Making Broadband Internet Labels Useful and Usable: Preliminary Report on Consumer-Driven Broadband Label Design

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For the latest updates on our broadband label research, see https://cups.cs.cmu.edu/broadband/

CyLab Carnegie Mellon University Security and Privacy Institute

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Lorrie Faith Cranor, Jon Peha, Christopher Choy, Ellie Young, and Megan Li

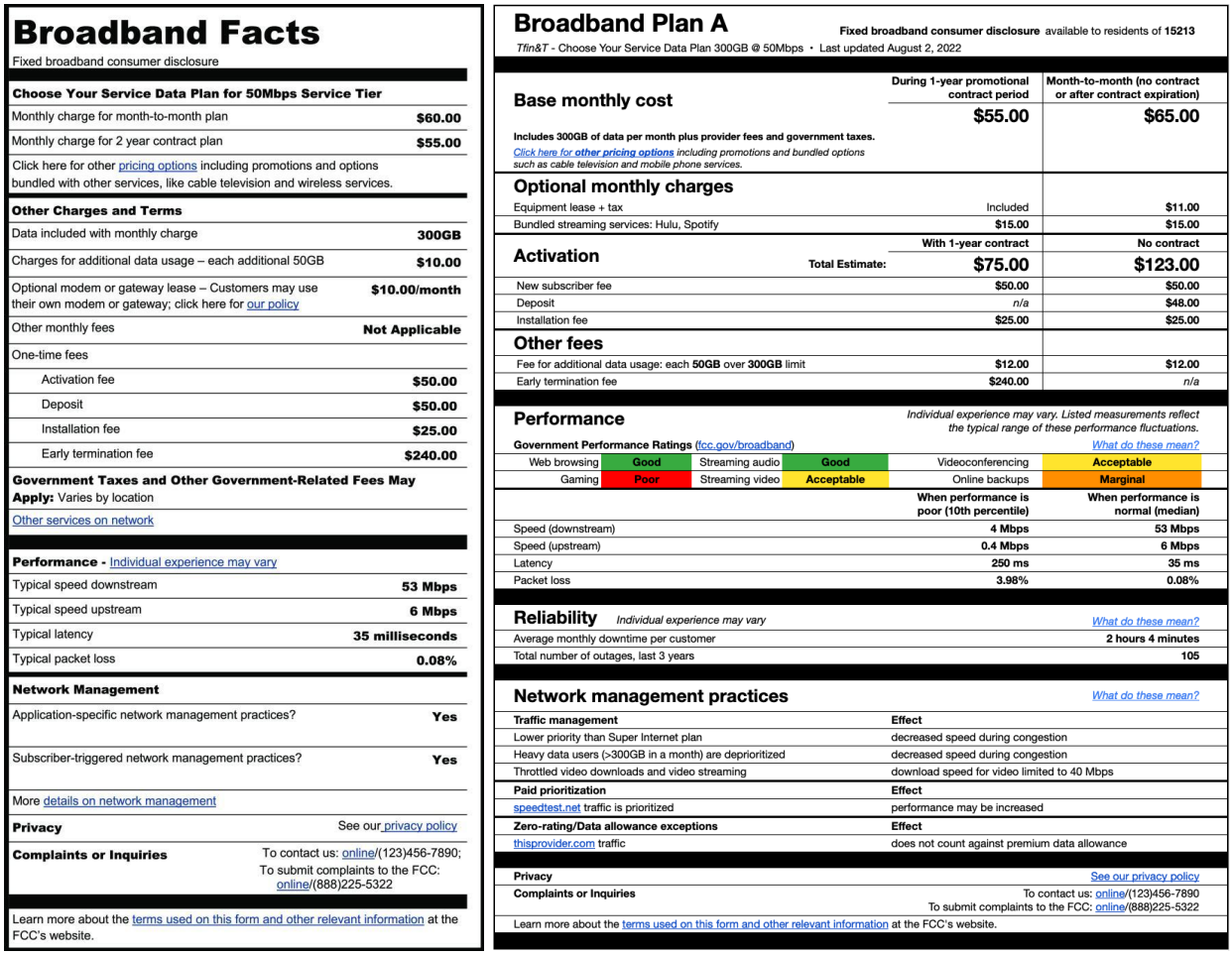
Executive Summary

In January 2022, the Federal Communications Commission (FCC) issued Notice of Proposed Rulemaking (NPRM) 22-7, which proposed requiring internet service providers to display broadband consumer disclosure labels prominently at the point of sale. In response to the FCC's request for comment in their NPRM, the CyLab Usable Privacy and Security Laboratory at Carnegie Mellon University conducted a large-scale user study to gain insight into what information is most important to US consumers when shopping for broadband internet services as well as what terminology and presentation formats make this information most understandable and useful to consumers. In addition, we examined the FCC's proposed 2016 broadband consumer label formats and proposed our own broadband consumer disclosure label formats.

We surveyed broadband internet consumers in a two-phase online study, recruiting from a diverse pool of 32,000 consumers who had previously participated in Consumer Report's consumer initiatives related to broadband internet. Across both survey phases we received a combined total of over 2,500 completed surveys. In the first phase we evaluated the 2016 labels to gain insights into what information was most important to consumers and what information caused confusion. We then created new label designs based on our results from the first phase. In the second phase, we compared the effectiveness of our new label designs with the 2016 labels. After analyzing our survey results, we made further revisions to our new label designs. This is a preliminary report of our findings and recommendations.

Phase 1 key findings

- Participants strongly supported the idea of broadband labels.
- Participants generally cared most about cost, speed, and reliability (a factor not included on the 2016 label) when considering a broadband plan for purchase.
- Participants were interested in metrics for both "normal" broadband performance and for times when performance is much worse than normal.
- Many participants were interested in seeing a score or grade for their plan's performance, but did not want it to replace the reporting of raw numbers.
- Participants expressed interest in using details about providers' network management practices to avoid providers with certain practices.
- Participants struggled to compute total service cost over the span of 2, 3, or 4 years using the information on the 2016 proposed label.
- Participants generally lacked knowledge of more technical terms and performance benchmarks–such as latency, packet loss, network management practices, performance percentiles, and network congestion–but when these terms were briefly explained to them, they often showed some understanding of the concepts.
- Across all comprehension questions, non-technical participants tended to perform worse than those who self-identified as having a technical background.



Broadband Facts

Fixed broadband consumer disclosure

Choose Your Service Data Plan for 50Mbps Service Tier	
Monthly charge for month-to-month plan	$60.00
Monthly charge for 2 year contract plan	$55.00
Click here for other pricing options including promotions and options bundled with other services, like cable television and wireless services.	
Other Charges and Terms	
Data included with monthly charge	300GB
Charges for additional data usage – each additional 50GB	$10.00
Optional modem or gateway lease – Customers may use their own modem or gateway; click here for our policy	$10.00/month
Other monthly fees	Not Applicable
One-time fees	
Activation fee	$50.00
Deposit	$50.00
Installation fee	$25.00
Early termination fee	$240.00
Government Taxes and Other Government-Related Fees May Apply: Varies by location	
Other services on network	
Performance - Individual experience may vary	
Typical speed downstream	53 Mbps
Typical speed upstream	6 Mbps
Typical latency	35 milliseconds
Typical packet loss	0.08%
Network Management	
Application-specific network management practices?	Yes
Subscriber-triggered network management practices?	Yes
More details on network management	
Privacy	See our privacy policy
Complaints or Inquiries	To contact us: online/(123)456-7890; To submit complaints to the FCC: online/(888)225-5322

Learn more about the terms used on this form and other relevant information at the FCC's website.

Broadband Plan A

Fixed broadband consumer disclosure available to residents of **15213**

Tfin&T - Choose Your Service Data Plan 300GB @ 50Mbps • Last updated August 2, 2022

Base monthly cost	During 1-year promotional contract period	Month-to-month (no contract or after contract expiration)
	$55.00	$65.00
Includes 300GB of data per month plus provider fees and government taxes. *Click here for other pricing options including promotions and bundled options such as cable television and mobile phone services.*		
Optional monthly charges		
Equipment lease + tax	Included	$11.00
Bundled streaming services: Hulu, Spotify	$15.00	$15.00
Activation	With 1-year contract	No contract
Total Estimate:	$75.00	$123.00
New subscriber fee	$50.00	$50.00
Deposit	n/a	$48.00
Installation fee	$25.00	$25.00
Other fees		
Fee for additional data usage: each **50GB** over **300GB** limit	$12.00	$12.00
Early termination fee	$240.00	n/a

Performance *Individual experience may vary. Listed measurements reflect the typical range of these performance fluctuations.*

Government Performance Ratings (fcc.gov/broadband) *What do these mean?*

Web browsing	Good	Streaming audio	Good	Videoconferencing	Acceptable
Gaming	Poor	Streaming video	Acceptable	Online backups	Marginal

	When performance is poor (10th percentile)	When performance is normal (median)
Speed (downstream)	4 Mbps	53 Mbps
Speed (upstream)	0.4 Mbps	6 Mbps
Latency	250 ms	35 ms
Packet loss	3.98%	0.08%

Reliability *Individual experience may vary* *What do these mean?*

Average monthly downtime per customer	2 hours 4 minutes
Total number of outages, last 3 years	105

Network management practices *What do these mean?*

Traffic management	Effect
Lower priority than Super Internet plan	decreased speed during congestion
Heavy data users (>300GB in a month) are deprioritized	decreased speed during congestion
Throttled video downloads and video streaming	download speed for video limited to 40 Mbps
Paid prioritization	**Effect**
speedtest.net traffic is prioritized	performance may be increased
Zero-rating/Data allowance exceptions	**Effect**
thisprovider.com traffic	does not count against premium data allowance

Privacy	See our privacy policy
Complaints or Inquiries	To contact us: online/(123)456-7890 To submit complaints to the FCC: online/(888)225-5322

Learn more about the terms used on this form and other relevant information at the FCC's website.

The FCC's 2016 fixed broadband label (left) evaluated in Phase 1 and our New fixed broadband label (right) tested in Phase 2. See Appendix C for enlarged versions.

Phase 2 key findings

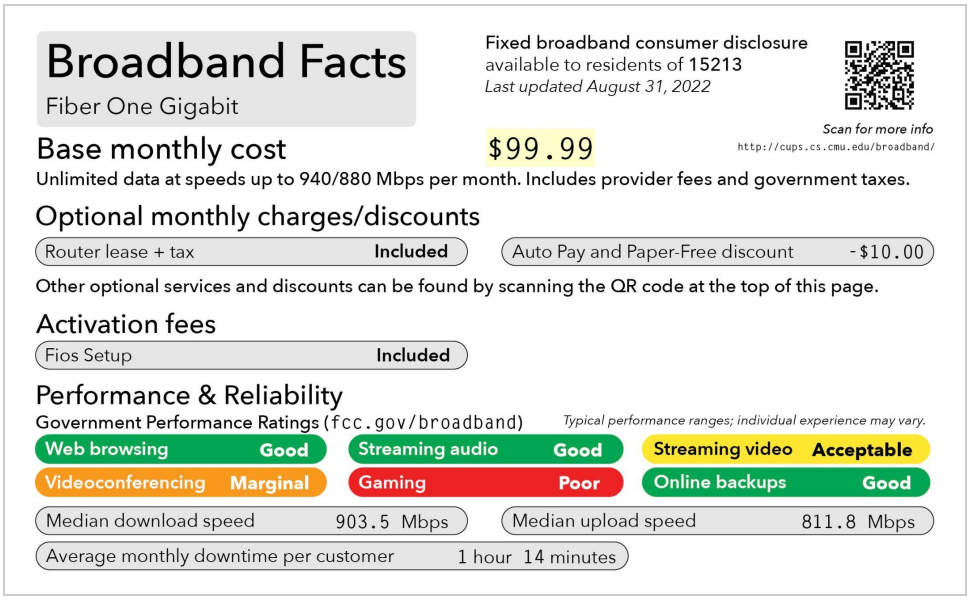
- Our proposed (New) labels generally performed better than the 2016 labels in enabling consumer comprehension of the represented broadband plan (including performance and service costs). In addition, consumers found them easier to use and preferred their format.
- Participants wanted to know the total cost of their internet plan and disliked any ambiguity; participants also expressed a desire for in-depth cost explanations, for taxes to be included as part of the label, and for some sense of plan service area.
- Participants requested information about network reliability, when and by how much the listed performance metrics could drop during peak times, and explanations for technical terms.
- Participants expressed interest in having both performance numbers and suitability ratings included on a label.
- Participants generally wanted to see a lot of information on the label, but also wanted a label that would be simple to understand and compare across plans.

- Generally, we saw slightly lower comprehension among non-technical participants than those who self-identified as having a technical background, and non-technical participants were slightly less likely to find the labels easy to use. These modest differences showed up in both the 2016 and New labels.

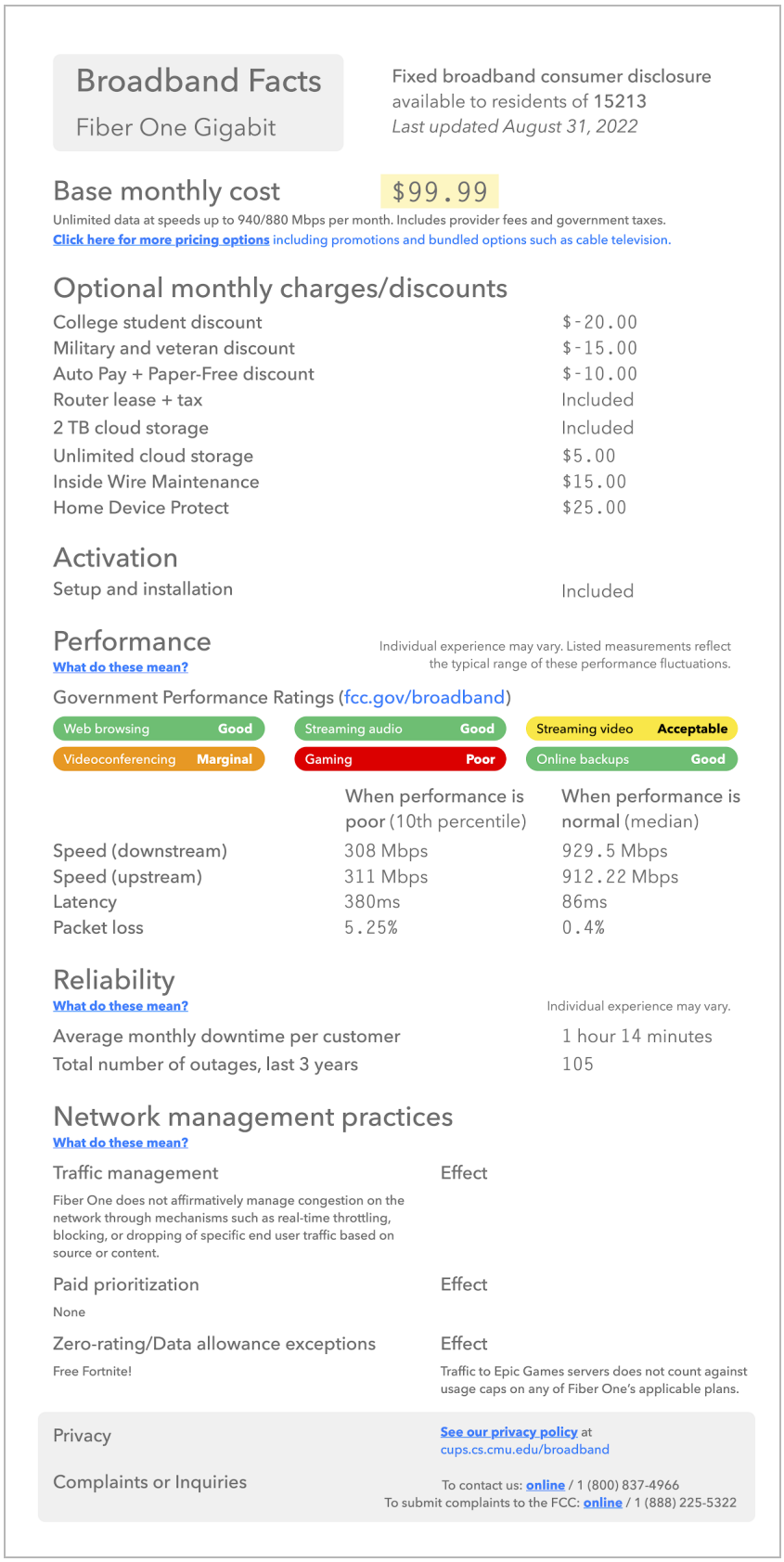
Recommendations

- Broadband labels should include a range of information valued by consumers but should highlight the information they value most, including information on cost, speed, and reliability.
- Broadband labels should balance the needs of consumers who value simplicity and conciseness with those who value detailed information. This can be achieved with a standardized label design with links to definitions of terms maintained by the FCC in a format conducive to comparing multiple plans. A layered label design with a summary and full version may help address the needs of a wider range of consumers.
- Broadband service providers should be required to deposit detailed plan information in a standardized computer-readable form in a publicly accessible database to enable third-parties to generate customized labels for consumers and offer comparison shopping tools, quality of experience or suitability ratings, and other value-added services.
- Non-optional costs should be bundled into a total cost where possible, including taxes, to make it easy for consumers to determine how much they will need to pay.
- Performance metrics should be included for downstream speed, upstream speed, latency, and packet loss in both normal and poor performance times.
- Broadband labels should include some measure of reliability, addressing consumer interest in information about outages and downtime.
- All data rate units be kept consistent (e.g. all broadband providers would express throughputs in Mbps and latencies in ms).
- Network management practices should be enumerated on the label in standard groups and accompanied by a standardized glossary with definitions and examples that explain these terms for consumers.
- Labels and accompanying data should be localized so that consumers can readily compare plan details–including total costs, performance at both normal and busy times, reliability, and network management practices– for a particular geographic location.

Our study concludes with a proposal for a broadband label design that takes into account participant feedback on both the 2016 and New label designs we tested. To help balance the need for both simplicity and detail, we propose a layered label design with both summary and detailed views, shown below.



The summary layer of our prototype layered design for a consumer broadband label.



Broadband Facts

Fiber One Gigabit

Fixed broadband consumer disclosure
available to residents of **15213**
Last updated August 31, 2022

Base monthly cost $99.99

Unlimited data at speeds up to 940/880 Mbps per month. Includes provider fees and government taxes.
Click here for more pricing options including promotions and bundled options such as cable television.

Optional monthly charges/discounts

College student discount	$-20.00
Military and veteran discount	$-15.00
Auto Pay + Paper-Free discount	$-10.00
Router lease + tax	Included
2 TB cloud storage	Included
Unlimited cloud storage	$5.00
Inside Wire Maintenance	$15.00
Home Device Protect	$25.00

Activation

Setup and installation	Included

Performance

What do these mean?

Individual experience may vary. Listed measurements reflect the typical range of these performance fluctuations.

Government Performance Ratings (fcc.gov/broadband)

Web browsing **Good**	Streaming audio **Good**	Streaming video **Acceptable**
Videoconferencing **Marginal**	Gaming **Poor**	Online backups **Good**

	When performance is **poor** (10th percentile)	When performance is **normal** (median)
Speed (downstream)	308 Mbps	929.5 Mbps
Speed (upstream)	311 Mbps	912.22 Mbps
Latency	380ms	86ms
Packet loss	5.25%	0.4%

Reliability

What do these mean?

Individual experience may vary.

Average monthly downtime per customer	1 hour 14 minutes
Total number of outages, last 3 years	105

Network management practices

What do these mean?

Traffic management	Effect
Fiber One does not affirmatively manage congestion on the network through mechanisms such as real-time throttling, blocking, or dropping of specific end user traffic based on source or content.	
Paid prioritization	Effect
None	
Zero-rating/Data allowance exceptions	Effect
Free Fortnite!	Traffic to Epic Games servers does not count against usage caps on any of Fiber One's applicable plans.

Privacy	**See our privacy policy** at cups.cs.cmu.edu/broadband
Complaints or Inquiries	To contact us: **online** / 1 (800) 837-4966 To submit complaints to the FCC: **online** / 1 (888) 225-5322

The detailed layer of our prototype layered design for a consumer broadband label.

About the Authors

The CyLab Usable Privacy and Security Laboratory at Carnegie Mellon University (cups.cs.cmu.edu) has done extensive research on consumer labels for website privacy policies, mobile app privacy, and IoT devices. This research was directed by Dr. Lorrie Cranor and Dr. Jon Peha. Dr. Cranor is a professor of computer science and of engineering & public policy at Carnegie Mellon University (CMU) and former chief technologist at the Federal Trade Commission (FTC). Dr. Peha is a professor of electrical & computer engineering and of engineering & public policy at CMU, and former chief technologist at the Federal Communications Commission (FCC). This study was conducted by independent researchers from CMU and is not funded by any external source. Consumer Reports collaborated with CMU to provide access to participants who had previously expressed interest in broadband internet options but had no role in experiment design, data analysis, or formulation of conclusions. For the latest updates on our broadband label research, see *https://cups.cs.cmu.edu/broadband/*

Acknowledgements

Special thanks to Soha Jiwani, Sanjnah Anand, Prerna Bothra, Rachna Sasheendran, and Jaideep Juneja for their assistance with qualitative data analysis. We would also like to thank Jonathan Schwantes and Susan Herold from Consumer Reports for their help in coordinating survey distribution.

1. Introduction

The Infrastructure Investment and Jobs Act of 2021 directs the Federal Communications Commission (FCC) to promulgate regulations for broadband consumer disclosure labels by November 2022.[1] The Act states that these labels should be as described in the Commission's public notice from April 2016, DA 16–357.[2] Hereafter, we refer to the label formats proposed in this notice as the FCC's 2016 labels. In January 2022, the FCC issued Notice of Proposed Rulemaking (NPRM) 22-7 which proposed requiring internet service providers to display broadband consumer disclosure labels prominently at the point of sale with the 2016 labels functioning as a safe harbor format for providers.[3] In response to the FCC's request for comment in their NPRM, we conducted a large-scale user study examining the 2016 labels' format, content, and overall usability.

We contribute the following preliminary report on what information is most important to US consumers when shopping for broadband internet services as well as what terminology and presentation formats make this information most understandable and useful to consumers. We find that consumers are strongly supportive of broadband internet labels. They are most interested in information about cost, performance, and reliability of broadband plans, but are also interested in seeing a variety of other information on the labels. There is a need to consider label designs that balance simplicity with this desire for information. We propose our own broadband consumer disclosure label formats along with a discussion on how our study's data drive design and content recommendations for future label iterations.

In the interest of submitting our findings and recommendations to the FCC in a timely manner, the following report is only a preliminary one. We are conducting further in-depth data analysis that we expect to publish in a future report.

2. Methods

We conducted our study in two phases. In the first phase we conducted an online survey to evaluate the 2016 labels and gain insights into what information was most important to consumers and what information caused confusion. We then created new label designs based on our results from the first phase. In the second phase, we conducted an online survey to compare the effectiveness of our new label designs with the 2016 labels. After analyzing our survey results, we made further revisions to our new label designs. All portions of this study were approved by the Carnegie Mellon University (CMU) Institutional Review Board, including participant recruitment, consent forms, compensation, and data handling practices.

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[1] The Infrastructure Investment and Jobs Act, Pub. L. No. 117-58, 135 Stat. 429, § 60504(a) (2021) (Infrastructure Act).

[2] Federal Communications Commission (FCC) 2016 Public Notice. *Consumer and Governmental Affairs, Wireline Competition, and Wireless Telecommunications Bureaus Approve Open Internet Broadband Consumer Labels*, GN Docket No. 14-28, Public Notice, 31 FCC Rcd 3358 (CGB/WCB/WTB 2016). https://www.fcc.gov/document/bureaus-approve-broadband-labels-proposed-consumer-advisory-cmte

[3] Federal Communications Commission (FCC) Notice of Proposed Rulemaking (NPRM) 22-7. *Empowering Broadband Consumers Through Transparency*, CG Docket No. 22-2 (January 27, 2022). https://www.fcc.gov/ecfs/search/search-filings/filing/01272939508367

2.1 Participant Recruitment

We recruited survey participants from a pool of people who had previously participated in Consumer Reports (CR) consumer initiatives related to broadband internet.[4] For each phase of the study, CR emailed our recruitment letter to a random sample of people in their pool, inviting them to participate in a voluntary Carnegie Mellon study. This group of people has shown a particular interest in the terms of their broadband internet service and are likely to be especially interested in the information a broadband consumer label would provide. As such, their feedback on labels is especially useful as they are people likely to actually use real-world implementations of the broadband consumer disclosure labels.

The recruitment email invited people to follow an included link to anonymously complete our survey via Qualtrics survey software. Consumer Reports emailed 15,000 people in phase one and 17,000 people in phase two for a total of 32,000 emailed survey invitations. Distribution was done in 4 email batches (2 pilot batches and 2 large-scale batches) from June to August of 2022. Emails were randomly sampled without replacement such that no emails previously invited to complete our survey would be re-invited in a later distribution batch. CMU was entirely responsible for survey data collection and analysis.

No compensation was offered to participants for their participation in the study and they were made aware of this in our consent form before proceeding to the survey.

2.2 Survey Methods

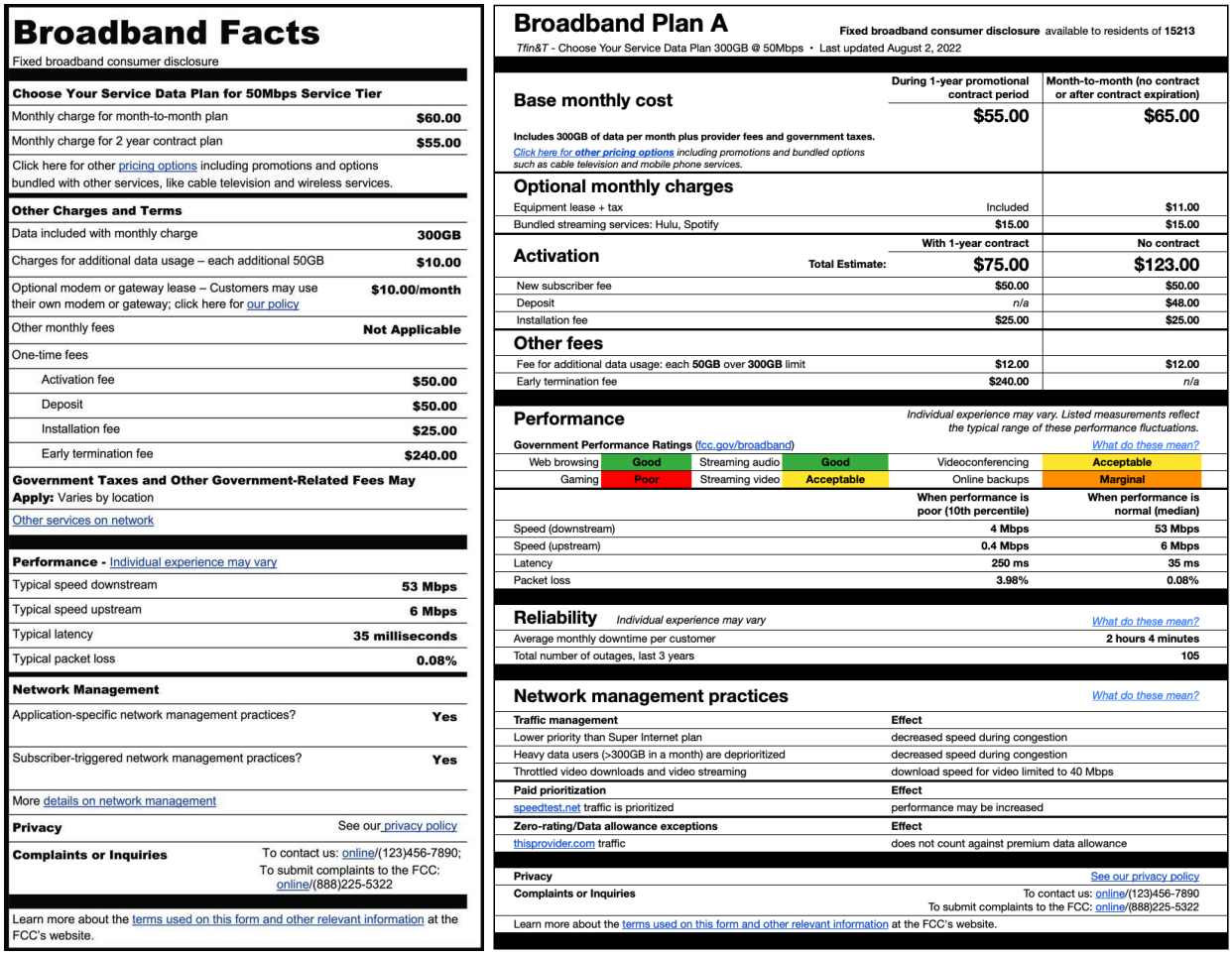
Participants first reviewed and completed a consent form as well as screening questions prior to the surveys. We required that all participants be US-residents aged 18 years or older with either fixed home internet or mobile phone internet plans. See Appendix C for the full list of all our survey questions.

For our Phase 1 survey, we asked which broadband plan type participants had purchased or updated most recently (fixed or mobile) and used this response to direct participants to questions related to fixed or mobile broadband. Within these two categories we randomly assigned each participant to one of three question subsets, focused on comprehension of broadband concepts and terms, preferences when shopping for broadband, or opinions about the 2016 label drafts. At the end of the survey, all participants were asked a series of demographic questions and questions about their current broadband internet plan including how much they pay monthly, their expected internet speeds, and what categories of activities they engage in while using the internet.

For Phase 2, we developed two new label formats–one for fixed and one for mobile broadband–based on the data we analyzed from Phase 1. We used a between-subjects study design to compare the usability of the four formats: 2016-fixed, 2016-mobile, New-fixed, New-mobile. Thus, each survey participant answered impression and comprehension questions for only one label format throughout a majority of the survey. The broadband type of their label version–fixed or mobile–was determined in the same manner as our Phase 1 survey. The format of their label version–2016 or New–was determined randomly. Similar to the Phase 1 survey, participants were then randomly assigned a subset of questions focused on either improvement suggestions or comprehension tasks for their assigned label version. All participants then answered A/B comparison questions using the 2016 labels

[4] See Consumer Reports intiatives “Fight for Fair Internet” https://www.consumerreports.org/upload/broadband and “Let’s Broadband Together” https://www.consumerreports.org/media-room/press-releases/2021/07/consumer-reports-launches-broadband-together----a-nationwide-sea/

and new labels. At the end of the survey, participants were asked a series of demographic questions and asked about the types of activities they engage in while using the internet.



Broadband Facts

Fixed broadband consumer disclosure

Choose Your Service Data Plan for 50Mbps Service Tier	
Monthly charge for month-to-month plan	$60.00
Monthly charge for 2 year contract plan	$55.00
Click here for other pricing options including promotions and options bundled with other services, like cable television and wireless services.	
Other Charges and Terms	
Data included with monthly charge	300GB
Charges for additional data usage – each additional 50GB	$10.00
Optional modem or gateway lease – Customers may use their own modem or gateway; click here for our policy	$10.00/month
Other monthly fees	Not Applicable
One-time fees	
Activation fee	$50.00
Deposit	$50.00
Installation fee	$25.00
Early termination fee	$240.00
Government Taxes and Other Government-Related Fees May Apply: Varies by location	
Other services on network	
Performance - Individual experience may vary	
Typical speed downstream	53 Mbps
Typical speed upstream	6 Mbps
Typical latency	35 milliseconds
Typical packet loss	0.08%
Network Management	
Application-specific network management practices?	Yes
Subscriber-triggered network management practices?	Yes
More details on network management	
Privacy	See our privacy policy
Complaints or Inquiries	To contact us: online/(123)456-7890; To submit complaints to the FCC: online/(888)225-5322

Learn more about the terms used on this form and other relevant information at the FCC's website.

Broadband Plan A

Fixed broadband consumer disclosure available to residents of **15213**

Tfin&T - Choose Your Service Data Plan 300GB @ 50Mbps • Last updated August 2, 2022

Base monthly cost	During 1-year promotional contract period	Month-to-month (no contract or after contract expiration)
Includes 300GB of data per month plus provider fees and government taxes. Click here for other pricing options including promotions and bundled options such as cable television and mobile phone services.	$55.00	$65.00
Optional monthly charges		
Equipment lease + tax	Included	$11.00
Bundled streaming services: Hulu, Spotify	$15.00	$15.00
Activation	With 1-year contract	No contract
Total Estimate:	$75.00	$123.00
New subscriber fee	$50.00	$50.00
Deposit	n/a	$48.00
Installation fee	$25.00	$25.00
Other fees		
Fee for additional data usage: each 50GB over 300GB limit	$12.00	$12.00
Early termination fee	$240.00	n/a

Performance — *Individual experience may vary. Listed measurements reflect the typical range of these performance fluctuations.*

Government Performance Ratings (fcc.gov/broadband) — What do these mean?

