IN THE UNITED STATES DISTRICT COURT
FOR THE DISTRICT OF DELAWARE

KARAMELION LLC, Plaintiff, v. **RESIDEO TECHNOLOGIES, INC.,** Defendant.	CASE NO. 1:19-cv-00746-MN **JURY TRIAL DEMANDED** **PATENT CASE**

AMENDED COMPLAINT FOR PATENT INFRINGEMENT AGAINST RESIDEO TECHNOLOGIES, INC.

Plaintiff Karamelion LLC files this Amended Complaint for Patent Infringement against Resideo Technologies, Inc., and would respectfully show the Court as follows:

I. THE PARTIES

1. Plaintiff Karamelion LLC ("Karamelion" or "Plaintiff") is a Texas limited liability company with its principal place of business at 5570 FM 423, Suite 250 #2022, Frisco, TX 75034.

2. On information and belief, Defendant Resideo Technologies, Inc. ("Defendant") is a corporation organized and existing under the laws of Delaware and has a place of business at 1985 Douglas Drive North, Golden Valley, Minnesota. Defendant has a registered agent at Corporation Service Company, 251 Little Falls Drive, Wilmington, DE 19808.

II. JURISDICTION AND VENUE

3. This action arises under the patent laws of the United States, Title 35 of the United States Code. This Court has subject matter jurisdiction of such action under 28 U.S.C. §§ 1331 and 1338(a).

4. On information and belief, Defendant is subject to this Court's specific and general personal jurisdiction, pursuant to due process and the Delaware Long-Arm Statute, due

at least to its business in this forum, including at least a portion of the infringements alleged herein. Furthermore, Defendant is subject to this Court's specific and general personal jurisdiction because Defendant is a Delaware corporation.

5. Without limitation, on information and belief, within this state, Defendant has used the patented inventions thereby committing, and continuing to commit, acts of patent infringement alleged herein. In addition, on information and belief, Defendant has derived revenues from its infringing acts occurring within Delaware. Further, on information and belief, Defendant is subject to the Court's general jurisdiction, including from regularly doing or soliciting business, engaging in other persistent courses of conduct, and deriving substantial revenue from goods and services provided to persons or entities in Delaware. Further, on information and belief, Defendant is subject to the Court's personal jurisdiction at least due to its sale of products and/or services within Delaware. Defendant has committed such purposeful acts and/or transactions in Delaware such that it reasonably should know and expect that it could be haled into this Court as a consequence of such activity.

6. Venue is proper in this district under 28 U.S.C. § 1400(b). On information and belief, Defendant is incorporated in Delaware. Under the patent venue analysis, Defendant resides only in this District. On information and belief, from and within this District Defendant has committed at least a portion of the infringements at issue in this case.

7. For these reasons, personal jurisdiction exists and venue is proper in this Court under 28 U.S.C. § 1400(b).

III. COUNT I
(PATENT INFRINGEMENT OF UNITED STATES PATENT NO. 6,275,166)

8. Plaintiff incorporates the above paragraphs herein by reference.

9. On August 14, 2001, United States Patent No. 6,275,166 ("the '166 Patent") was duly and legally issued by the United States Patent and Trademark Office. The application leading to the '166 patent was filed on January 19, 1999. (Ex. A at cover). The '166 Patent is titled "RF Remote Appliance Control/Monitoring System." A true and correct copy of the '166 Patent is attached hereto as Exhibit A and incorporated herein by reference.

10. Plaintiff is the assignee of all right, title and interest in the '166 patent, including all rights to enforce and prosecute actions for infringement and to collect damages for all relevant times against infringers of the '166 Patent. Accordingly, Plaintiff possesses the exclusive right and standing to prosecute the present action for infringement of the '166 Patent by Defendant.

11. The invention in the '166 Patent relates to control and monitoring of distributed systems in buildings such as systems for controlling and monitoring heating, air conditioning, lighting, security, occupancy, and usage of distributed facilities. (Ex. A at col. 1:5-12). Control of such distributed systems in the prior art commonly used computer networks and business software. (*Id.* at col. 1:11-13). A major difficult with such systems was the expense of wiring inter-connections between elements of the system, particularly when there are additions or changes to be made in the system. (*Id.* at col. 1:14-18). Prior art attempts to reduce the expense of the systems included using efficient network products such as using a widely known Ethernet standard, using AC power wiring to transmit RF communications to remove controllers, and using a combination of wired and wireless communications. (*Id.* at col. 1:18-27).

12. However, these centralized wireless control systems for building appliances have not been widely used mainly because systems that have a sufficient communication ranges are normally subject to regulations and licensing requirements that are prohibitively expensive. (*Id.*

at col. 1:28-32). Also, systems that are powerful enough to be used in widely distributed installations are unnecessarily expensive to be used in smaller installations. (*Id.* at col. 1:32-34). With respect to wireless communication, there is limited availability of RF carrier frequencies, and potential interference with other nearby systems that might be operating in similar frequencies. (*Id.* at col. 1:34-37). Because of the continued deficiencies of the prior art solutions, there was a need for a wireless appliance control system that overcomes the disadvantages of the prior art solutions. (*Id.* at col. 1:38-39).

13. The inventors developed an invention that "meets this need by providing a wireless configuration that uses a distributed array of low power (short range) wireless controllers that are also functional as relay units for communicating with a headend control computer at long range." (*Id.* at col. 1:42-46).

14. The '166 patent discloses exemplary embodiments of the claimed invention. The claimed invention is typically implemented in a building or location that has an appliance control/monitoring system. (*Id.* at col. 3:64 – col. 4:7). For example, the following figure is of a building (11) having a distributed array of appliance management stations (12) that wirelessly communicate with a headend control station (14) (*Id.* at col. 3:66 – col. 4:4):

