Introduction to WiFi Direct

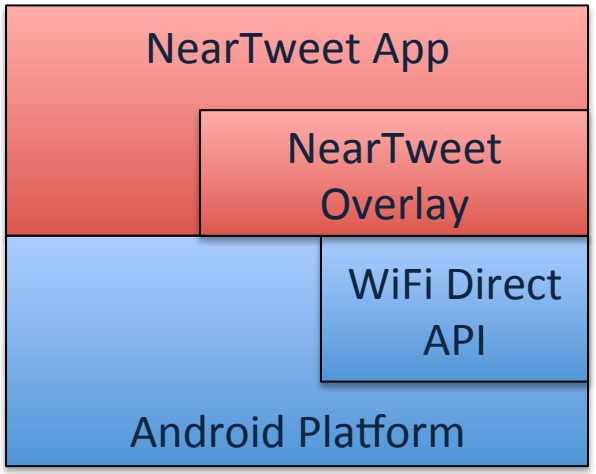
Mobile Computing

2012/13

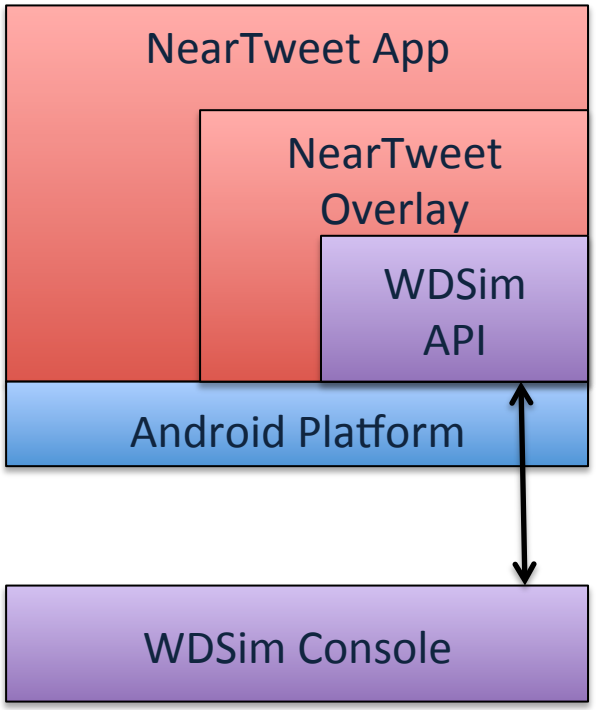
1. WiFi Direct in NearTweet

NearTweet Software Stack

Using
WiFi Direct



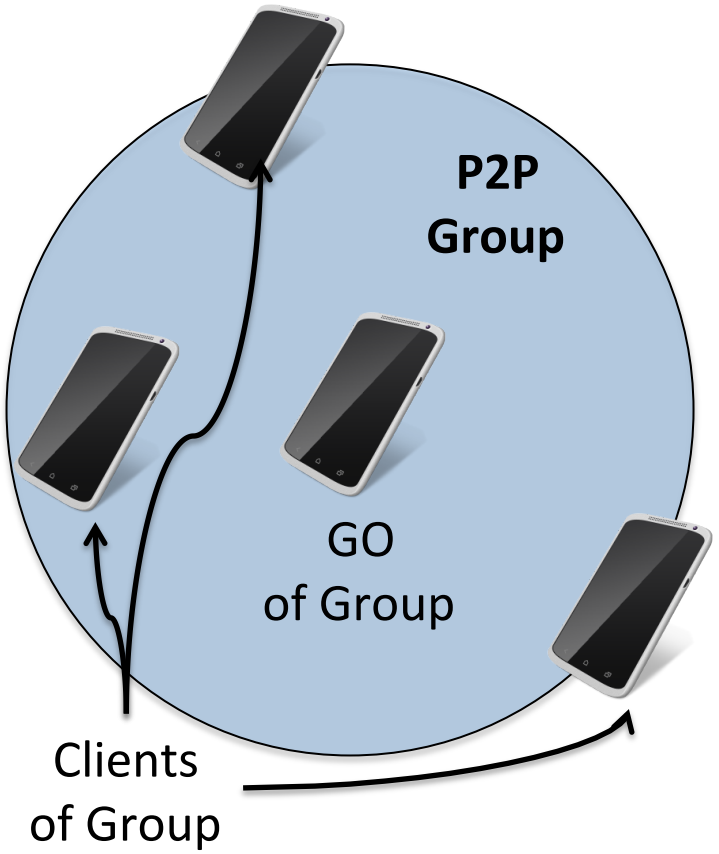
Using
WiFi Direct Simulator (WDSim)