Web browsing	Good	Streaming audio	Good	Videoconferencing	Acceptable
Gaming	Poor	Streaming video	Acceptable	Online backups	Marginal

	When performance is poor (10th percentile)	When performance is normal (median)
Speed (downstream)	4 Mbps	53 Mbps
Speed (upstream)	0.4 Mbps	6 Mbps
Latency	250 ms	35 ms
Packet loss	3.98%	0.08%

Reliability *Individual experience may vary* — What do these mean?

Average monthly downtime per customer	2 hours 4 minutes
Total number of outages, last 3 years	105

Network management practices — What do these mean?

Traffic management	Effect
Lower priority than Super Internet plan	decreased speed during congestion
Heavy data users (>300GB in a month) are deprioritized	decreased speed during congestion
Throttled video downloads and video streaming	download speed for video limited to 40 Mbps
Paid prioritization	**Effect**
speedtest.net traffic is prioritized	performance may be increased
Zero-rating/Data allowance exceptions	**Effect**
thisprovider.com traffic	does not count against premium data allowance

Privacy	See our privacy policy
Complaints or Inquiries	To contact us: online/(123)456-7890 To submit complaints to the FCC: online/(888)225-5322

Learn more about the terms used on this form and other relevant information at the FCC's website.

Figure 2-1: The FCC's 2016 fixed broadband label (left) evaluated in Phase 1 and our New fixed broadband label (right) tested in Phase 2. See Appendix D for enlarged versions.

2.3 Labels

We presented static images of broadband labels representing hypothetical internet plans to participants throughout both Phase 1 and Phase 2 surveys. Hyperlinks on the labels were left nonfunctional for survey participants. We did however provide a link to an external webpage with terminology explanations for certain parts of the Phase 1 survey. See Appendix B for terminology explanations and Appendix D for full images of all labels used in our surveys.

For Phase 1, we created labels mimicking the format of the FCC's proposed 2016 labels as closely as possible for both the fixed broadband and mobile broadband (Appendix Figure D1) versions.[5] The values for all fields on the label were also matched. We also created 2 cropped versions of the 2016

[5] Our tested 2016 labels mimicked the example labels taken from https://www.fcc.gov/broadbandlabels, which notably do not follow all of the recommendations listed in the FCC's NPRM 22-7 for the network management practices section.

fixed broadband label that showed just the header and cost section (Appendix Figure D2). Certain costs on these labels were tweaked to differ between the two labels and the header text was edited to identify one plan as Plan A and the other as Plan B. The text was otherwise left the same as the proposed 2016 labels. We displayed these cropped and modified labels to participants when asking them to answer cost comparison questions. For all other questions, participants were shown either the full labels or cropped out subsections of those labels closely mimicking the proposed 2016 labels.

For Phase 2, we iterated on the 2016 labels to develop two new label formats–one for fixed and one for mobile broadband types–based on the data we received from phase one. Hereafter, we refer to these iteratively improved labels as our New labels. For each of the four label formats we sought to test–2016 fixed, 2016-mobile, New-fixed, and New-mobile (Appendix Figures D4, D5, D6)–we created 2 versions to represent a Plan A and Plan B that would both be shown to participants when answering our comparison comprehension questions. Plan details including cost and performance values were kept as similar as possible between the 2016 labels and their corresponding New format versions. For all non-plan-comparison questions, participants were shown the Plan A version of the label or label subsection.

2.4 Data Analysis

We pilot tested our surveys by having CR first distribute our survey link to a smaller batch of participants–5000 emails for phase one and 2000 emails for phase two. After our pilot deployment results came in, we revised a few questions before having CR send out a large-scale distribution for each survey respectively. For Phase 1, pilot sample responses are included in all quantitative data results except for our revised questions, in which case the separation is explicitly noted. For Phase 2, due to the extensive nature of the revisions, we do not include the pilot sample responses in our quantitative results except where explicitly brought in as a separate pool of data.

Both surveys had a large number of incomplete responses from participants who made it part way into the survey, but then left it incomplete and untouched for over 24 hours. Although Qualtrics recorded data from the portions of the survey those participants did fill out, we do not have demographic data for these participants and do not include their data in our quantitative analysis. However, as many participants who did not complete the survey provided answers to some of our open-ended free response questions, we considered these responses in our qualitative results.

The Phase 1 survey had nine open-ended free-response questions. Analysis of these responses were divided between three researchers by survey question. Each researcher read through all responses for their assigned questions and took notes on common themes as well as drew out notable quotes.

The Phase 2 survey had 16 open-ended free-response questions with a total of over 7500 responses from all participants. To process this data, we divided reading all of the responses between six researchers who took notes on common themes and drew out relevant quotes. We then built a codebook with 22 codes representing our observed themes. For our preliminary analysis we selected only 14 of the 16 questions to code responses for and coded only 148 responses from each. The 148 responses for each question were randomly sampled with controls to evenly balance responses for each of the four label versions that participants were assigned to see: 2016-fixed, 2016-mobile, New-fixed, New-mobile. If there were fewer than 37 responses to a question for a given label version, we added an even distribution of remaining responses to other label versions. For each question, two coders independently coded batches of 32 responses and discussed any differences until agreement was reached. The remaining items were then coded by a single coder.

3. Results

Across both survey phases we received a combined total of 2519 completed surveys and 1737 incomplete surveys–the breakdown by survey is shown in appendix table A3.

3.1 Demographics

We did not aim for a representative US sample. Instead we focussed on surveying a group that had previously expressed interest in consumer issues related to broadband Internet. 80% of participants reported being the primary decision maker in their household's most recent decision to sign up for or change their broadband plan, and 18% reported making the decision jointly with someone else. Survey participants came from all 50 US states and Puerto Rico and include a mix of urban, suburban, and rural residents with diverse income and education levels. However, compared to the U.S. population, individuals in our sample are more likely to be older, male and to self-identify as white or caucasian. Our participant pool also has higher levels of education than the U.S. population, with 89% of participants having completed schooling beyond high school. Appendix Tables A1 and A2 summarize the demographic characteristics of the 2519 participants who completed the survey.

Our preliminary analysis suggests that most demographic characteristics seemed to play only a minor role in participant responses to most questions. However, participants who self-reported having a "background in computer science or related technical field" tended to respond differently than other participants on many questions. For comprehension questions in particular, participants without a technical background tended to perform worse.

3.2 Phase 1 Results

We received 1257 completed Phase 1 survey responses along with an additional 718 incomplete survey responses. Phase 1 survey participants completed the survey with a mean time of 39 minutes and median time of 15 minutes. For Phase 1, pilot sample responses are included in all quantitative data results except for our revised questions; in which case the separation is explicitly noted. Incomplete survey responses are excluded from our quantitative data results; however, we consider them in our qualitative data analysis of open-ended question responses.

Participants in the Phase 1 survey were randomly assigned to answer one of three sets of survey questions. Out of the 1257 completed responses, 466 answered "opinions on the 2016 labels" questions, 362 answered comprehension questions, and 426 answered "shopping preference" questions. The full Phase 1 population breakdown by survey question subset and broadband type is shown in Appendix Table A4.

3.2.1 Opinions About the 2016 Labels

Questions in this section focused on understanding participant opinions on the 2016 labels, including their initial impressions and what plan details they actually found important. Overall we found that participants liked the 2016 labels and found they were understandable, not overwhelming, and contained the information they expected of a broadband internet plan label. Every plan detail on the labels was rated as important for comparison shopping by a majority of participants. Additionally, a majority of participants stated that they wanted these plan details made available through a broadband "nutrition label" similar to the one they were shown.

Participants were first shown either the fixed or mobile version of the FCC's 2016 label. Participants were then asked for their likert agreement ratings to several sentiment statements (e.g. "This label would be useful to me when comparison shopping") as well as their likert importance ratings for each piece of information found on the label (e.g. "activation fee"). Figure 3.2-1 shows how participants rated their agreement with several prepared statements we presented to them immediately after seeing the label. Notably, participants were mixed on whether they wanted a score or grade instead of raw numbers as well as whether the information should be presented in a different format.

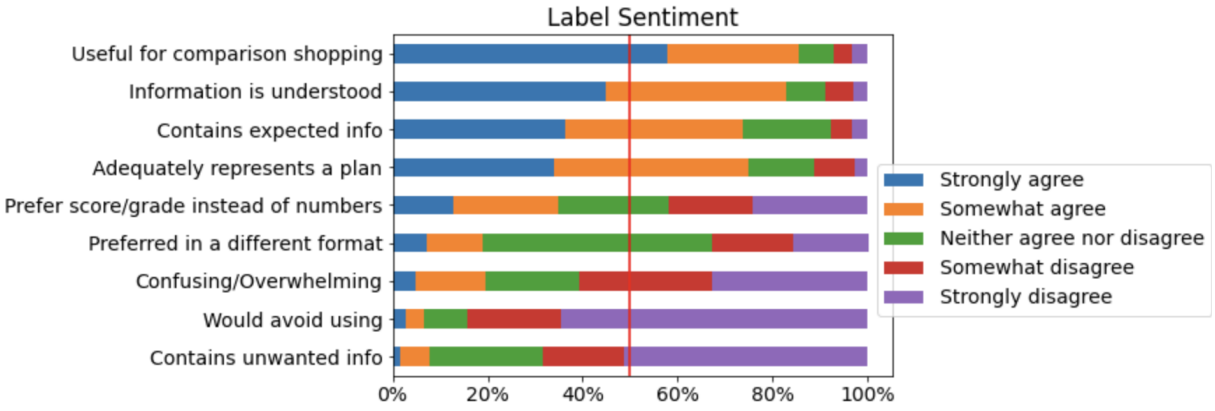


Figure 3.2-1: Participants' initial opinions on the 2016 labels provided through agreement with a series of sentiment statements.

For every field on the 2016 labels, at least 62% of all participants for each plan detail rated it as either "very important" or "extremely important" to have when comparison shopping. Figures 3.2-2 and 3.2-3 show the importance distribution for each detail. We included additional information not found on the 2016 labels as a part of these questions (e.g. "how suitable the plan is for online gaming") to gauge how important they would rank next to other details already on the proposed labels. The importance participants assigned to each of these application suitability ratings appeared to align with the broadband persona trends we observed in the population. For example, information about the plan's suitability for online gaming (engaged in by 13% of fixed broadband participants) vs its suitability for watching online videos (engaged in by 87% of fixed broadband participants) was rated as either extremely or very important by 19% and 74% of participants respectively. Across all details found on the 2016 labels, the fields rated as very or extremely important by the highest percentage of respondents were as follows. Monthly charges, data included with monthly charge, charges for data overage, and one-time activation fees were highly important for the cost section. For the performance section, downstream speed, other services on the network, upstream speed, and nationwide coverage rated highly important. For other information, the provider's contact information and privacy policy received the highest percentage of importance ratings.

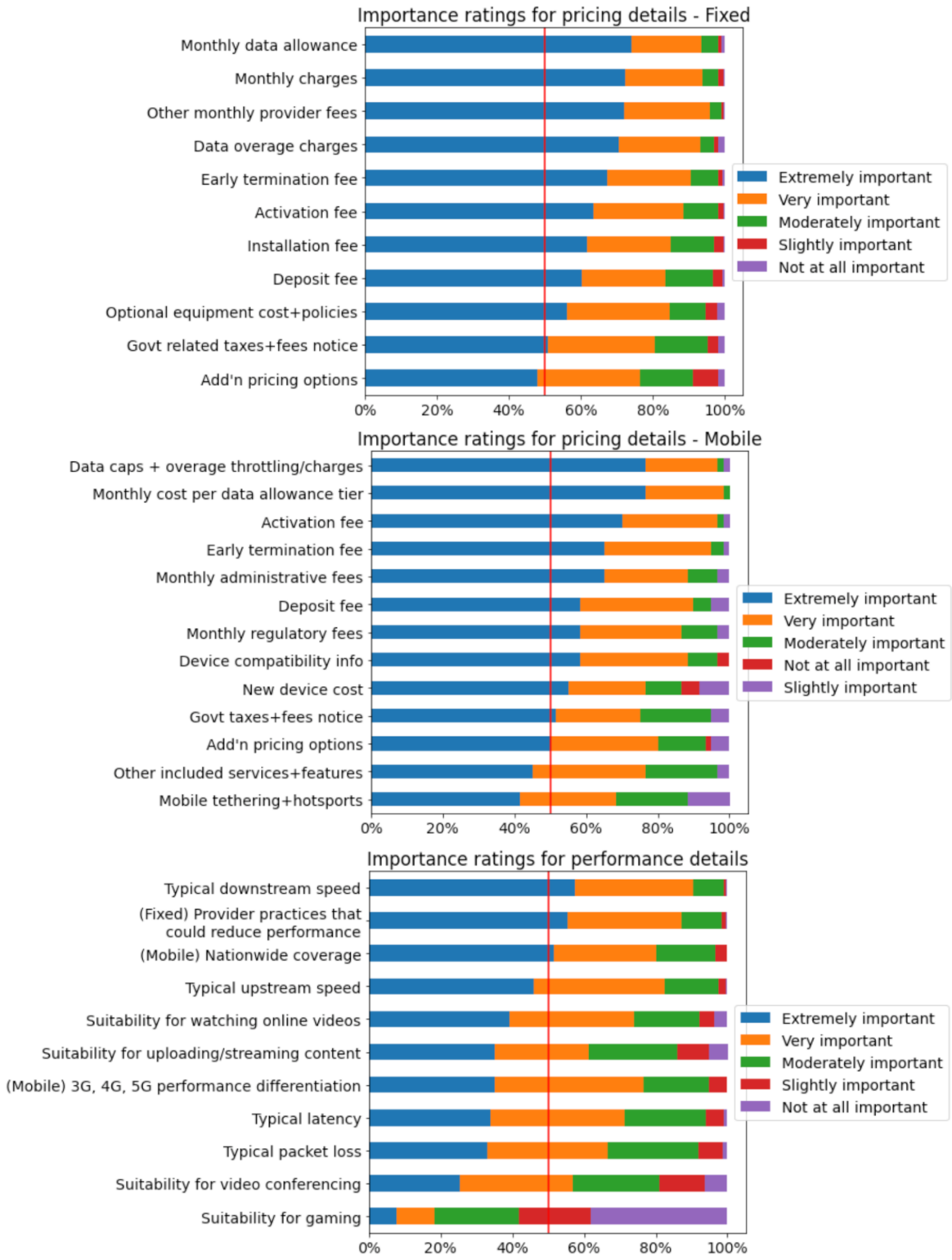


Figure 3.2-2: Participant importance ratings for pricing details on the fixed labels (top) and mobile labels (middle) and for performance details on both labels (bottom) after being shown the 2016 label and brief terminology explanations.

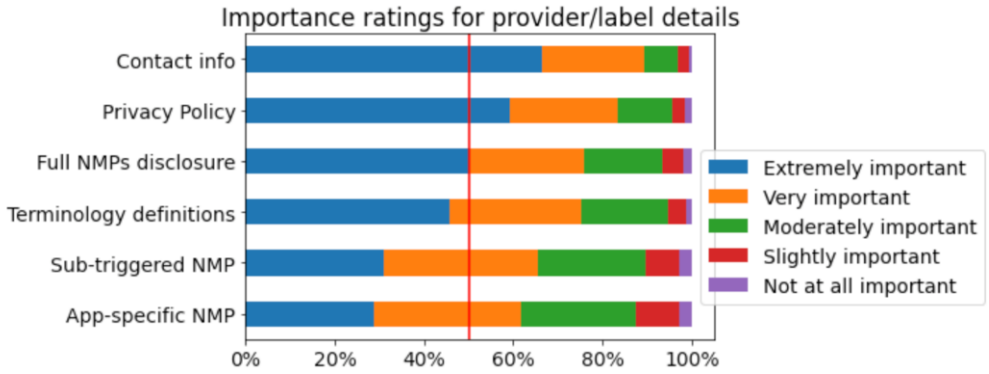


Figure 3.2-3: Participant importance ratings for other details including network management practices and contact information after being shown the 2016 label and brief terminology explanations.

3.2.2 Comprehension of Broadband Concepts and Terms

Questions in the comprehension of broadband concepts and terms section focused on exploring whether participants could use the 2016 label effectively. Participants were instructed to consult no external resources aside from what was provided in the survey while answering these comprehension questions. We found that participants were generally bad at computing their total cost over the span of 2, 3, or 4 years using the information on the 2016 label, and often resorted to using a calculator or pen and paper to do the computation. We also found that participants generally lacked knowledge of more technical terms and performance benchmarks. However, when these measurements were briefly explained to them, they did reasonably well at identifying which measurements were important for a given use case (e.g. watching Netflix). Finally, we found that participants did not understand the terms or differences between "application-specific network management practices" and "subscriber-triggered network management practices." However, when given examples of such practices, participants could distinguish between "application-specific" and "subscriber-triggered" practices with reasonably good accuracy.

Pricing

Participants were first shown two different broadband plans presented in the format of the proposed 2016 labels. We showed them only the pricing sections of each to help eliminate information extraneous to the task. However, only the month-to-month charge, contract duration, contract monthly charge, and one-time activation fee differed between the two. They were then asked which would be cheaper after 2 years, 3 years, and 4 years assuming the contract plans were nonrenewable and all one-time fees would need to be paid. Out of all the participants, only 23% were able to correctly answer all three questions. In addition, 24% of participants reported using a calculator and 10% of participants reported using pen and paper. Figure 3.2-4 summarizes the full score distributions broken down by the technical background demographic and condition. Non-technical participants scored worse than technical participants.

Generally, participant accuracy decreased as they had to consider the cost of each plan over a longer period of time. At least 15% of all participants also failed to properly consider the one-time activation fee as part of their calculations. Upon completion of the task, we asked participants to rate the difficulty of these calculations on a scale of 1 to 5 with 5 being "extremely difficult;" the mean rating was 2.90. When prompted to comment further on their experience completing the task, participants often cited difficulties understanding whether or not certain fees applied and wished that yearly totals were provided,

perhaps in a tabular format. Some participants felt that the pricing information was presented in a way that was "apples-to-oranges" (i.e., difficult to compare), but others noted that the standardized disclosure format was an improvement upon what is typically available to them. We observed that 25% of all participants who exited the survey without completing it dropped out when required to complete these computation tasks.

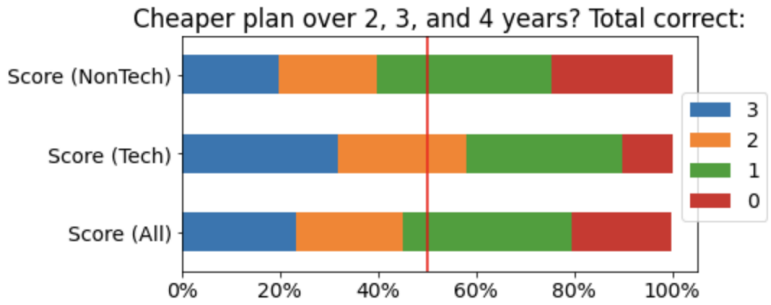


Figure 3.2-4: Number of correct annual cost computations (max 3) broken down by technical (tech) and non-technical (nontech) background.

Broadband performance metrics

Participants were next asked several multiple choice questions which gauged their understanding of broadband performance metrics. The first ten questions, which focused on cost calculation and performance terminology, were asked prior to us providing any education to the user. Questions ranged in difficulty to evaluate participant ability to do basic comparisons between plans (e.g. "Is it better to have a higher or lower value for downstream speed?") and ability to gauge if a plan would meet their needs (e.g. "After which packet loss rate threshold will a Zoom call become noticeably laggy or unintelligible?"). The majority of participants were able to identify if it was better to have higher or lower downstream speed, upstream speed, latency, and packet loss. However, more participants stated they were unsure about latency and packet loss than they were for downstream and upstream speeds. When asked to identify the highest data transmission rate from a list of speeds with differing values and units, only 24% of all participants answered correctly. Most of the other participants either admitted they did not know or miscalculated the unit conversations between Gbps, Mbps, and Kbps. When asked to identify the packet loss threshold after which videoconferencing would become noticeably laggy from a list of 4 values, 29% of participants answered correctly and 48% of participants stated they did not know what "packet loss" is. The threshold values for this question were spaced far enough apart such that all non-correct answers are clearly wrong to anyone who knows the rough estimate for noticeable packet loss.

Across all of these comprehension questions, non-technical participants performed worse than–or at least no better than–participants with a technical background (see Figure 3.2-5).

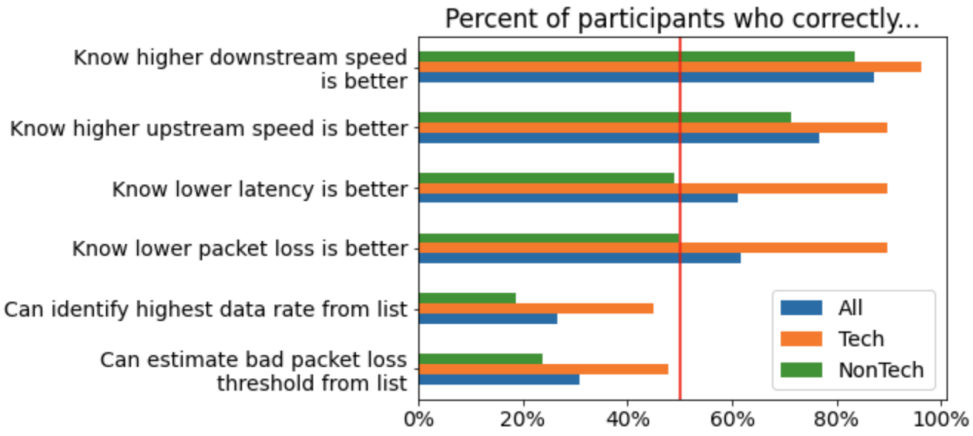


Figure 3.2-5: Percent of participants who demonstrated their a priori knowledge related to broadband performance, broken down by technical background.

Participants were then given a link to a page with brief 1-2 sentence definitions for downstream speed, upstream speed, latency, and packet loss (see Appendix B1) and asked to rate how important each of those metrics were for a particular application: online gaming, watching online videos, video conferencing. There is no precise answer for how much more important downstream speed is than upstream speed for a given use case. However, we can see from participant answers that–with the aid of some brief education–most perform reasonably well at identifying which metrics are generally more important for a given use case (see figure 3.2-6). For example, participants could identify that downstream speed was more important than upstream speed for the purposes of watching online videos. And for video conferencing, they recognized that all measures were relatively important.

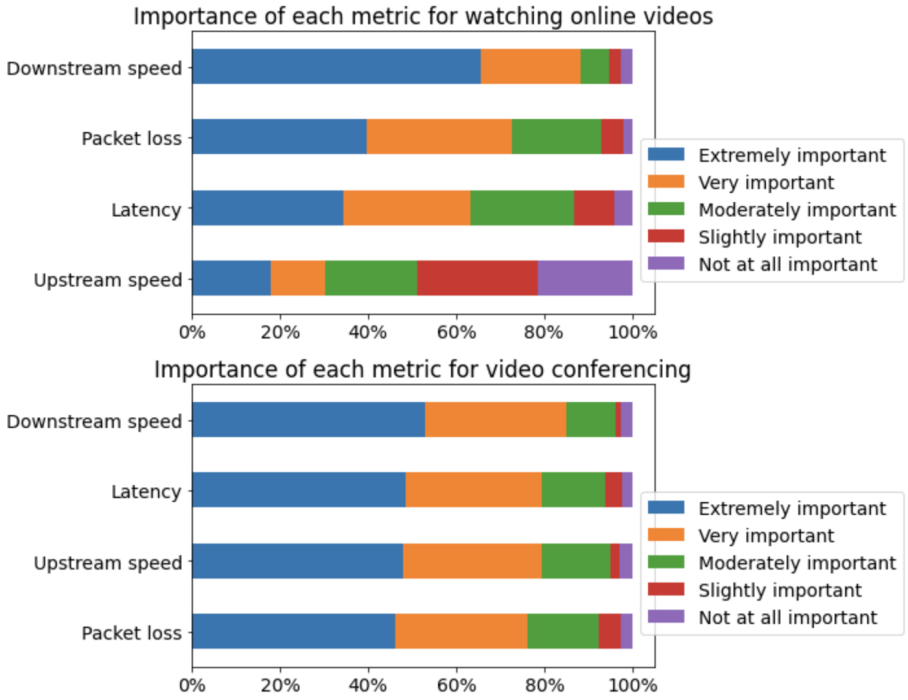


Figure 3.2-6: Participant understanding of what performance metrics were important for a given use case after brief terminology education.

Network management practices

We next asked participants questions to measure their comprehension of network management practices. We showed them a graphic with just the network management practices section of the 2016 proposed labels and asked them if they (1) knew what "network management practices" referred to and (2) understood the difference between "application-specific" and "subscriber-triggered" practices. The majority of all participants strongly disagreed with the sentiment that they understood those terms (Figure 3.2-7). We then provided participants with examples of network management practices (e.g. "decreasing the quality of all videos from Netflix" or "decreasing your internet speeds after exceeding your data allowance") and asked them to categorize them. Across the four examples we gave that were either application-specific or subscriber-triggered, between 46% and 62% of participants got each question correct. When presented with an example that was technically in both categories ("Increasing your YouTube video download speed for the first 5GB every month"), only 9% of participants answered correctly but 60% identified it as application-specific. This resulted in the final scores shown in figure 2.3-8.

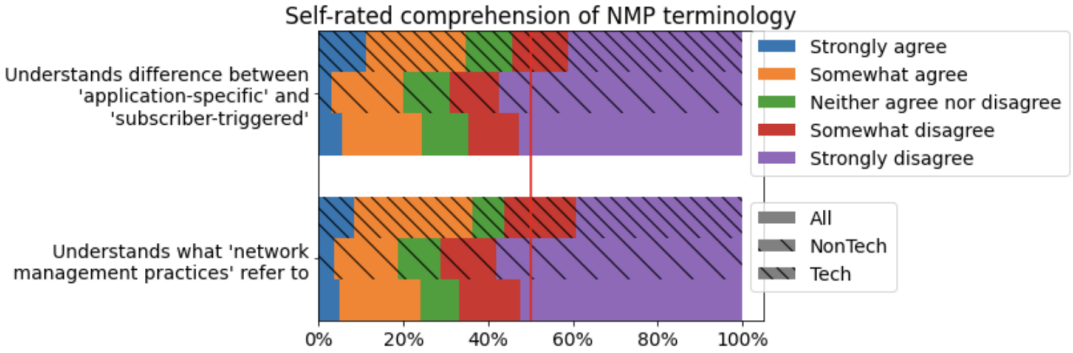


Figure 3.2-7: Participants self-reported understanding of terminology found in the network management practices section of the 2016 labels, broken down by technical background.

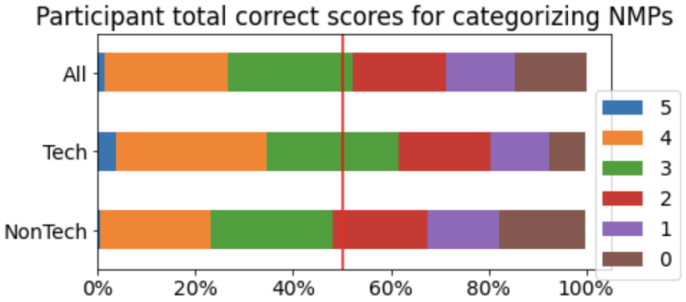


Figure 3.2-8: Number of correct categorizations of example network management practices (max 5) broken down by technical background.

Hyperlinks

Finally, we evaluated the usability of the hyperlinks proposed in the 2016 label by showing participants the part of the label with a hyperlink along with its surrounding context and asking

participants (1) if they would click on the hyperlink and (2) what they would expect to find after clicking on the hyperlink. We selected two hyperlinks for this evaluation. When shown the "Other services on the network" and "Details on network management" hyperlinks, 61% and 68% of all participants respectively said that they would click on those links. However, most participants were unsure or incorrect as to what information they would find behind the links. They often guessed that the "Other services on the network" hyperlink indicated additional fees or advertising for available bundling and promotions. Participants were less likely to hazard a guess at all as to what "Details on network management" indicated; they were much more likely to simply state that they didn't know what they would find behind the link. However, those who did make guesses were, in general, reasonably correct.

3.2.3 Preferences When Shopping for Broadband

Questions in the preferences when shopping for broadband section focused on discovering what information was most important to participants when comparison shopping for a broadband internet plan. Questions ranged from more open-ended free responses (e.g. "what factors are you most interested in?") to more specific likert agreement matrices (e.g. "I would avoid using a provider if they blocked mobile tethering"). Participants who answered these questions knew from our recruitment text that a broadband consumer label was being developed, but they were not shown the 2016 labels at any point in our survey prior to answering these questions. The goal was to gather their mostly unprimed user requirements for broadband label information.

Overall, we found that participants generally cared most about cost, speed, and reliability when considering a broadband plan for purchase. However, other information like customer service quality, suitability for multiple internet users in the same household, and suitability for various applications (such as videoconference and video streaming) were rated highly on importance. Participants were interested in knowing a plan's performance metrics both when performance is normal and when it is much worse than normal. Additionally, participants did not want a score or grade for their plan's performance as a replacement for the raw numbers. When presented with examples of network management practices, a majority of participants expressed interest in using details of network management practices to avoid providers with certain practices.

Factors

The first question we asked participants who completed this section was: "When you are shopping for a broadband provider or plan, what factors are you most interested in?" At this point participants had not seen any label graphics or survey questions that would prime them to consider any particular factors. Responses to this question included a wide range of factors including data caps, customer service quality, security and privacy, and upstream-downstream speed symmetry. However, the three most frequently recurring factors we saw were cost, speed, and reliability.

At the end of this section—after asking participants questions about their preferences for performance measurements, suitability ratings, and network management practices—we asked participants what other details they would like their providers to disclose to them. Participants also wanted to know about providers' privacy practices, their equipment options, and other customers' feedback. They wanted this information available when shopping for plans rather than upon purchase of a plan and often emphasized that information should be presented in plain language. Some participants specifically stated that they wanted details–especially speeds–presented in a standardized format to facilitate comparison shopping.

Additionally, we probed participants for their opinion on plan details that do not explicitly appear on the 2016 labels. Among these details, reliability–clarified to refer to lack of network outages–were rated highly important (>90% extremely or very important). Figure 3.2-9 shows how other details performed.

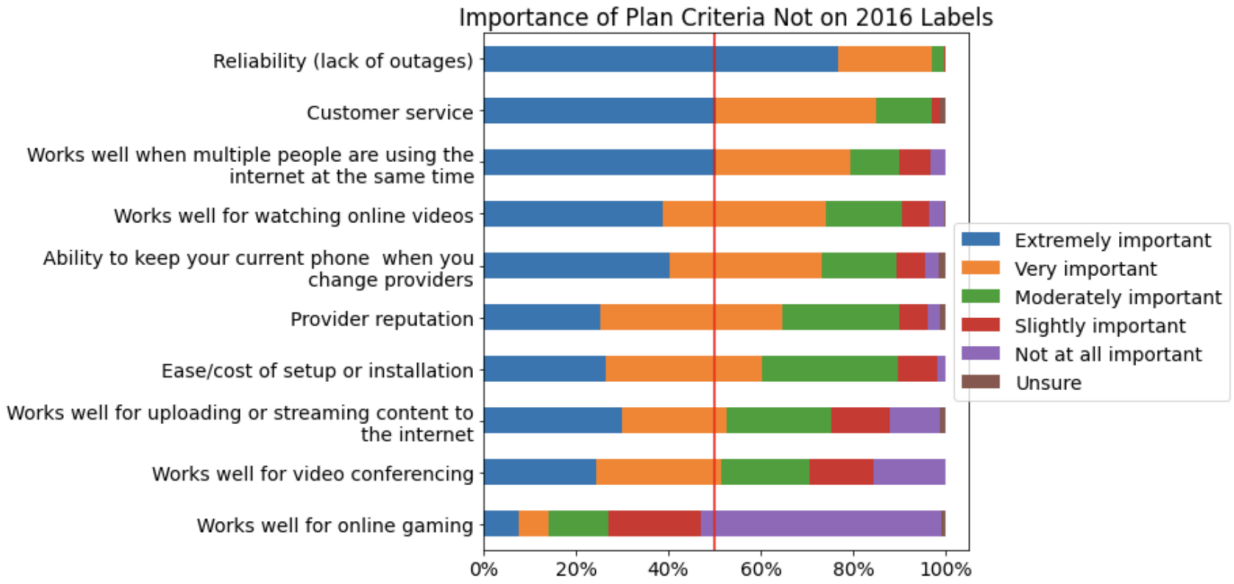


Figure 3.2-9: Participant importance ratings of other factors which may impact shopping decision but are not necessarily on the 2016 labels.

