# Infrastructureless Communication on the Android Platform

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## Motivation

"They lied [to] us. Told us Egypt died 30 years ago, but millions of Egyptians decided to search and they found their country in 18 days."
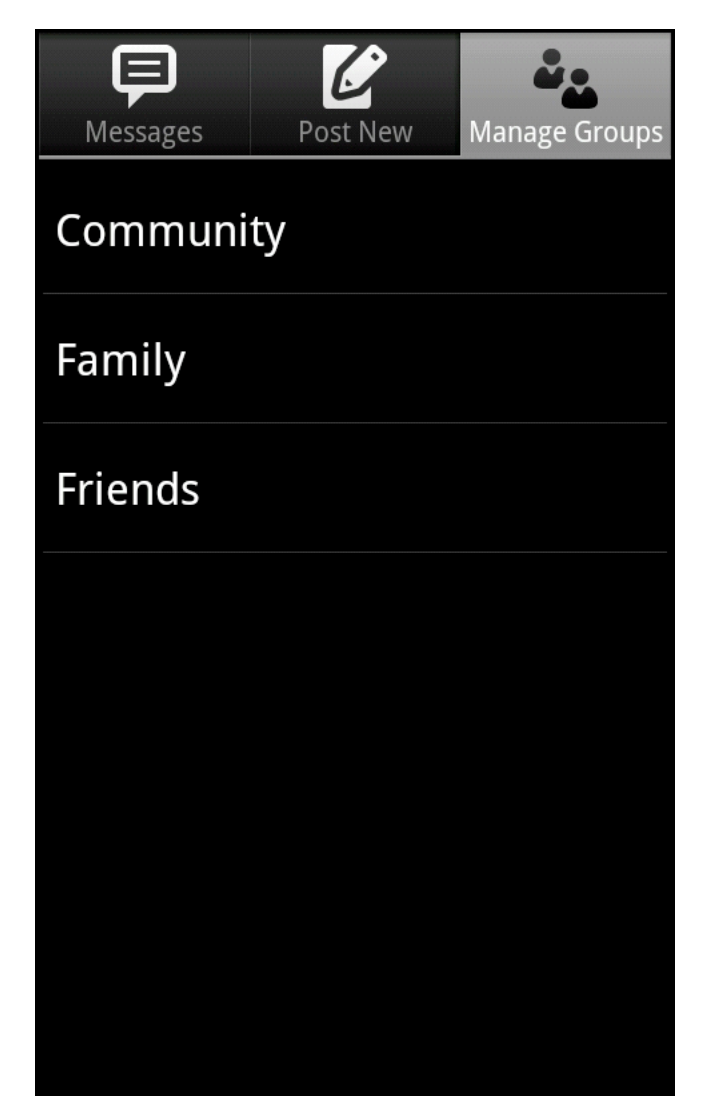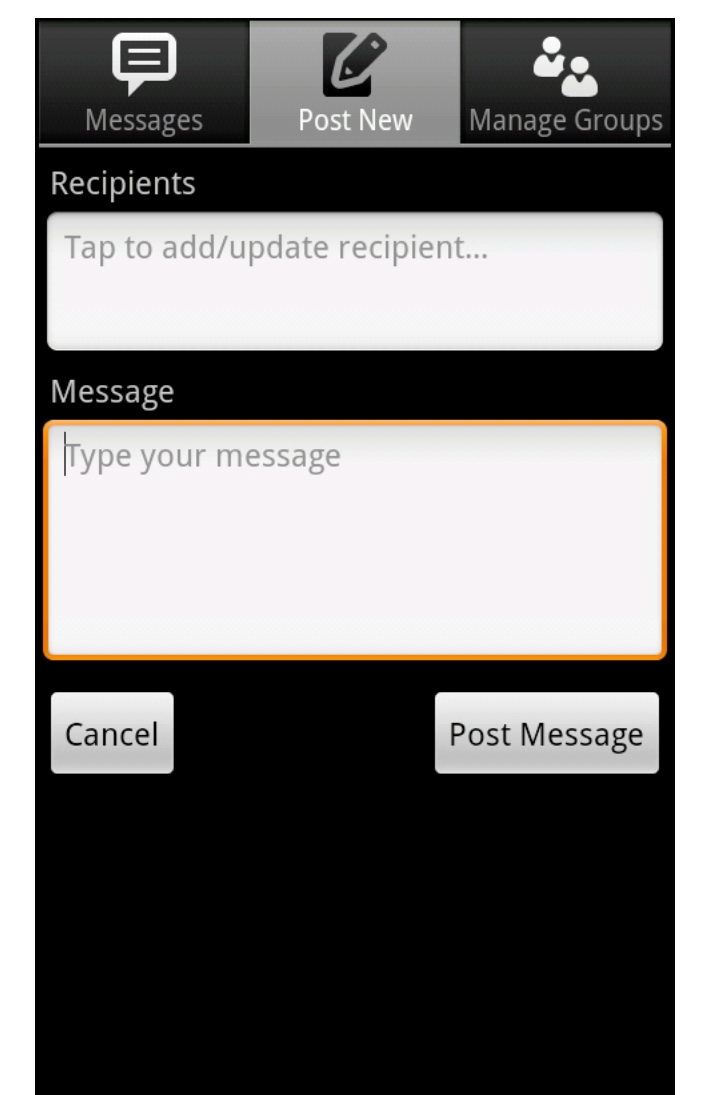