October 25, 2018

Ex Parte Notice

Ms. Marlene H. Dortch, Secretary
Federal Communications Commission
445 12th Street, S.W.
Washington, D.C. 20554

Re: Connect America Fund, WC Docket No. 10-90

Dear Ms. Dortch,

On Wednesday, October 24, 2018, the undersigned on behalf of Vantage Point Solutions (VPS) met with Suzanne Yelen, Alec MacDonell, Cathy Zima, Cha-Chi Fan and Stephen Wang of the Wireline Competition Bureau ("Bureau") of the Federal Communications Commission ("Commission"). During the meeting, we discussed test results of the VPS-developed Broadband Evaluation Testing and Tracking Instrument (BETTI) and the Commission's recent Order regarding performance testing rules for supported broadband networks ("Performance Testing Order").[1] The handouts from this meeting are attached to this ex parte notice. Based on the results of thousands of network tests and years of experience engineering broadband networks, VPS suggested some refinements to the requirements and procedures in the Performance Testing Order. The areas discussed included:

1. The Initiation Point in the Customer Premises for Performance Testing
2. Limitations Associated with the Use of Test Servers Located at IXPs
3. Issues Associated with the Requirement that Performance Tests be Initiated at the Beginning of each Test Hour Window
4. An Alternative to Relying on Third Party Test Servers Over Which the Provider Has No Control
5. Potential Remedy for Locations with High Levels of Crosstalk

With each of the issues discussed above, I also proposed potential solutions for the Commission to consider.

First, I expressed concern that the specific location in the customer premises where the testing should be initiated from was not clear in the Performance Testing Order. Leaving this vague could result in test results that are not representative of the customer's actual

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[1] Connect America Fund, Order DA-18=710A1 (WCB, WTB, and OET, rel. July 6 2018), ("Performance Testing Order")

broadband performance. To accurately measure the performance of the broadband service, it is important that the testing be performed on the customer side of the port used to deliver the broadband service. This is consistent with the 2011 transformation order which stated that the "actual speed and latency be measured on each ETC's access network from the end-user interface to the nearest Internet access point."[2] Performing performance testing on the network side of this port could produce results that are not representative of the broadband performance experienced by the customer. For example, a wireless radio may have access to 100 Mbps of spectrum capacity, yet the customer port on this radio is provisioned to only deliver 10 Mbps to the customer. Similar arguments can be made for equipment that is used to terminate coaxial networks, fiber networks, or other technologies. It is important that the performance testing be initiated at a point in the network that accurately represents the customer's experience and not internal to the equipment used to deliver the service.[3]

VPS has previously expressed concern[4,5] that it will be difficult, especially for small carriers, to meet the speed test requirements when testing to one of the Commission's Internet Exchange Points (IXPs).[6] When testing to an IXP, the broadband speed could be impacted by network congestion between the provider's ISP and the IXP (the portion of the network between the points labeled as "B" and "C" on page 8 of the attached presentation). This portion of the network is largely outside of the small provider's control, since they don't often have direct connections to these IXP locations as do the larger carriers. As shown in the attached presentation, the tested speeds were significantly slower when testing to the IXP in instances where the customer subscribed to higher broadband speeds (typically >100 Mbps). Our initial testing has shown there was very little difference in the tested speed between the provider's test server, their ISP's test server, and the IXP's test server at lower speeds. This can also be seen in the attached presentation for a Digital Subscriber Line (DSL) and fixed wireless customer.

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[2] Connect America Fund; A National Broadband Plan for Our Future; Establishing Just and Reasonable Rates for Local Exchange Carriers; High-Cost Universal Service Support; Developing an Unified Intercarrier Compensation Regime; Federal-State Joint Board, FCC-11-161, Nov. 18, 2011, para. 111.

[3] Letter from Larry Thompson of Vantage Point Solutions to Marlene Dortch, Dated August 28, 2018.

[4] Ibid

[5] Letter from Larry Thompson of Vantage Point Solutions to Marlene Dortch, Dated October 1, 2018.

