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Broadband Insights Report (OVBI)

4Q22

Introduction

Significant increases in consumption and speeds, spurred in part by government incentives, powered broadband toward or past major milestones at the end of 2022. The 4Q22 edition of the OpenVault Broadband Insights (OVBI) report indicates that average household consumption neared 600 GB per month, the percentage of subscribers on gigabit tiers more than doubled, and usage by participants in the FCC's Affordable Connectivity Program (ACP) continued to outpace that of the general population.

According to this 4Q22 edition, average per-household consumption was 586.7 GB at the end of 2022, an increase of nearly 10% over the prior year.

During the same period, the percentage of subscribers provisioned for gigabit speeds rose to 26%, and median usage by ACP participants was more than 34% higher than the median usage of all subscribers. In addition, the 4Q22 OVBI highlighted late-morning Christmas Day usage spikes that may carry implications for operators' service and customer support planning.

As with all editions of the OVBI, this 4Q22 edition uses data points from millions of individual broadband subscribers, collected and aggregated from OpenVault's software-as-a-service (SaaS) technology solutions. The data is used to pinpoint usage patterns, including the differences between two key categories: subscribers on flat-rate billing (FRB) plans that offer unlimited data usage and those on usage-based billing (UBB) plans, on which subscribers are billed based on their bandwidth consumption. OpenVault data is used for benchmarking purposes by the Federal Communications Commission (FCC) in specific comparative analyses.

Key findings from the 4Q22 OVBI include:

Usage
The monthly weighted average data consumed by subscribers in 4Q22 was 586.7 GB, up 9.4% from 536.3 in 4Q21.

Power Users
The number of power users of 1 TB or more per month increased by 16% over the previous year.

Speed Tiers
As migration to faster speed tiers continued, the percentage of subscribers in tiers under 200 Mbps declined by 43% in 4Q22.

Key ARPU Insight
The gigabit subscriber tier accounted for 26% of all users in 4Q22, an increase of more than 100% over 4Q21.

Key Bandwidth Usage Insight
Average total usage, which was 586.7 GB at the end of 2022, likely will exceed 600 GB in 2023.

Key UBB vs FRB Insight
Nearly 35% of UBB subscribers receive gigabit speeds, up from 13% a year ago and 2.5x the percentage of FRB gigabit subscribers.
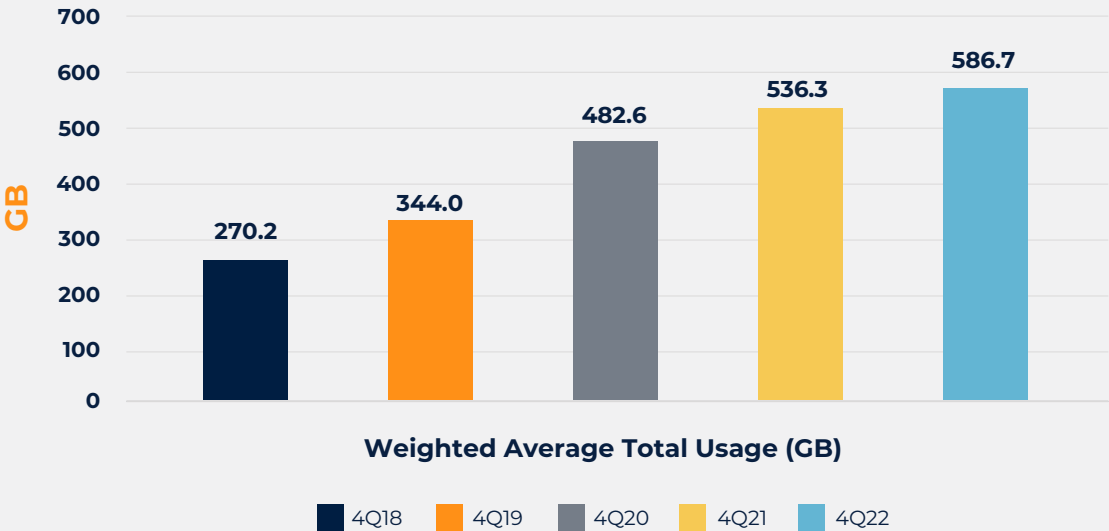
4Q22 Broadband Usage Key Findings

The following broadband usage trends were observed from 4Q18 to 4Q22.

FIGURE 1

Data Usage Trends 4Q18 to 4Q22

Weighted Average Total Usage (GB)

