

VNIIFTRI TWSTFT Activity Report

20th Meeting of the CCTF Working Group on TWSTFT

Andrey Naumov

6-7 September 2012, BIPM France



Time Scale Transfer group

Yury Smirnov

Andrey Naumov

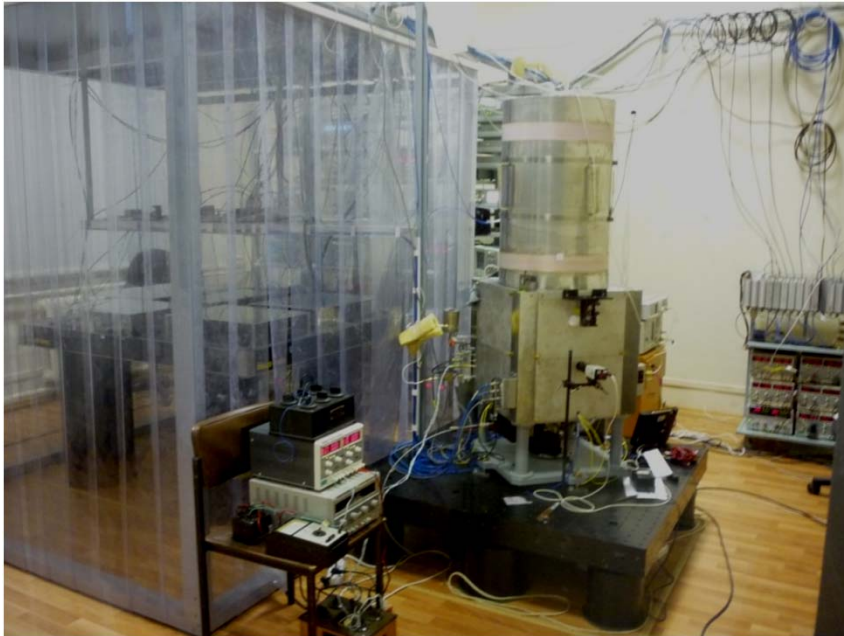
Igor Norets

Anatoly Kapitonov

Dmitry Luzgin



UTC(SU) Source



CSFO1, CSFO2 VNIIFTRI
Accuracy $\leq 5,0 \text{ E-16}$



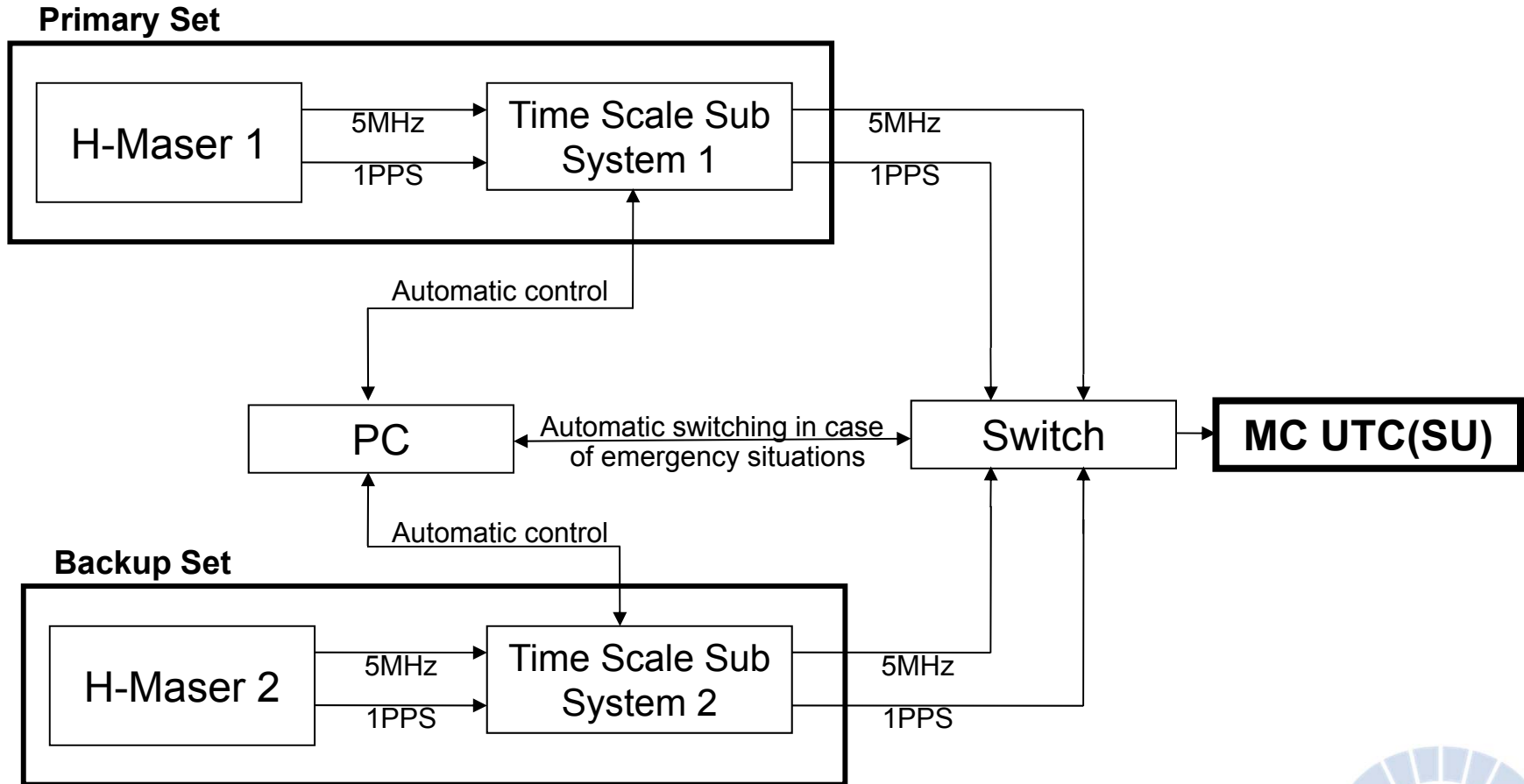
8 H-Maser clocks
Kvarz CH1-75A
 $\sigma_y(\tau) \leq 5,0 \text{ E-16}$



