Samsung DVB Hotel TV Interface Protocol

- □ Product: TV
- □ System: PAL DVB
- □ Category: Setup
- □ Version: 2.3
- □ Updated on: February 8, 2011
- □ Ownership: Visual Display Division Software Group

Version	Date	Amender	History
0.90	2007.05.27	Rishi Agrawal	- Defined initial spec.
0.91	2008.09.19	Rishi Agrawal	- Added DVB Direct Tuning, EPG Activate/Deactivate, Session Activate/Deactivate & Enable/Disable OSD commands. - Removed Display Channel Label command - MHEG added in Teletext Command
0.92	2008.09.23	Rishi Agrawal	- Added Teletext IR codes for color keys, Select Subtitle Language, Request subtitle status, Subtitle status, Select Audio Language, Request Audio status, Audio status & Add Program to TV (Analog) commands.
0.93	2008.10.20	Rishi Agrawal	- Added Navigation IR codes for EPG navigation, Request TV Identify, TV Identify, Request TV Firmware version, TV Firmware Version, Picture Mode, Set Analog Level, LED Message, SBB Status, Tune to program commands - Modified Tune channel (Digital) command for direct tuning. Activate/Deactivate session for sending TV status periodically to SBB, Request Subtitle Language Status, Subtitle Language Status, Select Subtitle Language, Request audio Language Status, Audio Language Status Select audio Language, TV Status.

Version	Date	Amender	History
0.94	2008.11.26	Rishi Agrawal	- Added PMO LED Message Display command
0.95	2009.01.05	Rishi Agrawal	- Modified Set Volume command, Activate/Deactivate Session, Tune Channel (Digital)
0.96	2009.01.12	Rishi Agrawal	- Modified Add Program to TV, TV Status Command - Added Delete Channel Map from TV (Analog/Digital), Update Channel Map Command
0.97	2009.01.19	Rishi Agrawal	- Removed EPG and MHEG Command
0.98	2009.01.21	Rishi Agrawal	- Modified PMO LED Display Command (Room Service removed)
0.99	2009.01.30	Rishi Agrawal	- Modified Tune Channel (Analog) Command (Program Label Changed to 5 characters)
0.991	2009.02.04	Rishi Agrawal	- Modified Tune Channel (Digital) Command (Store in EEPROM and Delete removed)
0.992	2009.02.05	Rishi Agrawal	- Modified Add Program to TV (Analog/Digital) Command (Comment added for distinguishing analog and digital parameters)
0.993	2009.02.09	Rishi Agrawal	- Tune Channel (Digital) Command – (Channel changed to Service and Note added)
0.994	2009.02.09	Rishi Agrawal	- Channel AMP update sequence added (Appendix 1)
0.995	2009.02.19	Rishi Agrawal	- Modified Add Program to TV (Digital) and Tune Service (Digital) Command - (Ordering or Service ID High and low changed and Modulation ordering changed.)
0.996	2009.02.27	Rishi Agrawal	- Added Set Power ON Source Command
0.997	2009.03.09	Apoorv Goyal	- Modified IR code to TV , Tune Channel (Analog) , Set Analog Level Command - Added Request DVB Status , DVB Status , Request MAIN MCU Firmware Version , MAIN MCU Firmware Version , Request SUB MCU Firmware Version , SUB MCU Firmware Version , Sound Mode Command
0.998	2009.03.12	Apoorv Goyal	- Modified Set PMO LED Clock , Select Input Source Command
0.999	2009.03.27	Rishi Agrawal	- Modified TV Status, Select Teletext/MHEG (MHEG Support Added), PMO LED Message Display (Ordering changed)
1.000	2009.05.18	Rishi Agrawal	- Added Comment for color codes usage for OSD Control Command - Modified Select Input source command (Source Banner Type bit information corrected)
1.1	2009.05.20	Rishi Agrawal	- Added Request Picture Size Status and Picture Size Status commands.
1.2	2009.06.12	Rishi Agrawal	-Added Key Teletext IR Code in IR Code to TV Command

Version	Date	Amender	History
1.3	2009.08.06	Rishi Agrawal	- Modified Select Teletext/ MHEG , RJP Status command - Added Key Exit IR Code in IR Code to TV, Enable/Disable Digital Text, Select Antenna Input command - Added MHEG operation in Appendix I. -Removed Request TV Firmware Version, TV-Firmware command as 5.48 and 5.50 added.
1.4	2009.31.10	Rishi Agrawal	- Added Power-Up Sequence in System description - Added KEY_GUIDE (for EPG) IR Code in IR Code to TV command. - Added Just Scan Option Picture size in Picture Size Command - Added Font Size support in OSD Control Command - Added power up Sequence Description in System Description.
1.5	2010.01.15	Rishi Agrawal	- Added WiseLink Support in IR Code to TV Command and Select Input Source - Added Byte in TV status command for updating STB for any Focus Window Active on Screen. - Enabled EPG status in TV status Command - Mixed Channel MAP and WiseLink operation added (Appendix 1)
1.6	2010.02.12	Rishi Agrawal	- Added Support for HDMI3 and HDMI 4 in Select Input Source Command and modified value for WiseLink
1.7	2010.02.26	Rishi Agrawal	- Added Command to Enable/Disable USB.
1.8	2010.06.04	Rishi Agrawal	- Modified language codes for subtitle and audio language
1.9	2010.06.11	Rishi Agrawal	- Added Display Custom Channel Banner Command - Modified Select input source command ASCII character support for program number to support numerical only.
2.0	2010.09.03	Rishi Agrawal	- Added KEY_RETURN in IR Code to TV command - Added PIP Control Command - Added USB Detected status in TV status command
2.1	2011.01.05	Rishi Agrawal	- Added KEY_3D in IR Code to TV command - Added Support for DVB-S in Add Program to TV and Tune Service Command
2.2	2011.01.07	Rishi Agrawal	- Modified parameter ordering for Modulation value for DVB-S in Add Program to TV and Tune Service Command - Added Support for DVB-T2 in Add Program to TV and Tune Service Command
2.3	2011.02.08	Rishi Agrawal	- Added Picture parameters for color, contrast, brightness, sharpness and tint in Set Parameters command

			- Added Key INFO IR Code in IR Code to TV Command

Contents

1. Introduction

Hospitality TV is provided with interactive functionality through set-back box (SBB/STB) connected with TV, and with other TVs in a computer controlled system for hotels and other hospitality business.

This document provides description of the Samsung protocol used for communication between the TV (DVB system) and the SBB/STB, both analog / digital types. The IR data from the TV receiver is sent through the IR line, it consists of both TV data and keyboard data. Control of the entire system is through SBB/STB and TV performs according to command from the SBB/STB.

Scope of this document includes brief description of the system, communication hardware interface and settings. Interface protocol packet description and commands from TV to SBB/STB and from SBB/STB to TV.

The STB/SBB is "master" to the TV and the TV is "slave" to the SBB/STB .In normal condition SBB/STB is the originator of all messages and TV responds to those commands and will send acknowledgement for the command. However, in special conditions TV can originate some command and SBB/STB needs to reply.

For Channel MAP update sequence please refer Appendix 1.

