

## Introduction

The EZ-Motion motion detector supports a rich set of Z-Wave commands that can enhance the users experience if properly supported by the application software. Software developers wishing to utilize all the features of EZ-Motion will find all of the necessary commands described here. The reader is assumed to be knowledgeable with the Z-Wave protocol and the Z-Wave Device Class Specification.

## Basic Operation

The EZ-Motion battery powered motion detector can be used in its default configuration. However, to get the maximum benefit and reliable operation, the EZ-Motion should be configured once it has been installed.

When EZ-Motion detects motion, it will send a BASIC\_SET ALL\_ON Z-Wave command to any Z-Wave devices that have been “Associated” with it. Once the EZ-Motion has not detected any motion for twenty minutes it will send a BASIC\_SET ALL\_OFF command which will turn the lights off. Use the ASSOCIATION\_SET commands to assign the desired NodeIDs to the EZ-Motion. You can assign up to 4 NodeIDs. Typically one of these would be an interface to a computer to provide status to the home management software. Once the EZ-Motion has been assigned NodeIDs to send the BASIC\_SET commands to, it will use the mesh-networking features of Z-Wave to guarantee delivery of the command.

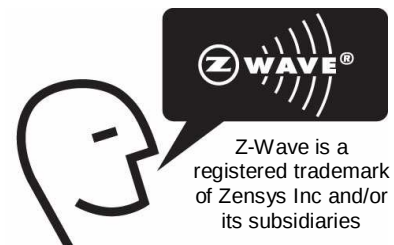
Once the EZ-Motion has detected motion and sent the BASIC\_SET command, it will go to sleep and ignore the motion detector for about 1 minute. This insures that battery power is conserved in rooms with a lot of motion. The amount of motion can be requested using the SENSOR\_MULTILEVEL\_REPORT command (encapsulated in a MULTI\_CHANNEL\_REPORT).

The EZ-Motion can also be sent a MULTILEVEL\_SENSOR\_GET to determine the current illumination intensity and the temperature. Note that these commands must be encapsulated in the MULTI\_INSTANCE commands to distinguish which sensor to report on.

Since the EZ-Motion is battery-powered, it is asleep most of the time. It cannot be used as a repeater in a Z-Wave network. It will not respond to any commands unless it is awake. The EZ-Motion will send a WAKE\_UP\_NOTIFICATION to the configured NodeID every time it wakes up. The amount of time between WAKE\_UP\_NOTIFICATIONs can be configured to be between 6 minutes and 25 Hours in tenths of an hour increments. When the WAKE\_UP\_NOTIFICATION has been received, software must quickly respond with any report requests or configuration commands as the EZ-Motion will go back to sleep in about 2.5 seconds. Note that the Z-Wave chip consumes approximately 1000 times more battery power when it is awake than when it is asleep. Battery life depends heavily on the amount of Z-Wave traffic to the EZ-motion. The less often the EZ-motion is awake and transmitting or receiving, the longer the battery will last.

When the blue “join” button (reset) is pressed, the EZ-Motion sends a NodeInfo packet asking to join a Z-Wave network. The EZ-Motion can either be “reset” to a HomeID of zero or it can join a network. All configuration settings in the EZ-Motion are reset to their factory defaults when the unit has been reset. The EZ-Motion remains awake for 10 minutes after the reset button is pressed so that it can be configured without having to wait for it to wake up.

Refer to the “EZ-Motion Users Manual” for more details on how to use the EZ-Motion 3-in-1 sensor.





## Installation:

The EZ-Motion is shipped without batteries and needs 3 AAA batteries. To install the batteries, remove the cover by grasping the back of the unit and pulling on the tab on the bottom of the front cover. The front cover will snap on and off easily.

Place the 3 batteries in the **proper orientation** as shown on the battery holder.

Replace the cover and press and release the blue “Join” button. This will reset the unit and the LED should blink continuously. If the led is not blinking then reset the unit using a ZWave Primary Controller.

Using the ZWave Primary Controller, press and hold the Add Node button on the remote and then press and release the Join Button on the EZ-Motion. The EZ-Motion will then join the ZWave network and will be assigned a Node Identifier Number. (NodeID)

At this point the EZ-Motion will typically need to be configured to associate the Z-Wave nodes it should turn on or off when it detects motion. EZ-Motion will remain awake for about 10 minutes after pressing the Join button.

You can also adjust the sensitivity of the motion detector. During this time the LED will turn on anytime it detects motion. You can adjust the sensitivity of EZ-Motion to meet the requirements of the room you are installing EZ-Motion into by testing the amount of motion required to turn the LED on.

After the 10 minutes, EZ-Motion will enter its normal operating mode and conserve battery power by going to sleep except when it detects motion or at periodic intervals programmed with the WakeUp class commands. If you need additional time to complete the configuration, just press the join button again to wake EZ-Motion up for another 10 minutes.

