**IN THE UNITED STATES DISTRICT COURT**
**FOR THE WESTERN DISTRICT OF OKLAHOMA**

| | | |
|---|---|---|
| SIPCO, LLC, | ) | |
| | ) | |
| Plaintiff, | ) | Case No. 5:19-cv-00709-PRW |
| | ) | |
| v. | ) | |
| | ) | **JURY TRIAL DEMANDED** |
| JASCO PRODUCTS COMPANY, LLC, | ) | |
| | ) | |
| Defendant. | ) | |

## SECOND AMENDED COMPLAINT FOR PATENT INFRINGEMENT

Plaintiff SIPCO, LLC ("SIPCO" or "Plaintiff") for its second amended Complaint against Jasco Products Company, LLC (collectively, "Defendant" or "Jasco") alleges the following:

## NATURE OF THE ACTION

1. This is an action for patent infringement arising under the Patent Laws of the United States, 35 U.S.C. § 1 *et seq*.

## THE PARTIES

2. Plaintiff is a limited liability company organized and existing under the laws of the State of Georgia with a place of business at 13921 Park Center Road, Herndon, VA 20171.

3. On information and belief, Jasco is a corporation organized under the laws of Oklahoma with a place of business at 10 E. Memorial Road, Oklahoma City, Oklahoma 73114.

4. On information and belief, Defendant sells and offers to sell products and services throughout the United States, including in this District, and introduces products and services into the stream of commerce and that incorporate infringing technology knowing that they would be sold in this District and elsewhere in the United States.

5. On information and belief, Defendant conducts a significant, persistent and regular amount of business in this District through product sales by its distributors, customers, and resellers and through online marketing, and derives substantial revenue from such business.

## JURISDICTION AND VENUE

6. This is an action for patent infringement arising under the Patent Laws of the United States, Title 35 of the United States Code.

7. This Court has subject matter jurisdiction under 28 U.S.C. §§ 1331 and 1338(a).

8. Venue is proper in this District under 28 U.S.C. §§ 1391(b), (c) and/or 1400(b). On information and belief, Defendant has placed, and is continuing to place, infringing products into the stream of commerce, via an established distribution channel, with the knowledge and/or understanding that such products are sold in this District. Defendant, directly or through intermediaries, conducts business in this District, and at least a portion of the acts of infringement and claims alleged in this Complaint have taken place and are continuing to take place in this District.

9. On information and belief, this Court has personal jurisdiction over Defendant because it is incorporated in Oklahoma and has purposefully availed itself of the privileges and benefits of the laws of the State of Oklahoma. Further, Defendant is subject to this Court's general and specific personal jurisdiction because Defendant has sufficient minimum contacts within the State of Oklahoma, pursuant to due process and/or the Oklahoma Long Arm Statute, because Defendant purposefully availed itself of the privileges of conducting business in the State of Oklahoma, and because Plaintiff's causes of action arise directly from Defendant's business contacts and other activities in the State of Oklahoma, including regularly doing or soliciting business and deriving substantial revenue from products and services provided to individuals in

this District. The exercise of jurisdiction over Defendant would not offend traditional notions of fair play and substantial justice.

## BACKGROUND

10. SIPCO is a small research, development and technology company originally based in Atlanta, Georgia. T. David Petite was its founding member.

11. In the 1990s, through his own individual research and development efforts, Mr. Petite invented a large number of wireless control and distribution technology applications. The inventions resulting from Mr. Petite's efforts include, but are not limited to, various ways of moving data as economically and seamlessly as possible over both wired and wireless networks.

12. Through the 1990s and early 2000s investors contributed tens of millions of dollars for technology development and implementation of networks. Clients included Georgia Power, Alabama Power, Newnan Utilities GA, Johnson Controls, Synovus Bank, and Grand Court Lifestyles residential living facilities.

13. After proving that the technology worked in the field, several companies competed to purchase an exclusive license to Mr. Petite's technology for the market known as "smart grid." Landis+Gyr (http://www.landisgyr.com/) (previously Siemens Metering) took an exclusive license to the smart grid technology in 2002 and in 2005 purchased rights to the technology for utility applications for an eight-figure amount. Mr. Petite's technology has been deployed in millions of meters deployed across North America and throughout the world.

14. SIPCO retained the rights to the mesh network patents, and for use of the technology outside of the utility space. It still maintains ownership of the software, firmware, hardware and patent portfolio that resulted from Mr. Petite's research and development efforts.

15. SIPCO's patent portfolios (of which the patents in suit are a part) include inventions that are widely recognized as pioneering in various fields of use. As a result, more than 100

corporations have taken licenses to them. Licensees include companies operating in the vertical markets of Industrial Controls, Lighting, Smart Grid, Building Automation, Network Backhaul, Home Appliance, Home Automation and Entertainment, Sensor Monitoring, and Internet Service Provisioning. Licensed products include products using standard wireless mesh protocols such as Zigbee and Z-Wave. *See* https://www.sipcollc.com/current-licensees.

16. SIPCO is the exclusive owner of all rights, title, and interest in the patents in suit, including the right to exclude others and to enforce, sue and recover damages for past and future infringement thereof.

**DEFENDANT'S KNOWLEDGE OF PLAINTIFF'S PATENTS**

17. Defendant has been aware of the patents in suit since many years prior to the commencement of this action.

18. In June 2012, Defendant was sent, and received, a correspondence describing the wireless mesh portfolio of patents. At the time, the patents in suit were owed by Plaintiff, but an entity called MPEG LA, LLC ("MPEG LA") was handling the licensing effort. MPEG LA's correspondence listed patents in the portfolio and pending applications, including the application number for U.S. Patent No 8,335,304.

19. In June 2012, Defendant was sent, and received a follow-up correspondence and several subsequent correspondence followed.

20. In October 2012, Defendant was provided draft license agreements, which also listed all patents and pending applications in the portfolio. Again, several subsequent correspondence followed.

21. By correspondence dated December 7, 2012, Defendant's general counsel wrote in an email to MPEG LA that Defendant had "analyzed the patents in the referenced portfolio," but had concluded that Defendant would not need a license.

22. In response dated December 10, 2012, MPEG LA's representative emphasized that the patents in the portfolio provide coverage for the use of Z-Wave protocol and that Jasco will need a license for any products using the Z-Wave protocol.

23. Representatives from MPEG LA and from Defendant then traded multiple correspondence to schedule a meeting at a trade conference in Las Vegas on January 10, 2013. The MPEG LA and Jasco representatives did meet at the trade conference on January 10, 2013.

24. In follow up to the meeting MPEG LA provided on January 17, 2013, to Defendant a representative list of patents. Again in response, Defendant stated that it had "reviewed the referenced patent claims" but that its position remained unchanged.

25. MPEG LA responded with another correspondence dated Feb. 7, 2013, that again listed patents and explained that any Z-Wave product would need coverage under at least some of the patents.

26. Defendant ceased responding to MPEG LA's correspondence for several months, even as MPEG LA representatives continued to point out that Jasco was infringing at least some of the portfolio's patents.

27. By correspondence dated December 5, 2013, MPEG LA provided claim charts to Defendant. Defendant failed to respond to the correspondence.

28. In early 2014, Plaintiff began handling the licensing activity directly and ceased using MPEG LA but, still, Defendant did not respond to repeated inquiries, both by email and telephone.

29. Finally, in June 2014, Defendant acknowledged that it had reviewed the claim charts but continued to maintain that it did not need a license.

**INFRINGEMENT OF U.S. PATENT NO. 6,836,737**

30. The allegations set forth in the foregoing paragraphs 1 through 29 are incorporated by reference into this claim for relief.

31. On December 28, 2004, U.S. Patent No. 6,836,737 ("the '737 Patent"), entitled "System and Methods for Providing Remote Monitoring of Consumption for a Utility Meter," was duly and legally issued by the United States Patent and Trademark Office. A true and correct copy of the '737 Patent is attached as Exhibit 1. Related U.S. application data is set forth on the face of the patent.

32. Plaintiff is the assignee and owner of the right, title, and interest in and to the '737 Patent, including the right to assert all causes of action arising under the '737 Patent and the right to any remedies for infringement of the '737 Patent.

33. Defendant has infringed and continues to infringe the '737 Patent under 35 U.S.C. § 271, literally or under the doctrine of equivalents, by making, using, selling, and/or offering for sale in the United States, and/or importing into the United States, infringing products without authorization (hereafter, "'737 Infringing Instrumentalities"). At a minimum, '737 Infringing Instrumentalities include, without limitation, Defendant's GE Z-Wave Direct- Wire Indoor/Outdoor Smart Switch 40A and GE Z-Wave Plus Direct-Wire Indoor/Outdoor Smart Switch 40A.

34. Defendants directly infringes and continues to directly infringe at least claim 1[1] of the '737 Patent by making, using, selling, offering to sell, importing and/or providing and causing to be used '737 Infringing Instrumentalities that are compliant with the Z- Wave protocol which

[1] Plaintiff reserves the right to identify additional asserted claims and accused products as this litigation proceeds. For example, Plaintiff expressly reserves the right to identify additional asserted claims and accused products during the discovery process.

satisfy, literally or under the doctrine of equivalents, each and every claim limitation of claim 1 of the ’737 Patent. The correspondence between the limitations of claim 1 of the ’737 Patent and such ’737 Infringing Instrumentalities is shown in the claim chart attached hereto as Exhibit 2. The claim chart is incorporated by reference as if set forth herein. The citations to the Z-Wave protocol in the claim chart, which is explained below, are required for a product configured to operate pursuant to Z-Wave. Additional details relating to such ’737 Infringing Instrumentalities and their infringement are within the possession, custody or control of Defendant.

35. Defendant provides users of ’737 Infringing Instrumentalities with instructions to operate within a Z-Wave network and markets Z-Wave connectivity in their promotional materials. To operate within a Z-Wave network, the ’737 Infringing Instrumentalities must operate pursuant to the Z-Wave protocol and the required portions of Z-Wave necessarily practice at least claim 1 of the ’737 Patent.

36. Claim 1 of the ‘737 Patent reads:

> A communication device adapted for use in an automated monitoring system for providing remote monitoring of utility consumption, the automated monitoring system comprising a site controller in communication with a plurality of utility meters via a wireless communication network and in communication with a host computer via a wide area network, the communication device comprising:
>
> a data interface configured to receive data related to the consumption measured by a utility meter;
>
> memory comprising a unique identifier corresponding to the utility meter;
>
> logic configured to receive the data related to the consumption measured by the utility meter, retrieve the unique identifier corresponding to the utility meter, and generate a transmit message using a predefined communication protocol being implemented by the wireless communication network, the transmit message comprising the unique identifier and the data related to the consumption measured by the utility meter and configured such that the transmit message may be received by the site controller via the wireless communication network and such that the site controller may identify the utility meter and notify the host computer of the transmit message;
>
> a wireless transceiver configured for communication over the wireless communication network and configured to provide the transmit message to the wireless communication network and receive messages from the

wireless communication network; and

logic configured to receive a transmit message from another communication device and retransmit the received transmit message.

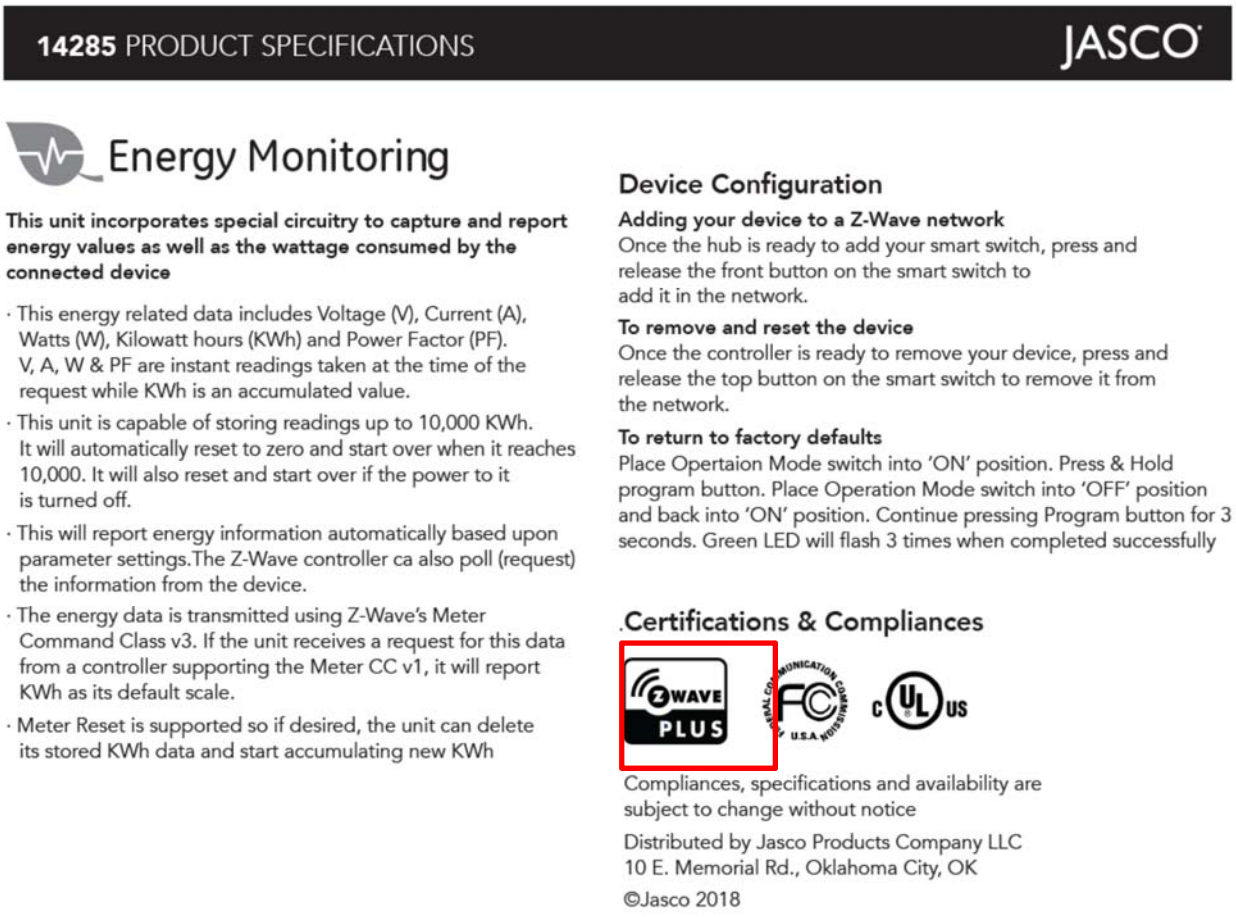
*See* Exhibit 1 at 17, lines 7-40.

37. As set forth in the claim chart attached as Exhibit 2, each element of claim 1 is infringed by the accused Jasco products.

38. To explain it in more detail, each part of the preamble, which reads:

> A communication device adapted for use in an automated monitoring system for providing remote monitoring of utility consumption, the automated monitoring system comprising a site controller in communication with a plurality of utility meters via a wireless communication network and in communication with a host computer via a wide area network, the communication device comprising:

maps to the accused Jasco's products. According to Jasco's own product literature, each "Jasco Z-Wave Smart Switch" supporting Z-Wave is for use in a Z-Wave network (in the preamble, "a wireless communication network") and provides remote energy monitoring of a connected device. This is clear from Jasco's 14285 Product Specification document, which shows "Jasco Z-Wave Smart Switch" is Z-Wave Plus certified (see red box around the Z-Wave Plus graphic).



**14285** PRODUCT SPECIFICATIONS JASCO

## Energy Monitoring

**This unit incorporates special circuitry to capture and report energy values as well as the wattage consumed by the connected device**

- This energy related data includes Voltage (V), Current (A), Watts (W), Kilowatt hours (KWh) and Power Factor (PF). V, A, W & PF are instant readings taken at the time of the request while KWh is an accumulated value.
- This unit is capable of storing readings up to 10,000 KWh. It will automatically reset to zero and start over when it reaches 10,000. It will also reset and start over if the power to it is turned off.
- This will report energy information automatically based upon parameter settings.The Z-Wave controller ca also poll (request) the information from the device.
- The energy data is transmitted using Z-Wave's Meter Command Class v3. If the unit receives a request for this data from a controller supporting the Meter CC v1, it will report KWh as its default scale.
- Meter Reset is supported so if desired, the unit can delete its stored KWh data and start accumulating new KWh

## Device Configuration

**Adding your device to a Z-Wave network**
Once the hub is ready to add your smart switch, press and release the front button on the smart switch to add it in the network.

**To remove and reset the device**
Once the controller is ready to remove your device, press and release the top button on the smart switch to remove it from the network.

**To return to factory defaults**
Place Opertaion Mode switch into 'ON' position. Press & Hold program button. Place Operation Mode switch into 'OFF' position and back into 'ON' position. Continue pressing Program button for 3 seconds. Green LED will flash 3 times when completed successfully

## Certifications & Compliances

Compliances, specifications and availability are subject to change without notice

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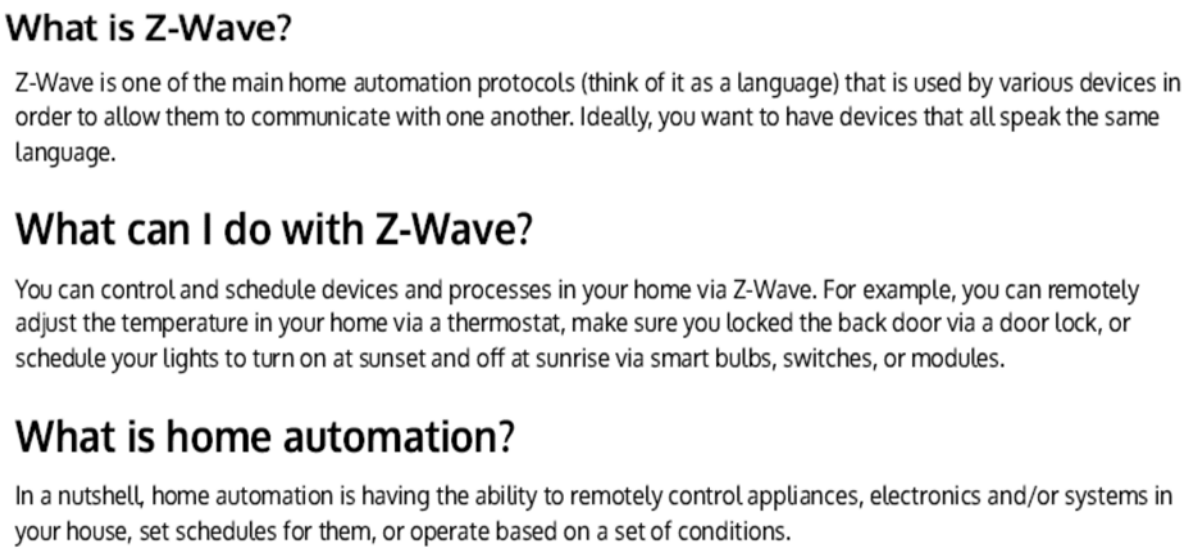
39. Further, Jasco's product literature below shows the operation and functionality of the Accused Jasco Products as "heavy duty switch enables wireless control of on/off functions of large load, hard-wired applications such as water heaters, landscape lighting, spas, pool pumps and heater units and more" which are "also equipped with state-of-the art energy monitoring capability, allowing you to monitor watts and kilowatts hours" (in the preamble, an "automated monitoring system").

40. Each of the "Jasco Z-Wave Smart Switch" supporting Z-Wave communicates with a compatible Z-Wave certified hub (in the preamble, "a site controller") and/or other compatible Z-Wave devices which together form a Z-Wave network (in the preamble, "a wireless communication network"). Jasco's "Q&A- Z-Wave Home Automation

(https://blog.byjasco.com/faq-z-wave-home-automation)" document, excerpted images below, shows that Z-Wave is a wireless communication network in which all Z-Wave devices are capable of communicating with one another.



## What is Z-Wave?

Z-Wave is one of the main home automation protocols (think of it as a language) that is used by various devices in order to allow them to communicate with one another. Ideally, you want to have devices that all speak the same language.

## What can I do with Z-Wave?

You can control and schedule devices and processes in your home via Z-Wave. For example, you can remotely adjust the temperature in your home via a thermostat, make sure you locked the back door via a door lock, or schedule your lights to turn on at sunset and off at sunrise via smart bulbs, switches, or modules.

## What is home automation?

In a nutshell, home automation is having the ability to remotely control appliances, electronics and/or systems in your house, set schedules for them, or operate based on a set of conditions.

41. Jasco's product literature below shows that "Jasco Z-Wave Smart Switch" is compatible with "SmartThings, Wink, ADT Pulse, Trane, Vivint, Nexia, Honeywell, HomeSeer, Harmony Home Hub Extender, Vera, Connect and Iris", wherein these aforementioned Z-Wave certified hub and compatible software applications "provides access from many popular home automation systems and applications" via the Internet (in the preamble, "a wireless communication network"), enabling end user to remotely control on/off status of a device connected to the accused "Jasco Z-Wave Smart Switch" and view information, such as energy usage, of the connected device using a compatible software application.


**Description**

Transform any home into a smart home with the GE branded Z-Wave Direct-Wire Indoor/Outdoor Smart Switch. When added to a Z-Wave network, the heavy duty switch enables wireless control of on/off functions for large load, hard-wired applications such as water heaters, landscape lighting, spas, pool pumps and heater units and more. The GE Smart Switch can be used indoors or outdoors and features an easy access wire connection block, front mounted LED lights indicating power and on/off status, and an override switch to turn connected devices on or off manually. The Smart Switch is housed in a lockable, tamper-resistant case to ensure settings and wiring are secure. The rugged, weather-resistant smart switch design will keep out dirt and debris while being durable enough for use in extreme weather conditions. The GE branded Z-Wave Direct-Wire Outdoor Smart Switch is also equipped with state-of-the-art energy monitoring capability, allowing you to monitor watts and kilowatt hours, and helping you keep your energy costs to a minimum. Take control of your home lighting and large load devices with a GE branded Z-Wave Smart Control!

**Features**

- Weather-resistant, rugged designed rain-proof housing suitable for use outdoors in damp or wet conditions
- Lockable, tamper-resistant metal case keeps out dirt/debris and keeps settings and wiring secure
- Smart Energy Monitoring – allows remote monitoring of watts and kilowatt hours with compatible Z-Wave systems
- LED Indicator Lights – front mounted LED lights indicate power and on/off status
- Manual Control – physical override switch to turn connected devices on or off manually
- Easy access wire connection block for direct wire installation
- Compatible with any Z-Wave certified hub, providing access from many popular home automation systems and applications (application software not included)
- Compatible with the following Z-Wave certified hubs: SmartThings, Wink, ADT Pulse, Trane, Vivint, Nexia, Honeywell, HomeSeer, Harmony Home Hub Extender, Vera, Connect and Iris. Works with Amazon Alexa for voice control (hub required)
- Requires a Z-Wave certified hub
- cUL Listed

42. Each of the "Jasco Z-Wave Smart Switch" supporting Z-Wave measures and reports power consumption of a connected device in watts and kilowatts to the Z-Wave certified hub in the Z-Wave network. Each Z-Wave certified hub is also configured to provide such power consumption information via the Internet (in the preamble, "a wide area network") to a smartphone, tablet or computer running or accessing compatible software ("a host computer").

43. Jasco's Z-Wave Wholesale Channel Sheet also shows Z-Wave devices in a Z-Wave network are capable of being in communication with "a phone, tablet, PC or Z-Wave remotes" (in the preamble "a host computer").


44. Further, Jasco's "Q&A- Z-Wave Home Automation (https://blog.byjasco.com/faq-z-wave-home-automation)" document shows "Z-Wave Hubs require an internet connection" in order to enable an end user to control and view information of Z-Wave devices in the Z-Wave network with smartphone:

## Do I need an internet connection in order to use Z-Wave devices?

Most Z-Wave Hubs require an internet connection so you can control your devices with your smartphone, and to take full advantage of the Z-Wave devices wireless smart functionalities. Several Z-Wave devices have the ability to be manually operated via physical buttons/switches on the devices themselves in the event that your internet is down temporarily. Z-Wave handheld controllers likely do not need the internet.

45. Additionally, the screenshot below is from Jasco's product literature and shows an exemplary display of energy consumption (in the preamble, "utility meter") in bar graph format on a mobile device

Save up to $2200 each year on your pool pump*, or up to $150 each year on your water heater** by scheduling runtimes. Works with all dimmable LED, CFL, halogen and incandescent bulbs. Requires installation with hard-wired connections.

*Cost savings based on 2HP pool pump operating 24 hrs/day, 365 days/yr @$0.12kwh vs scheduling just 4hrs/day.

**Cost savings based on 50 gallon electric water heater operating 24hrs/day, 365 days/yr @$0.12kwh vs scheduling just 10hrs/day.

## Energy Monitoring

This GE Smart Switch reports energy usage of connected devices providing the information and automation needed to reduce energy consumption and save money.

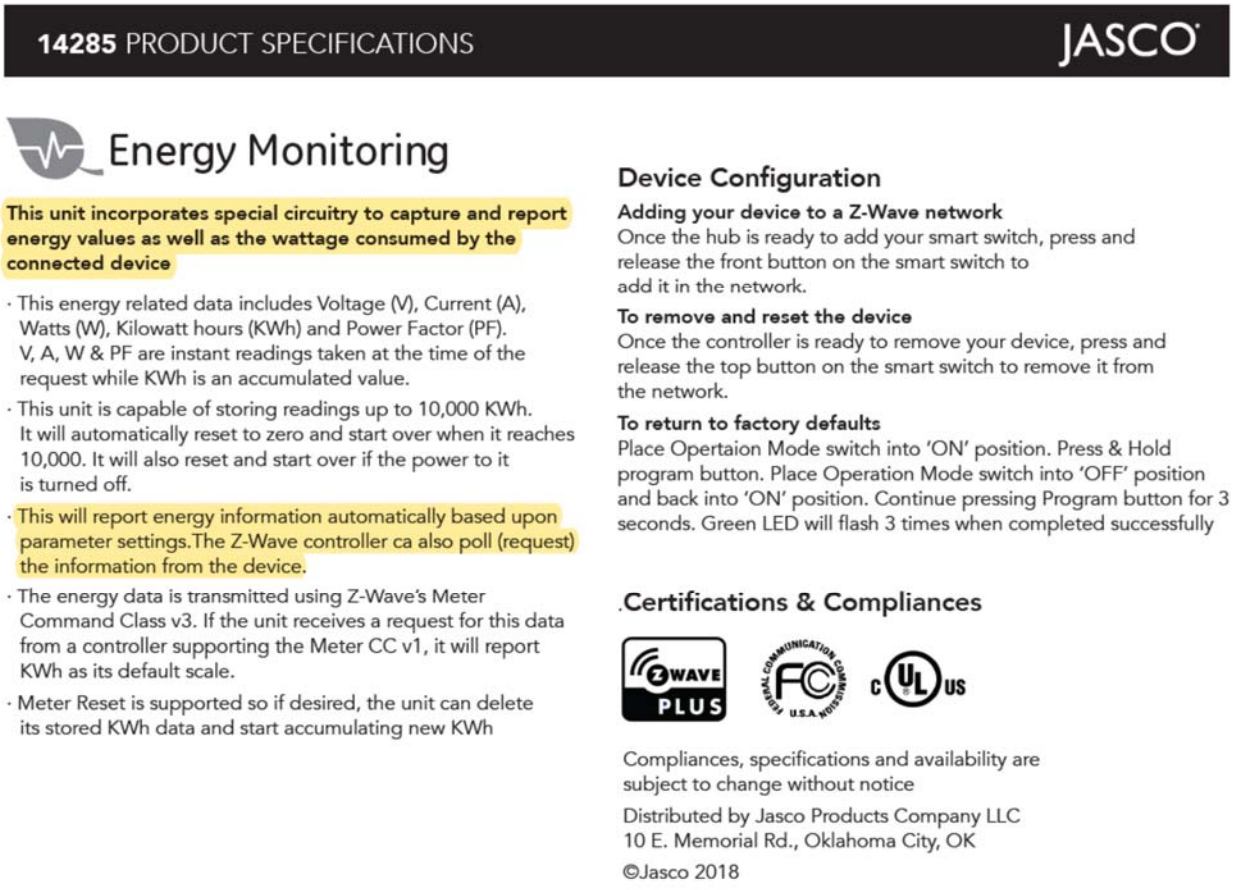

46. In sum, each element of the preamble is present in Jasco's own product descriptions.

47. The first element of claim 1 is "a data interface configured to receive data related to the consumption measured by a utility meter;"

48. This claim element is infringed, based on descriptions in Jasco's own product literature.

49. Specifically, each of the "Jasco Z-Wave Smart Switch" products supporting Z-Wave embodies this claim element because all include energy monitoring capability, and it is thereby inherent for all to include a built-in utility meter which measures energy consumption of a connected device in watts and kilowatts.

50. Jasco's 14285 Product Specification shows that each "Jasco Z-Wave Smart Switch" "incorporates special circuitry (in the claim, "data interface") to capture and report energy values as well as wattage consumed by the connected device (in the claim, "data related to the consumption measured by a utility meter")":



**14285** PRODUCT SPECIFICATIONS JASCO

## Energy Monitoring

**This unit incorporates special circuitry to capture and report energy values as well as the wattage consumed by the connected device**

- This energy related data includes Voltage (V), Current (A), Watts (W), Kilowatt hours (KWh) and Power Factor (PF). V, A, W & PF are instant readings taken at the time of the request while KWh is an accumulated value.
- This unit is capable of storing readings up to 10,000 KWh. It will automatically reset to zero and start over when it reaches 10,000. It will also reset and start over if the power to it is turned off.
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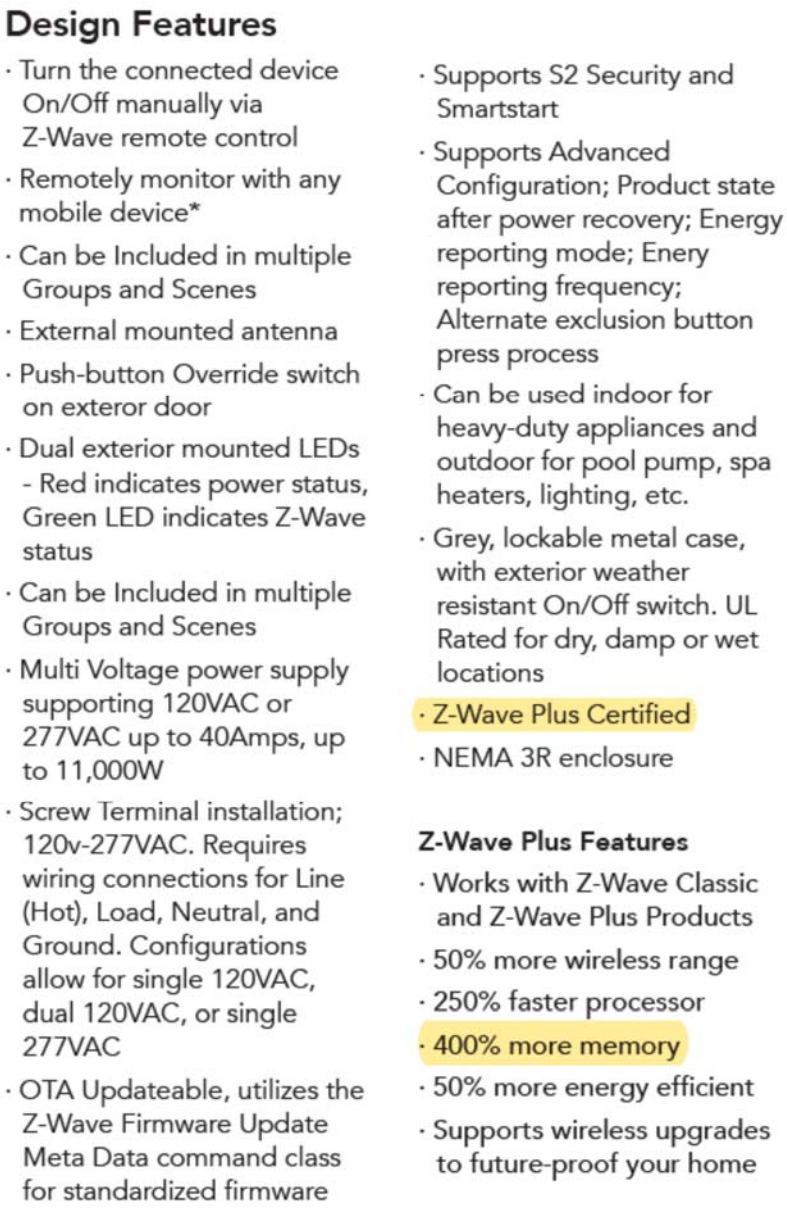
51. For this special circuitry to capture and report energy consumption values, it must be configured to receive measured energy usage data from the built-in energy measurement component (in the claim, "configured to receive data related to the consumption measured by a utility meter").

52. The next element of claim 1 reads: "memory comprising a unique identifier corresponding to the utility meter;"

53. It is clear that each of the "Jasco Z-Wave Smart Switch" includes a memory, because Jasco's 14285 Product Specification shows that each "Jasco Z-Wave Smart Switch", as a Z-Wave Plus certified device, has 400% more memory which is a common feature across all Z-Wave Plus certified devices (in the claim, "memory").