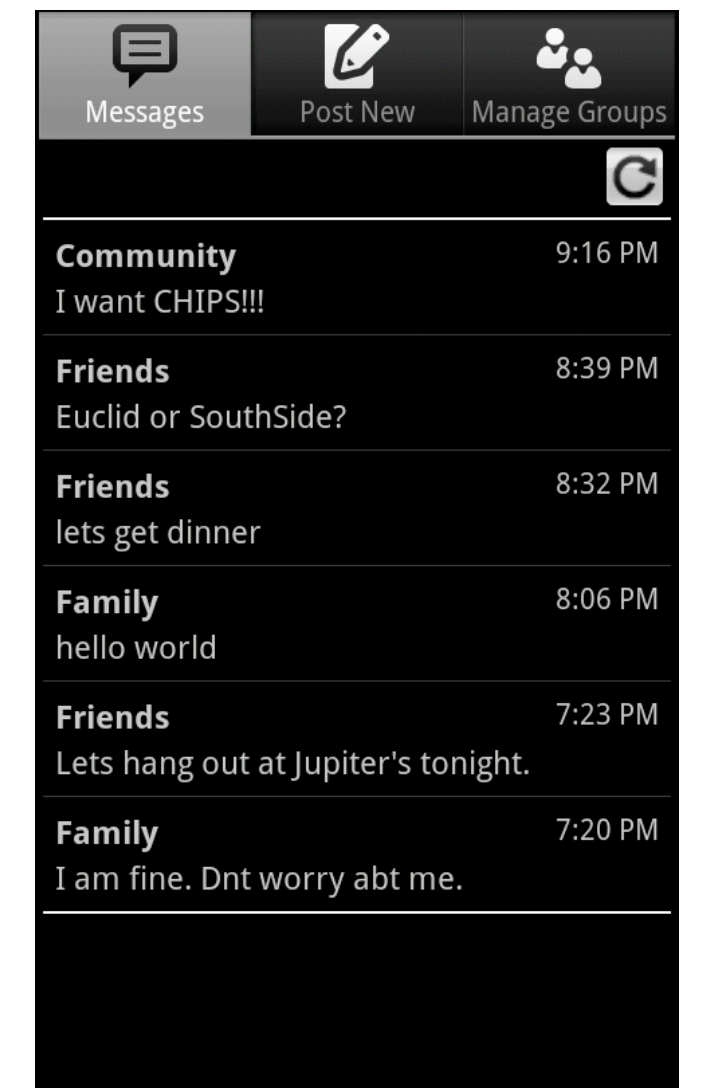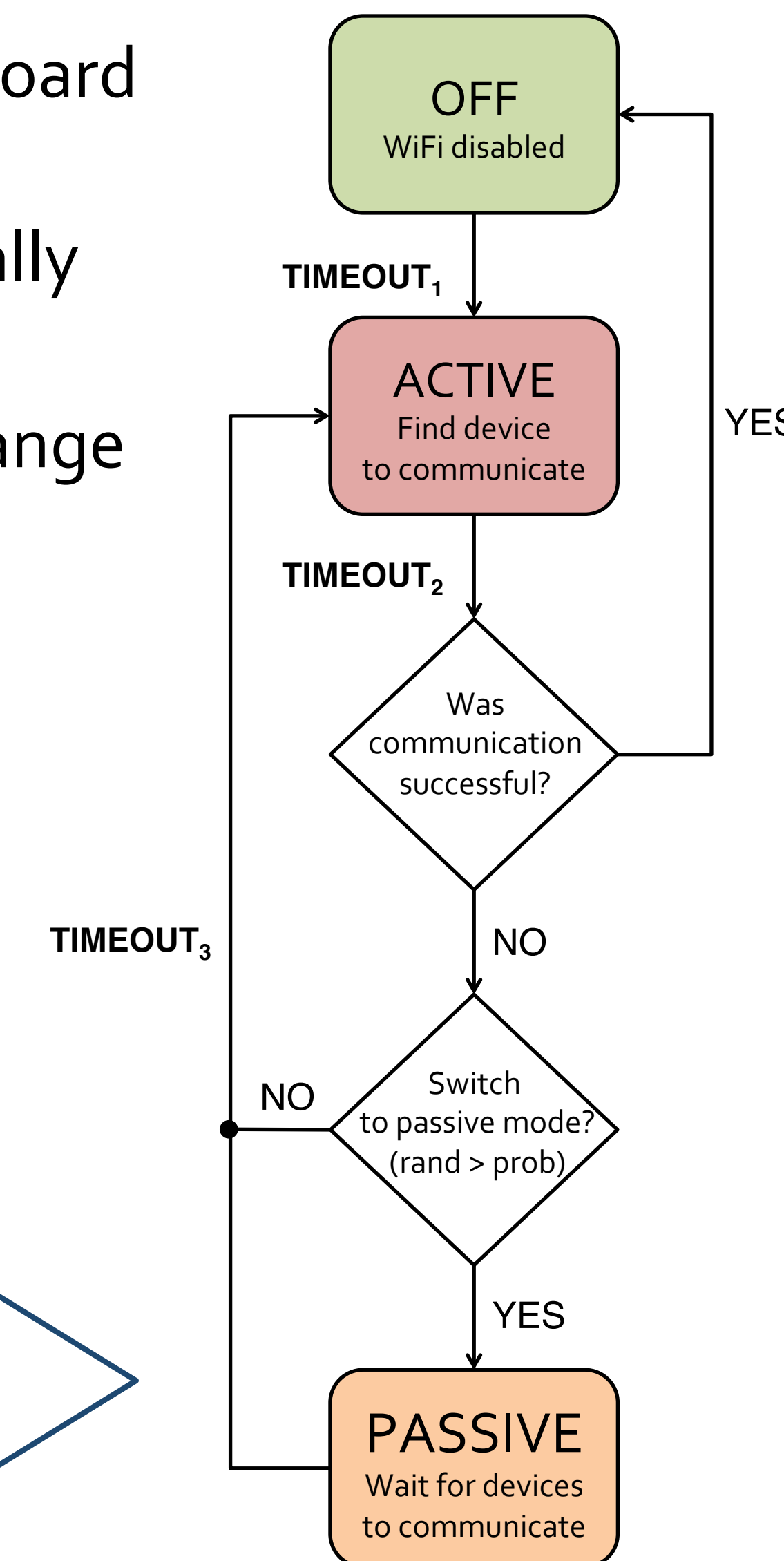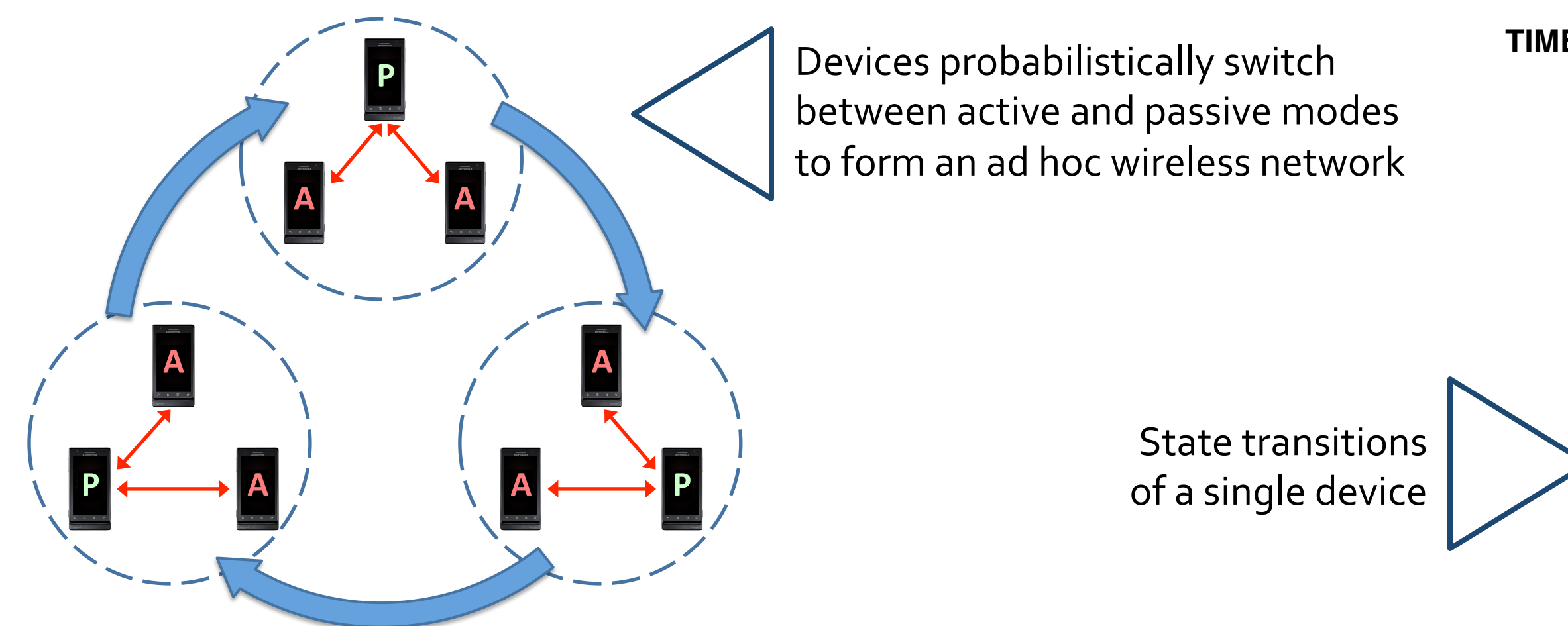
-- @Ghonim

