

# **DIRECTV Set-Top Box Information for the Installer**

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<b>REVISION HISTORY</b>			
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1.0	September 1, 2005	D. K.	Initial version
1.1	October 19, 2005	J. G.	Updated formatting
1.1.a	November 17, 2005	J. G.	Fixed 155200 typo and USB 2.0 default data rate in Table 3-1. Deleted duplicate table of Amplifier codes (Table 17)
1.2	November 18, 2005	J. G.	Intermediate version. Never released.
1.3	January 3, 2007	W. M.	Updated D11 default baud rate and added R15 in Table 2 and Table 3. Fixed baud rate in Section 3.9.
2.0	March 2, 2007	W. M.	Added command GetTuner and the multituner commands. Added support for HR20.



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# 1 Introduction

## 1.1 Disclaimer

DIRECTV makes no representations or warranties, express or implied, that use of the technologies described in this specification will not infringe patents, copyrights, or other intellectual property rights of third parties. Nothing in this specification should be construed as granting permission to use any of the technologies described. Anyone planning to make use of technology covered by the intellectual property rights of others should first obtain permission from the holder(s) of the rights. This specification is subject to change without notice. DIRECTV does not accept any responsibility whatsoever for any damages or liability, direct or consequential, which may result from use of this specification or any related discussions. These specifications are provided “as is” and the user of these specifications assumes any and all risks associated with the use of these specifications. DIRECTV expressly disclaims any and all representations or warranties, express or implied, regarding the specifications, including without limitation any warranty as to merchantability, fitness for a particular purpose, non-interruption of use, or non-infringement.

## 1.2 Scope

This document provides information on the DIRECTV Set-top box data port, front panel, and remote control commands as an aid for installers, and auxiliary devices. This document is relevant to set-top box (STB) models D10, D11, R15, H10 and HR20. Other models are not supported by this document.

## 1.3 Notice

Previous “Set-top Information for Installer” documents had a companion document listing various peculiarities of some STBs. This “Peculiarities” document must no longer be used.

## 1.4 Feedback

Email feedback to [custominstallsupport@directv.com](mailto:custominstallsupport@directv.com)



## 2 Set-Top Box Front Panel Shortcut Keys

The following shortcut key combinations are implemented by pressing the front panel keys simultaneously. The shortcut keys may not work if user interface graphics are on the screen instead of video. Table 2-2 shows which shortcut keys are supported by each model.

**Table 2-1: Shortcut Keys Combinations**

Key Combination	Action
ACTIVE and UP	Access the <b>System Setup: System Info &amp; Test</b> screen.
ACTIVE and RIGHT	Access the <b>System Setup: System Diagnostic</b> (hidden) screens. The System Diagnostic screen contains menu items to change the LNB configuration to stacked/unstacked; input phone settings for prefixes and call waiting, and a modem test.
ACTIVE and DOWN	Skip Guided Setup and display <b>Startup: Full Screen (Live TV)</b> on the default channel.

**Table 2-2: Supported Shortcut Keys**

STB Model	ACTIVE and UP	ACTIVE and RIGHT	ACTIVE and DOWN
D10		Yes	
D11		Yes	
H10	Yes	Yes	Yes
R15	Yes	Yes	Yes
HR20	Yes	Yes	



### 3 Data Port Connectors

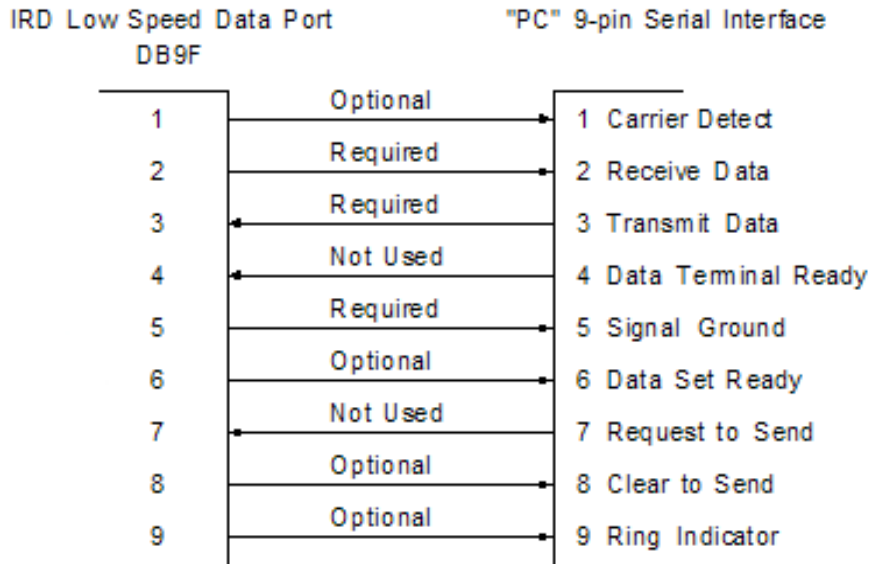
Table 3-1 shows what type of connector and data rate the STB data port has.

**Table 3-1: Type of Data Port Connector**

STB Model	Type of Data Port Connector	Data Rate (baud)
D10	RJ22	9600
D11	USB	9600
H10	RJ22	9600
R15	USB	9600
HR20	USB	9600

#### 3.1 Low-Speed Data Port Connector

The connector type on D10 and H10 is a standard DB-9F or RJ22 (4 way/4 position jack). The pins for the DB-9F are as shown in Figure 3-1. The STB will use three (3) lines (L2-Rx, L3-Tx and L5-Grnd) for bi-directional full-duplex communications.



**Figure 3-1. Low-Speed Data Port Pin Assignment Diagram**

Line positions, designated as “optional”, may be provided (but are not required to be provided)





by the STB as a convenience to source a “TRUE” state to those PC serial interface lines that may require a “TRUE” state for data transfer. Figure 3-2 shows the orientation of the RJ22 (4 way/4 position jack).

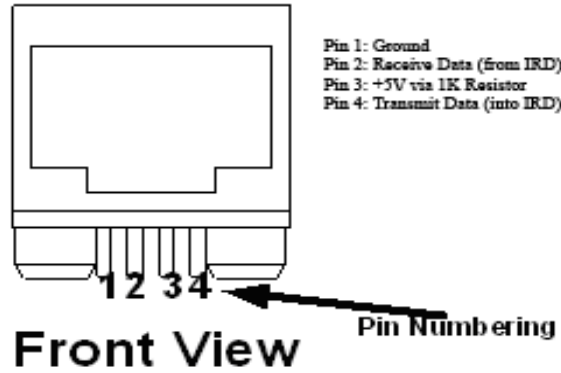


Figure 3-2. Orientation of the RJ22 (4 way/4 position) Jack

### 3.2 Low-Speed Electrical Performance and Characteristics

The low speed timing characteristics are defined in Table 3-2.

Table 3-2: Timing Characteristics

Parameter	Requirement
Bit Timing	104 $\mu$ s $\pm$ 7 $\mu$ s
Total Character Interval	1.04 ms $\pm$ 8 $\mu$ s

### 3.3 Bit Timing (Start, –D0 TO –D7, and Stop)

The STB complies with the bit timing requirements as shown in Figure 3-3.

