Remote Desktop Software Benchmark

This document presents a method to measure remote desktop software performance in a reproducible way, using three simple tests that are available on our website.

Requirements

- Process Hacker (http://processhacker.sourceforge.net/)
- Google Chrome 35
- AnyDesk 1.0.0 beta
- TeamViewer 9.0.28223
- Screenhero 0.14.1.1
- Splashtop Streamer 2.5.8.4 (A)
- Splashtop Personal 2.4.5.2
- Google Remote Desktop 35.0.1916.38

Test Conditions

- Computer A connects to Computer B
- 1 GBit network connection
- Camera: Nokia Lumia 620

- **Computer A**
  - o Windows 8.1 Enterprise (64-Bit)
  - o Intel Core i7-3720QM 2,6 GHz
  - o 4 GB RAM
  - o Intel HD Graphics 4000
  - o Monitor: Dell Ultrasharp 2412M (8 ms reaction time)
  - o Resolution: 1920x1200 (59 Hz)

- **Computer B**
  - o Windows 7 Professional (64-Bit)
  - o Intel Core i5-3470 3,2 GHz
  - o 16 GB RAM
  - o Intel HD Graphics (CPU-integrated)
  - o Monitor: Dell Ultrasharp 2412M (8 ms reaction time)
  - o Resolution: 1920x1200 (59 Hz)

- Default quality settings for every application
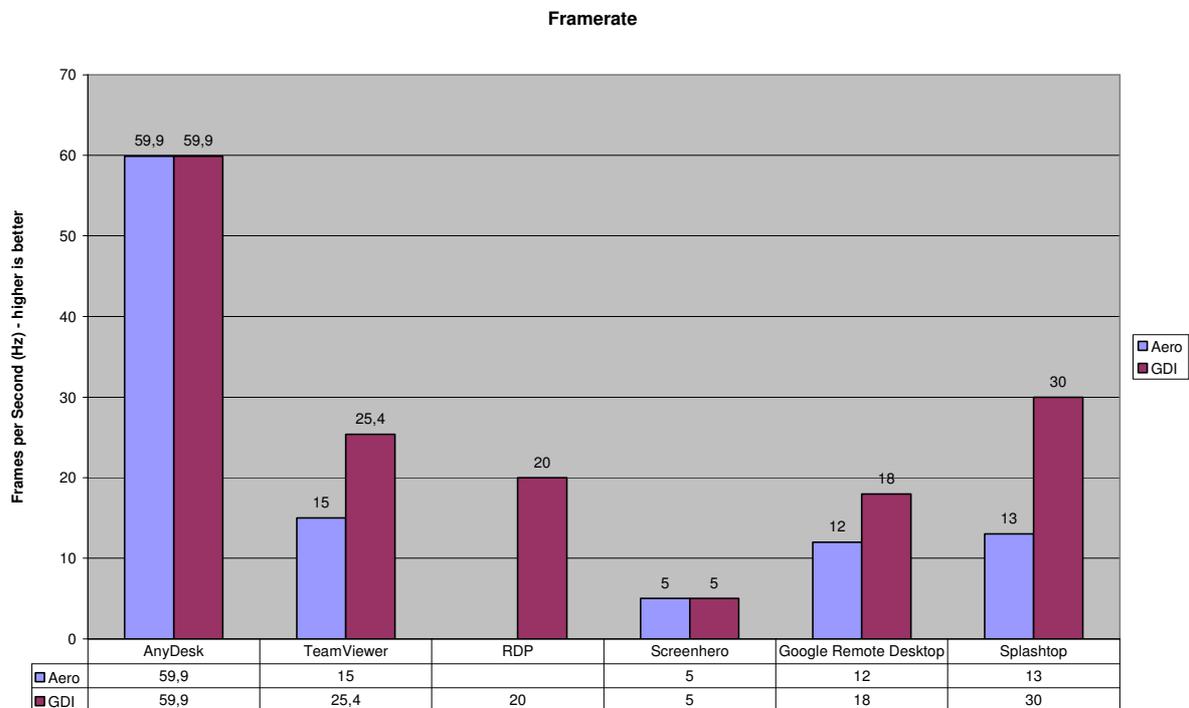- Enabled fullscreen-mode, when possible

