RS-232 Control Protocol

The OPPO BDT-101CI is equipped with an RS-232 port for wired remote control. The RS-232 port is configured as a DCE device using a female 9-pin D-Sub type connector.

RS-232 Pin Configuration:

The pin out of the BDT-101CI RS-232C port is as the following:

Pin	2	3	5
Signal	TXD	RXD	GND

This pin configuration allows a PC running a serial terminal program (such as Hyper Terminal) to communicate with the player using a straight-through DB9 9-pin RS-232 serial cable. Do NOT use a "Null-Modem" type cable for PC connection. For connection to a remote control system, please refer to the documentation that comes with the remote control system.

Communication Settings:

Baud Rate	Data Bits	Parity	Stop Bit	Flow Control
9600	8	None	1	None

Command Structure:

Each command starts with a # sign (ASCII 0x23), followed by a 3-character command code. If there are any parameters for the command, the parameters are given in text format, separated by a space (ASCII 0x20) from the command code. The # character (ASCII 0x23) must never appear in the parameters. A carriage return (ASCII 0x0d) indicates the end of the command. A line feed (ASCII 0x0a) can optionally follow the carriage return and will be ignored. Each command generally may not exceed 25 bytes including the start of command and end of command bytes.

The illustration of the command structure is as the followings:

<Command> = <Start of Command><Command Code>[<sp><Parameters>]<End of Command>
<Start of Command> = #, ASCII 0x23
<Command Code> = <byte><byte><byte>
<sp> = space, ASCII 0x20
<Parameters> = command-specific
<End of Command> = CR, ASCII 0x0d[LF, ASCII 0x0a]

Response Structure:

Upon receiving a command, the player shall try to execute the command and send back a response. The response starts with an "@" sign (ASCII 0x23), followed by the original command code and a space (ASCII 0x20), and a result code, either "OK" or "ER". If there are any parameters or additional message, the parameters or message is given in text format, separated by a space (ASCII 0x20) from the result code. The @ character (ASCII 0x40) must never appear in the parameters or message. A carriage return (ASCII 0x0d) indicates the end of response. Each response generally may not exceed 25 bytes including the start of response and the end of response bytes.

The illustration of the response structure is as the followings:

\<Response\> = \<Start of Response\>\<Command Code\>\<sp\>\<Result Code\>
[\<sp\>\<Parameters\>]\<End of Response\>
\<Start of Response\> = @, ASCII 0x40
\<Command Code\> = \<byte\>\<byte\>\<byte\>
\<Result Code\> = OK|ER
\<sp\> = space, ASCII 0x20
\<Parameters\> = command-specific
\<End of Response\> = CR, ASCII 0x0d

Status Update Messages Structure:

If the verbose mode is set to 2 or 3, the player will send status update messages automatically. These messages are not a response to any particular command. Any status change caused by commands from RS232 control, front panel buttons, IR remote control, or playback progress may trigger status update messages.

The status update messages have the following structure:

\<Update\> = \<Start of Update\>\<Status Code\>[\<sp\>\<Parameters\>]\<End of Update\>
\<Start of Update\> = @, ASCII 0x40
\<Status Code\> = \<byte\>\<byte\>\<byte\>
\<sp\> = space, ASCII 0x20
\<Parameters\> = status-specific
\<End of Response\> = CR, ASCII 0x0d

Command Sequence:

Commands are executed in the order they are received. The control client should wait for a response from the player before sending the next command.

If the player receives a new command before executing the previous command, the player may execute the commands in sequence or discard the previous command, depending on the internal processing of the player. The control client should avoid sending multiple commands in sequence without waiting for a response.

If the host does not receive a response from the player 10 seconds after the command is issued, the host may consider the command or response lost during transmission, and can retransmit the command.

Command List:

A. Command that maps to a remote control button

This group of commands maps directly to the infrared remote control keys. No parameters are needed for these commands. The player handles the commands as if it receives the same IR remote commands. For actions that require a multiple-key sequence, such as go to a certain chapter (GOT command followed by multiple numeric key commands and the SEL command), the player responds to each command individually until the last command is received. At that time the player shall respond with either OK or ER depending on the result of the action.