## Software Interface

The EZ-Motion will respond to a set of Z-Wave commands as described below. See the Z-Wave Device Class Specification and the Programmers Guide for more details.

EZ-Motion is battery powered and is typically asleep and not listening to commands. Every WakeUpInterval, it will wake up and issue a WAKE\_UP\_NOTIFICATION. The WAKE\_UP\_NOTIFICATION is sent as a broadcast unless configured with a specific NodeID. EZ-Motion will remain awake for about 2.5 seconds after the WAKE\_UP\_NOTIFICATION has been sent. Commands to be sent to the EZ-Motion must be sent shortly after the WAKE\_UP\_NOTIFICATION has been received.

**BASIC\_SET:** Ignored

**BASIC\_GET:** Returns a BASIC\_REPORT of the Motion sensor.

### BASIC REPORT:

| Byte | Hex | Name                | Description                                                                                                                                                                                                                                                                                                                                                |
|------|-----|---------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1    |     | COMMAND_CLASS_BASIC |                                                                                                                                                                                                                                                                                                                                                            |
| 2    |     | BASIC_REPORT        |                                                                                                                                                                                                                                                                                                                                                            |
| 3    |     | Amount of Motion    | The larger the value, the more motion has been detected.<br>A value of 0 indicates no motion has been detected for the last <a href="#">WaitAllOff</a> number of minutes. Amount Of Motion is the WaitAllOff value minus the number of minutes since motion was last detected. Thus, Amount Of Motion will be equal to WaitAllOff when motion is detected. |



**SENSOR\_MULTILEVEL\_GET:** Returns SENSOR\_MULTILEVEL\_REPORT

Generally this should not be used. The MULTI\_CHANNEL commands should be used to properly request the sensor instance requested.

## **SENSOR\_MULTILEVEL\_REPORT:**

| Byte | Hex | Name                            | Description                                                                                                                         |
|------|-----|---------------------------------|-------------------------------------------------------------------------------------------------------------------------------------|
| 1    |     | COMMAND_CLASS_SENSOR_MULTILEVEL |                                                                                                                                     |
| 2    |     | SENSOR_MULTILEVEL_REPORT        |                                                                                                                                     |
| 3    | 02  | SENSOR_TYPE_GENERIC             |                                                                                                                                     |
| 4    | 09  | Sensor Format                   | 1 byte. Unitless value 0-255                                                                                                        |
| 5    |     | MotionOffCount                  | <a href="#">WaitAllOff</a> minus the number of minutes since motion was last detected. A value of 0 means there has been no motion. |

**MULTI\_INSTANCE\_GET:** Returns a MULTI\_INSTANCE\_REPORT with the number of instances of each desired command class. Note that only SENSOR\_MULTILEVEL will return a value of 3, all other command classes will return a value of 1.

## **MULTI\_INSTANCE\_REPORT:**

| Byte | Hex | Name                         | Description                                                                                                                                             |
|------|-----|------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1    |     | COMMAND_CLASS_MULTI_INSTANCE |                                                                                                                                                         |
| 2    |     | MULTI_INSTANCE_REPORT        |                                                                                                                                                         |
| 3    |     | cmdClassReported             | For COMMAND_CLASS_SENSOR_MULTILEVEL a value of 3 is returned, all other classes return a value of 1. Only the multilevel sensor has multiple instances. |

## **MULTI\_INSTANCE vs. MULTI\_CHANNEL Encapsulation**

The MULTI\_INSTANCE command encapsulation can be used with EZMotion but is not recommended. MULTI\_CHANNEL Version 2 is the Zensys preferred command encapsulation and is strongly recommended. MULTI\_INSTANCE support may eventually be deprecated by Zensys. Note that older EZMotions (prior to 1.07) do not support MULTI\_CHANNEL.

Note: MULTI\_INSTANCE commands are NOT recommended and are included here only for reference. They have been **GREYED** out to make it clearer that these commands should not be used.

**MULTI\_INSTANCE\_CMD\_ENDCAP:** With an encapsulated SENSOR\_MULTILEVEL\_GET Returns MULTI\_INSTANCE\_ENCAP command with the desired Sensor instance SENSOR\_MULTILEVEL\_REPORT encapsulated within it. All other encapsulated commands are ignored.



