# **TECHNICAL MEMO:**

# Broadband Survey Analysis CITY OF BELLINGHAM, WA

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To gain insight into the current state of broadband and need for future connectivity, Magellan Advisors and the City of Bellingham conducted a broadband survey among businesses and residents. The survey was open for approximately eight weeks between November 2021 and January 2022 and received a total of 1625 valid unique responses. As shown in the table below, most responses came from households in Bellingham.

Table 1. Survey Responses by Type

Response Type	Count
Household: Location is primarily a residence	1557
Organization: Location is a business, government, non-profit, etc.	42
Individual without a physical address	26
Total	1625

Among residential respondents, the average household size was 2.58 people, very close to the 2.28 average size according to Census data. The median age of the youngest person in respondent households was 30 and the oldest was 48, compared to the median age of 31.5 years as reported in Census data, indicating that respondents were somewhat older than the population. Twenty five percent (261) of respondents indicated that they were retired or otherwise out of the workforce, which is somewhat lower than Census data estimates that 35.8% of Bellingham residents ages 16+ are no longer in the workforce. Top industries included about 32% of respondents (329) who worked in Arts, Business, Management, or Science, 19% who worked in Service (189), and 14% who worked in Office or Sales (144). Neary 80% of



respondents (819) had Bachelor's degrees or higher compared to Census data indicating that 44.3% have a Bachelor's degree or higher, indicating that respondents have higher educational attainment than the general population.

Survey respondents from organizations were asked to identify their industry sectors. Among the twenty responses to this question, four were from Healthcare and Social Assistance, and three were from Information, along with one or two from other sectors as shown in the table below. Due to the low number of responses, it is difficult to draw conclusions about how well Bellingham's industries are represented.

Table 2. Number of Organizational Responses by Sector

Number of Responses
3
2
1
1
2
1
2
4
2
1
1

Given the distribution methods, number of responses and respondent demographics, we cannot say that the survey results are statistically reliable. We can say that the survey results document the experience and perspective of more than 1600 households and organizations in Bellingham.

The survey yielded useful empirical indicators of broadband in the City. Recognizing results of survey analysis as indicators, we report statistics but use approximate language in discussing the findings. Generally, these results should be considered the "best case" for the more affluent and informed residents of the community. Additional effort will be required to determine the situation for younger, less educated residents. The same applies to large, multi-location service and wholesale companies.

# Broadband Adoption

Most of the respondents (91%) had broadband connections, defined as highspeed, always on service. Approximately 6% of respondents had low-speed service including cellular, dial-up, or satellite, and 2% were unsure of whether they had broadband. Approximately 1% (20 respondents) reported not having internet service.



Figure 1. Respondents' Type of Connection

Among respondents who did not have broadband, the top reason was that broadband was not available at their location. The second most cited reason was that available services are too expensive.



# Figure 2. Reasons for Not Having Broadband

Item	Overall Rank	Rank Distribution	Score	No. of Rankings
Broadband is not available to this location	1		306	55
Available services are too expensive	2		288	48
Available services are too slow or unreliable	3		215	38
Access internet elsewhere (work, school, library, public/free Wi-Fi, etc.)	4		118	28
Other reason not listed here	5		116	30
Smartphone meets internet access needs	6		94	24
Do not need internet services	7		44	21
		Lowest Rank Highest Rank		

15. Why does the location for which you are completing this survey not have broadband?

The majority of respondents (901) were served by Comcast, followed by Lumen/Centurylink (156). Respondents also had service through a handful of other companies including Pogozone (15), Wave (11), Ziply (4), and AT&T (2). Eighteen respondents wrote in providers including EPB, San Juan Cable, Starlink, Sprint/T-mobile, and Verizon.







# Performance

Respondents were asked how much they paid for broadband and related services and what contracted speeds they paid for. These were "best guesses" by the person responsible for choosing and paying for the service. Variance would diminish with more responses but should be assumed high in this situation. Actual performance was recorded automatically via a speed test integrated into the survey. But performance will vary over time based on network congestion and other factors. Therefore, we report a full set of descriptive statistics, including average, maximum, median, and minimum speeds.