Broadband performance metrics

The FCC's NPRM 22-7 specifies performance measurements intended to represent the plan's performance during peak usage periods. We provided participants with a list of possible ways to measure a plan's speed including maximum, mean, median, 10th percentile, and 25th percentile as well as non-numeric measurements like suitability for a use (e.g. "works well for watching online videos") and a grade or score (e.g. B+ or 3.2 stars). Then, we asked them how important each of these measurements were to them when considering a plan's advertised speeds and what measurements they would want advertised for a given plan if they could only select 1-2 of them. From our pilot sample, we found that participants generally rated the percentile measurements much lower in importance compared to more common measurements like mean and max. We hypothesized this was due to the technical and hard-to-conceptualize nature of a plan speed percentile. For our large-scale sample, we changed the text for the percentile options to use more descriptive language and found that increased their popularity among participants. For example, "25th percentile" was modified to "Typical speeds during the parts of the day when the internet is somewhat slower than normal (25th percentile)." As a result, we do not include the pilot sample responses in our quantitative analysis of these questions. Furthermore, we added the following educational text for participants to read through just prior to answering these questions:

> *The speed listed for your internet plan tier is typically not what you will actually experience all of the time. Internet speeds often vary due to factors outside of your provider's control (e.g. the time of day and number of people in your area using the*

internet at the same time). This has created debate regarding what advertised internet speeds should actually represent. These next questions seek to understand your opinion on the matter.

For the non-statisticians among us, an "nth percentile speed" indicates the maximum speed you will experience n% of the time and minimum speed for the rest of the time. These values are particularly useful compared to average values as they help us understand expected network speeds during specific situations. In general, lower percentiles let us know the minimum speeds we'll be getting a majority of the time regardless of network conditions, and higher percentiles let us know the upper speeds we'll be getting when network conditions are particularly good.

The speed measurements that earned the highest share of "very important" and "extremely important" ratings by participants were 10th percentile, both 25th and 50th percentile, mean, and median (Figure 3.2-10). When participants were asked to choose just one measurement or combination of measurements, the most popular options were mean, 10th percentile, and max (see Figure 3.2-11). The open responses revealed that some participants found the concept of percentiles confusing and did not understand that performance tends to fluctuate. For example, one participant wrote, "Keep it simple. All of the percentile calculations are too confusing" while justifying their top choice for mean as the single advertised measurement. Many participants also explicitly noted that knowing what minimum performances they could expect throughout the day was highly important to them. For example, one participant stated "I'm more concerned when the Internet is slow and whether I'm able to watch a 4K or HDR movie. I want to have a minimum speed that is adequate for me at any time during the day."

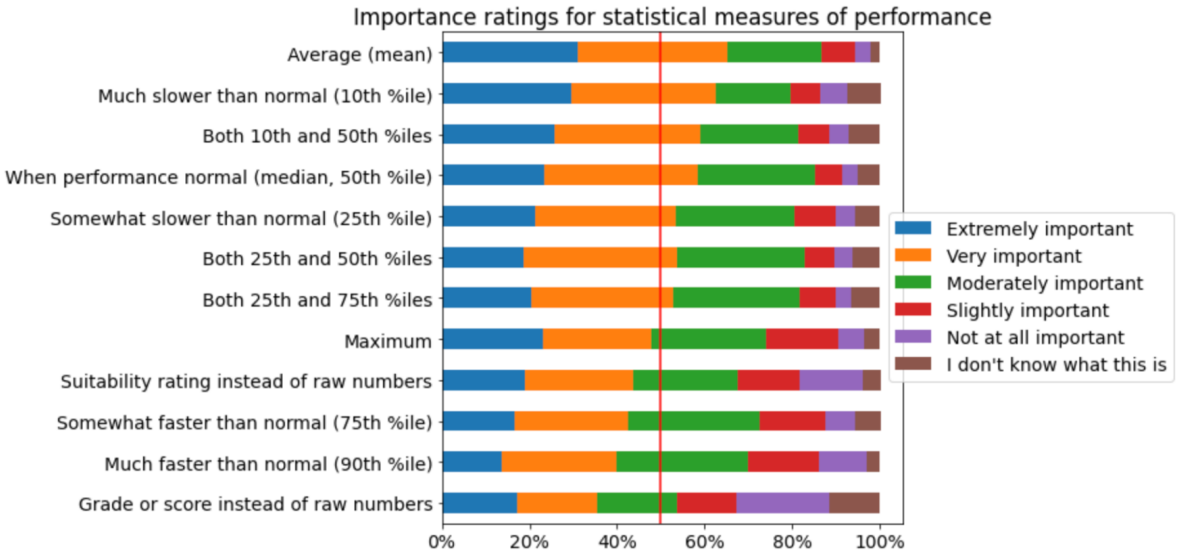


Figure 3.2-10: Participant importance ratings of different measures for network performance.

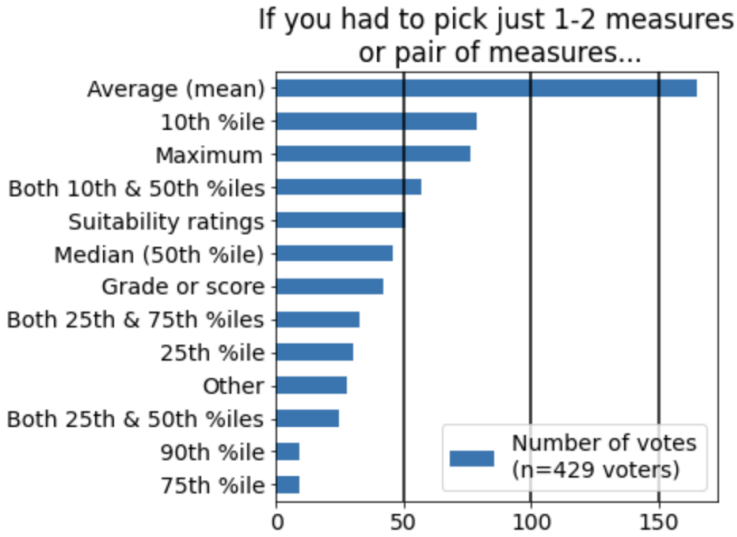


Figure 3.2-11: Number of participants who selected measure or pair of measures as one of their 1-2 choices to have advertised to them while shopping.

Network management practices

To evaluate how important knowing network management practices (NMPs) were to a participant's consumer shopping decision, we described several examples of NMPs and asked participants if they would avoid using a provider which engaged in those practices. We gave examples that represented an application-specific NMP and zero-rating NMP to all participants. For participants assigned the mobile broadband questions, we additionally showed NMPs that addressed mobile hotspots and mobile tethering. For all practices except for blocking mobile tethering, a majority of participants at least somewhat agreed that they would avoid a provider who engaged in those NMPs (see Figure 3.2-12).

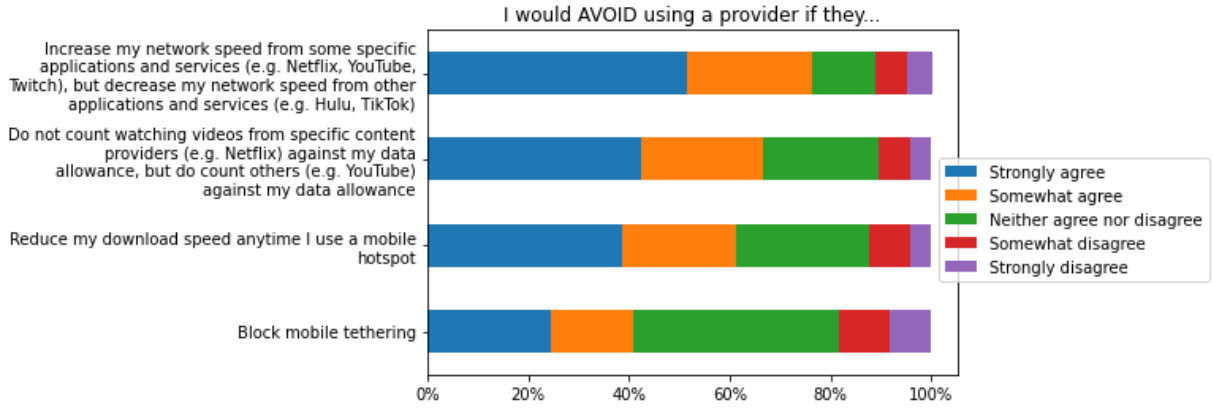


Figure 3.2-12: participant agreement distribution for avoiding a provider which engages in the listed network management practice examples.

3.3 Phase 2 Results

The Phase 2 survey received 1156 completed survey responses along with an additional 1019 incomplete survey responses and 106 completed pilot sample responses. Phase 2 survey participants completed the survey with a mean time of 53 minutes and median time of 22 minutes. For Phase 2, pilot sample responses are not included in our quantitative results except where explicitly stated. Unlike in phase 1, we made extensive changes between the pilot and large-scale samples including several edits to the survey questions and New label graphics. We retain the pilot responses to make comparisons between the version of the New label used in the pilot and main study. Similar to Phase 1, incomplete survey responses are only considered as part of our qualitative analysis of open-ended free-response questions. Appendix Table A5 shows the number of participants who answered each set of survey questions.

3.3.1 Comprehension

Questions in the comprehension section were multiple choice and required participants to reference provided label graphics to either find, compute, or intuit the answer. For questions that required fields found only on the New labels, participants could select "Unsure or label does not provide enough information to answer." We evaluated how label formats impacted participant comprehension of a single plan's details as well as ability to compare plans between two labels.

Overall, we found our proposed New labels perform better than the 2016 labels in enabling consumer comprehension of the represented broadband plan, including performance and service costs. When using a label to compare between a given Plan A and Plan B, Participants using the 2016 and New label formats performed similarly. For all questions that required knowledge about plan suitability for specific applications (e.g. videoconferencing) or information not explicitly stated on the 2016 labels, participants who used the New labels always performed better than those using the 2016 labels. Even when we consider the "unsure" answer as correct for information not explicitly included, participants using the New labels still usually performed better. When we asked participants how easy it was for them to answer our comprehension questions, 38% of New label participants and 22% of 2016 label participants selected either "Extremely easy" or "Somewhat easy."

Generally, we saw slightly lower comprehension among non-technical participants than those who self-identified as having a technical background. These modest differences showed up in both the 2016 and New labels.

Cost calculations

Participants who used the New label to calculate the total cost of the plan over 2 years were more likely to answer correctly than those who used the 2016 labels. A majority of the 2016-fixed format participants (55%) incorrectly calculated the total cost by multiplying the monthly price for a one-year contract by 24 months despite our instructions indicating the contract plan was nonrenewable—similar to real-world introductory contract pricing. Only 17% of the participants who used the New labels made this mistake. Participants were then asked to calculate just the one-time fees. Here we found no difference in correctness between mobile broadband participants using the two labels. However, fixed broadband participants were less successful with the New label. We hypothesize that this drop in correctness is due to our columnar format having a total one-time fee for both the contract plan and month-to-month plan. 17% of participants who used the New fixed labels incorrectly assumed that they would need to repay the activation, deposit, and installation fees when switching from contract to month-to-month.

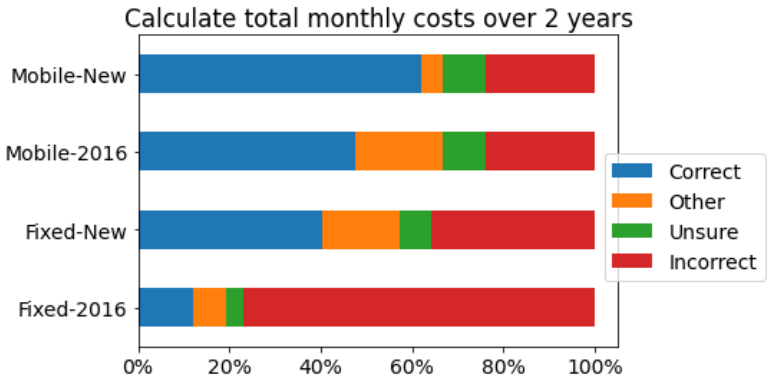


Figure 3.3-1: Share of participants who correctly calculated cost of plan over 2 years broken down by shown label format.

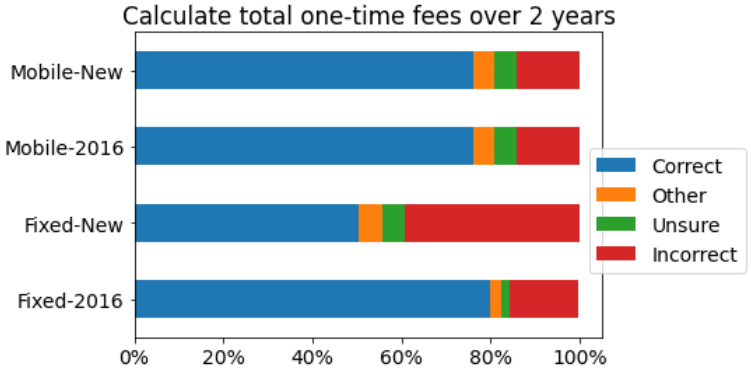


Figure 3.3-2: Share of participants who correctly calculated the total one-time fees for a given plan broken down by shown label format.

Performance

We next asked participants about the displayed plan's expected downstream speeds when performance is normal and slower than normal. For normal performance speeds, the New labels improved percent of correct participants by 47% for mobile broadband labels, but had little effect on fixed speeds. Notably, the New labels initially decreased participant correctness for fixed broadband labels in our pilot study, likely due to having both "10th percentile" and "median" speeds listed instead of just "typical speed." When we changed the wording of the performance column headers to "When performance is poor (10th percentile)" and "When performance is normal (median)" between our pilot and large-scale samples, we saw correctness increase further for mobile broadband labels and return to similar levels for fixed broadband labels (see Figure 3.3-3). We saw similar changes in correctness for identifying the slower than normal downstream speed, but only when considering 2016 label participants who selected "Unsure or label does not provide enough information to answer" as correct. Without that caveat, 2016 label participants perform much worse (see Figure 3.3-4).

Notably, we are generous towards participants interpreting what "typical speed" represents on the 2016 labels as we also were not certain whether that should be considered normal or much slower than normal performance speeds–the FCC defined it as the speed during typical peak usage period, which is

likely a lower than average speed.[6] Because of this ambiguity, for the 2016 fixed broadband label, we considered the listed typical speed to be the correct answer for both normal and slower than normal performance. For the 2016 mobile label, which uses a range (e.g. 6-12 Mbps) in the FCC's label sample,[7] we allowed for the interpretation that the smaller number was for much slower than normal performance and the larger number was for normal performance to be correct.

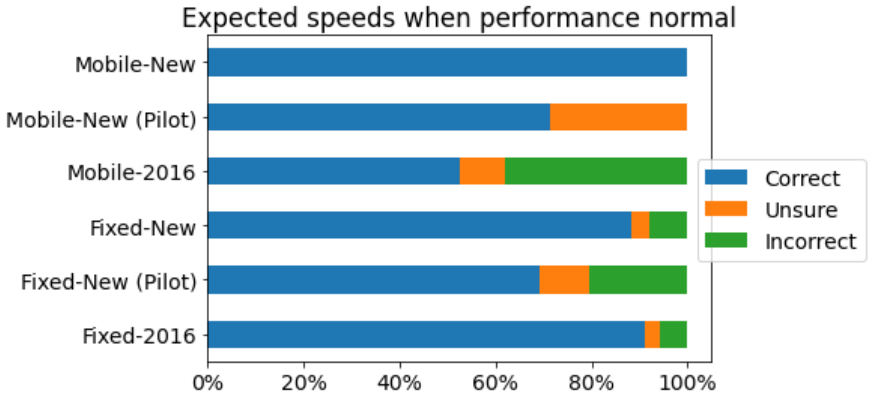


Figure 3.3-3: Share of participants who correctly identified the normal performance speeds from their provided broadband label. Pilot data included to show the effect of changing wording.

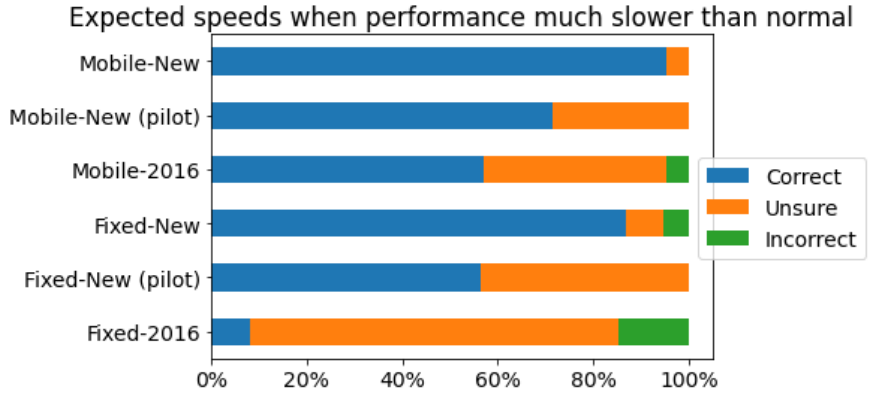


Figure 3.3-4: Share of participants who correctly identified the slower than normal performance speeds from their provided broadband label. Pilot data included to show the effect of changing wording.

Suitability

Participants were asked to rate the displayed plan's suitability for streaming audio and videoconferencing and the plan's expected reliability (downtime per month) on five-point scales. Both application suitability ratings and reliability are fields that we added to the New labels and are not explicitly present on the 2016 labels. As expected for reliability, an equal share of participants from the

[6] FCC NPRM 22-7. *Empowering Broadband Consumers Through Transparency*.

[7] Federal Communications Commission. *Broadband Consumer Labels: Sample Broadband Consumer Labels From 2016*. Accessed October 6, 2022 from https://www.fcc.gov/broadbandlabels

2016 labels (76%) and New labels (79%) were able to answer correctly with 2016 label participants selecting the "label does not provide enough information" option and New label participants selecting the appropriate expected monthly downtime bucket. For application suitability, participants could either choose the rating provided on the label (on New labels only) or attempt to interpret the provided performance measurements into a suitability rating on their own. On average across two suitability rating questions, 79% of New label participants chose the provided rating, and 43% of 2016 label participants selected the "unsure or not enough information" option with the rest selecting one of the five rating options. For streaming audio, 38% of 2016 label participants were able to coalesce around either the Good or Excellent rating. For videoconferencing however, ratings were spread out with only 9% to 15% of participants agreeing on any one of the five rating options.

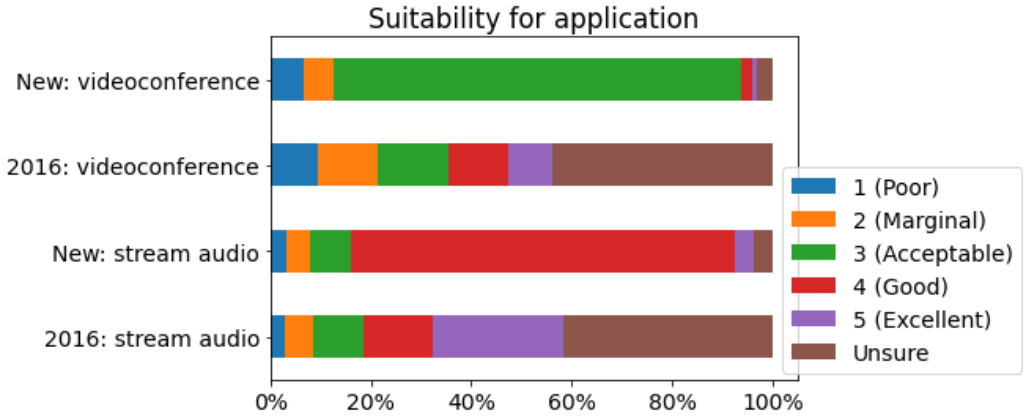


Figure 3.3-5: Participant rating of how suitable the plan is for video conferencing or streaming audio based on the information provided in the labels.

Network management practices

We next gave participants a list of broadband-related actions (e.g. watching online videos, exceeding 300GB of data per month) and asked them to select all the actions that could trigger their provider to throttle their speeds during times of network congestion. Our New labels list out triggers and actions for a provider's network management practices, but the 2016 labels do not. The New labels' listing of practices reduced participant uncertainty with 70% of 2016 label participants and 8% of New label participants selecting the "unsure or not enough information" option. In addition, New label participants were able to correctly interpret the label to identify occurring practices 64% of the time on average. For the 2016 labels, as no network management practices are described, there were no correct or incorrect answers from the listed practices. However, 11% of 2016 label participants selected our "None of the above" option despite the labels indicating that the plans had both application-specific and subscriber-triggered practices active.

Plan comparisons

For the next portion of the comprehension section, participants were shown 2 labels in the same assigned format representing a Plan A and Plan B. We instructed them to use these two labels to answer comparison questions that asked them to evaluate which plan had lower costs, better performance, better

reliability, or less restrictive network management practices. Figure 3.3-6 shows a summary of how well participants answered this group of questions. Since there was not a lot of variation in correctness between broadband types, we combine the groups into just 2016 label format or New label format participants. When asked at the end how easy or difficult it was for them to do these comparison tasks on a likert scale of extremely easy to extremely difficult, 27% of 2016 label participants and 54% of New label participants answered either "somewhat easy" or "extremely easy."

We observe that the New label formats do about as well as the 2016 label formats when using fields that exist on the 2016 labels to compare across plans. Additionally, a majority of New label participants were able to accurately compare between two plans using the added reliability section and more detailed network management practices section (see figure 3.3-6A). Despite not having a reliability section or access to detailed network management practices, a large portion of 2016 label participants selected an answer other than "unsure or not enough information" when asked to make these comparisons (see figure 3.3-6B). For comparing reliability, participants who selected "Plan A" likely interpreted packet loss as the measure of reliability. For comparing network management practices, participants who selected "Both plans are equal" likely misinterpreted the fact that both plans had both application-specific and subscriber-triggered network management practices to mean they were equally restrictive. A misinterpretation of that kind could cause a consumer to choose the plan that is less able to meet that consumer's needs.

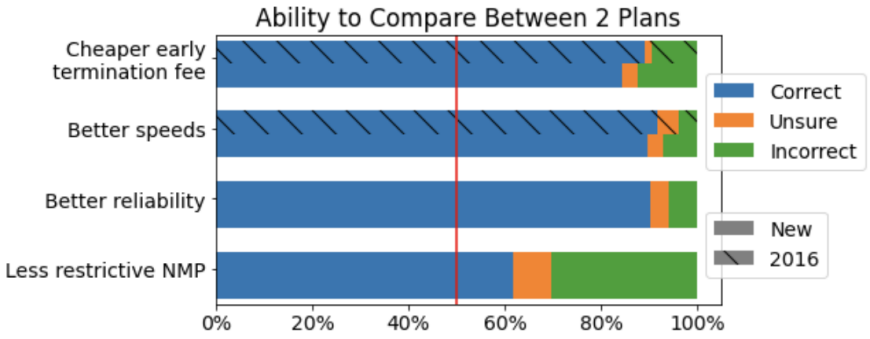


Figure 3.3-6A: Ability of participants to compare between a Plan A and Plan B using either the 2016 or New label formats.

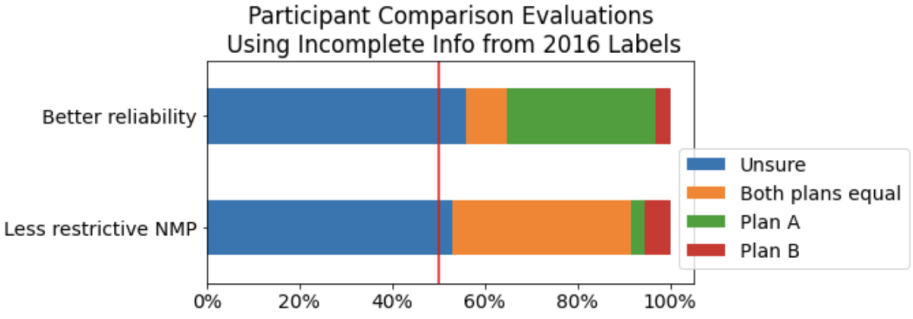


Figure 3.3-6B: Participant answers to comparison questions which required information not present on the 2016 labels they were shown.

3.3.2 Opinions on Labels

Questions in this section solicited participant opinions on their assigned label format including their suggestions for changes to the information presented for each section. Similar to the Phase 1 survey, participants were shown a graphic of a full broadband label in their assigned format and then asked to rate their agreement with several sentiment statements (e.g. "This label is confusing or overwhelming") and ability self-evaluations (e.g. "Using the information on this label, I am able to determine if this plan's performance will meet my internet usage needs"). Next they were shown graphics of just the major label portions–costs, performance, network management practices–and asked both open-ended questions on what they would like to change about the displayed section and more specific questions that asked how they felt about the presence or absence of specific plan details. The goal of this section was to gather further data on how both the FCC's 2016 labels and our own New labels could be further improved upon from the perspective of label users.

Overall, both label formats (2016 and New) were found useful, understandable, and contained all the information needed to select a plan without being overwhelming according to a majority of participants (Figure 3.3-7). The New labels were mostly on par with the 2016 labels when it came to participant confidence that they could use the labels in accomplishing given tasks. However, the New labels outperformed the 2016 labels in participant task confidence where tasks used details we added to the New labels that weren't explicitly on the 2016 labels like network reliability and detailed network management practices (Figure 3.3-8).

Generally, non-technical participants were slightly less likely to find the labels easy to use than those who self identified as technical. Technical users were also generally more interested in including additional information on the label. These modest differences showed up in both the 2016 and New labels.

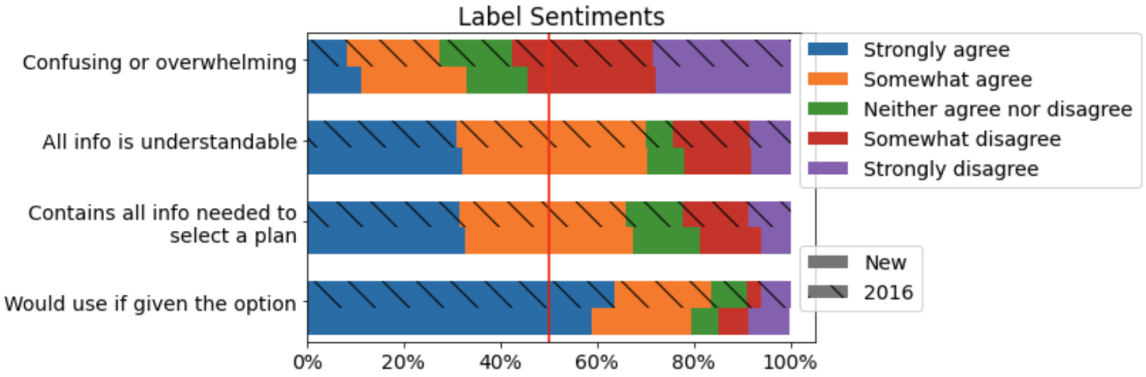


Figure 3.3-7: Participant agreement with label sentiment statements. Statements on figure axis are paraphrased for space

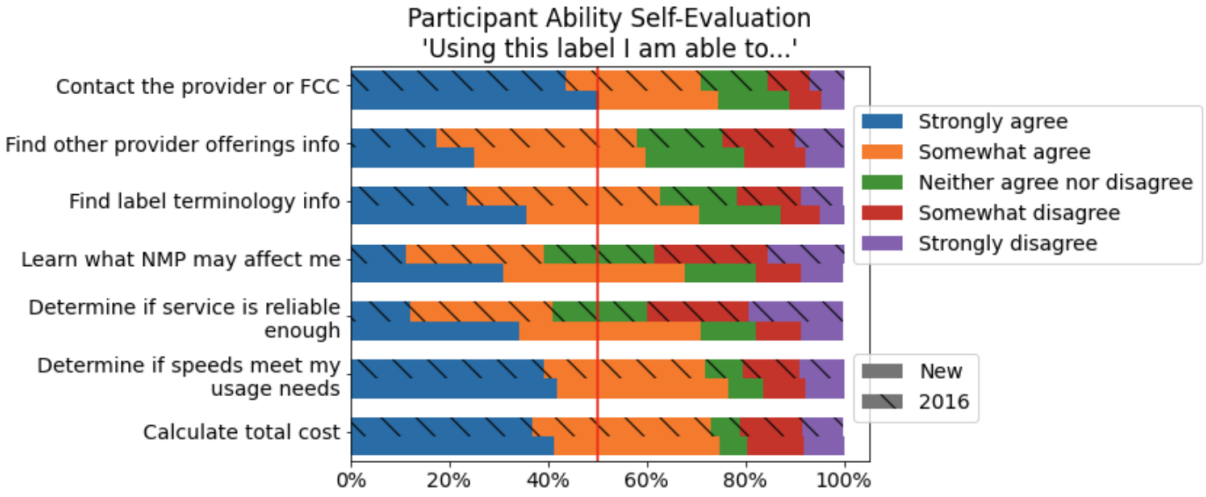


Figure 3.3-8: Participant agreement with label ability statements. Statements on figure axis are paraphrased for space

When shown just the cost and included features section of their assigned label, participants expressed a desire for more in-depth cost explanations, for taxes to be included as part of the label, and for some sense of plan service area. Generally, participants wanted to know the final total cost they would be paying and disliked any ambiguity. Here are some representative responses:

> *Include what's in the other included services/features. Why leave the consumer in the dark? The same can be said for the additional pricing options, plans and promotions-give most people the same deal instead of hiding it as part of the consumer information package.*
>
> *I suppose the label should have provided many more details, perhaps even examples of the yearly costs to make it more clear...*
>
> *Would want to see the "total" cost. Given my lack of knowledge on most "tech" issues, I would likely ask for additional explanations to most of the items on the label.*
>
> *Make it more clear what I will actually pay per month. Are there taxes or anything other tricky things don't know about?*
>
> *It's a good guide representing costs and the services you will get. I would also like to see a place to enter zip code so that all charges calculated and are known prior to signing up.*
>
> *Don't tell me that other fees may apply. Tell me what the total of the %{%}**}*]ing fees. Sorry if it's inconvenient to calculate that...*

Additionally, we asked participants directly if they would like to see taxes included on the label. An overwhelming majority of participants (97%) stated that they would. However, they were divided on whether taxes should be listed as a separate row on the table (55%) or wrapped into the listed price for each item on the label (42%).

For the performance section, the most frequent information requests we observed was for reliability information, quality of experience ratings, and explanations for technical terms.

> *I'd like an actual range (best and worst) of reliability/performance, preferably for my locale. Perhaps typical availability or "up-time" expressed as an average percentage of total time each month internet service has been available vs. down-time for the service in the past year.*
>
> *Give example of possible speed req'd to do zoom call per minute, how many mbps meeded to do online research for kids homework. Watch a movie/streaming high res vs low res. Give a rough idea of what's needed for common use cases… Add service levels guaranteed if any, or historical uptime vs downtime that people can expect with the service.*
>
> *What I want to know is would the service support my uses. Will it work for texting and email? Will it play music well? Can I use it to have video meetings? Can I stream movies?*
>
> *The word "typical" is undefined and its use and meaning may vary between providers. Moreover, how is a consumer to know whether their installation location or conditions are typical or exceptional or how often exceptional conditions happen or where they happen, etc.?*
>
> *Include a glossary of terms and include each reference. For example, explain MBPs, speed (downstream), speed (upstream), latency, packet loss. A customer should not have to be looking up every other word on his/her computer in reading this label.*

Although the New labels actually had some reliability information listed, participants were vocal about wanting even more reliability information, including information on how many customers were affected by outages and some basis of comparison either to other providers or some national average.

