EZMultiPli™

Z-Wave Wireless Plug-In Multi Sensor:

- Motion Sensor
- Light Sensor
- Temperature Sensor
- Color Indicator/Night Light
- Wall Powered
- Z-Wave Range Extender

Features

Motion Sensor
- Passive Infrared Sensor (PIR)
- 12’ range
- 90° coverage
- Programmable timeout
- Direct control of up to 4 associated devices

Temperature Sensor
- 0° - 170°F range
- 0.2°F resolution

Light Sensor
- light level 0-10,000 lux

Color Indicator Night Light
- Eight colors
- White, Red, Green, Blue, Aqua, Yellow, Pink, Off

Wall Powered
- 120VAC 60Hz 1Watt
- No wires - just plug it in
- Never needs batteries
- Screw tab for secure installation

Z-Wave® Wireless RF Communication
- SmartStart enabled
- Advanced mesh-network protocol
- Range extender improving network for all nodes
- 300’ RF range line-of-sight
- 100,000 bits/sec
- AES-128 encryption option
- Up to 4 associated Z-Wave nodes
- Network wide inclusion
- Over the air firmware update
- Fifth generation radio technology
- Pushbutton to factory reset or join network

Designed and assembled in USA

Table of Contents

Introduction

EZMultiPli™ enables fully automated lighting that turns on the lights when you enter a room and turns them off shortly after you leave. Sophisticated lighting, Audio, Video and heating/cooling are enabled with the EZMultiPli™ three-sensors-in-one Z-Wave® device.

EZMultiPli is primarily intended as a motion sensor that will detect motion and send a command to up to 4 associated Z-Wave devices as well as the system controller. The other Z-Wave devices can directly control lights in a room or the motion indication can be sent to a computer for complex scene control of lighting, audio, video and heating/cooling. When motion is not detected within a pre-set amount of time, EZMultiPli will send an "off" command to the Z-Wave nodes to turn the lights off.

In addition to the motion sensor, EZMultiPli also senses the amount of light in the room as well as the current temperature. The color LED light within EZMultiPli is a convenient night light or can be used as an indicator light to let you know if the weather forecast is predicting rain, your garage doors are open or any other indicator supported by your home control application.

EZMultiPli is wall powered and needs no wires or batteries. Simply plug EZMultiPli into the wall, join the Z-Wave network and you're ready to go. The optional screw tabs permanently affix the sensor into either a standard or a decorator wall outlet commonly used with GFCI circuits. No worrying about the cleaners accidentally removing the sensor and then forgetting to re-install it. An elder parent can't easily remove the sensor even if they forget why it is there.

Z-Wave is a wireless mesh-networking protocol for reliable, intelligent home control of all Z-Wave compatible devices. Z-Wave devices can act as repeaters to create a mesh-network to ensure reliable communication regardless of the manufacturer or type of device. This product can be included and operated in any Z-Wave network with other Z-Wave certified devices from any other manufacturers. Z-Wave devices such as lamp modules, fan controllers, thermostats, dimmer switches and many other types of home control devices are available from a wide range of manufacturers The Z-Wave Alliance (www.z-wavealliance.com) provides a list of manufacturers of Z-Wave compliant devices. Z-Wave was created by Sigma Designs and more details on the technology can be found at www.z-wave.com.

Quick Start

1. Unpack EZMultiPli
2. Plug EZMultiPli in - the LED should blink aqua indicating it is not currently joined to a Z-Wave network
3. If your Home Automation system supports SmartStart, just scan the QR code on the back and the system will automatically join the Z-Wave network and you're done!
4. If you Home Automation system does **not** support SmartStart yet, continue with the following instructions
5. Include the EZMultiPli to the Z-Wave network:
    a. Follow the instructions of your Home Automation system to include a new Z-Wave device
    b. Press and release the push button on the EZMultiPli
    c. The LED will blink blue indicating it is attempting to join the Z-Wave network
    d. Once joined to the network, the LED will be white whenever it detects motion for about 5 minutes
    e. The Home Automation system should then be configured to enable all the features of EZMultiPli
6. See your home automation software user manual for more details.
7. Each time you press the push button on EZMultiPli it enters a test mode. During this time LED will illuminate when motion is detected. Use this mode to check that the motion sensor will detect motion in the areas you want. This special mode ends in about five minutes.
8. Enjoy your new hands-free lighting controls!

Detailed Instructions

Installation

EZMultiPli can be simply plugged into any wall outlet in either orientation. The dome lens of the motion sensor provides wide angle coverage which will detect motion even if the outlet is low on the wall.

For a more secure installation, remove the outlet faceplate screw and insert thru the tab[1] on EZMultiPli. A standard wall outlet has a screw between the two outlets and does not need the screw tab extender. The tab extender can be discarded.

Decorator outlets, commonly used by GFCI circuits, have the screw at the ends of the faceplate and thus require the tab extender to reach the screw hole. Decorator outlets can be installed in either orientation but the 2nd outlet is blocked by EZMultiPli due to the placement of the screw.

The screw tab ensures cleaners, an elder parent or children cannot easily remove EZMultiPli thereby keeping your system secure and reliable.