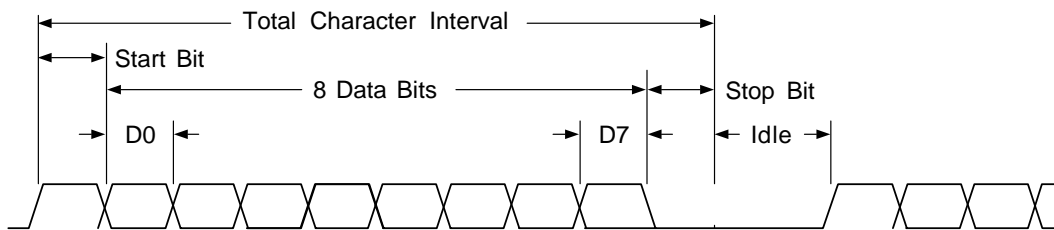


Figure 3-3. Bit Timing Diagram



### 3.4 Idle Interval, General

The general idle interval is a minimum of zero (0) msec. The maximum idle interval will be determined by the rate of transmitted data and internal STB processes when the port is “opened,” or is determined by the service command parser when the port is “closed.”

### 3.5 Idle Interval for Non-Empty STB Buffer

The idle interval will not exceed 30 ms as long as at least one byte exists in the STB receive buffer, given that the port is “opened.”

### 3.6 Low-Speed Input Characteristics

#### 3.6.1 Input Signaling Characteristics (Pin 3)

The low-speed data port will comply with the input signaling characteristics shown in Table 3-3.

**Table 3-3: Input Drive Characteristics**

Parameter	Specification
Space voltage	+3.0 volts min, +25 volts max
Mark voltage	-25 volts min, -3.0 volts max
Terminating impedance resistance	$6K < R < 7K$ resistive to ground
Capacitance	$C < 150$ pf

### 3.7 Low-Speed Output Characteristics

#### 3.7.1 Output Drive Characteristics (Pin 2)

The STB output drive characteristics are as shown in Table 3-4.

**Table 3-4: Output Drive Characteristics**

Parameter	Specification
Space voltage	+5.3 volts max at $I_{oh} = 0$ mA, +3.0 volts min



Mark voltage	-6.0 volts min at Iol = 0 mA, -3.0 volts max,
Terminating impedance resistance	3k < R < 7k resistive to ground
Capacitance	C < 2500 pF

### 3.7.2 Passive Outputs (Pins 1, 6, 8, and 9) (Optional)

If the data port optional pins one (1), six (6), eight (8) and nine (9) are provided, the passive outputs will be as shown in Table 3-5.

**Table 3-5: Passive Drive Characteristics**

Parameter	Specification
Output	-2 mA $\pm$ 20% at + 3 volts and -10 mA $\pm$ 20% at -5 volts

### 3.7.3 Low-Speed Signaling Conventions

The data port signaling conventions will be as listed in Table 3-6.

**Table 3-6: Low-Speed Data Port Signaling Conventions**

Interchange Voltage	Negative or Positive
Binary state	1 or 0
Signaling state	mark or space
Function	OFF or ON

The idle state for data port pins two (2) and three (3) will be “mark”.

## 3.8 USB 2.0 Data Ports

All new DIRECTV STBs have USB 2.0 data ports replacing the DB-9F or RJ22 data port connectors. The STB USB port has a host configuration. Serial commands are interfaced through the data port using a USB-Serial adapter. The following RS-232-compatible serial port adapters



will be supported:

**Table 3-7: USB-Serial Adapter**

<b>Manufacturer</b>	<b>Model</b>	<b>USB Vendor ID</b>	<b>USB Product ID</b>
IOGEAR	GUC232A	0x067B	0x2303
ATEN	UC-232A	0x067B	0x2303
BAFO	BF-810	0x067B	0x2303

The USB port on most STBs support hot-plug. That means USB ports will work any time when a USB-serial adapter is plugged in. Only the HR20's USB port works differently. The USB-serial adapter must be plugged before the STB is booted. If the USB connector is plugged in when the HR20 is running, it must be reset.

### **3.9 Low-Speed Data Port Interface**

All STBs have a default baud data rate of 9600. The data format is 1 start bit, 8 data bits, no parity, 1 stop bit, and no handshaking.



## 4 Data Port Commands

### 4.1 Data Port Commands and Supported STB

Table 4-1: Commands and Supported STB

Command Code	Command Label	Supported STB				
		D10	D11	R15	H10	HR20
0x81	Standby	Yes	Yes	Yes	Yes	Yes
0x82	Active	Yes	Yes	Yes	Yes	Yes
0x83	GetPrimaryStatus	Yes	Yes	Yes	Yes	Yes
0x84	GetCommandVersion	Yes	Yes	Yes	No	Yes
0x87	GetCurrentChannel	Yes	Yes	Yes	Yes	Yes
0x90	GetSignalQuality	Yes	Yes	Yes	Yes	Yes
0x91	GetCurrentTime	Yes	Yes	Yes	Yes	Yes
0x92	GetUserCommand	Yes	Yes	Yes	Yes	Yes
0x93	EnableUserEntry	Yes	Yes	Yes	Yes	Yes
0x94	DisableUserEntry	Yes	Yes	Yes	Yes	Yes
0x95	GetReturnValue	Yes	Yes	Yes	Yes	Yes
0x96	Reboot	Yes	Yes	Yes	Yes	Yes
0xA5	SendUserCommand	Yes	Yes	Yes	Yes	Yes
0xA6	OpenUserChannel	Yes	Yes	Yes	Yes	Yes
0x9A	GetTuner	No	No	Yes	No	Yes
0x8A	GetPrimaryStatusMT	No	No	Yes	No	Yes
0x8B	GetCurrentChannelMT	No	No	Yes	No	Yes
0x9D	GetSignalQualityMT	No	No	Yes	No	Yes
0x9F	OpenUserChannelMT	No	No	Yes	No	No



## 4.2 Software Version of Supported STB

DIRECTV STBs with the software version listed in Table 4-2 and newer software versions support data port commands described in this document.

**Table 4-2: Software Version of Supported STB**

DIRECTV STB	Software Version
D10-100	0x1040
D10-200	0x1040
D10-300	0x1043
D11-100	0x1040
D11-300	0x1040
D11-500	0x1040
R15-100	0x1029
R15-300	0x104B
R15-500	0x10FA
H10 <sup>(1)</sup>	0.4.33
HR20-700	0x134
<sup>(1)</sup> All Commands on H10 need a carriage return to be recognized. Therefore, each command string input must be followed by 0x0D (the carriage return hex code).	



### 4.3 Basic Data Port Commands

**Table 4-3: Basic Commands Summary**

Command Code	Command Label	Description
0x81	Standby <sup>(1)</sup>	Put STB in Standby
0x82	Active	Turn STB on
0x83	GetPrimaryStatus	Status information on current channel
0x84	GetCommandVersion	The STB returns the version of the Data Port Specification that it implements.
0x87	GetCurrentChannel	Get the major and minor numbers for the tuned channel
0x90	GetSignalQuality	Signal level for the tuned channel
0x91	GetCurrentTime	Current time in UTC
0x92	GetUserCommand	Get the remote or front panel command input by the user
0x93	EnableUserEntry	Allows direct control of the STB by the remote or front panel buttons
0x94	DisableUserEntry	Disables direct control of the STB by the remote or front panel buttons
0x95	GetReturnValue	Returns the last Return Value issued by a data port command
0x96	Reboot	Commands a reboot
0xA5	SendUserCommand	Send remote control commands through the data port
0xA6	OpenUserChannel	Tune to a channel by inputting a channel number
<sup>(1)</sup> This command holds its value after a warm start. Other commands are terminated.		

### 4.4 Multi-Tuner Data Port Commands

A new set of commands are introduced for multi-tuner STBs, such as R15 and HR20. For multi-tuner STBs, the tuner needs to be identified for many of the commands as an input parameter. To maintain backward compatibility, new commands with the suffix “MT”, have been created



that have a TunerID parameter added. In the case where an original non TunerID command is issued to a multi-tuner STB, it will be executed as the equivalent “MT” command with TunerID set to 0x01. The [TunerID] shall start at 0x01 and increase in value by one for each additional tuner (i.e. 0x01, 0x02, 0x03...). The [TunerID] can be obtained by issue the command GetTuner. R15 and HR20 STB support the multi-tuner commands.