Physical
UTC(SU)
realization

UTC(SU) Physical Realization

$$\text{UTC(SU)} - \text{MC UTC(SU)} \leq 0.5 \text{ ns}$$



SU01 TWSTFT Stationary station

- Antenna: 1.8 meters
- Satellite: AM2
- TimeTech SATRE 2 channels modem
- Up and Down converter : Comtech Company
- TimeTech SATSIM
- Links with PTB and Asia



SU02 TWSTFT Transportable Station

- Antenna: 1.2 meters
- Satellite: AM2
- TimeTech SATRE 1 channel modem
- Up and Down converter : Cross Tech
- TimeTech SATSIM
- Transportable H-Maser clock Kvarz CH1-76A



Software to control SATRE modem and producing ITU files:

- TimeTech TWSTI;

Two way measurements via SATRE435 Modem v2.2

Terminal Settings Hardware Filtering of raw data Receive statistics Frequency Power C/N0 Info

SATRE TWSTFT Modem 435

Date & Time
Date 2012/08/27 MJD 56166
UTC 11:47:04 (SATRE)

```
%Tx >2012/08/27;11:47:04;435;00000;INT;1_0;L;yyym;yyyuuuu; 0.0;51.8; 0.0
%Rx1>2012/08/27;11:47:02;435;00000;INT;C_0;L;yyncy;T;3; 5;435; 330.547; 330.825; -0.005; 0.285;
%Rx2>2012/08/27;11:47:04;435;00000;INT;C_0;L;yyynin;T;3; 6
```

Channel status

Receiver	Rx1	Rx2	Rx3	Legend
Receiver	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/> unused <input type="radio"/> unlocked <input checked="" type="radio"/> locked <input type="radio"/> format error
Samples	243	0	0	

Ranging

Receiver	Rx1	Rx2	Rx3	Legend
Receiver	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/> reseted <input checked="" type="radio"/> ranging OK <input type="radio"/> ranging error <input type="radio"/> past ranging error

Schedule

```
SSIM 112500 SAT-5
RXON 112600 SAT-5a xxxxxx xxxxxx
SAMPL 112700 300 xxxxxx xxxxxx
RXOFF 113205 OFF xxxxxx xxxxxx
TRSET 113215 TRST1
TRMUT 113230 ON
SSIM 113240 SAT-6
RXON 113330 SAT-6a xxxxxx xxxxxx
SAMPL 113500 300 xxxxxx xxxxxx
RXOFF 114005 OFF xxxxxx xxxxxx
SSIM 114030 SAT-7
RXON 114200 SAT-7a xxxxxx xxxxxx
SAMPL 114300 300 xxxxxx xxxxxx
RXOFF 114900 OFF xxxxxx xxxxxx
RXOFF 115000
```