2. System Description

Samsung DVB Hotel TV Interface Protocol
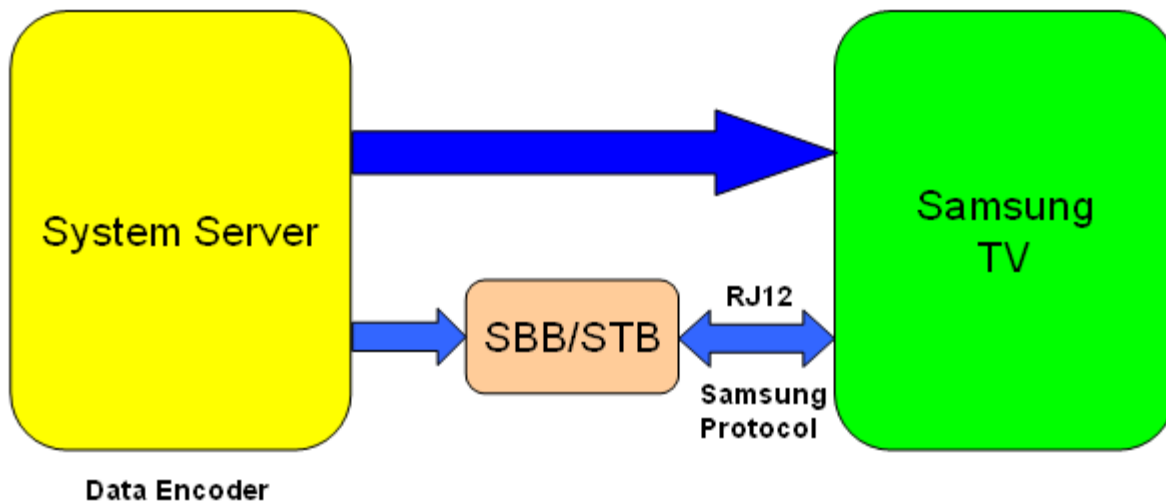
RJ12 Interface Details
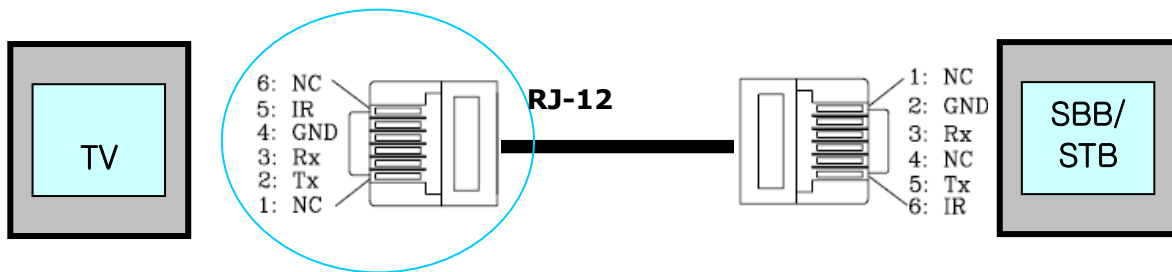
TV side interface consists of 6-pin RJ12 jack for TX, RX, IR and GND. IR line is a pass through line for IR data. No handshake is required only TX and RX is used for communication

SBB/STB side consists of 6-pin RJ12 jack.

Asynchronous Serial communication is used for communication between TV and SBB/STB unit. Communication baud is 9600 bps (default), 8N1 (no parity and one stop bit). Communication flow control is none.

The IR transmitter of SBB/STB remote control & keyboard should work at 36 $\pm$ 2 KHz and comply with Samsung RC specifications.

Power-Up Sequence

Initial on power-up, TV will send TV status command for 10 sec. SBB/STB shall send command to Enable/Disable session mechanism (refer command 5.25 Activate/Deactivate Session).

The communication begins with a transmission of Request TV Status command from SBB/STB. Once TV receives this command it switched to ONLINE mode.

TV will stop polling (if configured) while busy executing a command, but not for more than 5 Seconds, except in case when TV is powering ON or OFF.

In ONLINE Mode, the SBB/STB sends Request TV Status command and the TV responds with TV Status command. If TV does not receive any valid command within time set as in Activate/Deactivate session command, TV will regard the interface as missing and will revert to the OFFLINE mode. TV in this case will remain in OFFLINE mode until session is reestablished by STB/SBB by sending Request TV Status command.

TV functions as normal hotel TV (as set in TV Setup Menu) in OFFLINE mode. This is to make sure that guests are not disturbed when SBB/STB has failed. No program search is allowed when the TV is in Hotel mode

Samsung DVB Hotel TV Interface Protocol

3. Packet Description

Samsung protocol packet consists of a control byte, followed by command1, command2, data length information (for communication simplicity), data bytes (maximum of 32 bytes) and last is checksum byte. Checksum is the lower byte sum of all bytes before the checksum

Control Byte	Command1	Command2	Data Length	Data1	Data2...	Data64	Checksum

Control Byte:

0	1	0	1	1/0	x	x	x

Header (start of valid packet)

Reserved bits

Acknowledge bit, if it is '0' then respective set (TV or SBB/STB) will re-transmit the same packet again
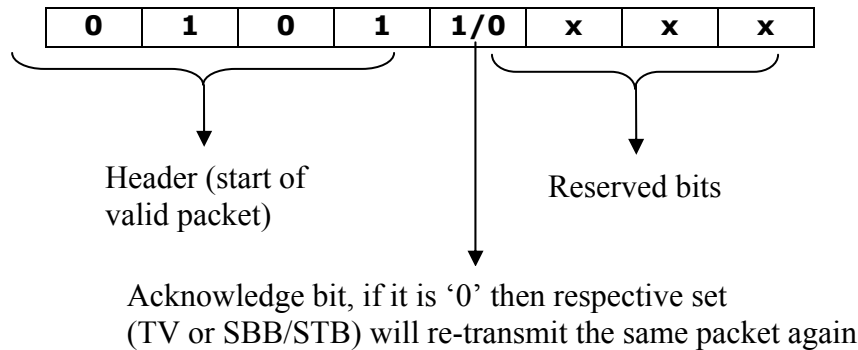
Command1:

Command byte 1 is high byte of command; MSB is set to '1' if command is from SBB/STB to TV (from 0x80 onwards)

Command2:

Command byte 2 is low byte of command

Data Length:

Data length byte is the total count of data bytes in the packet. It has a maximum value of 32

Data [1...nn]:

Variable length of data bytes, up to a maximum of 32 Bytes

Checksum:

The 8-bit sum of all preceding bytes

All data in the interface protocol are on HEX format, unless otherwise specified.

Example: - 58 80 01 01 80 5A is the packet for Power ON command from SBB/STB

Where

    58 -> Control Byte
    80 -> High byte of Power ON command
    01 -> Power ON command (Low Byte)
    01 -> Data Length
    80 -> Data byte1 value
    5A -> Checksum for the packet

