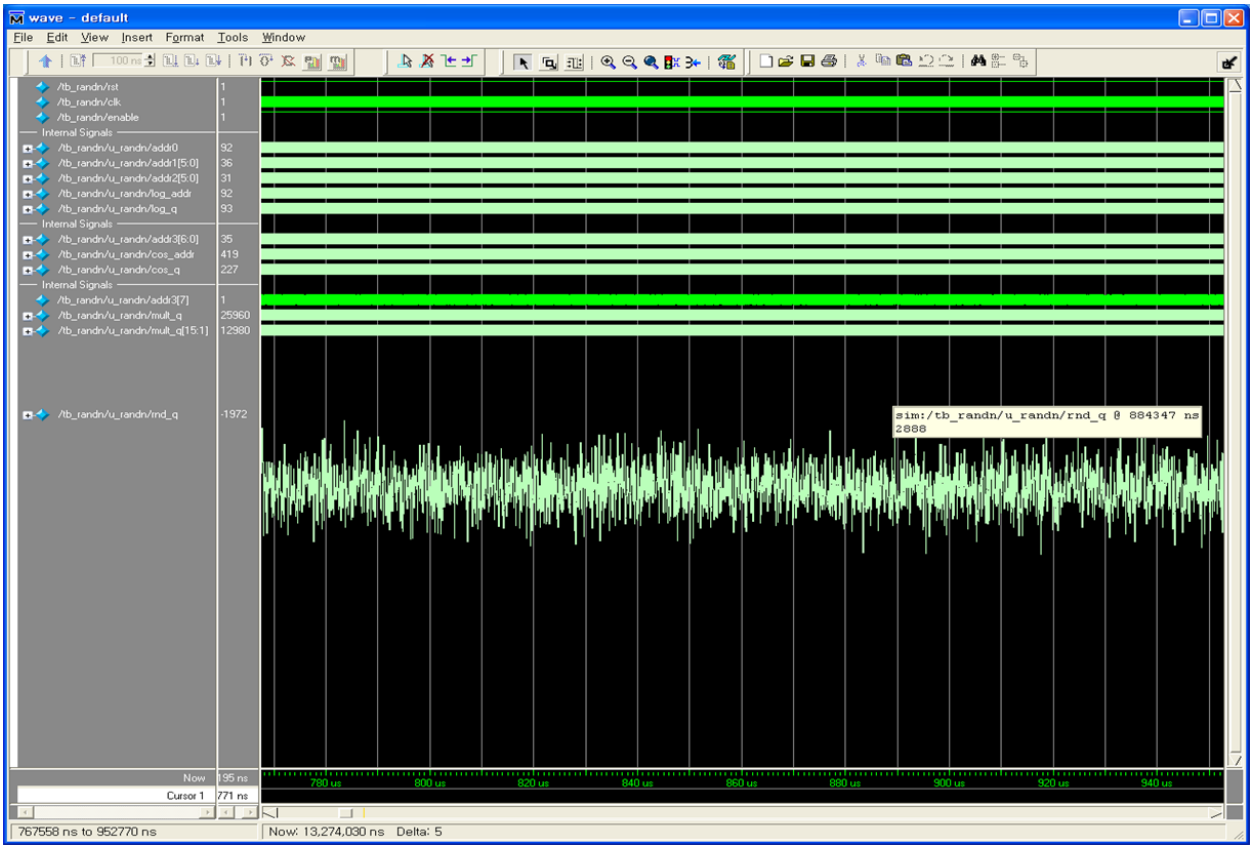
Gaussian ?

- Statistical distribution is Gaussian.

