



# 2016 Annual Report

## Voluntary Agreement for Ongoing Improvement to the Energy Efficiency of Small Network Equipment

Prepared on behalf of the  
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## EXECUTIVE SUMMARY

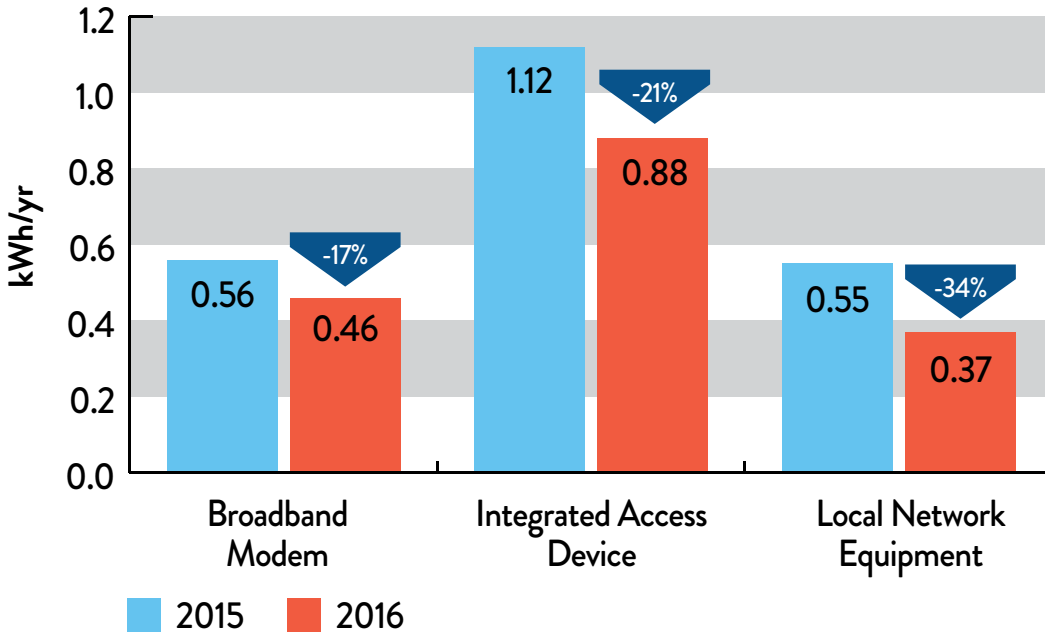
In 2015, 17 residential broadband Internet service providers and manufacturers of small network equipment, such as modems and routers used by consumers to access such services, led by the NCTA -The Internet & Television Association and the Consumer Technology Association (CTA), signed the Voluntary Agreement for Ongoing Improvement to the Energy Efficiency of Small Network Equipment. This agreement is modeled on the successful Voluntary Agreement for Ongoing Improvement to the Energy Efficiency of Set-Top Boxes. The primary objective of the agreement is to increase the energy efficiency of small network equipment while promoting rapid innovation and timely introduction of new features. The service provider signatories serve 92.8 million residential U.S. Internet subscribers, accounting for 84.4% of the market in 2016.

One of the requirements of the Voluntary Agreement is the publication of an annual report that summarizes developments for the previous calendar year. This second annual report has been prepared by the Independent Administrator and Auditor, D+R International, Ltd.

Under the Voluntary Agreement, signatories commit that at least 90% of all small network equipment purchased by each service provider or sold by each manufacturer at retail after December 31, 2015 will meet the energy efficiency standards established under the Voluntary Agreement. Overall, in 2016, 98.3% of small network equipment purchased or sold in 2016 met these standards, up from 89.6% in 2015. In 2016, ten of the eleven signatories met the 90% commitment individually, and the eleventh reached 88%. This is a significant increase from 2015, the year before these commitments became applicable, when only seven signatories reached 90%. This finding is supported by additional lab verification testing of a randomly selected model from each commercial signatory, and by a successful audit of one randomly selected signatory's records, which D+R found to be consistent with the annual report data submitted by the party.

This increase is also significant in light of increased consumer demands for higher-speed broadband services and increased Wi-Fi capacity for more devices at higher speeds within the home. While products that provide increased functionalities to meet these increased consumer demands may sometimes use more energy than less capable devices, this report finds that the signatories are delivering these more advanced functionalities more efficiently. Even as consumers demanded increasingly robust devices to support higher speed services and increased Wi-Fi capacity within their homes, the signatories nonetheless increased the percentage of devices meeting the energy standards of the Agreement in every category.

**Figure 1: Energy Usage by Equipment Type, Weighted by Broadband Speed**



Note: the above numbers were calculated by dividing the average kWh of each equipment type by the average broadband speed for that year

Broadband speed source: Akamai State of the Internet reports (Q1 '15, Q1 '16, Q1 '17).

With the increase in functionalities and demand for small network equipment, the overall energy usage for 2016 was slightly higher than in 2015. However, when the increase in broadband speed is taken into account the average kWh usage of the equipment actually decreased from 2015 to 2016 (see Figure 1). With the higher rate of equipment meeting the standards set forth in the Voluntary Agreement and the increase in broadband speed, the kWh per megabit per second decreased significantly. As increased functionality and higher broadband speed continue to be demanded by consumers, this measure will become increasingly important.

**Consumer-Facing Energy Efficiency Information.** Each service provider and retail vendor committed to providing reasonable access to energy efficiency information for small network equipment purchased on or after January 1, 2016. Links to this information are provided in [Appendix B](#) and at [www.energy-efficiency.us](http://www.energy-efficiency.us).

**Lab Verification Testing.** Additional verification testing was conducted in approved third-party labs or supervised by an accredited third-party observer. All eleven signatories that submitted verification testing reports confirmed the energy usage data included in this report.

**Random Procurement Audit.** The Independent Administrator is required to conduct a random audit of one commercial signatory's annual report data each year. D+R selected a signatory randomly and reviewed its raw reported data, invoice data, purchase order/sales data, product specification sheets, and screen shots from its systems for 2016. D+R determined that the data submitted by the signatory for the audit is consistent with the annual report data submitted by that signatory.

## OVERVIEW OF THE VOLUNTARY AGREEMENT

Guided by the objective of improved energy efficiency, the signatories crafted the [Voluntary Agreement for Ongoing Improvement to the Energy Efficiency of Small Network Equipment](#) in 2015 to reduce energy consumption and environmental impact, save their customers money, increase the reliability of their networks, and preserve flexibility conducive to rapid innovation and timely introduction of new features. The Voluntary Agreement provides a framework for the broadband Internet industry to deliver market-based energy efficiency gains that keep pace with technological innovation, and is modeled on the successful Voluntary Agreement for Ongoing Improvement to the Energy Efficiency of Set-Top Boxes that was signed in 2012. The agreement sets rigorous requirements that have improved the efficiency of small network equipment by nearly 20% compared to typical, previously deployed devices used by signatories.

Internet service provider signatories offered services to approximately 92.8 million U.S. residential customers using small network equipment in 2016, an increase of 2.9 million since 2015.<sup>1</sup> That represents 84.4% of U.S. broadband households.

The Voluntary Agreement classifies small network equipment into three categories:

- **Broadband Modems:** A simple network device that enables high speed data service with a WAN (Wide Area Network) interface to a service provider wired or optical network, and typically a single LAN (Local Area Network) interface for the customer premise network. The Broadband Modem category does not include devices with integrated router, or IEEE 802.11 (Wi-Fi) wireless access point functionality.
- **Integrated Access Devices (IAD):** Broadband network devices with a Wide Area Network interface to a service provider wired or optical network and one or more of the following functions on the Local Area Network interface: multiport routing, Wi-Fi wireless access point functionality, and/or Voice over Internet Protocol (VoIP).
- **Local Network Equipment (LNE):** Devices that do not have a direct interface to a service provider network. This category consists principally of routers, but also includes wireless access points, switches, and network extenders that bridge or extend a local area network beyond its physical limitations.<sup>2</sup>

### Voluntary Agreement Objectives

The objectives of the Voluntary Agreement are to continue improvements in the energy efficiency of small network equipment and to foster device and service functionality, while encouraging innovation and competition. By improving small network equipment energy efficiency, the Voluntary Agreement also aims to further reduce potential negative environmental impacts and increase benefits to consumers in a flexible manner that allows for high-quality services and takes advantage of rapidly changing technologies and new features.

1 - Based on data provided by the NCTA and the Consumer Technology Association.

2 - For the full definitions of these categories, see [Appendix A](#) of this report or Annex 1 of the Voluntary Agreement.

## Voluntary Agreement Signatories and Steering Committee

The signatories and participants in the Voluntary Agreement are listed below. Signatories that currently have a voting member serving on the Steering Committee are indicated with an asterisk; all signatories may participate in Steering Committee meetings.

### Service Provider Signatories

- AT&T Services, Inc.\*
- Cablevision Systems Corp. d/b/a Optimum\*
- CenturyTel Broadband Services, LLC d/b/a CenturyLink\*
- Charter Communications, Inc.\* (including Bright House Networks and Time Warner Cable\*)
- Comcast Cable Communications, LLC\*
- Cox Communications, Inc.\*
- Verizon Communications, Inc.\*

### Vendor Signatories

- Actiontec Electronics, Inc.
- ARRIS Group, Inc.\*
- D-Link Systems, Inc.
- EchoStar Technologies, LLC
- Netgear, Inc.\*
- Technicolor Connected Home USA LLC (signed in 2016)
- Ubee Interactive, Inc.

### Other Organizations

- Consumer Technology Association (CTA)\*
- NCTA - The Internet & Television Association\*
- Cable Television Laboratories (CableLabs)

Signatories Time Warner Cable and Bright House Networks merged into Charter in 2016, and Pace was acquired by ARRIS in 2016.

The Voluntary Agreement obligates the Steering Committee to designate an Independent Administrator and publish an annual report. The Steering Committee designated D+R International, Ltd. as the Independent Administrator and Auditor in 2015. This report is the second annual report.

The Voluntary Agreement requires that the Steering Committee meet at least once each year. The Steering Committee met twice in 2016, on June 14 and July 27.

