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Application Note

IT9500 UART Command Protocol for AV Sender v1.84

June 06, 2016

Reversion History

Reversion	Change List	Note
1.0		Initial version
1.1	● Firmware version code in EIT ● PCR/PTS Latency ● Audio PID , VIDEO PID, Pmt pid ● Set System date/time	
1.2	● Add SystemReboot command	
1.3	● Vendor board model name: SystemStatus Command/System Boot Status(0x1): add an 8-byte string for board name	
1.4	● Correct some error items	
1.5	● Add SIPSI Table Duration item	
1.6	● Add Reboot to System Default and Video Input Port/Mode items	
1.70	● Update Get/Set Transmission ● Update Get system info ● Update Get/Set TS config ● Update Get/Set Media Config ● Add Get/Set EIT	
1.71	● Update Get/Set Transmission for ISDB-T	
1.72	● Add TV standard option and ChipID	
1.73	● Add SetCalibrationTable	
1.74	● Add “Video Encoding Resolution Mode” to MediaConfiguration ● Modify Get/Set CalibartionTable to Get/Set RawData ● Add Get/Set NetworkConfiguration commands ● Add “PCR Restamp Mode” to TransmissionConfiguration	
1.75	● Add new options to Video Input Port/Mode ● Add parameters to Source Input Information, Get/SetMediaConfiguration and Get/SetRawData ● Add network parameters to Get/SetNetworkConfiguration ● Add Get/SetWebPageConfiguration command	
1.76	● Add NTP function and time zone	

1.77	● Add SetTSRawData function ● Add PAT version code ● Change “BW strapping” to “Channel Table” ● Add ISDB-T option to “Channel Table” ● Sync Software and UART version code to hex ● Sync TS raw data format with return channel spec (Appendix D)	
1.78	● Add Fast playback mode	
1.80	● Add Get/SetEncryptionConfiguration command ● Add ISDB-Tb channel table option ● Change SetTSRawData to Get/SetSerialPortConfiguration command	
1.81	● Add RF Encryption ● Update transparent UART format	
1.82	● Add brightness, contrast, saturation and hue settings to Get/SetMediaConfiguration command ● Add 1.5MHz and 2.5MHz BW supported	
1.83	● Add RTSP server reset and client connection information ● Add HDCP on/off	
1.84	● Add UART TS transparent mode with check sum (PID = 0x1FEC) ● Add Get/SetPCRCalibrationConfiguration command	

1. This application note Acribes the UART command protocol for a device/equipment with IT9500 transmitter.

ITE Tech. Inc.

Easy HD Expressway

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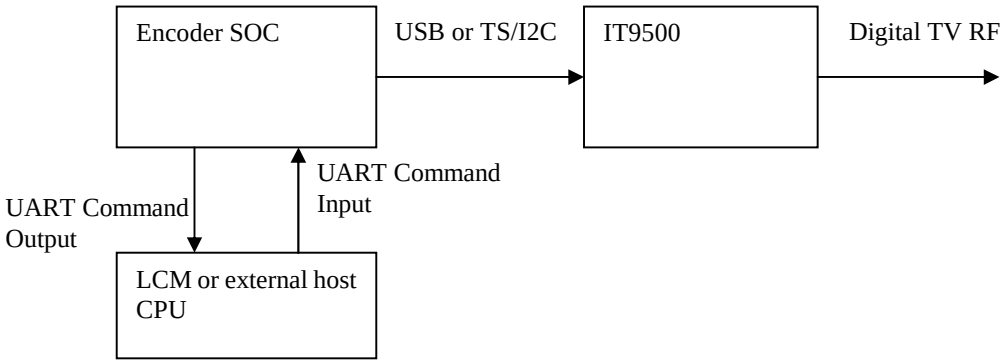
1 UART Communication

The following picture shows a typical block diagram of an IT9500 application. This document defines the UART command protocol when there is an LCM or external host CPU used to control or configure the system.



2 System information

2.1 UART Communication Parameters

38400,N,8,1

2.2 Firmware version code in EIT

The TS stream output should include firmware version code in present EIT information.

3 Command List

By default, all numeric fields are input in **big-endian**, except specified explicitly.

3.1 Control Command

A control command is initiated by LCM or the external host, and the encoder SOC will ack with the corresponding answer code.

The corresponding answer code of a command code <CmdCode> is defined as <CmdCode>+0x80

Control Command		
Command Code (by LCM or external host)	Command Description	Answer Code (by encoder SOC)
0x00	GetTransmissionConfiguration	0x80
0x01	GetMediaConfiguration	0x81
0x02	GetTSInfoConfiguration	0x82
0x03	GetHwRegisterValues	0x83
0x04	GetSystemInformation	0x84
0x05	GetSourceInformation	0x85
0x06	GetEITInformation	0x86
0x07	GetRawData	0x87
0x08	GetNetworkConfiguration	0x88
0x09	GetWebPageConfiguration	0x89
0x0A	GetSerialPortConfiguration	0x8A
0x0B	GetEncryptionConfiguration	0x8B
0x0C	GetPCRCalibrationConfiguration	0x8C
0x40	SetTransmissionConfiguration	0xC0
0x41	SetMediaConfiguration	0xC1
0x42	SetTSInfoConfiguration	0xC2
0x43	SetHwRegisterValues	0xC3
0x44	SetSystemDateTime	0xC4
0x45	SystemReboot	0xC5
0x46	SetEITInformation	0xC6
0x47	SetRawData	0xC7
0x48	SetNetworkConfiguration	0xC8
0x49	SetWebPageConfiguration	0xC9
0x4A	SetSerialPortConfiguration	0xCA
0x4B	SetEncryptionConfiguration	0xCB
0x4C	SetPCRCalibrationConfiguration	0xCC

3.2 Status Command

A status command is initiated by encoder SOC. It will be sent out when the system status changes. No answer/ack command is required.

Status Command	
Command Code (by encoder SOC)	Command Description

0xF0	SystemStatus

4 General Command Format

Field	Offset	Length (Byte)	Descriptions	Example
Leading Tag	0	1	'#'	0x23
Command Length	1	1	The total length of this command. It doesn't include the Leading Tag, CheckSum and End Tag.	
Sequence Number	2	1	0~255. Seq. ID, Optional, Reserved for future use	0
Command/Answer Code	3	1	Code: 0xXX	0x01
Command Data	4	n	1~n bytes	
CheckSum	4+n	1	=(byte[1]+…+byte[3+n]) MOD 256	
End Tag	5+n	1	'\r'	0x0D

5 Command Data Type

[char] format (1-byte):
A 1-byte char format. The range is -127~127.

6 Control Command

6.1 GetTransmissionConfiguration

Command Packet:

Field	Offset	Length (Byte)	Descriptions	Example
Leading Tag	0	1	'#'	0x23
Command Length	1	1	The total length of this command. It doesn't include the Leading Tag, CheckSum and End Tag.	
Sequence Number	2	1	0~255. Seq. ID, Optional, Reserved for future use	0
Command Code	3	1	Code: 0x00	0x00
Reserved	4	1	0	0

CheckSum	5	1	=(byte[1]+…+byte[4]) MOD 256	
End Tag	6	1	'\r'	0x0D

Answer Packet

Field	Offset	Length (Byte)	Descriptions	Example
Leading Tag	0	1	'#'	0x23
Command Length	1	1	The total length of this command. It doesn't include the Leading Tag, CheckSum and End Tag.	
Sequence Number	2	1	0~255. Seq. ID, Optional, Reserved for future use	0
Command Code	3	1	Code: 0x80	0x80
Return Code	4	1	0: Success, 0xFD: Unsupported, 0xFE: Cheksum Err, 0xFF: Fail.	
Bandwidth	5	1	In MHz, Valid Settings:1,2,3,4,5,6,7,8 0: 7+8 MHz (VHF:7M, UHF:8Mhz), 15: 1.5MHz, 25: 2.5MHz	0x08, for 8MHz BW
Frequency	6	4	In KHz, Valid Setting, 50000KHz~995000KHz	0xA2990, for 666MHz
Constellation	10	1	0: QPSK, 1: 16QAM, 2: 64QAM	0x1 for 16QAM
FFT	11	1	0: 2K, 1:8K, 2: 4K	0x1 for 8K
Code Rate	12	1	0: 1/2, 1: 2/3, 2: 3/4, 3: 5/6, 4: 7/8	0x1 for 2/3 CR
Guard Interval	13	1	0: 1/32, 1: 1/16, 2: 1/8, 3: 1/4	0x3 for ¼ GI
RF Gain	14	1	[char] -127~127, in 1db.	5 for +5 db gain. -5 for 5 db attenuation.
TPS Cell ID	15	2	Cell ID	
Channel Number	17	1	Channel number is 0~255. Shown on Panel or switch. Channel number table will base on Bandwidth if the BW Strapping is not supported.	
Channel Table	18	1	0: 7+8MHz, 1: 6MHz, 2: 7MHz, 3: 8MHz, 4: ISDB-T (Japan), 5: ISDB-Tb (Brazil), 9: User defined (default 7+8M), 0xFD: Unsupported. This table could be selected by bandwidth strapping on board.	
TV Standard	19	1	0: DVB-T 1: ISDB-T	
Segmentation	20	1	0: ISDB-T Full segmentation mode	

Mode			1: ISDB-T 1+12 segmentation mode	
One-Seg Constellation	21	1	0: QPSK, 1: 16QAM, 2: 64QAM	0x1 for 16QAM
One-Seg Code Rate	22	1	0: 1/2, 1: 2/3, 2: 3/4, 3: 5/6, 4: 7/8	0x1 for 2/3 CR
TV Standard Option	23	1	0: Unsupported, 1: Supported. Bit [0]: DVB-T Bit [1]: ISDB-T	0x03 for DVB-T and ISDB-T supported
ChipID	24	2		0x9507
PCR Restamp Mode	26	1	0: Disable 1: Eagle2 PCR restamp mode 1 2: Eagle2 PCR restamp mode 2 3: Eagle2 PCR restamp mode 3	
Reserved	27	10	0	
CheckSum	37	1	=(byte[1]+…+byte[36]) MOD 256	
End Tag	38	1	'\r'	0x0D

6.2 GetMediaConfiguration

Command Packet

Field	Offset	Length (Byte)	Descriptions	Example
Leading Tag	0	1	'#'	0x23
Command Length	1	1	The total length of this command. It doesn't include the Leading Tag, CheckSum and End Tag.	
Sequence Number	2	1	0~255. Seq. ID, Optional, Reserved for future use	0
Command Code	3	1	Code: 0x01	0x01
Reserved	4	1	0	0
CheckSum	5	1	=(byte[1]+…+byte[4]) MOD 256	
End Tag	6	1	'\r'	0x0D

