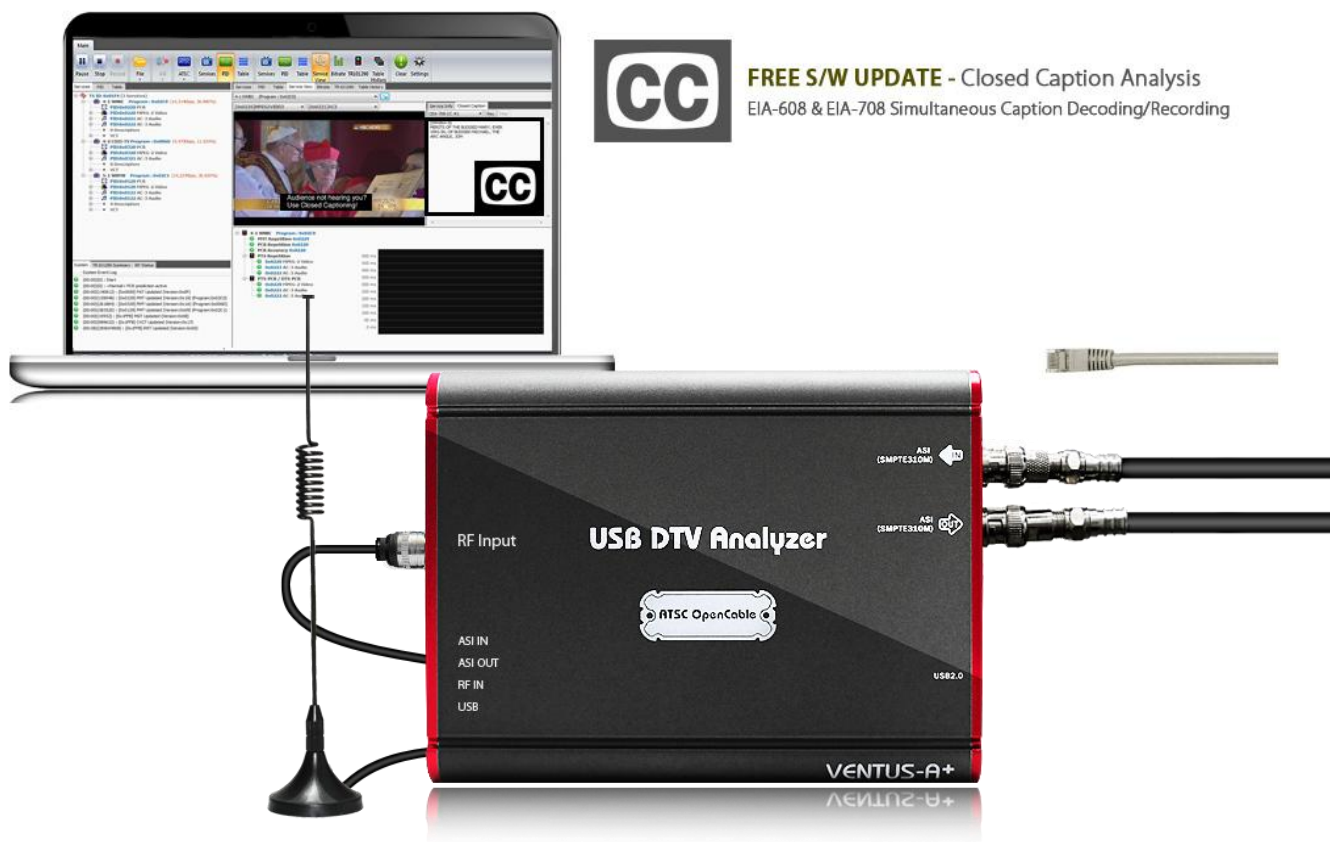


Manual

# VENTUS-A+ DTV Analyzer

USB DTV Analyzer – ATSC/QAM/DVB-T2/DVB-T/DVB-C



# VENTUS-A+ DTV Analyzer Manual

Revision Number: 1.2.3.0a

Distribution Date: Jan. 2016

## Copy Rights

Copyright © 2006~2015 LUMANTEK Co., Ltd.

All Rights Reserved

This document contains information that is proprietary to LUMANTEK.CO., LTD. The information in this document is believed to be accurate and reliable; however, LUMANTEK assumes no responsibility or liability for any errors or inaccuracies that may appear in this document, nor for any infringements of patents or other rights to third parties resulting from its use.

This publication may contain technical issues, inaccurate information or typos. These will be revised in revised edition, if there is any. No part of this publication is subject to be reproduced, stored in retrieval system, or transmitted in any forms, or any means without the prior consent by Lumantek.

## Trademarks

HD ENCODULATOR™, SD ENCODULATOR™ LUMANTEK Logo, Mega Cruiser™, ORIX™, X-Cruiser™, DTA-Plus™, Media Blaster™, are Trademarks of Lumantek. Co., Ltd.

Any other trademarks than stated above in this document belongs to its pertinent corporation.

## Warranty Period

Lumantek's products comes with One(1) year limited warranty. Please contact below if you need more information. .

LUMANTEK CUSTOMER SERVICES

[sales@lumantek.co.kr](mailto:sales@lumantek.co.kr) / TEL:02-6947-7422 / FAX:02-6947-7440

## Contents

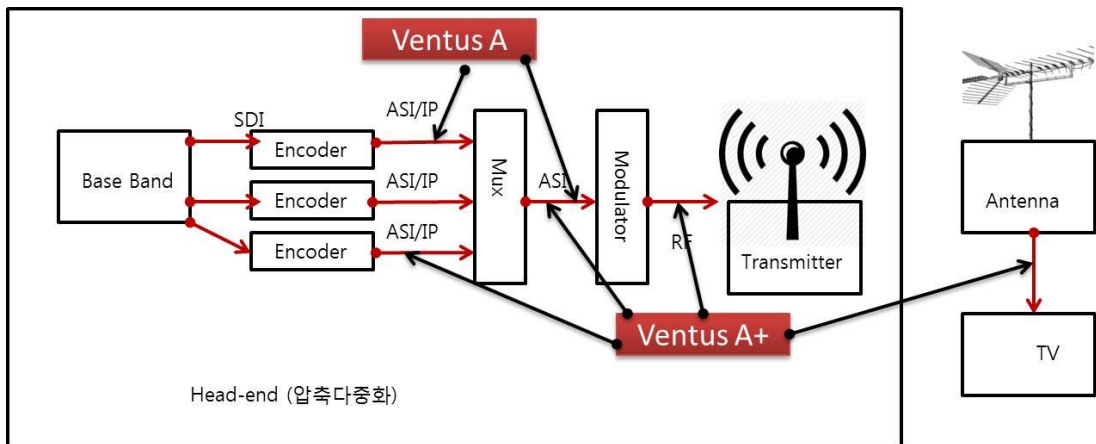
1. Introduction -----	4
1.1 Features	4
1.2 Specification	5
1.3 Software Specification	5
2. VENTUS-A Plus System Package -----	6
2.1 Parts Name	6
2.2 Package Contents	6
3. Installation -----	7
3.1 Software Installation	7
3.2 Driver Installation	11
4. DTV Analyzer Software -----	13
4.1 Control Window	14
4.2 Analysis Window – Services Tab	32
4.3 Analysis Window – PID Tab	33
4.4 Analysis Window – Table Tab	34
4.5 Analysis Window - Service View Tab	35
4.6 Analysis Window – Bit-Rate Tab	40
4.7 Analysis Window - TR 101 290 Tab	43
4.8 Analysis Window – Table History Tab	45
4.9 System Message & TR101290 Summary Window	48
4.10 TR 101 290 Summary Tab	49
4.11 RF Status Window	50
4.12 Operation Status Window	51
APPENDIX A. TR 101 290 Analysis Criteria	52
** Specification Sheet -----	55

## VENTUS-A+ DTV Analyzer

USB type DTV Analyzer for ATSC/QAM/DVB-T2/DVB-T/DVB-C

### 1. Introduction

VENTUS-A DTV Analyzer is designed to analyze MPEG-2 TS stream in real time/off line bases, Hardware and Software as in a package. The Hardware interlocks with the PC via USB cable to maximize its utilization as a mobile analyzer. Furthermore, it supports TS file output through ASI and real time input can re-transmitted via ASI.



#### 1-1. Features

- ① Real time analysis via RF/ASI/IP input plus offline analysis via TS files
- ② ETSI TR 101 290 based error detection
- ③ Bit-rate, PTS-PCR, DTS-PCR measurement, Table repetition cycle analysis
- ④ Provide configuration information for each PID, Service and Table
- ⑤ Provide Table History and detailed Table analysis tool
- ⑥ Provide Media player and detailed analysis information for each services
- ⑦ Load/Save TS recording & Analysis log
- ⑧ Support the newest TTA standard (Korean type 3D TV and multi-channel service)
- ⑨ Provide MER/Packet error rate and receiver sensitivity during RF reception

## 1.2 Specification

- Demodulation : 8VSB, OpenCable(64QAM, 256QAM)
- Size : 154mm x 76.8mm x 28.4mm
- USB 2.0 bus powered, no power supply required.
- RF input connector : 75Ω F-Type 1ea
- ASI/SMPTE310M input connector : 75Ω BNC 1ea
- ASI/SMPTE310M output connector : 75Ω BNC 1ea
- ASI input bit-rate : 0~108Mbps
- ASI output bit-rate : 0~108Mbps
- SMPTE310M input bit-rate : 19.392Mbps
- SMPTE310M output bit-rate : 19.392Mbps
- RF Input Frequency Range : 40 ~ 1002 MHz
- RF Input Level : +7 ~ -84 dBm +6 ~ - 75 dBm(64QAM), +6 ~ -66dBm(256QAM)

## 1.3 Software Specification

- TS input : ASI, SMPTE310M, File, IP(UDP/TS or UDP/RTP/TS), RF
- TS output : ASI or SMPTE310M (Not supported in IP Input, high speed analysis mode)
- Analysis mode : MPEG-2, ATSC, DVB
- Analysis Result Window
- Service, PID, Table, Service View, Bit-rate, TR 101 290, Table History
- Minimum System Requirements
- CPU : Intel Core i3 3.1GHz (Sandy Bridge) or above
- RAM : 2GB or above
- OS : Window 7
- Resolution : 1680x1050 or above

## 2 VENTUS-A Plus System Package

### 2.1 Parts Name



### 2.2 Package Contents



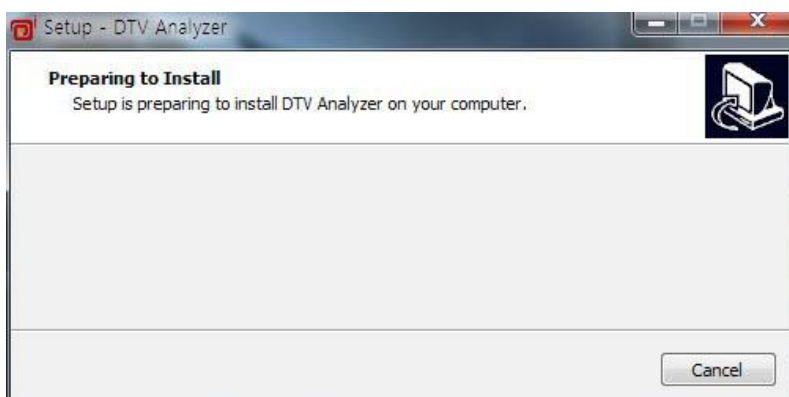
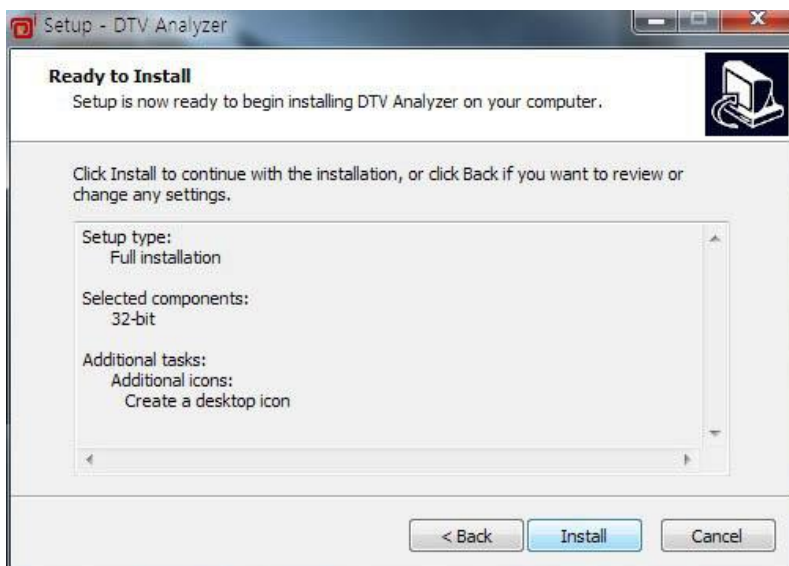
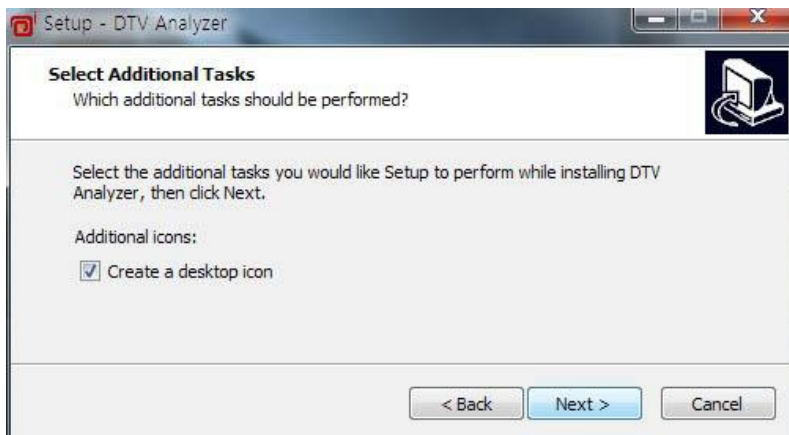
### 3 Installation

#### 3.1 Software Installation

Please disconnect USB cables from the DTV analyzer before installation.

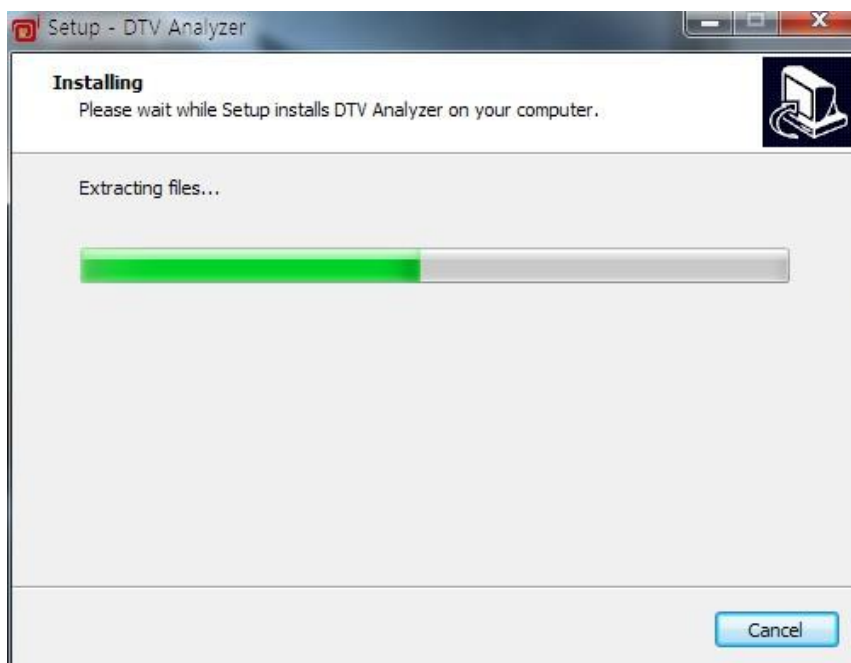
Run 'DTV Analyzer Setup' file in the USB memory provided with the package. Press 'Next' to proceed installation. (Run under 'Administrator Authority' for Windows OS 7 or above)



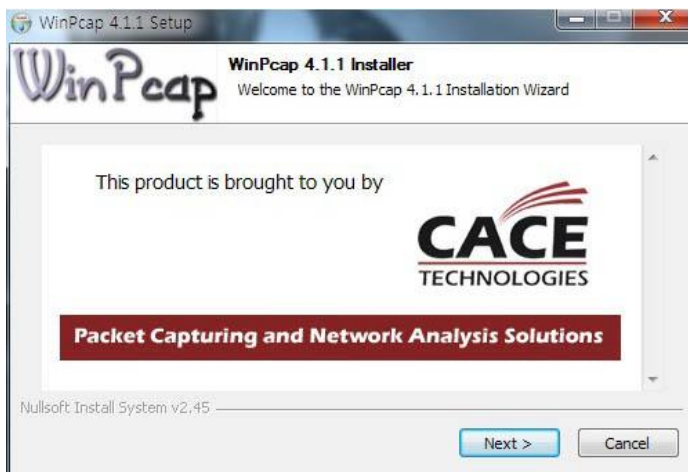




If you see below messages, please select 'Do not close the application'



After the installation is completed, the 'WinPcap' file needs to be installed. This must be done during the installation, no reinstallation required for version updates.