## Design Features

- Turn the connected device On/Off manually via Z-Wave remote control
- Remotely monitor with any mobile device*
- Can be Included in multiple Groups and Scenes
- External mounted antenna
- Push-button Override switch on exteror door
- Dual exterior mounted LEDs - Red indicates power status, Green LED indicates Z-Wave status
- Can be Included in multiple Groups and Scenes
- Multi Voltage power supply supporting 120VAC or 277VAC up to 40Amps, up to 11,000W
- Screw Terminal installation; 120v-277VAC. Requires wiring connections for Line (Hot), Load, Neutral, and Ground. Configurations allow for single 120VAC, dual 120VAC, or single 277VAC
- OTA Updateable, utilizes the Z-Wave Firmware Update Meta Data command class for standardized firmware
- Supports S2 Security and Smartstart
- Supports Advanced Configuration; Product state after power recovery; Energy reporting mode; Enery reporting frequency; Alternate exclusion button press process
- Can be used indoor for heavy-duty appliances and outdoor for pool pump, spa heaters, lighting, etc.
- Grey, lockable metal case, with exterior weather resistant On/Off switch. UL Rated for dry, damp or wet locations
- Z-Wave Plus Certified
- NEMA 3R enclosure

**Z-Wave Plus Features**

- Works with Z-Wave Classic and Z-Wave Plus Products
- 50% more wireless range
- 250% faster processor
- 400% more memory
- 50% more energy efficient
- Supports wireless upgrades to future-proof your home

54. Each of the "Jasco Z-Wave Smart Switch" supporting Z-Wave include built-in utility meter as described previously. Each Z-Wave device is identified by a unique identifier (in the claim, "unique identifier") which comprises a "Home ID" and "Node ID".

55. The Software Design Specification - Z-Wave Protocol Overview at p.6 states: "The Z-Wave protocol uses a unique identifier called the Home ID to separate networks from each other. The Home ID is a 32 bit unique identifier that is pre programmed in all controller devices. … Node

ID's are used to address individual nodes in a network, they are only unique within a network defined by a unique home ID. A node ID is an 8 bit value and like home ID's they are assigned to slave nodes by a controller."

56. This same unique identifier thereby must also correspond to the utility meter (in the claim, "corresponding to the utility meter") built-in to the accused Jasco "Z-Wave Smart Switch".

57. The Accused "Jasco Z-Wave Smart Switch" is Z-Wave device of type "enhanced slave" according to its Z-Wave certification and conformance statement (https://products.z-wavealliance.org/products/2939?selectedFrequencyId=2), captured in this image:

## Direct-Wire Outdoor Smart Switch (40 Amp)

**Brand Name:** GE
**Product Identifier:** 14285/ZW4007
**Product Version:** HW: 255 FW: 5.53
**Z-Wave Certification Number:** ZC10-18056123
**Z-Wave Certification Date:** 5/25/2018
**Use In:** U.S. / Canada / Mexico
**Z-Wave Protocol Implementation Conformance Statement:** View Download

Transform any home into a smart home with the GE 40 Amp Z-Wave Direct-Wire Indoor/Outdoor Smart Switch. When added to a Z-Wave network, the heavy duty switch enables wireless control of on/off functions for large load, hard-wired applications such as waters heaters, landscape lighting, spas, pool pumps and heaters. The Smart Switch can be used indoors or outdoors and features an easy access wire connection block, front mounted LED lights indicating power and on/off status, and an override switch to turn connected devices on or off manually. The Smart Switch is housed in a lockable, tamper-resistant case to ensure settings and wiring are secure. The rugged, weather-resistant design will keep out dirt and debris while being suitable for use in extreme weather conditions. The GE Z-Wave Direct-Wire Outdoor Smart Switch is also equipped with state-of-the-art energy monitoring capability, allowing you to monitor watts and kilowatt hours, helping you keep your energy costs to a minimum. Take control of your home lighting and large load devices with GE Z-Wave Smart Lighting Controls!

**Product Features:** View Features
**Z-Wave Plus Version:** 1
**Security S2 Classes:** S2 Authenticated, S2 Unauthenticated
**SmartStart Compatible:** Yes
**Manufacturer Provided Product Manual:** Download
**Association Capabilities:** View Associations
**Configuration Capabilities:** View Configuration Parameters
**Z-Wave hardware platform:** ZM5202
**Z-Wave version:** 6.81.01
**Z-Wave library type:** Enhanced 232 Slave
**Z-Wave Device Type:** On/Off Power Switch
**Z-Wave Role Type:** Always On Slave
**Product Type ID:** 0x4F44
**Product ID:** 0x3032
**Network Management Instructions:** View Network Management Info
**Command Classes:** View Command Classes
**Associated Categories:** All Lighting Devices Energy Meters On/Off Switches/Devices
**This Brand:** See other products of this brand
**Download Product Data in XML Format:** Download

58. Being a Z-Wave device of enhanced slave type, which is also a form of routing slave, each of the "Jasco Z-Wave Smart Switch" stores its unique Z-Wave Home ID and Node ID in its memory according to the Z-Wave specification, which states: "**Routing slaves have the same overall functionality as a slave**. The major difference is that a routing slave can send unsolicited messages to other nodes in the network…**Enhanced slaves have the same functionality as routing slaves and they are handled in the same way in the network**. The difference between routing slaves and enhanced slaves is that enhanced slaves have a real time clock and an EEPROM for storing application data." *See* Software Design Specification - Z-Wave Protocol Overview p.6.

59. See also the Z-Wave 500 Series Appl. Programmers Guide v6.81.0x, p.17 (image below), which states:

> Routing slave nodes have an area of 256 bytes MTP (Many Times Programmable memory) for storing data. The Z-Wave basis software reserves the first part of this area, and application data uses the remaning part.
>
> The home ID is set to a randomly generated value and node ID is zero. When registering a slave node to a Z-Wave network the slave node receive home and node ID from the networks primary controller node. These IDs are stored in the Z-Wave basis data area in the flash.

60. The next element of claim 1 reads: "logic configured to receive the data related to the consumption measured by the utility meter, retrieve the unique identifier corresponding to the utility meter, and generate a transmit message using a predefined communication protocol being implemented by the wireless communication network, the transmit message comprising the unique identifier and the data related to the consumption measured by the utility meter and configured such that the transmit message may be received by the site controller via the wireless communication network and such that the site controller may identify the utility meter and notify the host computer of the transmit message;"

61. It is clear that each of the "Jasco Z-Wave Smart Switch" Products that supports Z-Wave protocol includes a Z-Wave chipset implementing the Z-Wave protocol (in the claim, "logic") configured to generate a Z-Wave Meter Command to transmit power consumption data (in the claim, "data related to the consumption measured by the utility meter") as described in Jasco's 14285 Product Specification. Its own product specifications say so:

**14285** PRODUCT SPECIFICATIONS JASCO

## Energy Monitoring

**This unit incorporates special circuitry to capture and report energy values as well as the wattage consumed by the connected device**

- This energy related data includes Voltage (V), Current (A), Watts (W), Kilowatt hours (KWh) and Power Factor (PF). V, A, W & PF are instant readings taken at the time of the request while KWh is an accumulated value.
- This unit is capable of storing readings up to 10,000 KWh. It will automatically reset to zero and start over when it reaches 10,000. It will also reset and start over if the power to it is turned off.
- This will report energy information automatically based upon parameter settings.The Z-Wave controller ca also poll (request) the information from the device.
- The energy data is transmitted using Z-Wave's Meter Command Class v3. If the unit receives a request for this data from a controller supporting the Meter CC v1, it will report KWh as its default scale.
- Meter Reset is supported so if desired, the unit can delete its stored KWh data and start accumulating new KWh

### Device Configuration

**Adding your device to a Z-Wave network**
Once the hub is ready to add your smart switch, press and release the front button on the smart switch to add it in the network.

**To remove and reset the device**
Once the controller is ready to remove your device, press and release the top button on the smart switch to remove it from the network.

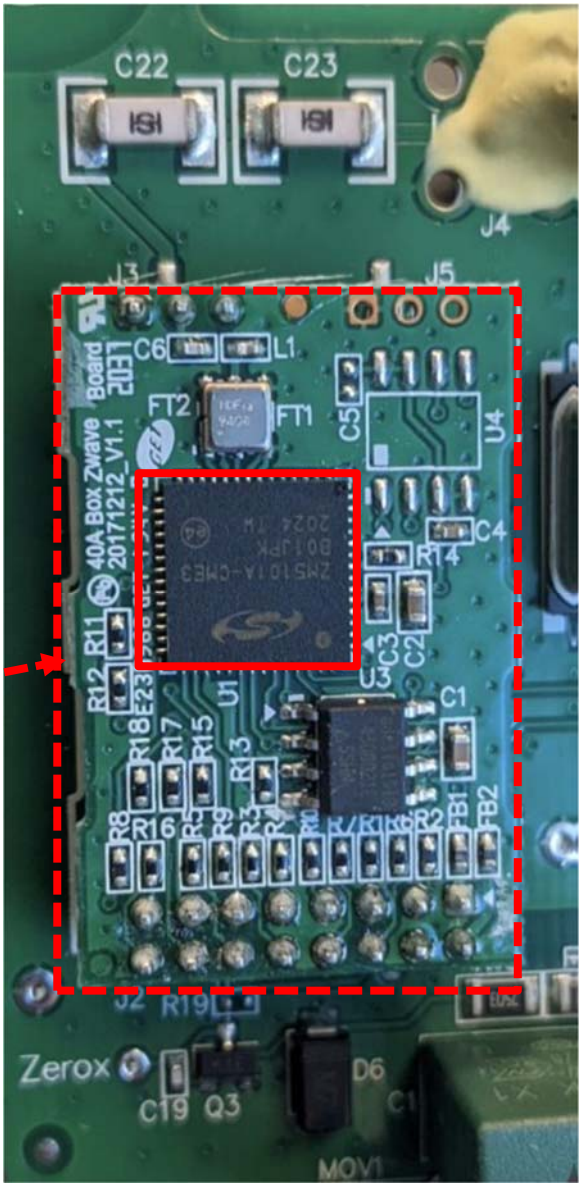
**To return to factory defaults**
Place Opertaion Mode switch into 'ON' position. Press & Hold program button. Place Operation Mode switch into 'OFF' position and back into 'ON' position. Continue pressing Program button for 3 seconds. Green LED will flash 3 times when completed successfully

### .Certifications & Compliances

62. A teardown of the Accused Jasco's Z-Wave Smart Switch shows a Z-Wave chipset (in red box):


Direct Wire
Indoor/Outdoor
Smart Switch
Wirelessly control and schedule pool pumps, water heaters, outdoor lights and more!
Energy Monitoring
SUPPORTS UP TO
40 AMPS
Use any mobile device!*
Z-WAVE
PLUS


1
2
3
4
5
6


C22
C23
J4
J3
J5
C6
L1
FT2
FT1
C5
U4
C4
R14
C3
C2
U3
C1
U1
R11
R12
R18
R17
R15
R13
R8
R16
R9
FB1
FB2
J2
R19
Zerox
C19
Q3
D6
MOV1

63. A Z-Wave Meter Command frame follows a basic frame format as defined in the Z-Wave Specification attached below. "The Z-Wave transfer layer contains 4 basic frame formats used for transferring commands in the network. All four frames use the following frame layout, which comes from *Software Design Specification - Z-Wave Protocol Overview p.9.*:

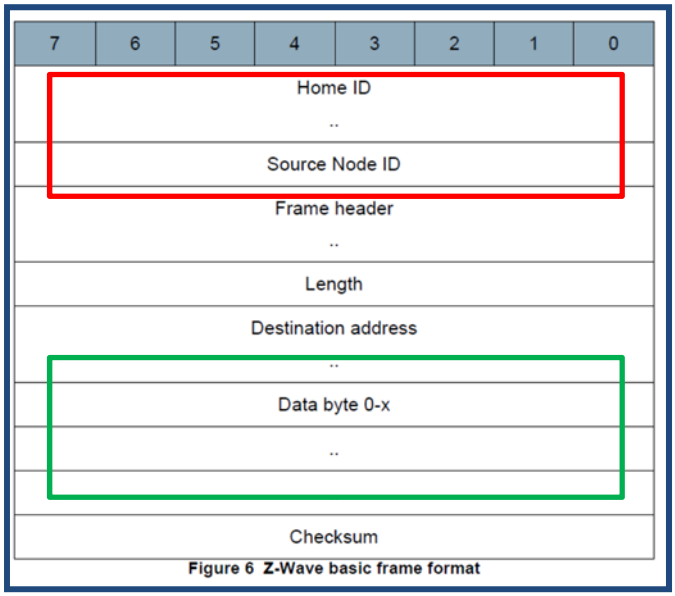


Figure 6 Z-Wave basic frame format

64. The generated Z-Wave Frame includes a header that contains information about the Z-Wave networks Home ID and Source Node ID (in the claim, "unique identifier") (highlighted in red box) of the accused Jasco Z-Wave Smart Switch which is retrieved (in the claim, "retrieved") from memory of the Accused Jasco Z-Wave Smart Switch product.

65. Further, the generated Z-Wave Frame includes payload data (green box) which contains a Meter Report Command, wherein data related to the consumption measured is contained in the "Meter Value" parameter:

### 4.1.2 Command Classes

Every message that is exchanged between Z-Wave devices is called a command. Commands can be classified into three major categories:

- ask a device to do something (Set)
- ask a device to provide something (Get)
- report a certain value or status to a device

The commands within the command class are identified by a single byte number as well. This leads to the command class layout as shown in Figure 4.3.

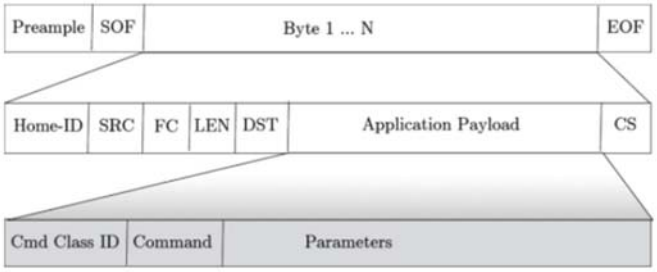



Figure 4.3: Frame Layout for Command Classes

*See*: Z-Wave Essentials. 3rd Edition, by Dr.-Ing. Christian Paetz, April 2017, pp.139 - 142

### 4.55 Meter Command Class, version 1

The Meter Command Class is used to advertise instantaneous and accumulated numerical readings.

The Command Class is intended for accumulated values in physical units from a water meter or metering device (gas, electric etc.) and thereby enabling some automatic meter reading capabilities.

### 1.1.2 Meter Report Command

This command is used to advertise the current meter reading at the sending node.

This command MUST NOT be issued using broadcast addressing.

| 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |
|---|---|---|---|---|---|---|---|
| Command Class = COMMAND_CLASS_METER | | | | | | | |
| Command = METER_REPORT (0x02) | | | | | | | |
| Meter Type | | | | | | | |
| Precision | | | Scale | | Size | | |
| Meter Value 1 | | | | | | | |
| ... | | | | | | | |
| Meter Value N | | | | | | | |

**Meter Type (8 bits)**

This field is used to specify what type of metering physical unit is being reported.

This field MUST be encoded according to Table 75.

**Precision (3 bits)**

This field MUST indicate how many decimal places are included in the Meter Value field. For example, the *Meter Value* field set to 1025 and this field set to 2 MUST be interpreted as equal to 10.25.

The value of the precision field MUST be in the range 0..7.

**Scale (2 bits)**

This field MUST advertise the unit used for the *Meter Value* field.

This field MUST be encoded according to Table 76.

**Size (3 bits)**

This field indicates the length in bytes of the *Meter Value* field. This field MUST be set to 1, 2 or 4.

**Meter Value (N bytes)**

This field is used to advertise the actual meter reading.

The length of this field in bytes MUST be according to the *Size* field.

The first byte MUST be the most significant byte.

This field MUST be encoded using signed representation and comply with Table 10.

*See*: Z-Wave Application Command Class Specification, p. 339-340

66. Each Accused "Jasco Z-Wave Smart Switch" Product receives power consumption data via the aforementioned data interface, formats the received power consumption data into scalable byte segments, determines a number of segments required to contain the power consumption data, and generates and transmits the preformatted Z-Wave message (in the claim, "generate a transmit message using a predefined protocol") comprising at least one packet, wherein the packets are equal to the number of segments of frame.

67. The generated Z-Wave Frame also contains a Destination Address which contains the Node ID of the compatible Z-Wave certified hub in the Z-Wave network, indicating that the Z-Wave Frame is for transmission to the Z-Wave hub as final destination.

68. Further, the Accused "Jasco Z-Wave Smart Switch" Products that supports Z-Wave protocol sends the generated Z-Wave Frame to the Z-Wave hub ("site controller") via the Z- Wave network ("wireless communication network"). Upon receiving such Z-Wave Frame, the Z-Wave hub may identify the Jasco Z-Wave Smart Switch 40A based on the Z- Wave Source Node ID ("the unique identifier") included in the Z-Wave Frame.

69. In addition, the Z-Wave hub notifies a smartphone, tablet or computer running apps or software programs ("a host computer") of the power consumption measured as previously described.

70. The next element of claim 1 reads: "a wireless transceiver configured for communication over the wireless communication network and configured to provide the transmit message to the wireless communication network and receive messages from the wireless communication network; and"

71. The "Jasco Z-Wave Smart Switch" includes a Z-Wave radio ("a wireless transceiver") configured to generate and send Z-Wave Frames that contains data related to the consumption measured to the Z-Wave hub as previously described.

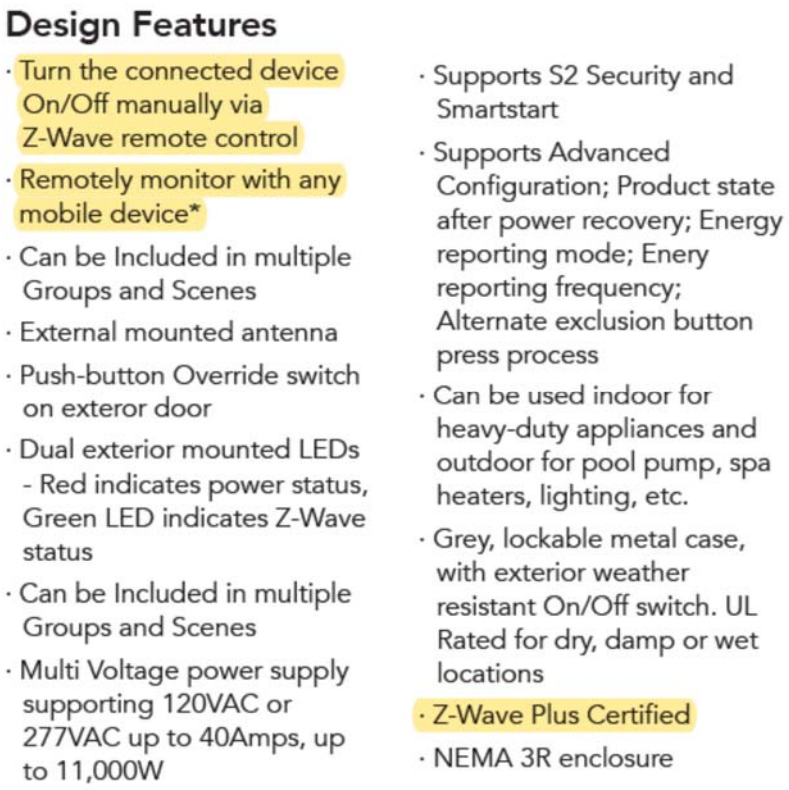
72. In addition, the Accused "Jasco Z-Wave Smart Switch" includes a Z-Wave radio ("a wireless transceiver") configured to receive Z-Wave Frames from the Z-Wave hub and/or other Z-Wave devices in the Z-Wave network. For example, an end user inputs on/off status using a smart phone application in order to remotely turning on or off a device connected to the Accused "Jasco Z-Wave Smart Switch." The smart phone application sends such command to the corresponding Z-Wave Hub. The Z-Wave hub then generates and sends Z-Wave Frame containing such on/off command to the corresponding Accused "Jasco Z-Wave Smart Switch". The Accused "Jasco Z-Wave Smart Switch" receives the Z-Wave Frame that contains on/off status and then executes the command accordingly.

73. The following excerpts from Jasco's product literature shows the functionality of remote control of an on/off status of a device connected to the Jasco Z-Wave Smart Switch over the Z-Wave network.

**Description**

Transform any home into a smart home with the GE branded Z-Wave Direct-Wire Indoor/Outdoor Smart Switch. When added to a Z-Wave network, the heavy duty switch enables wireless control of on/off functions for large load, hard-wired applications such as water heaters, landscape lighting, spas, pool pumps and heater units and more. The GE Smart Switch can be used indoors or outdoors and features an easy access wire connection block, front mounted LED lights indicating power and on/off status, and an override switch to turn connected devices on or off manually. The Smart Switch is housed in a lockable, tamper-resistant case to ensure settings and wiring are secure. The rugged, weather-resistant smart switch design will keep out dirt and debris while being durable enough for use in extreme weather conditions. The GE branded Z-Wave Direct-Wire Outdoor Smart Switch is also equipped with state-of-the-art energy monitoring capability, allowing you to monitor watts and kilowatt hours, and helping you keep your energy costs to a minimum. Take control of your home lighting and large load devices with a GE branded Z-Wave Smart Control!

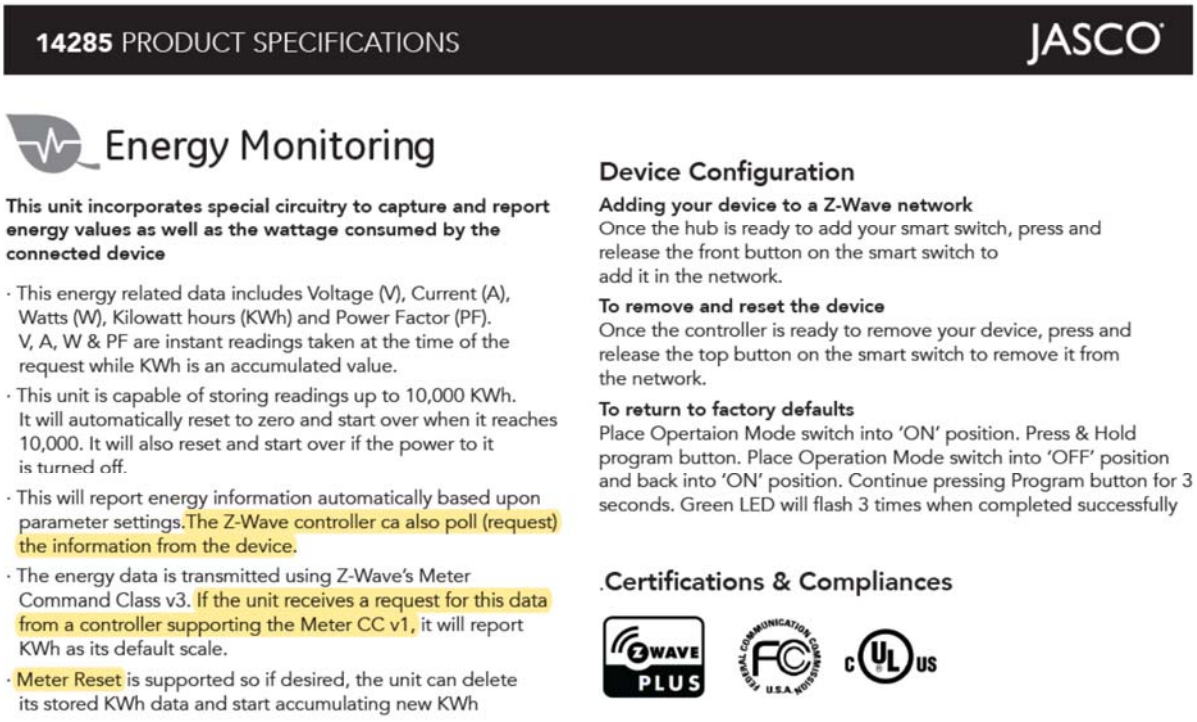

*See* https://byjasco.com/products/ge-z-wave-direct-wire-indooroutdoor-smart-switch-40a.



**Design Features**

- Turn the connected device On/Off manually via Z-Wave remote control
- Remotely monitor with any mobile device*
- Can be Included in multiple Groups and Scenes
- External mounted antenna
- Push-button Override switch on exteror door
- Dual exterior mounted LEDs - Red indicates power status, Green LED indicates Z-Wave status
- Can be Included in multiple Groups and Scenes
- Multi Voltage power supply supporting 120VAC or 277VAC up to 40Amps, up to 11,000W
- Supports S2 Security and Smartstart
- Supports Advanced Configuration; Product state after power recovery; Energy reporting mode; Enery reporting frequency; Alternate exclusion button press process
- Can be used indoor for heavy-duty appliances and outdoor for pool pump, spa heaters, lighting, etc.
- Grey, lockable metal case, with exterior weather resistant On/Off switch. UL Rated for dry, damp or wet locations
- Z-Wave Plus Certified
- NEMA 3R enclosure

74. Further, Jasco's 14285 Product Specification also shows that a "Z-Wave Controller can[n] poll (request) the information from the device" and that the Accused "Jasco Z-Wave Smart Switch" supports "Meter Reset" such that "the unit can delete its stored KWh data and start accumulating new KWh":



**14285** PRODUCT SPECIFICATIONS JASCO

## Energy Monitoring

**This unit incorporates special circuitry to capture and report energy values as well as the wattage consumed by the connected device**

- This energy related data includes Voltage (V), Current (A), Watts (W), Kilowatt hours (KWh) and Power Factor (PF). V, A, W & PF are instant readings taken at the time of the request while KWh is an accumulated value.
- This unit is capable of storing readings up to 10,000 KWh. It will automatically reset to zero and start over when it reaches 10,000. It will also reset and start over if the power to it is turned off.
- This will report energy information automatically based upon parameter settings.The Z-Wave controller ca also poll (request) the information from the device.
- The energy data is transmitted using Z-Wave's Meter Command Class v3. If the unit receives a request for this data from a controller supporting the Meter CC v1, it will report KWh as its default scale.
- Meter Reset is supported so if desired, the unit can delete its stored KWh data and start accumulating new KWh

## Device Configuration

**Adding your device to a Z-Wave network**
Once the hub is ready to add your smart switch, press and release the front button on the smart switch to add it in the network.

**To remove and reset the device**
Once the controller is ready to remove your device, press and release the top button on the smart switch to remove it from the network.

**To return to factory defaults**
Place Opertaion Mode switch into 'ON' position. Press & Hold program button. Place Operation Mode switch into 'OFF' position and back into 'ON' position. Continue pressing Program button for 3 seconds. Green LED will flash 3 times when completed successfully

## .Certifications & Compliances

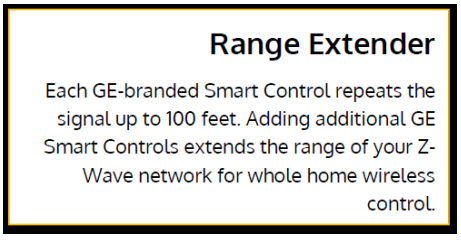
Z-WAVE PLUS

75. For these features to be realized, the Accused "Jasco Z-Wave Smart Switch" must receive Z-Wave messages containing corresponding Z-Wave commands, sent by a Z-Wave controller/hub over the Z-Wave network.

76. The next element of claim 1 reads: "logic configured to receive a transmit message from another communication device and retransmit the received transmit message."

77. This claim element is also clearly satisfied.

78. Jasco's product literature shows that the Accused "Jasco Z-Wave Smart Switch" is also a range extender which helps extend the range of Z-Wave network by repeating [Z-Wave] signals up to 100 feet".



**Range Extender**

Each GE-branded Smart Control repeats the signal up to 100 feet. Adding additional GE Smart Controls extends the range of your Z-Wave network for whole home wireless control.

79. For example, when the Accused "Jasco Z-Wave Smart Switch" receives a Z-Wave Frame, it first determines whether the Z-Wave frame is destined for another Z-Wave device (in the claim, "logic configured to receive a transmit message from another communication device and retransmit the received transmit message") as follows:

> . Upon
> receipt of a frame with this bit set, a node determines if it is responsible for forwarding the frame. The hop index field in the network frame provides the byte offset in the SR of the next hop. If a node's ID is located at this position, then the node updates the hop index field according to the route type field, recalculates the frame checksum, and retransmits the frame.

*See*: The Z-Wave Routing Protocols and its security implications, Badenhop et al., pp.117-118.

80. Further, the Accused "Jasco Z-Wave Smart Switch" is Z-Wave device of type "enhanced 232 slave" according to its Z-Wave certification and conformance statement at https://products.z-wavealliance.org/ products/2939?selectedFrequencyId=2, set forth below:

## Direct-Wire Outdoor Smart Switch (40 Amp)

**Brand Name:** GE
**Product Identifier:** 14285/ZW4007
**Product Version:** HW: 255 FW: 5.53
**Z-Wave Certification Number:** ZC10-18056123
**Z-Wave Certification Date:** 5/25/2018
**Use In:** U.S. / Canada / Mexico
**Z-Wave Protocol Implementation Conformance Statement:** View Download

Transform any home into a smart home with the GE 40 Amp Z-Wave Direct-Wire Indoor/Outdoor Smart Switch. When added to a Z-Wave network, the heavy duty switch enables wireless control of on/off functions for large load, hard-wired applications such as waters heaters, landscape lighting, spas, pool pumps and heaters. The Smart Switch can be used indoors or outdoors and features an easy access wire connection block, front mounted LED lights indicating power and on/off status, and an override switch to turn connected devices on or off manually. The Smart Switch is housed in a lockable, tamper-resistant case to ensure settings and wiring are secure. The rugged, weather-resistant design will keep out dirt and debris while being suitable for use in extreme weather conditions. The GE Z-Wave Direct-Wire Outdoor Smart Switch is also equipped with state-of-the-art energy monitoring capability, allowing you to monitor watts and kilowatt hours, helping you keep your energy costs to a minimum. Take control of your home lighting and large load devices with GE Z-Wave Smart Lighting Controls!

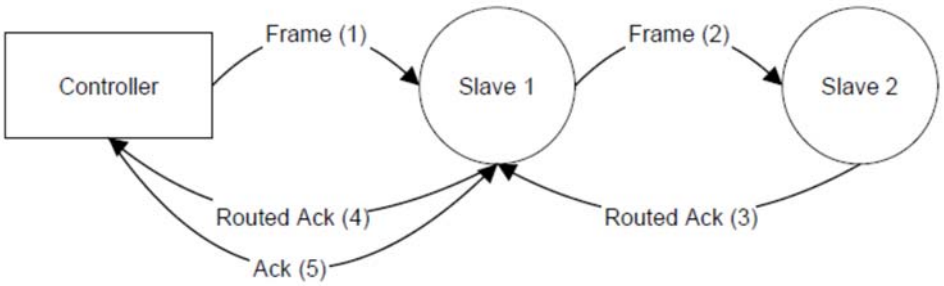
**Product Features:** View Features
**Z-Wave Plus Version:** 1
**Security S2 Classes:** S2 Authenticated, S2 Unauthenticated
**SmartStart Compatible:** Yes
**Manufacturer Provided Product Manual:** Download
**Association Capabilities:** View Associations
**Configuration Capabilities:** View Configuration Parameters
**Z-Wave hardware platform:** ZM5202
**Z-Wave version:** 6.81.01
**Z-Wave library type:** Enhanced 232 Slave
**Z-Wave Device Type:** On/Off Power Switch
**Z-Wave Role Type:** Always On Slave
**Product Type ID:** 0x4F44
**Product ID:** 0x3032
**Network Management Instructions:** View Network Management Info
**Command Classes:** View Command Classes
**Associated Categories:** All Lighting Devices Energy Meters On/Off Switches/Devices
**This Brand:** See other products of this brand
**Download Product Data in XML Format:** Download

81. The following excerpts from Software Design Specification – Z-Wave Protocol Overview also shows that Z-Wave devices that are slave nodes "forward commands to other nodes":

- "The Z-Wave protocol has 2 basic kinds of devices; controlling devices and slave nodes. Controlling devices are the nodes in a network that initiate control commands and sends out the commands to other nodes, and slave nodes are the nodes that reply on and execute the commands. Slave nodes can also forward commands to other nodes,

which make it possible for the controller to communicate with nodes out of the direct radio wave reach" Software Design Specification - Z-Wave Protocol Overview p.9.

- "The figure below shows an example of the frame flow when a frame is sent from a controller, repeated through a slave, to a second slave."




*See* Z-Wave Node Type Overview and Network Installation Guide. P10

- "Any slave node can act as repeater for frames going to other nodes. The only requirement for being able to act as repeater is that the node is in listening state. This requires that the node is permanently powered, and in order to limit battery consumption, this means that only mains-powered nodes will act as repeaters in most practical installations." Introduction – Getting Started with Z-Wave. P.22

82. The Accused "Jasco Z-Wave Smart Switch" supporting Z-Wave includes a Z-Wave chipset that implements Z-Wave protocol. Implementation of the Z-Wave protocol includes the routing layer which enables the repeating capability as shown in the Z-Wave Specification (see Software Design Specification - Z-Wave Protocol Overview p.12.):

> The Z-Wave routing layer controls the routing of frames from one node to another. Both controllers and slaves can participate in routing of frames in case they are always listening and have a static position. The layer is responsible for both sending a frame with a correct repeater list, and also to ensure that the frame is repeated from node to node. The routing layer is also responsible for scanning the network topology and maintaining a routing table in the controller.