■ 4Q18   ■ 4Q19   ■ 4Q20   ■ 4Q21   ■ 4Q22

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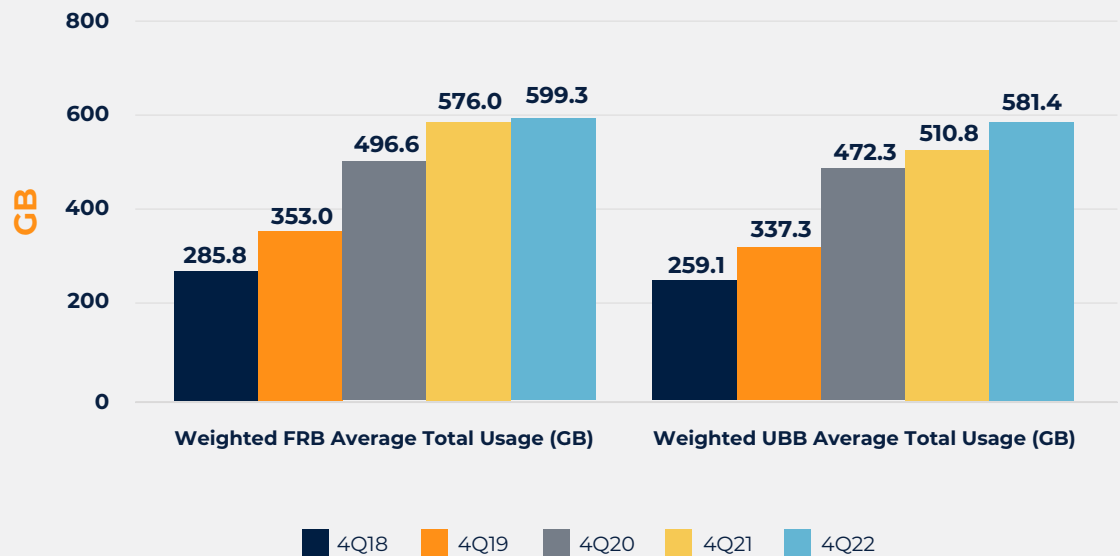
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- While 4Q22's weighted average data usage of 586.7 GB was up 9.4% from 536.3 GB in 4Q21, the YoY pace has slowed since its peak of 40.3% growth to 482.6 GB in 4Q20. Weighted averages combine data from FRB and UBB subscribers.

- Household data usage likely will surpass 600 GB by 4Q23 and, if growth continues at the current pace, usage will reach a terabyte by the end of 2028.

- Year-over-year upstream and downstream bandwidth growth remained relatively even, at 9.4% and 10.1% respectively, in 4Q22.

FIGURE 2

Data Usage Trends by Billing Type — 4Q18 to 4Q22

GB

	4Q18	4Q19	4Q20	4Q21	4Q22
Weighted FRB Average Total Usage (GB)	285.8	353.0	496.6	576.0	599.3
Weighted UBB Average Total Usage (GB)	259.1	337.3	472.3	510.8	581.4

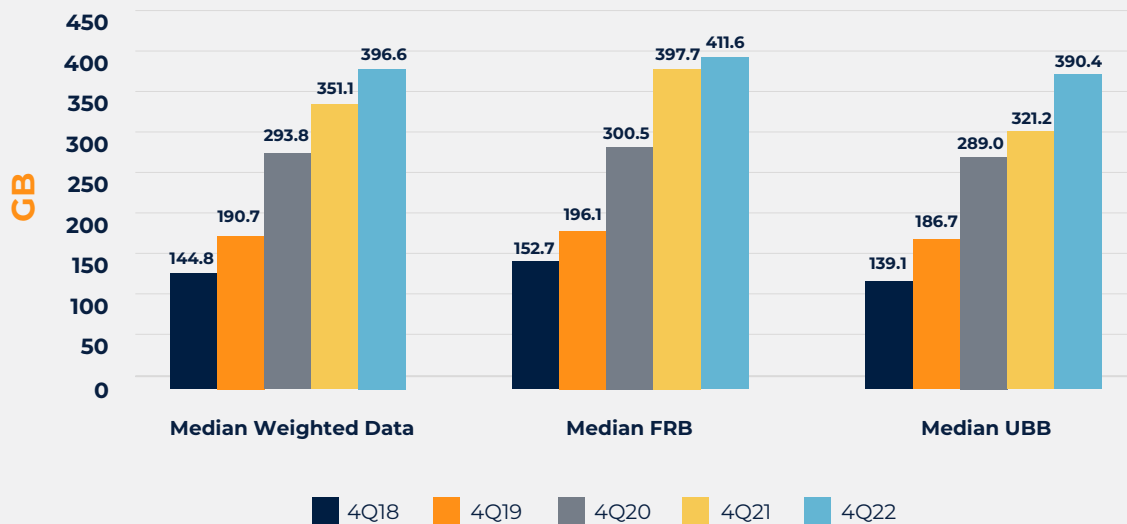OpenVault Broadband Insights Report 4Q22

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- While FRB Average Total Usage continues to remain higher than UBB Average Total Usage, the usage behavior for two types of billing plans are starting to converge into similar patterns. It is clear from the distribution of package adoption that the ARPU for UBB operators continues to significantly exceed the ARPU of FRB operators.

