# How does Google speed up the Internet?

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The engineers at Google have just launched a new algorithm to help speed up TCP, the main data transfer protocol for Internet traffic by optimizing the speed of sending traffic, thereby not blocking traffic.

They say that this method, called the bandwidth transmission time and bottleneck path (Bottleneck Bandwidth & Roundtrip - BBR) measures the fastest way to send data through different transmissions and can handle More efficient traffic when data is congested.

Google is also ready to use BBR to speed up YouTube traffic and by the end of the month, the company will also put BBR on Google Cloud Platform.**Google says that applying BBR will accelerate YouTube's currently highly optimized traffic by an average of 4% and most by 14% in some countries** .

## TCP acceleration efforts

TCP was developed in the 1970s, as part of the TCP / IP protocol suite to convert data into packets and transmit over the Internet. Researchers at the Internet Engineering Task Force (IETF) estimate that more than 90% of IP traffic is transmitted via TCP.

Over the past few decades, there have been many attempts to accelerate TCP / IP, heavily focused on how TCP handles congestion. TCP is designed to delay sending traffic when detecting congestion, determined by the number of packets lost during transmission.

'This is fine for years because the Switch and Router cache is still consistent with the narrow bandwidth of the Internet path,' Google explained. But the so-called congestion control based on lost data is no longer suitable for today's environment.

Van Jacobson, one of TCP's authors and one of BBR's development engineers, said that if TCP only slows down traffic when it detects lost data, it is too late.

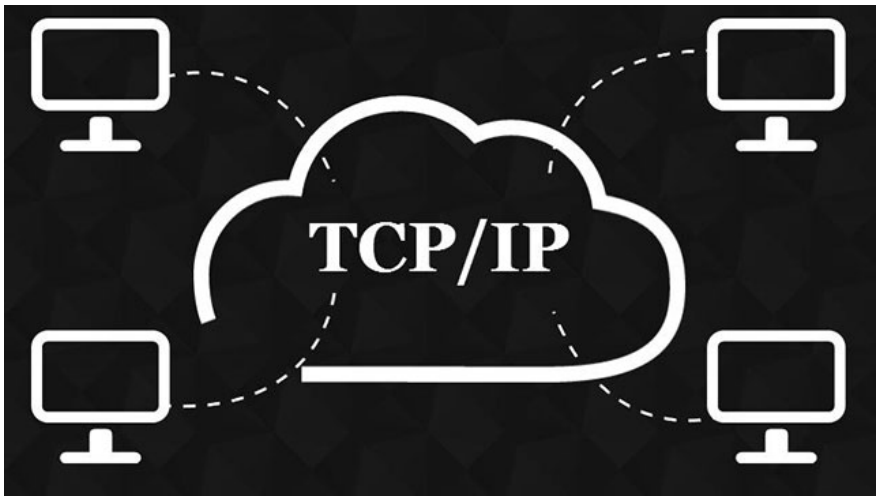
> 'BBR does not wait until a new problem is resolved. It shapes the transmission path as if it has length and size, thereby deciding how much data is fit in it. '

## Standards

BBR constantly calculates the amount of traffic and the time it takes to travel through different routes and knows how much data it will cause the network to be blocked when sent at a certain rate. That way, BBR sends traffic at the speed that the network can handle. This is more effective when controlling TCP congestion before.

BBR is also compatible with an alternative transport protocol, Quick UDP Internet Connections (QUIC), created by Google and deemed standard by IETF.

BBR is not the first attempt to accelerate TCP. Researchers at North Carolina State University have also developed one of the congestion control algorithms based on lost data used on today's TCP called Binary Increase Congestion Control (BIC) and then CUBIC. At a higher level, there are also methods for calculating the optimal level to send data when detecting congestion. An increasingly popular algorithm is Reno.




*BBR is another way to handle congestion problems when transferring data over the Internet*

Although everything uses data lost to decide to block, Jacobson said that according to him, BBR is the only TCP algorithm that actually calculates the traffic speed to determine the best way to send it, even if it is data. Whether it is lost or not.

## Reaction to BBR

Mirja Kühlewind, a senior researcher at the Networked Systems Group in Zurich and a Transport Area Director at the IETF, is also working to improve TCP, saying that standardization in transmission and congestion control is time consuming. . A lot of effort but only 1 was standardized and that was before the birth of BIC and BBR. Jacobson said the company's goal is to make BBR a standard.

Some Google customers have also realized the benefits of BBR. Wordpress hosts half a million pages on Google Cloud, founder and CTO Jason Cohen also cited Google's research showing that BBR improves 2,700 times the data compared to other data-based controls.

Cloud Platform users can automatically receive benefits from BBR when using certain GCP services such as Cloud Spanner, BigTable, Storage, CDN and Load Balancing.