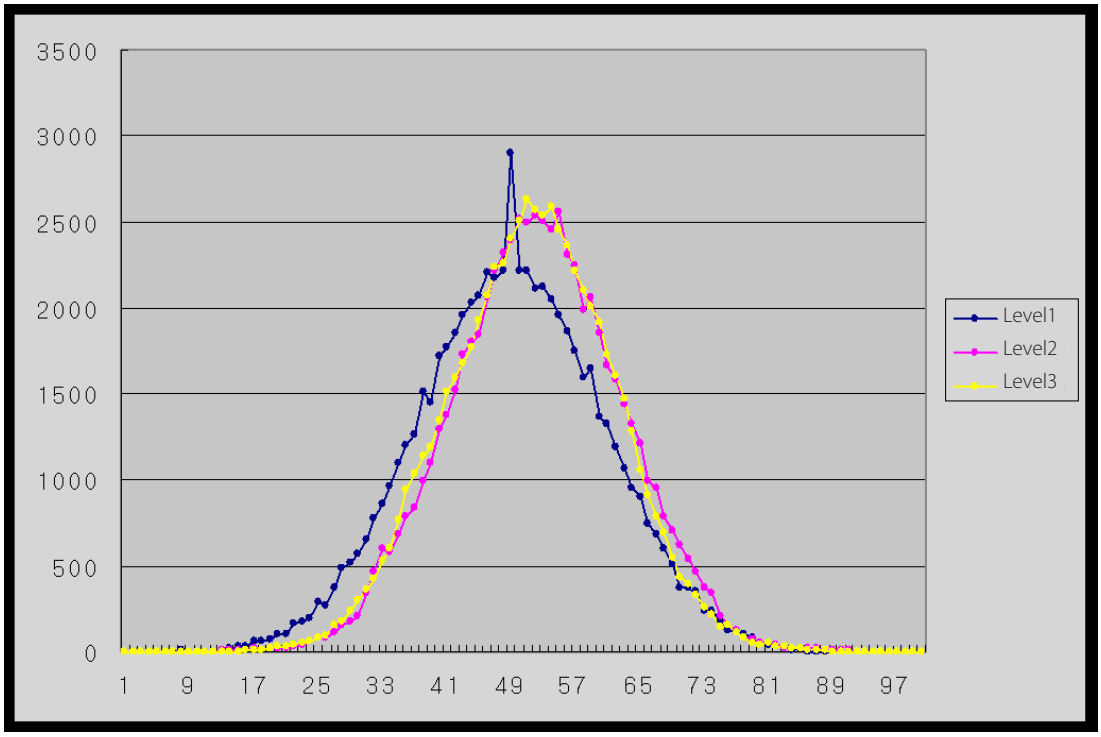
Addictive ?

- The effect is addition.

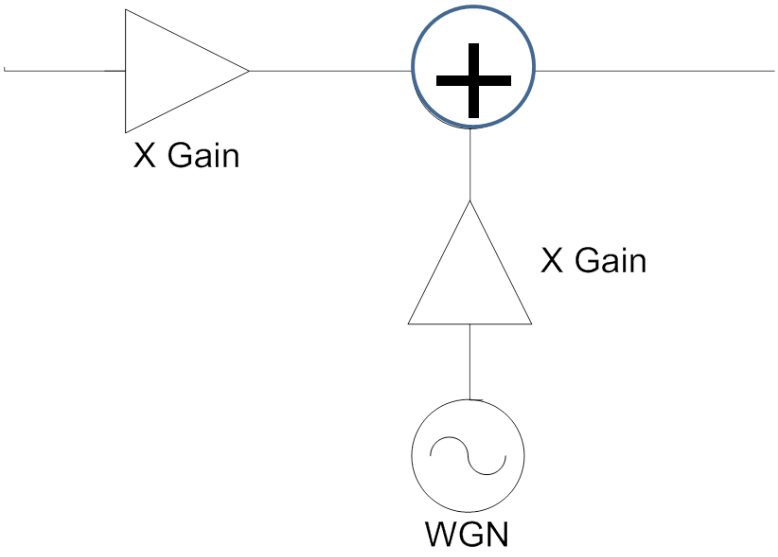
- **AWGN simulation result(Time domain sequence)**



