



Battery Drainage Investigation

Background

A client has highlighted that our app is draining too much battery. As such, they will not be retailing our Saas anymore if we are not to give them an update. To prevent the company from losing a client, we are tasked to investigate and generate a statistics report in 2 weeks with the date starting from 9 Jan 2023.

Hypothesis

While using DRVR app, it consumes more battery than it should.

Objectives

To investigate whether DRVR app truly drains a lot of battery. If it does, we will have to work on a solution to resolve this issue. From then on, we will have to investigate further on how to minimise battery consumption caused by the app.

Explorations + Decisions

In order to generate a report to justify whether the client's claim is true or not, we decided to utilise the battery usage function that is already available in both IOS and Android mobile devices. Initially we decided to monitor 4 apps instead of 3. After discussing, we decided to cut DriveSafe Nagase because it would be too demanding for every participant's mobile battery. Furthermore, its base features are the same as the default DriveSafe app. As a result, we came up with a form for employees to log down the 3 app's battery usage consumption on a daily basis. This way, we would have a non-bias statistics to record down our findings as the logging will not only happen once but thrice by the deadline.

Approach

▼ Approach 1 - Device Battery Analysis (Battery Usage and Battery Health)

Comparison Analysis between DriveSafe, Copilot, and Google Maps

To justify the claim of DriveSafe drains more battery than the Zendrive Copilot program, a comparative analysis between the two applications will be conducted. From research, the team identified that Google Maps from Google do offer live-time location tracking services in the background. We have decided to include Google Maps as part of the Testing as the industry benchmarks.

The cases for testing are determined as such:

case	Expected Observation	Drawn Conclusion
BT1	DriveSafe < CoPilot (Δ-10%)	DriveSafe <u>does not drain more battery</u> than ZenDrive Copilot.
BT2	Drive < Google Maps (Δ-10%)	DriveSafe <u>does not drain more battery</u> than Google Maps.
BT3	DriveSafe <= CoPilot (Δ-5%)	DriveSafe <u>consumes as much battery</u> as to ZenDrive Copilot.
BT4	Drive <= Google Maps (Δ-5%)	DriveSafe <u>consumes as much battery</u> as Google Maps.
BT5	DriveSafe > CoPilot (Δ+10%)	DriveSafe <u>drains more battery</u> than ZenDrive Copilot.
BT6	Drive > Google Maps (Δ+10%)	DriveSafe <u>drains more battery</u> than Google Maps.

In events of **BT1 AND BT2**, It is justified that DriveSafe does not drain more battery than the other two applications.

For **all other cases**, further investigation will be taken into identifying potential back-end issues that might be causing such high power consumption on mobile devices. Further actions will be taken upon completion of Approach 1.

User Pre-requisite

A user participating in the testing process will need to meet the pre-requisite mentioned:

1. User to own 01x personal mobile devices running IOS/ Android Operating Systems.
2. User to have the three applications installed and running on background service. (*Initial Launch upon installation is needed*)
3. All three application location tracking services are to be set on ALWAYS.
4. Additionally, for certain Android users, ensure all permission settings are granted to all three applications.
 - a. Example: " Disable Battery Optimization, Allow Apps to run in background "

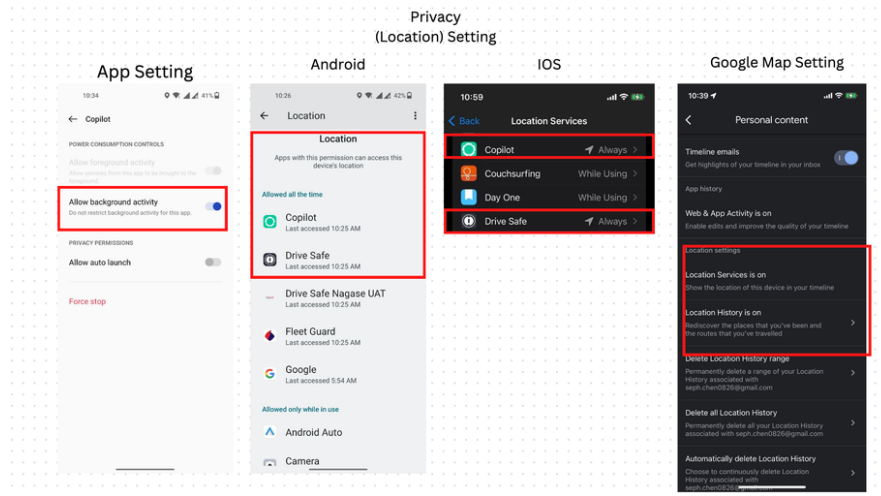


Figure 1.1.0 Configuration Setting for users

Testing Process

Data collection will be done every day to check in on the user's battery usage status. This will require users to input their Battery Health and Battery Usage of all three applications. Figure 1.0.0 shows the Google Form Deployed to collect the user battery usage in percentage.

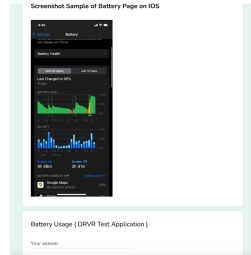


Figure 1.2.0 Screen Snip of Google Form Deployed

Testing period is set at two weeks from 13 January 2023 to 23 January 2023 to collect sufficient data points to construct data graph for trending analysis and comparative analysis.