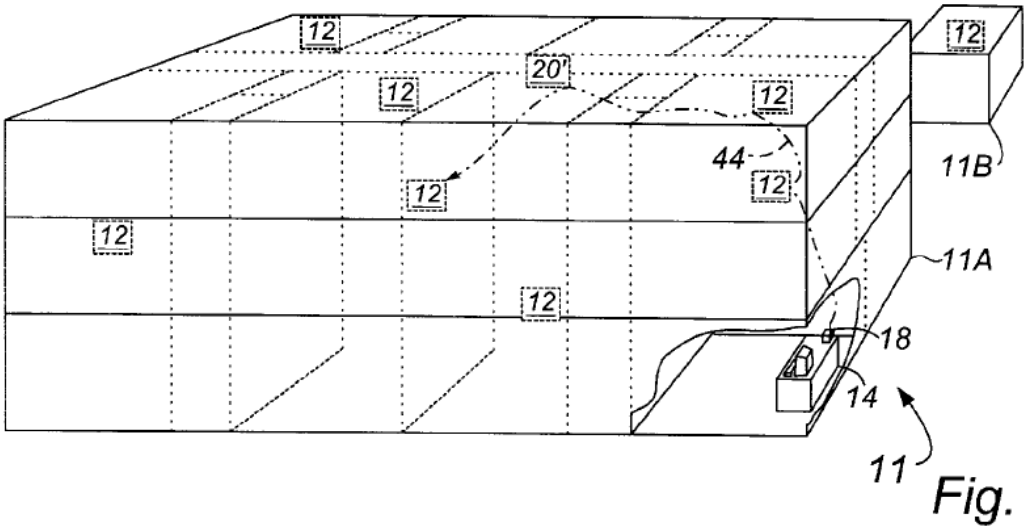
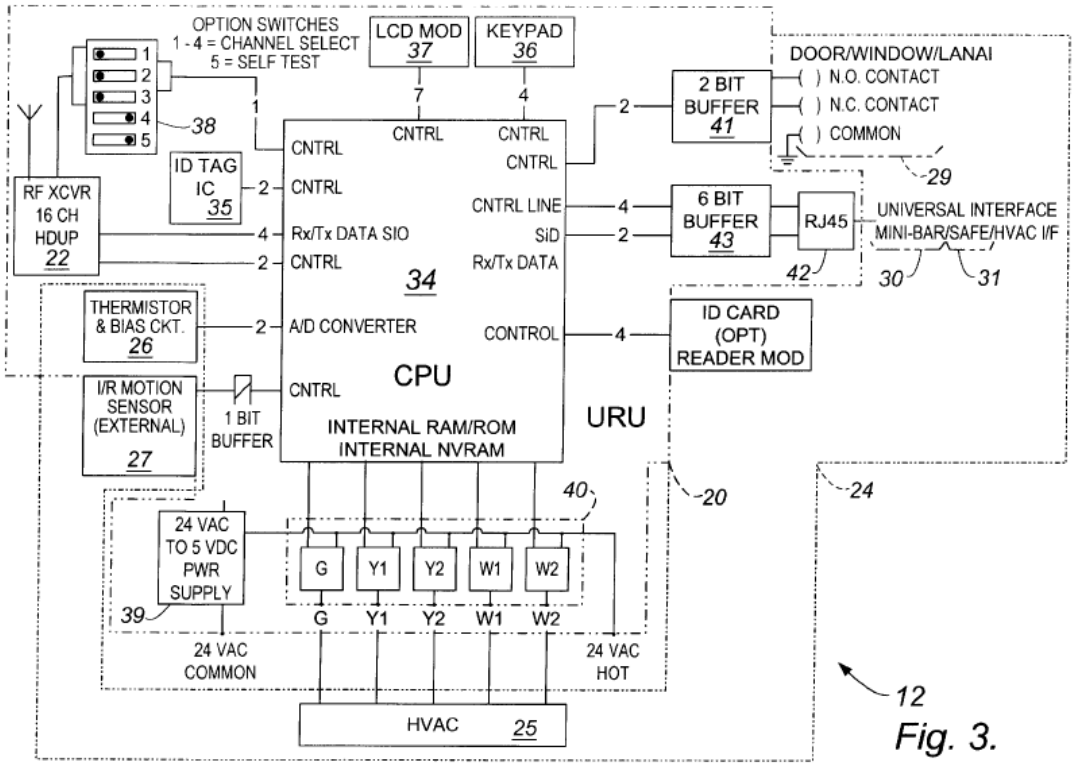


Fig. 2.

The typical appliances connected to the appliance control/monitoring system are heating, ventilation and air conditioning units (HVAC), temperature sensors, motion detectors, and audio/video devices. (*Id.* at col. 1:5-9, col. 4:54-61). The appliances are interfaced with relay units that have appliance interface/controllers to communicate with the appliance and satellite radio transceivers. (*Id.* at col. 4:62-66). The satellite radio transceivers of the relay units are operable at low power and have a limited wireless communications range that reaches only a portion of the building or location. (*Id.* at col. 4:62-66). In order to for the relay units to communicate beyond their limited wireless range, they communicate by relaying transmissions using intermediate relay units to the intended destination. (*Id.* at col. 4:66 – col. 5:1). An exemplary simplified circuit block diagram of the appliance controller portion of the relay unit, including a satellite radio transceiver, is shown in Figure 3 of the '166 patent:



(Ex. A). The microprocessor (34) is connected between a satellite transceiver (22) and the appliance device (24). (*Id.* at col. 5:13-15).

15. The '188 patent includes a diagram of an exemplary command protocol (Fig. 4) and exemplary return protocol (Fig. 5):

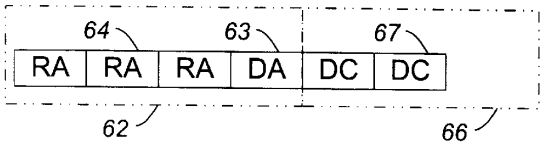


Fig. 4. 60

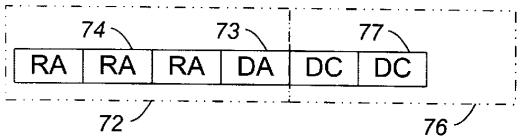
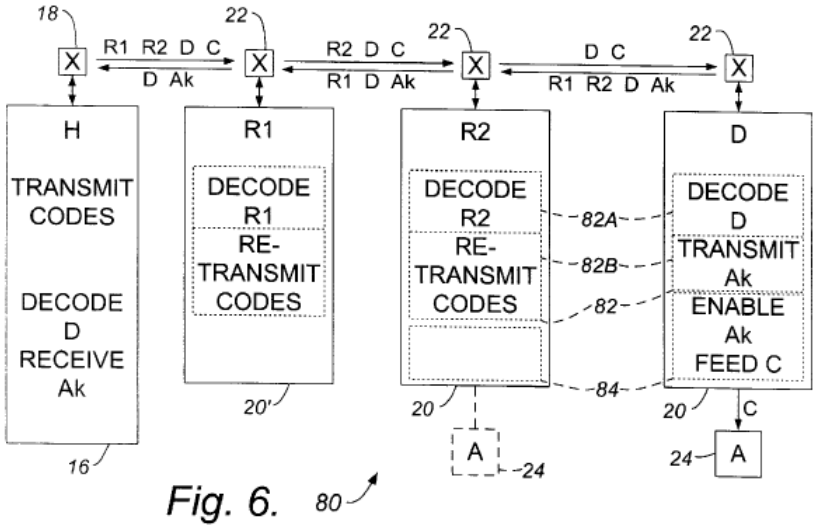


Fig. 5. 70

(Ex. A). The exemplary command protocol includes an address section (62) that includes a destination address (63) and may include relay addresses (64) so that the message may be relayed to another device. (*Id.* at col. 7:40-43). Following the address section is a command section (66) that includes device commands (67) that are directed to particular appliance devices at the destination relay unit. (*Id.* at col. 7:43-47). The exemplary return protocol includes a

counterpart of the address section (72) that includes a destination address (73) and relay addresses (74). (*Id.* at col. 7:48-51). Following the address section of the return protocol is a feedback section (76) that include feedback elements (77) that are responsive to the appliance devices at the destination relay unit. (*Id.* at col. 7:51-55).