FIGURE 3

Data Usage Trends by Billing Type — 4Q18 to 4Q22

Chart — GB by billing type category:

Median Weighted Data
- 4Q18: 144.8
- 4Q19: 190.7
- 4Q20: 293.8
- 4Q21: 351.1
- 4Q22: 396.6

Median FRB
- 4Q18: 152.7
- 4Q19: 196.1
- 4Q20: 300.5
- 4Q21: 397.7
- 4Q22: 411.6

Median UBB
- 4Q18: 139.1
- 4Q19: 186.7
- 4Q20: 289.0
- 4Q21: 321.2
- 4Q22: 390.4

Legend: 4Q18, 4Q19, 4Q20, 4Q21, 4Q22

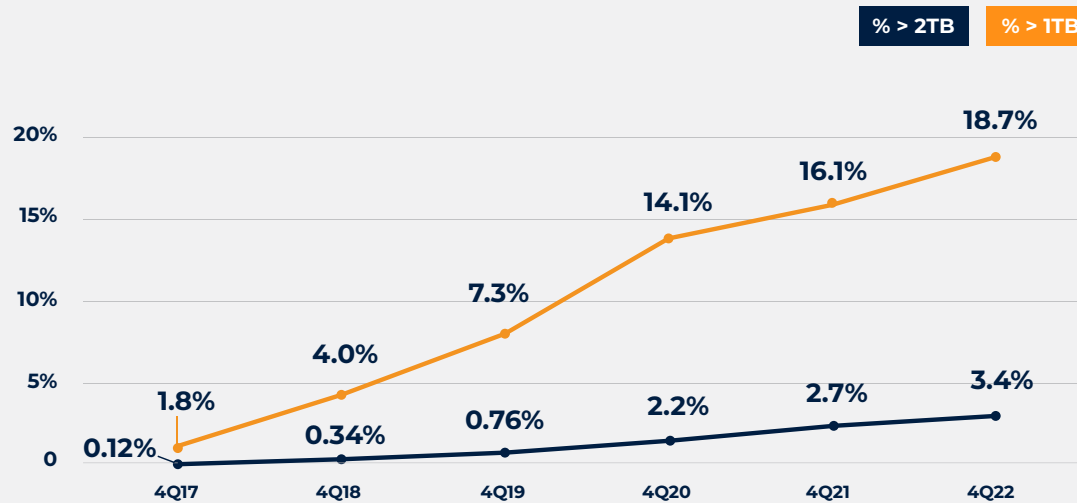OpenVault Broadband Insights Report 4Q22

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- The monthly weighted median usage in 4Q22 was 396.6 GB, up 13% from 351.1 GB a year ago.

- The gap between UBB and FRB subscribers narrowed considerably from 4Q22. Annual median usage growth for UBB providers nearly doubled to 21.5% and was roughly 6x the 3.5% growth of median usage for FRB providers.

FIGURE 4

Power User Consumption Trending — 4Q17 to 4Q22

% > 2TB % > 1TB

- 4Q17: 1.8% (>1TB), 0.12% (>2TB)
- 4Q18: 4.0% (>1TB), 0.34% (>2TB)
- 4Q19: 7.3% (>1TB), 0.76% (>2TB)
- 4Q20: 14.1% (>1TB), 2.2% (>2TB)
- 4Q21: 16.1% (>1TB), 2.7% (>2TB)
- 4Q22: 18.7% (>1TB), 3.4% (>2TB)

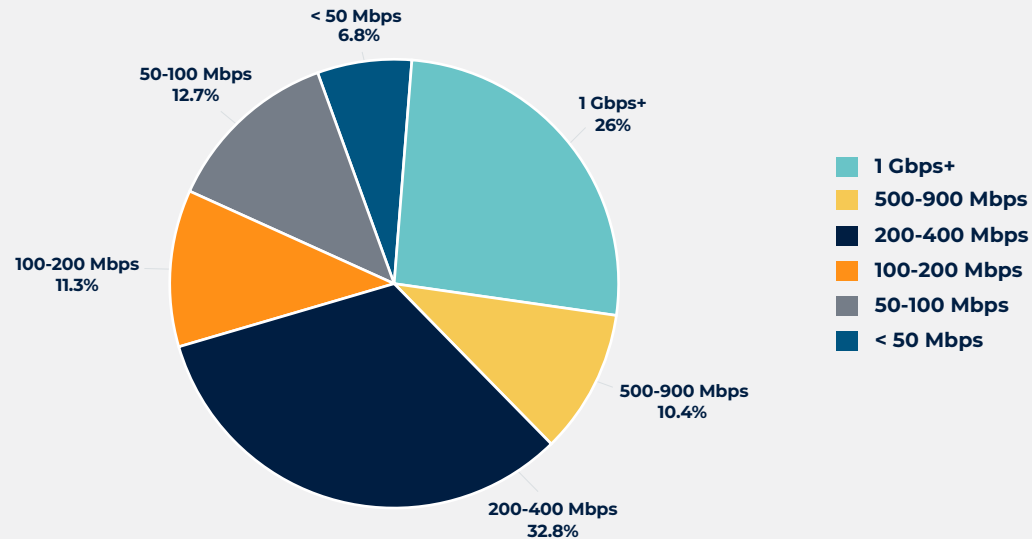OpenVault Broadband Insights Report 4Q22

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- The percentage of power users consuming 1 TB or more per month in 4Q22 was 18.7%, a year-over-year increase of 16% and 10x the percentage observed just five years ago, in 4Q17.