Command Code	Remote Key	Function	Response Example
POW	POWER	Toggle power STANDBY and ON	OK ON OK OFF
EJT	OPEN	Open/close the disc tray	OK OPEN

			OK CLOSE
PON	ON	Discrete on	OK ON
POF	OFF	Discrete off	OK OFF
DIM	DIMMER	Dim front panel display	OK ON OK DIM OK OFF
PUR	PURE AUDIO	Pure audio mode (no video)	OK ON OK OFF
VUP	VOL +	Increase volume	OK n (n is the volume number, 0 – 100)
VDN	VOL -	Decrease volume	OK n (n is the volume number, 0 – 100)
MUT	MUTE	Mute audio	OK MUTE OK UNMUTE
NU1	1	Numeric key 1	OK
NU2	2	Numeric key 2	OK
NU3	3	Numeric key 3	OK
NU4	4	Numeric key 4	OK
NU5	5	Numeric key 5	OK
NU6	6	Numeric key 6	OK
NU7	7	Numeric key 7	OK
NU8	8	Numeric key 8	OK
NU9	9	Numeric key 9	OK
NU0	0	Numeric key 0	OK
CLR	CLEAR	Clear numeric input	OK
GOT	GOTO	Play from a specified location	OK
HOM	HOME	Go to Home Menu to select media source	OK
PUP	PAGE UP	Show previous page	OK
PDN	PAGE DOWN	Show next page	OK
OSD	DISPLAY	Show/hide on-screen display	OK
TTL	TOP MENU	Show BD top menu or DVD title menu	OK
MNU	POP-UP MENU	Show BD pop-up menu or DVD menu	OK
NUP	Up Arrow	Navigation	OK
NLT	Left Arrow	Navigation	OK
NRT	Right Arrow	Navigation	OK
NDN	Down Arrow	Navigation	OK
SEL	ENTER	Navigation	OK
SET	SETUP	Enter the player setup menu	OK
RET	RETURN	Return to the previous menu or mode	OK
RED	RED	Function varies by content	OK
GRN	GREEN	Function varies by content	OK
BLU	BLUE	Function varies by content	OK
YLW	YELLOW	Function varies by content	OK
STP	STOP	Stop playback	OK
PLA	PLAY	Start playback	OK
PAU	PAUSE	Pause playback	OK
PRE	PREV	Skip to previous	OK
REV	REV	Fast reverse play	OK 1X
FWD	FWD	Fast forward play	OK 1X
NXT	NEXT	Skip to next	OK

AUD	AUDIO	Change audio language or channel	OK
SUB	SUBTITLE	Change subtitle language	OK
ANG	ANGLE	Change camera angle	OK a/b (a: current angle number, b: total available angles)
ZOM	ZOOM	Zoom in/out and adjust aspect ratio	OK (zoom ratio text)
SAP	SAP	Turn on/off Secondary Audio Program	OK (audio track information) OK Off
ATB	AB REPLAY	Repeat play the selected section	OK A- OK A-B OK OFF
RPT	REPEAT	Repeat play	OK Repeat Chapter OK Repeat Title OK OFF
PIP	PIP	Show/hide Picture-in-Picture	OK (PIP program info) OK Off
HDM	RESOLUTION	Switch output resolution	OK
SUH	SUBTITLE (hold)	Press and hold the SUBTITLE key. This activates the subtitle shift feature	OK
OPT	OPTION	Show/hide the Option menu	OK
M3D	3D	Show/hide the 2D-to-3D Conversion or 3D adjustment menu	OK
SEH		Display the Picture Adjustment menu	OK
NOP		No operation.	OK

B. **Query Commands**

This group of commands issues queries to the player. The player shall respond according to its current status.

Command Code	Function	Response Example
QVM	Query verbose mode	OK 0 OK 1 OK 2 OK 3
QPW	Query power status	OK ON OK OFF
QVR	Query firmware version	OK BDT101-xx-xxxx
QVL	Query volume	OK 100 OK MUTE
QHD	Query HDMI resolution	OK 480P OK 720P50 OK 1080P60 OK AUTO OK 4K*2K
QPL	Query playback status	OK NO DISC OK LOADING OK OPEN

		OK CLOSE OK PLAY OK PAUSE OK STOP OK STEP OK FREV OK FFWD OK SFWD OK SREV OK SETUP OK HOME MENU OK MEDIA CENTER
QTK	Query Track/Title	OK 02/10
QCH	Query Chapter	OK 03/03
QTE	Query Track/Title elapsed time	OK 00:01:34
QTR	Query Track/Title remaining time	OK 01:20:23
QCE	Query Chapter elapsed time	OK 00:01:34
QCR	Query Chapter remaining time	OK 00:12:22
QEL	Query Total elapsed time	OK 00:05:12
QRE	Query Total remaining time	OK 01:34:44
QDT	Query disc type	OK BD-MV OK DVD-VIDEO OK DVD-AUDIO OK SACD OK CDDA OK HDCD OK DATA-DISC
QAT	Query audio type	OK DD 1/1 OK DD 1/5 English OK DTS 2/5 English OK LPCM OK DTS-HD 1/4 English OK DSD (when playing SACD or DSD file) OK LPCM 192/24 (when playing audio-only content)
QST	Query subtitle type	OK OFF OK 1/1 English
QSH	Query subtitle shift	OK -10 (valid returns are -10 .. 0 .. 10)
QOP	Query OSD position	OK 0 (valid returns are 0 .. 5)
QRP	Query Repeat Mode	OK 00 Off (OK followed by a repeat mode code and text: 00 Off 01 Repeat One 02 Repeat Chapter 03 Repeat All 04 Repeat Title 05 Shuffle 06 Random)
QZM	Query Zoom Mode	OK 00 (OK followed by a zoom mode code: 00 Off 01 Stretch