## SensorMotion – Instance 1

### MULTI\_INSTANCE\_ENCAP:

| Byte | Hex | Name                            | Description                                                                                                                |
|------|-----|---------------------------------|----------------------------------------------------------------------------------------------------------------------------|
| 1    |     | COMMAND_CLASS_MULTI_INSTANCE    |                                                                                                                            |
| 2    |     | MULTI_INSTANCE_CMD_ENCAP        |                                                                                                                            |
| 3    | 01  | Instance number = 1             | .                                                                                                                          |
| 4    |     | COMMAND_CLASS_SENSOR_MULTILEVEL |                                                                                                                            |
| 5    |     | SENSOR_MULTILEVEL_REPORT        |                                                                                                                            |
| 6    | 02  | SENSOR_TYPE_GENERIC             |                                                                                                                            |
| 7    | 09  | Sensor Format                   | 1 byte. Unitless value 0-255                                                                                               |
| 8    |     | MotionOffCount                  | <u>WaitAllOff</u> minus the number of minutes since motion was last detected. A value of 0 means there has been no motion. |

## SensorIllumination – Instance 2

### MULTI\_INSTANCE\_ENCAP:

| Byte | Hex | Name                               | Description                                                                                                                                                                                                                                        |
|------|-----|------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1    |     | COMMAND_CLASS_MULTI_INSTANCE       |                                                                                                                                                                                                                                                    |
| 2    |     | MULTI_INSTANCE_CMD_ENCAP           |                                                                                                                                                                                                                                                    |
| 3    | 02  | Instance number = 2                | .                                                                                                                                                                                                                                                  |
| 4    |     | COMMAND_CLASS_SENSOR_MULTILEVEL    |                                                                                                                                                                                                                                                    |
| 5    |     | SENSOR_MULTILEVEL_REPORT           |                                                                                                                                                                                                                                                    |
| 6    | 03  | SENSOR_TYPE_ILLUMINATION_INTENSITY |                                                                                                                                                                                                                                                    |
| 7    | 01  | Sensor Format                      | 1 byte, value is a %                                                                                                                                                                                                                               |
| 8    |     | Value                              | Illumination Intensity value from 0-100%. This value is adjusted over time as the sensor experiences the minimum and maximum intensity values. The value should only be used as an approximation of the actual illumination intensity of the room. |

## SensorTemperature – Instance 3

### MULTI\_INSTANCE\_ENCAP:

| Byte | Hex | Name                                     | Description                                                                                                               |
|------|-----|------------------------------------------|---------------------------------------------------------------------------------------------------------------------------|
| 1    |     | COMMAND_CLASS_MULTI_INSTANCE             |                                                                                                                           |
| 2    |     | MULTI_INSTANCE_CMD_ENCAP                 |                                                                                                                           |
| 3    |     | Instance number = 3                      | .                                                                                                                         |
| 4    |     | COMMAND_CLASS_SENSOR_MULTILEVEL          |                                                                                                                           |
| 5    |     | SENSOR_MULTILEVEL_REPORT                 |                                                                                                                           |
| 6    |     | Sensor Type =<br>SENSOR_TYPE_TEMPERATURE |                                                                                                                           |
| 7    | 32  | Sensor Format = TEMPERATURE_FORMAT       | Fahrenheit with 1 digit of precision (tenths of a degree F)- 2 bytes of data                                              |
| 8    |     | Temperature MSB                          |                                                                                                                           |
| 9    |     | Temperate LSB                            | This is a 16-bit 2s complement signed number. A value of 320 (0x140) is 32.0 degrees F. A value of -11 (0xFF5) is -1.1 F. |

**MULTI\_CHANNEL\_CMD\_ENDCAP:** With an encapsulated SENSOR\_MULTILEVEL\_GET Returns MULTI\_CHANNEL\_ENCAP command with the desired Sensor instance SENSOR\_MULTILEVEL\_REPORT encapsulated within it. All other encapsulated commands are ignored.

## SensorMotion – Instance 1

**MULTI\_CHANNEL\_ENCAP** of a SENSOR\_MULTILEVEL\_REPORT

| Byte | Hex | Name                            | Description                                                                                                                         |
|------|-----|---------------------------------|-------------------------------------------------------------------------------------------------------------------------------------|
| 1    |     | COMMAND_CLASS_MULTI_CHANNEL     |                                                                                                                                     |
| 2    |     | MULTI_CHANNEL_CMD_ENCAP         |                                                                                                                                     |
| 3    | 01  | Source EndPoint                 | 01=Motion Sensor.                                                                                                                   |
| 4    |     | Destination Endpoint Number     | Value sent as the Source EndPoint in the GET                                                                                        |
| 5    |     | COMMAND_CLASS_SENSOR_MULTILEVEL |                                                                                                                                     |
| 6    |     | SENSOR_MULTILEVEL_REPORT        |                                                                                                                                     |
| 7    | 02  | SENSOR_TYPE_GENERIC             |                                                                                                                                     |
| 8    | 09  | Sensor Format                   | 1 byte. Unitless value 0-255                                                                                                        |
| 9    |     | MotionOffCount                  | <a href="#">WaitAllOff</a> minus the number of minutes since motion was last detected. A value of 0 means there has been no motion. |