[6] ibid, ¶ 20

I also expressed concern that speed test failures may occur simply due to the requirement that the testing be initiated at the "beginning of each test hour window."[7] Even though performance tests will be distributed across different weeks of the quarter, VPS is concerned that the test servers will become overloaded if all test devices in each week initiate a speed test at the same time. It is also possible that some providers may test every day, not just during the weeks needed to meet the FCC's performance testing requirements. This may be because the provider wants to measure their broadband performance for other reasons or because their test solution is not capable of limiting the test to only one week per quarter. Because of this, we suggested that the Commission allow some flexibility with respect to the start time within each test hour window that the test is initiated. By simply offsetting or shifting the test hour window (and therefore the test initiation time) by up to 30 minutes, the provider would still have a full hour to complete the performance test in circumstances where crosstalk is present. This would allow the provider to begin the first test hour window anytime between 5:30 pm and 6:30 pm. For example, if the first test is initiated at 6:25 pm (rather than 6:00 pm), the start of the next test hour window would be 7:25 pm, and so forth until the last test hour window which would be 11:25 pm to 12:25 am. Assuming the Commission would limit this offset to ±30 minutes or less, testing would still be performed during the peak hours between 7:00 pm and 11:00 pm.

We also discussed the fact that the speed test servers used to measure performance will likely also be outside of the provider's control. Many servers will simply reject additional speed test requests when they are too busy. They may also become overwhelmed and report slower speeds than what the broadband network is capable of. The VPS BETTI device uses sophisticated algorithms to dynamically select the "best" server in each IXP location for each test, but more could be done to help ensure the test servers can adequately handle this load. One approach discussed was that the Commission could have a third party such as the Universal Service Administrative Company (USAC) deploy and maintain servers that could be used as the termination point for performance testing in each of the IXP locations. It may be premature to move forward with this until we see the impact this testing has on test server performance. It is possible that this will not become an issue until providers begin testing higher broadband speeds as will be needed for the CAF Phase II auction winners. If test server overload is going to be a problem, it should start to become apparent over the next few months as companies prepare for the testing that will need to begin later in 2019.

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[7] Performance Testing Order, Paragraph 28.

Finally, I also expressed concern that there could be many sites that fail the crosstalk test because of the large number smart home and Internet of Things (IoT) devices that are deployed today. Some test devices (such as VPS's BETTI Plus) can measure the amount of crosstalk at a location. I proposed that the Commission consider allowing the provider to complete the speed test even in the presence of crosstalk and simply add the speed test results to the amount of crosstalk to determine the total broadband speed available to the customer. Doing so would eliminate the potential expense to the provider of having to move devices to other locations when the level of crosstalk is such that the required speed tests cannot be performed. VPS committed to perform some analysis and testing to determine if this is a realistic method and whether the needed accuracies can be achieved. VPS will make this a subject of a subsequent ex parte filing in the coming weeks.

*   *   *

Pursuant to Section 1.1206 of the Commission's rules, a copy of this letter is being filed via ECFS with your office. If you have any questions, please do not hesitate to contact me at (605) 995-1777 or Larry.Thompson@Vantagepnt.com.

Sincerely,

Larry D. Thompson
Chief Executive Officer
Vantage Point Solutions

cc:
Suzanne Yelen
Alec MacDonell
Cathy Zima
Cha-Chi Fan
Stephen Wang

FCC Broadband Performance Testing

Larry Thompson, PE
Chief Executive Officer
2211 N. Minnesota St.
Mitchell, SD 57301

FCC Broadband Performance Testing
WC Docket No. 10-90; DA 18-710, adopted on July 6, 2018

- Measuring the speed and latency performance for recipients of high-cost universal service support to serve fixed locations
- Testing Performed 1 Week each Quarter (6:00 pm-12:00 am)
    - Latency: Once per minute
    - Speed: Once per hour
- If Customer Load Exceeds 64 kbps Downstream (D/S) or 32 kbps Upstream (U/S), Testing Can be Delayed
- FCC Allowed Testing Methods
    - <u>MBA Testing</u>: Measuring Broadband America infrastructure
    - <u>Off-the-Shelf Testing</u>: Existing network management systems and tools
    - <u>Self-Testing</u>: provider-developed self-testing configurations
- Vantage Point Has Developed a "Self-Testing" Solution

