D+R International

2018 Annual Report

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

Prepared on behalf of the
Steering Committee by:
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EXECUTIVE SUMMARY

In 2015, the largest U.S. 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 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 (SNE) while promoting rapid innovation and timely introduction of new and improved features. The service provider signatories served 87.2 million residential U.S. Internet subscribers at the end of 2018, accounting for 89.2% of the market.

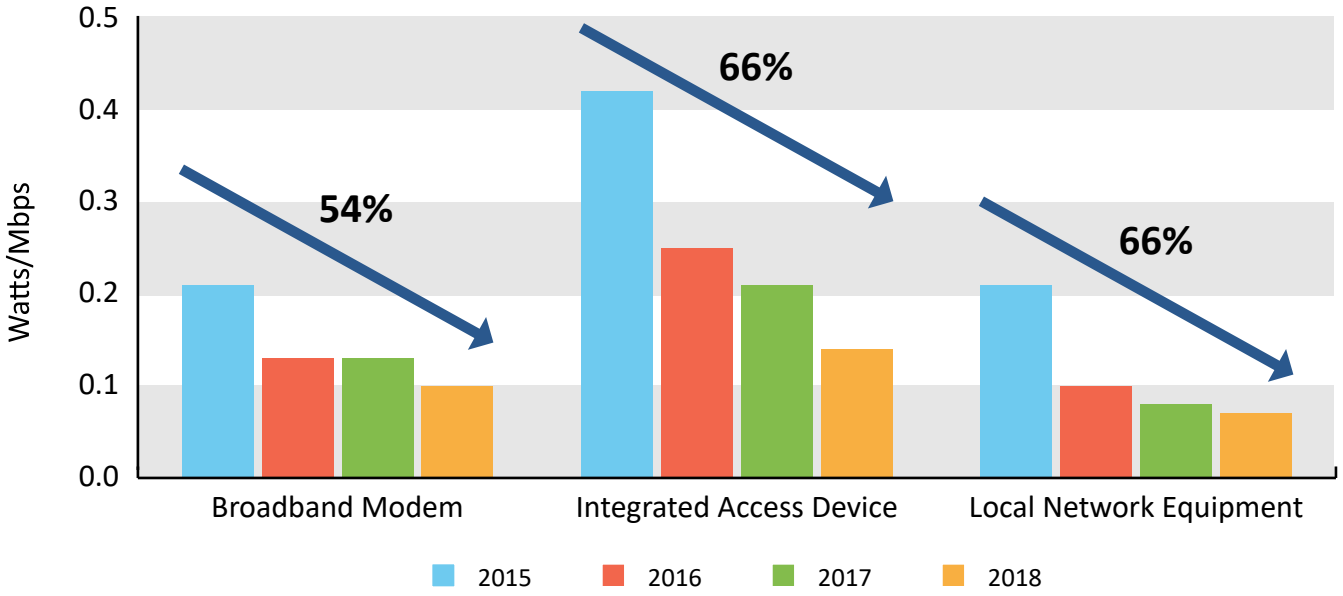
One of the requirements of the Voluntary Agreement is the publication of an annual report that summarizes developments for the previous calendar year. This fourth annual report has been prepared by the Independent Administrator and Auditor, D+R International, Ltd. (D+R).

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 each year beginning in 2016 will meet the energy efficiency levels established under the Voluntary Agreement. Overall, in 2018, 99.6% of small network equipment purchased or sold by the signatories in 2018 met these levels, an increase from the 99.2% reported for 2017, and all of the signatories met the 90% commitment individually. These findings are 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.

The signatories' improvement in 2018 compared to 2017 is significant in light of consumer demands for faster broadband services and improved Wi-Fi signal strength and capacity for more devices at higher speeds within the home. Average consumer broadband speeds have tripled during the short life of the Voluntary Agreement, and support for these speeds requires more energy for processing, memory and other functions. Moreover, new SNE must be designed to support the even greater demands expected in the future over the expected lifespan of devices. Notwithstanding these additional energy demands, the average weighted power of reported new SNE has not significantly increased since 2015, and in 2018 the signatories increased the percentage of devices meeting the target energy levels of the Voluntary Agreement in every category.

While the SNE models reported in 2018 on average used slightly more energy than the models reported in 2017 in order to support these greater functionalities, this report finds that the signatories are delivering these more advanced functionalities more efficiently. The average energy usage relative to broadband speed delivered once again decreased from 2017 to 2018, as it has each year under the Voluntary Agreement as shown in Figure 1.

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



These figures were calculated by dividing the average idle power of each equipment type as verified by D+R in this report by the average fixed broadband speed for that year reported by Ookla. In 2018, D+R transitioned its source of broadband speed data from Akamai to Ookla due to the discontinuation of Akamai's reporting of broadband speed data. This report used Ookla data for all years in order to yield a consistent measurement in the trend of the reduction of energy relative to broadband speed. This change in the source of broadband speed data results in different 2015-2017 ratios from the previous annual reports, but the important measurement is not the nominal ratios but the year-to-year change measured against a consistent standard.

The signatories' ability to support higher-speed services without a significant overall increase in power consumption demonstrates that their SNE devices are delivering services more efficiently and are thereby accomplishing the core objectives of the Voluntary Agreement.

This trend of greater efficiency in the delivery of increasingly robust broadband services and functionalities is expected to continue as the signatories continue to work toward meeting the more rigorous Tier 2 energy efficiency levels in 2020. The fact that more than 90% of devices met Tier 2 levels in 2018 does not mean that challenges and work do not lie ahead. To meet these levels in 2020 and beyond, the signatories will need to offer devices with greater functionality than those offered today while still meeting the commitments of the Voluntary Agreement. Consumers and other stakeholders will be able to monitor the parties' progress at www.energy-efficiency.us, which includes links to energy efficiency information for small network equipment purchased or sold at retail since January 1, 2015, as well as all previously published annual reports.

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 Voluntary 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. The signatories are committed to meet even more strict Tier 2 energy efficiency levels by 2020 that are on average an additional 11% lower than the levels under the current commitments, as part of an extension of the Voluntary Agreement through 2021 that was adopted unanimously by the signatories in 2018.

The Internet service provider signatories provided broadband Internet services to approximately 87.2 million U.S. residential customers, or 89.2% of U.S. broadband households in 2018. The coverage of the Voluntary Agreement has increased since its inception, partly as a result of the addition of Frontier Communications as a signatory in 2017 and the 2019 addition of the Suddenlink cable systems owned by Altice.[1]

The Voluntary Agreement classifies small network equipment into three categories:

- Broadband Modems: Simple network devices that enable 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 wired or optical 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.[2]

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. The Voluntary Agreement aims to achieve these goals through flexible approaches that allow the delivery of high-quality, innovative services to consumers.