## SensorIllumination – Instance 2

**MULTI\_CHANNEL\_ENCAP:**

| Byte | Hex | Name                               | Description                                                                                                                                                                                                                                        |
|------|-----|------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1    |     | COMMAND_CLASS_MULTI_CHANNEL        |                                                                                                                                                                                                                                                    |
| 2    |     | MULTI_CHANNEL_CMD_ENCAP            |                                                                                                                                                                                                                                                    |
| 3    | 02  | Source EndPoint                    | 02=Illumination Sensor.                                                                                                                                                                                                                            |
| 4    |     | Destination EndPoint               |                                                                                                                                                                                                                                                    |
| 5    |     | COMMAND_CLASS_SENSOR_MULTILEVEL    |                                                                                                                                                                                                                                                    |
| 6    |     | SENSOR_MULTILEVEL_REPORT           |                                                                                                                                                                                                                                                    |
| 7    | 03  | SENSOR_TYPE_ILLUMINATION_INTENSITY |                                                                                                                                                                                                                                                    |
| 8    | 01  | Sensor Format                      | 1 byte, value is a %                                                                                                                                                                                                                               |
| 9    |     | Value                              | Illumination Intensity value from 0-100%. This value is adjusted over time as the sensor experiences the minimum and maximum intensity values. The value should only be used as an approximation of the actual illumination intensity of the room. |

## SensorTemperature – Instance 3

### **MULTI\_CHANNEL\_ENCAP:**

| Byte | Hex | Name                                     | Description                                                                                                               |
|------|-----|------------------------------------------|---------------------------------------------------------------------------------------------------------------------------|
| 1    |     | COMMAND_CLASS_MULTI_CHANNEL              |                                                                                                                           |
| 2    |     | MULTI_CHANNEL_CMD_ENCAP                  |                                                                                                                           |
| 3    | 03  | Source EndPoint                          | 03=Temperature Sensor.                                                                                                    |
| 4    |     | Destination EndPoint                     |                                                                                                                           |
| 4    |     | COMMAND_CLASS_SENSOR_MULTILEVEL          |                                                                                                                           |
| 5    |     | SENSOR_MULTILEVEL_REPORT                 |                                                                                                                           |
| 6    |     | Sensor Type =<br>SENSOR_TYPE_TEMPERATURE |                                                                                                                           |
| 7    | 32  | Sensor Format = TEMPERATURE_FORMAT       | Fahrenheit with 1 digit of precision (tenths of a degree F)- 2 bytes of data                                              |
| 8    |     | Temperature MSB                          |                                                                                                                           |
| 9    |     | Temperate LSB                            | This is a 16-bit 2s complement signed number. A value of 320 (0x140) is 32.0 degrees F. A value of -11 (0xFF5) is -1.1 F. |

**MULTI\_CHANNEL\_END\_POINT\_GET:** Returns MULTI\_CHANNEL\_END\_POINT\_REPORT

### **MULTI\_CHANNEL\_END\_POINT\_REPORT:**

| Byte | Hex | Name                           | Description                                                                                                                |
|------|-----|--------------------------------|----------------------------------------------------------------------------------------------------------------------------|
| 1    |     | COMMAND_CLASS_MULTI_CHANNEL    |                                                                                                                            |
| 2    |     | MULTI_CHANNEL_END_POINT_REPORT |                                                                                                                            |
| 3    | 40  | Dynamic[7]<br>Identical[6]     | Bit 7=End point is Dynamic<br>Bit 6=End Points are Identical – they are all the same command class and thus are identical. |
| 4    | 3   | endpoints                      | There are 3 endpoints                                                                                                      |

**MULTI\_CHANNEL\_CAPABILITY\_GET:** Returns  
MULTI\_CHANNEL\_CAPABILITY\_REPORT

### **MULTI\_CHANNEL\_CAPABILITY\_REPORT:**

| Byte | Hex | Name                            | Description                                   |
|------|-----|---------------------------------|-----------------------------------------------|
| 1    |     | COMMAND_CLASS_MULTI_CHANNEL     |                                               |
| 2    |     | MULTI_CHANNEL_CAPABILITY_REPORT |                                               |
| 3    |     | EndPoint                        | .                                             |
| 4    |     | Generic Device Class            | GENERIC_TYPE_SENSOR_MULTILEVEL                |
| 5    |     | Specific Device Class           | SPECIFIC_TYPE_ROUTING_SENSOR_MULTILEVEL       |
| 6-n  |     | Command Classes                 | All supported command classes are then listed |



**MULTI\_CHANNEL\_END\_POINT\_FIND:** Returns  
MULT\_CHANNEL\_END\_POINT\_FIND\_REPORT

## **MULTI\_CHANNEL\_END\_POINT\_FIND\_REPORT:**

| Byte | Hex | Name                                | Description                             |
|------|-----|-------------------------------------|-----------------------------------------|
| 1    |     | COMMAND_CLASS_MULTI_CHANNEL         |                                         |
| 2    |     | MULTI_CHANNEL_END_POINT_FIND_REPORT |                                         |
| 3    | 0   | ReportsToFollow                     | .                                       |
| 4    |     | Generic Device Class                | GENERIC_TYPE_SENSOR_MULTILEVEL          |
| 5    |     | Specific Device Class               | SPECIFIC_TYPE_ROUTING_SENSOR_MULTILEVEL |
| 6    | 1   | EndPoints                           |                                         |
| 7    | 2   | EndPoints                           |                                         |
| 8    | 3   | EndPoints                           |                                         |