Additional responsibilities of the Steering Committee include the following:

- Managing the Voluntary Agreement
- Hiring the Independent Administrator
- Reviewing proposals for energy allowances based on new features, which the Steering Committee can approve, reject, or add to the Voluntary Agreement as appropriate
- Evaluating the effectiveness of the Voluntary Agreement in achieving its purposes
- Adopting new or revised efficiency measures, courses of action, and amendments to the Voluntary Agreement as technologies and services change

CTA and NCTA are required to provide the Independent Administrator with the estimated total number of U.S. residential broadband Internet access subscribers and the number served by service providers participating in the Voluntary Agreement during the reporting period. This information is due by April 1 of each year, beginning in 2016; CTA and NCTA provided the 2016 information on time in 2017.

### **Signatory Commitments**

The primary commitment is to procure and sell energy-efficient small network equipment. Specifically, beginning January 1, 2016, 90% of new small network equipment purchased by service providers or sold at retail by vendors had to meet the energy efficiency standards established in the Voluntary Agreement.

### **Independent Administrator and Auditor Role**

The Independent Administrator is a third party appointed by the Steering Committee. Under the Voluntary Agreement, the Independent Administrator must aggregate and compile confidential procurement or sales data submitted by the signatories. In 2016, the Voluntary Agreement commitments became effective and the Independent Administrator assessed the signatories' compliance with the commitments of the Voluntary Agreement. If these commitments are not met, the Independent Administrator is responsible for working with the provider to develop a remedial plan under procedures set out in the Voluntary Agreement.

The Independent Administrator is charged with conducting a random audit of one service provider's procurement figures or one vendor's sales figures each year. The results of the 2016 audit are presented in Appendix C. The Independent Administrator also randomly selects one model from each service provider and retail vendor that must be independently tested in an accredited third-party lab or supervised by an accredited independent observer to verify the reported idle power values. The successful results of that testing are described below.



## **New Feature Process for Small Network Equipment**

The New Feature Process is intended to encourage innovation and competition by service provider and vendor signatories and to encourage energy efficiency by design. This process provides a path for signatories to innovate and add new features, including features with no assigned allowances and features in the early stages of design, without being treated as being in violation of Voluntary Agreement energy allowances or commitments. If a service provider signatory deploys or a vendor signatory sells small network equipment that includes a new feature with no allowance, and the presence of the feature causes the device to exceed the prescribed allowances, the signatory may set and report an appropriate initial allowance for the power consumption of that feature when it reports the device under the Voluntary Agreement. When such information is reported, the Steering Committee will propose appropriate allowances and effective dates. Any allowances established by the Steering Committee for new features will be publicly reported as are other such allowances under the Voluntary Agreement.

## **Remediation and Alternative Energy Efficiency Strategies**

A signatory that fails to meet its procurement commitment must either seek advance credits for alternative energy efficiency measures or must undertake a remedial plan that secures energy savings that offset the incremental energy associated with devices purchased or sold in excess of the commitment.

## REPORT ON 2016 PROCUREMENT AND SALES COMMITMENTS

Under the Voluntary Agreement, 90% of small network equipment purchased or sold at retail by commercial signatories after December 31, 2015 must meet specified energy efficiency standards. These commitments came into effect in 2016 and data was collected from the service provider and retail vendor signatories to measure progress toward these commitments.<sup>3</sup> Overall, 98.3% of reported units satisfied the energy efficiency standards of the Agreement, up from 89.6% in 2015.

Ten of the eleven reporting signatories met the 90% threshold, and five of those signatories had 100% of their new purchases/sales meet the energy efficiency standards of the Agreement. One signatory reported 88% of its purchases/sales as meeting the energy standards, and the Independent Administrator is currently working with that party to develop a remedial plan to offset the energy consumption of the devices deployed in excess of the 90% commitment.

The success of the procurement commitment spanned every category of small network equipment, with at least 97% of every category meeting the standards of the Agreement, as shown in Table 1.

**Table 1: Total Number of Units and Number of Units Meeting Energy Efficiency Standards, by Equipment Type**

Category	Reported Units	Number Meeting Standards	Percent Meeting Standards
Broadband Modem	1,518,442	1,480,290	97.5%
Integrated Access Device	25,352,825	24,863,650	98.1%
Local Network Equipment	6,004,725	5,967,792	99.4%
<b>Total</b>	<b>32,875,992</b>	<b>32,311,732</b>	<b>98.3%</b>

<sup>3</sup> - Three vendor Signatories had no retail sales of small network equipment in 2016 and therefore did not need to submit sales data.

Within the products reported for 2016, IADs represented more than three-quarters of reported products, followed by local network equipment (principally routers) and broadband modems.

Figure 2 shows the category breakdown, by percentage, of the units purchased or sold.

**Figure 2: Small Network Equipment, by Equipment Type**

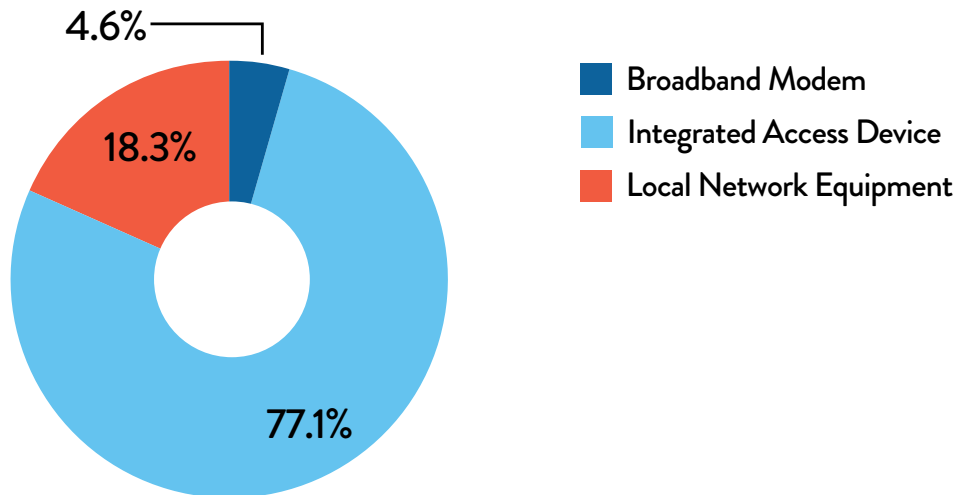
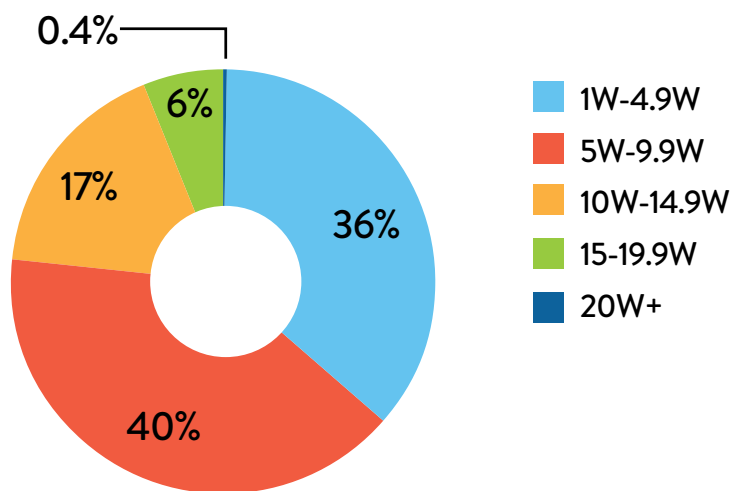


Figure 3 shows that the idle power of the integrated access device models reported by signatories is relatively equally distributed among the categories of 1-4.9 watts and 5-9.9 watts, representative of the wide variation in capability of these products, and those categories make up 76% of the IAD models. These numbers are reflective of the models reported and are not based on quantity sold of each model.

**Figure 3: Distribution of Reported Idle Power of Integrated Access Device Models**



## Energy Efficiency of Small Network Equipment

Details of the small network equipment purchased or sold by the signatories in 2016 are provided in [Appendix A: Small Network Equipment Purchased or Sold by Voluntary Agreement Signatories 2016](#). The idle mode power for these models spans from less than 1 watt to 20 watts. The energy efficiency of each model is assessed based upon its particular suite of functions and capabilities, which vary widely among small network equipment. For example, of the three categories of small network equipment defined by the Voluntary Agreement, integrated access devices (IADs) on average use the most energy, as shown in Table 2 below, but IADs perform multiple functions that in the past may have been performed by a separate modem, router, VoIP telephone modem, and/or home security controller that in the aggregate likely used more energy. This consolidation of functions in one device is made possible by the structure of the Voluntary Agreement, which assigns energy allowances for the various functionalities of each device to tailor appropriate energy efficiency standards.

**Table 2: Average Typical Weighted Idle Mode Power Consumption for Small Network Equipment Categories<sup>4</sup>**

SNE Category:	Average Weighted Power 2016 (in watts)
Broadband Modem	7.11
Integrated Access Device	13.53
Local Network Equipment	5.62

