

Grid Battle

A turn-based strategy network game

Junjie Gu

Introduction

- Add multiplayer aspect
- Over local area network
- Evaluate different network conditions



Outline

- Introduction
- Background
- Design
- Implementation
- Results
- Conclusions

Turn-Based Strategy Game

- Turn based
- Chess like
- Omnipresent
- example: Sid Meier's Civilization



iOS LAN game

- wireless local area network
- peer to peer architecture
- high transfer rate
- widely used on iOS

Design

- Actions include move, attack, spell magic, rest and screen moving
- Each player can execute actions on 2 units on each turn
- A timer constrains actions done in 30 seconds



Network Framework

- P2p communication architecture
- Not simultaneously, instead one way communication
- Using GKSession API

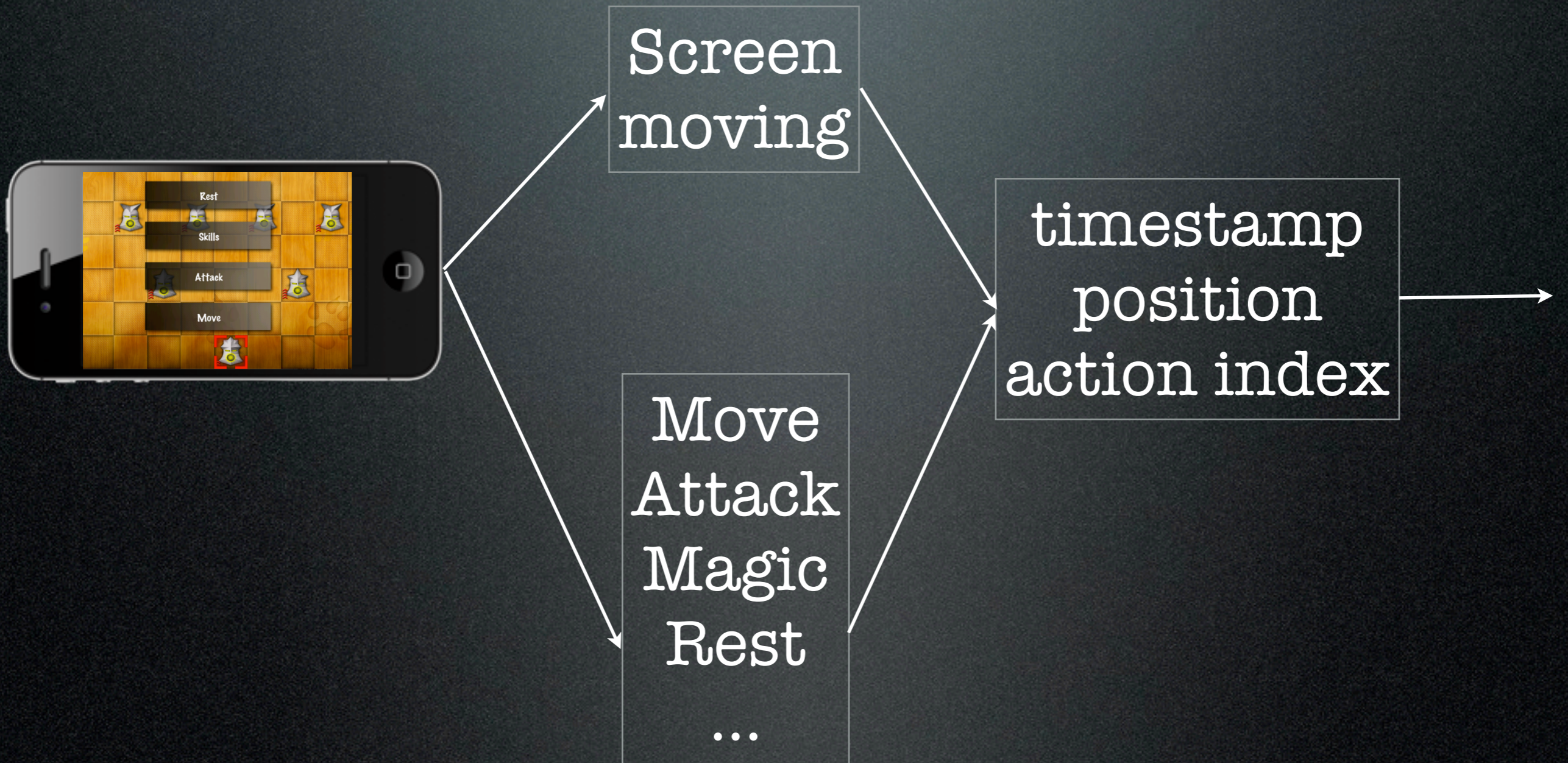
GKSession

- discover and connect nearby device
- using both Wi-Fi or bluetooth
- also provides basic VoIP
- don't know network protocol

