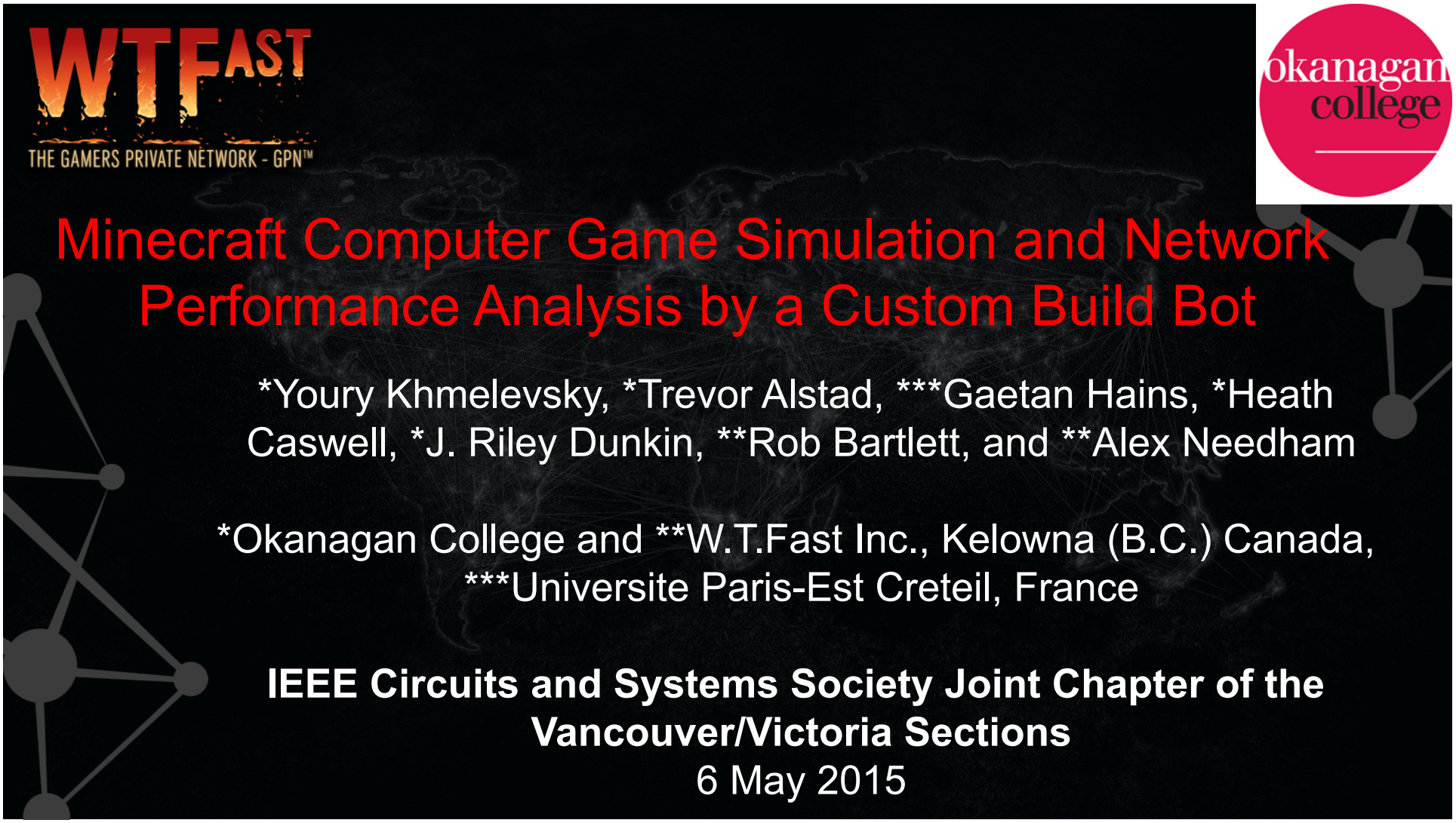
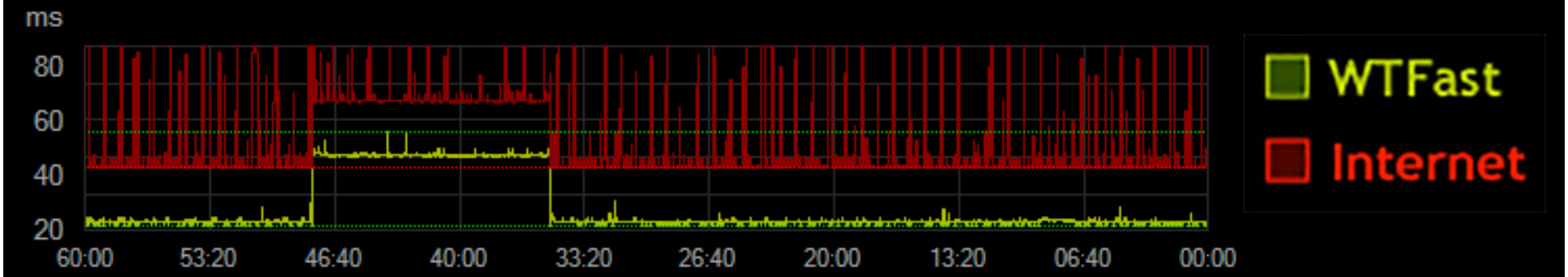