**VERSION\_GET:** Returns VERSION\_REPORT

## **VERSION\_REPORT:**

| Byte | Hex | Name                  | Description                                       |
|------|-----|-----------------------|---------------------------------------------------|
| 1    |     | COMMAND_CLASS_VERSION |                                                   |
| 2    |     | VERSION_REPORT        |                                                   |
| 3    |     | LIB_TYPE              |                                                   |
| 4    |     | ZW_VERSION_MAJOR      |                                                   |
| 5    |     | ZW_VERSION_MINOR      |                                                   |
| 6    |     | MyVersion             | Major release version of the firmware in EZMotion |
| 7    |     | MySubVersion          | Minor release version of the firmware             |

## **CONFIGURATION\_SET:**

| Byte | Hex | Name                        | Description                                                                                                                                                                                  |
|------|-----|-----------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1    |     | COMMAND_CLASS_CONFIGURATION |                                                                                                                                                                                              |
| 2    |     | CONFIGURATION_SET           |                                                                                                                                                                                              |
| 3    |     | PARAMETER_NUMBER            | 1=Sensitivity<br>2=WaitAllOff<br>3=EnableLED<br>4=LightThreshold<br>5=NoSleep<br>6=OnValue                                                                                                   |
| 4    |     | DEFAULT/SIZE                | When Bit 7=1 (DEFAULT) the selected parameter to be returned to its original factory setting.<br>Bits 2-0 are the SIZE field and must be set to 001 as the parameters are all a single byte. |
| 5    |     | Configuration Value         | See below                                                                                                                                                                                    |

Parameter #1 - Sensitivity: Range 0-255. Default=200. Sets the sensitivity of the motion detector. A value of 255 will cause the motion detector to be extremely sensitive and trigger on the slightest motion but may actually always see motion due to noise. A value of 0 will cause the motion detector to ignore all but the most extreme amounts of motion.

Parameter #2 - WaitAllOff: Range 0-255. Default=20. Number of minutes after sending an BASIC\_ON before sending a BASIC\_OFF when no motion has been detected. A value of 0 means that a BASIC\_OFF is never sent. In this case, the lights will be turned on by EZMotion, but another application will have to turn the lights off. Note that this mode will result in many BASIC\_ONs and will tend to use more battery power.

Parameter #3 - EnableLED: Range 0, 255. Default=255 (on). A value of zero disables the motion detector LED. A value of 255 turns on the LED when motion is detected. Turning off the LED will conserve battery power.

Parameter #4 - LightThreshold: Range 0-100. Default=100 (disabled). Each time motion is detected, the current illumination level is measured in the room and if the illumination is below the threshold then the lights will be turned on (BASIC\_SET ON). If the illumination is measured to be above the LightThreshold, then the lights will not be turned on. This feature enables the motion sensor to intelligently turn lights on in a room with significant natural sunlight. The lights are only turned on when the room is dark.

Parameter #5 – NoSleep: Range 0-255. Default=0. Setting the NoSleep parameter to be non-zero will cause EZMotion to never go to sleep. In a wall-powered configuration this mode can be used to keep it awake at all times so the sensors can be polled at anytime. When NoSleep is nonzero, the Listening bit is set in the NodeInfo frame. When the Listening bit is set, EZMotion is a routing node and participates in mesh-network routing of packets from other Z-Wave devices. Note that NoSleep is NOT reset to the default value when EZMotion is “reset” (IE: removed from a Z-Wave network). Generally this parameter is set at the factory and should not be altered by the user.

Parameter #6 – OnValue: Range 0-255. Default=255. When motion is detected, EZMotion will send a BASIC\_SET command with this value. This allows the user to configure the value that the associated device will be set to when motion is detected.

Note that the configuration values above are set to their default when a node is reset.

