EZUIRT Links and Code Records Explained

The EZUIRT can be both a controller (Insteon Sender) and a Responder. As a controller, the unit will translate received IR codes into Insteon commands to control other Insteon devices. As a responder, EZUIRT will send up to 8 IR commands in response to a single received I Insteon command . The specific behavior in both cases will depend on two records kept in 2 different databases:

- The code record database ,
- The Insteon links database.

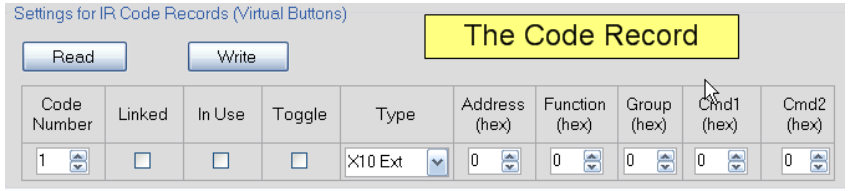
The following sections outline how these records are treated depending on the operating mode of the EZUIRT.

EZUIRT as an Insteon Controller—Role of the Code record

The code record consists of the following fields:

A) **Code Number**: A number from 1-40 which is a unique identifier to a record. Each distinct IR code would occupy a record.

B) **Linked** flag: This flag indicates that this record is associated with an Insteon link. When this flag is set for an active (in use) record, the EZUIRT



will issue a group command using the group number in the record and the corresponding link(s) in the links database (described later in this document.) If this flag is not checked and the "In Use" flag is set, then the EZUIRT issues a broadcast status change message, instead of a group command. This broadcast message contains the IR code received in the middle and least significant bytes of the "To" address field, and the type of code in the "Cmd2" byte.

C) **In Use** flag: This flag signifies that the record is active. Un-checking the flag is the same as deleting the record.

D) **Toggle** flag: if checked, the group commands sent when the code on this record is received will alternate between Cmd1 and Cmd2. An on/off toggle function for a given IR code can be easily achieved this way.

E) **Type**: this refers to the type of IR code for this record (e.g. X10, SONY, NEC, etc)

F) **Adress**: this is the part of the IR code that selects the unit to be addressed

G) **Function**: the part of the code that selects the function to be performed

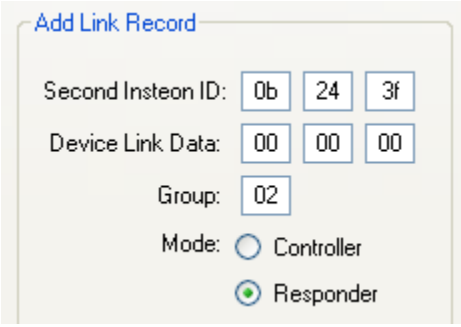
H) **Group**: this number (1-255) is the Insteon group number associated with the corresponding Insteon link. It must match a valid link

I) **Cmd1**: the Insteon command to be sent for this IR code. Normally defaults to the "Lights ON"/ "Scene ON" command.

J) **Cmd2**: the Insteon command to be sent for X10 off commands. For other types of IR codes, this filed is only valid when the "Toggle" flag is set.

EZUIRT as an Insteon Responder—Role of the Insteon Link

When sending IR codes in response to an Insteon group command from an Insteon controller, EZUIRT determines what code(s) to send based on the Insteon link. Refer to the figure on the right for the following explanation. Please note that ll notation is in hexadecimal.



A) **Second Insteon ID**: This is the ID of the controller that the EZUIRT will be responding to.

B) **Device Link Data**: This contains the information about the IR code to be sent on this link. The left-most byte is the Code Type, the middle byte is the address, and the right-most byte is the Function.

C) **Group**: This is the group number from the controller. For example, the group number for a KeypadLinc button 3 would be 3.

D) **Mode**: set to responder, since the EZUIRT is really responding to a command from an Insteon controller and sending IR codes in response.