WTFAST
THE GAMERS PRIVATE NETWORK - GPN™
okanagan college
Minecraft Computer Game Simulation and Network Performance Analysis by a Custom Build Bot
*Youry Khmelevsky, *Trevor Alstad, ***Gaetan Hains, *Heath Caswell, *J. Riley Dunkin, **Rob Bartlett, and **Alex Needham
*Okanagan College and **W.T.Fast Inc., Kelowna (B.C.) Canada, ***Universite Paris-Est Creteil, France
IEEE Circuits and Systems Society Joint Chapter of the Vancouver/Victoria Sections
6 May 2015

WTFAST

The Gamers Private Network ™

Value Proposition



- Gamer education = average speed is all that matters
- Reality: Packet Loss > Speed Flux/Spikes > Average Speed
- Compare to boating on smooth versus choppy water
- Connection meter shows WTFast smooth vs. Internet choppy

WTFAST

okanagan college

Project goals

- Analyze game traffic levels and the corresponding load on game servers and network software
- Performance optimization based on current and changing traffic levels
- Investigate traffic monitoring and optimization parallel game server clusters

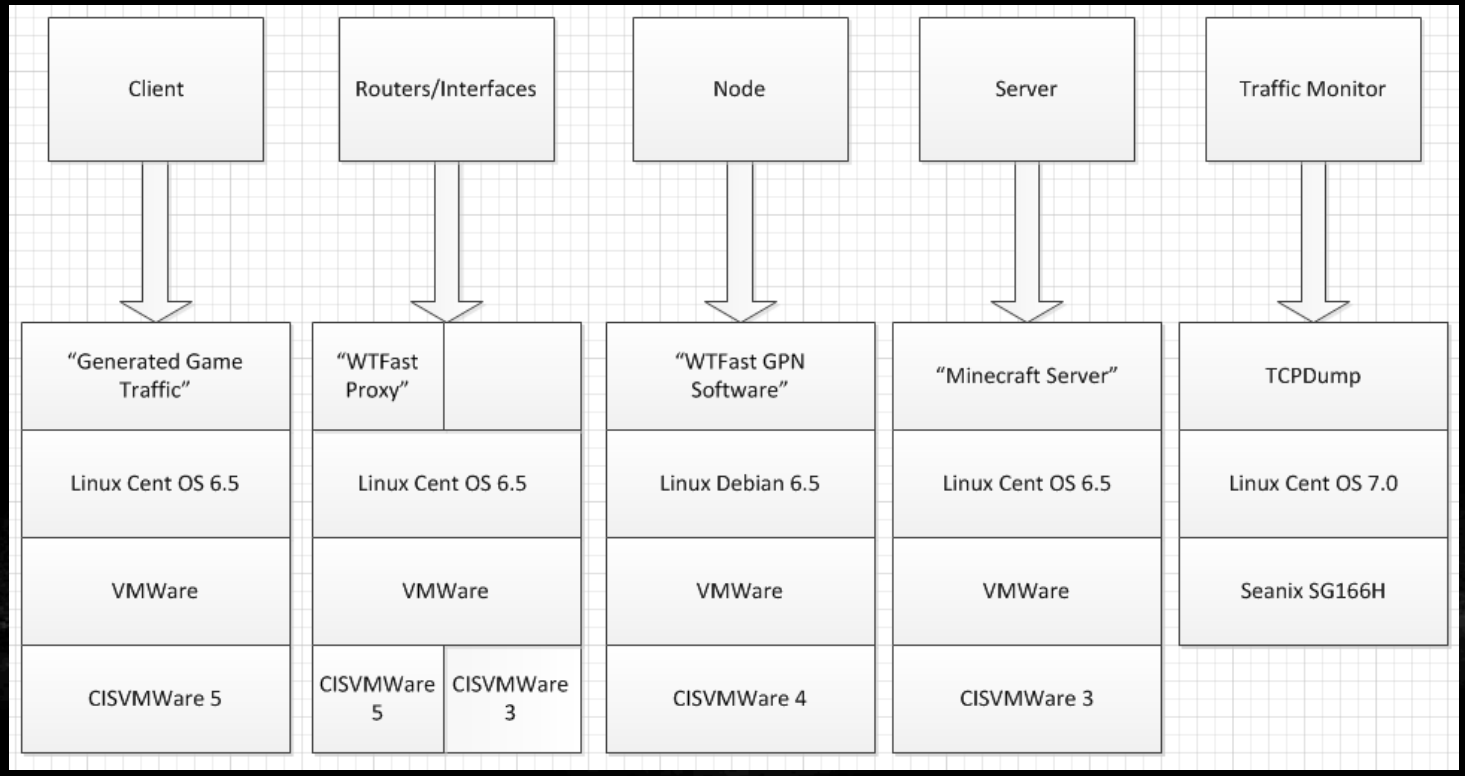
Research Opportunities

- Analyze the causes of game traffic latency
  - Wire latency
  - Server delay
  - High traffic volume
- Test the limits of network software and infrastructure

