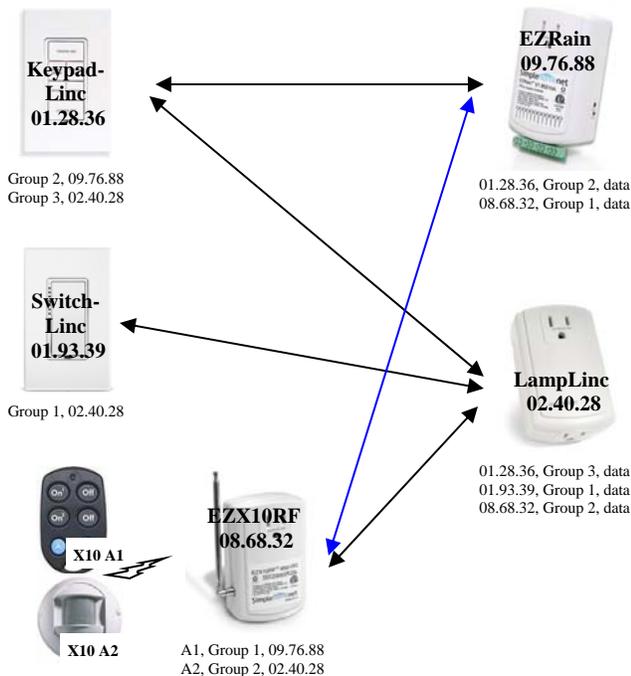# Of Groups and Links..

The INSTEON protocol defines various ways that devices use to communicate with each other. By far the most widely used, most powerful, and least understood messaging scheme is the All-Link (or Group) method explained below. Before delving into groups and links, we must first understand the following fundamental concepts:

- From a functionality standpoint, INSTEON devices can be divided into Senders (Controllers) and Responders (Slaves.) Examples of controllers include the ControlLinc, KeypadLinc, SwitchLinc and EZX10RF. *Senders are known to send commands to other devices* in response to user input such as the pressing of a button, the toggling of a switch, receipt of an X10 code, or in response to events such as the closure of a contact. Examples of responders include the LampLinc, ApplianceLinc, and the EZRain. *Responders take action based on commands sent by Senders*, such as turning on a lamp, turning on a sprinkler valve or activating a pump. Some unique devices like the EZIO8SA and EZIO2X4 can have dual functionality as Senders and Responders.
- A Sender can simultaneously send a command to a group of devices via a message known as All-Link (or Group) broadcast message. The Group number is with respect to the Sender which assigns the group and keeps track of multiple group numbers. There is no such thing as a network-wide group. Again, the group number is with respect to the Sender and different Senders can and do have the same group number. On the other hand, Responders join a given group and thus, can be made to take action when a Sender sends a Group command. Therefore, a Group can have many members, limited practically by the memory available in the Sender. A Responder can be made to respond to multiple Senders, and a Sender can be made to send to multiple responders. *Senders originate Groups and Responders join Groups.*
- Every INSTEON device is uniquely identified with a six-character ID. A link is an association between a Sender and a Responder where the Sender is made aware of the Responder's ID and the group being joined, and the Responder made aware of the Sender's ID, group number, and some device specific data that can be recalled when the link is activated. Each device has an internal memory where this information is kept (referred to as the links database.) *To be complete, a link must have one part in the Sender, and another in the Responder.*
- INSTEON devices provide various means to establish links. A manual method using the LED and pushbutton available in each device is by far the most widely used. The INSTEON command set also provides facilities to enable all-electronic or software-driven linking. These latter methods obviously need the use of an external software program.

Keypad-Linc 01.28.36

Group 2, 09.76.88
Group 3, 02.40.28

Switch-Linc 01.93.39

Group 1, 02.40.28

X10 A1

EZX10RF 08.68.32

X10 A2

A1, Group 1, 09.76.88
A2, Group 2, 02.40.28

EZRain 09.76.88

01.28.36, Group 2, data
08.68.32, Group 1, data

LampLinc 02.40.28

01.28.36, Group 3, data
01.93.39, Group 1, data
08.68.32, Group 2, data

Let us illustrate an example to bring it altogether. The small network of devices depicted on the left is formed with 3 Senders (EZIOX10RF transceiver, SwitchLinc and a KeypadLinc,) and 2 Responders (a LampLinc to which a reading lamp is connected and an EZRain irrigation device that manages the lawn sprinklers.) The EZX10RF is used to convert the signals from the X10 keyfob and motion sensor into INSTEON group messages. In this example, the keyfob is assigned address A1 and the motion sensor address A2. The text boxes under each device illustrate the contents of the links database. The desired behavior of the INSTEON devices is as follows:

- The front lawn on the EZRain valve #1 is controlled with button 2 of the KeypadLinc, and with the X10 keyfob on address A1.
- The reading lamp is controlled with button 3 of the KeypadLinc or the paddle on the SwitchLinc, and when an X10 motion sensor is tripped.
- Timers available in the EZX10RF and the EZRain are set up based on specific needs. These might include delaying the off action of the motion sensor, or timing the irrigation valve for a specific period.

Group commands are sent in 2 phases. On the first phase, the Sender broadcasts a message consisting of its ID, plus the group number and the specific command (On, Off, Dim, etc.) Any device that hears the message and recognizes the Sender's ID and group takes the appropriate action specified in the command. During the second phase (so called "Group Cleanup"), the Sender sends a direct message with the specific command to each of the devices linked in the particular group. This ensures each responder gets the message, adding to the overall reliability. The versatility of All-Link commands lies on the simplicity of the concept. Any controller can control a device without knowing its specific details. Plus any device can be controlled by multiple controllers without limitations.