On average, survey respondents reported contracted to receive speeds of approximately 323 mbps download and 127 mbps upload. To get a better understanding of actual performance, the survey contained an embedded speed test that respondents ran from their locations. The actual speed test results were much lower than contracted speeds, with an average download speed of 150 mbps and an upload speed of 86 mbps.

						LOST
	Contra	Actu	Actual			
	Download	Upload	Download	Upload	MRC	Mbps <sup>1</sup>
Average	322.73	126.54	149.99	85.59	\$113.79	\$0.48
Median	150	15	7.22	92.28	\$75.00	\$0.75
Mode	100	5	6.29	115.20	\$100.00	\$0.82
Max	3000	5007	1456.46	1218.89	\$25,000.00	\$9.34
Min	1	0.1	0.22	0.11	\$1.00	\$3.03
Averages By Provid	er					
AT&T	60	47.5	44.02	271.615	\$50.00	\$0.16
Lumen/Centurylink	335.46	340.74	114.49	133.86	\$63.48	\$0.26
Comcast	328.33	88.28	159.24	76.68	\$115.52	\$0.49
Pogozone	129.23	123.77	37.34	57.17	\$57.76	\$0.61
Wave	192.14	251.25	249.38	161.89	\$866.00	\$2.11
Ziply	13.5	252.75	5.41	1.39	\$61.67	\$9.06

Table 3. Descriptive Statistics for Broadband Cost and Performance Among Survey Respondents

<sup>1</sup> Cost per mbps is calculated by dividing the cost by the total throughput (actual download plus actual upload speed).



On average, respondents who subscribed to services through Comcast were paying more than CenturyLink/Lumen customers, although their average upload speeds were much lower. Respondents who identified Ziply as their provider were paying the most per mbps, and respondents who identified AT&T as their provider were getting the best value per mbps per month.

The following images show the general location of internet survey responses' speed test results, including locations where broadband was not available, relative to Washington State's new broadband standard of 100 Mbps download and 20 Mbps upload or 120 Mbps aggregate throughput. These maps indicate that lower speed connections are dispersed throughout the City and do not point to any specific neighborhoods or areas that are underserved compared to their surroundings.





Figure 4. 1. No Broadband Available and Slow Broadband Speed-test Results by Location





Figure 5. Below Washington State Broadband Standard Speed Test Results by Location





Figure 6. Above Washington State Broadband Standard Speed Test Results by Location

To further assess whether any specific neighborhoods are unserved or underserved, the numbers of each tier of speed test results were aggregated by neighborhood, as shown in the table below. Cornwall Park, Edgemoor,



and Lettered Streets had the highest numbers of very slow speed test results.

Neighborhood	Fast	None	Slow	Very Slow	Total
LETTERED STREETS		18	16	9	43
SILVER BEACH		21	24	8	53
COLUMBIA		28	13	7	48
ALABAMA HILL		24	14	7	45
SEHOME		14	8	6	28
KING MOUNTAIN	9	1	9	6	25
BARKLEY	35	1	16	5	57
HAPPY VALLEY	27	1	28	5	61
BIRCHWOOD		18	21	5	44
YORK		13	13	5	31
ROOSEVELT	39	2	36	4	81
SUNNYLAND		20	13	4	37
SOUTH		11	7	4	22
Outside	38	3	25	3	69
SAMISH	33	1	25	3	62
CORDATA		27	15	3	45
PUGET	23	1	22	3	49
SOUTH HILL		21	19	3	43
WHATCOM FALLS		20	21	3	44
CITY CENTER		12	11	2	25
MERIDIAN		12	4	1	17
FAIRHAVEN	9	1	4	1	15
CORNWALL PARK		21		10	31
EDGEMOOR		17		10	27
IRONGATE					
WESTERN WASHINGTON UNIVERSITY					

Table 4. Speed Test Results by Neighborhood

The survey also asked respondents to rank their current internet service on a variety of factors, as shown below. More than half of respondents ranked their services as Good or Excellent across all factors, with the exception of Price and Customer Service, for which respondents were relatively evenly split between Bad, Neither, or Good.