Answer Packet

Field	Offset	Length (Byte)	Descriptions	Example
Leading Tag	0	1	'#'	0x23
Command Length	1	1	The total length of this command. It doesn't include the Leading Tag, CheckSum and End Tag.	
Sequence Number	2	1	0~255. Seq. ID, Optional, Reserved for future use	0
Command Code	3	1	Code: 0x81	0x81

Return Code	4	1	0: Success, 0xFD: Unsupported, 0xFE: Cheksum Err, 0xFF: Fail.	
Video Input Port	5	1	0: AUTO, 1: HDMI-In, 2: Composite-In (CVBS), 3. Component-In (YPbPr), 4. VGA-In, 5: SDI-In, 6: ASI-In, 7: RTSP-In	
Video Input Mode	6	1	**HDMI:** 0: AUTO **Composite:** 0: AUTO, 1: NTSC, 2: PAL **Component:** 0: AUTO, 1: 50fps, 2: 60fps **VGA:** 0: AUTO **SDI:** 0: AUTO	
Video Encoding Type	7	1	0: H264, 1: MPEG2, 2: H265.	
Video Encoding Resolution Width	8	2	0: AUTO, Others: Width	1920
Video Encoding Resolution Height	10	2	0: AUTO, Others: Height	1080
Video Encoding Data Rate Control Type	12	1	0: CBR 1: VBR 2: Fixed QP 3: CVBR	
Video Encoding Max Bit Rate	13	2	The max output bit rate in Kbsp (for VBR).	
Video Encoding Average Bit Rate	15	2	The average output bit rate in Kbsp (for CBR & VBR).	
Video Encoding Frame Rate	17	1	In fps.	
Video aspect ratio	18	1	0: 16:9, 1: 4:3	
Video Encoding GOP Length	19	1	Group of picture length	
Video Encoding B Frame Number	20	1	Number of B Frames in GOP. 0: No B frame	
Video Encoding Resolution Mode	21	1	0: AUTO, 1: Manual (Depend on Width and Height)	
Video Encoding Frame Rate Decimal	22	1	In 0.xx fps	97 for 0.97

Video Encoding Frame Rate Drop Mode	23	1	0: AUTO, 1: Disable, 2: Enable. The frames will be dropped if the frame rate over the Encofing Frame Rate setting.	
Fast Playback Mode	24	1	0: Disable, Others: <F_Rate> % Enable When enabled, latency is shorter at the cost of smoothness. The nominal frame rate = original frame rate * (1+ F_Rate/100).	
Brightness	25	1	0~255. Luminance brigthness for video input.	
Contrast	26	1	0~255. Luminacne contrast for video input.	
Saturation	27	1	0~255. Chrominance saturation for video input.	
Hue	28	1	0~255. Chroma hue for video input.	
HDMI HDCP	29	1	0: Off, 1: On. Bit [0]: HDCP TX ON	
Reserved	30	7	0	
Audio Input Mode	37	1	0: Stereo, 1: Mono, 2: Duel 3: Joint stereo	
Audio Input Gain Old	38	1	-100~100, in 1db. Or 0x80 for positive flag.	0x05 = -5 for -5 db gain. 0x85 = 5 db.
Audio Encoding Type	39	1	0: AAC, 1: AC3, 2: MPEG2	
Audio Encoding Bit Rate	40	2	In Kbps.	
Audio Input Gain	42	1	[char] -100~100, in 1db.	
Audio Source Input Selection	43	1	0:AUTO, 1: From the same chip of Video source, 2: From external audio ADC	
Reserved	44	6	0	
CheckSum	50	1	=(byte[1]+…+byte[49]) MOD 256	
End Tag	51	1	'\r'	0x0D

6.3 GetTSInfoConfiguration

Command Packet

Field	Offset	Length (Byte)	Descriptions	Example
Leading Tag	0	1	'#'	0x23
Command Length	1	1	The total length of this command. It doesn't include the Leading Tag, CheckSum and End Tag.	
Sequence Number	2	1	0~255. Seq. ID, Optional, Reserved for future use	0
Command Code	3	1	Code: 0x02	0x02

Reserved	4	1	0	0
CheckSum	5	1	=(byte[1]+…+byte[4]) MOD 256	
End Tag	6	1	'\r'	0x0D

Answer Packet

Field	Offset	Length (Byte)	Descriptions	Example
Leading Tag	0	1	'#'	0x23
Command Length	1	1	The total length of this command. It doesn't include the Leading Tag, CheckSum and End Tag.	
Sequence Number	2	1	0~255. Seq. ID, Optional, Reserved for future use	0
Command Code	3	1	Code: 0x82	0x82
Return Code	4	1	0: Success, 0xFD: Unsupported, 0xFE: Cheksum Err, 0xFF: Fail.	
ONID	5	2		0xff17
NID	7	2		0xffa7
TSID	9	2		5
Network Name	11	32	String in Unicode (Maximum 16 characters)	
Service ID	43	2	Program Number (SID)	0x1
LCN Enable	45	1	0:Disable, 1:Enable, 2:Not available	1
LCN	46	2	Logical Channel Number 0xffff:no change	15
Service Name	48	32	String in Unicode (Maximum 16 characters)	"HD Channel"
Provider	80	32	String in Unicode (Maximum 16 characters)	"AVSender"
PMT PID	112	2		
Video PID	114	2		
Audio PID	116	2		
PTS PCR latency	118	2	In mili-second	
SIPSI Table Duration	120	2	Duration in minutes. 0: SI/PSI table always be sent, N: After N minutes, TS SI/PSI table will not be sent. And the TV system could only scan the channel in this period.	
Private Data Specifier	122	4	Private data specifier value. 0: Disable.	0x00000029 for Nordig
NIT Version	126	1	NIT version value	0x00
Country ID	127	1	Country ID of unicode string. Please refer the appendix A.	
Language ID	128	1	Language ID of unicode string. Please refer the	

			appendix A.	
ID Assignation Mode	129	1	This mode is an option for ONID/NID/TSID/Service ID/Region IDs assignation. 0: AUTO (IDs are assigned by frequency), 1: Manual (IDs are assigned by user), 2: Manual by Region ID (ISDB-T only).	
ISDB-T Region ID	130	1		1
ISDB-T Broadcaster Region ID	131	1		0
ISDB-T Remote Control Key ID	132	1		1
ISDB-T Service ID Data Type 1	133	2		0x0480
ISDB-T Service ID Data Type 1	135	2		0x0500
ISDB-T Service ID Partial reception	137	2		0x0580
TS Table Disable	139	1	0: Enable, 1: Disable Bit [0]: TOT/TDT table	
PAT Version	140	1	PAT version value	0x00
Reserved	141	2	0	
CheckSum	143	1	=(byte[1]+…+byte[142]) MOD 256	
End Tag	144	1	'\r'	0x0D

6.4 GetHwRegisterValues

Command Packet

Field	Offset	Length (Byte)	Descriptions	Example
Leading Tag	0	1	'#'	0x23
Command Length	1	1	The total length of this command. It doesn't include the Leading Tag, CheckSum and End Tag.	
Sequence Number	2	1	0~255. Seq. ID, Optional, Reserved for future use	0
Command Code	3	1	Code: 0x03	0x03
Reserved	4	1	0	0
Reserved	5	4	0	
Processor	9	1	0: OFDM, 8: LINK, 1: EEPROM.	

Register Address	10	4	The address for register read.	
Register Value List Size	14	1	The size for multi-byte register read.	
CheckSum	15	1	=(byte[1]+…+byte[14]) MOD 256	
End Tag	16	1	'\r'	0x0D

Answer Packet

Field	Offset	Length (Byte)	Descriptions	Example
Leading Tag	0	1	'#'	0x23
Command Length	1	1	The total length of this command. It doesn't include the Leading Tag, CheckSum and End Tag.	
Sequence Number	2	1	0~255. Seq. ID, Optional, Reserved for future use	0
Command Code	3	1	Code: 0x83	0x83
Return Code	4	1	0: Success, 0xFD: Unsupported, 0xFE: Cheksum Err, 0xFF: Fail.	
Reserved	5	4	0	
Register Value List Size	9	1	The size for multi-byte register read.	
Register Value List	10	1*n	Register value list in byte.	
CheckSum	10+n	1	=(byte[1]+…+byte[9+n]) MOD 256	
End Tag	11+n	1	'\r'	0x0D

6.5 GetSystemInformation

Command Packet

Field	Offset	Length (Byte)	Descriptions	Example
Leading Tag	0	1	'#'	0x23
Command Length	1	1	The total length of this command. It doesn't include the Leading Tag, CheckSum and End Tag.	
Sequence Number	2	1	0~255. Seq. ID, Optional, Reserved for future use	0
Command Code	3	1	Code: 0x04	0x04
Reserved	4	1	0	0
CheckSum	5	1	=(byte[1]+…+byte[4]) MOD 256	
End Tag	6	1	'\r'	0x0D

Answer Packet

Field	Offset	Length (Byte)	Descriptions	Example
Leading Tag	0	1	'#'	0x23
Command Length	1	1	The total length of this command. It doesn't include the Leading Tag, CheckSum and End Tag.	
Sequence Number	2	1	0~255. Seq. ID, Optional, Reserved for future use	0
Command Code	3	1	Code: 0x84	0x84
Return Code	4	1	0: Success, 0xFD: Unsupported, 0xFE: Cheksum Err, 0xFF: Fail.	
Reserved	5	1	0	
FW Version Year	6	1	Firmware version for year (Decimal).	13 means 2013
FW Version Month	7	1	Firmware version for month (Decimal).	1
FW Version Day	8	1	Firmware version for day (Decimal).	2
Software Version	9	2	SW/FW version code (Hex) 0x0177 = v1.77	0x0177
Device Type	11	1	0x01: HDMI only, 0x02: Composite only, 0x03: HDMI/Composite combine, 0x04: Component/VGA combine, 0x05: SDI/HDMI combine.	
System Configuration	12	1	0x00: No config (Default setting), 0x01: Configured.	
System State	13	1	0: Initialization (Booting), 1: No video Input (Idle), 2: Transmitting (Running), 9: System Fault (Failure)	
System Date	14	4		0x20130516 for 2013/05/16
System Time	18	4		0x15111200 for 15:11:12 (hh:mm:ss)
Board Model Name	22	8	Vendor board name	"HD-002"
UART API Version	30	2	UART API version code (Hex) 0x0170 = v1.70	0x0170
Extension Functions	32	1	0: Unsupported, 1: Supported. Bit [0]: RTSP Client Bit [1]: RTSP Server Bit [2]: NTP Client Bit [3]: NTP Server	
TimeZone Index	33	1	UTC time zone index. Please refer the appendix B.	

