2020 Annual Report

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

D+R International

Prepared on behalf of the
Steering Committee by:
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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".

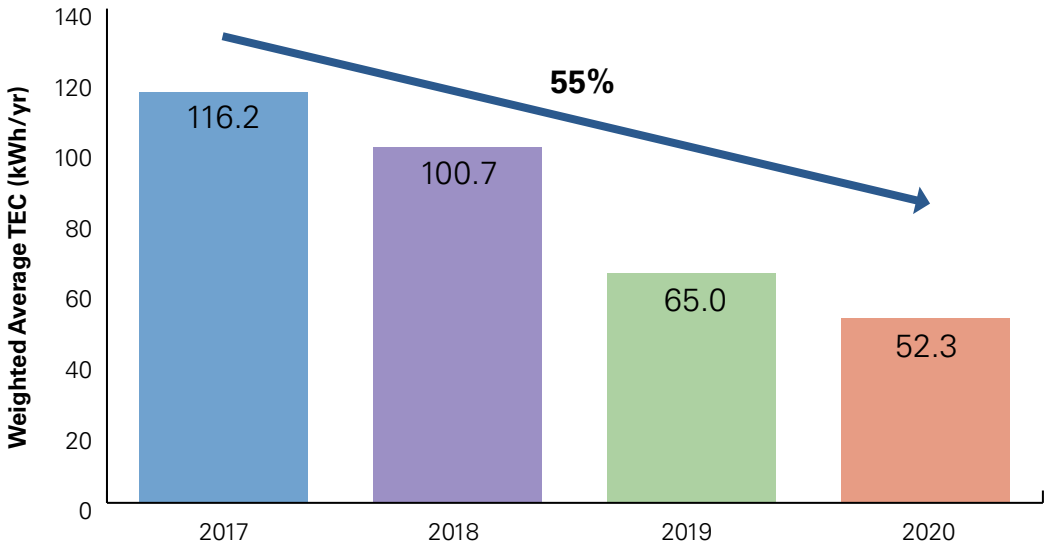
The primary objective of these programs is to improve the energy efficiency of set-top boxes and SNE while promoting innovation and introduction of new features without compromising the customer experience.

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 2020, over 99% of all new set-top boxes procured met these efficiency levels. In only four years since the Agreement's commitments initiated, the weighted average energy consumption for new set-top boxes has declined by 55%, as shown in Figure 1 below. These conclusions are based on 2020 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 rigorous efficiency levels beginning January 1, 2021. By 2020, each signatory reported that 100% of new SNE purchases had already met the CEEVA SNE efficiency levels set to take effect in 2021.

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 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 has been 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 the need for votes to be 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 2020, now 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 small network equipment 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 results of the 2020 audits are summarized in Appendix D.

CEEVA 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 2020, there were no new feature allowances reported by signatories for either program.

CEEVA STB

Canadian Pay TV providers deliver television service to approximately 10.1 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 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 Boxes[4] 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 2020 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 2020, the signatories served about 8.3 million subscribers, accounting for approximately 82% 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 reporting year, the testing requirement was waived due to the COVID-19 pandemic and the restrictions placed on travel for signatories and testing organizations. However, approximately 88% of the unique set-top box models received this year were tested in prior years of CEEVA STB and have been verified to meet the prescribed energy consumption levels. It is anticipated that the testing requirement will be reinstated for the 2021 reporting year, pending material abatement of the global pandemic.

3 - Total Canadian subscriber count was calculated by taking the 10.5 million subscribers reported at the end of 2019 from Canadian Radio-television and Telecommunications Commission, "2020 Communication Monitoring Report" available at https://crtc.gc.ca/pubs/cmr2020-en.pdf (pg. 19), and applying a 1.7% reduction factor, which the CRTC report indicated is the average annual subscriber decline over the prior five years.

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

5 - Canadian Radio-television and Telecommunications Commission, "2020 Communication Monitoring Report", https://crtc.gc.ca/pubs/cmr2020-en.pdf. The largest non-signatory, TELUS, serves a significant portion of the market not covered by CEEVA STB.