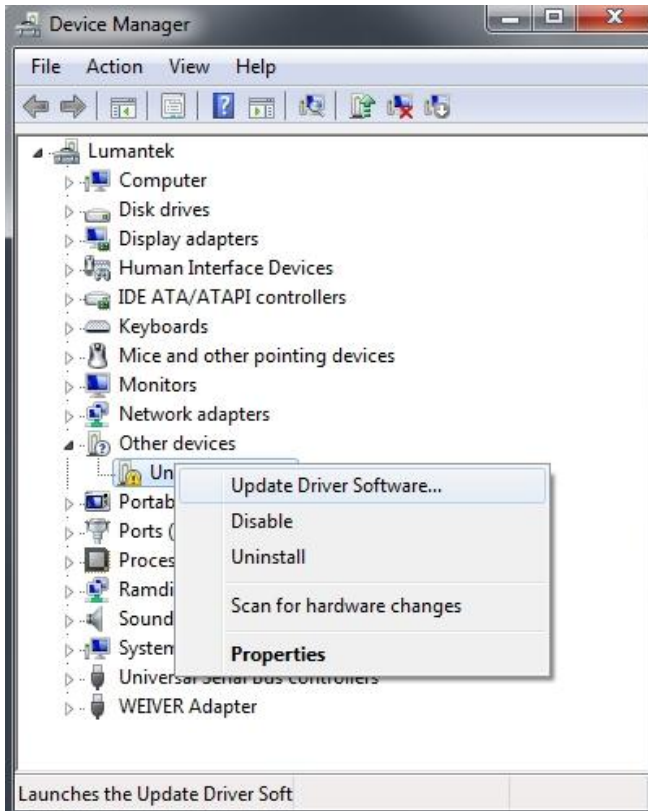


Automatically start the WinPcap driver at boot time' must be selected during the installation.

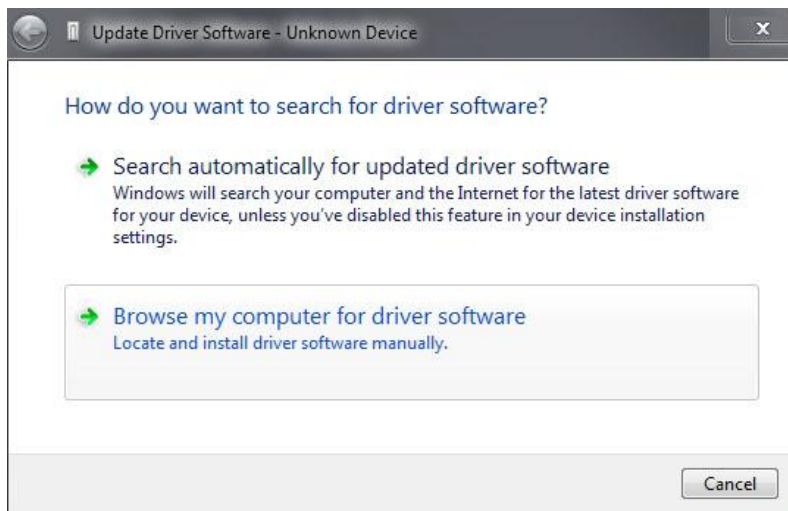
After the software installation is completed, the Driver will automatically start its installation when the hardware is connected. If not, please run '3.2 Driver Installation'.

### 3.2 Driver Installation

Connect DTV-Analyzer to PC with USB cable.



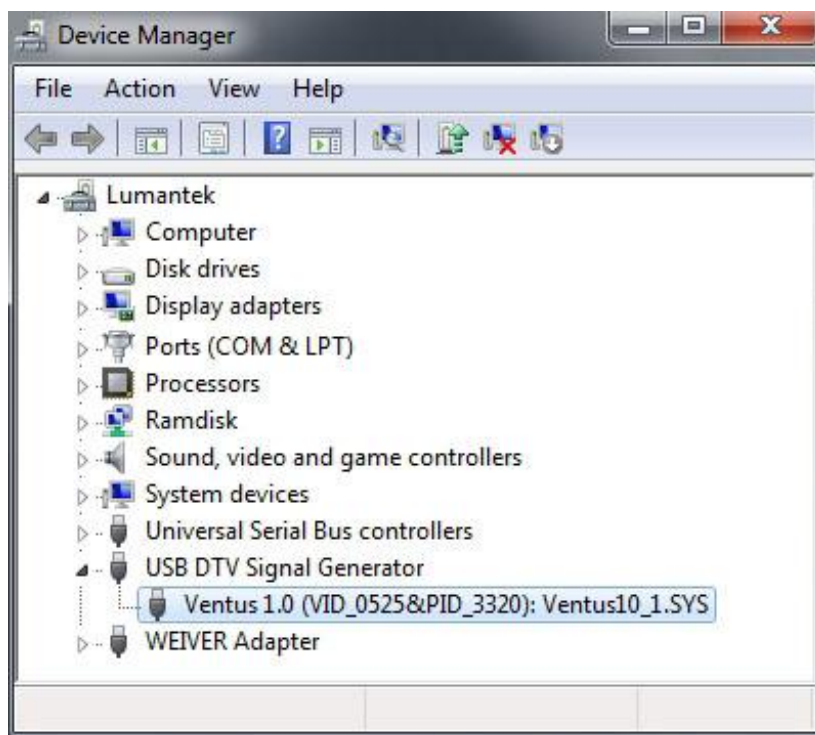
Right Click on 'Unknown device' in Device manager then click on Software upgrade.



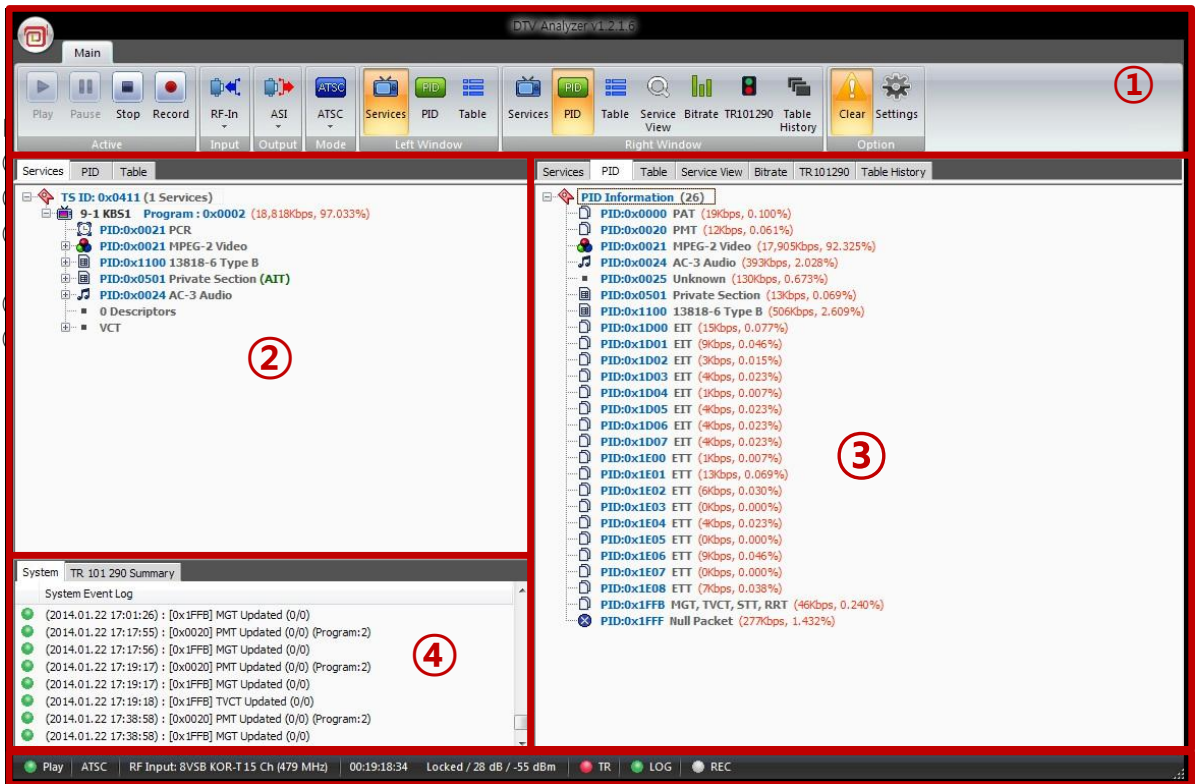
Select 'Browse my computer for driver software' then select either "`\Driver\Windows32bit.1`" or "`\Driver\Windows64bit.1`" based on your Window OS. Click on 'Next'.



Please check 'USB DTV Signal Generator -> Ventus 1.0' is shown in device manager after driver installation is completed.



## 4 DTV Analyzer Software



- ① Control Window
- ② Analysis Result Display (Left)
- ③ Analysis Result Display (Right)
- ④ System Message Display
- ⑤ Operation Status Indicator

## 4.1 Control Window

The Control Window shows the entire operational control and settings, with series of tabs including Active tab, Input tab, Output tab, Mode tab, Left/Right Window tab, and Option tab. ('Settings' Button for Input tab, Output tab, Mode tab and Option tab is activated only when system is NOT running)



- Active Tab

Controls 'Start', 'Pause' (in file analysis mode), 'stop', 'record' function. 'Record' button is activated only during the analysis in progress. It is a toggle switch, you can start/stop recording during the analysis at any point.

< Status: STOP >



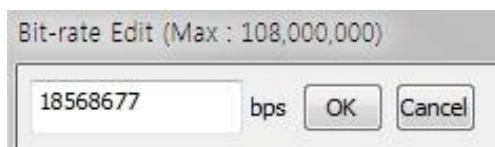
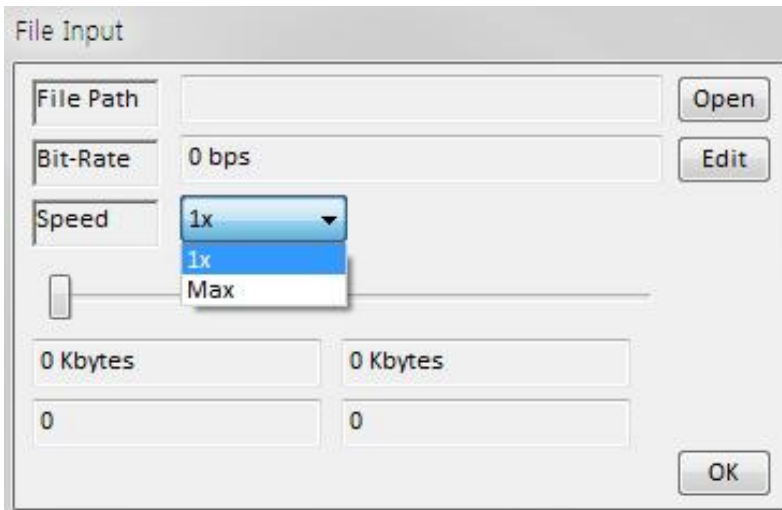
< Status: PLAY >



- Input Tab

You can select input port and detailed settings. File, TS-In, IP-In, and RF-In can be selected and each option comes with pop-up window for detailed settings.

< File Input Detailed setting Window >

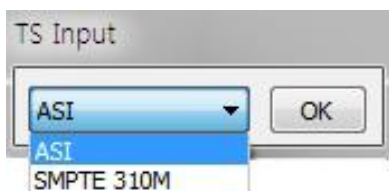


- ① Select a file with 'Open' button.
- ② Bit-rate is calculated automatically when the file has been selected, can be modified with 'Edit' button if necessary.
- ③ Speed: You can select among 1x analysis mode and High Speed Analysis mode('Max')(1x mode run its analysis based on its designated Bit-rate with time, Data output through Media Player and output port is available. 'Max mode enables High Speed Analysis but Data output through Media Player and output port is NOT available
- ④ You can select the Analysis starting point by adjusting the navigation bar.

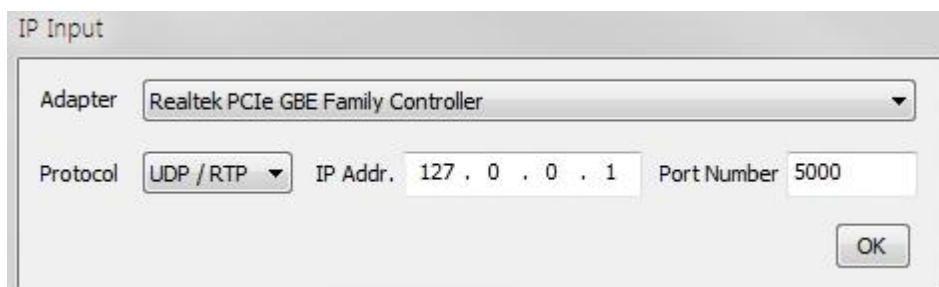


## &lt; TS-In Input detailed setting window &gt;

You can select either ASI Input or SMPTE-310M.



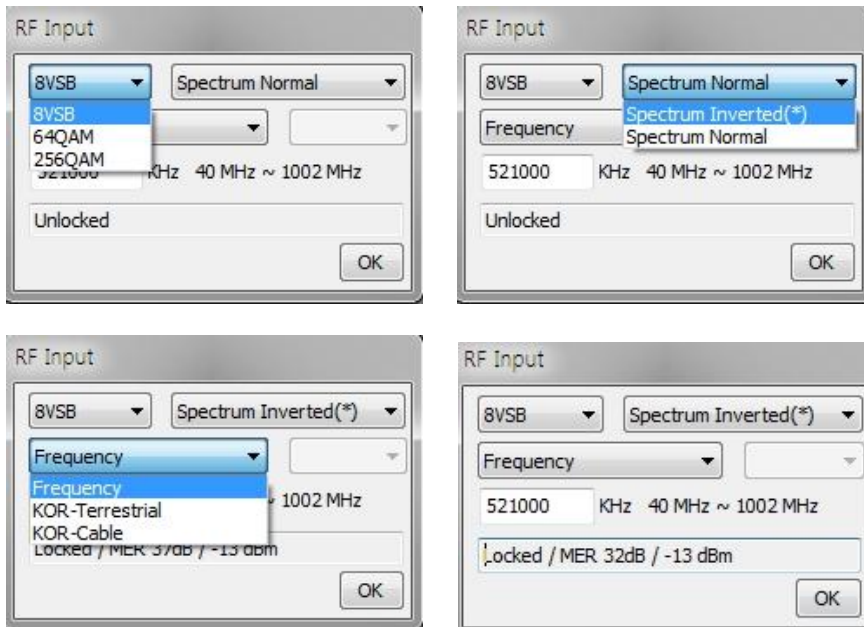
## &lt; IP-In Input Detailed setting Window&gt;



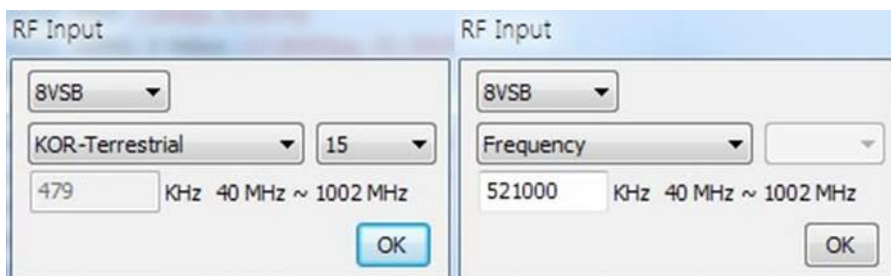
- ① You can select network adapter for IP input through the Adapter
- ② You can select UDP or RTP through Protocol
- ③ You can select the IP address and UDP through the Address and Port Number



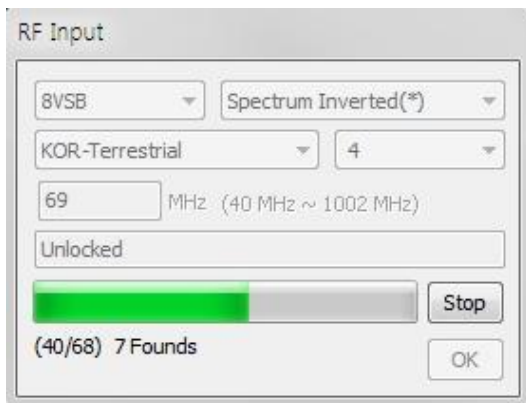
## &lt; RF-In Input Detailed setting Window &gt;



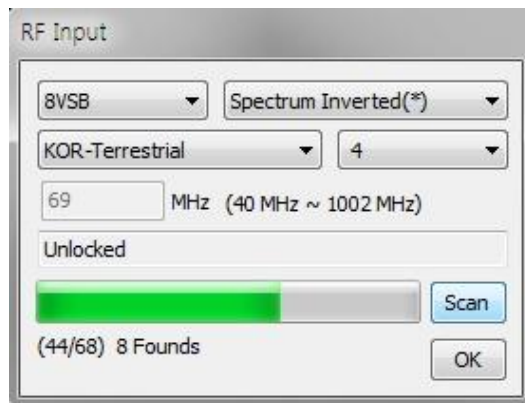
- ① You can select the modulation type, such as 8VSB, 64QAM, 256QAM in drop box menu on top left corner
- ② You can select 'spectrum INPUT type 'Spectrum Inverted' or 'Spectrum Normal'. The 'Spectrum Inverted' is set as the default.
- ③ It supports both frequency allocation, based on supported channel chart and direct selection of the frequency. (Current Selectable Chart: KOR-Terrestrial, KOR-Cable)
- ④ You can check the RF INPUT status with status bar at the bottom



- ⑤ Frequency Scanning Feature is available when such frequencies are selected based on the Channel Chart.

