Problem :

During floods and disasters, mobile networks and internet connectivity fail, making it impossible for people to send SOS messages or seek help.

Solution :

BLACKOUT PROTOCOL

Offline SOS Mesh Network for Disaster Situations

SOLUTION OVERVIEW

Solution: Blackout Protocol

Blackout Protocol is an Android application that enables **offline SOS messaging** by creating a **peer-to-peer mesh network** using nearby devices. Messages hop from phone to phone until one device gains internet access and syncs the data to the cloud.

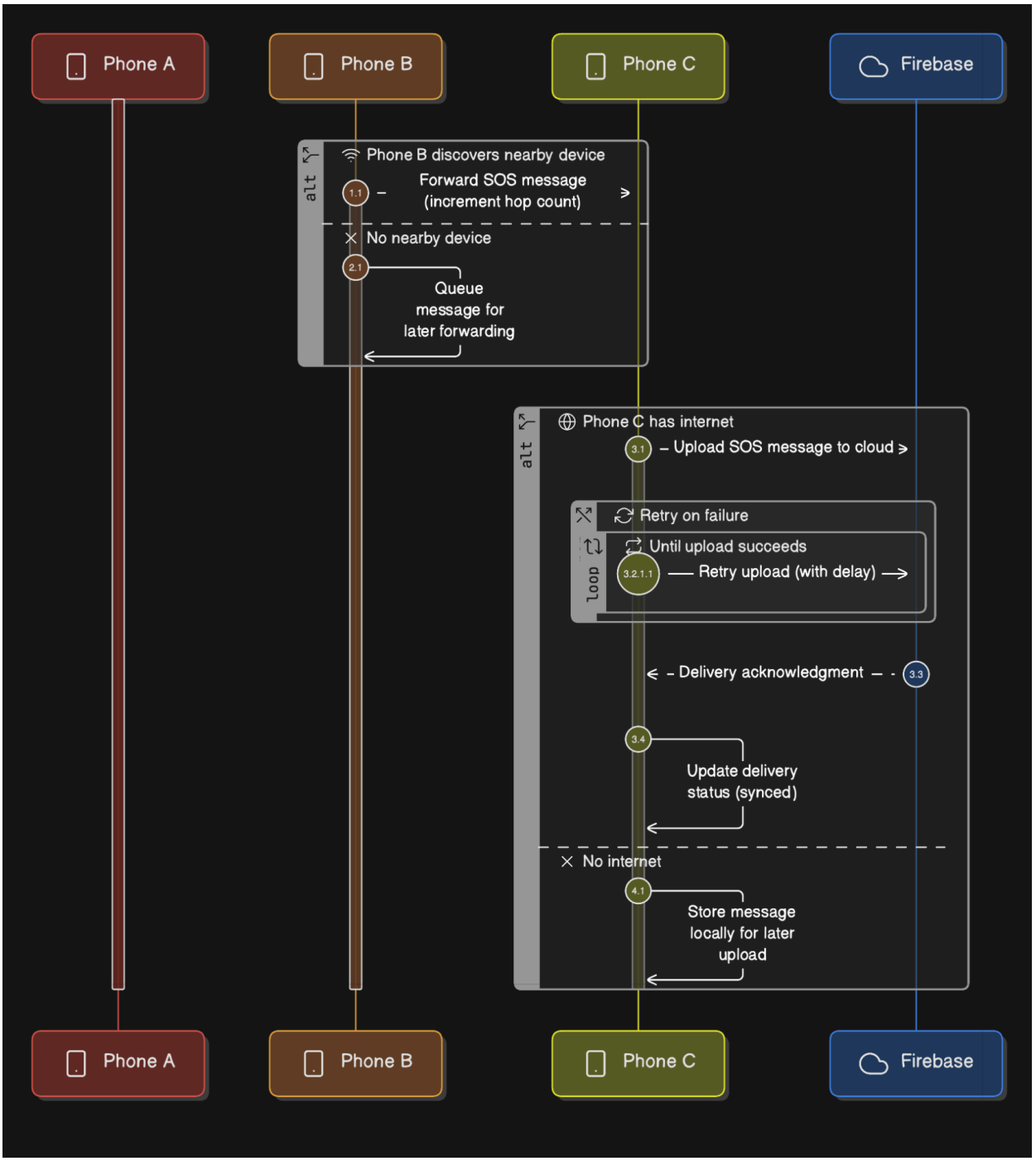
HOW IT WORKS

How It Works

1. Nearby phones discover each other without internet
2. SOS messages are forwarded across devices (multi-hop)
3. One phone acts as a gateway when internet is available
4. Messages are uploaded to the cloud automatically

Offline Mesh Flow: Phone A → Phone B → Phone C (Gateway) → Firebase Realtime Database

Note : Phone C acts as a Gateway device when internet connectivity is detected.