4. Commands

4.1.1 From SBB/STB to TV

S.No.	Type of Command	Cmd 1	Cmd 2	Functional Description
1.	Request TV Status	0x80	0x00	SBB request for TV status
2.	Power	0x80	0x01	Standby/Operate
3.	Set parameter(s)	0x80	0x02	Add analog settings
4.	OSD Control	0x80	0x03	Set OSD control info
5.	Display OSD text	0x80	0x04	Write OSD Text (Hotel message text)
6.	IR code to TV	0x80	0x05	Send IR code direct
7.	Select Input Source	0x80	0x06	Set input source
8.	Select Teletext/MHEG	0x80	0x07	Set Teletext/MHEG mode
9.	Picture Size	0x80	0x08	Selects TV screen picture size
10	Add Program to TV	0x80	0x09	Add program to TV (Analog)
11.	Tune Channel (Analog)	0x80	0x0A	Sets analog channel tune data
12.	Tune Channel (Digital)	0x80	0x0B	Sets digital channel tune data
13.	Activate/Deactivate EPG	0x80	0x0C	Displays EPG generated by TV
14.	Set Volume	0x80	0x0D	Force the volume to specified level
15.	Set World Time Clock	0x80	0x0E	Set World Time Clock
16.	Set World Time Clock Display Mode	0x80	0x0F	Control display ON/OFF for World Time Clock
17.	Navigate World Time Clock	0x80	0x10	Navigate through World Time Clock
18.	Set RJP Source Priority	0x80	0x11	Set source switching priority
19.	Set PMO LED Clock	0x80	0x12	Set PMO LED Clock
20.	Set PMO LED Display Mode	0x80	0x13	PMO LED Display Control ON/OFF
21.	Set Baud Rate	0x80	0x14	Sets communication Baud Rate (Depends on TV)
22.	Activate/Deactivate Session	0x80	0x15	Set session mechanism Timeout
23.	Enable/Disable OSD Display	0x80	0x16	Enable/ Disables OSD displays in TV
24.	Select Subtitle Language	0x80	0x17	Toggles between various subtitle languages
25.	Request Subtitle Status	0x80	0x18	SBB request for Subtitle status
26.	Select Audio Language	0x80	0x19	Toggles between various Audio languages
27.	Request Audio Status	0x80	0x1A	SBB request for Audio status
28.	Request TV-Identify	0x80	0x1B	SBB request for TV identification
29.	Request TV Firmware Version	0x80	0x1C	SBB request for TV Firmware version
30.	Picture Mode	0x80	0x1D	Set Picture mode
31.	Set Analog Level	0x80	0x1E	Set analog level
32.	LED Message	0x80	0x1F	Control Panel LED control
33.	SBB Status	0x80	0x20	Sends SBB Status to TV
34.	Tune to Program	0x80	0x21	Tunes to program stored in TV
35.	PMO LED Message Display	0x80	0x22	Displays predefined messages on PMO LED
36.	Delete Channel Map	0x80	0x23	Deletes Analog/Digital channel Map
37.	Update Channel Map	0x80	0x24	Updates TV's channel Map
38.	Set Power On Source	0x80	0x25	Sets Power On source

39.	Request DVB Status	0x80	0x26	To get Status of Tuned DVB Service
40.	Request MAIN MCU Firmware Version	0x80	0x27	To get Main MCU Firmware Version
41.	Request SUB MCU Firmware Version	0x80	0x28	To get Sub MCU Firmware Version
42.	Sound Mode	0x80	0x29	To set sound mode
43.	Request Picture Size Status	0x80	0x30	To get Picture Size set in TV
44.	Enable/Disable Digital Text	0x80	0x31	To set Digital Text ON/OFF
45.	Select Antenna Input	0x80	0x32	To select TV Channel Map
46.	Enable/Disable USB Device	0x80	0x33	To Enable/Disable USB Device
47.	Display Custom Channel Banner	0x80	0x34	To Display Custom Channel Banner
48.	PIP Control	0x80	0x35	To Control PIP

4.2.1 From TV to SBB/STB

S.No.	Type of Command	Cmd 1	Cmd 2	Functional Description
1.	Acknowledgement	0x00	0x00	Response for the command received
2.	TV status	0x00	0x01	TV status info to SBB/STB
3.	RJP Status	0x00	0x02	Send RJP Status to SBB/STB
4.	Subtitle Status	0x00	0x03	Send Subtitle Status to SBB/STB
5.	Audio Status	0x00	0x04	Send Audio Status to SBB/STB
6.	TV-Identify	0x00	0x05	Send TV identify string to SBB/STB
7.	TV-Firmware	0x00	0x06	Send TV firmware version to SBB/STB
8.	DVB Status	0x00	0x07	Sends Status of Tuned DVB Service
9.	MAIN MCU Firmware Version	0x00	0x08	Sends Main MCU Version
10.	SUB MCU Firmware Version	0x00	0x09	Sends Sub MCU version
11.	Picture Size Status	0x00	0x0A	Sends Picture size set in TV

5. Commands Detailed Description

All unused command bit must be set to zero.
All values are in HEX format, unless specified.

5.1 Acknowledgement

This command is sent from TV to SBB/STB in response to the command received from SBB/STB.

Sequence of the command is: CB-CMD1-CMD2-DLEN-CS

0x58	0x00	0x00	0x01	Data 1	Checksum

Data 1
0x01	ACK –Command Acknowledged
0x02	NACK –Command NOT Acknowledged
0x03	Command Unsupported

5.2 Request TV Status

This command is sent from SBB/STB to TV, requesting for TV status.

Sequence of the command is: CB-CMD1-CMD2-DLEN-CS

0x58	0x80	0x00	0x00	Checksum

This command is replied from the TV with TV status as mentioned in 5.3

5.3 TV Status

This command contains the TV status data for the SBB/STB.

Sequence of the command is: CB-CMD1-CMD2-DLEN-Data1-Data2-CS

0x58	0x00	0x01	0x04	Data 1	Data 2	Data 3	Data 4	Checksum

Data 1

Bit 7	1 indicate Aux input used
Bit 6	1 indicate EPG is on.
Bit 5	1 indicate MHEG is on.
Bit 4	1 indicate TV is on (out of standby)
Bit 3	1 indicate Teletext is on.
Bit 2	1 indicate TV is tuned to valid TV-signal
Bit 1	1 indicate OSD text is on screen
Bit 0	1 indicate Subtitle is ON

Data 2   Bit 7   1 Current Program/Channel is Digital if Aux input is 0
                                      0 Current Program/Channel is Analog if Aux input is 0
                   Bit 6~0 Holds High Byte for Program/Channel TV is tuned to if Aux input is 0

Data 3   Holds Low Byte for Program/Channel if Aux input is 0 or current input source
                   If Aux input is 1

Data 4

Bit 7	1 indicate Focus Window is active on screen
Bit 6	1 indicate USB is detected in TV
Bit 5~0	Reserved for future use

5.4 Power

This command turns the TV ON/OFF and is initiated from the SBB/STB.

Sequence of the command is: CB-CMD1-CMD2-DLEN-Data1-CS

0x58	0x80	0x01	0x01	Data 1	Checksum

Data 1

Bit7	1 indicate TV to turn on
	0 indicate TV to turn to standby
Bit6~0	Don't Care

5.5 Set Parameters

This command stores default (Power-up) analog parameters from SBB/STB to TV EEPROM.

Sequence of the command is: CB-CMD1-CMD2-DLEN Data1-Data2-CS

0x58	0x80	0x02	0x02	Data 1	Data 2	Checksum

Data 1

      Bit 3-0 Parameter Type
                0000 = Volume
                0001 = Max. Volume
                0010 = Min Volume
                0011 = Brightness
                0100 = Contrast
                0101 = Color
                0110 = Tint
                0111 = Sharpness

Data 2

                Value to store 0 ~ 100 (binary format)

5.6 OSD Control

This command sets control parameters for OSD text.

Sequence of the command is: CB-CMD1-CMD2-DLEN-Data1-Data2-CS

0x58	0x80	0x03	0x03	Data 1	Data 2	Data 3	Checksum

Data 1

                Parameter Type
      Bit 7   1 – Erase OSD text on screen
      Bit 6   Don't care.
      *Bit 5-0 OSD timeout in secs. (0 for permanent)

   *- optional, not provided TV will decide on Timeout

Data 2

                Parameter Type
      Bit 7-5 Select background color   Bit7=R Bit6=G Bit5=B
      Bit 4-2 Select Text color   Bit4=R Bit3=G Bit2=B

      White/Yellow/Magenta/Red/Cyan/Green/Blue/■
      Note: - Model Dependent

Data 3

      Display Font Size.
      Font size range support is model dependent. If no font size is specified then TV default OSD font size shall be taken.

5.7 Display OSD Text

This command sends text to TV for OSD display (basically for display of Hotel messages).

Sequence of the command is: CB-CMD1-CMD2-DLEN-Data1-Data2-Data [3…nn]-CS

0x58	0x80	0x04	DLEN	Data 1	Data2	Data [3…nn]	Checksum

Data 1

Vertical (Row) position of text string (Max. of 5 rows of text string is possible).