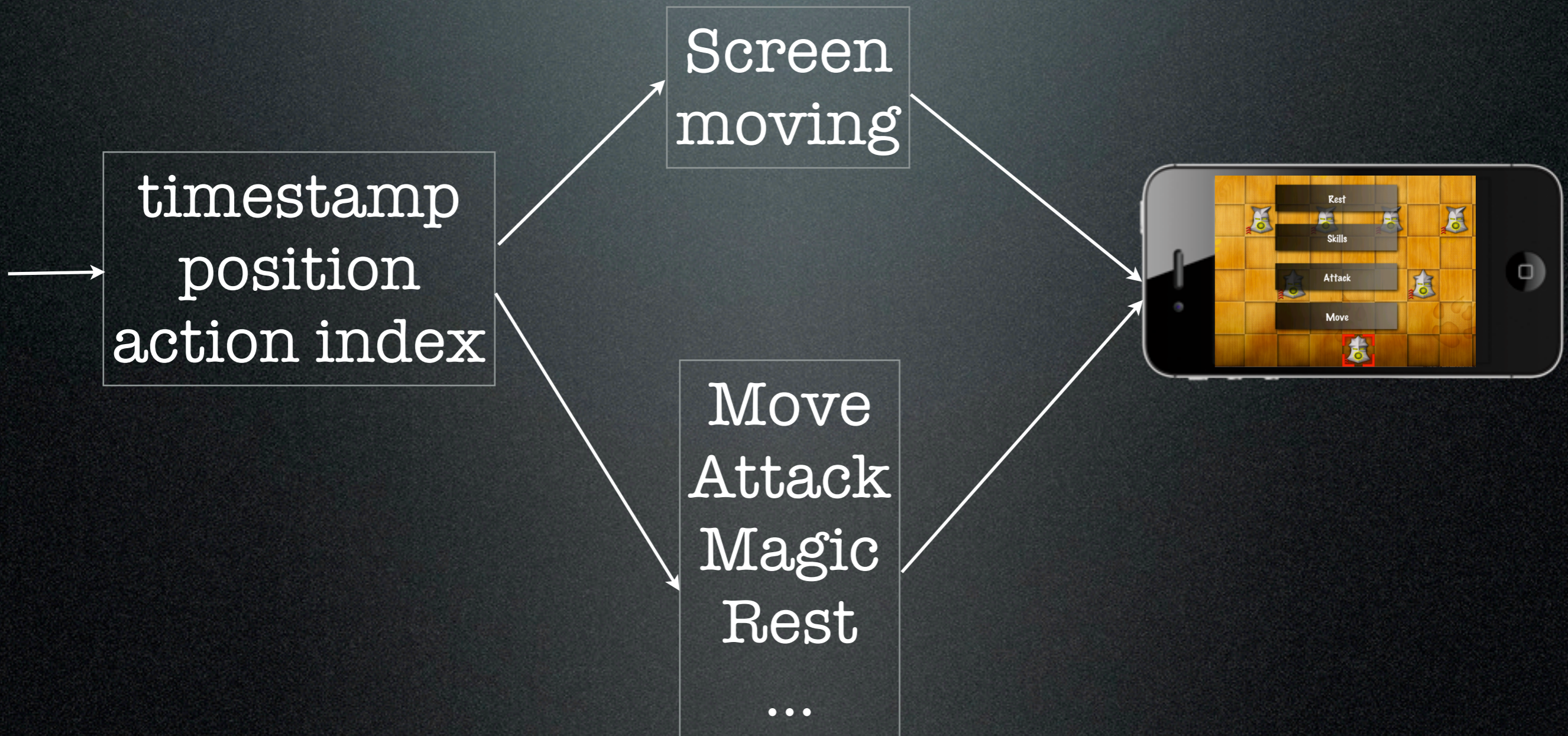
Synchronization method

- Touch events not sent
- Only sends actions data
- Timer to synchronize time

Framework



Framework



Jitter affect screen moving

send time

receive time



server

client

1

1

2

5

3

5

4

5

5

5

6

9



no buffer

Client side buffer

- not process directly on receiving data, instead push into buffer
- Pop out periodically (0.01s/0.05)
- hypothesis: should improve smoothness while increase delay