83. On information and belief, Defendant may have products that operate pursuant to the Zigbee specifications. At least claim 1 of the '737 Patent is also infringed when '737 Infringing Instrumentalities operate pursuant to the Zigbee specifications. Additional details relating to '737 Infringing Instrumentalities and their infringement are within the possession, custody or control of Defendant.

84. Plaintiff offers this preliminary identification and description of infringement without the benefit of discovery or claim construction in this action, and expressly reserves the right to augment, supplement, and revise its identification and description of infringement based on additional information obtained through discovery or otherwise.

85. Defendant's acts of infringement involving the '737 Patent have caused damage to Plaintiff, and Plaintiff is entitled to recover from Defendant the damages it has sustained as a result of Defendant's wrongful acts in an amount subject to proof at trial.

**INFRINGEMENT OF U.S. PATENT NO. 9,430,936**

86. The allegations set forth in the foregoing paragraphs 1 through 85 are incorporated by reference into this claim for relief.

87. On August 30, 2016, U.S. Patent No. 9,430,936 ("the '936 Patent"), entitled "Systems And Methods For Monitoring And Controlling Remote Devices," was duly and legally issued by the United States Patent and Trademark Office. A true and correct copy of the '936 Patent is attached as Exhibit 3. Related U.S. application data is set forth on the face of the patent.

88. Plaintiff is the assignee and owner of the right, title, and interest in and to the '936 Patent, including the right to assert all causes of action arising under the '936 Patent and the right to any remedies for infringement of the '936 Patent.

89. Defendant has infringed and continues to infringe the '936 Patent under 35 U.S.C. § 271, literally or under the doctrine of equivalents, by making, using, selling, and/or offering for

sale in the United States, and/or importing into the United States, infringing products without authorization (hereafter, "'936 Infringing Instrumentalities"). At a minimum, '936 Infringing Instrumentalities include all of Defendant's devices that operate pursuant to the Z-Wave protocol including, without limitation, the GE Enbrighten Z-Wave Plus In-Wall Smart Dimmer with QuickFit and Simple Wire; GE Enbrighten Z- Wave Commercial Grade In-Wall Smart Switch with QuickFit and Simple Wire; GE Enbrighten Z-Wave Commercial Grade In-Wall Smart Toggle Switch with QuickFit and Simple Wire; GE Enbrighten Z-Wave Plus Smart Switch with QuickFit and Simple Wire; GE Enbrighten Z-Wave Plus Smart Switch with QuickFit and Simple Wire, Toggle; GE Enbrighten Add-On Switch with QuickFit and SimpleWire; GE Enbrighten Add-On Switch with QuickFit and Simple Wire, Toggle; GE Z-Wave Plus In-Wall Touch Sensing Smart Dimmer; GE Z-Wave Plus Smart Motion Dimmer; GE Z-Wave Plus Smart Motion Switch; GE Z-Wave Plus In-Wall Smart Fan Control; GE Z-Wave Plus In-Wall 1000 Watt Smart Dimmer, 5005; GE Z-Wave Plus In-Wall Smart Dimmer; GE Z-Wave Plus In-Wall Smart Dimmer, White Toggle; GE Z-Wave Plus In-Wall Tamper-Resistant Smart Outlet; GE Z-Wave Plus In-Wall Smart Switch, White Toggle; GE Z-Wave Plus In-Wall Smart Switch; GE Z-Wave Plug In Smart Dimmer, Dual Plug w/ USB Charging; GE Plug-In Smart Switch Dual Plug w/ USB Charging; GE Z-Wave Plus Plug-In Dimmer, Dual Controlled Outlets, 5005; GE Z-Wave Plus Plug-In Outdoor Smart Switch, 5005; GE Z- Wave Plus Plug-In Two-Outlet Smart Switch; GE Z-Wave Plus Plug-In Smart Dimmer; GE Z-Wave Plus Plug-In Smart Switch; GE Z-Wave Plus Direct-Wire Indoor/Outdoor Smart Switch (40A); GE Z-Wave Smart Motion Sensor; GE Z-Wave Wireless Lighting Control Lamp Module with Dimmer Control; GE Z-Wave Wireless Lighting Control Fluorescent Light and Appliance Module; GE Z-Wave Plus Wireless Smart Lighting Control Duplex Receptacle

Outlet; GE Lighting Z-Wave Three-Way Dimmer Kit; and GE Z-Wave Wireless Lighting Control On/Off Switch.

90. Defendant directly infringes and continues to directly infringe at least claim 6[2] of the '936 Patent by making, using, selling, offering to sell, importing and/or providing and causing to be used '936 Infringing Instrumentalities that are compliant with the Z- Wave protocol which satisfy, literally or under the doctrine of equivalents, each and every claim limitation of claim 6 of the '936 Patent.

91. The correspondence between the limitations of claim 6 of the '936 Patent and such '936 Infringing Instrumentalities is shown in the claim chart attached hereto as Exhibit 4. The claim chart is incorporated by reference as if set forth herein. The citations to the Z-Wave protocol in the claim chart, which is explained below, are required for a product configured to operate pursuant to Z-Wave. Additional details relating to such '936 Infringing Instrumentalities and their infringement are within the possession, custody or control of Defendant.

92. Defendant provides users of '936 Infringing Instrumentalities with instructions to operate within a Z-Wave network and markets Z-Wave connectivity in their promotional materials. To operate within a Z-Wave network, the '936 Infringing Instrumentalities must operate pursuant to the Z-Wave protocol and the required portions of Z-Wave necessarily practice at least claim 6 of the '936 Patent.

93. Claim 6 of the '936 Patent reads:

> A wireless communication device for use in a communication system to communicate commands and sensed data between remote wireless communication devices, the wireless communication device comprising:

[2] Plaintiff reserves the right to identify additional asserted claims and accused products as this litigation proceeds. For example, Plaintiff expressly reserves the right to identify additional asserted claims and accused products during the discovery process.

> a transceiver configured to send and receive wireless communications; and
>
> a controller, operatively coupled to the transceiver, configured to communicate with at least one other remote wireless device via the transceiver with a preformatted message, the controller further configured to receive and format data messages, wherein data messages comprise a receiver address comprising an address of at least one remote wireless device, a command indicatorcomprising a command code, a data value comprising a scalable message, and a function code corresponding to function status of a device co-located with the transceiver, the controller further configured to implement a function corresponding a command code of a received data message,
>
> wherein the command code comprises at least one of a device-specific code or a non-device- specific code, wherein the device-specific code commands change of a setting of an actuator co- located with the transceiver and the non- device- specific code includes network status/diagnostic commands.

*See* Exhibit 2 at 15 line 17 to 16 line 18.

94. As set forth in the claim chart attached as Exhibit 4, each element of claim 6 of the '936 Patent is infringed by the accused Jasco products. The infringement is also explained in detail here.

95. Each part of the preamble, which reads, "A wireless communication device for use in a communication system to communicate commands and sensed data between remote wireless communication devices, the wireless communication device comprising…" maps to the accused Jasco's products.

96. Jasco's GE-branded Z-Wave Devices support Z-Wave and many are certified Z-Wave products. *See*, for example:

https://products.z-wavealliance.org/Search/DoAdvancedSearch?productName=&productIdentifier=&productDescription=&category=-1&brand=356&regionId=2&order=
https://products.z-wavealliance.org/Search/DoAdvancedSearch?productName=&productIdentifier=&productDe

scription=&category=-1&brand=440&regionId=2&order=
https://products.z-wavealliance.org/Search/DoAdvancedSearch?productName=&productIdentifier=&productDescription=&category=-1&brand=793&regionId=2&order=
https://products.z-wavealliance.org/Search/DoAdvancedSearch?productName=&productIdentifier=&productDescription=&category=-1&brand=49&regionId=2&order=

and also, for example:

| **Accused Product** | **Link to Z-Wave Protocol Implementation Conformance Statement** |
|---|---|
| GE Enbrighten Z-Wave Plus In-Wall Smart Dimmer with QuickFit and Simple Wire | https://products.z-wavealliance.org/products/3351/embedpics |
| GE Z-Wave Plus In- Wall Touch Sensing Smart Dimmer | https://products.z-wavealliance.org/products/2643/embedpics |
| GE Z-Wave Plus Smart Motion Dimmer | https://products.z-wavealliance.org/products/2108/embedpics |
| GE Z-Wave Plus Smart Motion Switch | https://products.z-wavealliance.org/products/2035/embedpics |
| GE Z-Wave Plus In-Wall Smart Fan Control | https://products.z-wavealliance.org/products/2506/embedpics |
| GE Z-Wave Plus In-Wall 1000 Watt Smart Dimmer, 5005 | https://products.z-wavealliance.org/products/2168/embedpics |
| GE Z-Wave Plus In-Wall Smart Dimmer | https://products.z-wavealliance.org/products/3323/embedpics<br>https://products.z-wavealliance.org/products/2105/embedpics |
| GE Z-Wave Plus In-Wall Smart Dimmer, | https://products.z-wavealliance.org/products/3352/embedpics |

| | |
|---|---|
| White Toggle | |
| GE Z- Wave Plus In-Wall Tamper-Resistant Smart Outlet | https://products.z-wavealliance.org/products/2732/embedpics<br>https://products.z-wavealliance.org/products/2236/embedpics |
| GE Z-Wave Plus In-Wall Smart Switch, White Toggle | https://products.z-wavealliance.org/products/3351/embedpics<br>https://products.z-wavealliance.org/products/2502/embedpics |
| GE Z-Wave Plus In-Wall Smart Switch | https://products.z-wavealliance.org/products/3349/embedpics<br>https://products.z-wavealliance.org/products/2501/embedpics |
| GE Z-Wave Plug In Smart Dimmer, Dual Plug w/ USB Charging | https://products.z-wavealliance.org/products/2210/embedpics |
| GE Plug-In Smart Switch Dual Plug w/ USB Charging | https://products.z-wavealliance.org/products/2626/embedpics<br>https://products.z-wavealliance.org/products/2192/embedpics |
| GE Z-Wave Plus Plug-In Dimmer, Dual Controlled Outlets, 5005 | https://products.z-wavealliance.org/products/2139/embedpics |
| GE Z-Wave Plus Plug-In Outdoor Smart Switch, 5005 | https://products.z-wavealliance.org/products/3408/embedpics<br>https://products.z-wavealliance.org/products/2526/embedpics |
| GE Z-Wave Plus Plug-In Two-Outlet Smart Switch | https://products.z-wavealliance.org/products/1935/embedpics |
| GE Z-Wave Plus Plug-In Smart Dimmer | https://products.z-wavealliance.org/products/1433/embedpics |
| GE Z- Wave Plus Plug-In Smart Switch | https://products.z-wavealliance.org/products/2561/embedpics |

| | |
|---|---|
| GE Z-Wave Plus Direct-Wire Indoor/Outdoor Smart Switch (40A) | https://products.z-wavealliance.org/products/2939/embedpics |
| GE Z-Wave Smart Motion Sensor | https://products.z-wavealliance.org/products/1902?selectedFrequencyId=2 |
| GE Z-Wave Wireless Lighting Control Lamp Module with Dimmer Control | https://products.z-wavealliance.org/products/1207/embedpics |
| GE Z-Wave Plus Wireless Smart Lighting Control Duplex Receptacle Outlet | https://products.z-wavealliance.org/products/724/embedpics |
| Smart Flood and Freeze Sensor | https://products.z-wavealliance.org/products/3642/embedpics |
| Plug-in Smart Switch (Single Plug) | https://products.z-wavealliance.org/products/2533/embedpics |
| Plug-In Smart Switch (Dual Plug) | https://products.z-wavealliance.org/products/2525/embedpics<br>https://products.z-wavealliance.org/products/2125/embedpics |

97. Each of Jasco's GE-branded Z-Wave Devices (in the preamble, "wireless communication devices") supporting Z-Wave communicates with a compatible Z-Wave certified hub and/or other compatible Z-Wave devices which together form a Z-Wave network (in the preamble "a wireless communication system"). Jasco's "Q&A- Z-Wave Home Automation (https://blog.byjasco.com/faq-z-wave-home-automation)" document shows that Z-Wave is a

wireless communication network in which all Z-Wave devices are capable of communicating with one another.

98. In addition to the Z-Wave descriptions already asserted herein, a Z-Wave network is used to communicate commands (e.g. on/off status) (in the preamble, "communicated commands"), and sensed data (e.g. temperature, motion) (in the preamble, "sensed data") between a mesh network of Z-Wave devices (in the preamble, "remote wireless communication devices"). This is all set forth in the Z-Wave protocols employed by the products.

99. For example, "The Z-Wave protocol is a low bandwidth half duplex protocol designed for reliable wireless communication in a low cost control network. The protocols main purpose is to communicate short control messages in a reliable manner from a control unit to one or more nodes in the network." Software Design Specification - Z-Wave Protocol Overview p.3.

100. And, "Z-Wave is a next-generation wireless ecosystem that lets all your home electronics talk to each other, and to you, via remote control. It uses simple, reliable, low-power radio waves that easily travel through walls, floors and cabinets. Z-Wave control can be added to almost any electronic device in your house, even devices that you wouldn't ordinarily think of as "intelligent," such as appliances, window shades, thermostats and home lighting" such as the products shown in the following image from Z-Wave literature (*See* Z -Wave: The New Standard in Wireless Remote Control http://www.z-wave.com/modules/AboutZ-Wave/):


101. Similarly, Jasco's product literature, in addition to its product names, makes clear that the products employ Z-Wave (*See* Jasco Z-Wave Wholesale Channel Sheet 1-17-2018_0.pdf.):

102. The Z-Wave features described above, which are present in all accused products, satisfy each element of the preamble.

103. The second element of claim 6 of the '936 Patent reads: "a transceiver configured to send and receive wireless communications;"

104. This claim element is clearly satisfied.

105. First, each of the accused Jasco's GE-branded Z-Wave Device supporting Z-Wave includes a Z-Wave ASIC chipset which comprises a Z-Wave radio ("a transceiver").

> Figure 1.8 shows the current workhorse, the Series 500 IC. The ASIC combines the radio transceiver, a microcontroller, embedded memory, and quite a few peripheral components in one single chip. Most of the Z-Wave products sold today just use this chip to implement all functions. This is a huge cost and complexity saving compared to discrete implementation where controller, memory, I/Os, and radio transceivers are separate components. The chapter 6.3 gives further information about the ASIC and the way it is used in products.
>
> Besides, the ASIC Sigma Designs also provides a system development kit (SDK) to simplify the product development. This contains, among other things, precompiled libraries for various applications
>
> covering all aspects of the communication protocol. All manufacturers are required to use one of these libraries for their product development, leading to similar behavior of all Z-Wave devices on the lower protocol layers. Z-Wave also defines application-specific functions (e.g. switch A is turned on when button B is pressed), but the manufacturers are responsible to implement this. Most manufacturers optimize and enhance functions on the application layer.

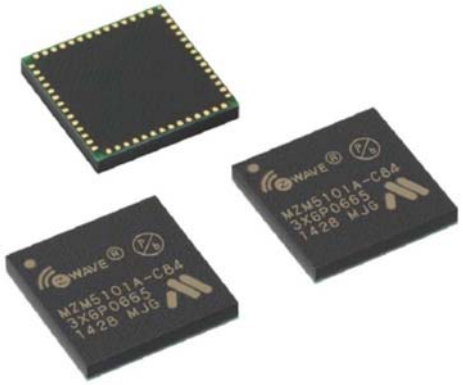



Figure 1.8: Sigma Designs Z-Wave ASIC Series 500

Source: Sigma Designs

*See* Z-Wave Essentials. 3rd Edition, by Dr.-Ing. Christian Paetz, April 2017, pp.33-35.

106. For example, teardown of the Accused Jasco's In-Wall Z-Wave Smart Switch shows a Z-Wave chipset (chip is black/grey square in left third of bottom image):


107. The Z-Wave radio ("transceiver") included in each of Jasco's GE-branded Z-Wave Device sends and receives wireless communications (Z-Wave frames) (in the claim, "configured to send and receive wireless communications") as follows:

- Each of the Accused Jasco's GE-branded Z-Wave Device is a Z-Wave device of device slave type according to its corresponding Z-Wave certification and conformance document. For example, Z-Wave conformance implementation statement of the accused Jasco's In-Wall Z-Wave Smart Switch shows that it is an "Always On Slave":

Z-Wave Protocol Implementation Conformance Statement

## In-Wall Smart Switch (120/277VAC)

### General Information

| | |
|---|---|
| **Product Identifier:** | 43072/ZW4008DV |
| **Brand Name:** | GE |
| **Product Version:** | HW: 255 FW: 5.53 |
| **Z-Wave Certification #:** | ZC10-19056488 |

### Product Features

| | |
|---|---|
| **Firmware Updatable** | Updatable by Consumer by RF |
| **Neutral Wire Required** | Yes |
| **Z-Wave Scene Type** | Central Scene |

### Z-Wave Product Information

| | |
|---|---|
| Supports Z-Wave Beaming Technology? | Yes |
| Supports Z-Wave Network Security? | Yes |
| Supports Z-Wave AES-128 Security S0? | No |
| Supports Security S2? | Yes: S2 Authenticated, S2 Unauthenticated |
| SmartStart Compatible? | Yes |

### Z-Wave Technical Information

| | |
|---|---|
| **Z-Wave Frequency:** | U.S. / Canada / Mexico |
| **Z-Wave Product ID:** | 0x3139 |
| **Z-Wave Product Type:** | 0x4952 |
| **Z-Wave Hardware Platform:** | ZM5202 |
| **Z-Wave Development Kit Version:** | 6.81.03 |
| **Z-Wave Library Type:** | Enhanced 232 Slave |
| **Z-Wave Device Type / Role Type:** | On/Off Power Switch / Always On Slave |

- Each Z-Wave device that is a slave node receives Z-Wave commands over the Z-Wave network ("receive wireless communications") from controlling devices and other slave nodes.
- Each Z-Wave device that is a slave node also sends and forwards Z-Wave commands over the Z-Wave network ("send wireless communications").

108. The following excerpts from Software Design Specification – Z-Wave Protocol Overview shows that Z-Wave devices that are slave nodes send and receive commands:

> The Z-Wave protocol has 2 basic kinds of devices; controlling devices and slave nodes. Controlling devices are the nodes in a network that initiate control commands and sends out the commands to other nodes, and **slave nodes are the nodes that reply on and execute the commands**. **Slave nodes can also forward commands to other nodes**, which make it possible for the controller to communicate with nodes out of the direct radio wave reach. …
>
> The Z-Wave routing layer controls the routing of frames from one node to another. Both controllers and slaves can participate in routing of frames in case they are always listening and have a static position. The layer is responsible for **both sending a frame with a correct repeater list**, and also to **ensure that the frame is repeated from node to node**. The routing layer is also responsible for scanning the network topology and maintaining a routing table in the controller.

*Software Design Specification - Z-Wave Protocol Overview p.9.*

> **Any slave node can act as repeater for frames going to other nodes.** The only requirement for being able to act as repeater is that the node is in listening state. This requires that the node is permanently powered, and in order to limit battery consumption, this means that only mains-powered nodes will act as repeaters in most practical installations.

*Introduction – Getting Started with Z-Wave. P.22*

109. For reference, a "command" in a Z-Wave network is defined as follows:

### 4.1.2 Command Classes

Every message that is exchanged between Z-Wave devices is called a command. Commands can be classified into three major categories:

- ask a device to do something (Set)
- ask a device to provide something (Get)
- report a certain value or status to a device

*See*: Z-Wave Essentials. 3rd Edition, by Dr.-Ing. Christian Paetz, April 2017, p.139.

110. The next element of claim 6 of the '936 Patent can be broken into two parts for easier analysis. The first part reads "a controller, operatively coupled to the transceiver, configured to communicate with at least one other remote wireless device via the transceiver with a preformatted message,"

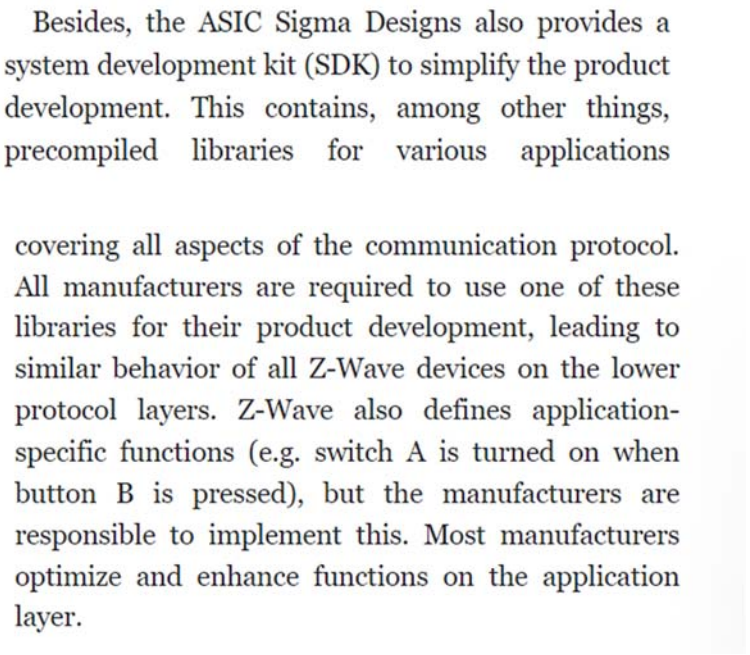
111. These limitations are also satisfied. Each of the Accused Jasco's GE-branded Z-Wave Device includes Z-Wave chipset which "combines the radio transceiver (in the claim, "the transceiver"), microcontroller (in the claim, "controller")…on one single chip". As the radio transceiver and the microcontroller are combined in one single chip, these two components must be operatively coupled (in the claim, "operatively coupled").

> Figure 1.8 shows the current workhorse, the Series 500 IC. The ASIC combines the radio transceiver, a microcontroller, embedded memory, and quite a few peripheral components in one single chip. Most of the Z-Wave products sold today just use this chip to implement all functions. This is a huge cost and complexity saving compared to discrete implementation where controller, memory, I/Os, and radio transceivers are separate components. The chapter 6.3 gives further information about the ASIC and the way it is used in products.

*See*: Z-Wave Essentials. 3rd Edition, by Dr.-Ing. Christian Paetz, April 2017, p.33.

112. The Z-Wave chipset included in each of the Accused Jasco's GE-branded Z-Wave Device also includes implementation of the Z-Wave protocol stack which configures the microcontroller ("controller") to send and receive Z-Wave messages (in the claim, "communicate") using the Z-Wave transceiver in the Z-Wave chipset.

113. Z-Wave ASIC includes implementation of the Z-Wave protocol stack by including "precompiled libraries for various applications covering all aspects of the communication protocol":

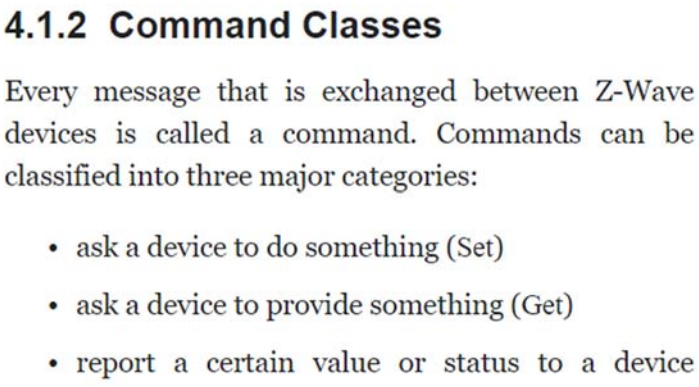


Besides, the ASIC Sigma Designs also provides a system development kit (SDK) to simplify the product development. This contains, among other things, precompiled libraries for various applications

covering all aspects of the communication protocol. All manufacturers are required to use one of these libraries for their product development, leading to similar behavior of all Z-Wave devices on the lower protocol layers. Z-Wave also defines application-specific functions (e.g. switch A is turned on when button B is pressed), but the manufacturers are responsible to implement this. Most manufacturers optimize and enhance functions on the application layer.

*See* Z-Wave Essentials. 3rd Edition, by Dr.-Ing. Christian Paetz, April 2017, p.33.

114. Each of the Accused Jasco's GE-branded Z-Wave Device, being Z-Wave device of slave type, sends and receives Z-Wave commands in a preformatted Z-Wave Frame to and from other Z-Wave devices (in the claim, "at least one other remote device") as previously described.



### 4.1.2 Command Classes

Every message that is exchanged between Z-Wave devices is called a command. Commands can be classified into three major categories:

- ask a device to do something (Set)
- ask a device to provide something (Get)
- report a certain value or status to a device

(Report)

According to the different device types, the Set, Get and Report commands may mean different things and need to be specified further.

Z-Wave organizes all the commands in the so-called **Command Classes**. Command classes describe a certain function of a device and group all necessary commands to deal with this function.

*See*: Z-Wave Essentials. 3rd Edition, by Dr.-Ing. Christian Paetz, April 2017, pp.139

115. All Z-Wave Commands follow a basic frame format (in the claim, "preformatted message") as defined in the Z-Wave Specification, which states that "The Z-Wave transfer layer contains 4 basic frame formats used for transferring commands in the network. All four frames use the following frame layout" as set forth in the image, which comes from the Software Design Specification - Z-Wave Protocol Overview p.9:

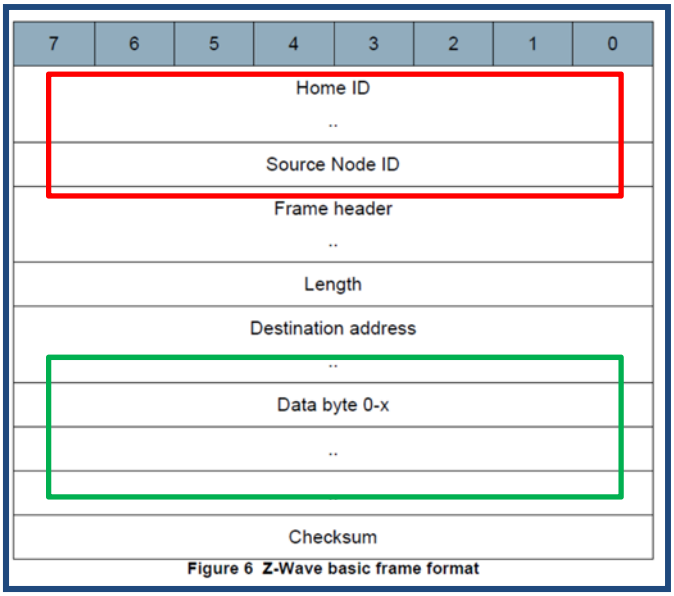


Figure 6 Z-Wave basic frame format

116. The second part of the claim element reads "the controller further configured to receive and format data messages, wherein data messages comprise a receiver address comprising an address of at least one remote wireless device, a command indicator comprising a command

code, a data value comprising a scalable message, and a function code corresponding to function status of a device co-located with the transceiver, the controller further configured to implement a function corresponding a command code of a received data message, [wherein the command code]"

117. The "wherein the command code" language in brackets comes from the next and last claim element but, because it is connected to this part of the claim element, it will first be mapped here.

118. This part of the claim element is also satisfied.

119. The Z-Wave chipset included in each of the Accused Jasco's GE-branded Z-Wave Device includes implementation of the Z-Wave protocol stack which configures the built-in microcontroller (in the claim, "controller") to receive and decode (in the claim, "receive and format") Z-Wave Frames (in the claim, "data messages") following the message format previously described and comprise various elements further described below. The following diagram illustrates the same Z-Wave Frame Format mentioned above, with the addition of incorporating a Z-Wave Command as "Application Payload":

The commands within the command class are identified by a single byte number as well. This leads to the command class layout as shown in Figure 4.3.

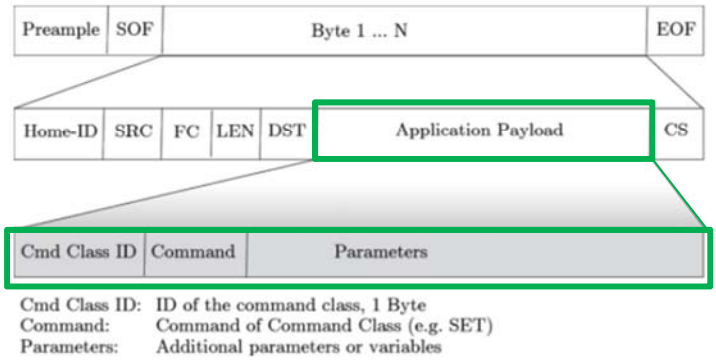



Figure 4.3: Frame Layout for Command Classes

*See*: Z-Wave Essentials. 3rd Edition, by Dr.-Ing. Christian Paetz, April 2017, pp.142.

120. The following diagram illustrates the same Z-Wave Frame incorporating Z-Wave Command as "Application Payload" and routing information:

> Since the routing information must be carried within the transport frame, the amount of space available for payload data is reduced by 5 Bytes. Figure 3.21 shows how the frame type changes when routing information is added.

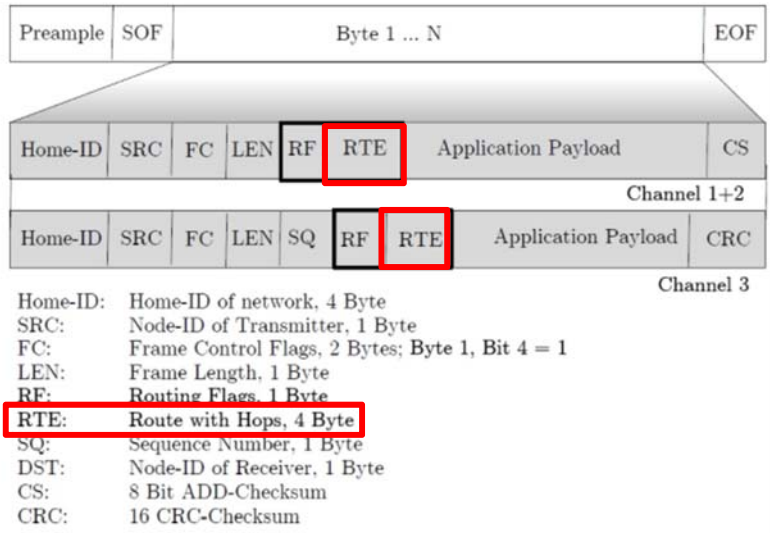



Figure 3.21: Routing Information changes the Transport Frame

*See*: Z-Wave Essentials. 3rd Edition, by Dr.-Ing. Christian Paetz, April 2017, pp.96, 97.

121. Further details of the RTE fields is described as follows:

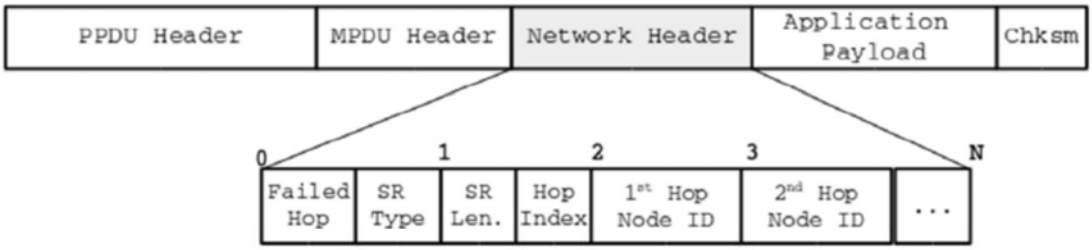



**Fig. 6 – The Z-Wave Network Header format.**

Routed Z-Wave frames use a network header, located between the MPDU header and application layer. Fig. 6 shows the fields of the network header. The first two bytes of the network header are divided into four 4-bit nibbles. The first nibble is the *failed hop*, used only for route error messages to declare the hop where the error occurred and is otherwise zero for other types of routed frames. The second nibble holds the SR type, which is used by routing nodes to determine how to forward the SR. The third nibble holds the length of SR in bytes. The fourth nibble holds the hop index field, which maintains the state of the SR while it is forwarded. The remaining bytes are the SR. The $i^{th}$ byte in the SR is the node ID of the $i^{th}$ hop in the route. The SR only contains the inner nodes of the route, relying on the MPDU header to provide the node IDs of the route end-points. The SR is limited to four inner node hops (Paetz, 2013). Considering the implicit final hop to the destination, Z-Wave routes may be up to five hops in length.

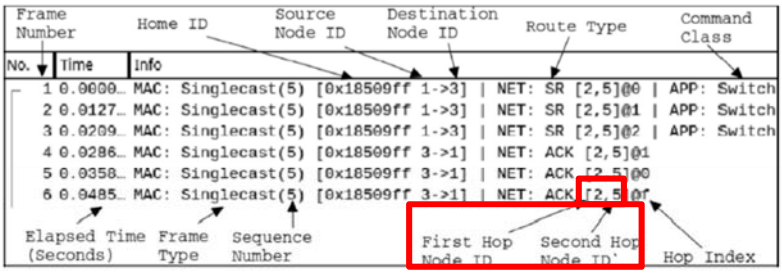



**Fig. 7 – The frames observed in the network under study when a SR is routed from Node 1 to 3 and the corresponding route ACK taking the reverse route back to Node 1.**

*See*: The Z-Wave Routing Protocols and its security implications, Badenhop et al., pp.117-118.