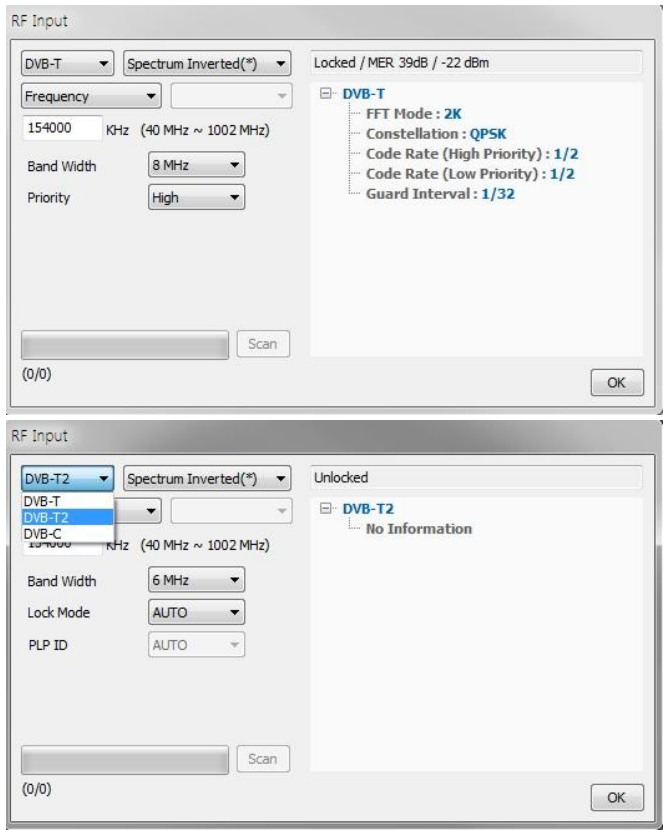


<Scanning >



<Scanning Completed>

< DVB-T2/T/C Type >

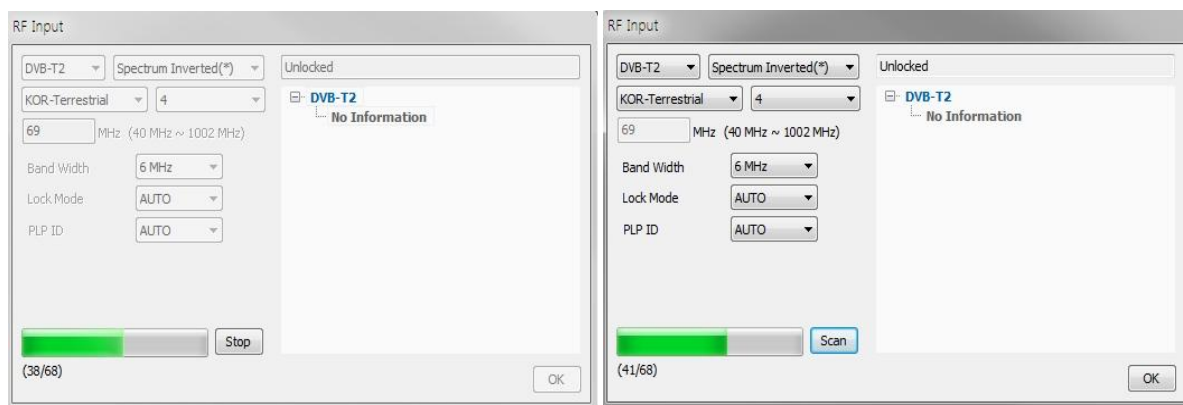


- ① Select frequency modulation from the drop down menu on top left. (DVB-T, DVB-T2, DVB-C )
- ② Please see the chart below for additional parameter settings for each modulation

<Additional Parameter Setting>

	1	2	3
DVB-T	Band Width (6MHz/7MHz/8MHz)	Priority (High/Low)	
DVB-T2	Band Width (1.7MHz/5MHz/6MHz/7MHz/8MHz)	Lock Mode (BASE/LITE)	PLP ID (*Default: AUTO, Selectable after 'LOCK')
DVB-C	Symbol Rate (* unit: Ksps)	Constellation (16QAM/32QAM/64QAM/ 128QAM/256 QAM)	

- ③ Select spectrum input format through drop down menu on top center of the UI.
- ④ Spectrum Inverted, Spectrum Normal
- ⑤ Direct frequency input and allocation of frequencies based on the frequency chart settings supported.
- ⑥ KOR-Terrestrial, KOR-Cable EU-Normal, EU-Special(Radio), EU-Digital
- ⑦ RF Input Status Indicator.
- ⑧ Frequency scan features available when frequency is allocated based on the channel chart.



&lt;Scan in Progress&gt;

&lt;Scan Completed&gt;

- Output Tab

Select Output type of the Output port.

You can select between ASI output and SMPTE-310M output, internal Re-mux will be activated when it is necessary. (\*When Re-Mux is being activated, the PCR related data will be modified from its original input data.)

Please refer to the following Chart for more details.

Input Port and Settings	Output Port	Data Output	Re-Mux Activation
File (1x Mode)	ASI	O	X
	SMPTE-310M	O	X
File (Max Mode)	ASI	X	X
	SMPTE-310M	X	X
TS-In (ASI)	ASI	O	X
	SMPTE-310M	O	O
TS-In (SMPTE-310M)	ASI	O	X
	SMPTE-310M	O	X
IP-In	ASI	X	X
	SMPTE-310M	X	X
RF-In	ASI	O	X
	SMPTE-310M	O	O

- Mode Tab

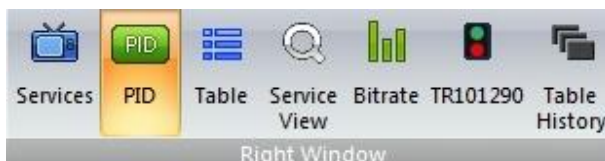
You can select Broadcasting standard applied for the analysis. Supporting MPEG-2, ATSC, DVB, and etc. (When MPEG-2 is selected, only items categorized in MPEG Standard will be analyzed)

If analysis mode and current selected TR101290 profile mode is conflicted, then a popup window prompt to change setting.



- Left Window Tab & Right Window Tab

You can select window portions to be shown either left or right.



- ① You can select Services, PID, Table in Left Window Tab
- ② You can select Services, PID, Table, Service View, Bit-rate, TR101290, Table History Right Window Tab

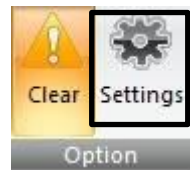
- Option Tab

Option Tab is comprised of 'Clear' and 'Settings' button . 'Clear' button will cancel the alarm and alarm status. The Color of the button will change to yellow with exclamation mark when the alarm is triggered. Click 'Clear' to clear alarm and initialize the status

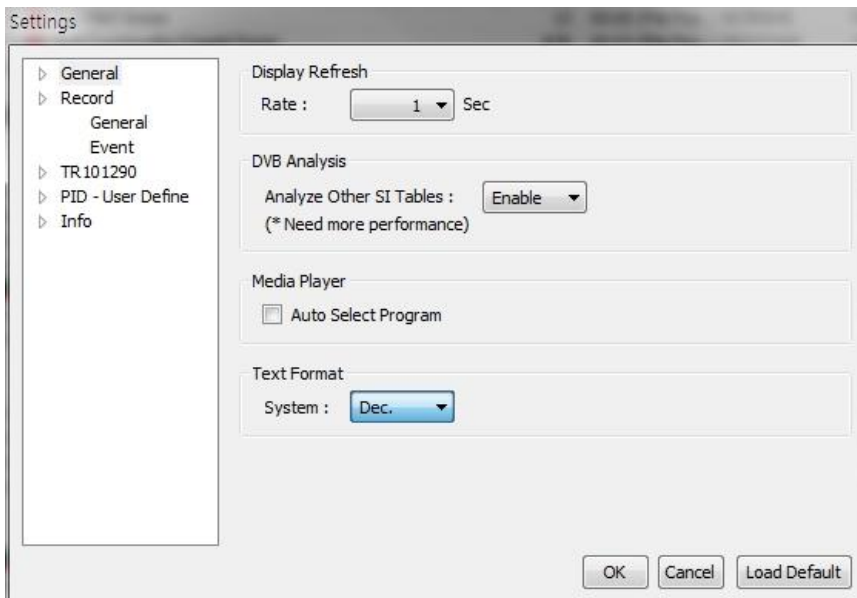
< Normal >



< Error Occurred >

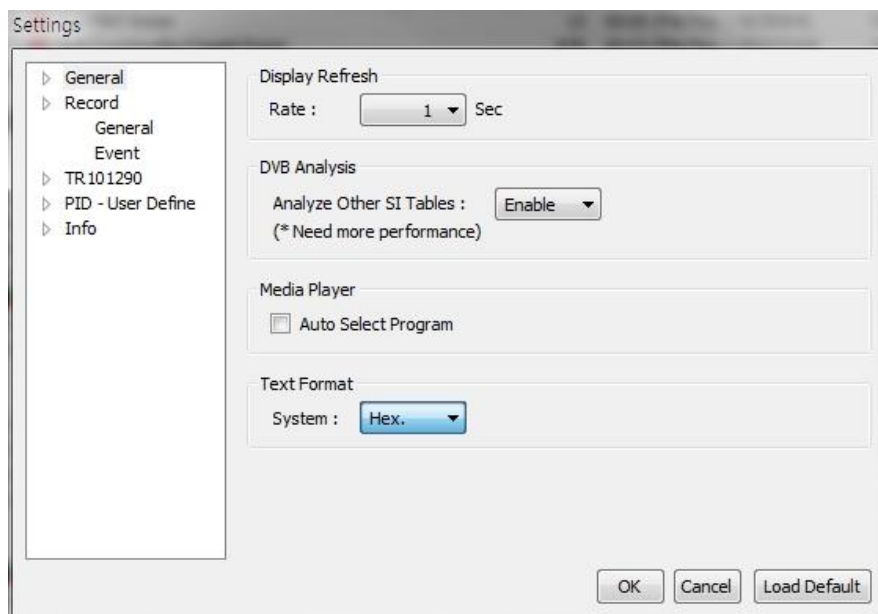


When 'Settings' is clicked, Pop-up Window will appeared.



- ① 'Settings' Pop-up Window enables you to configure 5 categories. This includes General, Record, TR 101290, PID-User Default, and Info
- ② Selecting the option on left will display details of selected option on right
- ③ Press 'Ok' to save settings, 'Cancel' to cancel changes, 'Load Default' to initialize setting.

## &lt;Settings Popup Window– General&gt;

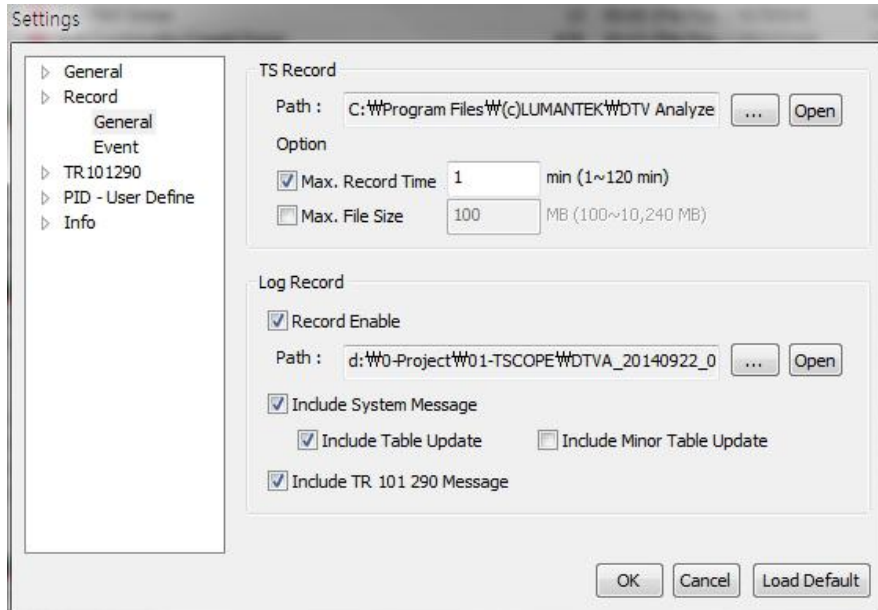


- ① You can configure GUI refresh rate with 'Display Refresh'. (1~10 sec)
- ② DVB Analysis – Analyze Other SI Tables". During DVB analysis mode, determine whether to perform analyzing NIT-other and SDT-other as well as information on network and etc. When this mode is activated, may require higher performance PC
- ③ "Media Player – click on "Auto Select Program" enable automatically analyze service and if it finds services then display first program in "Service View Window ."
- ④ Turn ON/OFF Deinterlace option for 'interlaced Video' with 'Media Player – Deinterlace if necessary' checkbox.
- ⑤ Adjust HEVC Decoding option with 'Media Player-HEVC decode Mode' checkbox.
- ⑥ You can select text option with "Text Format" to display in decimal or hexadecimal.



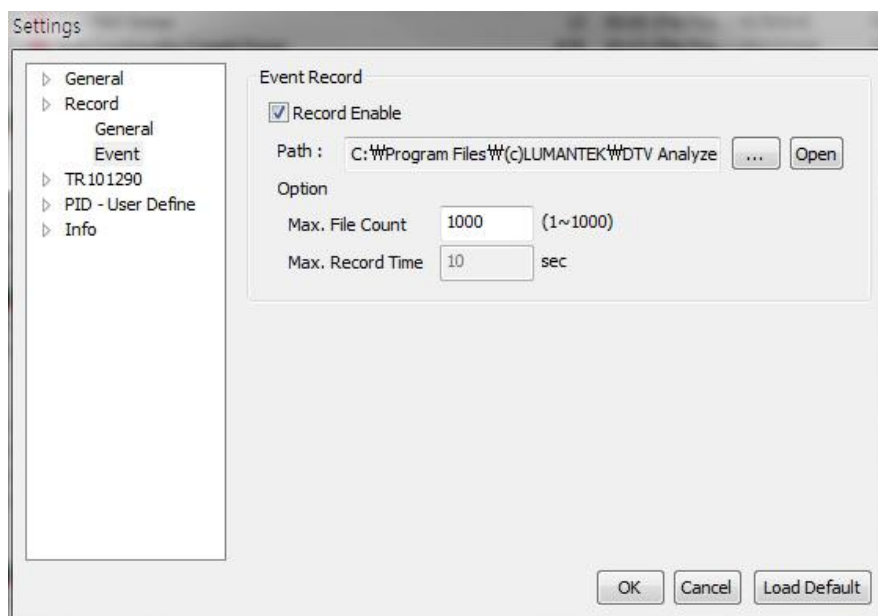
## &lt;Settings Popup Window– Record Tab&gt;

## - General



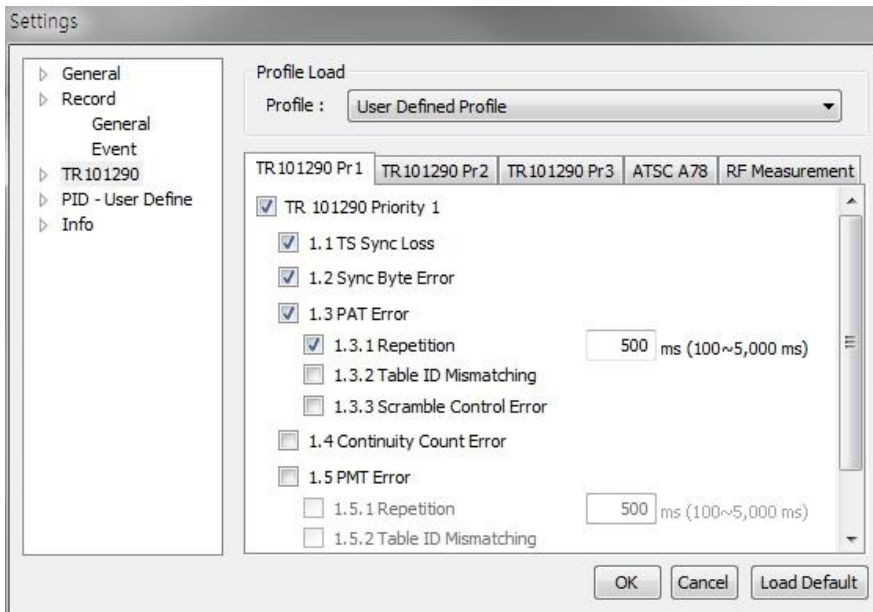
- ① TS Record path and name can be configured by pressing ‘...’ button. (Recording date and time will be added to the actual file name)
- ② Press ‘Open’ button to see the file path in TS Record.
- ③ TS Record item Option – check box allows to save the file by maximum size and time ( Maximum recording time and size is 120 Minutes or 10240 MB, respectively)
- ④ Check “Record Enable” box to save the log
- ⑤ Click ‘...’ button in Log Record to configure file path and file name. (Recording date and time of the log data will be added to the actual file name) Log file is saved in ‘\*.csv’ format.
- ⑥ Press ‘Open’ button in Log Record to see file path.
- ⑦ Check ‘Include System Message’ box in Log Record to save system operation related message log data.
- ⑧ Check ‘Include Table Update’ box in Log Record to save information table update message log data during system operation
- ⑨ Check ‘Include Minor Table Update’ in Log Record to save frequently updated information table message log data during system operation. Frequently updated information table includes STT, EIT, STT in ATSC. )
- ⑩ Check ‘Include TR 101 290 Message’ box in Log Record to save TR 101 290 error message log data during system operation.