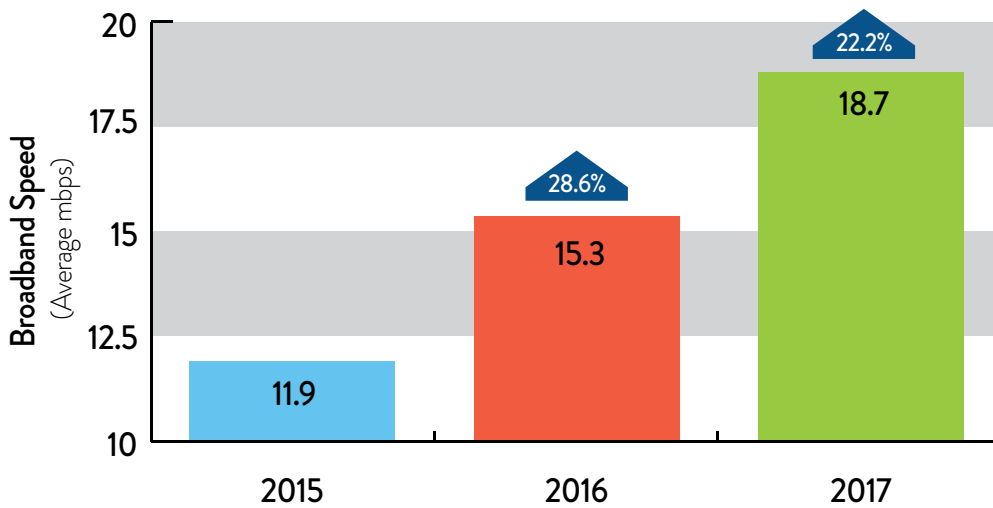
Even within these categories, these averages are affected by the wide variation in the specific capabilities of models as they are adjusted to meet changes in consumer demand with the rise in broadband speeds, devices, and usage. The average broadband connection speed for U.S. residential households has increased by 57% in just two years, as shown in Figure 4. Consumers are bringing an increasing number and variety of connected devices into their homes and streaming an increasing amount of video content to mobile devices. In 2016, the time spent watching video content on mobile devices, including laptops, tablets and smartphones is now equal to - within the sampling margin of error - time consumers spend watching video content on TVs.<sup>5</sup> In the home, this streamed content is typically delivered through the customer's modem and router. To meet consumers' increased demands for robust modems and routers to support higher-speed broadband services and increased Wi-Fi capacity in the home, the features of small network equipment have changed. One service provider, for example, reported purchasing a much higher percentage of IADs that include the more advanced 802.11ac Wi-Fi radios than the predominant 802.11n radios of its purchases in the prior year, thereby providing higher in-home speeds, and improved range and capacity to pass through walls. Overall, cable service provider signatories increased the average weighted Wi-Fi capacity of their devices by 35% from 2015 to 2016. These newer-generation IADs use larger MIMO antenna configurations and more power than older models to deliver higher conducted output power but meet the standards of the Agreement for these features.<sup>6</sup>

4 - Average weighted power was calculated by multiplying the weighted power of each unit type (by signatory) by the total number of units. These totals were all added and then divided by the total number of units in each category.

5 - Consumer Technology Association (CTA), Content Consumption Milestone: Number of Streaming Video Viewers Now Equal to Paid TV Subscribers, Says CTA (Mar. 7, 2017), <https://cta.tech/News/Press-Releases/2017/March/Content-Consumption-Milestone-Number-of-Streaming.aspx>.

6 - Some devices were also reclassified into different categories pursuant to an amendment to the Voluntary Agreement adopted in 2016.

**Figure 4: Annual Growth of Broadband Speeds<sup>7</sup>**



Note: the 2017 broadband speed is reflective of data from Q1 2017 only

The signatories nonetheless increased the percentage of devices meeting the energy standards of the Agreement in every category, even as consumers demanded increasingly robust devices to support higher speed services and increased Wi-Fi capacity within their homes. As noted above, at least 97% of the devices in each category, and 98.3% of devices overall, met the energy efficiency standards of the Agreement in 2016. This achievement reflects the Voluntary Agreement's objective to promote energy efficiency, but in a manner that does not constrain innovation and the delivery of new services to consumers.

The Voluntary Agreement is expected to continue to drive purchase and retail decisions, increasing the efficiency of equipment on the market and in consumers' homes. In the prior annual report, D+R found that the reported legacy models purchased and sold in 2015 that did not meet the Voluntary Agreement's new energy efficiency standards used an average of 18% more energy than the maximum power consumption permitted under the Voluntary Agreement's allowances.<sup>8</sup> Most of those less energy-efficient models reported in 2015 were not purchased/sold again in 2016, and those that were, were purchased and sold with declining frequency. In 2015, 85.8% of models met the standards of the Voluntary Agreement; in 2016, this figure increased to 93.6%, and only 1.7% of all purchases and sales were of models that did not meet these levels. All of this data supports a finding that the Voluntary Agreement is continuing to be successful in improving the energy efficiency of small network equipment.

7 - Source: Akamai State of the Internet reports (Q1'15, Q1'16, Q1'17).

8 - See D+R International, 2015 Annual Report, Voluntary Agreement for the Energy Efficiency of Small Network Equipment, page 11: <http://www.energy-efficiency.us/library/pdf/SNE-AnnualReport-2015.pdf>.

## Lab Verification Testing

The Independent Administrator randomly selected one model from each commercial signatory for verification testing. Verification testing was conducted in third-party laboratories approved by the Steering Committee or under a supervised vendor or service provider testing program with an accredited independent observer approved by the Steering Committee. Test results revealed that, in aggregate, the average actual usage is 1.05 watts less than the values originally reported by the signatories in their 2016 annual reports. The results also confirmed that idle mode energy usage was at or below the levels reported by the signatory, with the exception of one model. While that model tested higher than the signatory had originally reported, the model still met the standards of the Agreement. That model's energy usage has since been updated by the signatory to reflect this finding.

## Consumer-Facing Energy Efficiency Information

All signatories committed to provide subscribers and prospective customers with reasonable access to energy efficiency information for small network equipment purchased or sold at retail since January 1, 2016. This information makes it easier for consumers to learn about energy-efficient small network equipment and typical energy consumption. Links to the information are shown in Appendix B and posted at [www.energy-efficiency.us](http://www.energy-efficiency.us).

## CONCLUSION

The Voluntary Agreement is off to a promising start in improving the energy efficiency of small network equipment used by American consumers with broadband Internet access service. 2016 marked the first year that signatories were obligated to meet the 90% procurement/sales commitment, which came into effect January 1, 2016. Overall, 98.3% of reported units satisfied the energy efficiency standards of the Agreement, and all of the devices subjected to independent lab audits were confirmed to have idle power draws at or below their given allowances. Ten of the eleven reporting signatories met the 90% threshold and five of those met the Agreement's standards for 100% of their new sales/purchases. Under the terms of the Voluntary Agreement, the signatory that reported 88% of its devices meeting the standard is developing a remedial plan that will be expected to offset excess energy usage. As technology evolves and consumers continue to seek increased functionality, the Voluntary Agreement will serve as a guiding force to help signatories balance improving both product innovation and energy efficiency.

## APPENDIX A: SMALL NETWORK EQUIPMENT PURCHASED OR SOLD BY VOLUNTARY AGREEMENT SIGNATORIES IN 2016

Appendix A lists the small network equipment reported by the signatories as purchased or sold in 2016. Please note that the same model could have variances in reported power for several reasons, including differences in reported versus measured power, enabling of different product features, and/ or different software deployed on the device by different signatories. Modal power figures in this Appendix are rounded up to the next one-hundredth digit (e.g., 5.126 watts would be rounded up to 5.13 watts).

Vendor reports include only the models that were sold via retail channels. Models sold to Service Providers are reported by the Service Providers.

The Voluntary Agreement establishes the following categories of small network equipment subject to the Agreement:

- **“Broadband Modem”** A simple network device that enables high speed data service with a WAN (Wide Area Network) interface to a service provider wired or optical network, and typically a single LAN (Local Area Network) interface for the customer premise network. The Broadband Modem category does not include devices with integrated router, or IEEE 802.11 (Wi-Fi) wireless access point functionality.
- **“Integrated Access Device” (“IAD”)**. A network device that enables high speed data service with a WAN interface to a service provider wired or optical network and one or more of the following functions on the LAN interface: multiport routing, IEEE 802.11 (Wi-Fi) wireless access point functionality, and/or VoIP.
- **“Local Network Equipment” (“LNE”)**. The following local network devices that do not have a direct interface to a Service Provider wired or optical network:
  - **Wireless Access Point:** A device that typically includes one or more Ethernet interfaces, and that provides IEEE 802.11 (Wi-Fi) wireless network connectivity to multiple clients as its primary function.
  - **Router:** A network device that forwards packets from one network interface to another based on network layer information (typically IP destination address). Devices fitting this definition may provide both wired and wireless network connectivity.
  - **Switch:** A network device that filters and forwards frames based on the Ethernet destination MAC address of each frame as its primary function.
  - **Network Extender:** A device that bridges or extends a local area network beyond its physical limitations using one or more transmission media such as twisted pair, coax, Wi-Fi, or powerline.

Signatory	Brand	Model Number	Base Type	Claimed Allowances	Reported Idle Power (W)	Meets VA Levels
Actiontec	Actiontec	GT784	IAD ADSL2+	Fast Eth LAN (4), WiFi (n) LP, USB 2	6.06	No
Actiontec	Actiontec	R3000	IAD GigE	GigE Backup WAN, GigE LAN (4), WiFi (n) HP, WiFi (ac) HP, WiFi above 2x2 HP (3), 802.11n 256 QAM, USB 2 (2)	10.08	Yes
Actiontec	Actiontec	ECB6000	Basic LNE	GigE LAN, MoCA	2.03	Yes
Actiontec	Actiontec	ECB6200	Basic LNE	GigE LAN, MoCA	2.28	Yes
Actiontec	Actiontec	WCB3000	Advanced LNE	GigE LAN (2), WiFi (n) LP (2), MoCA	7.14	Yes
Actiontec	Actiontec	WCB6200	Advanced LNE	GigE LAN (2), WiFi (n) HP, WiFi (ac) HP, WiFi above 2x2 HP (2), MoCA	8.90	Yes
Actiontec	Actiontec	WEB6000	Advanced LNE	GigE LAN (2), WiFi (n) HP, WiFi (ac) HP, WiFi above 2x2 HP (2)	6.69	Yes
Actiontec	Actiontec	C1000A	IAD VDSL2	GigE LAN (4), WiFi (n) LP, USB 2	9.15	No
Actiontec	Actiontec	T1200H	IAD VDSL2	GigE Backup WAN, GigE LAN (4), WiFi (n) HP, HPNA, USB 2	9.30	No
Actiontec	Actiontec	V1000H	IAD VDSL2	GigE Backup WAN, GigE LAN (4), WiFi (n) LP, HPNA, USB 2	10.88	No
Actiontec	Actiontec	C1900A	IAD VDSL2 (30a)	GigE Backup WAN, VDSL2 (30a) Simul WAN, GigE LAN (4), WiFi (n) HP, USB 2	12.85	Yes
Actiontec	Actiontec	C2000A	IAD VDSL2 (30a)	GigE Backup WAN, VDSL2 (30a) Simul WAN, GigE LAN (4), WiFi (n) HP, HPNA, FXS (2), USB 2	14.90	Yes
Actiontec	Actiontec	F2250	IAD VDSL2 (30a)	VDSL2 (30a) Simul WAN, GigE LAN (4), WiFi (n) HP, USB 2	12.37	Yes
Actiontec	Actiontec	F2300	IAD GigE	GigE Backup WAN, GigE LAN (4), WiFi (n) HP, WiFi (ac) HP, WiFi above 2x2 HP (2), USB 2	9.49	Yes
Actiontec	Actiontec	T2200H	IAD VDSL2 (30a)	GigE Backup WAN, VDSL2 (30a) Simul WAN, GigE LAN (4), WiFi (n) HP, USB 2	13.51	Yes
Actiontec	Actiontec	T3200	IAD VDSL2 (30a)	GigE Backup WAN, VDSL2 (30a) Simul WAN, GigE LAN(4), WiFi (n) HP, WiFi (ac) HP, WiFi above 2x2 HP (3), 802.11n 256 QAM, USB 3	11.02	Yes
Actiontec	Actiontec	T3200M	IAD VDSL2 (30a)	GigE Backup WAN, SFP Backup WAN Present, VDSL2 (30a) Simul WAN, GigE LAN (4), WiFi (n) HP, WiFi (ac) HP, WiFi above 2x2 HP (3), 802.11n 256 QAM, MoCA, USB 3	12.58	Yes
Actiontec	Actiontec	MI424-WR REV I	IAD MoCA	GigE Backup WAN, GigE LAN (4), WiFi (n) LP, MoCA, USB 2 (2)	10.20	Yes
ARRIS	ARRIS	SBX-1000P	Basic LNE	GigE LAN, G.hn	3.70	Yes
ARRIS	ARRIS	SBX-AC1200P	Advanced LNE	GigE LAN, WiFi (n) LP, WiFi (ac) LP, G.hn, PCIe	7.40	Yes