16. A pictorial diagram showing an exemplary process for using a portion of the system is shown in Figure 6 of the '166 patent:



(Ex. A). A transmitter in the headend computer (H) signals the addresses of relay units (20), with one of the addresses being the destination address (D), and the other addresses include a first and second relay address (R1, R2), and a control signal (C) for appliance (A) being interfaced to the destination relay unit (D). (*Id.* at col. 7:56-65). The first relay unit decodes the first relay address, and transmits the control signal, the second relay address and the destination address from the first relay unit; the same steps occur at the second relay unit but with respect to decoding the second relay address. (*Id.* at col. 7:65 – col. 8:1). The destination relay unit decodes the destination address and feeds the control signal to the appliance; then the destination unit transmits the destination address, the first and second relay addresses, and an acknowledgement signal (Ak). (*Id.* at col. 8:2-6). The second relay unit decodes the second

relay address, and then transmits the acknowledgement signal (Ak), the first relay address, and the destination address; the same steps occur at the first relay unit but with respect to decoding the first relay address. (*Id.* at col. 8:6-9). The headend computer decodes the destination address and receives the acknowledgement signal (Ak). (*Id.* at col. 8:9-11). The decoding and transmitting in the relay units are implemented by first and second instruction portions (82A, 82B), respectively, of the relay program (82). (*Id.* at col. 8:11-14). The feeding of the control signal by the relay unit to the appliance and generating the acknowledgement signal occurs in the appliance program (84). (*Id.* at col. 8:14-16). Both the relay program and appliance program are in the microcomputer memory of each relay unit. (*Id.* at col. 8:16-18).

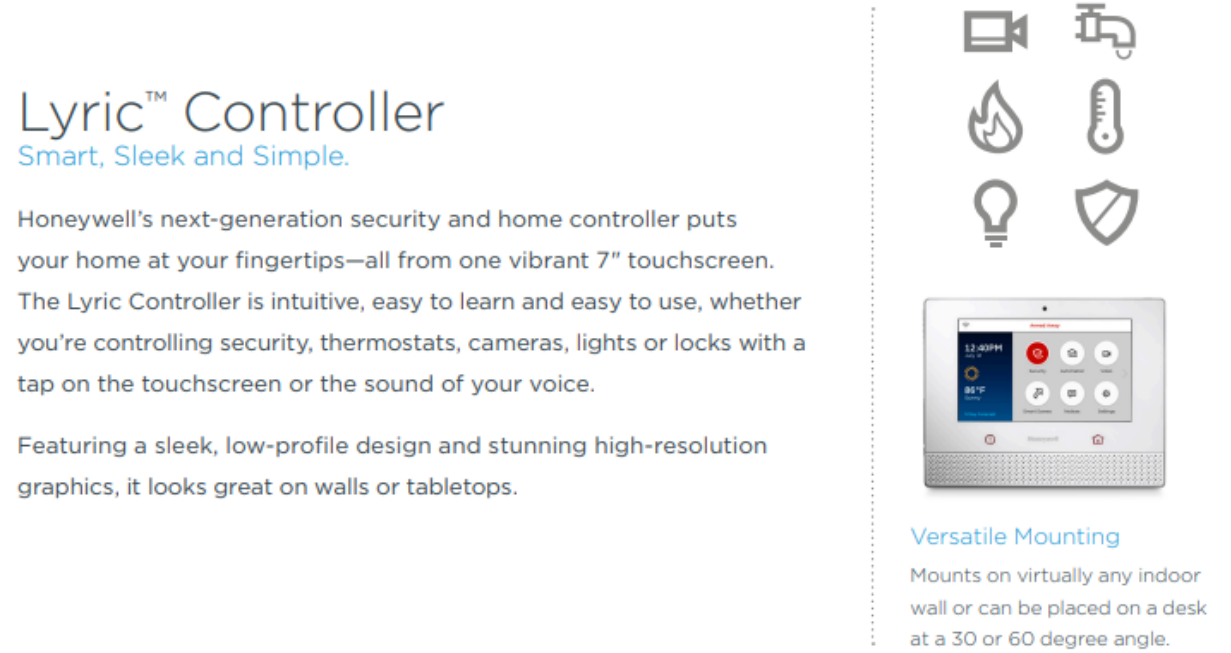
17. As explained during the prosecution history, the prior art did not teach a relay unit being an appliance controller that communicated with a headend computer using at least two other relay units. The invention therefore overcame the prior art, which were excessively expensive, had insufficient bandwidth, were ineffective in serving multiple devices, were unreliable, and were difficult to use. (Ex. B at col. 1:43-51).

18. **Direct Infringement.** Upon information and belief, Defendant has been directly infringing at least claim 1 of the '166 patent in Delaware, and elsewhere in the United States, by performing actions comprising making, using, selling, and/or offering for sale an appliance controller for a distributed appliance system having a headend computer, a multiplicity of appliances, and a plurality of relay units that satisfies the limitations of at least claim 1, including without limitation the Honeywell Lyric Controller, Z-Wave Switches (Honeywell Z-Wave Plus In-Wall Smart Switch, Honeywell Z-Wave Plus In-Wall Smart Fan Controller, Honeywell Z-Wave Plus Plug-in Smart Switch (Dual and Single Outlet), Honeywell Z-Wave Plus In-Wall Smart Switch, Honeywell Z-Wave Plus In-Wall Smart Dimmer, Honeywell In-Wall Add-On

Switch (Paddle), Honeywell In-Wall Add-On Switch (Toggle))/Thermostats (e.g., TH8320ZW, RTH8580ZW, RCHT8600)/outlets (Honeywell Z-Wave Plus Tamper-Resistant Smart Outlet, Honeywell Z-Wave Plus Plug-in Outdoor Smart Switch)/Locks/Garages and other Z-wave supported devices (*e.g.*, Honeywell Smart Home Security (RCHS5200W, RCHS5230W) ("Accused Instrumentality"). (*E.g.*, https://support.smartthings.com/hc/en-us/articles/360000328086-Honeywell-Z-Wave-Outlets-Switches-and-Dimmers; https://byjasco.com/brands/honeywell; https://products.z-wavealliance.org/products/2831).

19. Accused Instrumentality provides an appliance controller (*e.g.*, Z-Wave Switches (Honeywell Z-Wave Plus In-Wall Smart Switch, Honeywell Z-Wave Plus In-Wall Smart Fan Controller, Honeywell Z-Wave Plus Plug-in Smart Switch (Dual and Single Outlet), Honeywell Z-Wave Plus In-Wall Smart Switch, Honeywell Z-Wave Plus In-Wall Smart Dimmer, Honeywell In-Wall Add-On Switch (Paddle), Honeywell In-Wall Add-On Switch (Toggle))/Thermostats (e.g., TH8320ZW, RTH8580ZW, RCHT8600)/outlets (Honeywell Z-Wave Plus Tamper-Resistant Smart Outlet, Honeywell Z-Wave Plus Plug-in Outdoor Smart Switch)/Locks/Garages and other Z-wave supported devices (*e.g.*, Honeywell Smart Home Security (RCHS5200W, RCHS5230W)) for a distributed appliance system (*e.g.*, Z-Wave network) having a headend computer (*e.g.*, primary controller, such as a Honeywell Lyric Controller), a multiplicity of appliances (*e.g.*, appliances such as locks, lights, thermostats and outlets), and a plurality of relay units (*e.g.*, repeaters), one of the relay units being the appliance controller (*e.g.*, Z-Wave node). (*E.g.*, https://support.smartthings.com/hc/en-us/articles/360000328086-Honeywell-Z-Wave-Outlets-Switches-and-Dimmers; https://byjasco.com/brands/honeywell; https://products.z-wavealliance.org/products/2831).