Set-Top Box Service Provider Commitments

The service providers' primary commitment under CEEVA STB in 2020 is that 90% of the new set-top boxes that each 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 addition to service provider signatories' above-noted commitment, 99% of set-top boxes received by service provider signatories met Tier 2 levels in 2020, up from 98% in 2019 and 97% in 2018. The percentage of PVRs meeting the Tier 2 levels declined in 2020 from the percentage reported in 2019, but because the number of PVRs received also declined by 44%, the signatories' overall percentage of purchases meeting the levels increased.

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 2017-2020

Category	2017		2018		2019		2020	
	Received Units	Percent Meeting Tier 2 Levels EARLY	Received Units	Percent of Units Meeting Tier 2 Levels	Received Units	Percent of Units Meeting Tier 2 Levels	Received Units	Percent of Units Meeting Tier 2 Levels
PVR	876,729	91%	894,532	89%	442,258	88%	247,302	76%
Non-PVR	1,137,735	77%	1,133,194	100%	1,349,190	100%	1,585,340	100%
Total	**2,014,464**	**86%**	**2,027,726**	**97%**	**1,791,448**	**98%**	**1,832,642**	**99%**

The commitment to meet Tier 2 didn't 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

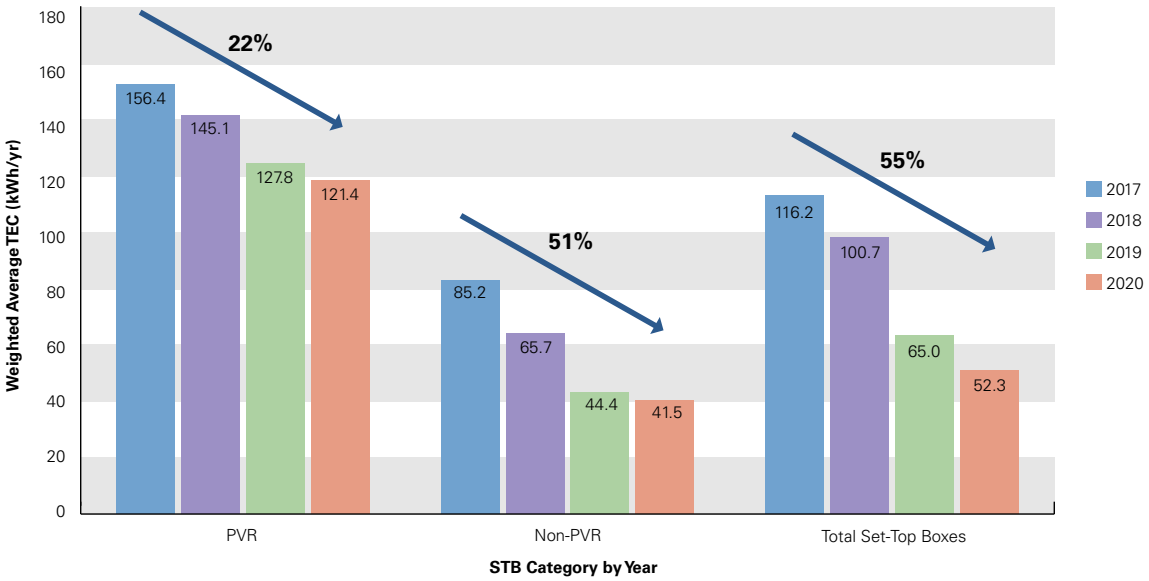
The weighted average Typical Energy Consumption[6] (TEC) for new set-top boxes received by the service provider signatories in 2020 was 121.4 kWh/year for PVRs and 41.5 kWh/year for non-PVRs. These figures represent 5% and 6% year-over-year declines respectively from 2019, and 22% and 51% declines compared 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 2017-2020

Category	Weighted Average TEC (kWh/yr)				Percent Change			
	2017	2018	2019	2020	2017-2018	2018-2019	2019-2020	2017-2020
PVR	156.4	145.1	127.8	121.4	-7%	-12%	-5%	-22%
Non-PVR	85.2	65.7	44.4	41.5	-23%	-32%	-6%	-51%
Total Set-Top Boxes	116.2	100.7	65.0	52.3	-13%	-35%	-19%	-55%

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 2017-2020



Across all set-top box categories, there has been a 55% reduction in the weighted average TEC of new purchases since 2017. These savings are driven in part by the 72% decline in the procurement of PVRs over the four years, 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. Specifically, the data shows the significant increase in the procurement of non-PVR devices as having resulted in a mix of 87% non-PVRs and 13% PVRs by 2020. Since 2018, there has been a steady decline in the number of new PVRs purchased, after a nearly even distribution in 2017 and 2018.