Signatory	Brand	Model Number	Base Type	Claimed Allowances	Reported Idl Power (W)	Meets VA Levels
ARRIS	ARRIS	SBR-AC1200P	Advanced LNE	Fast Eth LAN (4), GigE LAN, WiFi (n) LP, WiFi (ac) LP, G.hn, USB 2, PCIe	9.50	Yes
ARRIS	ARRIS	SBR-AC1900P	Advanced LNE	GigE LAN (5), WiFi (n) LP, WiFi (ac) LP, WiFi above 2x2 LP (2), 802.11n 256 QAM, G.hn, USB 2, USB 3, PCIe (2)	11.90	Yes
ARRIS	ARRIS	SBR-AC3200P	Advanced LNE	GigE LAN (5), WiFi (n) LP, WiFi (ac) LP (2), WiFi above 2x2 LP (3), 802.11n 256 QAM, G.hn, USB 2, USB 3, PCIe (4)	15.00	No
ARRIS	ARRIS	SBG6900-AC	IAD D3	D3 above 4x4 (3), GigE LAN (4), WiFi (n) LP, WiFi (ac) LP, WiFi above 2x2 LP (2), USB (2)	14.10	Yes
ARRIS	ARRIS	SB6190	Basic D3	D3 above 4x4 (7), GigE LAN	8.60	Yes
ARRIS	ARRIS	SBG6782-AC	IAD D3	D3 above 4x4, GigE LAN (4), WiFi (n) LP, WiFi (ac) LP, WiFi above 2x2 LP, MoCA	13.20	Yes
ARRIS	ARRIS	SBG7580-AC	IAD D3	D3 above 4x4 (7), GigE LAN (4), WiFi (n) LP, WiFi (ac) LP, WiFi above 2x2 LP (2), USB 2	14.00	Yes
ARRIS	ARRIS	SBG6580	IAD D3	D3 above 4x4, GigE LAN (4), WiFi (n) LP	11.44	No
ARRIS	ARRIS	SBG6580-2	IAD D3	D3 above 4x4, GigE LAN (4), WiFi (n) LP	7.60	Yes
ARRIS	ARRIS	SB6121	Basic D3	GigE LAN	6.64	No
ARRIS	ARRIS	SB6141	Basic D3	D3 above 4x4, GigE LAN	5.45	Yes
ARRIS	ARRIS	SBG6700-AC	IAD D3	D3 above 4x4, GigE LAN (2), WiFi (n) LP, WiFi (ac) LP, WiFi above 2x2 LP	10.00	Yes
ARRIS	ARRIS	SB6183	Basic D3	D3 above 4x4 (3), GigE LAN	8.45	Yes
ARRIS	ARRIS	SBG6400	IAD D3	D3 above 4x4, GigE LAN (2), WiFi (n) LP, USB 2	8.00	Yes
ARRIS	ARRIS	SBR-AC1750	Advanced LNE	GigE LAN (5), WiFi (n) LP, WiFi (ac) LP, WiFi above 2x2 LP (2), USB 2	5.25	Yes
ARRIS	ARRIS	TM822G	IAD D3	D3 above 4x4, GigE LAN, FXS (2)	5.70	Yes
ARRIS	ARRIS	TG862G/CT	IAD D3	D3 above 4x4, GigE LAN (4), WiFi (n) LP, FXS (2), USB 2	8.40	Yes
ARRIS	ARRIS	TM822G/NA-8	IAD D3	D3 above 4x4, GigE LAN, FXS (2), Battery	5.70	Yes
AT&T	ARRIS	NVG599	IAD VDSL2	GigE Backup WAN, VDSL2 Simul WAN, GigE LAN (4), WiFi (n) LP, WiFi (ac) LP, WiFi above 2x2 LP, HPNA, FXS (2), USB 2, PCIe, WiFi accelerator	18.11	Yes
AT&T	ARRIS	5031NV	IAD VDSL2	GigE Backup WAN, Fast Eth LAN (4), WiFi (n) HP, FXS (2), USB 2	7.90	Yes
AT&T	ARRIS	5268	IAD VDSL2	GigE Backup WAN, VDSL2 Simul WAN, GigE LAN (4), WiFi (n) HP, WiFi (ac) HP, WiFi above 2x2 HP (2), HPNA, FXS (2), USB 2, Battery	16.00	Yes

Signatory	Brand	Model Number	Base Type	Claimed Allowances	Reported IdL Power (W)	Meets VA Levels
Cablevision Systems Corp. d/b/a Optimum	ARRIS	TM1602A	IAD D3	D3 above 4x4 (3), GigE LAN, FXS (2)	9.30	Yes
Cablevision Systems Corp. d/b/a Optimum	ARRIS	TM804G	IAD D3	D3 above 4x4, GigE LAN, FXS (2)	6.30	Yes
Cablevision Systems Corp. d/b/a Optimum	Cisco	DPQ3925	IAD D3	D3 above 4x4, GigE LAN (4), FXS (2), USB 2	11.20	No
Cablevision Systems Corp. d/b/a Optimum	D-Link	DIR868L	Advanced LNE	GigE LAN (5), WiFi (n) LP, WiFi (ac) LP, WiFi above 2x2 LP (2), USB 3, PCIe (2)	9.10	Yes
Cablevision Systems Corp. d/b/a Optimum	Sagemcom	Fast 5260	Advanced LNE	GigE LAN (5), WiFi (n) HP, WiFi (ac) HP, WiFi above 2x2 HP (2), USB 2, PCIe (2)	6.50	Yes
CenturyLink	Actiontec	C1900A	IAD VDSL2	GigE Backup WAN, VDSL2 Simul WAN, GigE LAN (4), WiFi (n) LP, WiFi (n) HP, USB 2	11.64	Yes
CenturyLink	Technicolor	C1100T	IAD VDSL2	GigE Backup WAN, GigE LAN (4), WiFi (n) LP, USB 2	6.44	Yes
CenturyLink	Technicolor	C2100T	IAD VDSL2 (30a)	GigE Backup WAN, VDSL2 Simul WAN, GigE LAN (4), WiFi (ac) LP, WiFi above 2x2 LP (2), WiFi (n) HP, HPNA, FXS (2), USB 2	16.27	Yes
CenturyLink	Zyxel	PK5001Z	IAD ADSL2+	Fast Eth LAN (4), WiFi (n) LP	4.00	Yes
CenturyLink	Zyxel	C1100Z	IAD VDSL2	GigE Backup WAN, GigE LAN (4), WiFi (n) HP, USB 2	7.47	Yes
CenturyLink	Zyxel	C2100Z	IAD VDSL2	GigE Backup WAN, VDSL2 Simul WAN, GigE LAN (4), WiFi (ac) LP, WiFi above 2x2 LP (2), WiFi (n) HP, HPNA, FXS (2), USB 2	15.61	Yes
CenturyLink	Zyxel	GS105i	Basic LNE	GigE LAN (5)	2.18	Yes
Charter	Actiontec	WCB3000N	Advanced LNE	GigE LAN (2), WiFi (n) LP (2), MoCA	8.00	Yes
Charter	ARRIS	DG1670A	IAD D3	D3 above 4x4 (3), GigE LAN (4), WiFi (n) LP, WiFi above 2x2 LP, WiFi (n) HP, WiFi above 2x2 HP, USB 2	14.60	Yes
Charter	ARRIS	SB6183	Basic D3	D3 above 4x4 (3), GigE LAN	8.30	Yes
Charter	ARRIS	TG1672G	IAD D3	D3 above 4x4 (3), GigE LAN (4), WiFi (n) LP, WiFi above 2x2 LP, WiFi (n) HP, WiFi above 2x2 HP, FXS (2), USB 2	15.30	Yes
Charter	ARRIS	TG1682G	IAD D3	D3 above 4x4 (5), GigE LAN (4), WiFi (n) HP, WiFi (ac) HP, WiFi above 2x2 HP (2), FXS (2), USB 2 (2)	16.00	Yes
Charter	ARRIS	TM1602A	IAD D3	D3 above 4x4 (3), GigE LAN, FXS (2)	9.30	Yes
Charter	ARRIS	TM1602AP2	IAD D3	D3 above 4x4 (3), GigE LAN, FXS (2)	9.00	Yes
Charter	ARRIS	TM1602G	IAD D3	D3 above 4x4 (3), GigE LAN, FXS (2)	10.00	Yes
Charter	ARRIS	TM804G	IAD D3	D3 above 4x4, GigE LAN, USB 2 (2)	6.00	Yes
Charter	ARRIS	TM822G	IAD D3	D3 above 4x4, GigE LAN, FXS (2)	6.00	Yes