Data 2

Horizontal (Column) position of text string

Data [3…nn]

Data bytes include Text String along with attributes.
(Max. of characters to be displayed varies from TV models.
 Typically 25 to 32 characters supported in 1 row).

5.8 IR Code to TV

This command sends a code which the TV will interpret as an IR command and take action accordingly. Sequence of the command is: CB-CMD1-CMD2-DLEN-Data1-Data2-CS

0x58	0x80	0x05	0x02	Data 1	Data 2	Checksum

Data 1
   IR address data (custom code)
Data 2
   IR data byte (code value)

IR Key Code Table:

| S.No. | Key Name | Hex Code | |
		Custom	Data
1.	POWER	07	02
2.	1	07	04
3.	2	07	05
4.	3	07	06
5.	4	07	08
6.	5	07	09
7.	6	07	0A
8.	7	07	0C
9.	8	07	0D
10.	9	07	0E
11.	0	07	11
12.	-/--/---	07	23
13.	MUTE	07	0F
14.	VOL+	07	07
15.	VOL-	07	0B
16.	CH. UP *	07	12
17.	CH. DOWN *	07	10
18.	SOURCE	07	01
19.	P. SIZE	07	3E
20.	SLEEP	07	03
21.	Key Teletext	07	2C
22.	Teletext RED **	07	6C
23.	Teletext GREEN **	07	14
24.	Teletext YELLOW **	07	15
25.	Teletext CYAN **	07	16
26.	Key UP	07	60
27.	Key DOWN	07	61
28.	Key RIGHT	07	62
29.	Key LEFT	07	65
30.	Key ENTER	07	68
31.	Key TV	07	1B
32.	Key Exit	07	2D
33.	Key Guide	07	4F
34.	Key WiseLink	07	8C
35.	Key Return	07	58

36	Key 3D ***	07	9F
37	Key INFO	07	1F

*   Used as Teletext Page UP/DOWN keys when Teletext is ON.
**   Allowed in Teletext and EPG mode only
***   For Models supporting 3D Key functionality.

5.9 Select Input Source

This command selects input sources in TV

Sequence of the command is: CB-CMD1-CMD2-DLEN-Data1-Data2-Data3-Data4-[Data5-nn]-CS

0x58	0x80	0x06	DLEN	Data 1	Data 2	Data 3	Data 4	Data [5..nn]	Checksum

Data 1

    Bit 7   Source Banner Type
        0 = TV Banner OSD
        1 = Custom Banner OSD

    Bit 3-0 0000 = RF
           0001 = SCART1
           0010 = SCART2
           0011 = AV1
           0100 = AV2
           0101 = S-VIDEO1
           0110 = S-VIDEO2
           0111 = COMPONENT1
           1000 = COMPONENT2
           1001 = PC1
           1010 = PC2
           1011 = HDMI1
           1100 = HDMI2
           1101 = HDMI3
           1110 = HDMI4
           1111 = WiseLink**

** WiseLink is added in above command to inform STB for WiseLink status via TV status command. To switch to WiseLink use IR Code to TV command only.

----------------------Parameters for Custom banner OSD---------------------------

Data 2   Program No High Byte (ASCII Characters (0x30 ~ 0x39))

Data 3   Program No Mid Byte (ASCII Characters (0x30 ~ 0x39))

Data 4   Program No Low Byte (ASCII Characters (0x30 ~ 0x39))

Data 5-Data 22 Program Label (Max 18 Characters) (ASCII Characters (0x20 ~ 0x7E))
Note: Number of characters display in Program Label is model dependent.

* The list of input source may vary as per TV model.

5.10 Select Teletext

This command switches the TV into or out of Teletext mode

Sequence of the command is: CB-CMD1-CMD2-DLEN-Data1-CS

0x58	0x80	0x07	0x01	Data 1	Checksum

Data 1

      Bit 7   1 – Teletext ON
               0 – Teletext OFF

      Bit6~0 Don't Care

5.11 Picture Size

This command selects the picture size on the TV screen.

Sequence of the command is: CB-CMD1-CMD2-DLEN-Data1-CS

0x58	0x80	0x08	0x01	Data 1	Checksum

Data 1

      Bit 2-0 Parameter Type
               000 = Auto wide
               001 = Wide (16:9)
               010 = Just Scan
               011 = 4:3

5.12 Add Program to TV (Analog/Digital)

This command stores a program data in EEPROM of TV.

Sequence of the command is: CB-CMD1-CMD2-DLEN-Data1-Data2-Data3-Data4-[Data5-nn]-CS

0x58	0x80	0x09	DLEN	Data 1	Data 2	Data 3	Data 4	Data [5..nn]	Checksum

Data 1   0x80   Digital
                        0x00   Analog

If Data 1 is 0x00 (Analog) Then Data2 ~ Data12 for Analog Tuning will be as follows.

Data 2

              Program Number

Data 3

              Program Type
        Bit 7-4   Color & Sound System
                      0000 = B/G & PAL
                      0001 = L & SECAM
                      0010 = I & PAL
                      0011 = M & NTSC
                      0100 = N & PAL
                      0101 = BG & SECAM
                      0110 = D/K & PAL
                      0111 = D/K & SECAM

        Bit 3-0   Program Type
                      0000 = Normal Open programs
                      0001 = Protected programs (Pay and System)
                      0010 = Not Used
                      0011 = Radio
                      0100 = Delete

Data 4

              Tune Data high byte

Data 5

              Tune Data Low byte (Frequency Value is 62.5 KHz steps)

Data 6~10

              Program Label in ASCII 0 ~ 5 Characters (0x20 ~ 0x7E)

Data 11~12   Not Used

If Data 1 is 0x80 (Digital) Then Data2 ~ Data12 for Digital Tuning will be as follows.

Data 2   Program Number High
Data 3   Program Number Low

Data 4   Tune Data High byte
Data 5   Tune Data Middle byte
Data 6   Tune Data Low byte (Frequency Value is 62.5 KHz steps)*
* For DVB-S above frequency is Transponder Frequency

Data 7   Service ID High
Data 8   Service ID Low

Data 9   Bit 7-6   DVB System
                                      00=DVB-C
                                      01=DVB-T
                                      10 = Others (Refer Data 13)
                Bit 5-3   DVB modulation
                -------------------- DVB-C --------------------
                                        000=16Qam
                                      001=32Qam
                                      010=64Qam
                                      011=128Qam
                                      100=256Qam
                -------------------- DVB-T --------------------
                                      Not Required - Reserved (Zero)
                -------------------- DVB-S --------------------
                                      000=QPSK
                                      001=8PSK
                                      010=32APSK

                Bit 1-0   Program Type
                                      00=Normal
                                      01=Protected Programs (Pay & System)
                                      10=Radio
                                      11=Delete

Data 10   Bandwidth
                -------------------- DVB-C --------------------
                                      Not Required - Reserved (Zero)
                -------------------- DVB-T --------------------
                Bit 7-2   Not Required - Reserved (Zero)
                Bit 1-0   00=6 MHz
                                      01=7 MHz
                                      10=8 MHz
                -------------------- DVB-S --------------------
                Polarization   0 = Horizontal
                                      1 = Vertical

```
                   Symbol Rate
                   ---------------- DVB-C & DVB S ---------------
Data 11            Symbol Rate High
Data 12            Symbol Rate Low
                   -------------------- DVB-T --------------------
Data 11            Not Required - Reserved (Zero)
Data 12            Not Required - Reserved (Zero)
                   -------------------------------------------------
Data 13            DVB System (Contd…)
                   0 = DVB-S
                   1 = DVB-T2


                   --------------------- DVB-S --------------------
Data 14            Satellite ID
                   --------------------- DVB-T2 ------------------
Data 14            PLP_ID
                   ---------------- DVB-T & DVB-C ---------------
Data 14            Not Required – Don't Care
                   -------------------------------------------------
```

5.13 Tune Channel (Analog)

This command is used to tune analog channels.