> *It would be helpful to see scheduled vs unscheduled outage info for past 12 months listed under the Reliability section.*
>
> *Maybe this needs a comparative analysis to other providers to become meaningful. From this data, average monthly downtime of 2h 4m, with 105 over 3 years, seems to be a lot of downtime.*
>
> *A guarantee of some % (maybe 75%) of the stated speed and a sliding scale refund when it's not achieved; instead of the Blue Link "Individual experience may vary" statement that is there only to cover their A$$.*
>
> *I'd also like some indication of who did the testing and rating - whether the FCC does its own studies, whether the provider self-reports, or whether it's a third party (commercial or otherwise) who collects and organizes the reliability and performance data.*

We also asked New label participants whether they found the numbers or suitability ratings to be the most useful part of the performance section, and we asked 2016 label participants if they'd like suitability ratings added as an addition or replacement for the numbers. In combining the responses to those two questions, we observe that a majority of all participant groups (65-75%) wanted to have both numbers and ratings in the label performance section (Table 3.3-1).

Label Version	Just numbers	Just suitability ratings	Both numbers and ratings	Neither or Unsure
2016-fixed	7%	9%	**75%**	10%
2016-mobile	15%	8%	**65%**	13%
New-fixed	11%	9%	**70%**	11%
New-mobile	3%	11%	**69%**	17%

Table 3.3-1: Participant support for performance represented as numbers, ratings, both, or neither broken down by the label format they were looking at.

Participants next commented on what changes they wanted for the network management practices section. Many 2016 label participants wanted more details on what network management practices are and examples of their impact on consumers. Both 2016 label and New label participants had a large share of participants who expressed confusion over the terminology in this section and wanted either less technical language or a more thorough explanation–possibly through the provided hyperlink. Some New label participants wanted quantitative specifics to describe the effects of the various practices on their network experience.

> *Words are highly technical. The information is important, but needs to be presented at a lower level of comprehension.*
>
> *In the Effect column [of the New label], there should be a percentage performance change. For example, when data speeds are decreased during congestion, what percentage of the advertised speed will be cut?*
>
> *"Deprioritized" and "throttled" are not defined and are probably variable in severity so that the consumer really does not know what the net effect might be on their own use of the service.*
>
> *How often does congestion happen? How much is performance decreased by? What amount would next plan up (Super Internet in example) get me in terms of improvement?*

3.3.3 A/B Section Comparisons

Questions in this section had participants directly compare subsections of the 2016 and New label formats to determine overall preference and advantages of each format. Participants were shown corresponding subsections from a Version A label (2016 format) and Version B label (New format) then asked which version they preferred and what about each version they liked better than the other. Participants also had the option to select neither or unsure as a preference. The goal of this section was to better understand whether the changes we made between the 2016 labels and New labels were actually improvements. Since most of our changes to the header and footer were less interesting, we focused on soliciting feedback for the cost, performance (including reliability), and network management practices sections of the labels. Overall, we found that the New labels were preferred by the majority of participants for every subsection we asked about except for the cost section on the mobile broadband labels (see Figure 3.3-9).

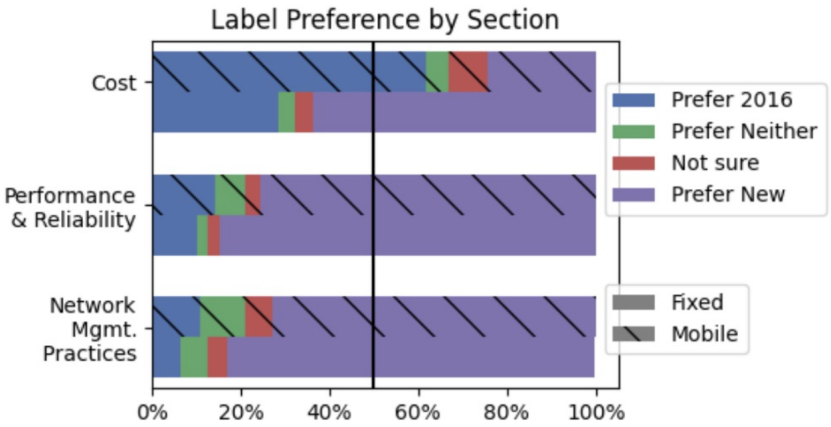


Figure 3.3-9: Participant preferences for 2016 vs New label subsections broken up by broadband type and subsection—cost, performance, or network management practices (NMP).

The most common reasons participants gave for preferring the 2016 format were larger font size and simpler, more concise layout. The most common reasons participants gave for preferring the New format were that it had more information and was better for side-by-side comparisons. Here are some representative responses for each:

> *I can't emphasize enough the important of keeping it simple so that the label is easily understood by the average non-tech person. The average person says: "this is what I am going to do with my devices, will this service let me do that."*

> *All the jargon on the label doesn't mean anything to me if I don't understand how it will affect my usage of the service. I liked the labels that included the very detailed information. Even the ones with more text/information were far more informative and helpful than pages of fine print no one ever reads.*

> *[2016 label] appears less busy and has larger, easier to read font.*

> *[2016 label is a] very simple presentation, but actually dismally incomplete for a sound decision*

> *[New label is] much more comprehensive. Allows one to understand what the service will support.*

> *[New label]'s well ordered… The format is uncluttered and easy to read & find info. The differences in font size and bolding are very helpful in separating things.*

The cost section comparisons were particularly contentious. For the fixed labels, some participants really liked the two-column format of the New label as it made it easier for them to compare between contract and month-to-month payment options, but others found it confusing and unnecessary.

> *[New label has] more cost comparison, shows costs involved with contract vs no contract, helps to make a better decision*

> *[New label] makes it easier to determine the first year vs additional year cost. I might choose an ISP based on first year cost with the intention to switch as soon as the contract is up, depending on the installation/termination fees.*
>
> *Even though it is somewhat confusing, [New label] is better because you can compare costs side by side.*
>
> *[2016 label is] more concise, no side by side comparison, and it gives more information. I prefer a linear format.*
>
> *[2016 label] follows normal, conventional communication practices. [New label]- which is like xfinity, gives totals ABOVE the individual charges in multiple sections. Its illogical and designed to confuse. [2016 label] is great.*

For the mobile labels, participants offered contradictory feedback. For example, both the 2016 and New formats had several participants praise them for being simpler, concise, and easier to read. Participant comments for why they preferred the 2016 label revealed that many participants preferred the cost section on the mobile 2016 label because it contained more information. On our proposed New labels, device compatibility information was moved off the label and the coverage map hyperlink was moved out of the cost section and into the new Reliability section. In addition, several participants were confused by the New label's removal of the "Government taxes and fees, and Other carrier surcharges may apply" field believing that instead of the taxes being included with the listed fees as we intended, they were being dropped altogether.

The performance and network management practices sections' feedback were less conflicting and consistent with the overall trends: the 2016 label is simpler with bigger font whereas the New label had more detailed information overall. Feedback for these sections also frequently praised the suitability ratings and explanation of what network management practices there were. Notably, the 2016 label's network management practices section was based on the FCC's example labels which, for both subscriber-triggered and application-specific network management practices, simply state "yes" with no further description.[8,9]

> *[New version] gives me ideas of how the performance will affect various common internet activities. The colors give an instant visual cue about service. The differentiation between normal and poor performance is also helpful.*
>
> *[2016 version network management practices section] is pretty much useless. Every provider will have the same information there. [New version] gives me actual information on the provider's practices.*

---

[8] Federal Communications Commission. *Broadband Consumer Labels: Sample Broadband Consumer Labels From 2016*. Accessed October 6, 2022 from https://www.fcc.gov/broadbandlabels. Images accessible at https://www.fcc.gov/sites/default/files/Fixed-Consumer-Broadband-Label-Sample.jpg and https://www.fcc.gov/sites/default/files/Mobile-Consumer-Broadband-Label-Sample.jpg

[9] This does not align with the FCC's NPRM guidance which states that those fields should have provided "a brief description and a link to a full discussion that identifies… network management practices, when such practices are triggered, and the effect such practices could have on performance."

4. Discussion

In this section we synthesize our results from both phases to identify overarching themes and actionable design recommendations for the broadband consumer disclosure labels. We divide this section into five subsections aimed at discussion points that extend across (1) all label sections, (2) the cost section, (3) the performance and reliability sections, (4) the network management practices section, and (5) other recommendations.

4.1 General Sentiments

4.1.1 Strong support for broadband labels

We strongly encourage continued development and eventual implementation of the broadband labels. Throughout our study, participants frequently expressed their enthusiastic support for broadband consumer disclosure labels–many viewed them as a way to combat providers' lack of transparency and manipulative pricing models. Even though participants expressed their share of frustrations with both the 2016 and New labels' formats and terminology, they strongly supported the implementation of these labels over the current status quo. Here are some representative responses:

> *God (or whoever is running this show here), BLESS you for doing this! Nowadays it's like having a part-time job to get through all the legalese in everything we do. These labels would alleviate a LOT of stress and wasted time, and help people make better decisions. Thank you again.*

> *I hope this is something that will actually happen. Broadband providers currently make it very difficult to compare plans within one provider's catalog as well as between providers. This labeling would greatly increase consumers' understanding of what they would be paying for.*

> *While I find [the New labels] to be the clearest, most accessible version of a consumer information label, either of them would be a huge improvement over the way providers currently provide information about their various plans. I hope this can actually be put into practice!*

> *I cannot wait for labels like this to become available. Several times I have signed up for service only to find later that the carrier has constant outages, bad internet service and lousy customer service. How great to know at least SOME of this when making the initial choice to sign up for a service!*

> *I really wish it was Federal law that purchasing broadband or cellular services had to be laid out for people like this. Good luck!*

4.1.2 Most important: Cost, speed, and reliability

When evaluating a broadband plan for purchase, participants frequently noted their decision making involved examining the cost, speed, and/or reliability of the plan. In other words, participants care the most about knowing how much they are going to pay, what they are going to get, and how much of the time they will not get what they paid for. However, broadband labels should not be reduced to just these details as we observed participants find many other plan details important to know when comparison shopping. We recommend that cost, speed, and reliability be highlighted among the larger set of plan

attributes disclosed to broadband consumers. Our final label proposal discusses one such approach for doing this (section 5.1).

4.1.3 More information + Conciseness

We observed from our participant responses in section 3.3.3 that participant preferences tended to align with whichever label had more information. However, we also observed that they valued design simplicity and conciseness; they wanted to be able to extract their desired information from the label as quickly as possible. In addition, more numbers on the label whether they were for costs or performance values tended to result in more label comprehension mistakes. These preferences for more detailed information and conciseness can conflict but are not mutually exclusive and future label design should strive to achieve both. Our recommendations for an improved label design in section 5.1 address one such approach for accomplishing this balance.

4.1.4 Making information in labels available to third-parties

We strongly recommend that all information found on the labels be made available to independent third parties. Information would be ideally accessed via API requests to a publicly-accessible computer-readable database. These information flows are necessary to satisfy consumer demands shown by our results. Specifically, consumers want pricing totals that include their specific optional add-ons and local taxes. They want quality of experience ratings tailored to their personal use cases and expectations. They want comparison tables with all plan options available to their location. And they want to know how their cost effectiveness competes against local and nationwide averages. A one-size-fits-all, FCC-mandated static label realistically cannot accomplish this–especially for quality of experience ratings for all applications that a consumer cares about (see section 4.3.4). Providers themselves also cannot provide this without having access to other providers' information and needing to overcome consumer mistrust. Here are some representative responses which either directly or indirectly call for third-party tooling:

> *These disclosure labels are a great innovation for consumers. If this advancement could be paired somehow with an ancillary list of available service providers in one's geographical area, the consumer would be much better able to make smart choices.*

> *It would be useful to have an independent agency, like FTC, provide a website where consumers could specify their household needs are and see what internet speeds and options would be ideal for them. Next you would specify your location to see what internet providers and plans are available; then be able to compare between them.*

> *It would be great to have a site where one could go to do a side by side comparison of plans available to your area!*

> *Instead of a standardized label, I would prefer a requirement for a web site where I could provide information about how and where I use the internet and what details I would like to know, and the site would display output that is tailored to my needs. Better yet, would be a web site that all vendors supplied information to, so that I could request a comparison of the cost and performance measures I want.*

The subjective appraisals for different uses of broadband should be evaluated by a third party, not the vendor of the service.

4.1.5 FCC Standardized Glossary

We recommend that the FCC be responsible for releasing and maintaining a glossary of broadband label terminology that can be accessed through a mandatory hyperlink on the label. Participants frequently complained the labels used too much technical jargon and that they couldn't understand the various terminology, much less how the information presented would impact their internet experience. This was especially true for participants without a technical background. Terms we found were frequently misunderstood or cited as technical "gobbledygook" included latency, packet loss, and network management practices (both application-specific and subscriber-triggered), performance percentiles, and network congestion. However, our results show that participants are highly interested in having all these plan details available to them. Therefore, consumers' lack of immediate understanding of terminology should not be considered a deterrent to their inclusion on the labels. Rather, lack of understanding should indicate a need for rewording with less technical jargon or for providing an explanation elsewhere–like in a glossary. This is supported by our results that show many participants, including those with a technical background, want explanations on what broadband terms meant and why they mattered.

We specifically recommend that the FCC be responsible for the glossary for two reasons. First, participants frequently doubted the credibility of their internet service providers, which extended to any provider-controlled content accessed through label hyperlinks, including glossaries. Second, official definitions would promote more consistent terminology usage across the industry, making it easier to compare services from different providers.

4.2 Cost Section Takeaways

We found that consumers generally want to know what they can expect to pay when they purchase a plan, and they hate when there are unexpected hidden fees or price increases. Creating labels with comprehensive cost sections that include all pricing options for a given plan would appear to meet this need. However, we also found that consumers generally struggled with cost computations and wanted fewer numbers to contend with. They preferred totals where possible: being presented with "just one number" made it easier not only to understand what they could expect to pay, but also to compare across plans. However, common providers' pricing schemas include a large selection of possible discounts (e.g. promotional, contract, student, paperless billing, autopay) and optional add-ons (e.g. equipment, television, voice, additional lines) that make providing a one-price-estimate-fits-all value difficult, if not impossible. Although we provided participants with a total activation cost estimate on the New labels we tested, this total was based on a predetermined notion of what optional costs would be included (e.g. installation) and explained to users prior to asking them to compute a 2 year total. Attempting to give a total price estimate based on a predetermined bundle of options in reality may push consumers into paying for services they do not require or frustrate consumers who end up purchasing more than estimated. In summary, creating a usable cost section is difficult. Nonetheless, we put forward the following design recommendations for the broadband labels' cost section.

4.2.1 Total Costs

Non-optional costs should be bundled into a total where possible as participants strongly preferred to just have one number representing what they need to pay where possible. This includes bundling applicable taxes into all listed prices. Participants strongly wanted taxes to be present on the label and having them as a separate row for a non-universal combination of optional costs is impractical. We did not explicitly ask participants if they want precise cost breakdowns accompanying total values. However, we tested having a total cost with accompanying breakdown for activation on the New labels and found it performed well with participants.

In a more ideal world, consumers could toggle discounts, add-ons, and taxes to affect a total cost value on a dynamic version of the label. Although individual providers may implement such a feature, the primary goal of the broadband labels is to enable comparison shopping across providers. This suggests the need for third-parties that can implement this tooling. Therefore, we again strongly recommend that this information be made available through a machine-readable interface (see section 4.1.4).

4.2.2 Cost Explanations

Cost explanations should be made easily accessible to consumers directly from the broadband label. Participants strongly expressed a desire for cost explanations both after their cost computation task and after being shown a label's cost section. Based on their feedback, a cost explanation would detail for each item: what the cost is for, when the consumer would pay it, what populations are exempt from paying it (e.g. legacy customers, customers switching from contract to month-to-month), and when the cost will increase.

We further recommend that the cost explanations not be directly on the label but instead be accessed through either a label hyperlink to an external webpage or tooltips. The FCC's 2016 labels do not currently have an explicit place for this beyond potentially the "other pricing options including promotions and options bundled with other services" hyperlink. We recommend the addition of a "cost explanations" hyperlink if this approach is taken. One other approach could be to have tooltips provide this information on electronic versions of the broadband labels so that this information is readily available without being nested in yet another hyperlink for consumers to navigate.

4.3 Performance Section Takeaways

4.3.1 Which Measurements to Include

Several parties have argued that packet loss and latency are esoteric measurements that should be removed from required inclusion on the label. However, our results show that even if consumers' a priori understanding of the terms was lacking, they still desired having these measurements and could use them after they are given short explanations. We recommend that the FCC require inclusion of all four performance measurements: downstream speed, upstream speed, latency, and packet loss.

4.3.2 What Measurements Should Reflect

The FCC proposes that label measurements should reflect the typical values during peak usage periods.[10] However the word "typical" is undefined and therefore means different things to different

[10] FCC NPRM 22-7. *Empowering Broadband Consumers Through Transparency*.

people; most of our participants assumed that "typical speed downstream" reflects the times when performance is normal. In addition, "peak usage periods" is also not defined in the NPRM. This vagueness leaves room for providers to potentially manipulate their metrics to appear more favorable, thus making direct comparisons across providers problematic, misleading the consumer and fostering mistrust of the labels. To mitigate this, we recommend the FCC provide a precise definition of all metrics that appear on the label in a glossary.

Overall, we found consumers are most interested in knowing a plan's expected performance during normal operation and when their service is operating much worse than normal (see section 3.2.3). Notably, they found knowing normal and much worse than normal performance more important than other values including best, better than normal, and just worse than normal (figure 3.2-10). Some participants also expressed wanting something like a worst-case guaranteed performance. We therefore recommend that whichever measures are decided upon, they reflect both the plan's expected normal and poor performance.

Although we tested participants' preferences for percentile measures, they were initially confused by those terms and it wasn't until we added less precise, non-technical language (e.g. "speed when performance is much slower than normal (10th percentile)") that they became highly interested in having these measurements. Since consumers generally lack knowledge of statistical measures in the context of broadband internet performance, our survey responses cannot be used to conclusively recommend which precise statistical measures should be used. Both the FCC and external parties have proposed several statistical measures including mean of all speed samples, median of all speed samples, 80/80 consistency, and 95% consistency.[11] We urge the FCC to determine what is the best statistical measure to represent "poor performance." We also recommend that the labels augment any statistical language with more non-technical language even at the cost of some conciseness or perceived precision; the measurements themselves should be rigorously precise.

4.3.3 Data Rate Unit Consistency

Our results show that non-technical participants especially struggled with data rate unit conversions between Kbps, Mbps, and Gbps. Since this can lead to critically flawed comparisons between plan options, we recommend the FCC require the data rate units be kept consistent (e.g. all broadband providers would express speeds in Mbps and latencies in ms).

4.3.4 Quality of Experience Ratings

Participants without a technical background largely did not understand the raw metrics reported in the Performance section of the 2016 label. Our results support including application suitability ratings in addition to measurement numbers. Our application suitability ratings are otherwise known as Quality of Experience (QoE) ratings and may realistically be difficult to provide on a standardized label as they are both subjective and highly application-dependent. Other factors outside of the provider's control, including number of users on the network and the subscriber's hardware, can also drastically affect quality of experience. Several participants also initially distrusted the suitability ratings on the New labels because they came on a provider-authored label despite our "Government Performance Ratings

[11] Schulzrinne, Henning and Johnston, Walter and Freund, Andreas Carlos, Your Mileage May Vary or Performance You Can Count On: What Should Broadband Consumer Labels Measure? (August 1, 2022). Available at SSRN: https://ssrn.com/abstract=4178758 or http://dx.doi.org/10.2139/ssrn.4178758

(fcc.gov/broadband)" header. They believed providers would use these to make a plan appear better than it actually is or to nudge consumers towards buying a more expensive plan than they actually needed. Finally, even if the FCC could publish standards for quality of experience ratings, they would likely require frequent updates.

That being said, ratings and guides are not new to government labels. The Nutrition Facts label created by the FDA includes a Percent Daily Value (%DV) which is a quick way to see whether the amount of nutrients in a particular food is in line with what the average adult needs in a day, regardless of whether they know anything about nutrition science. The Energy Star label from the U.S. Department of Energy includes an estimated yearly operating cost so that consumers don't have to do math on kWh to understand the practical impacts of purchasing energy-efficient appliances. Window stickers on new cars include a similar fuel price estimate from the EPA as well as 5-star safety ratings from the National Highway Traffic Safety Administration (NHTSA). The NHTSA's labels are of particular interest because like broadband internet performance (and unlike nutrition or energy labels), assessing a car's safety in a collision requires synthesis of many different technical measurements. Also like broadband internet performance, it's impossible to determine a car's safety in every possible crash scenario, so the NHTSA selected only a few representative scenarios to test.

QoE ratings are highly desired by consumers as supplemental information to the raw number metrics. For non-technical users especially, they cited the suitability ratings on our New label prototypes as the most understandable and helpful portions of the label. A potentially more realistic way to provide these is for independent third-parties to develop and maintain tools that can intake household consumer requirements, application preferences, household usage patterns, and label information and output ratings. To make this possible, the data contained in the broadband labels must be made available to third-parties. We therefore recommend that the FCC take steps to enable such functionality (see section 4.1.4).

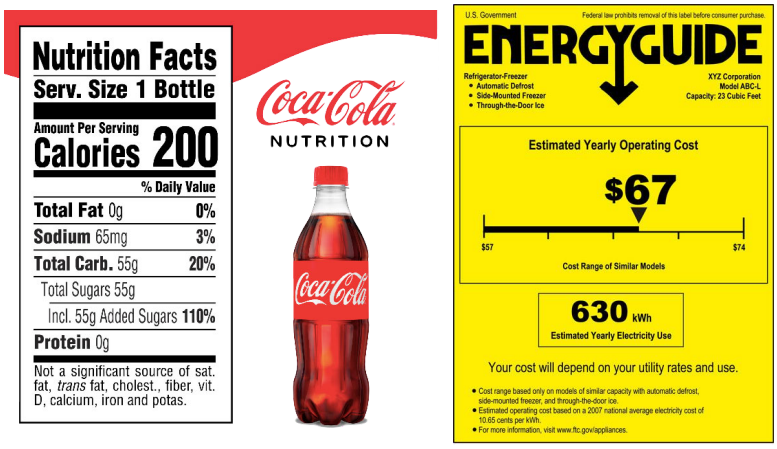


Figure 4-1: A soda nutrition label's (left) percent daily value (%DV) contextualizes 55g of added sugar for non-expert as more added sugar than they need in a day. The Energy Star label's (right) scale bar shows this fridge's annual operating cost is slightly above average.

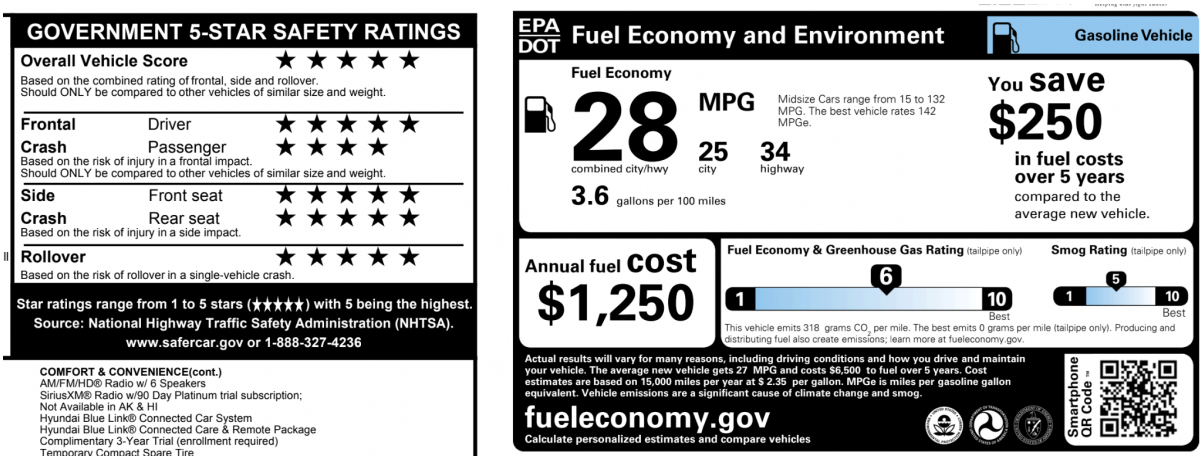


Figure 4-3: NHTSA safety ratings (left) and environment information (right) for a single car. The safety star ratings concisely indicate this car is very safe except for passengers in a frontal crash who are only mostly safe. The fuel economy section shows this car is slightly cheaper to fuel than most cars. This label also includes a QR code which leads to a more detailed label about this vehicle's fuel efficiency. Our proposed two-layer broadband label follows this format (section 5.1)

4.3.5 Reliability

Participants were highly interested in having some indication of reliability on the broadband labels. Notably, reliability can have several meanings in the context of broadband internet. The interpretation we tested with the New labels and surveyed interest for in Phase 1 was a lack of network outages. We know from our results that lack of outages is important to participants and representing this with average monthly downtime per customer and number of outages over the last three years was easily understood. Free responses also indicated that some consumers wanted additional reliability details like percent uptime, differentiation between scheduled versus unscheduled outages, and how the listed reliability compares to other providers both in the area and nationwide. We recommend that a reliability section be added to the broadband labels with some indication of outage frequency and duration.

4.4 Network Management Practices Section Takeaways

We recommend that network management practices be enumerated on the label in standard groups and the network management section be accompanied by a standardized glossary with definitions and examples that explain these terms for consumers.

4.4.1 Enumerate Network Management Practices in Standard Groups

Network management practices should be enumerated on the label because our results indicate that consumers want this information disclosed and they find the section functionally useless without the actual practices listed out. Practices can be disclosed as either a brief description like the NPRM specifies[12] or a table as some experts have recommended.[13] We tested the table format in our New label mockups and found participants liked it (see section 3.3.3).

[12] FCC NPRM 22-7. *Empowering Broadband Consumers Through Transparency*.
[13] Jordan, Scott, Broadband Labels: Performance and Network Management (July 28, 2022). Available at SSRN: https://ssrn.com/abstract=4175616 or http://dx.doi.org/10.2139/ssrn.4175616

Practices listed on the label should be grouped into standard groups (described in a standardized glossary) established by the FCC to promote consistency across providers, and to prevent potentially objectionable practices from being buried in a long list. We grouped practices into traffic management, paid prioritization, and zero-rating/data allowance exceptions on our New labels and found it performed well with participants. Subscriber-triggered and application-specific practices may be combined, as this is not a distinction that was readily understandable to participants.

4.5 Other Recommendations

4.5.1 Location-specific Labels

Providers' pricing, performance measurements, and network management practices for a given plan may vary with the customer's location or service area. Additionally, several recommendations we make for the broadband labels—including taxes with pricing items, reliability information, and increased label availability—require a specific location to be declared. We therefore strongly recommend that labels include an indication of the location to which the information on the label applies.

4.5.2 One Plan per Label

Some participant responses noted feeling initially overwhelmed by the amount of numbers on the label. We also observed slight decreases in comprehension when label rows were given multiple columns or values; we would expect this issue to compound as more columns are added. To minimize confusion, labels should be plan-specific. In practice, this would mean a provider could list the contract and month-to-month options on the same label, but they should not attempt to cram multiple cable internet speed tiers onto the same label. Of course, providers or third-parties could also provide plan comparison tables based on label information.

5. A Consumer-Driven Broadband Label Design

In this section, we propose a broadband label design prototype (figure 5-1) that improves on the New label designs that we tested in Phase 2 of our study. This prototype is informed by our findings across the entire study and aims to satisfy what consumers want from and understand on a broadband label. We encourage label designers to keep the rationale we present for each design element in mind as they iterate further on label designs.

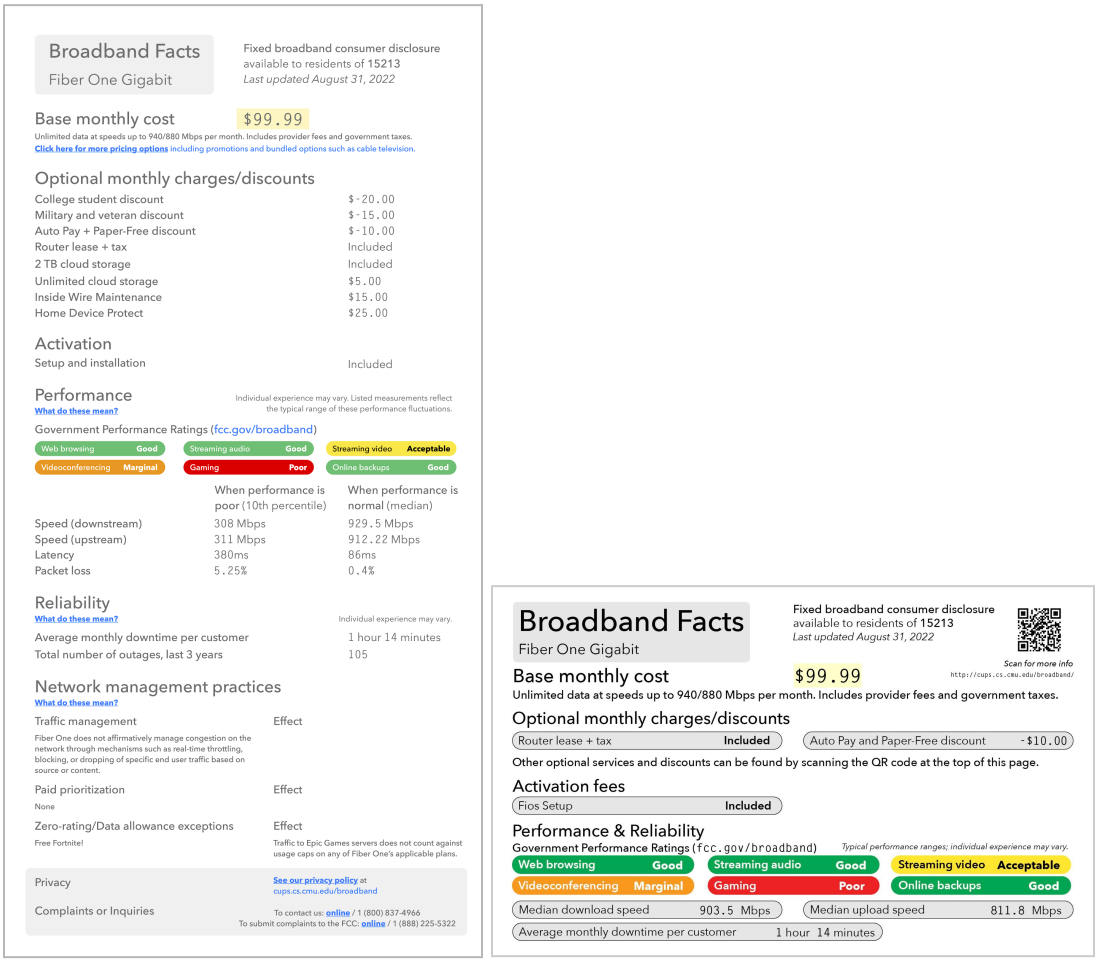


Figure 5-1: Prototype design for a layered, consumer-driven label design with a detailed layer (left) and summary layer (right). See Appendix E for full-scale versions of these labels.

5.1 Layered Labels

Many participants noted being initially overwhelmed by the labels, finding it difficult to quickly pick out the information they most wanted (see section 4.1.2). However, participants also expressed that they want easy access to all of the detailed information a full broadband label provides (see section 4.1.3). One approach we recommend for balancing these requirements is to use a layered label design. This

approach has seen popularity in other label applications[14] and features both a summary layer and detailed layer.

The detailed layer is the full label that contains all of the information providers must disclose on a broadband label. This layer looks similar to both the 2016 and New labels that we tested throughout our study. The summary layer should be generated only from information found on the detailed layer with the addition of a clearly marked QR code and/or URL that links to the detailed layer. Based on study participants' most desired plan details, we recommend the summary label contain only the base monthly cost of the plan (including taxes), base router/equipment rental monthly fee, activation fees, performance ratings, median download/upload speeds, and average monthly downtime per customer. Further, we again highly recommend that all information found on the labels be made accessible as machine-readable metadata (see section 4.1.4). See figure 5-1 and Appendix E for examples of our prototype label's layers.

Although a summary layer increases digestibility of broadband label information, it also makes it more likely that companies may omit critical information from the summary layer and show it only in the detailed layer. Careful consideration is needed as to the minimum set of required information on the summary layer. In addition, the summary layer should include a clear indication of how to access the detailed layer (e.g. with hyperlinks, QR codes) along with a brief note indicating what additional information can be found there that isn't present on the summary label.