using buffer

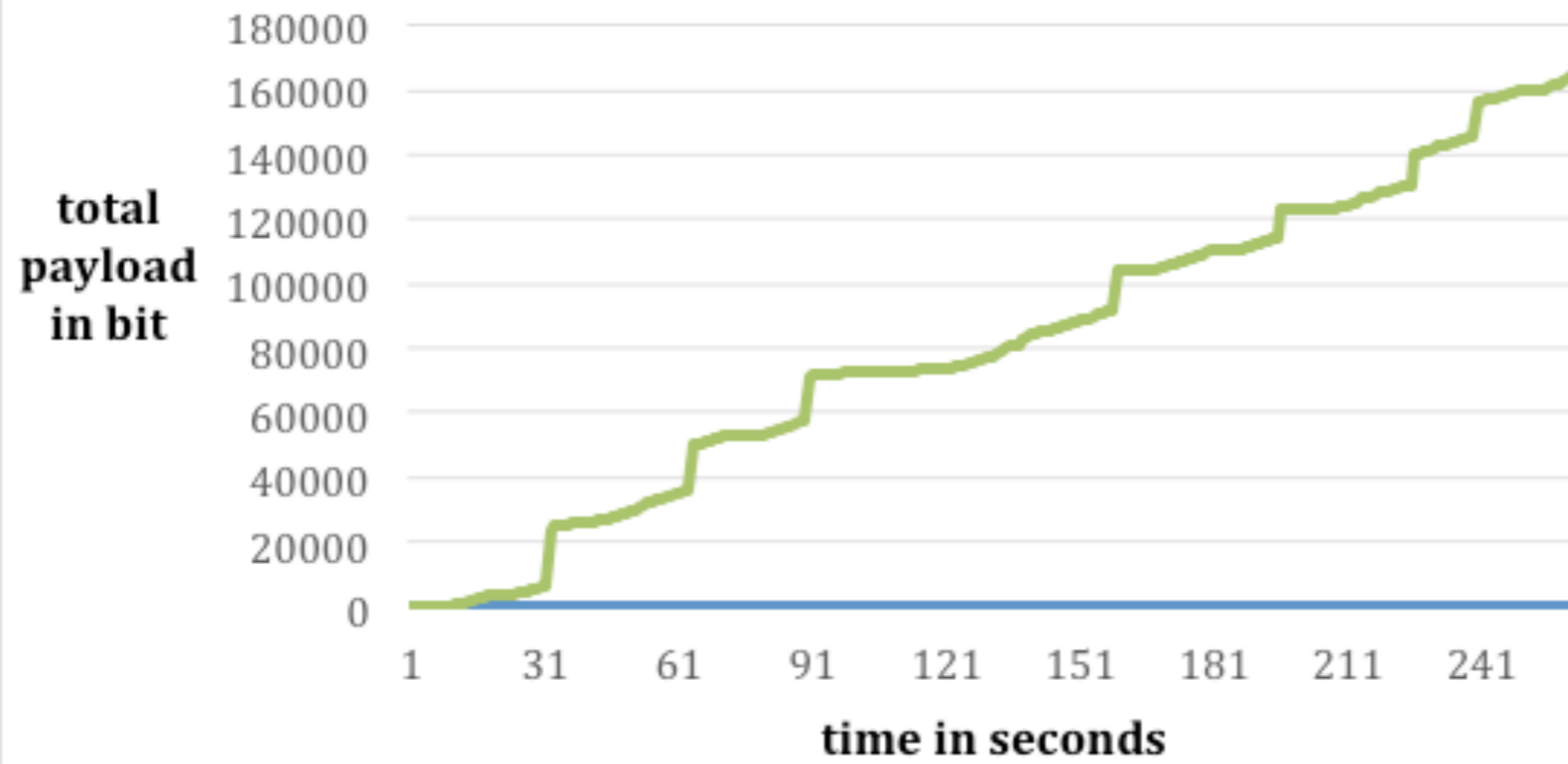
Other concerns

- Packet loss will be found if game states varies.
- Jitter doesn't affect menu actions, does affect screen moving.
- Bandwidth should be small