Broadband Evaluation Testing and Tracking Instrument (BETTI)

- Established Broadband Network Measurement Device
  - Initial Release: May 2016
  - Has Performed Hundreds of Thousands of Tests
- Upgraded to Meet FCC Performance Testing Requirements
  - Hardware upgrade (allow for >100Mbps testing)
  - Software upgrade (admin and customer portals)
- Vendor, Equipment, and Technology Agnostic
- Data Saved on Redundant Cloud-based Service (SQL DB)
- Supports 80/80 Speed Test Standard & 95% Latency Test
- Long-term Test Results Storage
- Flexible Data Export Support (XML, CSV, JSON, etc.)

BETTI Hardware – 2 Versions

- "BETTI" and "BETTI Plus"
- Low Power / Silent Operation
- BETTI – Single-ended Design
  - Easy customer install
  - Used when no crosstalk measurement required
  - Quad-core 64-bit ARM Processor with 512MB RAM
  - Single GigE Interface
- BETTI Plus – Inline Design
  - FCC crosstalk measurement capable
  - Dual-core 64-bit ARM Processor with 4GB RAM
  - Three GigE Interfaces / integrated switch

BETTI Installation and Operation

- Security Hardened Operating System
- Encrypted Communications
- Robust Firewall
- Fully Automated Performance Testing
  - No Service Provider Intervention Required
- Fully Configurable
  - IXP selection (manual or auto)
  - Test week selection
  - Customer address, FCC performance tier, service level

BETTI BOX
BY VANTAGE POINT

Provider Web Portal

Company

Name*	Vantage Point Demo	Notes	Online Demonstration Account
Active	☑		
Address*	2211 North Minnesota	Users	

Users

Add

User	Action
Andy Deinert	Delete

City*	Mitchell
State*	South Dakota ▾
Zip*	57301

Speed Tier Configuration

Add

State	Speed Tier	Action
South Dakota	4/1 Mbps	Edit Delete

Close   Save

Speed Tier Configuration

State	Speed Tier	Run Continuously
South Dakota ▾	4/1 Mbps ▾	☑

Quarter 1
Month	1 ▾
Week	1 ▾

Quarter 2
Month	2 ▾
Week	2 ▾

Quarter 3
Month	3 ▾
Week	3 ▾

Quarter 4
Month	1 ▾
Week	1 ▾

* Week 1 testing occurs on days 1-7 of the month, Week 2 on days 8-14, Week 3 on days 15-21, Week 4 on days 22-28
* Run Continuously flag will tell the devices to run tests even if it is not the configured testing week

Close   Save

Speed Test Results

Start ▲	Stop	ISP	IP	Destination	Distance(km)	Latency (ms)	Download(Mbps)	Upload(Mbps)	Result Image
10/04/2018 15:09:01	10/04/2018 15:09:31	South Dakota Network			42.30	58.410	23.700	7.000	View
10/04/2018 14:37:01	10/04/2018 14:37:32	South Dakota Network			0.49	59.134	20.820	6.410	View
10/04/2018 14:10:01	10/04/2018 14:10:34	South Dakota Network			0.49	50.435	20.960	5.780	View
10/04/2018 13:33:01	10/04/2018 13:33:31	South Dakota Network			42.30	51.443	22.930	7.180	View
10/04/2018 13:07:01	10/04/2018 13:07:32	South Dakota Network			42.30	49.078	22.960	6.120	View
10/04/2018 12:37:01	10/04/2 12:37:3								
10/04/2018 12:15:01	10/04/2 12:15:3								
10/04/2018 11:39:01	10/04/2 11:39:3								

VantagePoint   Home   Reports ▾   Andy Deinert ▾

State	Speed Tier	Healthy	Under Performing	Unresponsive
SD	10/1 Mbps	1	0	0
SD	100/20 Mbps	1	0	0