Sequence of the command is: CB-CMD1-CMD2-DLEN-Data1-Data2-Data3-Data4-Data [5…21]-CS

0x58	0x80	0x0A	LEN	Data 1	Data 2	Data 3	Data 4	Data [5…nn]	Checksum

Len

        Length of Data Bytes

Data 1   Program Number

Data 2   Tune Data High byte
Data 3   Tune Data Low byte (Frequency Value is 62.5 KHz steps)

Data 4   Parameter Type
        Bit 7-4   Color system & Sound system
                        0000 = B/G & PAL
                        0001 = L & SECAM
                        0010 = I & PAL
                        0011 = M & NTSC
                        0100 = N & PAL
                        0101 = BG & SECAM
                        0110 = D/K & PAL
                        0111 = D/K & SECAM

        Bit 3-0   Program Type
                        000 = Normal Open programs
                        001 = Protected programs (Pay and System)
                        010 = Radio

Data 5-12   Program Label in ASCII 0 to 5 chars (0x20-0x7E)

5.14 Tune Service (Digital)

This command is used to tune digital Service for DVB.

Sequence of the command is: CB-CMD1-CMD2-DLEN-Data1-Data2-Data3-Data4-Data [5…21]-CS

0x58	0x80	0x0B	LEN	Data 1	Data 2	Data 3	Data 4	Data [5…nn]	Checksum

Len

        Length of Data Bytes

Data 1   RCN Number High
Data 2   RCN Number Low
Data 3   Tune Data High byte
Data 4   Tune Data Middle byte
Data 5   Tune Data Low byte (Frequency Value is 62.5 KHz steps)*
* For DVB-S above frequency is Transponder Frequency

Data 6   Service ID High
Data 7   Service ID Low

Data 8   Bit 7-6   DVB System
                         00=DVB-C
                         01=DVB-T
                         10 = Others (Refer Data 12)

               Bit 5-3   DVB modulation
                   -------------------- DVB-C --------------------
                         000=16Qam
                         001=32Qam
                         010=64Qam
                         011=128Qam
                         100=256Qam
                   -------------------- DVB-T --------------------
                         Not Required - Reserved (Zero)
                   -------------------- DVB-S --------------------
                         000=QPSK
                         001=8PSK
                         010=32APSK

               Bit 2   Not Used
               Bit 1-0   Program Type
                         00=Normal
                         01=Protected Programs (Pay & System)
                         10=Radio

Data 9   Bandwidth
                -------------------- DVB-C --------------------
                            Not Required - Reserved (Zero)
                -------------------- DVB-T ---------------------
                Bit 7-2   Not Required - Reserved (Zero)
                Bit 1-0   00=6 MHz
                             01=7 MHz
                             10=8 MHz
                -------------------- DVB-S ---------------------
                Polarization   0 = Horizontal
                               1 = Vertical

                Symbol Rate
                --------------- DVB-C & DVB-S---------------
Data 10   Symbol Rate High
Data 11   Symbol Rate Low
                -------------------- DVB-T ---------------------
Data 10   Not Required - Reserved (Zero)
Data 11   Not Required - Reserved (Zero)

Data 12   DVB System (Contd…)
                0 = DVB-S
                1 = DVB-T2
                -------------------- DVB-S --------------------
Data 13   Satellite ID
                -------------------- DVB-T2 -------------------
Data 13   PLP_ID
                --------------- DVB-T & DVB-C ---------------
Data 13   Not Required – Don't Care

Note: This command will work only when TV is powered ON. This command will tune only to
       particular service identified by above parameters. The tuned information shall not be
       stored in TV's Channel MAP.

5.15 Activate/Deactivate EPG

This command switches ON and OFF TV's EPG.

Sequence of the command is: CB-CMD1-CMD2-DLEN-Data1-CS

0x58	0x80	0x0C	0x01	Data 1	Checksum

Data 1

Bit 7   1 – EPG ON
            0 – EPG OFF

Bit6~0 Don't Care

Note: Full page EPG will display information only for channels which are added in TV's channel map. To navigate through EPG use Up, Down, Left, Right and Enter key codes in IR Code to TV command.

5.16 Set Volume

Command forces the TV volume to specified level. This Force volume level is not stored in TV EEPROM. Normal TV Volume OSD will not be displayed.

Sequence of the command is: CB-CMD1-CMD2-DLEN-Data1-CS

0x58	0x80	0x0D	0x01	Data 1	Checksum

Data 1   0~100 = Volume Level data (in Binary format)

5.17 Set World Time Clock

This command is sent from SBB/STB to TV to set the GMT and local time in world time clock

Sequence of the command is: CB-CMD1-CMD2-DLEN-Data1-Data2-Data3-Data4-Data5-Data6-CS

0x58	0x80	0x0E	0x06	Data 1	Data 2	Data 3	Data 4	Data 5	Data 6	Checksum

Data 1
        Local year – only last 2 values – (00~99)

Data 2
        Local Month of year (1~12)

Data 3
        Local Day of Month (1~31)

Data 4
        Local Hour time of that place (as per standard GMT without summer or winter adjustments) (0~23)

Data 5
        Local Min time of that place (as per standard GMT without summer or winter adjustments) (0~59)

Data 6   This byte contains the time to be adjusted for summer or winter adjustments

        Bit 7   0 indicate decrease time from Local Time for adjustment
                            1 indicate increase time from Local Time for adjustment

        Bit 0-6   Time in minutes to be adjusted for local time

Note: TV Model Dependent

5.18 Set World Time Clock Display Mode

This command is sent from SBB/STB to TV to switch the World Time Clock Display ON/OFF

Sequence of the command is: CB-CMD1-CMD2-DLEN-Data1-CS

0x58	0x80	0x0F	0x01	Data 1	Checksum

Data 1
      0x80   Display world time clock (ON)
      0x00   Exit world time clock (OFF)

Note: TV Model Dependent

5.19 Navigate World Time Clock

This command is sent from SBB/STB to TV to navigate left/right in the World Time Clock Display

Sequence of the command is: CB-CMD1-CMD2-DLEN-Data1-CS

0x58	0x80	0x10	0x01	Data 1	Checksum

Data 1
      0x80   Move time zone 'Right'
      0x00   Move time zone 'Left'

Note: TV Model Dependent

5.20 RJP Status

This command is sent from TV to SBB/STB for informing the RJP status to SBB/STB

Sequence of the command is: CB-CMD1-CMD2-DLEN-Data1-CS

0x58	0x00	0x02	0x01	Data 1	Checksum

Data 1

      Bit 7   1 Indicates the source is changed forcibly (Manual Button Press) from RJP
                  0 Indicates source is changed automatically when live source is
                    connected to RJP

      Bit 6-4   Not Used

      Bit 3-0   Indicates source request. Refer Select Input Source command for values.

5.21 Set RJP Source Priority

This command is sent from SBB/STB to TV for setting the priority switching for RJP source in TV

Sequence of the command is: CB-CMD1-CMD2-DLEN-Data1-CS

0x58	0x80	0x11	0x01	Data 1	Checksum

Data 1

      Bit 7   1 Indicates TV should not switch source on its own.
                   RJP Source change is controlled by SBB/STB
             0 Indicates TV will switch source on its own using default priority
                 Default priority of TV is (AV-1, PC-2 and HDMI1-3)

      Bit 0-1   AV source priority
      Bit 2-3   PC source priority
      Bit 4-5   HDMI1 source priority
      Bit 6   Don't Care

    Note : Priority Values can be only 1,2 and 3 (1 is highest). All sources should have different priority. If any two sources are set with same priority, this command will be ignored. The SBB/STB can know of the changed input source from the TV Status Message (Databyte1 and Databyte2).

