Factsheet
Tests – Gaming

Gaming

Steam
Supported clients: Whiteboxes, Routers

The Steam client measures download speed of a game from Steam's game distribution network.

Measurement begins by fetching the manifest file for a freely available and publicly accessible game hosted by Steam. The manifest file provides information on the different "cells" (regions) that host the content and the chunks that are available in those cells (Steam files are split into chunks).

The client carries out the measurement phase by establishing one or more concurrent TCP connections to the user's local cell that hosts the chunks. These chunks are downloaded repeatedly for a configurable duration (defaulting to 10 seconds).

The client fetches the manifest itself, without the use of an offload server, so any geographic or ISP-specific logic implemented by Steam will equally affect our measurement client.

The client captures the following metrics:

1. The cell that was used
2. The average DNS lookup time
3. The average TCP connection time
4. The average download speed across all concurrent TCP connections

DOTA 2
Supported clients: Whiteboxes, Routers

The DOTA2 measurement client measures round-trip latency and packet loss to the nearest DOTA2 game server. DOTA2 divides game servers into regions, with multiple game servers (and relays on top of that) serving gameplay traffic amongst peers. Valve, the producer of DOTA2, publish a list of game servers and relays at http://cdn.dota2.com/apps/sdr/network_config.json, which is updated frequently. The game will periodically refresh its local cached copy of this server list.

The SamKnows DOTA2 measurement client performs its measurement in two phases. The first phase carries out a brief latency measurement to every DOTA2 server globally, in order to find the server with the lowest latency to the client. The second phase then carries out a fuller latency measurement to the server found in phase one. By default, only the results for the nearest server are reported.

The test uses ten ICMP echo packets to carry out its measurement by default. The test can also record the number of hops to the server.

The measurement client records the following:

- The IP address of the server.
- The region and datacenter name, if available, of the server.
- The average, minimum and maximum and standard deviation of round-trip time.
- The number of packets sent and received, allowing packet loss to be calculated.

FIFA 2021
Supported clients: Whiteboxes, Routers

The FIFA 2021 measurement client measures round-trip latency and packet loss to the EA (Electronic Arts) game servers that are used during gameplay. EA makes use of a variety of
cloud hosting providers to host their game servers, including AWS.

The FIFA 2021 measurement client performs its measurement in two phases. The first phase carries out a brief latency measurement to every FIFA 2021 server globally, in order to find the server with the lowest latency to the client. The second phase then carries out a fuller latency measurement to the server found in phase one. By default, only the results for the nearest server are reported.

The test uses ten ICMP echo packets to carry out its measurement by default. The test can also record the number of hops to the server.

The measurement client records the following:

- The IP address of the server.
- The region and datacenter name, if available, of the server.
- The average, minimum and maximum and standard deviation of round-trip time.
- The number of packets sent and received, allowing packet loss to be calculated.

League of Legends

Supported clients: Whiteboxes, Routers

The League of Legends measurement client measures round-trip latency and packet loss to the Riot network infrastructure, which serves gameplay traffic for League of Legends. Riot operates the following distinct regions that users can play in:

- North America
- Europe West
- Europe Nordic & East
- Oceania
- Russia
- Turkey
- Brazil
- Latin America North
- Latin America South
- Japan

In each of these regions, Riot operates a POP (Point of Presence) where traffic is exchanged with local ISPs and the game servers are hosted. These game servers utilise a modified version of the ENET protocol (based upon UDP) with supplemental encryption.

Whilst the game servers themselves cannot be measured reliably (due to the safeguards Riot employs to prevent cheating), the network infrastructure directly in front of the game servers can be measured.

The League of Legends measurement client performs its measurement in two phases. The first phase carries out a brief latency measurement to every League of Legends server globally, in order to find the server with the lowest latency to the client. The second phase then carries out a fuller latency measurement to the server found in phase one. By default, only the results for the nearest server are reported.

The test uses ten ICMP echo packets to carry out its measurement by default. The test can also record the number of hops to the server.