## - Event



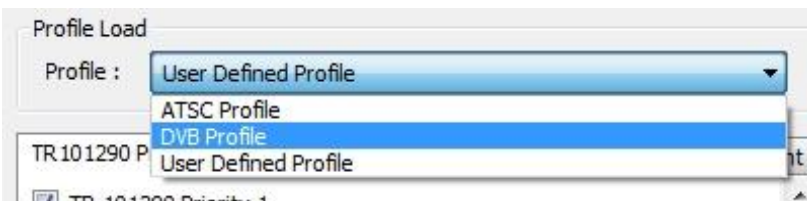
- ① Check “Record Enable” box from ‘Event Record’ to save event files during system operation.
- ② Designate the file name and path with “...” button in ‘Event Record’(The recording date and time will be added to the actual saved file name)
- ③ Use “Open” button to check the file path of the ‘Event Record’
- ④ Configure the maximum number of files for event recording with ‘Max, File Count’ edit box in ‘Option’ of ‘Event Record’.

## &lt;Settings Popup window – TR101290 &gt;

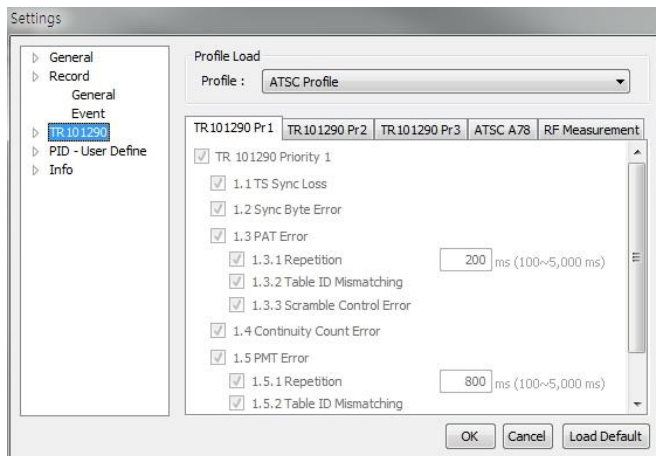


- ① You can configure ETSI TR 101 290 , ATSC A78 and RF Measurement analysis settings
- ② You can select ATSC, DVB, User-defined Profile
- ③ TR101290, ATSC A78 can be edited only if it is 'User-defined Profile'
- ④ RF Measurement can be edited at anytime
- ⑤ Use check box to enable/disable operation during analysis process
- ⑥ Parts with the numerical limitation would display such limitation on the right, and the ranges indicated in that box is the adjustable within its range.

## - Profile setting



## &lt;Settings Popup Window– ETSI TR 101 290



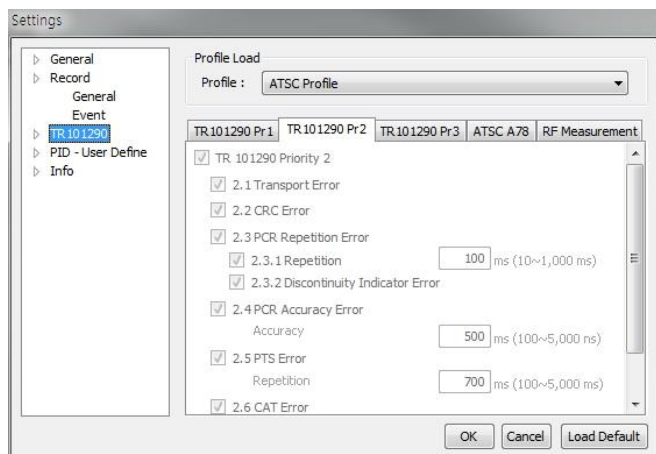
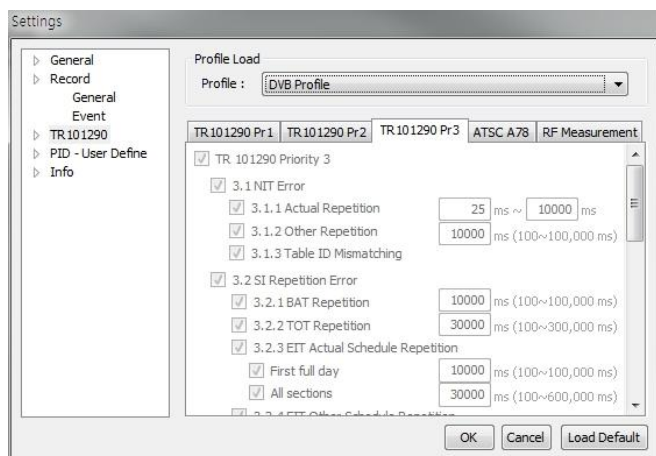
Detailed Setting for TR 101 290 Analysis.

Can select from ATSC, DVB and User-defined Profile. You can set only preferred analysis items in User-defined Profile menu.

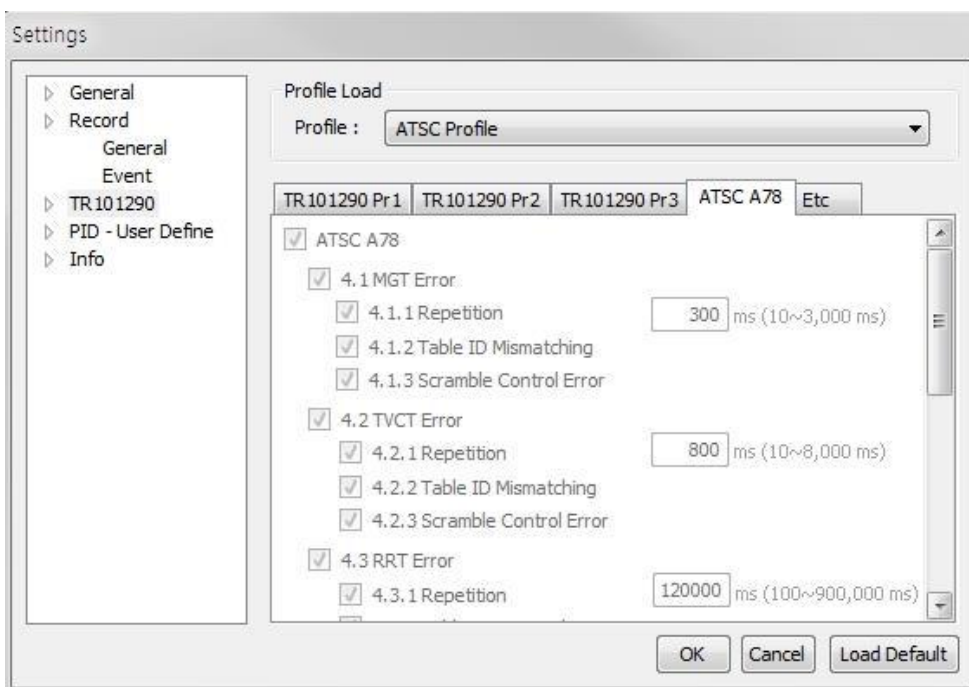
Analyze only checked box items, when it operate.

if there are numerical values in analysis and the limit values are configured as defined by to ATSC or DVB. Alternatively User can setup this limit value in User-defined Profile.

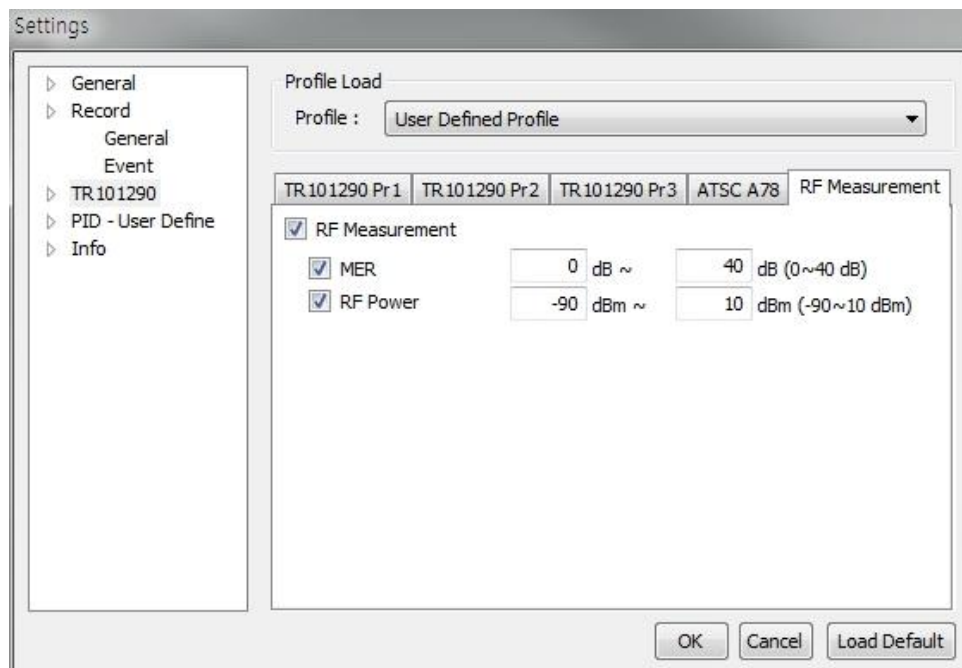
(in Priority 4 cases, the numerical limits range were set on basis of ATSC standard . You can configure related ATSC table value.)



## - ATSC A78



## - RF Measurement



## &lt;Settings Popup Window– PID-User Define&gt;

Settings

- General
- Record
  - General
  - Event
- TR101290
- PID - User Define
- Info

PID - User Define

☒ Hex. Program Number : 0x  PID : 0x

☐ Dec. Program Number :  PID :

No.	Program Number	PID
1	0x0002	0x0025
2	0x0002	0x0026

Settings

- General
- Record
  - General
  - Event
- TR101290
- PID - User Define
- Info

PID - User Define

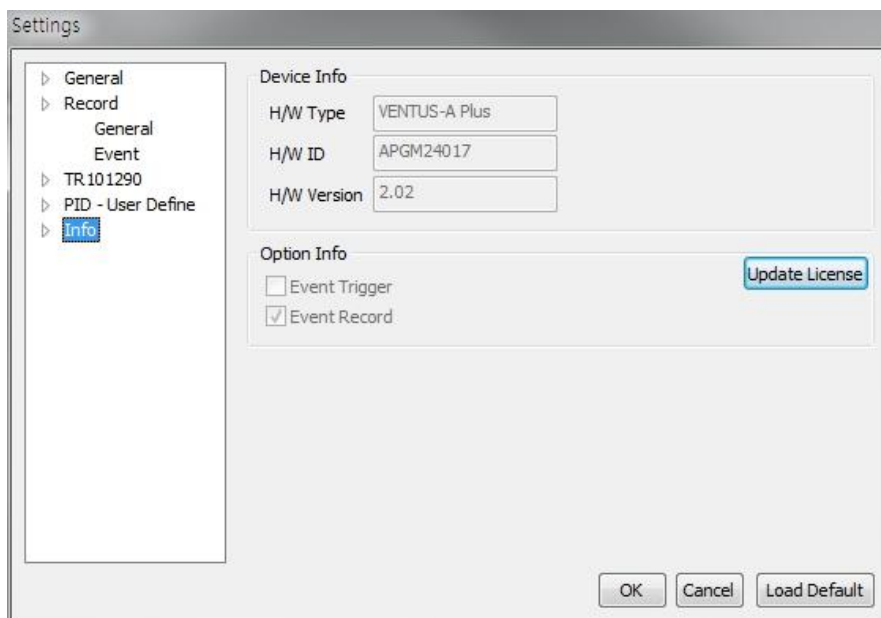
☐ Hex. Program Number : 0x  PID : 0x

☒ Dec. Program Number :  PID :

No.	Program Number	PID
1	2	37
2	2	38

- ① Analyze PIDs in specific Program Number.
- ② Decimal/Hexadecimal INPUT supported
- ③ Insert Program Number and PID then press ADD button
- ④ Press 'DEL' to remove added PID (If there is no selected PID, it will delete from the most recently added files)

## &lt;Settings Popup Window– Info Tab&gt;



- ① Can check the serial number and properties of connected Device with “Device Info”
- ② Can Check the options supported by the connected Device with “Option Info” (Event Trigger option, Event Record option supported)
- ③ Press ‘Update License’ button to register /apply new license option

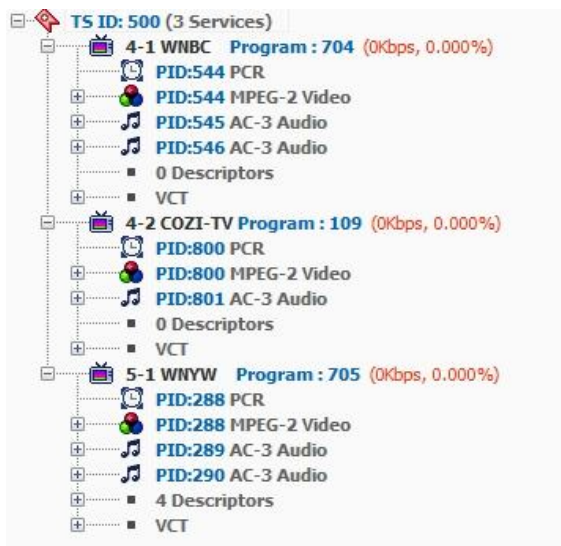
## 4.2 Analysis Window – Services Tab

Service Tab shows the analysis result of service components in a tree structure format.

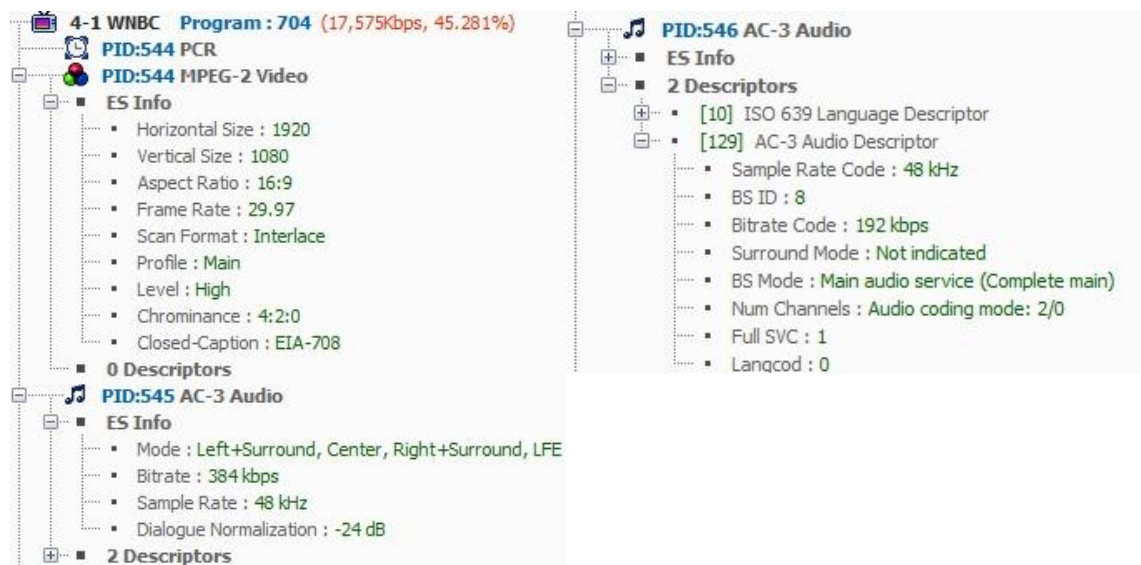
Double Click on node or click on '+', '-' to expand or fold displays.

The top of tree structure shows the number of TS ID and number of Services.

For each services, the Service name, Program Number, bit rate and occupancy information is shown along with the configuration information in sub-node.



The component of each program shows PID and properties along with the ES Info and Descriptor in sub-node. The ES info shows component information analysis inside the ES (elementary Stream) data and Descriptor shows contents included in PMT information table.