1 - Based on data provided by 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

- Altice USA, Inc.*
- AT&T Services, Inc.*
- CenturyTel Broadband Services, LLC d/b/a CenturyLink*
- Charter Communications, Inc. d/b/a Spectrum*
- Comcast Cable Communications, LLC*
- Cox Communications, Inc.*
- Frontier Communications Corp.*
- Verizon Communications, Inc.*

Vendor Signatories

- Actiontec Electronics, Inc.
- ARRIS Group, Inc.*
- NETGEAR, Inc.*
- Technicolor Connected Home USA LLC
- Ubee Interactive, Inc.

Other Organizations

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

The Voluntary Agreement obligates the Steering Committee to designate an Independent Administrator and publish an annual report. The Steering Committee designated D+R as the Independent Administrator and Auditor in 2015, and D+R has continued in this role for 2018. This report is the fourth annual report.

The Voluntary Agreement requires that the Steering Committee meet at least once each year. The Steering Committee met twice in 2018, on June 20 and July 24, and working groups were active throughout the year. 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

Signatory Commitments

The primary commitment is to procure and sell energy-efficient small network equipment. Specifically, beginning January 1, 2016, the commercial signatories committed that 90% of new small network equipment purchased by service providers or sold at retail by vendors each year will meet the energy efficiency levels 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 and sales data submitted by the signatories. If the Voluntary Agreement procurement or sales commitments are not met, the Independent Administrator is responsible for working with the signatory to develop a remedial plan under procedures set out in the Voluntary Agreement.

The Independent Administrator is charged with conducting an audit of one randomly-selected service provider's procurement figures or one vendor's sales figures each year. The results of the 2018 audit are presented in Appendix C. The Independent Administrator also randomly selects one model from each service provider and retail vendor to be tested by an independent accredited third-party lab or while supervised by an accredited independent observer to verify the reported idle power values. The successful results of that lab verification 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.

In 2018, one signatory proposed a new feature allowance for an IAD with a 10 Gigabit Ethernet Passive Optical Network (10G EPON) interface. 10G products can support significantly greater data rates than other PON-based WAN IAD types previously defined in the Voluntary Agreement. After technical review, the Steering Committee adopted a new IAD 10G EPON base allowance of 13 watts for both Tier 1 and Tier 2.

Remediation and Alternative Energy Efficiency Strategies

A signatory that fails to meet its procurement or sales 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. All signatories met all applicable commitments in 2018.

REPORT ON 2018 PROCUREMENT AND SALES COMMITMENTS

Under the Voluntary Agreement, 90% of small network equipment purchased or sold at retail each year by commercial signatories after December 31, 2015 must meet specified energy efficiency levels. Data was collected from the service provider and retail vendor signatories to measure satisfaction of these commitments in 2018.[3] Overall, 99.6% of reported units satisfied the energy efficiency levels of the Voluntary Agreement in 2018, up from 99.2% in 2017. In addition, signatories already surpassed the Tier 2 commitment two years ahead of its effective date, with 97.5% of devices purchased/sold in 2018 meeting Tier 2.

All of the reporting signatories met the 90% threshold, and seven of those signatories had 100% of their new purchases/sales meet the energy efficiency levels of the Agreement.

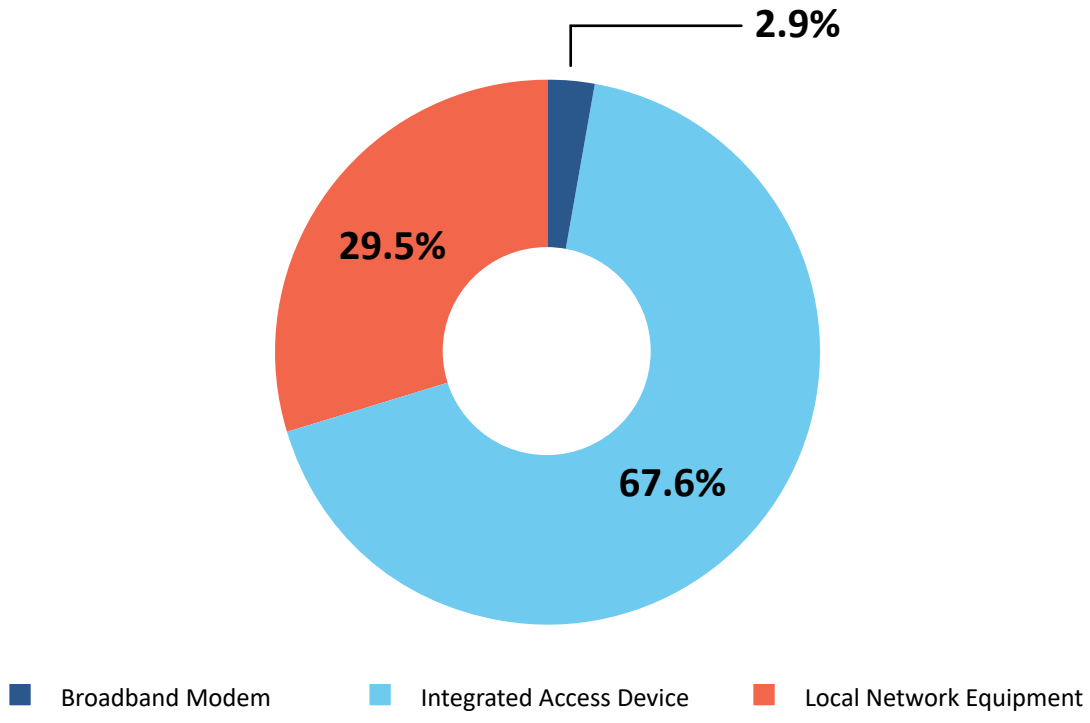
The success of the procurement commitment spanned every category of small network equipment, with at least 99% of every category meeting the levels of the Voluntary Agreement, as shown in Table 1.

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

Category	Reported Units	Number Meeting Tier 1 Levels	Percent Meeting Tier 1 Levels
Broadband Modem	841,052	841,052	100.0%
Integrated Access Device	19,789,205	19,696,025	99.5%
Local Network Equipment	8,652,315	8,640,940	99.9%
Total	**29,282,572**	**29,178,017**	**99.6%**

Integrated access devices (IADs) represent more than two-thirds 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.

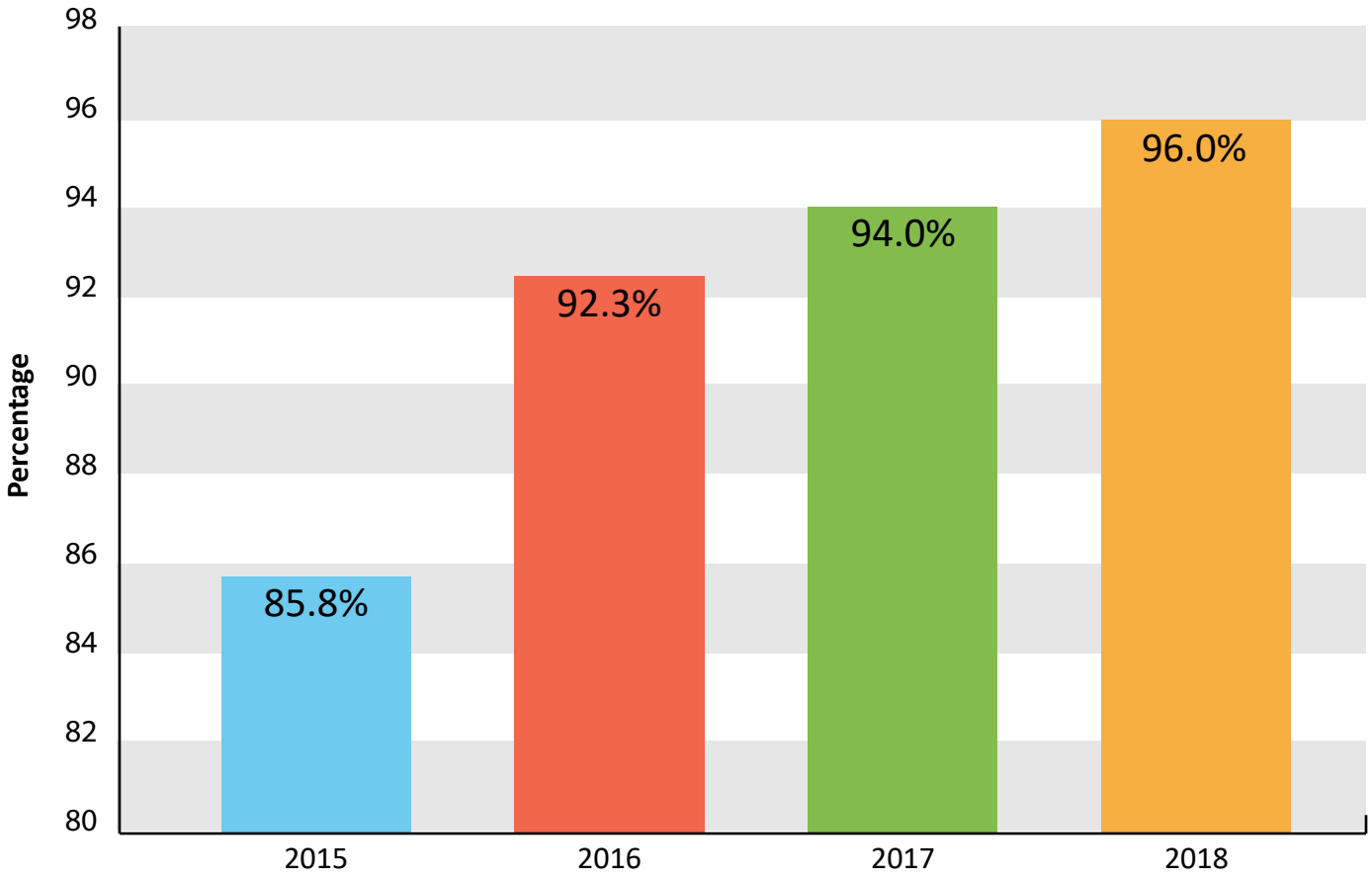
Figure 2: Small Network Equipment, by Equipment Type



3 - Two vendor Signatories had no retail sales of small network equipment in 2018 and therefore did not need to submit sales data.

In 2015, only 85.8% of models met the levels of the Voluntary Agreement. In 2016, that figure increased to 92.3% and only 1.7% of all purchases and sales were of models that did not meet these levels. In 2017, 94% of the models sold met the Voluntary Agreement levels and less than 1% of sales and purchases were models that did not meet Voluntary Agreement levels. In 2018, 96% of the models sold met the Voluntary Agreement levels and only 0.4% of sales and purchases were models that did not meet Voluntary Agreement levels. In a prior annual report, D+R found that the twenty-four reported legacy models purchased or sold in 2015 that did not meet the Voluntary Agreement's initial energy efficiency levels used an average of 18% more energy than the maximum power consumption permitted under the Voluntary Agreement's allowances.[4] Only one of these models was still purchased in 2018, and it represented only a small fraction of the signatory's new devices.

Figure 3: Percentage of Models Meeting Efficiency Levels



This data, as further corroborated by the verification measures described in this report, demonstrates that the signatories met their procurement and sales commitments under the Voluntary Agreement in 2018.

Energy Efficiency of Small Network Equipment

Details of the small network equipment purchased or sold by the signatories in 2018 are provided in Appendix A. The energy efficiency of each model is assessed based upon its particular suite of functions and capabilities, which vary widely. The overall trend in the average weighted power of each of the three categories of small network equipment defined by the Voluntary Agreement is shown in Table 2 below:

4 - D+R International, *2015 Annual Report, Voluntary Agreement for Ongoing Improvement to the Energy Efficiency of Small Network Equipment*, at p. 11, (Aug. 8, 2016), available at http://www.energy-efficiency.us/library/pdf/SNE-AnnualReport-2015.pdf.

Table 2: Average Weighted Idle Mode Power Consumption for Small Network Equipment Categories 2015-2018[5]

SNE Category	Average Weighted Power (in Watts)			
	2015	2016	2017	2018
Broadband Modem	6.67	7.11	8.12	9.36
Integrated Access Device	13.30	13.53	13.65	13.73
Local Network Equipment	6.44	5.62	5.28	6.79
Total Weighted Average	11.36	11.79	11.26	11.55

It should be noted that each year's total weighted average fluctuates based on changes in the relative quantities of each category purchased and sold each year, as provided in Table 3 below. For example, the average weighted power decreased between 2016 and 2018 even though each category's figure increased because of an increase in the proportion of lower-powered LNE from 18.3% of total reported devices to 29.5%. Fluctuations also occur within each category, as each category includes models that support a range of features and services. Lower-powered, lesser-featured models may become more efficient yet its category's average weighted power can still increase because a higher percentage of consumers sought out higher-powered, more fully-featured models within the same category.

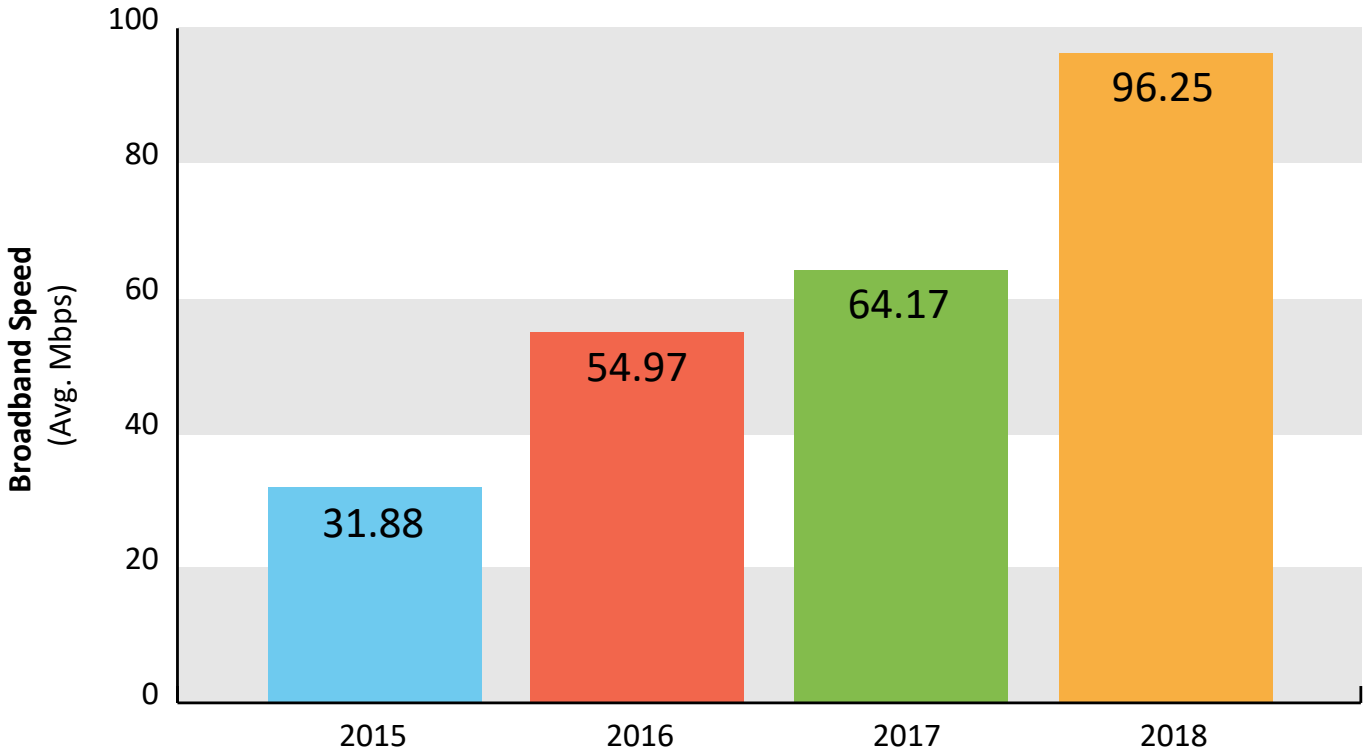
Table 3: Quantities of Small Network Equipment Purchased or Sold by Category 2015-2018

SNE Category	Total Units Purchased or Sold			
	2015	2016	2017	2018
Broadband Modem	2,607,044	1,518,442	1,317,245	841,052
Integrated Access Device	20,683,903	25,352,825	24,254,951	19,789,205
Local Network Equipment	5,649,062	6,004,725	8,956,156	8,652,315
Total Weighted Average	28,940,009	32,875,992	34,528,352	29,282,572

The increases in nominal power of many models of SNE since 2015, even as percentage of those models meeting Voluntary Agreement levels has increased, can be attributed to the power requirements of supporting faster broadband speeds. 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 the home, this streamed content is typically delivered through the customer's modem and router. To support these devices and content, the average broadband connection speed for U.S. residential households has tripled in just three years, as shown in Figure 4.

5 - While IADs, on average, use the most energy of the three categories, these devices perform multiple functions that in the past may have been performed by multiple separate devices, such as a 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 levels.

Figure 4: Annual Growth of Broadband Speeds[6]



These figures are from a series of annual reports published by Ookla measuring fixed broadband networks in the United States. In 2018, D+R transitioned its source of broadband speed data from Akamai to Ookla due to the discontinuation of Akamai's reports. As a result, the broadband speeds reported in the 2018 Annual Report differ from speeds reported in prior years. However, Ookla's measurements use a consistent methodology and accordingly should reasonably reflect the proportionate increase in year over year speeds, which is the purpose of this data for this report.

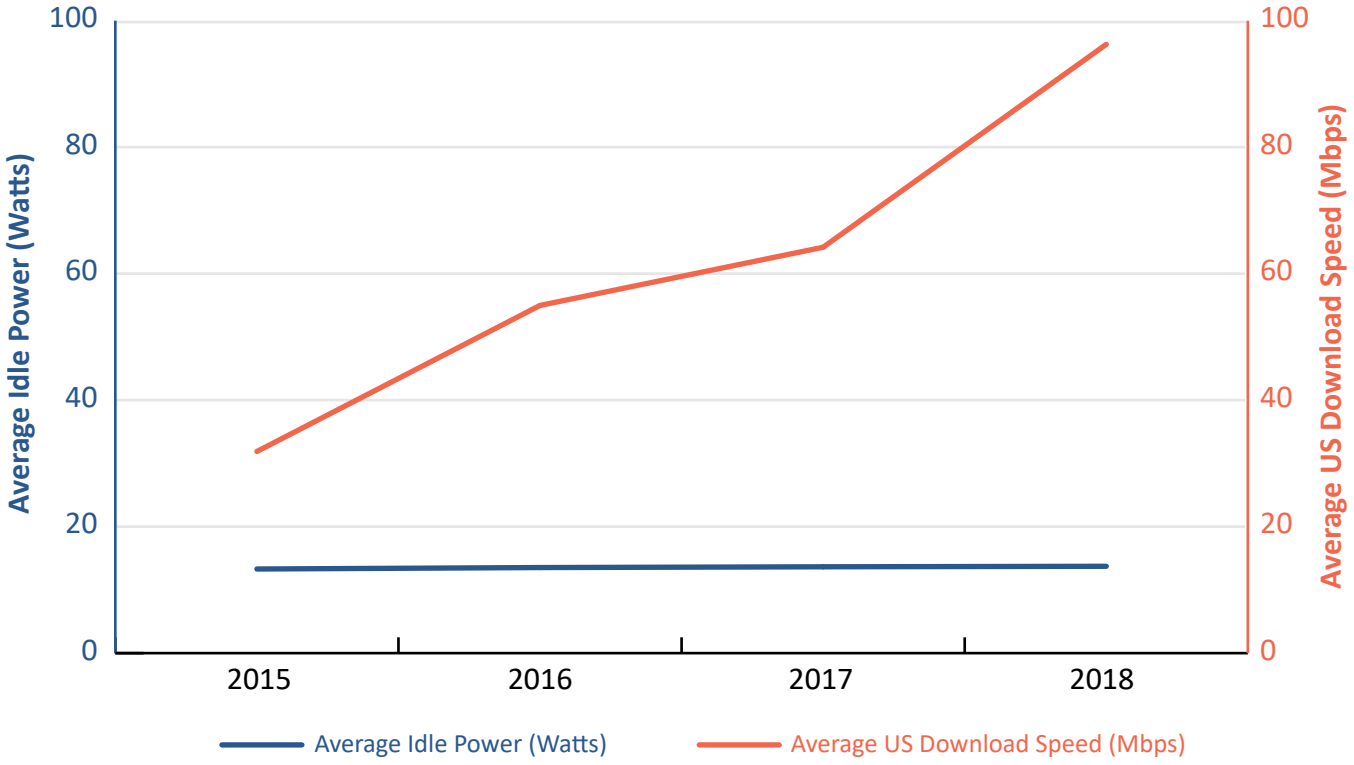
Moreover, Internet service providers need to purchase equipment that will be capable of supporting the speeds and services that customers will want over the next several years into the future, not just current demand. When possible, service providers want to be able to give customers the opportunity to upgrade their Internet service without having wait for a company technician to visit and replace their equipment. In addition, it would be environmentally and economically wasteful to procure new SNE today that would be expected to be quickly rendered obsolete by changes in consumer demand. As a result, SNE is designed and manufactured to support more demanding speeds and capabilities prior to their widespread adoption by consumers.

Accordingly, to meet consumers' increased demands for higher-speed broadband services and increased Wi-Fi capacity in the home, the design and features of small network equipment have changed. For example, one way that cable service provides have increased the downstream capacity of their Internet service has been to increase the number of bonded downstream channels in their DOCSIS 3.0 cable modems. Higher downstream requires additional demodulation and may require additional processing and memory, each of which requires energy. In 2015, the cable service provider signatories reported purchasing sixteen different models of DOCSIS 3.0 cable modems and IADs that had only 8 downstream channels. In 2018, all of the DOCSIS 3.0 models reported by cable service providers have at least 16 downstream channels (which effectively doubles downstream capacity), and several models have 24 downstream channels. The next evolution of DOCSIS modems, DOCSIS 3.1 introduced in 2017, use new technologies to support even higher capacity services.

6 - Ookla, *Speedtest® Market Reports 2016, 2017, 2018* (August 3, 2016; September 7, 2017; December 12, 2018), available at http://www.speedtest.net/reports.

Notwithstanding the need to support these more robust capabilities, the signatories have been able to reduce average energy relative to broadband speed. That ratio decreased from 2017 to 2018, as it has each year under the Voluntary Agreement as shown in Figure 1 of the Executive Summary of this report. Figure 5 below illustrates the contrast between the relative stability of the weighted average idle power consumption of reported SNE and the rapid increase in average download speeds during the four years of the Agreement. The signatories' ability to support these higher-speed services without a significant overall increase in power consumption demonstrates that their SNE devices are delivering services more efficiently and are thereby accomplishing the core objectives of the Voluntary Agreement.

Figure 5: Average Idle Power of SNE Devices vs. Download Speed 2015-2018



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. Efficiency is expected to improve further under the more rigorous Tier 2 allowances that will replace the existing energy efficiency levels of the Agreement in 2020. These levels are on average 11% lower than the current Voluntary Agreement levels. The fact that more than 97.5% of devices met Tier 2 levels in 2018 does not mean that challenges and work do not lie ahead. To meet these levels in 2020 and beyond, the signatories will need to offer devices with greater functionality than those offered today while still meeting the commitments of the Voluntary Agreement.

All of this data supports the finding that the Voluntary Agreement is continuing to be successful in improving the energy efficiency of small network equipment.

Lab Verification Testing

The Independent Administrator randomly selected one model from each commercial signatory for lab 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 are compared to the reported value as well as the maximum idle power consumption under the applicable allowances for that device.

Due to several factors affecting the variability of the test results, including noisy Wi-Fi environments, variability in WAN connections, software updates, and variability in hardware, a tolerance of up to 10% is permitted to be applied to the test results. If a model tests between 5% and 10% of the reported value, a second instance of that model must be tested.

In aggregate, the average measured idle power measurement from these test results is 1.03 watts less than the values originally reported by the signatories in their 2018 annual reports. The results also confirmed that idle mode energy usage was below the levels reported by the signatory for every model except two. These two models tested less than 5% higher than the signatories had originally reported, and both models still met the efficiency levels of the Agreement.

Consumer Access to 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, 2015. This information makes it easy 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.

CONCLUSION

The Voluntary Agreement continues to be successful in improving the energy efficiency of small network equipment used by American consumers with broadband Internet access service. 99.6% of reported units satisfied the energy efficiency levels of the Agreement despite increased consumer demands for the capabilities of the equipment. All of the service provider and retail vendor signatories met the 90% threshold and seven met the Agreement's allowances for 100% of their new sales and purchases. As the signatories continue to employ even greater functionality in their devices while still meeting the more rigorous Tier 2 energy efficiency levels that become effective in 2020, the Voluntary Agreement can be expected to continue to promote both product innovation and energy efficiency.

APPENDIX A: SMALL NETWORK EQUIPMENT PURCHASED OR SOLD BY VOLUNTARY AGREEMENT SIGNATORIES IN 2018

Appendix A lists the small network equipment reported by the signatories as purchased or sold in 2018. 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.

Table 4: Small Network Equipment Purcahsed/Sold by Voluntary Agreement Signatories in 2018

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	ECB6000	Basic LNE	GigE LAN, MoCA	2.03	Yes
Actiontec	Actiontec	ECB6200	Basic LNE	GigE LAN, MoCA	2.28	Yes
Actiontec	Actiontec	WCB6200	Advanced LNE	GigE LAN(2), WiFi (n) HP, WiFi (ac) HP, WiFi above 2x2 HP(2), MoCA	9.29	Yes
Altice	Sagemcom	F@st 5260CV	Advanced LNE	GigE LAN(5), WiFi (n) HP, WiFi (ac) HP, WiFi above 2x2 HP(2), USB 2, PCIe(2)	7.00	Yes
Altice	ARRIS	TM1602AP2	IAD D3.0	D3 above 4x4(5), GigE LAN, FXS(2)	9.00	Yes
Altice	ARRIS	TM1602G	IAD D3.0	D3 above 4x4(5), GigE LAN, FXS(2)	9.00	Yes
Altice	ARRIS	TG1672G	IAD D3.0	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	15.00	Yes
Altice	AlticeLabs	GR240BG	IAD SFP GPON	GigE LAN(4), WiFi (n) HP, WiFi (ac) HP, WiFi above 2x2 HP(4), 802.11n 256 QAM, FXS(2), USB 2, Battery	11.00	Yes
ARRIS	ARRIS	SB6141	Basic D3.0	D3 above 4x4, GigE LAN	5.45	Yes
ARRIS	ARRIS	SB6183	Basic D3.0	D3 above 4x4(3), GigE LAN	9.40	Yes
ARRIS	ARRIS	SB6190	Basic D3.0	D3 above 4x4(7), GigE LAN	8.60	Yes
ARRIS	ARRIS	SB8200	Basic D3.1	GigE LAN(2)	10.75	Yes
ARRIS	ARRIS	SBG10	IAD D3.0	D3 above 4x4(3), GigE LAN(2), WiFi (n) LP, WiFi (ac) LP, WiFi above 2x2 LP	10.60	Yes
ARRIS	ARRIS	SBG6400	IAD D3.0	D3 above 4x4, GigE LAN(2), WiFi (n) LP, USB 2	8.00	Yes
ARRIS	ARRIS	SBG6580-2	IAD D3.0	D3 above 4x4, GigE LAN(4), WiFi (n) LP	7.80	Yes
ARRIS	ARRIS	SBG6700-AC	IAD D3.0	D3 above 4x4, GigE LAN(2), WiFi (n) LP, WiFi (ac) LP, WiFi above 2x2 LP	10.00	Yes
ARRIS	ARRIS	SBG6900-AC	IAD D3.0	D3 above 4x4(3), GigE LAN(4), WiFi (n) LP, WiFi (ac) LP, WiFi above 2x2 LP(2), USB 2(2)	14.10	Yes
ARRIS	ARRIS	SBG6950AC2	IAD D3.0	D3 above 4x4(3), GigE LAN(4), WiFi (n) LP, WiFi (ac) LP, WiFi above 2x2 LP(2), USB 2	11.10	Yes
ARRIS	ARRIS	SBG7400AC2	IAD D3.0	D3 above 4x4(5), GigE LAN(4), WiFi (n) LP, WiFi (ac) LP, WiFi above 2x2 LP(3), USB 2	13.20	Yes
ARRIS	ARRIS	SBG7580-AC	IAD D3.0	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	SBG7600AC2	IAD D3.0	D3 above 4x4(7), GigE LAN(4), WiFi (n) LP, WiFi (ac) LP, WiFi above 2x2 LP(3), USB 2, PCIe(2), AP 5K-10K DMIPS	14.20	Yes
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-AC1750	Advanced LNE	GigE LAN(5), WiFi (n) LP, WiFi (ac) LP, WiFi above 2x2 LP(2), USB 2	5.25	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	SBV3202	IAD D3.0	D3 above 4x4(7), GigE LAN, FXS(2), AP 5K-10K DMIPS	9.20	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
ARRIS	ARRIS	SVG2482AC	IAD D3.0	D3 above 4x4(5), GigE LAN(4), WiFi (n) LP, WiFi above 2x2 LP, WiFi (ac) HP, WiFi above 2x2 HP, MoCA, FXS(2), USB 2(2)	19.00	Yes
ARRIS	ARRIS	TG862G/CT-0	IAD D3.0	D3 above 4x4, GigE LAN(4), WiFi (n) LP, FXS(2), USB 2	8.40	Yes
ARRIS	ARRIS	TG862G/NA-8	IAD D3.0	D3 above 4x4, GigE LAN(4), WiFi (n) LP, FXS(2), USB 2, Battery	8.50	Yes
ARRIS	ARRIS	TG862R	IAD D3.0	D3 above 4x4, GigE LAN(4), WiFi (n) LP, FXS(2), USB 2	8.40	Yes
ARRIS	ARRIS	TM1602AP2	IAD D3.0	D3 above 4x4(3), GigE LAN, FXS(2)	9.30	Yes
ARRIS	ARRIS	TM1602G	IAD D3.0	D3 above 4x4(3), GigE LAN, FXS(2)	10.30	Yes
ARRIS	ARRIS	TM822G/CT-0	IAD D3.0	D3 above 4x4, GigE LAN, FXS(2)	5.70	Yes
ARRIS	ARRIS	TM822G/NA-8	IAD D3.0	D3 above 4x4, GigE LAN, FXS(2), Battery	5.80	Yes

Signatory	Brand	Model Number	Base Type	Claimed Allowances	Reported Idle Power (W)	Meets VA Levels
ARRIS	ARRIS	TM822R	IAD D3.0	D3 above 4x4, GigE LAN, FXS(2)	5.70	Yes
AT&T	Pace	5268AC	IAD VDSL2	GigE Backup WAN, VDSL2 Simul WAN, GigE LAN(4), WiFi (n) LP, WiFi (ac) LP, WiFi above 2x2 LP(2), HPNA, FXS(2), USB 2	15.30	Yes
AT&T	ARRIS	BGW210-700	IAD VDSL2	GigE Backup WAN, VDSL2 Simul WAN, GigE LAN(4), WiFi (ac) LP, WiFi above 2x2 LP(2), WiFi (n) HP, WiFi above 2x2 HP, 802.11n 256 QAM, FXS(2), USB 2(2), PCIe, AP 5K-10K DMIPS	14.50	Yes
AT&T	Airties	4920	Advanced LNE	GigE LAN(2), WiFi (n) LP, WiFi (ac) HP, WiFi above 2x2 HP, PCIe(2)	7.70	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	Actiontec	C2300A	IAD VDSL2 (30a)	GigE Backup WAN, SFP Backup WAN Present, VDSL2 Simul WAN, GigE LAN(4), WiFi (n) HP, WiFi (ac) HP, WiFi above 2x2 HP(3), 802.11n 256 QAM, USB 3(2)	18.10	Yes
CenturyLink	Actiontec	C3000A	IAD VDSL2	VDSL2 Simul WAN, GigE LAN(5), WiFi (n) HP, WiFi (ac) HP, WiFi above 2x2 HP(3), USB 2, PCIe(2)	13.00	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	16.00	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, GigE LAN(4), WiFi (n) HP, WiFi (ac) HP, WiFi above 2x2 HP(2), HPNA, USB 2	12.27	Yes
CenturyLink	Zyxel	C3000Z	IAD VDSL2 (30a)	GigE Backup WAN, GigE LAN(4), WiFi (ac) LP, WiFi above 2x2 LP(2), WiFi (n) HP, WiFi above 2x2 HP, USB 2	10.40	Yes
Charter	Technicolor	TC4400-AMV2	Basic D3.1	GigE LAN(2)	9.00	Yes
Charter	Technicolor	DPC3216	IAD D3.0	D3 above 4x4(3), GigE LAN, FXS(2)	9.00	Yes
Charter	Technicolor	DPC3216C	IAD D3.0	D3 above 4x4(3), GigE LAN, FXS(2), Battery	10.50	Yes
Charter	ARRIS	TM1602AP2	IAD D3.0	D3 above 4x4(5), GigE LAN, FXS(2)	9.00	Yes
Charter	ARRIS	TM1602G	IAD D3.0	D3 above 4x4(5), GigE LAN, FXS(2), Battery	11.00	Yes
Charter	Technicolor	E31T2V1	IAD D3.1	GigE LAN, FXS(2)	9.00	Yes
Charter	Hitron	E31N2V1	IAD D3.1	GigE LAN, FXS(2)	10.50	Yes
Charter	Ubee	E31U2V1	IAD D3.1	GigE LAN, FXS(2)	8.00	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	Sagemcom	F@st5280	Advanced LNE	GigE LAN(5), WiFi (n) HP, WiFi (ac) HP, WiFi above 2x2 HP(4), 802.11n 256 QAM, USB 3, PCIe(2), AP 5K-10K DMIPS	9.50	Yes
Charter	Askey	RT4230W-D187	Advanced LNE	GigE LAN(5), WiFi (n) HP, WiFi (ac) HP, WiFi above 2x2 HP(4), 802.11n 256 QAM, USB 3, PCIe(2), AP 5K-10K DMIPS	8.50	Yes
Charter	ARRIS	RAC2V1A	Advanced LNE	GigE LAN(5), WiFi (n) HP, WiFi (ac) HP, WiFi above 2x2 HP(4), 802.11n 256 QAM, USB 3, PCIe(2), AP 5K-10K DMIPS	8.50	Yes
Comcast	ARRIS	TG3482G P2	IAD D3.1	GigE LAN(2), WiFi (n) LP, WiFi (ac) LP, WiFi above 2x2 LP(6), 802.11n 256 QAM, MoCA, FXS(2), Blue-tooth, ZigBee, Z-wave, PCIe(2), AP 5K-10K DMIPS	25.00	Yes
Comcast	ARRIS	TG1682G Rev12	IAD D3.0	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 D3.0	D3 above 4x4(5), GigE LAN(4), WiFi (n) LP, WiFi (ac) LP, WiFi above 2x2 LP(2), 802.11n 256 QAM, MoCA, FXS(2), USB 2(2), PCIe(2)	20.00	Yes
Comcast	ARRIS	X5001	IAD 10G EPON	GigE LAN(4), WiFi (n) LP, WiFi (ac) LP, WiFi above 2x2 LP(2), MoCA, FXS(2), USB 2, PCIe(2)	20.30	Yes
Comcast	Technicolor	CGM4140COM	IAD D3.1	GigE LAN(2), WiFi (n) LP, WiFi (ac) LP, WiFi above 2x2 LP(6), 802.11n 256 QAM, MoCA, FXS(2), Blue-tooth, ZigBee, Z-wave, PCIe(2), AP 5K-10K DMIPS	24.00	Yes
Comcast	Plume	XE1	Basic LNE	WiFi (n) LP, WiFi (ac) LP	3.00	Yes
Cox	ARRIS	CM8200A/P2	Basic D3.1	GigE LAN(2)	12.00	Yes
Cox	ARRIS	TG1682	IAD D3.0	D3 above 4x4(5), GigE LAN(4), WiFi (n) HP, WiFi (ac) HP, WiFi above 2x2 HP(2), FXS(2), USB 2(2)	13.60	Yes