Exclusion

When EZMultiPli is first plugged into the wall outlet, the LED should blink an aqua color. This indicates that it is not currently joined (or paired) to a Z-Wave network. If the LED is blinking white each time motion is detected, then it is already joined to a Z-Wave network. If the LED is blinking white you will need to exclude it from the other Z-Wave network before attempting to join a new one.

Follow the procedure of the Z-Wave primary controller to begin the exclusion process. Once the primary controller is ready to receive the exclusion command, press and release the push button on the side of EZMultiPli. The primary

[1] EZMultiPli Revision 1.xx does not have the tab but is otherwise compatible.

controller should give an indication that the reset process has completed. EZMultiPlis LED will blink aqua when it is ready to be added to a Z-Wave network.

Always ensure a device is not joined to a Z-Wave network before trying to add it to a Z-Wave controller.

Factory Reset

If the exclusion process above is not working or the controller EZMultiPli was originally joined to is lost or not available, the following process can be used to factory reset EZMultiPli.

Press and continue to hold the push button in for about 60 seconds. The LED will blink blue faster and faster and then shift to yellow and continue to blink faster and faster. Once the LED goes out, EZMultiPli is reset to the factory defaults and will blink aqua indicating it is ready to be added to a Z-Wave network.

Inclusion

Before attempting to include (pair) EZMultiPli to a Z-Wave network, be sure the LED is blinking an aqua color. If it is not blinking aqua, follow the exclusion instructions above.

There are three (3) methods of Inclusion of EZMultiPli into the Z-Wave network depending on the capabilities of your Home Automation system controller. If your system controller supports SmartStart, it is recommended to follow the directions below. If your system does not yet support SmartStart, use the Classic Inclusion or the Security S2 instructions below.

SmartStart

Sigma Designs SmartStart technology makes installation easy and secure. Simply plug EZMultiPli into a wall outlet and it will automatically attempt to join the Z-Wave network. During the inclusion process, your home automation system may ask for a PIN code or to scan a QR code. The pin code is printed on the back of EZMultiPli along with the QR code as shown here. Simply enter the five digit PIN code or scan the QR code with a compatible device. The sample QR code shown here has a PIN code of 01907. Each QR code is unique for every device. The QR code is also printed on the box. SmartStart uses the latest Security S2 encryption technology for all radio communication. EZMultiPli is completely backwards compatible with non-SmartStart systems if your home automation system doesn't support SmartStart yet.

Classic Inclusion

Follow the procedure of the Z-Wave primary controller to begin the inclusion process. Then press and release the push button on the side of EZMultiPli. Once EZMultiPli has been added to the Z-Wave network, the LED will stop blinking blue and instead will blink white each time it detects motion. EZMultiPli remains in this mode for 5 minutes. Once the 5 minutes has expired, EZMultiPli will enter normal operating mode and the LED will remain off. Pressing the push button will restart the 5 minute motion detector test mode. The primary controller should provide a Z-Wave NodeID which has been assigned to EZMultiPli. The NodeID is a unique identifier and is used by many home control applications to identify this particular EZMultiPli. Write down the NodeID and location for later entry into your home control application.

Security S2 Inclusion

If your Home Automation system controller supports Security S2 you can optionally enable encryption making all communication between the EZMultiPli and the controller completely secure. If your controller supports SmartStart there should be a method to scan the QR code on the back of EZMultiPli or the one on the box it came in. The QR code on the box is shown here which includes all of the digits of the security key. The PIN code is the first five (5) digits of the code which must be entered to complete the secure inclusion process. The other 35 digits should be checked when reported by the system controller during the inclusion process.

If the controller does not yet support SmartStart but does support Security S2, there are two levels of security available:

1. Authenticated Security
    a. Authenticated security requires the PIN code from the back of EZMultiPli to be entered either manually or by scanning the QR code. All SmartStart devices use the Authenticated Security level.
2. UnAuthenticated Security
    a. Unauthenticated security is easier as the PIN code does not have to be entered however the encryption keys are not as secure as they would be with Authenticated security.

The recommendation is to use Authenticated Security as it is required for all SmartStart devices. EZMultiPli can only directly control devices at the same security level. Thus, if you have Authenticated devices they cannot be directly controlled by EZMultiPli.

There is a third, higher level of security called Access Control. Devices like door locks and garage door openers utilize this higher level of security. EZMultiPli does not support the Access Control level of security as EZMultiPli does not typically control access to the home or secure locations within the home. Security S2 is not required and all the features of EZMultiPli are available without being encrypted. If the rest of the devices connected to the system controller are non-secure enabled, then it is recommended to disable security on EZMultiPli during the inclusion process.

Motion Report

EZMultiPli is a Notification Class motion sensor and will send a report to the Z-Wave system controller when motion is detected. When motion has not been detected for the OnTime parameter number of minutes (default is 10 minutes), another report will be sent to the system controller informing it that there has not been any motion for that amount of time.

Motion Timeout

The OnTime parameter is the number of minutes the lights will be on from the last time motion was detected. OnTime is programmable from 1 minute to 127 minutes. Z-Wave Configuration Class commands are used to program the OnTime setting. See the home control application documentation for the procedure for adjusting the OnTime parameter.

