BRIDGE PRD

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Revision History

Revision	Date	Author(s)	Description
0.0.1	12.04.2018	MS	Created
0.0.2	12.04.2018	MS, SS	Revised table formatting
0.0.3	12.04.2018	MS	Added information to section 1.2
0.0.4	12.04.2018	MS	Changed author names to 'First Last' from 'Last, First'
0.0.5	13.04.2018	MS	Added sections 5 and 6

Contents

1 Overview

The Guardian Bridge is a device that can communicate to a single valve controller over Guardian RF and to a security panel over wire, or a Z-Wave hub. This allows a security panel or Z-Wave hub to open/close the valve controller and be alerted if a leak is detected.

1.1 Key Features

- GuardianRF, RelayLink™, Z-Wave
- USB or 12V power

1.2 Communication

1.2.1 GuardianRF

The Guardian Bridge will be able to send the following commands to the valve controller:

- Open the valve
- Close the valve

The Guardian Bridge will receive the following events from the valve controller:

- At least one sensor is wet
- All sensors are dry
- Valve opened
- Valve Closed

1.2.2 RelayLink™

The Guardian Bridge will be able to send the following information over RelayLink™

- At least one sensor is wet
- All sensors are dry

OR

- Valve is open
- Valve is closed

1.2.3 Z-Wave

The Guardian Bridge will be able to send the following information over Z-Wave:

- At least one sensor is wet
- All sensors are dry
- Valve is open
- Valve is closed

2 Specifications

This section describes the requirements and scope of the Guardian Bridge

2.1 Environmental Specifications

Feature	Description
Operating Temperature Range	0°C to 70°C
Operating Humidity Range	5% to 90% RH Non Condensing
Storage Temperature Range	-40°C to 75°C - capable of operation after a 20 minute transition from storage to operating temperature
Storage Humidity Range	0% to 95% RH - capable of operation after a 20 minute transition from storage to operating humidity
Vibration	All axes, amplitude: 2mm, frequency: 1Hz - 20,000Hz
Mechanical Shock (Drop)	1m

2.2 Performance Specifications

Feature	Description
Range	1000+ ft (Guardian RF) 150+ ft indoors (Z-Wave)
Life Expectancy	10 years
Reliability	1st year 99% 5 years 95%

2.3 Hardware Specifications

2.3.1 Bridge Specifications

Item	Description and Specifications
RF module	SX1276IMLTRT, IC RF TXRX 802.15.4 28VQFN
Z-Wave Module	
Input voltage	
GuardianRF Receive sensitivity	
Z-Wave Receive sensitivity	
GuardianRF TX power	
Operation current	
Maximum current	
LEDs	3x White, same as valve controller
OTA	Support remote FW upgrade (All MCUs)

2.4 Mechanical Specifications

The 3D CAD shall be modeled on nominal dimensions and shall be the primary source of dimensional information.

Item	Description and Specifications
Type	Plastic
Resin	Blue:3005U;
Finish	Same as valve controller

2.4.1 Tooling

Tooling shall be good for over 300,000 injections.

2.4.2 Fit and Finish

- Flash allowance shall not to exceed 0.13 mm (0.005in). Flash applies to parting lines, ejector pins, ejector blades and ejection sleeves
- Parting line mismatch shall not exceed 0.13 mm (0.005 in)
- Gate & Ejector pin scar/vestige shall be sub-flush unless otherwise specified
- Cosmetic surfaces shall be free of nicks, scratches, or tooling marks
- The finish and color shall be similar to the Guardian valve controller. Non-visible surfaces may not be textured
- Guardian logo, power, Z-Wave, and Guardian RF icons will be pad printed white

3 Functional Requirements

The Guardian Bridge translates communication from GuardianRF to either RelayLink^{TM} or Z-Wave.

3.1 LEDs

The power and GuardianRF LEDs on the front of the Guardian Bridge will behave the same as the Guardian. The Z-Wave LED will be off when not paired to a Z-Wave hub, blinking (same pattern as WiFi light on valve controller when hotspot is on) and on when paired to the hub.