"URGENT CALL Wounded desperately need medical supplies in Bab El Loq and transport to hospital. DM me for details."

-- @occupiedcairo

"There are certain core values that ... we believe are universal: freedom of speech, freedom of expression, people being able to use social networking."
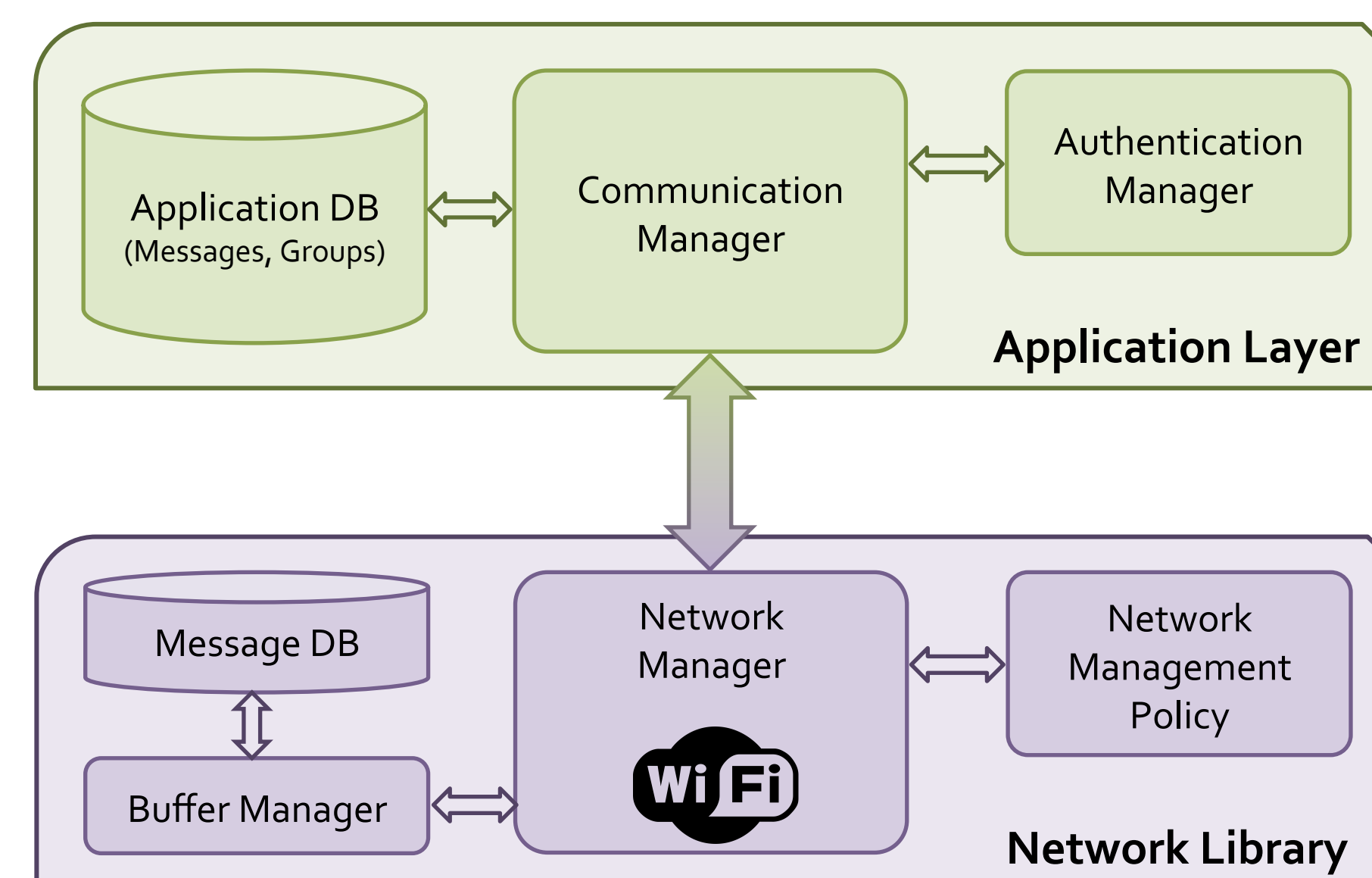
-- President Obama

Consider the recent events in Egypt where communication was disrupted when the government cut Internet connectivity. Given the ubiquity of smartphones and the bevy of radios onboard each phone, there is little reason that the scenario in Egypt should have impeded electronic communication between citizens. This is to say that since smartphones are fully equipped to communicate with one another, there is little reason for the Internet to be the only communication substrate. Therefore, by developing a delay-tolerant peer-to-peer message passing library, we remove reliance on the cellular networks; hence, we potentially enable people to exchange information in the absence of traditional communication infrastructure.

## Operation

- Devices form a mobile ad hoc network using onboard wireless radios
- All participating devices store and opportunistically forward messages
- Devices in **active mode** seek, connect, and exchange stored messages with devices in **passive mode**

Devices probabilistically switch between active and passive modes to form an ad hoc wireless network

State transitions of a single device

OFF
WiFi disabled

$TIMEOUT_1$

ACTIVE
Find device to communicate

YES

$TIMEOUT_2$

Was communication successful?

NO

$TIMEOUT_3$

NO

Switch to passive mode? (rand > prob)

YES

PASSIVE
Wait for devices to communicate

Messages | Post New | Manage Groups

Community 9:16 PM
I want CHIPS!!!

Friends 8:39 PM
Euclid or SouthSide?

Friends 8:32 PM
lets get dinner

Family 8:06 PM
hello world

Friends 7:23 PM
Lets hang out at Jupiter's tonight.

Family 7:20 PM
I am fine. Dnt worry abt me.

Messages | Post New | Manage Groups
Recipients
Tap to add/update recipient...
Message
Type your message

Cancel | Post Message

Messages | Post New | Manage Groups

Community

Family

Friends

## Architecture

Application DB (Messages, Groups)

Communication Manager

Authentication Manager

**Application Layer**

Message DB

Network Manager

Network Management Policy

Buffer Manager

WiFi

**Network Library**

### Application Layer
- Authenticates and filters messages based on groups
- Manages application data based on UI interactions

### Network Library
- Maintains connectivity to other devices
- Buffers and forwards messages