Setting OnTime to zero will cause EZMultiPli to not send a Z-Wave OFF command. An ON command will be sent each time motion is detected at a maximum rate of once every 60 seconds.

Note that EZMultiPli detects motion and not people. EZMultiPli cannot detect the presence of a person sitting still in a room reading, watching TV or working at a computer. EZMultiPli can only detect when the person moves. Set the OnTime to be one hour or more in applications where the person will be sitting still for a long time to prevent the lights from turning off while the person is still in the room. In hallways, where people are actively moving, the OnTime can be set to 5 minutes to turn the lights off as shortly after they have left the hallway.

Light Report

EZMultiPli sends a report of the relative amount of light currently in the room to the Z-Wave system controller. The value is from 0 to 100% and is relative to the maximum and minimum amount of light EZMultiPli has measured since it was plugged in. The reports are automatically sent every LiteMin number of minutes. The light level in LUX can be requested as well.

Temperature Report

EZMultiPli sends a report of the current temperature in tenths of a degree Fahrenheit or Celsius to the Z-Wave system controller every TempMin number of minutes.

LED Color

EZMultiPli has a color LED beneath the motion sensor dome. This LED is a convenient night light or an indicator light. The LED can be set to any of eight colors via the Z-Wave Color Switch Command Class:

1) BLACK (off)
2) WHITE
3) RED
4) GREEN
5) BLUE
6) AQUA
7) PINK
8) YELLOW

A Z-Wave BASIC SET ON/OFF also controls the LED but it only uses the white color. Use the Color Switch Command Class to control the color of the LED.

The LED blinks with different colors to indicate special operating modes:

- Blinking aqua (light blue) indicates the EZMultiPli is not currently joined to a Z-Wave network and is currently in a factory default state
- Blinking dark blue after pressing and releasing the button indicates the EZMultiPli is attempting to either include or exclude from a Z-Wave network. Inclusion mode expires after about 10 seconds and the LED should go off. During this time Firmware Update mode is enabled. If the Hub initiates a firmware download the LED will change to yellow when the download starts.
- Blinking yellow indicates a Firmware Update is in progress.
- Blinking white when motion is detected. When power is first applied and EZMultiPli is joined to a Z-Wave network it enters a motion sensor test mode for approximately 5 minutes. When motion is detected, the LED will blink white briefly then go out. This mode can be used to determine the best location for EZMultiPli to ensure it will detect motion where you need it to.
- When the button is pressed and held to Factory Reset the EZMultiPli it will initially blink dark blue but start blinking faster and faster as the button is held. After a few seconds the LED changes to yellow and continues to blink faster and faster. Once the LED goes out, then release the button and the LED should go back to blinking light blue indicating the unit has been reset to the factory defaults.
- The LED can be assigned any of the eight colors using the Z-Wave Color Command Class. If the LED changes due to any of the conditions above, the LED color set using the Z-Wave Color Command Class is lost. For example, if the LED is set to green and then there is a power failure, when power is restored the EZMultiPli will go into the motion test mode and the LED will blink white when motion is detected.

Z-Wave Range Extender

EZMultiPli utilizes a fifth generation Z-Wave radio transceiver and automatically improves the range and reliability of every node on the Z-Wave network. No configuration is required for EZMultiPli to enhance the speed and reliability of the Z-Wave mesh network. However, if EZMultiPli is added into an existing Z-Wave network, the entire network should perform a network rediscovery. The network rediscovery process will ensure that every node in the Z-Wave network can take advantage of EZMultiPli ability to forward messages across the Z-Wave mesh-network. Sometime the network discovery is called “healing” the network.

Configuration Parameters

All configuration parameters are set to their default when EZMultiPli is excluded from the Z-Wave network.

Parameter Number	Parameter Name	Default	Description	Valid Values
1	OnTime	10 Min	OnTime sets the number of minutes that the lights stay on when motion has **not** been detected. A value of 0 is a special mode where the lights are sent a command to turn them on whenever motion is detected. EZMultiPli will NOT turn the lights off in this mode. A motion detection event is sent at most once per minute. **Recommended values:** 5 min for hallways 20 min for an office environment 60 min for a library, office or other room where someone may be sitting still for a long time	0, 1-127
2	OnLevel	-1	OnLevel is the value sent by the Z-Wave BASIC_SET command to all Association Group 2 nodes when motion is detected. A value of 0 will turn the lights off (not recommended). A value between 1 and 99 will set the dim level to between 1% and 99% (99% is full on). A value of -1 will turn the light “on” which depends on the device but most will set the dim level to the last dim setting.	0* 1-99, -1
3	LiteMin	60	A Luminance report is sent to the Lifeline every LiteMin minutes. Luminance values can be obtained at any time by polling.	1-255
4	TempMin	60	A Temperature report is sent to the Lifeline every TempMin minutes. Temperature values can be obtained at any time by polling.	1-255
5	TempAdj	Factory Default	TempAdj is a twos-complement number that is used to adjust the temperature reading to make it more accurate. The value is in tenths of degree Fahrenheit. The temperature reading can be adjusted by +12.7F to -12.8F. A value of 1 will adjust the temperature reading by +0.1F. A value of -5 will adjust the temperature by -0.5F. A value of 123 will adjust the temperature by +12.3F.	-128 - +127

Technical Information for Software Developers

This section is intended for home control software developers to support EZMultiPli in their home control software. Users of EZMultiPli do not need this information but it is provided here for serious DIYers who want to understand how the device works under the hood.

