

MOBILE APPLICATIONS FOR CONTACT TRACING USING BLUETOOTH

PROBLEM

Contact tracing mobile applications have attracted attention as they help prevent the spread of COVID-19. On the other hand, questions arise about the consumption of hardware resources in the mobile device and the privacy of user data.

GENERAL OBJECTIVE

Analyze contact tracing mobile applications that use bluetooth to obtain a frame of reference regarding hardware resources and information consumed.

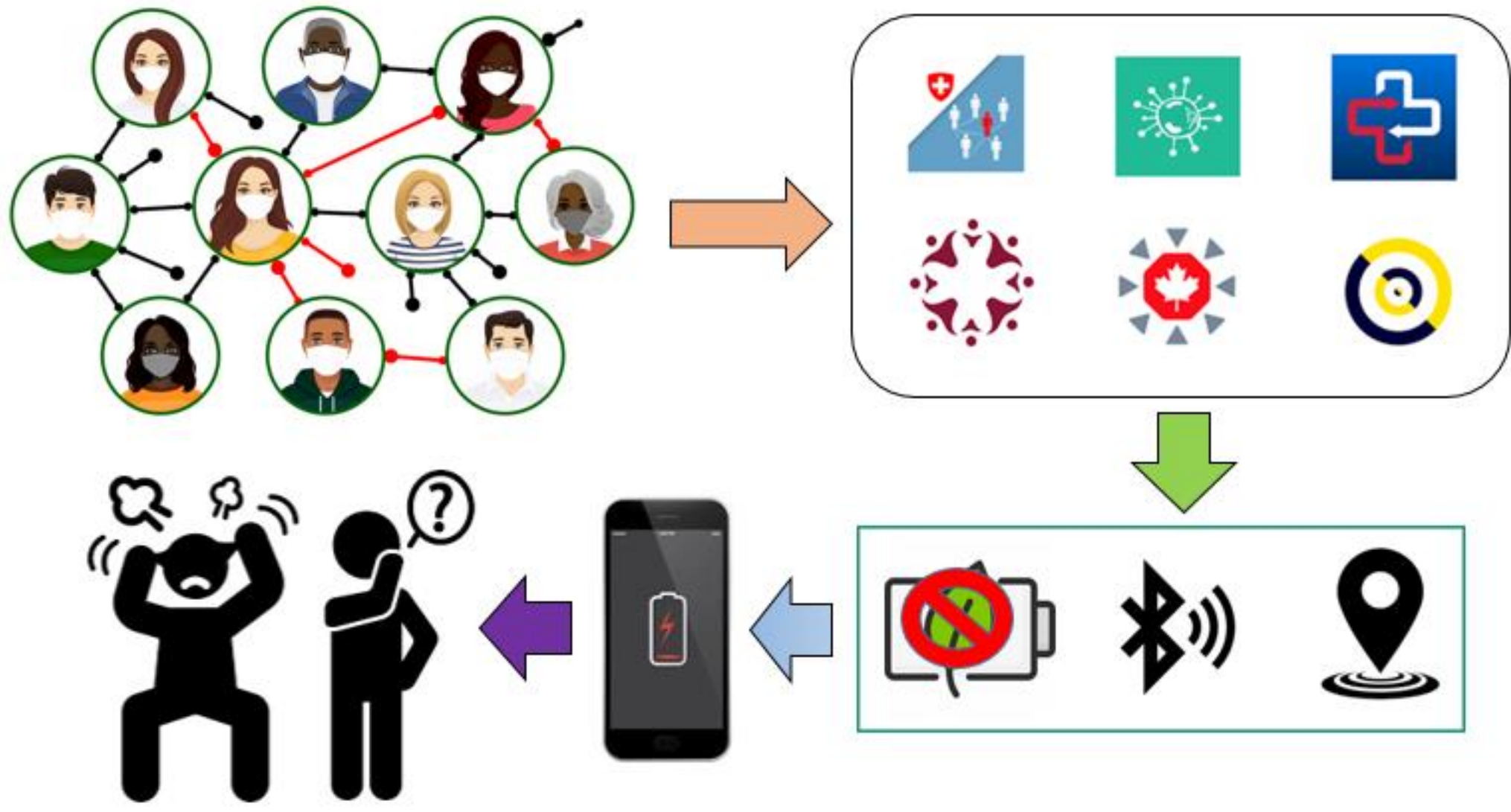


Fig. #1 Technologies for mobile contact tracing applications.