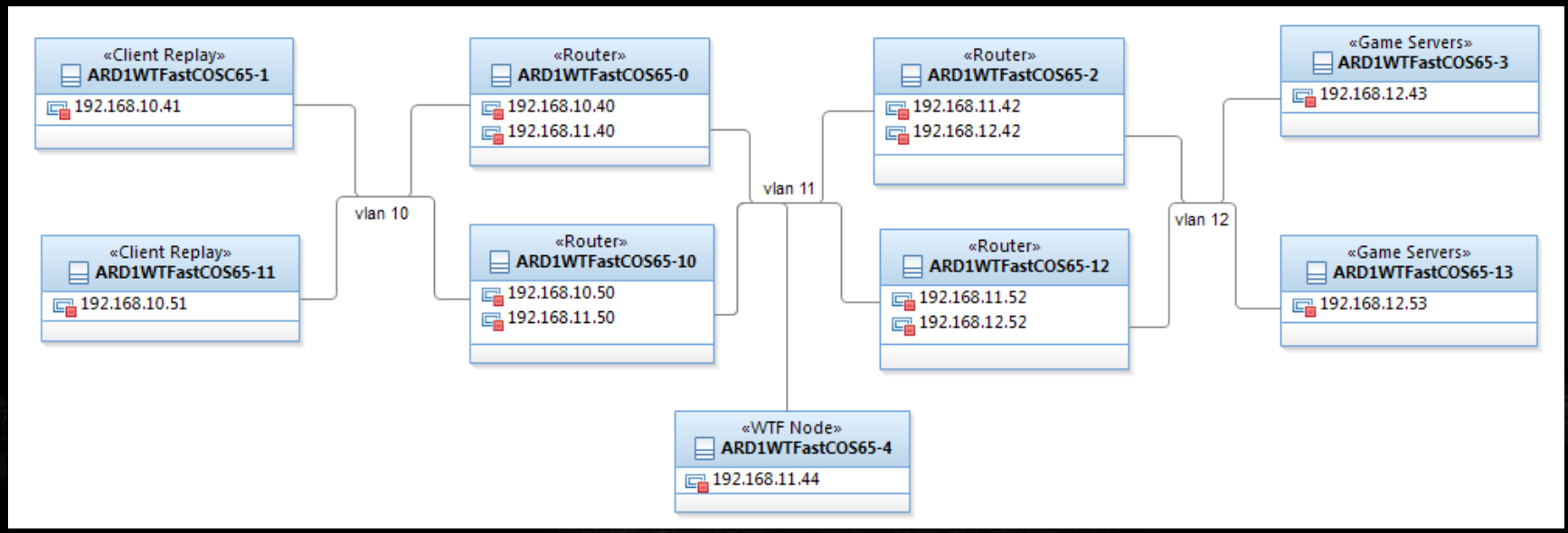
Experimentation

- Minecraft –
  - First-person game with an interactive and changeable world
  - Simple game server hosting
  - Run multiple instances
  - Community development
- Test network
  - “Ideal” network, LAN with negligible wire latency
  - Scalable number of game servers and instances
  - Predictable automated players to generate traffic

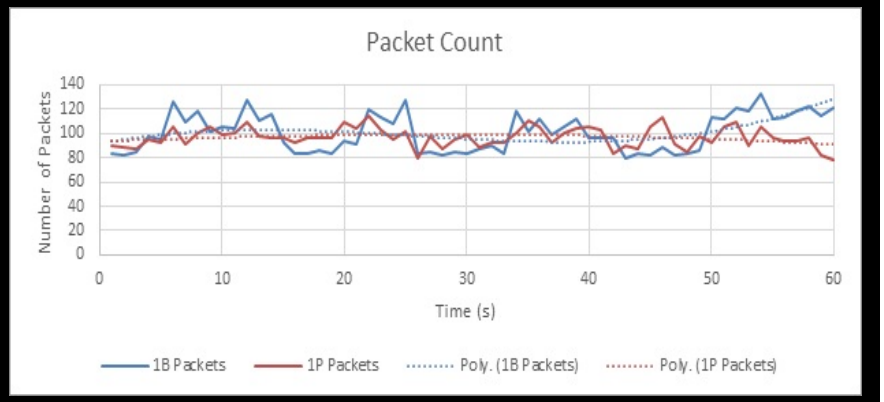