Command Code	Parameters	Function	Response Example
		02 Full 03 Underscan 04 1.2x 05 1.3x 06 1.5x 07 2x 08 3x 09 4x 10 1/2 11 1/3 12 1/4)	
QCD	Query CDDB number	QC1 OK XXYY QC2 OK YYZZ ER INVALID (OK followed by the CDDB number of the CD being played)	
QFT	Query media file format	OK MP3 OK WAV OK MKV OK JPG (OK followed by the media file format) ER INVALID	
QFN	Query media file name	OK Rocky Mountain High.wav (OK followed by the file name) ER INVALID	
QTN	Query track name	OK Rocky Mountain High (OK followed by the current track name) ER INVALID	
QTA	Query track album	OK Rise And Fall,Rage* (OK followed by the current track album) ER INVALID	
QTP	Query track performer	OK The Offspring (OK followed by the current track performer) ER INVALID	

C. Advanced Commands

This group of commands instructs the player to perform an advanced operation in a single step.

Command Code	Parameters	Function	Response Example
SVM	0 1 2 3	0 – Set Verbose Mode to off 1 – Not in use (for backwards compatibility) 2 – Enable unsolicited status update. Only major status changes are reported. 3 – Enable detailed status update. When content is playing, the player sends out playback time update every second.	OK 0 OK 1 OK 2 OK 3
SHD	AUTO SRC UHD_AUTO	Set HDMI output resolution. If a custom resolution parameter is given, this command changes the "Custom	OK 480P (OK followed by the original parameter)

	UHD24 UHD50 UHD60 1080P_AUTO 1080P24 1080P50 1080P60 1080I50 1080I60 720P50 720P60 576P 576I 480P 480I	Resolution" setting in the setup menu and sets the "Output Resolution" to "Custom" at the same time.	
SZM	1 AR FS US 1.2 1.3 1.5 2 1/2 3 4 1/3 1/4	Set zoom ratio. AR – Aspect ratio correction (Stretch, Letterbox or Pillarbox) FS - Full Screen US – Under scan For HDMI Output: 1, AR, FS, US, 1.2, 1.3, 1.5, 2, 1/2; For Component Output: 1, 2, 3, 4, 1/2, 1/3, 1/4)	OK 1.2 (OK followed by the zoom ratio) ER INVALID
SVL	0 – 100 MUTE	Set volume control	OK 100 OK MUTE
SRP	CH TT ALL OFF SHF RND	Repeat chapter Repeat title or CD track Repeat all Repeat off Shuffle Random	OK CH (OK followed by the repeat mode) ER INVALID
SRH	T3 C10 C 0:00:34 T 0:12:13 0:12:13	Search to Title 3 Search to Chapter 10 Search to 0:00:34 of the current chapter or track Search to 0:12:13 of the current title or disc Search to 0:12:13 of the current title or disc	OK ER INVALID
DPL		Direct play	OK
RST		Reset Command – Clean all command buffers, do not wait for any pending/executing commands. Start over again.	OK
SSH	-10 ... 10	Set subtitle shift	OK -10 (OK followed by the shift level) ER INVALID
SOP	0 … 5	Set OSD position	OK 5 (OK followed by the position value) ER INVALID

STC	E R T X C K	Set the time information display: E – Total Elapsed time R – Total Remaining time T – Title Elapsed time X – Title Remaining time C – Chapter/track Elapsed time K – Chapter/track Remaining time	OK E (OK followed by the display type) ER INVALID
SDP	D P	Set the SACD output mode D – Output DSD P – Output PCM (This command changes the setup menu setting for SACD Output. If an SACD is playing, the output will be changed on the fly.)	OK D (OK followed by the output mode) ER INVALID
QDR	1 … xxx	Query directory entry. The number is the index number of the file. ~~To query the current playing file, first use QTK to get the current file index, and then pass the index number to QDR.~~	OK U (USB Device) OK O (Optical Disc) OK F Rocky-mountain-high.wav OK D My Music (OK followed by F [file] or D [directory], followed by the file or folder name.)

Status Update Messages:

The following status update messages are sent by the player automatically when the verbose mode is set to 2 or 3.