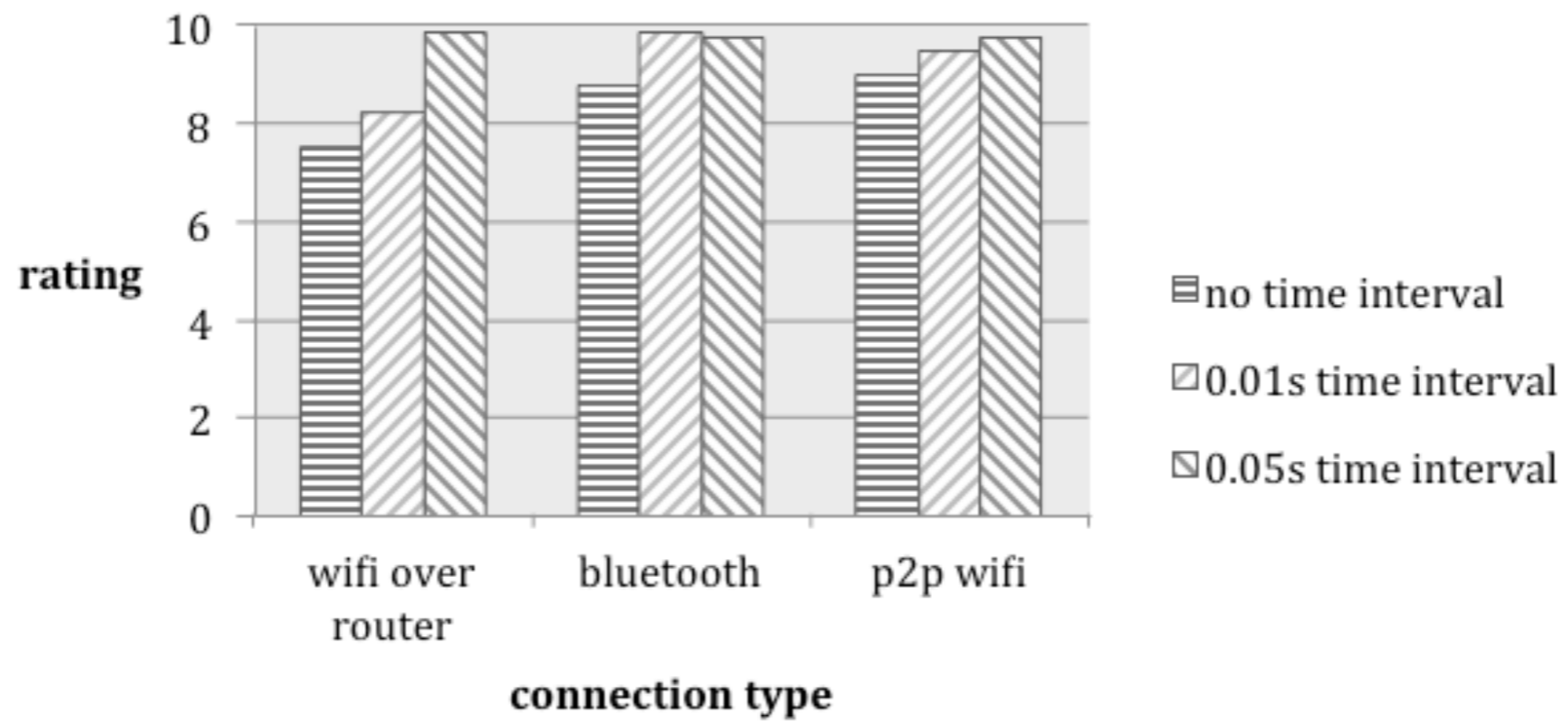
Evaluation

- 2 iPhone 5 with iOS 6.1.2
- 3 users
- 1 minute for each test
- use router Wi-Fi, p2p Wi-Fi and bluetooth
- use 0s, 0.01s, and 0.05s buffer timer

Cumulative Payload



User Opinions



Conclusions

- Users can play against each other in LAN without bug
- Bluetooth and p2p Wi-Fi works well
- no packet loss because states are always the same
- delay is not a problem for this game
- Client side buffer works well

Future work

- Add more players
- Use message aggregation

Thank you
questions?