EZMultiPli is a complex Z-Wave device with multiple sensors. Proper support of all of these devices requires an accurate interview of the device and it’s capabilities via the NodeInfo command and the appropriate version support of each of the command classes. The sections that follow give additional details on how the device works to ensure reliable operation.

Command Classes

The table below provides a list of Z-Wave command classes, their version number and if the command class is secure or not. When EZMultiPli is joined securely using Security S2 encryption, the secure command classes must be encrypted using the negotiated security key. Use of Security S2 encryption is optional and is not required. During the inclusion process, the choice of using encryption is made by the system controller. Rev 1.xx firmware may have older versions of the command classes than listed in this table. Recommendation is to interview the device to determine the applicable command class version.

Command Class	Purpose	Version	Secure
ZWAVEPLUS_INFO	Z-Wave Device Type and Role Type	2	N
NOTIFICATION	Motion Sensor notifications	8	Y
SENSOR_MUTILEVEL	Light level and Temperature sensors	6	Y
SWITCH_COLOR	Color LED control	1	Y
SWITCH_MULTILEVEL*	Required by Certification – turns the LED on/off	2	Y
MANUFACTURER_SPECIFIC	Z-Wave fingerprint data – Mfg, Device Type, Device ID	2	Y
VERSION	Firmware and Command Class version	2	Y
ASSOCIATION_GRP_INFO	Defines the association groups	1	Y
ASSOCIATION	Association group commands	2	Y
CONFIGURATION	Configuration parameter Set/Get and reports	3	Y
NODE_NAMING	Assign a Name and Location to the device	1	Y
DEVICE_RESET_LOCALLY	Reset by pressing and holding the button	1	Y
FIRMWARE_UPDATE_MD	Over-the-Air (OTA) firmware update	2	Y
POWERLEVEL	Temporary RF power level for network maintenance	1	Y
SECURITY_2*	AES-128 encryption	1	N
TRANSPORT_SERVICE*	Large frame support	2	N
SUPERVISION*	Confirm Set commands were completed	1	N
BASIC	Turns the LED on/off	1	Y

* New for Rev 2.xx firmware - not included in Rev 1.xx firmware.

Z-Wave Fingerprint:

ManufacturerID: 0x001E = Express Controls
ProductID: 0x0001
ProductTypeID: 0x0004
RoleType: 0x05 = SLAVE_ALWAYS_ON – listening – routing node that improves the Z-Wave mesh
NodeType: 0x00 = ZWAVE_PLUS_NODE
Icon Type: 0x0C07 = SENSOR_NOTIFICATION_HOME_SECURITY

SmartStart

SmartStart support significantly simplifies installation and provisioning of the entire home automation system. The QR code printed on the EZMultiPli (also printed on the outside of the box) can be scanned prior to shipment of a kit of components so that the entire system can be pre-paired in the cloud. The user simply plugs all components of the kit into the wall and each device in turn will join the Z-Wave network securely. The user does not have to go around and push buttons and write down NodeIDs - just plug everything in and in a few minutes the system is setup and ready to go.

Security S2 is required as part of SmartStart which is recommended as the overhead for S2 is insignificant and the increase in security is important to most users. Neither SmartStart nor Security S2 is required for full operation of EZMultiPli as it is fully backwards compatible with non-secure systems. Note that Security S0 is NOT supported.

Inclusion Interview

When EZMultiPli is first included into the Z-Wave network, the system controller must interview EZMultiPli to determine the type of device is being included. The NodeInfo frame is returned which must then be parsed and further interviews of the command class versions and command support within some command classes is required. The interview process should be common for all Z-Wave Plus devices resulting in a fairly complete description of the device without requiring specialized coding for EZMultiPli.

The most important part of the interview process is to associate the system controller interface NodeID to association group 1 (LIFELINE). EZMultiPli will send all notifications to this node. Assign a Return Route to the group 1 NodeID to ensure proper routing without unnecessary delays. Configuration Command Class V3 is supported which means that the

valid configuration parameter names, min/max/default values and a brief description are available directly from the configuration command class. No custom programming is required.

Notification Command Class

Notification Command Class is an extended version of the original Alarm Command Class. Notification Command Class has support for many types of sensors and devices. The capabilities of the sensors can be interviewed to determine the sensor type and commands supported. EZMultiPli is a Home Security (Burglar) type device and sends event types of Motion Detection. When motion is detected or motion has not been detected for OnTime minutes, EZMultiPli will send:

Name	Value (HEX)	Description
Command Class	71	COMMAND_CLASS_NOTIFICATION
Command	05	NOTIFICATION_REPORT
V1 Alarm Type	00	Not used
V1 Alarm Level	00	Not used
Reserved	00	Reserved
Notification Status	00 or FF	00=DISARMED, FF=ARMED
Notification Type	07	Motion
Event	00 or 07	0=NoMotion, 7=Motion detected
Event Parameters		Encapsulated Node Naming Location. Generally this field can be ignored.