3.1.1 LED Behavior

LED	Behavior	Events
1st LED (Power)	LED is ON	Bridge is powered on
	LED is OFF	Bridge is powered off
2nd LED (Z-Wave)	LED is ON	Bridge is included in a Z-Wave network
	LED is double-blinking	Bridge is in inclusion/exclusion mode
	LED is off	Bridge is not included in a Z-Wave network
3rd LED (GuardianRF)	LED blinks	Bridge has sent/received a GuardianRF transmission

3.2 Button

The single button will on the back will be used to pair the Bridge with a valve controller or a Z-Wave hub. A single press will be used to pair the Bridge to a valve controller (like shaking the leak detector). A triple press (3 presses in under 2 seconds) will put the bridge in Z-Wave inclusion mode if it has not been included yet, or in exclusion mode if it is currently included. The button will also be used for factory reset. To factory reset, the button will be held for 10 seconds.

3.3 Power

The Bridge will come with a plug-in 5V adapter with a micro-USB connector.

3.4 Guardian App and Device Pairing

The Bridge can be connected to the Guardian App if the user has a valve controller connected. The valve controller may not have a Bridge connected to it already.

3.4.1 Guardian App

The settings and information displayed to the user are TBD

3.5 Firmware Upgrades

The Bridge will be capable of OTA firmware updates. The GuardianRF MCU will be updated over GuardianRF, the Z-Wave module will be updated over Z-Wave. In case an OTW firmware update is required during development and testing the device will be designed in such a way that the firmware can be updated without complete disassembly.

3.6 GuardianRF

When any leak sensor is triggered the valve controller will send a message over GuardianRF to the bridge that one of the sensors is wet. Once all of the sensors are dry, the valve controller will send a message to the bridge that all sensors are dry When the Bridge receives a command to open or close the valve from Z-Wave or RelayLink™, an open or close command will be sent to the valve controller via GuardianRF.

3.7 RelayLink™

RelayLink™ is an revolutionary, innovative new communication protocol developed by Elexa Consumer Products to be faster and easier to use than current standards. Please see the RelayLink™ Specification Document for more information

4 Z-Wave

When the Bridge receives a 'leak detected' message it will inform the Z-Wave hub if it is paired. It will also inform the hub when an 'all sensors dry' message is received. The hub will also be able to send 'open valve' and 'close valve' messages to the bridge to relay to the valve controller. When included in the Z-Wave network, the Bridge will appear as two devices:

- An On/Off Switch
- A Leak Sensor

4.1 Z-Wave Inclusion

The Bridge will enter inclusion mode when first powered on (if not already included in a Z-Wave network) and will stay in inclusion mode for 30 seconds. After 30 seconds, if the Bridge is not included, pressing the button on the device 3 times in less than 2 seconds will put it back in inclusion mode for 30 seconds. When in inclusion mode, the Z-Wave LED will double blink. After successful inclusion the Z-Wave LED will remain solid.

4.2 Z-Wave Exclusion

If the hub is in exclusion mode and the Bridge is included in the Z-Wave network, a triple press of the Bridge button will put the device in exclusion mode. Upon successful exclusion the Z-Wave LED will turn off.

4.3 NWI

The Bridge will support NWI -Network Wide Inclusion

4.4 Z-Wave Specifications

4.4.1 Association Groups (AGs)

Association Group	Description
01	Lifeline This AG sends Binary Report when valve is opened or closed, Supports Device Reset Locally. When any leak sensor is wet, the device will send a leak notification
02	This AG is sent an Open/Close Basic Report
03	Sensor Multilevel Report containing the temperature information every 60 seconds