2. Overview of WiFi Direct

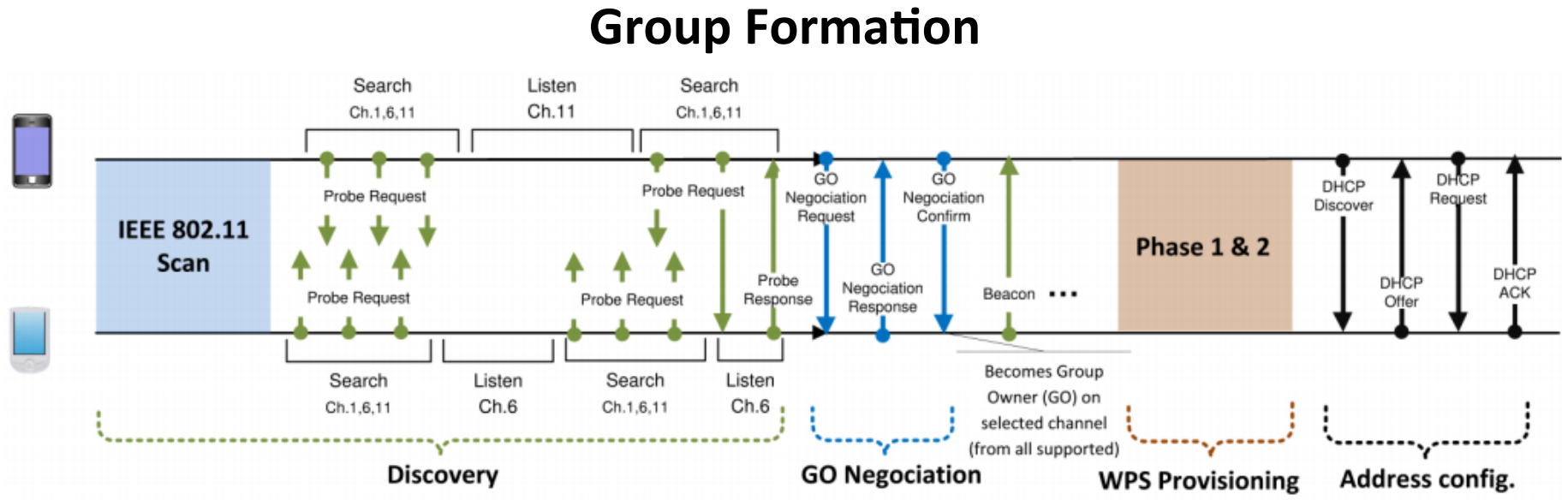
Architecture: P2P Groups

- WiFi Direct device roles
  - WiFi AP and client
- Devices form P2P Groups
  - Group Owner (GO) is the AP
  - Clients connect to the GO
  - The GO assigns IPs to clients