20. Each Accused Instrumentality is an appliance controller comprising a low power satellite radio transceiver (*e.g.*, radio frequency transceivers within the various Z-Wave devices) having a range being less than a distance to at least some of the appliances.



(*E.g.*, https://www.honeywellhome.com/en/products/security-alarm-solutions/lyric-security-and-home-control-system (Lyric Brochure)).[1]

(*Id.*).

[1] Red boxes and lines are added unless otherwise noted.

Here's a bright idea: Using SmartThings with Honeywell Z-Wave Outlets, Switches, and Dimmers, you can control your lights at the tap of a button, create complex lighting automations, and monitor your smart home when you're not there.

This article will tell you how to connect the following Honeywell devices:

- Honeywell Z-Wave In-Wall Smart Switch (39348)
- Honeywell Z-Wave In-Wall Fan Controller (39358)
- Honeywell Z-Wave Plug-In Switch (Dual Outlet - 39342)
- Honeywell Z-Wave Plug-In Switch (39337)
- Honeywell Z-Wave In-Wall Smart Toggle Switch (39354)
- Honeywell Z-Wave In-Wall Smart Toggle Dimmer (39357)
- Honeywell Z-Wave Plug-In Outdoor Smart Switch (39346)
- Honeywell Z-Wave Plug-In Dimmer (Dual Outlet - 39339)
- Honeywell Z-Wave In-Wall Tamper Resistant Duplex Receptacle (39349)
- Honeywell Z-Wave In-Wall Smart Dimmer (39351)
- Honeywell Z-Wave Plug-In Dimmer (39336)

(*E.g.*, https://support.smartthings.com/hc/en-us/articles/360000328086-Honeywell-Z-Wave-Outlets-Switches-and-Dimmers).

Honeywell Z-Wave Thermostat (YTH8320ZW1007/U)

The Honeywell Z-Wave Thermostat (YTH8320ZW1007/U) is a programmable Z-Wave thermostat that can be used to remotely control and automate the temperature inside your home.

Combined with SmartThings, the Honeywell Z-Wave Thermostat enables you to make your house warmer or cooler with your smartphone no matter where you are. Take things to the next level and combine the device with SmartThings' mobile presence features to automatically turn off the AC as you leave the house.

(*E.g.*, https://support.smartthings.com/hc/en-us/articles/200902870-Honeywell-Z-Wave-Thermostat-YTH8320ZW1007-U-).

Automation: Z-Wave and Other Devices

Home > Automation

IMPORTANT

Automation can ONLY be used for lifestyle enhancement. It must not be used for personal safety or property protection.

Working with Z-Wave Devices

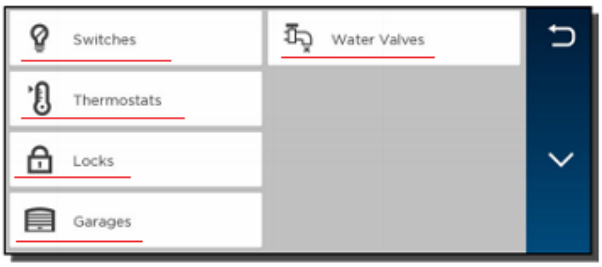
NOTE **Z-Wave automation functionality is supplementary only and has not been evaluated by compliance agency.**

Z-Wave technology is designed to automate devices in a home control network. The Lyric Controller is a security enabled Z-Wave device that supports Z-Wave Network Wide Inclusion (NWI) Mode.

The Controller and Z-Wave devices added to your system are linked together in a wireless network. Each device in the network is assigned a unique address and cannot be activated by a neighbor's Z-Wave controller. The Z-Wave network supports multiple controllers, allowing Z-Wave remote controls to be used throughout the home.

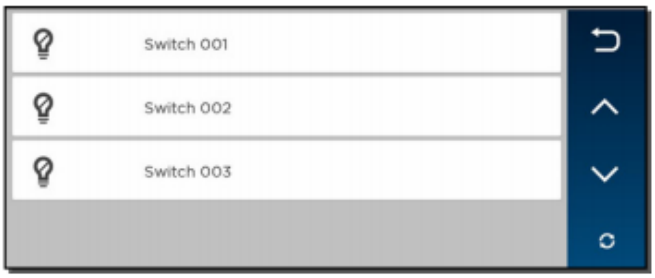
NOTE: In some cases, a Z-Wave device might not report its status to the Lyric Controller when an action is initiated at the device itself. This varies with the manufacturer.

Press **Automation** on the Home screen. The Automation Management screen appears, initially displaying categories of Z-Wave devices. (*Your Controller's display may differ from these illustrations.)*



(*E.g.*, https://www.honeywellhome.com/en/products/security-alarm-solutions/lyric-security-and-home-control-system (Lyric User Reference Guide).

Selecting a device category opens a list of devices in that category. An example of the **Switch** category is pictured.



For most devices, status is indicated by the color of the icon.

The **Refresh** button updates device status indications on the display.

Operating Z-Wave Devices Manually

1. On the Automation Management screen, select one of the device categories.
2. Select the device you wish to operate. Controls appear.
3. Lighting controls might offer an On/Off button or a slide control for dimmers.
4. Thermostats may display temperature set points and energy-saving features. The options shown will vary with your device.
5. Operate the device as desired.
6. Press to return to the previous screen.

Adding Z-Wave Devices (Include)

NOTE: When adding a device, it may be necessary to perform the **Exclude** procedure before the device can be Included successfully.

1. On the Automation Management screen, press the Down arrow.
2. Press **Tools**.
3. On-screen options appear, including **Include Devices**, **Exclude Devices** and **Advanced Tools**. (**View Failed Devices** may also appear.)
4. Select **Include Devices**.

   The panel enters Inclusion mode. Next, the panel displays "Ready to Include device. Press the function button on device".

(*Id.*).

Including Light Switches or Outlet Modules

Install the receptacle, wall switch or lamp/appliance module **before** Including it in your system. Refer to the device's instructions for more information about installation.

Z-Wave switches and outlet modules may vary. Refer to the device's instructions to ensure that it is Included properly in your system.

Including Door Locks

IMPORTANT

For security, Z-Wave door locks are encrypted, and enroll at low power transmission range (approximately 6 feet). This requires Including the lock before its installation in a door.

Assemble the lock, connect necessary cables and install batteries according to the device's instructions. **Be sure the door lock's orientation/handedness is correct**.

Z-Wave door locks vary. Refer to the device's instructions to ensure that it is Included properly and to program a user code.

After Inclusion, install the lock within recommended Z-Wave range (see **Wireless Range** for more information).

NOTES:

- Program the 4-digit user code into the Controller. When programming user codes into the Controller, determine if the user will have access to the Z-Wave lock. If so, the user code will be transferred to the lock.
- If using a lock with Smart Scenes, automatic locking/re-locking features should be disabled.
- Due to Low Power Inclusion Mode of secure devices, Include the Z-Wave Lock first, if not using an Inclusion Tool/Remote Control. The lock should be installed before including other devices.
- During operation, the system will display "JAMMED" and will revert to "Unlocked" status if a jammed lock is detected.
- When performing a command directly from a thermostat or water shutoff valve, a change of status message may not appear at the Controller.