5.22 Set PMO LED Clock

This command is sent from SBB/STB to TV to set the PMO LED clock time

Sequence of the command is: CB-CMD1-CMD2-DLEN-Data1-Data2-Data3-Data4-Data5-CS

0x58	0x80	0x12	0x05	Data 1	Data 2	Data 3	Data 4	Data 5	Checksum

Data 1
          Bit 7   Time Format
          1   24 Hour Format
          0   12 Hour Format

          Bit 6~0   Local year – only last 2 values – (00~99)

Data 2
          Local Month of year (1~12)

Data 3
          Local Day of Month (1~31)

Data 4
          Local Hour time of that place (as per standard GMT without
          summer or winter adjustments) (0~23)

Data 5
          Local Min time of that place (as per standard GMT without
          summer or winter adjustments) (0~59)

Note: TV Model Dependent

5.23 Set PMO LED Clock Display Mode

This command is sent from SBB/STB to TV for switching the PMO LED Clock Display ON/OFF

Sequence of the command is: CB-CMD1-CMD2-DLEN-Data1-CS

0x58	0x80	0x13	0x01	Data 1	Checksum

Data 1
          0x80   Display PMO LED clock (ON)
          0x00   PMO LED clock (OFF)

Note: TV Model Dependent

5.24 Set Baud Rate

This command is sent from SBB/STB to TV for switching selecting the baud rate to be used for communication protocol.

Sequence of the command is: CB-CMD1-CMD2-DLEN-Data1-CS

0x58	0x80	0x14	0x01	Data 1	Checksum

Data 1

        0x00   9600 bps (default)
        0x01   19200 bps
        0x02   38400 bps
        0x03   57600 bps

After this command is received the new baud rate will be applicable only after next master power OFF/ON.

Note – baud rate is model dependent and may vary as per H/W configuration in TV.

5.25 Activate/Deactivate Session

This command is sent from SBB/STB to TV for enabling/disabling session mechanism.
If session is activated by SBB/STB then TV will remain in online mode if it receives Request TV Status command (0x80 0x00) repeatedly or valid command within the set time. If TV did not receive Request TV Status command or valid command from SBB/STB within set time, TV will go into offline mode and will switch to power On Channel. Once TV is in offline mode it will come back to online mode on successful reception of Request TV Status command from SBB.

Sequence of the command is: CB-CMD1-CMD2-DLEN-Data1- Data2-CS

0x58	0x80	0x15	0x02	Data 1	Data 2	Checksum

Data 1

        0x00   No session
        0x01   1 Sec
        0x02   2 Sec
        0x03   5 Sec
        0x04   10 Sec (default)

Data 2   Bit 7   1 = indicates TV will send TV Status command (0x00 0x01) periodically after every 500ms.

Note – If Session is not activated by SBB/STB using this command then TV will not maintain any session and will be always in online mode.

Online Mode – Mode in which TV will be in complete control of SBB/STB and will process all valid commands sent by SBB/STB. Samsung TV remote will not work in these conditions.

Offline Mode – Mode in which presence of valid SBB/STB is not detected by TV. Hence TV will not process any commands (other than session) being sent by SBB/STB to TV. Samsung TV remote will work in this mode under some restrictions as set in Interactive Hotel Menu.

5.26 Enable/Disable OSD
This command is sent from SBB/STB to TV for enabling/disabling OSD display.

Sequence of the command is: CB-CMD1-CMD2-DLEN-Data1-CS

0x58	0x80	0x16	0x01	Data 1	Checksum

Data 1
        0x00   Enable OSD Display
        0x80   Disable OSD Display

Note – TV default condition is OSD enabled. If disable OSD command is received by TV then TV will not display any OSD resulting from further commands. It is the responsibility of SBB to close any OSD on screen before sending disable OSD command.

5.27 Select Subtitle Language
This command is sent from SBB/STB to TV for selecting Subtitle language.
In case of invalid language TV will not change the language or it will set default language.

Sequence of the command is: CB-CMD1-CMD2-DLEN-Data1-CS

0x58	0x80	0x17	0x04	Data n	Checksum

Data 1 : 0x80: Subtitle ON
          0x00: Subtitle OFF

Data 2 : First character of language code (Iso639-2)
Data 3 : Second ------------"------------
Data 4 : Third   ------------"------------

Note: Please refer table 1.0 for Subtitle language codes

5.28 Request Subtitle Language Status

This command is sent from SBB/STB to TV for checking availability of language in current DVB stream

Sequence of the command is: CB-CMD1-CMD2-DLEN-Data1-CS

0x58	0x80	0x18	0x03	Data n	Checksum

Data 1 : First character of language code (Iso639-2)
Data 2 : Second ------------"------------
Data 3 : Third   ------------"------------

TV will respond with Subtitle Language status command.

Note: Please refer table 1.0 for Subtitle language codes

5.29 Subtitle Language Status

This command is sent from TV to SBB/STB for informing the presence of requested language in 5.28 to SBB/STB

Sequence of the command is: CB-CMD1-CMD2-DLEN-Data1-CS

0x58	0x00	0x03	0x01	Data 1	Checksum

Data 1   Bit 7   1 Indicates requested Subtitle language is present
                          0 Indicates requested Subtitle language is not present

                Bit 6-0   Not Used

5.30 Select Audio Language

This command is sent from SBB/STB to TV for selecting Audio language.
In case of invalid language TV will not change the language or it will set default language.

Sequence of the command is: CB-CMD1-CMD2-DLEN-Data1-CS

0x58	0x80	0x19	0x03	Data n	Checksum

Data 1 : First character of language code (Iso639-2)
Data 2 : Second ------------"------------
Data 3 : Third   ------------"------------

Note: Please refer table 1.1 for Audio language codes

5.31 Request Audio Language Status

This command is sent from SBB/STB to TV for checking availability of language in current DVB stream

Sequence of the command is: CB-CMD1-CMD2-DLEN-Data1-CS

0x58	0x80	0x1A	0x03	Data n	Checksum

Data 1 : First character of language code (Iso639-2)
Data 2 : Second ------------"------------
Data 3 : Third   ------------"------------

TV will respond with Audio Language status command.

Note: Please refer table 1.1 for Audio language codes

5.32 Audio Language Status

This command is sent from TV to SBB/STB for informing the Audio status to SBB/STB

Sequence of the command is: CB-CMD1-CMD2-DLEN-Data1-CS

0x58	0x00	0x04	0x01	Data 1	Checksum

Data 1   Bit 7   1 Indicates requested Audio language is present
                        0 Indicates requested Audio language is not present

           Bit 6-0   Not Used

5.33 Request TV-Identify

This command is sent from SBB/STB to TV, requesting for TV identification.

Sequence of the command is: CB-CMD1-CMD2-DLEN-CS

0x58	0x80	0x1B	0x00	Checksum

This command is replied from the TV with TV Identify as mentioned in 5.34

5.34 TV-Identify

This command contains the TV identification data for the SBB/STB.

Sequence of the command is: CB-CMD1-CMD2-DLEN-Data1…Data n-CS

0x58	0x00	0x05	DLEN	Data1	Data n	Checksum

Here the data bytes hold the unique TV identification string (max. of 32 characters)

5.35 Request TV Firmware Version

This command is sent from SBB/STB to TV, requesting for TV Firmware version.

Sequence of the command is: CB-CMD1-CMD2-DLEN-CS

0x58	0x80	0x1C	0x00	Checksum

This command is replied from the TV with TV Firmware as mentioned in 5.36

5.36 TV-Firmware

This command contains the TV Firmware version for the SBB/STB.