- Annual growth of super power users consuming 2 TB or more per month increased 25%, from 2.7% to 3.4% — a nearly 30x increase within the past five years.

- Power user growth on UBB networks accelerated by 22.4% while FRB power users was 9.1%. *(Not pictured in Figure 4.)*

Provisioned Broadband Speeds — 4Q22

- < 50 Mbps 6.8%
- 1 Gbps+ 26%
- 50-100 Mbps 12.7%
- 100-200 Mbps 11.3%
- 200-400 Mbps 32.8%
- 500-900 Mbps 10.4%

Legend:
- 1 Gbps+
- 500-900 Mbps
- 200-400 Mbps
- 100-200 Mbps
- 50-100 Mbps
- < 50 Mbps

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- The percentage of subscribers on gigabit tiers reached 26% in 4Q22, more than double the 12.2% during the same period in 4Q21.

- The percentage of subscribers provisioned for speeds under 200 Mbps continues to decrease, dropping 43% year-over-year and ending 2022 at 31%.

- More than one in three UBB subscribers (34.6%) now are provisioned for gigabit speeds or faster. This far outpaces FRB subscribers (13.9%).
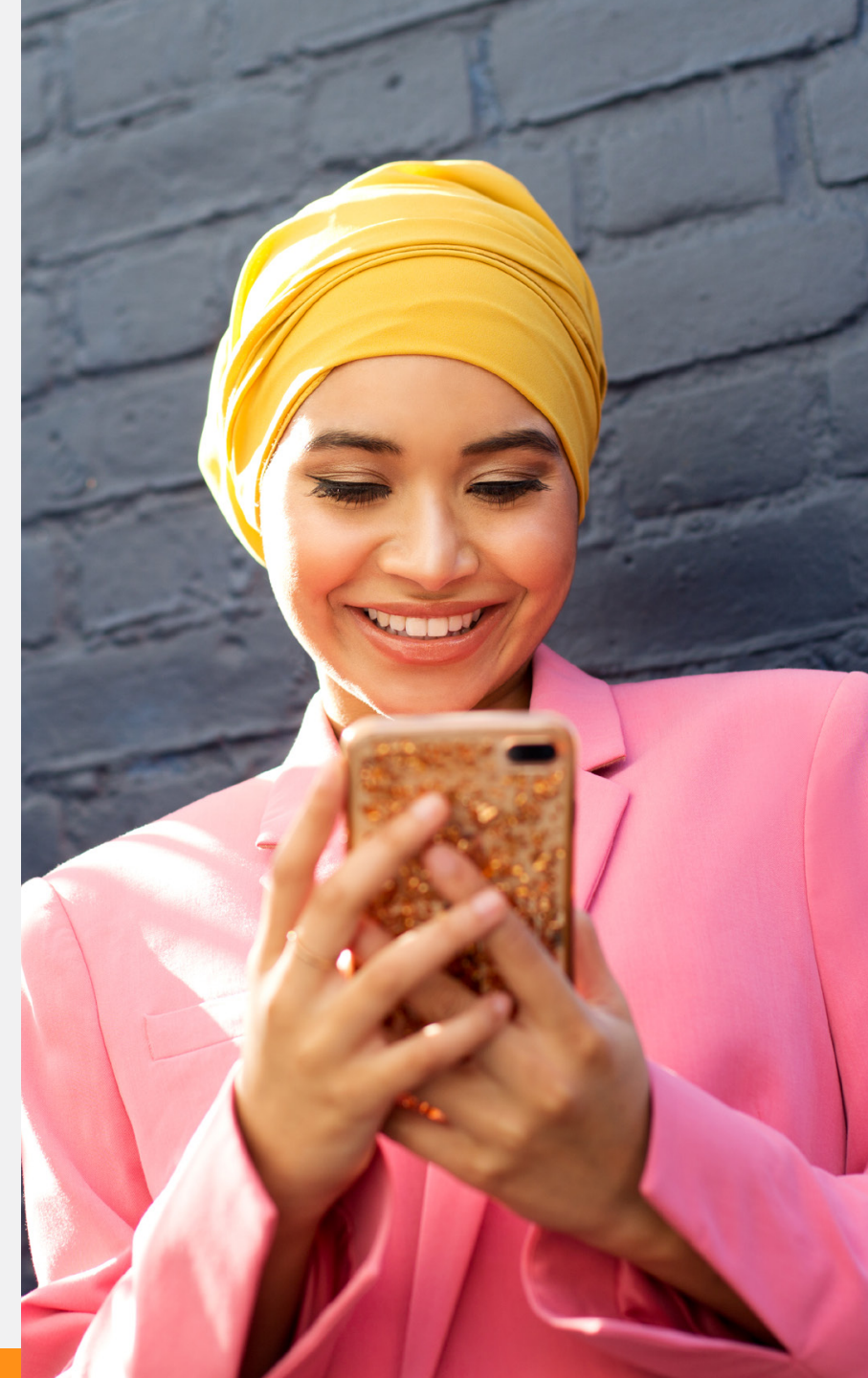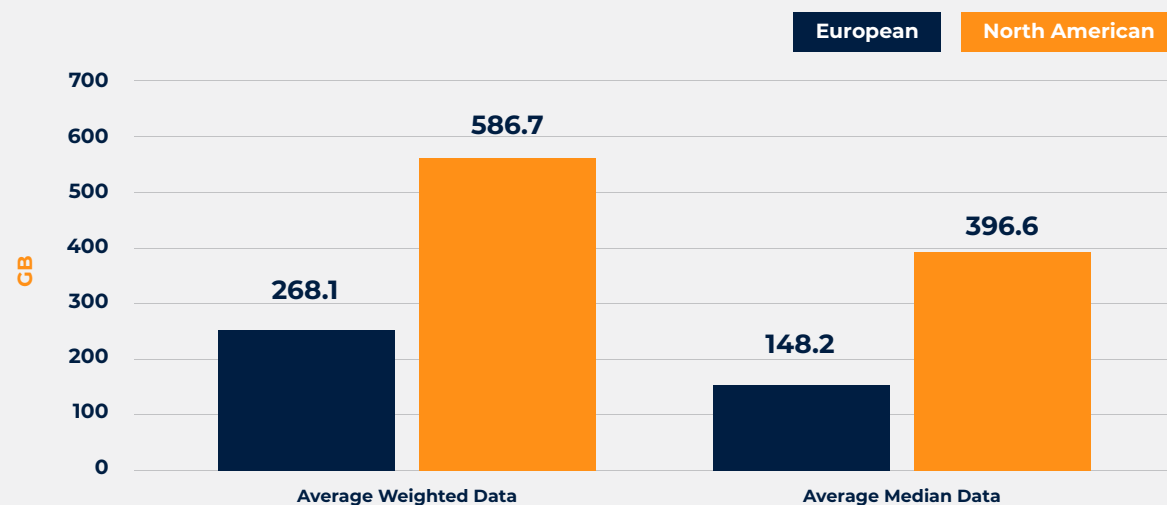
European vs. North American Data Usage — 4Q22