# Figure 7. Respondents' Assessment of Current Internet Service Performance

	Terrible	Bad	Neither/Not sure	Good	Excellent	Responses
Overall						
Count	29	125	169	579	139	1,041
Row %	2.8%	12.0%	16.2%	55.6%	13.4%	
Performance/speed						
Count	27	154	168	553	136	1,038
Row %	2.6%	14.8%	16.2%	53.3%	13.1%	
Price						
Count	141	335	274	225	60	1.035
Row %	13.6%	32.4%	26.5%	21.7%	5.8%	
Reliability						
Count	32	120	220	532	136	1,040
Row %	3.1%	11.5%	21.2%	51.2%	13.1%	
Customer service and support						
Count	229	210	312	223	55	1.029
Row %	22.3%	20.4%	30.3%	21.7%	5.3%	
Totals						
						10.11

13. How well does the current internet service perform for this location?

Most respondents reported slowdowns and service outages, although they were relatively infrequent, as shown in the figure below. Slowdowns appear to occur every few days to once a year and service goes out for an hour or two every few months to about once a year. About 13% of respondents did experience slow downs on a daily basis and about 3% of respondents were seeing brief outages on every day.



## Figure 8. Respondents' Assessment of Internet Service Outages and Slow Downs

	Never	Once a year or less	Every few months	Every few weeks	Every few days	Daily, every day	Responses
The service slows down. Count Row %	75 6.7%	160 14.2%	286 25.4%	216 19.2%	247 22.0%	141 12.5%	1,125
The service is out briefly. Count Row %	71 6.3%	340 30.2%	415 36.9%	166 14.8%	96 8.5%	37 3.3%	1,125
The service is out for less than an hour. Count Row %	116 10.4%	421 37.8%	351 31.5%	138 12.4%	59 5.3%	28 2.5%	1,113
The service is out for an hour or two. Count Row %	263 23.7%	533 48.0%	246 22.1%	48 4.3%	14 1.3%	7 0.6%	1,111
The service is out for several hours. Count Row %	379 34.1%	536 48.3%	158 14.2%	21 1.9%	8 0.7%	8 0.7%	1,110
The service is out for a day or more. Count Row %	743 67.7%	302 27.5%	35 3.2%	13 1.2%	3 0.3%	1 0.1%	1,097
Totals							

8. How often is the internet service to this location out or slow?

Total Responses

#### 1125

## Use

To better understand how internet is being used, we asked household respondents to identify how essential it is for a variety of common uses. Most respondents found internet to be extremely useful or essential across all tasks, except generating income or selling things, for which only about 40% of respondents found it to be essential.



# Figure 9. Household Usefulness of Internet Across Common Uses

	Extremely or essential	Very but not essential	Helpful but not really important	Minimally useful	Of no use	Responses
Finding and/or buying products or services Count Row %	738 70.0%	251 23.8%	50 4.7%	8 0.8%	8 0.8%	1,055
Generating income or selling things Count Row %	426 40.6%	110 10.5%	169 16.1%	183 17.4%	162 15.4%	1,050
Getting information for general purposes Count Row %	862 81.6%	166 15.7%	24 2.3%	4 0.4%	0 0.0%	1,056
Getting information for special interests or hobbies Count Row %	741 70.2%	242 22.9%	61 5.8%	8 0.8%	3 0.3%	1,055
Learning, making money, or staying healthy Count Row %	673 63.9%	233 22.1%	99 9.4%	32 3.0%	16 1.5%	1,053
Playing games, watching video, or other recreation Count Row %	600 57.0%	267 25.4%	101 9.6%	52 4.9%	33 3.1%	1,053
Staying in touch with family and friends Count Row %	672 63.8%	278 26.4%	83 7.9%	18 1.7%	3 0.3%	1,054
Totals Total Responses						1056

22. How important or useful is the internet in your household for the following purposes?

We also asked respondents how often someone in their household was using internet for critical services such as schoolwork or training, telecommuting, operating a home-based business, or health monitoring. The most common of these uses was teelcommuting, with nearly half (46.9%) of respondents indicating that someone in their household used internet for this purpose more than once a week. More than a quarter (32%) of respondent households had someone in their household who did online schoolwork or training more than once a week, and a similar percentage (29.8%) had someone who used it for operating a home-based business including "gig" work. Few resondents (2.0%) had someone in their household who used it more than once a week for consulting a healthcare professional, but more than half of respondents (56.3%) did use it a few times a year for this purpose.



