protocol-assignment-1

ToDo:

Important:

- UDP MTU
- Don't create packages with a size of (bit-size mod 8) != 0. It makes it hard on the receiver side to interpret those!

Changelog:

- 29.04.2018 [Fabian] Updated protocol
- 29.04.2018 [Kilian] Added `File-Status` message
- 29.04.2018 [Fabian] Added message description and `Ping` message
- 26.04.2018 [Kilian] Added Convention, added CRC and Hash,added ability to delete Files and Folders, minor optimisations
- 20.04.2018 [Fabian] Initial commit
- 22.04.2018 [Fabian] Protocol

Protocol:

General field descriptions:

Type [4 Bit]:
0000 => Client-Hello-Handshake
0001 => Server-Hello-Handshake
0010 => File-Creation
0011 => File-Transfer
0100 => File-Status
0101 => ACK
0110 => Ping

Client ID [32 Bit]:
An unique client id generated by the server on first contact.
E.g. a static int that gets incremented for each connected client.

Checksum [32 Bit]:
CRC32 Algorithm Wiki Link

Sequence Number [32 bit]:
Like TCP

FID Length [64 Bit]:
The length of the `FID` field in bytes.

FID [Defined in the `FID Length` filed]: The relative path to the file. Includes the file name e.g. `folder/file.txt`

Client-Hello-Handshake:

The initial connection message that gets send by the client.

```
0      4      20         52       56
+------+------+----------+--------+
| Type | Port | Checksum | UNUSED |
+------+------+----------+--------+
```

Port [16 Bit]:
The port on which the client listens to server messages

UNUSED [4 Bit]:
To ensure the package has mod 8 = 0 size

Server-Hello-Handshake:

Once the server received a `Client-Hello-Handshake` message he should reply with this message.

```
0      4       8           40            56         88
+------+-------+-----------+-------------+----------+
| Type | Flags | Client ID | Upload-port | Checksum |
+------+-------+-----------+-------------+----------+
```

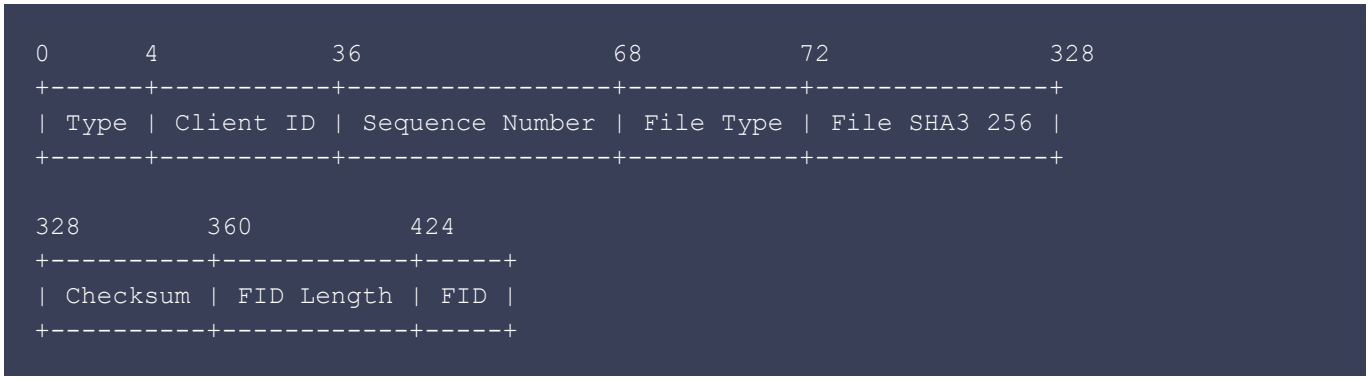
Upload-port [16 Bit]:
The Port where the client should send all following messages to

Flags [4 Bit]:

```
0000
||||
|||+-> Client accepted
||+--> Too many clients - connection revoked
|+---> *UNUSED*
+----> *UNUSED*
```

File-Creation:

Marks the start of a file transfer. Tells the server to create the given file with the given path. Replaces existing files.

