PMU strives to offer BIAS data services to customers while maximizing performance. It must be understood that performance is measured between two specific points and the metrics may vary significantly depending on what those two points are. Generally, the metrics below are measured between a device directly connected to the Optical Network Terminal (ONT) at a customer location and a testing server located at the PMU data center. Other potential end points are to the servers of commonly performant online services such as Google, Cloudflare, Netflix, Zoom, etc.

Bandwidth

Bandwidth is the total amount of data that moves between two points in a given unit of time. Generally, most services note bandwidth in terms of **M**ega**b**its **p**er **s**econd (Mbps) and **G**iga**b**its **p**er second (Gbps, equal to 1000 Mbps). Bandwidth is determined by both physical limitations of the equipment being used as well as by limitations imposed by settings in that equipment which only allow a specific volume of data per unit of time to pass through a given point. To understand performance it is important to note a couple facts.

First, the bandwidth available to a customer's service location can be significantly different than the bandwidth to any particular device at the customer's location. For example, a laptop at a customer location may only be capable of 10 megabits per second while the service to the home may be capable of 100 megabits. Or the customer's router may limit the bandwidth to all wireless devices to 3 megabits each to ensure fair sharing of resources while the router itself is capable of the full 100Mbps bandwidth available to the customer's location. PMU can only ensure bandwidth to the location but cannot control how it is utilized by the customer or their devices.

It should additionally be noted that the measured bandwidth can only be stated as a typical range rather than a precise number. This is because the state of the network and devices involved in the measuring of bandwidth varies from one moment to the next. Consequently, any two tests are unlikely to produce precisely identical results. However, the results should be a relatively small range at or near a specific target, depending on the service being subscribed to by the customer.

Finally, with network traffic there is always overhead. This is data that is part of the bandwidth but it is part of the mechanism of moving data through the network and is therefore not useful data to the customer. Most bandwidth measuring applications and devices do not, and frequently cannot, report on this data. As a result this is data that appears to be "lost" despite the fact it is present and doing work. By way of analogy, if you have a truck capable of towing 2000lbs you cannot tow a trailer with 2000lbs of lumber on it because the trailer's own weight has to be accounted for. If the trailer weighs 400lbs then you can only haul 1600lbs of lumber, not the full 2000lbs the truck's rating would suggest. The same is true of networks. If a device has a 100Mbps Ethernet port then it is only capable of up to 96Mbps of measured bandwidth. The 4Mbps

'missing' data is the data that was used in doing the work of delivering the 96Mb that was measured. This is called "efficiency" and is a feature of every network service. PMU attempts to set limits to compensate for inefficiency and deliver the full target bandwidth, but this effort will be hampered by physical limitations of the equipment being used.

Fiber 100 – Targeted at 100Mbps download and 50Mbps upload. Typical range of the PMU fiber network is **98-102Mbps** down and **48-52Mbps** up. The services' limits are set to compensate for inefficiency, but if the router in use has a 100Mbps port connected to the ONT rather than a gigabit port then physical limitations of the port will cap useful download bandwidth measurements to the 94-96Mbps range.

Fiber 500 – Targeted at 500Mbps upload and download. Typical range of the PMU fiber network is **498-502Mbps**.

Fiber 1000 – Targeted at 1000Mbps download and upload. Typical range of the PMU fiber network is **939-960Mbps**. The ports on the ONT and most common consumer router devices are gigabit, which means measurable useful bandwidth is limited to the physical efficiencies of the ports in use.

Latency

Where bandwidth is the amount of data that can be sent between two points in a given amount of time, latency is the speed with which that data moves, the amount of time it takes to get that bandwidth from point A to point B. By way of analogy, if 1600lbs of lumber being towed by the truck above is the bandwidth, then the top speed of the truck – how fast it can move that 1600lbs from one place to another – would be the latency. In applications such as gaming, streaming video, and voice calls latency is far more important than bandwidth. In these applications there isn't much data flowing, but it has to get to where it is going now. Software can tolerate some latency (that's what buffering is for) but only so much. Excessive delay in data will cause audio to sound garbled or video to pixelate. Latency can vary wildly depending on the two points between which it is being measured.

Typical latency is **6-15 milliseconds** for all PMU fiber plans. Some representative sample measurements, in milliseconds from a customer ONT to the services indicated:

PMU DNS2 – 1ms
PMU DNS1 – 4ms
Verisign DNS – 12ms
Zoom.us – 12ms
Google DNS – 13ms
Fast.com – 14ms
Microsoft.com – 14ms
Cloudflare DNS – 15ms
Facebook.com – 26ms