

## Comparison of Video Playback on Nexus 7 Tablets: Android 4.3 clearly better than the new version

### - A video playback performance comparison between Android 4.3 Jelly Bean and 4.4 KitKat with Nexus 7

Video playback quality is an important measure in today's mobile multimedia devices. These devices are used for watching videos from various sources like Netflix, Viaplay, HBO or YouTube. Consumers are very sensitive about video quality and do not accept poor performance like skipped frames, pausing or jerking.

The frame rate of most videos is 24-30 fps, but a speed of 60 fps is a basic requirement for tablets and is becoming more and more common. Today Samsung Galaxy S4 ja Apple iPhone 5S are already using max. 120fps speed. Watching of for example HFR (High Frame Rate) content produced by GoPro and other action cameras as well as watching of videos captured from games is getting more popular.

### Video playback performance measurements with OptoFidelity VideoMultimeter

OptoFidelity measured video playback performance of the Nexus tablets by using OptoFidelity VideoMultimeter measurement device. *OptoFidelity VideoMultimeter* is a professional measurement solution for measuring the true and objective video playback performance of mobile, tablet or any multimedia device. It is a perfect tool for R&D design verification, test laboratory use and other R&D applications. You can, for example, define the minimum, maximum, and average frame rate your display truly shows, or take a look at the frame rate as a function of time. With this, you can also find faults in design and problems in the interoperation between the different processes running in your device under test.

OptoFidelity video performance measurement on YouTube:  
<http://www.youtube.com/watch?v=enlq8FCod8>



Image 1: OptoFidelity VideoMultimeter

Tests were done for Nexus 7 tablets version 2012 and version 2013 both with old Android 4.3 Jelly Bean and new KitKat 4.4 operating system. The operating system was updated to both devices as an OTA (Over The Air) update by WiFi connection.

In this test we measured the playback of a HD video (24 fps) from YouTube and the playback of a local video stored to the device with the following image qualities and speeds:

- Video resolution 720 p, speed 30 fps
- Video resolution 1080 p, speed 30 fps
- Video resolution 720 p, speed 60 fps
- Video resolution 1080 p, speed 60 fps

Test videos were generated with OptoFidelity Test Video Generator.

Every video playback measurement was repeated several times, and an average score was taken to overall results. The results were generated by giving error points, so in overall results a smaller score is better, as it means the product got less error points. If the video playback couldn't be done at all, the product got 500 error points.

Three qualities were measured in the test. First of all we measured deviation, which shows to user as jerking. The target value for deviation is 0 msec. In this test deviation was rated with multiplier 3 (e.g.  $\pm 15$  msec results as 45 error points). If the value according to measurements is  $\pm 10$  msec or higher, the user can see this clearly as jerking of the video.

The other measured value was the speed over the whole video clip, that is AVG fps. The desired value varies depending on the reported speed of video (24, 30 and 60 fps). Deviation percentage from this target to any direction was taken into account as it was (for example deviation of 10 % results in 10 error points).

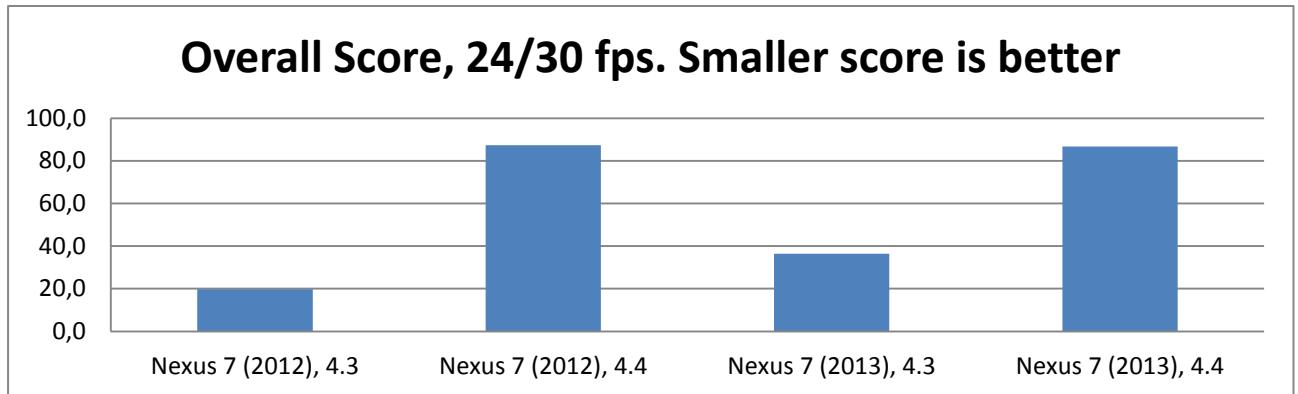
The third measured quality was the amount of dropped frames. These results were taken into account as they were, so e.g. 5 % of dropped frames caused 5 error points. Again if the dropped frame value is bigger, the user can see this as jerking of the video.

