Minecraft Network Defense

Security Education with Competitive Minecraft Scenarios

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What am I talking about?

- Minecraft level set and adversary analysis
- How the game Minecraft can be used to effectively demonstrate network security and network defense concepts.
- Tools and ideas for you to use Minecraft for security education.
- Live Demo?

Minecraft

Minecraft

Level Set

Minecraft

Level Set

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Network Defense

Minecraft

Level Set

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Minecraft

Level Set

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Network Defense? In Minecraft?

- It's more likely than you think.

- Adversaries
- Sample Mapping

Minecraft

Adversaries:
Zombie

Characteristics

- Common
- Lots of HP

- Slow
- Can’t climb walls

Minecraft

Adversaries:
Spider

Characteristics

- Climb walls
- Only attack in low light

Minecraft

Adversaries:
Skeleton

Characteristics

- Ranged attack
- High damage

- Flee from attackers

Minecraft

Adversaries:
Creeper

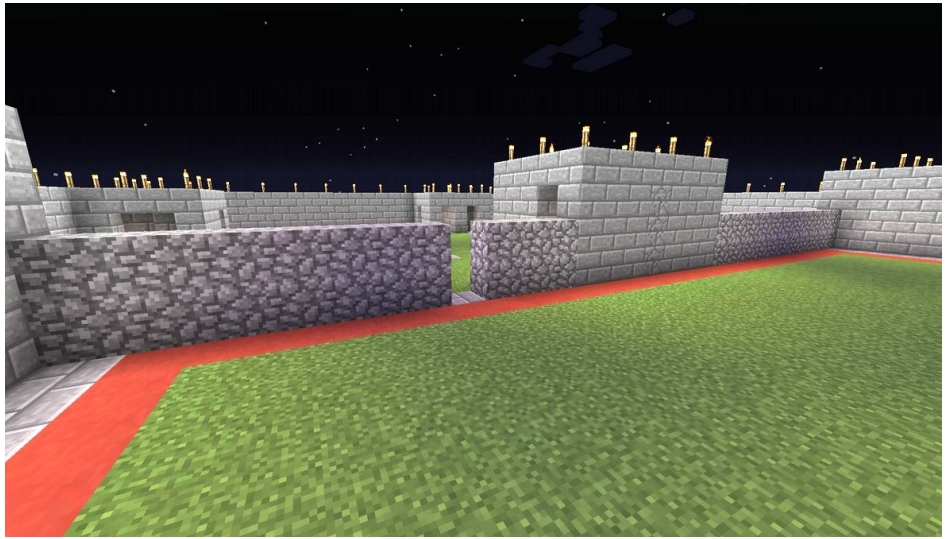
Characteristics

- Explosion destroys blocks
- Does a **ton** of damage

- Only detonates when close to player

Minecraft

Sample Mapping



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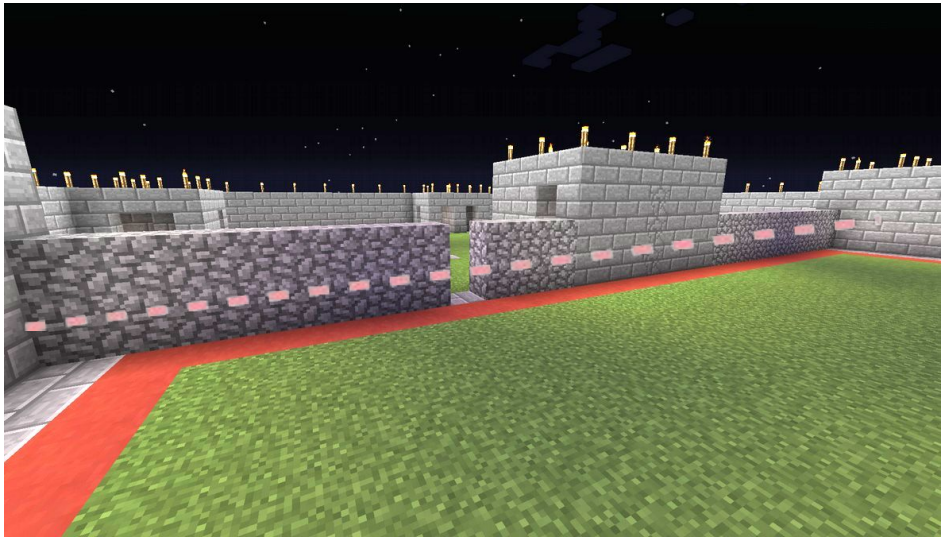
Minecraft