- **AWGN simulation result (Histogram)**



- **AWGN Block diagram**

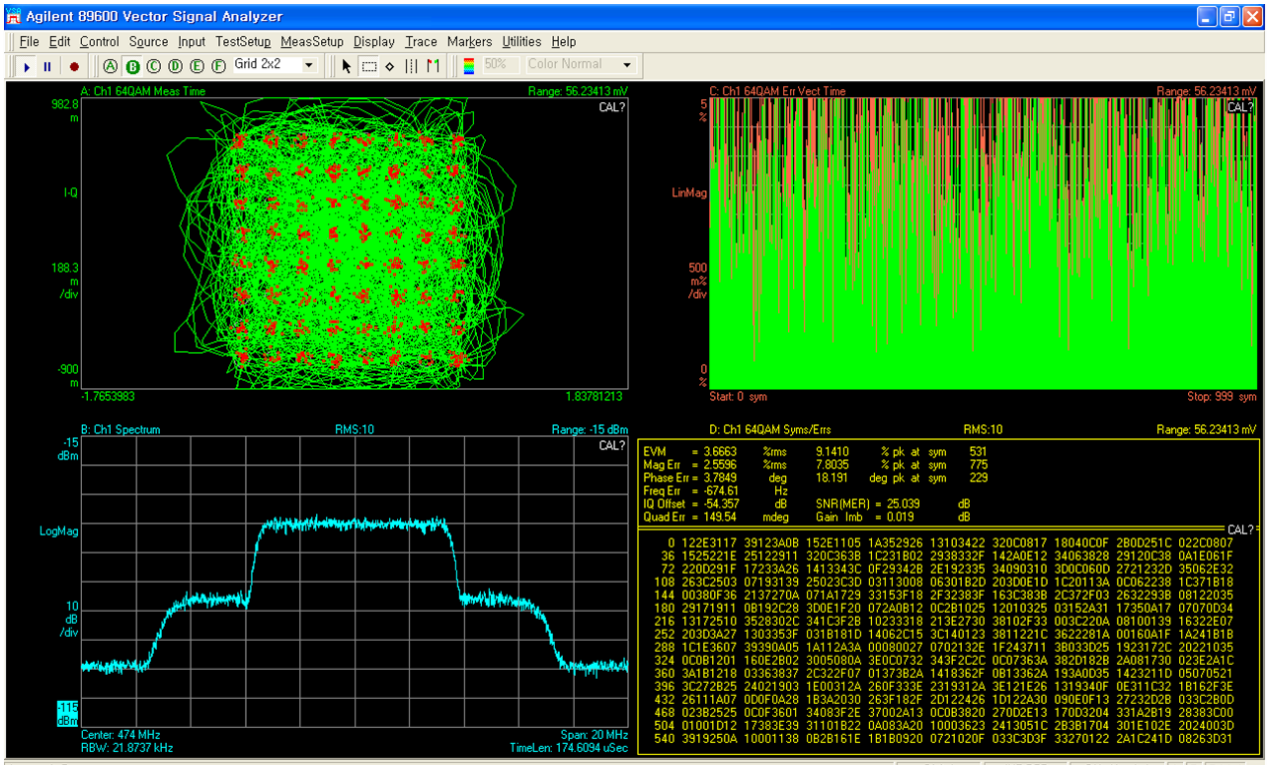


- **Feature**

  - Noise Bandwidth = 2 x Signal BW.
  - Easy Setting.
    C/N : +60 ~ -30dB, 0.1dB step
    BW : Interesting signal BW, 0.1Mhz Step
  - Fully digital controlled.
  - Very low correlated White Noise.