5.2 Prototype Design Specifications

Size Formatting

Both labels are designed to be printed on standard 8.5x11" paper while still remaining legible even if printed at a lower resolution in black and white only. The summary layer is designed to occupy only half a sheet of paper such that one could print two full-size summary layers on one page. The detailed layer is designed to be printed over several pages, growing lengthwise as more details like optional discounts/add-ons are added.

Header: Plan title and label disclosure, location, (summary label only) link to detailed label

Consistent with the 2016 labels, each label should contain some text denoting that this is a consumer disclosure about broadband internet. We recommend a large title ("Broadband Facts") with a subtitle denoting the broadband type (e.g. "Fixed broadband consumer disclosure"). The top of the label should also include the name of the ISP and the plan the label is for (e.g. "Verizon FiOS 1 Gig", "T-Mobile Magenta MAX").

For fixed broadband, the applicable location should also be listed at the top.

A summary label should include a link to the detailed label in the form of a QR code with URL underneath. The URL makes the link more accessible since it does not require a device capable of scanning a QR code.

[14] P. Emami-Naeini, Y. Agarwal, L. Faith Cranor and H. Hibshi, "Ask the Experts: What Should Be on an IoT Privacy and Security Label?," 2020 IEEE Symposium on Security and Privacy (SP), 2020, pp. 447-464, doi: 10.1109/SP40000.2020.00043.

Base monthly cost

The base monthly cost was the most important number on the label for participants. This price should come before any other sections on the label.

This cost should reflect the monthly price of the plan *before* any discounts or optional monthly charges are applied. For example, T-Mobile currently advertises its Magenta MAX plan for a single line as $85/month including a $5 discount for enabling automatic payments. In this case, the label would state the base price as $90 per month, and the automatic payment discount would be listed below in the **Optional monthly charges/discounts** section.

The base monthly cost should include any taxes and fees that are required for service. This includes government taxes and any required fees that the ISP tacks on to their listed monthly pricing.

When a plan is purchased as part of a bundle (e.g. cable television) the label should report the full price of the bundle. Although other items within the bundle are not internet service and won't be detailed on the label, they add mandatory fees to that plan and thus are part of the base monthly cost.

Below the base price, there should be a line stating what the plan advertises: how much data it includes per month and advertised downstream/upstream speeds. If the base price represents the total cost of the bundle the broadband internet plan is a part of, this line should additionally list all bundle components covered under the total base price.

Optional monthly charges/discounts

This section should list any optional modifications to the monthly cost of the plan.

Equipment (modem/router, etc) rental fees should be listed first. After that, ISPs may list optional charges/discounts in any order. The FCC may desire to mandate more specific ordering of this section so ISPs will not be tempted to bury the most important items at the bottom. Prices for optional services should factor in any additional taxes/fees associated with each service.

On the summary label, this section should only include the base equipment rental fee (least expensive available, if there are multiple tiers) and the automatic payment/paperless billing discount if applicable. A note below this section may be included stating that other optional services and discounts can be found by scanning the QR code or following the link in the header at the top of the page.

Activation fees

List any required one-time charges billed upon activation of service. If there are none, ISPs may omit the section or use one line to note that setup fees are included.

Other fees

List any one-off fees billed anytime other than activation of service (e.g. data overage fees, early termination fees). If there are none, this section may be omitted. Any fees billed consistently per month go in the Optional monthly charges section.

Performance Quality of Experience Ratings

Our qualitative results support including various key performance metrics as well as suitability (a.k.a quality of experience) ratings for various use cases.

We suggest broadband performance ratings follow the model of crash safety ratings by presenting performance in terms of suitability for a particular purpose. For example, higher-than-average latency could be unacceptable to a user who does a lot of online gaming, but isn't problematic at all for someone who mostly uses the Internet to check their email. As discussed in Section 4.3.4, these ratings may come from third parties selected by consumers rather than directly from government, but only if the FCC takes steps to make the underlying data available to these third parties.

To avoid overwhelming consumers with a large set of possible Internet usage scenarios, we recommend showing no more than a few categories of potential uses. The categories should cover a wide range of requirements for upstream and downstream speeds, packet loss, and latency. Our template includes the following categories as an example:

- **Web browsing.** Poor downstream speeds, poor packet loss and poor latency can noticeably reduce web browsing performance.
- **Streaming audio.** Streaming audio requires only modest downstream speeds, and upstream speed and latency have no significant effect.
- **Streaming video.** Streaming video requires substantial downstream throughput, but upstream speed and latency are not very important.
- **Videoconferencing.** Videoconferencing quality depends on upstream speeds in particular, which has been an issue in the pandemic.[15] Good latency is also important.
- **Gaming.** Many games require very low latency and low packet loss. Some games also require high speeds.
- **Online backups.** Uploading a lot of files to the cloud requires significant upstream capability but downstream speeds and latency are not important.

The ratings on our template follow the model of the Insurance Institute for Highway Safety (IIHS)'s ratings[16] of Good, Acceptable, Marginal, or Poor for each category. We color-coded the ratings for quick readability.

The label should also include a link to more information about the ratings and how they are created.

Measurements

We recommend including measurements for downstream speed, upstream speed, latency, and packet loss both for expected normal performance and for expected times when performance is poor (see section 4.3.1 and 4.3.2).

For ease of comparison and to reduce confusion, measurements should be reported on a consistent scale.

[15] Dahiya, S., Rokanas, L. N., Singh, S., Yang, M., & Peha, J. M. (2021). Lessons from internet use and performance during COVID-19. *Journal of Information Policy*, *11*(1), 202-221.

[16] https://www.iihs.org/ratings/vehicle/ford/escape-4-door-suv/2018

- **Speed** should be reported in megabits per second (Mbps).
    - If a measured speed is 425 kbps, it should be reported as 0.425 Mbps.
    - If a measured speed is 2.5 Gbps, it should be reported as 2500 Mbps.
- **Latency** should be reported in milliseconds (ms).
- **Packet** loss should be reported as a percentage.

This section should also include a link to an informational page explaining the terminology used and how the measurements are created.

Reliability (Detailed label)
Our participants were very interested in network reliability. We recommend reporting an expected amount of downtime a consumer might experience on a particular Internet plan as well as the total number of outages their location has experienced with that provider over a specified period of time. Our template uses average (mean) monthly downtime per customer and reports the total number of outages over the last three years.

Consistent with the performance section, this section should also include a link to an informational page explaining the terminology used and how the measurements are created.

Performance & Reliability (Summary label)
On the summary label, these two sections should be combined. To save space, we have omitted the 10th percentile measurements, latency and packet loss, and the total number of outages. The section is left containing the ratings, median upstream/downstream speeds, and average monthly downtime.

Coverage map (Wireless only)
Wireless plans should include a wireless service coverage map, preferably interactive.

Network management practices
This section is completely overhauled from the 2016 version. Participants wanted more information about network management practices than simply knowing if there are any.

We recommend categorizing or sorting network management practices in a way that puts the information that is most important to consumers at the top. Providers often employ many practices, so we recommend the label be structured to avoid enabling providers to bury the most important information at the bottom.

Our template splits network management practices into three categories: traffic management, paid prioritization, and zero-rating/data allowance exceptions. We have no data on whether these specific categories are effective, but we hope they illustrate the benefits of introducing some order to this section.

Our template is similar to Scott Jordan's proposal[17, 18] in that it includes two columns of information in this section: Practice and Effect. For each Practice listed, the Effect column describes its effect. Our template differs from the Jordan proposal in that application-specific and subscriber-triggered practices are combined in the same table.

ISPs must list each network management practice and its effect in this section. If they do not employ any management practices relevant to a particular category, they may include a small amount of descriptive text explaining so in place of this list.

Like the Performance and Reliability sections we recommend including a link to some informational material about network management practices.

Privacy
Include a link to the provider's privacy policy.

Complaints or Inquiries
Include contact info for the ISP. Following the 2016 label, our template also includes directions for how to submit complaints to the FCC.

[17] Jordan, Scott, Broadband Labels: Performance and Network Management (July 28, 2022).

[18] Jordan's proposal included three columns: The practice, When triggered, and Effect. When testing our label design on several existing plans we found the "When triggered" column to be redundant in most cases.

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Appendix A: Participant Populations

Table A1: Demographics of all participants who completed our surveys

Category	Demographic	Phase 1 (n=1257)	Phase 2 (n=1262)
Gender	Male	**74.3%**	**76.0%**
	Female	22.2%	21.2%
	Prefer to self-describe	0.5%	0.8%
	Prefer to not answer	3.0%	2.0%
Age	75+ yrs. old	21.0%	19.2%
	65-74 yrs. old	**41.4%**	**45.2%**
	55-64 yrs. old	18.4%	17.5%
	45-54 yrs. old	8.2%	7.4%
	35-44 yrs. old	6.0%	5.4%
	18-34 yrs. old	2.0%	2.0%
	Prefer to not answer	3.2%	2.2%
Race (multiple select)	White or Caucasian	**86.83%**	**85.5%**
	Asian	3.0%	2.4%
	Black or African American	1.8%	1.7%
	Hispanic or Latino	1.7%	2.2%
	Native American or Alaskan Native	0.9%	1.3%
	Native Hawaiian or Pacific Islander	0.4%	0.2%
	Not listed above	2.0%	1.5%
	Prefer not to answer	6.3%	5.3%
English proficiency	Native English speaker	**95.4%**	**95.1%**
	Fluent at English, non-native	2.7%	3.0%
	Non-native, non-fluent	0.3%	0.5%
	Prefer not to answer	1.6%	1.4%
Annual Income	More than $200,000	9.2%	8.1%
	$100,000 - $200,000	23.0%	25.4%
	$50,000 - $100,000	**26.3%**	**26.6%**
	$25,000 - $50,000	11.5%	9.9%
	Less than $25,000	4.0%	5.3%
Education (highest completed)	Some High School	0.1%	0.3%
	High School	10.7%	10.9%
	Trade School	4.8%	4.8%

Category	Demographic	Phase 1 (n=1257)	Phase 2 (n=1262)
	Professional Degree	8.1%	6.7%
	Bachelor's Degree	**39.8%**	**36.9%**
	Master's Degree	24.0%	26.4%
	Doctorate Degree	8.0%	8.7%
	Prefer not to answer	4.6%	5.4%
Technical Background	Technical	35.4%	40.7%
	Non-technical	**62.0%**	**56.5%**
	Unsure	1.1%	1.3%
	Prefer to not answer	1.6%	1.6%
Locale	Rural	22.8%	21.4%
	Suburban	**55.3%**	**59.8%**
	Urban	20.3%	16.9%
	Unsure or Prefer not to answer	1.7%	2.0%

Table A2: Broadband personas of all participants who completed our Phase 1 survey.

Broadband Detail	Demographic	Fixed (n=1088)	Mobile (n=169)
Recently Updated Plan	Within the last 2 years	43.7%	**55.2%**
	Not within the last 2 years	**55.8%**	43.0%
	Unsure	0.5%	1.8%
Special pricing	Paying an introductory rate	16.2%	n/a
	Not paying an intro rate	**79.5%**	n/a
	On a family plan	n/a	46.1%
	Not on a family plan	n/a	**50.3%**
	Unsure	4.3%	3.6%
Monthly Cost	Less than $40.00	4.9%	**23.0%**
	$40.00 - $79.99	**46.0%**	22.4%
	$80.00 - $119.99	25.2%	17.6%
	$120.00 - $159.99	8.9%	14.5%
	$160.00 - $199.99	4.8%	6.7%
	$200.00 or more	7.2%	10.3%
	Unsure or prefer to not answer	3.1%	5.5%
Internet Type	Cable	**54.1%**	n/a
	Fiber	25.8%	n/a

Broadband Detail	Demographic	Fixed (n=1088)	Mobile (n=169)
	DSL	10.9%	n/a
	Fixed wireless	5.3%	n/a
	Satellite	2.1%	n/a
	Starlink/Low-Earth Orbit	0.7%	n/a
	Unsure or prefer to not answer	1.24%	n/a
Internet Uses (select all that apply)	Casual web surfing	97.2%	85.5%
	Watching online videos	86.7%	47.3%
	Videoconferencing	71.1%	40.0%
	Regular online backups	46.7%	33.3%
	Watching 4K quality videos	39.4%	15.2%
	Real-time video streaming from device	30.0%	14.6%
	Online multiplayer gaming	12.6%	1.2%
	Connecting to a VPN	37.2%	n/a
	Peer-to-peer file sharing	7.0%	n/a
	Mobile tethering	n/a	30.9%
	None of the above while not connected to wifi	n/a	13.3%
	Other	5.2%	5.5%

Table A3: Distribution of complete and incomplete responses for each survey. In Phase 1 the pilot study participants were combined with the main study participants for most of our analyses.

	Complete	Incomplete
Phase 1 (incl. pilot sample responses)	1257	718
Phase 2	1156	1019
Phase 2 Pilot	106	n/a

Table A4: Distribution of completed survey responses for Phase 1 by broadband type and survey question subset.

Survey Subset	Fixed	Mobile	Total
Comprehension	320	42	362
Preferences	362	67	426
Opinions	406	60	466

Table A5: Distribution of completed, non-pilot-sample Phase 2 survey responses for each survey subsection separated by assigned label type.

	2016-fixed	New-fixed	2016-mobile	New-mobile	Total
Comprehension	224	204	21	21	470
Opinion on Label	303	307	40	36	686
A/B Comparisons	1038		118		1156

Appendix B: Broadband Definitions

Glossary of definitions provided to participants prior to answering some of the Phase 1 survey questions. Glossary was provided through a mixture of in-survey text and a link to an external webpage we hosted in our research lab's subdomain (cups.cs.cmu.edu/broadband/definitions.html).

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Appendix B1: Brief Definitions for Performance Metrics

- Upstream speed = speed at which your internet connection is able to send information to the internet.
- Downstream speed = speed at which your internet connection is able to receive information from the internet.
- Latency = the time it takes for information to move from its source to its destination; delay time between a user's action and the web application's response.
- Packet loss = measure of how much information that is sent over the internet never reaches its destination due to any number of factors including network congestion or faulty connections. This affects both your downstream and upstream speeds.

Appendix B2: Terms Describing Broadband Internet Performance

Upstream/downstream speeds

Upstream and downstream speeds measure how fast information can flow between you and the internet. In general, the higher the speed, the better your internet experience.

Downstream speed matters most when a lot of information is flowing from the internet to your device, such as when watching Netflix or downloading large files to your computer. Upstream speed matters when a lot of information is flowing from the user to the internet, such as when you are participating in a videoconference or uploading photos to the cloud.

Upstream/downstream speeds matter very little for applications that don't involve the flow of large amounts of information. For example, if you are only browsing the web, reading email, or listening to audio, you don't need to care about either speed as almost any modern internet plan's speeds will be good enough.

Latency

Latency measures how long it takes to move information from one place to another. It is essentially â€œlagâ€:[19] so, for example, when you're on a phone call, latency is the time delay from when you speak to when the other person hears your voice. It is usually measured in milliseconds (ms). In general, lower latency means better quality, but a small amount of latency is unavoidable. Latency matters in highly interactive applications such as online games, video chat, and phone calls. Latency doesn't really matter for non-interactive applications, like reading email or watching movies online.

Packet loss

Packet loss measures how much information that is sent over the internet never reaches its destination. If we imagine the internet to be a highway and information to be the cars on that highway,

[19] Due to an encoding error with our HTML quotation marks, this word was shown to participants as *â€œlagâ€*. It is meant to say *"lag"*

packet loss measures how many cars break down and never reach the other side of the highway. In general, lower packet loss is better, but most applications can tolerate some packet loss. If packet loss is too high, it may be difficult or unpleasant to use real-time applications such as phone calls, video chat, online games, and video streaming. High packet loss can also reduce speed when transferring a lot of information, such as when backing up many files to the cloud. Packet loss usually doesn't matter for less interactive activities that do not involve transferring a lot of information, such as web browsing or email.

Application-specific network management practices

A network practice is application-specific if it treats internet use differently based on the content, application or device. An example of this is your broadband provider increasing your speed for Netflix but decreasing your speed for Hulu.

Subscriber-triggered network management practices

A network practice is subscriber-triggered if it treats internet use differently based on who is using it. Subscribers may be treated differently based on which service plan they've purchased, the amount of data they use, or their location. An example of this is your broadband provider reducing your download speed when you use more than a certain monthly data allowance.

Broadband Label Extended Glossary

Activation fee: A fee you pay to create your new customer account. You pay this only once: when you first become a customer of a broadband provider.

Deposit: A one-time deposit is a fee you may pay when you first set up your new internet service. It is similar to a security deposit you might pay when renting an apartment. The deposit will be refunded to you if you comply with your provider's terms and conditions (e.g., pay your internet bill in full and on time) for a certain amount of time.

Installation fee: A fee you pay to install internet service in your home. This includes the equipment and professional technician support required for installation. You pay this only once: at (or just prior to) the time of installation.

Early termination fee: If you decide to cancel your internet service prematurely (i.e., before your contract plan ends), you may pay an early termination fee.

Monthly Administrative fees: A monthly fee that your provider may charge to cover expenses associated with servicing and maintaining your account.

Monthly Regulatory fees: A monthly fee that your provider may charge to help fund and comply with regulatory requirements, usually imposed by either the federal or state government.

Government Taxes and other Government-Related Fees May Apply: This is a general disclaimer notifying you that additional taxes and fees associated with government programs will be charged to you.

Device Compatibility: In some situations, you cannot switch your mobile internet provider or plan without buying a new mobile device. In this case, your mobile device is â€œlocked;â€ you can only continue to use it if you remain on your current plan or with your current provider. If your device is â€œunlocked,â€ you can use it with any mobile internet provider and plan.

Data allowance per month: The data allowance for your plan determines how much you can use the internet before you're charged additional fees, forced to use lower speeds, or cut off entirely. You will pay a certain monthly charge according to the data allowance tier you have chosen. Typically, a higher data allowance will be more expensive.

When you exceed the data allowance: Your provider limits how much you can use the internet each month. If you exceed your data cap (i.e., use the internet more than your provider allows), you will either experience **speed throttling** or pay **overage charges**. Speed throttling is when your provider deliberately slows your internet speed, and overage charges are extra fees you will pay on your monthly internet bill for exceeding your data cap.

Mobile tethering and hotspots: Both mobile tethering and hotspots allow you to connect devices to the internet in areas where they could otherwise not access the internet. Mobile tethering is when you use your phone (or other mobile device) to share internet service with other devices. This requires your phone to be connected to the other device through Wi-Fi, Bluetooth, or a USB cable. A hotspot is a dedicated device that connects to cellular internet service and then shares it with nearby devices.

3G, 4G, and 5G: The 'G' in 3G, 4G, and 5G stands for 'generation;' 5G is the fifth and newest generation of cellular internet technology. 4G internet is the current standard for cellular networks and will support just about anything you will need it for, including HD video streaming and conferencing. In general, 4G is faster than 3G, and 5G is faster than 4G.

Appendix C: Survey Questions

Appendix C1: Phase 1 Survey

From these questions, our current plan is to create 3 surveys which subsample specific sections from this comprehensive list. For each of these 3 surveys, there are 2 versions – one for fixed broadband, one for mobile broadband – making 6 survey versions in total. From our initial pilot testing, each of these surveys should take ~15min. to complete.

1. **Comprehension** - participants answer questions meant to gauge their understanding of broadband concepts and terms.
    a. Demographics
    b. Terminology Comprehension
2. **Utility** - participants answer questions related to their shopping preferences.
    a. Demographics
    b. Terminology Utility
    c. Other/Misc.
3. **Opinion** - participants answer questions given the context of the 2016 labels.
    a. Demographics
    b. Opinion on 2016 Labels

Introduction [Q1]

1. Welcome! Thank you for taking part in this survey. The purpose of this study is to better understand how consumers choose between broadband providers and plans. Participating in this study will aid research in developing a standardized consumer broadband label.

    The following survey should take between 10-15 minutes. Participation is voluntary, and you have the right to withdraw at any time by closing this web browser page. There is no compensation for participation in this study. The data captured for this research does not include any personally identifiable information about you. Your IP address will not be captured.

    This research is being conducted by CyLab at Carnegie Mellon University in collaboration with Consumer Reports. Should you have any questions or concerns regarding your participation or data, you may contact **broadband-study@andrew.cmu.edu** and refer to **STUDY2022_201**. If you have questions pertaining to your rights as a research participant; or to report concerns to this study, you should contact the Office of Research Integrity and Compliance at Carnegie Mellon University. Email: irb-review@andrew.cmu.edu. Phone: 412-268-1901 or 412-268-5460.

    Please answer the following questions to determine eligibility and provide or deny your consent to participate.
2. I am age 18 years or older AND currently reside within the United States of America.
    a. Yes
    b. No
3. I have read and understood the above text, and I consent to my continued participation in this study.
    a. Yes
    b. No
4. Which of the following broadband plan types have you signed up for or made changes to most recently?
    a. Fixed home internet

   b. Mobile phone internet
   c. Unsure
   d. I do not have any of the above plan types
5. When making your most recent decision to sign up for or change a broadband plan, who was the primary decision maker?
   a. I was the primary decision maker
   b. I made the decision jointly with someone else
   c. Someone else was the primary decision maker
   d. Unsure

Demographics [Q6]

1. What gender do you identify as?
   a. Male
   b. Female
   c. Non-binary
   d. Prefer to Self-describe: _____
   e. Prefer not to answer
2. What is your age?
   a. 18-24 yrs. old
   b. 25-34 yrs. old
   c. 35-44 yrs. old
   d. 45-54 yrs. old
   e. 55-64 yrs. old
   f. 65-74 yrs. old
   g. 75+ yrs. old
   h. Prefer not to answer
3. Which of the following best describes your race or ethnic identity? (Select all that apply)
   a. Asian
   b. Black or African American
   c. Hispanic or Latino
   d. Native American or Alaskan Native
   e. Native Hawaiian or Pacific Islander
   f. White or Caucasian
   g. Not listed above: _____
   h. Prefer not to answer
4. Are you a native English speaker?
   a. Yes
   b. No, but I consider myself a fluent English speaker
   c. No
   d. Prefer not to answer
5. What is your annual household income?
   a. Less than $25,000
   b. $25,000 - $50,000
   c. $50,000 - $100,000
   d. $100,000 - $200,000
   e. More than $200,000
   f. Prefer not to answer
6. What US state or territory do you currently reside in?
   a. Prefer to not disclose

   b. [*Dropdown menu of states/territories to select from*]
   c. I do not currently reside in the US
7. What type of area do you currently reside in?
   a. Urban
   b. Suburban
   c. Rural
   d. Unsure or Prefer not to answer
8. What is the highest degree or level of education you have completed?
   a. Some High School
   b. High School
   c. Bachelor's Degree
   d. Master's Degree
   e. Doctorate Degree
   f. Professional Degree
   g. Trade School
   h. Prefer not to answer
9. Do you have a background in computer science or related technical field? This could include an education or career in software engineering, computer engineering, computing technology, information technology, or management information systems.
   a. Yes
   b. No
   c. Unsure
   d. Prefer not to say

P1: Persona - Fixed

10. Within the last 2 years, have you switched or updated your **fixed** (a.k.a. home) internet provider or plan?
    a. Yes
    b. No
    c. Unsure
11. Are you currently paying an introductory rate? This is a discounted rate that's typically given to new customers for the first 1-2yrs of their subscription, after which the price will increase.
    a. Yes
    b. No
    c. Unsure
12. How much do you pay for your home internet plan per month? This price may include any bundled services, taxes, administration fees, or promotional discounts.
    a. Less than $40
    b. $40.00 - $79.99
    c. $80.00 - $119.99
    d. $120.00 - $159.99
    e. $160.00 - $199.99
    f. $200.00 or more
    g. Unsure or prefer to not disclose
13. Which of the following home internet options does your home use?
    a. **Cable internet** - internet access is fed through a coaxial cable network (same network used by your cable TV) to a cable modem in your home. Common providers in this category: Comcast Xfinity, Spectrum, Cox Communications, Astound Broadband

   b. **Fiber internet** - internet access is fed through a fiber-optic cable to a modem in your home. This type of connection often comes with gigabit speeds. Common providers in this category: AT&T Fiber, Verizon Fios, Earthlink Fiber, Google Fiber
   c. **DSL (digital subscriber line) services** - internet access is fed through your phone lines to a modem in your home. Common providers in this category: EarthLink, Verizon DSL High Speed Internet, CenturyLink.
   d. **Fixed wireless** - internet signal is transmitted through radio waves from a broadcast tower to a fixed antenna on your home (eg. mounted on your roof or exterior wall). Common providers in this category: AT&T Fixed Wireless Internet, T-Mobile 5G Home Internet, Ultra Home Internet, EarthLink 5G Home Internet, Rise Broadband.
   e. **Satellite internet** - internet access is through a satellite connection with a dish mounted on or nearby your home. Common providers in this category: HughesNet, Viasat.
   f. **Starlink** or other LEO (Low-earth orbit) Satellite internet.
   g. Unsure or prefer to not disclose.
14. When you are using your home network, which of the following activities do you or other members of your household engage in? (Select all that apply)
   a. **Casual web surfing.** This includes activities like visiting news websites, checking your email, or viewing social media content.
   b. **Watching online videos**. This includes watching video services like Netflix, Hulu, Twitch, YouTube, Tiktok, or Instagram.
   c. **Watching online videos in 4K quality**. This includes watching high resolution videos.
   d. **Real-time video streaming from your device**. This includes streaming a real-time video of yourself, surroundings, or device screen to services like YouTube Live, Twitch.tv, or Instagram Live.
   e. **Video conferencing**. This includes using services like Zoom, Skype Video Chat, Microsoft Teams, Google Meet, Cisco Webex, Discord, or FaceTime to have a video call with one or more people.
   f. **Online multiplayer gaming.** This includes games like Fortnite, League of Legends, Halo, Call of Duty, Minecraft, FFXIV, or Super Smash Bros Online.
   g. **Regular online backups**. This includes semi-frequently backing up your computer's files to an external server or cloud storage solution such as Apple iCloud, Google Photos, or Microsoft OneDrive.
   h. **Peer-to-peer file sharing** with services like BitTorrent and Gnutella.
   i. **Connecting to Virtual Private Networks (VPNs)** with services like Cisco AnyConnect, ExpressVPN, NordVPN, or Surfshark.
   j. **Other _____**

P2: Persona - Mobile

15. Within the last 2 years, have you switched or updated your **mobile** (a.k.a. cellular) internet providers or plans?
   a. Yes
   b. No
   c. Unsure
16. Are you part of a family plan bundle provided by your mobile phone carrier?
   a. Yes
   b. No
   c. Unsure
17. How much do you pay for your mobile phone data plan per month? This price may include any bundled services or products, taxes, administration fees, or promotional discounts.

a. Less than $40
b. $40.00 - $79.99
c. $80.00 - $119.99
d. $120.00 - $159.99
e. $160.00 - $199.99
f. $200.00 or more
g. Unsure or prefer to not disclose

18. When you are using your mobile phone's data, which of the following activities do you engage in? (Select all that apply)
    a. **Casual web surfing.** This includes activities like visiting news websites, checking your email, or viewing social media content.
    b. **Watching online videos**. This includes watching video services like Netflix, Hulu, Twitch, YouTube, Tiktok, or Instagram.
    c. **Watching online videos in 4K quality**. This includes watching high resolution videos.
    d. **Real-time video streaming from your device**. This includes streaming a real-time video of yourself, surroundings, or device screen to services like YouTube Live, Twitch.tv, or Instagram Live.
    e. **Video conferencing**. This includes using services like Zoom, Skype Video Chat, Microsoft Teams, Google Meet, Cisco Webex, Discord, or FaceTime to have a video call with one or more people.
    f. **Online multiplayer gaming.** This includes games like Among Us, Pokemon Go, PUBG Mobile, Genshin Impact, Fortnite, Minecraft, or Forza Street.
    g. **Regular online backups**. This includes semi-frequently backing up your phone's files to an external server or cloud storage solution such as Apple iCloud, Google Photos, or Microsoft OneDrive.
    h. **Mobile Tethering.** This involves sharing your phone's mobile Internet connection with connected devices. The connected device will use up a portion of your mobile device's data allowance.
    i. I avoid all of the above while my phone is not connected to wi-fi.
    j. **Other _____**

Comprehension [Q2]
Charges and Terms

1. *Directions:* For these questions, please refrain from consulting any outside resources and instead answer to the best of your ability. There is no penalty for answering incorrectly and some questions have no correct answer.
2. *{{ Graphics of just cost sections from Plan A and Plan B in fixed broadband format }} Directions*: Imagine that you are shopping for a new internet plan for the next few years. You are considering the above 2 plans, which offer a non-renewable contract plan that switches to a monthly plan after the contract period. For both plans, you will need to pay activation fees, installation fees, and a deposit.
3. If you will cancel your subscription after **2 years** from activation, which of the above fixed broadband plans is cheapest?
    a. Plan A
    b. Plan B
    c. Both plans are the same cost in this scenario
    d. Unsure
4. If you will cancel your subscription after **3 years** from activation, which of the above fixed broadband plans is cheapest?
    a. Plan A
    b. Plan B

c. Both plans are the same cost in this scenario
d. Unsure

5. If you will cancel your subscription after **4 years** from activation, which of the above fixed broadband plans is cheapest?
   a. Plan A
   b. Plan B
   c. Both plans are the same cost in this scenario
   d. Unsure
6. How did you go about answering the three comparison questions above? (Select all that apply)
   a. Guessed randomly
   b. Made an educated guess
   c. Did some math in my head
   d. Used pen/pencil and paper
   e. Used a calculator
   f. Used a spreadsheet and/or graph
   g. Other _____
7. How easy or difficult was it for you to answer the three comparison questions above? [rate 1-5, with 1 being very easy and 5 being very difficult]
8. Please comment further on your experience in answering the three comparison questions. [*free response*]
9. Could the information needed to answer the comparison questions have been presented better in any way? If so, how?[*Free response*]

Performance

10. For each of the following network performance metrics, select whether it is generally better to have a higher or lower value for the metric. [*Matrix w columns: Higher, Lower, Unsure*]
    a. Downstream speed
    b. Upstream speed
    c. Latency
    d. Packet loss
11. Which of the following represents the **highest** data transmission speed?
    a. 200 Xbps
    b. 1500 Mbps
    c. 1.20 Gbps
    d. 15,000 Kbps
    e. Both b and d
    f. I don't know
12. After which of the following packet loss rate thresholds would you estimate that real-time videoconferencing applications (e.g. Zoom video conference call) start to become noticeably lagged or unintelligible?
    a. I don't know what "packet loss" is
    b. 0.08%
    c. 3%
    d. 18%
    e. 32%
13. Please utilize the following definitions for answering the 4 questions in this section:
    Upstream speed = speed at which your internet connection is able to send information to the internet.
    Downstream speed = speed at which your internet connection is able to receive information from the internet.

Latency = the time it takes for information to move from its source to its destination; delay time between a user's action and the web application's response.
Packet loss = measure of how much information that is sent over the internet never reaches its destination due to any number of factors including network congestion or faulty connections. This affects both your downstream and upstream speeds.

14. Please rate how important you find each metric for the purposes of **online gaming**. [*Likert importance matrix*]
    a. Downstream speed
    b. Upstream speed
    c. Latency
    d. Packet loss
15. Please rate how important you find each metric for the purposes of **watching online videos (e.g. Netflix, Hulu, YouTube)**. [*Likert importance matrix*]
    a. Downstream speed
    b. Upstream speed
    c. Latency
    d. Packet loss
16. Please rate how important you find each metric for the purposes of **video conferencing (e.g. Zoom, Teams, Webex)**. [*Likert importance matrix*]
    a. Downstream speed
    b. Upstream speed
    c. Latency
    d. Packet loss
17. Please rate how important you find each metric for the purposes of **posting videos and photos to social media**. [*Likert importance matrix*]
    a. Downstream speed
    b. Upstream speed
    c. Latency
    d. Packet loss

Network Management

18. *Direction:* For the following questions, please imagine you have encountered the following content on a label describing a broadband internet plan you are considering purchasing.
    {{ Graphic of network management practice section from 2016 labels (same for both fixed and mobile) }}
19. Please rate your agreement with the following statements: [*Likert agreement matrix*]
    a. I understand what broadband provider "network management practices" refer to.
    b. I understand the difference between "application-specific" and "subscriber-triggered" network management practices.
20. Would you click on the "details on network management" link while considering this plan?
    a. Yes
    b. No
    c. I need more context information before deciding
21. If you did click on the "details on network management" link, what would you expect to find or learn from it? *[Free response]*
    – Page Break –
22. How would you categorize each of the following provider network management practices? [*Matrix with columns: application-specific, subscription-triggered, neither, both, I don't know*]
    a. Deliberately decreasing the quality of all videos from Netflix to your device
    b. Charging you $10 for every GB you use beyond your plan's data allowance

c. Decreasing your internet speeds after you exceed your data allowance
d. Waiving your data usage costs used to access the provider's website
e. Increasing your YouTube video download speed for the first 5GB every month

Other

23.

