

ClickOn Technology

CBIT-GEN-V10

Generic CBIT Protocol Specification V10

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1. Overview

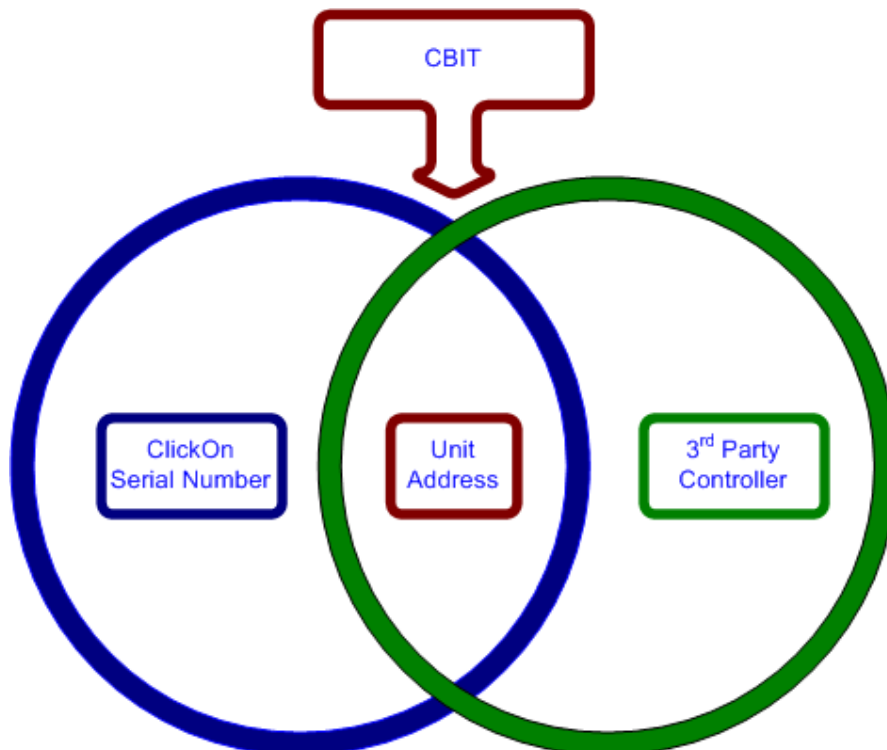
The CBIT (ClickOn Bus Interface Translator) module, when configured in passive mode, awaits commands from a host. The CBIT module provides simplified access to a networked ClickOn Bus installation / configuration.

The host is responsible for issuing all commands.

A relationship between the ClickOn products and the HOST needs to be established to enable the two systems to understand each other. This relationship between the two products is achieved by cross referencing the **serial number** of the ClickOn product to the **unit number** of the HOST.

The CBIT product file is used to define the cross reference relationship between the ClickOn Bus products and the HOST units manually or to define the relationship between ClickOn RF products (e.g. remote controls, wall-mount remote controls, etc.) and the HOST Unit numbers.

Additional RC (Remote Control) units may be configured by defining them in the CBIT product file. This file is accessible when using the CBIT CENTRAL utility.



The CBIT product file is also used to modify / change the mode, baud, number of assumed cross reference units, repeater settings and start up status.

The product file name that needs to be created / modified must start with **cbit**. Once the file has been created / modified it will need to be up-loaded to the CBIT module using the CBIT Up-Loader (CBIT CENTRAL) Application. For more information regarding the CBIT CENTRAL, please refer to the CBIT Central Documentation.

2. Protocol

2.1. Physical Layers

- RS-232 Crossover @ 115200 baud 8N1 (default). Configurable.

2.2. Data link Layer

FUNCTION	PREAMBLE	PACKET DATA	CRC
BYTES	1	VARIABLE	1
VALUE	0x5A	COMMAND SPECIFIC	CALCULATED

2.3. Communication Flow

When receiving a valid packet the receiver is responsible for transmitting an ACK (**0x06**) within 1 second of receipt.

On receiving a corrupt packet a NAK (**0x15**) should be transmitted within 500 milliseconds of receipt.