Daylight Saving	34	1	0: Disable, 1: Enable	
NTP Update Counter	35	1	This counter will be increased automatically if the NTP update succeeds.	
RTSP Server User Counter	36	1	0: No client connects 1: One client connects	
Reserved	37	9	0	
CheckSum	46	1	=(byte[1]+…+byte[45]) MOD 256	
End Tag	47	1	'\r'	0x0D

6.6 GetSourceInformation

Command Packet

Field	Offset	Length (Byte)	Descriptions	Example
Leading Tag	0	1	'#'	0x23
Command Length	1	1	The total length of this command. It doesn't include the Leading Tag, CheckSum and End Tag.	
Sequence Number	2	1	0~255. Seq. ID, Optional, Reserved for future use	0
Command Code	3	1	Code: 0x05	0x05
Reserved	4	1	0	0
CheckSum	5	1	=(byte[1]+…+byte[4]) MOD 256	
End Tag	6	1	'\r'	0x0D

Answer Packet

Field	Offset	Length (Byte)	Descriptions	Example
Leading Tag	0	1	'#'	0x23
Command Length	1	1	The total length of this command. It doesn' t include the Leading Tag, CheckSum and End Tag.	
Sequence Number	2	1	0~255. Seq. ID, Optional, Reserved for future use	0
Command Code	3	1	Code: 0x85	0x85
Return Code	4	1	0: Success, 0xFD: Unsupported, 0xFE: Cheksum Err, 0xFF: Fail.	
Reserved	5	1	0	
Video Input Port	6	1	0: AUTO, 1: HDMI-In, 2: Composite-In (CVBS), 3. Component-In (YPbPr), 4. VGA-In, 5: SDI-In, 6: ASI-In, 7: RTSP-In	
Video Width	7	2	Width for video input resolution	1920

Video Height	9	2	Height for video input resolution	1080
Video Scan Mode	11	1	0: Interlaced, 1: Progressive	
Video Frame Rate	12	1	Frame rate for video input	30
Video Frame Rate Decimal	13	1	Frame rate decimal for video input	97 for 0.97
Video Encoding Resolution Width Max	14	2	Max Width for video encoding resolution	1280
Video Encoding Resolution Height Max	16	2	Max Height for video encoding resolution	720
Reserved	18	11	0	
Audio Sample Rate	29	2	Audio input sample rate in 100Hz.	441 for 44.1KHz
Audio Compression	31	1	0: Un-compression (PCM) data 1: Compression data	
Reserved	32	14	0	
CheckSum	46	1	=(byte[1]+…+byte[45]) MOD 256	
End Tag	47	1	'\r'	0x0D

6.7 GetEITInformation

This command is used to get the settings for present event information (PID=0x12, table_id = "0x4E").

Command Packet

Field	Offset	Length (Byte)	Descriptions	Example
Leading Tag	0	1	'#'	0x23
Command Length	1	1	The total length of this command. It doesn't include the Leading Tag, CheckSum and End Tag.	
Sequence Number	2	1	0~255. Seq. ID, Optional, Reserved for future use	0
Command Code	3	1	Code: 0x06	0x06
Reserved	4	1	0	0
CheckSum	5	1	=(byte[1]+…+byte[4]) MOD 256	
End Tag	6	1	'\r'	0x0D

Answer Packet

Field	Offset	Length (Byte)	Descriptions	Example

Leading Tag	0	1	'#'	0x23
Command Length	1	1	The total length of this command. It doesn't include the Leading Tag, CheckSum and End Tag.	
Sequence Number	2	1	0~255. Seq. ID, Optional, Reserved for future use	0
Command Code	3	1	Code: 0x86	0x86
Return Code	4	1	0: Success, 0xFD: Unsupported, 0xFE: Cheksum Err, 0xFF: Fail.	
Enable	5	1	0: Disable, 1: Enable	0
Start Date	6	4		0x20130516 for 2013/05/16
Start Time	10	4		0x15111200 for 15:11:12 (hh:mm:ss)
Duration	14	4		0x15111200 for 15:11:12 (hh:mm:ss)
Event Name	18	32	String in Unicode (Maximum 16 characters). The event name in short event descriptor (0x4D).	
Event Text	50	96	String in Unicode (Maximum 48 characters). Event Description Text in short event descriptor (0x4D). Default present info is FW/UART API version code.	
Reserved	146	16	0	
CheckSum	162	1	=(byte[1]+…+byte[161]) MOD 256	
End Tag	163	1	'\r'	0x0D

6.8 GetRawData

This command is used to get the raw data. Ex. the modulator calibration table or binary file.

Command Packet

Field	Offset	Length (Byte)	Descriptions	Example
Leading Tag	0	1	'#'	0x23
Command Length	1	1	The total length of this command. It doesn't include the Leading Tag, CheckSum and End Tag.	
Sequence Number	2	1	0~255. Seq. ID, Optional, Reserved for future use	0
Command Code	3	1	Code: 0x07	0x07
Reserved	4	1	0	0
Access Option	5	1	0x00: Read from EEPROM,	

			0x01: Read from file, 0x02: Read from device, 0xFE: Reset to default	
Data Type	6	1	0x00: IQ table, 0x01: DC table, 0x02: Channel table (Freq and BW), please refer Appendix C for the detail format, 0x10: External RTSP server address file (IP2RF), 0x11: NTP server address file	
Data Block Number	7	1	1~255	
CheckSum	8	1	=(byte[1]+…+byte[7]) MOD 256	
End Tag	9	1	'\r'	0x0D

Answer Packet

Field	Offset	Length (Byte)	Descriptions	Example
Leading Tag	0	1	'#'	0x23
Command Length	1	1	The total length of this command. It doesn't include the Leading Tag, CheckSum and End Tag.	
Sequence Number	2	1	0~255. Seq. ID, Optional, Reserved for future use	0
Command Code	3	1	Code: 0x87	0x87
Return Code	4	1	0: Success, 0xFD: Unsupported, 0xFE: Cheksum Err, 0xFF: Fail.	
Access Option	5	1	0x00: Read from EEPROM, 0x01: Read from file, 0x02: Read from device, 0xFE: Reset to default	
Data Type	6	1	0x00: IQ table, 0x01: DC table, 0x02: Channel table (Freq and BW), 0x10: External RTSP address file (IP2RF)	
Data Total Size	7	2	Size 0~61200	
Data CheckSum	9	1	=(byte[1]+…+byte[N]) MOD 256	
Data Total Block Number	10	1	1~255	
Data Block Number	11	1	1~255	
Data Size	12	1	The max size is 240.	
Data Content	13	n		

CheckSum	13+n	1	=(byte[1]+…+byte[13+n-1]) MOD 256	
End Tag	14+n	1	'\r'	0x0D

6.9 GetNetworkConfiguration

This command is used to get the network configuration from the device.

Command Packet

Field	Offset	Length (Byte)	Descriptions	Example
Leading Tag	0	1	'#'	0x23
Command Length	1	1	The total length of this command. It doesn't include the Leading Tag, CheckSum and End Tag.	
Sequence Number	2	1	0~255. Seq. ID, Optional, Reserved for future use	0
Command Code	3	1	Code: 0x08	0x08
Reserved	4	1	0	0
CheckSum	5	1	=(byte[1]+…+byte[4]) MOD 256	
End Tag	6	1	'\r'	0x0D

Answer Packet

Field	Offset	Length (Byte)	Descriptions	Example
Leading Tag	0	1	'#'	0x23
Command Length	1	1	The total length of this command. It doesn't include the Leading Tag, CheckSum and End Tag.	
Sequence Number	2	1	0~255. Seq. ID, Optional, Reserved for future use	0
Command Code	3	1	Code: 0x88	0x88
Return Code	4	1	0: Success, 0xFD: Unsupported, 0xFE: Cheksum Err, 0xFF: Fail.	
DHCP Mode	5	1	0: DHCP enable 1: Fixed IP	
IP Version	6	1	0: None, 1: IPv4, 2: IPv6.	
Valid Option	7	1	0: Unvalid, 1: Valid Bit [0]: IP Address Bit [1]: MAC Address Bit [2]: Port Number Bit [3]: RTSP Server Path	

			Bit [4]: IP Subnet Mask Bit [5]: IP Default Gateway	
IP Address	8	16	Device IP addrees.	0xC0A80101 for 192.168.1.1
MAC Address	24	6	Device MAC address.	0xAABBCCDDEEFF for AA:BB:CC:DD:EE:FF
Port Number	30	2		
RTSP Server Path	32	32		
RTSP Server Options	64	1	0: Disable, 1: Enable RTSP Server + RF output, 2: Enable RTSP Server only.	
RTSP Server Streaming Mode	65	1	0: Unicast, 1: Multicast, 2: Broadcast.	
IP Subnet Mask	66	4	Device IP subnet mask.	
IP Default Gateway	70	4	Device IP default gateway.	
NTP Options	74	1	0: Disabe, 1: Enable NTP Client, 2: Enable NTP Server.	
NTP Update Duration	75	1	Duration in hours.	
RTSP Client User IP Address	76	4	IP addrees of client connection	0xC0A80101 for 192.168.1.1
Reserved	80	16		
CheckSum	96	1	=(byte[1]+…+byte[95]) MOD 256	
End Tag	97	1	'\r'	0x0D

6.10 GetWebPageConfiguration

This command is used to get the web page configuration from the device.

Command Packet

Field	Offset	Length (Byte)	Descriptions	Example
Leading Tag	0	1	'#'	0x23
Command Length	1	1	The total length of this command. It doesn't include the Leading Tag, CheckSum and End Tag.	
Sequence Number	2	1	0~255. Seq. ID, Optional, Reserved for future use	0
Command Code	3	1	Code: 0x09	0x09
Reserved	4	1	0	0

CheckSum	5	1	=(byte[1]+…+byte[4]) MOD 256	
End Tag	6	1	'\r'	0x0D

Answer Packet

Field	Offset	Length (Byte)	Descriptions	Example
Leading Tag	0	1	'#'	0x23
Command Length	1	1	The total length of this command. It doesn't include the Leading Tag, CheckSum and End Tag.	
Sequence Number	2	1	0~255. Seq. ID, Optional, Reserved for future use	0
Command Code	3	1	Code: 0x89	0x89
Return Code	4	1	0: Success, 0xFD: Unsupported, 0xFE: Cheksum Err, 0xFF: Fail.	
UserName	5	16	The user name of login page.	
Password	21	16	The pass word of login page.	
Reserved	37	32		
CheckSum	69	1	=(byte[1]+…+byte[68]) MOD 256	
End Tag	70	1	'\r'	0x0D

6.11 GetSerialPortConfiguration

This command is used to get the configuration of serial port from the device.