System Architecture



Investigating Infrastructure



Comparison of network traffic generated by an idle player (red) and the “old” idle bot (blue):



- This bot was sufficient to represent an idle player in a complex game world

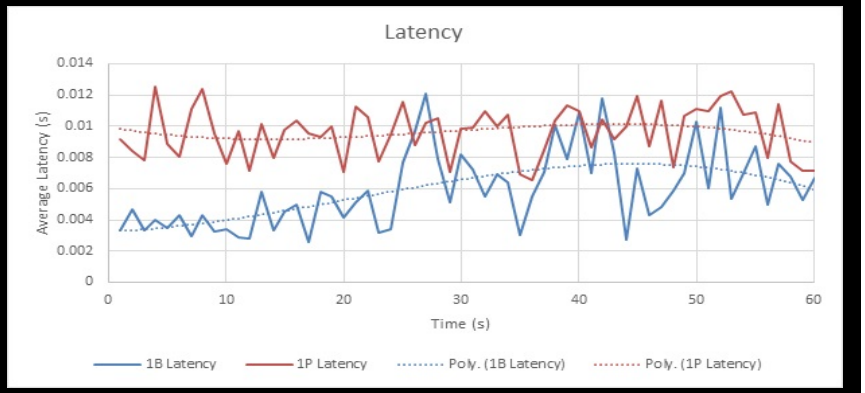
- Problems :
  - this bot is unable to replicate player actions
  - this bot generates very little traffic in a simple game world

