Roll Call Software

Sponsor: Federal Communications Commission | Team: 3B&T

INTRODUCTION

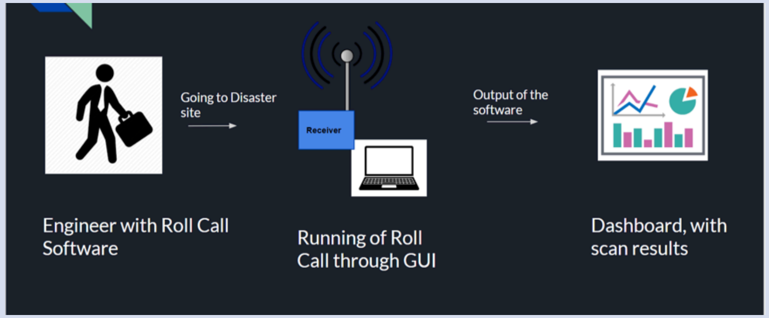
- The FCC uses a system called Roll Call to provide data about communications systems that may have been impacted by natural disasters.
- Impacted communications systems include AM/FM radio stations, cell phone towers, and emergency broadcast systems.
- The goal is to provide other agencies, such as FEMA, with the necessary information to begin restoring these communications systems.
- Challenges: Roll Call has historically operated in a command line interface (CLI), which is not user-friendly. Additionally, all post scan results were placed in a zipped folder, intended to be sent off immediately

OBJECTIVES AND REQUIREMENTS

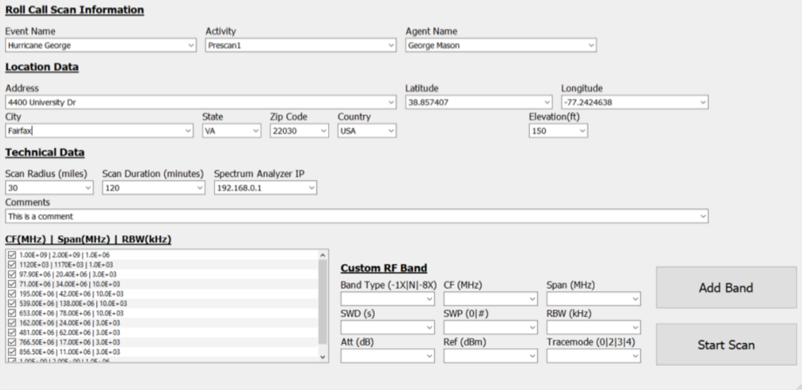
- The CLI has been replaced with a Graphical User Interface (GUI) in the Windows environment to provide a more user-friendly format.
- A dashboard was developed to provide post scan data results within one contained window on-site.
- We included a database, attached to the Roll Call software, that holds data from previous scans and supplies the GUI with the 15 most recent scans
- These functions do not rely on an internet connection

CONCEPT OF OPERATIONS

Before and after a disaster, an engineer travels to a disaster site with the Roll Call software and equipment. The engineer then runs the Roll Call scan through the GUI. After the scan, the dashboard allows the user to view the scan results as needed.



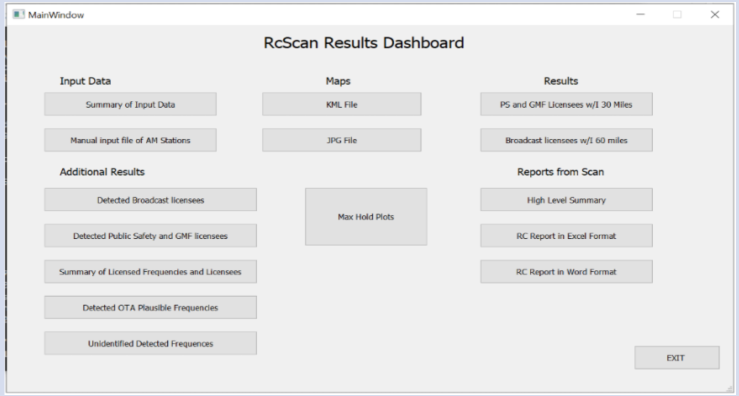
DESIGN



The GUI shown above takes in pre-scan information inputted by the user through Pythons cross-platform GUI toolkit Qt (PyQt5)and allows the engineer to verify all input information before beginning the scan.

At the end of each scan, the database (SQLite3) is updated and scan results are presented in a dashboard on-site. The database holds all user input utilized in scans and allows engineers to access 15 previous scan's inputs to simplify repeated scans. The GUI takes user input parameters that are then utilized for the scan.

When the scan is complete, a dashboard containing the most relevant data is displayed on-site in a pop-up window depicted in the figure below, while an XML file containing detailed post-scan data is transmitted to FCC headquarters.



VERIFICATION AND VALIDATION

- The software was placed on another laptop in order to implement changes without impeding the previous software on the laptop from the FCC. The changes were then made until all issues encountered during testing were resolved. The new version of the software was then replaced with the previous version of the software on the FCC laptop.
- Functional testing was completed on the GUI, dashboard, and database to ensure these components would operate as intended, even in the presence erroneous user input.
- Database testing was composed of long term data simulations; this was completed through the creation of a Python script that would fill the database with roughly 30,000 entries. This testing was also utilized for performance checks in the database query.
- For the database, SQL Injection attacks were considered. We implemented sanitizations techniques to prevent user input fields from accepting SQL characters that are considered hazardous. Only SQL safe characters are accepted from user input to prevent SQL injection attempts from leaving the GUI, ultimately protecting the database.

CONCLUSIONS

In conclusion, radio frequency (RF) communications are an important part of disaster relief and need to be available after a disaster occurs. Without access to these communications systems, including AM/FM radio, cell towers, and emergency broadcast systems, individuals and responsible agencies can no longer obtain potentially critical information in a quick and effective manner. Therefore, the ability to scan for these communications and figure out where they went down is an important process that can be life saving.

Ultimately, these communications represent a crucial safety priority during disasters, and ensuring these methods of communication remain active after a tragedy.

ACKNOWLEDGEMENTS

The members of 3B&T would like to thank the FCC for sponsoring this project. Every week, they took time out of their schedules to meet with us so that we could communicate our progress and they could provide us with feedback.

We would also like to thank our mentor, Dr. Powell, for guiding us through this entire process. He did his best to make sure that our project was done on time and the best it could be. The experience we gathered from this project is invaluable and will undoubtedly help us in our future careers.