### 4.3 Analysis Window – PID Tab

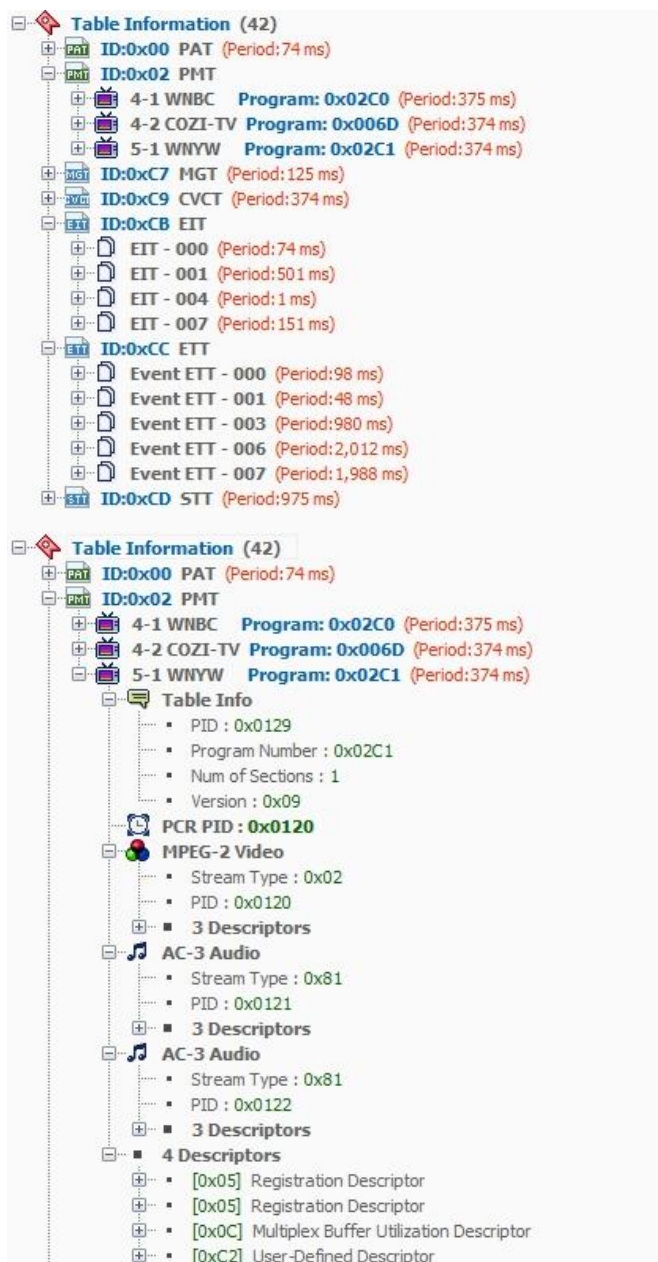
PID Tab shows the total number of analyzed PID with its properties, bit rate and occupancy.

PID Information (56)	
	PID:0x0000 PAT (7Kbps, 0.014%)
	PID:0x0001 CAT (15Kbps, 0.029%)
	PID:0x0010 NIT-Actual (39Kbps, 0.075%)
	PID:0x0011 SDT-Other, BAT, SDT-Actual (323Kbps, 0.626%)
	PID:0x0012 EIT-Actual p/f, EIT-Other Schedule, EIT-Actual Schedule (533Kbps, 1.034%)
	PID:0x0014 TDT (1Kbps, 0.002%)
	PID:0x0021 User Defined PID (172Kbps, 0.335%)
	PID:0x00C0 EMM (84Kbps, 0.163%)
	PID:0x00C1 EMM (51Kbps, 0.099%)
	PID:0x0410 H.264/AVC Video (3,908Kbps, 7.576%)
	PID:0x0413 PES Private Data (400Kbps, 0.775%)
	PID:0x041A PMT (15Kbps, 0.029%)
	PID:0x041B ECM (13Kbps, 0.026%)
	PID:0x0420 H.264/AVC Video (8,157Kbps, 15.811%)
	PID:0x0423 PES Private Data (400Kbps, 0.775%)
	PID:0x042A PMT (7Kbps, 0.014%)
	PID:0x042B ECM (16Kbps, 0.032%)
	PID:0x0430 H.264/AVC Video (3,889Kbps, 7.538%)
	PID:0x0433 PES Private Data (398Kbps, 0.772%)
	PID:0x043A PMT (7Kbps, 0.014%)
	PID:0x0440 H.264/AVC Video (5,400Kbps, 10.467%)
	PID:0x0443 PES Private Data (398Kbps, 0.772%)
	PID:0x044A PMT (7Kbps, 0.014%)
	PID:0x044B ECM (15Kbps, 0.029%)
	PID:0x0450 H.264/AVC Video (3,113Kbps, 6.034%)
	PID:0x0453 PES Private Data (400Kbps, 0.775%)
	PID:0x045A PMT (7Kbps, 0.014%)
	PID:0x045B ECM (16Kbps, 0.032%)
	PID:0x0460 H.264/AVC Video (4,041Kbps, 7.832%)
	PID:0x0463 PES Private Data (398Kbps, 0.772%)
	PID:0x046A PMT (7Kbps, 0.014%)
	PID:0x046B ECM (13Kbps, 0.026%)
	PID:0x0470 H.264/AVC Video (7,368Kbps, 14.280%)
	PID:0x0473 PES Private Data (400Kbps, 0.775%)
	PID:0x047A PMT (7Kbps, 0.014%)
	PID:0x047B ECM (16Kbps, 0.032%)
	PID:0x0480 H.264/AVC Video (3,754Kbps, 7.275%)
	PID:0x0483 PES Private Data (400Kbps, 0.775%)
	PID:0x048B ECM (15Kbps, 0.029%)
	PID:0x0490 H.264/AVC Video (4,533Kbps, 8.785%)
	PID:0x0493 PES Private Data (400Kbps, 0.775%)
	PID:0x049B ECM (15Kbps, 0.029%)
	PID:0x04DA PMT (7Kbps, 0.014%)
	PID:0x04EA PMT (7Kbps, 0.014%)
	PID:0x0BAB AIT (1Kbps, 0.002%)
	PID:0x0CC9 User Private (282Kbps, 0.548%)
	PID:0x0CCA User Private (282Kbps, 0.548%)
	PID:0x1441 ECM (15Kbps, 0.029%)
	PID:0x1442 ECM (15Kbps, 0.029%)
	PID:0x1444 ECM (15Kbps, 0.029%)
	PID:0x1445 ECM (15Kbps, 0.029%)
	PID:0x1446 ECM (15Kbps, 0.029%)
	PID:0x1447 ECM (15Kbps, 0.029%)
	PID:0x1448 ECM (15Kbps, 0.029%)
	PID:0x1449 ECM (15Kbps, 0.029%)
	PID:0x1FFF Null Packet (1,719Kbps, 3.331%)

#### 4. 4 Analysis Window– Table Tab

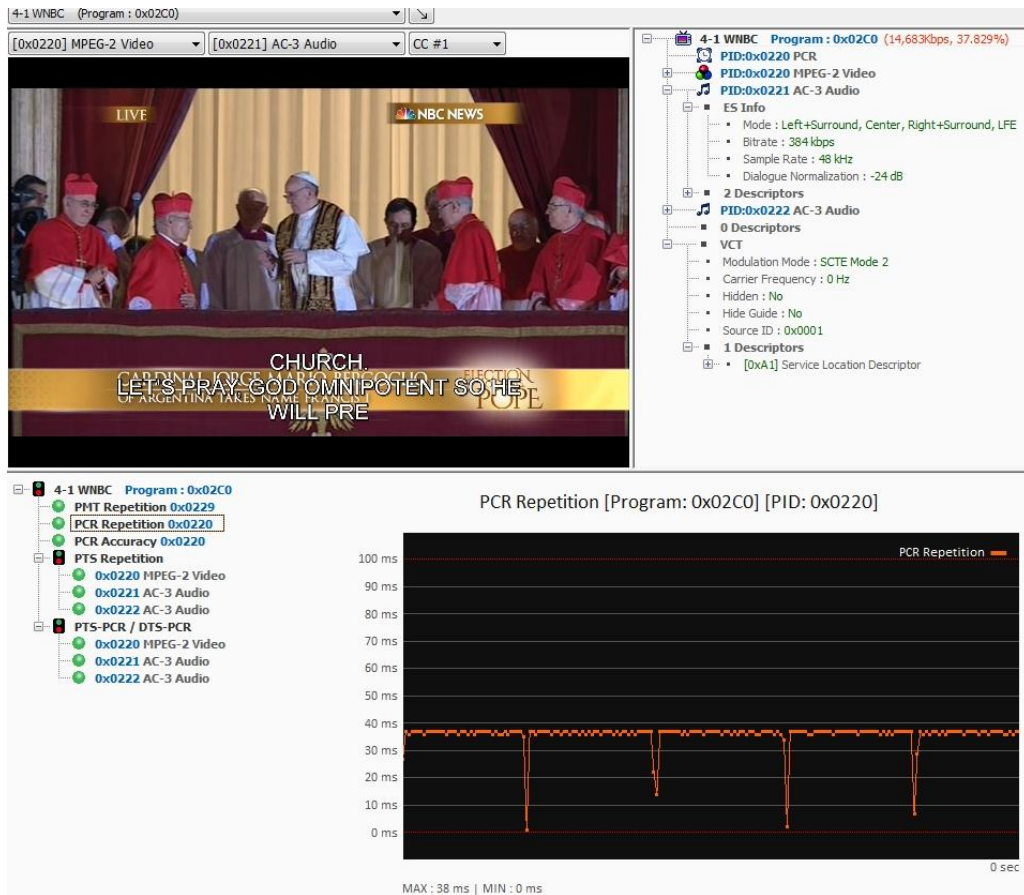
Service Tab shows collected information tables in sequence by its Table ID in a tree structure format.

Double Click on node or click on '+', '-' to expand or fold displays. It shows the information collected and the named of the tables, repeated cycle. the summary of the information displayed in sub-node.



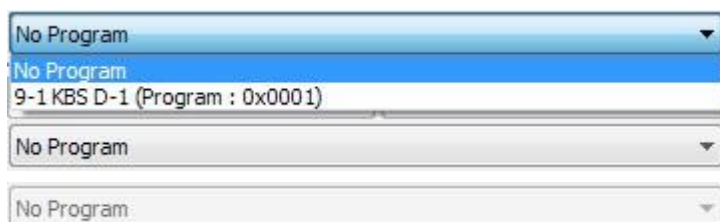
## 4.5 Analysis Window – Service View Tab

Service View Tab shows service component timing related error detection items with Media Player for one(1) selected program.



During the Analysis operation, the drop-box menu selection is inactivated until the program is detected. Upon the program detection the drop-box is activated.

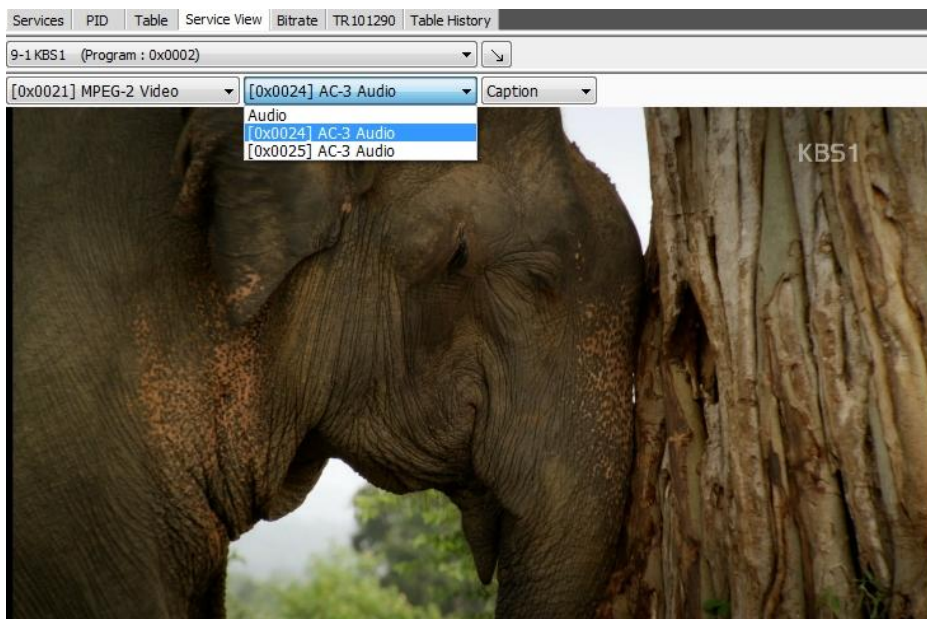
(If 'Auto Select Program' has been selected in 'Settings-Service View' tab, the first program detected is specified as a program)





Once program is specified, Media player will be activated. (Not supported in 'Max Speed' or 'File input' Mode)

Three(3) drop box menus right above the Media Player screen will be activated after the program has been specified, you can select Video, Audio and Caption/Sub- title. (Only supports English sub-titles ) Closed Caption will be displayed in a separate screen.



Arrow icon allows to expand or restore size of media player

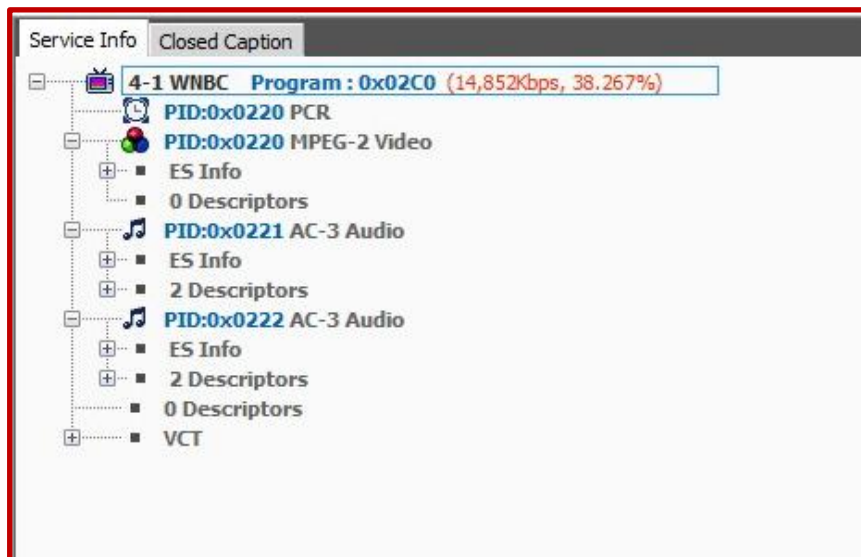
The screenshot displays the VENTUS-A+ DTV Analyzer interface. The top section shows the 'Services' list with columns for PID, Table, and Service View. The 'Service View' tab is selected, showing details for the selected service (4-1 WNBC, Program: 0x02C0). The 'Table' column shows the selected table (0x0220) and the 'Service View' column shows the selected service (0x0221 AC-3 Audio). The 'Table History' column shows the selected table (0x0220).

The main display area shows a live video feed from NBC NEWS. The video shows a group of people in red and white robes, likely a religious ceremony. The text 'ALL THOSE THAT RECEIVE THE BLESSINGS THROUGH THE RADIO, THE TV AND THE NEW COMMUNICATION' is overlaid on the video. The video is labeled 'LIVE' and 'NBC NEWS'.

The bottom right section shows a graph of PCR Accuracy for the selected service. The graph is titled 'PCR Accuracy [Program: 0x02C0] [PID: 0x0220]' and shows a plot of PCR Accuracy over time. The y-axis ranges from -500 ns to 500 ns. The x-axis represents time. The graph shows a series of peaks and valleys, indicating the accuracy of the PCR data. The text '[PCR Acc.] MAX : 111 ns | MIN : -148 ns' is displayed at the bottom of the graph.

Screen on the right is switchable between the Service configuration or Closed Caption service.

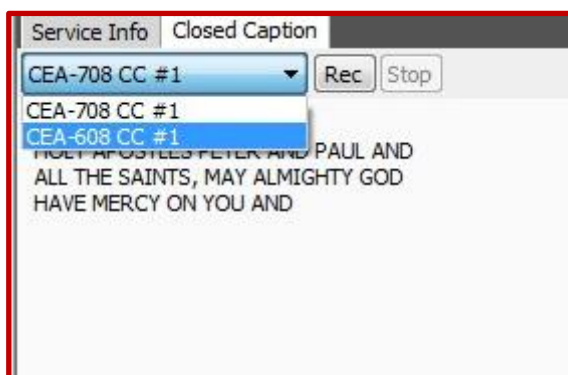
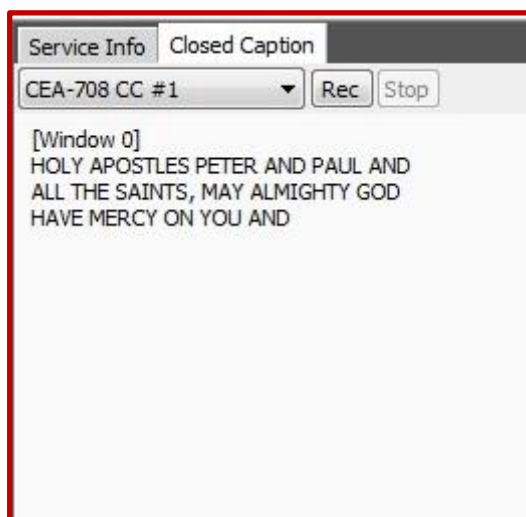
Configuration tree on the right shows the components of the specified program and is same configuration as 'Service Tab'



Closed Caption displays the CEA 608/708 data on screen.

Switchable CC Chanel through the channel list.

'Rec' allows users to record a detailed information of the Closed Caption data in '.csv' format. (file saving path is as same as 'Setting-Record-TS Record' path.)