WTFAST

Investigating Network Phenomena

okanagan college

The round-trip latency comparison of the bot and an idle player:



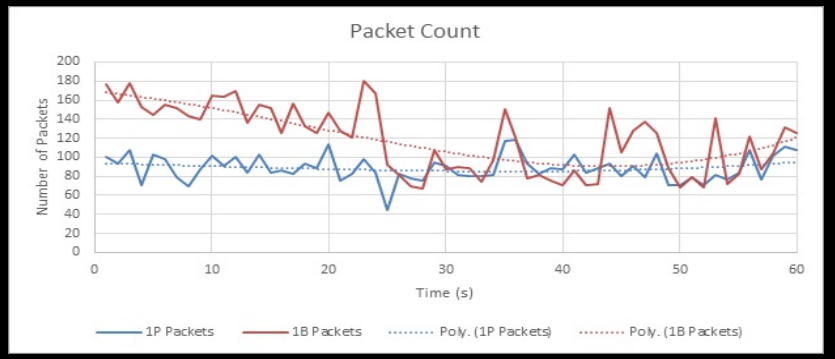
- The delay from when the server receives the packet and when it responds also is measured.
- By subtracting the server response delay from the round-trip time the network delay of the infrastructure was isolated, as shown.
- Results show minimal wire latency, as expected in the ideal environment.

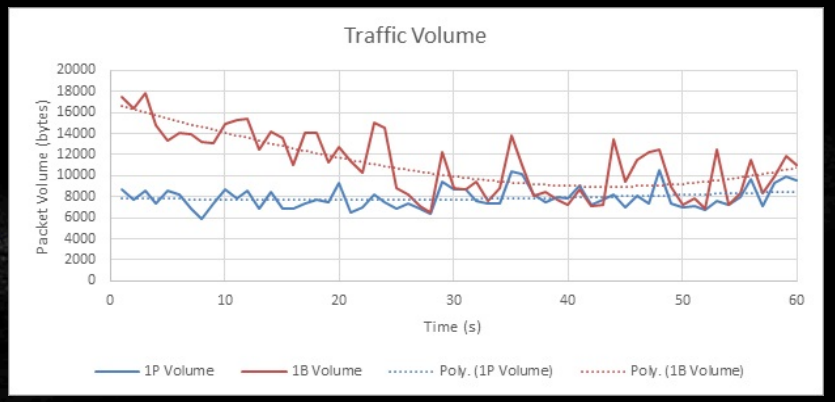
Investigating Network Phenomena

okanagan college

The fixed-ratio correlation between packet count and traffic volume:

- Game data represents only a small fraction of the traffic, protocol overhead amounts to as much as 90% of the volume