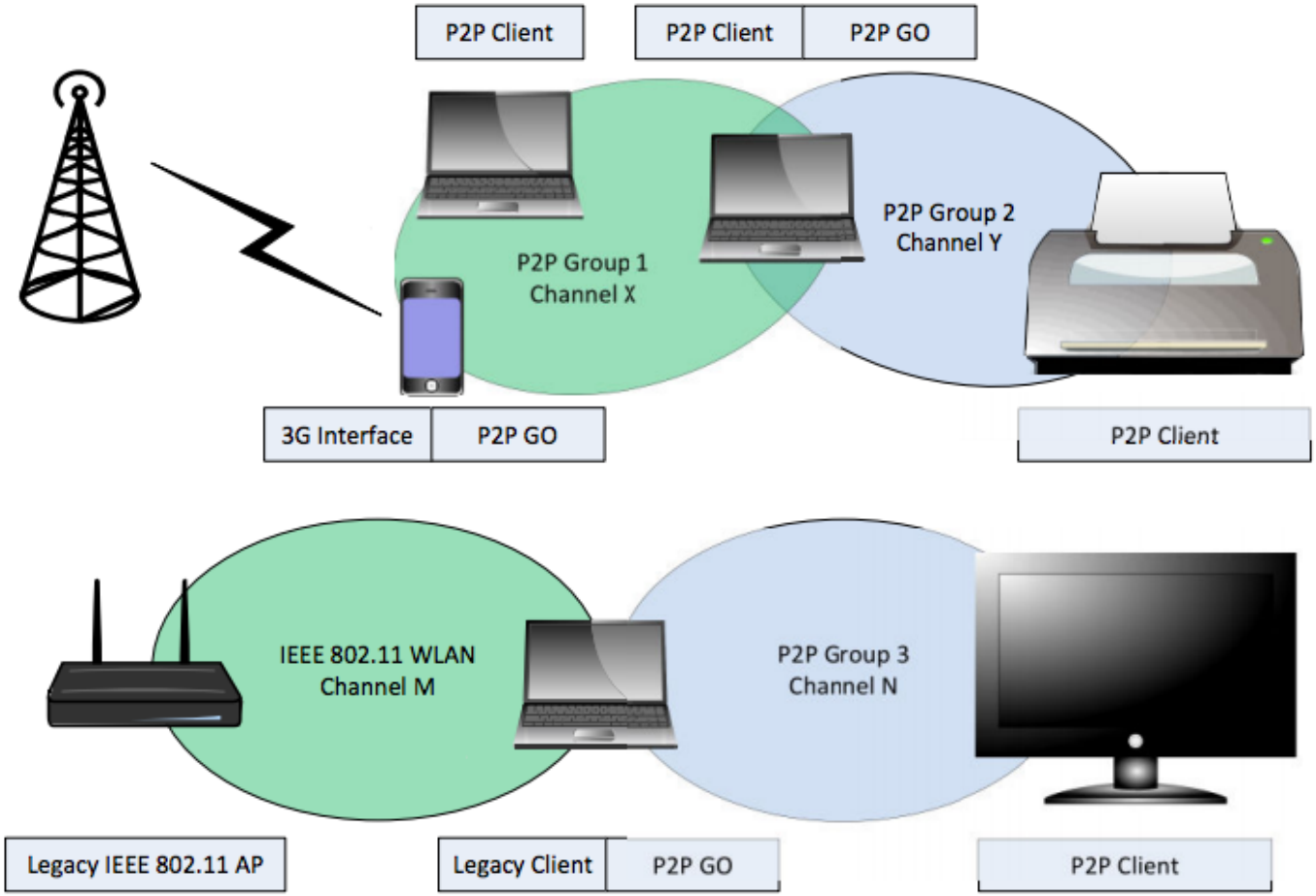


P2P Group Lifecycle

1. Group formation
   - Discovery, GO negotiation, Address config
2. Data transfer
3. Group tear down

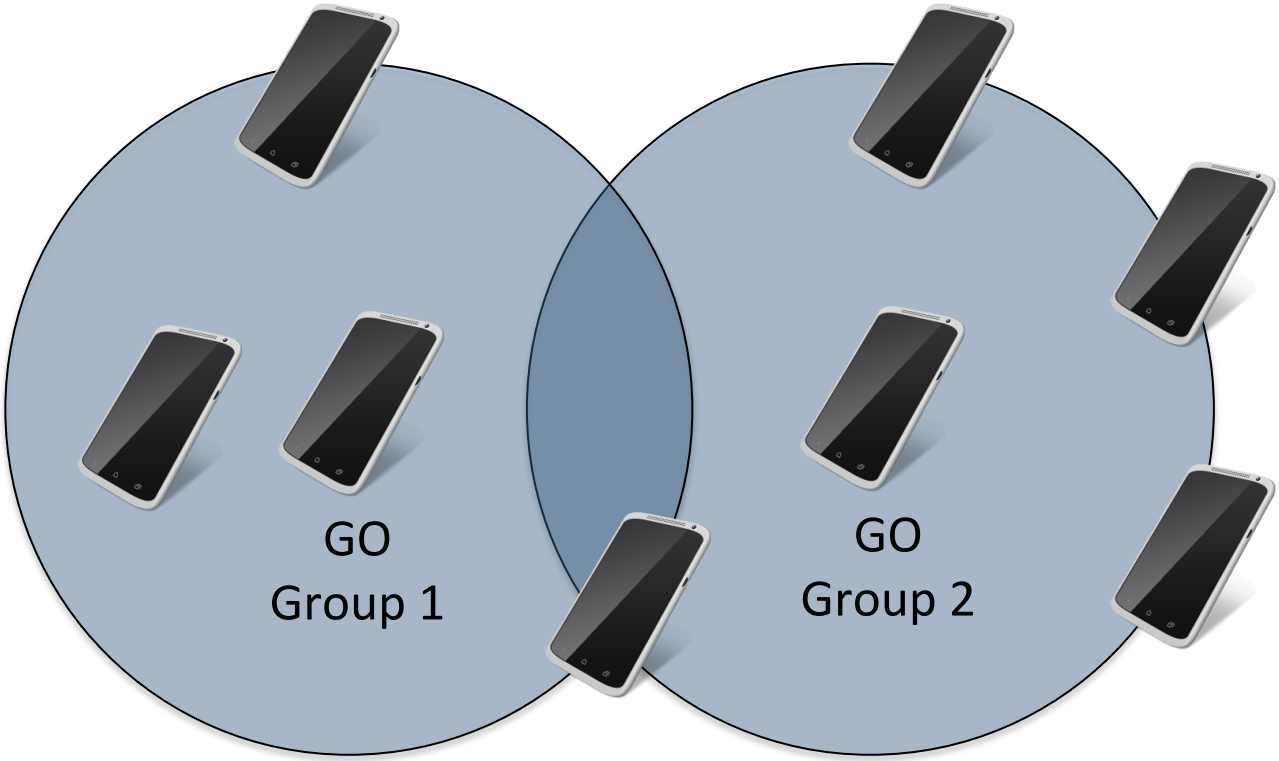


Examples of Supported Topologies



3. NearTweet Network

NearTweet Network: Overlay of P2P Groups



NearTweet network comprising two P2P groups

Job of the Overlay

- Manage network membership