How are Multiple IR Commands Sent?

Each IR code to be sent requires 1 Insteon link. For one code, the Group number is the "base" group number from the controller. For subsequent codes (up to 7 more), the most significant 3 bits of the group field contain the code number. For example, to send 2 different codes on a KeypadLinc button 2, there would be 2 links with the same KeypadLinc ID. The first link would have the group number of 02, and the first code we send details in the link data. The second link would have the IR code details for the second code, and the group number of 42. This group number is the "base" group number (2) with a value of 1 in the most significant 3 bits.

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EZUIRT Insteon Messages/Commands

The following information is intended to aid in programming a PC application to support EZUIRT The comprehensive Insteon command set was established with and certified by SmartLabs to ensure interoperability and future expansion. Manufacturers of Insteon applications follow this command set to ensure maximum customer satisfaction with Insteon products. In the tables that follow, the column heading **SE DAB** denotes whether the command is Standard-length (**S**) or Extended-length (**E**), and whether it is a Direct (**D**), ALL-Link (**A**), or Broadcast (**B**) command. EZUIRT assigned codes by SmartLabs are: DevCat: 0x03, SubDevCat: 0x0f, Product Key: 0x00003d.

Insteon Standard-Length Direct Messages/Commands

Command Name	SE DAB	Cmd 1	Cmd 2	Description
Assign to ALL-Link Group	**SD**	**0x01**	**0x00 - 0xFF** Group Number	Used during Insteon device linking session. Assigns a status snapshot to an ALL-Link group.
Delete from ALL-Link Group	**SD**	**0x02**	**0x00 - 0xFF** Group Number	Used during unlinking session. Deletes a status snapshot from an ALL-Link group.
Product Data Request	**SD**	**0x03**	**0x00**	EZUIRT responds with an Extended-length **Product Data Response** message.
Device Text String Request	**SD**	**0x03**	**0x02**	EZUIRT responds with an Extended-length **Device Text String Response** message.
Enter Link Mode	**SD**	**0x09**	**0x00 - 0xFF** Group Number	Enters linking mode. Use to add links.
Enter Unlink Mode	**SD**	**0x0A**	**0x00 - 0xFF** Group Number	Enters unlinking mode. Use to delete links.
ID Request	**SD**	**0x10**	**0x00**	EZUIRT first returns an ACK message, then it sends a *SET Button Pressed* Broadcast message, but it does not enter Linking Mode.
Set Address MSB	**SD**	**0x28**	**0x00—0xFF** High byte of 16-bit address	Sets Most-significant byte of EEPROM address for peek or poke. Set to 0x00 for access to EZUIRTxx.
Poke (see note 2)	**SD**	**0x29**	**0x00 - 0xFF** value of parameter to store	Puts the byte in Cmd 2 into the parameter **RAM** location pointed to by PARPTR which is then incremented. **To make permanent, follow this with the "Load EEPROM from RAM" command.**
Peek (see note 1)	**SD**	**0x2B**	**0x00 - 0xFF** PARPTR value	Sets Cmd 2 value into PARPTR. Cmd 2 of the ACK message returns the byte pointed to PARPTR.
EZUIRT Control	**SD**	**0xF0**	Subcommand	
			0x00 Load Initialization Values	Resets EZUIRT to its factory default settings
			0x01 Write a code record	Writes the code record buffer area into permanent memory based on the last code received.
			0x02 Read a code record	Reads a code record from permanent memory into the record buffer based on the last code received.
			0x03 Get a code record	Respond with an extended command containing the code record buffer based on the last code received.
Specific Code Record Read	**SD**	**0xF1**	**0x00—0x13** The record number.	Solicit an extended message with the specified code record