PROPOSAL

During the analysis we used the ASI Ecuador mobile application, creating black box tests in which we developed Python scripts to measure the use of RAM and CPU. In addition, the battery and network measurement used by the mobile application without intervening in the source code or architecture. Likewise, we implemented white box tests that consisted of reviewing the source code of the application and creating a simulation with its respective server to obtain information regarding the exchange of keys through BLE (Bluetooth Low Energy) and about the communication that is established to report as COVID positive and notify contacts of possible contagion.

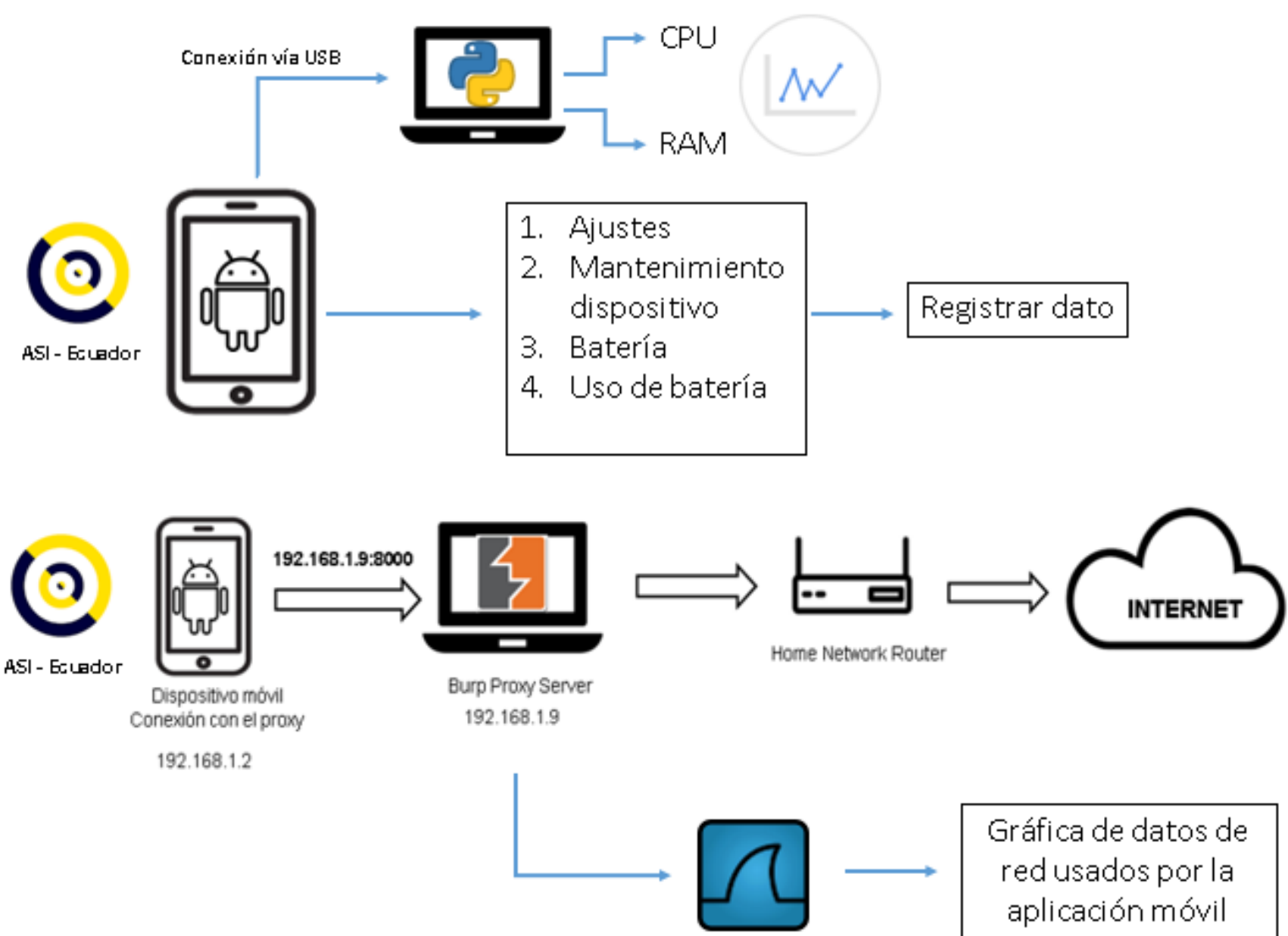


Fig. #2 Black box testing scheme

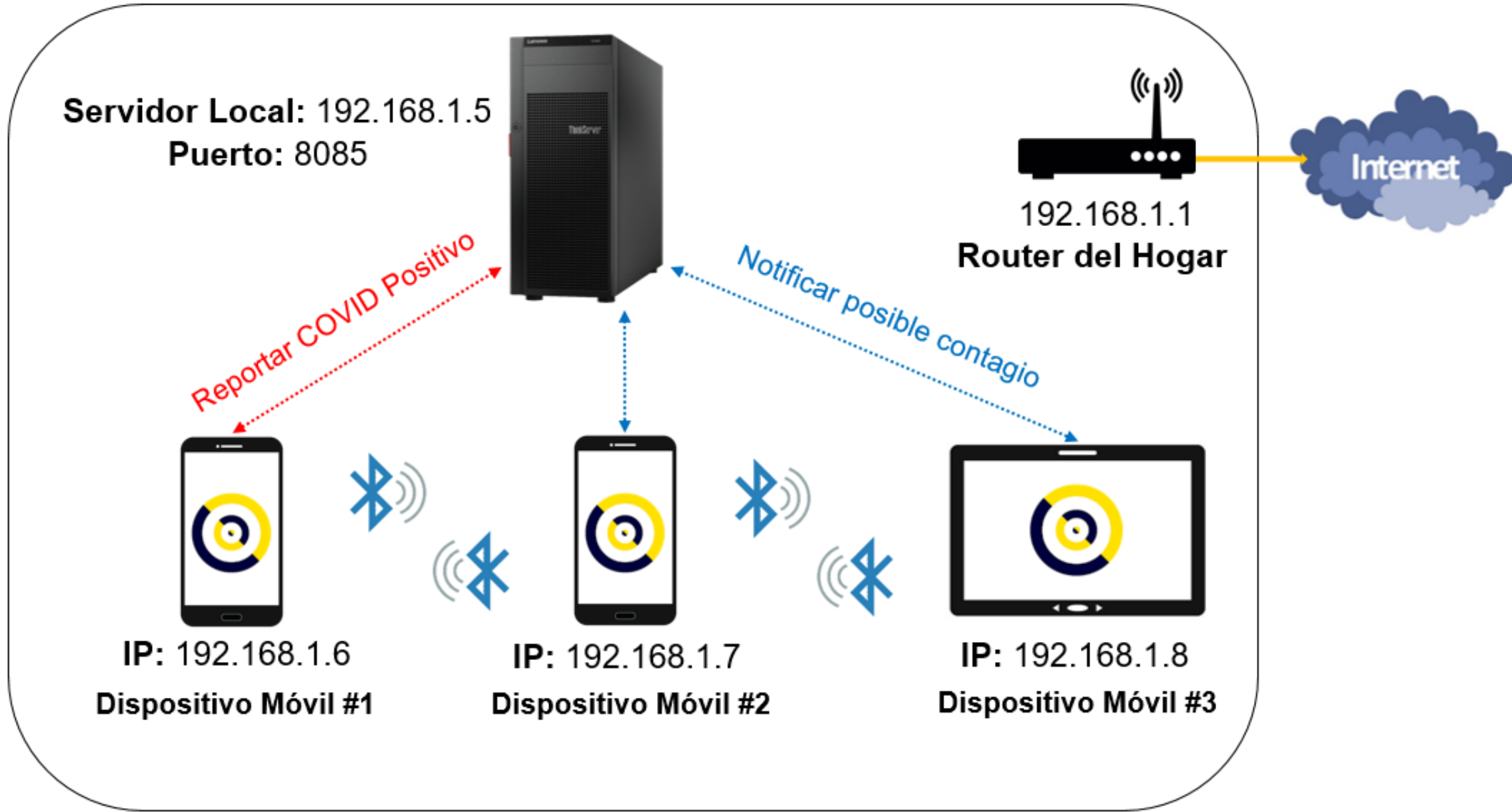


Fig. #3 Simulated environment on a local network

RESULTS

- The maximum average RAM memory used is 41.72 MB.
- The maximum average CPU used is 17.16%.
- Bluetooth occupies 36% of the battery consumed while the ASI Ecuador mobile application 1%.
- The average network data rate used both in uplink and downlink is 2.5KB / s, occupying this network data when the mobile application requires it.