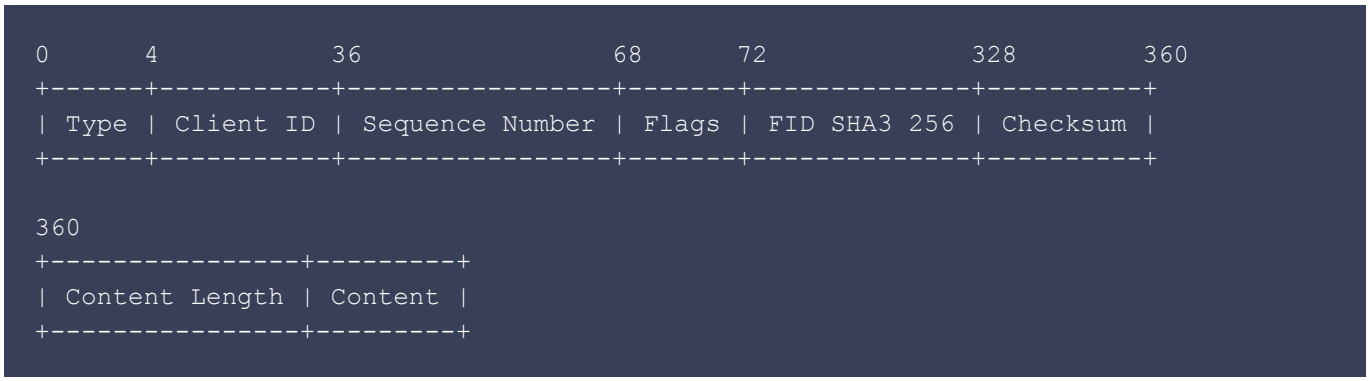


File Type [4 Bit]:

File SHA3 256 [256 Bit]:
The file SHA3 256 hash to check if the file was transmitted correctly. Unused for folders. Wiki Link

File-Transfer:

The actual file transfer message containing the file content.



Flags [4 Bit]:

FID SHA3 256 [256 Bit]:
The SHA3 256 hash of the `FID` to identify which file gets

Content Length [X Bit]:**Size not final. Don't forget about the MTU**
The length of the `Content` field.

Content [defined in "Content Length" in Bit]:**Size not final. Don't forget about the MTU**
The actual file content.

File-Status:

Used for requesting and responding the current file status e.g. after a connection disconnect.

```
0      4        8                      40         72          134
+------+--------+----------------------+----------+-----------+-----+
| Type |  Flags | Last Sequence Number | Checksum |FID Length | FID |
+------+--------+----------------------+----------+-----------+-----+
```

Flags [4 Bit]:

```
0000
||||
|||+-> Request status of FID
||+--> FID status response
|+---> *UNUSED*
+----> *UNUSED*
```

Last Sequence Number [32 Bit]: The last acknowledged `Sequence Number`. Ignored if `Request status of FID` is set.

ACK:

For acknowledging `Ping`, `File-Creation` and `File-Transfer` messages.

```
0      4           36                    68         100      104
+------+-----------+---------------------+----------+--------+
| Type | Client ID | ACK Sequence Number | Checksum | UNUSED |
+------+-----------+---------------------+----------+--------+
```

ACK Sequence Number [32 Bit]:
The acknowledged `Sequence Number` or `Ping Sequence Number`

Transfer-Ended:

Gets send by the client once he wants to end the transfer/close the connection.

```
0      4       8           40         72
+------+-------+-----------+----------+
| Type | Flags | Client ID | Checksum |
+------+-------+-----------+----------+
```

Flags [4 Bit]:

```
0000
||||
|||+-> Transfer finished
||+--> Cancelled by user
|+---> Error
+----> *UNUSED*
```

Ping:

This message is used for ensuring the opponent is still there. The opponent should acknowledge each received `Ping` message with an `Server-ACK`.Should get send by each side if there was no message exchange for more than 5 seconds.
It also can be used for package loss and throughput tests with a modified `Payload Length`.

```
0      4                      36               64
+------+----------------------+----------------+---------+
| Type | Ping Sequence Number | Payload Length | Payload |
+------+----------------------+----------------+---------+
```

Ping Sequence Number [32 Bit]
An unique number for identifying each ping

Payload Length [28 Bit]:
Describes how long the the following payload is in byte

Payload [X Byte]:
Defined via the `Payload Length`

Process example: