2021 Annual Report

Canadian Energy Efficiency Voluntary Agreement for Set-Top Boxes and Small Network Equipment

D+R
International

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EXECUTIVE SUMMARY

In 2017, as a result of discussions encouraged by Natural Resources Canada (NRCan), five of the largest Canadian Pay TV service providers and three leading set-top box manufacturers signed the Canadian Energy Efficiency Voluntary Agreement for Set-Top Boxes ("CEEVA STB").[1] In late 2019, the same service providers, two equipment manufacturers, NRCan, provincial governments, and leading utilities collaborated to launch a second program for small network equipment (SNE), such as modems and routers, used for residential Internet service in Canada ("CEEVA SNE").[2] Together, CEEVA STB and CEEVA SNE are referred to, in this report, as "CEEVA" or "the Agreements".

The primary objective of these programs is to improve the energy efficiency of set-top boxes and small network equipment while promoting innovation and introduction of new features without compromising the customer experience.

The core commitment of each program is that 90% of new devices meet efficiency levels prescribed by the Agreements. In addition to procuring energy-efficient devices, the signatories provide public access to information about the energy consumption characteristics of reported devices.

The Data Aggregator, D+R International (D+R), oversees these commitments while continuing to monitor the effectiveness of CEEVA year-over-year, including through the publication of these annual reports.

In 2021, over 99% of all new set-top boxes procured met these efficiency levels. In the five years since the Agreement's commitments initiated, the weighted average energy consumption for new set-top boxes has declined by 58%, as shown in Figure 1 below. These conclusions are based on 2021 procurement data and the results of independent testing and auditing described in this report.

Figure 1: Weighted Average Energy Consumption of Purchased Set-Top Boxes
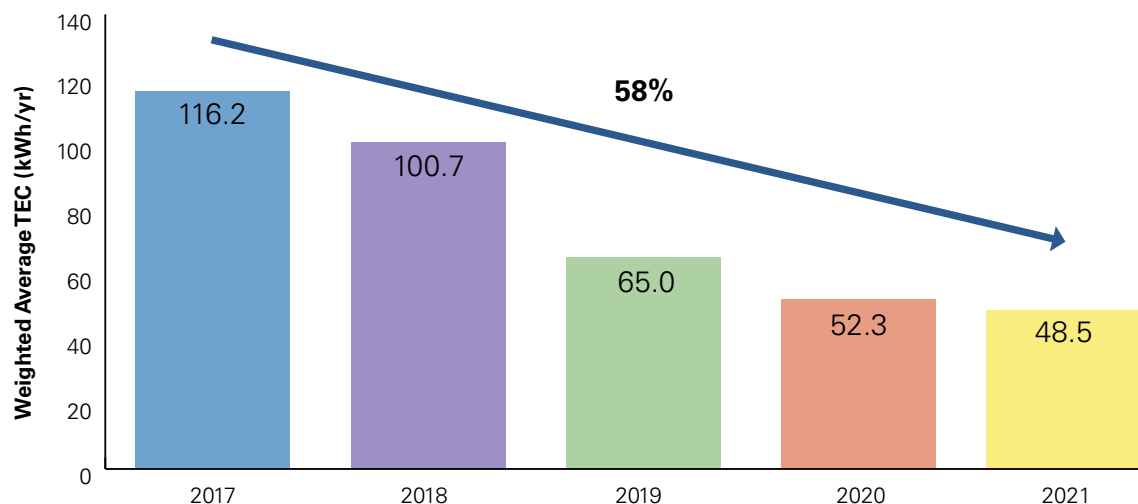
The service providers each committed that 90% of new SNE will meet CEEVA's efficiency levels beginning January 1, 2021. Each signatory reported that 100% of its new SNE purchases in 2021 met these SNE efficiency levels. The reports indicate a nearly 12% decrease in the weighted average power of new SNE received by the signatories in 2021 compared to 2020.

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1 - Canadian Energy Efficiency Voluntary Agreement for Set-Top Boxes (CEEVA STB), available at https://www.energyefficiency-va.ca/wp-content/uploads/2020/05/CEEVA-STB-as-Amended-Jan-2020.pdf.

2 - Canadian Energy Efficiency Voluntary Agreement for Small Network Equipment (CEEVA SNE), available at https://www.energyefficiency-va.ca/wp-content/uploads/2019/12/CEEVA-SNE-Final-12-17-19.pdf.

OVERVIEW OF CEEVA

CEEVA Objective

The primary objective of CEEVA is to encourage deployment of energy-efficient set-top boxes and small network equipment while allowing for innovation and advances in rapidly changing technologies and supporting the customer experience. By achieving this objective, CEEVA aims to improve the health of Canada's natural environment and reduce Canada's carbon footprint in a manner that neither stifles innovation nor disrupts the provision of high-quality service to meet customers' demands.

CEEVA Signatories and Steering Committee

The current signatories and participants in the Agreements are listed below. Each signatory and non-signatory member listed has representation on the Steering Committee.

Service Provider Signatories

- Bell Canada

- Cogeco

- Rogers Communications

- Shaw Communications

- Videotron

Manufacturer Signatories

- CommScope (formerly ARRIS)

- EchoStar Technologies LLC (CEEVA STB only)

- Technicolor

Non-Signatory Members of the Steering Committee

- Natural Resources Canada (NRCan)

- CableLabs

- Consumer Technology Association® (CTA®)

The Steering Committee was established to discuss, review, and coordinate both agreements. Its purpose includes ensuring that the following goals of CEEVA are met:

- Guaranteeing Canada-focused agreements that take into account the North American marketplace for set-top boxes and SNE;

- Creating a simplified, transparent, and accountable process for evaluating and reporting energy consumption and compliance with energy-efficiency commitments;

- Supporting a consensus approach to decision making, with votes used in very limited circumstances; and,

- Promoting innovation and avoiding disruption of Canadian consumers and the Canadian market.

Additionally, the Steering Committee selects the Data Aggregator responsible for compiling and reporting data from each signatory and publishing the annual reports. D+R was first appointed as the Data Aggregator for CEEVA STB in 2017, and has continued in this role in 2021, serving as the Data Aggregator for both CEEVA STB and CEEVA SNE.