Table 3: Percentage of Set-Top Boxes Received by Category 2017-2020

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

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 2020 set-top box purchases.

CEEVA SNE

The second initiative within the Agreements, CEEVA SNE, was adopted as of January 1, 2020, to improve the energy efficiency of SNE for residential Internet services in Canada. 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 served broadband Internet services to approximately 10.8 million Canadian residential customers, accounting for nearly 71% of the market.[8] The service provider signatories have each committed that 90% of their new modems, routers, and other program equipment will meet prescribed efficiency levels beginning January 1, 2021. Although this commitment was not in full effect for products procured in 2020, 100% of units procured by signatories in 2020 met CEEVA SNE's efficiency levels a year in advance.

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 includes wireless access points, switches, and network extenders that bridge or extend a LAN beyond its physical limitations.[9]

Small Network Equipment Covered

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. The current reporting represents an early assessment of the signatories' progress toward the commitments that began in 2021 after the end of the 2020 reporting period covered by this report.

Small Network Equipment Testing

Products procured after January 1, 2021, will need 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 is expected to begin for the 2021 reporting year sometime after the COVID-19 pandemic has materially abated.

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 - Based on data provided by the signatories and the Canadian Radio-television and Telecommunications Commission's (CRTC) "2020 Communication Monitoring Report," https://crtc.gc.ca/pubs/cmr2020-en.pdf.

9 - 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.

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 as of January 1, 2021, 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 reasonable steps to monitor the effectiveness of CEEVA SNE by reviewing its terms annually.

Report on Small Network Equipment Procurement

As noted, CEEVA SNE service provider signatories have committed that 90% of the new units that each receives as of January 1, 2021, will meet CEEVA SNE's energy-efficiency levels. While that commitment was not yet in effect in 2020, early reporting demonstrates that 100% of new SNE purchased by the service provider signatories that year met the CEEVA SNE energy-efficiency levels, as shown in Table 4 below.

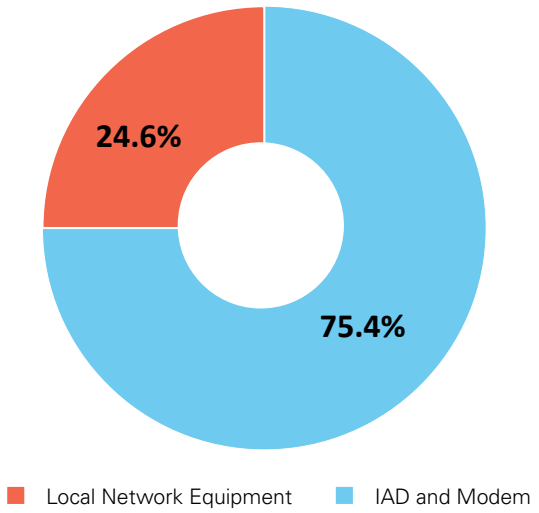
Table 4: Total Units Received in 2020 and Number Meeting Energy-Efficiency Levels, by Small Network Equipment Type

Category	Received Units	Number of Units Meeting Tier 2 Levels	Percentage of Units Meeting Tier 2 Levels
IAD and Modem	1,764,009	1,764,009	100.0%
Local Network Equipment	576,827	576,827	100.0%
Total	**2,340,836**	**2,340,836**	**100.0%**

Note that only one model of broadband modem was reported in 2020, and it met the Tier 2 energy-efficiency levels. It was combined with the IAD category to maintain confidentiality.

IADs represent 75% of reported products, followed by LNE with 25%. Less than 1% of the reported products were broadband modems in 2020. Figure 3 shows the category breakdown, by percentage, of the units purchased.

