

Case study: UI Latency and response measurements of three popular tablets.

“All devices are operate smoothly, but the Kindle snatches first place”

The Finnish test and measurement automation company OptoFidelity examined three popular tablet devices. The case study consisted of different UI reaction and response test cases. The devices tested were the Kindle Fire HDX (Amazon’s e-book reader), the iPad Mini Retina and the Dell Venue 8 Pro.

In general, all the devices had very good and steady latency and response times, but the Kindle was the best performer in most of the test cases. The Dell and iPad Mini were more or less equal. The most significant difference between devices was the boot up time, with the boot up time of Dell being more than twice as fast as that of the Kindle or iPad.

1. UI Latency and response measurements

The latency and response times of the devices were measured with OptoFidelity WatchDog. OptoFidelity WatchDog is a measurement instrument for analyzing user interface latency and response times throughout the whole R&D phase. In addition to measuring user interface response times, OptoFidelity WatchDog can also objectively quantify user reaction time to information on the user interface. In this test case the human interactions (taps) to open applications were measured. All measurements were triggered by tapping application icons and buttons, no hardware keys were used.

Measurements were based on:

- Response time: Time from the user tap release event to the moment the UI interaction was completed, in this when the case application was open and ready to use, or the user triggered functionality was completed.

The reaction and response times of the device were measured with following test cases:

- View finder launch time: The device camera view finder opening time. Measurement from tapping the camera icon to the View finder picture being visible.



- Photo capture time “Shot-to-shot”: The device’s photo capturing time. Measurement from tapping the photo capture button to when the device is ready to take another picture.
- Gallery open time: The photo gallery application launching time. Measurement from tapping the gallery icon to when the application is ready to use.
- Map launch time: The Map application launching time. From tapping the map icon to when the application is ready to use.
- Music player launch time: Measurement from tapping the music player icon to when the application is ready to use.
- Music player start time: Measurement from tapping the play icon in the open music player to the state when music starts.
- Calendar launch time: The calendar application launching time. Measurement from tapping the calendar icon to when the application is ready to use.
- Calculator launch time: The calculator application launching time. From tapping the calculator icon to when application is ready to use.
- Browser launch time: Browser application launching time. Measurement from tapping the browser icon to when the application is ready to use.
- Boot up time: The system boot up time. From turning the device on to when the device is ready to

2. UI performance results

2.1 UI reaction times

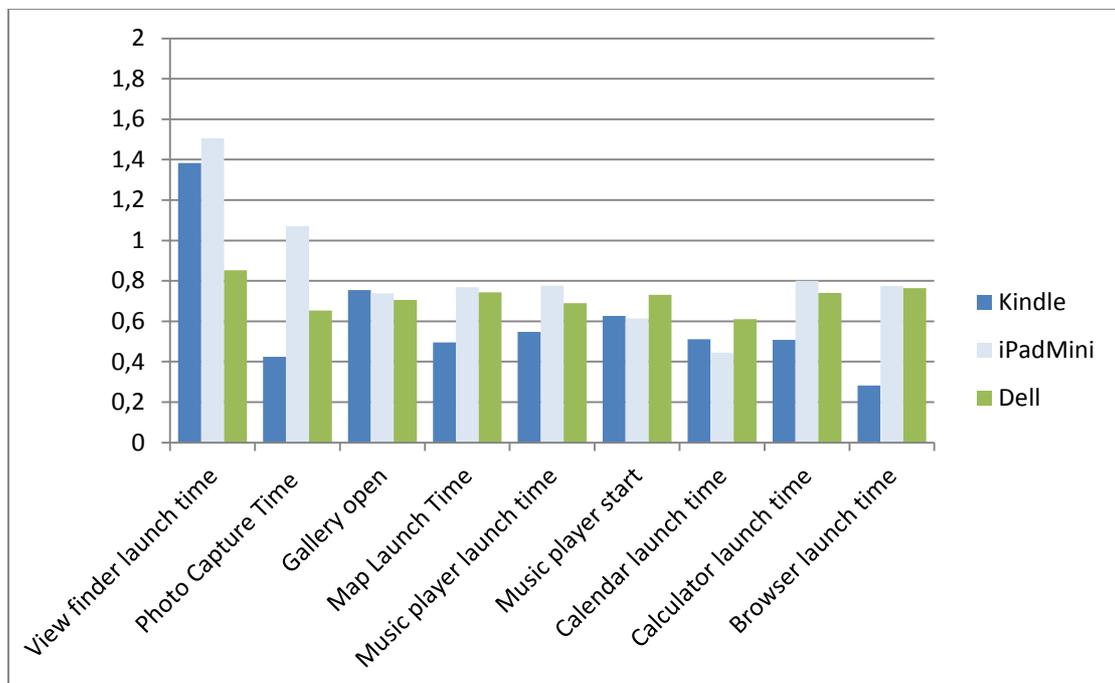


Image 2: UI Performance reaction times

All the devices tested had a good overall UI performance, and all the tablets were fast. The Kindle e-book reader beat the other models both in reaction and response times in 5 test cases out of 10, but the deviation in the results is minor. The biggest differences between the models can be found in view finder launch, photo capturing and system boot times. In these three categories the Dell was the fastest. Another interesting positive result was the browser launch time of Kindle. The median response time of the Kindle was only 0.28 seconds which is nearly 0.5 seconds faster than other models.