Test 1: Framerate

Address: http://anydesk.com/benchmark/framerate.html

The framerate website can be used to measure the transmitted framerate. You can make yourself familiar with the app by starting it locally on your computer and adjusting the angular velocity by setting the target framerate. The image appears to stand still and forms a cross, if it rotates by exactly 90 degrees in one frame. This will most likely be the case at 59-60 Hz locally.

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Once you are familiar with the app, you can use it to measure the actual framerate of any remote desktop software under test. It may be difficult to stabilize the image, when the remote desktop software introduces jitter (ie. the inter-frame delay varies) or image artifacts.

With our test setup, we measured framerates, both with composition enabled (Aero) and disabled (GDI) and have achieved the following results:

Framerate

|	AnyDesk	TeamViewer	RDP	Screenhero	Google Remote Desktop	Splashtop
Aero	59,9	15		5	12	13
GDI	59,9	25,4	20	5	18	30

Remarks:
1. RDP disables composition by force, so there are no Aero-measurements.
2. Teamviewer by default only transmits partial frames. You have to enable the „Improve application compatibility" option in the custom settings in order to get a stable image. The reported results are approximated and may actually be worse.
3. Screenhero jumps to 9 Hz if the mouse is moving. This applies both to Aero and GDI.
4. Google Remote Desktop suffers from severe jitter. This makes it difficult to get an accurate framerate reading. The reported values are therefore approximated and may actually be worse.
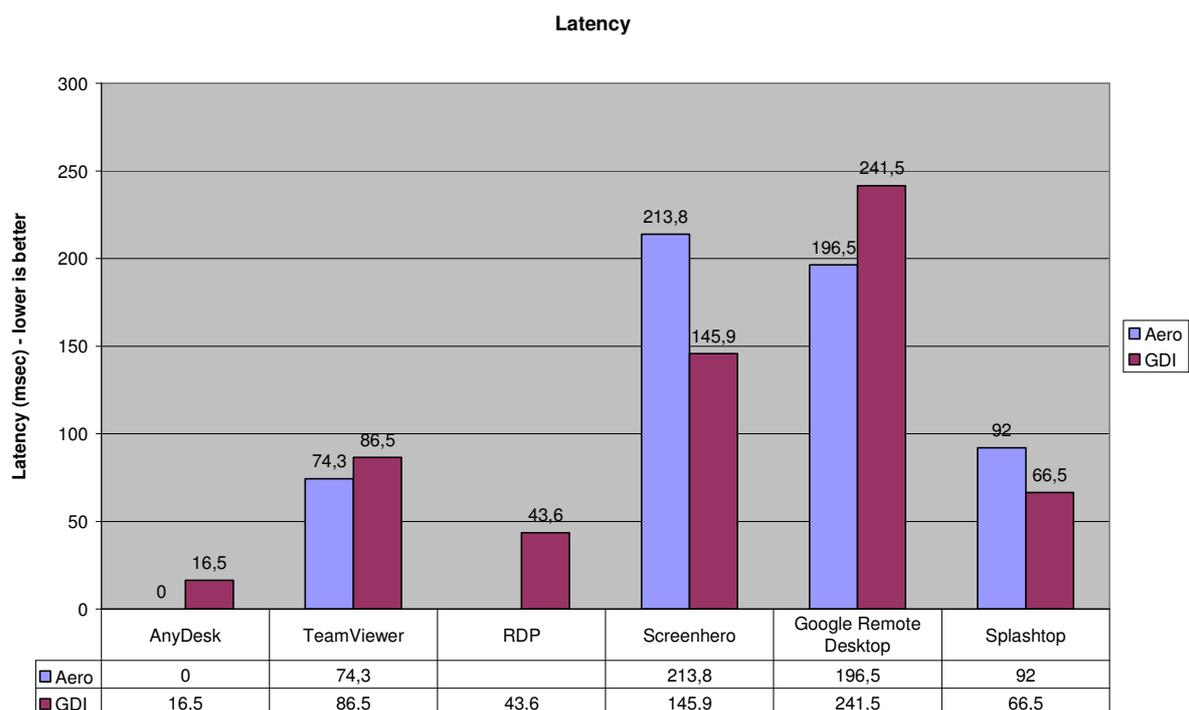
Test 2: Latency
Address: http://anydesk.com/benchmark/latency.html