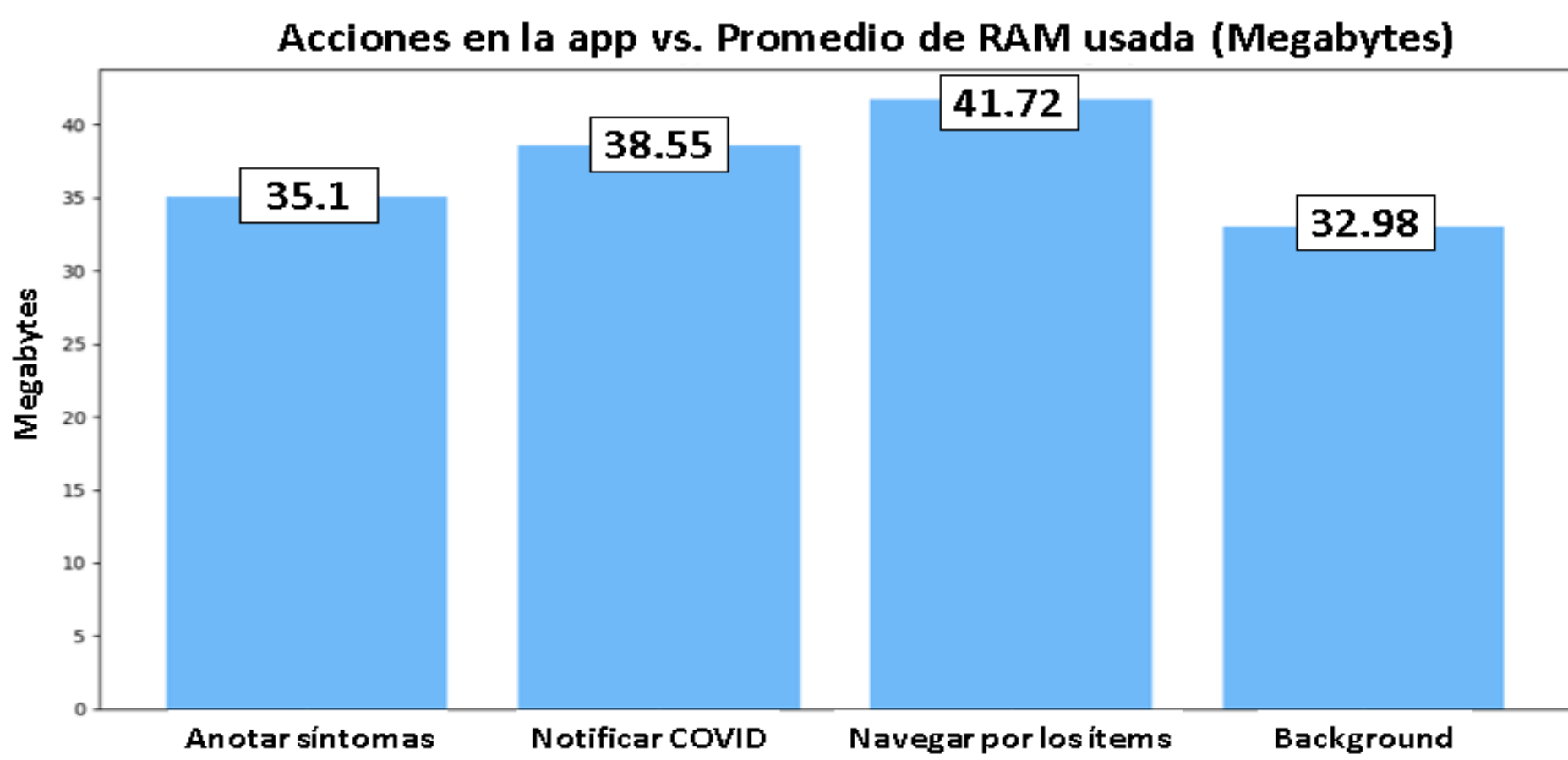


Fig. #4 RAM usage results

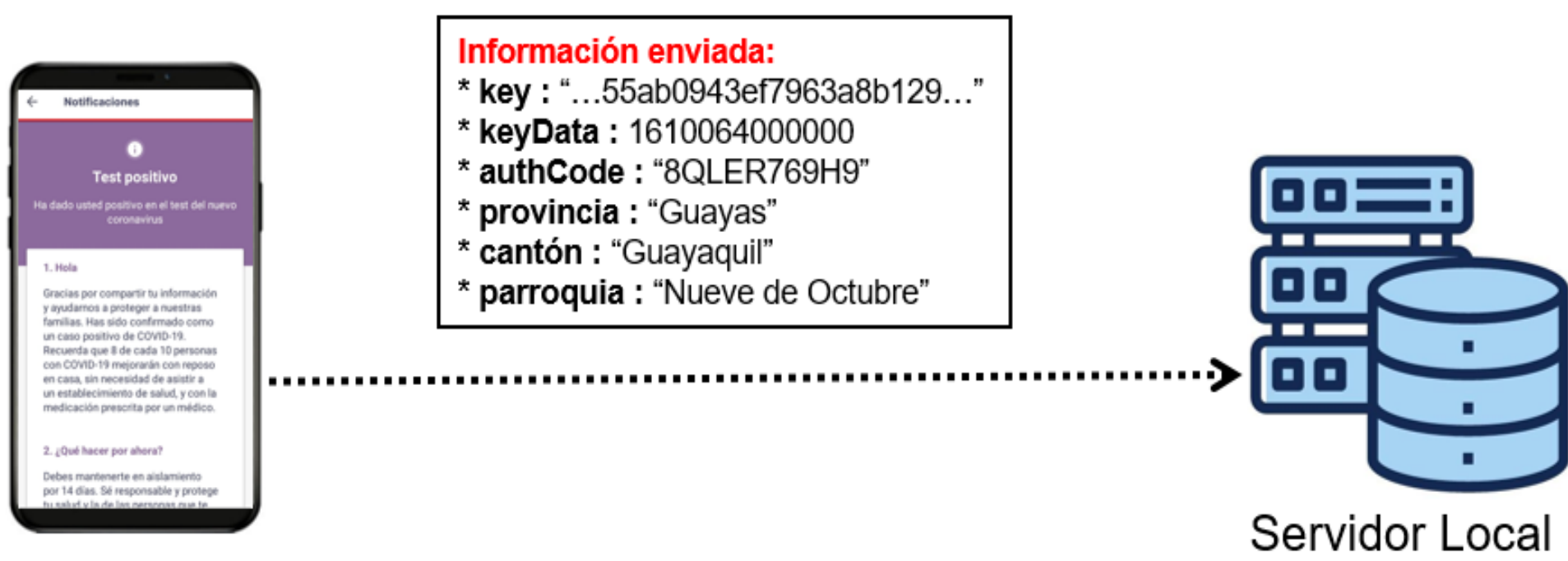


Fig. #5 Report positive COVID



Fig. #6 Comparison of our solution with others on the market

CONCLUSIONS

- It was possible to obtain indicators of CPU, RAM, battery and network usage, allowing to know the maximum values that it tends to occupy in a mobile device.
- There is a high battery consumption in Android mobile devices due to the operation of geolocation in conjunction with the bluetooth interface due to BLE.

- The simulated environment revealed that the application contains a component that acts as a broadcaster (BleServer) announcing its encrypted code and also has a receiver (BleClient) that allows the connection to be established and the process to register the contacts.
- On the occasions that the application interacts with the server, personal information from the devices is not shared, which guarantees the security and privacy of the user.