Installation fee	**$25.00**
Early termination fee	**$240.00**
Government Taxes and Other Government-Related Fees May Apply: Varies by location	
Other services on network	
Performance - Individual experience may vary	
Typical speed downstream	**53 Mbps**
Typical speed upstream	**6 Mbps**
Typical latency	**35 milliseconds**

24. If you encountered the above label for a broadband internet plan you are considering purchasing, would you click on the "Other services on network" link?
    a. Yes
    b. No
    c. I need more context information before deciding
25. If you did click on the "Other services on network" link, what would you expect to find or learn from it? [*Free response*]

Utility [Q3]

1. When you are shopping for a broadband provider or plan, what factors are you most interested in? (*Free response*)
2. *Directions*: The speed listed for your internet plan tier is typically not what you will actually experience all of the time. Internet speeds often vary due to factors outside of your provider's control (e.g. the time of day and number of people in your area using the internet at the same time). This has created debate regarding what advertised internet speeds should actually represent. These next questions seek to understand your opinion on the matter.

   For the non-statisticians among us, an "nth percentile speed" indicates the maximum speed you will experience n% of the time and minimum speed for the rest of the time. These values are particularly useful compared to average values as they help us understand expected network speeds during specific situations. In general, lower percentiles let us know the minimum speeds we'll be getting a majority of the time regardless of network conditions, and higher percentiles let us know the upper speeds we'll be getting when network conditions are particularly good.

3. Removed question
4. When examining a broadband plan for purchase and considering its advertised network speeds, how important to you are the following speed metrics?
   (Likert importance matrix + IDK column. Randomize statement order)
    a. The maximum speed possible. This is normally the upper speed cap set by your provider.
    b. The average (mean) speed across your entire time period(s)
    c. Typical speeds during the parts of the day when the internet speed is **much slower** than normal (10th percentile)
    d. Typical speeds during the parts of the day when the internet is **somewhat slower** than normal (25th percentile)

   e. Typical speeds during the parts of the day when the internet speed is **normal** (50th percentile, median)
   f. Typical speeds during the parts of the day when the internet speed is **somewhat faster** than normal (75th percentile)
   g. Typical speeds during the parts of the day when the internet speed is **much faster** than normal (90th percentile)
   h. Typical speeds during the parts of the day when internet speed is **much slower** than normal (10th percentile) AND when the internet speed is **normal** (50th percentile, median)
   i. Typical speeds during the parts of the day when the internet speed is **somewhat slower** than normal (25th percentile) AND when the internet speed is **normal** (50th percentile, median)
   j. Typical speeds during the parts of the day when the internet speed is **somewhat slower** than normal (25th percentile) AND when the internet speed is **somewhat faster** than normal (75th percentile)
   k. A grade or score (e.g. B+ or 3.5/5.0) rather than raw speed values
   l. A rating of suitability for specific applications (e.g. "suitable for watching HD videos") rather than raw speed values
5. If you had to pick just one speed measurement or combination of measurements to be advertised to you while shopping for a plan, which would you pick?
   a. *Insert options from above*
   b. Other speed measurement or combination of measurements _____
6. Please comment on your above choices. Why is your selected speed metric (or combination of metrics) more important than others? *(Free response)*

– Page Break –

7. For each of the following categories, please specify how important each of these criteria are to your decision when selecting a **fixed broadband** internet service provider or plan. [*Likert importance matrix + IDK column*]
   a. Reliability (lack of outages)
   b. *[mobile-only]* Ability to keep your current phone when you change providers
   c. Ease/cost of setup or installation
   d. Provider reputation
   e. Customer service
   f. *[fixed-only]* Works well when multiple people are using the internet at the same time
   g. Works well for online gaming
   h. Works well for video conferencing
   i. Works well for watching online videos
   j. Works well for uploading or streaming content to the internet

– Page Break –

8. *Directions:* Please rate your agreement with the following statements on this page
9. I am likely to switch providers or plans once my introductory contract and pricing option expires.
   a. Strongly disagree
   b. Somewhat disagree
   c. Neither agree nor disagree
   d. Somewhat agree
   e. Strongly agree
10. For some broadband plan metrics, I would prefer a score or grade (e.g. B+, 3.3 out of 5.0) over raw values (e.g. 25 mbps downstream speed, 0.08% packet loss).
    a. *Likert agreement (same as above)*

11. I would use a website unaffiliated with broadband providers (e.g. Consumer Reports) which compares and recommends a broadband provider or plan for me when shopping.
    a. *Likert agreement (same as above)*
12. I would AVOID using a provider if they… [*Likert agreement matrix*]
    a. Increase my network speed from some specific applications and services (e.g. Netflix, YouTube, Twitch), but decrease my network speed from other applications and services (e.g. Hulu, TikTok)
    b. Do not count watching videos from specific content providers (e.g. Netflix) against my data allowance, but do count others (e.g. YouTube) against my data allowance
    c. [*Mobile-only*] Reduce my download speed anytime I use a mobile hotspot
    d. [*Mobile-only*] Block mobile tethering

– Page Break –

13. What **other details** would you like internet providers to disclose to you when shopping for an internet service provider or plan? (*Free response*)
14. What other suggestions or preferences do you have for how broadband internet providers should notify users of their plans, performance metrics, and practices? (*Free response*)

Other/Misc. [Q4]

1. Have you heard of the Affordable Connectivity Plan?
    a. Yes, I'm aware of the details including definition and eligibility
    b. Yes, I've seen or heard it mentioned, but do not know the details of what it is
    c. No
2. When would you like to be notified of the following broadband service plan details? [*Matrix with select-all-that-apply columns: (1) While browsing prior to purchase, (2) During or immediately after purchase as part of my plan contract, (3) With every monthly bill, (4) Once every year, (5) Immediately after any changes to this detail in my purchased plan, (6) Never, (7) No opinion*]
    a. Monthly pricing
    b. One-time fees (e.g. activation, deposit, installation, or termination)
    c. Fees or service throttling for data overages
    d. Discounts, promotional rates, and bundles
    e. Expected upstream and downstream speeds
    f. Reliability metrics like frequency of outages
    g. Provider terms of service and privacy policy
3. Would you like to be directly notified by either electronic or physical mail of any changes to your service plan?
    a. Yes, by electronic mail (e-mail) only
    b. Yes, by physical mail only
    c. Yes, by both electronic and physical mail
    d. No, having the changes published to the provider's website is enough
    e. No, I am not interested

Opinion [Q5]

1. *Directions:* The US Federal Communications Commission is currently considering requiring broadband service providers to display a "nutrition label" similar to the one below that describes their plan offerings. Briefly look over this label and reference it as needed when answering the following questions.
2. *{{ Graphic of full label for either fixed or mobile broadband type }}*

   Show label depending on fixed or mobile survey route.
3. **Upstream/downstream speeds**

Upstream and downstream speeds measure how fast information can flow between you and the internet. In general, the higher the speed, the better your internet experience. Downstream speed matters most when a lot of information is flowing from the internet to your device, such as when watching Netflix or downloading large files to your computer. Upstream speed matters when a lot of information is flowing from the user to the internet, such as when you are participating in a videoconference or uploading photos to the cloud.

Upstream/downstream speeds matter very little for applications that don't involve the flow of large amounts of information. For example, if you are only browsing the web, reading email, or listening to audio, you don't need to care about either speed as almost any modern internet plan's speeds will be good enough.

Latency
Latency measures how long it takes to move information from one place to another. It is essentially "lag": so, for example, when you're on a phone call, latency is the time delay from when you speak to when the other person hears your voice. In general, lower latency means better quality, but a small amount of latency is unavoidable. Latency matters in highly interactive applications such as online games, video chat, and phone calls. Latency doesn't really matter for non-interactive applications, like reading email or watching movies online.

Packet loss
Packet loss measures how much information that is sent over the internet never reaches its destination. If we imagine the internet to be a highway and information to be the cars on that highway, packet loss measures how many cars break down and never reach the other side of the highway. In general, lower packet loss is better, but most applications can tolerate some packet loss. If packet loss is too high, it may be difficult or unpleasant to use real-time applications such as phone calls, video chat, online games, and video streaming. High packet loss can also reduce speed when transferring a lot of information, such as when backing up many files to the cloud. Packet loss usually doesn't matter for less interactive activities that do not involve transferring a lot of information, such as web browsing or email.

Application-specific network management practices
A network practice is application-specific if it treats internet use differently based on the content, application, or device. An example of this is your broadband provider increasing your speed for Netflix but decreasing your speed for Hulu.

Subscriber-triggered network management practices
A network practice is subscriber-triggered if it treats internet use differently based on who is using it. Subscribers may be treated differently based on which service plan they've purchased, the amount of data they use, or their location. An example of this is your broadband provider reducing your download speed when you use more than a certain monthly data allowance.

For additional terms' definitions and if you would like to reference the above information later in the survey, we recommend opening this external webpage (cups.cs.cmu.edu/broadband-definitions) in a separate tab.

4. Please rate your agreement with the following statements. [*Likert agreement matrix with random statement order*]
    a. This label would be useful to me while comparison shopping for broadband providers or plans.
    b. This label is confusing or overwhelming.

c. I would AVOID using this label when deciding which broadband plan to choose.
d. I understand the information found on this label.
e. This label contains the information I expect it to.
f. This label contains information I do NOT want it to.
g. This label adequately represents a broadband internet plan offering.
h. I would prefer the content of this label in a different format.
i. For some of these plan metrics, I would prefer a score or grade (e.g. B+, 3.3 out of 5.0) over raw values (e.g. 25 mbps downstream speed, 0.08% packet loss).

5. How important are each of the following **cost details** to you when comparison shopping between **fixed broadband** internet service providers and plans? [*Likert importance matrix*]
    a. Monthly charges
    b. Additional pricing options including promotions and bundles
    c. Data included with monthly charge
    d. Charges for additional data usage
    e. Optional modem or gateway lease cost and policies
    f. Other monthly fees imposed by your provider
    g. One-time Activation fee
    h. One-time Deposit
    i. One-time Installation fee
    j. One-time Early termination fee
    k. Government-Related taxes and fees notice
6. How important are each of the following **cost and feature details** to you when comparison shopping between **mobile broadband** internet service providers and plans? [*Likert importance matrix*]
    a. Information about whether your current mobile device is compatible with this provider/plan
    b. Cost of a new mobile device purchased from this broadband provider
    c. Monthly charges for each data allowance tier
    d. Data caps and associated speed throttling or overage charges
    e. Information on mobile tethering and hotspots
    f. Information on other included services and features like voice and text
    g. Additional pricing options including promotions and bundles
    h. Monthly Administrative fees
    i. Monthly Regulatory fees
    j. One-time Activation fee
    k. One-time Deposit fee
    l. One-time Early termination fee
    m. Government-Related taxes and fees notice
7. How important are each of the following **network performance details** to you when comparison shopping between broadband internet service providers and plans? [Likert importance matrix]
    a. *[fixed-only]* Information on the provider's practices which could cause periodic, reduced performance of your broadband service.
    b. [mobile-only] Differentiation between 3G, 4G, and 5G network performance
    c. [*mobile-only]* Nationwide coverage information
    d. Typical downstream speed
    e. Typical upstream speed
    f. Typical latency
    g. Typical packet loss
    h. Information about how well this plan works for online gaming
    i. Information about how well this plan works for video conferencing
    j. Information about how well this plan works for watching online videos

    k. Information about how well this plan works for uploading or streaming content to the internet
8. How important are each of the following **provider and label details** to you when comparison shopping between broadband internet service providers and plans? [Likert importance matrix]
    a. Application-specific network management practices
    b. Subscriber-triggered network management practices
    c. Full disclosure of all network management practices
    d. Privacy policy
    e. Contact information for complaints or inquiries
    f. Definitions for terms used on the broadband label and other relevant information
9. Would you want the broadband label information made additionally available through a website or service unaffiliated with broadband providers (e.g. Consumer Reports)?
    a. Yes
    b. No
    c. Unsure or no opinion
10. Where would you want the following information categories made available? (Select all that apply) [*Matrix with columns:*
    - On a label with a format standardized across providers similar to a nutrition label like the one above
    - On a more detailed external webpage or document referenced by the "nutrition label"
    - Through an independent party like Consumer Reports
    - Through a government agency like the FCC or FTC
    - Not made available or No preference
    - I don't know what this is]
    a. Monthly pricing
    b. Promotional options and bundles
    c. One-time fees
    d. Performance metrics
    e. Network management practices
    f. Provider privacy policy
    g. Provider contact information
    h. Terminology definitions
11. How could the proposed label be improved? (Free response)

Appendix C2: Phase 2 Survey

Survey Flow Logic

- Between-subjects survey design
- Participants will be randomly assigned to answer questions for either the FCC's 2016 label (abbv. 2016) or our new version of the label (abbv. new)
- Depending on their answer to Q1.4, participants will additionally be assigned to answer questions for either the fixed or mobile version of the label they've been assigned
- Participants will answer for either the opinions section or comprehension section; all other sections will be shown to all participants. Assignment is random. Based on pilot results, this should reduce our median completion time from 36 minutes to 25 minutes.

Note: any *italicized text* below is purely for internal note keeping purposes and will not be shown to participants once imported into qualtrics.

1 Introduction

1.1 Welcome! Thank you for taking part in this survey. The purpose of this study is to better understand how consumers choose between broadband providers and plans. Participating in this study will aid research in developing a standardized consumer broadband label.

The following survey should take between 20 and 30 minutes. Participation is voluntary, and you have the right to withdraw at any time by closing this web browser page. There is no compensation for participation in this study. The data captured for this research does not include any personally identifiable information about you. Your IP address will not be captured.

This research is being conducted by CyLab at Carnegie Mellon University in collaboration with Consumer Reports. Should you have any questions or concerns regarding your participation or data, you may contact **broadband-study@andrew.cmu.edu** and refer to **STUDY2022_201**. If you have questions pertaining to your rights as a research participant; or to report concerns to this study, you should contact the Office of Research Integrity and Compliance at Carnegie Mellon University. Email: irb-review@andrew.cmu.edu. Phone: 412-268-1901 or 412-268-5460.

Please answer the following questions to determine eligibility and provide or deny your consent to participate.

1.2 I am age 18 years or older and currently reside within the United States of America.
- 1.2.i Yes
- 1.2.ii No

1.3 I have read and understood the above text, and I consent to my continued participation in this study.
- 1.3.i Yes
- 1.3.ii No

1.4 Which of the following broadband plan types have you signed up for or made changes to most recently?
- 1.4.i Fixed home internet
- 1.4.ii Mobile phone internet
- 1.4.iii Unsure
- 1.4.iv I do not have any of the above plan types

1.5 When making your most recent decision to sign up for or change a broadband plan, who was the primary decision maker?
- 1.5.i I was the primary decision maker
- 1.5.ii I made the decision jointly with someone else
- 1.5.iii Someone else was the primary decision maker
- 1.5.iv Unsure

2 Opinions on Format X

For this section, we want to understand participant opinions on a specific label's content and format. How might the existing labels be improved upon?

2.1 *Timing Question 1: question item which tracks how long a participant stays on this page; this block is not visible to participants*.

2.2 *Directions:* Imagine that the following consumer disclosure label has been made mandatory for broadband providers to display prominently to customers as they shop for broadband plans. Please note that the hyperlinks (blue underlined text) shown on the label images in this survey are nonfunctional, but they would take you to a new page with relevant additional information on a real world version of these labels.
{{ Graphic with full Plan A label for either 2016-fixed, 2016-mobile, New-fixed, or New-mobile format }}

2.3 Please rate your agreement with the following statements. *[Likert agreement matrix. Random statement ordering]*
- 2.3.i I would use this label while examining a broadband plan if given the option.
- 2.3.ii This label is confusing or overwhelming.
- 2.3.iii I understand all of the information found on this label.
- 2.3.iv This label has all of the information I need to choose a broadband internet plan.

2.4 Using the information on this label I am able to... *[Likert agreement matrix.]*
- 2.4.i Calculate how much this plan will cost me in total.
- 2.4.ii Determine if this plan's performance speeds will meet my internet usage needs.
- 2.4.iii Determine whether the service offered under this plan is reliable enough to meet my needs.
- 2.4.iv Learn what network management practices may affect my broadband experience with this plan.
- 2.4.v Find additional information on the terms used in this label.
- 2.4.vi Find any additional information I need on the provider's offerings.
- 2.4.vii Contact the provider or Federal Communications Commission (FCC) should I have any questions or complaints.

2.5 What other initial impressions do you have about this label? *[Free response]*

2.6 What portions of the label are confusing to you, if any? *[Free response]*

– page break –

2.7 *Timing Question 2: question item which tracks how long a participant stays on this page; this block is not visible to participants.*

2.8 What plan **cost and feature information** would you add, modify, or remove from this label section to make it more useful to you? Please write "n/a" if you would change nothing about this section. [*Free response*]
{{ Graphic with just the cost section for either 2016-fixed, 2016-mobile, New-fixed, or New-mobile format }}

2.9 Would you like taxes to be included in the listed costs?
- 2.9.i Yes, the listed cost for each row (e.g. activation fee) should include any applicable taxes or fees.
- 2.9.ii Yes, however the taxes should be listed as their own separate row.
- 2.9.iii No, I would not like taxes to be included

2.10 What plan **performance information** would you add, modify, or remove from this label section to make it more useful to you? Please write "n/a" if you would change nothing about this section. [*Free response*]
{{ Graphic with just the performance section (incl. reliability) for either 2016-fixed, 2016-mobile, New-fixed, or New-mobile format }}

2.11 *[new only]* Which parts of this performance section are most useful to you?
- 2.11.i The performance ratings
- 2.11.ii The performance numbers
- 2.11.iii Both the ratings and numbers are useful
- 2.11.iv Neither the rating nor the numbers are useful
- 2.11.v Not sure

2.12 *[new only]* What plan **reliability information** would you add, modify, or remove from this label section to make it more useful to you? Please write "n/a" if you would change nothing about this section. *[Free response]*

2.13 *[2016 only]* Would you like performance ratings (good/acceptable/marginal/poor) for some common internet activities (video conferencing, video streaming, gaming, etc.) included on the label?
- 2.13.i Yes, I would like performance ratings **in addition to** performance numbers
- 2.13.ii Yes, I would like performance ratings **instead of** performance numbers
- 2.13.iii No, I would not like performance ratings included
- 2.13.iv Not sure

2.14 [2016 only] Would you like to see reliability information (such as average downtime or number of outages) added to this label?
- 2.14.i Yes
- 2.14.ii No
- 2.14.iii Not sure

2.15 What plan **network management information** would you add, modify, or remove from this label section to make it more useful to you? Please write "n/a" if you would change nothing about this section. [*Free response*]
{{ Graphic with just the network management information section for either 2016, New-fixed, or New-mobile format }}

2.16 What **other information** would you add, modify, or remove from this label section to make it more useful to you? Please write "n/a" if you would change nothing about this section. [*Free response*]
{{ Graphic with just the footer section for either 2016-fixed, 2016-mobile, New-fixed, or New-mobile format }}

3 Comprehension

For this section, we want to see if there are any differences in ability to use and understand the label between subjects who are shown the old version and subjects who are shown the new version(s). Do our proposed formats perform better or worse?

3.1 *Timing Question 3: question item which tracks how long a participant stays on this page; this block is not visible to participants.*

3.2 *Directions:* Imagine that the following consumer disclosure label has been made mandatory for broadband providers to display prominently to customers as they shop for broadband plans. Next, imagine you have received the following label that describes a broadband plan offering from your provider. Please **closely examine the label** and reference it as needed to answer the following questions. Note that the hyperlinks (blue underlined text) shown on the label images in this survey are nonfunctional, but they would take you to a new page with relevant additional information on a real world version of these labels.

{{ Graphic with full Plan A label for either 2016-fixed, 2016-mobile, New-fixed, or New-mobile format }}
Click here to open this label in a new window for your reference throughout the remaining questions on this page.

3.3 *[fixed only]* If you purchased the above plan, what is the lowest amount you could expect to pay in total over 2 years in **only monthly charges**? Assume that the contract plan is nonrenewable, you do not need the "optional modem/equipment" add on, and the listed prices include any applicable taxes.

- 3.3.i $1320.00 *(contract only)*
- 3.3.ii **$1440.00 *(1yr contract, 1yr month-month) [correct answer]***
- 3.3.iii $1560.00 *(monthly only)*
- 3.3.iv $1620.00 *(monthly+hulu)*
- 3.3.v Unsure or label does not provide enough information to answer
- 3.3.vi Other (please briefly describe how you calculated this number) ____

3.4 *[fixed only]* If you purchased the above plan, how much would you expect to pay in total over 2 years in **only applicable one-time fees**? Include any applicable new subscriber/activation fees, deposits, and installation fees as part of this calculation. Assume that the contract plan is nonrenewable, you will incur no overage charges, and the listed prices include any applicable taxes.

- 3.4.i $50.00 (*activation)*
- 3.4.ii $75.00 *(activation+install) [correct if no month-to-month deposit]*
- 3.4.iii $98.00 *(activation+deposit)*
- 3.4.iv **$123.00 *(activation+install+deposit) [correct]***
- 3.4.v $150.00 *(new activation $75+$50+$25)*
- 3.4.vi $198.00 *(new label, both activations)*
- 3.4.vii $363.00 *(all one-time fees)*
- 3.4.viii Unsure or label does not provide enough information to answer
- 3.4.ix Other (please briefly describe how you calculated this number) ___

3.5 *[mobile only]* If you purchased the above plan for **1 line with 10GB** of premium high speed data, what is the lowest amount you could expect to pay in total over 2 years in **only monthly charges and fees**? Assume that you will not be paying extra for additional mobile hotspot usage and the listed prices include any applicable taxes.

- 3.5.i $840.00 *(5GB only)*
- 3.5.ii $1080.00 *(missing fees)*
- 3.5.iii **$1164.00 *[correct]***
- 3.5.iv $1214.00 *(added activation)*
- *3.5.v* $1262.00 *(added activation+deposit)*
- 3.5.vi Unsure or label does not provide enough information to answer
- 3.5.vii Other (please briefly describe how you calculated this number) ____

3.6 *[mobile only]* If you purchased the above 10GB plan, how much would you expect to pay in total over 2 years in **only applicable one time fees or deposits**? Include any applicable activation fees and deposits as part of this calculation. Assume that you will not be paying extra for any international calls or mobile hotspot usage or upgrade fees, and the listed prices include any applicable taxes.

- 3.6.i $15.00 *(upgrade only)*
- 3.6.ii $48.00 (*deposit only*)
- 3.6.iii $50.00 *(activation only)*
- 3.6.iv $63.00 (deposit+upgrade)
- 3.6.v **$98.00 *(activation + deposit) [correct]***
- 3.6.vi $338.00 *(all)*
- 3.6.vii Unsure or label does not provide enough information to answer
- 3.6.viii Other (please briefly describe how you calculated this number) ____

3.7 *[fixed only]* What downstream internet speed could you roughly expect with this plan during the parts of the day when internet performance is **normal**?

- 3.7.i 53 Mbps *[correct answer]*
- 3.7.ii 50 Mbps
- 3.7.iii 21 Mbps
- 3.7.iv 4 Mbps
- 3.7.v Unsure or label does not provide enough information to answer

3.8 *[fixed only]* What downstream internet speed could you roughly expect with this plan during the parts of the day when internet performance is **much slower than normal**?

- 3.8.i 53 Mbps
- 3.8.ii 50 Mbps
- 3.8.iii 21 Mbps
- 3.8.iv 4 Mbps *[correct answer]*
- 3.8.v Unsure or label does not provide enough information to answer

3.9 *[mobile only]* What **5G downstream** internet speed could you roughly expect with this plan during the parts of the day when internet performance is **normal**?

- 3.9.i 58 Mbps *[correct answer]*
- 3.9.ii 47 Mbps
- 3.9.iii 22 Mbps
- 3.9.iv 10 Mbps
- 3.9.v Unsure or label does not provide enough information to answer

3.10 *[mobile only]* What **5G downstream** internet speed could you roughly expect with this plan during the parts of the day when internet performance is **much slower than normal**?

- 3.10.i 58 Mbps
- 3.10.ii 47 Mbps
- 3.10.iii 22 Mbps
- 3.10.iv 10 Mbps *[correct answer]*
- 3.10.v Unsure or label does not provide enough information to answer

3.11 How suitable is this plan for **streaming audio** on a scale of 1 to 5?

- 3.11.i 1 (Poor)
- 3.11.ii 2 (Marginal)
- 3.11.iii 3 (Acceptable)
- 3.11.iv 4 (Good) *[correct]*
- 3.11.v 5 (Excellent)
- 3.11.vi Unsure or label does not provide enough information to answer

3.12 How suitable is this plan for **videoconferencing** on a scale of 1 to 5?

- 3.12.i 1 (Poor)
- 3.12.ii 2 (Marginal)
- 3.12.iii 3 (Acceptable) *[correct]*
- 3.12.iv 4 (Good)
- 3.12.v 5 (Excellent)
- 3.12.vi Unsure or label does not provide enough information to answer

3.13 What level of reliability (lack of outages) would you expect from this plan?

- 3.13.i 1 - Very poor. I would expect over 10 hours of total network downtime every month. *[<98.5% uptime]*
- 3.13.ii 2 - Somewhat poor. I would expect 1 to 10 hours of total network downtime every month. *[99% uptime = 7hrs down] [Correct]*
- 3.13.iii 3 - Moderate. I would expect 10 to 59 minutes of total network downtime every month. *[99.9% uptime = 43min down]*

3.13.iv 4 - Somewhat good. I would expect 1 to 9 minutes of total network downtime every month. *[99.99% uptime = 4.3min down]*

3.13.v 5 - Very good. I would expect less than 1 minute of total network downtime every month. *[99.999% uptime = 26s down]*

3.13.vi Unsure or label does not provide enough information to answer

3.14 According to this label, the provider of this plan may slow your internet speeds during times of network congestion if you do which of the following? (Select all that apply)

3.14.i Do not enroll in autopay and paperless billing

3.14.ii Exceed 300GB of data per month

3.14.iii Mobile tethering

3.14.iv Exceed your premium data allowance

3.14.v Browsing the web

3.14.vi Watch online videos

3.14.vii Have a plan with lower priority than the Super tier

3.14.viii None of the above

3.14.ix Unsure or not enough information to determine

3.15 How easy or difficult was it for you to use the above labels to answer all of the above questions on this page of the survey?

3.15.i Extremely difficult

3.15.ii Somewhat difficult

3.15.iii Neither difficult nor easy

3.15.iv Somewhat easy

3.15.v Extremely easy

3.16 How would you improve the format or language on this label to be more usable and easily understood? *[Free response]*

– page break –

3.17 *Timing Question 4: question item which tracks how long a participant stays on this page; this block is not visible to participants.*

3.18 For the following section, imagine you have just moved to a new location and must choose between the only two broadband plans available there. The details for those plans are presented as the following two labels:
{{insert qualtrics hyperlinks to relevant labels}}
Clicking on each of the above links will open a view of the plan labels in a new window. Please use these labels in answering the following questions.
{{ Graphics with full Plan A and Plan B labels in either 2016-fixed, 2016-mobile, New-fixed, or New-mobile format }}
{{ Provide 2 links for each set so that users can open the images in a new tab }}

3.19 Which plan has a cheaper early termination fee if you have a contract plan?

3.19.i Plan A *[correct]*

3.19.ii Plan B

3.19.iii Both early termination fees are the same

3.19.iv Unsure

3.20 Which plan has the least restrictive network management practices?

3.20.i Plan A *[correct]*

3.20.ii Plan B

3.20.iii Both are equally restrictive

3.20.iv Unsure

3.21 Which plan has better speeds?

3.21.i Plan A

3.21.ii Plan B *[correct]*

3.21.iii Both are equal
3.21.iv Unsure

3.22 Which plan is better for videoconferencing?
3.22.i Plan A
3.22.ii Plan B *[correct]*
3.22.iii Both are equally good for videoconferencing
3.22.iv Unsure

3.23 Which plan has better network reliability?
3.23.i Plan A
3.23.ii Plan B *[correct]*
3.23.iii Both are equal
3.23.iv Unsure

3.24 How easy or difficult was it for you to use the above labels to answer all of the above questions on this page of the survey?
3.24.i Extremely difficult
3.24.ii Somewhat difficult
3.24.iii Neither difficult nor easy
3.24.iv Somewhat easy
3.24.v Extremely easy

3.25 Which plan would you choose and why? *[free response]*

4 AB Comparisons

For this section of the survey, we want to learn what participants specifically like or dislike for each part of the label they saw in section Q2. May result in a lot of qualitative data to crawl through, so try to condense free responses where possible and word them specifically enough to avoid gathering too many extraneous rants and unrelated responses. Randomize subsections to avoid ordering bias. Understand: How could future label designs be better?

4.1 Directions: This next section will ask you to compare between different formats for conveying information about a broadband plan. Please note that the hyperlinks (blue underlined text) shown on the label images in this survey are nonfunctional, but they would take you to a new page with relevant additional information on a real-world version of these labels.
– page break –

4.2 *Timing Question 5: question item which tracks how long a participant stays on this page; this block is not visible to participants.*

4.3 The following excerpts represent 2 different formats for conveying the **cost information** for a broadband plan. Please examine them closely before answering the following questions.
{{ Graphics with cost sections of 2016-fixed and New-fixed labels or 2016-mobile and New-mobile labels. Graphics annotated with Version A for 2016 labels and Version B for New labels }}
Which of the above formats would you prefer to see for the **cost information section** while comparison shopping for a broadband plan?
4.3.i Version A
4.3.ii Version B
4.3.iii None of the above
4.3.iv Not sure

4.4 What, if anything, about version A do you like better than B? *[Free response]*

4.5 What, if anything, about version B do you like better than A? *[Free response]*
– page break –

4.6 *Timing Question 6: question item which tracks how long a participant stays on this page; this block is not visible to participants.*

4.7 The following excerpts represent 2 different formats for conveying the **performance information** for a broadband plan. Please examine them closely before answering the following questions.
{{ Graphics with performance sections (incl. reliability) of 2016-fixed and New-fixed labels or 2016-mobile and New-mobile labels. Graphics annotated with Version A for 2016 labels and Version B for New labels }}
Which of the above formats would you prefer to see for the **performance information section** while comparison shopping for a broadband plan?

- 4.7.i Version A
- 4.7.ii Version B
- 4.7.iii None of the above
- 4.7.iv Not sure

4.8 What, if anything, about version A do you like better than B? *[Free response]*

4.9 What, if anything, about version B do you like better than A? *[Free response]*

– page break –

4.10 *Timing Question 7: question item which tracks how long a participant stays on this page; this block is not visible to participants.*

4.11 The following excerpts represent 2 different formats for conveying the **network management information** for a broadband plan. Please examine them closely before answering the following questions.
{{ Graphics with network management practices section of 2016-fixed and New-fixed labels or 2016-mobile and New-mobile labels. Graphics annotated with Version A for 2016 labels and Version B for New labels }}
Which of the above formats would you prefer to see for the **network management information section** while comparison shopping for a broadband plan?

- 4.11.i Version A
- 4.11.ii Version B
- 4.11.iii None of the above
- 4.11.iv Not sure

4.12 What, if anything, about version A do you like better than B? *[Free response]*

4.13 What, if anything, about version B do you like better than A? *[Free response]*

– page break –

4.14 Please leave us with any additional comments you have on the content or format of the broadband disclosure labels you saw here today. *[Free response]*

5 Demographics

5.1 *Timing Question 8: question item which tracks how long a participant stays on this page; this block is not visible to participants.*

5.2 *Directions:* To finish the survey, please answer the following demographic questions. This information helps us ensure we collect responses from a wide range of participant backgrounds. As a reminder, your responses here are collected anonymously and cannot be used to personally reidentify you.

