

Lynx LapTime Protocol

02/22/2010 kms - Created.
11/02/2011 kms - Revised.
06/10/2017 kms - <event>,<round>,<heat> added.

Overview

The Lynx LapTime Protocol allows any device to easily send split time information to FinishLynx.

FinishLynx has three "Sync Source" options: External, Internal, and None.

External Sync is used when the LapTime device will receive the same start signal that FinishLynx receives. The LapTime device can produce elapsed times or times in its local time of day. If using its local time of day the LapTime device must notify FinishLynx of the "zero" time (the time that the start occurred) using the "Z" opcode.

Internal Sync is used when it is not possible (or not convenient) to provide the LapTime device with the start signal. FinishLynx syncs the LapTime device's clock with its clock based on the arrival time of data packets. FinishLynx then uses its own start time to compute the elapsed split times. For Internal Sync to work well, it is important that data packets are sent by the LapTime device with as little delay as possible.

None Sync is used when the LapTime device is able to produce times in the same time base that FinishLynx is using. This is possible if both FinishLynx and the LapTime device are synced to the same external timer.

Protocol

Each data packet sent to FinishLynx must have the following format:

```
<sot><opcode>,<time>[,<identifier>[,<event>,<round>,<heat>]]<eot>
```

```
<sot>           := <sync ok> | <no sync>
<sync ok>       := 01 hex
<no sync>       := 02 hex
<opcode>        := S | Z | T
<time>          := formatted time field
<identifier>    := object identifier field (S opcode only)
<eot>           := <cr> | <lf> | <cr><lf>
<cr>            := 0D hex
<lf>           := 0A hex
```

The "S" opcode is for sending object split times. Both a time and an identifier (for example, lane number) must be sent. The identifier can optionally be followed by the event, round, and heat of the split.

The "Z" opcode is for sending the "zero" (or start) time of the current event. If FinishLynx is configured to use External Sync then all subsequent split times will have this time subtracted from them. If External Sync is not used then "Z" packets are not needed.

The "T" opcode is for sending the LapTime device's current time of day. If FinishLynx is configured to use Internal Sync then these packets can be sent periodically to ensure good sync between the LapTime device

and FinishLynx. If Internal Sync is not used then "T" packets are not needed.

The <sync ok> byte is used to indicate to FinishLynx that the packet is suitable for Internal Sync. The <no sync> byte is used to indicate that the packet is not suitable for Internal Sync. An "S" (split time) packet that is sent after the split event actually occurred should use the <no sync> byte. For instance, a transponder based split time system might wait to determine that the transponder has moved beyond the antenna before sending the split time. If "S" packets are sent with the <no sync> byte then "T" packets must periodically be sent with the <sync ok> byte. Even if "S" packets are sent with the <sync ok> byte it is best to periodically send "T" packets to maintain good sync.

Sample Data Packets

External Sync:

```
<sync ok>Z,13:23:15.345<eot>
<sync ok>S,13:24:12.876,2<eot>
<sync ok>S,13:24:13.134,1<eot>
<sync ok>S,13:25:10.364,2<eot>
<sync ok>S,13:25:11.496,1<eot>
```

Internal Sync: ("S" packets not delayed; "T" packets not sent)

```
<sync ok>S,13:24:12.876,2<eot>
<sync ok>S,13:24:13.134,1<eot>
<sync ok>S,13:25:10.364,2<eot>
<sync ok>S,13:25:11.496,1<eot>
```

Internal Sync: ("S" packets are delayed; "T" packets are sent)

```
<sync ok>T,13:24:00.000<eot>
<no sync>S,13:24:12.876,2<eot>
<no sync>S,13:24:13.134,1<eot>
<sync ok>T,13:24:30.000<eot>
<sync ok>T,13:25:00.000<eot>
<no sync>S,13:25:10.364,2<eot>
<no sync>S,13:25:11.496,1<eot>
<sync ok>T,13:25:30.000<eot>
```