Command Packet

Field	Offset	Length (Byte)	Descriptions	Example
Leading Tag	0	1	'#'	0x23
Command Length	1	1	The total length of this command. It doesn't include the Leading Tag, CheckSum and End Tag.	
Sequence Number	2	1	0~255. Seq. ID, Optional, Reserved for future use	0
Command Code	3	1	Code: 0x0A	0x0A
Reserved	4	1	0	0
CheckSum	5	1	=(byte[1]+…+byte[4]) MOD 256	
End Tag	6	1	'\r'	0x0D

Answer Packet

Field	Offset	Length (Byte)	Descriptions	Example
Leading Tag	0	1	'#'	0x23

Command Length	1	1	The total length of this command. It doesn't include the Leading Tag, CheckSum and End Tag.	
Sequence Number	2	1	0~255. Seq. ID, Optional, Reserved for future use	0
Command Code	3	1	Code: 0x8A	0x8A
Return Code	4	1	0: Success, 0xFD: Unsupported, 0xFE: Cheksum Err, 0xFF: Fail.	
Port Number	5	1	The serial port number on the device.	
Type	6	1	0: RS232, 1: RS422HalfDuplex, 2: RS422FullDuplex, 3: RS485HalfDuplex, 4: RS485FullDuplex, 5: Generic.	
BaudRate	7	4	The transfer bitrate.	
DataBit Length	11	1	The bit length for each character.	
ParityBit Check	12	1	0: None, 1: Even, 2: Odd, 3: Mark, 4: Space, 5: Extended. The parity for the data error detection.	
StopBit	13	1	0: 1bit, 1: 1.5bit, 2: 2bit. The number of stop bits used to terminate each character.	
FlowControl	14	1	0: None, 1: Xon/Xoff, 2: Hardware	
TS Transmission Mode	15	1	0: Disable. 1: Transparent mode. The serial data will be packed to TS format and unpacked in the virtual com of receiver device. The PID of TS is fixed to 0x1FED. Please refer the Appendix D for the detail data format. 2: TS Mode. The format of UART data is a 188-byte packet format. It will be transmitted over modulator directly. 3: Transparent mode with checksum. The serial data will be packed to TS format with checksum and unpacked in the virtual com of receiver device. The PID of TS is fixed to 0x1FEC. Please refer the Appendix D for the detail data format.	
Reserved	16	32		
CheckSum	48	1	=(byte[1]+…+byte[47]) MOD 256	
End Tag	49	1	'\r'	0x0D

6.12 GetEncryptionConfiguration

This command is used to get the configuration of stream encryption from the device.

Command Packet

Field	Offset	Length (Byte)	Descriptions	Example
Leading Tag	0	1	'#'	0x23
Command Length	1	1	The total length of this command. It doesn't include the Leading Tag, CheckSum and End Tag.	
Sequence Number	2	1	0~255. Seq. ID, Optional, Reserved for future use	0
Command Code	3	1	Code: 0x0B	0x0B
Reserved	4	1	0	0
CheckSum	5	1	=(byte[1]+…+byte[4]) MOD 256	
End Tag	6	1	'\r'	0x0D

Answer Packet

Field	Offset	Length (Byte)	Descriptions	Example
Leading Tag	0	1	'#'	0x23
Command Length	1	1	The total length of this command. It doesn't include the Leading Tag, CheckSum and End Tag.	
Sequence Number	2	1	0~255. Seq. ID, Optional, Reserved for future use	0
Command Code	3	1	Code: 0x8B	0x8B
Return Code	4	1	0: Success, 0xFD: Unsupported, 0xFE: Cheksum Err, 0xFF: Fail.	
RF Encryption Mode	5	1	0: Disable, 1: Enable	
RF Encryption Type	6	1	0: SDES encryption	
RF Encryption Key	7	8	The encryption key of RF encryption algorithm.	
Data Encryption Mode	15	1	0: Disable, 1: Enable	
Data Encryption Type	16	1	0: DES encryption	
PartialEncryption Data Byte Length	17	2	0: Encrypt all bytes (except 4-byte header) 4~n: The length of skip bytes in a 188-byte TS packet (except 4-byte header) for partial Encryption.	4~172 skip bytes for DES
Data Encryption Key	19	64	The encryption key of data encryption algorithm.	
Reserved	83	32		
CheckSum	115	1	=(byte[1]+…+byte[114]) MOD 256	
End Tag	116	1	'\r'	0x0D

6.13 GetPCRCalibrationConfiguration

This command is used to get the configuration of PCR calibration from the device.

Command Packet

Field	Offset	Length (Byte)	Descriptions	Example
Leading Tag	0	1	'#'	0x23
Command Length	1	1	The total length of this command. It doesn't include the Leading Tag, CheckSum and End Tag.	
Sequence Number	2	1	0~255. Seq. ID, Optional, Reserved for future use	0
Command Code	3	1	Code: 0x0C	0x0C
Reserved	4	1	0	0
CheckSum	5	1	=(byte[1]+…+byte[4]) MOD 256	
End Tag	6	1	'\r'	0x0D

Answer Packet

Field	Offset	Length (Byte)	Descriptions	Example
Leading Tag	0	1	'#'	0x23
Command Length	1	1	The total length of this command. It doesn't include the Leading Tag, CheckSum and End Tag.	
Sequence Number	2	1	0~255. Seq. ID, Optional, Reserved for future use	0
Command Code	3	1	Code: 0x8C	0x8C
Return Code	4	1	0: Success, 0xFD: Unsupported, 0xFE: Cheksum Err, 0xFF: Fail.	
PCR Restamp Mode	5	1	This vaule is the same as the PCR Restamp Mode of TrasmissionConfiguration 0: Disable 1: Eagle2 PCR restamp mode 1 2: Eagle2 PCR restamp mode 2 3: Eagle2 PCR restamp mode 3	
PCR Reset Time Period	6	4	In millisecond.	
Bandwidth	10	1	In MHz, Valid Settings:1,2,3,4,5,6,7,8 0: 7+8 MHz (VHF:7M, UHF:8Mhz), 15: 1.5MHz, 25: 2.5MHz 0xff : no change	0x08, for 8MHz BW
Constellation	11	1	0: QPSK, 1: 16QAM, 2: 64QAM	0x1 for 16QAM

			0xff : no change	
Code Rate	12	1	0: 1/2, 1: 2/3, 2: 3/4, 3: 5/6, 4: 7/8 0xff: no change	0x1 for 2/3 CR
Guard Interval	13	1	0: 1/32, 1: 1/16, 2: 1/8, 3: 1/4 0xff: no change	0x3 for ¼ GI
TV Standard	14	1	0: DVB-T 1: ISDB-T	
Packet Time Jitter	15	4		
PCR ExtJitter	19	4		
Positive	23	1	1: Positive, -1: Negative	
Reserved	24	32		
CheckSum	56	1	=(byte[1]+…+byte[55]) MOD 256	
End Tag	57	1	'\r'	0x0D

6.14 SetTransmissionConfiguration

Command Packet

Field	Offset	Length (Byte)	Descriptions	Example
Leading Tag	0	1	'#'	0x23
Command Length	1	1	The total length of this command. It doesn't include the Leading Tag, CheckSum and End Tag.	
Sequence Number	2	1	0~255. Seq. ID, Optional, Reserved for future use	0
Command Code	3	1	Code: 0x40	0x40
Reserved	4	1	0	0
Bandwidth	5	1	In MHz, Valid Settings:1,2,3,4,5,6,7,8 0: 7+8 MHz (VHF:7M, UHF:8Mhz), 15: 1.5MHz, 25: 2.5MHz 0xff : no change	0x08, for 8MHz BW
Frequency	6	4	In KHz, Valid Setting, 50000KHz~995000KHz 0xffffffff:no change	0xA2990, for 666MHz
Constellation	10	1	0: QPSK, 1: 16QAM, 2: 64QAM 0xff : no change	0x1 for 16QAM
FFT	11	1	0: 2K, 1:8K, 2: 4K 0xff: no change	0x1 for 8K
Code Rate	12	1	0: 1/2, 1: 2/3, 2: 3/4, 3: 5/6, 4: 7/8 0xff: no change	0x1 for 2/3 CR

Guard Interval	13	1	0: 1/32, 1: 1/16, 2: 1/8, 3: 1/4 0xff: no change	0x3 for ¼ GI
RF Gain	14	1	[char] -127~127, in 1db.	5 for +5 db gain. -5 for 5 db attenuation.
TPS Cell ID	15	2	Cell ID	
Channel Number	17	1	Channel number 0~255 shown on Panel or switch	
Channel Table	18	1	0: 7+8MHz, 1: 6MHz, 2: 7MHz, 3: 8MHz, 4: ISDB-T, (Japan), 5: ISDB-Tb (Brazil), 9: User defined (default 7+8M). This table could be selected by bandwidth strapping on board.	
TV Standard	19	1	0: DVB-T 1: ISDB-T	
Segmentation Mode	20	1	0: ISDB-T Full segmentation mode 1: ISDB-T 1+12 segmentation mode	
One-Seg Constellation	21	1	0: QPSK, 1: 16QAM, 2: 64QAM 0xff : no change	0x1 for 16QAM
One-Seg Code Rate	22	1	0: 1/2, 1: 2/3, 2: 3/4, 3: 5/6, 4: 7/8 0xff: no change	0x1 for 2/3 CR
TV Standard Option	23	1	0: Unsupported, 1: Supported. Bit [0]: DVB-T Bit [1]: ISDB-T	0x03 for DVB-T and ISDB-T supported
ChipID	24	2		0x9507
PCR Restamp Mode	26	1	0: Disable 1: Eagle2 PCR restamp mode 1 2: Eagle2 PCR restamp mode 2 3: Eagle2 PCR restamp mode 3	
Reserved	27	10	0	
CheckSum	37	1	=(byte[1]+…+byte[36]) MOD 256	
End Tag	38	1	'\r'	0x0D

Answer Packet

Field	Offset	Length (Byte)	Descriptions	Example
Leading Tag	0	1	'#'	0x23
Command Length	1	1	The total length of this command. It doesn't include the Leading Tag, CheckSum and End Tag.	