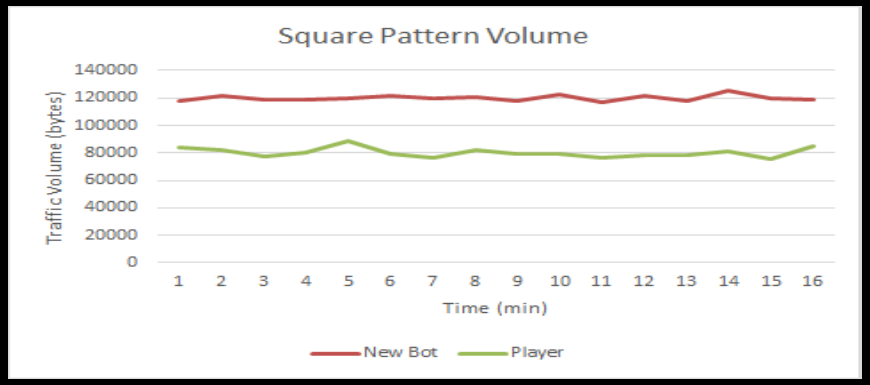


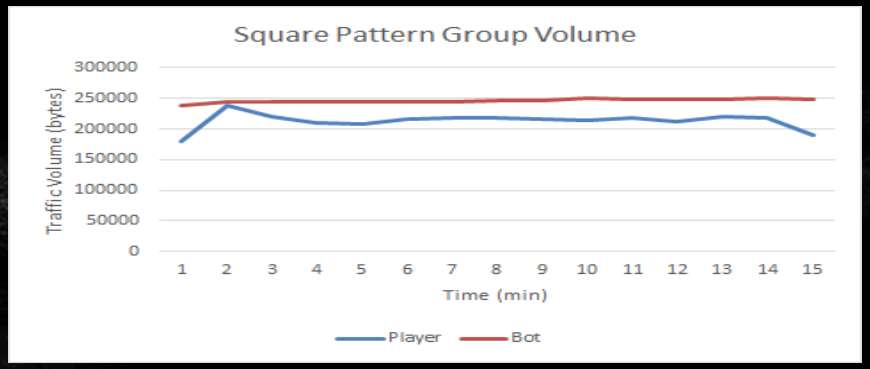


Future Work: Investigating Network Phenomena and new Bot

Comparison of the traffic generated by the “new bot” when performing the same actions as a real player:

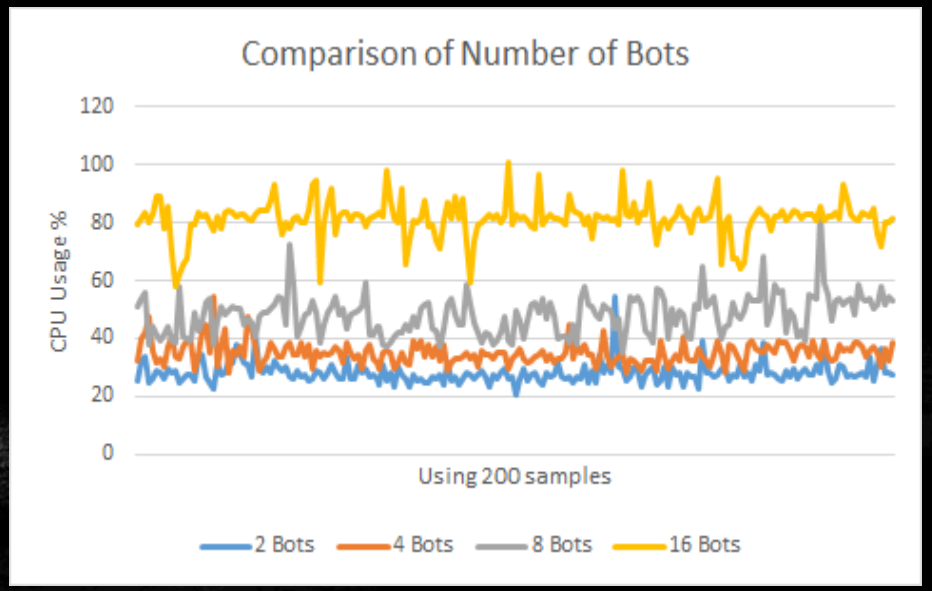
- The bot produces more traffic than a player, but this makes it useful as a worst-case example of player traffic.
- When additional player are in the same area as our test subjects, the volume generated by each increases significantly.
- The difference between the new bot and a player becomes negligible when enough surrounding bots are present





Future work based on the test infrastructure:

- CPU usage of multiple game servers, and multiple VMs
- Traffic generation using thousands of bots
- Detailed analysis of network software and game servers under stress
- Scalable virtual game server infrastructure with GPN gateway



