



Operation: RM

Radio Modem App

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Client: General Dynamics Mission Systems

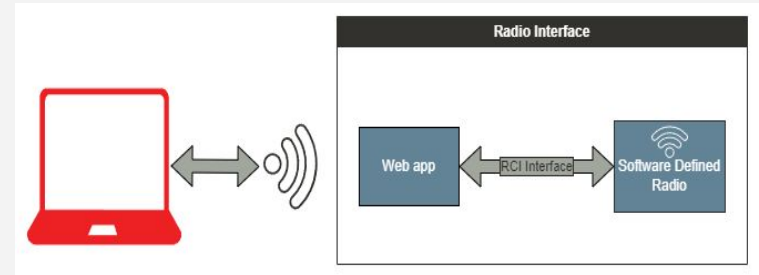


Problem Statement



GENERAL DYNAMICS Mission Systems

- GDMS has over 12,000 employees worldwide
- GDMS develops technology to assist the defense, public safety, and intelligence communities
- Efficient, tactical communication is crucial for maintaining safety
- Existing web application is difficult to use on mobile devices





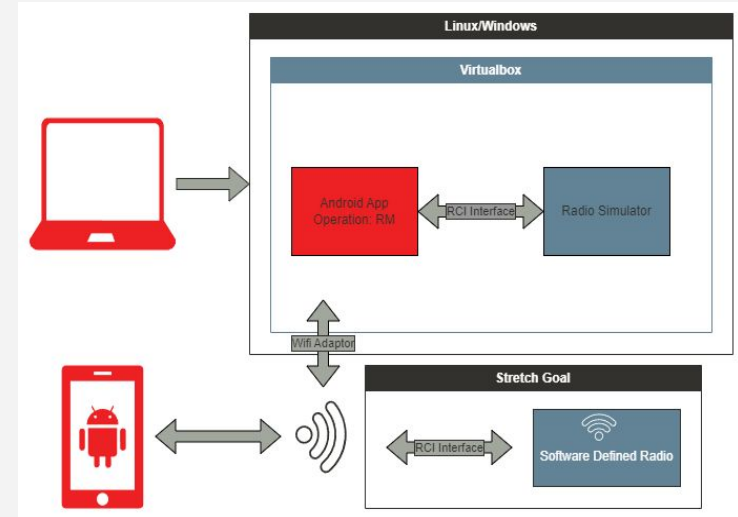
Solution Overview

Android application providing an email system that controls the radio modem

- Application mimics current web application to minimize system training
- Application is mobile device friendly

Key Application Features

- Android OS integration
- File / Camera transmission
- Radio Connection presets
- Remote Connectivity





Requirements/ Spec Overview

Functional

- File transfer between the Android application and the radio simulator

Performance

- Reliability, usability

Environmental

- Compatible with Android 12, 13, and 14
- Java and C are utilized
- Application functional on a robust variety of screen sizes



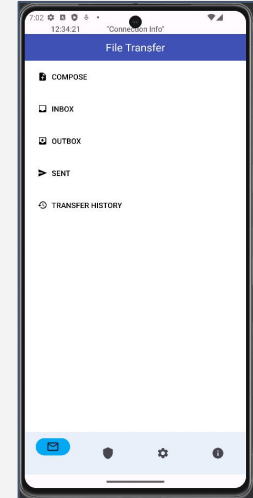
Implementation Overview

Mobile android application

- Looks similar to the current web Version
- User can navigate Inbox and Outbox, Composition, radio modem's transfer and sent history
- Change settings in the application

File transfer

- Send file over different waveforms to the radio
- Compose and send emails to the radio modem through a queue system





Architecture Details

Front-end

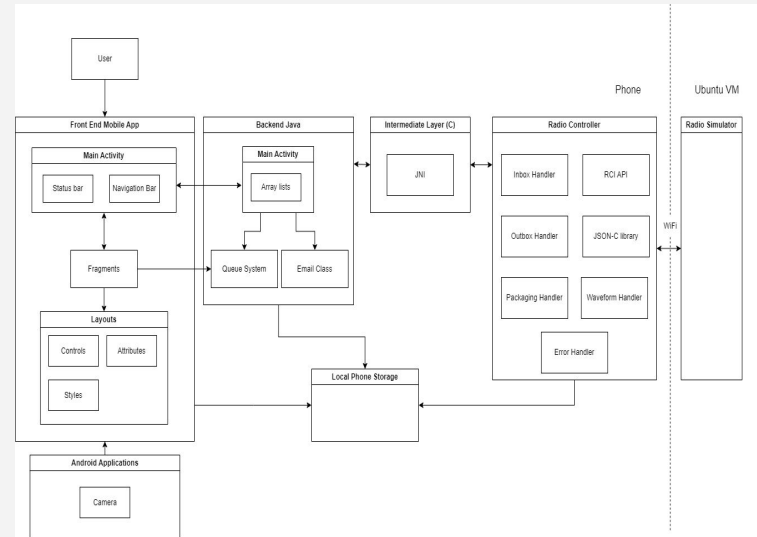
- Layered screens to support persistent data
- Android activity and fragment relationship
- Handle Android OS integration