Signatory	Brand	Model Number	Base Type	Claimed Allowances	Reported Idle Power (W)	Meets VA Levels
Cox	ARRIS	TM3402A	IAD D3.1	GigE LAN(4), FXS(2)	11.60	Yes
Cox	Technicolor	CGM4141	IAD D3.1	GigE LAN(2), WiFi (n) LP, WiFi (ac) LP, WiFi above 2x2 LP(6), 802.11n 256 QAM, MoCA, FXS(2), Blue-tooth, ZigBee, Z-wave, PCIe(2), AP 5K-10K DMIPS	24.00	Yes
Cox	ActionTec	WCB6200Q	Advanced LNE	GigE LAN(2), WiFi (n) HP, WiFi (ac) HP, WiFi above 2x2 HP(2), MoCA	9.80	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
Frontier	ARRIS	NVG468 MQ	IAD GigE	GigE LAN(4), WiFi (n) LP, WiFi (ac) LP, WiFi above 2x2 LP(3), MoCA, FXS(2), USB 3, PCIe, AP 5K-10K DMIPS	12.80	Yes
Frontier	ARRIS	NVG448 BQ	IAD VDSL2	GigE Backup WAN, VDSL2 Simul WAN, GigE LAN(4), WiFi (n) LP, WiFi (ac) LP, WiFi above 2x2 LP(3), FXS(2), USB 3, PCIe, AP 5K-10K DMIPS	13.50	Yes
Frontier	ARRIS	NVG448 BQ	IAD VDSL2	GigE Backup WAN, VDSL2 Simul WAN, GigE LAN(4), WiFi (n) LP, WiFi (ac) LP, WiFi above 2x2 LP(3), FXS(2), USB 3, PCIe, AP 5K-10K DMIPS	13.30	Yes
Frontier	ARRIS	NVG448 B	IAD VDSL2	GigE Backup WAN, VDSL2 Simul WAN, GigE LAN(4), WiFi (n) LP, WiFi (ac) LP, WiFi above 2x2 LP, FXS(2), USB 3, PCIe(2), AP 5K-10K DMIPS	12.00	Yes
Frontier	ARRIS	NVG443 B	IAD VDSL2	GigE Backup WAN, VDSL2 Simul WAN, GigE LAN(4), WiFi (n) LP, WiFi (ac) LP, WiFi above 2x2 LP, USB 3, PCIe(2), AP 5K-10K DMIPS	12.00	Yes
Frontier	NETGEAR	D2200D	IAD ADSL2+	Fast Eth LAN(4), WiFi (n) LP, PCIe	4.00	Yes
Frontier	ARRIS	AM525	Advanced LNE	GigE LAN(2), WiFi (n) LP, WiFi (ac) LP, WiFi above 2x2 LP(2), MoCA	8.30	Yes
Frontier	ARRIS	FST1305	G.fast	VDSL2 Backup WAN, GigE LAN	4.70	Yes
Frontier	Actiontec	ECB6200	Basic LNE	GigE LAN, MoCA	2.60	Yes
NETGEAR	NETGEAR	AC2100-100NAS	Advanced LNE	GigE LAN(4), WiFi (n) LP, WiFi (ac) LP, WiFi above 2x2 LP, USB 3	6.34	Yes
NETGEAR	NETGEAR	AC2400-100NAS	Advanced LNE	GigE LAN(4), WiFi (n) LP, WiFi (ac) LP, WiFi above 2x2 LP, USB 3	6.34	Yes
NETGEAR	NETGEAR	BRK500-100NAS	Basic LNE	GigE Backup WAN, GigE LAN(4), WiFi (n) HP, WiFi (ac) HP(2), WiFi above 2x2 HP, 802.11n 256 QAM	2.44	Yes
NETGEAR	NETGEAR	CBR40-100NAS	IAD D3.0	D3 above 4x4(7), GigE LAN(4), WiFi (n) HP, WiFi (ac) HP(2), 802.11n 256 QAM, PCIe	13.03	Yes
NETGEAR	NETGEAR	CM1100-100NAS	Basic D3.0	D3 above 4x4(7), GigE LAN(2)	7.31	Yes
NETGEAR	NETGEAR	CM1150V-100NAS	Basic D3.0	D3 above 4x4(7), GigE LAN(4)	7.50	Yes
NETGEAR	NETGEAR	EX7700-100NAS	Advanced LNE	GigE LAN(2), WiFi (ac) LP, WiFi (n) HP, 802.11n 256 QAM, PCIe	4.68	Yes
NETGEAR	NETGEAR	GS105E-200NAS	Basic LNE	GigE LAN(5)	0.74	Yes
NETGEAR	NETGEAR	GS108-400NAS	Basic LNE	GigE LAN(8)	2.10	Yes
NETGEAR	NETGEAR	GS308T-100NAS	Basic LNE	GigE LAN(8)	1.93	Yes
NETGEAR	NETGEAR	GS808E-100NAS	Basic LNE	GigE LAN(8)	1.10	Yes
NETGEAR	NETGEAR	GS908E-100NAS	Basic LNE	GigE LAN(8)	2.90	Yes
NETGEAR	NETGEAR	PLP2000-100PAS	IAD GigE	GigE LAN, HPNA	4.62	Yes
NETGEAR	NETGEAR	R6260-100NAS	Advanced LNE	GigE LAN(4), WiFi (n) LP, WiFi (ac) LP, WiFi above 2x2 LP, USB 2	5.30	Yes
NETGEAR	NETGEAR	R6350-100NAS	Advanced LNE	GigE LAN(4), WiFi (n) LP, WiFi (ac) LP, WiFi above 2x2 LP, USB 2	5.30	Yes
NETGEAR	NETGEAR	R7450-100NAS	Advanced LNE	GigE LAN(4), WiFi (n) LP, WiFi (ac) LP, WiFi above 2x2 LP, USB 3	6.34	Yes
NETGEAR	NETGEAR	RAX120-100NAS	Advanced LNE	GigE LAN(5), WiFi (ac) LP(2), WiFi above 2x2 LP(2), WiFi (n) HP, WiFi above 2x2 HP(2), 802.11n 256 QAM, USB 3(2), AP 5K-10K DMIPS	12.69	Yes
NETGEAR	NETGEAR	RAX80-100NAS	Advanced LNE	GigE Backup WAN, GigE LAN(5), WiFi (n) HP, WiFi (ac) HP, WiFi above 2x2 HP(2), 802.11n 256 QAM, USB 3(2), AP 5K-10K DMIPS	16.61	No