**Table 4-4: Multi-Tuner Commands Summary**

Command Code	Command Label	Description
0x9A	GetTuner	Get the number of tuners and their designations.
0x8A	GetPrimaryStatusMT	Get the status information of current channel.
0x8B	GetCurrentChannelMT	Get the major and minor numbers of the tuned channel.
0x9D	GetSignalQualityMT	Get the signal level for the tuned channel.
0x9F	OpenUserChannelMT	Tune to a channel by inputting a channel number.

## 4.5 Default Data Rate and Format

All STBs have a default data rate of 9600. The data format is 1 start bit, 8 data bits, no parity, 1 stop bit, and no handshaking.

## 4.6 Command Protocol

The STB will use the command and data acknowledgment protocol for flow control as specified in Figure 4-1.

Any controller that is implemented to control DIRECTV STB, should follow the protocol depicted in Figure 4-1.



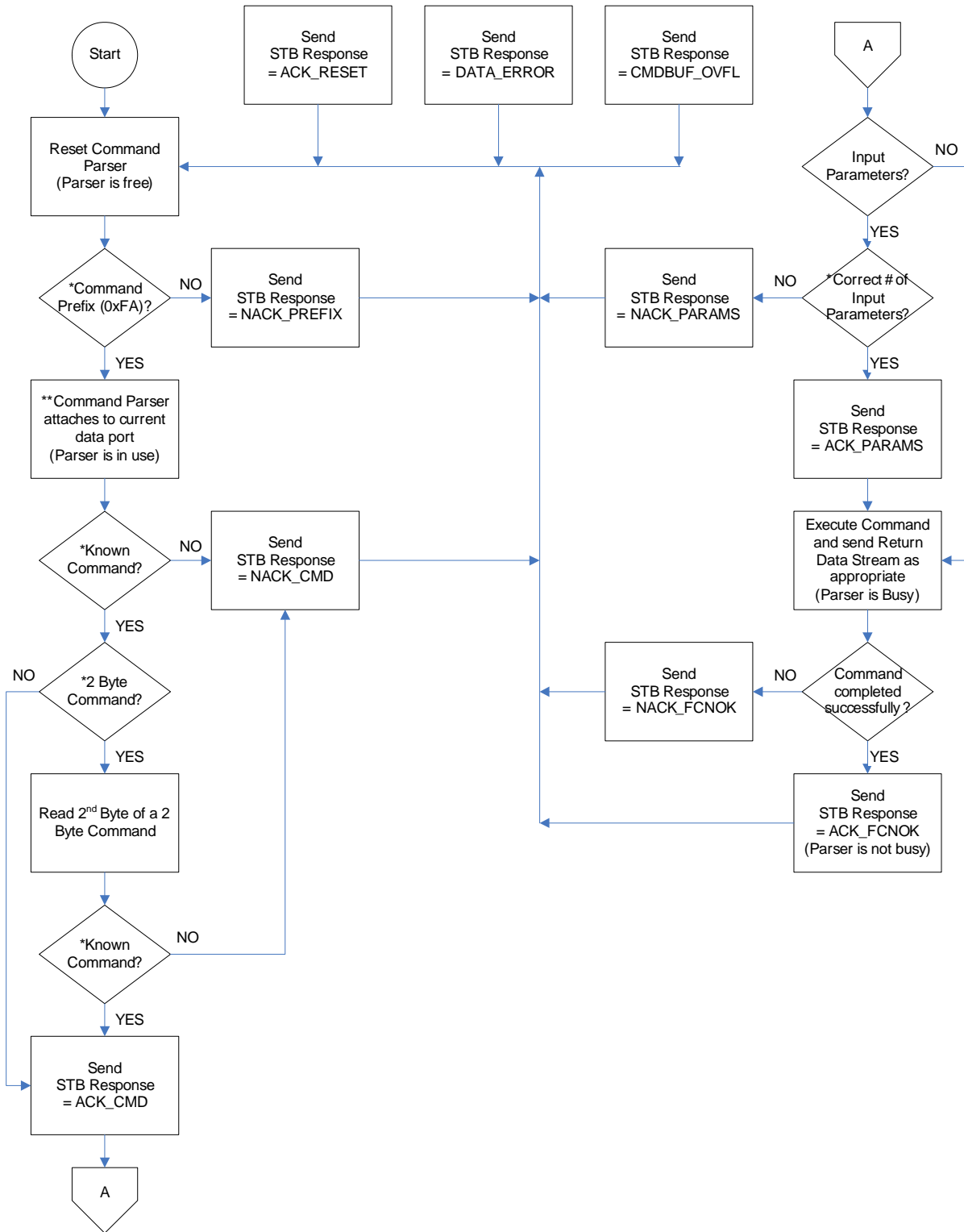


Figure 4-1. Service Command Parser Flowchart



## 4.7 STB Command Prefix

0xFA Required Command Prefix, precedes all commands

## 4.8 STB Responses

**Table 4-5: STB Responses List**

Response Code	Response Label	Description
0xF0	ACK_CMD	Command Acknowledge
0xF1	NACK_CMD	Command Unknown
0xF2	ACK_PARAMS	Parser received the correct number of parameters
0xF3	NACK_PARAMS	Parser timed out when receiving parameters
0xF4	ACK_FCNOK	Service command completed successfully
0xF5	NACK_FCNOK	Service command completed unsuccessfully
0xF6	ACK_RESET	Command parser reset - break condition detected
0xF7	NACK_BUSY	A previous service command is pending completion
0xF9	NACK_INUSE	Command parser in use by another device
0xFB	NACK_PREFIX	Expected Prefix, prefix not sent
0xFD	DATA_ERROR	Command parser reset – Communication data error
0xFF	CMDBUF_OVFL	Command parser reset – Command buffer



## 5 Data Port Command Details

All parameters specified by square brackets “[ ]” are one (1) byte in length.

### 5.1 Standby (0x81)

<b>Command Label</b>	Standby
<b>Command Byte</b>	0x81
<b>Input Parameter(s)</b>	None
<b>Return Data Stream</b>	None
<b>Return Response</b>	ACK_FCNOK : Always Success
<b>Return Value</b>	0x0000 : Always Success
<b>Description</b>	The STB will execute a Standby command by placing the STB in the "low power" mode where the audio and video processing is disabled.  This command has the same effect as turning the box "off" by pressing the front panel power button.

Example: Turn off the STB.

Controller -> STB: FA	(Command Prefix)
Controller -> STB: 81	(Command ID)
STB -> Controller: F0	(Command acknowledged)
STB -> Controller: F4	(Command completed successfully)

### 5.2 Active (0x82)

<b>Command Label</b>	Active
<b>Command Byte</b>	0x82
<b>Input Parameter(s)</b>	None
<b>Return Data Stream</b>	None
<b>Return Response</b>	ACK_FCNOK : Always Success
<b>Return Value</b>	0x0000 : Always Success
<b>Description</b>	The STB executes this command by placing the STB in the operational mode.  This command has the same effect as turning the box "on" by pressing the front panel power button.



