State report of current developments for picosecond precision Time-Tagging system

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Riga Event Timer A033-ET
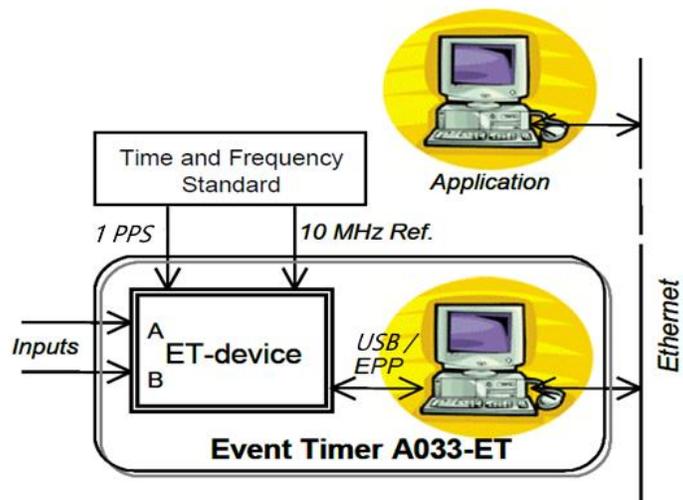
- Start / Stop inputs
- 1 PPS input
- 10 MHz reference clock input
- Gate control input
- Single-short RMS resolution - 2.5 ps
- Repetition rate > 10K
- Single-input offset drift 2 ps/ °c
- Open API and code samples

… to introduce or remember

Application area for Eventech event timers was focused mainly on Satellite Laser Ranging, where the highest performance of the measurement equipment is especially needed, and, as a result:
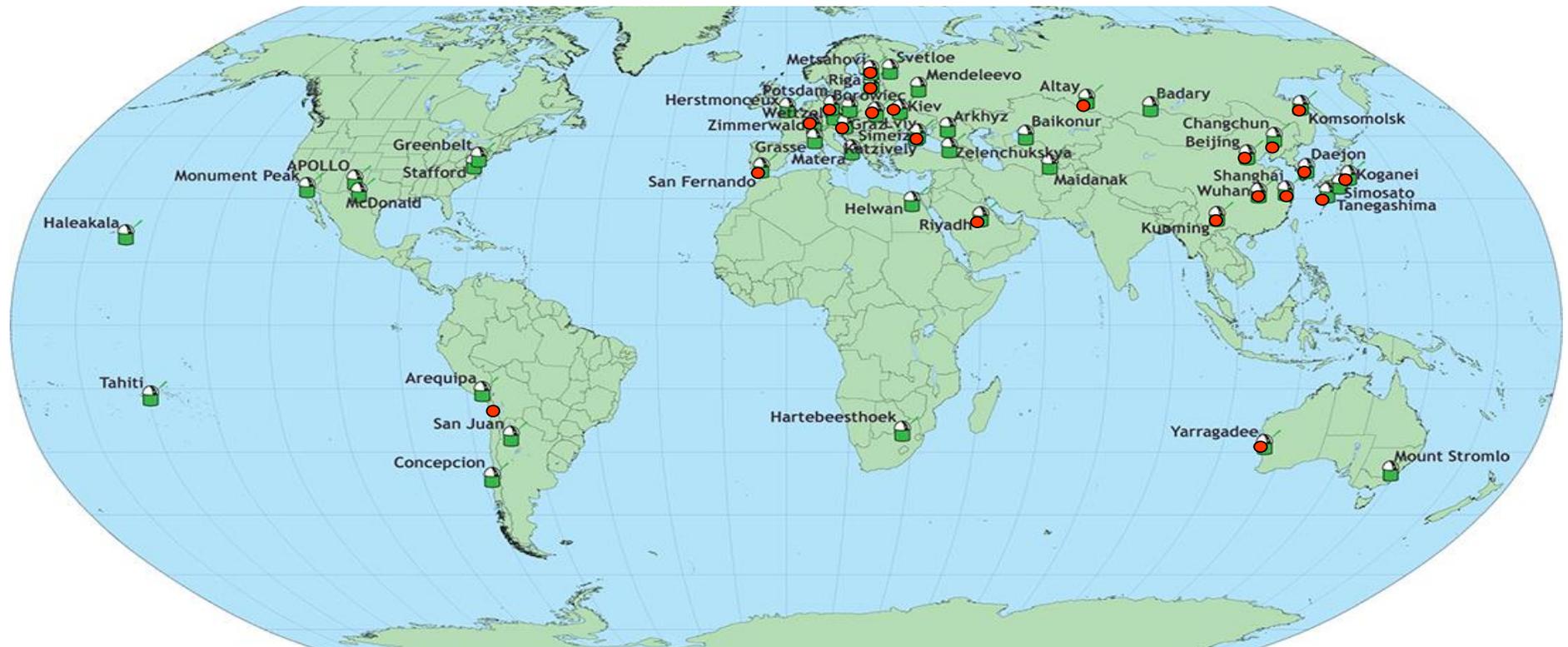
ILRS Network Map:
With a red circles marked SLR stations equipped
with Eventech event timers (it is about 50%)

A033-ET Updates Wish List (2010-2020)

Don't touch nothing !!!

Event Timer for Space

On-board implementation of the multi-purpose Event Timer (MPET) on space qualified components was developed by Eventech in 2016
ESA Contract No. 4000115326.