Signatory	Brand	Model Number	Base Type	Claimed Allowances	Reported Idle Power (W)	Meets VA Levels
NETGEAR	NETGEAR	RBR20-100NAS	Advanced LNE	GigE LAN(2), WiFi (n) LP, WiFi (ac) LP, WiFi (ac) HP, 802.11n 256 QAM, Blue-tooth, PCIe	4.90	Yes
NETGEAR	NETGEAR	RBS40V-100NAS	Advanced LNE	GigE LAN(2), WiFi (n) HP, WiFi (ac) HP(2), 802.11n 256 QAM, Blue-tooth, PCIe	7.62	Yes
NETGEAR	NETGEAR	RBS50Y-200NAS	Basic LNE	WiFi (ac) LP(2), WiFi above 2x2 LP, WiFi (n) HP, 802.11n 256 QAM, Blue-tooth, PCIe	6.70	Yes
NETGEAR	NETGEAR	SRK60-100NAS	Advanced LNE	GigE LAN(4), WiFi (ac) LP(2), WiFi above 2x2 LP, WiFi (n) HP, WiFi above 2x2 HP, 802.11n 256 QAM, USB 2, Blue-tooth, PCIe	7.34	Yes
NETGEAR	NETGEAR	WAC124-100NAS	IAD GigE	GigE LAN(4), WiFi (n) LP, WiFi (ac) LP, WiFi above 2x2 LP, USB 2, PCIe(2)	5.30	Yes
NETGEAR	NETGEAR	WAC505-100NAS	Basic LNE	GigE LAN, WiFi (ac) LP, WiFi (n) HP, 802.11n 256 QAM	5.48	Yes
NETGEAR	NETGEAR	XR700-100NAS	Advanced LNE	GigE LAN(6), WiFi (n) HP, WiFi (ac) HP, WiFi above 2x2 HP(2), 802.11n 256 QAM, USB 3(2)	15.30	No
Verizon	Actiontec	GT784WNV	IAD ADSL2+	Fast Eth LAN(4), WiFi (n) LP, USB 2	6.09	No
Verizon	Dlink	DSL-2750B	IAD ADSL2+	Fast Eth LAN(4), WiFi (n) LP, USB 2	5.05	Yes
Verizon	Dlink	DGS-1005G	Basic LNE	GigE LAN(5)	1.56	Yes
Verizon	Actiontec	WCB6200Q	Advanced 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
Verizon	Actiontec	ECB5240	Advanced LNE	GigE LAN(4), MoCA	4.91	Yes

Table 5 describes feature allowances established by the Voluntary Agreement.

Table 5: Voluntary Agreement Allowance Descriptions

Description	Descriptor	Allowance
Base Allowance: IAD Devices (by WAN interface) (watts)		
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 D3.0	6.2
DOCSIS 3.1 No FDX	IAD D3.1	16.7
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
Base Allowance: Broadband Modems (by WAN Interface) (watts)		
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 D3.0	4.7
DOCSIS 3.1 No FDX	Basic D3.1	15.2
G.fast	G.fast	4.2
Base Allowance: LNE (watts)		
LNE other than Advanced LNE	Basic LNE	2.0
Advanced LNE	Advanced LNE	3.75
Adders for Additional Backup WAN Interface		
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
VDSL2 (8, 12a, 17a, but not 30a)	VDSL2 Backup WAN	1.0
Adders for Simultaneous Additional WAN Interface		
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
Adders for LAN interfaces and Additional Functionality		
1 Fast Ethernet port	Fast E LAN	0.2
1 Gigabit Ethernet port	GigE LAN	0.25

Table 5: Voluntary Agreement Allowance Descriptions (cont.)

Description	Descriptor	Allowance
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 Single Channel	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-10K DMIPS	AP 5K-10K DMIPS	1.0

APPENDIX B: CONSUMER-FACING SMALL NETWORK EQUIPMENT ENERGY EFFICIENCY INFORMATION

Small network equipment energy information for consumers is available at www.energy-efficiency.us, and for each service provider and retail vendor at the links below.

Table 6: Consumer-Facing Small Network Equipment Energy Efficiency Information

Signatory	Consumer Information Location	Additional Information
Service Providers		
Altice	https://energy.cablelabs.com/cablevision-sne/	
AT&T	https://www.att.com/ecms/dam/att/consumer/help/tv/pdf/ATT-Small-Network-Equipment-Energy-Information-29Jun2018.pdf	
CenturyLink	https://www.centurylink.com/home/help/internet/modems-and-routers/modem-energy-efficiency.html	
Charter	https://energy.cablelabs.com/charter-sne/	
Comcast	https://energy.cablelabs.com/comcast-sne/	
Cox	https://energy.cablelabs.com/cox-sne/	
Frontier	https://frontier.com/~/media/HelpCenter/Documents/tv/fios/small-network-equipment-efficiency.ashx	
Verizon	https://www.verizon.com/support/residential/tv/equipment/stb-dvr#sne	Scroll down to "Learn about Verizon's Small Network Equipment (SNE) Energy Information" and click the plus sign next to it.
Vendors		
Actiontec Electronics	http://support.actiontec.com/doc_files/actiontec_broadband_equipment_energy_information_sne_v1.pdf	
ARRIS	https://corporateresponsibility.arris.com/	Scroll down to "Sustainability" and click the link entitled "ARRIS Small Network Equipment (SNE) Energy Efficiency".
NETGEAR	https://www.netgear.com/images/pdf/about/NETGEAR%20SNE%20Energy%20Information%202015.pdf	
Technicolor	No Retail Products	
Ubee Interactive	No Retail Products	

D+R International

2018 Annual Report Audit Results

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 an audit of one randomly-selected 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 conducted an audit of the 2018 report data provided in 2019, which was used to develop the findings for the 2018 Annual Report. D+R randomly selected the party by creating an Excel spreadsheet and using the "random" function.

D+R reviewed raw data from the selected party to verify the data submitted. This data 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 submitted by that party.

August 12, 2019

D+R International

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