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

October 24, 2022

Lorrie Faith Cranor, Director of CyLab Security and Privacy Institute, Bosch Distinguished Professor in Security and Privacy Technologies, FORE Systems Professor of Computer Science and of Engineering & Public Policy, Carnegie Mellon University (lorrie@cmu.edu)

Jon Peha, Director of Center for Executive Education on Technology Policy, and Professor in Dept. of Electrical & Computer Engineering and Dept. of Engineering & Public Policy, Carnegie Mellon University (peha@cmu.edu)

Christopher Choy, Privacy Engineering Masters Student, School of Computer Science, Carnegie Mellon University (cchoy2@andrew.cmu.edu)

Ellie Young, Societal Computing PhD Student, School of Computer Science, Carnegie Mellon University (yellie@cmu.edu)

Megan Li, Undergraduate Student, Harvey Mudd College (mlli@hmc.edu)

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



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

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 F	acts	Broadband F				available to residents of 15213
Fixed broadband consumer disclosure					,	
Choose Your Service Data Plan for 50Mbps Service Tier		Base monthly cost		During 1-year promotional contract period	Month-to-month (no contract or after contract expiration)	
Monthly charge for month-to-month plan \$60.00				\$55.00	\$65.00	
Monthly charge for 2 year contract plan \$55.00		Includes 300GB of data per month plus provider fees and government taxes.				
Click here for other pricing options including promotions and options		Click here for other pricing options including promotions and bundled options such as cable television and mobile phone services.				
bundled with other services, like cable tele	• .	Optional monthly				
Other Charges and Terms		Equipment lease + tax			Included	\$11.00
Delignational interpretation of the production o		Bundled streaming services: Hulu, Spotify			\$15.00	\$15.00
		Activation		With 1-year contract	No contract	
Charges for additional data usage – each a	additional 50GB \$10.00	Activation		Total Estimate	\$75.00	\$123.00
Optional modem or gateway lease - Custo	omers may use \$10.00/month	New subscriber fee			\$50.00	\$50.00
their own modem or gateway; click here for	r our policy	Deposit			n/a	\$48.00
Other monthly fees	Not Applicable	Installation fee			\$25.00	\$25.00
One-time fees		Other fees				
Activation fee	\$50.00	Fee for additional data usage: Early termination fee	each 50GB over 300GB li	mit	\$12.00 \$240.00	\$12.00 n/a
autor was	M. (10.00.00.00.00.00.00.00.00.00.00.00.00.0	Early termination fee			\$240.00	n/a
Deposit	\$50.00	Performance				vary. Listed measurements reflect
Installation fee \$25.00		Government Performance Ratings (fcc.gov/broadband)			the typical range of these performance fluctuations.	
Early termination fee	\$240.00	Web browsing Good		Good	Videoconferencing	What do these mean? Acceptable
Government Taxes and Other Gove	ernment-Related Fees May	Gaming Poor	Streaming video	Acceptable	Online backups	Marginal
Apply: Varies by location					When performance is	When performance is
Other services on network		Speed (downstream)			poor (10th percentile) 4 Mbps	normal (median) 53 Mbps
		Speed (downstream)			0.4 Mbps	6 Mbps
Performance - Individual experience may vary		Latency			250 ms	35 ms
Typical speed downstream 53 Mbps		Packet loss			3.98%	0.08%
Typical speed upstream	6 Mbps	Reliability Individua	l experience may vary			
Typical latency 35 milliseconds			Average monthly downtime per customer			What do these mean? 2 hours 4 minutes
Typical packet loss 0.08%		Total number of outages, last 3 years 105				
Network Management		Network manage	ment practices			What do these mean?
Application-specific network management practices? Yes		Traffic management			Effect	
			Lower priority than Super Internet plan		decreased speed during congestion	
Subscriber-triggered network management practices? Yes		Heavy data users (>300GB in a month) are deprioritized		decreased speed during congestion		
		l ————	Throttled video downloads and video streaming		download speed for video limited to 40 Mbps	
More details on network management		Paid prioritization speedtest.net traffic is prioritized		Effect performance may be increased		
Privacy	See our privacy policy		Zero-rating/Data allowance exceptions		Effect	
		thisprovider.com traffic			does not count against premiu	ım data allowance
Complaints or Inquiries	To contact us: online/(123)456-7890; To submit complaints to the FCC:					
	online/(888)225-5322	Privacy		See our privacy policy		
		Complaints or Inquiries	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 for	Learn more about the terms used on this form and other relevant information at the FCC's website.					
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

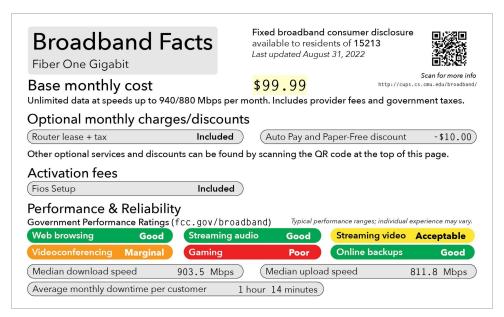
- Our proposed (New) labels generally performed better than the 2016 labels in enabling consumer comprehension of the represented broadband plan (including performance and service costs). In addition, consumers found them easier to use and preferred their format.
- Participants wanted to know the total 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.

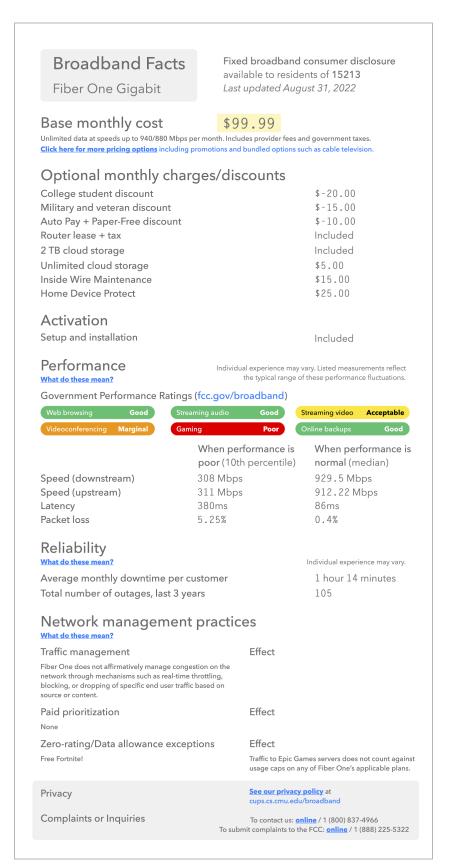
Recommendations

- 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.



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.