Research Goals

- To create a framework to bridge game states between same style games that are unfamiliar.
- To add modular multiplayer functionality to single player games.
- To create an abstract model representing a game’s state.
- To create an optimised format for game messages.
- To represent players’ actions / jesters in local and remote environments.
- To bridge fixed and wireless networks in real-time.

Advantages

- Crossing games is accomplished by using several translations and algorithms.
  - Levels are sized, based on a player’s movements, which keeps all players’ actions uniform.
  - Levels are represented in an abstract form.
  - Weapon damage is calculated based on a universal preset of values that are adjusted based on local game conditions.
  - Adding multiplayer functionality to single-player games: The middleware generates multiplayer entities and events which it uses to access the local player’s values & level & the display subsystem.
  
  Implementation:
  - Can be done one of three ways.
    - Middleware Server: is a dedicated server that acts as a server for a specific game, while connecting to a larger shared game. This allows nodes to play in larger games without requiring modifications.
    - Middleware local Server: Intercepts network traffic before it is sent, allowing a translation from local network data to shared network data and back. Buffer and message manipulation is performed.
    - Middleware In Game: Gives heights accuracy, more features and lower overhead by removing interpreters, presenting network data and statistics to the user as well as having direct access to in game values.

Mapping Games to a protocol

To create a universal protocol one has to build a framework around an abstract game state instead of the underlying system’s data types.

Game State is divided in two phases:

- Per-game: Refers to the preparing of the local game to interact with other games on the network and helping players to join the network. (Game Info, Player Info, Register Player, map data and environmental)
- In game: Refers to the set of actions that player can make which effacing the world and all player with in it. (Player update and weapon fired)

Building networks

Computer Games have a divorce appeal not only based on the growing number of realist games but also on the growing market of casual games, with more people playing, along with more available network access in cyber-cafes and home. Can the network model grow to link all of these new players who may have access to some parts of the wider network but not others?

- Wi-Fi Local area network (Forwarders): With the mobility of wireless access the challenge is to manage nodes that go out of range of the base station.
  - A “Forwarder” acts as a bridge for these nodes to connect to other wireless nodes.

- Internet connections (Relayers): The Internet has many interconnected networks. Not all networks that are connected may have full transparency (access for all). Relayers are nodes that bridge low connectivity nodes with the greater network.

Optimisations

Message size: All messages have been designed to give the most data within their game context. This means that game values are stripped down to save space while at the same time considering the values used in the overall session. All game values/data are transmitted in binary notation saving space.

- Mass-updates: nodes acting as proxies for other nodes can add their updates to their own, allowing one message to represent several updates.

- Indexed updates: update can be constructed based on only the value that has changed, which allows messages to scale with action in the game. With the scale system, all updates can be independent, removing the need for deltas & acknowledgments.

Future

This framework opens a new evolutionary path in gaming. Currently, older games are replaced by newer ones, resulting in a forced migration. Now, games can exist as a mutually supportive, non-competitive grouping, independent and external from other games that do not share their core ideals. This can become very interesting as evolution now becomes an individually centred process emanating from the needs and the desires of the genre. As the evolution of bridging game worlds continues, games will start to merge into expansive worlds viewed and interacted with as the user wishes.

M.Sc. in Computer Science
(Networks and Distributed Systems)