

## Cameron's networking library(TCP)

**Note: This library uses the library zlib, and I am not, nor do I claim to the writer of it.**

### Network:

**CAMSNETLIB** `int InitializeNetworking();`

Initializes networking.

Remarks:

- Must be called before you can do anything(lol)

Return value:

- Zero:
  - When function succeeds.
- Non Zero:
  - See WSASStartup.

**CAMSNETLIB** `int CleanupNetworking();`

Cleans up networking.

Return value:

- Zero:
  - When function succeeds.
- Non Zero:
  - See WSACleanup.

Remarks:

- Must be called for every InitializeNetworking call.

### Client:

**CAMSNETLIB** `TCPClientInterface* CreateClient(cfunc msgHandler, dcfunc disconFunc, int compression = 9, float pingInterval = 30.0f, void* obj = nullptr);`

Parameters:

- msgHandler - Pointer to a function with the following signature:
  - `void MsgHandler(TCPClientInterface& clint, const BYTE* data, DWORD nBytes, void* obj)`
  - This is where all packets are received.
- disconFunc - Pointer to a function with the following signature:
  - `void function(bool unexpected)`

- Function called when you get disconnected from server.
- [optional] compression - This sets level what compression the client will compress data to send at. Value of 1-9.
- [optional] pingInterval - Interval at which client pings server, used to detect half dropped connections(Ping is actually a TCP keep alive message)
- [optional] Obj - Pointer to a class object, that is passed to the msghandler function; it is mostly used in oop.

Creates, and initializes a client object.

Remarks:

- Must be called before you can do anything(lol)
- A call to DestroyClient is required.

Return value:

- `TCPClientInterface*`

`CAMSNETLIB void DestroyClient(TCPClientInterface*& client);`

Destroys the specified client object.

`virtual bool Connect(const LIB_TCHAR* dest, const LIB_TCHAR* port, float timeout = 5.0f) = 0;`

Parameters:

- dest - IP address or hostname of server.
- port - Port server is listening on.
- timeout - period of time in which function will timeout if a successful connection has not been made.

Attempts to connect to the destination(IP address or hostname).

It waits/blocks until either:

- 1) A successful connection has been established.
- 2) Timeout period has returned

Return value:

- True:
  - When function succeeds.
- False:
  - If client is already connected, or function fails.

`virtual void Shutdown() = 0;`

Immediately shuts down connection to server, and performs cleanup.  
It waits/blocks until function returns.

```
virtual void Disconnect() = 0;
```

Shuts down connection to server, and performs cleanup.  
It does not wait/block.

```
virtual bool RecvServData() = 0;
```

Initializes socket, and receiving thread and starts receiving data from server.

Remarks:

- Must be called before you can send any type of data to server.

Return value:

- True:
  - When function succeeds.
- False:
  - If client is not connected.
  - Receive thread fails to create.

```
virtual void SendServData(const char* data, DWORD nBytes, CompressionType
compType = BESTFIT) = 0;
```

Parameters:

- data - pointer to data to send.
- nBytes - byte count of data to be sent
- compType - compression preference, ( BESTFIT[recommended], SETCOMPRESSION, NOCOMPRESSION )

Sends data to connected server.

```
virtual HANDLE SendServDataThread(const char* data, DWORD nBytes,
CompressionType compType = BESTFIT) = 0;
```

Parameters:

- data - pointer to data to send.
- nBytes - byte count of data to be sent
- compType - compression preference, ( BESTFIT[recommended], SETCOMPRESSION, NOCOMPRESSION )

Creates a thread that sends the data specified to the server.

Remarks:

- Handle must be closed after this is called either with `WaitAndCloseHandle`, or `CloseHandle`.

Return value:

- A handle to created send thread.

```
virtual void SendMsg(char type, char message) = 0;
virtual void SendMsg(const std::tstring& user, char type, char message) = 0;
```

Sends a message to connected server in the format of TYPE, MESSAGE.  
These functions are wrappers to `SendServData`.  
Data is not compressed when calling these functions.

```
virtual void Ping() = 0;
```

Pings the server, should be called in message handler.

```
virtual void SetPingInterval(float interval) = 0;
```

Sets the client's ping interval.

```
virtual float GetPingInterval() const = 0;
```

Return Value:

- Current value of ping interval.

```
virtual void SetFunction(cfunc function) = 0;
```

Sets the clients function/message handler, it is called whenever a message is received.

```
virtual bool IsConnected() const = 0;
```

Return value:

- True:
  - If connected.
- False:

- If not connected.

```
virtual Socket& GetHost() = 0;
```

Returns a reference to the connected socket.

Return value:

- Socket&

```
virtual void* GetObj() const = 0;
```

Returns a pointer to the object you specified in constructor.