Insteon Extended-Length Direct Messages/Commands

Command Name	SE DAB	Cmd 1	Cmd 2	Description
Product Data Response	**ED**	**0x03**	**0x00**	**Extended Data as follows**: **D1**: 0x00, **D2-D4**: Product Key, **D5**: DevCat, **D6**: SubCat, **D7**: 0xFF, **D8**: 0xFF. **D9-D14**: don't care
FX Username Response	**ED**	**0x03**	**0x01**	**Extended data as follows: D1—D8**: Code FX User Name, **D9—D14**: don't care
Device Text String Response	**ED**	**0x03**	**0x02**	D1-D14 contain the ASCII device text string—Either null delimited or all 14 bytes
Code record request Response	**ED**	**0xF1**	**0x00—0x27** (record number)	D1—D6 Code record data
Specific Code Record Write	**ED**	**0xF2**	**0x00—0x27** The record number.	Write the record with the data in D1-D6

Insteon Standard-Length Broadcast Messages/Commands

Command Name	SE DAB	Cmd 1	Cmd 2	Description
SET Button Pressed Slave	**SB**	**0x01**	None	Linking Mode as a Slave device
Status Change	**SB**	**0x27**	**Bits 0-5:** 0x00—0x27—Code Record number **Bits 6-7:** 00: X10 OFF command 01: X10 DIM command 10: X10 ON command 11: X10 BRIGHT command	A code was received for which an **unlinked** record exists. See below for message format. The Command 2 byte encodes the type of command received and the Code Record (virtual input) number that was activated.

Notes:

1) **Memory Layout:** The range of fixed (EEPROM) and volatile (RAM) locations accessible for Peek and Poke (if applicable) correspond to the map on the right. The "rw" notation indicates whether the location is read only ("r"), or both readable and writeable ("rw") when followed with the "RAM to EEPROM" command. Note that some locations are directly accessible with Standard Direct Commands. Also note that the MSB of the peek address must be first set to 0x00 for these locations to be accessible.

2) **ACTIVE CODE RECORD BUFFER layout**: An internal database holds a record for each recognized (learned) X10 House/Unit or IR code. The code being acted upon is held in a buffer that is accessible (rw). Commands are available to read a given database record into this buffer, or to write the buffer into a given database record.

3) **IR Code Types:** are determined by bits 0:2 of the code record flags byte as follows:
- 000 = X10
- 001 = X10 Extended
- 010 = SONY
- 011 = NEC
- 100 = NEC Extended
- 101 = Philips RC5

Address	Description (rw)
0x00	Last X10 House/Unit or IR Addres Code received (r)
0x01	Last X10 or IR Command Code received (r)
0x02	Firmware revision (r)
0x03	Special Register (EEPROM LOADED) (r)
0x04-0x09	Active Code Record Buffer—See below (rw)
0x10-0xff	Code Records (40 records, 6 bytes each)
Byte	**Description (all bytes are rw)**
0	Flags: Bit 7—Set if the record is in use Bit 6—Set if the record has an Insteon link Bits 0:2—IR Code Type (see note 3)
1	X10 House/Unit or IR Address
2	X10 or IR Command
3	Group: The assigned Insteon group (1-40)
4	Cmd1: Command 1 sent
5	Cmd2: Command 2 sent

An Insteon group command is sent for a code with a linked record (both "in use" and "linked" flags set). An Insteon broadcast message is sent for a code where only the "in use" flag is set.

Broadcast Message Format:

Byte	Field	Example	Description
1-3	FROM Address	00.22.34	Insteon address of the device sending the broadcast
4-6	TO Address	03.0d.ff	The TO address field contains the Device Type upper byte (03) followed by the IR Code received in the form "Addr./Function".
7	Flags	1000xxxx	Indicates type of message
8	Command 1	0x27	Code to indicate Status Change Broadcast message
9	Command 2	**Bits 0-5:** 0x00—0x27—Code Record number **Bits 6-7:** 00: OFF command 01: DIM command 10: ON command 11: BRIGHT command	The Command 2 byte encodes the type of command received and the Code Record (virtual input) number that was activated.

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