Including Thermostats

Install and **test** the thermostat before Including it in your system. Refer to the device's instructions for more information about installation.

IMPORTANT

Honeywell is not responsible for property damages due to improper setting of thermostat modes.

NOTES:

- Some thermostats do not update temperature status automatically.
- When using Z-Wave thermostat control on the Controller, the thermostat's scheduling feature should not be used.
- When the HOLD button on the Controller's thermostat control screen is highlighted, Z-Wave scenes driven by Smart Scenes will not affect thermostat operation. Additionally, if your system is connected to remote services, the remote 7-day schedules will also not affect thermostat operation.
- For threshold monitoring to be configurable on the remote services and Z-Wave thermostat screens, the respective zones will first need to be assigned with a response type in zone programming. Threshold monitoring is not available on all thermostats.

(*Id.*).

Wireless Range

This device complies with the Z-Wave® standard of open-air, line of sight transmission distances of 100 feet. Actual performance in a home depends on the number of walls between the controller and the destination device, the type of construction and the number of Z-Wave enabled devices installed in the control network.

Note that Z-Wave home control networks are designed to work properly alongside wireless security sensors, Wi-Fi, Bluetooth and other wireless devices. Some 900MHz wireless devices such as baby cams, wireless video devices and older cordless phones may cause interference and limit Z-Wave functionality.

Things to consider regarding RF range:

- Each wall or obstacle (refrigerators, large TVs, etc.) between the remote and the destination device can reduce the maximum range of 100 feet by approximately 25-30%.
- Brick, tile or concrete walls block more of the RF signal than walls made of wooden studs and drywall.
- Wall mounted Z-Wave devices installed in metal junction boxes will suffer a significant loss of range (approximately 20%) since the metal box blocks a large part of the RF signal.

Additional Z-Wave Information

- Lyric can control up to **72** Z-Wave devices.
- The system supports a maximum of 232 nodes. Note that a node is created every time a device is Included, even if the device is being re-added to the system after being Excluded. This can cause the number of nodes in the system to exceed the number of actual devices.
- If the limit of 232 nodes is met and you need to add or re-Include more Z-Wave devices, use the Reset Controller function. Be aware that resetting the controller deletes all of the system's nodes, requiring all devices to be Included again. Node numbers can be viewed by selecting Automation > Tools > Advanced Tools > View Enrolled Devices. Remember that the system may require the Master User code for access to Advanced Tools.

(*Id.*).

Z-Wave Compatibility

Z-Wave devices vary; follow the instructions provided with the specific device when including and excluding devices into your Z-Wave network.

NOTE: Not all Z-Wave devices have been tested. Some functions may produce unpredictable results.

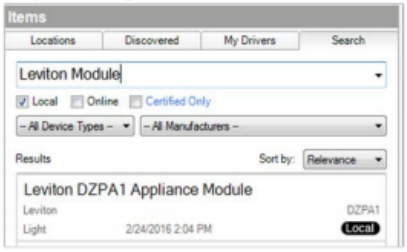
Door Locks	**Appliance**
Yale® Real Living Push-Button Lever Lock	HomeManageables Appliance Module
Yale Real Living Touchscreen Lever Lock	Wayne Dalton Small Appliance Module
Yale Real Living Push-Button Deadbolt Lock	GE® Wireless Lighting Control Plug-In Appliance Module
Yale Real Living Touchscreen Deadbolt Lock	Cooper In-Wall Duplex Receptacle Module (Model RF9505-TDS)
Schlage® Link Deadbolt Lock	**Lights**
Schlage Link Lever Lock	Leviton®/ViziaRF+® Switches
Kwikset® Smartcode Lever lock	Leviton/ViziaRF+ Dimmers
Kwikset Smartcode Deadbolt Lock	Leviton/ViziaRF+ Plug-In Appliance Modules
Thermostats	GE Wireless Lighting Control Dimmers
Honeywell Z-Wave Thermostat (ZWSTAT)	GE Wireless Lighting Control Switches
Wayne Dalton Z-Wave Thermostat	GE Wireless Lighting Control Plug-In Appliance Modules
Trane® Z-Wave Thermostat	Intermatic In-Wall Receptacle (Model HA01)
Residential Control Systems Thermostat (Model TZ45)	Cooper Plug-in Lighting Switch Module (Model RFAPM)
Intermatic InTouch Thermostat (Model CA8900)	AEON Labs Lamp/Dimmer Module (Model DSC06106-ZWUS)
Radio Thermostat Company of America (Model CT30, CT32, CT100, CT101 and CT110)	Remotec Lamp Dimmer Module (Model ZDS-100US)
Siren	**Window Shades**
FortrezZ SSA1/SSA2 Wireless Siren & Strobe Alarm	Somfy® ILT Series
Water Valve	
FortrezZ WV-01 Wireless Z-Wave Water Valve	

(*Id.*).

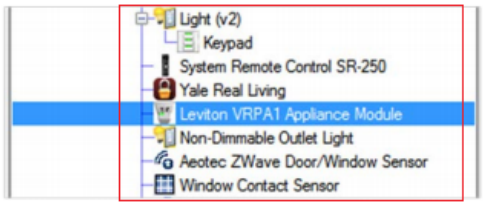
Z-Wave device drivers

To add a Z-Wave device driver into your project:

1 In System Design, enter the name of driver in the *Search* tab.



2 **Double-click** on the driver to add it into the project. You can also right-click on the driver and select **Add to Project** to add the driver.



3 If you have more than a couple Z-Wave devices, it is recommended that you rename this driver to help with troubleshooting multiple devices. **Right-click** on the driver and select **Rename**. Enter a descriptive name and press **Enter.**

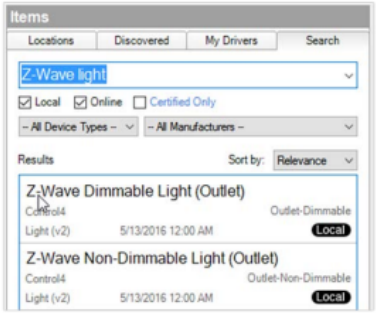
Most Z-Wave device drivers will also need a motorization, sensor, or light driver. For example, a window contact sensor device driver also needs the Window Contact Sensor driver and an outlet module device driver needs the Z-Wave Dimmable Light (Outlet) driver.

(*Id.*).

Motorization, sensor, and light drivers

To add a motorization, sensor or light driver into your project:

1 In System Design, enter the name of the driver in the search field in the *Search* tab.



2 **Double-click** on the driver to add it into the project. You can also right-click on the driver and select **Add to Project** to add the driver.