Sample Mapping



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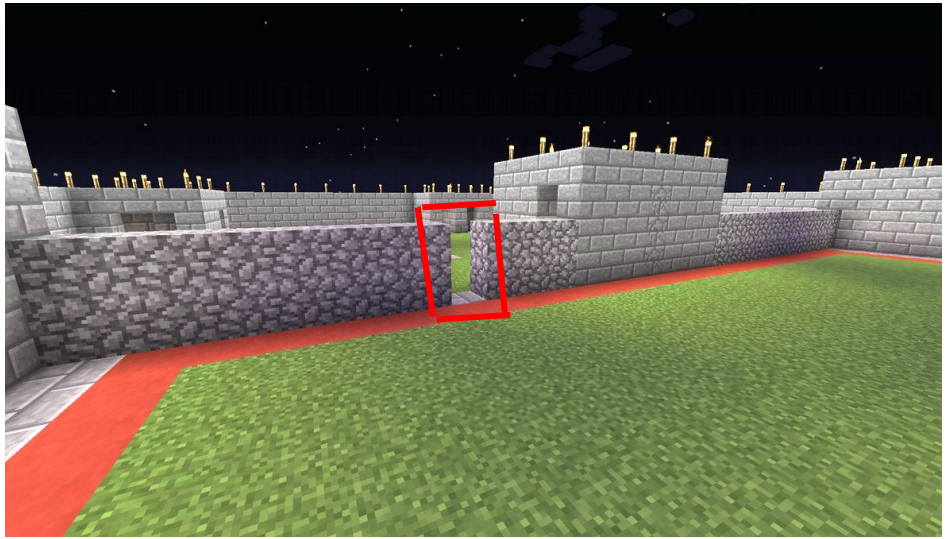
Sample Mapping

Source				Destination			
Zone	Address	User	HIP Profile	Zone	Address	Application	Actione
Trust	any	any	any	Untrust	any	citrix ssl web-browsing	✓
Trust	any	any	any	Untrust	any	gotomeeting youtube	✓
Guest	any	any	any	Untrust	any	facebook gmail-base	✓
Guest	any	any	any	Untrust	any	web-browsing	✗



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Application of Network Defense

Application of Network Defense

The Firewall

- Resource allocation and cost/benefit
  - Defense setup time
  - Limited # of firewall blocks available
  - Defense against external threats vs. internal network segmentation

Application of Network Defense

Threat Types

- External/ commodity
  - Firewall works well
- “Sophisticated attackers”/ insiders
  - Active monitoring, segmentation, response

Application of Network Defense

Threat Intel

- Threat intelligence gathering
  - Time commitment/ resource allocation CBA
- Active defense risk/reward
  - You don’t get points for vanquishing adversaries
  - Personal risk

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→ https://github.com/wjwoodson/minecraft-vuln-mgt/ ←

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The Scenario

- Defend your **network** against **cyber threats** in this 10 minute 2-4 player Minecraft scenario:
    - build a **firewall** to keep attackers out of a defensive perimeter
    - use **cyber defense tools** to stop the bad guys
    - go **hunting** for **cyber threat intelligence**
    - **sophisticated attackers** might already be inside your network!