Over **14343** tests ran

Testing to FCC IXP Locations

- Testing Endpoints
  - Some vendor solutions may not measure customer experience
  - Many small providers do not directly connect to IXP locations
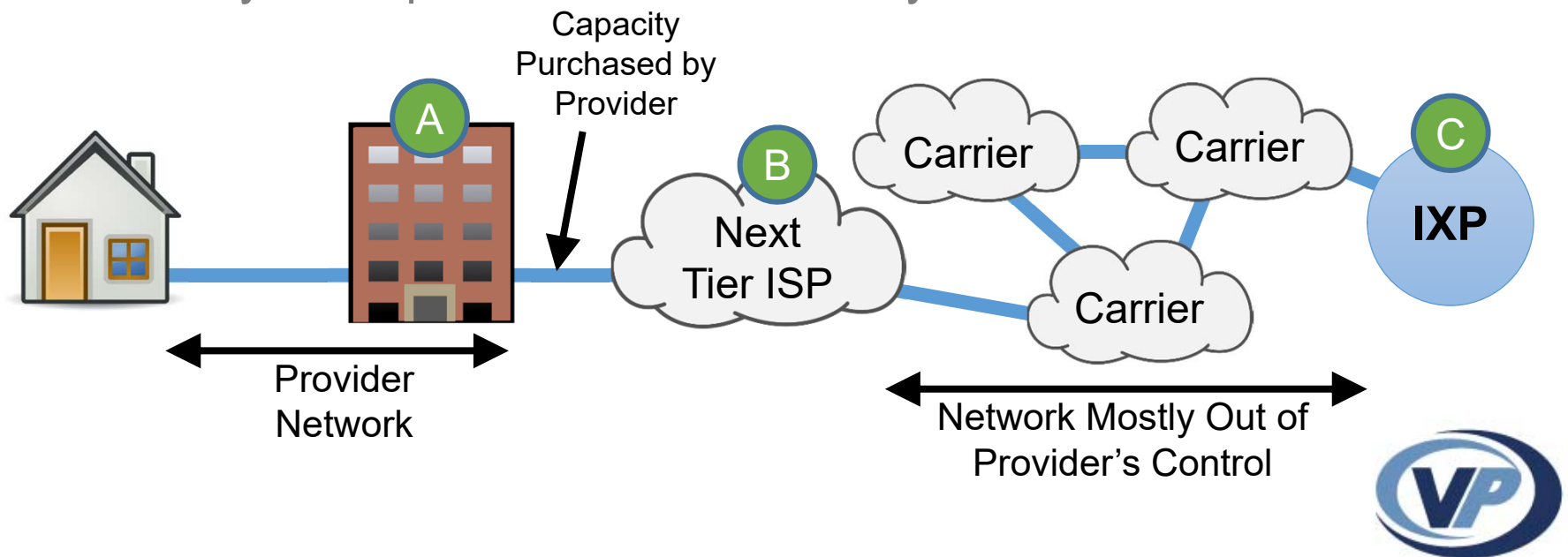
Testing to IXP (iPhone)

Speedtest app results (10/22/18):

Type	Date	↓ Mbps		↑ Mbps	
📶	10/22/18 6:06 PM	245	PASS	240	PASS
📶	10/22/18 6:05 PM	241	PASS	229	PASS
📶	10/22/18 6:04 PM	247	PASS	238	PASS
📶	10/22/18 6:04 PM	228	PASS	205	PASS
📶	10/22/18 6:03 PM	251	PASS	226	PASS
📶	10/22/18 6:03 PM	227	PASS	216	PASS
📶	10/22/18 6:02 PM	175	FAIL	158	FAIL
📶	10/22/18 6:01 PM	146	FAIL	171	FAIL
📶	10/22/18 6:01 PM	197	FAIL	175	FAIL

Service: 250M/250M

A — Provider
D/S Ave: 244 Mbps
U/S Ave: 236 Mbps
Latency: 2 ms
Distance: 1 mi

B — ISP
D/S Ave: 235 Mbps
U/S Ave: 216 Mbps
Latency: 4 ms
Distance: 66 mi

C — IXP
D/S Ave: 173 Mbps
U/S Ave: 168 Mbps
Latency: 28 ms
Distance: 258 mi

Frequent Failures When Testing to IXP
- 80% = 200 Mbps
- Testing based on standard Ookla app
- Failures primarily with higher speed services (>100 Mbps)
- Network performance after first ISP largely out of Provider's control