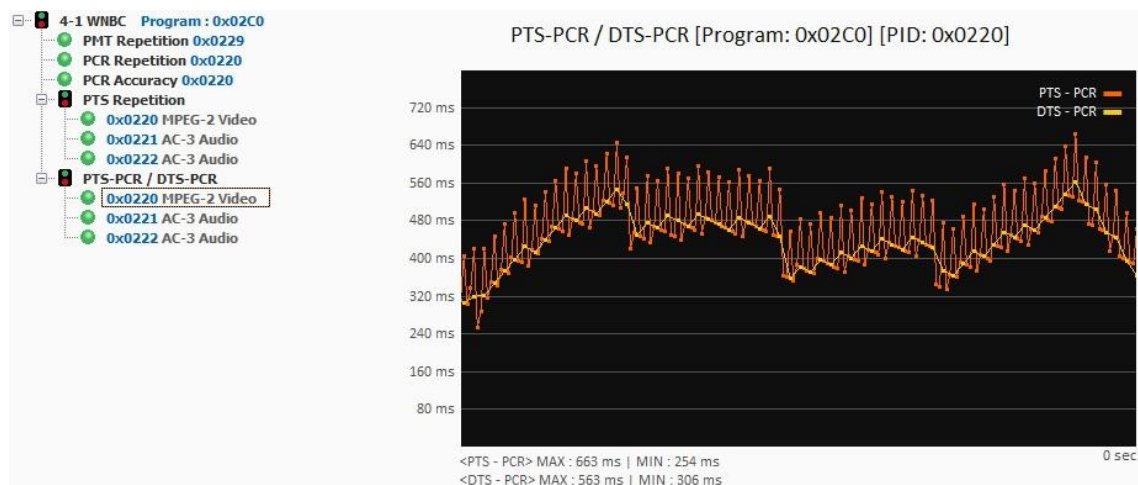


The timing related error items at the bottom shows PMT Repetition, PCR Repetition, PCR Accuracy, PTS Repetition plus PTS-PCR, PTS-PCR value as defined in TR 101 290.  
 (PTS-PCR indicates the difference in its value compare to PCR input value right before PTS)  
 (DTS-PCR indicates the difference in its value compare to PCR input value right before DTS)

Icon color indication:

Gray: (Not analyzed), Green (normal ), Red (error)

Select each item on the left side table to show related graph.



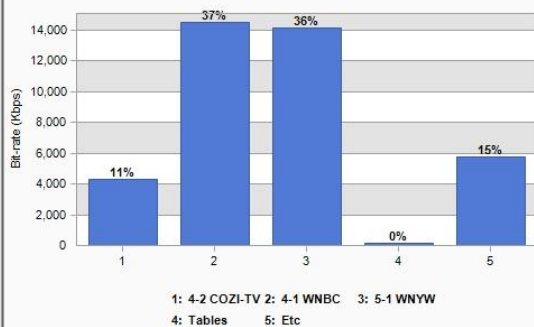


## 4.6 Analysis Result Window – ‘Bit-Rate’ Tab

‘Bit-rate’ tab shows detailed information about measurement components of the ‘Bit-rate’.

Service Bitrate		PID Bitrate						
PID	type	ratio(%)	btr(kbps)	btr_min(kbps)	btr_max(kbps)	btr_avg(kbps)	CC error	
Program 4-2 COZI-TV (Program : 0x006D)								
0x0320	MPEG-2 Video / PCR	10.990	4,265	1,213	5,596	3,986		
0x0321	AC-3 Audio	10.478	4,067	1,016	5,399	3,789	0	
		0.511	198	197	198	197	0	
Program 4-1 WNBC (Program : 0x02C0)								
0x0220	MPEG-2 Video / PCR	37.422	14,524	13,193	17,575	14,803		
0x0221	AC-3 Audio	35.900	13,933	12,601	16,982	14,211	0	
0x0222	AC-3 Audio	1.15	394	394	395	394	0	
		0.507	197	197	198	197	0	
Program 5-1 WNYW (Program : 0x02C1)								
0x0120	MPEG-2 Video / PCR	36.469	14,154	14,097	14,400	14,279		
0x0121	AC-3 Audio	34.768	13,494	13,437	13,738	13,618	0	
0x0122	AC-3 Audio	1.185	460	460	463	461	0	
		0.515	200	198	200	199	0	
Tables								
0x0000	PAT	0.352	136	126	148	137		
0x0129	PMT	0.54	21	19	21	20	0	
0x0229	PMT	0.11	4	3	4	4	0	
0x0329	PMT	0.11	4	3	4	4	0	
0x1000	EIT - 006	0.11	4	3	4	4	0	
0x1001	EIT - 007	0.0	0	0	1	0	0	
0x1002	EIT - 000	0.0	0	0	6	0	0	
0x1003	EIT - 001	0.46	18	18	24	19	0	
0x1004	EIT - 002	0.11	4	0	10	3	0	
0x1005	EIT - 003	0.0	0	0	4	0	0	
0x1006	EIT - 004	0.0	0	0	3	0	0	
0x1007	EIT - 005	0.0	0	0	9	0	0	
		0.0	0	0	1	0	0	

Total Bitrate : 38,812,634 bps



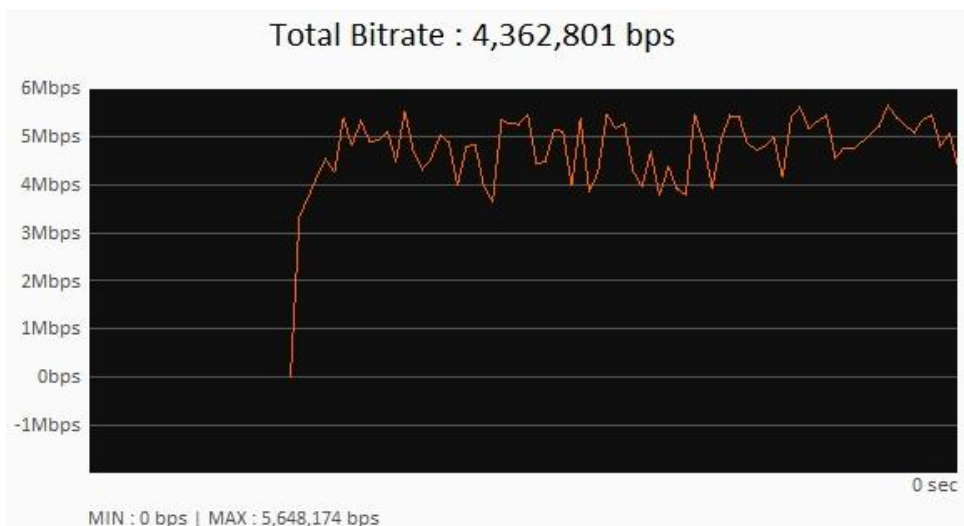


The upper window shows occupancy of each PIDs, Min/Max/Avg Bit-rate and number of Continuity Count error. These items can be organized and sorted by its components for each services PID.

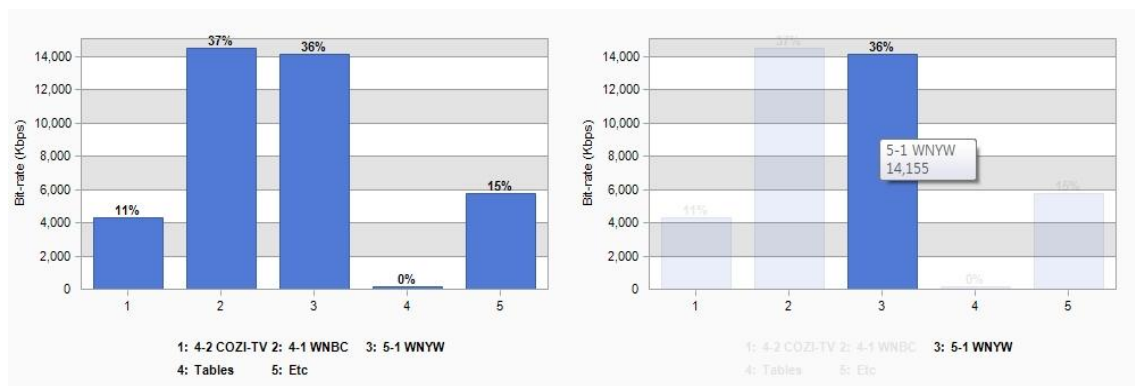
Service Bitrate	PID Bitrate							
PID	type	ratio(%)	btr(kbps)	btr_min(kbps)	btr_max(kbps)	btr_avg(kbps)	CC error	
Program	4-2 COZI-TV (Program : 0x006D)	10.990	4,265	1,213	5,596	3,986		
0x0320	MPEG-2 Video / PCR	10.478	4,067	1,016	5,399	3,789	0	
0x0321	AC-3 Audio	0.511	198	197	198	197	0	
Program	4-1 WNBC (Program : 0x02C0)	37.422	14,524	13,193	17,575	14,803		
0x0220	MPEG-2 Video / PCR	35.900	13,933	12,601	16,982	14,211	0	
0x0221	AC-3 Audio	1.15	394	394	395	394	0	
0x0222	AC-3 Audio	0.507	197	197	198	197	0	
Program	5-1 WNYW (Program : 0x02C1)	36.469	14,154	14,097	14,400	14,279		
0x0120	MPEG-2 Video / PCR	34.768	13,494	13,437	13,738	13,618	0	
0x0121	AC-3 Audio	1.185	460	460	463	461	0	
0x0122	AC-3 Audio	0.515	200	198	200	199	0	
Tables		0.352	136	126	148	137		
0x0000	PAT	0.54	21	19	21	20	0	
0x0129	PMT	0.11	4	3	4	4	0	
0x0229	PMT	0.11	4	3	4	4	0	
0x0329	PMT	0.11	4	3	4	4	0	
0x1000	EIT - 006	0.0	0	0	1	0	0	
0x1001	EIT - 007	0.0	0	0	6	0	0	
0x1002	EIT - 000	0.46	18	18	24	19	0	
0x1003	EIT - 001	0.11	4	0	10	3	0	
0x1004	EIT - 002	0.0	0	0	4	0	0	

Service Bitrate	PID Bitrate							
PID	type	ratio(%)	btr(kbps)	btr_min(kbps)	btr_max(kbps)	btr_avg(kbps)	CC error	
0x0000	PAT	0.50	19	19	21	20	0	
0x0120	MPEG-2 Video / PCR	35.264	13,687	13,437	13,738	13,619	0	
0x0121	AC-3 Audio	1.189	461	460	463	461	0	
0x0122	AC-3 Audio	0.515	200	198	200	199	0	
0x0129	PMT	0.7	3	3	4	3	0	
0x0220	MPEG-2 Video / PCR	34.768	13,494	12,601	16,982	14,198	0	
0x0221	AC-3 Audio	1.19	395	394	395	394	0	
0x0222	AC-3 Audio	0.507	197	197	198	197	0	
0x0229	PMT	0.7	3	3	4	3	0	
0x0320	MPEG-2 Video / PCR	11.617	4,509	1,016	5,399	3,802	0	
0x0321	AC-3 Audio	0.507	197	197	198	197	0	
0x0329	PMT	0.7	3	3	4	3	0	
0x1000	EIT - 006	0.0	0	0	1	0	0	
0x1001	EIT - 007	0.0	0	0	6	0	0	
0x1002	EIT - 000	0.46	18	18	24	19	0	
0x1003	EIT - 001	0.0	0	0	10	3	0	
0x1004	EIT - 002	0.0	0	0	4	0	0	
0x1005	EIT - 003	0.0	0	0	3	0	0	
0x1006	EIT - 004	0.0	0	0	9	0	0	
0x1007	EIT - 005	0.0	0	0	1	0	0	
0x1080	Event ETT - 006	0.0	0	0	3	0	0	
0x1081	Event ETT - 007	0.3	1	0	3	0	0	
0x1082	Event ETT - 000	0.93	36	36	40	37	0	
0x1083	Event ETT - 001	0.31	12	6	12	8	0	
0x1084	Event ETT - 002	0.0	0	0	3	0	0	
0x1085	Event ETT - 003	0.7	3	0	3	0	0	
0x1086	Event ETT - 004	0.0	0	0	3	0	0	
0x1087	Event ETT - 005	0.0	0	0	3	0	0	
0x1FFF	MGT, STT, CVCT	0.89	34	31	34	33	0	
0x1FFF	Null Packet	14.264	5,536	5,486	5,792	5,604	0	
Total		100.0	38,812	38,812	38,812	38,812		

'Total Bit-rate' at the bottom shows the information of the entire bit-rate with its Max/Min information. Color graph on the right shows the program occupancy in percentage.



Below bar graph indicates share of each programs, If you put mouse point on the specific bar it will show the associated program name or program number as well as Bit-rate.

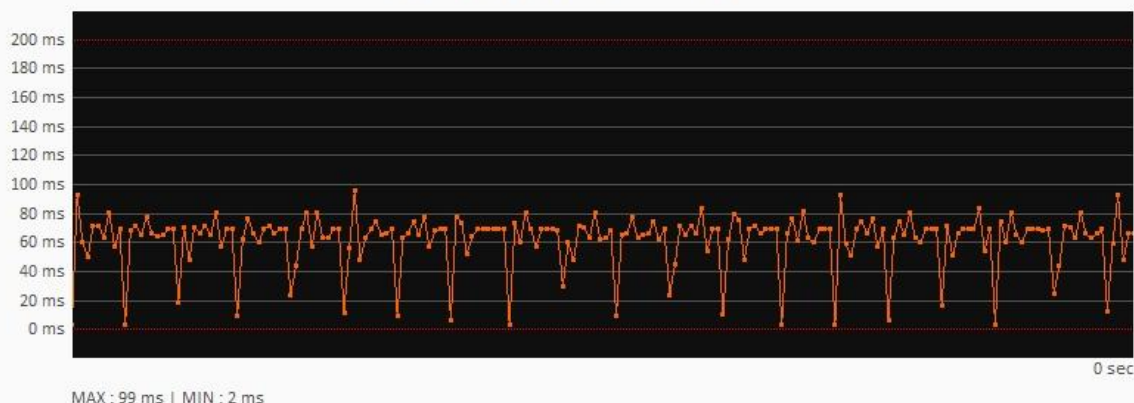


## 4.7 Analysis result window – TR 101 290 Tab

'TR 101 290' Tab shows the result of error analysis based on 'ESTI TR 101 290', and ATSC A78 standard. Double Click on each nodes or click '+', '-' to expand or fold displays.

Parameter	# Error	Last Error Time/Pos	Event Detail
<input checked="" type="checkbox"/> <b>TR101290 Priority 1</b>			
<input checked="" type="checkbox"/> 1.1 TS Sync Loss	0		
<input checked="" type="checkbox"/> 1.2 Sync Byte Error	0		
<input checked="" type="checkbox"/> 1.3 PAT Error	0		
<input checked="" type="checkbox"/> 1.3.1 Repetition	0		
<input checked="" type="checkbox"/> 1.3.2 Table ID Mismatching	0		
<input checked="" type="checkbox"/> 1.3.3 Scramble Control Error	0		
<input checked="" type="checkbox"/> 1.4 Continuity Count Error	0		
<input checked="" type="checkbox"/> 1.5 PMT Error	0		
<input type="checkbox"/> 1.6 PID Error			
<input checked="" type="checkbox"/> <b>TR101290 Priority 2</b>			
<input checked="" type="checkbox"/> 2.1 Transport Error	0		
<input checked="" type="checkbox"/> 2.2 CRC Error	0		
<input checked="" type="checkbox"/> 2.3 PCR Repetition Error	0		
<input checked="" type="checkbox"/> 2.4 PCR Accuracy Error	0		
<input checked="" type="checkbox"/> 2.5 PTS Error	0		
<input checked="" type="checkbox"/> 2.6 CAT Error			
<input checked="" type="checkbox"/> <b>TR101290 Priority 3</b>			
<input checked="" type="checkbox"/> <b>ATSC A78</b>			
<input checked="" type="checkbox"/> 1 MGT Error	0		
<input checked="" type="checkbox"/> 2 VCT Error	0		
<input checked="" type="checkbox"/> 3 RRT Error			
<input checked="" type="checkbox"/> 4 EIT Error	0		
<input checked="" type="checkbox"/> 5 ETT Error			
<input checked="" type="checkbox"/> 6 STT Error	0		
<input checked="" type="checkbox"/> <b>RF Measurement</b>			
<input checked="" type="checkbox"/> 1. MER Error	0		
<input checked="" type="checkbox"/> 2. RF Power Error	0		

PAT Repetition [TS ID: 0x0C11]



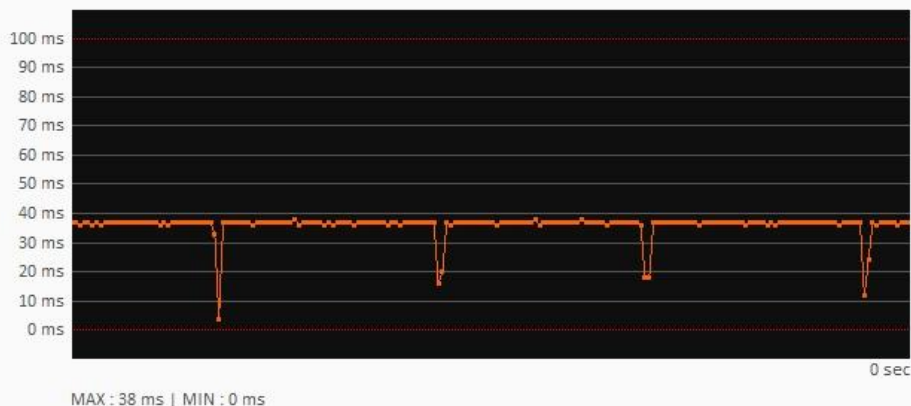
More detailed information is provided for nodes with 'Expand' and 'Fold' indicators

Parameter	# Error	Last Error Time/Pos	Event Detail
<b>TR101290 Priority 1</b>			
1.1 TS Sync Loss	0		
1.2 Sync Byte Error	0		
<b>1.3 PAT Error</b>	0		
1.3.1 Repetition	0		
1.3.2 Table ID Mismatching	0		
1.3.3 Scramble Control Error	0		
1.4 Continuity Count Error	0		
<b>1.5 PMT Error</b>	0		
1.6 PID Error			
<b>TR101290 Priority 2</b>			
2.1 Transport Error	0		
2.2 CRC Error	0		
<b>2.3 PCR Repetition Error</b>	0		
<b>2.4 PCR Accuracy Error</b>	0		
<b>2.5 PTS Error</b>	0		
<b>2.6 CAT Error</b>			
<b>TR101290 Priority 3</b>			
<b>ATSC A78</b>			
<b>1 MGT Error</b>	0		
<b>2 VCT Error</b>	0		
<b>3 RRT Error</b>			
<b>4 EIT Error</b>	0		
<b>5 ETT Error</b>	0		
<b>6 STT Error</b>	0		
<b>RF Measurement</b>			
1. MER Error	0		
2. RF Power Error	0		

Clicking on the timing related measurement items will display its relevant graphs at the bottom.