Note that by default the motion sensor is ARMed, meaning it will send reports when motion is detected. The motion sensor can be DISARMED via the NOTIFICATION_SET command with a value of 0.

When motion is detected (or no motion for OnTime minutes), EZMultiPli first sends a BASIC_SET to all association group 2 NodeIDs. These commands are sent WITHOUT ROUTING so EZMultiPli must be within direct range (30 feet) of any nodes in group 2. If the commands were sent with routing it could take many seconds for all nodes to receive the commands due to routing especially if one of the nodes is unreachable or has failed. This delay would result in a poor user experience. By sending the commands without routing, the commands are sent to all 4 nodes within a fraction of a second. Once the commands have been sent to group 2, then a Notification Report is sent to association group 1 which is typically the system controller node. The Notification Report is sent with full routing including explorer frames if necessary. Note that assigning Return Routes is the key to avoiding delays in the Z-Wave protocol trying to find a working route back to the system controller. If the user wishes to control nodes that are beyond direct range, they should be controlled by the system controller and not use EZMultiPli association group 2. The Power Level Command Class can be used to determine if the desired node is within reliable direct range or not.
To poll the current status of the motion sensor, use the version 1 Alarm Command Class ALARM_GET command. The ALARM_REPORT command returns an Alarm Level value of 00 if no motion is detected and FF if motion has been detected within the last OnTime minutes.

Association

The Association Group Information command class should be used to interview EZMultiPli to determine the level of support of the Association command class. EZMultiPli has two association groups:

Group 1: LIFELINE

This group supports a single NodeID and is normally assigned to the Z-Wave system controller when EZMultiPli is added to the Z-Wave network. All Notification command class reports (motion detection) are sent to the node assigned to this group. Advanced lighting control should be handled by a home control application based on these reports.

Group 2: BASIC

This group is used to directly turn lights on or off when motion is detected. Up to four (4) Z-Wave devices can be associated in this group. EZMultiPli will send a BASIC ON command to all devices that are associated in this group. Note that including the NodeID of EZMultiPli in this group will control the LED which will come on when motion is detected and goes off when no motion has been detected for OnTime minutes.

Return Routes should be assigned to all associated NodeIDs to minimize Z-Wave routing delays.

Multilevel Sensor Reports

The sensors should be interviewed to determine their capabilities and supported scales using the SENSOR_MULTILEVEL_SUPPORTED_GET_SENSOR and SENSOR_MULTILEVEL_SUPPORTED_GET_SCALE commands. The sensors can be polled at any time to determine their current reading.

The sensors will send the following reports unsolicited every 60 minutes by default. Configuration parameters can be used to change the interval between sensor updates.

Revision H boards can only report luminance in the Percent scale. The hardware revision can be determined using the Version Command Class Version 2 Get command. The Hardware Version field of the Version Report command will be 0x01 for Rev H boards (percent only) and will be 0x02 for Rev J and later units that support the Lux scale. The default scale is percent. The scale used for the unsolicited reports is the scale last requested via a GET command.

Light Level Sensor

Name	Value (HEX)	Description
Command Class	31	COMMAND_CLASS_SENSOR_MULTILEVEL
Command	05	SENSOR_MULTILEVEL_REPORT
Sensor Type	03	Luminance
Sensor Scale	01	Percentage value, single byte
Sensor Value	0-63	Relative luminance level 0-100%

Hardware Version 0x02 (Rev J boards) support the Lux scale as well.

Name	Value (HEX)	Description
Command Class	31	COMMAND_CLASS_SENSOR_MULTILEVEL
Command	05	SENSOR_MULTILEVEL_REPORT
Sensor Type	03	Luminance
Sensor Scale	0A	Lux, two bytes (Scale is in bits 3&4)
Sensor Value	0-10,000	Light level in Lux

Temperature Sensor

The scale of the temperature sensor can be either Celsius or Fahrenheit depending on the scale sent using a SENSOR_MULTILEVEL_GET command. By default the scale is Celsius. The application software should convert the report to the users desired temperature scale.

Name	Value (HEX)	Description
Command Class	31	COMMAND_CLASS_SENSOR_MULTILEVEL
Command	05	SENSOR_MULTILEVEL_REPORT
Sensor Type	01	Temperature
Sensor Scale	22 or 2A	22=Celsius, 2A=Fahrenheit One digit of fractional precision
Sensor Value MSB		Signed 16-bit value includes 1 digit of fractional data. A value of 320 is 32.0 and -555 is -55.5.
Sensor Value LSB		

Configuration Command Class

See the Configuration Parameters section for details on the configuration parameters. Version 3 of the Configuration command class provides a list of valid parameters, the name, minimum, maximum, default, size and a brief description in English. No need for custom programming, just interview the device and display the results to the end user.