Sequence Number	2	1	0~255. Seq. ID, Optional, Reserved for future use	0
Command Code	3	1	Code: 0xC0	0xC0
Return Code	4	1	0: Success, 0xFD: Unsupported, 0xFE: Cheksum Err, 0xFF: Fail.	
CheckSum	5	1	=(byte[1]+…+byte[4]) MOD 256	
End Tag	6	1	'\r'	0x0D

6.15 SetMediaConfiguration

Command Packet

Field	Offset	Length (Byte)	Descriptions	Example
Leading Tag	0	1	'#'	0x23
Command Length	1	1	The total length of this command. It doesn't include the Leading Tag, CheckSum and End Tag.	
Sequence Number	2	1	0~255. Seq. ID, Optional, Reserved for future use	0
Command Code	3	1	Code: 0x41	0x41
Reserved	4	1	0	0
Video Input Port	5	1	0: AUTO, 1: HDMI-In, 2: Composite-In (CVBS), 3. Component-In (YPbPr), 4. VGA-In, 5: SDI-In, 6: ASI-In, 7: RTSP-In	
Video Input Mode	6	1	**HDMI:** 0: AUTO **Composite:** 0: AUTO, 1: NTSC, 2: PAL **Component:** 0: AUTO, 1: 50fps, 2: 60fps **VGA:** 0: AUTO **SDI:** 0: AUTO	
Video Encoding Type	7	1	0: H264, 1: MPEG2, 2: H265.	
Video Encoding Resolution Width	8	2	0: AUTO, Others: Width	1920
Video Encoding Resolution Height	10	2	0: AUTO, Others: Height	1080
Video Encoding Data Rate Control	12	1	0: CBR 1: VBR	

Type			2: Fixed QP 3: CVBR	
Video Encoding Max Bit Rate	13	2	The max output bit rate in Kbsp (for VBR).	
Video Encoding Average Bit Rate	15	2	The average output bit rate in Kbsp (for CBR & VBR).	
Video Encoding Frame Rate	17	1	In fps.	
Video aspect ratio	18	1	0: 16:9, 1: 4:3	
Video Encoding GOP Length	19	1	Group of picture length	
Video Encoding B Frame Number	20	1	Number of B Frames in GOP. 0: No B frame	
Video Encoding Resolution Mode	21	1	0: AUTO, 1: Manual (Depend on Width and Height)	
Video Encoding Frame Rate Decimal	22	1	In 0.xx fps	97 for 0.97
Video Encoding Frame Rate Drop Mode	23	1	0: AUTO, 1: Disable, 2: Enable. The frames will be dropped if the frame rate over the Encofing Frame Rate setting.	
Fast Playback Mode	24	1	0: Disable, 1: Enable When enabled, latency is shorter at the cost of smoothness.	
Brightness	25	1	0~255. Luminance brigthness for video input.	
Contrast	26	1	0~255. Luminacne contrast for video input.	
Saturation	27	1	0~255. Chrominance saturation for video input.	
Hue	28	1	0~255. Chroma hue for video input.	
HDMI HDCP	29	1	0: Off, 1: On. Bit [0]: HDCP TX ON	
Reserved	30	7	0	
Audio Input Mode	37	1	0: Stereo, 1: Mono, 2: Duel 3: Joint stereo	
Audio Input Gain Old	38	1	-100~100, in 1db. Or 0x80 for positive flag.	0x05 = -5 for -5 db gain. 0x85 = 5 db.
Audio Encoding Type	39	1	0: AAC, 1: AC3, 2: MPEG2	
Audio Encoding Bit Rate	40	2	In Kbps.	
Audio Input Gain	42	1	[char] -100~100, in 1db.	

Audio Source Input Selection	43	1	0:AUTO, 1: From the same chip of Video source, 2: From external audio ADC	
Reserved	44	6	0	
CheckSum	50	1	=(byte[1]+…+byte[49]) MOD 256	
End Tag	51	1	'\r'	0x0D

Answer Packet

Field	Offset	Length (Byte)	Descriptions	Example
Leading Tag	0	1	'#'	0x23
Command Length	1	1	The total length of this command. It doesn't include the Leading Tag, CheckSum and End Tag.	
Sequence Number	2	1	0~255. Seq. ID, Optional, Reserved for future use	0
Command Code	3	1	Code: 0xC1	0xC1
Return Code	4	1	0: Success, 0xFD: Unsupported, 0xFE: Cheksum Err, 0xFF: Fail.	
CheckSum	5	1	=(byte[1]+…+byte[4]) MOD 256	
End Tag	6	1	'\r'	0x0D

6.16 SetTSInfoConfiguration

Command Packet

Field	Offset	Length (Byte)	Descriptions	Example
Leading Tag	0	1	'#'	0x23
Command Length	1	1	The total length of this command. It doesn't include the Leading Tag, CheckSum and End Tag.	
Sequence Number	2	1	0~255. Seq. ID, Optional, Reserved for future use	0
Command Code	3	1	Code: 0x42	0x42
Reserved	4	1	0	0
ONID	5	2		0xff17
NID	7	2		0xffa7
TSID	9	2		5
Network Name	11	32	String in Unicode (Maximum 16 characters)	
Service ID	43	2	Program Number (SID)	0x1
LCN Enable	45	1	0:Disable, 1:Enable, 2:Not available	1
LCN	46	2	Logical Channel Number 0xffff:no change	15

Service Name	48	32	String in Unicode (Maximum 16 characters)	“HD Channel”
Provider	80	32	String in Unicode (Maximum 16 characters)	“AVSender”
PMT PID	112	2		
Video PID	114	2		
Audio PID	116	2		
PTS PCR latency	118	2	In mili-second	
SIPSI Table Duration	120	2	Duration in minutes. 0: SI/PSI table always be sent, N: After N minutes, TS SI/PSI table will not be sent. And the TV system could only scan the channel in this period.	
Private Data Specifier	122	4	Private data specifier value. 0: Disable.	0x00000029 for Nordig
NIT Version	126	1	NIT version value	0x00
Country ID	127	1	Country ID of unicode string. Please refer the appendix A.	
Language ID	128	1	Language ID of unicode string. Please refer the appendix A.	
ID Assignation Mode	129	1	This mode is an option for ONID/NID/TSID/Service ID/Region IDs assignation. 0: AUTO (IDs are assigned by frequency), 1: Manual (IDs are assigned by user), 2: Manual by Region ID (ISDB-T only).	
ISDB-T Region ID	130	1		1
ISDB-T Broadcaster Region ID	131	1		0
ISDB-T Remote Control Key ID	132	1		1
ISDB-T Service ID Data Type 1	133	2		0x0480
ISDB-T Service ID Data Type 2	135	2		0x0500
ISDB-T Service ID Partial reception	137	2		0x0580
TS Table Disable	139	1	0: Enable, 1: Disable Bit [0]: TOT/TDT table	
PAT Version	140	1	PAT version value	0x00
Reserved	140	3	0	

CheckSum	143	1	=(byte[1]+…+byte[142]) MOD 256	
End Tag	144	1	'\r'	0x0D

Answer Packet

Field		Length (Byte)	Descriptions	Example
Leading Tag	0	1	'#'	0x23
Command Length	1	1	The total length of this command. It doesn't include the Leading Tag, CheckSum and End Tag.	
Sequence Number	2	1	0~255. Seq. ID, Optional, Reserved for future use	0
Command Code	3	1	Code: 0xC2	0xC2
Return Code	4	1	0: Success, 0xFD: Unsupported, 0xFE: Cheksum Err, 0xFF: Fail.	
CheckSum	5	1	=(byte[1]+…+byte[4]) MOD 256	
End Tag	6	1	'\r'	0x0D

6.17 SetHwRegisterValues

Command Packet

Field	Offset	Length (Byte)	Descriptions	Example
Leading Tag	0	1	'#'	0x23
Command Length	1	1	The total length of this command. It doesn't include the Leading Tag, CheckSum and End Tag.	
Sequence Number	2	1	0~255. Seq. ID, Optional, Reserved for future use	0
Command Code	3	1	Code: 0x43	0x43
Reserved	4	1	0	
Reserved	5	4	0	
Processor	9	1	0: OFDM, 8: LINK, 1: EEPROM.	
Register Address	10	4	The address for register write.	
Register Value List Size	14	1	The size for multi-byte register writes.	
Register Value List	15	1*n	Register value list in byte.	
CheckSum	15+n	1	=(byte[1]+…+byte[14+n]) MOD 256	
End Tag	16+n	1	'\r'	0x0D

Answer Packet

Field	Offset	Length (Byte)	Descriptions	Example
Leading Tag	0	1	'#'	0x23
Command Length	1	1	The total length of this command. It doesn't include the Leading Tag, CheckSum and End Tag.	
Sequence Number	2	1	0~255. Seq. ID, Optional, Reserved for future use	0
Command Code	3	1	Code: 0xC3	0xC3
Return Code	4	1	0: Success, 0xFD: Unsupported, 0xFE: Cheksum Err, 0xFF: Fail.	
CheckSum	5	1	=(byte[1]+…+byte[4]) MOD 256	
End Tag	6	1	'\r'	0x0D

6.18 SetSystemDateTime

Command Packet

Field	Offset	Length (Byte)	Descriptions	Example
Leading Tag	0	1	'#'	0x23
Command Length	1	1	The total length of this command. It doesn' t include the Leading Tag, CheckSum and End Tag.	
Sequence Number	2	1	0~255. Seq. ID, Optional, Reserved for future use	0
Command Code	3	1	Code: 0x44	0x44
Reserved	4	1	0	0
Date	5	4		0x20130516 for 2013/05/16
Time	9	4		0x15111200 for 15:11:12 (hh:mm:ss)
TimeZone Index	13	1	UTC time zone index. Please refer the appendix B.	
Daylight Saving	14	1	0: Disable, 1: Enable	
Reserved	15	6	0	
CheckSum	21	1	=(byte[1]+…+byte[20]) MOD 256	
End Tag	22	1	'\r'	0x0D

Answer Packet

Field	Offset	Length (Byte)	Descriptions	Example
Leading Tag	0	1	'#'	0x23

Command Length	1	1	The total length of this command. It doesn't include the Leading Tag, CheckSum and End Tag.	
Sequence Number	2	1	0~255. Seq. ID, Optional, Reserved for future use	0
Command Code	3	1	Code: 0xC4	0xC4
Return Code	4	1	0: Success, 0xFD: Unsupported, 0xFE: Cheksum Err, 0xFF: Fail.	
CheckSum	5	1	=(byte[1]+…+byte[4]) MOD 256	
End Tag	6	1	'\r'	0x0D

6.19 SystemReboot

Command Packet

Field	Offset	Length (Byte)	Descriptions	Example
Leading Tag	0	1	'#'	0x23
Command Length	1	1	The total length of this command. It doesn't include the Leading Tag, CheckSum and End Tag.	
Sequence Number	2	1	0~255. Seq. ID, Optional, Reserved for future use	0
Command Code	3	1	Code: 0x45	0x45
Reserved	4	1	0	0
Reboot Type	5	1	0: Reboot the device 1: Reboot and apply all settings when system configs were changed. The reboot behavior is depended on AVSender. 2: Reboot to the system default 3: Reboot to calibration mode 4: Reboot RTSP server 5: Reset client connection of RTSP server	
Reserved	6	4	0	
CheckSum	10	1	=(byte[1]+…+byte[9]) MOD 256	
End Tag	11	1	'\r'	0x0D

Answer Packet

Field	Offset	Length (Byte)	Descriptions	Example
Leading Tag	0	1	'#'	0x23
Command Length	1	1	The total length of this command. It doesn't include the Leading Tag, CheckSum and End Tag.	