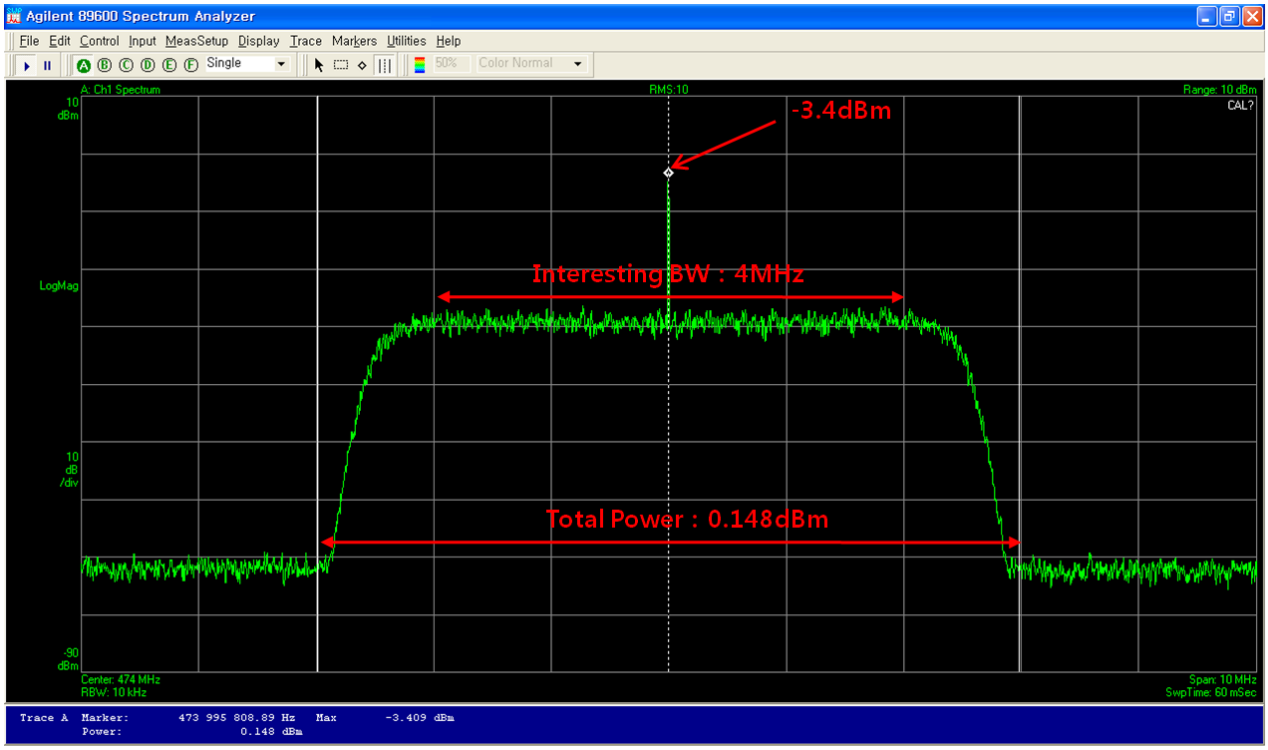
- **DVB-C Test**

  Symbol Rate : 6.875MS/s, C/N : 25dB, BW : 8MHz



- **CW Test**

RF level : 0dBm, C/N : 0dB, BW : 4MHz

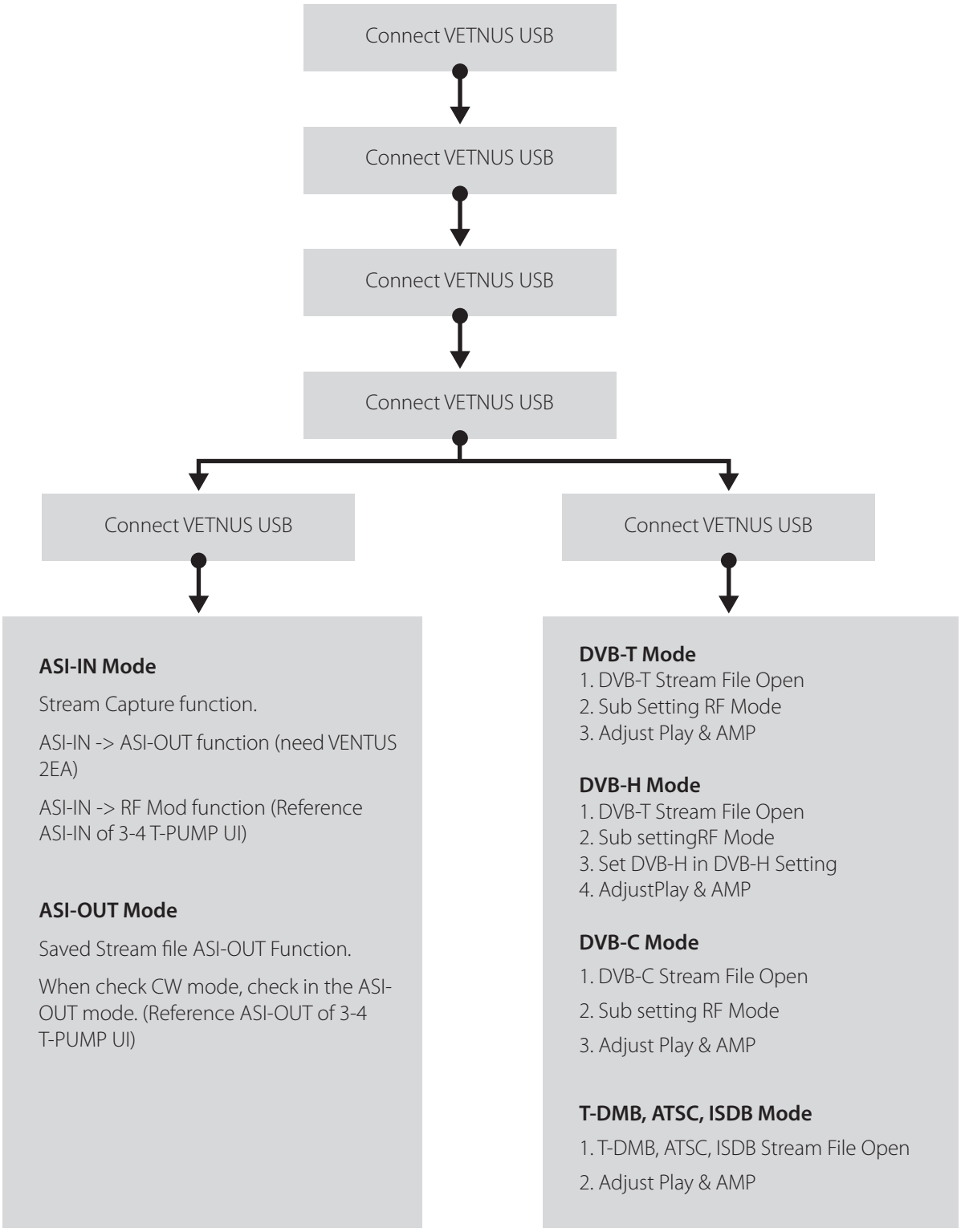


- **CW Example**

- Total Power : Constant (RF level = 0dBm)
- C/N : 0dB : Signal Power is equal to Noise Power in 4Mhz BW
- CW level(power and level is same at CW) : -3.4dBm = 0.457mW
- Noise + CW = -0.2dBm @ 4MHz BW : 0.955mW
- Noise = 0.955 – 0.457 = 0.498mW
- Noise power is equal to CW signal
- Small Difference is because of Measurement error and digital numerical quantization error.

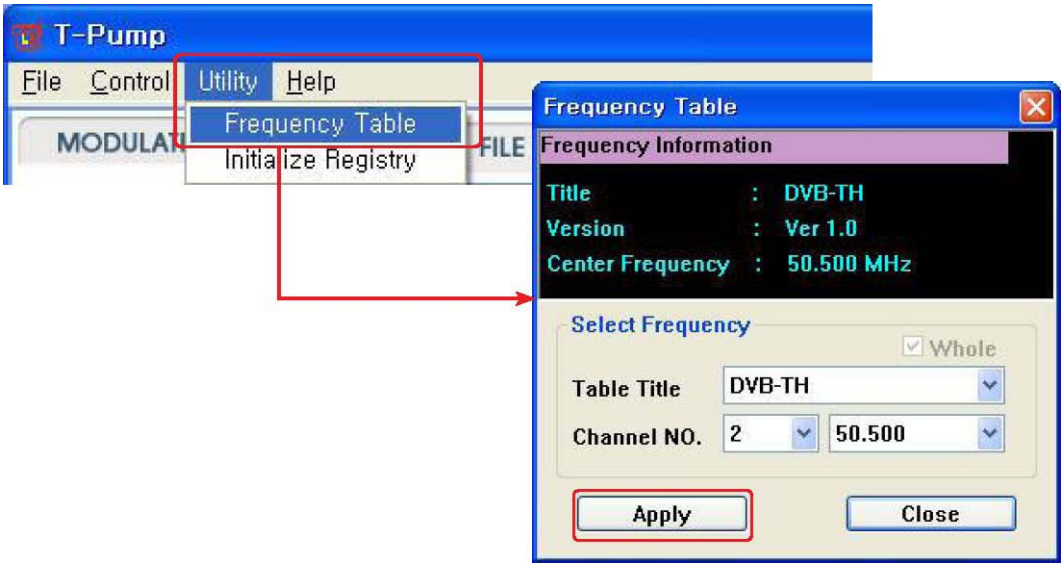
Appendix. A Ventus User Menu Summary

A.1 Ventus operating Procedure



A.2 Create Frequency Table

In this upgrade version, you can edit Frequency Table by yourself. The saved file placed C:\Program Files\(c)LUMANTEK\T-Pump\FreqTable.+



A sample *.dat file has frequency table information. If you save a sample file in [C:\Program Files\(c)LUMANTEK\T-Pump\FreqTable], you can search it in Freqeuncy Table Window.

* Frequency Table Editting

```
//Channel No, Center Frequency, Frequency Range, FP, FS, FOSC
//$ is End Mark
//* is starting point of Frequency table

//Title, table version
|DVB-TH|Ver 1.0|

//Frequency table
*|2|50.500|
|3|57.500|
|4|64.500|
|5|177.500|
|69|858.000|$
```

You can edit freqeuncy table by type first of sample file as *, and last as $.