5.3 What gender do you identify as?

- 5.3.i Male
- 5.3.ii Female
- 5.3.iii Non-binary
- 5.3.iv Prefer to Self-describe: _____
- 5.3.v Prefer not to answer

5.4 What is your age?

- 5.4.i 18-24 yrs. old

5.4.ii 25-34 yrs. old
5.4.iii 35-44 yrs. old
5.4.iv 45-54 yrs. old
5.4.v 55-64 yrs. old
5.4.vi 65-74 yrs. old
5.4.vii 75-84 yrs. old
5.4.viii 85+ yrs. old
5.4.ix Prefer not to answer

5.5 Which of the following best describes your race or ethnic identity? (Select all that apply)
5.5.i Asian
5.5.ii Black or African American
5.5.iii Hispanic or Latino
5.5.iv Native American or Alaskan Native
5.5.v Native Hawaiian or Pacific Islander
5.5.vi White or Caucasian
5.5.vii Not listed above: _____
5.5.viii Prefer not to answer

5.6 Are you a native English speaker?
5.6.i Yes
5.6.ii No, but I consider myself a fluent English speaker
5.6.iii No
5.6.iv Prefer not to answer

5.7 What is your annual household income?
5.7.i Less than $25,000
5.7.ii $25,000 - $50,000
5.7.iii $50,000 - $100,000
5.7.iv $100,000 - $200,000
5.7.v More than $200,000
5.7.vi Prefer not to answer

5.8 What US state or territory do you currently reside in?
5.8.i Prefer to not disclose
5.8.ii [*Dropdown menu of states/territories to select from*]
5.8.iii I do not currently reside in the US

5.9 What type of area do you currently reside in?
5.9.i Urban
5.9.ii Suburban
5.9.iii Rural
5.9.iv Unsure or Prefer not to answer

5.10 What is the highest degree or level of education you have completed?
5.10.i Some High School
5.10.ii High School
5.10.iii Bachelor's Degree
5.10.iv Master's Degree
5.10.v Doctorate Degree
5.10.vi Professional Degree
5.10.vii Trade School
5.10.viii Prefer not to answer

5.11 Do you have a background in computer science or related technical field? This could include an education or career in software engineering, computer engineering, computing technology, information technology, or management information systems.

- 5.11.i Yes
- 5.11.ii No
- 5.11.iii Unsure
- 5.11.iv Prefer not to say

5.12 *[Fixed only]* When you are using your home network, which of the following activities do you or other members of your household engage in? (Select all that apply)

- 5.12.i **Casual web surfing.** This includes activities like visiting news websites, checking your email, or viewing social media content.
- 5.12.ii **Watching online videos**. This includes watching video services like Netflix, Hulu, Twitch, YouTube, Tiktok, or Instagram.
- 5.12.iii **Watching online videos in 4K quality**. This includes watching high resolution videos.
- 5.12.iv **Real-time video streaming from your device**. This includes streaming a real-time video of yourself, surroundings, or device screen to services like YouTube Live, Twitch.tv, or Instagram Live.
- 5.12.v **Video conferencing**. This includes using services like Zoom, Skype Video Chat, Microsoft Teams, Google Meet, Cisco Webex, Discord, or FaceTime to have a video call with one or more people.
- 5.12.vi **Online multiplayer gaming.** This includes games like Fortnite, League of Legends, Halo, Call of Duty, Minecraft, FFXIV, or Super Smash Bros Online.
- 5.12.vii **Regular online backups**. This includes semi-frequently backing up your computer's files to an external server or cloud storage solution such as Apple iCloud, Google Photos, or Microsoft OneDrive.
- 5.12.viii **Peer-to-peer file sharing** with services like BitTorrent and Gnutella.
- 5.12.ix **Connecting to Virtual Private Networks (VPNs)** with services like Cisco AnyConnect, ExpressVPN, NordVPN, or Surfshark.
- 5.12.x **Other _____**

5.13 *[Mobile only*] When you are using your mobile phone's data, which of the following activities do you engage in? (Select all that apply)

- 5.13.i **Casual web surfing.** This includes activities like visiting news websites, checking your email, or viewing social media content.
- 5.13.ii **Watching online videos**. This includes watching video services like Netflix, Hulu, Twitch, YouTube, Tiktok, or Instagram.
- 5.13.iii **Watching online videos in 4K quality**. This includes watching high resolution videos.
- 5.13.iv **Real-time video streaming from your device**. This includes streaming a real-time video of yourself, surroundings, or device screen to services like YouTube Live, Twitch.tv, or Instagram Live.
- 5.13.v **Video conferencing**. This includes using services like Zoom, Skype Video Chat, Microsoft Teams, Google Meet, Cisco Webex, Discord, or FaceTime to have a video call with one or more people.
- 5.13.vi **Online multiplayer gaming.** This includes games like Among Us, Pokemon Go, PUBG Mobile, Genshin Impact, Fortnite, Minecraft, or Forza Street.
- 5.13.vii **Regular online backups**. This includes semi-frequently backing up your phone's files to an external server or cloud storage solution such as Apple iCloud, Google Photos, or Microsoft OneDrive.

5.13.viii **Mobile Tethering.** This involves sharing your phone's mobile Internet connection with connected devices. The connected device will use up a portion of your mobile device's data allowance.

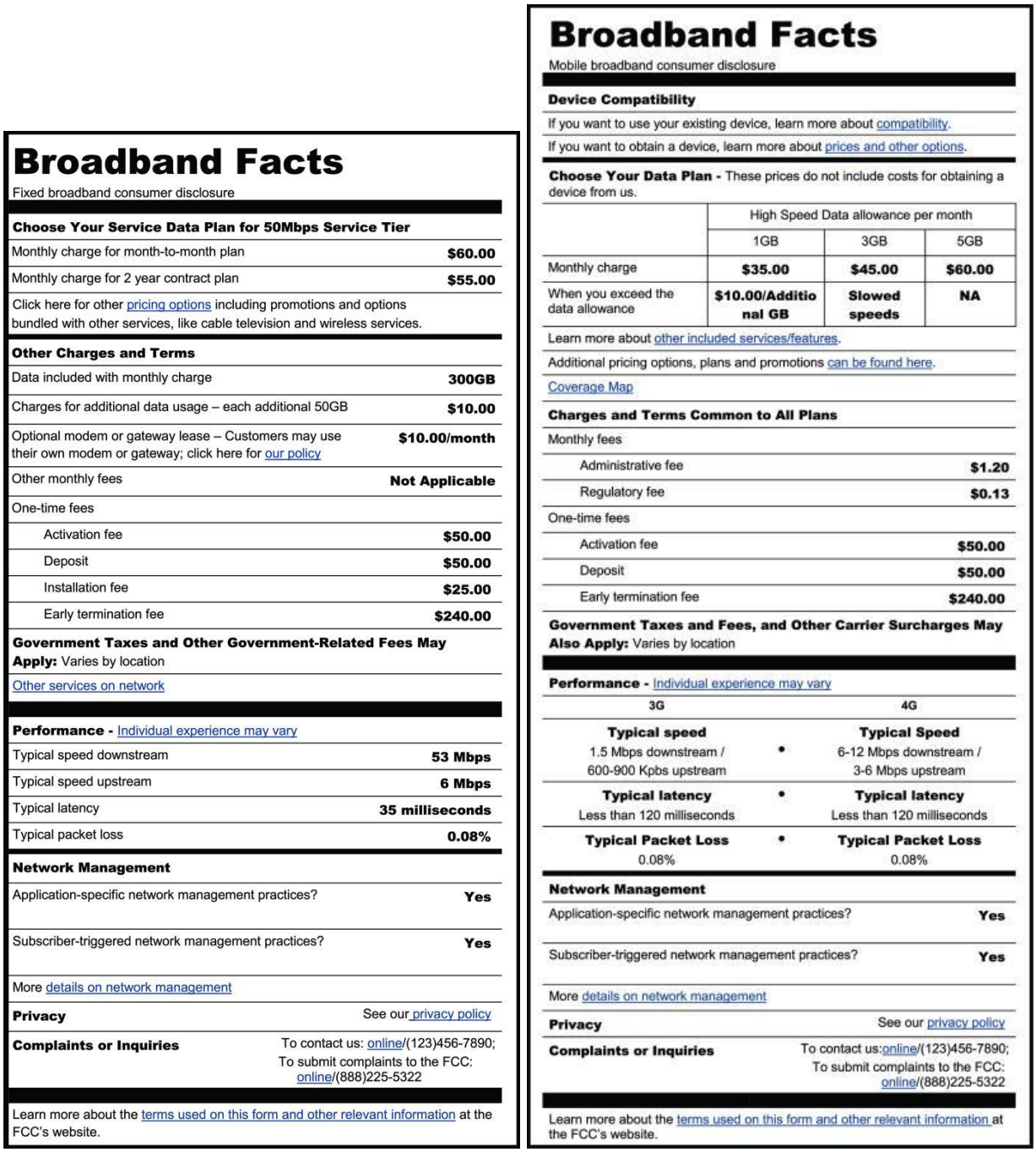
5.13.ix I avoid all of the above while my phone is not connected to wi-fi.

5.13.x **Other _____**

Appendix D: Survey Graphics

Phase 1 Graphics

Figure D1: 2016 fixed (left) and mobile (right) broadband labels



Broadband Facts

Fixed broadband consumer disclosure

Choose Your Service Data Plan for 50Mbps Service Tier	
Monthly charge for month-to-month plan	**$60.00**
Monthly charge for 2 year contract plan	**$55.00**
Click here for other pricing options including promotions and options bundled with other services, like cable television and wireless services.	
Other Charges and Terms	
Data included with monthly charge	**300GB**
Charges for additional data usage – each additional 50GB	**$10.00**
Optional modem or gateway lease – Customers may use their own modem or gateway; click here for our policy	**$10.00/month**
Other monthly fees	**Not Applicable**
One-time fees	
Activation fee	**$50.00**
Deposit	**$50.00**
Installation fee	**$25.00**
Early termination fee	**$240.00**
Government Taxes and Other Government-Related Fees May Apply: Varies by location	
Other services on network	
Performance - Individual experience may vary	
Typical speed downstream	**53 Mbps**
Typical speed upstream	**6 Mbps**
Typical latency	**35 milliseconds**
Typical packet loss	**0.08%**
Network Management	
Application-specific network management practices?	**Yes**
Subscriber-triggered network management practices?	**Yes**
More details on network management	
Privacy	See our privacy policy
Complaints or Inquiries	To contact us: online/(123)456-7890; To submit complaints to the FCC: online/(888)225-5322

Learn more about the terms used on this form and other relevant information at the FCC's website.

Broadband Facts

Mobile broadband consumer disclosure

Device Compatibility

If you want to use your existing device, learn more about compatibility.

If you want to obtain a device, learn more about prices and other options.

Choose Your Data Plan - These prices do not include costs for obtaining a device from us.

	High Speed Data allowance per month		
	1GB	3GB	5GB
Monthly charge	**$35.00**	**$45.00**	**$60.00**
When you exceed the data allowance	**$10.00/Additional GB**	**Slowed speeds**	**NA**

Learn more about other included services/features.

Additional pricing options, plans and promotions can be found here.

Coverage Map

Charges and Terms Common to All Plans	
Monthly fees	
Administrative fee	**$1.20**
Regulatory fee	**$0.13**
One-time fees	
Activation fee	**$50.00**
Deposit	**$50.00**
Early termination fee	**$240.00**

Government Taxes and Fees, and Other Carrier Surcharges May Also Apply: Varies by location

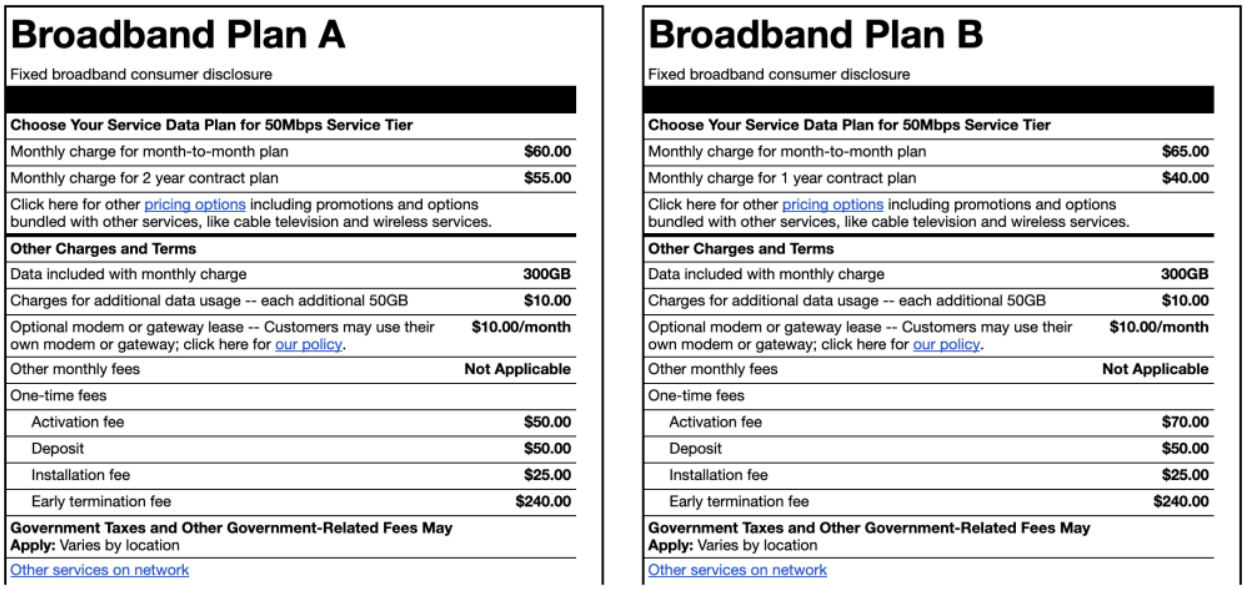
Performance - Individual experience may vary

3G		4G
Typical speed 1.5 Mbps downstream / 600-900 Kpbs upstream	•	**Typical Speed** 6-12 Mbps downstream / 3-6 Mbps upstream
Typical latency Less than 120 milliseconds	•	**Typical latency** Less than 120 milliseconds
Typical Packet Loss 0.08%	•	**Typical Packet Loss** 0.08%

Network Management	
Application-specific network management practices?	**Yes**
Subscriber-triggered network management practices?	**Yes**
More details on network management	
Privacy	See our privacy policy
Complaints or Inquiries	To contact us:online/(123)456-7890; To submit complaints to the FCC: online/(888)225-5322

Learn more about the terms used on this form and other relevant information at the FCC's website.

Figure D2: Plan A and Plan B cost sections for cost comparison questions



Broadband Plan A

Fixed broadband consumer disclosure

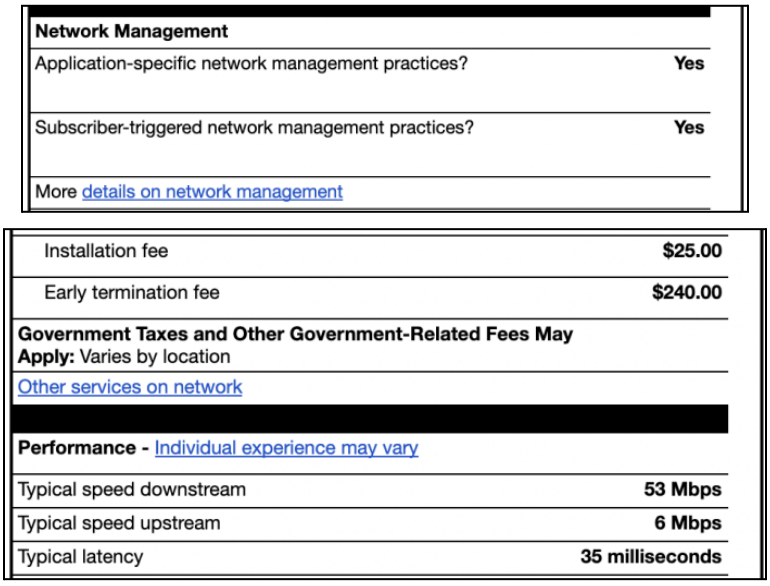
Choose Your Service Data Plan for 50Mbps Service Tier	
Monthly charge for month-to-month plan	$60.00
Monthly charge for 2 year contract plan	$55.00
Click here for other pricing options including promotions and options bundled with other services, like cable television and wireless services.	
Other Charges and Terms	
Data included with monthly charge	300GB
Charges for additional data usage -- each additional 50GB	$10.00
Optional modem or gateway lease -- Customers may use their own modem or gateway; click here for our policy.	$10.00/month
Other monthly fees	Not Applicable
One-time fees	
Activation fee	$50.00
Deposit	$50.00
Installation fee	$25.00
Early termination fee	$240.00
Government Taxes and Other Government-Related Fees May Apply: Varies by location	
Other services on network	

Broadband Plan B

Fixed broadband consumer disclosure

Choose Your Service Data Plan for 50Mbps Service Tier	
Monthly charge for month-to-month plan	$65.00
Monthly charge for 1 year contract plan	$40.00
Click here for other pricing options including promotions and options bundled with other services, like cable television and wireless services.	
Other Charges and Terms	
Data included with monthly charge	300GB
Charges for additional data usage -- each additional 50GB	$10.00
Optional modem or gateway lease -- Customers may use their own modem or gateway; click here for our policy.	$10.00/month
Other monthly fees	Not Applicable
One-time fees	
Activation fee	$70.00
Deposit	$50.00
Installation fee	$25.00
Early termination fee	$240.00
Government Taxes and Other Government-Related Fees May Apply: Varies by location	
Other services on network	

Figure D3: Label portions shown to participants when asking if they would click on the shown hyperlinks and what they believed laid beyond them.

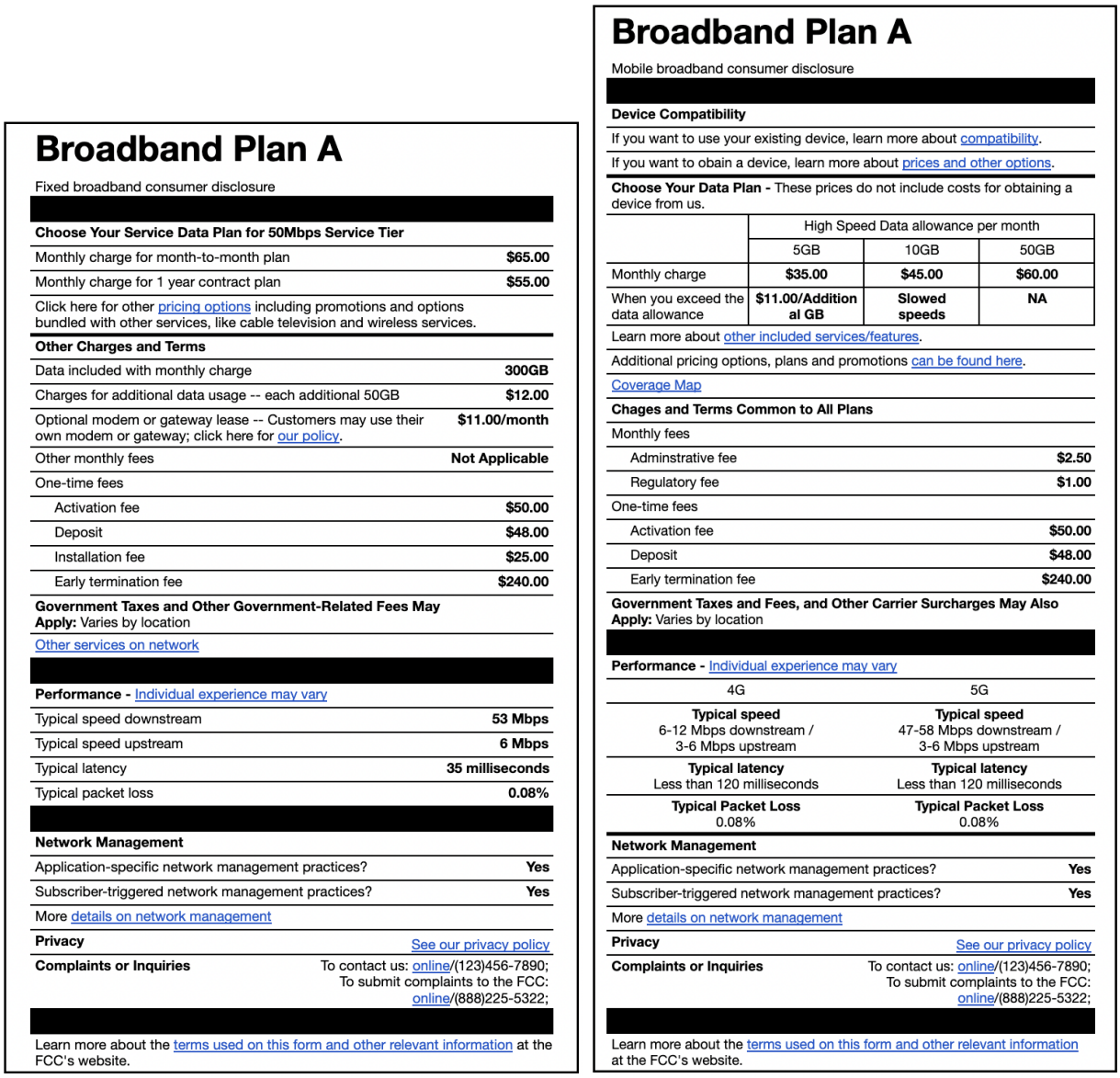


Network Management	
Application-specific network management practices?	Yes
Subscriber-triggered network management practices?	Yes
More details on network management	

Installation fee	$25.00
Early termination fee	$240.00
Government Taxes and Other Government-Related Fees May Apply: Varies by location	
Other services on network	
Performance - Individual experience may vary	
Typical speed downstream	53 Mbps
Typical speed upstream	6 Mbps
Typical latency	35 milliseconds

Phase 2 Graphics

Figure D4: 2016 fixed (left) and mobile (right) label, Plan A full



Broadband Plan A

Fixed broadband consumer disclosure

Choose Your Service Data Plan for 50Mbps Service Tier	
Monthly charge for month-to-month plan	**$65.00**
Monthly charge for 1 year contract plan	**$55.00**
Click here for other pricing options including promotions and options bundled with other services, like cable television and wireless services.	
Other Charges and Terms	
Data included with monthly charge	**300GB**
Charges for additional data usage -- each additional 50GB	**$12.00**
Optional modem or gateway lease -- Customers may use their own modem or gateway; click here for our policy.	**$11.00/month**
Other monthly fees	**Not Applicable**
One-time fees	
Activation fee	**$50.00**
Deposit	**$48.00**
Installation fee	**$25.00**
Early termination fee	**$240.00**
Government Taxes and Other Government-Related Fees May Apply: Varies by location	
Other services on network	
Performance - Individual experience may vary	
Typical speed downstream	**53 Mbps**
Typical speed upstream	**6 Mbps**
Typical latency	**35 milliseconds**
Typical packet loss	**0.08%**
Network Management	
Application-specific network management practices?	**Yes**
Subscriber-triggered network management practices?	**Yes**
More details on network management	
Privacy	See our privacy policy
Complaints or Inquiries	To contact us: online/(123)456-7890; To submit complaints to the FCC: online/(888)225-5322;

Learn more about the terms used on this form and other relevant information at the FCC's website.

Broadband Plan A

Mobile broadband consumer disclosure

Device Compatibility			
If you want to use your existing device, learn more about compatibility.			
If you want to obain a device, learn more about prices and other options.			
Choose Your Data Plan - These prices do not include costs for obtaining a device from us.			
	High Speed Data allowance per month		
	5GB	10GB	50GB
Monthly charge	**$35.00**	**$45.00**	**$60.00**
When you exceed the data allowance	**$11.00/Additional GB**	**Slowed speeds**	**NA**
Learn more about other included services/features.			
Additional pricing options, plans and promotions can be found here.			
Coverage Map			
Chages and Terms Common to All Plans			
Monthly fees			
Adminstrative fee			**$2.50**
Regulatory fee			**$1.00**
One-time fees			
Activation fee			**$50.00**
Deposit			**$48.00**
Early termination fee			**$240.00**
Government Taxes and Fees, and Other Carrier Surcharges May Also Apply: Varies by location			
Performance - Individual experience may vary			
4G		5G	
Typical speed 6-12 Mbps downstream / 3-6 Mbps upstream		**Typical speed** 47-58 Mbps downstream / 3-6 Mbps upstream	
Typical latency Less than 120 milliseconds		**Typical latency** Less than 120 milliseconds	
Typical Packet Loss 0.08%		**Typical Packet Loss** 0.08%	
Network Management			
Application-specific network management practices?			**Yes**
Subscriber-triggered network management practices?			**Yes**
More details on network management			
Privacy			See our privacy policy
Complaints or Inquiries			To contact us: online/(123)456-7890; To submit complaints to the FCC: online/(888)225-5322;

Learn more about the terms used on this form and other relevant information at the FCC's website.

Figure D5: New fixed label, Plan A full

Broadband Plan A

Fixed broadband consumer disclosure available to residents of **15213**

Tfin&T - Choose Your Service Data Plan 300GB @ 50Mbps • Last updated August 2, 2022

Base monthly cost

	During 1-year promotional contract period	Month-to-month (no contract or after contract expiration)
	$55.00	**$65.00**

Includes 300GB of data per month plus provider fees and government taxes.

*Click here for **other pricing options** including promotions and bundled options such as cable television and mobile phone services.*

Optional monthly charges

Equipment lease + tax	Included	**$11.00**
Bundled streaming services: Hulu, Spotify	**$15.00**	**$15.00**

Activation

	With 1-year contract	No contract
Total Estimate:	**$75.00**	**$123.00**
New subscriber fee	**$50.00**	**$50.00**
Deposit	*n/a*	**$48.00**
Installation fee	**$25.00**	**$25.00**

Other fees

Fee for additional data usage: each **50GB** over **300GB** limit	**$12.00**	**$12.00**
Early termination fee	**$240.00**	*n/a*

Performance

Individual experience may vary. Listed measurements reflect the typical range of these performance fluctuations.

Government Performance Ratings (fcc.gov/broadband) *What do these mean?*

Web browsing	**Good**	Streaming audio	**Good**	Videoconferencing	**Acceptable**
Gaming	**Poor**	Streaming video	**Acceptable**	Online backups	**Marginal**

	When performance is poor (10th percentile)	When performance is normal (median)
Speed (downstream)	**4 Mbps**	**53 Mbps**
Speed (upstream)	**0.4 Mbps**	**6 Mbps**
Latency	**250 ms**	**35 ms**
Packet loss	**3.98%**	**0.08%**

Reliability

Individual experience may vary *What do these mean?*

Average monthly downtime per customer	**2 hours 4 minutes**
Total number of outages, last 3 years	**105**

Network management practices

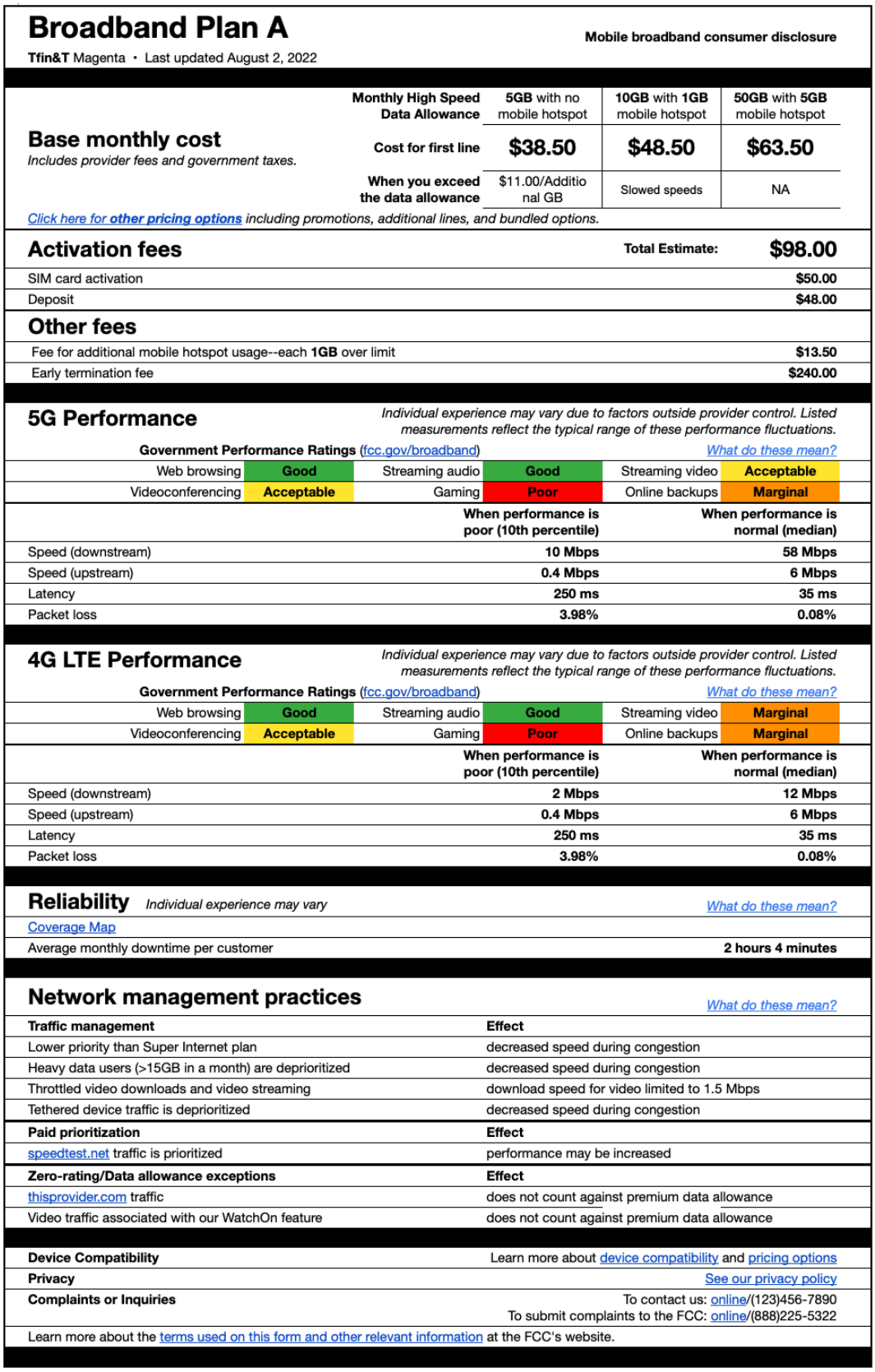
What do these mean?

Traffic management	**Effect**
Lower priority than Super Internet plan	decreased speed during congestion
Heavy data users (>300GB in a month) are deprioritized	decreased speed during congestion
Throttled video downloads and video streaming	download speed for video limited to 40 Mbps
Paid prioritization	**Effect**
speedtest.net traffic is prioritized	performance may be increased
Zero-rating/Data allowance exceptions	**Effect**
thisprovider.com traffic	does not count against premium data allowance

Privacy	See our privacy policy
Complaints or Inquiries	To contact us: online/(123)456-7890 To submit complaints to the FCC: online/(888)225-5322

Learn more about the terms used on this form and other relevant information at the FCC's website.

Figure D6: New mobile label, Plan A full



Broadband Plan A

Mobile broadband consumer disclosure

Tfin&T Magenta • Last updated August 2, 2022

	Monthly High Speed Data Allowance	**5GB** with no mobile hotspot	**10GB** with **1GB** mobile hotspot	**50GB** with **5GB** mobile hotspot
Base monthly cost *Includes provider fees and government taxes.*	**Cost for first line**	**$38.50**	**$48.50**	**$63.50**
	When you exceed the data allowance	$11.00/Additional GB	Slowed speeds	NA

*Click here for **other pricing options** including promotions, additional lines, and bundled options.*

Activation fees

Total Estimate: $98.00

SIM card activation	**$50.00**
Deposit	**$48.00**

Other fees

Fee for additional mobile hotspot usage--each **1GB** over limit	**$13.50**
Early termination fee	**$240.00**

5G Performance

Individual experience may vary due to factors outside provider control. Listed measurements reflect the typical range of these performance fluctuations.

Government Performance Ratings (fcc.gov/broadband) *What do these mean?*

Web browsing	**Good**	Streaming audio	**Good**	Streaming video	**Acceptable**
Videoconferencing	**Acceptable**	Gaming	**Poor**	Online backups	**Marginal**

	When performance is poor (10th percentile)	**When performance is normal (median)**
Speed (downstream)	**10 Mbps**	**58 Mbps**
Speed (upstream)	**0.4 Mbps**	**6 Mbps**
Latency	**250 ms**	**35 ms**
Packet loss	**3.98%**	**0.08%**

4G LTE Performance

Individual experience may vary due to factors outside provider control. Listed measurements reflect the typical range of these performance fluctuations.