Data Aggregator Role

The Data Aggregator is a third-party organization selected by the Steering Committee. Pursuant to CEEVA, the Data Aggregator must aggregate and analyze confidential procurement data submitted by the signatories to determine compliance with CEEVA commitments. Additionally, this role includes verifying the test results of each set-top box and SNE reported by service providers. If any of the commitments are not met, the Data Aggregator initiates a remedial process following the procedures set forth in CEEVA.

In addition to aggregating and analyzing the annual data submissions from each signatory, the Data Aggregator is also tasked with auditing one randomly selected service provider's procurement figures each year for each program. The successful results of the 2021 audits are summarized in Appendix D.

New Feature Allowances

To keep pace with fast-changing technologies and consumer demands, CEEVA includes a process that enables parties to develop and deploy set-top boxes and SNE with new energy-consuming features without seeking advance approval of a new energy allowance for that feature. Without this flexibility, innovation and competition could be stifled, as consumers could face delays in obtaining new features and services while providers would be deprived of first-mover advantages in bringing new capabilities to the market.

If a service provider deploys a set-top box or SNE that includes a new feature without an allowance and the applicable Tier levels are exceeded, it may set and report an appropriate initial allowance for the power consumption of said feature when reporting the device. The Steering Committee will review the best available evidence to set a new allowance for that feature within six months. In 2021, there were no new feature allowances reported by signatories for either program.

CEEVA STB

Canadian Pay TV providers deliver television service to approximately 9.7 million households using a variety of specialized devices referred to as set-top boxes.[3] These devices allow homes to receive encrypted television programming and related video services from providers. They also support a variety of services such as program guides, Personal Video Recorders (PVRs), and multi-room viewing, all of which help to deliver reliable viewing and enhance the customer experience. Set-top boxes vary among service providers and include both hardware components and software programming which are updated frequently to deliver the newest services to customers.

All set-top boxes require power to operate. To help improve the energy efficiency of these devices, five of the largest Pay TV service providers, manufacturers of set-top boxes, and other supporting organizations participate in CEEVA STB. Given the nature of the North American set-top box market, CEEVA STB generally reflects the approach taken in the U.S. Voluntary Agreement for Ongoing Improvement to the Energy Efficiency of Set-Top Boxes4 coupled with provisions specific to Canada, including terms for the active participation of NRCan.

This report classifies the set-top boxes received by the signatories in 2021 into two categories:

- **Personal Video Recorders (PVR):** Set-top boxes with features that enable recording and playback of video content from a local hard disk drive or other local storage.

- **Non-PVRs:** Set-top boxes that do not include a local hard disk drive or other local storage for recording and playback of video content.

Set-Top Box Market Coverage

The signatories established the objective that CEEVA STB include service providers whose combined customer base represents at least 85% of the residential Canadian Pay TV market. In 2021, the signatories served about 8.2 million subscribers, accounting for approximately 83% of the total residential Pay TV market.[5]

Set-Top Boxes Covered

CEEVA STB covers all new set-top boxes received by service provider signatories after January 1, 2017. New set-top boxes do not include any units received for the first time before that date, or any units that have been refurbished.

Set-Top Box Testing

In previous years, to demonstrate that the set-top boxes purchased by service provider signatories met the Tier 2 efficiency levels, CEEVA STB required all set-top boxes to be tested running the service provider's software as it is normally installed for an end user. Testing must be conducted by a Steering Committee-approved organization with ISO 17065 or 17025 accreditation and/or recognized by the Standards Council of Canada for set-top box testing.

For the 2020 and 2021 reporting years, the testing requirement was waived due to the COVID-19 pandemic and the restrictions placed on travel and lab access for signatories and testing organizations. However, approximately 81% of the unique set-top box models received in 2021 were tested in prior years of CEEVA STB and have been verified to meet the prescribed energy consumption levels.

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3 - Total subscriber count was taken as of Q4 2021, based on data from the Canadian Radio-television and Telecommunications Commission, available at https://crtc.gc.ca/eng/publications/reports/PolicyMonitoring/rad.htm.

4 - Voluntary Agreement for Ongoing Improvement to the Energy Efficiency of Set-Top Boxes, https://www.energy-efficiency.us.

5 - The largest non-signatory, TELUS, serves a significant portion of the market not covered by CEEVA STB. TELUS Corporation Fourth Quarter 2021, "Supplemental Investor Information", available at https://assets.ctfassets.net/rz9m1rynx8pv/3PDLkEXqSCgT2KKowdUAtx/6797116969eaa427e95fd14595c902cd/TELUS_Q4_2021_IR_Supplemental.pdf.

Set-Top Box Service Provider Commitments

The service providers' primary commitment under CEEVA STB in 2021 is that 90% of the new set-top boxes that each signatory receives each year will meet CEEVA STB's Tier 2 energy-efficiency levels. Service providers have also committed to provide information to consumers about the general energy consumption characteristics of set-top boxes that they receive, and to monitor and ensure the ongoing effectiveness of CEEVA STB by reviewing its terms annually.

Report on Set-Top Box Procurement

In total across all service provider signatories, 99.8% of set-top boxes received met Tier 2 levels in 2021, continuing the upward trend in overall compliance since the 97.3% reported in 2018, the first year in which the procurement commitment was in effect. The percentage of PVRs meeting the Tier 2 levels increased to 98.6% in 2021, up from 93.3% percent reported in 2020.

Table 1 shows the number of set-top boxes received by service providers since the first year of CEEVA STB, and the percentage that met the Tier 2 efficiency levels each year.

Table 1: Received Set-Top Box Units by Category 2017-2021

Category	2017		2018		2019		2020		2021	
	Received Units	Percent Meeting Tier 2 Levels EARLY	Received Units	Percentage of Units Meeting Tier 2 Levels	Received Units	Percentage of Units Meeting Tier 2 Levels	Received Units	Percentage of Units Meeting Tier 2 Levels	Received Units	Percentage of Units Meeting Tier 2 Levels
PVR	876,729	91.0%	894,532	94.0%	442,258	93.4%	247,302	93.3%	249,872	98.6%
Non-PVR	1,137,735	77.0%	1,133,194	100.0%	1,349,190	100.0%	1,585,340	100.0%	1,546,039	100.0%
Total	2,014,464	86.0%	2,027,726	97.3%	1,791,448	98.4%	1,832,642	99.1%	1,795,911	99.8%

The commitment to meet Tier 2 did not start until 2018, but early compliance was measured in 2017. 100% of all models were Tier 1 compliant in 2017.

Set-Top Box Energy-Efficiency Trends and Baseline

The weighted average Typical Energy Consumption[6] (TEC) for new set-top boxes received by the service provider signatories in 2021 was 115.6 kWh/year for PVRs and 37.7 kWh/year for non-PVRs. These figures represent 5% and 9% year-over-year declines respectively from 2020, and 26% and 56% declines compared to 2017, the baseline established by CEEVA STB for measuring energy-efficiency trends. These declines, illustrated in Table 2 and Figure 2 below, are particularly noteworthy given customers' continued demand for increased functionality in these devices.

Table 2: Weighted Average TEC, by Set-Top Box Category 2017-2021

Category	Weighted Average TEC (kWh/yr)					Percent Change				
	2017	2018	2019	2020	2021	2017-2018	2018-2019	2019-2020	2020-2021	2017-2021
PVR	156.4	145.1	127.8	121.4	115.6	-7%	-12%	-5%	-5%	-26%
Non-PVR	85.2	65.7	44.4	41.5	37.7	-23%	-32%	-6%	-9%	-56%
Total Set-Top Boxes	116.2	100.7	65.0	52.3	48.5	-13%	-35%	-19%	-7%	-58%

6 - TEC is the product of a method for evaluating energy consumption through a calculation of the expected typical energy consumption for a specific model of set-top box during a one-year period, expressed in units of kWh/year.

Figure 2: Weighted Average TEC, by Set-Top Box Category 2017-2021
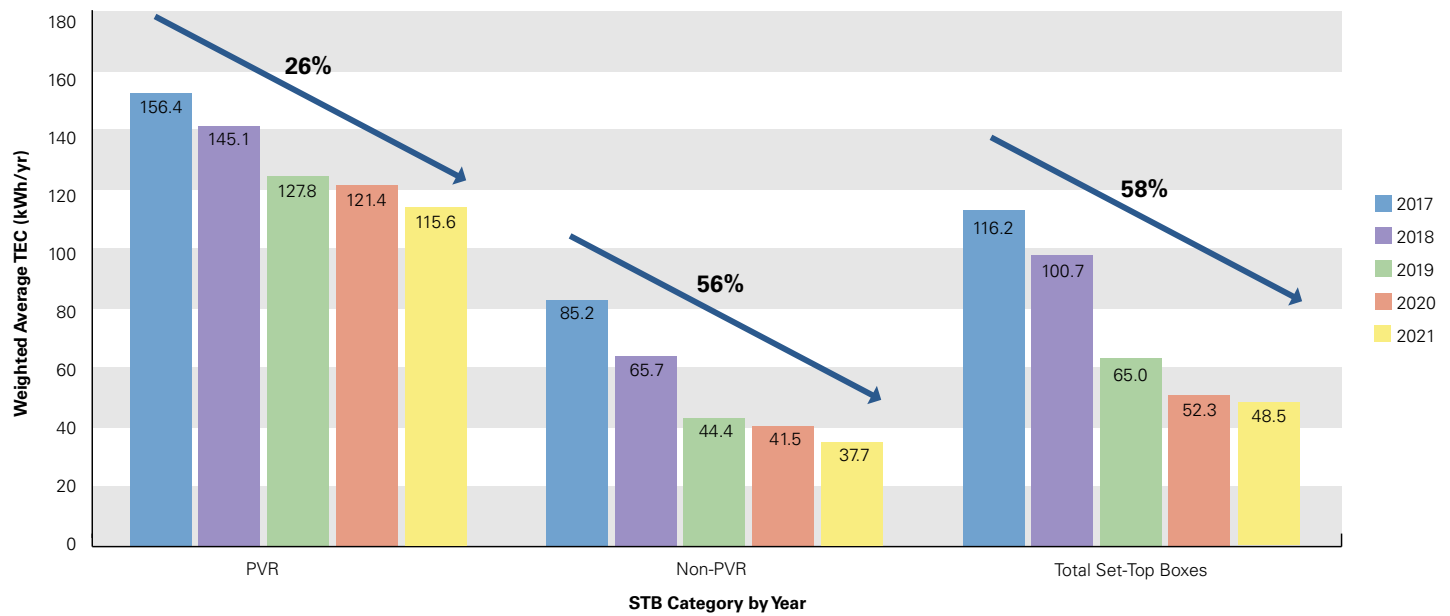
Across all set-top box categories, there has been a 58% reduction in the weighted average TEC of new purchases since 2017. These savings are driven in part by the decline over the five years in the procurement of PVRs, which generally consume more energy than non-PVR devices. Service providers have deployed whole-home architectures that enable customers to view recorded content throughout their home using a single PVR, and some have deployed cloud-based services that enable customers to record and view recorded content without any PVR at all. The impact of the growth of these innovative offerings is illustrated in Table 3, below, which demonstrates the increase in non-PVRs and decrease in PVRs as a percentage of total new set-top boxes received in a given year. From 2018 to 2020, there was a steady decline in the number of new PVRs purchased, after a nearly even distribution in 2017 and 2018. From 2020 to 2021, while there was an increase in the percentage of new PVRs, Non-PVRs still made up the majority of new set-top boxes purchased in 2021.

Table 3: Percentage of Set-Top Boxes Received by Category 2017-2021

Category/Received Units	2017	2018	2019	2020	2021
PVR	44%	44%	25%	13%	14%
Non-PVR	56%	56%	75%	87%	86%

In summary, the improved energy efficiency of models and the continued shift to a greater proportion of lower-powered models have combined to dramatically reduce the overall energy usage of new set-top box purchases.

CEEVA SNE

The second initiative of the Agreements, CEEVA SNE, was adopted as of January 1, 2020, to improve the energy efficiency of SNE for residential Internet services. CEEVA SNE aims to achieve the deployment of efficient SNE without restricting the rapid pace of technological innovation characteristic of Internet services. This program aligns with the technical standards and test methods of a similar SNE voluntary agreement adopted in the United States,[7] but—as with the CEEVA STB— contains appropriate provisions unique to the Canadian context, including terms for the participation of NRCan.

The Internet service provider signatories provided wired broadband Internet services to approximately 10.2 million Canadian residential customers. The service provider signatories have each committed that 90% of their new modems, routers, and other program equipment used to serve these customers will meet prescribed efficiency levels beginning January 1, 2021. In the first year that these commitments were in effect, 100% of the new units received by the signatories in 2021 met CEEVA SNE's Tier 2 efficiency levels.

Small Network Equipment Covered

CEEVA classifies SNE into three categories:

- **Broadband Modems:** Simple network devices that enable high-speed data service with a Wide Area Network (WAN) interface to a service provider wired or optical network, and typically a single Local Area Network (LAN) 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 include 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, 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 LAN beyond its physical limitations.[8]

The commitment effective date for CEEVA SNE began on January 1, 2021. All new SNE received by service provider signatories after the commitment effective date are covered. This is the first annual report in which the procurement commitments are in full effect.

Small Network Equipment Testing

Products procured after January 1, 2021, are required to be tested by a Steering Committee-approved organization with ISO 17065 or 17025 accreditation and/or recognized by the Standards Council of Canada for SNE testing. Similar to CEEVA STB, testing requirements were waived for 2021 as a result of the COVID-19 pandemic and restrictions placed on travel and lab access. Even though official testing was waived, signatories were able to use previous test results, informal test results obtained in their laboratories, or test results from the public postings in the U.S. SNE Voluntary Agreement program for models reported in both countries.

Small Network Equipment Service Provider Commitments

The service providers' primary commitment under CEEVA SNE is that 90% of the new units that each signatory receives each year will meet CEEVA SNE's energy-efficiency levels. The initial allowances are described as Tier 2 to correspond to the second tier of allowances in effect for the SNE Voluntary Agreement in the United States. Service providers have also committed to inform consumers about the general energy consumption characteristics of SNE that they receive and to take

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7 - U.S. Voluntary Agreement for Ongoing Improvement to the Energy Efficiency of Small Network Equipment, https://www.energy-efficiency.us/library/pdf/SNE-VoluntaryAgreement.pdf.

8 - Definitions of these categories are provided in Annex A of CEEVA SNE, https://www.energyefficiency-va.ca/wp-content/uploads/2019/12/CEEVA-SNE-Final-12-17-19.pdf.

reasonable steps to monitor the effectiveness of CEEVA SNE by reviewing its terms annually.

Report on Small Network Equipment Procurement

In 2021, 100% of new SNE purchased by the service provider signatories met the CEEVA SNE energy-efficiency levels, as shown in Table 4 below.

Table 4: Total Units Received in 2021 and Number Meeting Energy-Efficiency Levels, by Small Network Equipment Type

Category	Received Units	Number of Units Meeting Tier 2 Levels	Percentage of Units Meeting Tier 2 Levels
IAD	2,028,878	2,028,878	100.0%
LNE	641,702	641,702	100.0%
Total	**2,670,580**	**2,670,580**	**100.0%**

The signatories did not report receipt of any new broadband modems in 2021.

IADs represent 76% of reported products and LNE represents 24%. There were no broadband modems reported in 2021. Figure 3 shows the category breakdown, by percentage, of the units purchased.

Figure 3: Small Network Equipment, by Equipment Type

24%

76%

■ LNE   ■ IAD
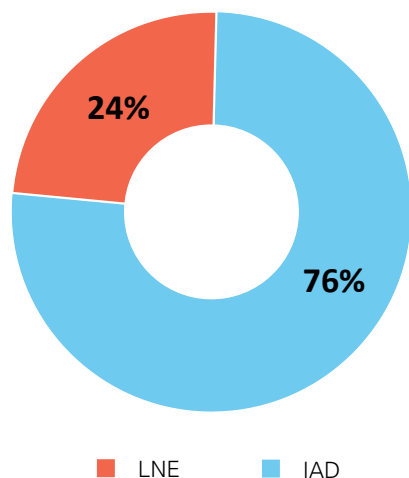
Small Network Equipment Energy Efficiency

While the weighted average power of set-top boxes has sharply declined under CEEVA, securing absolute energy reductions for SNE is more challenging as consumers increasingly demand support for faster Internet speeds and stronger Wi-Fi signals that require additional power in SNE. Nonetheless, the total weighted average of new SNE declined nearly 12% from 2020 to 2021. Details of the new SNE received by the signatories in 2021 are provided in Appendix B. The energy efficiency of each model is assessed based upon its particular suite of functions and capabilities, which vary widely between IADs and LNE. The weighted average power of each of the categories reported for CEEVA SNE is shown in Table 5 below.

Table 5: Weighted Average Idle Mode Power Consumption for Small Network Equipment Purchased in 2020-2021

| SNE Category	Weighted Average Power (in Watts)	
	2020	2021
IAD	20.46	17.85
LNE	4.30	6.23
Total Weighted Average	16.44	15.06

The increase in per-unit LNE power is less concerning than it may appear because, based on the models reported, the increase is attributed to a shift to models of network extenders that use more power per unit but typically require fewer units per home, resulting in an overall energy savings. The newer models support additional radios and more MIMO spatial streams, which support better Wi-Fi coverage throughout the home. A single unit of these more capable network extenders typically replaces two or three of the lower-power network extenders, reducing the overall power consumed in the home.

The energy usage of SNE should also be evaluated not only on year-to-year comparisons of nominal power, but also on the overall efficiency of products relative to their capability. Average fixed consumer broadband speeds increased by nearly 40% in 2021, as shown in Figure 4. Support for these higher speeds requires more energy for processing, memory and other functions. Moreover, new SNE is designed to be capable of supporting the even greater demands anticipated in the future over the expected lifespan of devices

Figure 4: Average Fixed Broadband Download Internet Speed 2020-2021[9]
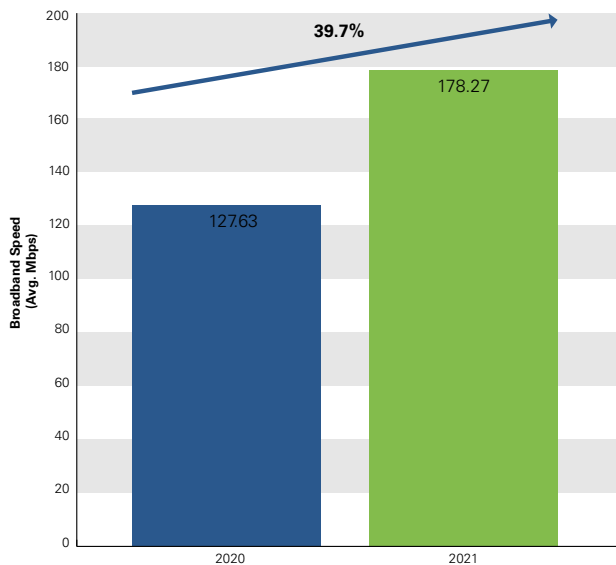
The average weighted power of new SNE relative to broadband speed delivered has decreased by 34%, as shown in Figure 5. With increased speeds and functionality of devices, this report finds that the signatories are delivering SNE functionalities more efficiently. Future reports will monitor this trend and evaluate its impact on SNE energy usage and efficiency.

9 - Ookla, *Speedtest® Canada's Mobile and Fixed Broadband Internet Speeds* (Q3 2020 & Q3 2021), https://www.speedtest.net/global-index/canada#mobile.

Figure 5: Weighted Average Energy Usage of New SNE, Relative to Broadband Download Speed
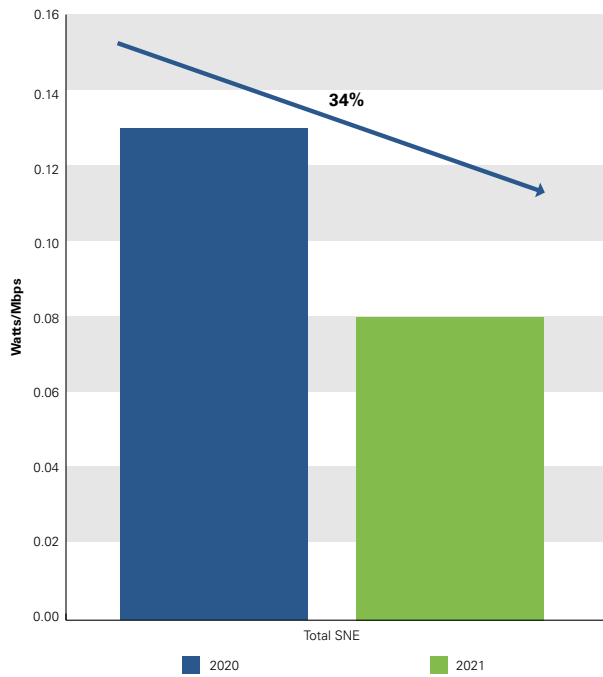
These figures were calculated by dividing the average idle power of each equipment type as verified by D+R in this report by the average fixed mean broadband download speed reported by Ookla. For 2020, the average download speed was calculated from the Q3 2020 regional speed data. For 2021, the average download speed was calculated from the July, August, and September 2021 data. The data for 2020 and 2021 is available at https://www.speedtest.net/global-index/canada#market-analysis.

ENERGY-EFFICIENCY INFORMATION FOR CONSUMERS

All service provider signatories committed to provide their subscribers and prospective customers with reasonable access to energy-efficiency information about reported set-top boxes and small network equipment. This information allows consumers to learn about their options for energy-efficient devices. Links to this information are shown in Appendix C and posted online at www.energyefficiency-va.ca.

CONCLUSION

CEEVA STB continued to achieve success in 2021, with a 5% and 9% year-over-year reduction in weighted average energy use of PVRs and non-PVRs respectively, resulting in a 58% reduction since 2017. These improvements in energy efficiency are widespread, with more than 99% of new set-top boxes meeting Tier 2 energy levels in 2021. In the first year in which the procurement commitment was in effect for CEEVA SNE, 100% of devices met the procurement commitment and the total weighted average energy usage declined by nearly 12% compared to 2020, even with an almost 40% increase in fixed broadband speed. D+R will continue to monitor progress and developments for both set-top box and SNE energy efficiency in future reports.

APPENDIX A: TIER 2 SET-TOP BOXES RECEIVED IN 2021 BY SERVICE PROVIDER SIGNATORIES

Table 6 lists the reported TEC for new Tier 2 set-top box models received by CEEVA STB Service Provider signatories in 2021. These values are reported TEC, rather than calculated TEC. In CEEVA STB, service providers have the option to publish a "reported TEC" that rounds up calculated TEC values for reporting purposes to account for production variances. Modal power and reported TEC figures in this Appendix are rounded up to the next one-tenth digit (e.g., 99.11 kWh/year would be rounded up to 99.2 kWh/year). Please note that the same model could have variances in TEC for several reasons, including differences in reported versus calculated TEC, enabling of different product features, and/or deployment of the device by service providers running different software. CEEVA STB calculates maximum allowable TEC for a product using the base-type allowances outlined in Table 7 and the feature allowances outlined in Table 8. Table 8 also includes descriptions of the features abbreviated in Table 6 in the "Claimed Allowances" column. CEEVA STB sets forth rules for how to claim feature allowances, so the column for claimed allowances lists only the features used when calculating the maximum allowable TEC for the specific product to qualify toward meeting the signatory's commitment.