Description of the test setup:
- The monitors of Computer A and B are placed beside each other.
- The web-app is transmitted through the remote desktop software under test and visible on both monitors.
- A commercial-quality digital camera is used to take an image of both millisecond counters at the same time.
- The difference between the counters is the measured latency. We took the average of the delays from 10 photos for every application.
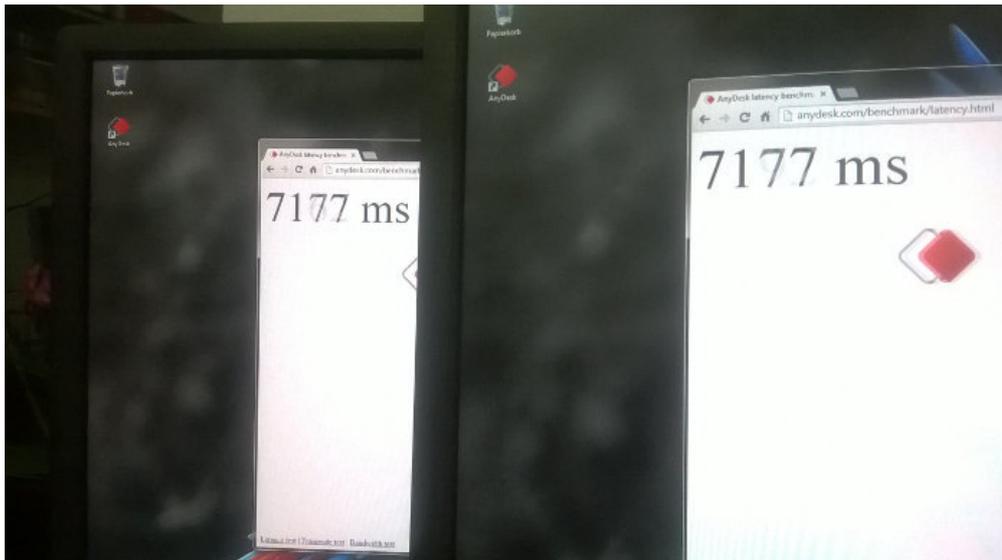
Our test setup

Some remote desktop solutions produce intermixed frames and because of fade-out and fade-in-effects, some frames will not provide a clear reading. Photos with these effects had to be sorted out. With this setup, we came up with the following results:

Latency

	AnyDesk	TeamViewer	RDP	Screenhero	Google Remote Desktop	Splashtop
■ Aero	0	74,3		213,8	196,5	92
■ GDI	16,5	86,5	43,6	145,9	241,5	66,5