Government Performance Ratings (fcc.gov/broadband) *What do these mean?*

Web browsing	**Good**	Streaming audio	**Good**	Streaming video	**Marginal**
Videoconferencing	**Acceptable**	Gaming	**Poor**	Online backups	**Marginal**

	When performance is poor (10th percentile)	**When performance is normal (median)**
Speed (downstream)	**2 Mbps**	**12 Mbps**
Speed (upstream)	**0.4 Mbps**	**6 Mbps**
Latency	**250 ms**	**35 ms**
Packet loss	**3.98%**	**0.08%**

Reliability

Individual experience may vary *What do these mean?*

Coverage Map	
Average monthly downtime per customer	**2 hours 4 minutes**

Network management practices

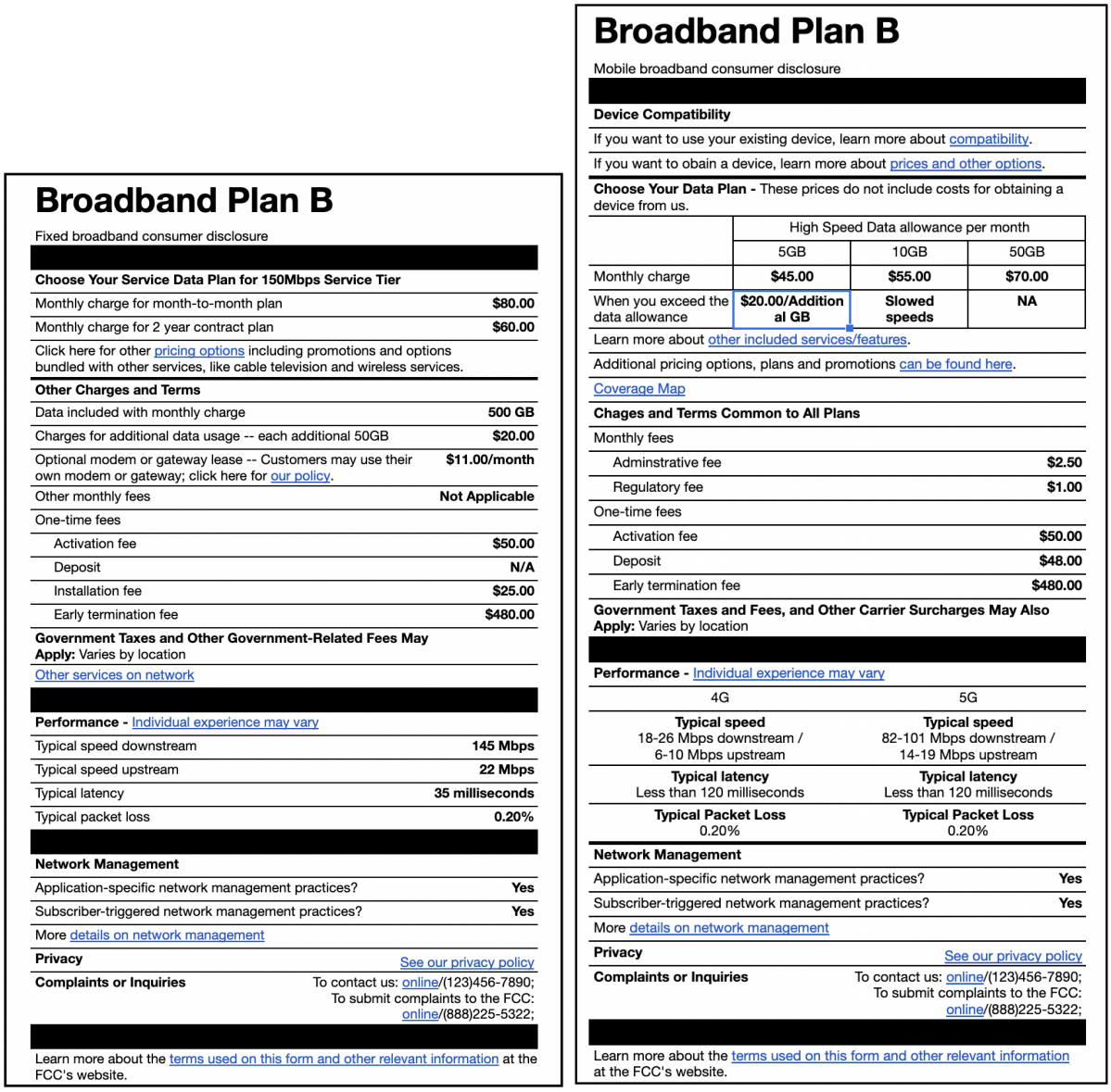
What do these mean?

Traffic management	**Effect**
Lower priority than Super Internet plan	decreased speed during congestion
Heavy data users (>15GB in a month) are deprioritized	decreased speed during congestion
Throttled video downloads and video streaming	download speed for video limited to 1.5 Mbps
Tethered device traffic is deprioritized	decreased speed during congestion
Paid prioritization	**Effect**
speedtest.net traffic is prioritized	performance may be increased
Zero-rating/Data allowance exceptions	**Effect**
thisprovider.com traffic	does not count against premium data allowance
Video traffic associated with our WatchOn feature	does not count against premium data allowance

Device Compatibility	Learn more about device compatibility and pricing options
Privacy	See our privacy policy
Complaints or Inquiries	To contact us: online/(123)456-7890 To submit complaints to the FCC: online/(888)225-5322

Learn more about the terms used on this form and other relevant information at the FCC's website.

Figure D7: 2016 fixed (left) and (mobile) labels, Plan B for comparison questions



Broadband Plan B

Fixed broadband consumer disclosure

Choose Your Service Data Plan for 150Mbps Service Tier	
Monthly charge for month-to-month plan	**$80.00**
Monthly charge for 2 year contract plan	**$60.00**
Click here for other pricing options including promotions and options bundled with other services, like cable television and wireless services.	
Other Charges and Terms	
Data included with monthly charge	**500 GB**
Charges for additional data usage -- each additional 50GB	**$20.00**
Optional modem or gateway lease -- Customers may use their own modem or gateway; click here for our policy.	**$11.00/month**
Other monthly fees	**Not Applicable**
One-time fees	
Activation fee	**$50.00**
Deposit	**N/A**
Installation fee	**$25.00**
Early termination fee	**$480.00**
Government Taxes and Other Government-Related Fees May Apply: Varies by location	
Other services on network	
Performance - Individual experience may vary	
Typical speed downstream	**145 Mbps**
Typical speed upstream	**22 Mbps**
Typical latency	**35 milliseconds**
Typical packet loss	**0.20%**
Network Management	
Application-specific network management practices?	**Yes**
Subscriber-triggered network management practices?	**Yes**
More details on network management	
Privacy	See our privacy policy
Complaints or Inquiries	To contact us: online/(123)456-7890; To submit complaints to the FCC: online/(888)225-5322;

Learn more about the terms used on this form and other relevant information at the FCC's website.

Broadband Plan B

Mobile broadband consumer disclosure

Device Compatibility			
If you want to use your existing device, learn more about compatibility.			
If you want to obain a device, learn more about prices and other options.			
Choose Your Data Plan - These prices do not include costs for obtaining a device from us.			
	High Speed Data allowance per month		
	5GB	10GB	50GB
Monthly charge	**$45.00**	**$55.00**	**$70.00**
When you exceed the data allowance	**$20.00/Additional GB**	**Slowed speeds**	**NA**
Learn more about other included services/features.			
Additional pricing options, plans and promotions can be found here.			
Coverage Map			
Chages and Terms Common to All Plans			
Monthly fees			
Adminstrative fee			**$2.50**
Regulatory fee			**$1.00**
One-time fees			
Activation fee			**$50.00**
Deposit			**$48.00**
Early termination fee			**$480.00**
Government Taxes and Fees, and Other Carrier Surcharges May Also Apply: Varies by location			
Performance - Individual experience may vary			
4G		5G	
Typical speed 18-26 Mbps downstream / 6-10 Mbps upstream		**Typical speed** 82-101 Mbps downstream / 14-19 Mbps upstream	
Typical latency Less than 120 milliseconds		**Typical latency** Less than 120 milliseconds	
Typical Packet Loss 0.20%		**Typical Packet Loss** 0.20%	
Network Management			
Application-specific network management practices?			**Yes**
Subscriber-triggered network management practices?			**Yes**
More details on network management			
Privacy			See our privacy policy
Complaints or Inquiries			To contact us: online/(123)456-7890; To submit complaints to the FCC: online/(888)225-5322;

Learn more about the terms used on this form and other relevant information at the FCC's website.

Figure D8: New fixed label, Plan B for comparison questions

Broadband Plan B

Fixed broadband consumer disclosure available to residents of **15213**

CoxtrumCN - Choose Your Service Data Plan 500GB @ 150Mbps • Last updated August 2, 2022

Base monthly cost	During 2-year promotional contract period	Month-to-month (no contract or after contract expiration)
	$60.00	**$80.00**
Includes 500GB of data per month plus provider fees and government taxes. *Click here for **other pricing options** including promotions and bundled options such as cable television and mobile phone services.*		
Optional monthly charges		
Equipment lease + tax	Included	**$11.00**
Bundled streaming services: Hulu, Spotify	**$15.00**	**$15.00**
Activation	**With 2-year contract**	**No contract**
Total Estimate:	**$75.00**	**$123.00**
New subscriber fee	**$50.00**	**$50.00**
Deposit	*n/a*	**$48.00**
Installation fee	**$25.00**	**$25.00**
Other fees		
Fee for additional data usage: each **50GB** over **500GB** limit	**$20.00**	**$20.00**
Early termination fee	**$480.00**	*n/a*

Performance

Individual experience may vary due to factors outside provider control. Listed measurements reflect the typical range of these performance fluctuations.

Government Performance Ratings (fcc.gov/broadband) *What do these mean?*

Web browsing	**Good**	Streaming audio	**Good**	Videoconferencing	**Good**
Gaming	**Marginal**	Streaming video	**Good**	Online backups	**Marginal**

	When performance is poor (10th percentile)	When performance is normal (median)
Speed (downstream)	**16 Mbps**	**145 Mbps**
Speed (upstream)	**3 Mbps**	**22 Mbps**
Latency	**250 ms**	**35 ms**
Packet loss	**4.98%**	**0.20%**

Reliability

Individual experience may vary *What do these mean?*

Average monthly downtime per customer	**1 hours 24 minutes**
Total number of outages, last 3 years	**42**

Network management practices

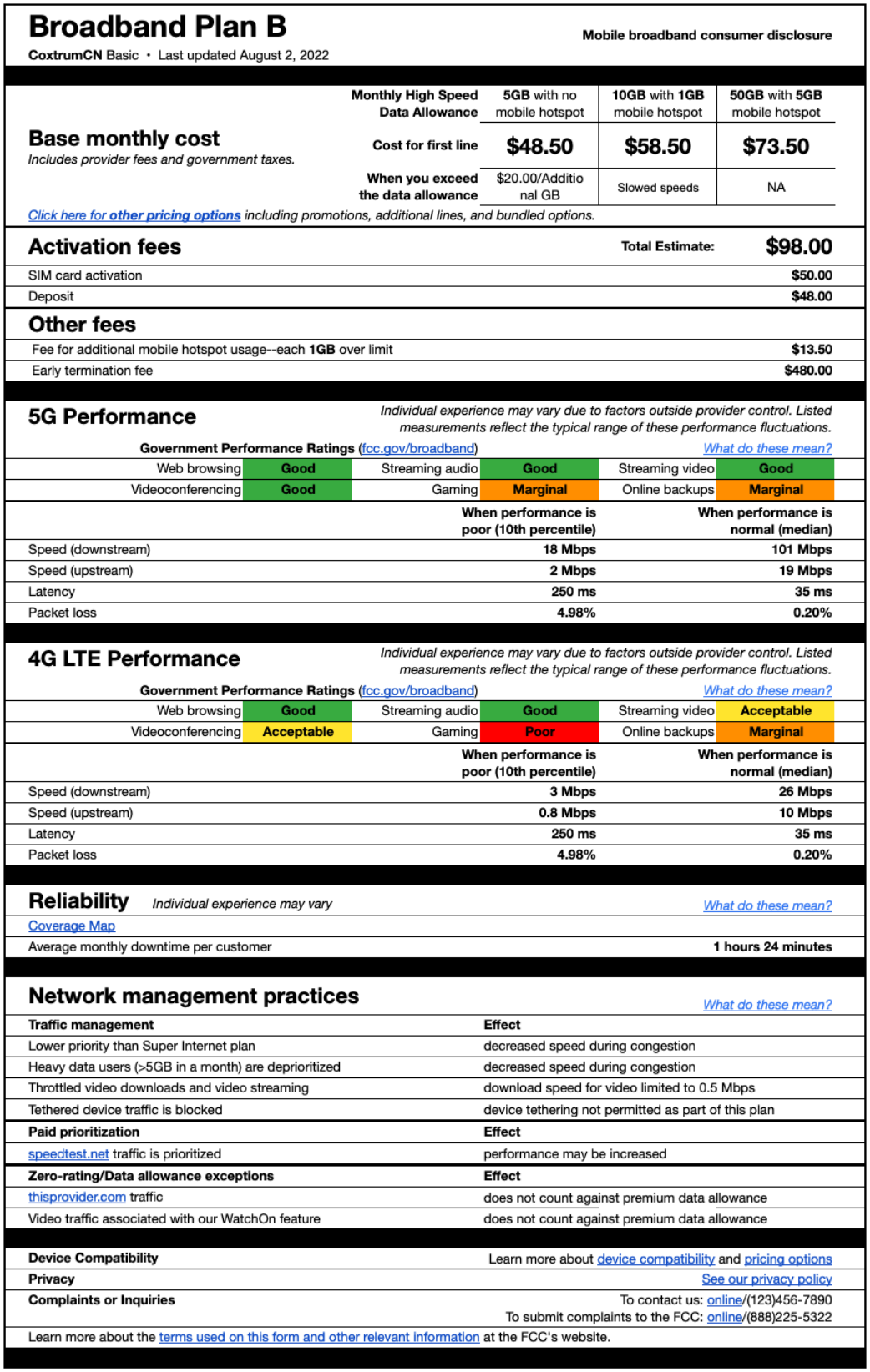
What do these mean?

Traffic management	**Effect**
Lower priority than Super Internet plan	decreased speed during congestion
Heavy data users (>100GB in a month) are deprioritized	decreased speed during congestion
Throttled video downloads and video streaming	download speed for video limited to 20 Mbps
Throttled video uploads	upload speed for video limited to 5 Mbps during congestion
Zero-rating/Data allowance exceptions	**Effect**
thisprovider.com traffic	does not count against premium data allowance
emailWebsite.com traffic	does not count against premium data allowance for the first 5GB/mo

Privacy	See our privacy policy
Complaints or Inquiries	To contact us: online/(123)456-7890 To submit complaints to the FCC: online/(888)225-5322

Learn more about the terms used on this form and other relevant information at the FCC's website.

Figure D9: New mobile label, Plan B for comparison questions



Broadband Plan B

Mobile broadband consumer disclosure

CoxtrumCN Basic • Last updated August 2, 2022

	Monthly High Speed Data Allowance	**5GB** with no mobile hotspot	**10GB** with **1GB** mobile hotspot	**50GB** with **5GB** mobile hotspot
Base monthly cost *Includes provider fees and government taxes.*	**Cost for first line**	**$48.50**	**$58.50**	**$73.50**
	When you exceed the data allowance	$20.00/Additional GB	Slowed speeds	NA

*Click here for **other pricing options** including promotions, additional lines, and bundled options.*

Activation fees

Total Estimate: $98.00

SIM card activation	**$50.00**
Deposit	**$48.00**

Other fees

Fee for additional mobile hotspot usage--each **1GB** over limit	**$13.50**
Early termination fee	**$480.00**

5G Performance

Individual experience may vary due to factors outside provider control. Listed measurements reflect the typical range of these performance fluctuations.

Government Performance Ratings (fcc.gov/broadband) *What do these mean?*

Web browsing	**Good**	Streaming audio	**Good**	Streaming video	**Good**
Videoconferencing	**Good**	Gaming	**Marginal**	Online backups	**Marginal**

	When performance is poor (10th percentile)	**When performance is normal (median)**
Speed (downstream)	**18 Mbps**	**101 Mbps**
Speed (upstream)	**2 Mbps**	**19 Mbps**
Latency	**250 ms**	**35 ms**
Packet loss	**4.98%**	**0.20%**

4G LTE Performance

Individual experience may vary due to factors outside provider control. Listed measurements reflect the typical range of these performance fluctuations.

Government Performance Ratings (fcc.gov/broadband) *What do these mean?*

Web browsing	**Good**	Streaming audio	**Good**	Streaming video	**Acceptable**
Videoconferencing	**Acceptable**	Gaming	**Poor**	Online backups	**Marginal**

	When performance is poor (10th percentile)	**When performance is normal (median)**
Speed (downstream)	**3 Mbps**	**26 Mbps**
Speed (upstream)	**0.8 Mbps**	**10 Mbps**
Latency	**250 ms**	**35 ms**
Packet loss	**4.98%**	**0.20%**

Reliability

Individual experience may vary *What do these mean?*

Coverage Map

Average monthly downtime per customer: **1 hours 24 minutes**

Network management practices

What do these mean?

Traffic management	**Effect**
Lower priority than Super Internet plan	decreased speed during congestion
Heavy data users (>5GB in a month) are deprioritized	decreased speed during congestion
Throttled video downloads and video streaming	download speed for video limited to 0.5 Mbps
Tethered device traffic is blocked	device tethering not permitted as part of this plan
Paid prioritization	**Effect**
speedtest.net traffic is prioritized	performance may be increased
Zero-rating/Data allowance exceptions	**Effect**
thisprovider.com traffic	does not count against premium data allowance
Video traffic associated with our WatchOn feature	does not count against premium data allowance

Device Compatibility Learn more about device compatibility and pricing options

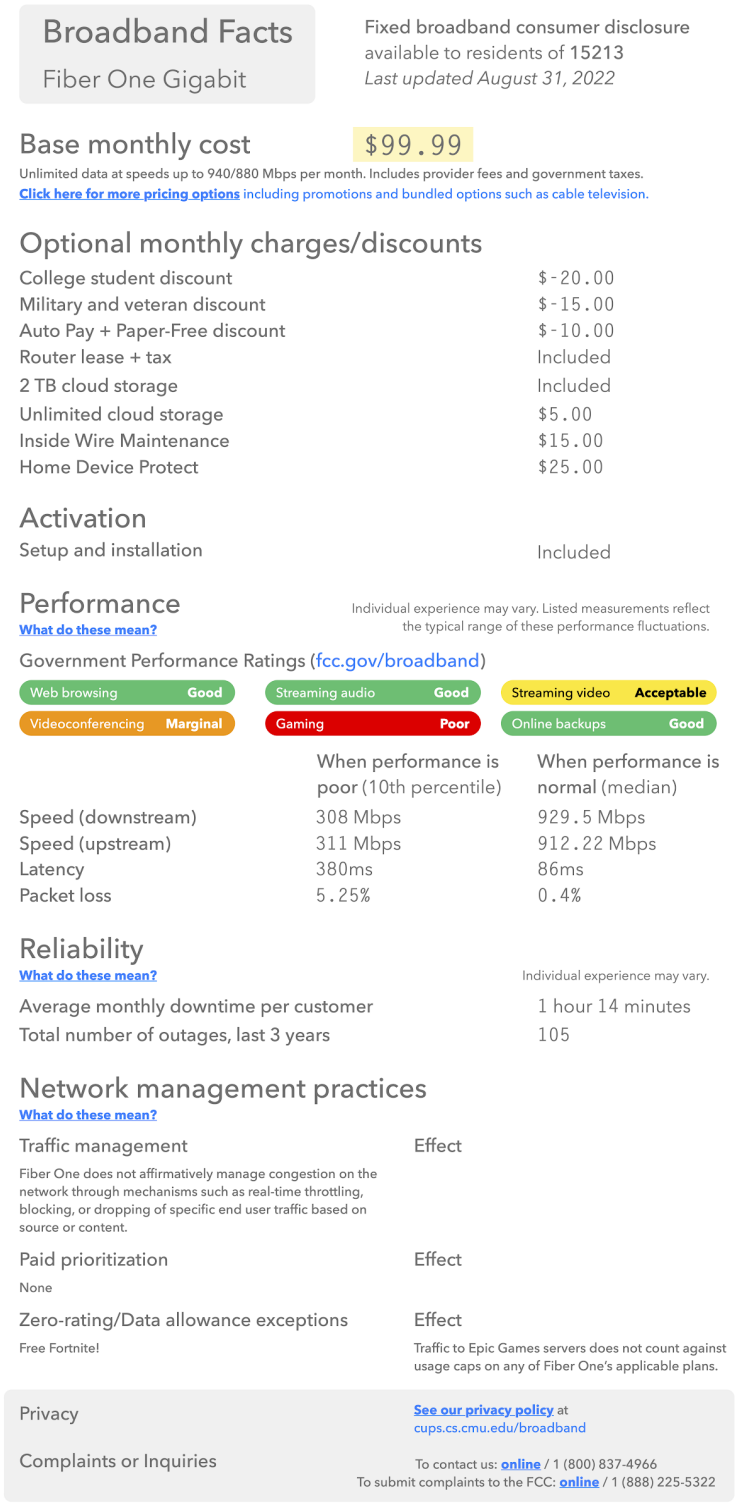
Privacy See our privacy policy

Complaints or Inquiries To contact us: online/(123)456-7890
To submit complaints to the FCC: online/(888)225-5322

Learn more about the terms used on this form and other relevant information at the FCC's website.

Appendix E: Latest Label Prototypes

Figure E1: Detailed label (demonstrative example)



Broadband Facts

Fiber One Gigabit

Fixed broadband consumer disclosure
available to residents of **15213**
Last updated August 31, 2022

Base monthly cost $99.99

Unlimited data at speeds up to 940/880 Mbps per month. Includes provider fees and government taxes.
Click here for more pricing options including promotions and bundled options such as cable television.

Optional monthly charges/discounts

College student discount	$-20.00
Military and veteran discount	$-15.00
Auto Pay + Paper-Free discount	$-10.00
Router lease + tax	Included
2 TB cloud storage	Included
Unlimited cloud storage	$5.00
Inside Wire Maintenance	$15.00
Home Device Protect	$25.00

Activation

Setup and installation	Included

Performance

What do these mean?

Individual experience may vary. Listed measurements reflect the typical range of these performance fluctuations.

Government Performance Ratings (fcc.gov/broadband)

Web browsing **Good**	Streaming audio **Good**	Streaming video **Acceptable**
Videoconferencing **Marginal**	Gaming **Poor**	Online backups **Good**

	When performance is **poor** (10th percentile)	When performance is **normal** (median)
Speed (downstream)	308 Mbps	929.5 Mbps
Speed (upstream)	311 Mbps	912.22 Mbps
Latency	380ms	86ms
Packet loss	5.25%	0.4%

Reliability

What do these mean?

Individual experience may vary.

Average monthly downtime per customer	1 hour 14 minutes
Total number of outages, last 3 years	105

Network management practices

What do these mean?

Traffic management Fiber One does not affirmatively manage congestion on the network through mechanisms such as real-time throttling, blocking, or dropping of specific end user traffic based on source or content.	Effect
Paid prioritization None	Effect
Zero-rating/Data allowance exceptions Free Fortnite!	Effect Traffic to Epic Games servers does not count against usage caps on any of Fiber One's applicable plans.

Privacy	**See our privacy policy** at cups.cs.cmu.edu/broadband
Complaints or Inquiries	To contact us: **online** / 1 (800) 837-4966 To submit complaints to the FCC: **online** / 1 (888) 225-5322

Figure E2: Detailed label (Real-life example)

Broadband Facts

Verizon FiOS 1 Gig

Fixed broadband consumer disclosure
available to residents of **15213**
Last updated August 31, 2022

Base monthly cost $99.99

Unlimited data at speeds up to 940/880 Mbps per month. Includes provider fees and government taxes.
Click here for more pricing options including promotions and bundled options such as cable television.

Optional monthly charges/discounts

Fios Forward (ACP)	$-40.00
College student discount	$-20.00
Military and veteran discount	$-15.00
Auto Pay + Paper-Free discount	$-10.00
$350 off Stream TV soundbar OR Stream TV device on us	Included
Router lease + tax	Included
Verizon Cloud 2 TB	Included
Streaming OR Gaming package	Included
Whole Home Wi-Fi Plus	$5.00
Verizon Cloud Unlimited	$5.00
Complete streaming + gaming	$10.00
Home Device Advisor	$15.00
Inside Wire Maintenance	$15.00
Verizon Home Device Protect	$25.00

Activation

Fios Setup	Included

Performance

What do these mean?

Individual experience may vary. Listed measurements reflect the typical range of these performance fluctuations.

Government Performance Ratings (fcc.gov/broadband)

Web browsing Good	Streaming audio Good	Streaming video Good
Videoconferencing Good	Gaming Good	Online backups Good

	When performance is **poor** (10th percentile)	When performance is **normal** (median)
Speed (downstream)	308 Mbps	929.5 Mbps
Speed (upstream)	311 Mbps	912.22 Mbps
Latency	150ms	8.86ms
Packet loss	5.25%	0.4%

Reliability

What do these mean?

Individual experience may vary.

Average monthly downtime per customer	1 hour 14 minutes
Total number of outages, last 3 years	105

Network management practices

What do these mean?

Traffic management — Effect

Verizon does not affirmatively manage congestion on the network through mechanisms such as real-time throttling, blocking, or dropping of specific end user traffic based on source or content. There are no usage caps applicable to Verizon's internet access services.

Paid prioritization — Effect

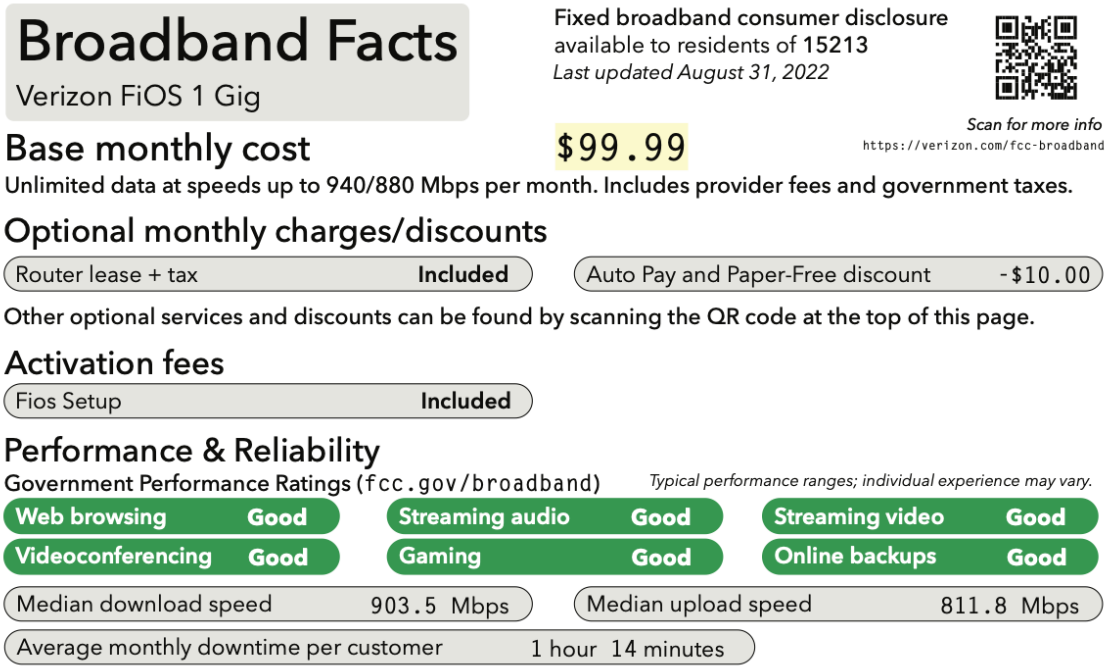
None

Zero-rating/Data allowance exceptions — Effect

None

Privacy	See our privacy policy at verizon.com/about/privacy
Complaints or Inquiries	To contact us: online / 1 (800) 837-4966 To submit complaints to the FCC: online / 1 (888) 225-5322

Figure E3: Summary label (real-life example)
Note: This label is printable



Appendix F: Codebooks

Code	Definition	Examples
Approval of label	Likes label or section of label FORMAT as presented	“This format gives 1000% more information than my present provider gives me."
Disapproval of label	Dislikes label or section of label FORMAT as presented. May cite it's overwhelming, confusing, or deliberately misleading.	
Supports label concept	Likes the NOTION of a label for broadband plans; even if they don't like the format/content specifically as is.	"if all providers had the same label it would help compare services. I think it would be helpful."
Dislikes labels concept: Mistrust label	Dislikes the NOTION of a label for broadband plans. May see it as a non-starter or encouraging poor provider practices. Distrust that the label is accurate and there aren't extra hidden fees	“If it were "real life" dealing with Comcast, I would not believe either version...”
Dislikes labels concept: Doubts utility for non-technical users	Concerned for other people's ability to use this label either bc they won't find is understandable or useful. Hard to understand how label will impact user-experience for non-technical. Some terms fundamentally non-accessible to public.	
Dislikes labels concept (other)	Lack of options makes labels mostly useless. No one would use these. Etc.	
Glossary for technical terms	Participants wants non-technical definitions/explanations for terms used, possibly with examples.	
Hyperlinks bad	Dislikes the presence of hyperlinks/prefers that information be presented upfront rather than hidden behind link. May cite alternative like tooltips	
Text format/readability	Pertains to text font/color/size/general appearance formatting things. i.e., does not have to do with the content of the text	
Simplify/Make concise	Participant prefers a label with less text and/or a more "streamlined" format	“Streamlined information. Version B has way too much information.”
Less technical language	Participant prefers language used in the label to be less technical and instead use layman's terms or "human" language summaries	“The easiest part to understand was the chart with colors. Need plainer language on the rest.” “Tell people "exactly" what they will pay for, right off the block ... e.g. You will pay $38.50 per month, which includes all taxes and fees. If

Code	Definition	Examples
		you go over your monthly quota, and/or [...], your data stream will be reduced to 1.5Mbs...”
Likes more information	Participant preferred version because it had more information on the label (in general). Wants more information on the label.	
Desire to easily compare	Sentiment that people want to compare these values across providers or plans	"Reliability has no context. 2hours down/mo does not sound "somewhat poor" unless it's compared to some standard which the question provided. Is 53 Mbs good or bad or average across the industry.”
Off-label Request	Things people ask for that don't make sense as part of label. Eg. an explanation of which costs they need to pay when.	
Tool justification	Participant wants a tool for recommending them a plan or otherwise comparison shopping. Justifies information accessibility by third-parties	
Just one number	Sentiment that people want less numbers. Particularly in cost-related fields, but may apply to performance	
Add total costs	Wants summary costs like yearly totals. Does NOT include responses which want providers to change the pricing models themselves.	"If you sign a 2 yr contract, the pricing should show the two year amounts. Having this split into two different sections made it too confusing to calculate the total cost. (and I'm a CPA)”
Add taxes/government fees	Participant wants to know the taxes that will be added in either as separate row or combined into costs.	"A section on taxes would be helpful. OR make the description a bit clearer that the Base monthly cost INCLUDES taxes. "
Cost explanation	Participant confused on if they should pay a particular fee and would need provider to disclose when they would outside of what's presently on the label. Wants more details regarding costs and what other charges there could be	"An explanation that Optional monthly charges are indeed optional and that the user may decline them without affecting the rest of the pricing.
Add reliability info	Wants information regarding downtime, uptime, outages, etc. May also want info regarding compensation for outages.	“Maximum and minimum downtimes or a chart showing downtimes dates and durations.” “cash back for outages”
Suitability rating concerns	Concerned about the ratings' source of truth,	"Performance" was easy to read,

Code	Definition	Examples
	relativity (someone's good is another's poor), or formatting	but again, context is lacking. Who created the grading scale?" "Without reading an explanation via the What do these mean link, listing performance as Acceptable in yellow may dissuade customers from choosing that plan as opposed to a more expensive/higher tier plan when in reality, Acceptable may be just fine for their needs."
Add poor performance info	Wants information on minimum expected speeds or % slowdown when throttled or when congestion might occur	