Sequence of the command is: CB-CMD1-CMD2-DLEN-Data1-Data2-CS

0x58	0x00	0x06	DLEN	Data1	Data2	Checksum

Data1 & Data2 value is unique with respect to the service provider.

5.37 Picture Mode

This command selects the picture mode in the TV.

Sequence of the command is: CB-CMD1-CMD2-DLEN-Data1-CS

0x58	0x80	0x1D	0x01	Data 1	Checksum

Data 1

        Bit 1-0   Parameter Type
                    00 = Dynamic
                    01 = Standard
                    10 = Movie

5.38 Set Analog Level

This command sets audio or picture settings directly. Corresponding OSD's will not be displayed.

Sequence of the command is: CB-CMD1-CMD2-DLEN-Data1-Data2-CS

0x58	0x80	0x1E	0x02	Data 1	Data 2	Checksum

Data 1

      Bit 7   1 – indicate Mute/Unmute sound
      Bit 2-0 000 = Set Volume
                  001 = Set Brightness
                  010 = Set Contrast
                  011 = Set Color
                  100 = Set Tint
                  101 = Set Sharpness
                  110 = Mute Control

Data 2

      Value to store 0 ~ 100 (binary format)

5.39 LED Message

This command will control the front panel LED.

Sequence of the command is: CB-CMD1-CMD2-DLEN-Data1-CS

0x58	0x80	0x1F	0x01	Data 1	Checksum

Data 1

      Bit 2-0 Parameter Type
                  000 = Indicate Normal TV operation
                  001 = Indicate slow flashing (Message)
                  010 = Indicate fast flashing (Urgent)
                  011 = Indicate LED OFF
                  100 = Indicate LED ON

5.40 SBB Status

This command informs the TV of the current SBB status.

Sequence of the command is: CB-CMD1-CMD2-DLEN-Data1-CS

0x58	0x80	0x20	0x01	Data 1	Checksum

Data 1   Bit 7 1 = indicates TV is recognized by interface
                    0 = TV is not recognized by interface

5.41 Tune to Program

This command informs the TV to tune to specified program. Program will be selected only if it is added to TV's channel map.

Sequence of the command is: CB-CMD1-CMD2-DLEN-Data1-CS

0x58	0x80	0x21	0x03	Data 1	Data 2	Data 3	Checksum

Data 1   0x00   Analog
                  0x80   Digital (DVB)
                  ------------ Analog -------------
Data 2   0x00
Data 3   Program Number (0~99)
                  ------------ Digital -------------
Data 2   Program Number High (RCN number)
Data 3   Program Number Low (RCN Number)

5.42 PMO LED Message Display

This command is sent from SBB/STB to TV to set/clear additional information display on PMO LED clock.

Sequence of the command is: CB-CMD1-CMD2-DLEN-Data1-Data2-Data3-Data4-Data5-CS

0x58	0x80	0x22	0x01	Data 1	Checksum

Data 1   Bit 0   1 = Display Message icon on PMO Display
                        0 = Clear Message icon on PMO Display
                Bit 1   1 = Display Alarm icon on PMO Display
                        0 = Clear Alarm icon on PMO Display
                Bit 2   1 = Display Room Service icon on PMO Display
                        0 = Clear Room Service icon on PMO Display

5.43 Delete Channel Map from TV (Analog/Digital)

This command is sent from SBB/STB to TV to Clear TV's entire Analog/Digital channel map

Sequence of the command is: CB-CMD1-CMD2-DLEN-Data1-Data2-Data3-Data4-Data5-CS

0x58	0x80	0x23	0x01	Data 1	Checksum

Data 1   0x80   Clear Entire Digital Channel Map
                0x00   Clear Entire Analog Channel Map

5.44 Update Channel Map

This command is sent from SBB/STB to TV to initialize TV to start channel map update

Sequence of the command is: CB-CMD1-CMD2-DLEN-Data1-Data2-Data3-Data4-Data5-CS

0x58	0x80	0x24	0x01	Data 1	Checksum

Data 1   0x80   Start Channel Map Update
                0x00   Stop channel Map Update

Note - Upon reception of this command TV will power up virtually (No Audio, No video & panel Backlight is OFF). This is done just to facilitate SBB to update Analog/Digital Channel Map in TV. Once TV receives stop channel Map command it will come back to normal Stand by mode.

5.45 Set Power On Source

This command is sent from SBB/STB to TV to set Power On Source

Sequence of the command is: CB-CMD1-CMD2-DLEN-Data1-Data2-Data3-Data4-Data5-CS

0x58	0x80	0x25	0x03	Data 1	Data 2	Data 3	Checksum

Data 1

```
Bit 3-0   0000 = ATV
          0001 = DTV
          0010 = SCART1
          0011 = SCART2
          0100 = AV1
          0101 = AV2
          0110 = S-VIDEO1
          0111 = S-VIDEO2
          1000 = COMPONENT1
          1001 = COMPONENT2
          1010 = PC1
          1011 = PC2
          1100 = HDMI1
          1101 = HDMI2
          1110 = HDMI3
          1111 = HDMI4
```

```
---------------- ATV ----------------------
Data 2          0x00
Data 3          Channel Number (0~99)
---------------- DTV ----------------------
Data 2          Channel Number HI
Data 3          Channel Number LO
```

5.46 Request DVB Status

This command is sent from SBB/STB to TV to Get Status of DVB Service.

Sequence of the command is: CB-CMD1-CMD2-DLEN-CS

0x58	0x80	0x26	0x00	Checksum

This command is replied from the TV with DVB status as mentioned in 5.46.

5.47 DVB Status

This command is sent from TV to SBB/STB to send Status of DVB Service.If DVB Service not tuned currently all Data Bytes will have 0xFF.

Sequence of the command is: CB-CMD1-CMD2-DLEN-Data1-Data2-CS

0x58	0x00	0x07	0x02	Data 1	Data 2	Checksum

Data 1

        Bit 7   1 - Tuner Locked
                   0 – Tuner Unlocked

        Bit 6~4   Service type
                000 – Normal
                001 - Radio
                010 - Scrambled
                011 - Data

        Bit 3-0   Bit Error Rate(0-10)

Data 2

        Bit 6-0   Signal Quality(0~100 Scale)

5.48 Request MAIN MCU Firmware Version

This command is sent from SBB/STB to TV, requesting for TVs Main MCU Firmware Version.

Sequence of the command is: CB-CMD1-CMD2-DLEN-CS

0x58	0x80	0x27	0x00	Checksum

Note: This command will work only when TV is powered ON (MAIN MCU alive)

5.49 MAIN MCU Firmware Version

This command contains the TVs MAIN MCU Firmware version for the SBB/STB.

Sequence of the command is: CB-CMD1-CMD2-DLEN-Data1…Data n-CS

0x58	0x00	0x08	DLEN	Data1	Data n	Checksum

5.50 Request SUB MCU Firmware Version

This command is sent from SBB/STB to TV, requesting for TVs Sub MCU Firmware Version.

Sequence of the command is: CB-CMD1-CMD2-DLEN-CS

0x58	0x80	0x28	0x00	Checksum

5.51 SUB MCU Firmware Version

This command contains the TVs SUB MCU Firmware version for the SBB/STB.

Sequence of the command is: CB-CMD1-CMD2-DLEN-Data1…Data n-CS

0x58	0x00	0x09	DLEN	Data1	Data n	Checksum

- Some Models do not have Sub MCU. In That case TV will reply with Command 0x00 0x00 with Data Byte 1 - Command Unsupported

5.52 Sound Mode

This command selects the sound mode in the TV.

