Host2Hub File Sync Protocol

Packet Format

Each packet starts with a one byte long identifier followed by the arguments. The end of the packet is signalized by a **SUB** (0x1A) byte. (This is subject to change and will likely be replaced by a **NUL** (0x00) byte in the future. The different packets are listed below.

Generally, the host sends a packet to the hub and the hub responds. The only cases in which the hub actively sends a packet are if it reports an error or delivers a print message.

Packet Types

The Host can send these Packets, the Hub must handle these packets:

Identifier	Type	Meaning	Argmuent
Y (0x59)	Actively Sent	Start *SYNC Mode*	
D (0x44)	Actively Sent	Ensure Directory exists	/path/to/dir
F (0x46)	Actively Sent	Ensure File has same Hash	/path/to/file SHA256
C (0x43)	Response	CHUNK	192 Bytes of the file data (base64-encoded compressed file)
E (0x45)	Response	End Of File	
N (0x4E)	Actively Sent	End *SYNC Mode*	
R (0x52)	Actively Sent	Remove File or Directory	/path/to/file/or/diretory
P (0x50)	Actively Sent	Start Program (loop() from /__init__.py)	
X (0x58)	Actively Sent	Stop Program	
& (0x26)	Actively Sent	Reboot	

= (0x3D)	Actively Sent	Sync Communication	timestamp
> (0x3E)	Actively Sent	Enter REPL	
$ (0x24)	Actively Sent	Reset State	

The Hub can send these Packets, the Host must handle these packets:

Identifier	Type	Meaning	Argmuent
K (0x4B)	Response	OK	
= (0x3D)	Response	Sync Communication	given timestamp
U (0x55)	Response	Request File Contents	
! (0x21)	Actively Sent	*Internal Error*	traceback
E (0x45)	Actively Sent	*User Error*	traceback
P (0x50)	Actively Sent	*Print*	json-encoded args & kwargs

Packets written in italics are not yet documented below.

Examples

Sync all files

If a full tree needs to be synced to the hub, this is the right choice.

1. Host sends `Y` to start *SYNC Mode.*
   Hub responds with `K`.
2. Here, Files and Directories are updated.

   Refer to Update an individual file and Update an individual directory.
3. Host sends `N` to stop *SYNC Mode*.
   Hub responds with `K`.

Effect

Upon receiving `N`, the Hub deletes all files and directories that were not updated since `Y` was sent.

Update an individual file

1. Host sends `F`. The argument is the file's path and its SHA256 Hash, seperated by a space. The file path needs to start with `/`.
   Hub responds with `K`, ***or*** with `U`.
2. If `U` was sent, Host repeatedly sends `C` with 192 bytes of the file as argmuent, ***or*** `E` if EOF is reached.
   Hub responds to each of these packets with `K`. Hub can respond with `U` to `E` if the hash is still not matching.

Effect

The Hub checks whether the file exists and has the correct hash. If it is correct, it responds with **K**. Otherwise, it sends **U** and stores the file received in the following **C** packets under the given file path.

Update an individual directory

1. Host sends `D` with the file path as argument. The file path needs to start with `/`.
   Hub responds with `K`.

Effect

The Hub ensures the directory exists.

Delete an individual file or directory

1. Host sends `R` with the file path as argument. The file path needs to start with `/`.
   Hub responds with `K`.

Effect

The Hub deletes the file or directory found under the given file path if it exists. Non-empty directories are cleared.

Start the program

1. Host sends `P`.
   Hub responds with `K`.

Effect

The Hub stops the task it created when it received `P` the last time, if it exists.
The Hub starts the `loop()` function it found in the `/__init__.py` file by creating a new task using `asyncio`.

Stop the program

1. Host sends `X`.
   Hub responds with `K`.

Effect

The Hub stops the task it created when it received `P` the last time, if it exists.

Sync connection

1. Host sends `=` with arbitrary data as argument.
   Hub echos the packet.

Effect

Echo. Ping-Pong. Verify connection.

Open REPL

1. Host sends `>`.

Effect

The Hub stops all running tasks and returns control to the Micropython REPL.

[OUTDATED: This is to be preferred in comparison to sending Ctrl-C (which also works), as it makes sure the `print()` function works as expected afterwards.] -> [NOTE: Ctrl-C should not work]

Reboot Hub

1. Host sends `&`.

Effect

The Hub reboots.

Cancel sync

1. Host sends `$`.
   Hub responds with `K`.

Effect

The Hub resets its sync state. It is recommended to send this when a new connection is made.

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