Figure 3: Small Network Equipment, by Equipment Type



Small Network Equipment Energy-Efficiency Baseline

Details of the SNE purchased or sold by the signatories in 2020 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:

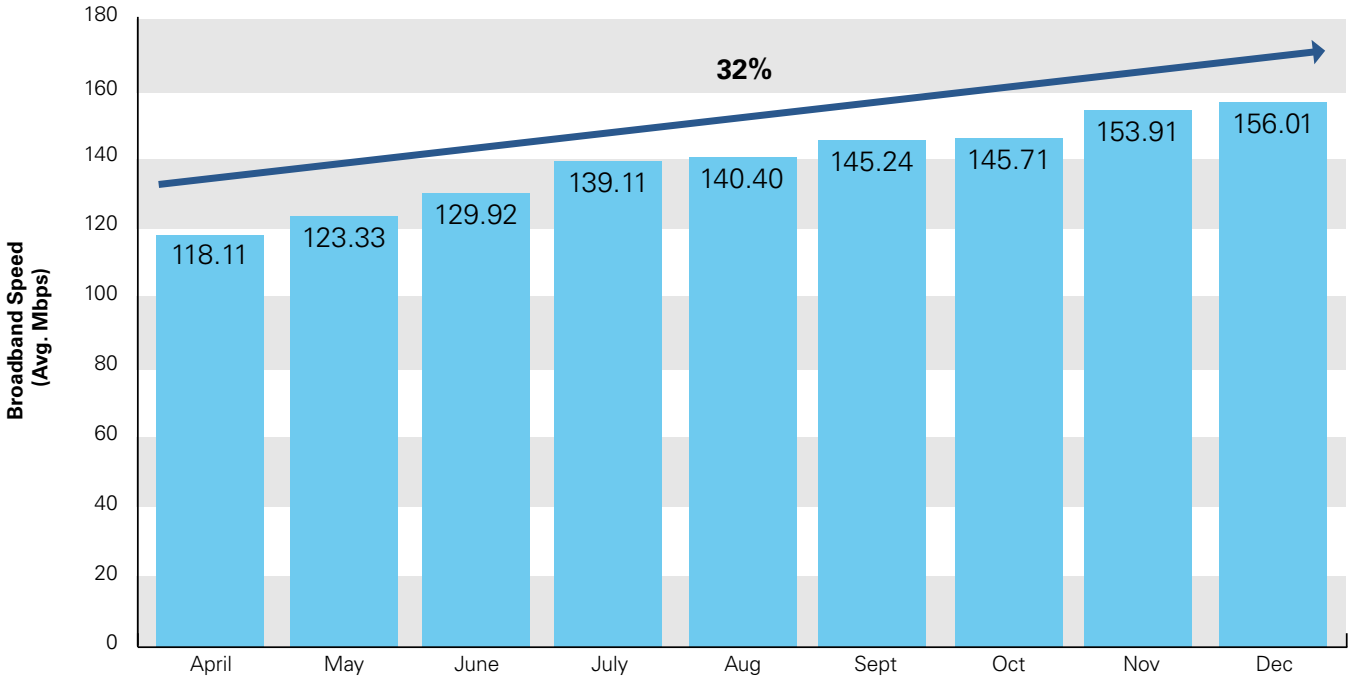
Table 5: Weighted Average Idle Mode Power Consumption for Small Network Equipment Purchased in 2020

SNE Category	Weighted Average Power (in Watts)
	2020
IAD and Modem	20.41
Local Network Equipment	4.30
Total Weighted Average	16.44

Note that only one model of broadband modem was reported in 2020, so it was included in the IAD category to maintain confidentiality.

While the weighted average power of set-top boxes has sharply declined under CEEVA, securing absolute energy reductions for SNE could be more challenging as consumers increasingly demand support for faster Internet speeds and stronger Wi-Fi signals that require additional SNE power. The average fixed broadband connection speed increased by 32% just in the last nine months of 2020, shown in Figure 4 below. Future reports will monitor this trend and evaluate its impact on SNE energy usage and efficiency.