WTFAST

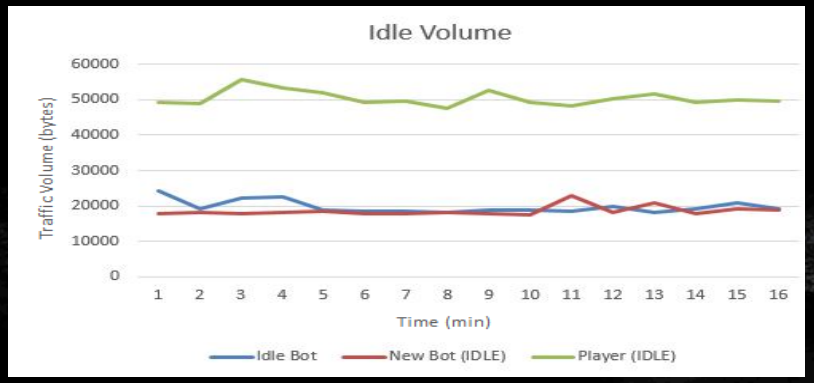
Minecraft Traffic Simulation Bot

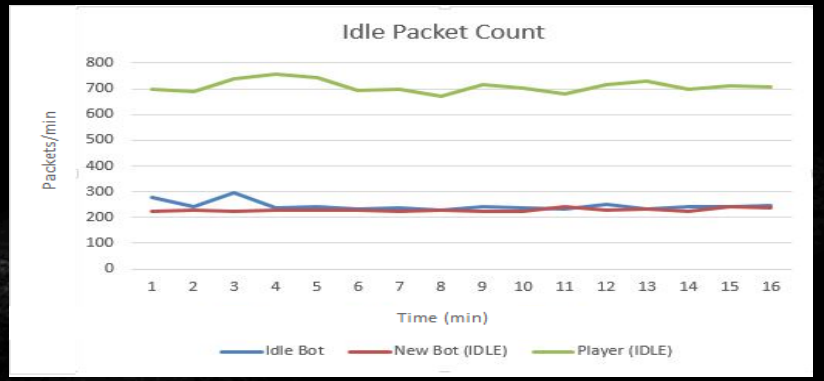
okanagan college

Minecraft Traffic Simulation Bot Video

Idle Traffic Comparison

- Theory: Idle traffic between bots would be similar, with players producing slightly more
- Actuality: Idling players produced more than twice the traffic of an idle bot





Conclusion

- The bot produces traffic that is roughly the same as an idle player
  Dependent on game state, alone it produces less, in groups they produce more
- Idle players generate traffic like active ones
  Less action packets sent, but faster responses to server when idle
- Traffic scales with additional players
  Each player causes its own traffic, plus requires the server to send info about the player to other players, resulting in quadratic growth
- The round-trip latency in the investigating LAN environment is almost entirely due to server-side delays (server processing or delayed TCP acks)


WTFAST
Acknowledgements
okanagan college
Project has been funded by NSERC's College and Community Innovation Program - Applied Research and Development Grant Level-1 in 2014 (Canada): "GPN-Perf: Investigating performance of game private networks".
Two student teams (8 and 3 students) are participating in the project development in the COSC 236: OOSA&D and COSC 470: SW Engineering Project courses.

References

Presentation is based on the following research papers:

- Trevor Alstad, J. Riley Dunkin, Ga´etan Hains, Youry Khmelevsky, Rob Bartlett, and Alex Needham. Minecraft computer game simulation and network performance analysis. In Second International Conferences on Computer Graphics, Visualization, Computer Vision, and Game Technology (VisioGame 2014), Bandung, Indonesia, November 2014.
- Trevor Alstad, J. Riley Dunkin, Simon Detlor, Brad French, Heath Caswell, Zane Ouimet, and Youry Khmelevsky. Game Network Traffic Simulation by a Custom Bot. In 2015 9th Annual IEEE International Systems Conference (SysCon 2015), Vancouver, April 13-16, 2015.