Signatory	Brand	Model Number	Base Type	Claimed Allowances	Reported Idl Power (W)	Meets VA Levels
Charter	Cisco*	DPC3216	IAD D3	D3 above 4x4 (3), GigE LAN, FXS (2)	9.00	Yes
Charter	Netgear	R6300v2	Advanced LNE	GigE LAN (5), WiFi (n) HP, WiFi (ac) HP, WiFi above 2x2 HP (2), 802.11n 256 QAM, USB 2, USB 3, PCIe (2)	10.70	Yes
Charter	Sagemcom	F@st5260	Advanced LNE	GigE LAN (5), WiFi (n) HP, WiFi (ac) HP, WiFi above 2x2 HP (2), USB 2, PCIe (2)	6.50	Yes
Charter	Technicolor	TC4310	Basic D3	D3 above 4x4 (3), GigE LAN	9.00	Yes
Charter	Technicolor	TC8715D	IAD D3	D3 above 4x4 (3), GigE LAN (4), WiFi (n) HP, WiFi (ac) HP, WiFi above 2x2 HP (2), USB 2	16.00	Yes
Charter	Technicolor	TC8717T	IAD D3	D3 above 4x4 (3), GigE LAN (4), WiFi (n) HP, WiFi (ac) HP, WiFi above 2x2 HP (2), FXS (2), USB 2 (2)	15.50	Yes
Charter	Ubee	DDM354	Basic D3	D3 above 4x4 (3), GigE LAN	9.00	Yes
Charter	Ubee	DDW36C	IAD D3	D3 above 4x4 (3), GigE LAN (4), WiFi (n) HP, WiFi (ac) HP, WiFi above 2x2 HP (2), USB 2	15.00	Yes
Charter	Ubee	DVW32CB	IAD D3	D3 above 4x4 (3), GigE LAN (4), WiFi (n) HP, WiFi (ac) HP, WiFi above 2x2 HP (2), FXS (2), USB 2	13.00	Yes
Comcast	ARRIS	TG1682G (No DECT)	IAD D3	D3 above 4x4 (5), GigE LAN (4), WiFi (n) HP, WiFi (ac) HP, WiFi above 2x2 HP (2), MoCA, FXS (2), USB 2 (2)	20.00	Yes
Comcast	ARRIS	TG1682G P3	IAD D3	D3 above 4x4 (5), GigE LAN (4), WiFi (n) HP, WiFi (ac) HP, WiFi above 2x2 HP (2), MoCA, FXS (2), USB 2 (2)	16.00	Yes
Comcast	Cisco*	DPC3941Tv2	IAD D3	D3 above 4x4 (5), GigE LAN (4), WiFi (n) LP, WiFi (ac) LP, WiFi above 2x2 LP (2), MoCA, FXS (2), USB 2 (2), PCIe (2)	18.00	Yes
Cox	Cisco*	DPQ3212	IAD D3	D3 above 4x4, GigE LAN, FXS (2), USB 2	9.10	No
Cox	Ubee	DVW326	IAD D3	D3 above 4x4, GigE LAN (4), WiFi (n) LP, WiFi above 2x2 LP, FXS (2), USB 2, PCIe	9.30	Yes
Cox	ARRIS	TG2472	IAD D3	D3 above 4x4 (5), GigE LAN (4), WiFi (n) HP, WiFi (ac) HP, WiFi above 2x2 HP (2), FXS (2), USB 2	16.40	Yes
Cox	Cisco*	DPC3010	Basic D3	D3 above 4x4, GigE LAN, USB 2	8.40	No
Cox	ARRIS	SB6182	Basic D3	D3 above 4x4, GigE LAN	6.45	Yes
Cox	ARRIS	SB6183	Basic D3	D3 above 4x4 (3), GigE LAN	8.30	Yes
Cox	Ubee	DDW365	IAD D3	D3 above 4x4, GigE LAN (4), WiFi (n) LP, WiFi above 2x2 LP, USB 2, PCIe	9.60	Yes
Cox	Netgear	CG3000Dv2	IAD D3	D3 above 4x4, GigE LAN (4), WiFi (n) LP, WiFi above 2x2 LP, USB 2 (2), PCIe	9.20	Yes
Cox	Netgear	C6300BD	IAD D3	D3 above 4x4, GigE LAN (4), WiFi (n) HP, WiFi (ac) HP, WiFi above 2x2 HP (2), 802.11n 256 QAM, USB 2, PCIe (2)	13.50	Yes

Signatory	Brand	Model Number	Base Type	Claimed Allowances	Reported Idl Power (W)	Meets VA Levels
Cox	ARRIS	DG2460	IAD D3	D3 above 4x4 (5), GigE LAN (4), WiFi (n) HP, WiFi (ac) HP, WiFi above 2x2 HP (2), USB 2	14.80	Yes
Cox	Technicolor	DPC3848	IAD D3	D3 above 4x4 (5), GigE LAN (4), WiFi (n) LP, WiFi (ac) LP, WiFi above 2x2 LP (2), USB 2	13.10	Yes
Cox	Netgear	R6300v2	Advanced LNE	GigE LAN (5), WiFi (n) HP, WiFi (ac) HP, WiFi above 2x2 HP (2), 802.11n 256 QAM, USB 2, USB 3, PCIe (2)	10.70	Yes
D-Link	D-Link	DCM-301	Basic D3	D3 above 4x4, GigE LAN	5.12	Yes
D-Link	D-Link	DSL-2750B	IAD ADSL2+	Fast Eth LAN (4), WiFi (n) LP (2)	4.78	Yes
D-Link	D-Link	DSL-2750B	IAD ADSL2+	Fast Eth LAN (4), WiFi (n) LP (2)	4.78	Yes
D-Link	D-Link	DIR-510L	Advanced LNE	Fast Eth LAN, WiFi (ac) LP	2.93	Yes
D-Link	D-Link	DIR-605L	Advanced LNE	Fast Eth LAN (5), WiFi (n) HP	0.70	Yes
D-Link	D-Link	DIR-619L-ES	Advanced LNE	Fast Eth LAN (5), WiFi (n) HP (2)	2.23	Yes
D-Link	D-Link	DIR-619L-ES	Advanced LNE	Fast Eth LAN (5), WiFi (n) HP (2)	2.23	Yes
D-Link	D-Link	DIR-655	Advanced LNE	GigE LAN (5), WiFi (n) LP, WiFi (n) HP (2), USB 2	4.18	Yes
D-Link	D-Link	DIR-820L	Advanced LNE	Fast Eth LAN (5), WiFi (n) LP, WiFi (ac) LP	3.47	Yes
D-Link	D-Link	DIR-820L	Advanced LNE	Fast Eth LAN (5), WiFi (n) LP, WiFi (ac) LP	3.47	Yes
D-Link	D-Link	DIR-830L	Advanced LNE	Fast Eth LAN (5), WiFi (n) LP, WiFi (ac) LP	4.05	Yes
D-Link	D-Link	DIR-850L	Advanced LNE	Fast Eth LAN (5), WiFi (n) LP, WiFi (ac) HP	6.22	Yes
D-Link	D-Link	DIR-859	Advanced LNE	GigE LAN (5), WiFi (ac) HP	3.74	Yes
D-Link	D-Link	DIR-859	Advanced LNE	GigE LAN (5), WiFi (ac) HP	3.74	Yes
D-Link	D-Link	DIR-860L	Advanced LNE	GigE LAN (5), WiFi (n) LP, WiFi (ac) HP, USB 3	4.90	Yes
D-Link	D-Link	DIR-866L	Advanced LNE	GigE LAN (5), WiFi (n) HP, WiFi (ac) HP, WiFi above 2x2 HP, 802.11n 256 QAM, USB 2	5.33	Yes
D-Link	D-Link	DIR-868L	Advanced LNE	GigE LAN (5), WiFi (n) HP, WiFi (ac) HP, WiFi above 2x2 HP, 802.11n 256 QAM, USB 3	8.77	Yes
D-Link	D-Link	DIR-868L-CV	Advanced LNE	GigE LAN (5), WiFi (n) HP, WiFi (ac) HP, WiFi above 2x2 HP, 802.11n 256 QAM, USB 3	8.77	Yes
D-Link	D-Link	DIR-880L	Advanced LNE	GigE LAN (5), WiFi (n) HP (2), WiFi (ac) HP (2), WiFi above 2x2 HP, 802.11n 256 QAM	9.10	Yes
D-Link	D-Link	DIR-885L	Advanced LNE	GigE LAN (5), WiFi (n) LP, WiFi (ac) LP, WiFi above 2x2 LP, 802.11n 256 QAM, USB 3, AP>5K DMIPS	9.98	Yes