Figure 4: Monthly Average Fixed Broadband Internet Speed from April to December 2020



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 significant success in 2020, with a 20% year-over-year reduction in weighted average energy use of set-top boxes, resulting in a 55% reduction since 2017. These improvements in energy efficiency are widespread, with 99% of new set-top boxes meeting Tier 2 energy levels in 2020.

The signatories built upon this success through implementation of a second CEEVA program for residential Internet equipment in 2020. 100% of new SNE models procured by the service provider signatories met the Agreement's energy-efficiency levels in 2020, one year before the commitment effective date, but the signatories will continue to be challenged in maintaining those efficiency levels as consumers increasingly demand more robust home Internet services.

APPENDIX A: SET-TOP BOXES RECEIVED DURING REPORTING PERIOD

Table 6 lists the reported TEC for new Tier 2 set-top box models received by CEEVA STB signatories in 2020. 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.

Table 6: Tier 2 Set-Top Boxes Received by Signatories in 2020

STBs Received by CEEVA Signatories in 2020					Claimed Allowances	Reported Modal Power (W)		TEC (kWh/yr)
Service Provider	Base Type	Primary Function	Brand	Model No.		On	Sleep	
Bell	IP	Non-PVR	CommScope	2502	Adv Video, HD, HNI, MS, W-HNI, MIMO-5(4)	11.9	11.6	103.0
Bell	IP	PVR	CommScope	5662	Adv Video, DVR, HD, HNI, S-DVR, MS, W-HNI, MIMO-5(4)	13.6	12.2	114.0
Bell	Satellite	Non-PVR	DISH Technologies	7500	Adv Video, APD, HD, HNI, M-HNI, HEVP	5.3	5.0	45.0
Bell	Satellite	PVR	DISH Technologies	9500	Adv Video, APD, DVR, HD, HNI, M-HNI, S-DVR, MS, HEVP	14.3	13.9	124.0
Bell	IP	Non-PVR	Askey Computer Corp	STI6130	Adv Video, HD, HNI, W-HNI, MIMO-2.4(2), MIMO-5(2), HEVP, UHD-4	2.7	0.4	15.0
Cogeco	Cable	PVR	ARRIS	DCX900/ P68C/0322/1000 Phase 1	Adv Video, CableCARD, DVR, HD, M-HNI, Multi-room, MS, MS-A, HEVP, UHD-4	17.6	14.7	143.0
Cogeco	IP	Non-PVR	ARRIS	DCX860/ R4CC/9322	Adv Video, HD, HNI, M-HNI	5.9	5.2	50.0
Cogeco	IP	Non-PVR	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-PVR	ARRIS	DCX525/0310/001 Phase 1	Adv Video, HD, HNI	7.7	7.3	66.0
Rogers	IP	Non-PVR	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-PVR	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-PVR	Technicolor	TX061AEI	Adv Video, HD, HNI, W-HNI, MIMO-2.4(2), MIMO-5(2), HEVP	4.2	3.3	40.0
Shaw	Satellite	PVR	ARRIS	DSR830	Adv Video, DVR, HD, MS, MIMO-5(2)	13.0	12.5	115.0
Videotron	IP	Non-PVR	ARRIS	AX061AEI	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-PVR	Technicolor	TX061AEI	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 2020 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 2020 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
D3	DOCSIS 3.0	50
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: SMALL NETWORK EQUIPMENT RECEIVED DURING REPORTING PERIOD

Appendix B lists the Tier 2 SNE reported by the signatories in 2020. 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).