  - Handle nodes entering and leaving the network
- Route messages in the overlay
  - Send messages within and across P2P groups
- Manage distributed state
  - E.g., buffer messages, order tweets, count spam flags

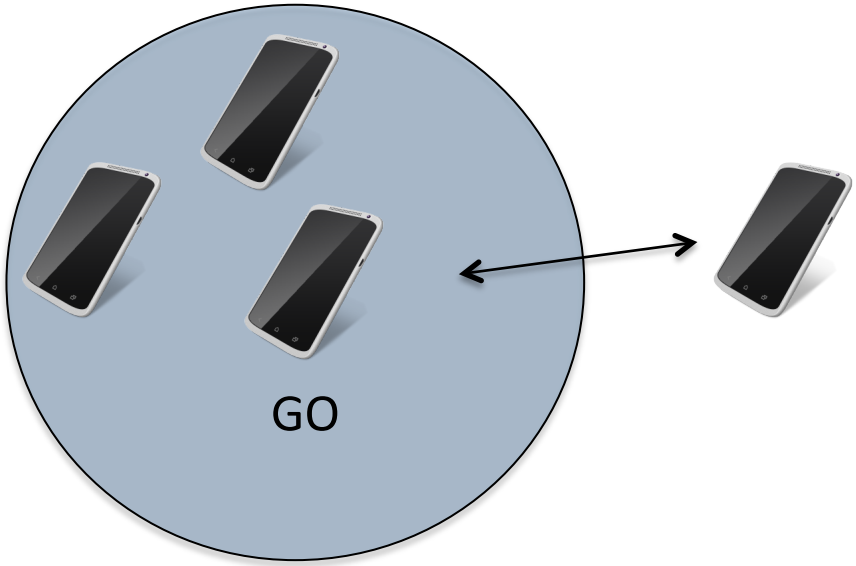
Recommended Development Stages

- Implementation in the general case very hard
  - Highly dynamic network
  - Fully decentralized architecture