All commands are initiated by the HOST

An example flow:



2.4. Transport Layer

	PREAMBLE	RETRY COUNT	COMMAND	ERROR CODE	DATA LENGTH	DATA	CRC
BYTES	1	1	1	1	2	?	2

FIELD	DESCRIPTION
PREAMBLE	An STX byte (0x5A) to signify the start of a packet.
RETRY COUNT	Each request/reply starts with a retry count of '0' (0x03). After each transmission failure (No ACK/NAK received within 500ms) the packet may be resent with this number incremented by 1. E.g. 0x01, 0x 02 etc... (Up to a maximum of 3 times)
COMMAND	See the following section for a listing of available commands.
ERROR CODE	See the following section for a listing of error codes. Error codes can only be sent in the Command Reply packets
DATA LENGTH	Length in bytes of Command specific data to follow.
DATA	Command specific data.
CRC	CRC on complete packet excluding PREAMBLE. See Appendix A for a discussion on the CRC calculation algorithm.

3. Command Set

3.1. Command Codes

CMD	PURPOSE
0x31	Get the current CBIT PROFILE and version.
0x32	Get Addressed CBIT unit status
0x33	Set Addressed CBIT units status
0x34	Set Addressed CBIT Extended units status
0x35	Get Non-Addressed ClickOn Bus devices.
0x36	Get Non-Addressed ClickOn RF packets
0x41	Get Bus device Unit number from Serial number
0x42	Get Bus device Serial number and Unit number
0x43	Set Bus Device Address.
0x44	Delete Unit number from Profile
0x51	Get Links From a given unit.
0x52	Add Link to Bus device.
0x53	Delete Link from bus device.
0x61	Get Global Variable value
0x62	Set Global Variable value

3.2. Error Codes

CODE	PURPOSE	SPECIFIC TO
0x30	No Error.	-
0x31	Command Timeout.	-
0x32	Not available.	
0x33	Unit Range Out of Bound	Status retrieval and command set.
0x34	Invalid Status	Set unit status (command)
0x35	Unit Number already defined.	Set Bus Device Address
0x36	Bus device not found	Set Bus Device Address
0x37	Bus device Table full	Add bus link
0x61	Global Variable Not Found	Get or Set Global Variables
0x62	Invalid Global Variable Value	Set Global Variable

3.11. CMD-42: Get Bus device Serial number and Unit number (Command)

DESC	Get Bus device Serial number and Unit number
-------------	--

ORIGIN	PRE	RETRY	CMD	ERR	LEN	DATA	CRC
HOST	STX	[R]	0x42	00	4	[1]	[CRC]
CBIT				[E]	VAR	[2]	

[1] Data: *HOST => CBIT*

Field	Purpose	Size
1a	From Address (little-endian)	2
1b	Until Address (little-endian)	2
1c		
1d		

[2] Data: *CBIT => HOST*

Field	Purpose	Size
1a	Serial number and Unit number of units starting from "From Address" to "Until Address". Format: "3 digit Unit Nr,8 digit Serial Nr,Layer,3 digit Channel" example 003,38000720,0,002	18 * number of units

Notes:	Will return an error code 0x33 if unit range is out of bound. Bus devices have no layers and therefore 0 is assigned to it.
---------------	--

[R] - Retry counter.

[E] - Error code.

[CRC] - Packet CRC.

4. Appendix A – CRC Calculation

```
//-----  
// C source code for CRC routine  
//-----  
#define CRCMASK 0xA001  
WORD cl_crc_update(WORD crc, unsigned char c)  
{  
    WORD i;  
  
    for( i=0; i<8; i++ )  
    {  
        if ( (crc^(WORD)c) & 1 ) crc = (crc>>1)^CRCMASK;  
        else crc >>= 1;  
        c >>= 1;  
    }  
    return crc;  
}  
  
//-----  
// Example usage of CRC routine  
//-----  
void example( void )  
{  
    extern unsigned char txbuf[500];  
    unsigned char      crc1;  
    unsigned char      crc2;  
  
    // Initial value of CRC should be 0x00  
    unsigned char crc = 0x00;  
  
    //Add all bytes in buffer to CRC calculation  
    for ( int c=0; c<500; c++ )  
    {  
        crc = cl_crc_update ( crc, txbuf[c] );  
    }  
    crc1 = (crc & 0xFF); // CRC low byte  
    crc2 = (crc >> 8 ); // CRC high byte  
  
    //CRC complete  
}
```