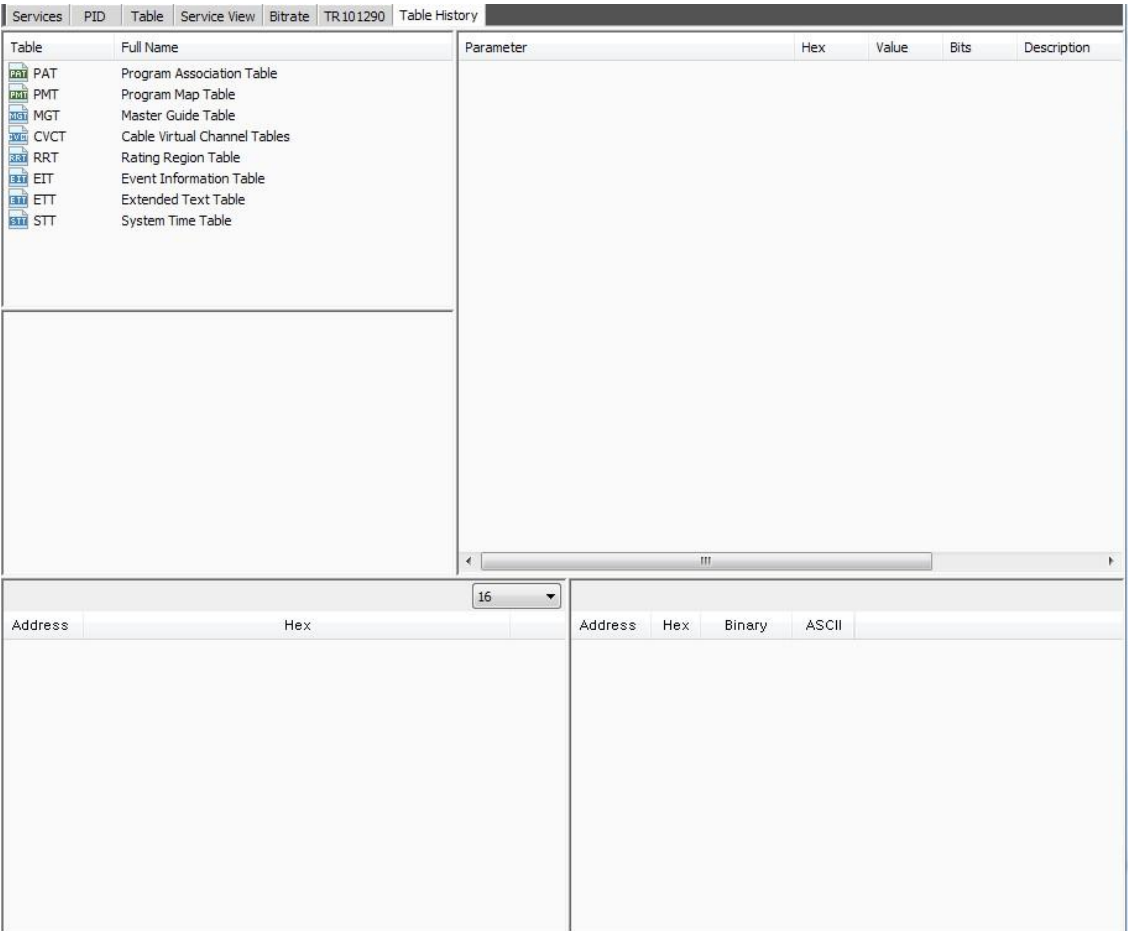
2.2 CRC Error	0		
<b>2.3 PCR Repetition Error</b>	0		
<b>4-2 COZI-TV PID : 0x0320</b>	0		
2.3.1 PCR Repetition Error	0		
2.3.2 PCR Discontinuity Indicator Error	0		
<b>4-1 WNBC PID : 0x0220</b>	0		
<b>5-1 WNYW PID : 0x0120</b>	0		

PCR Repetition [Program: 0x006D] [PID: 0x0320]

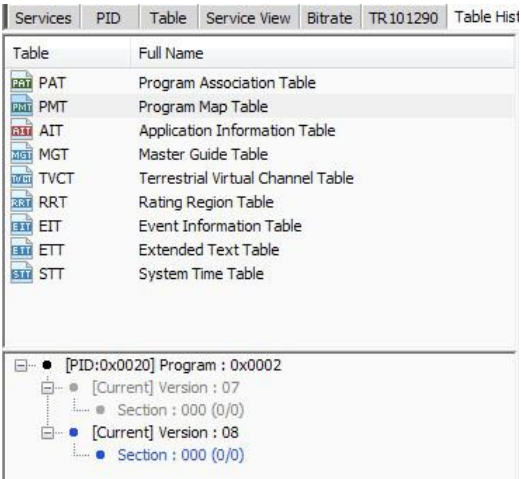


4. 8 Analysis Result Window– Table History Tab

‘Table History’ Tab shows all the components of collected information table and its history.



Top-left window shows the type of collected information table. When a specific information table has been clicked, a relevant collected history of information table appears on mid-left.



The collected information table data is saved as by the 'section'.

When specific 'section' has been selected for the analysis, the analysis components will be displayed on the right upper window by information table configuration chart along with the byte-data information of such section shown at the bottom left.

(Section Number/Last Section Number will be indicated in the Section text)

(the latest information table data is indicated in 'blue' while previous ones are in 'gray')

The screenshot displays the VENTUS-A+ DTV Analyzer interface. The top menu bar includes Services, PID, Table, Service View, Bitrate, TR.101290, and Table History. The main window is divided into several sections:

- Table History:** A list of tables with their full names and current status. The selected table is PMT (Program Map Table).
- Table Configuration:** A tree view showing the structure of the selected table. The selected section is 'Section : 000 (0/0)'.
- Table Data:** A table showing the parameters of the selected section. The parameters are listed in the table below.
- Hex Data View:** A view showing the raw data in hexadecimal and ASCII format. The data is displayed in a table with columns for Address, Hex, Binary, and ASCII.

Parameter	Hex	Value	Bits	Description
PMT - Transport Stream Program Map Section				
Section Header	0x02	2	64	PMT Information
Table ID	0x02	2	8	
Section Syntax Indicator	0x01	1	1	
'0'	0x00	0	1	
Reserved	0x03	3	2	
Section Length	0x0098	152	12	
Program Number	0x0002	2	16	
Reserved	0x03	3	2	
Version Number	0x08	8	5	
Current Next Indicator	0x01	1	1	Current
Section Number	0x00	0	8	
Last Section Number	0x00	0	8	
Reserved	0x07	7	3	
PCR PID	0x0021	33	13	
Reserved	0x0F	15	4	
Program Info Length	0x0000	0	12	
ES Info	0x02	2	272	MPEG-2 Video
ES Info	0x08	11	448	13818-6 Type E
ES Info	0x05	5	80	Private Section
ES Info	0x81	129	312	AC-3 Audio
CRC 32	0x376...	92962...	32	CRC OK

Address	Hex	Binary	ASCII
00000	02 80 98 00 02 D1 00 00 E0 21 F0 00 02 E0 21 F0		...
00010	1D A3 12 01 6B 6F 72 01 00 3F 0A 00 56 00 69 00		... k
00020	64 00 65 00 6F 86 07 E1 6B 6F 72 C1 DF FF 0B F1		d, e, o
00030	00 F0 33 66 04 00 F0 00 06 14 0D 00 10 00 00 08		... 3f,
00040	FF FF FF FF FF FF FF FF 52 01 10 13 19 00 00 0D		...
00050	BB 01 02 51 89 0F E2 00 00 FF 41 00 00 00 FF 41		... Q,
00060	FF 04 00 03 12 C8 05 E5 01 F0 05 6F 03 00 06 F0		...
00070	81 E0 24 F0 22 A3 12 01 6B 6F 72 01 00 3F 0A 00		... \$, "
00080	41 00 75 00 64 00 69 00 6F 81 06 80 38 05 FF 1F		A, u, d
00090	00 0A 04 6B 6F 72 00 37 68 F6 07		... k o

The byte-data is highlighted at the bottom left along with the binary data on the right when certain items have been selected from the analysis chart on upper right window.

Table	Full Name	Parameter	Hex	Value	Bits	Description
PAT	Program Association Table	PMT - Transport Stream Program M...				
PMT	Program Map Table	Section Header	0x02	2	64	PMT Information
AIT	Application Information Table	Table ID	0x02	2	8	
MGT	Master Guide Table	Section Syntax Indicator	0x01	1	1	
TVCT	Terrestrial Virtual Channel Table	'I'	0x00	0	1	
RRT	Rating Region Table	Reserved	0x03	3	2	
EIT	Event Information Table	Section Length	0x0098	152	12	
ETT	Extended Text Table	Program Number	0x0002	2	16	
STT	System Time Table	Reserved	0x03	3	2	
		Version Number	0x1E	30	5	
		Current Next Indicator	0x01	1	1	Current
		Section Number	0x00	0	8	
		Last Section Number	0x00	0	8	
		Reserved	0x07	7	3	
		PCR PID	0x0021	33	13	
		Reserved	0x0F	15	4	
		Program Info Descriptor Length	0x0000	0	12	
		ES Info	0x02	2	272	MPEG-2 Video
		ES Info	0x0B	11	448	13818-6 Type B
		ES Info	0x05	5	80	Private Section
		ES Info	0x81	129	312	AC-3 Audio
		CRC 32	0x1C7...	47755...	32	CRC OK

[PID:0x0020] Program : 0x0002	
[Current] Version : 0x1D	
Section : 000 (1/1)	
[Current] Version : 0x1E	
Section : 000 (1/1)	

Address	Hex	Address	Hex	Binary	ASCII
00000	02 B0 98 00 02 FD 00 00 E0 21 F0 00 02 E0 21 F0	00008	E0	1110 0000	.
00010	1D A3 12 01 6B 6F 72 01 00 3F 0A 00 56 00 69 00	00009	21	0010 0001	!
00020	64 00 65 00 6F 86 07 E1 6B 6F 72 C1 DF FF 0B F1				
00030	00 F0 33 66 04 00 F0 00 06 14 0D 00 10 00 00 08				
00040	FF FF FF FF FF FF FF 52 01 10 13 19 00 00 0D				
00050	8B 01 02 50 E6 0F E2 00 01 01 82 00 00 01 01 82				
00060	FF 04 00 03 0C 86 05 E5 01 F0 05 6F 03 00 06 E6				
00070	81 E0 24 F0 22 A3 12 01 6B 6F 72 01 00 3F 0A 00				
00080	41 00 75 00 64 00 69 00 6F 81 06 80 38 05 FF 1F				
00090	00 0A 04 6B 6F 72 00 1C 76 D9 AE				



#### 4.9 System message and TR101290 summary window

System message and TR101290 summary window is divided into 'System' and 'TR 101 290 Summary' tab.

< 'System' Tab >

'System' shows operation system messages in colors. Operation and stop message (Green) information table refresh message (Green), internal operation warning message (Orange).

System	TR101290 Summary	RF Status
System Event Log		
<ul style="list-style-type: none"> <li>(2014-09-29, 16:38:55) : Start</li> <li>(2014-09-29, 16:38:56) : &lt;Normal&gt; PCR prediction active</li> <li>(2014-09-29, 16:38:56) : [0] PAT Updated (Version:15)</li> <li>(2014-09-29, 16:38:56) : [553] PMT Updated (Version:25) (Program:704)</li> <li>(2014-09-29, 16:38:56) : [8187] CVCT Updated (Version:23)</li> <li>(2014-09-29, 16:38:56) : [8187] MGT Updated (Version:8)</li> <li>(2014-09-29, 16:38:57) : [809] PMT Updated (Version:26) (Program:109)</li> <li>(2014-09-29, 16:38:57) : [297] PMT Updated (Version:9) (Program:705)</li> <li>(2014-09-29, 16:39:38) : &lt;Warning&gt; PCR prediction failed</li> <li>(2014-09-29, 16:39:39) : &lt;Normal&gt; PCR prediction active</li> <li>(2014-09-29, 16:39:48) : [8187] RRT Updated (Version:0)</li> </ul>		





































Warning messages are as follows.

	Description	Reason
<Warning> PCR prediction failed	The system cannot carry out PCR data related analysis on input data	Input data
<Warning> [PID] "Name" Update failed	Abnormal data detected during the 'update' process after the table data collection	Input data
<Warning> [PID] "Name" PACKET COLLECTING FAILED	Information table packet collection failure	Input data
<Warning> Clean Unknown PIDs	Deleting any unknown PIDs from the memory when there is too many types of PID	Input data
<Warning> Media Player Packet Loss Occur	Packet Loss occurred during its data transfer to the Media Player while Media Player is in its operation at 'Service View'	PC calculation overflow
<SYS> Input Buffer Overflow	Data not processed. Omitted.	PC calculation overflow



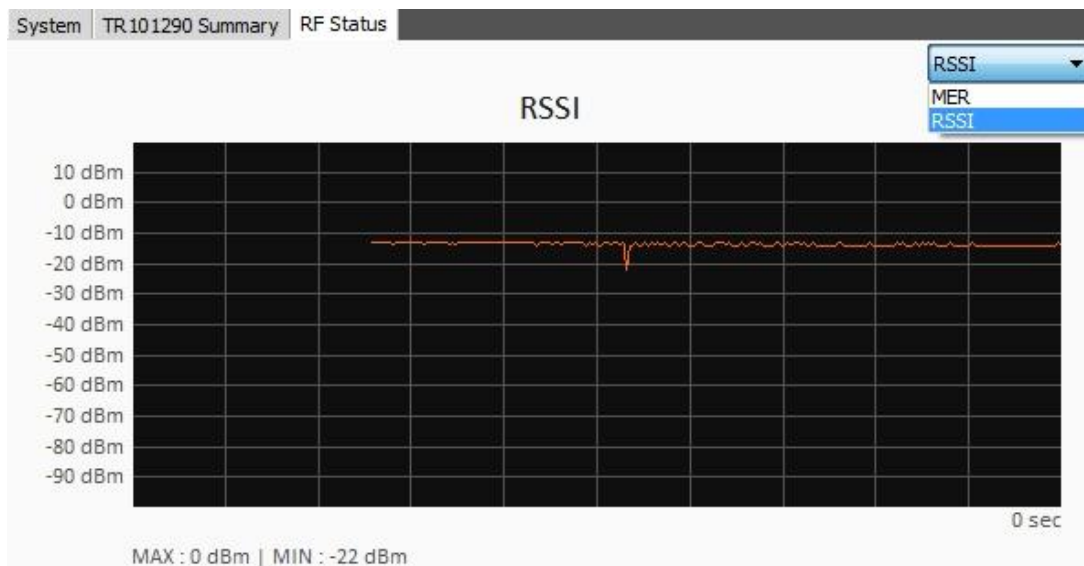
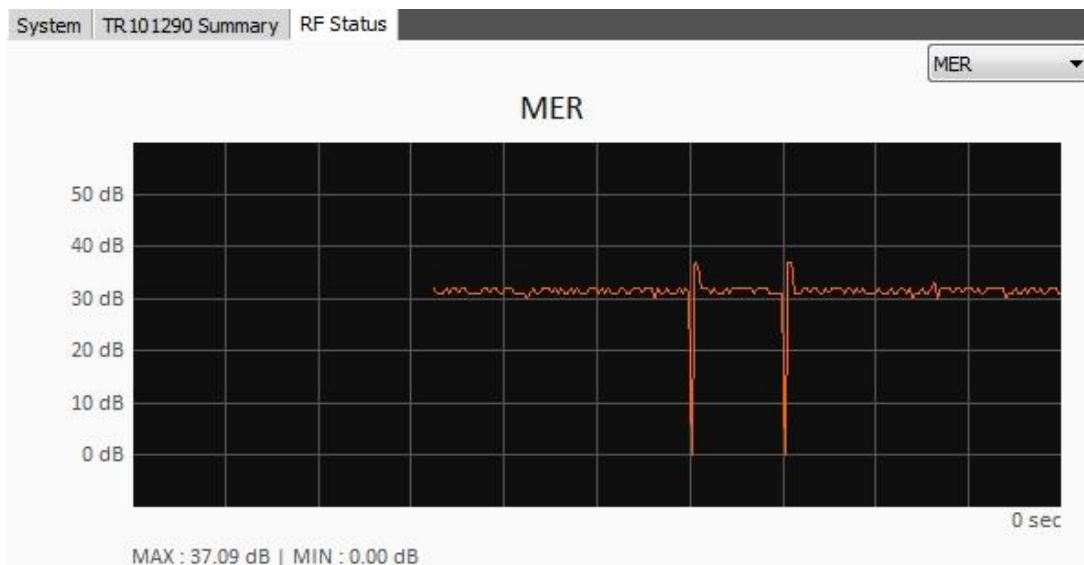
#### 4.10 TR 101 290 Summary' Tab