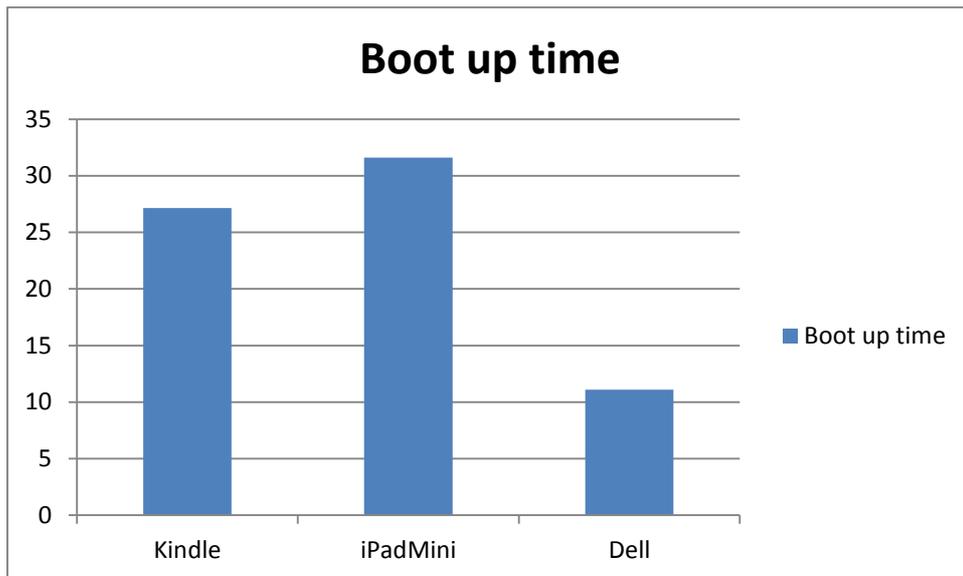


Image 3: The system boot time

The system boot time showed the greatest difference overall, as the Dell was more than twice as fast (11.08 sec) as the Kindle (27.79 sec) and surprisingly the iPad Mini (31.60 sec) was the slowest.

2.2 Music scroll performance

The other feature measured was the music scroll performance, which defines the average speed of music gallery icon updates. The target value was 60 frames per second (FPS). Music scroll performance was measured using the OptoFidelity *VideoMultimeter* measurement device. *OptoFidelity VideoMultimeter* is a professional measurement solution for measuring the true and objective video playback performance of cellphones, tablets or any other multimedia device.

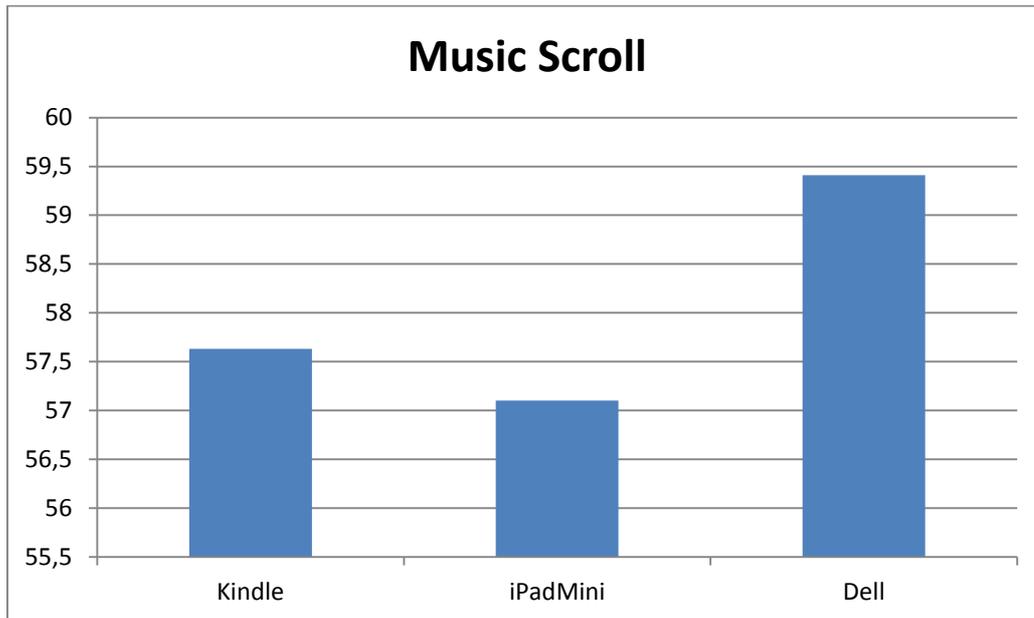


Image 4: Music scroll performance

The results were more or less equal and all the devices scored well. The average speed of the Dell was more than 59 fps, which represents an excellent score and scrolling almost without pauses. The Kindle and iPadMini also had good fps rates, but values between 57-58 might cause occasional frame freezes.

3 Overall Conclusion

According to the UI Performance features measured in this study, all three devices had very good and steady UI performances, which leaves latency and response times. Overall the Dell was the fastest performer, but there were no significant differences between brands, except for the boot up time. As all the devices were fast and more or less equal, there are no differences that would directly affect real user experience and decision making. It could be said to be a little surprising that the Apple iPadMini did not stand out compared to the other products.

4 More information:

For more information about OptoFidelity: or our products, please contact sales"@optofidelity.com

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