Data Collection will be conducted daily during this period by asking users to log their app battery usage. Upon sufficient data points, the Team analyst will construct and prepare a trending graph, and comparison chart for analysis.

As part of the data consistency effort, additional emphasis is placed on informing all testers to retain the phone battery at a healthy state by not letting it deplete till zero percent.

Control Setup

Control is an element that will remain unaffected by other variables. In this approach, we will set up the control element as such:

Control	Description	Remark
C1	Device running on DriveSafe App <u>only</u> .	Stationery
C2	Device running on Copilot App <u>only</u> .	
C3	Device running on Google Maps <u>only</u> .	
C4	Device running on DriveSafe App <u>only</u> while moving.	Mobile
C5	Device running on Copilot App <u>only</u> while moving.	
C6	Device running on Google Maps App <u>only</u> while moving.	
Default	Device not running any of the application.	Stationery





From this control cases, we will measure the battery life of each case to come up with a comparative analysis. The logistics needed for this setup will be 02x Mobile Devices, running on IOS. The principal consideration for choosing IOS for the control devices is to provide consistency in data collection and the ease of ensuring all needed permission access is granted for the applications.

Approach 2: Battery Testing 2.0 - Comparative Analysis for Nagase, MSIG, SMAT and Tracker

Comparative Analysis for Round 2 Testing

In round 2, the key objective of the testing will be to further investigate battery drainage in other versions of the DRVR DriveSafe App, such as the White-label product - Nagase, MSIG FleetSafe, SMAT Fleet Guard etc. The key motivation behind round 2 is to study the effect and difference in battery data with added features on different versioning of the Apps. This study will allow the development team to potentially identify key issues/bugs that might be existing in the released product.

Features(y) / Application (x)	Nagase	MSIG Fleet Guard	SMAT Fleet Safe	DriveSafe Tracker

	 Nagase Driver App Navigation	 Fleet Guard Navigation	 Fleet Safe SMAT Navigation	 Drive Safe Tracker Navigation
Driving Score	✓	✓	✓	✗
Real-time location tracking	✓	✗ Trip-basis	✗ Trip-basis	✓

User Pre-requisite

A user participating in the testing process will need to meet the pre-requisite mentioned:

1. User to own **01x** personal mobile devices running IOS/ Android Operating Systems.
2. User to have the **four** applications installed and running on background service. *(Initial Launch upon installation is needed)*
3. All three application location tracking services are to be set on **ALWAYS**.
4. Additionally, for certain Android users, ensure all permission settings are granted to all three applications.
 - a. Example: " **Disable Battery Optimization, Allow Apps to run in background** "
 - b. For Android Users, **ACCUBattery** App is required in addition to provide consistency to the data points.

Testing Process

Data collection will be done every day to check in on the user's battery usage status. This will require users to input their Battery Health and Battery Usage of all three applications. Figure 1.0.0 shows the  **Google Form** Deployed to collect the user battery usage in percentage.

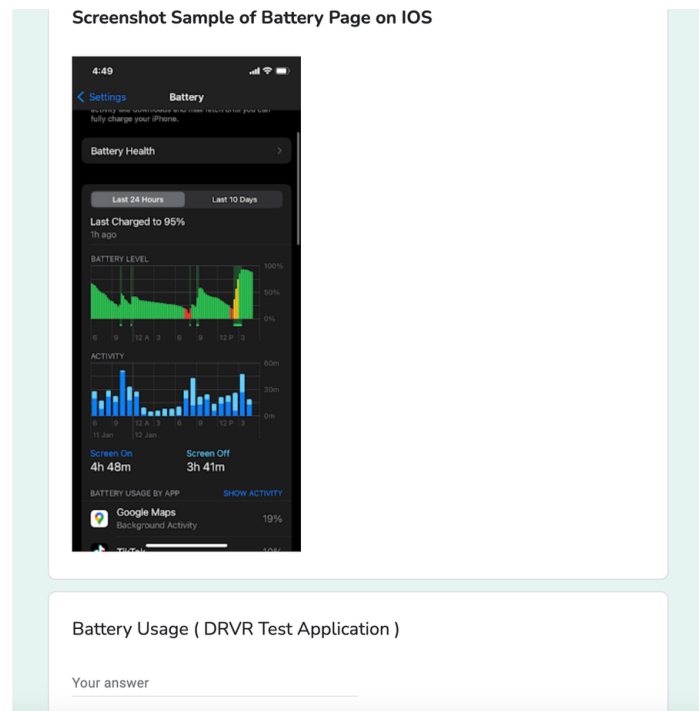


Figure 1.2.0 Screen Snip of Google Form Deployed

Testing period is set at two weeks from **02 Feb 2023 to 13 January 2023** to collect sufficient data points to construct data graph for trending analysis and comparative analysis.

Data Collection will be conducted daily during this period by asking users to log their app battery usage. Upon sufficient data points, the Team analyst will construct and prepare a trending graph, and comparison chart for analysis.

As part of the data consistency effort, additional emphasis is placed on informing all testers to retain the phone battery at a healthy state by not letting it deplete till zero percent.

Other documents

- Summary Analysis of Approach 1 : Comparative Analysis of Battery Usage

◦ [Google Colaboratory](#) Google Colab Analysis