**CONFIGURATION\_GET**: will return a CONFIGURATION\_REPORT.

## CONFIGURATION\_REPORT:

| Byte | Hex | Name                        | Description                                                                                 |
|------|-----|-----------------------------|---------------------------------------------------------------------------------------------|
| 1    |     | COMMAND_CLASS_CONFIGURATION |                                                                                             |
| 2    |     | CONFIGURATION_SET           |                                                                                             |
| 3    |     | PARAMETER_NUMBER            | 1=TRIGGER<br>2=WaitAllOff<br>3=EnableLED<br>4=LightThreshold<br>5=NoSleep<br>6=OnValue      |
| 4    |     | DEFAULT/SIZE                | Bits 2-0 are the SIZE field and must be set to 001 as the parameters are all a single byte. |
| 5    |     | Configuration Value         | See above                                                                                   |

## WAKE\_UP\_INTERVAL\_SET:

| Byte | Hex | Name                  | Description                                                                                                                                                                                                          |
|------|-----|-----------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1    |     | COMMAND_CLASS_WAKE_UP |                                                                                                                                                                                                                      |
| 2    |     | WAKE_UP_INTERVAL_SET  |                                                                                                                                                                                                                      |
| 3    |     | SecondsMSB            | Set the WakeUpInterval in seconds. Note that the EZ-Motion converts this time to 0.1-25.5 hours. This value is rounded off to the nearest tenth of an hour and clipped to 0.1 or 25.5 hours. This is a 3 byte value. |
| 4    |     | Seconds               |                                                                                                                                                                                                                      |
| 5    |     | SecondsLSB            |                                                                                                                                                                                                                      |
| 6    |     | NodeID                | NodeID to send the WakeupNotification to. Defaults to 0xFF (broadcast). Typically this should be configured to a SUC or other node connected to a computer.                                                          |

**WAKE\_UP\_INTERVAL\_GET**: Returns a WAKE\_UP\_INTERVAL\_REPORT

## **WAKE\_UP\_INTERVAL\_REPORT:**

| Byte | Hex | Name                  | Description    |
|------|-----|-----------------------|----------------|
| 1    |     | COMMAND_CLASS_WAKE_UP |                |
| 2    |     | WAKE_UP_INTERVAL_SET  |                |
| 3    |     | SecondsMSB            | WakeUpInterval |
| 4    |     | Seconds               |                |
| 5    |     | SecondsLSB            |                |
| 6    |     | NodeID                |                |

Every WakeUpInterval the EZ-Motion will wake up and send a WakeUpNotification frame to the configured NodeID (broadcast by default). The WakeUpInterval has a direct impact on battery life. The WakeUpInterval should be set to 60 minutes or longer for >1 year of battery life.

## **WAKE\_UP\_NOTIFICATION:**

| Byte | Hex | Name                  | Description                                                                                           |
|------|-----|-----------------------|-------------------------------------------------------------------------------------------------------|
| 1    |     | COMMAND_CLASS_WAKE_UP |                                                                                                       |
| 2    |     | WAKE_UP_NOTIFICATION  | Tells the configured NodeID that the EZ-Motion is awake and can be polled for status or reconfigured. |

Typically the configured NodeID will send a WAKE\_UP\_NO\_MORE\_INFORMATION frame to tell the EZ-Motion that there is no more data for it and that it can go to sleep. This will conserve battery power.

**WAKE\_UP\_INTERVAL\_CAPABILITIES\_GET:** returns a  
WAKE\_UP\_INTERVAL\_CAPABILITIES\_REPORT

## **WAKE\_UP\_INTERVAL\_CAPABILITIES\_REPORT\_V2:**

| Byte | Hex | Name                                    | Description |
|------|-----|-----------------------------------------|-------------|
| 1    |     | COMMAND_CLASS_WAKE_UP                   |             |
| 2    |     | WAKE_UP_INTERVAL_CAPABILITIES_REPORT_V2 |             |
| 3    | 00  | Min WakeUp SecondsMSB                   | 6 minutes   |
| 4    | 01  | Min WakeUp Seconds                      |             |
| 5    | 68  | Min WakeUp SecondsLSB                   |             |
| 6    | 01  | Max WakeUP Sec MSB                      | 25.0 Hours  |
| 7    | 5f  | Max WakeUp Sec                          |             |
| 8    | 90  | Max WakeUp Sec LSB                      |             |
| 9    |     | Default WakeUp MSB                      | 1 hour      |
| 10   |     | Default WakeUp                          |             |
| 11   |     | Default WakeUp LSB                      |             |
| 12   | 00  | Wakeup Step Size MSB                    | 6 minutes   |
| 13   | 01  | WakeUp Step Size                        |             |
| 14   | 68  | WakeUp Step Size LSB                    |             |

**MANUFACTURER\_SPECIFIC\_GET:** Returns a MANUFACTURER\_SPECIFIC\_REPORT.

## **MANUFACTURER\_SPECIFIC\_REPORT:**

| Byte | Hex | Name                                | Description                |
|------|-----|-------------------------------------|----------------------------|
| 1    |     | COMMAND_CLASS_MANUFACTURER_SPECIFIC |                            |
| 2    |     | MANUFACTURER_SPECIFIC_REPORT        |                            |
| 3    | 00  | MANUFACTURER_ID1                    |                            |
| 4    | 1E  | MANUFACTURER_ID2                    | 0x001E is Express Controls |
| 5    | 00  | MFG_PRODUCT_TYPE1                   |                            |
| 6    | 02  | MFG_PRODUCT_TYPE2                   |                            |
| 7    | 00  | MFG_PRODUCT_ID1                     |                            |
| 8    | 01  | MRF_PRODUCT_ID2                     |                            |