### 5.3 GetPrimaryStatus (0x83)

<b>Command Label</b>	GetPrimaryStatus
<b>Command Byte</b>	0x83
<b>Input Parameter(s)</b>	None
<b>Return Data Stream</b>	<p>[MajorchnHI] [MajorChnLO] [MinorChnHI] [MinorChnLO]  [Primary Type] [Audio Type] [Data Type]  [Primary SCIDHI] [Primary SCIDLO]  [Audio SCIDHI] [Audio SCIDLO]  [Data SCIDHI] [Data SCIDLO]  [Network HI] [Network LO]  [Xponder]  [Year] [Month] [Day] [Hour] [Min] [Sec] [Day Of Week]  [ROMVer3] [ROMVer2] [ROMVer1] [ROMVer0]  [STS ID0] [STS ID1] [STS ID2] [STS ID3] [STS Ver]  [CAM ID0] [CAM ID1] [CAM ID2]  [CAM ID3] [CAM ID4] [CAM ID5]  [Signal Quality]  [Rx ID0] [Rx ID1] [RxID2] [RxID3] [RxID4] [RxID5]  *****</p> <p>MajorChnHI and MajorChnLO (Major Channel Number):  0x0000 – 0xFFFF</p> <p>MinorChnHI and MinorChnLO (Minor Channel Number):  0x0000 – 0xFFFF</p> <p>Primary Type:  0x0B Data  0x0C Audio  0x0E Retired  0x0F Video - TV  0x10 Video - HDTV  0xFF None</p> <p>Audio Type:  0x00 MPEG In / PCM Out  0x09 AC3 In / AC3 Out  0xFF None</p> <p>Data Type:  0x0B Retired                      0x0C Retired  0x0D Retired                      0xFF None</p> <p>SCIDs:</p>



	<p>0x0000 – 0xFFFF          0xFFFF if not required</p> <p>Network:          0x0000 – 0xFFFF</p> <p>Xponder:          0x00 – 0xFF (0 to 255, corresponding to transponders 1 to 256)</p> <p>Year: 0x00 – 0xFF (# of years after 1993)</p> <p>Month: 0x01 – 0x0C</p> <p>Date: 0x01 – 0x1F</p> <p>Hour: 0x00 – 0x17</p> <p>Minute: 0x00 – 0x3B</p> <p>Second: 0x00 – 0x3B</p> <p>Day Of Week: 0x01 to 0x07 (0x01=Monday....0x07=Sunday)</p> <p>Signal Quality:          0x00 – 0x64 ( 0x00=FEC unlocked and 0x64=max signal strength)</p> <p>CAM and RID are in Hex format.</p>
<b>Return Response</b>	<p>ACK_FCNOK : Success</p> <p>NACK_FCNOK : Failure - STB not tuned to a DIRECTV System channel</p>
<b>Return Value</b>	<p>0x0000 : Success</p> <p>Non-Zero : Failure - STB not tuned to a DIRECTV System channel</p>
<b>Description</b>	<p>The STB will execute a GetPrimaryStatus command by providing the STB's health and status as defined by the Return Data Stream parameters.</p> <p>The STB will provide current time in Universal Time Coordinate (UTC) unconditioned by time zone and daylight savings settings.</p> <p>The fields ROMVer3, ROMVer2, ROMVer1, ROMVer0, STS ID0, STS ID1, STS ID2, STS ID3, STS Ver are private.</p> <p>The CAM ID is returned in hexadecimal with zeroes stuffed into the most significant positions to fill out the unused bits. For example, a CAM ID = 0013 1751 9641 in hex is 0x4E87C119. This command would return 00 00 4E 87 C1 19 for the CAM ID.</p> <p>The RID ID is returned in hexadecimal with zeroes stuffed into the most significant positions to fill out the unused bits. For example, a RID = 0001 7035 6778 in hex is 0xA27702A. This command would return 00 00 0A 27 70 2A for the RID.</p>

## 5.4 GetCommandVersion (0x84)

<b>Command Label</b>	GetCommandVersion
<b>Command Byte</b>	0x84
<b>Input Parameter(s)</b>	None



<b>Return Data Stream</b>	[Version Major] [Version Minor] [Reserved1] [Reserved2] ***** Version Major: 0x00 – 0xFF; Version Minor: 0x00 – 0xFF Reserved1: 0x00 Reserved2: 0x00
<b>Return Response</b>	ACK_FCNOK : Always Success
<b>Return Value</b>	0x0000 : Always Success
<b>Description</b>	This command displays the version of the Data Port specification the STB software was coded to. For example: Ver 1.4 will return a [Version Major]: 0x01 and [Version Minor]: 0x04.  Note: STBs supported by this document will return a version number of 1.4 or higher.

## 5.5 GetCurrentChannel (0x87)

<b>Command Label</b>	GetCurrentChannel
<b>Command Byte</b>	0x87
<b>Input Parameter(s)</b>	None
<b>Return Data Stream</b>	[MajorChnHI] [MajorChnLO] [MinorChnHI] [MinorChnLO] ***** MajorChnHI : 0x00 – 0xFF MajorChnLO : 0x00 – 0xFF MinorChnHI : 0x00 – 0xFF MinorChnLO : 0x00 – 0xFF
<b>Return Response</b>	ACK_FCNOK : Success NACK_FCNOK : Failure – STB not tuned to a DIRECTV System channel
<b>Return Value</b>	0x0000 : Success Non-Zero : Failure – STB not tuned to a DIRECTV System channel
<b>Description</b>	The STB executes this command by providing the major and minor channel number (i.e., for the DIRECTV system channel the STB is tuned to) in the Return Data Stream.

Example: Find out what channel a single tuner STB is tuned to (STB is tuned to channel 276 which in hexadecimal notation is 0x114).

Controller -> STB: FA (Command Prefix)

Controller -> STB: 87 (Command ID)



STB -> Controller: F0 (Command acknowledged)  
 STB -> Controller: 01 14 FF FF (Major and minor<sup>[1]</sup> channel number)  
 STB -> Controller: F4 (Command completed successfully)

<sup>[1]</sup>Note: For most of DIRECTV channels, the minor channel number is 0xFFFF.

### 5.6 GetSignalQuality (0x90)

<b>Command Label</b>	GetSignalQuality
<b>Command Byte</b>	0x90
<b>Input Parameter(s)</b>	None
<b>Return Data Stream</b>	[Signal Quality] ***** Signal Quality: 0x00 – 0x64 ( 0x00=FEC unlocked and 0x64=max signal strength)
<b>Return Response</b>	ACK_FCNOK : Success NACK_FCNOK : Failure – STB not tuned to a DIRECTV System channel
<b>Return Value</b>	0x0000 : Success Non-Zero : Failure – STB not tuned to a DIRECTV System channel
<b>Description</b>	The STB executes this command by providing the signal quality in the Return Data Stream.

### 5.7 GetCurrentTime (0x91)

<b>Command Label</b>	GetCurrentTime
<b>Command Byte</b>	0x91
<b>Input Parameter(s)</b>	None
<b>Return Data Stream</b>	[Year] [Month] [Date] [Hour] [Minute] [Second] [Day Of Week] ***** Year: 0x00 – 0xFF (# of years after 1993) Month: 0x01 – 0x0C Date: 0x01 – 0x1F Hour: 0x00 – 0x17 Minute: 0x00 – 0x3B Second: 0x00 – 0x3B



	Day Of Week: 0x01 to 0x07 (0x01=Monday....0x07=Sunday).
<b>Return Response</b>	ACK_FCNOK : Always Success
<b>Return Value</b>	0x0000 : Always Success
<b>Description</b>	The STB executes this command by providing the current time in Universal Time Coordinate (UTC) conditioned by time zone and daylight savings settings.