Table 6: Tier 2 Set-Top Boxes Received by Service Provider Signatories in 2021

Set-Top Boxes Received by Service Provider Signatories in 2021					Claimed Allowances	Reported Modal Power (W)		TEC (kWh/yr)
Service Provider	Base Type	Primary Function	Brand	Model No.		On	Sleep	
Bell	IP	Non-DVR	CommScope	2502	Adv Video, HD, HNI, MS, MS-A, W-HNI, MIMO-5(4)	11.9	11.6	103.0
Bell	IP	DVR	CommScope	5662	Adv Video, DVR, HD, HNI, S-DVR, MS, W-HNI, MIMO-5(4)	13.6	12.2	114.0
Bell	Satellite	Non-DVR	DISH Technologies	7500	Adv Video, APD, HD, HNI, M-HNI	5.3	5.0	45.0
Bell	Satellite	DVR	DISH Technologies	9500	Adv Video, APD, DVR, HD, HNI, M-HNI, S-DVR, MS, HEVP	14.3	13.9	124.0
Bell	IP	Non-DVR	Askey Computer	STI6130	Adv Video, HD, HNI, W-HNI, MIMO-2.4(2), MIMO-5(2), HEVP, UHD-4	2.7	0.4	15.0
Cogeco	IP	Non-DVR	Technicolor	UIW4020COG (Sapphire)	Adv Video, HD, HNI, W-HNI, MIMO-2.4(3), MIMO-5(3), HEVP, UHD-4	5.0	2.9	40.0
Cogeco	Cable	Non-DVR	ARRIS	DCX525/0310/001 Phase 1	Adv Video, HD, HNI	7.7	7.3	66.0
Cogeco	IP	Non-DVR	Sagemcom	DIW3930	Adv Video, HD, HNI, W-HNI, MIMO-2.4(3), MIMO-5(3), HEVP	3.4	2.3	30.0
Rogers	IP	Non-DVR	Technicolor	TX061AEI	Adv Video, APD, HD, HNI, W-HNI, MIMO-2.4(2), MIMO-5(2), HEVP, UHD-4	5.3	3.4	42.0
Rogers	IP	Non-DVR	ARRIS	AX061AEI	Adv Video, APD, HD, HNI, W-HNI, MIMO-2.4(2), MIMO-5(2), HEVP, UHD-4	5.7	4.0	42.0
Shaw	IP	Non-DVR	Technicolor	TX061AEI	Adv Video, HD, HNI, W-HNI, MIMO-2.4(2), MIMO-5(2), HEVP	4.2	3.3	40.0
Shaw	IP	Non-DVR	CommScope (ARRIS Global)	AX061AEI	Adv Video, HD, HNI, W-HNI, MIMO-2.4(2), MIMO-5(2), HEVP	4.0	2.9	40.0
Shaw	Satellite	DVR	CommScope (EDC)	DSR830	Adv Video, DVR, HD, MS, MIMO-5(2)	12.7	11.8	110.0
Shaw	Satellite	Non-DVR	CommScope (EDC)	DSR800	Adv Video, HD, MIMO-5(2)	7.0	6.4	65.0
Videotron	IP	Non-DVR	ARRIS	Xi6-A	Adv Video, HD, HNI, W-HNI, MIMO-2.4(2), MIMO-5(2), HEVP, UHD-4	5.1	3.2	40.0
Videotron	IP	Non-DVR	Technicolor	Xi6-T	Adv Video, HD, HNI, W-HNI, MIMO-2.4(2), MIMO-5(2), HEVP, UHD-4	5.5	3.5	43.0

Table 7 lists the base type and allowances (kWh/year) for set-top boxes received in 2021 shown in Table 6.

Table 7: Set-Top Box Base Allowances

Base Type	Tier 2 Allowance (kWh/yr)
Cable	45
Internet Protocol (IP)	45
Satellite	50

Table 8: Set-Top Box Feature Allowances

Table 8 lists the features, feature descriptions, and allowances (kWh/year) for set-top boxes received in 2021 shown in Table 6.

Feature	Description	Tier 2 Allowance (kWh/yr)
Adv Video	Advanced Video Processing	8
APD	Automatic Power Down (4hrs)	-
CableCARD	CableCARD	15
DVR	Digital Video Recorder (DVR)	45
HD	High Definition (HD)	12
HEVP	High Efficiency Video Processing	10
HNI	Home Network Interface	10
M-HNI	MoCA HNI	12
MIMO-2.4	MIMO WiFi HNI 2.4	2
MIMO-5	MIMO WiFi HNI 5	4
MS	Multi-stream	8
MS-A	Multi-stream Additional	8
Multi-room	Multi-room	40
S-DVR	Shared DVR	20
UHD-4	Ultra High Definition - 4K	5
W-HNI	WiFi HNI	15

APPENDIX B: TIER 2 SMALL NETWORK EQUIPMENT RECEIVED IN 2021 BY SERVICE PROVIDER SIGNATORIES

Appendix B lists the Tier 2 SNE reported by the Service Provider signatories in 2021. Note that the same model deployed by different signatories 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. 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). CEEVA SNE calculates maximum allowable idle power for a product using the base and feature allowances listed in Table 10, which includes descriptions of the features abbreviated in Table 9 in the "Claimed Allowances" column. CEEVA SNE sets forth rules for how to claim feature allowances, so the column for claimed allowances lists only the features used when calculating the maximum allowable idle power for the specific product to qualify toward meeting the signatory's commitment.

