

**Before the  
FEDERAL COMMUNICATIONS COMMISSION  
Washington, DC 20554**

In the Matter of	)	
	)	
Empowering Broadband Consumers	)	CG Docket No. 22-2
Through Transparency	)	
	)	

**COMMENTS OF NETFORECAST, INC.**

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## INTRODUCTION

NetForecast respectfully submits these comments to the Federal Communications Commission regarding the important topic of providing meaningful and transparent information to consumers regarding their internet service choices.

NetForecast<sup>1</sup> has 20 years of experience studying internet performance. We are an independent auditor of ISP performance and a member of the FCC Measuring Broadband America<sup>2</sup> collaborative. We were also contributors to the recent Broadband Internet Technical Advisory Group (BITAG) technical working group that wrote *Latency Explained*.<sup>3</sup>

## RECOMMENDATION SUMMARY

Consumers should have access to high quality technical information about the performance delivered by their local ISPs. Latency is a critical performance metric, which should include separate near and far measurements integrated into a single score for ISPs servicing each major metropolitan area—and near and far latency values should be tracked on an on-going basis.

NetForecast recommends that the Commission convene a technical working group to specify the methodology for testing, scoring, and setting acceptable score values.

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<sup>1</sup> [Homepage – Netforecast, Inc.](#)

<sup>2</sup> [Home Page - Measuring Broadband America](#)

<sup>3</sup> [DRAFT - Latency Explained - DRAFT \(bitag.org\)](#)

## DISCUSSION

Latency is the elapsed time for packets to traverse the internet measured as round trip time (RTT) in milliseconds. Latency is the sum of router and switch processing times at each hop and speed of light propagation time over network path distance. High latency has a negative impact on user quality of experience for many applications but here we focus on two important use cases: interactive web access and video conferencing.

### *Web Use Case*

Browser-based interactions require content that must be received in a timely manner to keep the user engaged and productive. That need drives demand for higher bandwidth. However, as bandwidth increases, latency becomes an inhibitor to effectively utilize bandwidth due to the well-known bandwidth-delay-product (BDP) phenomena impacting end-to-end throughput of TCP.<sup>4</sup> This is caused by the need to keep a large volume of data in transit over an internet path from sender to receiver. The in-transit (aka inflight) data volume increases as either bandwidth or latency increase. The combination of both high bandwidth services (fast access circuit speed) and high latency (longer network distance) reduces effective bandwidth. Given the constant march to increase speed, there must be a commensurate march to decrease latency.

Note: Despite decades of protocol improvement, BDP still impacts effective throughput, and replacing TCP with a better new protocol would take decades to accomplish the transition.

The problem is successfully addressed by content delivery networks (CDNs) which place content near the user's browser, thus reducing internet physical distance. But not all services can use CDNs, nor can CDNs completely remove the need to access content from other servers

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<sup>4</sup> [https://www.netforecast.com/wp-content/uploads/NFR5095\\_Effective\\_Throughput\\_Report.pdf](https://www.netforecast.com/wp-content/uploads/NFR5095_Effective_Throughput_Report.pdf)

which are likely to be significantly farther from the user than the CDN's server. This duality of content location creates a split near-and-far impact model of latency.

### *Video Conferencing Use Case*

The recent pandemic created a huge demand for video conferencing to support work from home, distance learning and family interaction. There has been much coverage describing poor video conferencing calls. Improvements were first focused upon the need for higher bandwidth. Although minimal bandwidth is essential to support video conferencing, the next limiting factor is latency, as shown in a comprehensive tests of five leading video conferencing services.<sup>5</sup> The referenced report shows the upper bounds to network latency required to support video conferencing. Those limits can easily be exceeded in common conferencing use cases. The critical variable is the distance from conference server to each of the call participants. There are two general scenarios: 1) all participants and the server are near each other, or 2) many participants and the server are located at far-flung cities across the US. Again, this drives the need to understand latency across both near and far internet paths.

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<sup>5</sup> [NFR5137-Videoconferencing\\_Internet\\_Requirements.pdf \(netforecast.com\)](#)

## **BROADBAND TRANSPARENCY RECOMMENDATIONS**

It is important that the Commission's revised Broadband Consumer Disclosure Label accurately describe latency performance of each ISP. There are several factors that the Commission should consider.

### ***Near and Far Latency Reporting***

As noted in the two major use cases above, there is an important distinction between latency that is seen between the user and destination services or other users that are near to them (e.g., within the same metropolitan area), and services or users far across the US (to distant metropolitan areas). Both near and far latency should be close to respective optimal values as defined by long-term low-use periods which represent a baseline of near at-rest latency. An acceptable latency value should then be a reasonable point above the baseline value. Scoring should be based on the magnitude of latency increase above acceptable during peak usage periods, and also how often the acceptable value is exceeded during the reporting period (e.g., hour, day, month). An example of such a report across the US from March 2020 to March 2021 shows significant performance shifts by ISPs, along with a major degradation in the 2020 year-end holiday period.<sup>6</sup>

### ***Simple Rating Method***

Internet latency is a mysterious concept to many consumers. Even though RTT values in milliseconds may be shown, the consumer needs better guidance. NetForecast recommends that the near and far RTT values from each metropolitan area be converted into a simple scoring scale such as 0-to-100 points where zero is worst and 100 is best. The RTT-to-score conversion should

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<sup>6</sup> [NFR5144-NetForecast-Latency-Benchmark-Longterm-Trends.Final\\_.pdf \(netdna-ssl.com\)](#)

normalize baseline latency differences of near and far such that a single score represents uniform latency quality based upon users' equal need to access near or far content.

In addition, the label should provide a good/poor score boundary to help the consumer make a quick assessment of acceptable performance quality.

There is an example of such an approach in operation showing rolling latency scores for ISPs and major cities by hour for the past two days.<sup>7</sup> This scoring approach uses the Apdex<sup>8</sup> methodology, but other approaches should also be considered. In the Apdex scoring example, a score of less than 0.85 is typically viewed as providing deficient performance.

### ***Localized Reporting***

Consumers need to make service decisions based on how well a service is likely to operate for them. We see that internet performance varies dramatically across metropolitan areas even for the same ISP. A performance metric that is averaged across the US over a year does not sufficiently inform the consumer. The consumer needs to know how well the service performs in their locale. Buying decisions are local decisions. A newcomer to a city may ask neighbors, “Which carrier provides the best cellular coverage here?” That information will likely be of more practical value than a national average report. The new performance label should have the same functional granularity.

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<sup>7</sup> [Daily US Internet Latency Update – Netforecast, Inc.](#)

<sup>8</sup> [The Apdex Users Group](#)

***Not a Static Label***

Given our arguments that internet performance varies greatly by location and time, it is important that the new performance label stay current. The best vehicle is to make the label available on an official website which updates frequently. Printed labels based on historic data are of limited value in a dynamic and fast-paced technology era.

***Independent Third Party***

Finally, we recommend that the Commission perform its own tests and use them as the foundation for any label. Alternatively, the Commission can use an independent third party to perform tests and integrate them into the necessary report structure. An independent third party would provide transparency and confidence in the results.

Respectfully submitted,

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