European vs. North American Data Usage — 4Q22

| | European | North American |

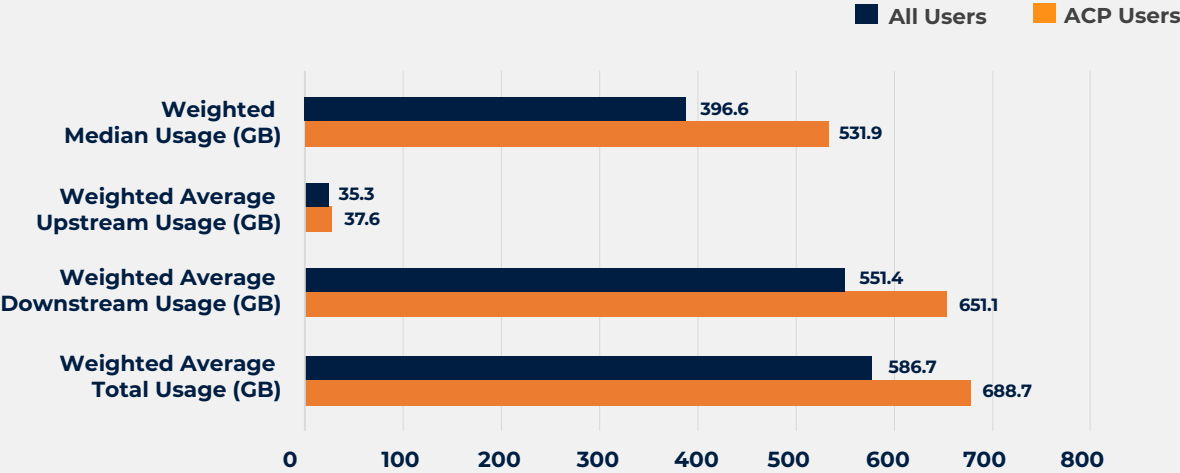OpenVault Broadband Insights Report 4Q22

- European average data usage (268.1 GB) grew 12.5% from a year ago, a faster pace than the North American annual growth rate of 9.4%.

- North American median data usage (396.6 GB) was more than 2.5x that of European median data usage (148.2 GB) in 4Q22, a slightly smaller difference than observed in 4Q21.

Affordable Connectivity Plan (ACP) Usage

FIGURE 7

ACP Usage vs. Overall Usage — 4Q22

Legend: ■ All Users ■ ACP Users

Category	All Users	ACP Users
Weighted Median Usage (GB)	396.6	531.9
Weighted Average Upstream Usage (GB)	35.3	37.6
Weighted Average Downstream Usage (GB)	551.4	651.1
Weighted Average Total Usage (GB)	586.7	688.7

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- OpenVault has observed higher consumption among participants in the FCC's Affordable Connectivity Program. Average usage of 688.7 GB in 4Q22 was 17% higher the 586.7 GB average for all users, but was not as high as the ACP differentials in 2Q22 (33%) and 3Q22 (24%). Median ACP usage in 4Q22 was 531.9 GB, 34.1% higher than the 396.6 GB median for all users.