### Figure 10. Critical Uses by Household Respondents

	Once a year or less	A few times a year	About once a month	About once a week	More than once a week	Responses
Consult a healthcare professional Count Row %	139 13.3%	589 56.3%	230 22.0%	67 6.4%	21 2.0%	1,046
Do online schoolwork or training at home Count Row %	287 28.0%	179 17.5%	105 10.2%	126 12.3%	328 32.0%	1,025
Do home-based business, contract or "gig" work Count Row %	492 48.4%	87 8.6%	58 5.7%	76 7.5%	303 29.8%	1,016
Telecommute, work from home as an employee Count Row %	340 33.5%	76 7.5%	55 5.4%	67 6.6%	476 46.9%	1,014
Totals Total Responses						1046

21. How often do members of your household do the following by any means?

Among organizational respondents, digital technologies were absolutely essential or very useful for all uses including management and operations and supporting customers, as shown in the figure below.



# Figure 11. Usefulness of Digital Technologies for Organizational Respondents

	Extremely useful or essential	Very useful but not essential	Helpful or somewhat important	Minimally useful, not important	Of no use	Responses
Buying materials or equipment and hiring employees Count Row %	16 80.0%	1 5.0%	2 10.0%	1 5.0%	0 0.0%	20
Managing or operating the organization Count Row %	19 95.0%	0 0.0%	1 5.0%	0 0.0%	0 0.0%	20
Tracking inventory, materials, and work activities Count Row %	12 60.0%	4 20.0%	1 5.0%	1 5.0%	2 10.0%	20
Producing goods or providing services for customers Count Row %	17 85.0%	1 5.0%	1 5.0%	1 5.0%	0 0.0%	20
Tracking orders, fulfillment, and delivery Count Row %	14 70.0%	2 10.0%	1 5.0%	1 5.0%	2 10.0%	20
Selling, marketing, and getting customers to buy Count Row %	16 80.0%	1 5.0%	0 0.0%	1 5.0%	2 10.0%	20
Supporting customers, providing customer service Count Row %	19 95.0%	0 0.0%	0 0.0%	1 5.0%	0 0.0%	20
Totals Total Responses						20

26. How important or useful are digital technologies for the following activities?

To understand just how critical broadband is, we asked organizational respondents whether they would be willing to move their business for much faster, less expensive internet services. Of the 24 respondents, nearly two thirds (29.2%) said they would definitely would move.



### Figure 12. Organizational Respondents' Willingness to Move for Broadband

28. If your organization were able to get much faster and less expensive internet services elsewhere with comparable business characteristics, how likely would it be to move from your current location?



Value	Percent	Responses
0 - Definitely WOULD NOT move	29.2%	7
1	12.5%	3
2	16.7%	4
3	16.7%	4
4	16.7%	4
5 - Definitely WOULD move	8.3%	2
		Totals: 24

# 5.4 CONCLUSIONS

Generally, affluent consumers (relatively older and better educated) in Bellingham have reasonably fast broadband. Unfortunately, younger residents with lower levels of educational achievement did not respond so we cannot draw any conclusions about their connectivity. Broadband is available in most locations and although Comcast dominates the market, several other service providers also have offerings for residents and businesses.

Overall, respondents were happy with their current services, although price and customer service were an issue for some respondents. Although broadband speeds were acceptable in most locations, some neighborhoods had a relatively high number of low-speed tests, indicating that they may be underserved. The neighborhoods of Cornwall Park, Edgemoor, and Lettered



Streets had the highest number of low speed tests, some of which did not meet the definition of broadband by Washington's standards, and several of which fell below Federal standards.