Signatory	Brand	Model Number	Base Type	Claimed Allowances	Reported Idl Power (W)	Meets VA Levels
D-Link	D-Link	DIR-890L/R	Advanced LNE	GigE LAN (5), WiFi above 2x2 LP (6), WiFi (ac) HP (2), USB 2, USB 3, PCIe (3)	11.72	Yes
D-Link	D-Link	DIR-890L/R	Advanced LNE	GigE LAN (5), WiFi (n) HP, WiFi (ac) HP, WiFi above 2x2 HP (6), 802.11n 256 QAM, USB 2, USB 3, PCIe (3), AP>5K DMIPS	11.72	Yes
D-Link	D-Link	DIR-895L	Advanced LNE	GigE LAN (5), WiFi (n) HP, WiFi (ac) HP (2), WiFi above 2x2 HP (6), 802.11n 256 QAM, USB 2, USB 3, PCIe (3), AP>5K DMIPS	13.60	Yes
D-Link	D-Link	DSR-150	Advanced LNE	Fast Eth LAN (9), USB 2	5.48	Yes
D-Link	D-Link	DSR-150	Advanced LNE	Fast Eth LAN (9), USB 2	5.48	Yes
D-Link	D-Link	DSR-250	Advanced LNE	GigE LAN (9), USB 2	5.60	Yes
D-Link	D-Link	DSR-500	Advanced LNE	GigE LAN (6), USB 2	4.32	Yes
D-Link	D-Link	GO-RT-N300	Advanced LNE	Fast Eth LAN (5), WiFi (n) LP	2.60	Yes
D-Link	D-Link	DAP-1120	Basic LNE	WiFi (n) LP (2)	0.96	Yes
D-Link	D-Link	DAP-1320	Basic LNE	WiFi (n) LP (2)	1.07	Yes
D-Link	D-Link	DaP-1330	Basic LNE	Fast Eth LAN, WiFi (n) LP (2)	1.58	Yes
D-Link	D-Link	DAP-1620	Basic LNE	GigE LAN, WiFi (ac) HP (2)	3.12	Yes
D-Link	D-Link	DAP-1620	Basic LNE	GigE LAN, WiFi (ac) HP (2)	3.12	Yes
D-Link	D-Link	DAP-1650	Basic LNE	GigE LAN (4), WiFi (ac) LP (2), USB 2	5.45	Yes
D-Link	D-Link	DAP-1720	Basic LNE	GigE LAN, WiFi (n) LP, WiFi (ac) LP, WiFi above 2x2 LP, AP>5K DMIPS	6.65	Yes
D-Link	D-Link	DAP-2553	Basic LNE	GigE LAN, WiFi (n) LP	2.39	Yes
D-Link	D-Link	DAP-2690	Basic LNE	GigE LAN, WiFi (n) HP (3), USB 2	4.72	Yes
D-Link	D-Link	DAP-3320	Basic LNE	Fast Eth LAN, WiFi (n) HP (2)	2.88	Yes
D-Link	D-Link	DCH-G021	Advanced LNE	Fast Eth LAN, WiFi (n) LP, USB 2, Bluetooth, ZigBee, Z-Wave	2.75	Yes
D-Link	D-Link	DES-1005E	Basic LNE	Fast Eth LAN (5)	1.69	Yes
D-Link	D-Link	DES-1005E	Basic LNE	Fast Eth LAN (5)	1.69	Yes
D-Link	D-Link	DES-1005P	Basic LNE	Fast Eth LAN (5)	1.37	Yes
D-Link	D-Link	DES-1008E	Basic LNE	Fast Eth LAN (8)	1.46	Yes
D-Link	D-Link	DES-1008PA	Basic LNE	Fast Eth LAN (8)	2.36	Yes

Signatory	Brand	Model Number	Base Type	Claimed Allowances	Reported Idl Power (W)	Meets VA Levels
D-Link	D-Link	DES-1008PA	Basic LNE	Fast Eth LAN (8)	2.36	Yes
D-Link	D-Link	DES-105	Basic LNE	Fast Eth LAN (5)	1.53	Yes
D-Link	D-Link	DES-108	Basic LNE	Fast Eth LAN (8)	2.28	Yes
D-Link	D-Link	DGS-1005	Basic LNE	GigE LAN (5)	0.91	Yes
D-Link	D-Link	DGS-1005G	Basic LNE	GigE LAN (5)	0.77	Yes
D-Link	D-Link	DGS-1008G	Basic LNE	GigE LAN (8)	1.14	Yes
D-Link	D-Link	DGS-1008G	Basic LNE	GigE LAN (8)	1.14	Yes
D-Link	D-Link	DGS-1008P	Basic LNE	GigE LAN (8)	2.73	Yes
D-Link	D-Link	DGS-108	Basic LNE	GigE LAN (8)	1.90	Yes
D-Link	D-Link	DWL-3600AP	Basic LNE	GigE LAN, WiFi (n) HP, WiFi above 2x2 HP (2), PCIe, AP>5K DMIPS	5.41	Yes
D-Link	D-Link	DWL-6600AP	Basic LNE	GigE LAN, WiFi (n) HP, PCIe	5.79	No
D-Link	D-Link	DWL-8610AP	Basic LNE	GigE LAN (2), WiFi (n) LP, WiFi (ac) LP, WiFi above 2x2 LP (3), PCIe (2), AP>5K DMIPS	6.94	Yes
D-Link	D-Link	GO-SW-5E	Basic LNE	Fast Eth LAN (5)	1.46	Yes
D-Link	D-Link	GO-SW-5G	Basic LNE	GigE LAN (5)	0.91	Yes
D-Link	D-Link	GO-SW-8G	Basic LNE	GigE LAN (8)	1.18	Yes
D-Link	D-Link	GO-SW-8G	Basic LNE	GigE LAN (8)	1.18	Yes
Netgear	Netgear	DM111PSP-100NAS	Basic ADSL2+	Fast Eth LAN	4.28	No
Netgear	Netgear	CM400-1AZNAS	Basic D3	D3 above 4x4, GigE LAN	5.30	Yes
Netgear	Netgear	CM400-1T8NAS	Basic D3	D3 above 4x4, GigE LAN	5.30	Yes
Netgear	Netgear	CM500-100NAS	Basic D3	D3 above 4x4 (3), GigE LAN	8.22	Yes
Netgear	Netgear	CM600-100NAS	Basic D3	D3 above 4x4 (5), GigE LAN	10.15	Yes
Netgear	Netgear	CM1000-100NAS	Basic D3	D3 above 4x4 (7), GigE LAN	9.04	Yes
Netgear	Netgear	CM700-100NAS	Basic D3	D3 above 4x4 (7), GigE LAN	8.73	Yes
Netgear	Netgear	DM200-100NAS	Basic VDSL2	VDSL2 Simul WAN, Fast Eth LAN	5.62	Yes
Netgear	Netgear	C3000-1T8NAS	IAD D3	D3 above 4x4, GigE LAN (2), WiFi (n) LP, WiFi above 2x2 LP, USB 2	9.25	Yes

Signatory	Brand	Model Number	Base Type	Claimed Allowances	Reported Idl Power (W)	Meets VA Levels
Netgear	Netgear	C3700-1T8NAS	IAD D3	D3 above 4x4, GigE LAN (2), WiFi (n) LP (2), WiFi above 2x2 LP (2), USB 2	10.51	Yes
Netgear	Netgear	C6250-100NAS	IAD D3	D3 above 4x4 (3), GigE LAN (2), WiFi (n) LP, WiFi (ac) LP, WiFi above 2x2 LP (2), USB 2	14.60	Yes
Netgear	Netgear	C7000-1T8NAS	IAD D3	D3 above 4x4 (3), GigE LAN (4), WiFi (ac) LP, WiFi above 2x2 LP (2), 802.11n 256 QAM, USB 2	13.27	Yes
Netgear	Netgear	N450-100NAS	IAD D3	D3 above 4x4, GigE LAN (4), WiFi (n) LP, WiFi above 2x2 LP, USB 2, PCIe (2)	7.84	Yes
Netgear	Netgear	C6300-1T8NAS	IAD D3	D3 above 4x4 (3), GigE LAN (4), WiFi (n) LP, WiFi (ac) LP, WiFi above 2x2 LP (2), 802.11n 256 QAM, USB 2	13.27	Yes
Netgear	Netgear	D6400-100NAS	IAD VDSL2	GigE Backup WAN, GigE LAN (5), WiFi (n) LP, WiFi (ac) HP, WiFi above 2x2 HP, USB 2 (2)	9.22	Yes
Netgear	Netgear	D7000-100NAS	IAD VDSL2	GigE Backup WAN, GigE LAN (4), WiFi (n) HP, WiFi (ac) HP, WiFi above 2x2 HP, 802.11n 256 QAM, USB 3 (2)	8.82	Yes
Netgear	Netgear	R8500-100NAS	Advanced LNE	GigE LAN (7), WiFi (n) HP, WiFi (ac) HP (2), WiFi above 2x2 HP (6), 802.11n 256 QAM, USB 2, USB 3, PCIe (3)	18.45	No
Netgear	Netgear	R9000-100NAS	Advanced LNE	GigE Backup WAN, GigE LAN (7), WiFi (ac) LP, WiFi above 2x2 LP (2), WiFi (ac) HP, WiFi above 2x2 HP (2), USB 3 (2), Bluetooth	15.30	No
Netgear	Netgear	PLW1010-100NAS	Advanced LNE	GigE LAN, WiFi (n) LP, G.hn	4.73	Yes
Netgear	Netgear	PL1200-100PAS	Advanced LNE	GigE LAN, WiFi (n) LP, WiFi (ac) LP, 802.11n 256 QAM, G.hn	6.83	Yes
Netgear	Netgear	PL1000-100PAS	Advanced LNE	GigE LAN, G.hn	2.19	Yes
Netgear	Netgear	PL1010-100PAS	Advanced LNE	GigE LAN, G.hn	2.19	Yes
Netgear	Netgear	PLP1000-100PAS	Advanced LNE	GigE LAN, G.hn	2.14	Yes
Netgear	Netgear	R6250-100NAS	Advanced LNE	GigE LAN (5), WiFi (n) HP, WiFi (ac) HP, WiFi above 2x2 HP, USB 2, PCIe (2)	9.40	Yes
Netgear	Netgear	WNR3500L-100NAS	Advanced LNE	GigE LAN (5), WiFi (n) LP, USB 3	5.84	Yes
Netgear	Netgear	R6900-100NAS	Advanced LNE	GigE LAN (5), WiFi (n) HP, WiFi (ac) HP, WiFi above 2x2 HP (2), 802.11n 256 QAM, USB 2, USB 3, PCIe (2)	10.22	Yes
Netgear	Netgear	R7000-100PAS	Advanced LNE	GigE LAN (5), WiFi (n) HP, WiFi (ac) HP, WiFi above 2x2 HP (2), 802.11n 256 QAM, USB 2, USB 3, PCIe (2)	10.07	Yes
Netgear	Netgear	R6400-100NAS	Advanced LNE	GigE LAN (5), WiFi (n) HP, WiFi (ac) HP, WiFi above 2x2 HP (2), USB 2, USB 3, PCIe (2)	9.41	Yes
Netgear	Netgear	R6300-100PAS	Advanced LNE	GigE LAN (5), WiFi (n) HP, WiFi (ac) HP, WiFi above 2x2 HP (2), 802.11n 256 QAM, USB 2, USB 3, PCIe (2)	9.83	Yes