122. A person ordinarily skilled in the art would combine the information above and logically derive a Z-Wave Frame format which incorporates a Z-Wave Command as "Application Payload" and routing information in "RTE" field which includes Node ID of hops enroute:

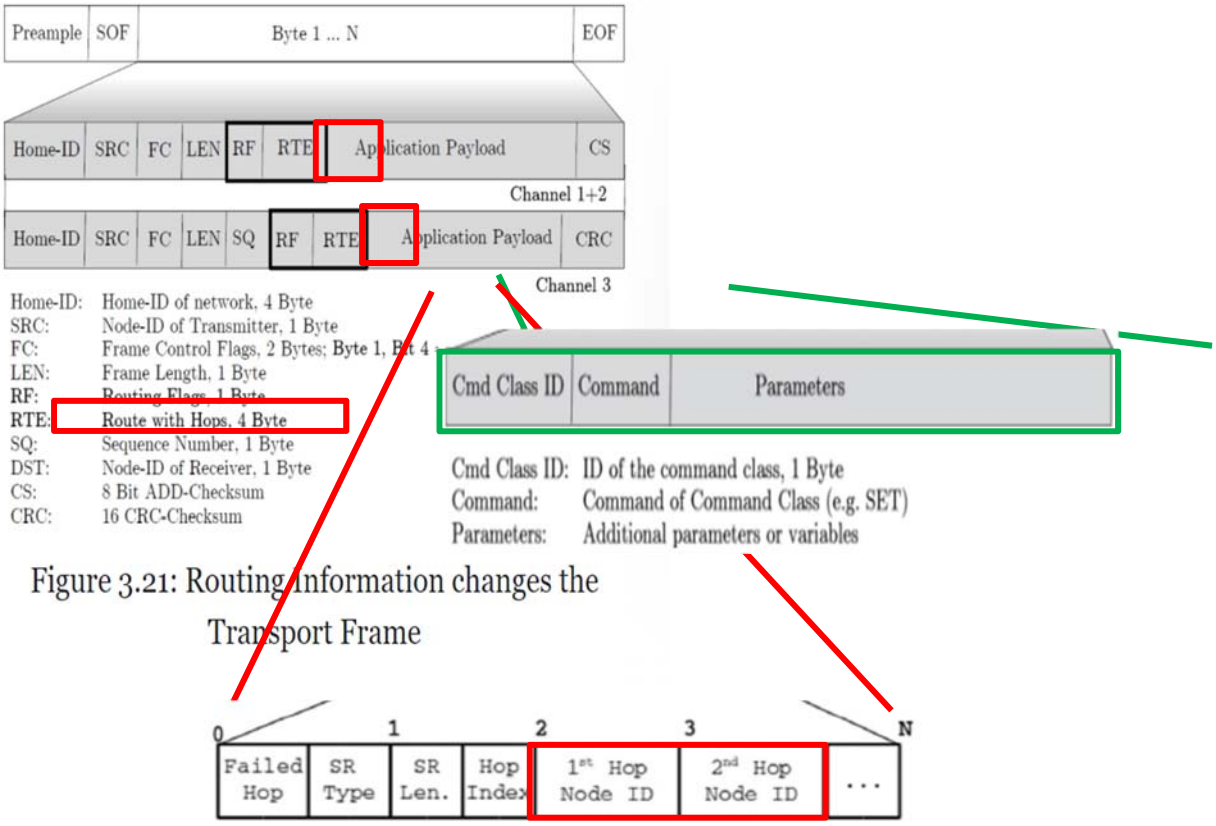



Figure 3.21: Routing information changes the Transport Frame

123. The diagram shows that a received Z-Wave Frame includes a header that contains source route information (RTE) ("receiver address") which includes Z-Wave Node ID(s) ("an address") (highlighted in red box) of at least one Z-Wave device ( "remote wireless device") which helps forward the Z-Wave Frame from the Z-Wave device that originates the Z-Wave Frame to the Accused Jasco's GE-branded Z-Wave Device as the final destination of the Z-Wave Frame.

124. Further, the received Z-Wave Frame includes "Command Class" and "Command" fields ("command indicator") comprising "ID of the command class 1 Byte" and "Command of the Command Class (e.g. SET)" ("command code") respectively:

Command classes are identified by a single byte number. Annex C shows the complete list of command classes by ID.

The commands within the command class are identified by a single byte number as well. This leads to the command class layout as shown in Figure 4.3.

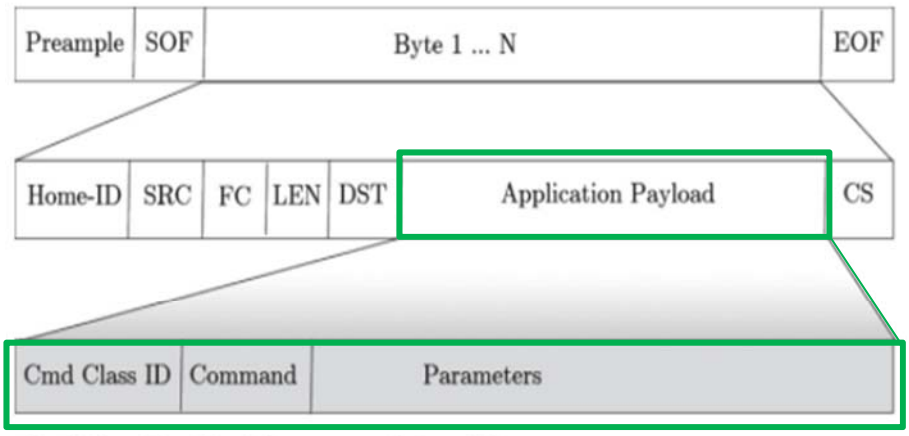



Figure 4.3: Frame Layout for Command Classes

*See*: Z-Wave Essentials. 3rd Edition, by Dr.-Ing. Christian Paetz, April 2017, p.142.

125. Reference to the Command Class frame format in the Z-Wave Specification is as follows:



### 3.3 Command class frame format

All commands have a common header consisting of a Command Class identifier and a Command identifier. Further, the command can have from zero to n bytes of command data. The bit-numbering scheme is "LSB 0" because bit numbering starts at zero for the least significant bit (Notice that LSB is denoted as 'Bit 0'… and MSB is denoted as 'Bit 7 throughout the document). The figures below show the generic command frame for the two possible formats:

| 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |
|---|---|---|---|---|---|---|---|
| Command Class (0x20 – 0xEE) | | | | | | | |
| Command | | | | | | | |
| Command Data 1 | | | | | | | |
| .. | | | | | | | |
| Command Data n | | | | | | | |

**Figure 4, Generic command format**

| 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |
|---|---|---|---|---|---|---|---|
| Command Class MSB (0xF1 – 0xFF) | | | | | | | |
| Command Class LSB (0x00 – 0xFF) | | | | | | | |
| Command | | | | | | | |
| Command Data 1 | | | | | | | |
| .. | | | | | | | |
| Command Data n | | | | | | | |

**Figure 5, Generic extended command format**

#### 3.3.2 Command

The command field contains the specific command that SHOULD be executed. The field has a length of 1 byte.

#### 3.3.3 Command data (N bytes)

The command data field contains data related to the command. Simple commands, such as get commands, contain no command data. Other commands, such as set or report commands can contain several bytes of command data.

*See*: Z-Wave Command Class Specification, A-M, pp.8-10.

126. Z-Wave Specification defines a complete list of command classes in by ID in SDS13740-1 Z-Wave Plus Device and Command Class Types and Defines Specification, p. 41-43. A sample excerpt is attached below. A "Command Class ID" field contains a value of "0x25" indicates the command relates to "COMMAND CLASS SWITCH BINARY":

```
#define COMMAND_CLASS_SENSOR_ALARM                                          0x9C /*SDS10963-4 The
Sensor Alarm command class can be used to realize Sensor Alarms.*/
#define COMMAND_CLASS_SENSOR_BINARY                                         0x30 /*[DEPRECATED]*/
#define COMMAND_CLASS_SENSOR_BINARY_V2                                      0x30 /*[DEPRECATED]*/
#define COMMAND_CLASS_SENSOR_CONFIGURATION                                  0x9E /*[OBSOLETED]*/
#define COMMAND_CLASS_SENSOR_MULTILEVEL                                     0x31
#define COMMAND_CLASS_SENSOR_MULTILEVEL_V2                                  0x31
#define COMMAND_CLASS_SENSOR_MULTILEVEL_V3                                  0x31
#define COMMAND_CLASS_SENSOR_MULTILEVEL_V4                                  0x31
#define COMMAND_CLASS_SENSOR_MULTILEVEL_V5                                  0x31
#define COMMAND_CLASS_SENSOR_MULTILEVEL_V6                                  0x31
#define COMMAND_CLASS_SENSOR_MULTILEVEL_V7                                  0x31
#define COMMAND_CLASS_SENSOR_MULTILEVEL_V8                                  0x31
#define COMMAND_CLASS_SENSOR_MULTILEVEL_V9                                  0x31
#define COMMAND_CLASS_SENSOR_MULTILEVEL_V10                                 0x31
#define COMMAND_CLASS_SILENCE_ALARM                                         0x9D /*SDS10963-4 The
Alarm Silence command class can be used to nuisance silence to temporarily disable the sounding*/
#define COMMAND_CLASS_SIMPLE_AV_CONTROL                                     0x94
#define COMMAND_CLASS_SWITCH_ALL                                            0x27
#define COMMAND_CLASS_SWITCH_BINARY                                         0x25
#define COMMAND_CLASS_SWITCH_BINARY_V2                                      0x25
#define COMMAND_CLASS_SWITCH_MULTILEVEL                                     0x26
#define COMMAND_CLASS_SWITCH_MULTILEVEL_V2                                  0x26
#define COMMAND_CLASS_SWITCH_MULTILEVEL_V3                                  0x26
#define COMMAND_CLASS_SWITCH_MULTILEVEL_V4                                  0x26
#define COMMAND_CLASS_SWITCH_TOGGLE_BINARY                                  0x28 /*[DEPRECATED]*/
#define COMMAND_CLASS_SWITCH_TOGGLE_MULTILEVEL                              0x29 /*[DEPRECATED]*/
```

127. Z-Wave Specification also defines a complete list of command within command class by ID in SDS13740-1 Z-Wave Plus Device and Command Class Types and Defines Specification, pp. 43 - 129. For example, a "Command" field contains a value of "0x01" indicates the command is "BINARY_SET":

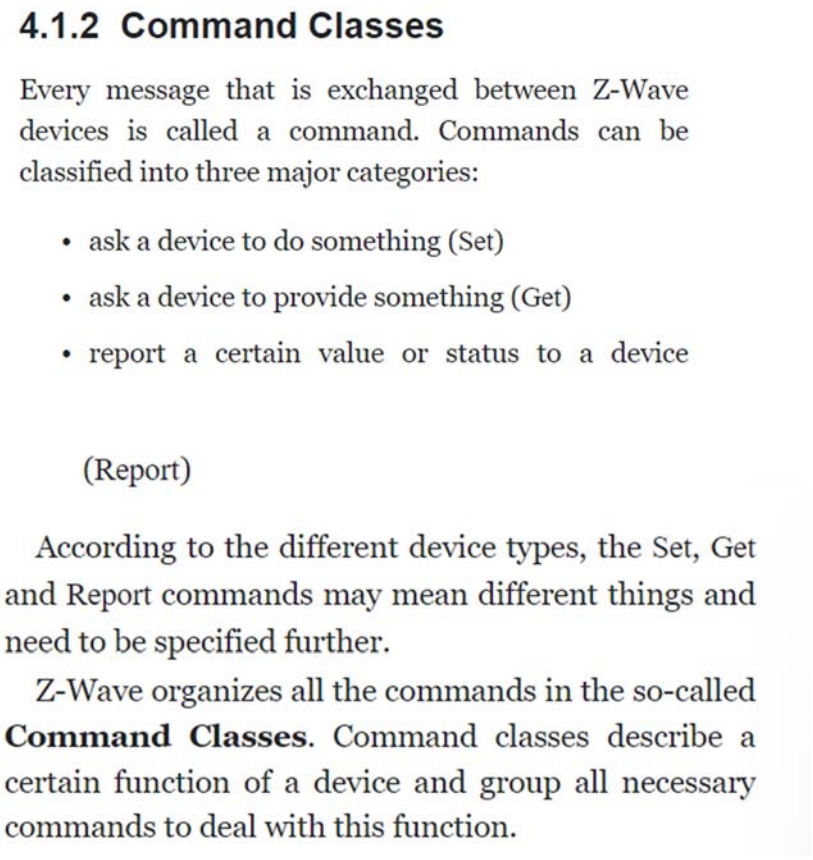
```
/* Switch Binary command class commands */
#define SWITCH_BINARY_VERSION                                    0x01
#define SWITCH_BINARY_GET                                        0x02
#define SWITCH_BINARY_REPORT                                     0x03
#define SWITCH_BINARY_SET                                        0x01

/* Switch Binary command class commands */
#define SWITCH_BINARY_VERSION_V2                                 0x02
#define SWITCH_BINARY_GET_V2                                     0x02
#define SWITCH_BINARY_REPORT_V2                                  0x03
#define SWITCH_BINARY_SET_V2                                     0x01
```

128. In addition, the received Z-Wave Frame includes "Parameters" field (in the claim, "data value") holding information (e.g. sensor data, value representing on/off status) related to the corresponding Command Class and Command type. As the number of parameters specified for each Command Class and Command type in each device type varies, the "Parameters" field thereby comprises a variable number of parameters, and each parameter is of variable size of zero to n bytes and thus must embody a scalable message. It is clearly indicated in the Z-Wave Specification that "the number of data fields transmitted can be determined from a field usually called Length. The Length field is used in cases where the same command has a variable number of command data fields" and that Command data is of size N bytes. *See* citation of Z-Wave Specification "3.3 Command class frame format", "3.3.3 Command data (N bytes)" included previously.

129. In addition, a received Z-Wave Frame includes value, e.g. numeric value of 0 or 255 (as shown in the example below) representing on/off respectively (in the claim, "function code") in the "Parameters" field which correspond to the "on/off status" ("function status") of an actuator ("device") within the Accused Jasco's GE-branded Z-Wave device, e.g. a light switch. Such actuator is co-located with the Z-Wave transceiver (in the claim, "transceiver") as both components are included within the same housing of the Accused Jasco's GE-branded Z-Wave device.

130. The microcontroller (in the claim, "controller") included in the Accused Jasco's GE-Branded Z-Wave device is further configured to "do something", "provide something" or "report something" (in the claim, "implement a function") corresponding a command code of a received data message. All Accused Jasco's GE-Branded Z-Wave device must support the Basic Command Class and implement a function after interpreting the basic commands dependent of its specific functionality:



### 4.1.2 Command Classes

Every message that is exchanged between Z-Wave devices is called a command. Commands can be classified into three major categories:

- ask a device to do something (Set)
- ask a device to provide something (Get)
- report a certain value or status to a device (Report)

According to the different device types, the Set, Get and Report commands may mean different things and need to be specified further.

Z-Wave organizes all the commands in the so-called **Command Classes**. Command classes describe a certain function of a device and group all necessary commands to deal with this function.

*See*: Z-Wave Essentials. 3rd Edition, by Dr.-Ing. Christian Paetz, April 2017, pp.139.

### 4.1.3 Command Class Basic

There is one very special command class called Basic. Basic is a wildcard command class. It is not tied to a special device function but just offers the three very basic commands:

- Set: set a value between 0 and 255 (0x00 .. 0xff);
- Get: ask the device to report a value;
- Report: response to the Get command. Reports a value between 0 and 255 (0x00 .. 0xff).

The specialty of the Basic command class is that every device will interpret the basic commands dependent of its specific functionality:

- A binary switch will switch on when receiving a value 255 and switch off when receiving a value of 0;
- A thermostat may turn into a convenience temperature mode when receiving value = 0 and may turn into an energy-saving mode when receiving a higher value;
- A temperature sensor will issue a basic report and send an integer temperature value;
- A door sensor will either send out a value = 0 in case the door is closed or a 255 (0xff) when the door is opened.

The basic command class as shown in Figure 4.4 is the smallest common denominator of all Z-Wave devices. Every Z-Wave device must support the Basic command class; however, certain commands may be ignored if there is no meaningful implementation in the device.

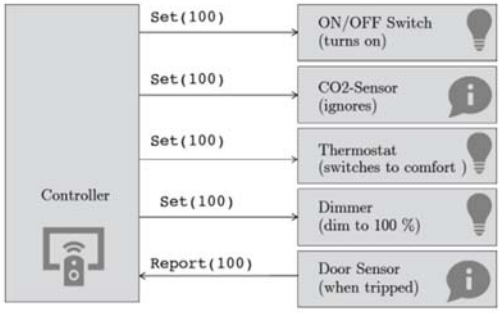



Figure 4.4: Basic Command Class

*See*: Z-Wave Essentials. 3rd Edition, by Dr.-Ing. Christian Paetz, April 2017, pp.143-146.

131. The next and final element of claim 6 of the '936 Patent reads "wherein the command code comprises at least one of a device-specific code or a non-device- specific code, wherein the device-specific code commands change of a setting of an actuator co- located with the transceiver and the non- device- specific code includes network status/diagnostic commands."

132. This element is also satisfied. The aforementioned "command code" as explained in the previous claim element comprises a device-specific code command.

133. As explained previously, every Z-Wave device must support the Basic Command Class, which comprises the Set command (in the claim, "device specific code"), which

changes the setting of the Accused Jasco's GE-Branded Z-Wave device dependent upon its specific functionality:

### 4.1.2 Command Classes

Every message that is exchanged between Z-Wave devices is called a command. Commands can be classified into three major categories:

- ask a device to do something (Set)
- ask a device to provide something (Get)
- report a certain value or status to a device

(Report)

According to the different device types, the Set, Get and Report commands may mean different things and need to be specified further.

Z-Wave organizes all the commands in the so-called **Command Classes**. Command classes describe a certain function of a device and group all necessary commands to deal with this function.

*See*: Z-Wave Essentials. 3rd Edition, by Dr.-Ing. Christian Paetz, April 2017, pp.139.

### 4.1.3 Command Class Basic

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- Set: set a value between 0 and 255 (0x00 .. 0xff);
- Get: ask the device to report a value;
- Report: response to the Get command. Reports a value between 0 and 255 (0x00 .. 0xff).

The specialty of the Basic command class is that every device will interpret the basic commands dependent of its specific functionality:

- A binary switch will switch on when receiving a value 255 and switch off when receiving a value of 0;
- A thermostat may turn into a convenience temperature mode when receiving value = 0 and may turn into an energy-saving mode when receiving a higher value;
- A temperature sensor will issue a basic report and send an integer temperature value;
- A door sensor will either send out a value = 0 in case the door is closed or a 255

(oxff) when the door is opened.

The basic command class as shown in Figure 4.4 is the smallest common denominator of all Z-Wave devices. Every Z-Wave device must support the Basic command class; however, certain commands may be ignored if there is no meaningful implementation in the device.

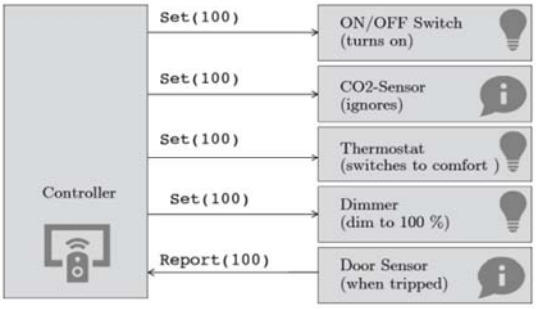


Figure 4.4: Basic Command Class

134. In the example where the Accused Jasco's GE-Branded Z-Wave device is a light switch, the accused Jasco device changes setting of an actuator used to control the on/or off state of a light. Such actuator is co-located (in the claim, "co-located") with the Z-Wave transceiver (in the claim, "transceiver") as both components are included within the same housing of the Accused Jasco's GE-branded Z-Wave device.

135. In another example, the Accused Jasco's In-Wall Smart Switch that is a On/Off Power Switch that supports "Binary Switch Class including the "Binary Switch Set Command" (in the claim, "device specific code") as described in its Z-Wave certification document (*https://products.z-wavealliance.org/products/3349/embedpics*):

Z-Wave Protocol Implementation Conformance Statement

**(Continued)**

**In-Wall Smart Switch (120/277VAC)**

2 / 5 Supports Basic Set and is controlled by pressing the ON or OFF button with the local load.
3 / 5 Supports Basic Set and is controlled by double pressing the ON or OFF button.

**Supported Command Classes (18):**

- Application Status
- Association V2
- Central Scene V3
- Device Reset Locally
- Manufacturer Specific V2
- Scene Activation
- Security S2
- Switch Binary V2
- Version V3
- Association Group Info
- Basic V2
- Configuration V4
- Firmware Update Meta-Data V4
- Powerlevel
- Scene Actuator Conf
- Supervision
- Transport Service V2
- Z-Wave Plus Info V2

**Controlled Command Classes (1):**

- Basic V2

**4.26.2 Binary Switch Set Command**

The Binary Switch Set command, version 2 is used to set a binary value in a supporting device.

| 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |
|---|---|---|---|---|---|---|---|
| Command Class = COMMAND_CLASS_SWITCH_BINARY | | | | | | | |
| Command = SWITCH_BINARY_SET | | | | | | | |
| Target Value | | | | | | | |
| Duration | | | | | | | |

**Table 28, Binary Switch Set :: Value**

| Value | | Level | State |
|---|---|---|---|
| 0 | (0x00) | 0% | Off |
| 1..99 | (0x01..0x63) | 100% | On |
| ... | | *reserved* | *reserved* |
| 255 | (0xFF) | 100% | On |

*Source: Software Design Spec., Z-Wave Command Class Specification A-M.*

136. The "Binary Switch Set Command" further specifies supported Target Value. In the above example, Jasco's GE-branded Z-Wave Device changes setting of the actuator used to control the on/off state of device based upon the target value field in a received Binary Switch Set Command. A Target Value of "0" causes a change to "Off" state. A Target Value of any values between 1 and 255 causes a change to "On" state. Such actuator is co-located with the Z-Wave

transceiver ("transceiver") as both components are included within the same housing of the Accused Jasco's GE-branded Z-Wave device.

137. The aforementioned "command code" as explained in the previous claim element may also comprise a non device-specific code command.

138. An example of a non-device specific command (in the claim, the alternative "non-device-specific code") being a network status/diagnostic command (in the claim, "network status/diagnostic command") is "Node Information Send Command". According to the Z-Wave specification, all Z-Wave devices receiving this command must send out a Node Information Frame is response. Thus, it is mandatory for the Accused Jasco's GE-branded Z-Wave device to support this command by "send[ing] a Node Information Frame to the indicated NodeID" upon receiving it.

#### 4.4.6.5 Node Information Send Command

This command is used to trigger a receiving node to issue a Node Information Frame (NIF).

A node receiving this command MUST send a Node Information Frame to the indicated NodeID with the indicated transmission options. No status message is returned for this command.

A management application MAY use this message to make a node identify itself towards a Z-Wave remote control during association operations. This command SHOULD NOT be used while learn mode is activated. Instead, periodic Node Information Frame transmissions MAY be enabled along with learn mode; refer to 4.4.6.1.

| 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |
|---|---|---|---|---|---|---|---|
| Command Class = COMMAND_CLASS_NETWORK_MANAGEMENT_BASIC | | | | | | | |
| Command = COMMAND_NODE_INFORMATION_SEND (0x05) | | | | | | | |
| Seq No | | | | | | | |
| Reserved | | | | | | | |
| Destination NodeID | | | | | | | |
| tx Options | | | | | | | |

**Seq No (8 bits)**

Refer to 4.4.1.1 Sequence Number management.

**Reserved**

This field MUST be set to 0 by a sending node and MUST be ignored by a receiving node.

**Destination NodeID (1 byte)**

This field indicates the NodeID of the node that will receive the Node Information frame. The NodeID MAY be set to the broadcast NodeID to reach all nodes within direct range.

Acknowledgement SHOULD NOT be requested when broadcasting.

**tx Options (1 byte)**

This field allows a management application to specify if the Node Information frame is to be sent with special properties. This field MUST be treated as a bitmask and MUST comply with Table 12.

*Source: Software Design Spec., Z-Wave Command Class Specification N-Z*

139. On information and belief, Defendant may have other products that operate pursuant to the Z-Wave protocol and, therefore, are also '936 Infringing Instrumentalities.

Additional details relating to ’936 Infringing Instrumentalities and their infringement are within the possession, custody or control of Defendant.

140. On information and belief, Defendant may have products that operate pursuant to the Zigbee specifications. At least claim 6 of the ’936 Patent is also infringed when ’936 Infringing Instrumentalities operate pursuant to the Zigbee specifications. Additional details relating to ’936 Infringing Instrumentalities and their infringement are within the possession, custody or control of Defendant.

141. Plaintiff offers this preliminary identification and description of infringement without the benefit of discovery or claim construction in this action, and expressly reserves the right to augment, supplement, and revise its identification and description of infringement based on additional information obtained through discovery or otherwise.

142. Defendant’s acts of infringement involving the ’936 Patent have caused damage to Plaintiff, and Plaintiff is entitled to recover from Defendant the damages it has sustained as a result of Defendant’s wrongful acts in an amount subject to proof at trial.

**INFRINGEMENT OF U.S. PATENT NO. 8,335,304**

143. The allegations set forth in the foregoing paragraphs 1 through 142 are incorporated by reference into this claim for relief.

144. On December 18, 2012, U.S. Patent No. 8,335,304 (“the ’304 Patent”), entitled “Multi-Function General Purpose Transceivers And Devices,” was duly and legally issued by the United States Patent and Trademark Office. A true and correct copy of the ’304 Patent is attached as Exhibit 5. Related U.S. application data is set forth on the face of the patent.

145. Plaintiff is the assignee and owner of the right, title, and interest in and to the ’304 Patent, including the right to assert all causes of action arising under the ’304 Patent and the right to any remedies for infringement of the ’304 Patent.

146. Defendant has infringed and continues to infringe Claim 7 of the ’304 Patent under 35 U.S.C. § 271 without authorization.

147. Jasco’s products infringe in two ways.

148. First, each of Jasco’s GE-branded non-battery operated Z-Wave devices and Jasco’s GE-branded non-battery operated Z-Wave Plus devices, including but not limited to the Smart Flood/Freeze Sensor, Plug-In Outdoor Smart Switch, In-Wall Smart Toggle Dimmer, In-Wall Smart Toggle Switch, all perform each step of Claim 7.

149. Second, each of Jasco’s Bluetooth Low Energy (BLE) products, including but not limited to GE-branded Plug-in Smart Switch, GE-branded Bluetooth In-Wall Smart Switch, GE-branded In-Wall Smart Dimmer, and GE-branded Bluetooth Plug-In Smart Dimmer, all perform each step of Claim 7.

150. Defendant’s infringement of Claim 7 of the ’304 Patent is shown in the claim charts attached hereto as Exhibits 6A and 6B. The claim charts are incorporated by reference as if set forth herein. The citations to the Z-Wave specifications in the claim chart attached as Exhibit 6A are required for a product configured to operate pursuant to Z-Wave. The citations to the Bluetooth specifications in the claim chart attached as Exhibit 6B are required for a product configured to operate pursuant to Bluetooth.

151. Claim 7 of the ‘304 Patent sets forth:

> A wireless communication method for relaying electronic messages in a wireless communication network comprising a plurality of wireless communication devices, the method comprising:
>
> wirelessly receiving an information signal at a first wireless communication device, the information signal comprising a unique message code and an instruction code;
>
> decoding the information signal toaccess the unique message code and the instruction code;

initiating communication with asecond wireless communicationdevice in the wireless communication network in response to the unique message code and the instruction code;

communicating the unique message code from the first wireless communication device tothe second communication device.

*See* Exhibit 5 at 15, lines 12-28.

**Z-WAVE INFRINGEMENT OF THE '304 PATENT**

152. As set forth in the claim chart attached as Exhibit 6A, each element of claim 7 is infringed by the accused Jasco products.

153. First, each element of preamble is satisfied. The preamble states: "A wireless communication method for relaying electronic messages in a wireless communication network comprising a plurality of wireless communication devices, the method comprising:"

154. This claim reads on Jasco's Z-Wave devices, including its Smart Flood/Freeze Sensor, Plug-In Outdoor Smart Switch, In-Wall Smart Toggle Dimmer, In-Wall Smart Toggle Switch. In-Wall Smart Dimmer, In-Wall Smart Switch, On/Off/Dim Lamp Module.

155. Jasco advertises that each of these GE-branded Z-Wave non-battery operated Devices support Z-Wave and all of these devices are certified Z-Wave products.


GE Z-Wave products work with all Z-Wave certified gateways to allow you to control them from any mobile device. Z-Wave devices have been tested and confirmed functional with these great hub products and we continue testing future devices for compatibility. All GE Z-Wave Lighting Controls can be controlled by Alexa and Google Assistant when connected to a supported hub.

JASCO®

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405-752-0710 • 800-654-8483 • www.byjasco.com


*See:* Jasco Z-Wave Wholesale Channel Sheet 1-17-2018_0.pdf.

156. A full list of Jasco's non-battery operated Z-Wave Devices are listed in the following links:

https://products.z-wavealliance.org/Search/DoAdvancedSearch?productName=&productIdentifier=&productDescription=&category=-1&brand=356&regionId=2&order=
https://products.z-wavealliance.org/Search/DoAdvancedSearch?productName=&productIdentifier=&productDescription=&category=-1&brand=440&regionId=2&order=
https://products.z-wavealliance.org/Search/DoAdvancedSearch?productName=&productIdentifier=&productDescription=&category=-1&brand=793&regionId=2&order=
https://products.z-wavealliance.org/Search/DoAdvancedSearch?productName=&productIdentifier=&productDescription=&category=-1&brand=49&regionId=2&order=

157. In addition, below is an exemplary list of accused Jasco products and corresponding Z-Wave Protocol Implementation Statements:

| **Accused Product** | **Link to Z-Wave Protocol Implementation Conformance Statement** |
|---|---|
| GE Enbrighten Z-Wave Plus In-Wall Smart Dimmer with QuickFit and Simple Wire | https://products.z-wavealliance.org/products/3351/embedpics |
| GE Z-Wave Plus In- Wall Touch Sensing Smart Dimmer | https://products.z-wavealliance.org/products/2643/embedpics |
| GE Z-Wave Plus Smart Motion Dimmer | https://products.z-wavealliance.org/products/2108/embedpics |
| GE Z-Wave Plus Smart Motion Switch | https://products.z-wavealliance.org/products/2035/embedpics |
| GE Z-Wave Plus In-Wall Smart Fan Control | https://products.z-wavealliance.org/products/2506/embedpics |

| | |
|---|---|
| GE Z-Wave Plus In-Wall 1000 Watt Smart Dimmer, 5005 | https://products.z-wavealliance.org/products/2168/embedpics |
| GE Z-Wave Plus In-Wall Smart Dimmer | https://products.z-wavealliance.org/products/3323/embedpics<br>https://products.z-wavealliance.org/products/2105/embedpics |
| GE Z-Wave Plus In-Wall Smart Dimmer, White Toggle | https://products.z-wavealliance.org/products/3352/embedpics |
| GE Z- Wave Plus In-Wall Tamper-Resistant Smart Outlet | https://products.z-wavealliance.org/products/2732/embedpics<br>https://products.z-wavealliance.org/products/2236/embedpics |
| GE Z-Wave Plus In-Wall Smart Switch, White Toggle | https://products.z-wavealliance.org/products/3351/embedpics<br>https://products.z-wavealliance.org/products/2502/embedpics |
| GE Z-Wave Plus In-Wall Smart Switch | https://products.z-wavealliance.org/products/3349/embedpics<br>https://products.z-wavealliance.org/products/2501/embedpics |
| GE Z-Wave Plug In Smart Dimmer, Dual Plug w/ USB Charging | https://products.z-wavealliance.org/products/2210/embedpics |
| GE Plug-In Smart Switch Dual Plug w/ USB Charging | https://products.z-wavealliance.org/products/2626/embedpics<br>https://products.z-wavealliance.org/products/2192/embedpics |
| GE Z-Wave Plus Plug-In Dimmer, Dual Controlled Outlets, 5005 | https://products.z-wavealliance.org/products/2139/embedpics |
| GE Z-Wave Plus Plug-In Outdoor Smart Switch, 5005 | https://products.z-wavealliance.org/products/3408/embedpics<br>https://products.z-wavealliance.org/products/2526/embedpics |
| GE Z-Wave Plus Plug-In Two-Outlet Smart Switch | https://products.z-wavealliance.org/products/1935/embedpics |

| | |
|---|---|
| GE Z-Wave Plus Plug-In Smart Dimmer | https://products.z-wavealliance.org/products/1433/embedpics |
| GE Z- Wave Plus Plug-In Smart Switch | https://products.z-wavealliance.org/products/2561/embedpics |
| GE Z-Wave Plus Direct-Wire Indoor/Outdoor Smart Switch (40A) | https://products.z-wavealliance.org/products/2939/embedpics |
| GE Z-Wave Wireless Lighting Control Lamp Module with Dimmer Control | https://products.z-wavealliance.org/products/1207/embedpics |
| GE Z-Wave Plus Wireless Smart Lighting Control Duplex Receptacle Outlet | https://products.z-wavealliance.org/products/724/embedpics |
| Smart Flood and Freeze Sensor | https://products.z-wavealliance.org/products/3642/embedpics |
| Plug-in Smart Switch (Single Plug) | https://products.z-wavealliance.org/products/2533/embedpics |
| Plug-In Smart Switch (Dual Plug) | https://products.z-wavealliance.org/products/2525/embedpics<br>https://products.z-wavealliance.org/products/2125/embedpics |

158. Jasco's GE-branded non-battery operated Z-Wave devices comprise a Z-Wave ASIC chipset, which includes implementation of the Z-Wave protocol stack, which comprises implementation of a method ("wireless communication method") relaying electronic messages ("relaying electronic messages") in a Z-Wave network ("wireless communication network") comprising other Z-Wave devices or a Z-Wave controller ("a plurality of wireless communication devices").