The default values yield a usable device and only advanced users will want to change the configuration values. The most common configuration item to change is OnTime which determines the number of minutes of No-Motion to be detected before a Notification event of 0 is sent to the controller. If all timing is performed by the system controller, then this value may want to be changed to 2 minutes so that the controller is made aware of the lack of motion as soon as possible. An OnTime of zero is generally not recommended as there is no “off” notification in this mode.

If the user assigns NodeIDs to Association Group 2 then OnTime becomes very important and they should set the OnTime parameter.

Color Switch Command Class

The color of the LED is controlled with the Color Switch Command Class.

Name	Value (HEX)	Description
Command Class	33	COMMAND_CLASS_COLOR_CONTROL
Command	05	STATE_SET
Length	3	Number of ID/State pairs in this command
Capability ID	02	RED
State	00 or FF	00=OFF, 01-FF=ON
Capability ID	03	GREEN
State	00 or FF	00=OFF, 01-FF=ON
Capability ID	04	BLUE
State	00 or FF	00=OFF, 01-FF=ON
Dimming Duration		Not used

There are 3 LEDs inside the PIR sensor dome, RED, GREEN and BLUE. Each of the LEDs can be turned either ON or OFF to yield eight different colors. Dimming is not supported. A single command can set the value of all three LEDs or each LED can be controlled in a separate command. Recommendation is to always set all 3 colors to the desired value or else you may get unexpected results. Any channel not specified in the command will remain at its current value. The Multilevel Switch command class is a required part of the Color Switch command class however all the multilevel switch commands do is turn the LED on or off. Since the intensity of each of the 3 LEDs is binary, any setting other than 0 will turn the LED on to the color selected by the Color Switch command class. Switch Multilevel command class is listed in the NIF which is required for Z-Wave certification of any device with Color Switch command class. Switch Multilevel just turns the LED on with any value other than zero. Zero will turn the LED off. It is recommended to ignore Switch Multilevel and not display it to the user.

Note that if the pushbutton is pressed, the color setting is lost because the sensor will enter motion testing mode where the LED turns on white anytime motion is detected for 5 minutes. Setting the color however cancels motion testing mode and the color will remain.

A BASIC_SET command turns the LED on white or off.

Basic Command Class

The Basic command class can be used to turn the LED either On or OFF. The LED is set to white when the Basic command class SET command with any valid non-zero value. The LED is turned off with a Basic SET of 0. Recommendation is to use the Color Switch command class to select the desired color instead of Basic.

NodeIDs in Association Group 2 are sent Basic SET commands with a value of the OnLevel parameter when motion is detected. When motion has not been detected for the OnTime parameter number of minutes, then a Basic SET of 0 is sent.

Security S2

Security S2 is supported with the Authenticated and UnAuthenticated levels of security. The Authenticated level requires the user to enter the PIN code or QR code printed on the back of the EZMultiPli. The UnAuthenticated level does not require the PIN code. Both security levels will encrypt nearly all communication using AES-128 encryption to ensure reliable and secure communication.

Note that Security S0 command class is NOT supported due to the delays and overhead.

Firmware Update Command Class

The firmware of EZMultiPli can be updated in the field by the customer using the Firmware Update Command Class. An Intel Hex file of the Over-The-Air firmware can be obtained from the Express Controls web site.

NOTE! Version 1.xx EZMultiPli CANNOT be upgraded to 2.xx due to fundamental changes in the download format and the addition of Security S2. Attempts to OTA a 1.xx unit with 2.xx firmware will fail. It is recommended to exclude and include a 2.xx EZMultiPli without Security S2 before attempting to OTA the firmware. OTA with encrypted frames will work but takes significantly longer and is more prone to failure.

It is strongly recommended to bring EZMultiPli within a few feet of the system controller. This ensures reliable radio transfer of the firmware and minimizes the duration of the process. The firmware update takes about five minutes of continuous radio traffic so the update should only be done when the rest of the system is not required to be operational.

The following procedure should be used to update the firmware:

Step	System Controller	Device that needs updated firmware
	All commands use the COMMAND_CLASS_FIRMWARE_UPDATE_MD (0x7A)	
1	System controller decides to check for updates: Send **FIRMWARE_MD_GET(0x01)**	
2		Responds with **FIRMWARE_MD_REPORT(0x02)**
	Check the Manufacturer ID and FirmwareID fields. These values are assigned by the device Mfg and may or may not be the revision of the firmware. The two fields must uniquely identify the image. Checksum is optional and may be 0. If a newer firmware image is available continue, if not, exit.	
3		User must push the button to initiate the update (manual authentication is recommended) The also goes into LEARN mode and the LED blinks BLUE
4	Send **FIRMWARE_UPDATE_MD_REQUEST_GET(0x03)**	
5		Responds with **FIRMWARE_UPDATE_MD_REQUEST_REPORT**(0x04) LED changes to blinking YELLOW