Signatory	Brand	Model Number	Base Type	Claimed Allowances	Reported Idle Power (W)	Meets VA Levels
Netgear	Netgear	PLW1000-100NAS	Advanced LNE	GigE LAN, WiFi (n) LP, WiFi (ac) LP, G.hn	4.73	Yes
Netgear	Netgear	R6300-2CPNAS	Advanced LNE	GigE LAN (4), WiFi (n) HP, WiFi (ac) HP, WiFi above 2x2 HP (2), 802.11n 256 QAM, USB 2, USB 3, PCIe (2)	9.83	Yes
Netgear	Netgear	R7900-100NAS	Advanced LNE	GigE LAN (5), WiFi (n) HP, WiFi (ac) HP (2), WiFi above 2x2 HP (3), 802.11n 256 QAM, USB 3, PCIe (3)	12.81	Yes
Netgear	Netgear	R7000P-100NAS	Advanced LNE	GigE LAN (5), WiFi (n) HP, WiFi (ac) HP, WiFi above 2x2 HP (2), 802.11n 256 QAM, USB 2, USB 3	9.30	Yes
Netgear	Netgear	R8000-100NAS	Advanced LNE	GigE LAN (5), WiFi (n) HP, WiFi (ac) HP (2), WiFi above 2x2 HP (3), 802.11n 256 QAM, USB 2, USB 3, PCIe (3)	12.70	Yes
Netgear	Netgear	R8000-100PAS	Advanced LNE	GigE LAN (5), WiFi (n) HP, WiFi (ac) HP (2), WiFi above 2x2 HP (3), 802.11n 256 QAM, USB 2, USB 3, PCIe (3)	12.70	Yes
Netgear	Netgear	R7300DST-100NAS	Advanced LNE	GigE LAN (5), WiFi (n) HP, WiFi (ac) HP, WiFi above 2x2 HP (2), 802.11n 256 QAM, USB 2, USB 3, PCIe (2)	9.58	Yes
Netgear	Netgear	EX7000-100NAS	Advanced LNE	GigE LAN (5), WiFi (n) HP, WiFi (ac) HP, WiFi above 2x2 HP (2), 802.11n 256 QAM, USB 3, PCIe (2)	9.30	Yes
Netgear	Netgear	R6700-100NAS	Advanced LNE	GigE LAN (5), WiFi (n) LP, WiFi (ac) LP	6.34	Yes
Netgear	Netgear	R7800-100NAS	Advanced LNE	GigE LAN (5), WiFi (ac) LP, WiFi above 2x2 LP (3), WiFi (n) HP, WiFi above 2x2 HP, 802.11n 256 QAM, USB 3 (2), SATA, PCIe (2)	9.25	Yes
Netgear	Netgear	R6220-100NAS	Advanced LNE	GigE LAN (5), WiFi (n) LP, WiFi (ac) LP, USB 2	5.20	Yes
Netgear	Netgear	R6220-200NAS	Advanced LNE	GigE LAN (5), WiFi (n) LP, WiFi (ac) LP, USB 2	5.20	Yes
Netgear	Netgear	PLP1200-100PAS	Advanced LNE	GigE LAN, WiFi (n) LP, WiFi (ac) LP, 802.11n 256 QAM, G.hn	3.00	Yes
Netgear	Netgear	RBR50-100NAS	Advanced LNE	GigE LAN (4), WiFi (ac) LP, WiFi above 2x2 LP (3), WiFi (n) HP, WiFi above 2x2 HP, 802.11n 256 QAM, USB 2, Bluetooth, PCIe	7.33	Yes
Netgear	Netgear	RBS50-100NAS	Advanced LNE	GigE LAN (4), WiFi (ac) LP, WiFi above 2x2 LP (3), WiFi (n) HP, WiFi above 2x2 HP, 802.11n 256 QAM, USB 2, Bluetooth, PCIe	7.33	Yes
Netgear	Netgear	WNDR4500-100NAS	Advanced LNE	GigE LAN (5), WiFi (n) LP (2), USB 2 (2), PCIe	4.05	Yes
Netgear	Netgear	WNDR4500-100PAS	Advanced LNE	GigE LAN (5), WiFi (n) LP (2), USB 2 (2), PCIe	4.05	Yes
Netgear	Netgear	WNDR4300-100NAS	Advanced LNE	GigE LAN (5), WiFi (n) LP (2), USB 2, PCIe	3.73	Yes
Netgear	Netgear	R7500-200NAS	Advanced LNE	GigE LAN (5), WiFi (ac) LP, WiFi above 2x2 LP (2), WiFi (n) HP, WiFi above 2x2 HP, 802.11n 256 QAM, USB 3 (2), SATA, PCIe (2)	7.18	Yes



Signatory	Brand	Model Number	Base Type	Claimed Allowances	Reported Idl Power (W)	Meets VA Levels
Netgear	Netgear	EX6200-100NAS	Advanced LNE	GigE LAN (5), WiFi (n) LP, WiFi (ac) LP, WiFi above 2x2 HP, 802.11n 256 QAM, USB 3	5.64	Yes
Netgear	Netgear	EX6150-100NAS	Advanced LNE	GigE LAN, WiFi (n) LP, WiFi (ac) LP, WiFi above 2x2 HP, 802.11n 256 QAM	4.20	Yes
Netgear	Netgear	EX6100-100NAS	Advanced LNE	GigE LAN, WiFi (n) LP, WiFi (ac) LP, WiFi above 2x2 HP, 802.11n 256 QAM	4.03	Yes
Netgear	Netgear	EX6400-100NAS	Advanced LNE	GigE LAN, Wifi (n) LP, WiFi (ac) LP, WiFi above 2x2 LP (3), PCIe	3.62	Yes
Netgear	Netgear	EX3700-100NAS	Advanced LNE	GigE LAN, WiFi (n) LP, WiFi (ac) LP, PCIe (2)	2.85	Yes
Netgear	Netgear	EX6120-100NAS	Advanced LNE	GigE LAN, WiFi (n) LP, WiFi (ac) LP, PCIe (2)	2.85	Yes
Netgear	Netgear	EX7300-100NAS	Advanced LNE	GigE LAN, WiFi (n) LP (4), WiFi (ac) LP (4), WiFi above 2x2 LP (4)	12.90	Yes
Netgear	Netgear	EX3800-100NAS	Advanced LNE	GigE LAN, WiFi (n) LP, WiFi (ac) LP, 802.11n 256 QAM, PCIe (2)	2.80	Yes
Netgear	Netgear	R6050-100PAS	Advanced LNE	GigE LAN (5), WiFi (n) LP (2), WiFi (ac) HP, USB 2	3.67	Yes
Netgear	Netgear	R8300-100NAS	Advanced LNE	GigE LAN (7), WiFi (n) HP, WiFi (ac) HP (2), WiFi above 2x2 HP (6), 802.11n 256 QAM, USB 3	8.13	Yes
Netgear	Netgear	WNDR3400-100NAS	Basic LNE	Fast Eth LAN (4), WiFi (n) LP (2), USB 2, PCIe (2)	5.29	Yes
Netgear	Netgear	WN2500RP-100NAS	Basic LNE	Fast Eth LAN (4), WiFi (n) LP (2), PCIe (2)	5.07	Yes
Netgear	Netgear	WN2500RP-100PAS	Basic LNE	Fast Eth LAN (4), WiFi (n) LP (2), PCIe (2)	5.07	Yes
Netgear	Netgear	XAVB5201-100PAS	Basic LNE	Fast Eth LAN, WiFi (n) HP, G.hn	3.26	Yes
Netgear	Netgear	XWNB5221-100PAS	Basic LNE	Fast Eth LAN, WiFi (n) HP, G.hn	3.26	Yes
Netgear	Netgear	WNCE3001-100NAS	Basic LNE	Fast Eth LAN, WiFi (n) LP	1.91	Yes
Netgear	Netgear	WNR2000-100NAS	Basic LNE	Fast Eth LAN (4), WiFi (n) LP	2.21	Yes
Netgear	Netgear	WNR2000H-511NAS	Basic LNE	Fast Eth LAN (4), WiFi (n) LP	2.21	Yes
Netgear	Netgear	WN3000RP-100NAS	Basic LNE	Fast Eth LAN, WiFi (n) HP	1.66	Yes
Netgear	Netgear	EX2700-100PAS	Basic LNE	Fast Eth LAN, WiFi (n) HP	1.64	Yes
Netgear	Netgear	EX6200-100PAS	Advanced LNE	GigE LAN (5), WiFi (n) LP, WiFi (ac) LP, WiFi above 2x2 HP, 802.11n 256 QAM, USB 3	5.64	Yes
Netgear	Netgear	FS205-100PAS	Basic LNE	Fast Eth LAN (5)	1.15	Yes
Netgear	Netgear	PR2000-100NAS	Basic LNE	Fast Eth LAN (2), WiFi (n) HP, USB 2	1.71	Yes

Signatory	Brand	Model Number	Base Type	Claimed Allowances	Reported Idl Power (W)	Meets VA Levels
Netgear	Netgear	GS305-100PAS	Basic LNE	GigE LAN (5)	1.23	Yes
Netgear	Netgear	GS205-100PAS	Basic LNE	GigE LAN (5)	1.16	Yes
Netgear	Netgear	GS605NA	Basic LNE	GigE LAN (5)	1.14	Yes
Netgear	Netgear	R6100-100NAS	Basic LNE	Fast Eth LAN (5), WiFi (n) LP, WiFi (ac) LP, USB 2, PCIe	3.70	Yes
Netgear	Netgear	R6100-100PAS	Basic LNE	Fast Eth LAN (5), WiFi (n) LP, WiFi (ac) LP, USB 2, PCIe	3.70	Yes
Netgear	Netgear	GS308-100PAS	Basic LNE	GigE LAN (8)	1.34	Yes
Netgear	Netgear	GS208-100PAS	Basic LNE	GigE LAN (8)	1.33	Yes
Netgear	Netgear	GS608NA	Basic LNE	GigE LAN (8)	1.33	Yes
Netgear	Netgear	WNR2020-200PAS	Basic LNE	Fast Eth LAN (5), WiFi (n) LP (2)	1.60	Yes
Netgear	Netgear	WNR1000-100NAS	Basic LNE	Fast Eth LAN (5), WiFi (n) LP	1.60	Yes
Verizon	Actiontec	GT784WNV	IAD ADSL2+	Fast Eth LAN (4), WiFi (n) LP, USB 2	6.09	No
Verizon	D-Link	DSL-2750B	IAD ADSL2+	Fast Eth LAN (4), WiFi (n) LP, USB 2	5.05	Yes
Verizon	D-Link	DGS-1005G	Basic LNE	GigE LAN (5)	1.56	Yes
Verizon	Actiontec	WCB6200Q	Basic LNE	GigE LAN (2), WiFi (n) HP, WiFi (ac) HP, WiFi above 2x2 HP (2), MoCA	9.21	Yes
Verizon	Verizon	FiOS-G1100	IAD MoCA	GigE Backup WAN, GigE LAN (4), WiFi (n) HP, WiFi (ac) HP, WiFi above 2x2 HP (2), MoCA, USB 2 (2), Z-wave	10.43	Yes

\*Technicolor acquired the SNE business of Cisco in late 2015; accordingly products delivered with this model number in 2016 may be branded Cisco or Technicolor.