Sequence Number	2	1	0~255. Seq. ID, Optional, Reserved for future use	0
Command Code	3	1	Code: 0xC5	0xC5
Return Code	4	1	0: Success, 0xFD: Unsupported, 0xFE: Cheksum Err, 0xFF: Fail.	
CheckSum	5	1	=(byte[1]+…+byte[4]) MOD 256	
End Tag	6	1	'\r'	0x0D

6.20 SetEITInformation

This command is used to set the settings for present event information (PID=0x12, table_id = "0x4E").

Command Packet

Field	Offset	Length (Byte)	Descriptions	Example
Leading Tag	0	1	'#'	0x23
Command Length	1	1	The total length of this command. It doesn't include the Leading Tag, CheckSum and End Tag.	
Sequence Number	2	1	0~255. Seq. ID, Optional, Reserved for future use	0
Command Code	3	1	Code: 0x46	0x46
Reserved	4	1	0	0
Enable	5	1	0: Disable, 1: Enable	0
Start Date	6	4		0x20130516 for 2013/05/16
Start Time	10	4		0x15111200 for 15:11:12 (hh:mm:ss)
Duration	14	4		0x15111200 for 15:11:12 (hh:mm:ss)
Event Name	18	32	String in Unicode (Maximum 16 characters). The event name in short event descriptor (0x4D).	
Event Text	50	96	String in Unicode (Maximum 48 characters). Event Description Text in short event descriptor (0x4D). Default present info is FW/UART API version code.	
Reserved	146	16	0	
CheckSum	162	1	=(byte[1]+…+byte[161]) MOD 256	
End Tag	163	1	'\r'	0x0D

Answer Packet

Field	Offset	Length (Byte)	Descriptions	Example
Leading Tag	0	1	'#'	0x23
Command Length	1	1	The total length of this command. It doesn't include the Leading Tag, CheckSum and End Tag.	
Sequence Number	2	1	0~255. Seq. ID, Optional, Reserved for future use	0
Command Code	3	1	Code: 0xC6	0xC6
Return Code	4	1	0: Success, 0xFD: Unsupported, 0xFE: Cheksum Err, 0xFF: Fail.	
CheckSum	5	1	=(byte[1]+…+byte[4]) MOD 256	
End Tag	6	1	'\r'	0x0D

6.21 SetRawData

This command is used to set the raw data. Ex. the modulator calibration table or binary file.

Command Packet

Field	Offset	Length (Byte)	Descriptions	Example
Leading Tag	0	1	'#'	0x23
Command Length	1	1	The total length of this command. It doesn't include the Leading Tag, CheckSum and End Tag.	
Sequence Number	2	1	0~255. Seq. ID, Optional, Reserved for future use	0
Command Code	3	1	Code: 0x47	0x47
Reserved	4	1	0	0
Access Option	5	1	0x00: Write to EEPROM, 0x01: Write to file, 0x02: Write to device only, 0xFE: Reset to default	
Table Type	6	1	0x00: IQ table, 0x01: DC table, 0x02: Channel table (Freq and BW), please refer Appendix C for the detail format, 0x10: External RTSP server address file (IP2RF) 0x11: NTP server address file	
Table Data Total Size	7	2	Size 0~61200	
Table Data CheckSum	9	1	=(byte[1]+…+byte[N]) MOD 256	
Table Data Total	10	1	1~255	

Block Number				
Table Data Block Number	11	1	1~255	
Table Data Size	12	1	The max size is 240.	
Table Data	13	n		
CheckSum	13+n	1	=(byte[1]+…+byte[13+n-1]) MOD 256	
End Tag	14+n	1	'\r'	0x0D

Answer Packet

Field	Offset	Length (Byte)	Descriptions	Example
Leading Tag	0	1	'#'	0x23
Command Length	1	1	The total length of this command. It doesn't include the Leading Tag, CheckSum and End Tag.	
Sequence Number	2	1	0~255. Seq. ID, Optional, Reserved for future use	0
Command Code	3	1	Code: 0xC7	0xC7
Return Code	4	1	0: Success, 0xFD: Unsupported, 0xFE: Cheksum Err, 0xFF: Fail.	
CheckSum	5	1	=(byte[1]+…+byte[4]) MOD 256	
End Tag	6	1	'\r'	0x0D

6.22 SetNetworkConfiguration

This command is used to set the network configuration to the device.

Command Packet

Field	Offset	Length (Byte)	Descriptions	Example
Leading Tag	0	1	'#'	0x23
Command Length	1	1	The total length of this command. It doesn't include the Leading Tag, CheckSum and End Tag.	
Sequence Number	2	1	0~255. Seq. ID, Optional, Reserved for future use	0
Command Code	3	1	Code: 0x48	0x48
Reserved	4	1	0	0
DHCP Mode	5	1	0: DHCP enable 1: Fixed IP	
IP Version	6	1	0: None, 1: IPv4, 2: IPv6.	

Valid Option	7	1	0: Unvalid, 1: Valid Bit [0]: IP Address Bit [1]: MAC Address Bit [2]: Port Number Bit [3]: RTSP Server Path Bit [4]: IP Subnet Mask Bit [5]: IP Default Gateway	
IP Address	8	16	Device IP addrees.	0xC0A80101 for 192.168.1.1
MAC Address	24	6	Device MAC address.	0xAABBCCDDEEFF for AA:BB:CC:DD:EE:FF
Port Number	30	2		
RTSP Server Path	32	32		
RTSP Server Options	64	1	0: Disable, 1: Enable RTSP Server + RF output, 2: Enable RTSP Server only.	
RTSP Server Streaming Mode	65	1	0: Unicast, 1: Multicast, 2: Broadcast.	
IP Subnet Mask	66	4	Device IP subnet mask.	
IP Default Gateway	70	4	Device IP default gateway.	
NTP Options	74	1	0: Disabe, 1: Enable NTP Client, 2: Enable NTP Server.	
NTP Update Duration	75	1	Duration in hours.	
RTSP Client User IP Address	76	4	IP addrees of client connection	0xC0A80101 for 192.168.1.1
Reserved	80	16		
CheckSum	96	1	=(byte[1]+…+byte[95]) MOD 256	
End Tag	97	1	'\r'	0x0D

Answer Packet

Field	Offset	Length (Byte)	Descriptions	Example
Leading Tag	0	1	'#'	0x23
Command Length	1	1	The total length of this command. It doesn't include the Leading Tag, CheckSum and End Tag.	
Sequence Number	2	1	0~255. Seq. ID, Optional, Reserved for future use	0
Command Code	3	1	Code: 0xC8	0xC8
Return Code	4	1	0: Success, 0xFD: Unsupported, 0xFE: Cheksum	

			Err, 0xFF: Fail.	
CheckSum	5	1	=(byte[1]+…+byte[4]) MOD 256	
End Tag	6	1	'\r'	0x0D

6.23 SetWebPageConfiguration

This command is used to set the web page configuration to the device.

Command Packet

Field	Offset	Length (Byte)	Descriptions	Example
Leading Tag	0	1	'#'	0x23
Command Length	1	1	The total length of this command. It doesn't include the Leading Tag, CheckSum and End Tag.	
Sequence Number	2	1	0~255. Seq. ID, Optional, Reserved for future use	0
Command Code	3	1	Code: 0x49	0x49
Reserved	4	1	0	0
UserName	5	16	The user name of login page.	
Password	21	16	The pass word of login page.	
Reserved	37	32		
CheckSum	69	1	=(byte[1]+…+byte[68]) MOD 256	
End Tag	70	1	'\r'	0x0D

Answer Packet

Field	Offset	Length (Byte)	Descriptions	Example
Leading Tag	0	1	'#'	0x23
Command Length	1	1	The total length of this command. It doesn't include the Leading Tag, CheckSum and End Tag.	
Sequence Number	2	1	0~255. Seq. ID, Optional, Reserved for future use	0
Command Code	3	1	Code: 0xC9	0xC9
Return Code	4	1	0: Success, 0xFD: Unsupported, 0xFE: Cheksum Err, 0xFF: Fail.	
CheckSum	5	1	=(byte[1]+…+byte[4]) MOD 256	
End Tag	6	1	'\r'	0x0D

6.24 SetSerialPortConfiguration

This command is used to set the configuration of serial port to the device.

Command Packet

Field	Offset	Length (Byte)	Descriptions	Example
Leading Tag	0	1	'#'	0x23
Command Length	1	1	The total length of this command. It doesn't include the Leading Tag, CheckSum and End Tag.	
Sequence Number	2	1	0~255. Seq. ID, Optional, Reserved for future use	0
Command Code	3	1	Code: 0x4A	0x4A
Reserved	4	1	0	0
Port Number	5	1	The serial port number on the device.	
Type	6	1	0: RS232, 1: RS422HalfDuplex, 2: RS422FullDuplex, 3: RS485HalfDuplex, 4: RS485FullDuplex, 5: Generic.	
BaudRate	7	4	The transfer bitrate.	
DataBit Length	11	1	The bit length for each character.	
ParityBit Check	12	1	0: None, 1: Even, 2: Odd, 3: Mark, 4: Space, 5: Extended. The parity for the data error detection.	
StopBit	13	1	0: 1bit, 1: 1.5bit, 2: 2bit. The number of stop bits used to terminate each character.	
FlowControl	14	1	0: None, 1: Xon/Xoff, 2: Hardware	
TS Transmission Mode	15	1	0: Disable. 1: Transparent mode. The serial data will be packed to TS format and unpacked in the virtual com of receiver device. The PID of TS is fixed to 0x1FED. Please refer the Appendix D for the detail data format. 2: TS Mode. The format of UART data is a 188-byte packet format. It will be transmitted over modulator directly. 3: Transparent mode with checksum. The serial data will be packed to TS format with checksum and unpacked in the virtual com of receiver device. The PID of TS is fixed to 0x1FEC. Please refer the Appendix D for the detail data format.	
Reserved	16	32		
CheckSum	48	1	=(byte[1]+…+byte[47]) MOD 256	
End Tag	49	1	'\r'	0x0D

Answer Packet

Field	Offset	Length (Byte)	Descriptions	Example
Leading Tag	0	1	'#'	0x23
Command Length	1	1	The total length of this command. It doesn't include the Leading Tag, CheckSum and End Tag.	
Sequence Number	2	1	0~255. Seq. ID, Optional, Reserved for future use	0
Command Code	3	1	Code: 0xCA	0xCA
Return Code	4	1	0: Success, 0xFD: Unsupported, 0xFE: Cheksum Err, 0xFF: Fail.	
CheckSum	5	1	=(byte[1]+…+byte[4]) MOD 256	
End Tag	6	1	'\r'	0x0D

6.25 SetEncryptionConfiguration

This command is used to set the configuration of stream encryption to the device.