Table 9: Tier 2 Small Network Equipment Received by Signatories in 2021

Signatory	Brand	Model Number	Base Type	Claimed Allowances	Reported Idle Power (W)
Bell	Sagemcom	HomeHub 3000 (Fast5566)	IAD VDSL2	GigE Backup WAN, SFP Backup WAN Not Present, VDSL2 Simul WAN, GigE LAN(4), Wi-Fi (n) HP, Wi-Fi (ac) HP(2), Wi-Fi above 2x2 HP(6), 802.11n 256 QAM, FXS(2), USB 3(2), PCIe(2)	17.00
Bell	Sagemcom	Valerie - Virgin Internet (Fast5566)	IAD VDSL2	GigE Backup WAN, SFP Backup WAN Not Present, VDSL2 Simul WAN, GigE LAN(4), Wi-Fi (n) HP, Wi-Fi (ac) HP(2), Wi-Fi above 2x2 HP(6), 802.11n 256 QAM, FXS(2), USB 3(2), PCIe(2)	17.00
Bell	Sagemcom	Pods Gen 1	Basic LNE	GigE LAN, Wi-Fi (n) LP, Wi-Fi (ac) LP, Bluetooth	3.50
Bell	Sagemcom	Pods Gen 2	Basic LNE	GigE LAN(2), Wi-Fi (n) LP, Wi-Fi (ac) LP(2), Wi-Fi above 2x2 LP(2), 802.11n 256 QAM, Bluetooth, PCIe(3)	6.50
Bell	Sagemcom	HomeHub 4000 (Fast5689)	IAD 10G EPON	GigE Backup WAN, GigE LAN(4), Wi-Fi (n) HP, Wi-Fi (ac) HP, Wi-Fi above 2x2 HP(4), 802.11n 256 QAM, FXS(2), USB 3, ZigBee, Z-wave	14.00
Bell	Sagemcom	Pods Gen 3	Basic LNE	GigE LAN(2), Wi-Fi (n) LP, Wi-Fi (ac) LP(2), Wi-Fi above 2x2 LP(2), 802.11n 256 QAM, Bluetooth, PCIe(3)	6.50
Cogeco	ARRIS	TG3452	IAD D3.1	GigE LAN(4), Wi-Fi (ac) LP, Wi-Fi above 2x2 LP(2), Wi-Fi (n) HP, Wi-Fi above 2x2 HP, MoCA, FXS(2), USB 3	18.00
Cogeco	Hitron	CODA 4589	IAD D3.1	GigE LAN(4), Wi-Fi (n) HP, Wi-Fi (ac) HP, Wi-Fi above 2x2 HP(3), MoCA, FXS(2), USB 3	17.00
Cogeco	Sagemcom	B1A	Basic LNE	GigE LAN(2), Wi-Fi (n) LP, Wi-Fi (ac) LP(2), Wi-Fi above 2x2 LP(2), 802.11n 256 QAM, Bluetooth, PCIe(3)	6.50
Cogeco	CIG	WF-8052	Basic LNE	GigE LAN(2), Wi-Fi (n) LP, Wi-Fi (ac) LP(2), Wi-Fi above 2x2 LP(2), 802.11n 256 QAM, Bluetooth, PCIe(3)	6.50
Cogeco	Sercomm	900-2090-00	Basic LNE	GigE LAN(2), Wi-Fi (n) LP, Wi-Fi (ac) LP(2), Wi-Fi above 2x2 LP(2), 802.11n 256 QAM, Bluetooth, PCIe(3)	6.50
Cogeco	Sagemcom	B1A	Basic LNE	GigE LAN(2), Wi-Fi (n) LP, Wi-Fi (ac) LP(2), Wi-Fi above 2x2 LP(2), 802.11n 256 QAM, Bluetooth, PCIe(3)	6.50
Rogers	Technicolor	CGM4141COM	IAD D3.1	GigE LAN(2), Wi-Fi (n) LP, Wi-Fi (ac) LP, Wi-Fi above 2x2 LP(6), 802.11n 256 QAM, MoCA, FXS(2), Bluetooth, ZigBee, PCIe(2), AP 5K-10K DMIPS	24.00
Rogers	WNC	WNXE12AWR	Basic LNE	GigE LAN, Wi-Fi (n) LP, Wi-Fi (ac) LP, Bluetooth	3.50
Rogers	Sagemcom	XE2-SG	Basic LNE	GigE LAN(2), Wi-Fi (n) LP, Wi-Fi (ac) LP(2), Wi-Fi above 2x2 LP(2), 802.11n 256 QAM, Bluetooth, PCIe(3)	6.50
Rogers	Technicolor	CGM4331COM	IAD D3.1	GigE LAN(4), Wi-Fi (n) HP, Wi-Fi (ac) HP, Wi-Fi above 2x2 HP(4), 802.11n 256 QAM, FXS(2), Bluetooth, ZigBee, PCIe(2), AP 5K-10K DMIPS	16.00
Rogers	Commscope	TG4482A	IAD D3.1	GigE LAN(4), Wi-Fi (n) HP, Wi-Fi (ac) HP, Wi-Fi above 2x2 HP(4), 802.11n 256 QAM, FXS(2), Bluetooth, ZigBee, PCIe(2), AP 5K-10K DMIPS	22.80
Rogers	Technicolor	CGM4331COM	IAD D3.1	GigE LAN(4), Wi-Fi (n) HP, Wi-Fi (ac) HP, Wi-Fi above 2x2 HP(4), 802.11n 256 QAM, FXS(2), Bluetooth, ZigBee, PCIe(2), AP 5K-10K DMIPS	16.00
Rogers	Sagemcom	XE2-SG	Basic LNE	GigE LAN(2), Wi-Fi (n) LP, Wi-Fi (ac) LP(2), Wi-Fi above 2x2 LP(2), 802.11n 256 QAM, Bluetooth, PCIe(3)	6.50
Shaw	Hitron	CODA-5810	IAD D3.1	GigE LAN(3), Wi-Fi (n) HP, Wi-Fi (ac) HP, Wi-Fi above 2x2 HP(4), 802.11n 256 QAM, USB 3, PCIe(2), AP 5K-10K DMIPS	20.00
Shaw	Commscope (Arris Global)	TG4482	IAD D3.1	GigE LAN(4), Wi-Fi (n) HP, Wi-Fi (ac) HP, Wi-Fi above 2x2 HP(4), 802.11n 256 QAM, FXS(2), Bluetooth, ZigBee, PCIe(2), AP 5K-10K DMIPS	22.80
Shaw	Technicolor	CGM4331SHW	IAD D3.1	Fast E LAN, GigE LAN(3), Wi-Fi (n) HP, Wi-Fi (ac) HP, Wi-Fi above 2x2 HP(2), 802.11n 256 QAM, MoCA, FXS(2), Bluetooth, ZigBee, PCIe(3), AP 5K-10K DMIPS	16.00

Table 9: Tier 2 Small Network Equipment Received by Service Provider Signatories in 2021 (cont.)