Step	System Controller	Device that needs updated firmware
6		If the Update request is good and the user has pushed the button, Send **FIRMWARE_UPDATE_MD_GET** (0x05) with a report number of 1
7	Responds with **FIRMWARE_UPDATE_MD_REPORT** (0x06) with data (typically 40 bytes)	
8		Device validates the checksum of the received data and stores it in NVM increments the report number and sends **FIRMWARE_UPDATE_MD_GET**.
	Repeat steps 7-8 for each block of data. Both sides must have timeouts and retry blocks that failed to reach the other side. Either side may get duplicates so the report number must be checked and if the sequence is incorrect the command should be discarded.	
9	When the last block of data to be downloaded is ready to be sent, set the LAST bit and send FIRMWARE_UPDATE_MD_REPORT.	
10		Device sees the LAST bit is set, writes the remaining bytes from this smaller block to the NVM, call ZW_FirmwareUpdate_NVM_isValidCRC16 to check the CRC within the downloaded file is good, compares the CRC sent in step 3 with the computed CRC match, calls ZW_FirmwareUpdate_NVM_Set_NEWIMAGE(TRUE) if image is OK. This takes a few seconds. Sends **FIRMWARE_UPDATE_MD_STATUS_REPORT**
11		Wait for the SEND of the REPORT to complete and the callback to acknowledge that the report was sent. Enable the watchdog with ZW_WatchdogEnable() then execute a WHILE(1) and wait for the watchdog to reset the chip. The bootloader will identify the new firmware and copy it to flash. This process takes several seconds. The device then reboots again and should now be running the updated firmware.

Troubleshooting

Problem	Solution
Lights turn off when people are still in the room	Remember that EZMultiPli detects ***motion*** and cannot detect people. 1) Increase the OnTime so that the lights stay on long enough for someone to move before the lights turn off (>1 hour) 2) Move EZMultiPli closer to the people
Lights don't turn on when there is motion	EZMultiPli must be "Associated" with specific NodeIDs to control them directly. Associate EZMultiPli with the desired Z-Wave devices. The system controller must be associated in Group 1 so that the Notification events are sent to the controller.
Doesn't detect motion from a distance	Test the motion sensitivity by pressing the button then wait for the LED to stop blinking blue. The LED will then blink white briefly anytime motion is detected for about 5 minutes. Move around where you want motion to be detected and verify that the LED blinks when motion is present. The motion sensitivity approximately 12 feet so that it will cover a typical room without falsely reporting. Flipping EZMultiPli around will result in a slightly different motion detection pattern.
The LED doesn't come on when there is motion	This is normal. The LED illuminates when there is motion during the initial 5 minute period after pressing the push button. After this initial 5 minute testing period the LED goes off and stays off.
The temperature is off by several degrees	If EZMultiPli is plugged into an outlet on an exterior wall or close to the floor, the temperature may be off by a few degrees. The temperature reading can be adjusted using TempAdj Configuration Parameter.
Unable to directly control Security S2 devices	EZMultiPli can only directly control non-secure devices or devices at the same security level. The Z-Wave system controller has knowledge of all security levels so utilize it to control devices instead of having EZMultiPli control them directly.
Motion sensor doesn't work	Two things have to be setup for a system controller to receive motion events: 1) The system controllers NodeID must be added to Association Group 1 2) EZMultiPli must be ARMed The system controller should assign itself to group 1 when EZMultiPli is included into the Z-Wave network. Note that it may also need to reassign return routes if EZMultiPli is moved to a new location. A network rediscovery (aka "heal") may be required to correct routing issues. EZMultiPli is ARMed by default and generally remains that way. Some system controllers may DISARM it. See the documentation for your home control application on how to ARM/DISARM.
Can I use EZMultiPli outdoors?	EZMultiPli is not rated for outdoor use but if it is protected from rain/snow it is usable outdoors.
Other sources of technical help	There are a number of Z-Wave forums/blogs. Here are just a few: drzwave.blog board.homeseer.com www.z-wavealliance.org info@ExpressControls.com

Document History

Firmware Revision	Date	Description
2.02	1/23/2018	SDK 6.81.00 Adds SmartStart inclusion which adds a QRCode to each unit with a 5 digit PIN code to ensure fully encrypted security key exchange. SDK 6.81 adds Security S2 and full AES-128 encryption. Encryption is optional and is not required for full functionality. Configuration Command Class has been upgraded to V3 so that the configuration parameter names, min, max, default and a text description can be obtained directly from the device. The LiteMin and TempMin parameters have had the 0 option removed. Z-Wave certification requires that all sensors always report in and it is not allowed to turn them completely off. Z-Wave Certified
		Units with Rev 1.xx firmware CANNOT be over-the-air (OTA) firmware upgraded to the 2.xx firmware. Only units with the screw tab on the enclosure can be OTA upgraded with 2.xx firmware. Firmware update of the 2.xx firmware to a 1.xx unit will fail if attempted. Sensor functionality between Rev 1.xx and 2.xx is virtually identical. Rev 2.xx units add the Security S2 encryption and SmartStart inclusion features but the sensor functionality remains the same. 
1.10	9/22/2017	SDK upgrade to 6.51.10 Auto reboot if no communication after 18 hours or 10 frame delivery failures in a row. Improved watchdog reset calculations to improve robust operation even in the event of a soft failure.
1.8	6/15/2015	Add hardware revision to differentiate between Rev H and Rev J boards. Rev J boards have the improved light level sensor and support the LUX scale. Previous release remained in “learn mode” and would often be excluded when the controller was put into exclusion mode. LED will blink light blue when it is not joined to the Z-Wave network indicating it has been excluded.
1.6	4/13/2015	Release of the Rev J hardware board with improved light sensor. Adds the LUX scale to the luminance sensor. SDK 6.51.06
1.3	9/16/2014	Initial Z-Wave certified release. SDK 6.51.03

Regulatory Information

Z-Wave Plus Certified

Certificate number (Rev 1.xx) ZC10-14090018
SmartStart Certification (Rev 2.xx) ZC10-18015976

Z-Wave is a registered trademark of Sigma Designs and/or its subsidiaries.