159. Z-Wave Essentials. 3rd Edition, by Dr.-Ing. Christian Paetz, April 2017, p.33 shows that Z-Wave ASIC includes implementation of the Z-Wave protocol stack by including "precompiled libraries for various applications covering all aspects of the communication protocol":

> Besides, the ASIC Sigma Designs also provides a system development kit (SDK) to simplify the product development. This contains, among other things, precompiled libraries for various applications covering all aspects of the communication protocol. All manufacturers are required to use one of these libraries for their product development, leading to similar behavior of all Z-Wave devices on the lower protocol layers. Z-Wave also defines application-specific functions (e.g. switch A is turned on when button B is pressed), but the manufacturers are responsible to implement this. Most manufacturers optimize and enhance functions on the application layer.

160. In addition, Jasco's "Q&A- Z-Wave Home Automation document (https://blog.byjasco.com/faq-z-wave-home-automation)" shows that Z-Wave is a wireless communication network (in the claim, "wireless communication network") in which all Z-Wave devices are capable of communicating with one another.

## What is Z-Wave?

Z-Wave is one of the main home automation protocols (think of it as a language) that is used by various devices in order to allow them to communicate with one another. Ideally, you want to have devices that all speak the same language.

## What can I do with Z-Wave?

You can control and schedule devices and processes in your home via Z-Wave. For example, you can remotely adjust the temperature in your home via a thermostat, make sure you locked the back door via a door lock, or schedule your lights to turn on at sunset and off at sunrise via smart bulbs, switches, or modules.

## What is home automation?

In a nutshell, home automation is having the ability to remotely control appliances, electronics and/or systems in your house, set schedules for them, or operate based on a set of conditions.

161. Further, a Z-Wave network is used to communicate commands (e.g. on/off status) in Z-Wave Frames (in the claim, "electronic messages") between a mesh network of Z-Wave devices, thereby enabling Z-Wave devices to securely "talk" to each other:


*Source: Jasco Z-Wave Wholesale Channel Sheet 1-17-2018_0.pdf*

162. "The Z-Wave protocol is a low bandwidth half duplex protocol designed for reliable wireless communication in a low cost control network. The protocols main purpose is to communicate short control messages in a reliable manner from a control unit to one or more nodes in the network." Software Design Specification - Z-Wave Protocol Overview p.3.

163. "Z-Wave is a next-generation wireless ecosystem that lets all your home electronics talk to each other, and to you, via remote control. It uses simple, reliable, low-power radio waves that easily travel through walls, floors and cabinets. Z-Wave control can be added to almost any electronic device in your house, even devices that you wouldn't ordinarily think of as "intelligent," such as appliances, window shades, thermostats and home lighting.


*See: Z -Wave: The New Standard in Wireless Remote Control http://www.z-wave.com/modules/AboutZ-Wave/*

164. Jasco's Z-Wave Wholesale Channel Sheet 1-17-2018_0.pdf below shows that the Accused "Jasco's GE-branded non battery operated Z-Wave devices" are also a range extender which helps extend the range of Z-Wave network by repeating [Z-Wave] signals up to 100 feet" ("relaying electronic messages") in a Z-Wave network.

## Z-Wave Plus 500 Series

Compared to Z-Wave Classic models, Z-Wave Plus offers 50% more wireless range and energy efficiency, a 250% faster processor and 400% more memory. Offers full control from any mobile device or Z-Wave enabled wireless remotes. Take control of your home lighting with GE Z-Wave Plus Smart Lighting Controls.

## Range Extender

Each GE-branded Smart Control repeats the signal up to 150 feet. Adding additional GE Smart Controls extends the range of your Z-Wave network for whole home wireless control.

## Comprehensive Line-up

Innovative line that brings many benefits to everyday life including remote home monitoring, safety and security, and energy conservation by controlling a wide array of home devices including lighting, appliances, HVAC, entertainment, and more.

## Plug-in Modules

**Key Design Features**

- Ratings: 120VAC, 60Hz
- Space Savings and innovative design
- Suit your needs with features ranging from Single, Dual, and Dual Independently controlled outlets and USB Charging

| Model Number | Description | UPC | Length EA | Width EA | Height EA | Weight EA | Quantity IP | Quantity MP |
|---|---|---|---|---|---|---|---|---|
| 14290* | Plug-In Smart Dimmer, Dual Plug | 30878142809 | 2.64 | 4.7 | 7.16 | 0.7 | 2 | 24 |
| 14282* | Plug-In Smart Switch, Dual Plug | 30878142823 | 2.62 | 4.66 | 7.13 | 0.66 | 2 | 24 |
| 14284* | Plug-In Outdoor Smart Switch | 30878142847 | 2.62 | 4.66 | 7.13 | 0.78 | 2 | 24 |
| 28175* | Plug-In Smart Dimmer, Dual Plug w/USB Charging | 30878281751 | 2.64 | 4.7 | 7.16 | 0.85 | 2 | 24 |
| 28177* | Plug-In Smart Switch, Dual Plug w/USB Charging | 30878281775 | 2.64 | 4.7 | 7.16 | 0.85 | 2 | 24 |
| 28167* | Plug-In Smart Dimmer, Single Plug | 30878281676 | 2.62 | 4.66 | 7.13 | 0.63 | 2 | 24 |
| 28169* | Plug-In Smart Switch, Single Plug | 30878281690 | 2.62 | 4.66 | 7.13 | 0.57 | 2 | 24 |

## Toggle Switches

**Key Design Features**

- Screw terminal installation provides improved space efficiency compared to flying leads. Requires Neutral and Traveler wire for installation.
- Auto centering toggle design

| Model Number | Description | UPC | Length EA | Width EA | Height EA | Weight EA | Quantity IP | Quantity MP |
|---|---|---|---|---|---|---|---|---|
| 12728** | In-Wall Add On Switch, White Toggle | 30878127288 | 2.62 | 4.64 | 7.13 | 0.55 | 2 | 24 |
| 14292** | In-Wall Smart Toggle Switch, White | 30878142922 | 2.62 | 4.64 | 7.13 | 0.62 | 2 | 24 |
| 14295* | In-Wall Smart Toggle Switch, White | 30878142953 | 2.62 | 4.64 | 7.13 | 0.64 | 2 | 24 |
| 14293**** | In-Wall Smart Switch, Light Almond Toggle | 30878142939 | 2.62 | 4.64 | 7.13 | 0.64 | 2 | 24 |
| 14296**** | In-Wall Smart Dimmer, Light Almond Toggle | 30878142960 | 2.62 | 4.64 | 7.13 | 0.64 | 2 | 24 |

## Paddle Switches

**Key Design Features**

- Screw terminal installation provides improved space efficiency compared to flying leads. Requires Neutral and Traveler wire for installation. *Excludes 1000 Watt Dimmer.*
- Includes white and light almond changeable paddles, black, brown and ivory sold separately.

| Model Number | Description | UPC | Length EA | Width EA | Height EA | Weight EA | Quantity IP | Quantity MP |
|---|---|---|---|---|---|---|---|---|
| 14287* | In-Wall Smart Fan Control | 30878142878 | 2.62 | 4.66 | 7.13 | 0.66 | 2 | 24 |
| 12723** | In-Wall Add On Switch, White or Light Almond | 30878127233 | 2.58 | 4.64 | 7.1 | 0.54 | 2 | 24 |
| 14291* | In-Wall Smart Switch | 30878142915 | 2.62 | 4.66 | 7.13 | 0.65 | 2 | 24 |
| 14294* | In-Wall Smart Dimmer | 30878142946 | 2.62 | 4.68 | 7.16 | 0.68 | 2 | 24 |
| 14299* | In-Wall 1000W Smart Dimmer | 30878142911 | 2.64 | 4.68 | 7.15 | 0.68 | 2 | 24 |

## Specialty Products

| Model Number | Description | UPC | Length EA | Width EA | Height EA | Weight EA | Quantity IP | Quantity MP |
|---|---|---|---|---|---|---|---|---|
| | **SENSOR PRODUCTS** | | | | | | | |
| 32563* | Hinge Pin Door Sensor | 308783 | 2.58 | 4.64 | 7.1 | 0.54 | 2 | 24 |
| 34193* | Tabletop Motion Sensor, Battery Operated USB | 30878142915 | 2.62 | 4.66 | 7.13 | 0.65 | 2 | 24 |
| 26931* | In-Wall Occupancy Vacancy Switch | 30878269315 | 2.62 | 4.64 | 7.13 | 0.64 | 2 | 24 |
| 26933* | In-Wall Occupancy Vacancy Dimmer | 30878269339 | 2.62 | 4.64 | 7.13 | 0.64 | 2 | 24 |
| | **IN-WALL OUTLET** | | | | | | | |
| 14288* | In-Wall Tamper Resistant Smart Outlet | 30878142911 | 2.64 | 4.68 | 7.15 | 0.68 | 2 | 24 |
| | **CONNECTED BULBS** | | | | | | | |
| 35931*** | A19 60W Equivalent LED Bulb, 2700k | 30878269339 | 2.65 | 4.68 | 7.17 | 0.65 | 2 | 24 |

*GE/Z-WAVE **GE/3-WAY ADD-ON ***ENBRIGHTEN ****CAV

JASCO

Z-WAVE PLUS

165. Further, the Accused "Jasco's GE-branded non battery operated Z-Wave devices" are Z-Wave device of type "slave" according to its Z-Wave certification and conformance document. For example, Z-Wave conformance implementation statement of the accused Jasco's In-Wall Z-Wave Smart Switch shows that it is an "Always On Slave":

Z-Wave Protocol Implementation Conformance Statement

# In-Wall Smart Switch (120/277VAC)

## General Information

| | |
|---|---|
| **Product Identifier:** | 43072/ZW4008DV |
| **Brand Name:** | GE |
| **Product Version:** | HW: 255 FW: 5.53 |
| **Z-Wave Certification #:** | ZC10-19056488 |

## Product Features

| | |
|---|---|
| **Firmware Updatable** | Updatable by Consumer by RF |
| **Neutral Wire Required** | Yes |
| **Z-Wave Scene Type** | Central Scene |

## Z-Wave Product Information

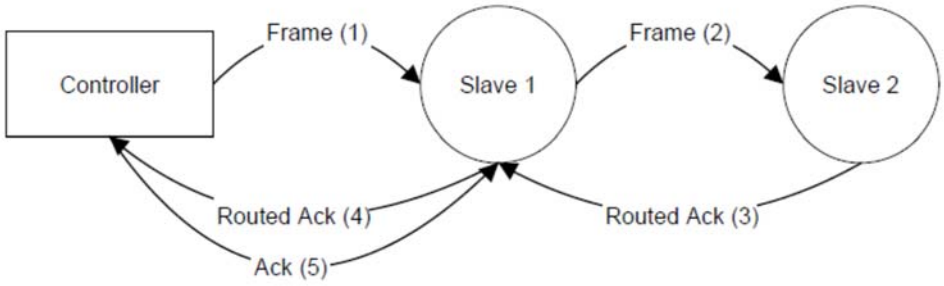
| | |
|---|---|
| Supports Z-Wave Beaming Technology? | Yes |
| Supports Z-Wave Network Security? | Yes |
| Supports Z-Wave AES-128 Security S0? | No |
| Supports Security S2? | Yes: S2 Authenticated, S2 Unauthenticated |
| SmartStart Compatible? | Yes |

## Z-Wave Technical Information

| | |
|---|---|
| **Z-Wave Frequency:** | U.S. / Canada / Mexico |
| **Z-Wave Product ID:** | 0x3139 |
| **Z-Wave Product Type:** | 0x4952 |
| **Z-Wave Hardware Platform:** | ZM5202 |
| **Z-Wave Development Kit Version:** | 6.81.03 |
| **Z-Wave Library Type:** | Enhanced 232 Slave |
| **Z-Wave Device Type / Role Type:** | On/Off Power Switch / Always On Slave |

166. The following excerpts from Software Design Specification – Z-Wave Protocol Overview shows that Z-Wave devices that are slave nodes "forward commands to other nodes":

- "The Z-Wave protocol has 2 basic kinds of devices; controlling devices and slave nodes. Controlling devices are the nodes in a network that initiate control commands and sends out the commands to other nodes, and slave nodes are the nodes that reply on and execute the commands. Slave nodes can also forward commands to other nodes, which make it possible for the controller to communicate with nodes out of the direct radio wave reach" Software Design Specification - Z-Wave Protocol Overview p.9.
- "The figure below shows an example of the frame flow when a frame is sent from a controller, repeated through a slave, to a second slave.




"

*See* Z-Wave Node Type Overview and Network Installation Guide. p.10.

- "Any slave node can act as repeater for frames going to other nodes. The only requirement for being able to act as repeater is that the node is in listening state. This requires that the node is permanently powered, and in order to limit battery consumption, this means that only mains-powered nodes will act as repeaters in most practical installations." Introduction – Getting Started with Z-Wave. P.22

167. The Accused "Jasco GE-Branded Non-Battery powered Z-Wave devices" supporting Z-Wave includes a Z-Wave chipset that implements the Z-Wave protocol. Implementation of the Z-Wave protocol includes the routing layer which enables the repeating capability as shown in the Z-Wave Specification:

> The Z-Wave routing layer controls the routing of frames from one node to another. Both controllers and slaves can participate in routing of frames in case they are always listening and have a static position. The layer is responsible for both sending a frame with a correct repeater list, and also to ensure that the frame is repeated from node to node. The routing layer is also responsible for scanning the network topology and maintaining a routing table in the controller.

*See* Software Design Specification - Z-Wave Protocol Overview p.12.

168. The first claim element reads "wirelessly receiving an information signal at a first wireless communication device, the information signal comprising a unique message code and an instruction code;"

169. This claim element is satisfied. Each of "Jasco's GE-branded non-battery operated Z-Wave devices" supporting Z-Wave includes a Z-Wave ASIC chipset which comprises a Z-Wave radio transceiver:

Figure 1.8 shows the current workhorse, the Series 500 IC. The ASIC combines the radio transceiver, a microcontroller, embedded memory, and quite a few peripheral components in one single chip. Most of the Z-Wave products sold today just use this chip to implement all functions. This is a huge cost and complexity saving compared to discrete implementation where controller, memory, I/Os, and radio transceivers are separate components. The chapter 6.3 gives further information about the ASIC and the way it is used in products.

Besides, the ASIC Sigma Designs also provides a system development kit (SDK) to simplify the product development. This contains, among other things, precompiled libraries for various applications covering all aspects of the communication protocol. All manufacturers are required to use one of these libraries for their product development, leading to similar behavior of all Z-Wave devices on the lower protocol layers. Z-Wave also defines application-specific functions (e.g. switch A is turned on when button B is pressed), but the manufacturers are responsible to implement this. Most manufacturers optimize and enhance functions on the application layer.

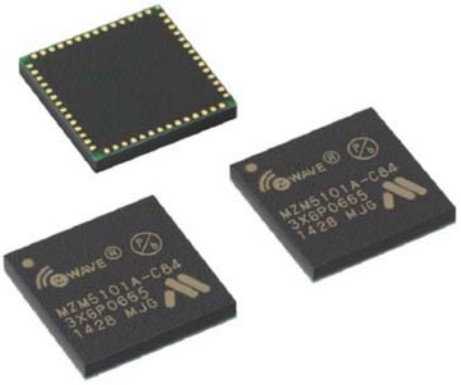
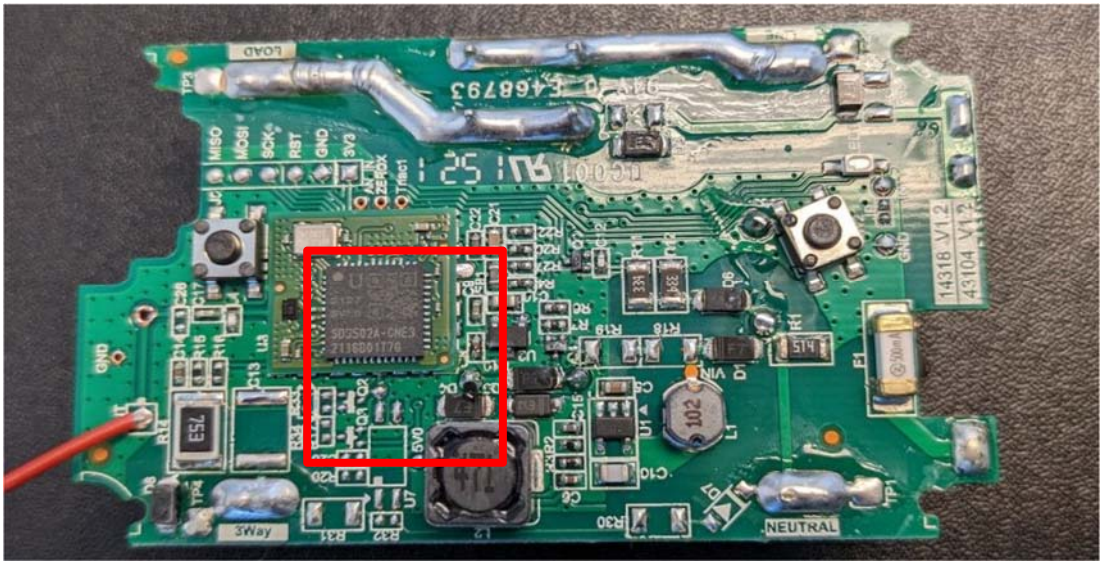



Figure 1.8: Sigma Designs Z-Wave ASIC Series 500

Source: Sigma Designs

*See*: Z-Wave Essentials. 3rd Edition, by Dr.-Ing. Christian Paetz, April 2017, pp.33-35.

170. For example, a teardown of the Accused Jasco's In-Wall Z-Wave Smart Switch shows a Z-Wave chipset (in red box):

171. The Z-Wave radio transceiver included in each the "Jasco's GE-branded non-battery operated Z-Wave devices" wirelessly receives a Z-Wave Frame ("an information signal") because each of the accused Jasco GE-branded Z-Wave Devices is a Z-Wave device of device slave type according to its corresponding Z-Wave certification and as set forth in the conformance document. For example, as mentioned above and in the graphic in the section related to the preamble, Z-Wave conformance implementation statement of the accused Jasco's In-Wall Z-Wave Smart Switch shows that it is an "Always On Slave".

172. Each Z-Wave device that is a slave node receives Z-Wave commands over the Z-Wave network ("wirelessly receiving an information signal") from controlling devices and other slave nodes.

173. The following excerpts from Software Design Specification – Z-Wave Protocol Overview shows that Z-Wave devices that are slave nodes send and receive commands:

- "The Z-Wave protocol has 2 basic kinds of devices; controlling devices and slave nodes. Controlling devices are the nodes in a network that initiate control commands and sends out the commands to other nodes, and **slave nodes are the nodes that reply on and execute the commands. Slave nodes can also forward commands to other nodes**, which make it possible for the controller to communicate with nodes out of the direct radio wave reach" Software Design Specification - Z-Wave Protocol Overview p.9.

- "The Z-Wave routing layer controls the routing of frames from one node to another. Both controllers and slaves can participate in routing of frames in case they are always listening and have a static position. The layer is responsible for **both sending a frame with a correct repeater list, and also to ensure that the frame is repeated from node to node**. The routing layer is also responsible for scanning the network topology and maintaining a routing table in the controller." Software Design Specification - Z-Wave Protocol Overview p.9.

- "**Any slave node can act as repeater for frames going to other nodes.** The only requirement for being able to act as repeater is that the node is in listening state. This requires that the node is permanently powered, and in order to limit battery consumption, this means that only mains-powered nodes will act as repeaters in most practical installations." Introduction – Getting Started with Z-Wave. P.22

174. A command is a message ("an information signal") exchanged between Z-Wave devices in a Z-Wave network and is defined as follows:

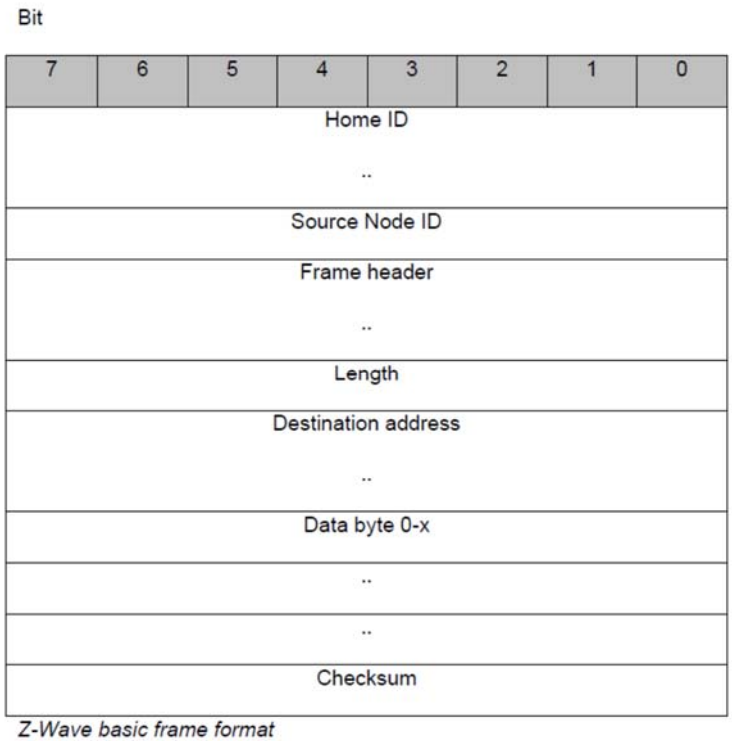
### 4.1.2 Command Classes

Every message that is exchanged between Z-Wave devices is called a command. Commands can be classified into three major categories:

- ask a device to do something (Set)
- ask a device to provide something (Get)
- report a certain value or status to a device

*See*: Z-Wave Essentials. 3rd Edition, by Dr.-Ing. Christian Paetz, April 2017, p.139.

175. All Z-Wave Commands follow a basic frame format as defined in the Z-Wave Specification attached below. The Z-Wave transfer layer contains 4 basic frame formats used for transferring commands in the network. All four frames use the following frame layout:




*Z-Wave basic frame format*

Software Design Specification - Z-Wave Protocol Overview p.9.

176. The following diagram illustrates the same Z-Wave Frame Format mentioned above, with the addition of incorporating a Z-Wave Command as "Application Payload":

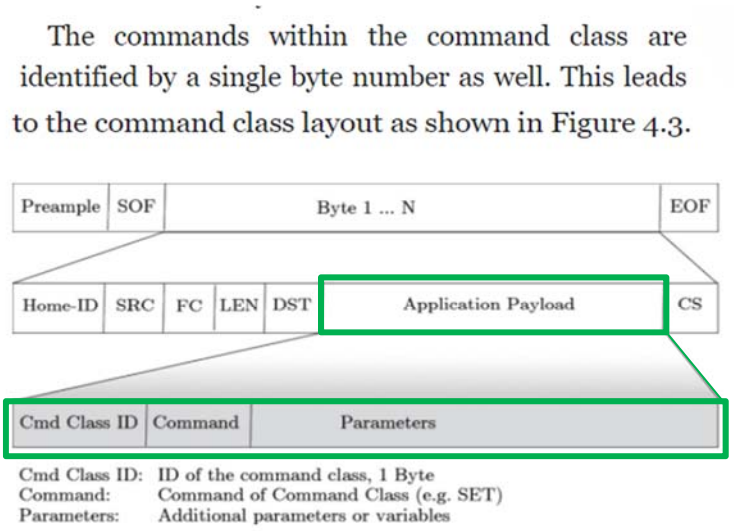



Figure 4.3: Frame Layout for Command Classes

*See*: Z-Wave Essentials. 3rd Edition, by Dr.-Ing. Christian Paetz, April 2017, pp.142

177. "Command" field containing "Command within the Command Class (e.g. SET)…identified by a single number as well". A combination of the "Command Class" value and the "Command" value form a "unique message code" (in the claim, "unique message code") representing a command related to a particular device type. The below excerpts describe Command Classes and Commands within Command Classes.

### 4.1.2 Command Classes

Every message that is exchanged between Z-Wave devices is called a command. Commands can be classified into three major categories:

- ask a device to do something (Set)
- ask a device to provide something (Get)
- report a certain value or status to a device (Report)

According to the different device types, the Set, Get and Report commands may mean different things and need to be specified further.

Z-Wave organizes all the commands in the so-called **Command Classes**. Command classes describe a certain function of a device and group all necessary commands to deal with this function.

*See*: Z-Wave Essentials. 3rd Edition, by Dr.-Ing. Christian Paetz, April 2017, p. 142.

Command classes are identified by a single byte number. Annex C shows the complete list of command classes by ID.

The commands within the command class are identified by a single byte number as well. This leads to the command class layout as shown in Figure 4.3.

*See*: Z-Wave Essentials. 3rd Edition, by Dr.-Ing. Christian Paetz, April 2017, p. 142.

### 3.3 Command class frame format

All commands have a common header consisting of a Command Class identifier and a Command identifier. Further, the command can have from zero to n bytes of command data. The bit-numbering scheme is "LSB 0" because bit numbering starts at zero for the least significant bit (Notice that LSB is denoted as 'Bit 0'… and MSB is denoted as 'Bit 7 throughout the document). The figures below show the generic command frame for the two possible formats:

| 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |
|---|---|---|---|---|---|---|---|
| Command Class (0x20 – 0xEE) | | | | | | | |
| Command | | | | | | | |
| Command Data 1 | | | | | | | |
| .. | | | | | | | |
| Command Data n | | | | | | | |

**Figure 4, Generic command format**

| 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |
|---|---|---|---|---|---|---|---|
| Command Class MSB (0xF1 – 0xFF) | | | | | | | |
| Command Class LSB (0x00 – 0xFF) | | | | | | | |
| Command | | | | | | | |
| Command Data 1 | | | | | | | |
| .. | | | | | | | |
| Command Data n | | | | | | | |

**Figure 5, Generic extended command format**

#### 3.3.2 Command

The command field contains the specific command that SHOULD be executed. The field has a length of 1 byte.

#### 3.3.3 Command data (N bytes)

The command data field contains data related to the command. Simple commands, such as get commands, contain no command data. Other commands, such as set or report commands can contain several bytes of command data.

*See*: Z-Wave Command Class Specification, A-M, pp. 8-10.

178. Further, the received Z-Wave Frame also includes "Command Data" ("instruction code") which contain one or more parameters associated with the Command Class and Command within the Command Class.

179. In the example of "Binary Switch Set Command", which is supported by the accused Jasco devices, the combination of "COMMAND_CLASS_SWITCH_BINARY" and "SWITCH_BINARY_SET" is "a unique message code" (in the claim, "unique message code"), while "Target Value" field contains the "instruction code" (in the claim, "instruction code") , e.g. "0" represents to turn Off.

**4.26.2 Binary Switch Set Command**

The Binary Switch Set command, version 2 is used to set a binary value in a supporting device.

| 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |
|---|---|---|---|---|---|---|---|
| Command Class = COMMAND_CLASS_SWITCH_BINARY | | | | | | | |
| Command = SWITCH_BINARY_SET | | | | | | | |
| Target Value | | | | | | | |
| Duration | | | | | | | |

**Table 28, Binary Switch Set :: Value**

| Value | | Level | State |
|---|---|---|---|
| 0 | (0x00) | 0% | Off |
| 1..99 | (0x01..0x63) | 100% | On |
| ... | | *reserved* | *reserved* |
| 255 | (0xFF) | 100% | On |

*Source: Software Design Spec., Z-Wave Command Class Specification A-M.*

180. The next claim element reads "decoding the information signal to access the unique message code and the instruction code;". This claim element is also satisfied.

181. The aforementioned Z-Wave chipset included in each of the Accused Jasco's GE-branded Z-Wave Device includes implementation of the Z-Wave protocol stack configured to decode a received Z-Wave Frame (in the claim "decoding the information") to access the command class and command type information ("unique message code") and the "hop index" in the RTE field of the Z-Wave Frame.

182. Z-Wave Essentials. 3rd Edition, by Dr.-Ing. Christian Paetz, April 2017, p.33 shows that Z-Wave ASIC includes implementation of the Z-Wave protocol stack by including "precompiled libraries for various applications covering all aspects of the communication protocol":

> Besides, the ASIC Sigma Designs also provides a system development kit (SDK) to simplify the product development. This contains, among other things, precompiled libraries for various applications covering all aspects of the communication protocol. All manufacturers are required to use one of these libraries for their product development, leading to similar behavior of all Z-Wave devices on the lower protocol layers. Z-Wave also defines application-specific functions (e.g. switch A is turned on when button B is pressed), but the manufacturers are responsible to implement this. Most manufacturers optimize and enhance functions on the application layer.

183. The Z-Wave protocol stack includes implementation to "decod[e] and execut[e] commands in a Z-Wave network" (in the claim "access the unique message code and instruction code"):

## 7 APPLICATION LAYER

The Z-Wave application layer is responsible for decoding and executing commands in a Z-Wave network. The only part of the application layer that is described in this overview is the assignment of Home ID's and Node ID's and the replication of controllers. The rest of the application layer is implementation specific, and can be different from one implementation to another.

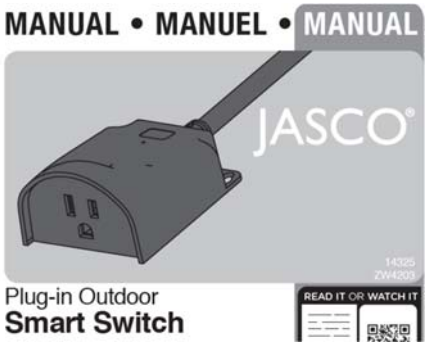
*Source: Software Design Specification - Z-Wave Protocol Overview, p.17.*

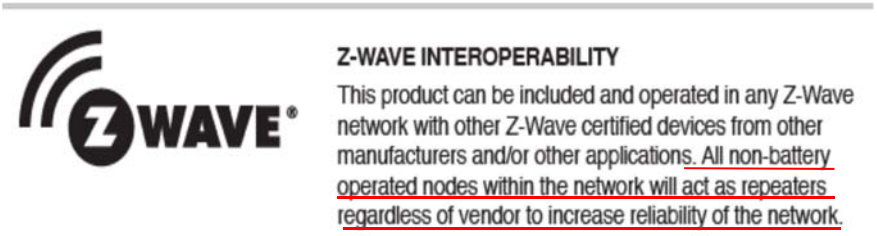
184. The next claim element reads "initiating communication with a second wireless communication device in the wireless communication network in response to the unique message code and the instruction code;", followed by "communicating the unique message code from the

first wireless communication device to the second communication device." These claim elements can be mapped together, and are also satisfied.

185. Each of Jasco's GE-branded non-battery operated Z-Wave device ("a first wireless communication device") implements a method to forward/repeat/relay commands to other Z-Wave nodes ("initiate communication with a second wireless communication device") in a Z-Wave network in response to any Network Management command code or Application command code ("unique message code") and corresponding command parameters ("instruction code") received but destined for another Z-Wave device.

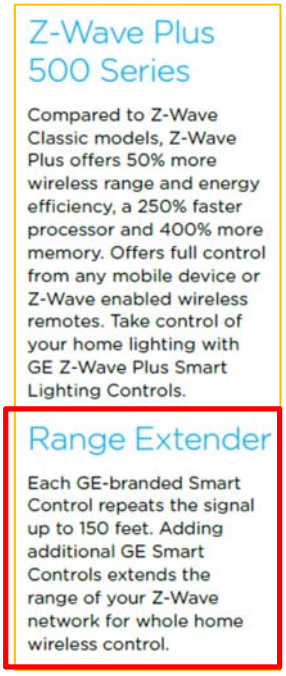
186. Each of Jasco's GE-branded non-battery operated Z-Wave device must embody these claim elements as Jasco's product literature of all accused products shows that the "All non-battery operated nodes within the network will act as repeaters regardless of vendor to increase reliability of the network".




*Source: Jasco Smart Flood/Freeze Sensor Manual; Jasco Plug-In Outdoor Smart Switch Manual; Jasco In-Wall Smart Toggle Dimmer Manual; Jasco In-Wall Smart Toggle Switch Manual; Jasco In-Wall Smart Dimmer Manual; Jasco In-Wall Smart Switch, On/Off/Dim Lamp Module Manual*

187. Further, Jasco's Z-Wave Wholesale Channel Sheet 1-17-2018_0.pdf also indicates each GE-branded Smart Control is also a range extender which helps extend the range of Z-Wave network (in the claim, "wireless communication network") by repeating [Z-Wave] signals up to 100 feet".