The measurement client records the following:

- The IP address of the server.
- The region and datacenter name, if available, of the server.
- The average, minimum and maximum and standard deviation of round-trip time.
- The number of packets sent and received, allowing packet loss to be calculated.

Fortnite

Supported clients: Whiteboxes, Routers

The SamKnows Fortnite client measures round-trip latency and packet loss to the Epic Games infrastructure that hosts the Fortnite gameplay servers. These servers are segregated by region. The real Fortnite game will automatically choose the region to exchange gameplay traffic with, whilst the
SamKnows client will carry out measurements to all regions. Fortnite currently relies on Amazon’s AWS for most of its gameplay infrastructure. It also makes use of some proxying infrastructure - most notably that of Subspace.com - to overcome regional peering issues.

Fortnite divides infrastructure into the following region definitions:

- North America - East
- North America - West
- Europe
- Oceania
- Brazil
- Asia
- Middle East

The Fortnite measurement client performs its measurement in two phases. The first phase carries out a brief latency measurement to every Fortnite server globally, in order to find the server with the lowest latency to the client. The second phase then carries out a fuller latency measurement to the server found in phase one. By default, only the results for the nearest server are reported.

The test uses ten UDP packets to carry out its measurement by default. The test can also record the number of hops to the server.

The measurement client records the following:

- The IP address of the server.
- The region and datacenter name, if available, of the server.
- The average, minimum and maximum and standard deviation of round-trip time.
- The number of packets sent and received, allowing packet loss to be calculated.

### Apex Legends

**Supported clients:** Whiteboxes, Routers

SamKnows has developed a measurement client that assesses round-trip latency and packet loss to the Apex Legends gameplay infrastructure. Like other gaming providers, Apex Legends segregates its infrastructure by region. Apex Legends hosts its infrastructure with multiple cloud platforms (Amazon AWS and Google GCE) and colocation providers.

Apex Legends divides infrastructure into the following region definitions:

- North America - East
- North America - Central
- North America - West
- Brazil - South
- Europe - West
- Asia
- South East Asia
- Japan
- Korea
- Australia

Each region is often served by multiple datacenters from different hosting/colocation providers. For example, "North America - West" is served by AWS, GCE and also by a third-party colocation operator.

The Apex Legends measurement client performs its measurement in two phases. The first phase carries out a brief latency measurement to every Apex Legends server globally, in order to find the server with the lowest latency to the client. The second phase then carries out a fuller latency measurement to the server found in phase one. By default, only the results for the nearest server are reported.

The test uses ten ICMP echo packets to carry out its measurement by default. The test can also record the number of hops to the server.

The measurement client records the following:

- The IP address of the server.
- The region and datacenter name, if available, of the server.
- The average, minimum and maximum and standard deviation of round-trip time.
- The number of packets sent and received, allowing packet loss to be calculated.

**PUBG (PlayerUnknown's Battlegrounds)**
Supported clients: Whiteboxes, Routers

The PUBG measurement measures round-trip latency and packet loss to the PUBG gameplay infrastructure. The PUBG server infrastructure is hosted with AWS, in a subset of their locations.

The PUBG measurement client performs its measurement in two phases. The first phase carries out a brief latency measurement to every server globally, in order to find the server with the lowest latency to the client. The second phase then carries out a fuller latency measurement to the server found in phase one. By default, only the results for the nearest server are reported.

The test uses ten UDP packets, using PUBG’s proprietary protocol, to carry out its measurement. The test can also record the number of hops to the server.

The measurement client records the following:
- The IP address of the server.
- The region and datacenter name, if available, of the server.
- The average, minimum and maximum and standard deviation of round-trip time.
- The number of packets sent and received, allowing packet loss to be calculated.

**Diablo 3**
Supported clients: Whiteboxes, Routers

The Diablo 3 measurement measures round-trip latency and packet loss to the Diablo 3 gameplay infrastructure. The Diablo 3 server infrastructure is hosted by Blizzard, the game’s publisher, across multiple continents.

The Diablo 3 measurement client performs its measurement in two phases. The first phase carries out a brief latency measurement to every server globally, in order to find the server with the lowest latency to the client. The second phase then carries out a fuller latency measurement to the server found in phase one. By default, only the results for the nearest server are reported.