## 5.8 GetUserCommand (0x92)

<b>Command Label</b>	GetUserCommand																																								
<b>Command Byte</b>	0x92																																								
<b>Input Parameter(s)</b>	None																																								
<b>Return Data Stream</b>	<p>[Type] [Device] [Key]</p> <p>*****</p> <p>Type:</p> <p>    0x00 Key Toggle</p> <p>    0x01 Key Down</p> <p>    0x03 Key Up</p> <p>Device:</p> <p>    0x00 Front Panel</p> <p>    0x01 Remote</p> <p>Key:</p> <table border="0"> <tr> <td>0xA0 Enter (key #38)</td> <td>0xB0 Pause (key #43)</td> </tr> <tr> <td>0xA1 Info (key #26)</td> <td>0xB1 Rewind (key #44)</td> </tr> <tr> <td>0xA2 Active (key #27)</td> <td>0xB2 Play (key #45)</td> </tr> <tr> <td>0xA3 List (key #29)</td> <td>0xB3 Stop (key #46)</td> </tr> <tr> <td>0xA4 Back (key #31)</td> <td>0xB4 FFWD (key #47)</td> </tr> <tr> <td>0xA5 (-) (key #37)</td> <td>0xB5 Record (key #48)</td> </tr> <tr> <td></td> <td>0xB6 Replay (key #49)</td> </tr> <tr> <td>0xC3 Select (key #36)</td> <td>0xB7 Advance (key #50)</td> </tr> <tr> <td>0xC5 Power ON (key #1)</td> <td></td> </tr> <tr> <td>0x9A Right Arrow (key #35)</td> <td>0xE0 Digit 0 (key #9)</td> </tr> <tr> <td>0x9B Left Arrow (key #34)</td> <td>0xE1 Digit 1 (key #10)</td> </tr> <tr> <td>0x9C Up Arrow (key #32)</td> <td>0xE2 Digit 2 (key #11)</td> </tr> <tr> <td>0x9D Down Arrow (key #33)</td> <td>0xE3 Digit 3 (key #12)</td> </tr> <tr> <td></td> <td>0xE4 Digit 4 (key #13)</td> </tr> <tr> <td></td> <td>0xE5 Digit 5 (key #14)</td> </tr> <tr> <td></td> <td>0xE6 Digit 6 (key #15)</td> </tr> <tr> <td></td> <td>0xE7 Digit 7 (key #16)</td> </tr> <tr> <td>0xD0 Power OFF (key #2)</td> <td>0xE8 Digit 8 (key #17)</td> </tr> <tr> <td>0xD1 CH + (key #19)</td> <td>0xE9 Digit 9 (key #18)</td> </tr> <tr> <td>0xD2 CH - (key #20)</td> <td>0xEA Red (key #39)</td> </tr> </table>	0xA0 Enter (key #38)	0xB0 Pause (key #43)	0xA1 Info (key #26)	0xB1 Rewind (key #44)	0xA2 Active (key #27)	0xB2 Play (key #45)	0xA3 List (key #29)	0xB3 Stop (key #46)	0xA4 Back (key #31)	0xB4 FFWD (key #47)	0xA5 (-) (key #37)	0xB5 Record (key #48)		0xB6 Replay (key #49)	0xC3 Select (key #36)	0xB7 Advance (key #50)	0xC5 Power ON (key #1)		0x9A Right Arrow (key #35)	0xE0 Digit 0 (key #9)	0x9B Left Arrow (key #34)	0xE1 Digit 1 (key #10)	0x9C Up Arrow (key #32)	0xE2 Digit 2 (key #11)	0x9D Down Arrow (key #33)	0xE3 Digit 3 (key #12)		0xE4 Digit 4 (key #13)		0xE5 Digit 5 (key #14)		0xE6 Digit 6 (key #15)		0xE7 Digit 7 (key #16)	0xD0 Power OFF (key #2)	0xE8 Digit 8 (key #17)	0xD1 CH + (key #19)	0xE9 Digit 9 (key #18)	0xD2 CH - (key #20)	0xEA Red (key #39)
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	0xD3    Guide (key #25)	0xEB    Yellow (key #40)
	0xD4    Exit (key #30)	0xEC    Green (key #41)
	0xD5    Power (key #7)	0xED    Blue (key #42)
	0xD6    Previous Channel (key #21)	0xF7    Menu (key #28)
		0xF8    Format (key #51)
	Note: All keys not otherwise identified above will be considered RESERVED.	
<b>Return Response</b>	ACK_FCNOK    : Success	
	NACK_FCNOK   : Failure – No User Command available since last request	
<b>Return Value</b>	0x0000        : Success	
	Non-Zero       : Failure – No User Command available since last request	
<b>Description</b>	<p>The STB will execute a GetUserCommand command by providing the remote control or front panel key presses via the Return Data Stream.</p> <p>The DisableUserEntry command will be called prior to calling the GetUserCommand command.</p> <p>If a user command has transpired since the last GetUserCommand request, the user command Type, Device, and Contents are placed in the return data stream. If a user command has not been made since the last request, the NACK_FCNOK is returned instead.</p> <p>The GetUserCommand is used to identify the type, device and key. For example, if the user pressed and released the Select (0xC3) key then one GetUserCommand is required. The GetUserCommand provides a Type of 0x00 (Key Toggle), Device of 0x01 (Remote) and Key of 0xC3 (Select key). On the other hand, if the user pressed the Select (0xC3) key, held it so that the remote repeats the command, and then released it on the remote control, two (2) GetUserCommands are required. The first GetUserCommand provides a Type of 0x01 (Key Down), Device of 0x01 (Remote) and Key of 0xC3 (Select key). The second GetUserCommand provides a Type of 0x03 (Key Up), Device of 0x01 (Remote) and Key of 0xC3 (Select).</p>	

## 5.9 EnableUserEntry (0x93)

<b>Command Label</b>	EnableUserEntry
<b>Command Byte</b>	0x93
<b>Input Parameter(s)</b>	None
<b>Return Data Stream</b>	None
<b>Return Response</b>	ACK_FCNOK    : Always Success
<b>Return Value</b>	0x0000        : Always Success
<b>Description</b>	The STB executes an EnableUserEntry command by allowing remote control and front panel key presses to reach the user interface handler.



## 5.10 DisableUserEntry (0x94)

<b>Command Label</b>	DisableUserEntry
<b>Command Byte</b>	0x94
<b>Input Parameter(s)</b>	None
<b>Return Data Stream</b>	None
<b>Return Response</b>	ACK_FCNOK : Always Success
<b>Return Value</b>	0x0000 : Always Success
<b>Description</b>	The STB executes a DisableUserEntry command by blocking remote control and front panel key presses from reaching the user interface handler. Instead user commands (front panel entries and IR remote control entries) may be obtained using the GetUserCommand service command.

## 5.11 GetReturnValue (0x95)

<b>Command Label</b>	GetReturnValue
<b>Command Byte</b>	0x95
<b>Input Parameter(s)</b>	None
<b>Return Data Stream</b>	[RVal3] [RVal2] [RVal1] [RVal0] Note: Return data are in Hex format.
<b>Return Response</b>	ACK_FCNOK : Always Success
<b>Return Value</b>	None : Preserves the previous return value
<b>Description</b>	The STB will execute a GetReturnValue command by returning the Return Value from the last issued Command that generated a return value.

## 5.12 Reboot (0x96)

<b>Command Label</b>	Reboot
<b>Command Byte</b>	0x96
<b>Input Parameter(s)</b>	None
<b>Return Data Stream</b>	None
<b>Return Response</b>	None <sup>(1)</sup>
<b>Return Value</b>	None
<b>Description</b>	The STB will execute a Reboot command by performing a hard reset of the STB. This command has the same effect as pressing the red reset button on the STB. <sup>(1)</sup> Since a hard-reset is performed, no return value or return response can be provided.