- ACP participants' overall data usage in 4Q22 represented a 5% increase over 2Q22, when OpenVault began tracking the ACP category.

- In 4Q22, 22% of ACP participants were power users consuming more than 1 TB of data per month, compared with close to 19% of the overall population.
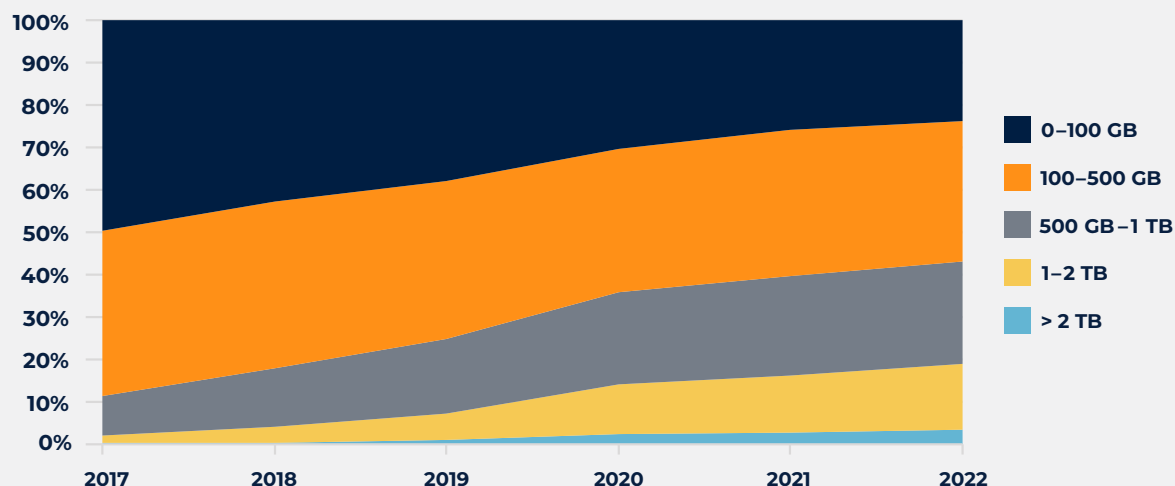
Bandwidth Usage Growth

Although growth has slowed since the height of the pandemic, average monthly consumption continues to rise and now is poised to eclipse the 600 GB mark. The multi-year trend through 4Q22 (Figure 8) illustrates how the percentage of power users of more than 1 TB per month has risen to nearly 19%, while the number of subscribers using 500 GB or more is advancing toward 50%. To accommodate this growth and maintain a positive customer experience, proper network planning for bandwidth usage is essential. Operators need to be aware of growing peak usage volume, ideally down to the days and hours those peaks commonly occur.

FIGURE 8

Bandwidth Usage
Distribution Trending — 4Q17 to 4Q22

Legend:
- 0–100 GB
- 100–500 GB
- 500 GB–1 TB
- 1–2 TB
- > 2 TB

X-axis: 2017, 2018, 2019, 2020, 2021, 2022

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Peak Bandwidth Usage

A noticeable boost in bandwidth consumption occurs annually at about the same time in December and into January, and each year consumption has been higher than the year before. After January, consumption rarely retracts throughout the year outside of normal seasonal patterns (i.e., lighter usage in summer months).

Inevitably, the holiday season inspires an increase in household internet usage. Christmas Day typically sees higher bandwidth consumption than any other day.

Although people are gathered in their homes, they often are simultaneously accessing the Internet for services such as video conferencing with friends and family, trying out new online games, and streaming holiday movies on smart TVs. Gift-giving also increasingly includes higher quality connected devices such as high (4K) resolution smart TVs, streaming devices, digital watches and fitness bands, gaming consoles, tablets, laptops, and various IoT smart devices.

Figure 9 is a first-ever look at Christmas Day data usage by time of day, using December 25th, 2022 (orange line) and the previous two Sundays for comparison purposes. By all accounts, the curves for the prior two Sundays depict normal "day-in-the-life" family internet usage. On Christmas Day 2022, data usage was much higher between 9 am and noon. This pattern is consistent with Christmas Days in years past (consumption is higher each year, however).