*Source: Jasco Z-Wave Wholesale Channel Sheet 1-17-2018_0.pdf*

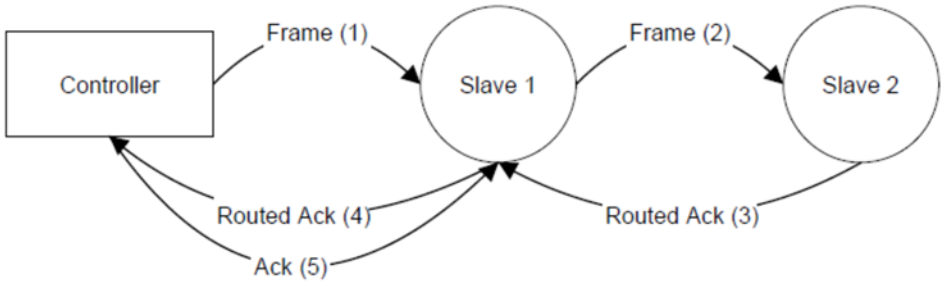
188. Also, the Accused "Jasco's GE-branded non battery operated Z-Wave devices" are Z-Wave device of type "slave" according to its Z-Wave certification and conformance statement as explained previously.

189. The following excerpts from Software Design Specification – Z-Wave Protocol Overview shows that Z-Wave devices that are slave nodes "forward commands to other nodes":

- "The Z-Wave protocol has 2 basic kinds of devices; controlling devices and slave nodes. Controlling devices are the nodes in a network that initiate control commands and sends out the commands to other nodes, and slave nodes are the nodes that reply

on and execute the commands. Slave nodes can also forward commands to other nodes, which make it possible for the controller to communicate with nodes out of the direct radio wave reach" Software Design Specification - Z-Wave Protocol Overview p.9.

- "The figure below shows an example of the frame flow when a frame is sent from a controller, repeated through a slave, to a second slave.




"

*See* Z-Wave Node Type Overview and Network Installation Guide. P10

- "Any slave node can act as repeater for frames going to other nodes. The only requirement for being able to act as repeater is that the node is in listening state. This requires that the node is permanently powered, and in order to limit battery consumption, this means that only mains-powered nodes will act as repeaters in most practical installations." Introduction – Getting Started with Z-Wave. P.22.

190. The Accused "Jasco GE-Branded Non-Battery powered Z-Wave devices" supporting Z-Wave includes a Z-Wave chipset that implements the Z-Wave protocol. Implementation of the Z-Wave protocol includes the routing layer which enables the repeating capability as shown in the Z-Wave Specification:

> The Z-Wave routing layer controls the routing of frames from one node to another. Both controllers and slaves can participate in routing of frames in case they are always listening and have a static position. The layer is responsible for both sending a frame with a correct repeater list, and also to ensure that the frame is repeated from node to node. The routing layer is also responsible for scanning the network topology and maintaining a routing table in the controller.

*See* Software Design Specification - Z-Wave Protocol Overview p.12.

191. After determining that it is responsible for forwarding/relaying the Z-Wave Frame, the Accused "Jasco GE-Branded Non-Battery powered Z-Wave devices " updates the hop index field according to the route type field, recalculates the frame checksum, and retransmits the frame" as follows:

. Upon receipt of a frame with this bit set, a node determines if it is responsible for forwarding the frame. The hop index field in the network frame provides the byte offset in the SR of the next hop. If a node's ID is located at this position, then the node updates the hop index field according to the route type field, recalculates the frame checksum, and retransmits the frame.

*See*: The Z-Wave Routing Protocols and its security implications, Badenhop et al., pp.117-118.

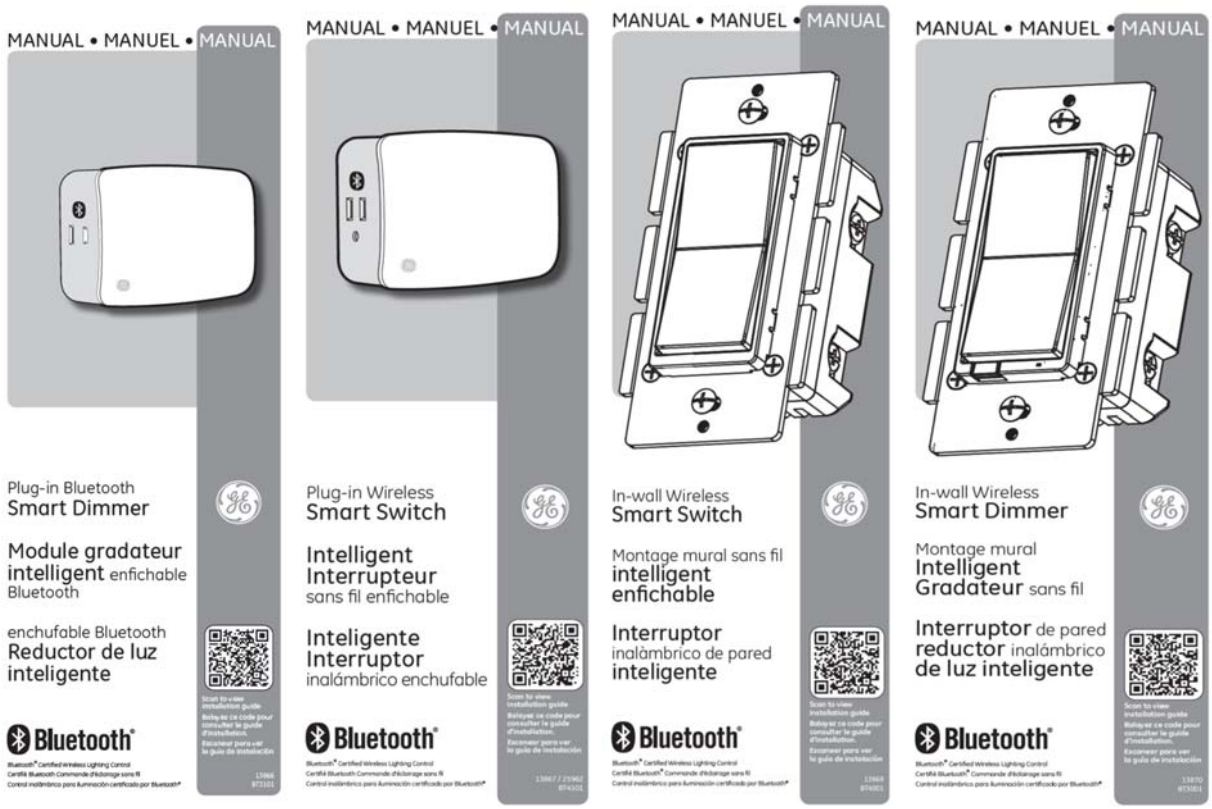
192. Thus, the forwarded/repeated Z-Wave Frame must comprise the same values in both the "Command Class" field and "Command" field ("unique message code") as in the received Z-Wave Frame, together with the corresponding command parameters. Each Jasco's GE-branded non-battery operated Z-Wave device ("a first wireless communication device") then communicates such repeated Z-Wave Frame to another Z-Wave device ("second communication device") en route to the Z-Wave Frame's final destination.

**BLUETOOTH INFRINGEMENT OF THE '304 PATENT**

193. Jasco's Bluetooth products also infringe the same claim 7 of the '304 Patent.

194. As an initial matter, each of Jasco's Bluetooth Low Energy (BLE) products include: GE branded Plug-in Smart Switch, GE branded Bluetooth In-Wall Smart Switch, GE branded Bluetooth In-Wall Smart Dimmer, GE branded Bluetooth Plug-In Smart Dimmer.

195. Jasco advertises that each of Jasco's Bluetooth Low Energy (BLE) products support Bluetooth Low Energy (BLE) and all of these devices are certified BLE products.




196. Each element of the preamble, which states, "A wireless communication method for relaying electronic messages in a wireless communication network comprising a plurality of wireless communication devices, the method comprising:" are satisfied.

197. Jasco's Bluetooth Low Energy (BLE) products comprise a Bluetooth chipset, which includes implementation of the Bluetooth protocol stack, which comprises implementation of a method (in the preamble, a wireless communication method") for relaying electronic messages in a Bluetooth mesh network (in the preamble, "wireless communication network") comprising other Bluetooth Low Energy (BLE) devices (in the preamble, "a plurality of wireless communication devices").

198. Below is a teardown of Jasco's Bluetooth Smart Dimmer (*see* https://www.edn.com/teardown-bluetooth-smart-dimmer/) showing it includes a CSR 1010 single chip Bluetooth radio with integrated microprocessor and memory:

DESIGN TEARDOWNS

# Teardown: Bluetooth smart dimmer

JANUARY 22, 2018
BY **BRIAN DIPERT**

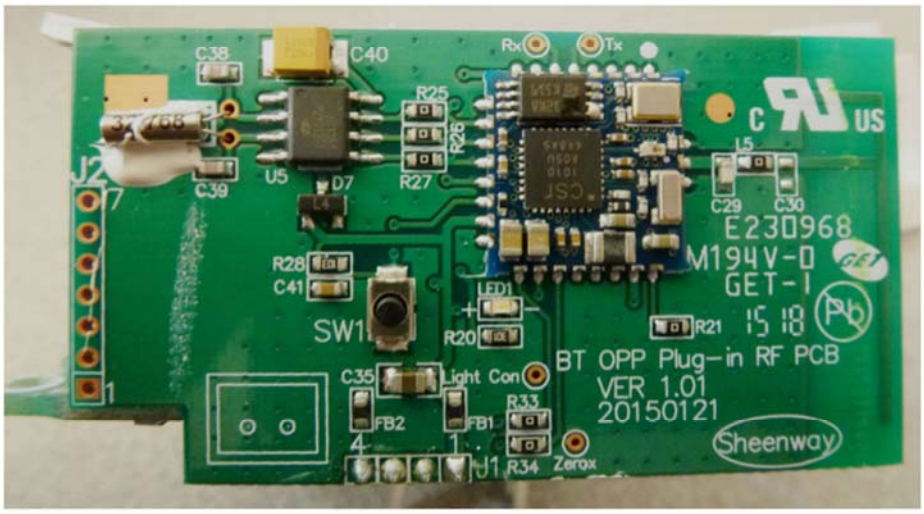
Print PDF

EDN

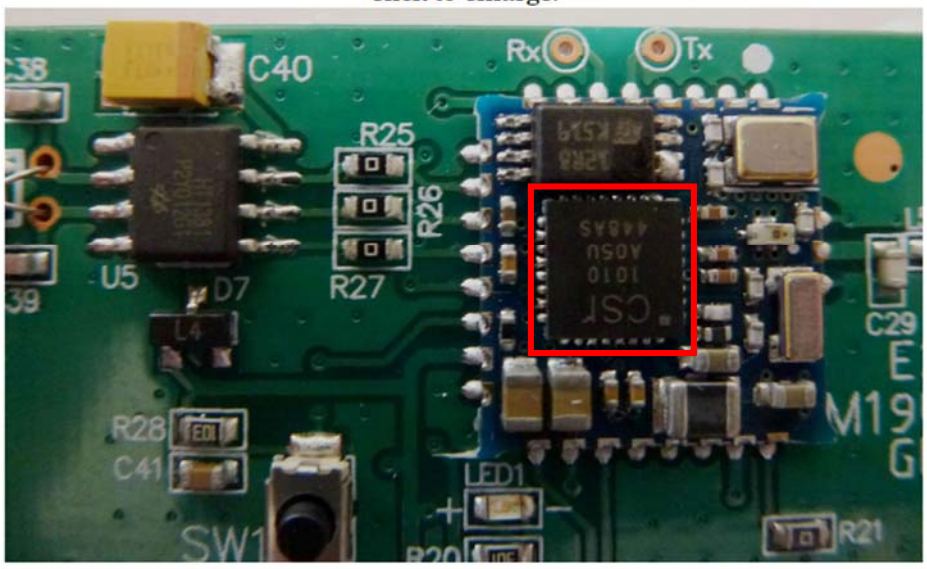
... stay tuned) to its B1410I sibling, albeit supporting both on/off and variable-intensity dimming capabilities, including flexible programming facilities. I'll begin, as usual, with a series of external packaging shots:

READ MORE TEAR DOWN

And here's the secondary PCB, handling Bluetooth connectivity and other digital functions, and which as far as I can tell is hardware-identical to its BT4101 counterpart including the CSR (now Qualcomm) model 1010 single-chip Bluetooth radio with integrated microprocessor and memory at its nexus. Note, as before, the Bluetooth antenna etched into the PCB's right edge.

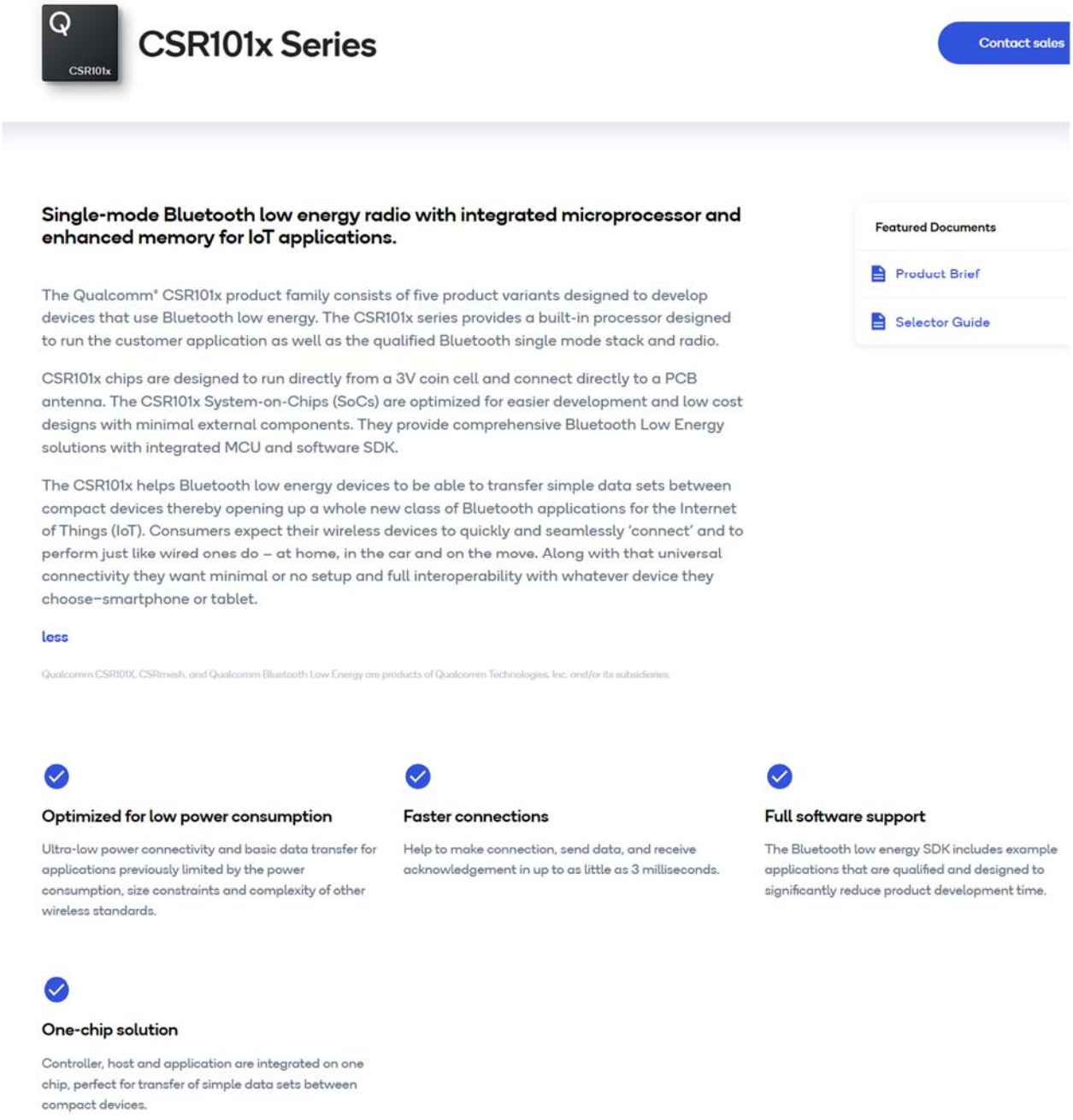



Click to enlarge.




Click to enlarge.

199. Qualcomm CSR chipset includes implementation of the BLE protocol stack enabling BLE devices to "transfer simple data sets between compact devices" by "provid[ing] comprehensive Bluetooth Low Energy solutions with integrated MCU and software SDK":



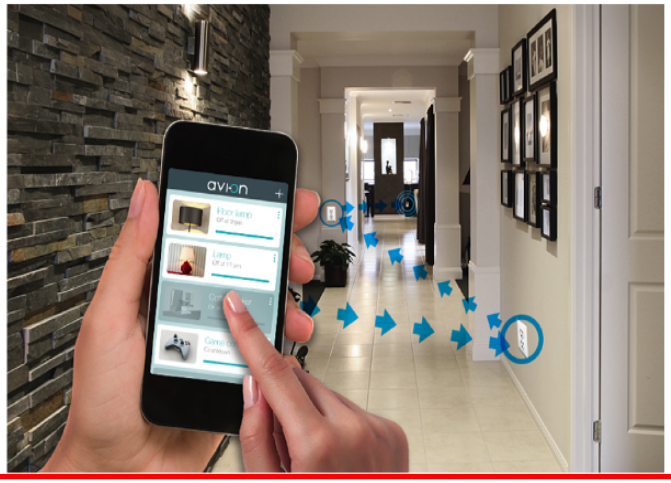

*See*: https://www.qualcomm.com/products/csr101x-series

200. Further, Jasco's website (https://blog.byjasco.com/turn-any-lamp-into-a-smart-lamp-with-bluetooth-smart-controls) shows that BLE is a wireless communication network in which all BLE devices are capable of communicating with one another. Further, a BLE network is used to communicate commands (e.g. on/off status) in BLE message ("electronic messages") between a mesh network of BLE devices, thereby enabling BLE devices to securely "talk" to each other and relay messages:

## WHAT IS A BLUETOOTH PLUG-IN SMART SWITCH/DIMMER?

You are probably familiar with smart light switches that turn your lights on and off from your phone when you are away. Super cool, but do you actually need to turn your lights on and off when you aren't anywhere near your house? Probably not. However, you may want to set up custom schedules or turn the lights on before you go into the house after dark. Not a problem – our solution is easier and cost less than other smart switches.

Bluetooth Smart Lighting Controls from GE are a unique ecosystem of easy-to-use smart home products, providing an affordable system to control lighting and small appliances around your home with no Wi-Fi or hub required. For this post, the main focus will be the Bluetooth Plug-in Smart Switch and Dimmer. As the name suggests, these products work over a Bluetooth Smart connection. You probably use traditional Bluetooth every day to talk on your phone hands-free in the car or connect to your wireless speakers. Unlike this traditional Bluetooth you're familiar with, when you are within 100-feet of your Plug-In Smart Switch or Dimmer you will be able to turn your lights on or off using the app on your phone or tablet. Now, what if you want to ensure that the lights are on before you get home? Well, the Bluetooth Smart Controls have timers built in so you can program your lights according to a schedule that fits your needs. The lights (or other devices) will still come on and off even when your phone is off or you are not in range.




It works like Z-Wave or ZigBee in that it operates on a mesh network. All that really means is that the devices can securely talk to each other and relay messages. For example, if you tell the kitchen light to turn on but you are in the bedroom (more than 100-feet from the kitchen switch) the bedroom switch will tell the hall switch to tell the kitchen switch to turn on. What this also means is the more GE smart devices you use in your home, the greater your range of control! Pretty cool, huh?

*Source: https://blog.byjasco.com/turn-any-lamp-into-a-smart-lamp-with-bluetooth-smart-controls*

201. The first element of claim 7 of the '304 Patent, "wirelessly receiving an information signal at a first wireless communication device, the information signal comprising a unique message code and an instruction code;" is also satisfied,

202. Each of the Jasco's Bluetooth Low Energy (BLE) products supporting BLE includes a Bluetooth chipset which comprises a Bluetooth radio and antenna, as previously explained.

203. The Bluetooth radio (in the claim, "first wireless communication device") included in each of the "Jasco's Bluetooth Low Energy (BLE)" wirelessly receives (in the claim, "wirelessly receiving") a BLE message comprising a command (in the claim, "an information signal"), for example, to switch lights on/off from another Bluetooth Low Energy (BLE) product.


It works like Z-Wave or ZigBee in that it operates on a mesh network. All that really means is that the devices can securely talk to each other and relay messages. For example, if you tell the kitchen light to turn on but you are in the bedroom (more than 100-feet from the kitchen switch) the bedroom switch will tell the hall switch to tell the kitchen switch to turn on. What this also means is the more GE smart devices you use in your home, the greater your range of control! Pretty cool, huh?

204. In one example, such Bluetooth Low Energy Message (in the claim, "an information signal") comprising a unique message code (e.g. Light LC Light On/Off Set Message)

and an instruction code (e.g. Light LC Light On/Off Binary State value) (in the claim, a "unique message code" and an "instruction code").

205. All BLE messages include a Network PDU which follows a basic frame format as defined in the Bluetooth Specification Mesh Profile attached below:

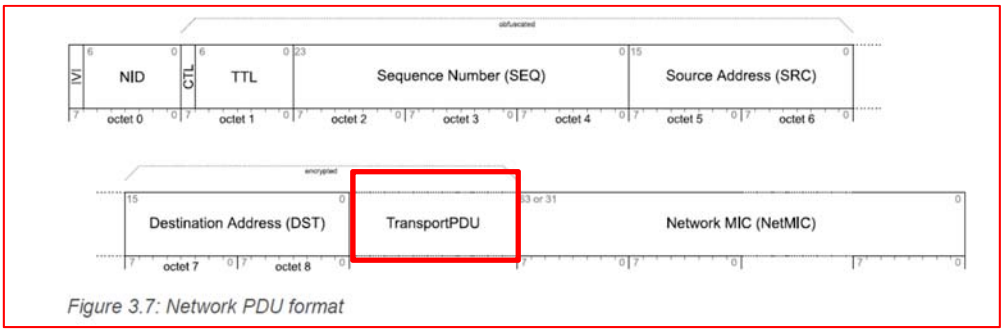


Figure 3.7: Network PDU format

*Source: Bluetooth Specification Mesh Profile v1.0, 2017", p. 43*

206. The following diagram illustrates the same Bluetooth Network PDU mentioned above, with the addition of incorporating a command as the "Transport PDU":

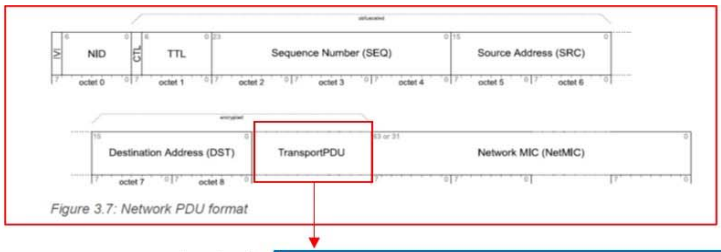


Figure 3.7: Network PDU format

| Element | SIG Model ID | States | Messages | Rx | Tx |
|---|---|---|---|---|---|
| Light LC | 0x130F | Light LC Mode (see Section 6.2.3.1) | Light LC Mode Get | M | |
| | | | Light LC Mode Set | M | |
| | | | Light LC Mode Set Unacknowledged | M | |
| | | | Light LC Mode Status | | M |
| | | Light LC Occupancy Mode (see Section 6.2.3.2) | Light LC OM Get | M | |
| | | | Light LC OM Set | M | |
| | | | Light LC OM Set Unacknowledged | M | |
| | | | Light LC OM Status | | M |
| | | Light LC Light OnOff (see Section 6.2.3.3) | Light LC Light OnOff Get | M | |
| | | | Light LC Light OnOff Set | M | |
| | | | Light LC Light OnOff Set Unacknowledged | M | |
| | | | Light LC Light OnOff Status | | M |
| | | Light LC Occupancy (see Section 6.2.3.4) Light LC Ambient LuxLevel (see Section 6.2.3.4) | Sensor Status | M | |

Table 6.144: Light LC Server messages

**6.3.5.3.2 Light LC Light OnOff Set**

The Light LC Light OnOff Set is an acknowledged message used to set the Light LC Light OnOff state of an element (see Section 6.2.3.3).

The response to the Light LC Light OnOff Set message is a Light LC Light OnOff Status message.

The structure of the message is defined in the following table.

| Field | Size (octets) | Notes |
|---|---|---|
| Light OnOff | 1 | The target value of the Light LC Light OnOff state |
| TID | 1 | Transaction Identifier |
| Transition Time | 1 | Format as defined in Section 3.1.3. (Optional) |
| Delay | 1 | Message execution delay in 5 millisecond steps (C.1) |

C.1: If the Transition Time field is present, the Delay field shall also be present; otherwise these fields shall not be present.

Table 6.110: Light LC Light OnOff Set message parameters

The Light OnOff field identifies the Light LC Light OnOff state of the element (see Section 6.2.3.3).

**6.2.3.3 Light LC Light OnOff**

Light LC Light OnOff is a binary state that represents the state of a Light Lightness controller. The values for the state are defined in the following table.

| Value | Description |
|---|---|
| 0b0 | Light LC State Machine state is equal to Off or equal to Standby |
| 0b1 | Light LC State Machine state is not equal to Off and not equal to Standby |

Table 6.28: Light LC Light OnOff states

Note: The Light LC Light OnOff acts as a control point. When the Light LC Light OnOff state is set to a new value (e.g., by a message or as a result of a bound state change), the Light LC

207. A received BLE includes a unique message code (e.g. Light LC Light On/Off Set Message) and an instruction code (e.g. Light LC Light On/Off Binary State value, e.g. "0b0").

208. The next element, "decoding the information signal to access the unique message code and the instruction code;" also is satisfied.

209. The aforementioned Bluetooth chipset (e.g., a CSR 1012 or CSR 1010 chipset) included in each of the Jasco's Bluetooth Low Energy (BLE) products includes a microprocessor and implementation of the Bluetooth protocol stack configured to decode a received BLE Network PDU to access the unique message code and the instruction code. This covers the full scope of the claim.

**Jasco Products, Avi-on Labs and CSR Announce World's First Bluetooth Smart Lighting Control Platform Powered by Avi-on™**

National Hardware Show 2015

May 05, 2015 05:45 AM Eastern Daylight Time

OKLAHOMA CITY--(BUSINESS WIRE)--Jasco Products Company, GE licensee and leader in home automation, lighting and security products, sets a new standard in wireless lighting automation with a complete ecosystem of GE branded Bluetooth lighting controls. This easy-to-use system provides direct and simple scheduling and control of lighting from your smartphone or tablet while utilizing mesh network technology behind the scenes for maximum range and reliability.

"Jasco has developed a complete ecosystem of Bluetooth Smart lighting controls powered by Avi-on and CSRmesh, the only of its kind on the market," said Cameron Trice, CEO of Jasco Products. "With Avi-on providing leading edge software development and support, Jasco is delivering a game-changing wireless solution to all of our major retail partners, a solution that doesn't require a hub or even a wireless router – you simply control and schedule your lights directly from your smartphone or tablet. With the Avi-on, CSR and Jasco partnership, we are able to bring products to market with unprecedented speed, low cost, and superior ease of use, while maintaining our usual standard of high quality and long term support."

The platform includes plug and play firmware, iOS and Android mobile applications, a secure cloud service, and a pre-certified module based on the CSR 1012 chipset. The platform enables real-time dimming, one-touch setup, grouping, schedules, timers and multi-user controls all from an easy-to-use mobile app.

"The ability to replace wires with software will transform the lighting and construction industries worldwide," said Eric Miller, CEO of Avi-on. "Avi-on has delivered a simple, scalable and proven controls platform at an affordable price, and we are excited to move forward in partnership with Jasco Products."

Jasco's GE branded lighting controls use CSR's Bluetooth Mesh technology to allow an almost unlimited number of Bluetooth Smart enabled devices to be simply networked together and controlled from a smartphone or tablet. Jasco's full line of GE branded products will ship this summer and will include "smart" switches, dimmers, an outdoor timer and a smart plug which will give consumers complete control of virtually any standard home lighting device or appliance.

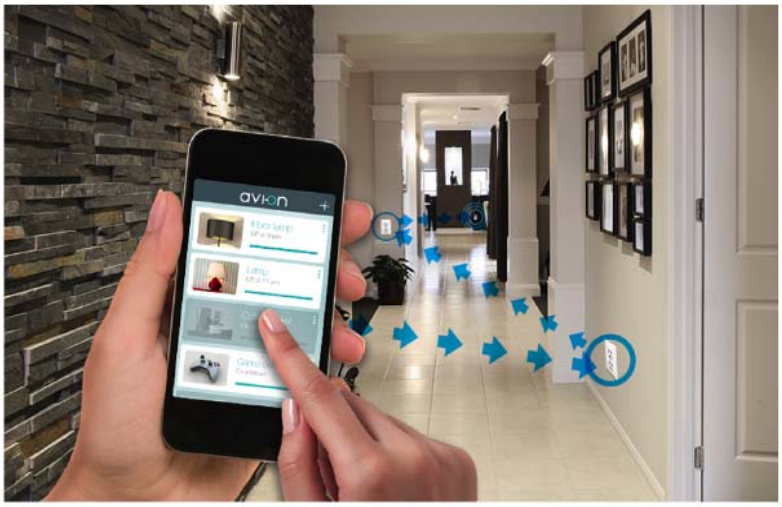
*Source: https://www.businesswire.com/news/home/20150505005099/en/Jasco-Products-Avi-on-Labs-CSR-Announce-World%E2%80%99s*

210. As with Jasco's Z-Wave protocol products, the final two claim elements, "initiating communication with a second wireless communication device in the wireless communication

network in response to the unique message code and the instruction code;", followed by "communicating the unique message code from the first wireless communication device to the second communication device" can be mapped together, and are also satisfied with regard to its Bluetooth products.

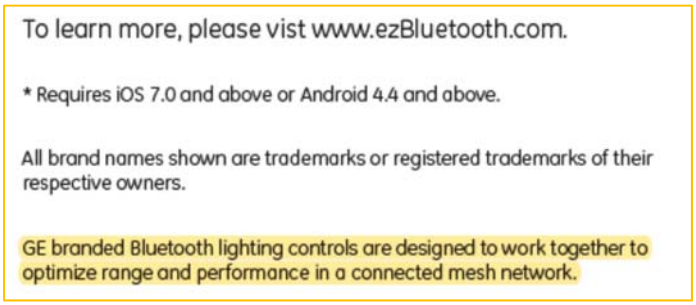
211. Each of Jasco's Bluetooth Low Energy (BLE) product (in the claim, "a first wireless communication device") implements a method to relay commands to other BLE devices (in the claim, "initiate communication with a second wireless communication device") in the Bluetooth mesh network (in the claim, "wireless communication network") in response to any BLE Message destined for another BLE device.

212. Jasco's website (https://blog.byjasco.com/turn-any-lamp-into-a-smart-lamp-with-bluetooth-smart-controls), as mentioned above, shows that a BLE network is used to communicate commands (e.g. on/off status) in BLE message (in the claim, "electronic messages") between a mesh network of BLE devices, thereby enabling BLE devices to securely "talk" to each other and relay messages:




It works like Z-Wave or ZigBee in that it operates on a mesh network. All that really means is that the devices can securely talk to each other and relay messages. For example, if you tell the kitchen light to turn on but you are in the bedroom (more than 100-feet from the kitchen switch) the bedroom switch will tell the hall switch to tell the kitchen switch to turn on. What this also means is the more GE smart devices you use in your home, the greater your range of control! Pretty cool, huh?

213. Further, product manuals of each Jasco's Bluetooth Low Energy (BLE) product state that "GE branded Bluetooth lighting controls are designed to work together to optimize range and performance in a connected mesh network". This shows that the accused Jasco Bluetooth Low Energy (BLE) product relays a received message to another Bluetooth Low Energy product in the network (in the claim, "from the first wireless communication device to the second communication device").


To learn more, please vist www.ezBluetooth.com.

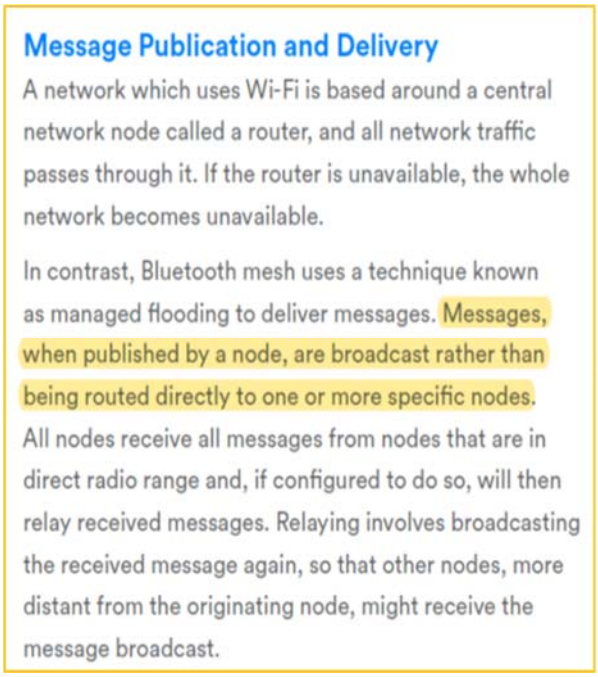
* Requires iOS 7.0 and above or Android 4.4 and above.

All brand names shown are trademarks or registered trademarks of their respective owners.

GE branded Bluetooth lighting controls are designed to work together to optimize range and performance in a connected mesh network.

