

Fatima Zariwala, Aditya Gupta, Dr. Anil Mehta.  
Mission Unicorn.

## TOUR GUIDE EFFECT (Abstract)

For reducing response time during the "Golden Hour" of an emergency, a system with rich situational awareness information is required. Therefore in this poster, we propose an experimental setup assisting an individual to build a real time emergency communication system with multimedia sharing capabilities in a controlled environment. However we understand building a robust real time communication can pose multiple challenges. Hence the proposed poster illustrates a roadmap with resolution to possible hurdles. The major blocks of setup include building a mobile application on Android OS, setting up VPS (Virtual Private Server), using Kamailio SIP proxy server, configuring firewall and a hosted website for unified dashboard.

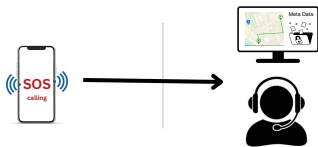
A major focus of this work is the development of a mobile application, which provides seamless interoperability across the SIP proxies, end devices and routers. Poster explains architectural overview and resolution to challenges concerning battery optimization, maintaining persistent connectivity with the server, and managing background operations to guarantee reliable performance. We employed VPS service from hostinger, allowing us to build a cost effective and highly scalable set up. As the backbone of our communication system we have used the Kamailio server. Setup and configuration for Kamailio is explained in the poster to establish a reliable peer to peer connection with SIP calling and multimedia sharing. Further to protect our system from bulk SIP vicious attacks Firewall setting is also explained.

This poster outlines strategies for tackling technical challenges and presents a foundational method that can be adapted and improved according to specific needs.

## WHY IS THIS IMPORTANT?

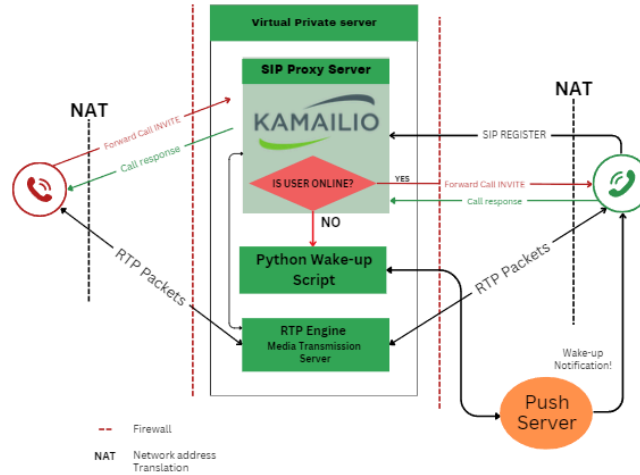
We have installed an emergency communication set up on a campus level allowing a person to call, via SIP protocol, for help through an app. Figure1 illustrates use case.

The major roadblock while building the system was the unavailability of an effective experimental set up guide, resulting in high time consumption. We have addressed major hurdles in different elements, helping an individual to quickly navigate through the fundamental blocks.



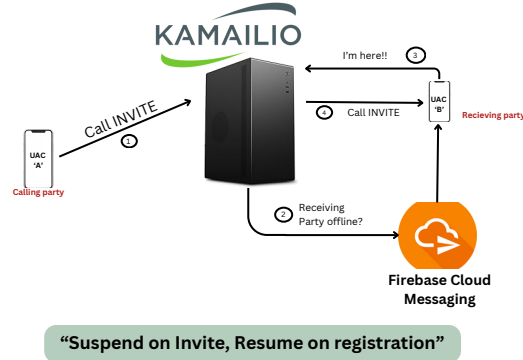
## OUR VEHICLE

### High-level architecture of SIP communication set-up:



### Connection/VOIP Calling Process

### Waking-Up App through Push Notification:



"Suspend on Invite, Resume on registration"

## THE ROAD SHOW

### Battery Optimization Issues on Android devices:

- System restricting background Services on latest Frameworks on Android like Xiaomi, Oppo, Vivo.
  - App does not auto start after device reboot.
  - Foreground Services restarting with 10 to 15 delay.
  - User is registered with the server but unresponsive.
  - App not able to send keep alive request to server (no re-registration).
  - Service priority decreasing in android 14 or higher not allowing app to persistently run in background.
  - App sleeps after some time causing failure in receiving incoming call
- Manually allow App-auto restart from setting.
  - Disable battery optimization permissions.
  - Add registration code in the foreground services to send keep alive.
  - Enable userLoc Module in kamailio to run options scripts.
  - Use push notifications services wake up app and trigger registration function.

UserLoc module sending options request to registered users:

```

Scenario A: UAC Reachable
47:56:107385 x OPTIONS
47:57:046791 x 200 OK

```

Scenario A: UAC Reachable

```

Scenario B: UAC Unreachable
212.26.94.76:8029 69.29.241.57:11211
16160:146:250217 x OPTIONS

```

Scenario B: UAC Unreachable

### Multiple registration of a single user :

- Multiple Aor's of same user
- Sending registration through multiple ports on app causing multiple ringing on the UAC.
- Set the <UUID> in the contact field of header.
- Set a static port for the Transport type (UDP or TLS) while sending registration through app.
- Store the randomly generated port in the default config file upon initial setup.

### RTP streams missing and Push notification services related issues:

- RTP packets not sent over IPv4 to IPv6 networks.
- Call received via push notification but calling party not able to receive 200 ok (SDP).
- Missing RTP streams terminates the transaction.
- RTP engine assuming FAILURE ROUTE while resuming.
- Disable IPv6 and use IPv4 only network.
- Configure ICE, STUN AND TURN server.
- Ensure 'record route' is attribute is added while resuming transaction.
- RTP Engine called via `rtp_manage()` should not be used in the route of `suspend()` function, instead use in `branch_route()` (see fig).