Federal Communications Commission (FCC)

FCCID: UTH-ZW1410

This device complies with part 15 of the FCC rules. Operation of this device is subject to the following two conditions:

(1) This device may not cause harmful interference, and
(2) This device must accept any interference, including interference that may cause undesired operation.

NOTE: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna or device.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

WARNING!
Changes or modifications not expressly approved by Express Controls could void the user’s authority to operate the equipment.

ETL Certified

The ETL listed mark is proof that EZMultiPli was independently tested and meets the published safety standard. ETL listing is equivalent to the Underwriters Laboratory (UL) listed mark commonly found on many products sold in North America. The ETL listing service is managed by Intertek. The ETL control number for EZMultiPli is: 4010942.

Safety Standards:
UL 60950-1
Issued: 2007/03/27 Ed: 2 Rev: 2011/12/19 Information Technology Equipment Safety Part 1: General Requirements
CSA C22.2#60950-1
Issued: 2007/03/27 Ed: 2 (R2012) Information Technology Equipment Safety Part 1: General Requirements; Amendment 1: 2011

Warranty Information

LIMITED 2 YEAR WARRANTY

If within two (2) years from the date of purchase, this product fails due to a defect in material or workmanship, Express Controls LLC will repair or replace it, as its sole option, free of charge. This warranty is extended to the original household purchaser only and is not transferable. This warranty does not apply to: (a) damage to units caused by accident, dropping or abuse in handling, acts of God or any negligent use; (b) units which have been subject to unauthorized repair, opened or otherwise modified; (c) units not used in accordance with instructions; (d) damages exceeding the cost of the product; (e) the finish on any portion of the product, such as surface and/or weathering, as this is considered normal wear and tear; (f) transit damage, initial installation costs, removal costs, or reinstallation costs.
EXPRESS CONTROLS LLC WILL NOT BE LIABLE FOR INCIDENTAL OR CONSEQUENTIAL DAMAGES. SOME STATES DO NOT ALLOW THE EXCLUSION OR LIMITATION OF INCIDENTAL OR CONSEQUENTIAL DAMAGES, SO THE ABOVE LIMITATION OR EXCLUSION MAY NOT APPLY TO YOU. THIS WARRANTY IS IN LIEU OF ALL OTHER EXPRESS OR IMPLIED WARRANTIES. ALL IMPLIED WARRANTIES, INCLUDING THE WARRANTY OF MERCHANTABILITY AND THE WARRANTY OF FITNESS FOR A PARTICULAR PURPOSE, ARE HEREBY MODIFIED TO EXIST ONLY AS CONTAINED IN THIE LIMITED WARRANTY, AND SHALL BE OF THE SAME DURATION AS THE WARRANTY PERIOD STATED ABOVE. SOME STATES DO NOT ALLOW LIMITATIONS ON THE DURATIONS OF AN IMPLIED WARRANTY, SO THE ABOVE LIMITATION MAY NOT APPLY TO YOU.
This warranty service is available by either (a) returning the product to the dealer from whom the unit was purchased, or (b) mailing the product, along with proof of purchase, postage prepaid to the authorized service center listed below. This warranty is made by: Express Controls – www.ExpressControls.com. Please, be sure to package the product securely to avoid shipping damage.

Technical Specification

Operating Temperature Range: -20ºC to 80ºC
RF Range: 300 feet minimum line of sight
RF Data Rate: 9.6Kbps, 40Kbps, 100Kbps
RF Frequency: 908/916MHz (US)
RF Interface: ZW5202
Power Supply: 120VAC 60Hz 1Watt

Motion Sensor Range: 12ft
Motion Sensor Coverage: 90º
Temperate Accuracy: +/- 2.0C (-20C to 80C)
Temperature Resolution: 0.1C
Light Sensor: 0-10,000 lux
LED: 8 colors
Dimensions: 3.25”H x 1.9”W x 1.9”D
Weight: 50g

Z-Wave Command Class Support:
Routing Slave Enhanced 232
SmartStart
ZWavePlus
Notification (Alarm command class version 3)
Multilevel Sensor V6 (Luminance, Temperature)
Color Control
Manufacturer Specific
Version
Association Group Info
Association
Configuration
Node Naming
Device Reset Locally
Firmware Update
PowerLevel
Multilevel Switch
Basic
Security S2
Transport Service
Supervision

Ordering information:
EZMultiPl-US 908/916MHz for North America
SKU (EAN13):0661799815048