*Source: Jasco GE Plug-In Wireless Smart Switch Manual; Jasco GE In-Wall Wireless Smart Switch Manual; Jasco GE In-Wall Wireless Smart Dimmer Manual; Jasco GE Plug-In Bluetooth Smart Dimmer Manual;*

214. The relayed BLE message comprises the same BLE Message type ("unique message code", e.g. LC Light LC On/Off Set Message) and its corresponding command parameters (e.g. Light LC Light On/Off State). Each of Jasco's Bluetooth Low Energy (BLE) product (in the claim, "a first wireless communication device") communicates such relayed BLE Message to another BLE device (in the claim, "second communication device") in a broadcast manner as explained in *Bluetooth Mesh Networking – An Introduction for Developers, 2017", p. 26*:



**Message Publication and Delivery**

A network which uses Wi-Fi is based around a central network node called a router, and all network traffic passes through it. If the router is unavailable, the whole network becomes unavailable.

In contrast, Bluetooth mesh uses a technique known as managed flooding to deliver messages. Messages, when published by a node, are broadcast rather than being routed directly to one or more specific nodes. All nodes receive all messages from nodes that are in direct radio range and, if configured to do so, will then relay received messages. Relaying involves broadcasting the received message again, so that other nodes, more distant from the originating node, might receive the message broadcast.

**Multipath Delivery**

An important consequence of Bluetooth technology's use of managed flooding is that messages arrive at their destination via multiple paths through the network. This makes for a highly reliable network and it is the primary reason for having opted to use a flooding approach rather than routing in the design of Bluetooth mesh networking.

215. On information and belief, Defendant may have other products that operate pursuant to the Z-Wave protocol or Bluetooth specifications and, therefore, also infringe claim 7 of the '304 Patent. Additional details are within the possession, custody or control of Defendant, including information about other infringing products.

216. On information and belief, Defendant may have products that operate pursuant to the Zigbee specifications. At least claim 7 of the '304 Patent is also infringed when '304 Infringing Instrumentalities operate pursuant to the Zigbee specifications. Additional details relating to '304 Infringing Instrumentalities and their infringement are within the possession, custody or control of Defendant.

217. Plaintiff offers this preliminary identification and description of infringement without the benefit of discovery or claim construction in this action, and expressly reserves the right to augment, supplement, and revise its identification and description of infringement based on additional information obtained through discovery or otherwise.

218. Defendant's acts of infringement of Claim 7 of the '304 Patent have caused damage to Plaintiff, and Plaintiff is entitled to recover from Defendant the damages it has sustained as a result of Defendant's wrongful acts in an amount subject to proof at trial.

**INFRINGEMENT OF U.S. PATENT NO. 7,650,425**

219. The allegations set forth in the foregoing paragraphs 1 through 29 are incorporated by reference into this claim for relief. On January 19, 2010, U.S. Patent No. 7,650,425 ("the '425 Patent"), entitled "System and Method for Controlling Communication Between A Host Computer And Communication Devices Associated With Remote Devices In An Automated Monitoring System," was duly and legally issued by the United States Patent and Trademark Office. A true and correct copy of the '425 Patent is attached as Exhibit 7. Related U.S. application data is set forth on the face of the patent.

220. Plaintiff is the assignee and owner of the right, title, and interest in and to the '425 Patent, including the right to assert all causes of action arising under the '425 Patent and the right to any remedies for infringement of the '425 Patent. Defendant has infringed and continues to infringe Claim 1 of the '425 Patent under 35 U.S.C. § 271 without authorization.

221. Each of Jasco's Z-Wave devices that can act as a Z-Wave Primary Controller, including but not limited to GE 45633 Wireless Lighting Control Advanced Remote, perform each step of Claim 1 of the '425 Patent, which reads:

> A method for controlling communication with a host computer connected to a first communication network and a plurality of communication devices that define a second communication network associated with a plurality of remote devices that are to be monitored and controlled by the host computer, the method comprising the steps of:
>
> sending a path determination message to a target communication device from a site controller through the second communication network prompting the target communication device to retransmit the path determination message to the site controller through the second communication network,

generating a network map of all down-stream communication paths from the site controller to the target communication device and all up- stream communication paths from the target communication device to the site controller from the unique addresses of the communication devices that retransmitted the path determination message from the sitecontroller to the target communication device or from the target communication device to the site controller,

based on the network map, determining one or more up-stream and down-stream communication paths associated with each of the plurality of communication devices;

managing communication with each of the plurality of communication devices and the identification of eachof the plurality of communication devices in the one or more communication paths, via a first communication protocol, based on one or more of the communication paths associated with each of the plurality of communication devices;

managing communication with the host computer via a second communication protocol;

storing on the site controller a first look-up table for identifying each of the plurality of communication devices that define a second communication network; and

storing on the site controller a second look-up table for identifying a function to be performed by the site controller based upon an analysis of a message received from any one of the plurality of communication devices that define a second communication network.

*See* Exhibit 7 at 18, lines 23-64.

222. Defendant's infringement of claim 1 of the '425 Patent is shown in the claim chart attached hereto as Exhibit 8. The claim chart is incorporated by reference as if set forth herein. The citations to the Z-Wave specifications in the claim chart, which is explained below, are required for a product configured to operate pursuant to Z-Wave.

223. As set forth in the claim chart attached as Exhibit 8, each element of claim 1 of the '425 Patent is infringed by the accused Jasco products.

224. First, each element of the preamble is satisfied. The preamble states: "A method for controlling communication with a host computer connected to a first communication network and a plurality of communication devices that define a second communication network associated with a plurality of remote devices that are to be monitored and controlled by the host computer, the method comprising the steps of:"

225. Jasco's Z-Wave Controller devices include: GE 45633 Wireless Lighting Control Advanced Remote, which supports the Z-Wave protocol and is a certified Z-Wave product.

**INTRODUCTION**

Thank you for purchasing the GE 45633 LCD Remote. This remote allows you to control Z-Wave certified door locks and thermostats as well as Z-Wave lighting devices. Your Z-Wave home control network can include up to 232 Z-Wave enabled devices. You can also set up and control up to 18 individual lights, 18 groups of lights as well as 18 scenes for task or mood lighting.

226. Jasco's Z-Wave Controller devices in combination with a certified Z-Wave gateway provides a method for controlling communication between a host computer and a plurality of Z-Wave devices that are to be monitored and controlled by the host computer.

GE Z-Wave Handheld Smart Remote

SKU# **45633** | You have items in your cart (/cart).

**Description**

Transform any home into a smart home with the GE Z-Wave Wireless Lighting Control LCD Remote. Create and control custom lighting scenes without the hardwired mess. Features simple do-it-yourself installation. Control up to 18 individual lights, 18 groups and 18 scenes with this low-profile remote. Controls up to four Z-Wave certified HVAC thermostats and six Z-Wave door locks. Sleek black design with blue backlit LCD keypad functions as a primary or secondary controller. Take control of your home lighting with GE Z-Wave Wireless Lighting Controls! Z-Wave is the world's largest ecosystem of interoperable smart home products. Z-Wave lighting controls provide an easy-to-install and affordable system to control lighting and small appliances in your home. Add GE Z-Wave lighting controls to a Z-Wave certified gateway to access and control your home from anywhere in the world using your smartphone, tablet or computer as a home automation command center. Never worry if you accidentally left the lights on because you can turn them off remotely or program your lights to go on/off at specific times. Create customized lighting scenes for any occasion such as a "go to sleep" scene or a "movie night" scene. Give the illusion that someone is home by programming the lights to turn on/off while you are away—perfect for deterring crime and adding additional security!

**Features**

- Allows you to remotely turn the light or appliance on/off
- Battery-powered - no wiring needed
- Controls up to 18 individual lights, 18 groups (turn lights on/off at the same time) and 18 scenes (scene activates preset brightness levels for task or ambient lighting)
- Controls up to four Z-Wave certified HVAC thermostats and six Z-Wave door locks
- The sleek black design with blue backlit LCD keypad functions as a primary or secondary controller

227. Each of Jasco's Z-Wave Controller device communicates with a plurality of Z-Wave transceivers (in the preamble, "communication devices") which together form a Z-Wave network (in the preamble, "a second communication network"). Jasco's "Q&A- Z-Wave Home Automation (https://blog.byjasco.com/faq-z-wave-home-automation)" document shows that Z-Wave is a wireless communication network in which all Z-Wave devices are capable of communicating with one another.

## What is Z-Wave?

Z-Wave is one of the main home automation protocols (think of it as a language) that is used by various devices in order to allow them to communicate with one another. Ideally, you want to have devices that all speak the same language.

## What can I do with Z-Wave?

You can control and schedule devices and processes in your home via Z-Wave. For example, you can remotely adjust the temperature in your home via a thermostat, make sure you locked the back door via a door lock, or schedule your lights to turn on at sunset and off at sunrise via smart bulbs, switches, or modules.

## What is home automation?

In a nutshell, home automation is having the ability to remotely control appliances, electronics and/or systems in your house, set schedules for them, or operate based on a set of conditions.

228. The aforementioned Z-Wave transceivers (in the preamble, "communication devices") are included in Z-Wave chipsets incorporated in Z-Wave devices (in the preamble, "remote devices") such as door locks, thermostats and Z-Wave lighting devices.

229. "The Z-Wave protocol is a low bandwidth half duplex protocol designed for reliable wireless communication in a low cost control network. The protocol's main purpose is to communicate short control messages in a reliable manner from a control unit to one or more nodes in the network." Software Design Specification - Z-Wave Protocol Overview p.3.

230. Further, a Z-Wave network is used to communicate commands (e.g. on/off status) between a mesh network of Z-Wave devices. The use of a Z-Wave Hub and compatible software applications "provides access from many popular home automation systems and applications" via the Internet (in the preamble, "a first communication network"), enabling end user to remotely control e.g. on/off status and monitor information of Z-Wave devices in the Z-Wave network from a phone, tablet, PC" (in the preamble, "a host computer"):

> "Z-Wave is a next-generation wireless ecosystem that lets all your home electronics talk to each other, and to you, via remote control. It uses simple, reliable, low-power radio waves that easily travel through walls, floors and cabinets. Z-Wave control can be added to almost any electronic device in your house, even devices that you wouldn't ordinarily think of as "intelligent," such as appliances, window shades, thermostats and home lighting.


**…… And Z-Wave lets you control these devices in ways that give you complete command even when you're not at home yourself.**

> And Z-Wave lets you control these devices in ways that give you complete command even when you're not at home yourself. **You can control your Z-Wave household remotely from a PC and the Internet from anywhere in the world...even through your cell phone**!
>
> • Z-Wave Is Versatile – Z-Wave can be added to almost anything in your home that uses electricity, and gives you the power to control or **monitor** them from your home or away from home."

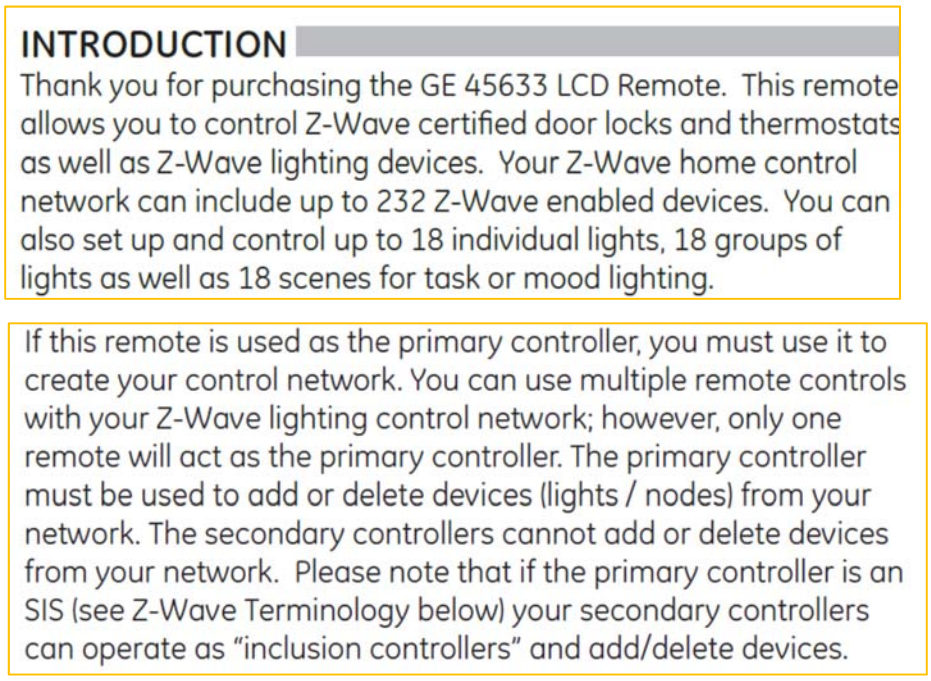
*See: Z -Wave: The New Standard in Wireless Remote Control http://www.z-wave.com/modules/AboutZ-Wave/*

231. Further, Jasco's Z-Wave Wholesale Channel Sheet shows Z-Wave devices in a Z-Wave network are capable of being in communication with "a phone, tablet, PC or Z-Wave remotes" (in the preamble, "a host computer").


*Source: "Z-Wave_Advanced_Remote_Operating_Manual.pdf"*


*Source: Jasco Z-Wave Wholesale Channel Sheet 1-17-2018_0.pdf*

232. The second element of the '425 Patent's claim 1 can be analyzed in parts. The first part, which reads "sending a path determination message to a target communication device from a site controller throughthe second communication network" is satisfied because Jasco's Z-Wave Controller devices can act as a Z-Wave Primary Controller ("a site controller"). This information is shown in Jasco's product literature below:



**INTRODUCTION**

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If this remote is used as the primary controller, you must use it to create your control network. You can use multiple remote controls with your Z-Wave lighting control network; however, only one remote will act as the primary controller. The primary controller must be used to add or delete devices (lights / nodes) from your network. The secondary controllers cannot add or delete devices from your network. Please note that if the primary controller is an SIS (see Z-Wave Terminology below) your secondary controllers can operate as "inclusion controllers" and add/delete devices.

*Source:* GE 45633 Wireless Lighting Control Advanced Remote Operating Manual, p.4, 6.

233. Jasco's Z-Wave Controller devices comprise a Z-Wave ASIC chipset, which includes implementation of the Z-Wave protocol stack which comprises implementation of a method to send ("sending") a Explorer Frame ("a path determination message").

234. Z-Wave Essentials. 3rd Edition, by Dr.-Ing. Christian Paetz, April 2017, p.33 shows that Z-Wave ASIC includes implementation of the Z-Wave protocol stack by including "precompiled libraries for various applications covering all aspects of the communication protocol":

Besides, the ASIC Sigma Designs also provides a system development kit (SDK) to simplify the product development. This contains, among other things, precompiled libraries for various applications

covering all aspects of the communication protocol. All manufacturers are required to use one of these libraries for their product development, leading to similar behavior of all Z-Wave devices on the lower protocol layers. Z-Wave also defines application-specific functions (e.g. switch A is turned on when button B is pressed), but the manufacturers are responsible to implement this. Most manufacturers optimize and enhance functions on the application layer.

235. Jasco's Z-Wave Controller devices send an explorer frame during network inclusion and also during route resolution:

**10.2 Adding additional nodes**

New slave nodes can be included in the Z-Wave network as the network is gradually expanded. In Figure 21, the example is extended to include another slave node.

If the new node is within direct range of the controller, the inclusion happens the exact same way as for the first slave node. If out of range, the new node cannot reach the controller. Then, an explore frame is issued.

*Source: Z-Wave Node Type Overview and Network Installation Guide, p 27.*

**6.3.2 Route resolution strategy**

In order to support pre-4.50 nodes, a v4.50 controller always uses the following strategy:

1. Try last working route
2. Try a number of routes calculated from the routing table
3. Issue an explorer search request

*Source: Z-Wave Node Type Overview and Network Installation Guide, p.28-29.*

When all known routes have failed, the Sending node may use an Explorer Frame as a last resort. The Explorer Frame will be relayed by other nodes, recording the route it takes, until it eventually reaches the target node.

The target node will use the reverse route to answer back to the controller upon Explorer Frame reception.

*Source: Z-Wave Networking Basics, p.6*

236. Jasco's Z-Wave Controller devices sends a Explorer Frame (in the claim, "a path determination message") to a specific Z-Wave device or to each Z-Wave device (in the claim, a "target communication device") in the Z-Wave network (in the claim, "the second communication network"). Every Z-Wave device in the Z-Wave network helps forward the explorer frame through the Z-Wave network (in the claim, "the second communication network").

237. Concepts of the Z-Wave Explorer Frame is described in *Z-Wave Essential by Christian Paetz, p.122-123* and in Z-Wave Specification documents as follows:

## 3.5.2 Explorer Frame

The explorer frame is a powerful tool to overcome communication problems in a network caused by incorrect network and routing information.

The explorer frame is a special frame that is sent out as a broadcast and is routed forward by every node in the network supporting the explorer frame process. This process is sometimes referred to as flooding. Of course, there needs to be a pruning mechanism to stop the forwarding to make sure the network does not get overloaded with repeatedly forwarded and broadcasted messages.

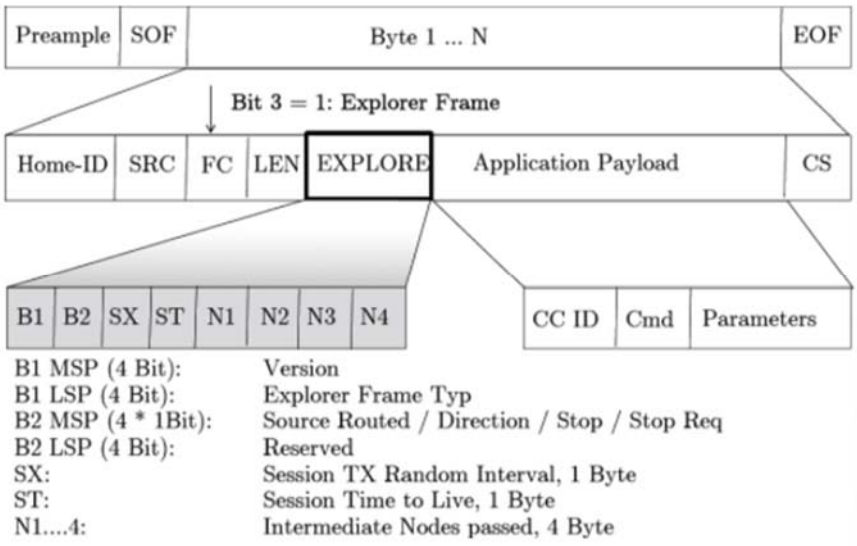



Figure 3.34: Explorer frame Layout

The explorer frame has a source address but no destination address. Every node forwarding the explorer frame adds its own Node-Id to the frame.

Explorer frames are broadcasted Z-Wave frames, which carries a special explorer header and optionally an embedded Z-Wave command to be executed by a target addressed inside the explorer header.

Special rules specify how explorer-supporting nodes should forward copies of explorer frames.

*Source: Z-Wave Node Type Overview and Network Installation Guide, p 27.*

For an explorer frame to reach its target, a number of repeater nodes must be present. The sufficient number depends on the actual network topology and the amount of RF noise in the environment. This observation applies to route resolution as well as network-wide inclusion.

*Source: Z-Wave Node Type Overview and Network Installation Guide, p 23.*

238. Jasco's Z-Wave Controller devices must support Explorer Frame because they are either a Z-Wave Plus device or are built with SDK versions support Explorer Frame.

239. GE 45633 Wireless Lighting Control Advanced Remote is built on SDK 6.01, according to its Z-Wave certification and conformance statement (https://products.z-wavealliance.org/products/2939?selectedFrequencyId=2). As shown in Paetz, P.126-128, "every SDK Version 6.0 and up" supports Explorer Frame:

Z-Wave Protocol Implementation Conformance Statement

**GE 45633 Z-Wave Wireless Lighting Control Advanced Remote**

**General Information**

| | |
|---|---|
| **Product Identifier:** | ZW5303 |
| **Brand Name:** | GE |
| **Product Version:** | v4.0 |
| **Z-Wave Certification #:** | ZC08-13050006 |

**Z-Wave Product Information**

| | |
|---|---|
| Supports Z-Wave Beaming Technology? | Yes |
| Supports Z-Wave Network Security? | Yes |
| Supports Z-Wave AES-128 Security S0? | No |
| Supports Security S2? | No |
| SmartStart Compatible? | No |

**Z-Wave Technical Information**

| | |
|---|---|
| **Z-Wave Frequency:** | U.S. / Canada / Mexico |
| **Z-Wave Product ID:** | 0x5303 |
| **Z-Wave Product Type:** | 0x8009 |
| **Z-Wave Hardware Platform:** | ZM4101 |
| **Z-Wave Development Kit Version:** | 6.01 |
| **Z-Wave Library Type:** | Portable Controller |
| **Z-Wave Device Class:** | Generic Controller / Portable Remote Controller |

**Controlled Command Classes (11):**

| | |
|---|---|
| Association | Basic |
| Configuration | Controller Replication |
| Door Lock | Manufacturer Specific |
| Security S0 | Switch All |
| Switch Multilevel | Thermostat Mode |
| Thermostat Setpoint | |

## How to know if a device supports explorer frames?

Unless the manual states support for explorer frames, the firmware version of the device needs to be checked. Device firmware is built using an SDK (Systems Development Kit) provided by Sigma Designs. The Z-Wave Alliance Product Database mentioned in

Appendix A gives information about the firmware version used and also indicates if explorer frames are used. The following SDK versions support explorer frames:

- Every SDK Version 6.0 and up
- All SDKs between Version 4.5 and 4.9

In case the controller software does not show the SDK version during inclusion the following rules of thumb may help:

- If a device supports network wide inclusion it will also support explorer frames (for more information about network wide inclusion refer to chapter

5.1.5).

- If a device supports auto inclusion it will also support explorer frames.
- All Z-Wave Plus devices support explorer frame (for information about Z-Wave Plus please refer to chapter 1.6.4)
- All products launched prior to 2010 will not support explorer frame
- Most of the devices launched between 2010 and 2014 support explorer frame.
- All devices launched after 2014 support explorer frame

### 3.5.2 Explorer Frame

The explorer frame is a powerful tool to overcome communication problems in a network caused by incorrect network and routing information.

The explorer frame is a special frame that is sent out as a broadcast and is routed forward by every node in the network supporting the explorer frame process. This process is sometimes referred to as flooding. Of course, there needs to be a pruning mechanism to stop the forwarding to make sure the network does not get overloaded with repeatedly forwarded and broadcasted messages.

*Source: Z-Wave Essential by Christian Paetz, p.122-123.*

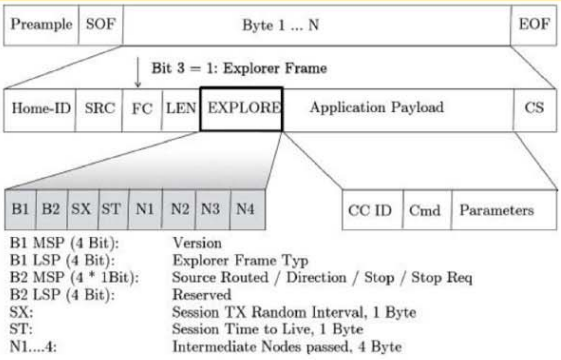



Figure 3.34: Explorer frame Layout

Explorer frames are broadcasted Z-Wave frames, which carries a special explorer header and optionally an embedded Z-Wave command to be executed by a target addressed inside the explorer header.

Special rules specify how explorer-supporting nodes should forward copies of explorer frames.

*Source: Z-Wave Node Type Overview and Network Installation Guide, p 27.*

For an explorer frame to reach its target, a number of repeater nodes must be present. The sufficient number depends on the actual network topology and the amount of RF noise in the environment. This observation applies to route resolution as well as network-wide inclusion.

*Source: Z-Wave Node Type Overview and Network Installation Guide, p 23.*

240. The second part of the claim element, which reads "prompting the target communication device to retransmit the path determination message to the site controller through the second communication network," is also satisfied.

241. The Explorer Frame sent by Jasco's Z-Wave Controller devices reaches a Z-Wave device (in the claim, "a target node" or "target communication device") that has no other routes available than the route back to the immediate node that forwarded the explorer frame. The Explorer Frame prompts such target node to send the explorer frame information, including a list of all routing nodes used on its way, back to the Jasco Z-Wave Controller device (in the claim, "retransmit the path determination message to the site controller" using the route just detected (in the claim, "through the second communication network").

When all known routes have failed, the Sending node may use an Explorer Frame as a last resort. The Explorer Frame will be relayed by other nodes, recording the route it takes, until it eventually reaches the target node.

The target node will use the reverse route to answer back to the controller upon Explorer Frame reception.

*Source: Z-Wave Networking Basics, p.6*

The explorer frame has a source address but no destination address. Every node forwarding the explorer frame adds its own Node-Id to the frame. Figure 3.35 shows the format of the explorer frame with additional 8 Bytes reserved for the routing detection function. If there is at least one valid route from the sender to its desired destination, the explorer frame will eventually reach this destination now carrying all the routing nodes used on its way. This information is the new and also the best route from the given source to the given destination. Figure 3.35 shows this principle. In the first step node 6 - the one that has lost the route -sends the explorer frame to node 5 and 7. Node 7 will terminate the explorer frame because it has no other routes available than the route back to node 6. Node 5 will now proceed the frame in a second step to nodes 4 and 3. After the third step, the explorer frame reaches the controller node 1 from node 3, while node 2 receives two frames from 4 and 3. In the final step, node 2 will forward the frame to node 1 the only node that this node 2 did not get a frame before. However, node 1 will disregard this frame since it already knows the best valid route 1 → 3 → 5 → 6.

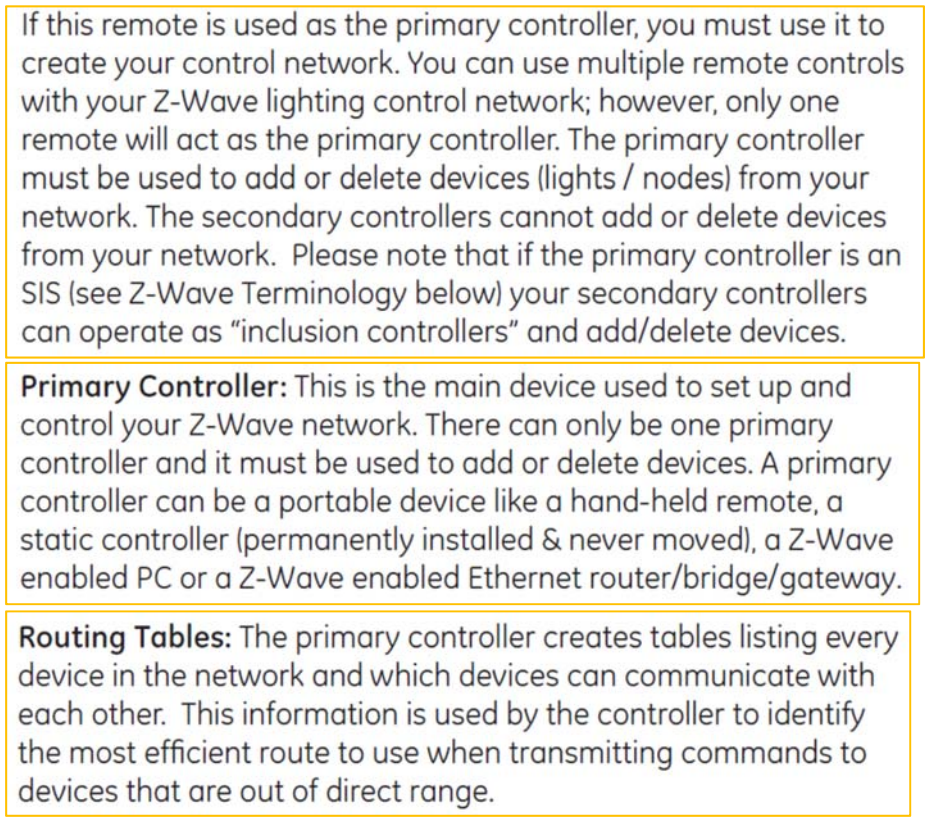
The receiver—in this case the controller—is now supposed to send the explorer frame information back to the sender using the route just detected. The sender receives this very valuable information and can update its routing table accordingly. Because the explorer frame generates a lot of network traffic, it is only used as the last resort after all other communication attempts fail. On the other hand, the explorer frame technology will find always a valid way if there is a valid way.

*Source: Z-Wave Essential by Christian Paetz, p.123-124.*

242. The next claim element, which reads "generating a network map of down-stream communication paths from the site controller to the target communication device and all up- stream communication paths from the target communication device to the site controller from the unique addresses of the communication devices that retransmitted the path determination message from

the sitecontroller to the target communication device or from the target communication device to the site controller," is also satisfied, as set forth in the claim chart and below.

243. Jasco's Z-Wave Controller devices implement a method to generate a network topology and routing table (in the claim, "generating a network map") of all down-stream and up-stream communication paths between the Jasco Z-Wave Primary Controller (in the claim, "the site controller") and any Z-Wave device in the network (in the claim, "the target communication device") basedupon "N1..N4 Intermediate Node Passed" fields (in the claim, "the unique addresses of the communication devices that retransmitted the path determination message") in returned explorer frames.



If this remote is used as the primary controller, you must use it to create your control network. You can use multiple remote controls with your Z-Wave lighting control network; however, only one remote will act as the primary controller. The primary controller must be used to add or delete devices (lights / nodes) from your network. The secondary controllers cannot add or delete devices from your network. Please note that if the primary controller is an SIS (see Z-Wave Terminology below) your secondary controllers can operate as "inclusion controllers" and add/delete devices.

**Primary Controller:** This is the main device used to set up and control your Z-Wave network. There can only be one primary controller and it must be used to add or delete devices. A primary controller can be a portable device like a hand-held remote, a static controller (permanently installed & never moved), a Z-Wave enabled PC or a Z-Wave enabled Ethernet router/bridge/gateway.

**Routing Tables:** The primary controller creates tables listing every device in the network and which devices can communicate with each other. This information is used by the controller to identify the most efficient route to use when transmitting commands to devices that are out of direct range.

*Source: GE 45633Wireless LightingControl AdvancedRemote OperatingManual, p. 6, 7*

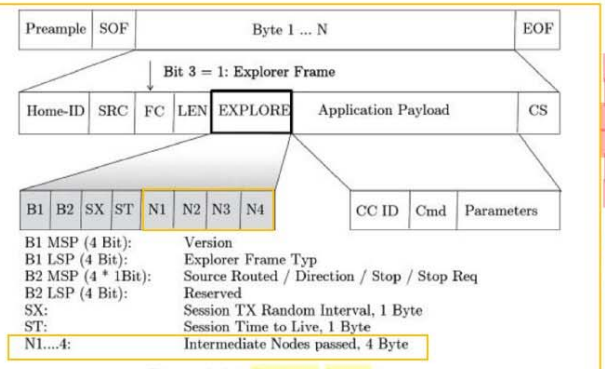



Figure 3.34: Explorer frame Layout

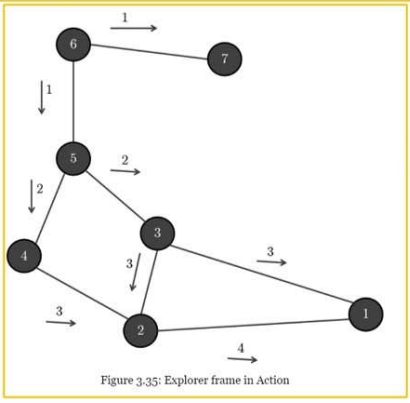



Figure 3.35: Explorer frame in Action

The explorer frame has a source address but no destination address. Every node forwarding the explorer frame adds its own Node-Id to the frame. Figure 3.35 shows the format of the explorer frame with additional 8 Bytes reserved for the routing detection function. If there is at least one valid route from the sender to its desired destination, the explorer frame will eventually reach this destination now carrying all the routing nodes used on its way. This information is the new and also the best route from the given source to the given destination. Figure 3.35 shows this principle. In the first step node 6 - the one that has lost the route -sends the explorer frame to node 5 and 7. Node 7 will terminate the explorer frame because it has no other routes available than the route back to node 6. Node 5 will now proceed the frame in a second step to nodes 4 and 3. After the third step, the explorer frame reaches the controller node 1 from node 3, while node 2 receives two frames from 4 and 3. In the final step, node 2 will forward the frame to node 1 the only node that this node 2 did not get a frame before. However, node 1 will disregard this frame since it already knows the best valid route 1 → 3 → 5 → 6.

The receiver—in this case the controller—is now supposed to send the explorer frame information back to the sender using the route just detected. The sender receives this very valuable information and can update its routing table accordingly. Because the explorer frame generates a lot of network traffic, it is only used as the last resort after all other communication attempts fail. On the other hand, the explorer frame technology will find always a valid way if there is a valid way.

*Source: Z-Wave Essential by Christian Paetz, p.123-124.*

**3.1.1 Controller Nodes**

A controller in the Z-Wave terminology is defined as a unit that has the ability to host a routing table of the entire network and calculate routes on the basis thereof. Moreover, the controller has the ability to pass on routes to slave units, in order to enable them to transmit routed signals.