Testing to IXP (Windows PC)

Service: 250M/250M

Provider
- D/S Ave: 244 Mbps
- U/S Ave: 248 Mbps
- Latency: 1 ms
- Distance: 1 mi

ISP
- D/S Ave: 247 Mbps
- U/S Ave: 248 Mbps
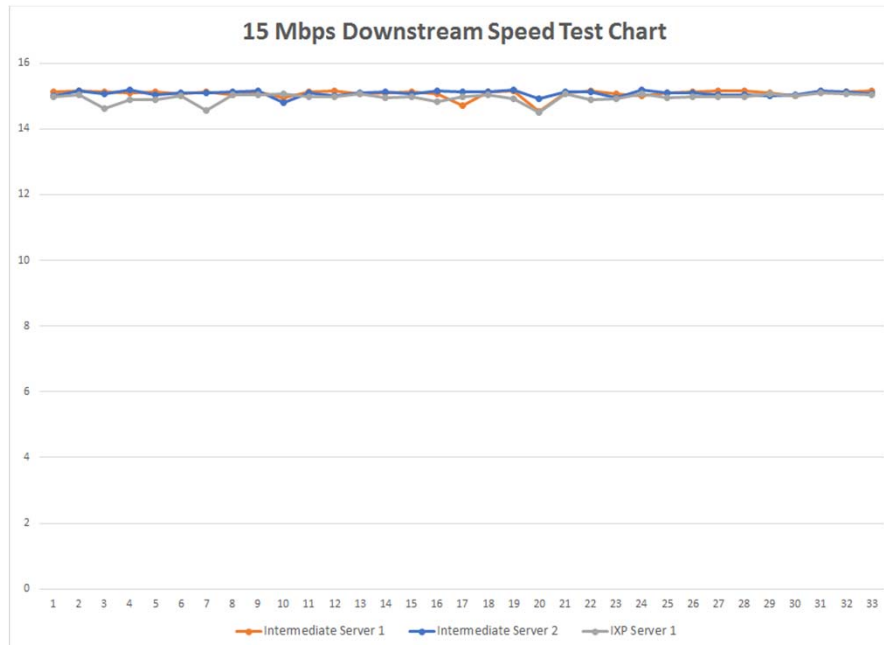- Latency: 4 ms
- Distance: 66 mi

IXP
- D/S Ave: 186 Mbps
- U/S Ave: 180 Mbps
- Latency: 27 ms
- Distance: 258 mi

Frequent Failures When Testing to IXP
- 80% = 200 Mbps
- Testing based on standard Ookla app
- Failures primarily with higher speed services (>100 Mbps)
- Network performance after first ISP largely out of Provider's control

Provider & IXP Testing – 15 Mbps / 2 Mbps

15 Mbps Downstream Speed Test Chart

Legend: Intermediate Server 1, Intermediate Server 2, IXP Server 1

Comparable Speed Results for Testing to Intermediate Servers and IXP Location

- 15M/2M Service over DSL
- 80% = 12 Mbps D/S
- No speed test server at provider – Alternative servers used
- Testing initiated from BETTI platform
- Download tests relatively consistent across all speed test server locations

Service: 15M/2M		
Intermediate 1	Intermediate 2	IXP
D/S Ave: 15.1 Mbps U/S Ave: 1.8 Mbps Latency: 34.4 ms	D/S Ave: 15.1 Mbps U/S Ave: 1.8 Mbps Latency: 41.3 ms	D/S Ave: 15.0 Mbps U/S Ave: 2.1 Mbps Latency: 70.5 ms

