Lucy - IoT & 5G Smart City detector platform

IronRobots.com

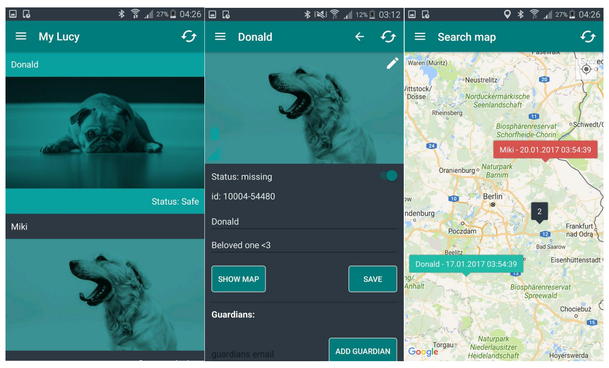
GOALS

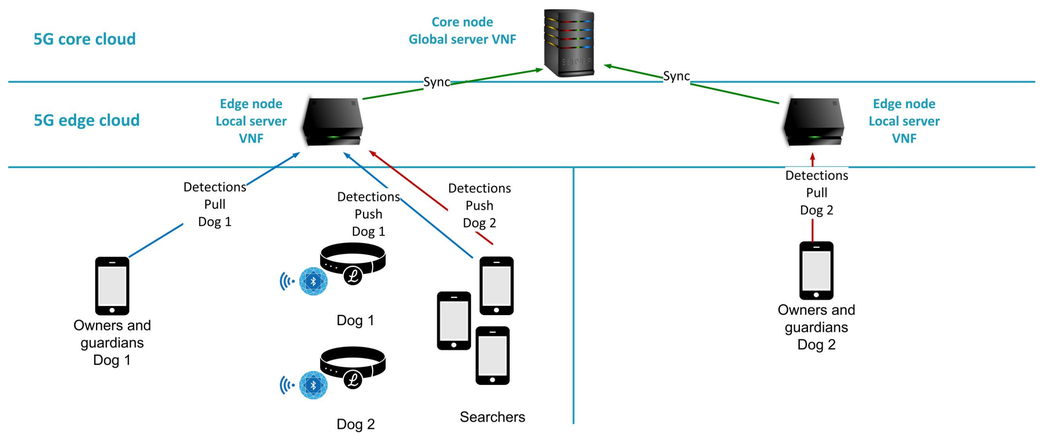
- Power consumption on smartphones - BLE scanning and LTE usage
  - Interval between BLE scans in seconds
  - Time of BLE scanning
  - LTE communication interval
- Quality of Experience (QoE) of our mobile
- Scalability of the cloud backend using 5G architecture
  - Request per second for owners and searchers
  - Latency for owners and searchers

CHALLENGES

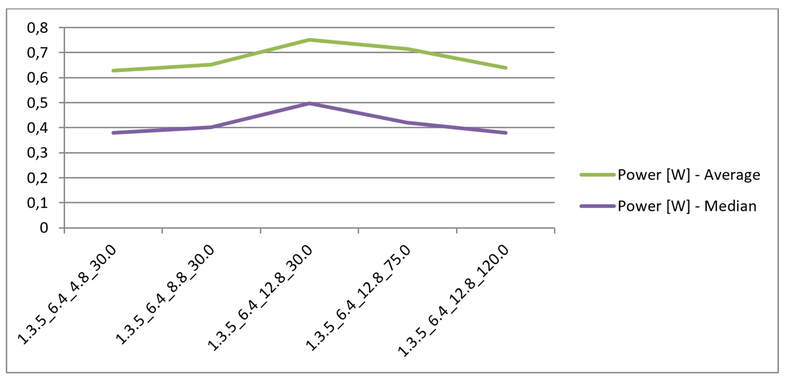
- Tune times between BLE scan and LTE communication periods for foreground and background app operations
- Tune length of the BLE scanning not reducing the success rate
- Measure the QoE and improve the responsiveness
- Design an efficient 5G architecture

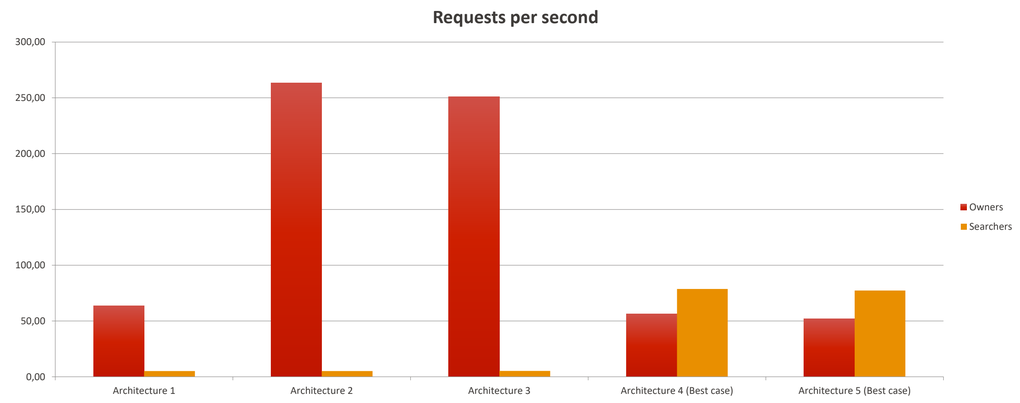
DEMO SETUP





RESULTS





MORE RESULTS

Power consumption

Best values for BLE scanning:

- scan period time when the application is in background mode – 12.8 seconds
- time between scans – 75 seconds.
- increase of power consumption is about 0.3 W

LTE communication interval - android synchronization does not increase the power consumption, as it happens in cycles controlled by Android with commination from other apps

Thanks to the redesign of the network transmission pipeline, we have raised the overall Triangle Portal QoE score from 3.42 to 3.72.

Scalability (architectures)

1. Distributing our server implementation over the main server and edge nodes
2. Using edge nodes as caching servers, with the main application running on the server node
3. Using edge nodes as caching servers with dynamic fetching, with the main application running on the server node
4. Using edge nodes as localized cache with asynchronous queueing on the central server
5. Using edge nodes to process region data in memory and localized cache with asynchronous queueing on the central server

CONCLUSIONS

- We have find tuned the BLE scanning times
- We have moved to Android synchronization from direct communication
- We have redesign our mobile application to introduce more asynchronous calls and improved the perceived QoE
- We have chosen an optimal architecture using 5G edge nodes to process region data in memory and localized cache with asynchronous queueing on the central server

POST MORTEM

- We have performed extensive testing during the period of 7 months (Stage 1 and 2)
- Our current BLE scanning parameters and LTE communication has been optimized and both have been introduced into the production version of Lucy
- The new app design with a better QoE has been also introduced into the production version of Lucy
- The optimal 5G architecture is ready and as soon as 5G networks with edge processing will be available, we can move to this new architecture