The test uses ten ICMP packets to carry out its measurement. The test can also record the number of hops to the server.

The measurement client records the following:
- The IP address of the server.
- The region and datacenter name, if available, of the server.
- The average, minimum and maximum and standard deviation of round-trip time.
- The number of packets sent and received, allowing packet loss to be calculated.

**Heroes of the Storm**
Supported clients: Whiteboxes, Routers

The Heroes of the Storm measurement measures round-trip latency and packet loss to the Heroes of the Storm gameplay infrastructure. The Heroes of the Storm server infrastructure is hosted by Blizzard, the game’s publisher, across multiple continents.

The Heroes of the Storm measurement client performs its measurement in two phases. The first phase carries out a brief latency measurement to every server globally, in order to find the server with the lowest latency to the client. The second phase then carries out a fuller latency measurement to the server found in phase one. By default, only the results for the nearest server are reported.

The test uses ten ICMP packets to carry out its measurement. The test can also record the number of hops to the server.
The measurement client records the following:

- The IP address of the server.
- The region and datacenter name, if available, of the server.
- The average, minimum and maximum and standard deviation of round-trip time.
- The number of packets sent and received, allowing packet loss to be calculated.

**Hearthstone**
Supported clients: Whiteboxes, Routers

The Hearthstone measurement measures round-trip latency and packet loss to the Hearthstone gameplay infrastructure. The Hearthstone server infrastructure is hosted by Blizzard, the game’s publisher, across multiple continents.

The Hearthstone measurement client performs its measurement in two phases. The first phase carries out a brief latency measurement to every server globally, in order to find the server with the lowest latency to the client. The second phase then carries out a fuller latency measurement to the server found in phase one. By default, only the results for the nearest server are reported.

The test uses ten ICMP packets to carry out its measurement. The test can also record the number of hops to the server.

The measurement client records the following:

- The IP address of the server.
- The region and datacenter name, if available, of the server.
- The average, minimum and maximum and standard deviation of round-trip time.
- The number of packets sent and received, allowing packet loss to be calculated.

**Overwatch**
Supported clients: Whiteboxes, Routers

The Overwatch measurement measures round-trip latency and packet loss to the Overwatch gameplay infrastructure. The Overwatch server infrastructure is hosted by Blizzard, the game’s publisher, across multiple continents.

The Overwatch measurement client performs its measurement in two phases. The first phase carries out a brief latency measurement to every server globally, in order to find the server with the lowest latency to the client. The second phase then carries out a fuller latency measurement to the server found in phase one. By default, only the results for the nearest server are reported.

The test uses ten ICMP packets to carry out its measurement. The test can also record the number of hops to the server.

The measurement client records the following:

- The IP address of the server.
- The region and datacenter name, if available, of the server.
- The average, minimum and maximum and standard deviation of round-trip time.

**StarCraft 2**
Supported clients: Whiteboxes, Routers

The StarCraft 2 measurement measures round-trip latency and packet loss to the StarCraft 2 gameplay infrastructure. The StarCraft 2 server infrastructure is hosted by Blizzard, the game’s publisher, across multiple continents.
The StarCraft 2 measurement client performs its measurement in two phases. The first phase carries out a brief latency measurement to every server globally, in order to find the server with the lowest latency to the client. The second phase then carries out a fuller latency measurement to the server found in phase one. By default, only the results for the nearest server are reported.

The test uses ten ICMP packets to carry out its measurement. The test can also record the number of hops to the server.

The measurement client records the following:

- The IP address of the server.
- The region and datacenter name, if available, of the server.
- The average, minimum and maximum and standard deviation of round-trip time.
- The number of packets sent and received, allowing packet loss to be calculated.

World of Warcraft
Supported clients: Whiteboxes, Routers

The World of Warcraft measurement measures round-trip latency and packet loss to the World of Warcraft gameplay infrastructure. The World of Warcraft server infrastructure is hosted by Blizzard, the game’s publisher, across multiple continents.