Command Packet

Field	Offset	Length (Byte)	Descriptions	Example
Leading Tag	0	1	'#'	0x23
Command Length	1	1	The total length of this command. It doesn't include the Leading Tag, CheckSum and End Tag.	
Sequence Number	2	1	0~255. Seq. ID, Optional, Reserved for future use	0
Command Code	3	1	Code: 0x4B	0x4B
Reserved	4	1	0	0
RF Encryption Mode	5	1	0: Disable, 1: Enable	
RF Encryption Type	6	1	0: SDES encryption	
RF Encryption Key	7	8	The encryption key of RF encryption algorithm.	
Data Encryption Mode	5	1	0: Disable, 1: Enable	
Data Encryption Type	6	1	0: DES encryption	
PartialEncryption Data Byte Length	7	2	0: Encrypt all bytes (except 4-byte header) 4~n: The length of skip bytes in a 188-byte TS packet (except 4-byte header) for partial Encryption.	4~172 skip bytes for DES

Data Encryption Key	9	64	The encryption key of data encryption algorithm.	
Reserved	73	32		
CheckSum	105	1	=(byte[1]+…+byte[104]) MOD 256	
End Tag	106	1	'\r'	0x0D

Answer Packet

Field	Offset	Length (Byte)	Descriptions	Example
Leading Tag	0	1	'#'	0x23
Command Length	1	1	The total length of this command. It doesn't include the Leading Tag, CheckSum and End Tag.	
Sequence Number	2	1	0~255. Seq. ID, Optional, Reserved for future use	0
Command Code	3	1	Code: 0xCB	0xCB
Return Code	4	1	0: Success, 0xFD: Unsupported, 0xFE: Cheksum Err, 0xFF: Fail.	
CheckSum	5	1	=(byte[1]+…+byte[4]) MOD 256	
End Tag	6	1	'\r'	0x0D

6.26 SetPCRCalibrationConfiguration

This command is used to set the configuration of PCR calibration to the device.

Command Packet

Field	Offset	Length (Byte)	Descriptions	Example
Leading Tag	0	1	'#'	0x23
Command Length	1	1	The total length of this command. It doesn't include the Leading Tag, CheckSum and End Tag.	
Sequence Number	2	1	0~255. Seq. ID, Optional, Reserved for future use	0
Command Code	3	1	Code: 0x4C	0x4C
Reserved	4	1	0	0
PCR Restamp Mode	5	1	This vaule is the same as the PCR Restamp Mode of TrasmissionConfiguration 0: Disable 1: Eagle2 PCR restamp mode 1 2: Eagle2 PCR restamp mode 2 3: Eagle2 PCR restamp mode 3	
PCR Reset Time	6	4	In millisecond.	

Period				
Bandwidth	10	1	In MHz, Valid Settings:1,2,3,4,5,6,7,8 0: 7+8 MHz (VHF:7M, UHF:8Mhz), 15: 1.5MHz, 25: 2.5MHz 0xff : no change	0x08, for 8MHz BW
Constellation	11	1	0: QPSK, 1: 16QAM, 2: 64QAM 0xff : no change	0x1 for 16QAM
Code Rate	12	1	0: 1/2, 1: 2/3, 2: 3/4, 3: 5/6, 4: 7/8 0xff: no change	0x1 for 2/3 CR
Guard Interval	13	1	0: 1/32, 1: 1/16, 2: 1/8, 3: 1/4 0xff: no change	0x3 for ¼ GI
TV Standard	14	1	0: DVB-T 1: ISDB-T	
Packet Time Jitter	15	4		
PCR ExtJitter	19	4		
Positive	23	1	1: Positive, -1: Negative	
Reserved	24	32		
CheckSum	56	1	=(byte[1]+…+byte[55]) MOD 256	
End Tag	57	1	'\r'	0x0D

Answer Packet

Field	Offset	Length (Byte)	Descriptions	Example
Leading Tag	0	1	'#'	0x23
Command Length	1	1	The total length of this command. It doesn't include the Leading Tag, CheckSum and End Tag.	
Sequence Number	2	1	0~255. Seq. ID, Optional, Reserved for future use	0
Command Code	3	1	Code: 0xCC	0xCC
Return Code	4	1	0: Success, 0xFD: Unsupported, 0xFE: Cheksum Err, 0xFF: Fail.	
CheckSum	5	1	=(byte[1]+…+byte[4]) MOD 256	
End Tag	6	1	'\r'	0x0D

7 Status Command

7.1 SystemStatus Command

The status command is sent by encoder SOC automatic. It's a single way data message, no "ACK" required.
The status message will be sent, when the status changes or the LCM issues 0x04 GetSystemInformation command.

System Status Message Type

Type	Description
0x00	SD Card Firmware Update Status
0x01	System Boot Status
0x02	Source Input Information

Answer Packet

Field	Offset	Length (Byte)	Descriptions	Example
Leading Tag	0	1	'#'	0x23
Command Length	1	1	The total length of this command. It doesn't include the Leading Tag, CheckSum and End Tag.	12
Sequence Number	2	1	0~255. Seq. ID, Optional, Reserved for future use	0
Command Code	3	1	Code: 0xF0	0xF0
Reserved	4	1	0	0
Type	5	1	Status message type: Type=0x00: Firmware Update from SD Card Type=0x01: System Boot Finished Type=0x02: Video Information Type=0x03: Audio Information	
Status information	6	46	Defined below	
CheckSum	52	1	=(byte[1]+…+byte[51]) MOD 256	
End Tag	53	1	'\r'	0x0D

SD Card Firmware Update Status (Type = 0x00)

Field	Offset	Length (Byte)	Descriptions	Example
Status	6	1	0: Firmware Update Start 1: Firmware Update Finished	
Reserved	7	39	0	

System Boot Status (Type = 0x01)

Field	Offset	Length (Byte)	Descriptions	Example
FW Version Year	6	1	Firmware version for year (Decimal).	13 means 2013

FW Version Month	7	1	Firmware version for month (Decimal).	1
FW Version Day	8	1	Firmware version for day (Decimal).	2
Software Version	9	2	SW/FW version code (Hex) 0x0177 = v1.77	0x0177
Device Type	11	1	0x01: HDMI only, 0x02: Composite only, 0x03: HDMI/Composite combine, 0x04: Component/VGA combine, 0x05: SDI/HDMI combine.	
System Configuration	12	1	0x00: No config (Default setting), 0x01: Configured.	
System State	13	1	0: Initialization (Booting), 1: No video Input (Idle), 2: Transmitting (Running), 9: System Fault (Failure)	
System Date	14	4		0x20130516 for 2013/05/16
System Time	18	4		0x15111200 for 15:11:12 (hh:mm:ss)
Board Model Name	22	8	Vendor board name	“HD-002”
UART API Version	30	2	UART API version code (Hex) 0x0170=v1.70	0x0170
Extension Functions	32	1	0: Unsupported, 1: Supported. Bit [0]: RTSP Client Bit [1]: RTSP Server Bit [2]: NTP Client Bit [3]: NTP Server	
TimeZone Index	33	1	UTC time zone index. Please refer the appendix B.	
Daylight Saving	34	1	0: Disable, 1: Enable	
NTP Update Counter	35	1	This counter will be increased automatically if the NTP update succeeds.	
RTSP Server User Counter	36	1	0: No client connects 1: One client connects	
Reserved	37	9	0	

Source Input Information (Type = 0x02)

Field	Offset	Length (Byte)	Descriptions	Example
Video Input Port	6	1	0: AUTO, 1: HDMI-In, 2: Composite-In (CVBS), 3. Component-In (YPbPr), 4. VGA-In, 5: SDI-In, 6:	

			ASI-In, 7: RTSP-In	
Video Width	7	2	Width for video input resolution	1920
Video Height	9	2	Height for video input resolution	1080
Video Scan Mode	11	1	0: Interlaced, 1: Progressive	
Video Frame Rate	12	1	Frame rate for video input	30
Video Frame Rate Decimal	13	1	Frame rate decimal for video input	97 for 0.97
Video Encoding Resolution Width Max	14	2	Max Width for video encoding resolution	1280
Video Encoding Resolution Height Max	16	2	Max Height for video encoding resolution	720
Reserved	18	11	0	
Audio Sample Rate	29	2	Audio input sample rate in 100Hz.	441 for 44.1KHz
Audio Compression	31	1	0: Un-compression (PCM) data 1: Compression data	
Reserved	32	14	0	

Appendix A

Country and language IDs mapping table:

Country	Country ID	Language	Language ID
Australia	0	English	0
Canada	1	English	0
UK	2	English	0
Hongkong	3	English	0
New Zealand	4	English	0
USA	5	English	0
Albania	6	Albanian	1
Andorra	7	Catalan	2
Denmark	8	Danish	3
Belgium	9	Dutch	4
Netherlands	10	Dutch	4
Austria	11	German	5
Germany	12	German	5
Switzerland	13	German	5
Indonesia	14	Indonesian	6
Italy	15	Italian	7
Luxembourg	16	Luxembourgish	8
Malaysia	17	Malay	9
Norway	18	Norwegian	10
Angola	19	Portuguese	11
Brazil	20	Portuguese	11
Portugal	21	Portuguese	11
Ireland	22	Irish	12
Argentina	23	Spanish	13
Colombia	24	Spanish	13
Cuba	25	Spanish	13
Spain	26	Spanish	13
Mexico	27	Spanish	13
Uruguay	28	Spanish	13
Venezuela	29	Spanish	13
Sweden	30	Swedish	14
Croatia	31	Croatian	15
Czech	32	Czech	16
Hungary	33	Hungarian	17