Back-end

- JNI library support C and Java cross programming
- Communicate with radio using the provided RCI API using C
- Backend Java handles app operations

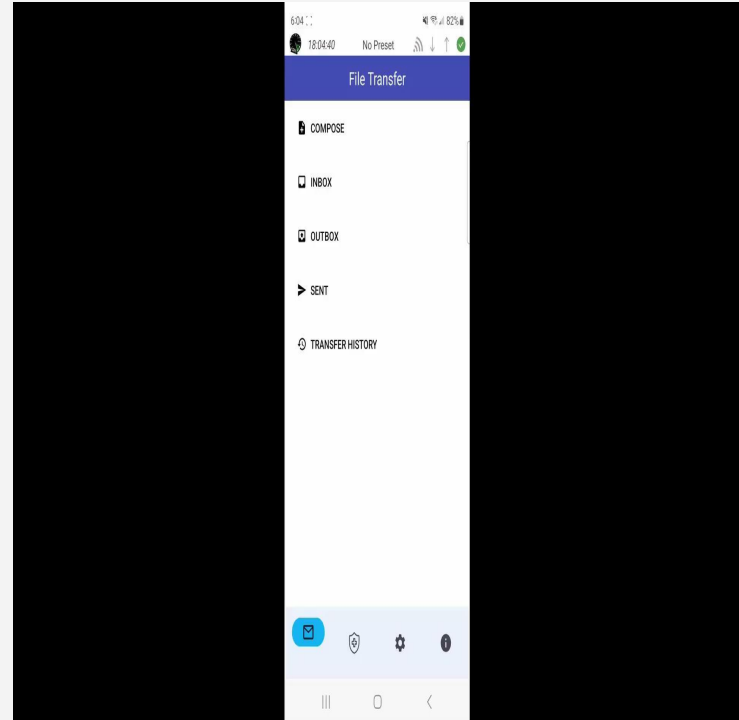
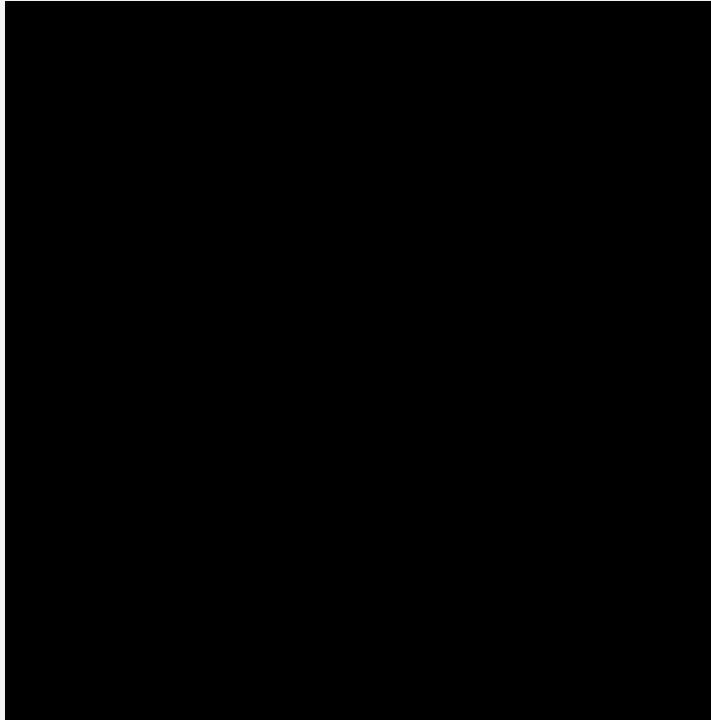
File Management

- Uses Jsch library to transfer files between the app and radio by using SFTP and SSH
- Works with phone's storage to manage emails on local side