An overall score was determined according to the amount of error points from the mentioned measurements. The best score in this test is 0. Other categories according to error points include

- Score less than 10 error points      very good
- Score 10-20                              good
- Score 20-50                              satisfactory
- Score over 50                              unsatisfactory

## Results

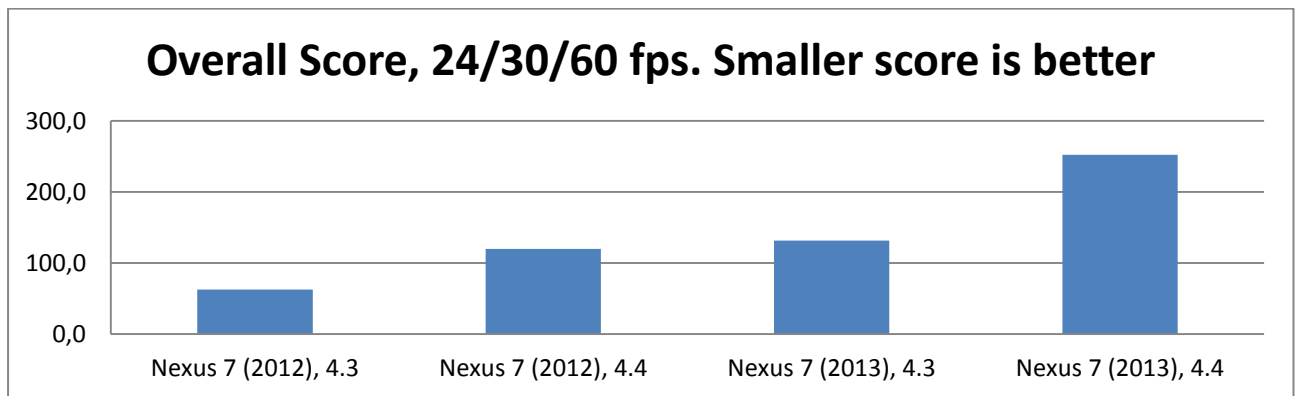
Results were interesting. According to all measures the performance of the new operating system was weaker than that of the old operating system. The best result in video playback got Nexus 7 of year 2012 with the older operating system. The second best was Nexus 7 of year 2013 with the old operating system. In practice the update of operating system has a remarkable negative impact on results of both versions of Nexus. Dropped frames and deviation appeared in the normal use of basic videos (video speed 24/30 fps).



*Image 2: Overall results with frame rate 24/30 fps. The year 2012 Nexus 7 with the old operating system got the best score.*

An interesting result from the point of view of a demanding user requiring high frame rates is that after KitKat 4.4 update the playback of a 60 fps video did not work anymore with neither of the test videos (720 p or 1080 p) in Nexus 7 of year 2013. The older operating system played the speed of 60 fps and resolution of 720 p satisfactory. The playback of this speed in total is poor with both devices and versions.

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*Image 3: Overall results with all speeds. Nexus 7 Android 4.4 system wasn't able to play at all video resolution of 720 p or 1080 p with speed of 60 fps.*