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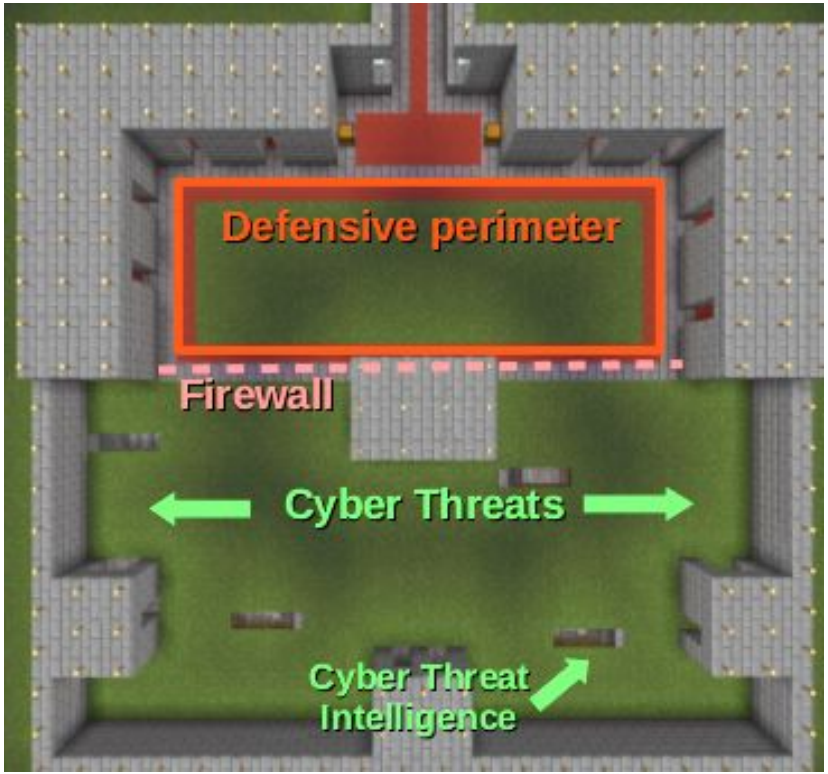
- Build a **firewall** in order to create a **defensive perimeter** within your network.

- The longer you are able to keep attackers from entering the defensive perimeter the more points you will score.

Your Network



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Security Tools

- You will be provided with materials for building the **firewall** as well as **cyber defense tools** (sword and armor)
- Make sure to defend yourself too, as **deaths will count against your score**

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Cyber Threat Intel

- You can earn more points by collecting **cyber threat intelligence** from the network outside your defensive perimeter.

- Threat intelligence blocks can be found in tunnels below the base after attackers begin to spawn.

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Sophisticated Attackers

- **Sophisticated attackers** will come from **within the perimeter**
- Try to stop them as quickly as possible using your **cyber defense tools**

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Strategies

- Build a **firewall** between **external threats** and internal network
  - Allow egress
- Eliminate **external threats** and go gather **threat intel**
  - This is risky
- Monitor for **potential vulnerabilities** within internal network
  - **Sophisticated attackers / insiders** will show up eventually