The World of Warcraft measurement client performs its measurement in two phases. The first phase carries out a brief latency measurement to every server globally, in order to find the server with the lowest latency to the client. The second phase then carries out a fuller latency measurement to the server found in phase one. By default, only the results for the nearest server are reported.

The test uses ten ICMP packets to carry out its measurement. The test can also record the number of hops to the server.

The measurement client records the following:

- The IP address of the server.
- The region and datacenter name, if available, of the server.
- The average, minimum and maximum and standard deviation of round-trip time.
- The number of packets sent and received, allowing packet loss to be calculated.

Among Us
Supported clients: Whiteboxes, Routers

The Among Us measurement measures round-trip latency and packet loss to the Among Us gameplay infrastructure. The Among Us server infrastructure is hosted by Linode, a cloud server provider, across Europe, North America and Asia.

The Among Us measurement client performs its measurement in two phases. The first phase carries out a brief latency measurement to every server globally, in order to find the server with the lowest latency to the client. The second phase then carries out a fuller latency measurement to the server found in phase one. By default, only the results for the nearest server are reported.

The test uses ten ICMP packets to carry out its measurement. The test can also record the number of hops to the server.

The measurement client records the following:

- The IP address of the server.
- The region and datacenter name, if available, of the server.
- The average, minimum and maximum and standard deviation of round-trip time.
- The number of packets sent and received, allowing packet loss to be calculated.

**Tom Clancy's Rainbow Six Siege**

Supported clients: Whiteboxes, Routers

The Tom Clancy's Rainbow Six Siege measurement measures round-trip latency and packet loss to the Tom Clancy's Rainbow Six Siege gameplay infrastructure. The Tom Clancy's Rainbow Six Siege server infrastructure is hosted on Microsoft Azure across multiple continents.

The Tom Clancy's Rainbow Six Siege measurement client performs its measurement in two phases. The first phase carries out a brief latency measurement to every server globally, in order to find the server with the lowest latency to the client. The second phase then carries out a fuller latency measurement to the server found in phase one. By default, only the results for the nearest server are reported.

The test uses ten UDP packets, using a proprietary protocol, to carry out its measurement. The test can also record the number of hops to the server.

The measurement client records the following:

- The IP address of the server.
- The region and datacenter name, if available, of the server.
- The average, minimum and maximum and standard deviation of round-trip time.
- The number of packets sent and received, allowing packet loss to be calculated.

**Rocket League**

Supported clients: Whiteboxes, Routers

The Rocket League measurement measures round-trip latency and packet loss to the Rocket League infrastructure. The Rocket League server infrastructure is hosted using a variety of cloud server providers and spans multiple continents.

The Rocket League measurement client performs its measurement in two phases. The first phase carries out a brief latency measurement to every server globally, in order to find the server with the lowest latency to the client. The second phase then carries out a fuller latency measurement to the server found in phase one. By default, only the results for the nearest server are reported.

The test uses ten UDP packets, using Rocket League’s proprietary protocol, to carry out its measurement. The test can also record the number of hops to the server.

The measurement client records the following:

- The IP address of the server.
- The region and datacenter name, if available, of the server.
- The average, minimum and maximum and standard deviation of round-trip time.
- The number of packets sent and received, allowing packet loss to be calculated.

**Valorant**

Supported clients: Whiteboxes, Routers

The Valorant measurement measures round-trip latency and packet loss to the Valorant infrastructure. The Valorant server infrastructure is hosted with AWS across multiple continents.

The Valorant measurement client performs its measurement in two phases. The first phase carries out a brief latency measurement to every server globally, in order to find the server with the lowest latency to the client. The second phase then carries out a fuller latency measurement to the server found in
phase one. By default, only the results for the nearest server are reported.

The test uses ten UDP packets, using Valorant’s proprietary protocol, to carry out its measurement. The test can also record the number of hops to the server.

The measurement client records the following:

- The IP address of the server.
- The region and datacenter name, if available, of the server.
- The average, minimum and maximum and standard deviation of round-trip time.
- The number of packets sent and received, allowing packet loss to be calculated.