Return value:

- Void\*

## Server:

```
CAMSNETLIB TCPServInterface* CreateServer(sfunc msgHandler, customFunc
conFunc, customFunc disFunc, USHORT maxCon = 20, int compression = 9, float
pingInterval = 30.0f, void* obj = nullptr);
```

Parameters:

- msgHandler - Pointer to a function with the following signature:
  - void MsgHandler(TCPServInterface& serv, ClientData\* const clint, const BYTE\* data, DWORD nBytes, void\* obj)
  - This is where all packets are received.
- conFunc - Pointer to a function with the following signature:
  - void function(ClientData\* data)
  - Called after client is added to server.
- disFunc - Pointer to a function with the following signature:
  - void function(ClientData\* data)
  - Called before client is removed from server.
- [optional] maxCon - The maximum amount of clients the server can support before it sends (TYPE\_CHANGE, MSG\_CHANGE\_SERVERFULL) to the connecting client.
- [optional] compression - The level of compression the server will compress data to send at. Value of 1-9.
- [optional] pingInterval - The frequency the server sends ping messages to connected clients, to keep them from timing out. (Ping is actually a TCP keep alive message)
- [optional] Obj - Pointer to a class object, that is passed to the msghandler function; it is mostly used in oop.

Creates, and initializes a server object.

Remarks:

- Must be called before you can do anything(lol)
- A call to DestroyServer is required.

Return value:

- `TCPServInterface*`

```
CAMSNETLIB void DestroyServer(TCPServInterface*& server);
```

Destroys the specified server object.

```
virtual bool AllowConnections(const LIB_TCHAR* port) = 0;
```

Binds host socket, and creates a thread that waits for connections to the server.

Remarks:

- Must be called before you can send any type of data to server.

Return value:

- True:
  - If function succeeds.
- False:
  - If function has already been called.
  - If function fails.
    - Socket::Bind fails.
    - Receive thread fails to create.
    - Client array fails to allocate.

```
virtual void SendClientData(const char* data, DWORD nBytes, Socket addr, bool
single, CompressionType compType = BESTFIT) = 0;
```

```
virtual void SendClientData(const char* data, DWORD nBytes, Socket* pcs,
USHORT nPcs, CompressionType compType = BESTFIT) = 0;
```

```
virtual void SendClientData(const char* data, DWORD nBytes,
std::vector<Socket>& pcs, CompressionType compType = BESTFIT) = 0;
```

```
virtual HANDLE SendClientDataThread(const char* data, DWORD nBytes, Socket
addr, bool single, CompressionType compType = BESTFIT) = 0;
```

```
virtual HANDLE SendClientDataThread(const char* data, DWORD nBytes, Socket*
pcs, USHORT nPcs, CompressionType compType = BESTFIT) = 0;
virtual HANDLE SendClientDataThread(const char* data, DWORD nBytes,
std::vector<Socket>& pcs, CompressionType compType = BESTFIT) = 0;
```

Parameters:

- data – pointer to data to send.
- nBytes – byte count of data to be sent
- compType – compression preference, ( BESTFIT[recommended], SETCOMPRESSION, NOCOMPRESSION )

Sends data to specified clients. Threaded functions do this on a separate thread.

Remarks:

- Handle must be closed after this is called either with WaitAndCloseHandle, or CloseHandle.
- First overload, the value of single determines what the function does
  - If single is true it sends only to address specified.
  - If single is false, and addr is not connected, it sends to all clients currently connected to the server.
  - If single is false, and addr is connected, it sends to all clients, excluding the addr specified.

Return value:

- For threaded functions returns a HANDLE to created thread, non-threaded return nothing.

```
virtual void SendMsg(Socket pc, bool single, char type, char message) = 0;
virtual void SendMsg(Socket* pcs, USHORT nPcs, char type, char message) = 0;
virtual void SendMsg(std::vector<Socket>& pcs, char type, char message) = 0;
virtual void SendMsg(const std::tstring& user, char type, char message) = 0;
```

Sends a message to specified clients in the format of TYPE, MESSAGE.  
These functions are wrappers to SendClientData.  
Data is not compressed when calling these functions.

```
virtual ClientData* FindClient(const std::tstring& user) const = 0;
```

Return value:

- A pointer to the ClientData, specified by user.

```
virtual void DisconnectClient(ClientData* client) = 0;
```

Disconnects connected client on the server.

```
virtual void Shutdown() = 0;
```

Immediately shuts down all connections to server, and performs cleanup. It waits/blocks until function returns.

```
virtual ClientData** GetClients() const = 0;
```

Return value:

- A pointer to the array of clients.

```
virtual USHORT ClientCount() const = 0;
```

Return value:

- Returns the number of connected clients.

```
virtual void Ping() = 0;
```

Pings all clients connected to server.

```
void Ping(Socket client);
```

Pings the specified client.

```
virtual void SetPingInterval(float interval) = 0;
```

Sets the server's ping interval.

```
virtual float GetPingInterval() const = 0;
```

Return Value:

- Current value of ping interval.

```
virtual bool MaxClients() const = 0;
```

Return value:

- True:
  - If number of connected clients is at the maximum number of clients.



- False:
  - If number of connected clients is less than maximum clients.

```
virtual bool IsConnected() const = 0;
```

Return value:

- True:
  - If listening socket has been binded.
- False:
  - If listening socket has not been binded.

```
virtual Socket& GetHost() = 0;
```

Returns a reference to the connected socket.