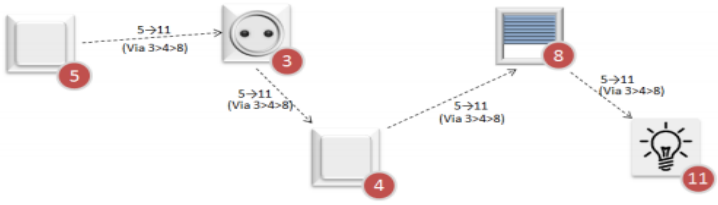
3 This is the driver that will show up in the UI, rename the driver to represent the device it is controlling. **Right-click** on the driver and select **Rename**. Enter the name to be shown in the UI and press **Enter**.

(*Id.*).

The Z-Wave Protocol handles transmissions to destinations all over the network. If necessary, other nodes are used as repeaters. This is called routing.

During bootstrapping, the Primary Controller asks the new node to discover its neighbors. Thanks to the neighbor nodes information, the Primary Controller builds a network map and knows the different possible routes to reach a node.

When using repeaters, the Sending node includes the route information in the frame. Each repeater parses the routing information and forwards the frame accordingly.



Example 4: Routing via repeaters

Routing may also be used during inclusion if a node is not within direct range of the Primary Controller.

(http://zwavepublic.com/sites/default/files/APL13031-2%20-%20Z-Wave%20Networking%20Basics.pdf).

Z-Wave Alliance Recommendation ZAD12837-1

Z-Wave Transceivers – Specification of Spectrum Related Components

(2014)

Scope

This Recommendation provides guidelines pertaining to spectrum usage of the short range narrowband digital radiocommunication transceivers complying with ITU-T Recommendation G.9959. ITU-T Recommendation G.9959 contains the system architecture, physical layer (PHY) and medium access control layer (MAC) specifications for G.9959 compliant transceivers.

References

[1] Recommendation ITU-T G.9959, *Short range narrowband digital radiocommunication transceivers – PHY & MAC layer specifications*

Definitions

This Recommendation uses the following definitions:

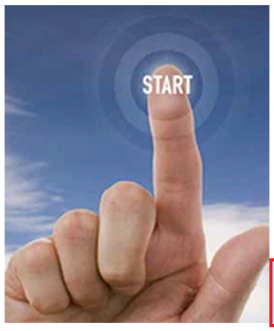
Channel: a transmission path between nodes. One channel is considered to be one transmission path. Logically a channel is an instance of the communications medium used for the purpose of passing data between two or more nodes.

Node: any network device that contains a G.9959 transceiver. In the context of this Recommendation, use of the term 'node' without a qualifier means 'G.9959 node'.

(https://z-wavealliance.org/wp-content/uploads/2015/02/ZAD12837-1.pdf).

21. Each Accused Instrumentality has an appliance interface for communicating with the at least one local appliance (*e.g.*, an interface which connects and makes possible the transmission of a signal to the switch, thermostat, lock). For example, the thermostat communicated with the furnace to turn on/off the furnace. (*Supra* ¶20).

22. Each Accused Instrumentality has a microcomputer connected between the satellite radio transceiver (*e.g.*, Z-Wave transceiver) and the appliance interface and having first program instructions for controlling the satellite transceiver (*e.g.*, the microcontroller controls the transmission of signals from the transceiver to the other Z-Wave nodes in the network), and second program instructions for directing communication between the satellite transceiver and the appliance interface (*e.g.*, the microcontroller within the Z-Wave device enables the command received from the primary controller by the Z-Wave transceiver to be communicated to the appliance interface of the device so that the intended action can be executed such as turn on a furnace). (*Supra* ¶20; https://standards.ieee.org/getieee802/download/802.15.4-2011.pdf).



Z-Wave's physical and media access layers (PHY/MAC) have been ratified by the International Telecommunication Union (ITU) as the international standard (G.9959). The Z-Wave Standard is administered by the Z-Wave Alliance which serves as the Standards Development Organization (SDO) for Z-Wave.

Together, Sigma Designs, the Z-Wave Alliance and the over 450 international companies that use Z-Wave technology in their products and services present the largest ecosystem of interoperable wireless control products in the world. The Z-Wave mesh communication protocol stack is embedded in the available chips and modules, and is accessed through a complete set of APIs. Z-Wave chips and modules provide Flash or OTP memory options for the manufacturer or OEM's application software.

For many products, the Z-Wave chip or module, with its on-board micro-controller, is all that is needed for a complete Z-Wave solution. For companies that choose chip-based over module-based solutions, a range of blueprints of the PCB circuitry surrounding the Z-Wave Single Chip is offered, including antenna circuitry and filters. Sigma Designs also licenses reference designs, stack software and APIs to chip manufacturers that are interested in entering the wireless control space, providing Z-Wave porting services that assure quality and accelerate product development. Z-Wave's industry-leading device specifications are available royalty free, based on a RAND model. The Z-Wave certification program ensures interoperability between all products.

(https://Z-Wavealliance.org/Z-Wave-oems-developers/).

The Version Command Class, version 2 is extended to report the version of various firmware images such as a host processor firmware, etc. in addition to the firmware image running in the Z-Wave chip.

As an example, one may construct a product comprising a Z-Wave chip and a secondary host processor that maintains a security certificate. With Firmware Update Meta Data Command Class, version 3 the Z-Wave chip, the host processor and the security certificate may all be updated via individual firmware IDs. Version 2 of the Version Command Class (this Command Class) allows a controlling node to request the corresponding version information for each firmware ID.

Commands not mentioned here remain the same as specified for Version Command Class, version 1.

4.20.1 Version Report Command

This command is used to report the library type, protocol version and application version from a node.

Version 2 of this command renames the fields Application Version and Application Sub Version to Firmware 0 Version and Firmware 0 Sub Version. The use remains the same.

A node MUST advertise the version of all firmware images which can be updated via the Firmware Update Command Class.

A one-chip system MUST comply with the following:

- The Firmware 0 Version MUST reflect the complete firmware implementing the Z-Wave protocol stack as well as the Z-Wave application.

A multi-processor system MUST comply with the following:

- The Firmware 0 Version MUST reflect the firmware implementing the Z-Wave protocol stack and the inter-chip interface module that enables the Z-Wave application to run in the host processor. Another firmware number (e.g. Firmware 1) version MUST reflect the Z-Wave application that runs in the host processor. Any firmware number larger than 0 MAY be used for this purpose.

(http://zwavepublic.com/sites/default/files/command_class_specs_2017A/SDS13782-4%20Z-Wave%20Management%20Command%20Class%20Specification.pdf).

23. Each Accused Instrumentality provides first program instructions including detecting communications directed by the headend computer (*e.g.*, primary controller, in this case Honeywell Lyric Controller) relative to the same appliance controller (*e.g.*, targeted Z-Wave node), signaling receipt of the directed communications (*e.g.*, sending acknowledgement signal through the Z-Wave transceiver), and directing communications to the headend computer relative to the same appliance controller (*e.g.*, sending status of an appliance or signal from a connected sensor). For example, Honeywell Lyric Controller can send/receive messages to program various connected Z-wave devices; the Z-wave thermostat can receive communications to turn up or down the heat, or can communicate regarding the status of the appliance. (*Supra* ¶20; https://standards.ieee.org/getieee802/download/802.15.4-2011.pdf).