Phone A
Phone B
Phone C
Firebase
alt
Phone B discovers nearby device
1.1
Forward SOS message
(increment hop count)
No nearby device
2.1
Queue
message for
later forwarding
alt
Phone C has internet
3.1
Upload SOS message to cloud
Retry on failure
loop
Until upload succeeds
3.2.1.1
Retry upload (with delay)
Delivery acknowledgment
3.3
3.4
Update delivery
status (synced)
No internet
4.1
Store message
locally for later
upload
Phone A
Phone B
Phone C
Firebase

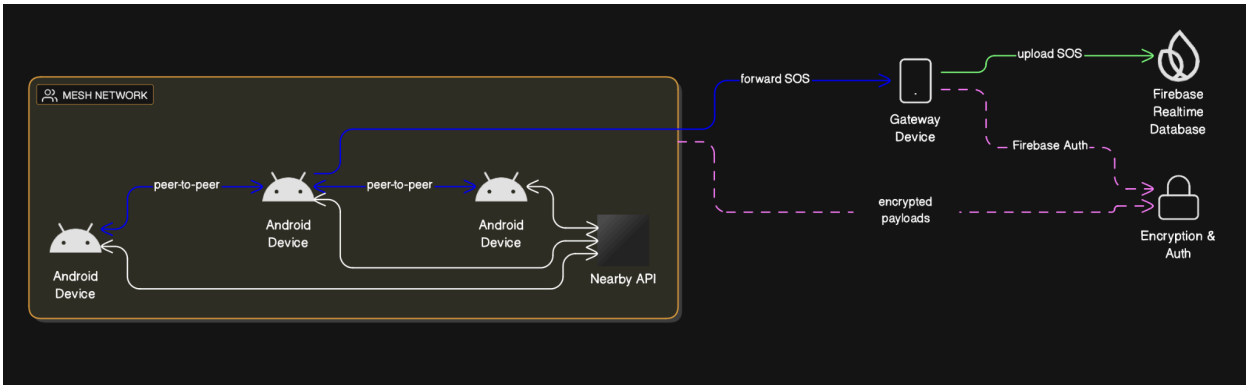
Google Technologies Used

- Google Nearby Connections API
- Firebase Realtime Database
- Google Play Services
- Android SDK (Kotlin)

System Architecture

(The gateway device dynamically changes based on which phone has internet access.)

- **Android Devices (Offline Mesh)**
- **Google Nearby Connections API**
- **Gateway Device**
- **Firebase Realtime Database**



KEY FEATURES

- Works without internet
- Multi-hop SOS message delivery
- Automatic cloud sync when internet is detected
- Real-time network and gateway status
- Optional encrypted location sharing
- Transparent message logging

CHALLENGES FACED

(while making this system)

- Reliable message delivery without internet
- Permission handling across Android versions
- Mesh stability across different devices
- Gateway detection and delivery confirmation

Future Scope

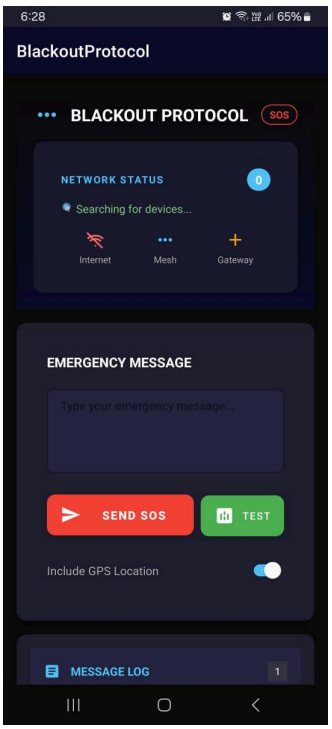
- AI-based SOS priority classification
- Authority-side monitoring dashboard
- Large-scale disaster mesh deployment
- Advanced routing and optimization

Conclusion

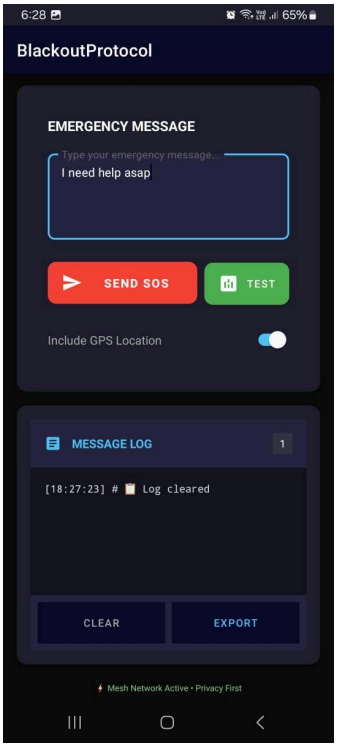
Blackout Protocol ensures emergency communication during disasters when traditional networks fail. It is an offline-first, resilient, and practical system designed for real-world emergency scenarios.

