OCA Event Timer

OCA – UMR Gemini
Grasse – FRANCE

E. Samain: Prime Investigator
D. Albanese: Optics
P. Bério: Analyse Working Group
F. Deleflie: Validation Working group
F. Para: Instrumentation
F. Pierron: Laser station
J.M. Torre: Laser stations Working group
P. Vrancken: Test benches
J. Weick : error - link budget - computation
OCA Event timer

- OCA and CNES designed a Space event timer in the framework of the T2L2 project

- OCA can build a ground model for laser ranging station from the design of the space instrument
  - Usual laser ranging activities
  - T2L2 Time transfer
T2L2 Event timer Space instrument Engineering Model
Space instrument
Characteristics

- Input frequency: 10 MHz sinus 0 dBm
- 1 input channel ECL Level
- Internal local oscillator: 100 Mhz
- Logical counter frequency: 100 MHz
- Vernier period: 20 ns
- Resolution: 0.1 ps
- Communication: Serial RS422 @ 1 Mhz
- Dead time: 3 µs
- Internal fifo: 2 words
- Dimensions (one card with counter, frequency synthesis and Vernier): 220 x 150 mm
- Power supply: 15 W
Space instrument
General performances

- Precision < 2 ps (in calibration 0.9 ps)
- Linearity < 1 ps
- Time stability < 30 fs over 1000 s
- Thermal drift < 1 ps/°C
- Magnetic field sensitivity: no effect
Space instrument
Calibration precision

Precision in auto-calibration mode: 0.9 ps
## T2L2 Questionnaire
### Event timer

<table>
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<tr>
<th>STATION</th>
<th>BUS</th>
<th>DEAD TIME</th>
<th>FORMAT</th>
<th>Nb. Ch.</th>
<th>In F.</th>
<th>Out F.</th>
<th>PPS</th>
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Ground instrument Design

- 19 inches rack (3U)
- One card for frequency synthesis and counters
- One card for the Vernier; up to 4 Vernier
- Internal power supply
- Internal embedded PC
  - Data conversion
  - Internal storage
  - Communication: Ethernet and Serial port…
- Trigger input
  - Analogic with programmable comparator
  - NIM
Ground instrument Design

- Input frequency: 10 MHz or 5 MHz sinus > 0 dBm
- Output frequency: 10 or 5 MHz
- Dead time < 1 µs (600 ns min)
- Precision < 2 ps; < 1 ps upgrade (100 Mhz Vernier)
- Linearity < 1 ps
## Ground instrument Development plan

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