DATA TRANSFER PROTOCOL

TIMEFLIP DEVICE

ver 3.1  
06.04.2018

2018

All values are stored in TimeFlip on-board RAM memory and are reset to default when the battery is taken out or replaced.

TimeFlip device uses Bluetooth Low Energy (BLE) protocol. Services and specifications are listed in the table 1.

Table 1 – TimeFlip services and specifications

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| # | Service name/UUID | Specification’s name/UUID | Size, bytes | Properties:  r – reading  w – writing  n – notification |
| 1 | Device Information /  0x180A |  |  |  |
|  |  | Firmware Revision String /  0x2A26 | 6 | R |
| 2 | Battery Service /  0x180F |  |  |  |
|  |  | Battery Level /  0x2A19 | 1 | R, N |
| 3 | TimeFlip /  F1196F50-71A4-11E6-BDF4-0800200C9A66 |  | 1 |  |
|  |  | Accelerometer data/ F1196F51-71A4-11E6-BDF4-0800200C9A66 | 6 | R |
|  |  | Facets /  F1196F52-71A4-11E6-BDF4-0800200C9A66 | 1 | R, N |
|  |  | Command result output/  F1196F53-71A4-11E6-BDF4-0800200C9A66 | 21 | R |
|  |  | Command /  F1196F54-71A4-11E6-BDF4-0800200C9A66 | 21 | W |
|  |  | Double tap definition/  F1196F55-71A4-11E6-BDF4-0800200C9A66 | 1 | N |
|  |  | Calibration version / F1196F56-71A4-11E6-BDF4-0800200C9A66 | 4 | R, W |
|  |  | Password /  F1196F57-71A4-11E6-BDF4-0800200C9A66 | 6 | W |

**Firmware Revision String**

UUID:

0x2A26

|  |  |  |  |
| --- | --- | --- | --- |
| Type | Access | Size, bytes | Description |
| Firmware version | Read | 6 | Contains stock firmware version.  0x544676332E31 = “TFv3.1” |

**Battery Level specification**

UUID:

0x2A19

|  |  |  |  |
| --- | --- | --- | --- |
| Type | Access | Size, bytes | Description |
| Battery charge | Read,  Notification | 1 | Battery charge in % |

**Accelerometer values specification**

UUID:  
F1196F51-71A4-11E6-BDF4-0800200C9A66

|  |  |  |  |
| --- | --- | --- | --- |
| Type | Access | Size, bytes | Description |
| Accelerometer data | Read | 6 | *big-endian*  1,2 bytes – Accelerometer value X  3,4 bytes – Accelerometer value Y  5,6 bytes – Accelerometer value Z |

**Facets specification**  
UUID:  
F1196F52-71A4-11E6-BDF4-0800200C9A66

|  |  |  |  |
| --- | --- | --- | --- |
| Type | Access | Size, bytes | Description |
| Facet data | Read,  Notification | 1 | ID value of notified facet (0..47) |

**Command result output specification**

UUID:

F1196F53-71A4-11E6-BDF4-0800200C9A66

|  |  |  |  |
| --- | --- | --- | --- |
| Type | Access | Size, bytes | Description |
| Command output | Read | 21 | Output of command result:  0x01 – history read request  0x10 – status request |

History is read out in packages of 21 bytes.

History block contains 3 bytes

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Byte number | 0 | | | | | | | | 1 | | | | | | | | 2 | | | | | | | |
| Bit number | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 |
| Time | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x |  | | | | | |
| Facet |  | | | | | | | | | | | | | | | | | | x | x | x | x | x | x |

Maximum amount of time stored in history – 262144 seconds or ~ 3,03 days.

Maximum facets number – 48

One package contains 7 history blocks.

History read-out protocol:

After history read-out request is sent, the first package of 7 history blocks will be written in the characteristics. History blocks will be updated along with history reading-out until the very last one. Example:

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Byte number | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 |
| History block | 0 | | | 1 | | | 2 | | | 3 | | | 4 | | | 5 | | | 6 | | |

If the last history package is not full, missing values will be filled with zeros.

Penultimate package will contain the information on the number of sent history packages.

Example:

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Byte number | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 |
| History block | Х | Х | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

The last package contains zeros, it thus communicates the end of history data transmission.

Example:

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Byte number | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 |
| History block | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

**Command specificaton**

UUID:

F1196F54-71A4-11E6-BDF4-0800200C9A66

Executed command is shown in characteristics as 0xXX 0x02 where 0хХХ – is command message.

Unexecuted command is shown in characteristics as 0xXX 0x01 where 0хХХ – is command message.

|  |  |  |  |
| --- | --- | --- | --- |
| Type | Access | Size, bytes | Description |
| Command | Write | 21 | 0x01 – history read out request  0x02 – delete history  0x03 – calibration reset  Resets values for TimeFlip facets and resets characteristics *Calibration version* (UUID: F1196F56-71A4-11E6-BDF4-0800200C9A66) to nil.  0x04 0x01 – lock function\* on  0x04 0x02 – lock function off  0x05 0xXX 0xXX – auto-pause\*\* (off by default) 0xXX 0xXX – timer value in minutes after which the auto-pause is activated (0 = auto-pause off) Auto-pause timer is automatically reset when TimeFlip is flipped to another facet.  0x06 0x01 - pause\*\*\* function on 0x06 0x02 – pause function off  0x10 – status request (response in “**command result outup**” shown as 0xXX  0xYY  0xZZ 0xZZ) 0xXX – lock function (0x01 – on, 0x02 – off) 0xYY - pause (0x01 – on, 0x02 – off) 0xZZ 0xZZ – auto-pause timer value (in minutes)  0x15 0xXX 0xZZ … 0xZZ - write name 0xXX – number of symbols in name  0xZZ … 0xZZ - name (19 symbols MAX. ASCII coding)  0х30 0xZZ … 0xZZ – set new password  0xZZ … 0xZZ – password set, length is 6 symbols  0x50 0xAA – Delete current firmware and proceed to firmware loader. |

\* lock function – locks TimeFlip to count time on current active facet and blocks the device from switching facets when TimeFlip is turned or flipped.

\*\* Autopause function – automatically sets time count on pause after pre-set period of time (timer value).  
\*\*\* Pause – time count is set on pause, but the facets continue to be notified (user can turn/flip TimeFlip and assign new tasks to facets).

**Double tap specification**

UUID:

F1196F55-71A4-11E6-BDF4-0800200C9A66

This characteristics is currently unavailable

**Calibration version**

UUID:

F1196F56-71A4-11E6-BDF4-0800200C9A66

|  |  |  |  |
| --- | --- | --- | --- |
| Type | Access | Size, bytes | Description |
|  | Write, Read | 4 | Saves the value recorded between connections. The value is reset to ”0” when the battery is pulled out or “reset calibration” command is executed (0x03)”. |

This characteristics is used to check whether TimeFlip facets calibration corresponds to facets calibration in the mobile app. The check is performed by comparing value read out from this characteristics and the one stored in the mobile app. When the facets are assigned in TimeFlip, an arbitrary number is written to present characteristics and in the same time in the mobile app.

**Password**

UUID:

F1196F57-71A4-11E6-BDF4-0800200C9A66

|  |  |  |  |
| --- | --- | --- | --- |
| Type | Access | Size, bytes | Description |
| Password | Write | 6 | Characteristics which requires password to be written in it to allow TimeFlip operation. Resets when TimeFlip is disconnected from a phone. Requires password input after re-connect. |

If the password is not provided, or provided incorrect, custom TimeFlip characteristics will return zeros on reading.