Return value:

- Socket&

```
virtual void* GetObj() const = 0;
```

Returns a pointer to the object you specified in constructor.

Return value:

- Void\*

## Other:

```
CAMSNETLIB void WaitAndCloseHandle(HANDLE& hnd);
```

Waits for the specified handle to be triggered, then closes the specified handle.

## Server and Client auto handled messages

Key:

-Checkmarks mean auto handled.

TYPE	MESSEAGE	SERVER	CLIENT	ADDITIONAL DATA
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TYPE_PING (0)	MSG_PING (0)	Sent to client every X seconds. ✓	May be optionally handled on both client and server.	NONE
TYPE_CHANGE (-128)	MSG_CHANGE_SERVERFULL (-128)	Sent to client when server is full. ✓	Should be handled in msgHandler on client.	NONE
TYPE_CHANGE (-128)	MSG_CHANGE_DISCONNECT (-127)	Sent to all clients when any user/pc disconnects ✓	Optionally handled on client.	const LIB_TCHAR* includes NULL char

### Notice:

**THIS IS A UNICODE BUILD ATTEMPTS TO USE  
MULTIBYTE/ASCII WILL RESULT IN A CRASH.**

### Examples

Note the following is pseudo code, and should only be used to understand the framework.

#### Client:

**-Creating a basic client:**

```

void MsgHandler(TCPClientInterface& clint, const BYTE* data, DWORD nBytes, void* obj)
{
    char* dat = (char*)&data[MSG_OFFSET];
    nBytes -= MSG_OFFSET;
    MsgStreamReader streamReader((char*)data, nBytes);
    const char type = streamReader.GetType(), msg = streamReader.GetMsg();

    switch (type)
    {
        case TYPE_PING:
        {
            switch(msg)
            {
                case MSG_PING:
                    clint.Ping();
                    break;
            }
            break;
        } //TYPE_PING
        case TYPE_CHANGE:
        {
            switch(msg)
            {
                case MSG_CHANGE_SERVERFULL:
                {
                    //Notify user server is full
                    break;
                }

                case MSG_CHANGE_DISCONNECT:
                {
                    //Notify user server is a client has disconnected
                    break;
                }
            }
        }
        break;

        // Handle other cases
    }
}

```

```

void DisconnectHandler(bool unexpected) // for disconnection
{
    if(unexpected)
    {
        // Notify user they have been disconnected
    }

    // Most likely do nothing because you caused the disconnection
}

```

```

InitializeNetworking();

TCPClientInterface* client = CreateClient(&MsgHandler, &DisconnectHandler);
bool res = client->Connect(L"ip", L"port number");
if (res)
{
    res = client->RecvServData();
    if (res)
    {
        //Ready to send packets
    }
}

CleanupNetworking();

```

## -Sending packets from client to server:

```

//Sends the number 5 to the server, excluding msg_type, and msg
int number = 5;
client->SendServData((char*)&number, sizeof(int));

or

//Sends the number 5 to the server, including msg_type, and msg
MsgStreamWriter streamWriter(TYPE_, MSG_TYPE_, sizeof(int));
streamWriter.Write(number);
HANDLE hnd = client->SendServData(streamWriter, streamWriter.GetSize());
WaitAndCloseHandle(hnd);

```

## Server:

### -Creating a basic server:

```

void DisconnectHandler(ClientData* data)
{
    //Do whatever possibly log disconnections?
}

void ConnectHandler(ClientData* data)
{
    //Do whatever possibly log connections?
}

//Handles all incoming packets
void MsgHandler(TCPServInterface& serv, ClientData* const clint, const BYTE* data, DWORD
nBytes, void* obj)
{
    auto clients = serv.GetClients();
}

```

```

    const USHORT nClients = serv.ClientCount();

    char* dat = (char*)&data[MSG_OFFSET];
    nBytes -= MSG_OFFSET;
    MsgStreamReader streamReader((char*)data, nBytes);
    const char type = streamReader.GetType(), msg = streamReader.GetMsg();

    //Switch type and msg for all your packets
}

InitializeNetworking();

//Optional port map on router
MapPort(port, L"TCP", L"Server");
TCPServInterface* serv = CreateServer(&MsgHandler, &ConnectHandler, &DisconnectHandler);
bool res = serv->AllowConnections(L"port");
if (res)
{
    //Ready to send packets
}

CleanupNetworking();

```

## -Sending packets from server to client:

```

//Sends the number 5 to all clients on server, excluding msg_type, and msg
int number = 5;
serv->SendClientData((char*)&number, sizeof(int), Socket(), false);

```

Or

```

//Sends the number 5 to only the pc you specified, including msg_type, and msg
int number = 5;
MsgStreamWriter streamWriter(TYPE_, MSG_TYPE_, sizeof(int));
streamWriter.Write(number);
HANDLE hnd = serv->SendClientData(streamWriter, streamWriter.GetSize(), socket, true);
WaitAndCloseHandle(hnd);

```