### 5.13 SendUserCommand (0xA5)

<b>Command Label</b>	SendUserCommand																																										
<b>Command Byte</b>	0xA5																																										
<b>Input Parameter(s)</b>	<p>[Type] [Device] [Key]</p> <p>*****</p> <p>Type:</p> <p>    0x00 Key Toggle</p> <p>    0x01 Key Up</p> <p>    0x02 Key Down</p> <p>Device:</p> <p>    0x00 Front Panel</p> <p>    0x01 Remote</p> <p>Key:</p> <table border="0"> <tr> <td>0XA0 Enter (key #38)</td> <td>0xB0 Pause (key #43)</td> </tr> <tr> <td>0XA1 Info (key #26)</td> <td>0xB1 Rewind (key #44)</td> </tr> <tr> <td>0XA2 Active (key #27)</td> <td>0xB2 Play (key #45)</td> </tr> <tr> <td>0XA3 List (key #29)</td> <td>0xB3 Stop (key #46)</td> </tr> <tr> <td>0XA4 Back (key #31)</td> <td>0xB4 FFWD (key #47)</td> </tr> <tr> <td>0XA5 (-) (key #37)</td> <td>0xB5 Record (key #48)</td> </tr> <tr> <td>0xB6 Replay (key #49)</td> <td></td> </tr> <tr> <td>0xC3 Select (key #36)</td> <td>0xB7 Advance (key #50)</td> </tr> <tr> <td>0xC5 Power ON (key #1)</td> <td></td> </tr> <tr> <td></td> <td>0xE0 Digit 0 (key #9)</td> </tr> <tr> <td>0x9A Right Arrow (key #35)</td> <td>0xE1 Digit 1 (key #10)</td> </tr> <tr> <td>0x9B Left Arrow (key #34)</td> <td>0xE2 Digit 2 (key #11)</td> </tr> <tr> <td>0x9C Up Arrow (key #32)</td> <td>0xE3 Digit 3 (key #12)</td> </tr> <tr> <td>0x9D Down Arrow (key #33)</td> <td>0xE4 Digit 4 (key #13)</td> </tr> <tr> <td></td> <td>0xE5 Digit 5 (key #14)</td> </tr> <tr> <td></td> <td>0xE6 Digit 6 (key #15)</td> </tr> <tr> <td></td> <td>0xE7 Digit 7 (key #16)</td> </tr> <tr> <td>0xD0 Power OFF (key #2)</td> <td>0xE8 Digit 8 (key #17)</td> </tr> <tr> <td>0xD1 CH + (key #19)</td> <td>0xE9 Digit 9 (key #18)</td> </tr> <tr> <td>0xD2 CH - (key #20)</td> <td>0xEA Red (key #39)</td> </tr> <tr> <td>0xD3 Guide (key #25)</td> <td>0xEB Yellow (key #40)</td> </tr> </table>	0XA0 Enter (key #38)	0xB0 Pause (key #43)	0XA1 Info (key #26)	0xB1 Rewind (key #44)	0XA2 Active (key #27)	0xB2 Play (key #45)	0XA3 List (key #29)	0xB3 Stop (key #46)	0XA4 Back (key #31)	0xB4 FFWD (key #47)	0XA5 (-) (key #37)	0xB5 Record (key #48)	0xB6 Replay (key #49)		0xC3 Select (key #36)	0xB7 Advance (key #50)	0xC5 Power ON (key #1)			0xE0 Digit 0 (key #9)	0x9A Right Arrow (key #35)	0xE1 Digit 1 (key #10)	0x9B Left Arrow (key #34)	0xE2 Digit 2 (key #11)	0x9C Up Arrow (key #32)	0xE3 Digit 3 (key #12)	0x9D Down Arrow (key #33)	0xE4 Digit 4 (key #13)		0xE5 Digit 5 (key #14)		0xE6 Digit 6 (key #15)		0xE7 Digit 7 (key #16)	0xD0 Power OFF (key #2)	0xE8 Digit 8 (key #17)	0xD1 CH + (key #19)	0xE9 Digit 9 (key #18)	0xD2 CH - (key #20)	0xEA Red (key #39)	0xD3 Guide (key #25)	0xEB Yellow (key #40)
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	0xD4 Exit (key #30) 0xD5 Power (key #7) 0xD6 Previous Channel (key #21)  0xEC Green (key #41) 0xED Blue (key #42) 0xF7 Menu (key #28) 0xF8 Format (key #51)
	Note: All keys not otherwise identified above will be considered RESERVED.
<b>Return Data Stream</b>	None
<b>Return Response</b>	ACK_FCNOK : Success NACK_FCNOK : Failure – Undefined command
<b>Return Value</b>	0x0000 : Success 0x0001 : Failure – Command not supported for specified device Others : Failure – Bad command
<b>Description</b>	<p>The STB will execute a SendUserCommand command by sending the defined user command to the user interface task.</p> <p>This operation can take place whether command DisableUserEntry (0x13) is active or not. The STB will respond to the user command as though a user button on the keypad or remote control were pressed. Most commands require both a down and an up key press.</p> <p>The type Key Toggle will take 60 ms.</p> <p>Note: There is a chance for command conflict if DisableUserEntry is not active, particularly from stray IR remote control signals.</p>

Example: Bring up menu on the screen.

Controller -> STB: FA (Command Prefix)  
Controller -> STB: A5 (Command ID)  
STB -> Controller: F0 (Command acknowledged)  
Controller -> STB: 00 01 F7 (00 – key toggle, 01 – remote, F7 - menu)  
STB -> Controller: F2 (Received the correct number of parameters)  
STB -> Controller: F4 (Command completed successfully)

## 5.14 OpenUserChannel (0xA6)

<b>Command Label</b>	OpenUserChannel
<b>Command Byte</b>	0xA6
<b>Input Parameter(s)</b>	[MajorChnHI] [MajorChnLO] [MinorChnHI] [MinorChnLO] ***** MajorChnHI : 0x00 – 0xFF



	<p>MajorChnLO : 0x00 – 0xFF</p> <p>MinorChnHI : 0x00 – 0xFF</p> <p>MinorChnLO : 0x00 – 0xFF</p>
<b>Return Data Stream</b>	None
<b>Return Response</b>	<p>ACK_FCNOK : Success</p> <p>NACK_FCNOK : Failure – Not a DIRECTV System channel</p>
<b>Return Value</b>	<p>0x0000 : Success</p> <p>0xFFFF : Channel not found in Program Guide</p> <p>0xFFFE : Channel is not a DIRECTV System channel</p> <p>0x0002 : No Video Control Word</p> <p>0x0004 : No Audio Control Word</p> <p>0x0008 : No HS Data Control Word</p> <p>0x0010 : No Low-Speed Data Control Word</p> <p>0x0020 : No System Clock Reference</p> <p>0x0040 : No Presentation Time Stamp</p> <p>0x0080 : Tuning Error</p> <p>0x0100 : Video Error</p> <p>0x0200 : Access Error</p> <p>0x0400 : Buffer Overflow</p> <p>0x0800 : Acquisition Not Complete</p> <p>0x1000 : Audio Error</p> <p>0x2000 : Video Timeout</p> <p>0x4000 : Inactive Transponder</p> <p>0x1001 : Failure – Channel not found in program guide</p> <p>0x1002 : Failure – Channel not a DIRECTV system channel</p> <p>0x1003 : Failure – Channel not authorized</p> <p>0x1004 : Failure – Channel blocked by viewer</p> <p>0x1005 : Failure – Channel rating limit exceeded</p> <p>0x1006 : Failure – Channel spending limit exceeded</p> <p>Others : Failure – Bad command</p>
<b>Description</b>	The STB will execute an OpenUserChannel command by tuning to and decoding streams for the specified guide major/minor channel number.