TR 101 290 & ATSC A78 error detection results are presented in a summarized format. For further information see. 'analysis window – TR101290'

System	TR101290 Summary	RF Status			
Parameter		# Error	Last Error Time/Pos	Event Detail	
 <b>TR101290 Priority 1</b>					
 <b>1.1 TS Sync Loss</b>		0			
 <b>1.2 Sync Byte Error</b>		0			
 <b>1.3 PAT Error</b>		2	2014-12-19, 15:23:23	PAT Repetition Error [205 ms]	
 <b>1.4 Continuity Count Error</b>		593	2014-12-19, 15:23:24	TS Continuity Counter Error [PID:	
 <b>1.5 PMT Error</b>		0			
 <b>1.6 PID Error</b>					
 <b>TR101290 Priority 2</b>					
 <b>2.1 Transport Error</b>		8595	2014-12-19, 15:23:23	TS Error Indicator Error [PID:0x0	
 <b>2.2 CRC Error</b>		0			
 <b>2.3 PCR Repetition Error</b>		4	2014-12-19, 15:23:23	PCR Discontinuity Indicator Error	
 <b>2.4 PCR Accuracy Error</b>		0			
 <b>2.5 PTS Error</b>		0			
 <b>2.6 CAT Error</b>					
 <b>TR101290 Priority 3</b>					
 <b>3.1 NIT Error</b>					
 <b>3.2 SI Repetition Error</b>					
 <b>3.3 Buffer Error</b>					
 <b>3.4 Unreferenced PID Error</b>		208	2014-12-19, 15:25:00	Unreferenced PID Error [PID:0x0	
 <b>3.5 SDT Error</b>					
 <b>3.6 EIT Error</b>					
 <b>3.7 RST Error</b>					
 <b>3.8 TDT Error</b>					
 <b>3.9 Empty Buffer Error</b>					
 <b>3.10 Data Delay Error</b>					
 <b>ATSC A78</b>					
 <b>1 MGT Error</b>		2	2014-12-19, 15:23:23	MGT Repetition Error [316 ms]	
 <b>2 TVCT Error</b>		1	2014-12-19, 15:23:23	VCT Repetition Error [1291 ms]	
 <b>3 RRT Error</b>					
 <b>4 EIT Error</b>		1	2014-12-19, 15:23:23	EIT-0 Repetition Error [1258 ms]	
 <b>5 ETT Error</b>					
 <b>6 STT Error</b>		0			
 <b>Etc</b>					
 <b>1 MER Error</b>		0			
 <b>2 RF Power Error</b>		0			
 <b>3 PTS-PCR/ DTS-PCR Error</b>		1	2014-12-19, 15:23:22	PTS-PCR Error [-47721742 ms]	

## 4.11 RF Status Window

In RF quality, MER and RSSI measurement values of the last 150 seconds data are displayed in a Graph.



## 4. 12 Operation Status Window

Operation status window shows the summary of overall operation information. Various operating status is shown below

● Play	ATSC	FILE Input(Max): \SBS_3D_광고후전환_20131201_001932.ts	01:03 / 05:46	19,364 Kbps	● TR	● LOG	● REC
● Play	ATSC	TS Input: ASI	00:00:00:07	19,392 Kbps	● TR	● LOG	● REC 00:00:04 (9 MBytes)
● Play	ATSC	IP Input: udp:\127.0.0.1:5000	00:00:00:04	0 Kbps	● TR	● LOG	● REC
● Play	ATSC	RF Input: 8VSB 521,000 KHz	00:00:00:12	Locked / 30 dB / -56 dBm	● TR	● LOG	● REC 00:00:06 (13 MBytes)
● Play	ATSC	RF Input: 8VSB 521,000 KHz	00:00:00:03	Locked / 31 dB / -56 dBm	● TR	● LOG	● REC
● Stop	ATSC	RF Input: 8VSB 521,000 KHz	00:00:00:13	Locked / 30 dB / -56 dBm	● TR	● LOG	● REC

Summarized information will be shown in following sequence.

- ① Operation status (Play, Stop, Pause , -current operating status)
- ② analysis mode (selected mode among MPEG-2, ATSC, DVB and ISDB)
- ③ input configuration (input port and detailed configuration information)
- ④ analysis processing time and input status (File/TS/IP input status shows its Bit-rate, whereas RF input shows quality of RF status - Lock, SNR, RSSI in this orders.)
- ⑤ TR 101 290 error detection status (Gray – operation disabled, Green- normal , Red –error occurred)
- ⑥ LOG record status (Grey –recording disabled , Green – recording )
- ⑦ TS Recording Status (Grey - recording disabled, Green – recording) (file size and recording time is shown additional during recording status)

## APPENDIX A..TR 101 290 Analysis Criteria Description (Crucial items in Bold)

### General Error categorization

- ① Data Loss
- ② Transmitter Defect
- ③ Error caused without the data loss factors. (Transmitter Defect)

	Item	Description (General Cause of the Error)
<b>Priority 1</b>	<b>1.1 TS Sync Loss</b>	Unable to Sync TS data in analysis stream. (①)
	<b>1.2 Sync Byte Error</b>	Fragmentary Sync error after TS data Sync.
	1.3 PAT Error	PAT Info table error (③)
	1.3.1 Repetition	PAT info table unable to repeat within its time limit
	1.3.2 Table ID Mismatching	PAT info Table ID do not match
	1.3.3 Scramble Control Error	PAT info table is scrambled
	<b>1.4 Continuity Counter Error</b>	Data Continuity cut off on TS data for each PID (①)
	1.5 PMT Error	PMT Info table error. (③)
	1.5.1 Repetition	PMT info table unable to repeat within its time limit
	1.5.2 Table ID Mismatching	PMT info Table ID do not match
	1.5.3 Scramble Control Error	PMT info table is scrambled
	1.6 PID Error	PID & PID data cycle unable to meet its parameter defined by user

	Item	Description
<b>Priority 2</b>	<b>2.1 Transport Error</b>	Error bit included in internal data of the TS packet (①)
	<b>2.2 CRC Error</b>	CRC for each info data do not match(②)
	2.3 PCR Error	PCR Time info error(③)
	2.3.1 PCR Repetition Error	PCR Time info unable to repeat within its time limit
	2.3.2 PCR Discontinuity Indicator Error	PCR Time info showing significant deviation without discontinuity command
	2.4 PCR Accuracy Error	PCR Time Info accuracy off its margin of error parameter (③)
	2.5 PTS Error	PTS Time info unable to repeat within its time limit. (③)
	2.6 CAT Error	CAT Info table error. (③)
	2.6.1 Table ID Mismatching	CAT info Table ID do not match
	2.6.2 Scramble Control Error	CAT info table is scrambled

	Item	Description
Priority 3	3.1 NIT Error	NIT Info table error. (③)
	3.1.1 Actual Repetition	NIT-Actual info table unable to repeat within its time limit
	3.1.2 Other Repetition	NIT-Other info table unable to repeat within its time limit
	3.1.3 Table ID Mismatching	NIT info table is scrambled
	3.2 SI Repetition Error	SI Info table error. (③)
	3.2.1 BAT Repetition	BAT info table unable to repeat within its time limit
	3.2.2 TOT Repetition	TOT info table unable to repeat within its time limit
	3.2.3 EIT Actual Repetition	EIT-Actual info table unable to repeat within its time limit
	3.2.3 EIT Other Repetition	EIT-Other info table unable to repeat within its time limit
	3.3 Buffer Error	TS buffer overflow (Not supported)
	<b>3.4 Unreferenced PID Error</b>	Unidentified PID reference (③)
	3.5 SDT Error	SDT Info table error. (③)
	3.5.1 Actual P/F Repetition	SDT-Actual Present/Follow info table unable to repeat within its time limit
	3.5.2 Other P/F Repetition	SDT-Other Present/Follow info table unable to repeat within its time limit
	3.5.3 Table ID Mismatching	SDT info table unable to repeat within its time limit
	3.6 EIT Error	EIT Info table error. (③)
	3.6.1 Actual Repetition	EIT-Actual info table unable to repeat within its time limit.
	3.6.2 Other Repetition	EIT-Other info table unable to repeat within its time limit.
	3.6.3 Table ID Mismatching	EIT info Table ID do not match.
	3.6.4 Present/Following Exist Error	EIT info Table without the 'Present' or 'Following' info.
	3.7 RST Error	RST Info table error. . (③)
	3.7.1 Repetition	RST info table unable to repeat within its time limit.
	3.7.2 Table ID Mismatching	RST info Table ID do not match.
	3.8 TDT Error	TDT Info table error. (③)
	3.8.1 Repetition	TDT info table unable to repeat within its time limit.
	3.8.2 Table ID Mismatching	TDT info Table ID do not match.
	3.9 Empty Buffer Error	TS buffer underflow. (Not supported)
	3.10 Data Delay Error	A single data delayed more than 1sec or a still cut image delayed more then 60 sec.(Not supported)

	Item	Description
ATSC A.78	1 MGT Error	MGT Info table error. (③)
	1.1 Repetition	MGT info table unable to repeat within its time limit.
	1.2 Table ID Mismatching	MGT info Table ID do not match.
	1.3 Scramble Control Error	MGT info table is scrambled.
	2 VCT Error	VCT Info table error. (③)
	2.1 Repetition	VCT info table unable to repeat within its time limit.
	2.2 Table ID Mismatching	VCT info Table ID do not match.
	2.3 Scramble Control Error	VCT info table is scrambled.
	3 RRT Error	RRT Info table error. (③)
	3.1 Repetition	RRT info table unable to repeat within its time limit.
	3.2 Table ID Mismatching	RRT info Table ID do not match.
	3.3 Scramble Control Error	RRT info table is scrambled.
	4 EIT Error	EIT Info table error. (③)
	4.1 EIT-0 Repetition	EIT-0 info table unable to repeat within its time limit.
	4.2 EIT-1 Repetition	EIT-1 info table unable to repeat within its time limit.
	4.3 EIT-2 Repetition	EIT-2 info table unable to repeat within its time limit.
	4.4 EIT-3 Repetition	EIT-3 info table unable to repeat within its time limit.
	4.5 Table ID Mismatching	EIT info Table ID do not match.
	4.6 Scramble Control Error	EIT info table is scrambled
	5 ETT Error	ETT Info Table error. (③)
	5.1 Table ID Mismatching	ETT Info Table ID do not match.
	5.2 Scramble Control Error	Error occurs when ETT info Table is scrambled
	6 STT Error	STT Info table error. (③)
	6.1 Repetition	STT info table unable to repeat within its time limit.
	6.2 Table ID Mismatching	STT info Table ID do not match.

	Item	Description
Etc	1. MER Error	RF Signal OFF the limited MER Range.
	2 RF Power Error	RF Signal OFF the limited Power Range.
	3 PTS-PCR/DTS-PCR Error	Deviation between PTS/DTS and PCR value off the limited range(③)

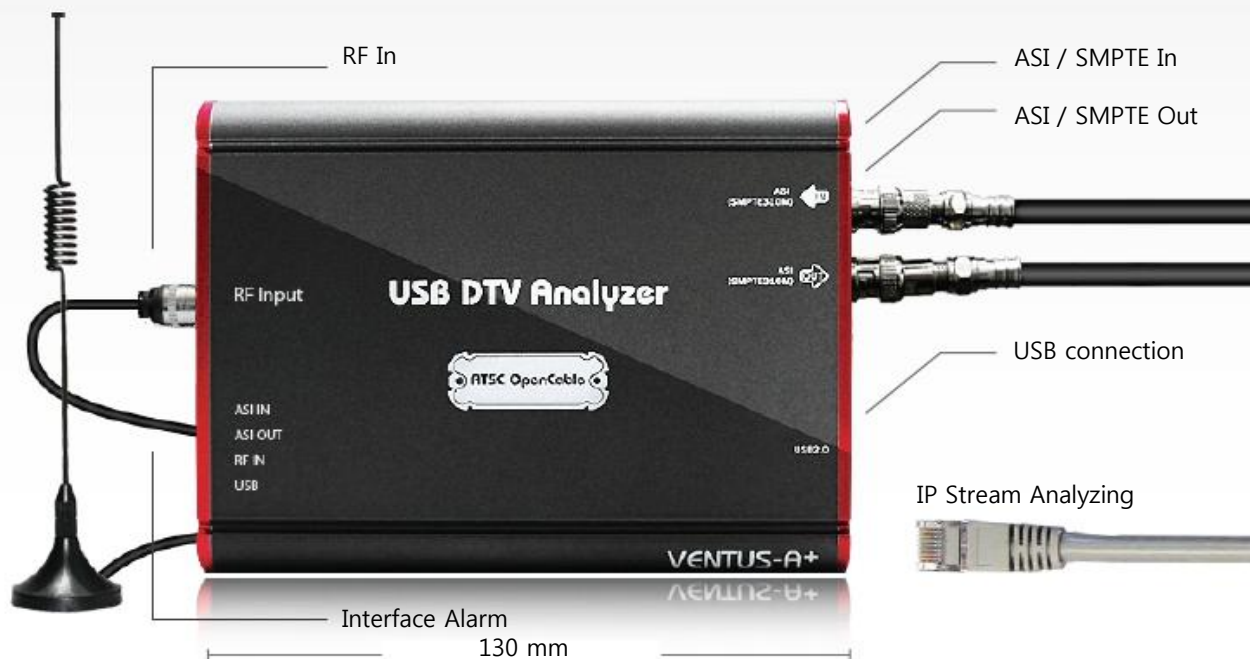
## H/W Specification (ATSC type)

Demodulation	8VSB, QAM-B(64QAM,256QAM)
Size	154mm x 77mm x 29mm
POWER	USB2.0buspowered, No power supply required.
RF input connector	75 $\Omega$ F-Type 1ea
ASI/SMPTE310M connector	75 $\Omega$ BNC 1ea
ASI /SMPTE310M output connector	75 $\Omega$ BNC 1ea
ASI input bit-rate	0~108 Mbps
ASI output bit-rate	0~108 Mbps
SMPTE310M input bit-rate	19.392 Mbps
SMPTE310M output bit-rate	19.392 Mbps
RF Input Frequency Range	40~1002 MHz
RF Input Level	8VSB:+7~-84dBm OpenCable(QAM):+6~-66dBm

## S/W Specification (ATSC type)

TS Input	ASI,SMPTE310M,File,IP(UDP/TS or UDP/RTP/TS),RF
TS Out	ASI or SMPTE310M (Allow when input is ASI,SMPT E310M,File,RF)
Analysis Mode	MPEG-2,ATSC,DVB
7 Analysis Window Tab	Service, PID, Table, Service View, Bit-rate,TR101290,TableHistory
Closed caption	
Real-time decoder	
Recommended system requirements	
-CPU	: better than IntelCore i3 3.1GHz (SandyBridge)
-RAM	: betterthan2GB
-OS	: Window7
-Resolution	: bigger than 1680x1050

## USB type DTV Analyzer (ATSC type)



H/W Specification (DVB type)		S/W Specification (DVB type)	
Demodulation	DVB-T2, DVB-T, DVB-C	TS Input	ASI,SMPTE310M,File, IP(UDP/Ts or UDP/RTP/TS),RF
Size	154mm x 77mm x 29mm	TS Out	ASI or SMPTE310M (Allow when input is ASI,SMPTE310M,File,RF)
POWER	USB2.0buspowered, No power supply required	Analysis Mode	MPEG-2,ATSC,DVB
RF input connector	75 Ω F-Type 1ea	7 Analysis Window Tab	Service, PID, Table, Service View, Bit-rate,TR101290,TableHistory
ASI input connector	75 Ω BNC 1ea	Closed caption	
ASI output connector	75 Ω BNC 1ea	Real-time decoder	
ASI input bit-rate	0~108 Mbps	Recommended system requirements	
RF Input Frequency Range	40~1002 MHz	-CPU : better than IntelCore i3 3.1GHz(SandyBridge)	
RF Input Level	DVB-T2:+5~-78 dBm DVB-T:+7~-83 dBm DVB-C:+2~-67 dBm	-RAM : betterthan2GB	
		-OS : Window7	
		-Resolution : bigger than 1680x1050	

USB type DTV Analyzer (DVB type)