Provider & IXP Testing – 25 Mbps / 7 Mbps

25 Mbps Downstream Speed Test Chart
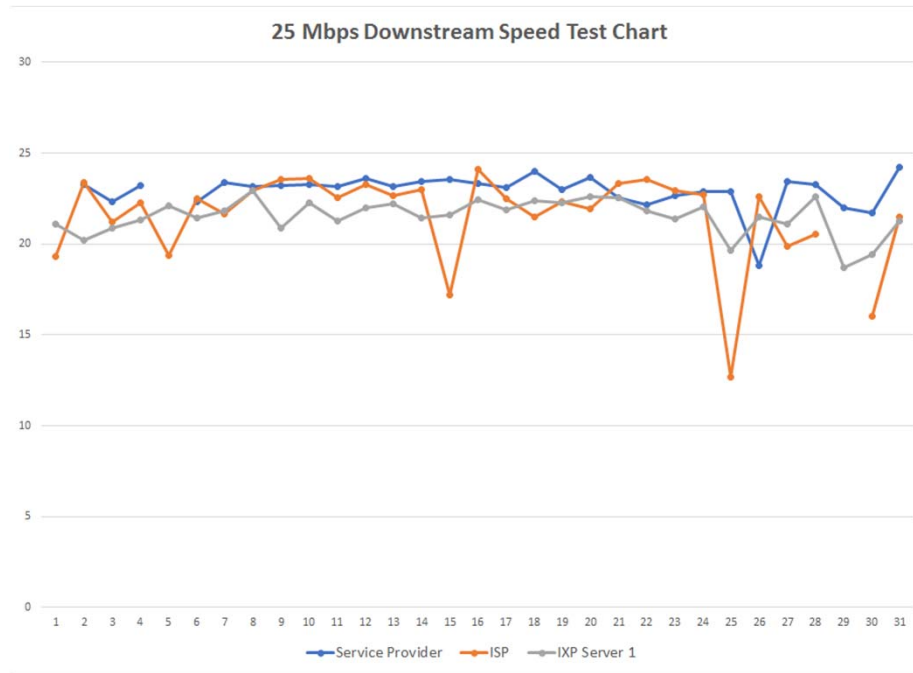
Comparable Speed Results for Testing to Provider, ISP, and IXP
- 25M/7M Service over Fixed Wireless
- 80% = 20 Mbps D/S
- Testing initiated from BETTI platform
- Periodic download speed test failures but within 80% pass threshold
- Latency to IXP is not within 95% pass threshold

Service: 25M/7M		
Provider	ISP	IXP
D/S Ave: 22.9 Mbps U/S Ave: 5.2 Mbps Latency: 59.2 ms	D/S Ave: 21.6 Mbps U/S Ave: 4.9 Mbps Latency: 67.1 ms	D/S Ave: 21.5 Mbps U/S Ave: 5.1 Mbps Latency: 95.6 ms

Provider & IXP Testing – 1,000 Mbps (1 Gbps)

1000 Mbps Downstream Speed Test Chart

— Service Provider — IXP Server 1
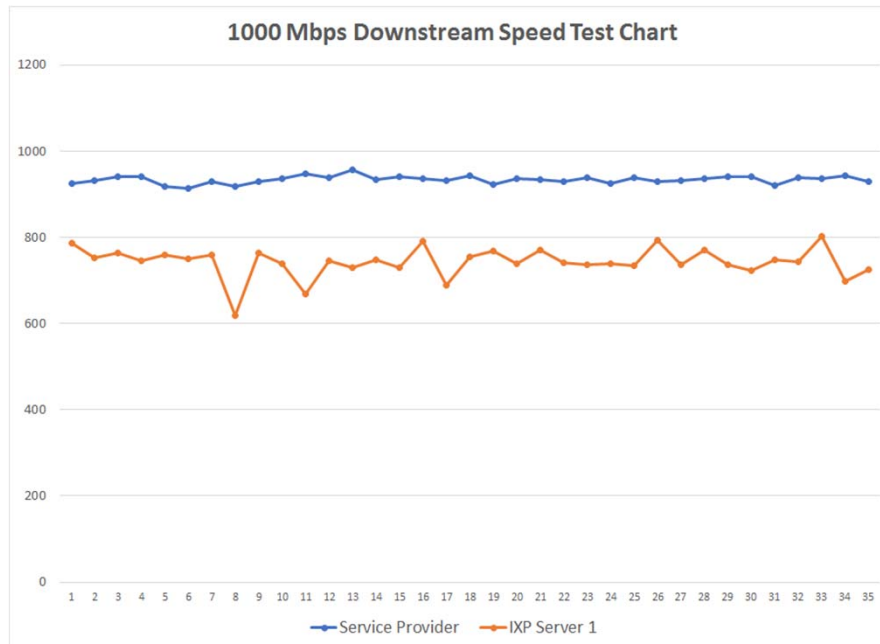
Downstream Speed Test for Gigabit Service
- 1,000M/1,000M Service over Fiber
- 80% = 800 Mbps
- Testing initiated from BETTI platform
- U/S less than 80% of subscribed, but exceeds 500 Mbps FCC requirement
- Downstream test to service provider speed test server passed, but tests to IXP server failed