Remarks:
1. RDP disables composition by force, so there are no Aero-measurements.
2. Because the monitor refreshes at 60 Hz, it is not possible to measure any latency below 1000s / 60Hz ≅ 16.7 ms. The phase difference between the two monitors can introduce up to ~16 ms (1 Frame) latency by itself. If both monitors show the same counter on the photo (which we measured as 0 ms), there is actually a latency, but it is most likely ≤ 8 ms (due to fade-in-/fade-out-times).
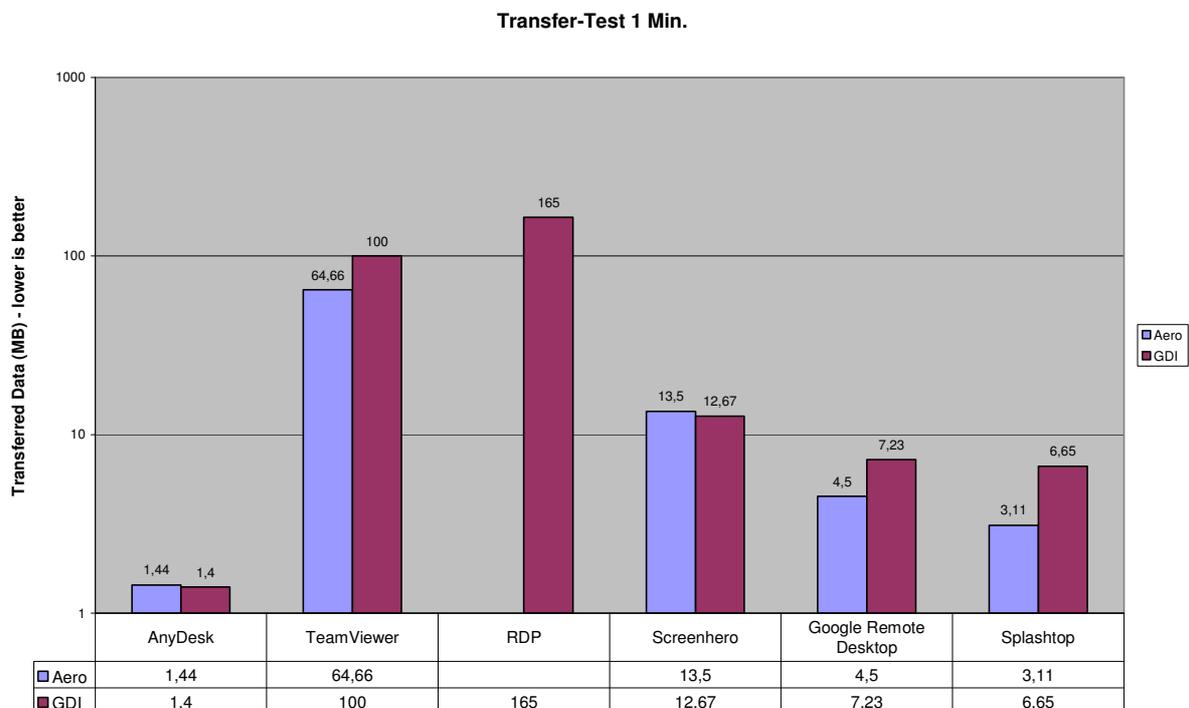
Test 3: Bandwidth