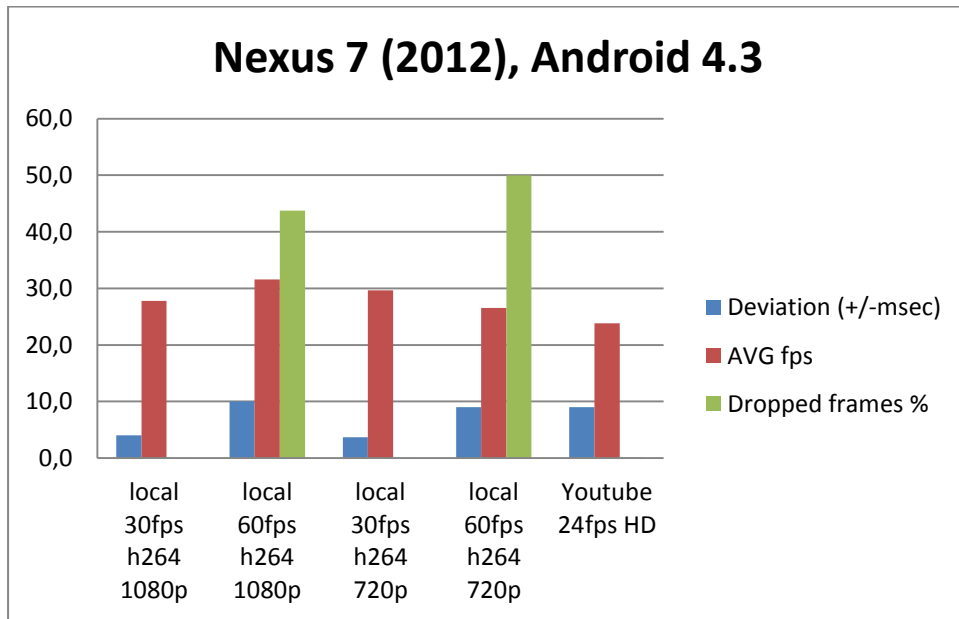


Image 4: The results of test winner Nexus 7 (2012) with old operating system

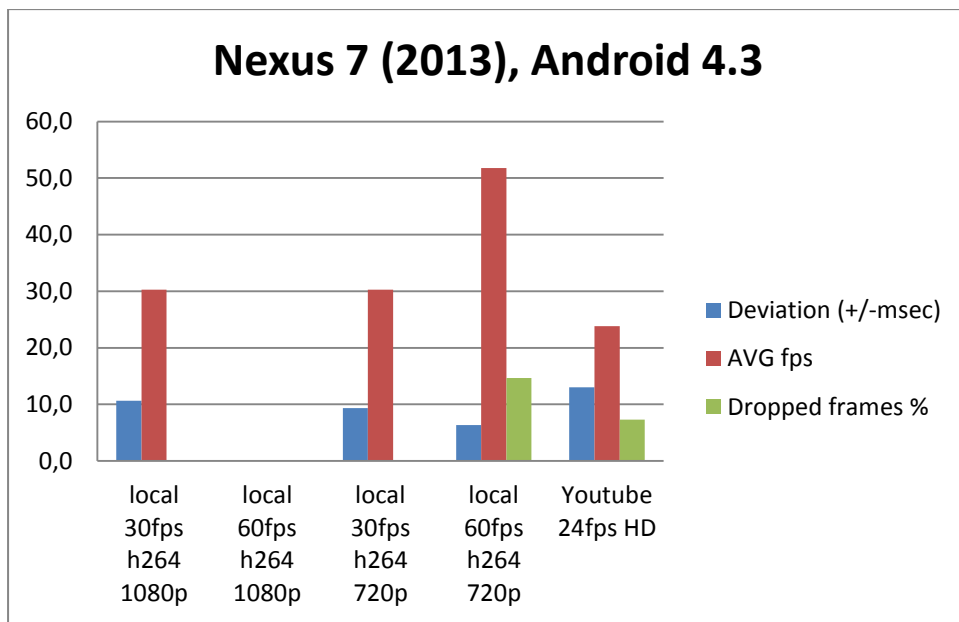


Image 5: Test results Nexus 7 (2013) with Android 4.3 operating system.