Example: Change to channel 276 (hex 0x114) on a single tuner STB.

Controller -> STB: FA (Command Prefix)

Controller -> STB: A6 (Command ID)

STB -> Controller: F0 (Command acknowledged)

Controller -> STB: 01 14 FF FF (Parameters<sup>[1]</sup>)

STB -> Controller: F2 (Received the correct number of parameters)



STB -> Controller: F4 (Command completed successfully)

[1]Note: For most DIRECTV channels, the channel minor number is 0xFFFF.

### 5.15 GetTuner (0x9A)

<b>Command Label</b>	GetTuner
<b>Command Byte</b>	0x9A
<b>Input Parameter(s)</b>	None
<b>Return Data Stream</b>	<pre> [Number of DIRECTV Tuners] [DIRECTV Tuner ID 1] [DIRECTV Tuner Type 1] [DIRECTV Tuner ID 2] [DIRECTV Tuner Type 2] ... [DIRECTV Tuner ID 16] [DIRECTV Tuner Type 16] [Number of ATSC Tuners] [ATSC Tuner ID 1] [ATSC Tuner Type 1] [ATSC Tuner ID 2] [ATSC Tuner Type 2] ... [ATSC Tuner ID 16] [ATSC Tuner Type 16] ***** Number of DIRECTV Tuners : 0x00 – 0x10 DIRECTV Tuner Designations (Tuner ID) : 0x01 – 0xFF Number of ATSC Tuners : 0x00 – 0x10 ATSC Tuner Designations (Tuner ID) : 0x01 – 0xFF DIRECTV /ATSC Tuner Type :     0x0A      Legacy DIRECTV Ku band     0x0B      Legacy DIRECTV Ku band + DVB     0x0C      Legacy DIRECTV Ku band + DVB + new Ka band     0x0D      ATSC </pre>



	0x0E – 0x1F Reserved
<b>Return Response</b>	ACK_FCNOK : Success NACK_FCNOK : Failure
<b>Return Value</b>	0x0000 : Success 0x0001 : Failure – Command not supported for specified device. Others : Failure – Bad command
<b>Description</b>	The command gives the number of DIRECTV and ATSC tuners. It also lists the tuner type and designations. The STB returns a unique Tuner ID for each tuner regardless if it is a DIRECTV or ATSC tuner. This Tuner ID may be used as input to the multi-tuner commands.

### 5.16 GetPrimaryStatusMT (0x8A)

<b>Command Label</b>	GetPrimaryStatusMT
<b>Command Byte</b>	0x8A
<b>Input Parameter(s)</b>	[TunerID] ***** TunerID : 0x01 – 0xFF
<b>Return Data Stream</b>	[MajorChnHI] [MajorChnLO] [MinorChnHI] [MinorChnLO] [Primary Type] [Audio Type] [Data Type] [Primary SCIDHI] [Primary SCIDLO] [Audio SCIDHI] [Audio SCIDLO] [Data SCIDHI] [Data SCIDLO] [NetworkHI] [NetworkLO] [Xponder] [Year] [Month] [Day] [Hour] [Min] [Sec] [Day Of Week] [ROMVer3] [ROMVer2] [ROMVer1] [ROMVer0] [STS ID0] [STS ID1] [STS ID2] [STS ID3] [STS Ver] [CAM ID0] [CAM ID1] [CAM ID2] [CAM ID3] [CAM ID4] [CAM ID5] [Signal Quality] [Rx ID0] [Rx ID1] [RxID2] [RxID3] [RxID4] [RxID5] ***** MajorChnHI and MajorChnLO (Major Channel Number): 0x0000 – 0xFFFF MinorChnHI and MinorChnLO (Minor Channel Number):



	<p>0x0000 – 0xFFFF</p> <p>Primary Type:</p> <p>0x0B Data</p> <p>0x0C Audio</p> <p>0x0E Retired</p> <p>0x0F Video - TV</p> <p>0x10 Video - HDTV</p> <p>0xFF None</p> <p>Audio Type:</p> <p>0x00 MPEG In / PCM Out</p> <p>0x09 AC3 In / AC3 Out</p> <p>0xFF None</p> <p>Data Type:</p> <p>0x0B Retired                      0x0C Retired</p> <p>0x0D Retired                      0xFF None</p> <p>SCIDs:</p> <p>0x0000 – 0xFFFE</p> <p>0xFFFF if not required</p> <p>Network:</p> <p>0x0000 – 0xFFFF</p> <p>Xponder:</p> <p>0x00 – 0xFF (0 to 255, corresponding to transponders 1 to 256)</p> <p>Year: 0x00 – 0xFF (# of years after 1993)</p> <p>Month: 0x01 – 0x0C</p> <p>Date: 0x01 – 0x1F</p> <p>Hour: 0x00 – 0x17</p> <p>Minute: 0x00 – 0x3B</p> <p>Second: 0x00 – 0x3B</p> <p>Day Of Week: 0x01 to 0x07 (0x01=Monday...0x07=Sunday)</p> <p>Signal Quality:</p> <p>0x00 – 0x64 (0x00=FEC unlocked and 0x64=max signal strength)</p> <p>CAM ID and Rx ID are in Hex format</p>
<b>Return Response</b>	<p>ACK_FCNOK : Success</p> <p>NACK_FCNOK : Failure - STB not tuned to a DIRECTV System channel</p>
<b>Return Value</b>	<p>0x0000 : Success</p> <p>Non-Zero : Failure - STB not tuned to a DIRECTV System channel</p>
<b>Description</b>	<p>The STB will execute a GetPrimaryStatusMT command by providing the STB's health and status as defined by the Return Data Stream parameters.</p> <p>The STB will provide current time in Universal Time Coordinate (UTC) unconditioned by time zone and daylight savings settings.</p>





	<p>The fields ROMVer3, ROMVer2, ROMVer1, ROMVer0, STS ID0, STS ID1, STS ID2, STS ID3, STS Ver are private.</p> <p>The CAM ID is returned in hexadecimal with zeroes stuffed into the most significant positions to fill out the unused bits. For example, a CAM ID = 0013 1751 9641 in hex is 0x4E87C119. This command would return 00 00 4E 87 C1 19 for the CAM ID.</p> <p>The RID ID is returned in hexadecimal with zeroes stuffed into the most significant positions to fill out the unused bits. For example, a RID = 0001 7035 6778 in hex is 0xA27702A. This command would return 00 00 0A 27 70 2A for the RID.</p>
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### 5.17 GetCurrentChannelMT (0x8B)

<b>Command Label</b>	GetCurrentChannelMT
<b>Command Byte</b>	0x8B
<b>Input Parameter(s)</b>	<p>[TunerID]</p> <p>*****</p> <p>TunerID : 0x01 – 0xFF</p>
<b>Return Data Stream</b>	<p>[MajorChnHI] [MajorChnLO] [MinorChnHI] [MinorChnLO]</p> <p>*****</p> <p>MajorChnHI : 0x00 – 0xFF</p> <p>MajorChnLO : 0x00 – 0xFF</p> <p>MinorChnHI : 0x00 – 0xFF</p> <p>MinorChnLO : 0x00 – 0xFF</p>
<b>Return Response</b>	<p>ACK_FCNOK : Success</p> <p>NACK_FCNOK : Failure – STB not tuned to a DIRECTV System channel</p>
<b>Return Value</b>	<p>0x0000 : Success</p> <p>Non-Zero : Failure – STB not tuned to a DIRECTV System channel</p>
<b>Description</b>	<p>The STB will execute a GetCurrentChannelMT command by providing the major/minor channel number (i.e., for the DIRECTV system channel the STB is tuned to) in the Return Data Stream.</p>

### 5.18 GetSignalQualityMT (0x9D)

<b>Command Label</b>	GetSignalQualityMT
<b>Command Byte</b>	0x9D



<b>Input Parameter(s)</b>	[TunerID] ***** TunerID : 0x01 – 0xFF
<b>Return Data Stream</b>	[Signal Quality] ***** Signal Quality: 0x00 – 0x64 ( 0x00=FEC unlocked and 0x64=max signal strength)
<b>Return Response</b>	ACK_FCNOK : Success NACK_FCNOK : Failure – STB not tuned to a DIRECTV System channel
<b>Return Value</b>	0x0000 : Success Non-Zero : Failure – STB not tuned to a DIRECTV System channel
<b>Description</b>	The STB will execute a GetSignalQualityMT command by providing the signal quality in the Return Data Stream.