Power PCB

Timing PCB
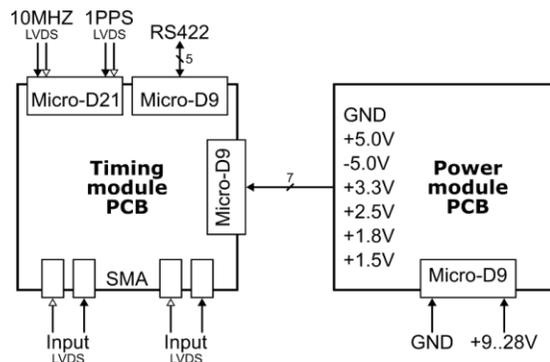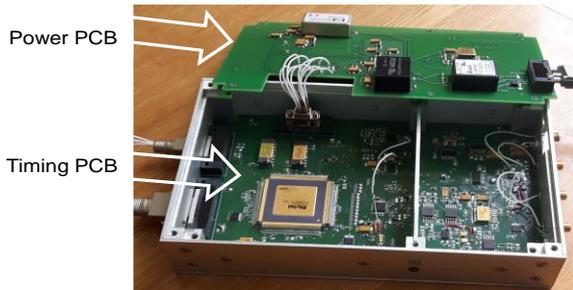
Parameters	A033-ET	MPET QM
Time measurement range	50 ns ÷ 1.5 h	60 ns ÷ 3.0 h
Least significant bit	1.2 ps	2.5 ps
Dead-time	50 ns	60 ns
Internal buffer (time-tags)	16 K	2 K
Measurement uncertainty (RMS error)	2.5 ps	5 ps
Integral nonlinearity	<2 ps	4.2 ps
Interval nonlinearity (for intervals more than)	<1 ps (>100 ns)	<1 ps (>170 ns)
Operating temperatures range	+ 5 °C ÷ + 45 °C	- 35 °C ÷ + 75 °C
Input-to-input offset drift	0.5 ps/°C	1.5 ps/°C
Single input offset drift	2 ps/°C	30 ps/°C

Event Timer for Space

Based on the MPET QM, time interval meter, for Planetary Altimeter (PALT), to be used in ESA's planetary mission HERA, is developed by Eventech (ESA Contract No. 4000125526)
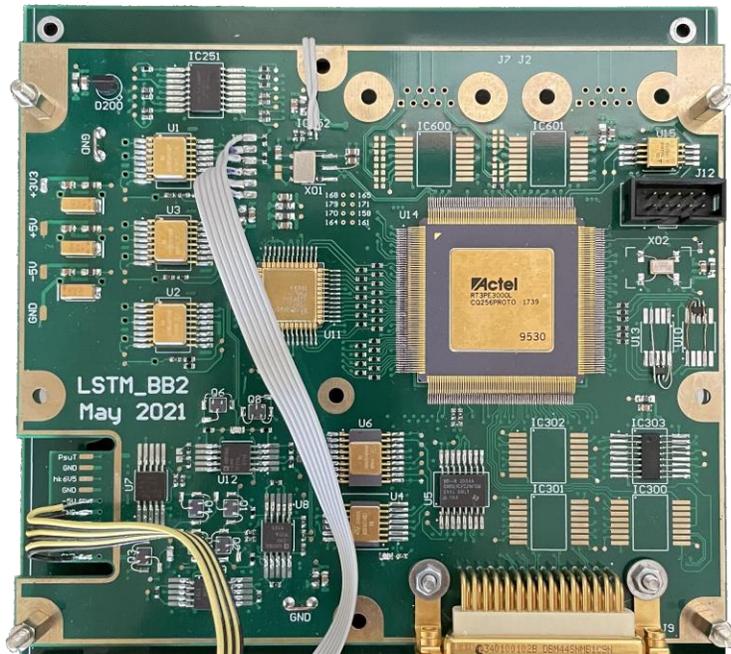
Parameter	Value
Precision (single-shot RMS resolution)	7 - 8 ps
Input offset drift	0.4 ps/°C
Power consumption	3.5 W
Form factor	One 8-layer PCB (150 x 130 mm)

A033-ET Updates Wish List

Increase repetition rate !!!

As a result, the A034-ET, with almost the same parameters as the A033-ET, but with a repetition rate 20 MHz - passes its first tests in the Eventech laboratory and will be available for customers in Q3 of 2023.

European Regional Development Fund, project no. 1.1.1.1/20/A/104

Multi-channel picosecond precise Time-tagging system with amplitude measurement for Satellite Laser Ranging

NATIONAL DEVELOPMENT PLAN 2020

EUROPEAN UNION
European Regional Development Fund

I N V E S T I N G   I N   Y O U R   F U T U R E

Multi-channel picosecond precise time-tagging system parameters

- Number of channels   >=5;
- Dead time   < 30   ns;
- Single-shot RMS resolution   ~ 1   ps;
- Built-in amplitude meter;
- Built in Range Gate Generator with resolution ~ 10 ps;

  (first prottype awaited in Q4 of 2023)

PPM transceiver for Optical communication

Combining the work on demand to
increase repetitions rate
and
built-in range gate generator,
we started to develop a
PPM realtime transceiver for optical communication.

Main parameters:

Message bit repetitions rate   >= 20 MHz
Transmitter resolution   10 ps.

(first prottype awaited in Q4 of 2023)

Conclusion

We are **looking for** and **ready to** cooperate with those, who are interested:

- to use our terrestrial event timers;

- to use our event timers / technologies in space qualified tasks;

- to use our technologies in joint scientific projects;

- to embed our technologies in their systems.

Thank you for your attention !

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NATIONAL DEVELOPMENT PLAN 2020

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