Table 9: Tier 2 Small Network Equipment Received by Signatories in 2020

Signatory	Brand	Model Number	Base Type	Claimed Allowances	Reported Idle Power (W)
Bell	Sagemcom	Fast5566 (HomeHub 3000)	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	Fast5566 (Valerie - Virgin Internet)	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	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	ARRIS	AM525	Advanced LNE	GigE LAN(2), Wi-Fi (n) LP, Wi-Fi (ac) LP, Wi-Fi above 2x2 LP(2), MoCA	8.50
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	Hitron	HT EMN3	Advanced LNE	GigE LAN(2), Wi-Fi (n) LP, Wi-Fi (ac) LP, Wi-Fi above 2x2 LP(2), MoCA	5.50
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	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	6.50
Rogers	Technicolor	CGM4331COM	IAD D3.1	GigE LAN(4), Wi-Fi (n) HP, Wi-Fi (ac) HP, Wi-Fi above 2x2 HP(2), 802.11n 256 QAM, FXS(2), Bluetooth, ZigBee, PCIe(3), AP 5K-10K DMIPS	16.00
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, FXS(2), Bluetooth, ZigBee, Z-wave, PCIe(2), AP 5K-10K DMIPS	22.00
Shaw	Technicolor	CGM4331SHW	IAD D3.1	GigE LAN(4), Wi-Fi (n) HP, Wi-Fi (ac) HP, Wi-Fi above 2x2 HP(2), 802.11n 256 QAM, FXS(2), Bluetooth, ZigBee, PCIe(3), AP 5K-10K DMIPS	15.30
Shaw	Sagemcom	XE1	Basic LNE	GigE LAN, Wi-Fi (n) LP, Wi-Fi (ac) LP, Bluetooth	3.50
Shaw	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	6.50
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, PCIe(2), AP 5K-10K DMIPS	24.00
Videotron	Technicolor	CGM4331COM	IAD D3.1	GigE LAN(4), 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	17.50
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	Zyxel	EMG2926	Advanced LNE	GigE LAN(5), Wi-Fi (n) LP, Wi-Fi (ac) LP, USB 2(2)	6.00
Videotron	Wistron NeWeb Corp	HIXE12AWR	Basic LNE	GigE LAN, Wi-Fi (n) LP, Wi-Fi (ac) LP, Bluetooth	3.50
Videotron	TP-Link	TL-SG105	Basic LNE	GigE LAN(5)	1.80
Videotron	ARRIS	CM8200A/P2	Basic D3.1	GigE LAN(2)	12.00

Table 10 lists the features, feature descriptions, and allowances (watts) for SNE received in 2020 shown in Table 9.

Table 10: Small Network Equipment Feature Allowances

Description	Descriptor	Tier 2 Allowance (W)
Base Allowance: IAD Devices (by WAN interface)		
ADSL2plus	IAD ADSL2+	3.70
DOCSIS 3.0 basic configuration (4x4)	IAD D3.0	6.00
DOCSIS 3.1 No FDX	IAD D3.1	15.10
SFP with GPON	IAD SFP GPON	5.00
VDSL2 (8, 12a, 17a, but not 30a)	IAD VDSL2	4.50
VDSL2 (all above profiles including 30a)	IAD VDSL2 (30a)	6.00
Gigabit Ethernet	IAD GigE	4.00
MoCA 1.1/2.0	IAD MoCA	5.70
Base Allowance: Broadband Modems (by WAN Interface)		
DOCSIS 3.0 basic configuration (4x4)	Basic D3.0	4.50
DOCSIS 3.1 No FDX	Basic D3.1	13.60
G.fast	G.fast	4.20
Base Allowance: LNE		
LNE other than Advanced LNE	Basic LNE	1.50
Advanced LNE	Advanced LNE	3.50
Adders for Additional Backup WAN Interface		
Gigabit Ethernet WAN	GigE Backup WAN	0.40
SFP Not Present	SFP Backup WAN Not Present	0.70
VDSL2 (8, 12a, 17a, but not 30a)	VDSL2 Backup WAN	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 Fast Ethernet port	Fast E LAN	0.20
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 2.0 - no load connected	USB 2	0.10
USB 3.0 - no load connected	USB 3	0.20
Built-in back-up battery	BATTERY	0.40
Bluetooth	Bluetooth	0.50

Table 10: Small Network Equipment Feature Allowances (cont.)

Description	Descriptor	Tier 2 Allowance (W)
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: CONSUMER ENERGY-EFFICIENCY INFORMATION

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

Signatory	Consumer information Location
Service Providers	
Bell	https://www.bce.ca/responsibility/key-documents/2020-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

Signatory	Consumer information Location
Service Providers	
Bell	https://www.energyefficiency-va.ca/wp-content/uploads/2021/04/Bell-Website-SNE-Energy-Info_4152021-EN.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 2020 procurement data of one randomly selected service provider per program, which were used to develop the findings published in the 2020 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 2020 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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