Modernization and Characterization of the Riga SLR Timing System

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This paper was supported by the EU FP7 GRANT REGPOT-CT-2011-285912-FOTONIKA
A Quick Glance Back

- Frequency standard was an unsteered rubidium oscillator
- Timing system and laser system are in separate buildings
- Time (1 PPS and Frequency) is delivered via a coaxial cable run between buildings
- Rubidium generated 1 PPS was sent to the laser system
- A synchrometer was located in each of the buildings, used to distribute time and generate signals
- 1 PPS from laser system synchrometer was synchronized to UTC by sending it back to timing building for comparison with GPS receiver
Old Setup

Temperature Controlled Timing Room
- Rb
- Synchrometer (XO)
- GNSS Receiver

Telescope Building
- Synchrometer (XO)
- Telescope Electronics
- Riga Event Timer

Connections:
- 5 MHz
- 1 PPS
- Coaxial
Some Issues

- Rb Standard > 25 years old, significant drift
- Synchronization equipment equally as old, reliability untested
- Sync to UTC manually monitored
- Poor or non-existent documentation
Some Issues
New Timing System

• Based on Spectracom SecureSync timing unit with GNSS steered rubidium oscillator

• Replacement for frequency standard and Synchronization system
New Timing System
Planned Setup

Temperature Controlled Timing Room

- GNSS Receiver
- SecureSync Rb
- TIC

Telescope Building

- Telescope Electronics
- SecureSync OCXO
- Riga Event Timer

Connections:
- 10 MHz
- IRIG B
- 1 PPS

Coaxial (plans to replace with fiber in future)
Allan Deviation Analysis

Frequency Stability of SecureSync
Ref = Agilent Cs

- 1 PPS Data
- 10 MHz
- Old Rb
Signal Delay over Time

Transmission delay Time Service - SLR Building, Riga