Service: 1,000M/1,000M	
Provider	**IXP**
D/S Ave: 933.6 Mbps U/S Ave: 747.8 Mbps Latency: 2.3 ms	D/S Ave: 742.9 Mbps U/S Ave: 583.0 Mbps Latency: 10.5 ms

Randomize Test Hour Window

> "We note that speed testing has greater network impact than latency testing. For speed testing, we require providers to start separate download and upload speed tests at the beginning of each test hour window." (para. 28)

- Thousands of Performance Tests Will be Initiated at Same Time
- Even With Test Weeks Distributed Through Quarter, Test Servers and Circuits Could Become Overloaded if Test Initiated at <u>Beginning</u> of Each Test Hour Window
- Server Load Could be Minimized if Tests were Distributed Throughout Test Hour

BETTI BOX

BY VANTAGE POINT

Network Performance Testing

BROADBAND
EVALUATION
TESTING and
TRACKING
INSTRUMENT

Network Performance Testing is **mandatory for all USF support recipients**.

BETTI Box by Vantage Point is designed to meet FCC requirements, and built to meet your operational needs.

EASY TO USE
Just plug it in and walk away

FIELD TESTED
Technology has performed over 100,000 tests

TECHNOLOGY NEUTRAL
Vendor Agnostic and works on all networks

INTELLIGENT
Autodetects customer information

RESPONSIVE
Receive alerts if a test location goes offline or if a test fails

SECURE
Equipment and portal are secure and encrypted

VP VantagePoint
EMPLOYEE OWNED

Compliance made Simple.

BETTI Box is a turn-key solution specifically designed to fulfill Network Performance Testing requirements—with minimal impact to your network or operation. BETTI Box is a combination of custom-built performance testing devices and a dedicated company portal, bringing you into compliance and giving you intelligence and insight into your network.

BETTI Box comes with:

- ✓ FCC Certification Letter
- ✓ Quarterly Performance Monitoring & Reporting
- ✓ Access to trained, certified technicians
- ✓ Cost savings when combined with other VPS services
- ✓ Subscriber Info Card to answer customer questions about the equipment

⚠️ Failure to comply will result in a reduction of support. ALL USF high-cost support recipients must report performance testing results, including:

CAF II Auction Winners ▪ Rate-of-Return Carriers ▪ A-CAM Companies ▪ Rural Broadband Experiments ▪ Alaska Plan Carriers

To learn more about BETTI Box and how to fulfill your Network Performance Testing requirements, contact:

ANDY DEINERT, CISSP

NETWORK & SECURITY SERVICES MANAGER

Andy.Deinert @vantagepnt.com
605-995-1765

or visit www.VANTAGEPNT.com/BETTI

BETTIBOX is a turn-key solution specifically designed to fulfill Network Performance Testing requirements – with minimal impact to your network or operation. **BETTIBOX** is a combination of custom-built performance testing devices and a dedicated company portal, bringing you into compliance and giving you intelligence and insight into your network.

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or visit VANTAGEPNT.com/BETTI

INTRODUCING:

BETTIBOX

BY VANTAGE POINT

Network Performance Testing

MANDATORY
MADE SIMPLE

VP VantagePoint

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Rate-of-Return Carriers
ACAM Companies
Rural Broadband Experiments
Alaska Plan Carriers

BETTI BOX
BY VANTAGE POINT

- **EASY TO USE**
  Just plug it in and walk away

- **FIELD TESTED**
  Vantage Point has performed over 50,000 tests with this technology

- **TECHNOLOGY NEUTRAL**
  Vendor agnostic and works on all networks

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VP VantagePoint
EMPLOYEE OWNED