### 5.19 OpenUserChannelMT (0x9F)

<b>Command Label</b>	OpenUserChannelMT
<b>Command Byte</b>	0x9F
<b>Input Parameter(s)</b>	[MajorChnHI] [MajorChnLO] [MinorChnHI] [MinorChnLO] [TunerID] ***** MajorChnHI : 0x00 – 0xFF MajorChnLO : 0x00 – 0xFF MinorChnHI : 0x00 – 0xFF MinorChnLO : 0x00 – 0xFF TunerID: 0x01 – 0xFF
<b>Return Data Stream</b>	None
<b>Return Response</b>	ACK_FCNOK : Success NACK_FCNOK : Failure – Not a DIRECTV System channel
<b>Return Value</b>	0x0000 : Success 0xFFFF : Channel not found in Program Guide 0xFFFE : Channel is not a DIRECTV System channel 0x0002 : No Video Control Word 0x0004 : No Audio Control Word 0x0008 : No HS Data Control Word 0x0010 : No Low-Speed Data Control Word



	0x0020 : No System Clock Reference 0x0040 : No Presentation Time Stamp 0x0080 : Tuning Error 0x0100 : Video Error 0x0200 : Access Error 0x0400 : Buffer Overflow 0x0800 : Acquisition Not Complete 0x1000 : Audio Error 0x2000 : Video Timeout 0x4000 : Inactive Transponder  0x1001 : Failure – Channel not found in program guide 0x1002 : Failure – Channel not a DIRECTV system channel 0x1003 : Failure – Channel not authorized 0x1004 : Failure – Channel blocked by viewer 0x1005 : Failure – Channel rating limit exceeded 0x1006 : Failure – Channel spending limit exceeded  Others : Failure – Bad command
<b>Description</b>	The STB will execute an OpenUserChannelMT command by tuning to and decoding streams for the specified guide major/minor channel number using the specified tuner.



## 6 Remote Control

### 6.1 Introduction

There are a variety of DIRECTV remote controls available to the consumer. Specific features of DIRECTV remote controls can be found by accessing the on-line manuals at [www.directv.com](http://www.directv.com) as noted below

The following sections list the DIRECTV remote control key codes for IR emitters used to control the STB. This chapter also provides links pointed to documents that listed the brand setup code used for setting up the remote to control the TV and auxiliary devices. It is the same code list found within the STB user interface.

### 6.2 Brand Setup Code List

The brand setup code used for setting up the remote to control the TV and auxiliary devices can be found on [www.directv.com](http://www.directv.com). On directv.com, go to “Customer Service” and click on “System Manuals”. Then click on “Remote Control”. Find the setup code in the appropriate document.



**Figure 6-1 RC32 remote control.**



### 6.3 Remote Control Key Codes

All DIRECTV Set-top box IR and RF commands are modulated on a 38 kHz carrier.

Key Label	Hex Code Assignment
STB Power ON	80h
STB Power OFF	81h
TV Power ON	5Bh <sup>(1)</sup>
TV Power OFF	5Bh <sup>(1)</sup>
POWER	10h
TV Input	5Bh <sup>(1)</sup>
Digit 0	11h
Digit 1	01h
Digit 2	02h
Digit 3	03h
Digit 4	04h
Digit 5	05h
Digit 6	06h
Digit 7	07h
Digit 8	08h
Digit 9	09h
CH +	0Dh
CH -	0Eh
Prev. Channel	0Fh
Volume UP	5Bh <sup>(1)</sup>
Volume Down	5Bh <sup>(1)</sup>
Mute	5Bh <sup>(1)</sup>
Guide	28h
Info	2Eh
Menu	20h



Active	29h
List	2Ah
Exit	26h
Back	27h
Up	21h
Down	22h
Left	23h
Right	24h
Select	25h
(-)	12h
Enter	13h
Red	41h
Yellow	42h
Green	43h
Blue	44h
Pause	32h
Rewind	33h
Play	30h
Stop	31h
FFWD	34h
Record	35h
Replay	36h
Advance	37h
Format	73h
<sup>(1)</sup> Default value when the remote control has not been programmed.	



## 7 Appendix: Acronyms

Term	Definition
APG	Advanced Program Guide. DIRECTV's new generation of the electronic program guide.
Blackout	An access restricted based on the subscriber IRD location.
CA	Conditional Access
Callback	Data call, transmitted over telecommunications lines from the subscriber IRD to the CAMC. This is a repoting mechanism for impulse pay-per-view purchases.
CAM	Conditial Access Module. Usually referred to as the access card or smart card. A removable, electronic subassembly providing conditional access control of the subscriber terminal. The CA system equipment (smart card) needed in the Integrated Receiver Decoder to control a subscriber's service channel authorization and decryption.
DBS	Direct broadcast satellite. A satellite operating in accordance with International Telecommunications Union and Federal Communications Commission regulations for high power broadcasting from space to individual consumers.
DES	Data Encryption Standard
DIRECTV®	Trademarked name of the DIRECTV Group.
DVI	Digital Visual Interface
DVR	Digital Video Recorder: records a digital signal to a hard disk or similar storage
FEC	Forward Error Correction
HDCP	High-bandwidth Digital Content Protection
IPPV	Impulse Pay-Per-View. A method for ordering service on "impulse" where payments are required for each program or special event independently.
IR	Infrared
IRD	Integrated Receiver Decoder. The indoor portion of the subscriber terminal which performs functions of transmission channel tuning, service channel selection, demodulation, demultiplexing, decryption (under control of the CAM), analog signal output and subscriber interface.
LHCP	Left Hand Circular Polarization
LNB	Low Noise Block down converter. Portion of ODU that receives the satellite signal (12.2-12.7 GHz) and converts the signal into L-band (950-2025 MHz).
NTSC	National Television Systems Committee. Standardization body that developed the Analog Terrestrial formats.





ODU	Outdoor Unit. The system that provides signal reception and down conversion.
OPPV	Order-Ahead pay-per-view. Movie purchases placed by calling a customer service representative rather than using the on-screen displays. Necessary to purchase movies when the subscriber does not connect the phone to the IRD.
OSD	On-Screen Display
PCM	Pulse Code Modulation
PPV	Pay-Per-View
RF	Radio Frequency
RHCP	Right Hand Circular Polarization
RID	Receiver Identification
S/P DIF	Sony Phillips Digital Interface. Interface to transmit digital data to the digital processor. Commonly used as an optical Dolby Digital connector.
Smart card	Credit card sized microcomputer capable of securely storing personal data including financial data such as credit balances. Also known as the CAM.
STB	Set-top box
UEI	Universal Electronics Inc.
UTC	Universal Time Coordinate