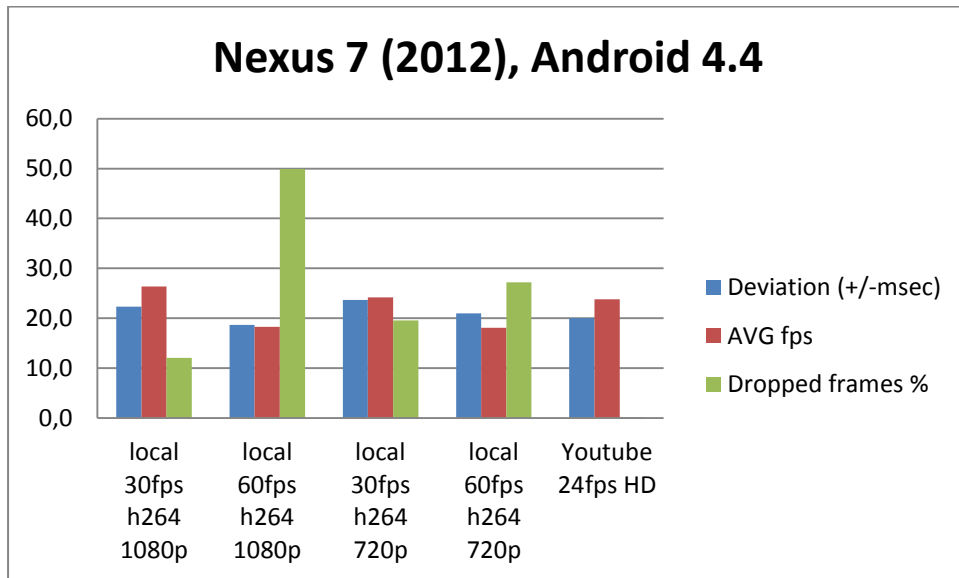


Image 6: Test results Nexus 7 (2012) with Android 4.4 operating system.

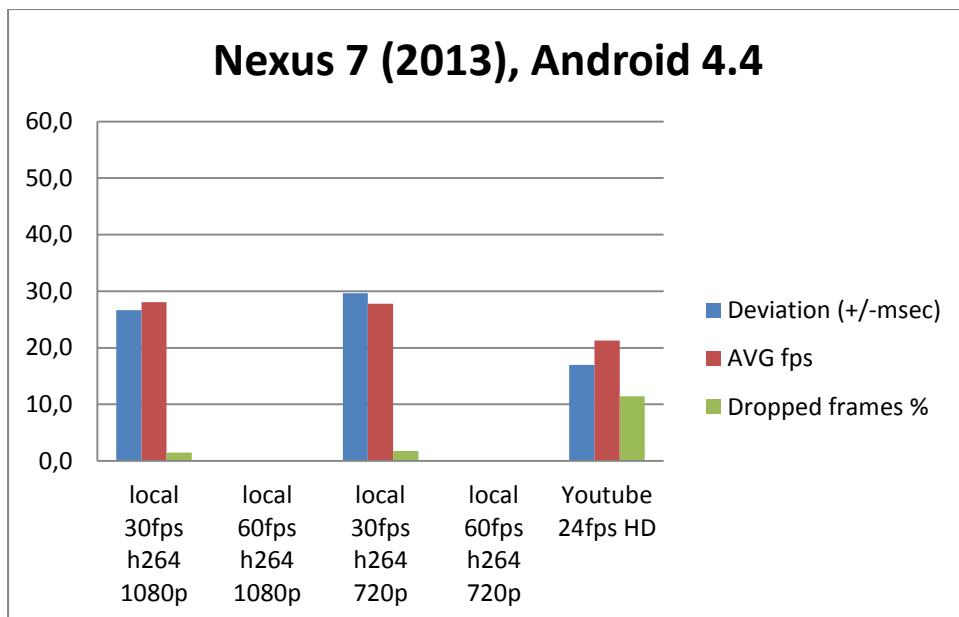


Image 7: The weakest performance in this test: Nexus 7 (2013) with Android 4.4 operating system. A device with the new operating system wasn't able to play the video resolution of 720 p or 1080 p with speed of 60 fps at all.

## Conclusion

When evaluating video playback, the older KitKat operating system performs better than the new one. The update has a clear effect on the quality perceived by user especially when watching fast videos with more and more common 60 fps speeds. This is something that user should know before loading a new version of operating system.

These results raise the question, how is it possible that updating to a new software version has such a clear negative effect on the relatively measured results.

#### **Company behind the results**

OptoFidelity is a Finnish, nonaligned high technology company specializing in test and measurement automation. Our focus is on non-intrusive testing and measuring devices from the end-user point of view.

Our mission is to fight against poor manual testing and show that investment in right testing automation can pay back in more qualified applications and devices as well as more satisfied end-user user experience.

We have several test systems and testing tools which can be used separately or for building a complete, fully automated test system. Most of our products are scalable and can also be integrated to customers own testing automation system or our partners script test or software testing tools.

Learn more about our test automation solutions on <http://www.optofidelity.com/products-and-services/test-automation>

You can also watch our other test automation demo videos at <http://www.youtube.com/channel/UCxZMoLkyOc7rMwKuTrNp6HQ>