FIGURE 9

Total Data Usage by Time of Day
(Christmas Day vs Two Previous Sundays) — 4Q22

SUNDAY 12/25/22

SUNDAY 12/18/22

SUNDAY 12/11/22
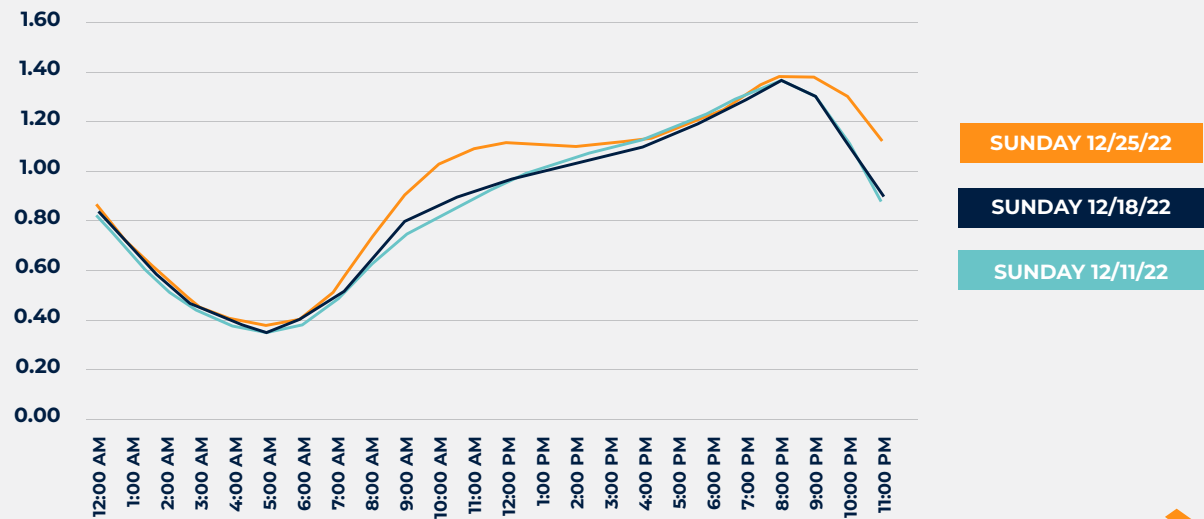
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Operators should generally design their networks to support normal daily peak hours. They should also be mindful of data usage growth at other peak times, particularly in December. Figure 10 shows data usage volume during the hour with the highest volume in December for the past five years. In December 4Q22, usage during the peak hour increased 18.3% over the peak hour of the previous December (1.56 GB to 1.85 GB). This means, for example, while total average usage growth might be around 9%, operators would need to support twice that percentage of growth during the peak hour. Growth in subscribers in addition to average usage growth will have a multiplier effect on the peak usage as well.

FIGURE 10

Peak Data Usage Volume in a Single Hour in December — 4Q22

Data Usage Volume (Millions)

2018 2019 2020 2021 2022
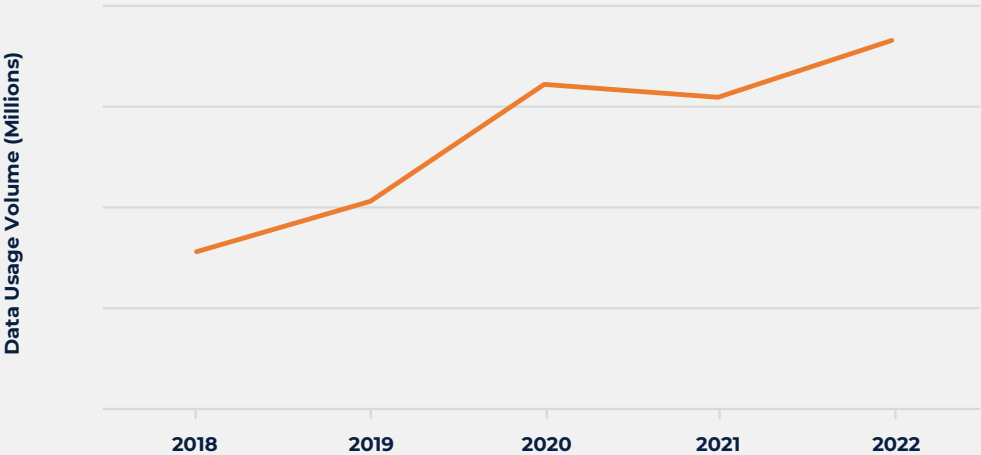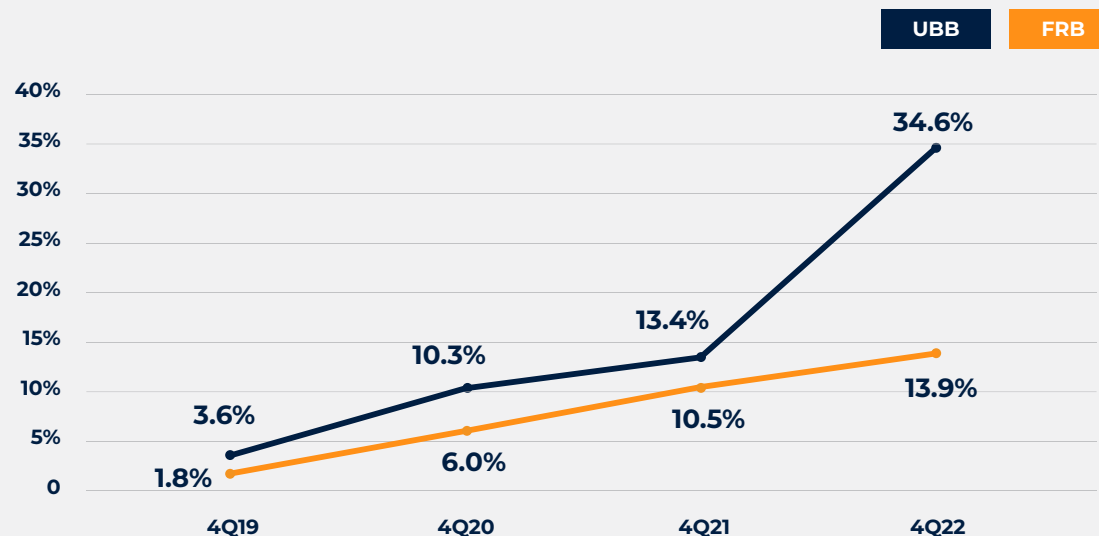
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More UBB Subscribers Adopting Gig+ Speeds