**BATTERY\_GET:** Returns a BATTERY\_REPORT.

## **BATTERY\_REPORT:**

| Byte | Hex | Name                  | Description                                                                                                                                                                                                                                                                                                                          |
|------|-----|-----------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1    |     | COMMAND_CLASS_BATTERY |                                                                                                                                                                                                                                                                                                                                      |
| 2    |     | BATTERY_REPORT        |                                                                                                                                                                                                                                                                                                                                      |
| 3    |     | Battery Level         | Percentage of battery remaining. New batteries will give a value of 100%. The unit may still communicate at a battery level of 0 but it will be unreliable. Note that the battery level will remain at close to 100% and then drop relatively quickly as the batteries wear out. This is due to the way batteries typically operate. |

## **ASSOCIATION\_SET:**

| Byte | Hex | Name                      | Description                                                                                |
|------|-----|---------------------------|--------------------------------------------------------------------------------------------|
| 1    |     | COMMAND_CLASS_ASSOCIATION |                                                                                            |
| 2    |     | ASSOCIATION_SET           |                                                                                            |
| 3    |     | GroupID                   | Ignored – Only 1 group supported                                                           |
| 4    |     | NodeID                    | Add this NodeID to the association group<br>All BASIC_SET commands are sent to this NodeID |

Send multiple ASSOCIATION\_SET commands to set multiple NodeIDs (up to 4).

**ASSOCIATION\_GET:** Returns an ASSOCIATION\_REPORT.

## **ASSOCIATION\_REPORT:**

| Byte | Hex | Name                      | Description                                                                                         |
|------|-----|---------------------------|-----------------------------------------------------------------------------------------------------|
| 1    |     | COMMAND_CLASS_ASSOCIATION |                                                                                                     |
| 2    |     | ASSOCIATION_REPORT        |                                                                                                     |
| 3    |     | GroupID                   | The Grouping Identifier from the ASSOCIATION_GET will be returned. There is only 1 group supported. |
| 4    | 4   | MaxNodesSupported         | Number of NodeIDs supported – always 4                                                              |
| 5    | 0   | Reports To Follow         | This packet is all we need                                                                          |
| 6    |     | NodeID1                   | Only returned if a valid value has been programmed                                                  |
| 7    |     | NodeID2                   | Only returned if a valid value has been programmed                                                  |
| 8    |     | NodeID3                   | Only returned if a valid value has been programmed                                                  |
| 9    |     | NodeID4                   | Only returned if a valid value has been programmed                                                  |

## **ASSOCIATION REMOVE:**

| Byte | Hex | Name                      | Description                                                                                                      |
|------|-----|---------------------------|------------------------------------------------------------------------------------------------------------------|
| 1    |     | COMMAND_CLASS_ASSOCIATION |                                                                                                                  |
| 2    |     | ASSOCIATION_REMOVE        |                                                                                                                  |
| 3    |     | GroupID                   | Ignored as EZ-Motion has only 1 groupID.                                                                         |
| 4    |     | NodeIDs                   | NodeID to be removed from the ASSOCIATION group. If no NodeIDs are sent the entire list is reset to the default. |

## **ASSOCIATION GROUPINGS GET:** Returns ASSOCIATION\_GROUPINGS\_REPORT

| Byte | Hex | Name                      | Description |
|------|-----|---------------------------|-------------|
| 1    |     | COMMAND_CLASS_ASSOCIATION |             |
| 2    |     | ASSOCIATION_GROUPINGS_GET |             |

## **ASSOCIATION GROUPINGS REPORT:**

| Byte | Hex | Name                         | Description                       |
|------|-----|------------------------------|-----------------------------------|
| 1    |     | COMMAND_CLASS_ASSOCIATION    |                                   |
| 2    |     | ASSOCIATION_GROUPINGS_REPORT |                                   |
| 3    | 1   | Supported Groupings          | EZ-Motion only supports 1 GroupID |

## **NODE NAMING NODE NAMING GET:** Returns NODE\_NAMING\_NAME\_REPORT

| Byte | Hex | Name                      | Description |
|------|-----|---------------------------|-------------|
| 1    |     | COMMAND_CLASS_NODE_NAMING |             |
| 2    |     | NODE_NAMING_NODE_NAME_GET |             |

## **NODE NAMING NODE NAMING REPORT**

| Byte | Hex | Name                                  | Description                                                                                                                      |
|------|-----|---------------------------------------|----------------------------------------------------------------------------------------------------------------------------------|
| 1    |     | COMMAND_CLASS_NODE_NAMING             |                                                                                                                                  |
| 2    |     | NODE_NAMING_NODE_NAME_REPORT          |                                                                                                                                  |
| 3    |     | Char Presentation                     | 0=ASCII<br>1=Extended ASCII<br>2=Unicode                                                                                         |
| 4-20 |     | NULL terminated string of characters. | Default is a NULL string of 16 characters. Note that 16 characters are always returned in this field. Unprogrammed values are 0. |