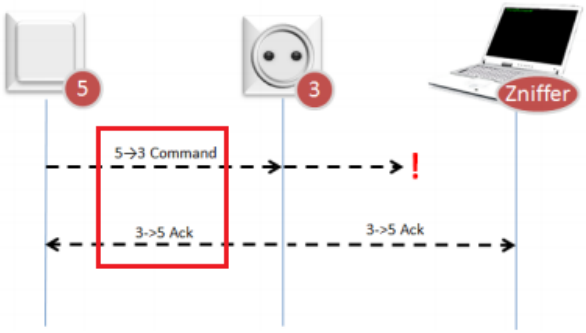
24. Each Accused Instrumentality has a second program instructions including detecting relay communications directed between the headend computer and a different relay unit, transmitting the relay communications, detecting a reply communication from the different relay unit, and transmitting the reply communication to the headend computer, wherein at least some of the relay units communicate with the headend computer by relay communications using at least two others of the relay units (*e.g.*, a Z-Wave node detects messages from primary controller and checks whether message is intended for itself, if not, then acting as a repeater, transmits it to next intended device in the route; the Z-Wave node detects messages from another Z-Wave node and forwards it to primary controller). The Accused Instrumentality work on Z-Wave technology which uses mesh network and would communicate with the headend computer by relay communications using at least two others of the relay units (*e.g.*, repeaters). (*Supra* ¶20; https://standards.ieee.org/getieee802/download/802.15.4-2011.pdf; https://www.zwaveproducts.com/learn/ask-an-expert/glossary/mesh-network; http://docslide.us/documents/Z-Wave-technical-basics-small.html; http://www.zwaveproducts.com/learn/Z-Wave).

Each frame carries a checksum. A Receiving node can verify the frame integrity thanks to this checksum. Invalid frames are discarded.

A Receiving node returns an Ack message in order to confirm that the frame has been received. If no Ack is received by the Sending node, it must assume that the transmission failed. The Sending node will then retransmit the same message until it gets feedback from the Receiving node. After three unsuccessful transmissions, the Sending node will consider the link to be down.

Ack messages are sent to confirm the frame integrity and do not imply that the Receiving node has understood or executed the command.

Local differences in wireless link quality may cause a Z-Wave network analyzer (known as a Zniffer) not to see the same transmissions as nodes participating in a transmission.



Example 3: Network analysis issues

(http://zwavepublic.com/sites/default/files/APL13031-2%20-%20Z-Wave%20Networking%20Basics.pdf).

This command is used to set the network route to use when sending commands to the specified NodeID.

The use of this command is NOT RECOMMENDED.

7	6	5	4	3	2	1	0
COMMAND_CLASS = NETWORK_MANAGEMENT_INSTALLATION_MAINTENANCE							
COMMAND = PRIORITY_ROUTE_SET							
NodeID							
Repeater 1 [First repeater]							
Repeater 2							
Repeater 3							
Repeater 4 [Last repeater]							
Speed							

NodeID (1 byte)

This field is used to specify the destination NodeID for which a last working route MUST be set.

Repeater (4 bytes)

This field is used to specify repeaters for the route. Each byte represents a NodeID and the first field (Repeater 1) is the first repeater of the route.

The value 0x00 MUST indicate that the byte does not represent a repeater. If the route is shorter than four repeaters, unused repeaters fields MUST be set to 0x00. If Repeater 1 is set to 0x00, it means that the Last Working Route is direct (nodes are within direct reach).

(http://zwavepublic.com/sites/default/files/command_class_specs_2017A/SDS13784-4%20Z-

Wave%20Network-Protocol%20Command%20Class%20Specification.pdf).

The Z-Wave Protocol handles transmissions to destinations all over the network. If necessary, other nodes are used as repeaters. This is called routing.

During bootstrapping, the Primary Controller asks the new node to discover its neighbors. Thanks to the neighbor nodes information, the Primary Controller builds a network map and knows the different possible routes to reach a node.

When using repeaters, the Sending node includes the route information in the frame. Each repeater parses the routing information and forwards the frame accordingly.

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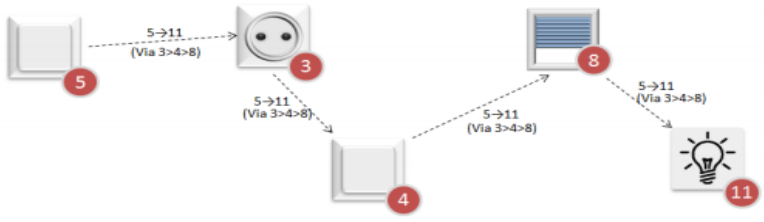

Example 4: Routing via repeaters

Routing may also be used during inclusion if a node is not within direct range of the Primary Controller.

(http://zwavepublic.com/sites/default/files/APL13031-2%20-%20Z-Wave%20Networking%20Basics.pdf).

III. COUNT II
(PATENT INFRINGEMENT OF UNITED STATES PATENT NO. 6,873,245)

25. Plaintiff incorporates the above paragraphs herein by reference.

26. On March 29, 2005, United States Patent No. 6,873,245 ("the '245 Patent") was duly and legally issued by the United States Patent and Trademark Office. The application leading to the '245 patent was filed on August 14, 2001, and is a continuation-in-part of the application leading to the '166 Patent. (Ex. B at cover). The '245 Patent is titled "RF Remote Appliance Control/Monitoring System." A true and correct copy of the '245 Patent is attached hereto as Exhibit B and incorporated herein by reference.

27. Plaintiff is the assignee of all right, title and interest in the '245 patent, including all rights to enforce and prosecute actions for infringement and to collect damages for all relevant times against infringers of the '245 Patent. Accordingly, Plaintiff possesses the exclusive right and standing to prosecute the present action for infringement of the '245 Patent by Defendant.

28. Because the '245 patent is a continuation in part of the application leading to the '166 patent, the '245 patent has a substantially overlapping specification and the background regarding the '166 patent is equally applicable and is incorporated by reference with respect to the '245 patent. (*Supra* ¶¶11-17).

29. **Direct Infringement.** Upon information and belief, Defendant has been directly infringing at least claim 1 of the '245 patent in Delaware, and elsewhere in the United States, by performing actions comprising making, using, selling, and/or offering for sale an appliance controller for a distributed appliance systems having a multiplicity of appliances, and a plurality of relay units, that satisfies the limitations of at least claim 1, including without limitation the Honeywell Lyric Controller, Honeywell Z-Wave Plus In-Wall Smart Switch, Honeywell Z-Wave Plus In-Wall Smart Fan Controller, Honeywell Z-Wave Plus Plug-in Smart Switch (Dual and Single Outlet), Honeywell Z-Wave Plus In-Wall Smart Switch, Honeywell Z-Wave Plus In-Wall Smart Dimmer, Honeywell In-Wall Add-On Switch (Paddle), Honeywell In-Wall Add-On Switch (Toggle))/Thermostats (e.g., TH8320ZW, RTH8580ZW, RCHT8600)/outlets (Honeywell Z-Wave Plus Tamper-Resistant Smart Outlet, Honeywell Z-Wave Plus Plug-in Outdoor Smart Switch)/Locks/Garages and other Z-wave supported devices (*e.g.*, Honeywell Smart Home Security (RCHS5200W,RCHS5230W) ("Accused Instrumentality"). (*E.g.*, https://support.smartthings.com/hc/en-us/articles/360000328086-Honeywell-Z-Wave-Outlets-

Switches-and-Dimmers; https://byjasco.com/brands/honeywell; https://products.z-wavealliance.org/products/2831).