Adoption of gigabit speeds has jumped significantly among UBB subscribers, increasing to almost 35% in 4Q22 from 13.4% in 4Q21. Figure 11 below illustrates the largest margin observed thus far, as 2.5x as many subscribers on UBB platforms than on FRB platforms (13.9%) are now taking gig service. As noted in previous OVBI reports, a factor driving the acceleration of data usage and the increase in power users (by 22%) among UBB subscribers is the trend among many UBB operators to provide unlimited data to their gigabit subscribers.

FIGURE 11

Subscriber % at 1 Gbps+ Speed Tier — 4Q19 to 4Q22

| UBB | FRB |

	4Q19	4Q20	4Q21	4Q22
UBB	3.6%	10.3%	13.4%	34.6%
FRB	1.8%	6.0%	10.5%	13.9%

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Industry Observations

Below are recent milestones or data equivalences that put the historic usage rates noted in this OVBI 4Q22 report into perspective.

235 MM
Number of Disney+
subscribers in 2022

Source: Indiewire.com 8/1/2022

223 MM
Number of Netflix
subscribers in 2022

Source: Indiewire.com 8/1/2022

$25.3 Billion
Dollars spent in the United States on
SVoD (Subscriber Video on Demand)

Source: EarthWeb.com 9/22/22

137 MM
Connected TVs
in the United States

Source: EarthWeb.com 9/22/22

110 MM
Average number of
Superbowl viewers

Source: EarthWeb.com 9/22/22

$2 Billion
Google to pay the NFL
for Sunday Ticket

Source: DataProt.net 8/24/22

OVBI Average Broadband Household Index 4Q22

A snapshot of the average U.S. broadband household.

586.7 GB
Average Bandwidth Usage

551.4 GB
Average Downstream Usage

35.3 GB
Average Upstream Usage

415 Mbps
Average Downstream Speed

25 Mbps
Average Upstream Speed

Conclusion

Demand for greater internet speed continues to increase, especially on UBB platforms, as evidenced by the significant migration of users to speeds above 500 Mbps. Power users are growing in numbers, and average bandwidth usage is highly likely to exceed 600 GB in 2023.

Operators need to be mindful not only of this overall growth, but of growth among specific segments of subscribers and at specific times. Consumption by subscribers in the FCC's Affordable Connectivity Program continues to outpace that of all subscribers, and rapid growth of peak time consumption – especially during and around the holiday season – are both considerations that need to be addressed in network planning.

OpenVault Solutions to Address This Report's Insights

From network congestion to increasing revenue, OpenVault offers solutions to improving the value of broadband networks. Three of the solutions associated with this report's insights are:

Dynamic Network Health through Congestion Management and Capacity Boosting

For providers that have invested in a DOCSIS 3.1 network, OpenVault offers a means to extend its performance and value without significant capital expenditure. Broadband providers can deploy a closed-loop and automated data-driven solution that diagnoses performance issues, pinpoints plan and usage areas to address and targets remedies. Additionally, OpenVault can dynamically create bandwidth without human intervention. Through persistent analysis of data from each CM and CMTS, the OpenVault Profile Management Application (PMA) learns the state of the system and creates profile sets tailored to the unique real-world environment of each OFDM/OFDMA channel – essentially creating "virtual node splits" and opening up more usable bandwidth.

ACP Reporting

OpenVault makes Affordable Connectivity Program audit reporting a simple process. OpenVault's access to subscriber usage data enables us to track usage/zero usage calculating as defined by the FCC. These reports provide a list of accounts that have hit the threshold for consecutive days with zero usage (also as defined by the FCC): 15 Days; 30 Days; or 45 Days and includes: MAC addresses; billing account; usage by month – upstream, downstream, and total; and data repository providing multiple years of history.

Subscriber Upgrade Candidates

Now broadband providers can identify, in near real-time, subscribers with usage behavior that approaches the maximum speed of their service packages. Perfect candidates for upgrading to higher-speed and more provider-lucrative plans, targeted subscribers will experience higher QoE and reduce their need for customer care.

Learn more about these and other revenue increasing and network management solutions at OpenVault.com.

About OpenVault

OpenVault is a market-leading source of broadband technology solutions and data-driven insights into worldwide broadband consumption patterns. OpenVault's cloud-based, SaaS solutions and tools help service providers optimize network performance, increase revenue, and improve subscriber satisfaction. OpenVault aggregates and analyzes the resulting market data to provide unparalleled granular views of consumer usage that can be used to anticipate residential and business broadband trends.

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