Sequence of the command is: CB-CMD1-CMD2-DLEN-Data1-CS

0x58	0x80	0x29	0x01	Data 1	Checksum

Data 1

      Bit 2-0 Parameter Type
              000 = Standard
              001 = Music
              010 = Movie
              011 = Speech
              100 = Custom

5.53 Request Picture Size Status

This command is sent from SBB/STB to TV, requesting for Picture Size set in TV.

Sequence of the command is: CB-CMD1-CMD2-DLEN-CS

0x58	0x80	0x30	0x00	Checksum

5.54 Picture Size Status

This command contains Picture size set in TV for the SBB/STB.

Sequence of the command is: CB-CMD1-CMD2-DLEN-Data1-CS

0x58	0x00	0x0A	0x01	Data 1	Checksum

Data 1

        Bit 2-0   Picture Size Type
                000 = Auto Wide
                001 = 16:9
                010 = Wide Zoom
                011 = Zoom
                100 = 4:3
                101 = Screen Fit

Note: Picture Size may vary depending upon the TV model.

5.55 Enable/Disable Digital Text

This command enables/disabled digital text in TV.

Sequence of the command is: CB-CMD1-CMD2-DLEN-Data1-CS

0x58	0x80	0x31	0x01	Data 1	Checksum

Data 1

        Bit 7   1 – Digital Text ON
               0 – Digital Text OFF

        Bit6~0 Don't Care

Note: After making digital Text Enable it takes approx 3~5 Sec for downloading the Digital content from the stream.

5.56 Select Antenna Input

This command is sent from SBB/STB to TV, to select antenna input (Air/Cable).

Sequence of the command is: CB-CMD1-CMD2-DLEN-Data1-CS

0x58	0x80	0x32	0x01	Data 1	Checksum

Data 1

        Bit 7   0 – Air
                    1 – Cable

        Bit6~0 Don't Care

Note: TV will refer to the Channel Map depending on antenna input selected.

5.57 Enable/Disable USB Device

This command is sent from SBB/STB to TV, to Enable/Disable USD device connected to TV

Sequence of the command is: CB-CMD1-CMD2-DLEN-Data1-CS

0x58	0x80	0x33	0x01	Data 1	Checksum

Data 1

        Bit 0   0 – Disable USB
                    1 – Enable USB

        Bit7~1 Don't Care

Note: TV Default condition at power ON is USB is enabled.

5.58 Display Custom Channel Banner

This command is sent from SBB/STB to TV, to Display Custom Channel Banner

Sequence of the command is: CB-CMD1-CMD2-DLEN-Data1-CS

0x58	0x80	0x34	DLEN	Data 1	Data [2…nn]	Checksum

Data 1   Program No High Byte (ASCII Characters (0x30 ~ 0x39))

Data 2   Program No Mid Byte (ASCII Characters (0x30 ~ 0x39))

Data 3   Program No Low Byte (ASCII Characters (0x30 ~ 0x39))

Data 4-Data 21 Program Label (Max 18 Characters) (ASCII Characters (0x20 ~ 0x7E))
Note: Number of characters display in Program Label is model dependent.

5.59 PIP Control

This command sets the PIP mode to display the PIP window.

Sequence of the command is: CB-CMD1-CMD2-DLEN-Data1-CS

0x58	0x80	0x35	0x01	Data 1	Checksum

Data 1

        Bit 5-3   PIP Position
               000 = Upper Left
               001 = Upper Right
               010 = Lower Left
               011 = Lower Right

        Bit 0   PIP Mode
               1 – PIP ON
               0 – PIP OFF

Appendix 1

Channel MAP update sequence: Please follow the following steps to update channel MAP in TV

> **Step 1**: Bring TV to standby State
>
> **Step 2**: Send Update Channel MAP Command (0x24) with Data as 0x80.
>
> - ➢ TV will power on to a virtual standby state where there will be no audio/video and backlight is switched OFF.
> - ➢ TV is in a state where it can accept Add program to TV, Delete Channel MAP and Update Channel MAP command only for both Analog channels and Digital services.
>
> **Step 3**: Send Delete channel MAP command (0x23) for deleting entire channel MAP in TV before adding any Analog/Digital MAP in TV.
>
> **Step 4**: Send Add Program to TV command for storing Analog channels and Digital Services in TV.
>
> **Step 5**: After addition of channel MAP is complete send Update Channel MAP Command with Data as 0x00. This will bring TV back to standby state.

Operations with MHEG: Digital Text is a feature which enables/disables TV to download digital text present in the stream. To make MHEG ON:-

1) Digital Text needs to be ON - mandatory.
2) Send IR Code to TV command for Key Teletext to switch ON the MHEG.
3) Send IR Code to TV command for Key Exit to switch OFF the MHEG.

Note: In TV status command the MHEG ON/OFF bit informs about MHEG engine state. If MHEG engine is ON (by any means) that bit will be set.

Mixed Channel MAP: This is a feature in which Analog, DVB-T and DVB-C channels are stored in a single channel List in TV. Hence TV has capability of storing and tuning to different standards without changing the antennae input.

Following commands behave as below in case of TV supporting Mixed channel MAP.
1) Tune To Program – No need to specify analog or Digital tuning parameter. TV will ignore this byte as there can be only 1 channel for 1 Program Number.
2) Select Antennae Input – Since TV will automatically select the modulation type from channel MAP hence no need to use this command in case of Mixed Channel MAP.

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WiseLink: This is a feature in TV which guest can play video, play Music or watch photographs by connecting USB device to TV.

Functioning: As soon as USB is plugged into the TV a message will pop up "Connecting to portable device" (message string and look and feel varies w.r.t. TV model). Upon this status bit for Focus window on screen bit will be enabled in "TV status" command informing STB that some focus window is activated on TV screen. User can thus navigate to WiseLink source via navigation keys in IR code to TV command and play music, videos or photographs. Once WiseLink source is activated TV status data byte 2 will inform STB that TV is in WiseLink source (refer select Input source command for values). On exiting WiseLink source focus window enabled flag will be cleared and corresponding source value is updated in TV status.

Once USB is detected TV can switch to and from WiseLink source via IR code to TV command.

Table 1.0 - Subtitle Languages and Codes

S.No	Language	IS0 639-2
1	English	"eng"
2	German	"ger"
3	Spanish	"spa"
4	Italian	"ita"
5	Swedish	"swe"
6	French	"fre"
7	Bulgarian	"bul"
8	Croatian	"hrv"
9	Czech	"cze"
10	Dutch	"dut"
11	Greek	"gre"
12	Hungarian	"hun"
13	Polish	"pol"
14	Portuguese	"por"
15	Romanian	"rum"
16	Russian	"rus"
17	Turkish	"tur"
18	Danish	"dan"
19	Finnish	"fin"
20	Norwegian	"nor"
21	Serbian	"srp"
22	Welsh	"cym"
23	Gaelic	"gdh"
24	Irish	"iri"
25	Slovak	"slk"
26	Arabic	"ara"
27	Persian	"per"
28	Catalan	"cat"

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Table 1.1: Audio Languages and Codes

S.No	Language	IS0 639-2
1	English	"eng"
2	German	"ger"
3	Spanish	"spa"
4	Italian	"ita"
5	Swedish	"swe"
6	French	"fre"
7	Bulgarian	"bul"
8	Croatian	"hrv"
9	Czech	"cze"
10	Dutch	"dut"
11	Greek	"gre"
12	Hungarian	"hun"
13	Polish	"pol"
14	Portuguese	"por"
15	Romanian	"rum"
16	Russian	"rus"
17	Turkish	"tur"
18	Danish	"dan"
19	Finnish	"fin"
20	Norwegian	"nor"
21	Serbian	"srp"
22	Welsh	"cym"
23	Gaelic	"gdh"
24	Irish	"iri"
25	Slovak	"slk"
26	Arabic	"ara"
27	Persian	"per"
28	Catalan	"cat"