ENSE 472: Digital Networks Netcode

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1.0 Introduction

For our ENSE 472 project we will be researching gaming netcode. Gaming netcode is another term used for networking for video games. This topic relates heavily on networking issues, from ping rates, to routing, to potential packet loss and so forth. We will cover different types of netcode like dedicated servers, client hosted, and peer-to-peer. We will explore how certain games utilize different netcode, the benefits and disadvantages to each, and issues that can still be improved upon today. We will look at the process of implementing netcode and the challenges of designing strong netcode for games.

1.1 Problem Definition

Networking does not come without some challenges. Some of the major challenges facing the network presented are: ping, routing, packet loss, update rates, and tick rates. These topics are all mainly related to processing capacity. The most general term that almost everyone, whether they play online games or not, has heard of is "ping". Ping, also known as latency, is the time in which it takes to send a request to the server and then to properly receive the answer back. The higher the ping, the more delayed a response will be, making the game feel almost unresponsive. Routing involves how the data packets sent from your local machine are directed to the server properly. The greater the distance between the machine and the player, the more server hops the packet will have to take, and therefore the greater time needed. Packet loss describes the issue of your data properly reaching its location or not. If a packet is lost, it can cause major trouble for real-time applications, such as online video games. Packet loss can also be intertwined with routing in a sense, as the more hops a packet needs to take, the greater the chance of packet loss as well. Update rates is a term used to describe how often a game sends and receives data. The greater the update rate, the less delay added on top of the time it takes for the data to travel, as well as packet loss becoming less concerning. When decreasing the update rate issues arise, however, these issues are mainly to do with graphics and gameplay and are out of the scope of this project. Tick rates, also known as simulation rates, is how often the server actually produces and processes all of the data received in order to actually simulate its proper response.

The big picture of all of this is that video games would not be able to be played online if it were not for netcode. There needs to be some soft of synchronization between clients and servers for it to be a usable application. All modern servers need some form of lag compensation if they want people to enjoy their experience. Lag compensation involves everything previously mentioned relating to delayed data sent and received between the client and the server. By combining all the knowledge from the previously mentioned topics, the server is able to compensate for their clients so that everything will still feel responsive and without delay. Another possible issue users can have are de-syncing issues. This involves the case where one player might see one thing and another might see something totally different. A final issue users can face is hit registration when playing a shooting game. These issues that a user may face all

link together and are brought upon people due to the major challenges mentioned. They are all linked to the communication between networks which involve the transport layer, layer 4, in the ISO/OSI Model. Which type of network transportation would be better for the communication between clients and servers for online video games.

4.0 Responsibilities

This following section outlines the research responsibilities of our group members.

Jeremy Cross:
- Describe the different forms of netcode
- Provide examples of which games use these forms of netcode

Taylen Jones:
- Benefits and Disadvantages with modern netcode
- Examples of good implementations and poor implementations within games

Daris Lychuk:
- Describe the process of netcode and functionality details
- Describe the problem definition and what the big picture behind it all truly is

Kegan lavoy:
- Issues with different forms of netcode
- Challenges with building netcode