4.4.2 Compatible Command Classes

Command Class	Notes
COMMAND CLASS VERSION V2 (86)	Returned Value: 03 04 3D 01 01 01 00 Z-Wave Library Type: 03 (Enhanced Slave) Protocol Version: 04 3D Protocol Sub-Version: 01 01 Application Version: 01 Application Sub-Version: 00
COMMAND CLASS BASIC V1 (20)	-
COMMAND CLASS SWITCH BINARY V1 (25)	Binary Switch commands will open/close the valve. Reports are used to communicate valve opening/closing Valve Open FF Valve Closed: 00
COMMAND CLASS SENSOR MULTILEVEL V11 (31)	The Multilevel CC is used to communicate the temperature recorded by the Valve Controller in the Guardian system. This is only reported to association group 3. Returned Value: 01 XX XX Sensor Type: 01 (Temperature) Precision/Scale/Size (Celsius): 01 (Precision = 000; Scale = 00; Size = 001) Precision/Scale/Size (Farenheit): 01 (Precision = 000; Scale = 00; Size = 001) Sensor Data: 00 FF (-125 125 in Degrees Fahrenheit or Celsius)
COMMAND CLASS MULTI CHANNEL V4 (60)	The Multi Channel Command Class is used to distinguish commands to/from the Valve Controller endpoint (endpoint 1) and the Leak Detector endpoint (endpoint 2).
COMMAND CLASS MULTI CHANNEL V4 (60)	The Multi Channel Command Class is used to distinguish commands to/from the Valve Controller endpoint (endpoint 1) and the Leak Detector endpoint (endpoint 2).
COMMAND CLASS ASSOCIATION V2 (85)	Group 1 Group 1 is the “Lifeline” group, which can hold five devices.
COMMAND CLASS ASSOCIATION GRP INFO V3 (59)	-
COMMAND CLASS MANUFACTURER SPECIFIC V2 (72)	Returned Value: 02 1F 01 02 03 04 Manufacturer ID: 02 1F Product Type: 01 02 Product ID: 03 04
COMMAND CLASS DEVICE RESET LOCALLY V1 (5A)	-
COMMAND CLASS POWERLEVEL V1 (73)	-
COMMAND CLASS SUPERVISION V1 (6C)	-
COMMAND CLASS FIRMWARE UPDATE MD V4 (7A)	-
COMMAND CLASS CONFIGURATION V1 (70)	See Configuration Command Class Parameters

COMMAND CLASS NOTIFICATION V8 (71)	The Guardian Bridge sends a notification report to association group 1 when any Leak Detector in the system senses moisture. Returned Value: 00 00 00 FF 05 XX 00 00 V1 Alarm Type 00 (Unsupported) V1 Alarm Level 00 (Unsupported) Notification Status: FF (Unsolicited Reporting is Enabled) Notification Type: 05 (Water Alarm) Leak Detected Event: 02 (Water Leak Detected, Unknown Location) Leak Removed Event: 00 (Event Inactive) Sequence/Reserved/Event Parameters: Length 00 Notification Event Parameters: 00 (No Event Parameters)
COMMAND CLASS ZWAVE PLUS INFO V2 (5E)	Returned Value: 01 05 00 15 00 15 00 Z-Wave Plus Version: 01 Role Type: 05 Node Type: 00 Installer Icon Type: 15 00 User Icon Type: 15 00

5 RelayLink™

RelayLink™ provides power and two way communication between an ancient security panel and the Guardian Bridge, one bit at a time.

5.1 Pinout

Group	Power		Input		Output		
Pin Number	1	2	3	4	5	6	7
Label	+12V	GND	IN	GND	NO	COM	NC

5.1.1 Power Group

Pins 1 and 2 are used to supply power from a 12V security panel.

5.1.2 Input Group

Pins 3 and 4 are a configurable input. With the Guardian App the Bridge can be set to send an open or close command to the valve controller. Details are TBD

5.1.3 Output Group

Pins 5, 6, and 7 are the outputs. The Guardian App can be used to configure the output to be normally open (NO) or normally closed (NC) and which event triggers it to change state. Events include:

- Valve open
- Valve closed
- At least one leak sensor is wet
- All sensors are dry

6 Pad Printing

Pad printing will be done in white.

6.0.1 Required Logos/Labels

The following must be printed on the Bridge:

- Guardian logo on top
- Power symbol on 1st LED
- Z-Wave symbol on 2nd LED
- GuardianRF symbol on 3rd LED
- RelayLink™ pin numbers
- RelayLink™ pin labels
- Button must be labeled “BUTTON”

7 Packaging and Labels

8 Validation and Testing

9 Certifications