Appendix. B Ventus User API (VtsAPI Calling Sequence)

B.1 Calling Sequence

```
VtsAPI_Initialize()

    CountDevice()

        OpenDevice()

            Pump control setting
            Modulator setting for DAB Modulator
            File setting for DAB Modulator
            RF setting
            DMA tranfer

        CloseDevice()

VtsAPI_Finalize()
```

B.2 Pump control setting

```
PumpSetState(VTS_PumpState_t t_PumpState) => Pump(DMA) Stop, Stop&Clear, Run

ex) Stop : PumpSetState(0/*VTS_PUMP_STATE_STOP*/)

ex) Stop & H/W buffer Clear : PumpSetState(1/*VTS_PUMP_STATE_STOP_CLR*/)

ex) Run : PumpSetState(2/*VTS_PUMP_STATE_RUN*/)


PumpSetMode (
    VTS_PumpMode_t t_PumpMode,
    bool b_RemuxOnOff,
    VTS_TS_Format_t t_OutTsFormat,
    VTS_TS_Format_t t_SrcTsFormat) => Pump Setting

ex)For DAB : PumpSetMode (
    6,/*VTS_PUMP_MODE_RF_OUT_RAW*/
    0,/*false*/
    0,/*VTS_TS_FORMAT_188*/
    0/*VTS_TS_FORMAT_188*/
    )
```

B.3 Modulator setting

ModulatorInit(VTS_BroadcastType_t t_BcType) => Modulator H/W image download

ex) DAB : ModulatorInit(11/*VTS_BC_T_DMB*/)

B.4 File setting for DAB Modulator

T_DMB_Parse (unsigned char* u1p_Buff, unsigned int u4_Size, bool b_IsDSLFormat)
=> *.eti or *.dsl . part of *.eti or *.dsl passing and then DAB configure parameter

ex) *.eti

After File open and Read, u1p_Buff 24576 Bytes size point forward
T_DMB_Parse(u1_Buff, 24576, 0/*false*/)

ex) *.dsl
After File open and Read , u1p_Buff 24576 Bytes size point forward
T_DMB_Parse(u1_Buff, 24576, 1/*true*/)

B.5 RF Setting

ModulatorSetRF(unsigned int u4_Hz) => Up Converter Frequency
ex) 400MHz : ModulatorSetRF (400000000)
ex) 1000MHz : ModulatorSetRF (1000000000)

AttenSetFrequency(unsigned int u4_Freq_Hz) => Atten Plus Frequency
ex) 400MHz : AttenSetFrequency(400000000)
ex) 1000MHz : AttenSetFrequency(1000000000)

AttenSetOutLevel(short s2_OutLevel_01dBm) =>Atten Plus Out Level
ex) -10dBm : AttenSetOutLevel(-100)
ex) -60.5dBm : AttenSetOutLevel(-605)

B.6 DMA transfer

PumpGetHwBuffUsed(unsigned int* u4p_HwBuffUsed, unsigned int* u4p_RxBuffUsed)
=> H/W Buffer usage check

ex) PumpGetHwBuffUsed(&gu4_BuffUsed, NULL)

PumpGetHwBuffSize(&gu4_BuffSize)
=> H/W Buffer Total Size bring . (Ventus 1.0 8MBytes, Ventus 2.0 16MBytes)

ex)

```
PumpWrite(
      unsigned char* u1p_Buff,
      unsigned int u4_dwWrite,
      unsigned long* u4p_TransferedBytes,
      bool b_IsDSLFormatForDABModulator)
```
=> DMA Write

ex) *.eti
PumpWrite(gu1a_Buff, u4_FileReadBytes, &u4_TransferedBytes, 0/*false*/)

Ex) *.dsl
PumpWrite(gu1a_Buff, u4_FileReadBytes, &u4_TransferedBytes, 1/*true*/)

B.7 all sequence

```
VtsAPI_Initialize();
CountDevice();
OpenDevice(0);
PumpSetState(1);//Stop Clear
PumpSetMode (6, 0, 0, 0);
ModulatorInit(11);//for DAB Modulator Image Download
ModulatorSetRF(400000000);//400MHz
AttenSetFrequency(400000000);//400MHz
AttenSetOutLevel(-200);//-20dBm
T_DMB_Parse(u1_Buff, 24576, 0);//DAB Modulator parameter setting
PumpSetState(2);//run

Loop:
    PumpGetHwBuffUsed(&gu4_BuffUsed, NULL)
    // Total – Used = Free
    // Free >= u4_FileReadBytes    PumpWrite
    PumpWrite(gu1a_Buff, u4_FileReadBytes, &u4_TransferedBytes, 0/*false*/)

PumpSetState(1);//Stop Clear

CloseDevice();
VtsAPI_Finalize();
```

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