Table 3 describes feature allowances outlined in the Voluntary Agreement.

**Table 3: Voluntary Agreement Allowance Descriptions**

Description	Descriptor	Allowance
<b>Base Allowance: IAD Devices (by WAN interface) (watts)</b>		
ADSL2plus	IAD ADSL2+	3.9
VDSL2 (8, 12a, 17a, but not 30a)	IAD VDSL2	4.7
VDSL2 (all above profiles including 30a)	IAD VDSL2 (30a)	6.2
DOCSIS 3.0 basic configuration (4x4)	IAD D3	6.2
MoCA 1.1/2.0	IAD MoCA	5.7
Gigabit Ethernet	IAD GigE	4.0
SFP with 1000BaseLX/SX	IAD SFP 1000BaseLX/SX	4.0
SFP with GPON	IAD SFP GPON	5.0
<b>Base Allowance: Broadband Modems (by WAN Interface) (watts)</b>		
ADSL2plus	Basic ADSL2+	2.4
VDSL2 (8, 12a, 17a, but not 30a)	Basic VDSL2	3.2
VDSL2 (all above profiles including 30a)	Basic VDSL2 (30a)	4.7
DOCSIS 3.0 basic configuration (4x4)	Basic D3	4.7
G.fast	G.fast	4.2
<b>Base Allowance: LNE (watts)</b>		
LNE other than Advanced LNE	Basic LNE	2.0
Advanced LNE	Advanced LNE	3.75
<b>Adders for Additional Backup WAN Interface</b>		
Gigabit Ethernet WAN	GigE Backup WAN	0.7
SFP Not Present	SFP Backup WAN Not Present	0.7
SFP Present (1000BaseLX/SX or GPON)	SFP Backup WAN Present	2.0
<b>Adders for Simultaneous Additional WAN Interface</b>		
VDSL2 (8, 12a, 17a, but not 30a)	VDSL2 Simul WAN	3.2
VDSL (profile 30a)	VDSL2 (30a) Simul WAN	4.7
DOCSIS 3.0 additional power allowance for each additional 4 downstream channels	D3 above 4x4	1.5
<b>Adders for LAN interfaces and Additional Functionality</b>		
1 Fast Ethernet port	Fast E LAN	0.2

**Table 4: Voluntary Agreement Allowance Descriptions (cont.)**

Description	Descriptor	Allowance
1 Gigabit Ethernet port	GigE LAN	0.25
Wi-Fi IEEE 802.11n radio at 2.4 GHz or at 5.0 GHz with a conducted output power less than 200 mW per chain (up to 2x2, i.e. 400 mW)	Wi-Fi (n) LP	1.0
Wi-Fi, IEEE 802.11ac radio at 5 GHz with a conducted output power less than 200 mW per chain (up to 2x2, i.e. 400 mW)	Wi-Fi (ac) LP	2.1
Additional allowance per RF chain above a 2x2 MIMO configuration (e.g., for 3x3 and 4x4) with a conducted output power less than 200 mW per chain	Wi-Fi above 2x2 LP	0.3
Wi-Fi IEEE 802.11n radio at 2.4 GHz or at 5.0 GHz with a conducted output power greater than or equal to 200 mW per chain (up to 2x2, i.e. 400 mW)	Wi-Fi (n) HP	1.2
Wi-Fi, IEEE 802.11ac radio at 5 GHz with a conducted output power greater than or equal to 200 mW per chain (up to 2x2, i.e. 400 mW)	Wi-Fi (ac) HP	2.5
Additional allowance per RF chain above a 2x2 MIMO configuration (e.g., for 3x3 and 4x4) with a conducted output power greater than 200 mW per chain	Wi-Fi above 2x2 HP	0.4
Wi-Fi IEEE 802.11n at 2.4GHz supporting 256-QAM	802.11n 256 QAM	0.5
HPNA	HPNA	1.5
G.hn	G.hn	2.0
MoCA 1.1/2.0	MoCA	2.5
FXS	FXS	0.3
DECT	DECT	0.5
USB 2.0 - no load connected	USB 2	0.1
USB 3.0 - no load connected	USB 3	0.2
SATA - no load connected	SATA	0.3
Built-in back-up battery	BATTERY	0.4
Bluetooth	Bluetooth	0.1
ZigBee	ZigBee	0.1
Z-wave	Z-wave	0.1
PCIe Interface (Connected)	PCIe	0.2
Application Processor > 5K DMIPS	AP>5K DMIPS	1.0

## APPENDIX B: CONSUMER SMALL NETWORK EQUIPMENT ENERGY EFFICIENCY INFORMATION

Small network equipment energy information for consumers is available at [www.energy-efficiency.us](http://www.energy-efficiency.us), and for each service provider and retail vendor at the links below.

Signatory	Consumer information Location	Additional Information
<b>Service Providers</b>		
<b>Cablevision Systems Corp. d/b/a Optimum</b>	<a href="http://energy.cablelabs.com/cablevision-sne/">http://energy.cablelabs.com/cablevision-sne/</a>	
<b>AT&amp;T</b>	<a href="https://www.att.com/media/att/2016/support/pdf/att_small_network_equipment.pdf">https://www.att.com/media/att/2016/support/pdf/att_small_network_equipment.pdf</a>	
<b>Bright House Networks (Spectrum)</b>	<a href="http://energy.cablelabs.com/bright-house-networks-sne/">http://energy.cablelabs.com/bright-house-networks-sne/</a>	
<b>CenturyLink</b>	<a href="http://internethelp.centurylink.com/internethelp/modem-energy-efficiency.html">http://internethelp.centurylink.com/internethelp/modem-energy-efficiency.html</a>	
<b>Charter Communications (Spectrum)</b>	<a href="http://energy.cablelabs.com/charter-sne/">http://energy.cablelabs.com/charter-sne/</a>	
<b>Comcast</b>	<a href="http://energy.cablelabs.com/comcast-sne/">http://energy.cablelabs.com/comcast-sne/</a>	
<b>Cox Communications</b>	<a href="http://energy.cablelabs.com/cox-sne/">http://energy.cablelabs.com/cox-sne/</a>	
<b>Time Warner Cable (Spectrum)</b>	<a href="http://energy.cablelabs.com/time-warner-cable-sne/">http://energy.cablelabs.com/time-warner-cable-sne/</a>	
<b>Verizon</b>	<a href="https://www.verizon.com/Support/Residential/Tv/FiosTv/Receivers/User+Guides/User+Guides.htm#sne">https://www.verizon.com/Support/Residential/Tv/FiosTv/Receivers/User+Guides/User+Guides.htm#sne</a>	Scroll down to "SNE Energy Information"
<b>Vendors</b>		
<b>Actiontec Electronics</b>	<a href="https://actiontecsupport.zendesk.com/hc/en-us/articles/115000617706-Actiontec-Broadband-Equipment-Energy-Information">https://actiontecsupport.zendesk.com/hc/en-us/articles/115000617706-Actiontec-Broadband-Equipment-Energy-Information</a>	
<b>Arris</b>	<a href="http://ir.arris.com/phoenix.zhtml?c=87823&amp;p=irol-govresponsibility">http://ir.arris.com/phoenix.zhtml?c=87823&amp;p=irol-govresponsibility</a>	Scroll down to "Sustainability" header and click "Arris Small Network Equipment (SNE) Energy Efficiency" link
<b>D-Link Systems</b>	<a href="ftp://ftp2.dlink.com/PRODUCTS/ENERGY_REPORT/D-LINK_PRODUCTS_ENERGYTEST_RESULTS_08022017_1.0_EN.PDF">ftp://ftp2.dlink.com/PRODUCTS/ENERGY_REPORT/D-LINK_PRODUCTS_ENERGYTEST_RESULTS_08022017_1.0_EN.PDF</a>	

Signatory	Consumer information Location	Additional Information
<b>EchoStar</b>	No Retail Products	
<b>Netgear</b>	<a href="http://www.netgear.com/images/pdf/about/NETGEAR_Public_SNE_Energy_Information.pdf">http://www.netgear.com/images/pdf/about/NETGEAR_Public_SNE_Energy_Information.pdf</a>	
<b>Technicolor</b>	No Retail Products	
<b>Ubee Interactive</b>	No Retail Products	



# 2016 Annual Report Audit Results

In 2015, 17 residential broadband Internet service providers and manufacturers of small network equipment, such as modems and routers used by consumers to access such services, signed the Voluntary Agreement for Ongoing Improvement to the Energy Efficiency of Small Network Equipment.

The Voluntary Agreement requires the service provider and retail vendor signatories to submit annual procurement and sales data to an independent administrator, who collects and analyzes the data, then publishes the findings in an Annual Report. Data from the individual signatories is aggregated for publication in the Annual Report to protect this highly confidential information. To verify the accuracy of the reported data, the Voluntary Agreement requires a random audit of one commercial signatory each year. In accordance with the confidentiality requirements of the Voluntary Agreement, the name of the audited party is not published.

D+R International conducted an audit of the 2016 report data provided in 2017, which was used to develop the findings for the 2016 Annual Report. D+R randomly selected the party by creating an Excel spreadsheet and using the “random” function.

D+R requested raw data from the selected party to verify the data submitted. D+R reviewed the submitted data, which included invoice data and specification sheets.

D+R, as the Independent Administrator, has determined that the data submitted by the signatory for the audit is consistent with the annual report data submitted by that party.

September 5, 2017