Screenshots of project :

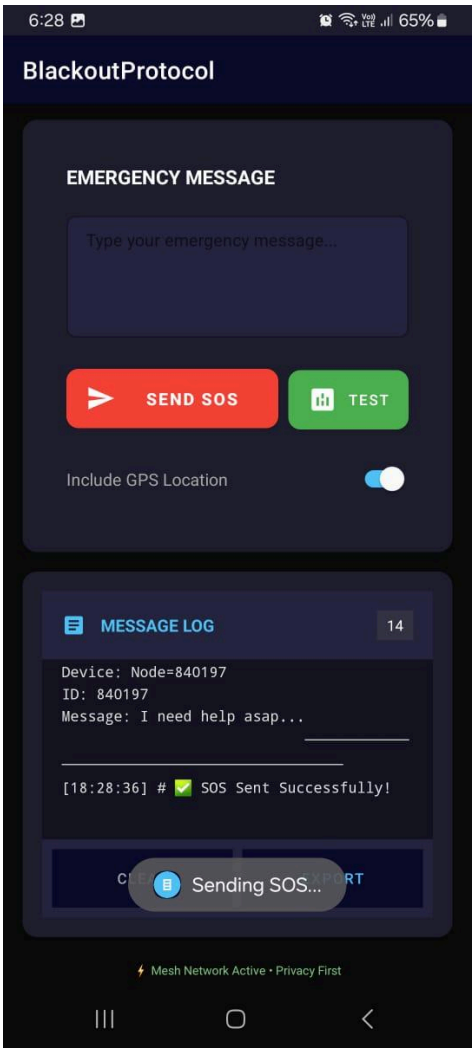
Home Screen :

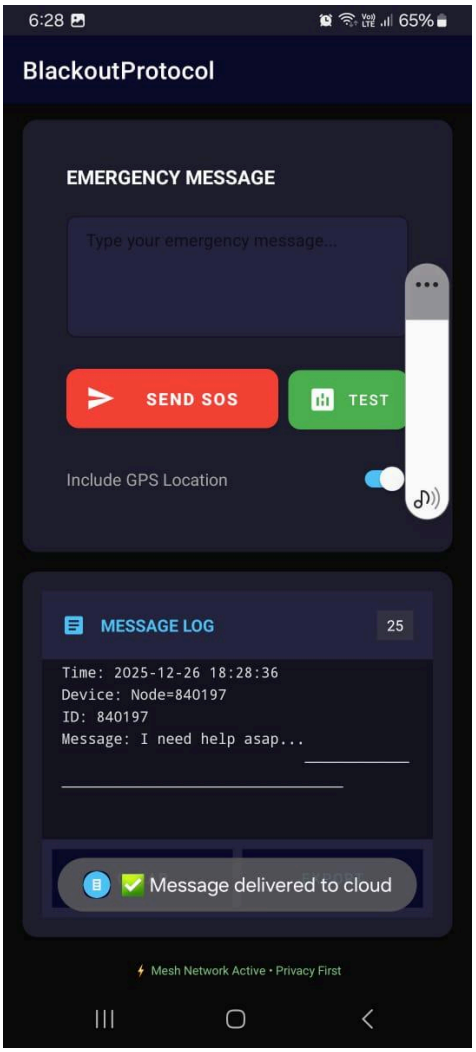


Sending message :



Process View :


6:28
65%
BlackoutProtocol
EMERGENCY MESSAGE
Type your emergency message...
SEND SOS
TEST
Include GPS Location
MESSAGE LOG
14
Device: Node=840197
ID: 840197
Message: I need help asap...
[18:28:36] # SOS Sent Successfully!
Sending SOS...
Mesh Network Active • Privacy First


6:28
65%
BlackoutProtocol
EMERGENCY MESSAGE
Type your emergency message...
SEND SOS
TEST
Include GPS Location
MESSAGE LOG
25
Time: 2025-12-26 18:28:36
Device: Node=840197
ID: 840197
Message: I need help asap...
Message delivered to cloud
Mesh Network Active • Privacy First

Firebase Screenshot :