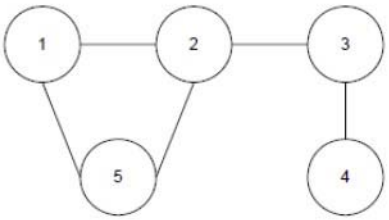
**3.4 Routing**

All controllers contain a routing table, which enables the controller to calculate routes in the Z-Wave network. Slave nodes will not have the ability to initiate transmission of routed frames, unless the controller has provided one or more controller assigned routes to the Routing Slave or Enhanced Routing Slave.

*Source: Z-Wave Node Type Overview and Network Installation Guide, 2008, pp. 3, 9.*

**6.2 Routing Table**

The routing table is where a controller keeps the information from the nodes about the network topology. The table is a bit field table where all information about what nodes that can see each other is kept. The figure below illustrates a network topology and the resulting routing table.




| | 1 | 2 | 3 | 4 | 5 | 6 |
|---|---|---|---|---|---|---|
| **1** | 0 | 1 | 0 | 0 | 1 | 0 |
| **2** | 1 | 0 | 1 | 0 | 1 | 0 |
| **3** | 0 | 1 | 0 | 1 | 0 | 0 |
| **4** | 0 | 0 | 1 | 0 | 0 | 0 |
| **5** | 1 | 1 | 0 | 0 | 0 | 0 |
| **6** | 0 | 0 | 0 | 0 | 0 | 0 |

*Network topology and routing table.*

The routing table is build by the primary controller based on information it receives from all the nodes in the network, at installation time, about each nodes range.

*Source: Software Design Specification - Z-Wave Protocol Overview, 2006, p. 13.*

244. The next claim element reads, "based on the network map, determining one or more up-stream and down-stream communication paths associated with each of the plurality of communication devices;" and is also satisfied.

245. Jasco's Z-Wave Controller devices implement a method to calculate and determine one or more up-stream and down-stream communication paths associated with each of the Z-Wave devices in the network.

246. Specifically, a Z-Wave Controller calculates and stores multiple assigned routes and send theseassigned routes to Z-Wave devices in the network.

**3.1.1 Controller Nodes**

A controller in the Z-Wave terminology is defined as a unit that has the ability to host a routing table of the entire network and calculate routes on the basis thereof. Moreover, the controller has the ability to pass on routes to slave units, in order to enable them to transmit routed signals.

**3.4 Routing**

All controllers contain a routing table, which enables the controller to calculate routes in the Z-Wave network. Slave nodes will not have the ability to initiate transmission of routed frames, unless the controller has provided one or more controller assigned routes to the Routing Slave or Enhanced Routing Slave.

*Source: Z-Wave Node Type Overview and Network Installation Guide, 2008, pp. 3, 9.*

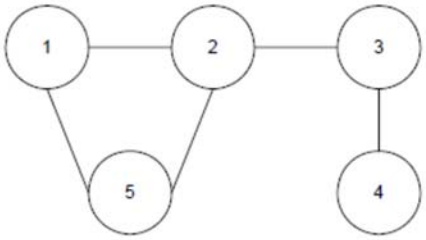
Routing Slaves primarily has a static physical location in the network. The Routing slave will receive four routes to each of its potential five destinations (return routes) from a static or a portable controller.

*Source: Z-Wave Routing Algorithm. (http://www.docin.com/p-611108656.html)*

SDS10243-2 Z-Wave Protocol Overview 2006-04-24

**6.2 Routing Table**

The routing table is where a controller keeps the information from the nodes about the network topology. The table is a bit field table where all information about what nodes that can see each other is kept. The figure below illustrates a network topology and the resulting routing table.




| | 1 | 2 | 3 | 4 | 5 | 6 |
|---|---|---|---|---|---|---|
| **1** | 0 | 1 | 0 | 0 | 1 | 0 |
| **2** | 1 | 0 | 1 | 0 | 1 | 0 |
| **3** | 0 | 1 | 0 | 1 | 0 | 0 |
| **4** | 0 | 0 | 1 | 0 | 0 | 0 |
| **5** | 1 | 1 | 0 | 0 | 0 | 0 |
| **6** | 0 | 0 | 0 | 0 | 0 | 0 |

*Network topology and routing table.*

The routing table is build by the primary controller based on information it receives from all the nodes in the network, at installation time, about each nodes range.

*Source: Software Design Specification - Z-Wave Protocol Overview, 2006, p. 13.*

**4.4.8.11 Return Route Assign Command**

This command is used to make a controller assign static return routes (up to 4) to a slave node. This allows the slave nodes to communicate directly with other nodes.

Up to 5 different destinations can be allocated return routes. Attempts to assign new return routes when all 5 destinations already are allocated will be ignored.
Allocated return routes can only be cleared using the Return Route Delete Command.

The controller calculates the shortest routes from the slave node (Source NodeID field) to the destination node (Destination NodeID field) and transmits the return routes to the slave node (Source NodeID field).

The Return Route Assign Complete Command MUST be returned in response to this command when the route assignment is completed.

*Source: Z-Wave Network-Protocol Command Class Specification, 2018, p.72.*

247. The next claim element reads, "managing communication with each of the plurality of communication devices and the identification of eachof the plurality of communication devices in the one or more communication paths, via a first communication protocol, based on one or more of the communication paths associated with each of the plurality of communication devices;" and is also satisfied.

248. Jasco's Z-Wave Controller devices implement a method to manage communication with and identification of each Z-Wave devices in the network ("the plurality of communication devices") via Z-Wave Network Management Commands and Z- Wave Application commands in the Z-Wave protocol ("a first communication protocol") based on one or more communication paths.

**3.1 Network Nodes**

The Z-Wave network consists of two different types of network nodes; controllers and slaves. The controller nodes are able to calculate routes (and alternative routes). The second node type is the slave node, which generally acts as input and output units. Both types exist in different versions as described below. The Z-Wave protocol supports networks of up to 232 nodes, which can be freely shared between controller and slave nodes.

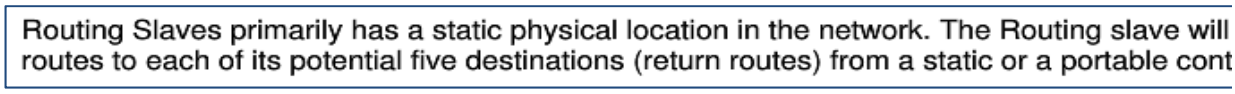
**3.1.1 Controller Nodes**

A controller in the Z-Wave terminology is defined as a unit that has the ability to host a routing table of the entire network and calculate routes on the basis thereof. Moreover, the controller has the ability to pass on routes to slave units, in order to enable them to transmit routed signals.

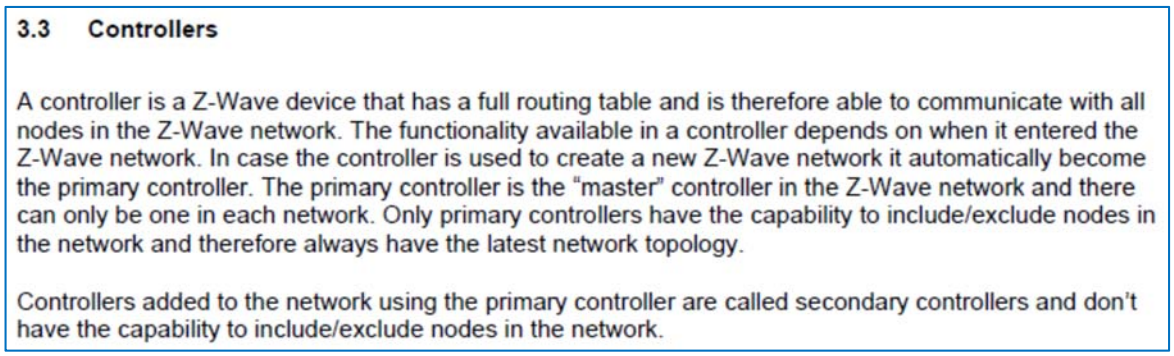
**3.4 Routing**

All controllers maintains a routing table, which enables the controller to calculate routes in the Z-Wave network. Slave nodes can not initiate transmission of routed frames, unless the controller has provided one or more return routes to the Routing Slave or Enhanced Routing Slave.

*Source: Z-Wave Node Type Overview and Network Installation Guide, 2008, pp. 3, 9.*


Routing Slaves primarily has a static physical location in the network. The Routing slave will routes to each of its potential five destinations (return routes) from a static or a portable cont

*Source: Z-Wave Routing Algorithm.(http://www.docin.com/p-611108656.html)*


**3.3 Controllers**

A controller is a Z-Wave device that has a full routing table and is therefore able to communicate with all nodes in the Z-Wave network. The functionality available in a controller depends on when it entered the Z-Wave network. In case the controller is used to create a new Z-Wave network it automatically become the primary controller. The primary controller is the "master" controller in the Z-Wave network and there can only be one in each network. Only primary controllers have the capability to include/exclude nodes in the network and therefore always have the latest network topology.

Controllers added to the network using the primary controller are called secondary controllers and don't have the capability to include/exclude nodes in the network.

*Source: Software Design Specification - Z-Wave Protocol Overview, 2006, p. 4.*

249. By operating pursuant to the Z-Wave protocols set forth above, which the accused device does, each step of the claim element is satisfied.

250. The next claim element, "managing communication with the host computer via a second communication protocol;" is also satisfied.

251. Jasco's product literature below shows that Jasco's GE Z-Wave Handheld Smart Remote functions as a primary controller. In addition, Jasco advertises that "add[ing] GE Z-Wave lighting controls to a Z-Wave certified gateway to access and control your home from anywhere in the world using your smartphone, tablet or computer as a home automation command center".

252. Thus, Jasco suggests a network configuration where GE Z-Wave Handheld Smart Remote acts a primary controller to include a Z-Wave certified gateway to the network for the purpose of communicating via the Internet (in the claim, "a second communication protocol") with a smartphone, tablet or computer (in the claim, "host computer"). For example, when an end user inputs on/off command related to a Z-Wave light control via a compatible app on a smartphone, tablet or computer, such command will be sent over the Internet to a Z-Wave certified gateway.

The command is then sent from Z-Wave certified gateway to the corresponding Z-Wave light control in the Z-Wave network using one or more communication paths managed by the Jasco's GE Z-Wave Handheld Smart Remote which acts a primary controller as previously explained.

# GE Z-Wave Handheld Smart Remote

SKU# **45633** | You have items in your cart (/cart).

**Description**

Transform any home into a smart home with the GE Z-Wave Wireless Lighting Control LCD Remote. Create and control custom lighting scenes without the hardwired mess. Features simple do-it-yourself installation. Control up to 18 individual lights, 18 groups and 18 scenes with this low-profile remote. Controls up to four Z-Wave certified HVAC thermostats and six Z-Wave door locks. Sleek black design with blue backlit LCD keypad functions as a primary or secondary controller. Take control of your home lighting with GE Z-Wave Wireless Lighting Controls! Z-Wave is the world's largest ecosystem of interoperable smart home products. Z-Wave lighting controls provide an easy-to-install and affordable system to control lighting and small appliances in your home. Add GE Z-Wave lighting controls to a Z-Wave certified gateway to access and control your home from anywhere in the world using your smartphone, tablet or computer as a home automation command center. Never worry if you accidentally left the lights on because you can turn them off remotely or program your lights to go on/off at specific times. Create customized lighting scenes for any occasion such as a "go to sleep" scene or a "movie night" scene. Give the illusion that someone is home by programming the lights to turn on/off while you are away—perfect for deterring crime and adding additional security!

**Features**

- Allows you to remotely turn the light or appliance on/off
- Battery-powered - no wiring needed
- Controls up to 18 individual lights, 18 groups (turn lights on/off at the same time) and 18 scenes (scene activates preset brightness levels for task or ambient lighting)
- Controls up to four Z-Wave certified HVAC thermostats and six Z-Wave door locks
- The sleek black design with blue backlit LCD keypad functions as a primary or secondary controller

253. The next claim element, which reads, "storing on the site controller a first look-up table for identifying each of the plurality of communication devices that define a second communication network; and" is also satisfied.

254. Each of Jasco's Z-Wave device that can act as Z-Wave Primary Controller, including but not limited to GE 45633 Wireless Lighting Control Advanced Remote, implements a method to store (in the claim, "storing") a node list (in the claim, "a first look-up table") which identifies each of the plurality of Z-Wave devices (in the claim, "communication devices") included in and defined the Z-Wave network (in the claim, "a second communication network").

255. Below are excerpts from Z-Wave specification shows a Z-Wave controller keeps latest updated node list:

**3.1.5 Network Management Proxy Command Class, version 1**

The Network Management Proxy Command Class provides functions to access basic network information such as the list of nodes currently included.

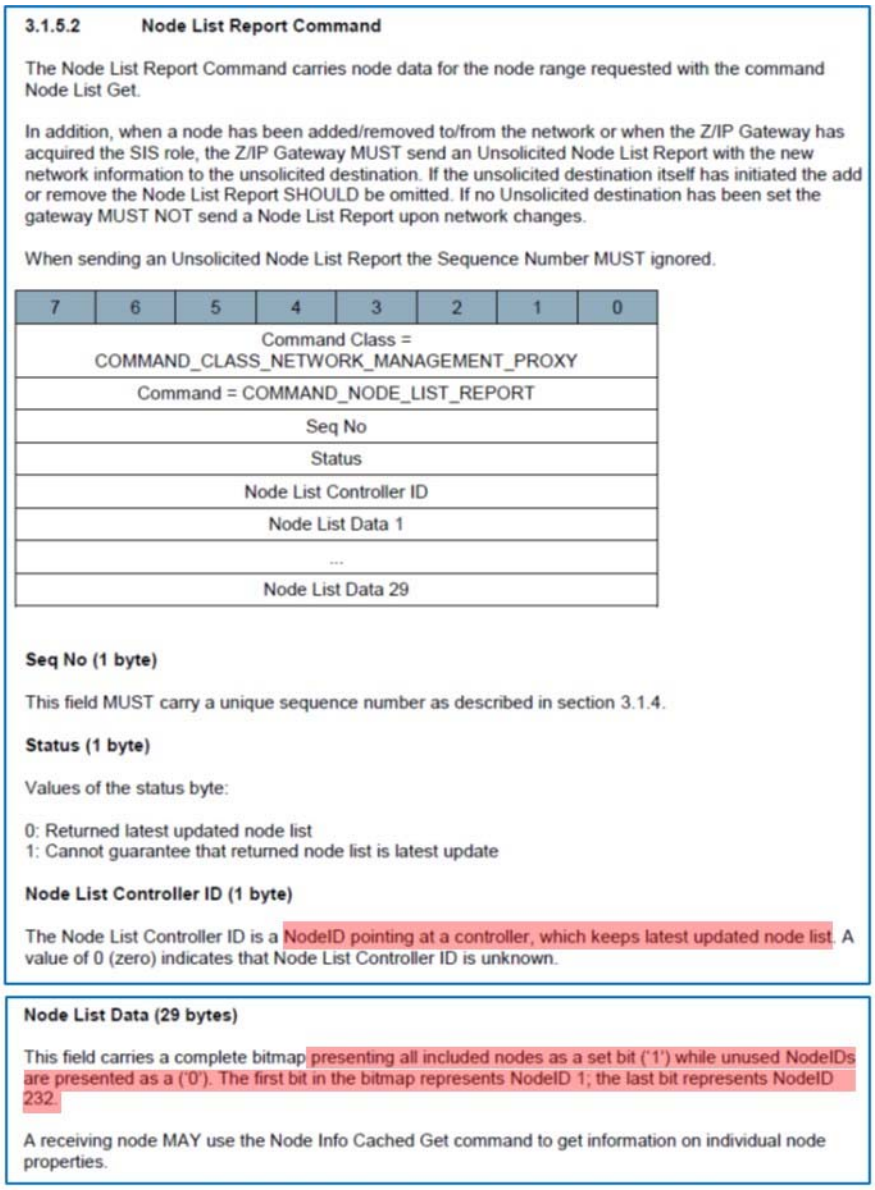
**3.1.5.1 Node List Get Command**

The Node List Get Command is used to request the node list from local storage in a node.

The Node List Report Command MUST be returned in response to this command.

This command MUST NOT be issued via multicast addressing.
A receiving node MUST NOT return a response if this command is received via multicast addressing.
The Z-Wave Multicast frame, the broadcast NodeID and the Multi Channel multi-End Point destination are all considered multicast addressing methods.

*Source: Z-Wave Command Class Specification, N-Z, 2016, p. 10.*



**3.1.5.2 Node List Report Command**

The Node List Report Command carries node data for the node range requested with the command Node List Get.

In addition, when a node has been added/removed to/from the network or when the Z/IP Gateway has acquired the SIS role, the Z/IP Gateway MUST send an Unsolicited Node List Report with the new network information to the unsolicited destination. If the unsolicited destination itself has initiated the add or remove the Node List Report SHOULD be omitted. If no Unsolicited destination has been set the gateway MUST NOT send a Node List Report upon network changes.

When sending an Unsolicited Node List Report the Sequence Number MUST ignored.

| 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |
|---|---|---|---|---|---|---|---|
| Command Class = COMMAND_CLASS_NETWORK_MANAGEMENT_PROXY | | | | | | | |
| Command = COMMAND_NODE_LIST_REPORT | | | | | | | |
| Seq No | | | | | | | |
| Status | | | | | | | |
| Node List Controller ID | | | | | | | |
| Node List Data 1 | | | | | | | |
| ... | | | | | | | |
| Node List Data 29 | | | | | | | |

**Seq No (1 byte)**

This field MUST carry a unique sequence number as described in section 3.1.4.

**Status (1 byte)**

Values of the status byte:

0: Returned latest updated node list
1: Cannot guarantee that returned node list is latest update

**Node List Controller ID (1 byte)**

The Node List Controller ID is a NodeID pointing at a controller, which keeps latest updated node list. A value of 0 (zero) indicates that Node List Controller ID is unknown.

**Node List Data (29 bytes)**

This field carries a complete bitmap presenting all included nodes as a set bit ('1') while unused NodeIDs are presented as a ('0'). The first bit in the bitmap represents NodeID 1; the last bit represents NodeID 232.

A receiving node MAY use the Node Info Cached Get command to get information on individual node properties.

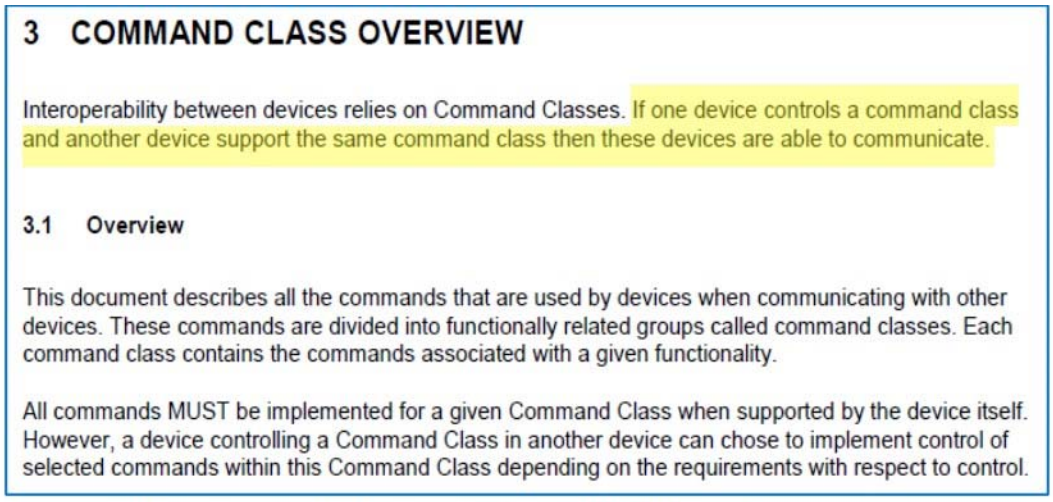
*Source: Z-Wave Command Class Specification, N-Z, 2016, p. 11-12.*

256. The final claim element, which reads "storing on the site controller a second look-up table for identifying a function to be performed by the site controller based upon an analysis of a message received from any one of the plurality of communication devices that define a second communication network" is also satisfied.

257. Each of Jasco's Z-Wave devices that can act as a Z-Wave Primary Controller, including but not limited to GE 45633 Wireless Lighting Control Advance Remote, implements a

method to store (in the claim, "storing") and implement a list of Controlled Z-Wave Command Class and Supported Z-Wave Command Class (in the claim, "a second look-up table") and logic to identify a function to be performed or a response to be returned upon receiving a corresponding command sent by a Z-Wave device in the Z-Wave network (in the claim, "a second communication network").

258. For example, the GE45633 implements the following Z-Wave Command Classes related to Z-Wave certified thermostats, door locks and lighting devices, thereby enabling it to identify and perform corresponding function related to functionality of these Z-Wave certified devices.



## 3 COMMAND CLASS OVERVIEW

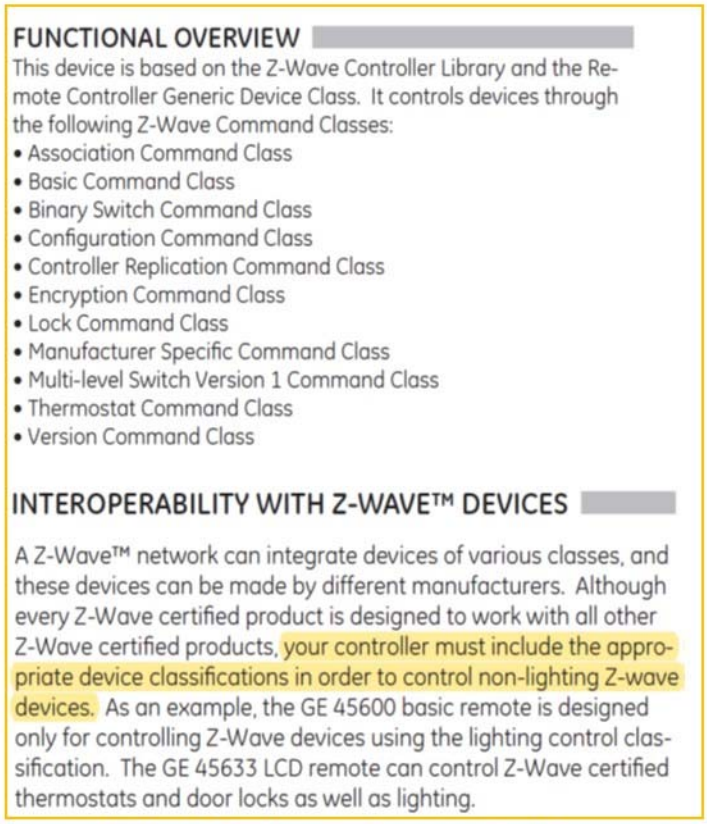
Interoperability between devices relies on Command Classes. If one device controls a command class and another device support the same command class then these devices are able to communicate.

### 3.1 Overview

This document describes all the commands that are used by devices when communicating with other devices. These commands are divided into functionally related groups called command classes. Each command class contains the commands associated with a given functionality.

All commands MUST be implemented for a given Command Class when supported by the device itself. However, a device controlling a Command Class in another device can chose to implement control of selected commands within this Command Class depending on the requirements with respect to control.

*Source: Z-Wave Command Class Specification, A-M, 2016, p. 3.*



**FUNCTIONAL OVERVIEW**

This device is based on the Z-Wave Controller Library and the Remote Controller Generic Device Class. It controls devices through the following Z-Wave Command Classes:

- Association Command Class
- Basic Command Class
- Binary Switch Command Class
- Configuration Command Class
- Controller Replication Command Class
- Encryption Command Class
- Lock Command Class
- Manufacturer Specific Command Class
- Multi-level Switch Version 1 Command Class
- Thermostat Command Class
- Version Command Class

**INTEROPERABILITY WITH Z-WAVE™ DEVICES**

A Z-Wave™ network can integrate devices of various classes, and these devices can be made by different manufacturers. Although every Z-Wave certified product is designed to work with all other Z-Wave certified products, your controller must include the appropriate device classifications in order to control non-lighting Z-wave devices. As an example, the GE 45600 basic remote is designed only for controlling Z-Wave devices using the lighting control classification. The GE 45633 LCD remote can control Z-Wave certified thermostats and door locks as well as lighting.

*Source: GE 45633 Wireless Lighting Control Advanced Remote Operating Manual, p.4, 6.*

259. Jasco's Z-Wave device that can act as Z-Wave Primary Controller, including but not limited toGE 45633 Wireless Lighting Control Advanced Remote, stores its list of Controlled Z-Wave Command Class and Supported Z-Wave Command Class and such stored list of commands can be sent by the Z-Wave Primary Controller in a Node Information Frame (NIF).

### 3.2 Node Information Frame

The Node Information Frame (NIF) is used to inform other devices about node capabilities. The NIF contains a structure with a protocol specific part that is handled by the Z-Wave protocol and an application specific part that is filled in by the application. The protocol specific part consists of a bit telling if the node is a continuously listening device, the Basic Device Class the device is based on etc. The application specific part consists of the Generic and Specific Device Class and the Command Classes that are supported and/or controlled by the device.

A NIF will be sent to the controller when a node is to be included in the network, excluded from the network or upon request.

The figure below shows the parameters hosted by NIF.

| Byte descriptor \ bit number | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |
|---|---|---|---|---|---|---|---|---|
| Capability | Liste-ning | Z-Wave Protocol Specific Part | | | | | | |
| Security | Opt. Func. | Z-Wave Protocol Specific Part | | | | | | |
| Reserved | Z-Wave Protocol Specific Part | | | | | | | |
| Basic *) | Basic Device Class (Z-Wave Protocol Specific Part) | | | | | | | |
| Generic | Generic Device Class | | | | | | | |
| Specific | Specific Device Class | | | | | | | |
| NodeInfo[0] | Command Class 1 | | | | | | | |
| ... | ... | | | | | | | |
| NodeInfo[n-1] | Command Class n | | | | | | | |

*) The "Basic" field is only included when the NIF is sent by a controller

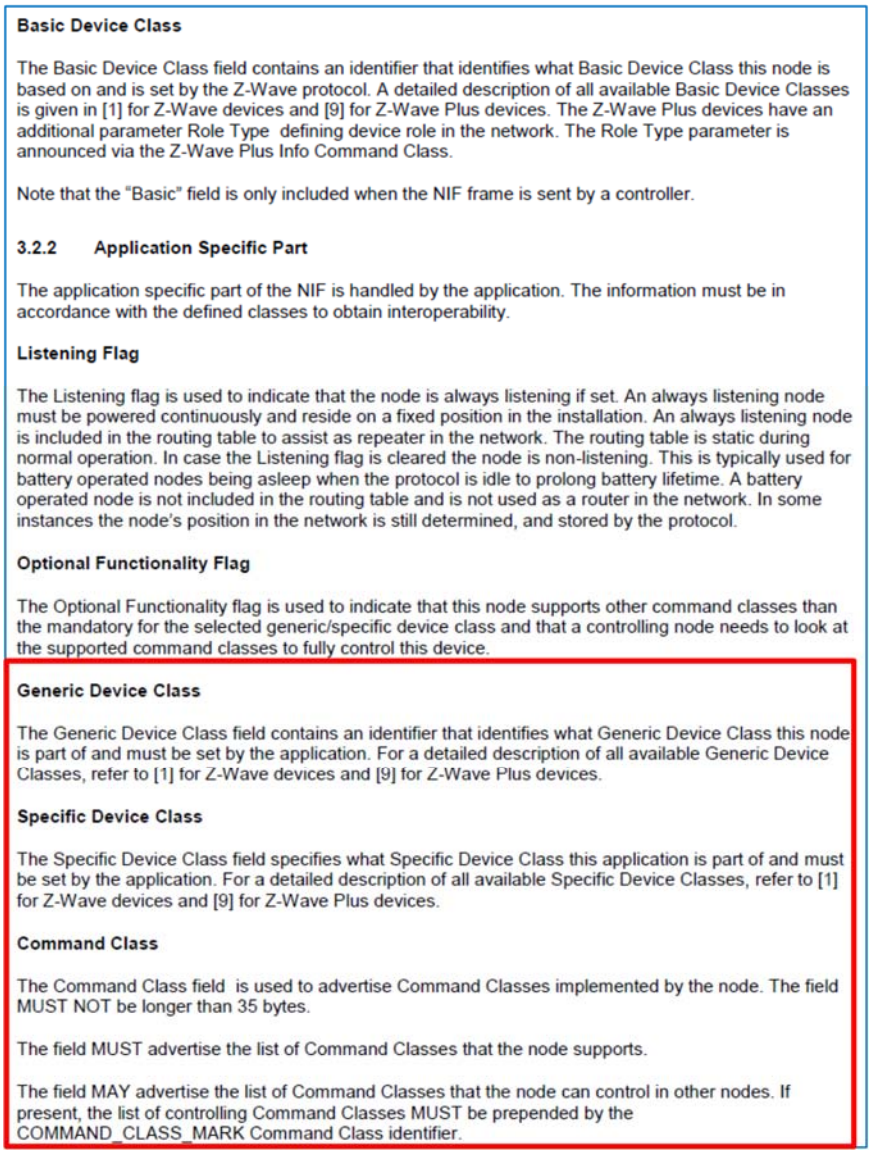
**Figure 2, Node Information Frame format**

The Z-Wave Protocol in a controller saves all the Node Information except the supported and controlled Command Classes when a node is included in the network. The reserved field MUST be set to 0 by a sending node and MUST be ignored by a receiving node.

#### 3.2.1 Z-Wave Protocol Specific Part

The protocol specific part of the NIF is handled by the Z-Wave protocol. This information is automatically inserted in the packet by the protocol layer when transferring data using the API.

*Source: Z-Wave Command ClassSpecification, A-M, 2016, p. 4.*



**Basic Device Class**

The Basic Device Class field contains an identifier that identifies what Basic Device Class this node is based on and is set by the Z-Wave protocol. A detailed description of all available Basic Device Classes is given in [1] for Z-Wave devices and [9] for Z-Wave Plus devices. The Z-Wave Plus devices have an additional parameter Role Type defining device role in the network. The Role Type parameter is announced via the Z-Wave Plus Info Command Class.

Note that the "Basic" field is only included when the NIF frame is sent by a controller.

**3.2.2 Application Specific Part**

The application specific part of the NIF is handled by the application. The information must be in accordance with the defined classes to obtain interoperability.

**Listening Flag**

The Listening flag is used to indicate that the node is always listening if set. An always listening node must be powered continuously and reside on a fixed position in the installation. An always listening node is included in the routing table to assist as repeater in the network. The routing table is static during normal operation. In case the Listening flag is cleared the node is non-listening. This is typically used for battery operated nodes being asleep when the protocol is idle to prolong battery lifetime. A battery operated node is not included in the routing table and is not used as a router in the network. In some instances the node's position in the network is still determined, and stored by the protocol.

**Optional Functionality Flag**

The Optional Functionality flag is used to indicate that this node supports other command classes than the mandatory for the selected generic/specific device class and that a controlling node needs to look at the supported command classes to fully control this device.

**Generic Device Class**

The Generic Device Class field contains an identifier that identifies what Generic Device Class this node is part of and must be set by the application. For a detailed description of all available Generic Device Classes, refer to [1] for Z-Wave devices and [9] for Z-Wave Plus devices.

**Specific Device Class**

The Specific Device Class field specifies what Specific Device Class this application is part of and must be set by the application. For a detailed description of all available Specific Device Classes, refer to [1] for Z-Wave devices and [9] for Z-Wave Plus devices.

**Command Class**

The Command Class field is used to advertise Command Classes implemented by the node. The field MUST NOT be longer than 35 bytes.

The field MUST advertise the list of Command Classes that the node supports.

The field MAY advertise the list of Command Classes that the node can control in other nodes. If present, the list of controlling Command Classes MUST be prepended by the COMMAND_CLASS_MARK Command Class identifier.

Source: Z-Wave Command Class Specification, A-M, 2016, p. 5.

260. On information and belief, Defendant may have other products that operate pursuant to the Z-Wave protocol and, therefore, also infringe claim 1 of the '425 Patent. Additional details are within the possession, custody or control of Defendant, including information about other infringing products.

261. Additional details relating to '425 Infringing Instrumentalities and their infringement are within the possession, custody or control of Defendant.

262. Plaintiff offers this preliminary identification and description of infringement without the benefit of discovery or claim construction in this action, and expressly reserves the right to augment, supplement, and revise its identification and description of infringement based on additional information obtained through discovery or otherwise.

263. Defendant's acts of infringement of Claim 1 of the '425 Patent have caused damage to Plaintiff, and Plaintiff is entitled to recover from Defendant the damages it has sustained as a result of Defendant's wrongful acts in an amount subject to proof at trial.

## JURY DEMAND

Plaintiff requests a jury trial of all issues in this action so triable.

## PRAYER FOR RELIEF

WHEREFORE, Plaintiff prays for judgment as follows:

A. Declaring that Defendant has infringed the '737, '936, '304 and '425 Patents as asserted herein.

B. That, where such a finding is appropriate, Defendant's infringement was willful.

C. Awarding damages arising out of Defendant's infringement of the '737, '936, '304 and '425 Patents as asserted herein to SIPCO, together with prejudgment and post-judgment interest, in an amount according to proof.

D. Awarding attorneys' fees to SIPCO pursuant to 35 U.S.C. § 285 or as otherwise permitted by law.

E. Awarding such other costs and further relief as the Court may deem just and proper.

Dated: March 22, 2022

**/s/Gregory J. Myers**
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(admitted *pro hac vice*)
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