- Restrict implementation to three use cases
  1. Single group, client node moves
  2. Single group, GO node moves
  3. Two groups bridged by client node

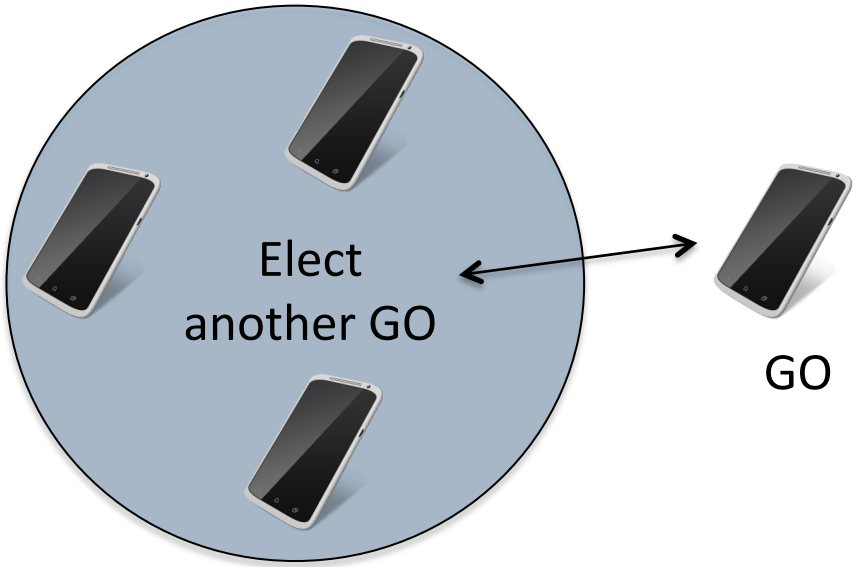
Use Case 1: Single Group, Client Moves

- The simplest use case:
  - One P2P group: one OG, multiple clients
  - The OG never leaves
  - Handle single clients in / out



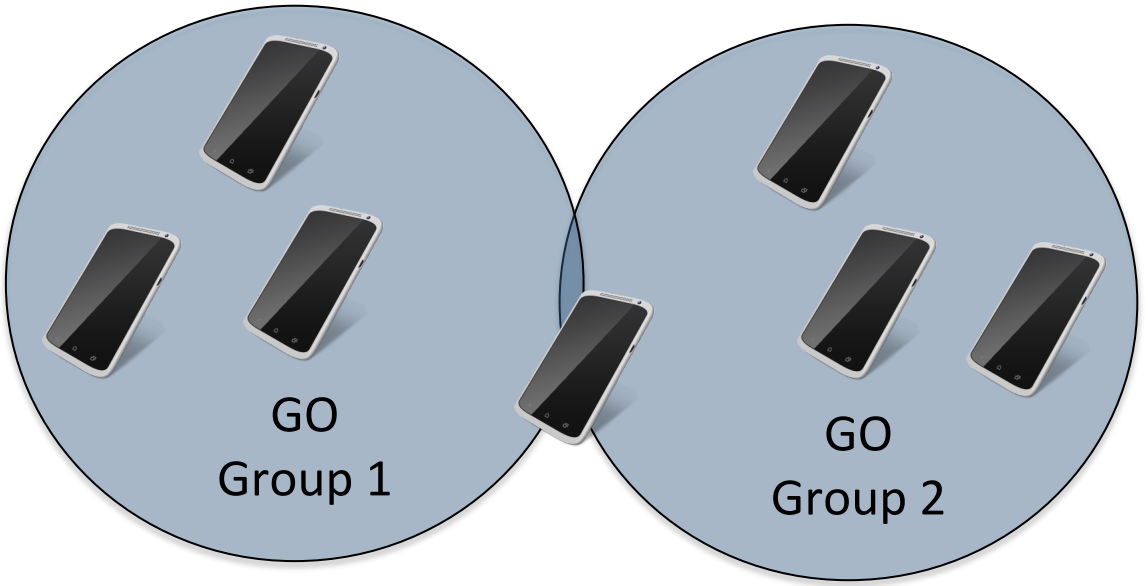
Use Case 2: Single Group, GO Moves

- Slightly more complex:
  - One P2P group: one OG, multiple clients
  - Handle OG leaving orderly
  - Clients must re-elect a new OG