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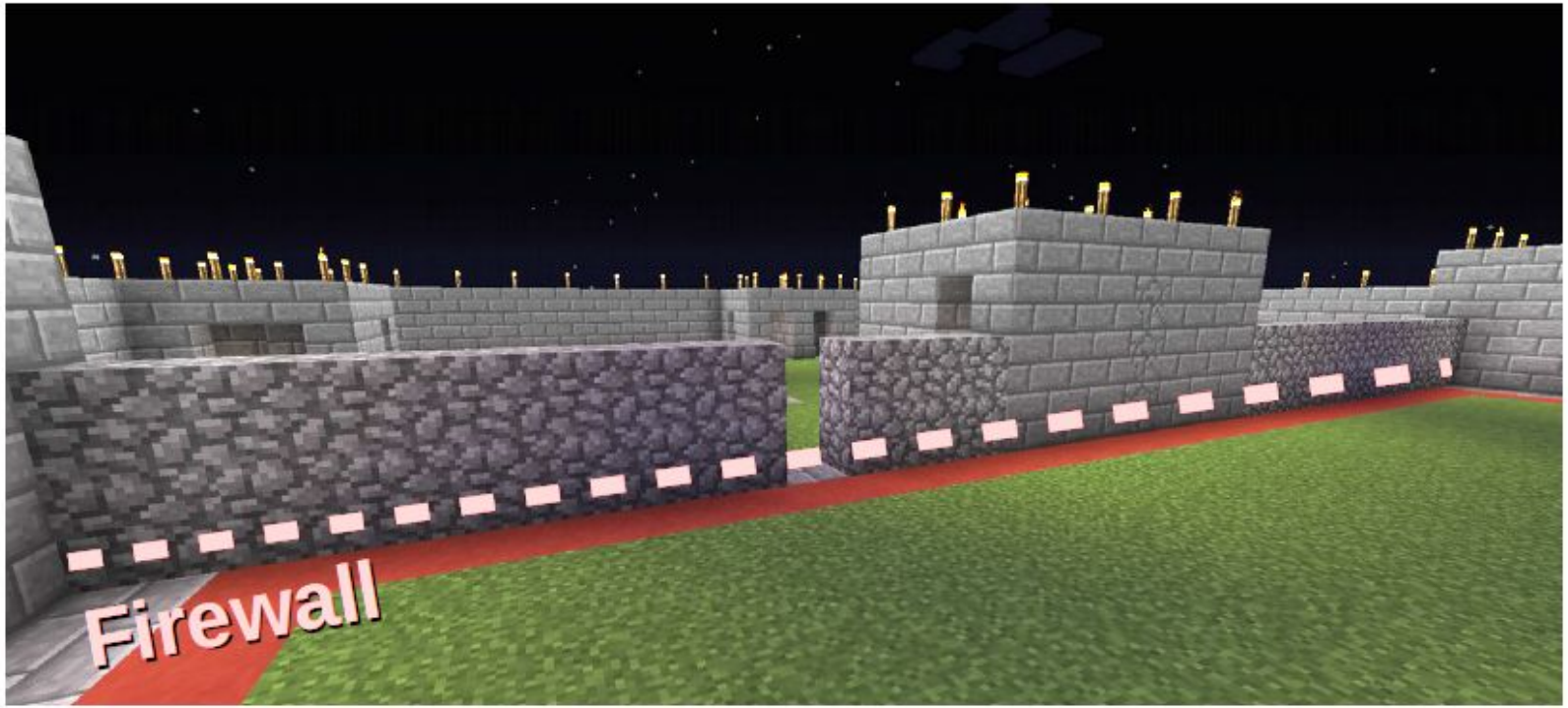
Strategies