30. Each Accused Instrumentality provides an appliance controller (*e.g.*, Honeywell Lyric Controller, Z-Wave Switches (Honeywell Z-Wave Plus In-Wall Smart Switch, Honeywell Z-Wave Plus In-Wall Smart Fan Controller, Honeywell Z-Wave Plus Plug-in Smart Switch (Dual and Single Outlet), Honeywell Z-Wave Plus In-Wall Smart Switch, Honeywell Z-Wave Plus In-Wall Smart Dimmer, Honeywell In-Wall Add-On Switch (Paddle), Honeywell In-Wall Add-On Switch (Toggle))/Thermostats (e.g., TH8320ZW, RTH8580ZW, RCHT8600)/outlets (Honeywell Z-Wave Plus Tamper-Resistant Smart Outlet, Honeywell Z-Wave Plus Plug-in Outdoor Smart Switch)/Locks/Garages and other Z-wave supported devices (*e.g.*, Honeywell Smart Home Security (RCHS5200W, RCHS5230W)) for a distributed appliance system (*e.g.*, Z-Wave network) having a multiplicity of appliances (*e.g.*, appliances such as furnaces, lights, etc.), and a plurality of relay units (*e.g.*, repeaters), one of the relay units being the appliance controller (*e.g.*, a Z-Wave Controller). (*Supra* ¶20; http://zwavepublic.com/sites/default/files/command_class_specs_2017A/SDS13782-4%20Z-Wave%20Management%20Command%20Class%20Specification.pdf; http://zwavepublic.com/sites/default/files/APL13031-2%20-%20Z-Wave%20Networking%20Basics.pdf)

31. Each Accused Instrumentality has a low power satellite radio transceiver (*e.g.*, radio frequency transceivers within the various Z-Wave devices) having a range being less than a distance to at least some of the appliances. (*Supra* ¶20).

32. Each Accused Instrumentality has an appliance interface for communicating with the at least one local appliance (*e.g.*, an interface which connects and makes possible the transmission of signal to the actual electrical appliance like a furnace). (*Supra* ¶20).

33. Each Accused Instrumentality has a microcomputer (*e.g.*, microcontroller) connected between the satellite radio transceiver (*e.g.*, Z-Wave transceiver) and the appliance interface and having first program instructions for controlling the satellite transceiver (*e.g.*, the microcontroller controls the transmission of signals from the transceiver to the other Z-Wave nodes in the network) and second program instructions for directing communication between the satellite transceiver and the appliance interface (*e.g.*, the microcontroller within the Z-Wave device enables the command received from the appliance interface to be communicated to the local appliance by the Z-Wave transceiver so that the intended action can be executed such as turn off/on a furnace). (*Supra* ¶¶20, 22; https://Z-Wavealliance.org/Z-Wave-oems-developers/; http://zwavepublic.com/sites/default/files/command_class_specs_2017A/SDS13782-4%20Z-Wave%20Management%20Command%20Class%20Specification.pdf; http://www.rfwireless-world.com/Tutorials/Z-Wave-physical-layer.html).

34. Each Accused Instrumentality has a first program instructions including detecting communications directed by another of the relay units (*e.g.*, another Z-Wave node acting as a repeater) relative to the same appliance controller (*e.g.*, targeted Z-Wave node), signaling receipt of the directed communications (sending acknowledgement signal through the Z-Wave transceiver), and directing communications to the other of the relay units relative to the same appliance controller (*e.g.*, sending status of an appliance or signal from a connected sensor). For example, Honeywell Lyric Controller can send/receive messages to program various connected Z-Wave devices; the deadbolt can receive communications to turn on/off a furnace or can

communicate regarding the status of the furnace. (*Supra* ¶20; http://zwavepublic.com/sites/default/files/APL13031-2%20-%20Z-Wave%20Networking%20Basics.pdf; http://zwavepublic.com/sites/default/files/command_class_specs_2017A/SDS13784-4%20Z-Wave%20Network-Protocol%20Command%20Class%20Specification.pdf).

35. Each Accused Instrumentality has a second program instructions including detecting relay communications directed between the another of the relay units and a different relay unit, transmitting the relay communications, detecting a reply communication from the different relay unit, and transmitting the reply communication to the other of the relay units, wherein at least some of the relay units communicate with others of the relay units by relay communications using at least two others of the relay units (*e.g.*, a Z-Wave node detects messages from primary controller and checks whether message is intended for itself, if not, then acting as a repeater, transmits it to next intended device in the route. Also, the Z-Wave node detects messages from another Z-Wave node and forwards it to primary controller. N number of nodes may be involved in the process acting as repeaters or relay units). The Accused Instrumentality works on Z-Wave technology which uses mesh network and would communicate with the other relay units by relay communications using at least two others of the relay units (*e.g.*, repeaters). (*Supra* ¶¶20, 24; http://zwavepublic.com/sites/default/files/APL13031-2%20-%20Z-Wave%20Networking%20Basics.pdf; http://zwavepublic.com/sites/default/files/command_class_specs_2017A/SDS13784-4%20Z-Wave%20Network-Protocol%20Command%20Class%20Specification.pdf; https://www.zwaveproducts.com/learn/ask-an-expert/glossary/mesh-network;

http://docslide.us/documents/Z-Wave-technical-basics-small.html;

http://www.zwaveproducts.com/learn/Z-Wave).

36. Plaintiff has been damaged because of Defendant's infringing conduct. Defendant is thus liable to Plaintiff for damages in an amount that adequately compensates Plaintiff for such Defendant's infringement of the '166 Patent and the '245 Patent, *i.e.*, in an amount that by law cannot be less than would constitute a reasonable royalty for the use of the patented technology, together with interest and costs as fixed by this Court under 35 U.S.C. § 284.

37. On information and belief, Defendant had at least constructive notice of the '166 Patent and the '245 Patent by operation of law, and there are no marking requirements that have not been complied with.

IV. JURY DEMAND

Plaintiff, under Rule 38 of the Federal Rules of Civil Procedure, requests a trial by jury of any issues so triable by right.

V. PRAYER FOR RELIEF

WHEREFORE, Plaintiff respectfully requests that the Court find in its favor and against Defendant, and that the Court grant Plaintiff the following relief:

a. Judgment that one or more claims of United States Patent No. 6,275,166 have been infringed, either literally and/or under the doctrine of equivalents, by Defendant;

b. Judgment that one or more claims of United States Patent No. 6,873,245 have been infringed, either literally and/or under the doctrine of equivalents, by Defendant;

c. Judgment that Defendant account for and pay to Plaintiff all damages to and costs incurred by Plaintiff because of Defendant's infringing activities and other conduct complained of herein, and an accounting of all infringements and damages not presented at trial;

d. That Plaintiff be granted pre-judgment and post-judgment interest on the damages caused by Defendant's infringing activities and other conduct complained of herein;

e. That Plaintiff be granted such other and further relief as the Court may deem just and proper under the circumstances.

May 13, 2019

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