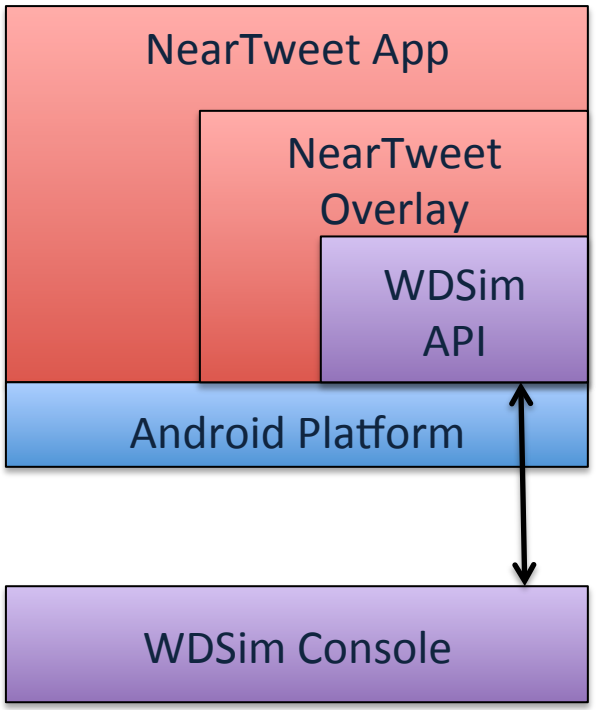
Use Case 3: Groups Bridged by Node

- The most complex:
  - Two P2P groups: one node bridges them
  - Handle the bridge node in / out
  - Must merge / split the overlay network



4. WiFi Direct Simulation

WiFi Direct Framework (WDSim)

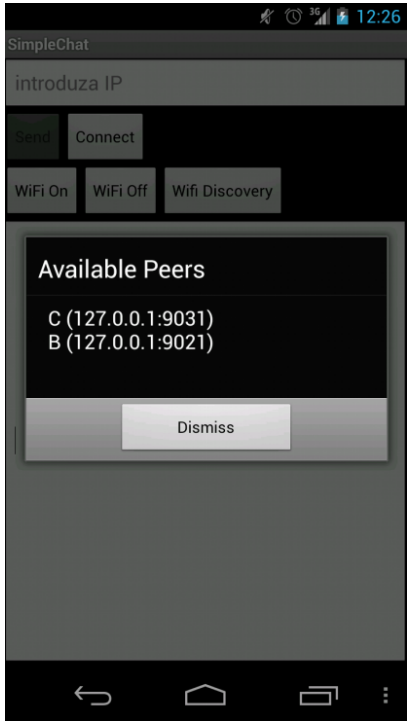


Emulated Device

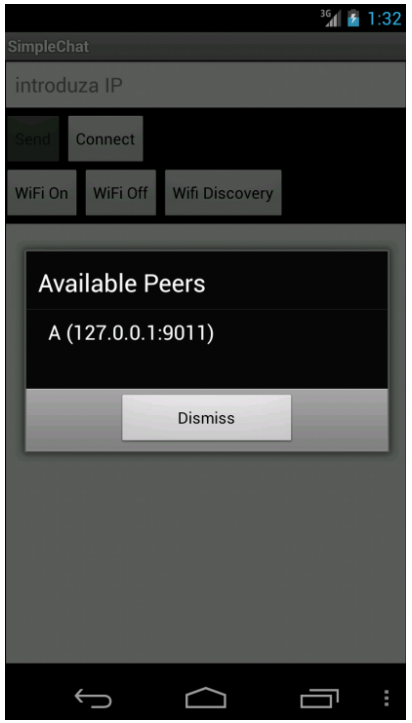
Standalone App

Today's Assignment

- Follow the lab guide available on the website:
  - "Simulation of WiFi Direct"



Node A



Node B