## **NODE NAMING NODE NAMING SET**

| Byte | Hex | Name                      | Description                                                                           |
|------|-----|---------------------------|---------------------------------------------------------------------------------------|
| 1    |     | COMMAND_CLASS_NODE_NAMING |                                                                                       |
| 2    |     | NODE_NAMING_NODE_NAME_SET |                                                                                       |
| 3    |     | Char Presentation         | 0=ASCII<br>1=Extended ASCII<br>2=Unicode                                              |
| 4-20 |     | Up to 16 Bytes            | String of characters in Char Presentation format. Only the first 16 bytes are stored. |

**NODE NAMING NODE LOCATION:** The NODE\_NAMING\_NODE\_LOCATION GET/SET/REPORT commands are identical to the NODE\_NAMING\_NODE\_NAME except a separate string of 16 bytes is stored for the location. The default string is again 16 NULL bytes.



**NO\_OPERATION:** Ignored

## Recommended Operating Settings

EZ-Motion will function with the factory defaults but will function significantly better if several configuration values are set by the user.

It is assumed that there is an Intelligent Controller somewhere in the system that can provide a GUI similar to the diagram shown here. The Intelligent Controller is typically a PC or other web-based device connected to a ZWave Controller such as the EZController.

The “Motion Sensitivity” is set using the Configuration Set command with parameter #1 (Sensitivity). Note that the actual value to be programmed is 0-255 which is more resolution than the average user needs. The range can be reduced to typically 5 or 10 valid values which are either scaled to the 0-255 range or a lookup of “good” values can be determined. In this

example, simply multiplying the users value by 25 will result in a good range of values. Note that the values at the top end of the scale (255) result in bigger changes in the sensitivity than the lower values. You may want to use a logarithmic scale or a simple look-up-table. Note that really large values of sensitivity (>200) will result in EZ-Motion always detecting motion even when there is none when battery powered.

| Item                                    | Value                                 |
|-----------------------------------------|---------------------------------------|
| Motion Sensitivity                      | 1-10, 3=pet immune, 10=very sensitive |
| Nodes to be controlled                  | Up to 4 NodeIDs                       |
| Minutes of no motion before turning off | 5-255 minutes                         |
| Illumination Threshold                  | 0-100%                                |
| Heartbeat time                          | 1-255 Tenths of hour                  |

The “Node to be controlled” is set using the Association Set command. One of the values will probably want to be a SUC or other type of node that is connected to the Intelligent Controller. Some applications may want all commands routed thru the controller so this option may not be presented to the user.

The “Minutes of no Motion” is set using the Configuration Set command with parameter #1 (WaitAllOff). Limiting the user to values of more than 5 insures that the lights do not turn on and off when the user is sitting relatively still in a room and thus the EZ-Motion has a hard time detecting the motion.

The “Illumination Threshold” is set using the Configuration Set command with Parameter #4 (LightThreshold). A “good” value is usually 20%.

The “Heartbeat Time” is set using the Wake\_Up\_Interval\_Set command. Limiting the user to a reasonable minimum value of 30 minutes will insure reasonable battery life.

Other configuration values could be provided to the user in an “Advanced” menu.

It is CRITICAL to assign a Return Route to the SUC (or interface to the Intelligent Controller) since it is often not in direct range of the EZ-Motion. A **ZW\_AssignReturnRoute** command should be sent to the EZ\_Motion for all nodes in the association group and especially for the SUC. The ZW\_AssignReturnRoute will program the shortest route possible between the EZ-Motion and the SUC and store it in the EZ-Motion. This must only be done after a full rediscovery of the network has been performed after all nodes are in their final location to insure the proper routes are programmed. If EZMotion is unable to reach the WakeUpNodeID, it will automatically initiate a network rediscovery process to try to discover a new route. This process will shorten the battery life. Pre-programming a reliable return route is very important.



## Troubleshooting

| Symptom                                                                       | Solution                                                                                                                                                                         |
|-------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Unit doesn't work                                                             | Replace all batteries with brand new ones.                                                                                                                                       |
| LED doesn't turn on after pressing reset                                      | Insure that battery holders are making good contact to all batteries.<br>Replace the batteries                                                                                   |
| LED detects motion after pressing reset but doesn't communicate with network. | Reset the unit.<br>The LED will blink when it has been reset. You can then Add it to the network and the LED will stop blinking and instead will turn on when it detects motion. |
| Turns on the wrong lights                                                     | Reset the unit.<br>Reassign the Association NodeIDs.                                                                                                                             |