Address: http://anydesk.com/benchmark/bandwidth.html

The bandwidth puts the image compression under severe stress. It displays a complex circular moving image with 60 FPS on a white background. We measured the total transmitted data for the process of connection from Computer A to Computer B and waiting for exactly one minute. We used default quality settings on all competitors.
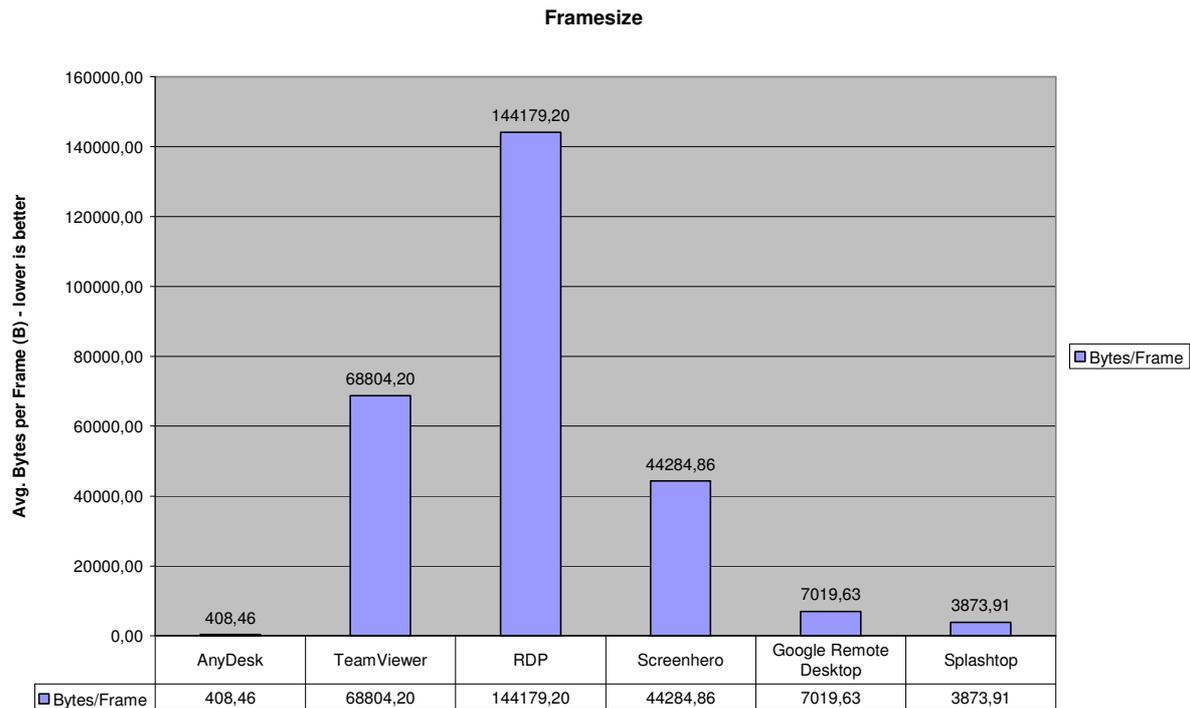
Data sources:
- **Teamviewer**: the transmitted data is reported in the connection info dialog.
- For all other programs, we measured the sent and received bytes that Process Hacker reported for the network backend (Disk and Network tab in the process properties).
  - **AnyDesk**: service process (AnyDesk.exe --service)
  - **RDP**: msra.exe process
  - **Screenhero**: screenhero.exe (started by screenhero.daemon.exe)
  - **Splashtop**: SRFeature.exe
  - **Google Remote Desktop**: remote_assistance_host.exe

Transfer-Test 1 Min.

	AnyDesk	TeamViewer	RDP	Screenhero	Google Remote Desktop	Splashtop
Aero	1,44	64,66		13,5	4,5	3,11
GDI	1,4	100	165	12,67	7,23	6,65

Remarks:
1. Splashtop reduces the desktop resolution to 1024x768. We restored the resolution after connecting to 1920x1200, but Splashtop still only transmits with the lower resolution and a greatly reduced image quality. It is therefore not comparable.

Finally we used our measured data to produce a figure which indicates the average compressed frame size in bytes. This was done, by extrapolating the number of frames for one minute from the average framerate (test 1) and dividing it by the transmitted data figures above (test 3). Both values were taken from the GDI-datasets.

Framesize

Bytes/Frame	AnyDesk	TeamViewer	RDP	Screenhero	Google Remote Desktop	Splashtop
	408,46	68804,20	144179,20	44284,86	7019,63	3873,91

Conclusion

We have shown that AnyDesk excels in every area under test. We believe the we have se-
lected the three key qualities which define usability for remote desktop applications. We also
wish to note that AnyDesk always transmits frames as a whole. The user will never see inter-
mediate frames (ie. stripes or other image artifacts). However, it would be very hard to give a
test procedure for this characteristic.

The tests were done under ideal conditions with a 1 Gbit/s local network connection. But as
the last test shows, AnyDesk will also transmit up to 60 FPS over a regular internet connec-
tion.