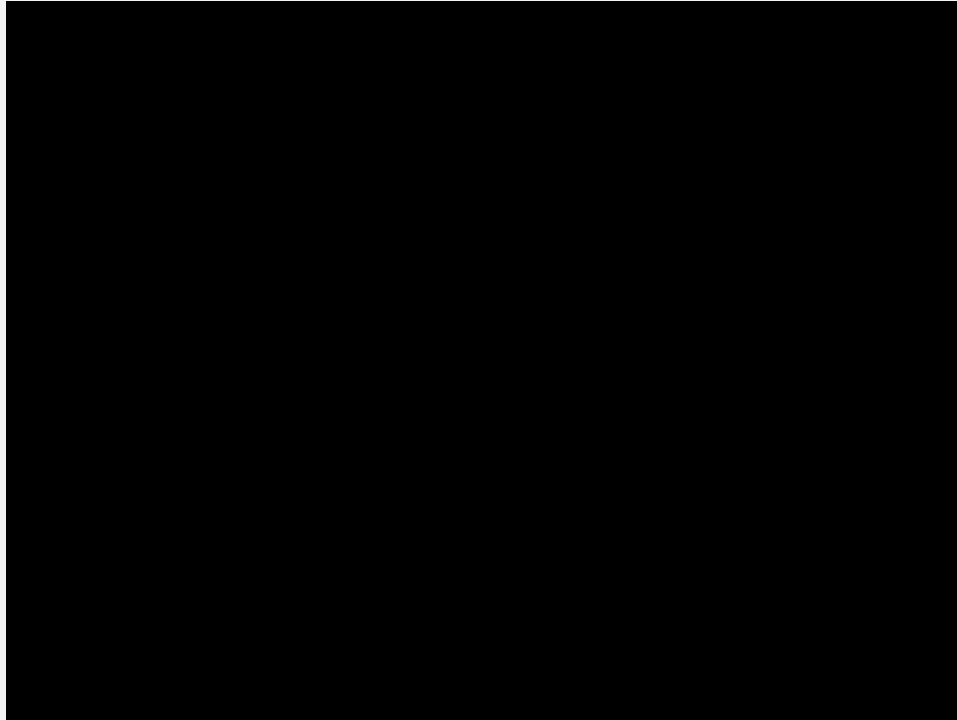


Prototype Review - Composing Emails



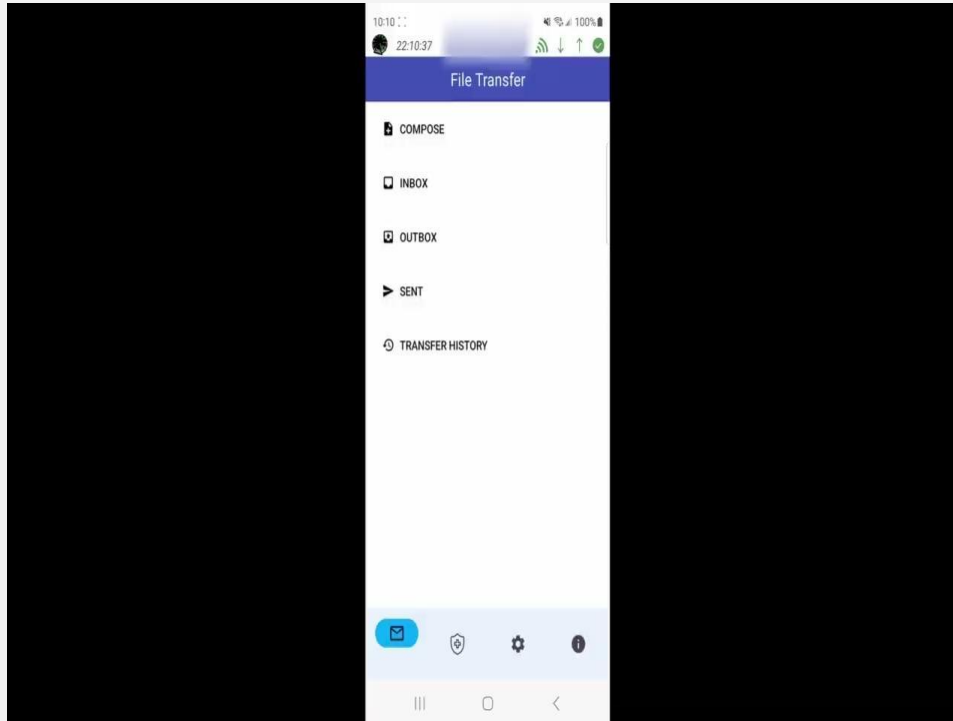


Prototype Review - Sending Emails



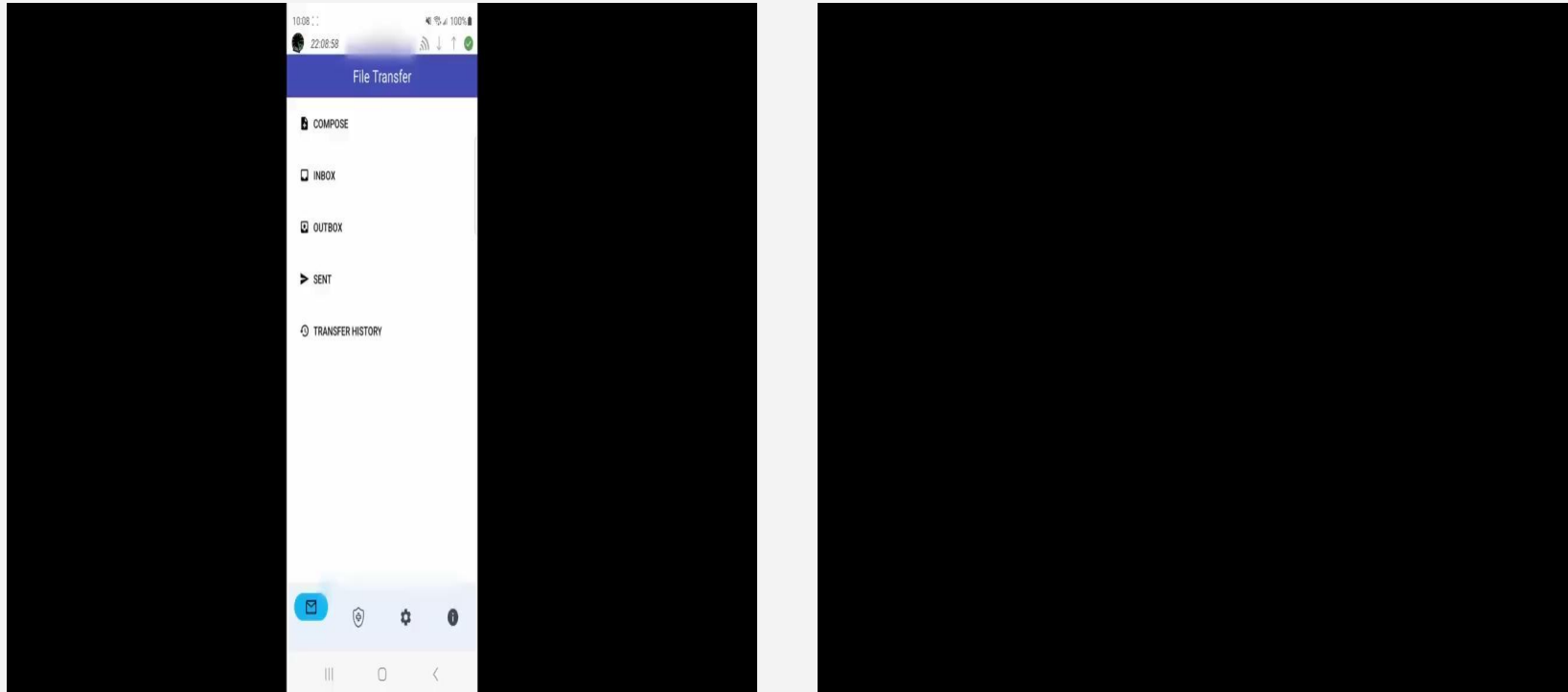


Prototype Review - Receiving Emails





Prototype Review - Managing Settings





Challenges And Resolution

Challenges

- No access to version management software (git)
- Hindrances initializing the project inside android studio
- Trouble connecting and communicating to radio simulator



Resolutions

- Confluence content collaboration
- Effective communication between group and sponsor
- GitLab licenses for the group

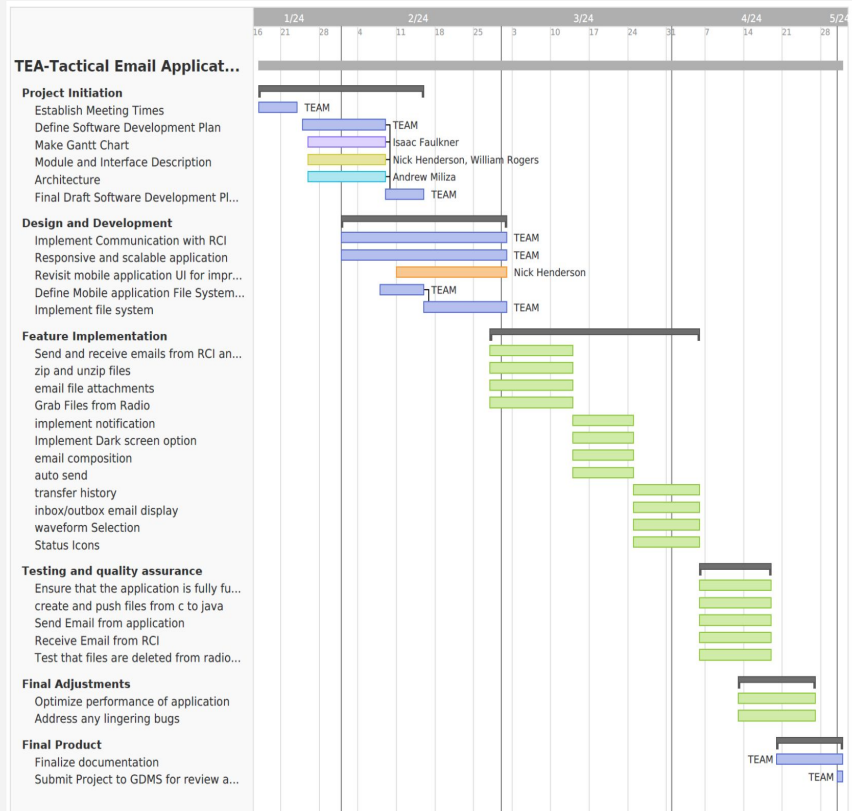




Schedule

Important Dates

- March 2nd-Design And Development
- April 5th-Feature implementation
- April 18th- Testing and Quality Assurance
- April 26th-Final Adjustments
- May 2nd - Final Product

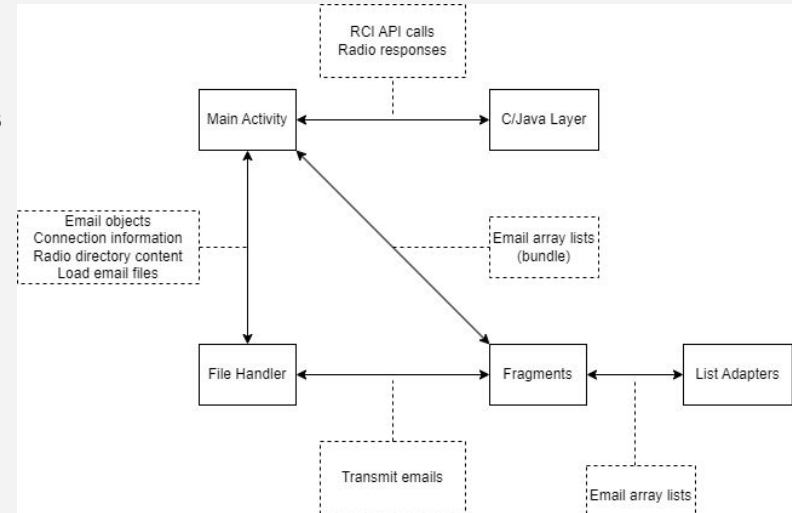




Testing Plan



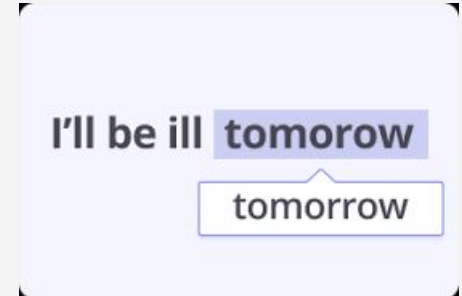
- Unit Testing
 - Implementation with JUnit5 and Mockito
 - Junit5 used for testing button responsiveness and Fragments
 - Mockito assists in simulating objects to test the status bar
- Integration Testing
 - Front end java and back-end c code through JNI
 - UDP packet exchange between app and radio simulator
 - Android Studio testing harness and creating error scenarios
- Usability Testing
 - Navigating the app
 - Composing and receiving emails
 - App responsiveness





Future Work

- Voice Command Integration
- Customizable Email Templates
- Email Insight and Recommendation
- Auto Correct
- Cross-Platform Support





Conclusion

- Developing a mobile android application to replace the existing web interface of a software defined radio (SDR)
- Our solution creates a more efficient and tactical manner for mobile communication with the radio modem
- Our solution allows the user to switch between different waveforms and to receive and transmit messages
- Our solution expands the currently implemented interface by adding notifications and integrated camera functionality
- General Dynamics has positively responded to our current prototype
- Our project allows GDMS to test out a mobile version of their application with their customers with limited costs for initial prototype development