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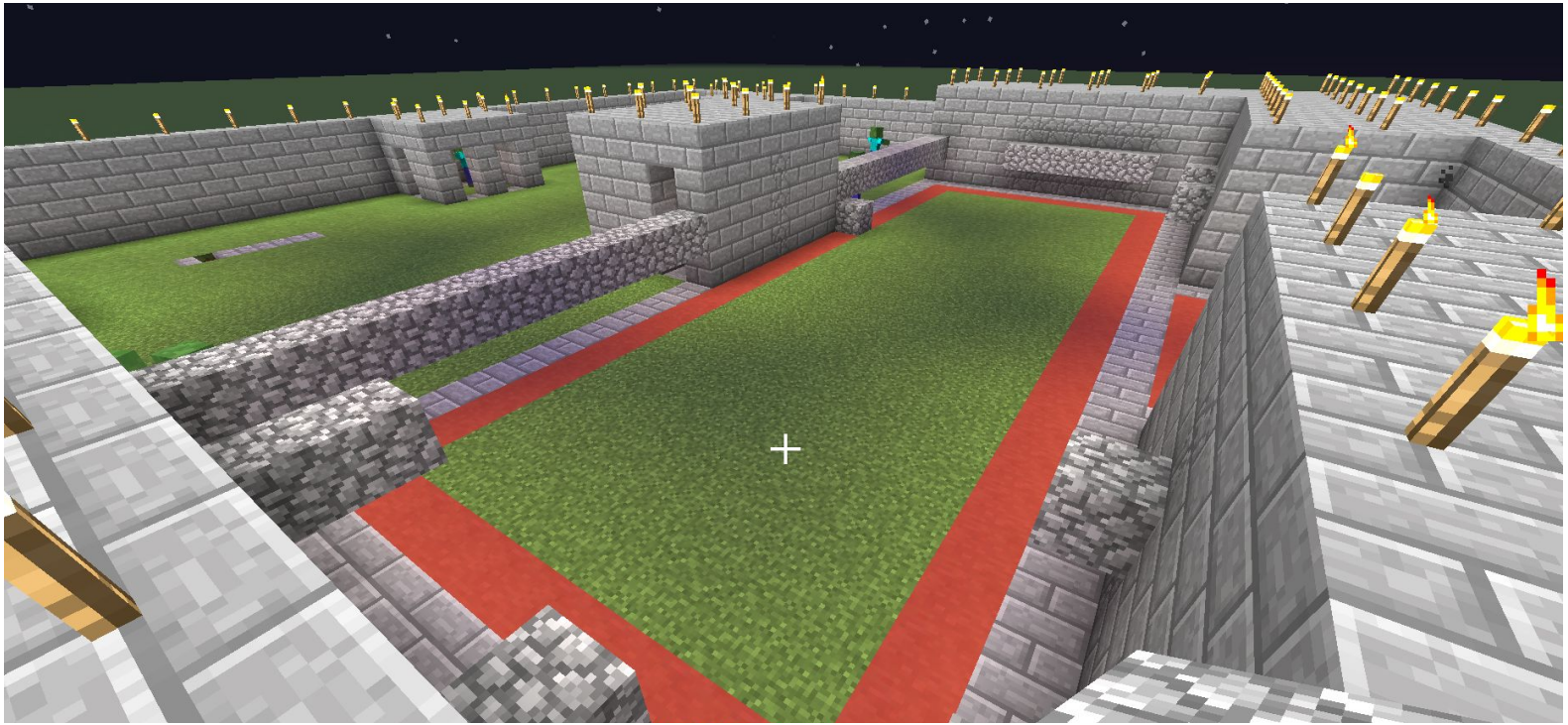
Strategies



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Strategies

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DIY

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DIY

- I believe that children are, in fact, our future
- **Please run a** (this) **scenario yourself** in a game of your choosing (Minecraft) **soon**
- Fork repo, add more engaging and intricate blue team scenarios
  - Or pick something in Security, Technology, CS, etc. **and do it.**

"Threat Modeling the Minecraft Way" - Jarred White (https://www.rsaconference.com/writable/presentations/file_upload/spo2-t10-threat-modeling-the-minecraft-way.pdf)

"Mining Learning and Crafting Scientific Experiments: A Literature Review on the Use of Minecraft in Education and Research" - Nebel et al. (http://www.ifets.info/journals/19_2/26.pdf)

Minecraft Network Defense

- Applying real world security concepts within games
- Competition between players + measured guidance for how to do well
- Varied ways to score points - perimeter security, IR, etc.

Demo

Minecraft Network Defense

Future Plans

- Non-breaking issues requiring manual administrator config/setup time in game.
    - Add whitelist.json configurator
    - Migrate player name whitelists to central file (back with whitelist.json)
    - Add auto-provision & equip firewall materials + sword/armor to beginning of scenario.
- Additional Scenarios
    - More complex adversaries - spiders, skeletons, creepers
    - Patch vulnerabilities in automated system
    - Player collaboration & role division
    - Adversarial scenario - attack & defend

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Questions

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