* TCP Protocol
  + It assures that every message is received by the destination
  + Easier to check if a player disconnects in the middle of a game
  + Better for long distance games
* Message Format
  + All messages are terminated with ‘\n’
  + All parameters are separated with spaces
  + Optional parameters are shown with brackets [type\_of\_parameter]
  + Mandatory parameters are shown like <type\_of\_parameter>

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| **Direction** | **Message format**  **Brief explanation** |
| Client -> Server | HELP\n  Shows available commands |
| Server -> Client | OK [success\_code]\n  Success message showing what the server did |
| Server -> Client | ERROR <error\_code>\n  Error message explaining the error and possible solutions |
| Client -> Server | REGISTER <username>\n  Register user with <username> |
| Client -> Server | LIST\n  Shows list of users and their status |
| Client -> Server | INVITE [username]\n  Invites <username> for a match or rematch last player |
| Client -> Server | ACCEPT\n  Accepts the game |
| Client -> Server | REJECT\n  Rejects the game invite |
| Client -> Server | PLAY <x> <y>\n  Makes a move on the selected square |
| Client -> Server | FOLD\n  Quit the current game |
| Client -> Server | EXIT\n  Exits the application |
| Server -> Client | BOARD <turn> <[[<>,<>,<>],[<>,<>,<>],[<>,<>,<>]]>\n  Sends updates game to client |
| Server -> Client | GAME <code>\n  Start / win / lose / tie game |
| Server -> Client | DISPLAY <message>\n  Prints <message> for the user |
| Client -> Server | LOGOUT\n  Exits current session |
| Client -> Server | CANCEL\n  Cancels Invitation sent |

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| **Error codes** | **Error Messages** |
| REG\_FAIL | Username already in use, pick a different username |
| NO\_USER | No such user exists, LIST all users and pick a valid user |
| USER\_BUSY | User is busy, LIST all users to check their status |
| INVALID\_COOR | Invalid Coordinates, valid range {0,1,2} |
| INVALID\_PLAY | Position {}x{} already has {} |
| USER\_DISCONECTED | Opponent has left the game, you win |
| NOT\_IN\_GAME | This command is only valid during a game type HELP to see how to start a new game |
| SERVER\_OFF | The server will exit, and you'll be disconnected automatically |
| BAD\_REQUEST | Bad Request, type HELP to see available commands |
| USER\_UNKNOWN | User unregistered, you need to register before doing this action |
| USER\_REGISTERED | You are already registered |
| IMBUSY | You are in the middle of a game |
| NO\_ENV | You don't have any invites pending |
| NO\_TURN | Not your turn to play |
| BAD\_FORMAT | Command is badly formatted, type '?' for more information |
|  | ERROR: Server {} is offline |
| NO\_INV | You haven't sent any invitation yet |
| YSELF | You've played yourself |

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| **Success Codes** | **Success Messages** |
| REG\_OK | User successfully registered |
| INVETE\_OK | Waiting for reply... |
| INVITE\_REC | You've been invited to play by {} ACCEPT | REJECT |
| REJECT | {} has rejected your request |
| WAITING\_FOR\_PLAY | Not your turn to play |
| WIN | Congratulations, you have won |
| LOSE | Better luck next time |
| TIE | Tie |
| START | Game started against {} |
| FOLD | {} has dropped out of the game |
| DISCONNECT | User Logged Out |
| CANCEL | Invite canceled |

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