Romania	34	Romanian	18
Poland	35	Polish	19
Slovenia	36	Slovenian	20
Slovakia	37	Slovak	21
Bulgaria	38	Bulgarian	22
Russian	39	Russian	23
Ukrainian	40	Ukrainian	24
Egypt	41	Arabic	25
Iraq	42	Arabic	25
Libya	43	Arabic	25
Saudi Arabia	44	Arabic	25
Afghanistan	45	Persian	26
Iran	46	Persian	26
Greece	47	Greek	27
Israel	48	Hebrew	28
Turkey	49	Turkish	29
Latvia	50	Latvian	30
Lithuania	51	Lithuanian	31
Bangladesh	52	Bengali	32
Belarus	53	Belarusian	33
Finland	54	Finnish	34
France	55	French	35
Korea	56	Korean	36
China	57	Chinese Simplified	37
Taiwan	58	Chinese Traditional	38
India	59	Hindi	39
Japan	60	Japanese	40
Vietnam	61	Vietnamese	41

Appendix B

Time zone mapping table

Index	Time Zone	Name
0	Dateline Standard Time (UTC-12:00)	International Date Line West
1	UTC-11 (UTC-11:00)	
2	Hawaiian Standard Time (UTC-10:00)	Hawaii
3	Alaskan Standard Time (UTC-09:00)	Alaska
4	Pacific Standard Time (Mexico) (UTC-08:00)	Pacific Time (US and Canada)
5	Pacific Standard Time (UTC-08:00)	Baja California Peninsula (Tijuana)
6	Mountain Standard Time (UTC-07:00)	Mountain Time (US and Canada)
7	U.S. Mountain Standard Time (UTC-07:00)	Arizona
8	Mountain Standard Time (Mexico) (UTC-07:00)	Chihuahua, La Paz, Mazatlan
9	Central America Standard Time (UTC-06:00)	Central America
10	Central Standard Time (UTC-06:00)	Central Time (US and Canada)
11	Central Standard Time (Mexico) (UTC-06:00)	Guadalajara, Mexico City, Monterrey
12	Canada Central Standard Time (UTC-06:00)	Saskatchewan (Canada)
13	U.S. Eastern Standard Time (UTC-05:00)	Indiana (East)
14	Eastern Standard Time (UTC-05:00)	Eastern Time (US and Canada)
15	S.A. Pacific Standard Time (UTC-05:00)	Bogota, Lima, Quito
16	Venezuela Standard Time (UTC-04:30)	Caracas
17	Atlantic Standard Time (UTC-04:00)	Atlantic Time (Canada)
18	Central Brazilian Standard Time (UTC-04:00)	Cuyaba
19	S.A. Western Standard Time (UTC-04:00)	Demerara, La Paz, Manaus, San Juan
20	Paraguay Standard Time (UTC-04:00)	Asuncion
21	Pacific S.A. Standard Time (UTC-04:00)	Santiago
22	Newfoundland and Labrador Standard Time (UTC-03:30)	Newfoundland and Labrador
23	E. South America Standard Time (UTC-03:00)	Brasilia
24	Argentina Standard Time (UTC-03:00)	Buenos Aires
25	Greenland Standard Time (UTC-03:00)	Greenland
26	S.A. Eastern Standard Time (UTC-03:00)	Buenos Aires, Georgetown
27	Montevideo Standard Time (UTC-03:00)	Montevideo
28	Bahia Standard Time (UTC-03:00)	Salvador
29	UTC-02 (UTC-02:00)	
30	Azores Standard Time (UTC-01:00)	Azores
31	Cape Verde Standard Time (UTC-01:00)	Cape Verde Islands
32	Morocco Standard Time (UTC)	Casablanca, Monrovia

33	UTC (UTC)	
34	GMT Standard Time (UTC)	Greenwich Mean Time: Dublin, Edinburgh, Lisbon, London
35	Greenwich Standard Time (UTC)	Monrovia, Iceland
36	W. Central Africa Standard Time (UTC+01:00)	West Central Africa
37	Romance Standard Time (UTC+01:00)	Brussels, Copenhagen, Madrid, Paris
38	Central Europe Standard Time (UTC+01:00)	Belgrade, Bratislava, Budapest, Ljubljana, Prague
39	W. Europe Standard Time (UTC+01:00)	Amsterdam, Berlin, Bern, Rome, Stockholm, Vienna
40	Central European Standard Time (UTC+01:00)	Sarajevo, Skopje, Warsaw, Zagreb
41	Namibia Standard Time (UTC+01:00)	Windhoek
42	Syria Standard Time (UTC+02:00)	Damascus
43	Turkey Standard Time (UTC+02:00)	Istanbul
44	Middle East Standard Time (UTC+02:00)	Beirut
45	E. Europe Standard Time (UTC+02:00)	Bucharest
46	Libya Standard Time (UTC+02:00)	Tripoli
47	South Africa Standard Time (UTC+02:00)	Harare, Pretoria
48	Israel Standard Time (UTC+02:00)	Jerusalem
49	Egypt Standard Time (UTC+02:00)	Cairo
50	GTB Standard Time (UTC+02:00)	Athens, Istanbul, Minsk
51	FLE Standard Time (UTC+02:00)	Helsinki, Kiev, Riga, Sofia, Tallinn, Vilnius
52	Arabic Standard Time (UTC+03:00)	Baghdad
53	Kaliningrad Standard Time (UTC+03:00)	Kaliningrad, Minsk
54	Jordan Standard Time(UTC+03:00)	Amman
55	E. Africa Standard Time (UTC+03:00)	Nairobi
56	Arab Standard Time (UTC+03:00)	Kuwait, Riyadh
57	Iran Standard Time (UTC+03:30)	Tehran
58	Azerbaijan Standard Time (UTC+04:00)	Baku
59	Arabian Standard Time (UTC+04:00)	Abu Dhabi, Muscat
60	Georgian Standard Time (UTC+04:00)	Tbilisi
61	Russian Standard Time (UTC+04:00)	Moscow, St. Petersburg, Volgograd
62	Caucasus Standard Time (UTC+04:00)	Baku, Tbilisi, Yerevan
63	Mauritius Standard Time (UTC+04:00)	Port Louis
64	Afghanistan Standard Time (UTC+04:30)	Kabul
65	Pakistan Standard Time (UTC+05:00)	Islamabad, klotsche
66	West Asia Standard Time (UTC+05:00)	Islamabad, Karachi, Tashkent

67	India Standard Time (UTC+05:30)	Chennai, Kolkata, Mumbai, New Delhi
68	Sri Lanka Standard Time (UTC+05:30)	Sri Jayawardenepura
69	Nepal Standard Time (UTC+05:45)	Kathmandu
70	Ekaterinburg Standard Time (UTC+06:00)	Ekaterinburg
71	Central Asia Standard Time (UTC+06:00)	Astana, Dhaka
72	Bangladesh Standard Time (UTC+06:00)	Dhaka
73	Myanmar Standard Time (UTC+06:30)	Yangon Rangoon
74	S.E. Asia Standard Time (UTC+07:00)	Bangkok, Hanoi, Jakarta
75	N. Central Asia Standard Time (UTC+07:00)	Almaty, Novosibirsk
76	China Standard Time (UTC+08:00)	Beijing, Chongqing, Hong Kong SAR, Urumqi
77	Taipei Standard Time (UTC+08:00)	Taipei
78	Singapore Standard Time (UTC+08:00)	Kuala Lumpur, Singapore
79	W. Australia Standard Time (UTC+08:00)	Perth
80	North Asia Standard Time (UTC+08:00)	Krasnoyarsk
81	Ulaanbaatar Standard Time (UTC+08:00)	Kulun
82	Tokyo Standard Time (UTC+09:00)	Osaka, Sapporo, Tokyo
83	North Asia East Standard Time (UTC+09:00)	Irkutsk, Ulaanbaatar
84	Korea Standard Time (UTC+09:00)	Seoul
85	Cen. Australia Standard Time (UTC+09:30)	Adelaide
86	A.U.S. Central Standard Time (UTC+09:30)	Darwin
87	E. Australia Standard Time (UTC+10:00)	Brisbane
88	A.U.S. Eastern Standard Time (UTC+10:00)	Canberra, Melbourne, Sydney
89	Yakutsk Standard Time (UTC+10:00)	Yakutsk
90	Tasmania Standard Time (UTC+10:00)	Hobart
91	West Pacific Standard Time (UTC+10:00)	Guam, Port Moresby
92	Vladivostok Standard Time (UTC+11:00)	Vladivostok
93	Central Pacific Standard Time (UTC+11:00)	Magadan, Solomon Islands, New Caledonia
94	Magadan Standard Time (UTC+12:00)	Magadan
95	NTC+12 (UTC+12:00)	
96	Fiji Islands Standard Time (UTC+12:00)	Fiji Islands, Kamchatka, Marshall Islands
97	New Zealand Standard Time (UTC+12:00)	Auckland, Wellington
98	Tonga Standard Time (UTC+13:00)	Nuku'alofa
99	Samoa Standard Time (UTC+13:00)	Samoa

Appendix C

1. Channel table text file format:

Channel number, Frequency, Bandwidth

```
0, 177500, 7
1, 142500, 7
2, 149500, 6
3, 156500, 5
4, 474000, 8
5, 1250000, 6
6, 2450000, 8
…
```

2. Channel table binary format in UART transmission:

1 byte for channel number	4 bytes for frequency	1 byte for bandwidth
0	177500	7
1	142500	7
2	149500	6
3	156500	5
4	474000	8
5	1250000	6
6	2450000	8
…		

Appendix D

UART TS transparent mode format (TS packet of 188 bytes):

TS Header (4-Byte)	Data Length (1-Byte)	Data Packet (Max 183 Byte)

UART TS transparent mode with checksum format (TS packet of 188 bytes):

TS Header (4-Byte)	Data Length (1-Byte)	Data Packet (Max 182 Byte)	CheckSum (1-Byte)

CheckSum(byte[187]) = (byte[5]+…+byte[Data Length+5]) MOD 256

188 TS packet format:

Syntax	No. of bits	Mnemonic
Transport_packet() {		
sync_byte	8	bslbf
tansport_error_indicator	1	bslbf
payload_unit_start_indicator	1	bslbf
transport_priority	1	bslbf
PID	13	uimsbf
transport_scrambling control	2	bslbf
adaptation_field_control	2	bslbf
continuity_counter	4	uimsbf
transparent_mode_data_length	8	bslbf
transparent_mode_data_packet	1464	
}		

sync_byte - Sync the decoder: 8 bits, 0x47
tansport_error_indicator - 1 bit packet error indicator
payload_unit_start_indicator - PSI or PES packet: 1 bit, 0x0
transport_priority - Usefule in scalable MPEG2: 1 bit, 0x1
PID - 13 bits ID, 0x1FED/0x1FEC
transport_scrambling_control - 2 bits
adaptation_field_control - No adaptation_field, payload only: 2bits , 0x01
continuity_counter - Counts packets of PES: 4 bits