Signatory	Brand	Model Number	Base Type	Claimed Allowances	Reported Idle Power (W)
Shaw	Technicolor	CGM4140SHW	IAD D3.1	GigE LAN(2), Wi-Fi (n) LP, Wi-Fi (ac) LP, Wi-Fi above 2x2 LP(6), 802.11n 256 QAM, MoCA, FXS(2), Bluetooth, ZigBee, Z-wave, PCIe(2), AP 5K-10K DMIPS	24.00
Shaw	Hitron	CODA-4582	IAD D3.1	GigE LAN(4), Wi-Fi (n) HP, Wi-Fi (ac) HP, Wi-Fi above 2x2 HP(2), 802.11n 256 QAM, Bluetooth, ZigBee	18.00
Videotron	Technicolor	CGM4141VDT	IAD D3.1	GigE LAN(2), Wi-Fi (n) LP, Wi-Fi (ac) LP, Wi-Fi above 2x2 LP(6), 802.11n 256 QAM, MoCA, FXS(2), Bluetooth, ZigBee, Z-wave, PCIe(2), AP 5K-10K DMIPS	24.00
Videotron	Hitron	CODA-4680	IAD D3.1	GigE LAN(4), Wi-Fi (n) HP, Wi-Fi (ac) HP, Wi-Fi above 2x2 HP(3), USB 3, PCIe(2), AP 5K-10K DMIPS	18.00
Videotron	ARRIS	TM804G	IAD D3.0	D3 above 4x4, GigE LAN, FXS(4), BATTERY	8.20
Videotron	Commscope	TG4482	IAD D3.1	GigE LAN(4), Wi-Fi (n) HP, Wi-Fi (ac) HP, Wi-Fi above 2x2 HP(4), 802.11n 256 QAM, MoCA, FXS(2), Bluetooth, ZigBee, PCIe(2), AP 5K-10K DMIPS	24.50
Videotron	Hitron	NOVA-2004	IAD 10G EPON	GigE LAN(2), FXS(2)	9.60

Table 10 lists the base and feature allowances (in watts) and feature descriptions for SNE received in 2021 shown in Table 9.

Table 10: Small Network Equipment Allowances

Description	Descriptor	Allowance
Base Allowance: IAD Devices (by WAN interface) (watts)		
DOCSIS 3.0 basic configuration (4x4)	IAD D3.0	6.00
DOCSIS 3.1 No FDX	IAD D3.1	15.10
VDSL2 (8, 12a, 17a, but not 30a)	IAD VDSL2	4.50
10G EPON	IAD 10G EPON	13.00
Base Allowance: LNE (watts)		
LNE other than Advanced LNE	Basic LNE	1.50
Adders for Additional Backup WAN Interface		
Gigabit Ethernet WAN	GigE Backup WAN	0.40
SFP Not Present	SFP Backup WAN Not Present	0.70
Adders for Simultaneous Additional WAN Interface		
VDSL2 (8, 12a, 17a, but not 30a)	VDSL2 Simul WAN	3.20
DOCSIS 3.0 additional power allowance for each additional 4 downstream channels	D3 above 4x4	1.30
Adders for LAN interfaces and Additional Functionality		
1 Gigabit Ethernet port	GigE LAN	0.20
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	1.00
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	1.80
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	0.30
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	1.10
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	2.20
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	0.30
Wi-Fi IEEE 802.11n at 2.4GHz supporting 256-QAM	802.11n 256 QAM	0.50
MoCA 1.1/2.0 Single Channel	MoCA	2.20
FXS	FXS	0.30
USB 3.0 - no load connected	USB 3	0.20
Built-in back-up battery	BATTERY	0.40
Bluetooth	Bluetooth	0.50
ZigBee	ZigBee	0.20
Z-wave	Z-wave	0.20
PCIe Interface (Connected)	PCIe	0.20
Application Processor 5K-10K DMIPS	AP 5K-10K DMIPS	1.00

APPENDIX C: AVAILABILITY OF ENERGY-EFFICIENCY INFORMATION FOR CONSUMERS

The service provider signatories committed to providing reasonable, public access to energy-efficiency information for reported set-top box and small network equipment devices. The URLs for such information are posted below. Information for all companies is also available at www.energyefficiency-va.ca.

Table 11: Consumer Set-Top Box Energy-Efficiency Information

Service Provider Signatory	Consumer information Location
Bell	https://bce.ca/responsibility/key-documents/2021-bell-stb-energy-information.pdf
Cogeco	https://energyca.cablelabs.com/cogeco/
Rogers	https://energyca.cablelabs.com/rogers/
Shaw (Cable)	https://support.shaw.ca/t5/tv-articles/equipment-info-shaw-tv-box-energy-consumption/ta-p/5187
Shaw (Satellite)	https://www.shawdirect.ca/english/support/article?articleid=8389&languageid=1033
Videotron	https://energyca.cablelabs.com/videotron/

Table 12: Consumer Small Network Equipment Energy-Efficiency Information

Service Provider Signatory	Consumer information Location
Bell	https://bce.ca/responsibility/key-documents/2021-bell-sne-energy-information.pdf
Cogeco	https://energyca.cablelabs.com/cogeco-sne/
Rogers	https://energyca.cablelabs.com/rogers-sne/
Shaw	https://support.shaw.ca/t5/internet-articles/equipment-info-shaw-internet-hardware-energy-consumption/ta-p/20568
Videotron	https://energyca.cablelabs.com/videotron-sne/

APPENDIX D: STB AND SNE ANNUAL PROCUREMENT AUDITS

CEEVA requires service provider signatories to submit annual procurement data to the Data Aggregator, D+R, which collects and analyzes the data and publishes the results in an annual report. To protect confidential information, all data in the annual report are aggregated. In order to verify the accuracy of the submitted information from each service provider, both CEEVA STB and CEEVA SNE require an annual audit of one service provider's procurement figures.

Accordingly, the Data Aggregator conducted audits of the 2021 procurement data of one randomly selected service provider per program, which were used to develop the findings published in the 2021 Annual Report. The service providers were selected at random using the "random" function in Excel, and were prompted to provide the Data Aggregator a list of all new set-top boxes received in 2021 for CEEVA STB and a list of all new small network equipment in the case of the signatory selected for CEEVA SNE. D+R also requested shipment details and specification sheets for each model procured in both cases.

D+R, as the Data Aggregator, has determined that the data submitted by each service provider as part of the audit are consistent with the annual reports submitted by each party.

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