5. Appendix B – Commands

Tag	Value	Description
ON	01	Switch light on
OFF	00	Switch light off
UP	33 – 41	Increase light level
DOWN	17 – 25	Decrease light level
LEVEL	105 – 200	5% - 90%
TOGGLE	02	Toggle between on/off
MIN_ON	03	Minimum if off
RESTORE	04	Restore to previous level if off

6. Appendix C – Unit Status Table

Tag	Value	Description
OFF	0	Device switched off
LEVEL	5 – 99	Brightness level (%) (Applicable to dimmable devices only)
ON	100	Device switched on
No Mains	101	
Short Circuit	102	
Overload	103	
Incompatible load type	104	
Over Temperature	105	
Zero cross error	106	
Reserved for future usage.	107-198	
Status pending. Awaiting true status from BUS unit.	199	

7. Appendix D – Device Types.

The device type value is sent back with the device status (the first byte)

Value	Device Description.
0	No Device linked to specified unit number
6	6 channel Key ring Remote Control
22	16 channel Key ring Remote Control
100	64 channel Remote Control
17	1 channel Wall mount Remote Control
18	2 channel Wall mount Remote Control
19	3 channel Wall mount Remote Control
33	1 Button Wall switch
34	2 Button Wall switch
35	3 Button Wall switch
44	6 Button Wall switch
40	6 channel Switch Interface
28	RF Transceiver
29	Power Switch
30	Dimmer
38	4 Channel Relay Module
41	0-10V Controller
47	DALI Interface

8. Appendix E – Extended Commands.

Tag	Value	Description
TIMED COMMAND	80	Switch light for a specified time.
FADE	81	Fade light up or down.
STROBE	82	Strobe light (on/off cycle)
TIMED LEVEL	84	Light level ramping.

The timed command, fade, strobe and timed level commands require parameters to execute correctly.

8.1. *Timed command*

Command 80, needs three parameters; start level, end level and duration. The compilation of the command should be done in the following manner:

- Start level (values range 0 = off, 9 = 100%, 15 = current): This value forms part of the upper most significant bits of the first byte <7:4> (zero indexed).
- End level (values range 0 = off, 9 = 100%, 15 = current): This value forms part of the least significant bits of the first byte <3:0> (zero indexed).
- Duration forms part of the first 7 bits of the second byte <6:0> if the 7th bit is set the duration will be ticked off in minutes, if not set, in seconds.

8.2. *Fade Command*

Command 81, needs three parameters; start level, end level and duration. The compilation of the command should be done in the following manner:

- Start level (values range 0 = off, 9 = 100%, 15 = current): This value forms part of the upper most significant bits of the first byte <7:4> (zero indexed).
- End level (values range 0 = off, 9 = 100%): This value forms part of the least significant bits of the first byte <3:0> (zero indexed).
- The time interval between each 1% change forms part of the first 7 bits of the second byte <6:0> if the 7th bit is set the duration will be ticked off in seconds, if not set, in 100ms.

8.3. *Strobe Command*

Command 82, needs four parameters; start level, end level and duration. The compilation of the command should be done in the following manner:

- On time (x500ms): This value forms part of the upper most significant bits of the first byte <7:4> (zero indexed byte).
- Off time (x500ms): This value forms part of the least significant bits of the first byte <3:0> (zero indexed byte).
- End level (0=off, 1=50%, 2=100%, 3=restore): This value forms part of the last 2 bits of the second byte <7:6>
- Duration forms part of the first 5 bits of the second byte <4:0> if the 5th bit is set the duration will be ticked off in minutes, if not set, in intervals of 2 seconds.

8.4. *Timed Level Command*

Command 84, needs two parameters; start level, end level and duration. The compilation of the command should be done in the following manner:

- Brightness level (0% - 100%): This value is the first byte.
- Soft on/off rate: The first 7 bits contains the time from full on to full off or from full off to full on. If the 7th bit is set the duration will be ticked off in minutes, if not set, in seconds. Use 0 to use device defaults.

9. Appendix F - Global Variables

Token	Values
BAUD	115200, 57600, 38400, 19200, 9600
UNITS	1 – 512
PSVNOTIFY	TRUE, FALSE or PACKET

10. Appendix G – Crossover cable.

