

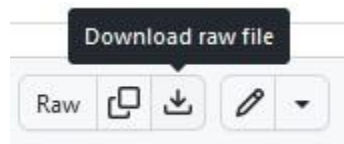
Dota 2 Low Latency DOCSIS Trial Instructions

Purpose

Dota 2, a free to play game, provides network statics and the ability to enable/disable Low Latency DOCSIS from within the game client. For this trial, we would like to collect measurable network statistics for different scenarios while LLD is enabled and disabled.

Setup

1. Install the Steam application: <https://store.steampowered.com/>
2. Install Dota 2 from within the Steam app.
3. Once installed, in your Steam library list, right click on Dota 2 and select "Properties..."
 - Under "Launch Options", type the following: `-console -sw`
 - i. `-console` allows opening of the console window to enter game commands
 - ii. `-sw` allows the game to be run in a window instead of full screen. It also allows moving the mouse cursor outside of the game window to use other apps like Notepad and the iPerf traffic tool.
4. Download the iPerf traffic tool that will generate upstream traffic. Please download this version even if you have done so previously:
 - <https://github.com/ilivingood/IETF-L4S-Deployment/blob/main/iperf3-gui.exe>
 - Click the "Download Raw file" button to properly save the .zip file.



Note: Currently only the Windows version of Dota 2 supports LLD

Configuring the Match Settings

1. In the Steam app, select Dota 2 in the game list and click Play.
2. In Dota 2, click Play DOTA in the lower right of the game window.
3. Under Custom Lobbies, click +CREATE.
4. To the right of Lobby Settings, click EDIT.
5. Configure the settings as shown below:
6. Server location: Pick US West or US East based on your location.
7. Set lobby visibility to "unlisted" and set a lobby password to make sure other players do not bother you.
8. Click OK.

GENERAL LOBBY SETTINGS

GAME NAME

GAME MODE

LOBBY PASSWORD

SERVER LOCATION

LOBBY VISIBILITY

☐ Hide Password
☐ ENABLE CHEATS
☐ IMMORTAL DRAFT ⓘ

▼ ADVANCED LOBBY SETTINGS

COMPETITIVE

SELECTION PRIORITY

STARTING TEAM

PENALTY - RADIANT

PENALTY - DIRE

LEAGUE

GAMEPLAY RULES

SPECTATORS

DOTA TV DELAY

PAUSING

SERIES TYPE

BOT SETTINGS

☒ FILL EMPTY SLOTS WITH BOTS

RADIANT DIFFICULTY

RADIANT BOTS

DIRE DIFFICULTY

DIRE BOTS

Running the Tests

There are three scenarios we would like you to gather stats for.

Baseline Test – No Low Latency with No Background Traffic

1. Press \ to open the console window.
2. Enter this command to disable Low Latency: `net_option ecn -1`
3. Click Start Game.
4. Click Skip Ahead to enter the match immediately. There is no need to play the match and you can idle by the fountain.
5. After 5 minutes, type these commands:
 - a. `clear` : clear the console window first.
 - b. `net_option ecn` : record low latency setting for the record
 - c. `net_connections_stats` : outputs the game session's network stats
6. Right click in the console window and select "Save to Log"
7. Save the file with the name: `dota1.txt`
8. Quit the match.

Upstream Test 1 - No Low Latency with Background Traffic

1. Back on the main Dota2 screen, press \ to open the console window if it is not already.
2. Enter this command to disable Low Latency: `net_option ecn -1`

3. Open the iPerf traffic generator tool and click the Play button. It will run for 5 minutes and then stop.
4. Click Start Game.
5. Click Skip Ahead to enter the match immediately. There is no need to play the match and you can idle by the fountain.
6. Just before the 5 minute timer runs out in the iPerf tool, run these commands in the console window:
 - a. `clear` : clear the console window first.
 - b. `net_option ecn` : record low latency setting for the record
 - c. `net_connections_stats` : outputs the game session's network stats
7. Right click in the console window and select "Save to Log."
8. Save the file with the name: `dota2.txt`
9. Quit the match.

Upstream 2 - Low Latency with Background Traffic

1. Back on the main Dota2 screen, press \ to open the console window if it is not already.
2. Enter this command to disable Low Latency: `net_option ecn 1`
3. Open the iPerf traffic generator tool and click the Play button. It will run for 5 minutes and then stop.
4. Click Start Game.
5. Click Skip Ahead to enter the match immediately. There is no need to play the match and you can idle by the fountain.
6. Just before the 5 minute timer runs out in the iPerf tool, run these commands in the console window:
 - a. `clear` : clear the console window first.
 - b. `net_option ecn` : record low latency setting for the record
 - c. `net_connections_stats` : outputs the game session's network stats
7. Right click in the console window and select "Save to Log."
8. Save the file with the name: `dota3.txt`
9. Quit the match.

The screenshot shows the Dota2 console window with the following text:

```

[Networking] 30ms 32ms 33ms 35ms 35ms
[Networking] Connection quality histogram: (54 ms)
[Networking] perfect 99+ 97-99 95-97 90-95
[Networking] 54 0 0 0
[Networking] 100.0% 0.0% 0.0% 0.0%
[Networking] Connection quality distribution:
[Networking] 50th 25th 5th 2nd
[Networking] 100% 100% 100% 100%
[Networking] Latency variance histogram: (9318 to 10000)
[Networking] 21 1-2 3-5 5-10 10-20 20-30 30-40 40-50 50-60 60-70 70-80 80-90 90-100
[Networking] 0.34 0.34 0.34 0.34 0.34 0.34 0.34 0.34 0.34 0.34 0.34 0.34 0.34
[Networking] Rate s
[Networking] Se
[Networking] Re
[Networking] Pi
[Networking] Qu
[Networking] Bytes buffered: 0
[Networking] Lifetime stats received from remote host
[Networking] Totals
[Networking] Sent: 7,368 pkts 3,48
[Networking]

```

A context menu is open over the console text, showing the following options:

- Copy All Text
- Select All
- Save to Log

Downstream Test 1 and 2

1. Please rerun Upstream tests 1 and 2 but click the Download button during step 1 of each test.
2. Please save the data files with the names dota4.txt and dota5.txt

More Data Is Welcome!

Running additional tests and choosing a Dota 2 server location furthest away, i.e., selecting US West if you are in Pennsylvania, will provide additional data points because of added latency. The geographic area can be selected under “Server Location” when you are configuring the match settings.

Send In Your Results

Please use this form to upload your notepad files with collected game statistics:

<https://app.smartsheet.com/b/form/b1b7c10f57fa4750b1d140452b74f3f6>

Thank you!