A. **Verbose Mode 2:**

UPW - Power Status Update:
      Sent when there is a change of power on/off status.
      Possible parameters: 1 digit
            1 – Player is turned on
            0 – Player is going off
      Example: UPW 1

UPL - Playback Status Update:
      Sent when there is a change of playback status.
      Possible Parameters: 4 chars
            DISC – No disc
            LOAD – Loading disc
            OPEN – Tray is open
            CLOS – Tray is closing
            PLAY – Playback is starting
            PAUS – Playback is paused
            STOP – Playback is stopped
            STPF – Forward frame-by-frame step mode
            STPR – Reverse frame-by-frame step mode
            FFWn – Fast forward mode. Where n is a number of 1... 5 to indicate the speed level
            FRVn – Fast reverse mode. Where n is a number of 1… 5 to indicate the speed level
            SFWn – Slow forward mode. Where n is a number of 1…4 to indicate the speed level (1 = ½, 2 = ¼, 3 = 1/8, 4 = 1/16)

SRVn – Slow reverse mode. Where n is a number of 1…4 to indicate the speed level (1 = ½, 2 = ¼, 3 = 1/8, 4 = 1/16)
HOME – in home menu
MCTR – in media center
Example: UPL PLAY

UVL - Volume Level Update:
Sent when there is a change in volume level or mute status.
Possible Parameters: 3 chars
MUT – Mute is engaged
000 .. 100 – Current volume level. Also sent when mute is cancelled.
Example: UVL 095

UDT - Disc Type Update:
Sent when a new disc type is detected.
Possible Parameters: 4 chars
BDMV   - Blu-ray Disc
DVDV – DVD-Video
DVDA – DVD-Audio
SACD
CDDA
HDCD
DATA – Data disc
VCD2 – VCD 2.0
SVCD - SVCD
Example: UDT DVDV

UAT - Audio Type Update:
Sent when a new audio track is encountered.
Parameters: Type (2 chars), space, number (01/99, 5 chars), space, language (3 chars), space, channels (2 chars)
Type code:
DD – Dolby Digital
DP – Dolby Digital Plus
DT – Dolby TrueHD
TS – DTS
TH – DTS-HD High Resolution
TM – DTS-HD Master Audio
PC – LPCM
MP – MPEG Audio
CD – CD Audio
UN – Unknown
Number: current audio track / available audio tracks in 2-digit number format. For example, 01/99 means the first of 99 available tracks; 02/05 means the second of 5 available tracks. If only one track is available, it is 01/01.
Language: Three-character language code: ENG for English, FRA for French, and so on (ISO3166). UNK for unknown.
Channels: 1.0 for mono, 2.0 for stereo, 5.1 or 7.1 for 5.1-channel or 7.1-ch surround, 0.0 for unknown.
Example: UAT DD 01/05 ENG 5.1

UST - Subtitle Type Update:
Sent when a new subtitle is selected.
Parameters: number (01/99, 5 chars), space, language (3 chars)
Number: current subtitle track / available subtitle tracks in 2-digit number format. For example, 01/99 means the first of 99 available tracks; 02/05 means the second of 5 available tracks. If

subtitle is set to off, use 00/xx where xx is the number of available subtitle tracks. If no subtitle is available, use 00/00.
Language: Three-character language code: ENG for English, FRA for French, and so on (ISO3166). UNK for unknown.
Example: UST 02/05 ENG

B. **Verbose Mode 3:**

UTC - Time Code Update:
Sent every second when the playback time advances. The time information is the same as the front panel display. To switch to a different type of time information, please refer to the STC command.
Parameters: Title (3 digits), space, Chapter (3 digits), space, Type (1 chars), space, time (8 chars HH:MM:SS)
Title: Current title number. For example, 001. For discs without title numbers (CD), 001 is always used.
Chapter: Current chapter or track number. For example, 003.
Type Code:
       E – Total Elapsed time
       R – Total Remaining time
       T – Title Elapsed time
       X – Title Remaining time
       C – Chapter/track Elapsed time
       K – Chapter/track Remaining time
Example: UTC 001 001 C 00:01:23

UVO - Video Resolution Update:
Sent when the source content resolution or the output resolution is changed.
Parameters: Source resolution (7 chars), space, Output resolution (7 chars)
Resolution Names:
       _480I60 – 480i 60/59.94Hz
       _480P60 – 480p 60/59.94Hz
       _576I50 – 576i 50Hz
       _576P50 – 576p 50Hz
       _720P60 – 720p 60/59.94Hz
       _720P50 – 720p 50Hz
       1080I60 – 1080i 60/59.94Hz
       1080I50 – 1080i 50Hz
       1080P60 – 1080p 60/59.94Hz
       1080P50 – 1080p 50Hz
       1080P24 – 1080p 24Hz
       1080P23 – 1080p 23.97Hz
       UHD_P24– UHD 24Hz
       UHD_P23 – UHD 23.97Hz
       UHD_L60 – UHD 60Hz/59.94HzYCbCr 4:2:0
       UHD_L50 – UHD 50Hz YCbCr 4:2:0