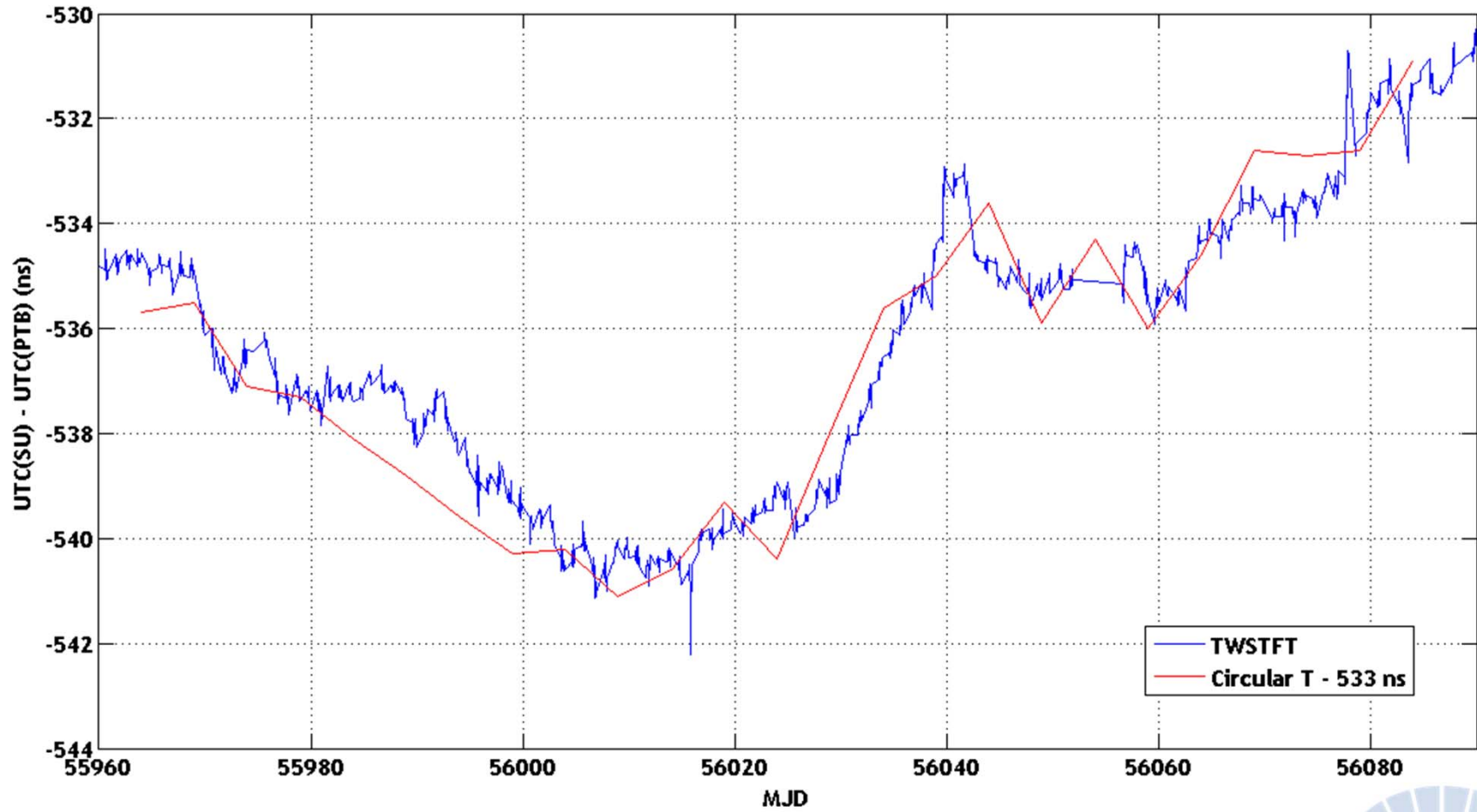
Logging & Warnings

```
2012/08/27 10:49:42 (Local PC) Hardware check starts...
2012/08/27 10:49:42 (Local PC) SATRE 192.168.5.27 OK
2012/08/27 10:49:42 (Local PC) Transceiver ComTech Connection OK
2012/08/27 10:49:42 (Local PC) SATSIM Connection OK
2012/08/27 11:23:59 (SATRE) no Statistics data for: SAT-4a
```

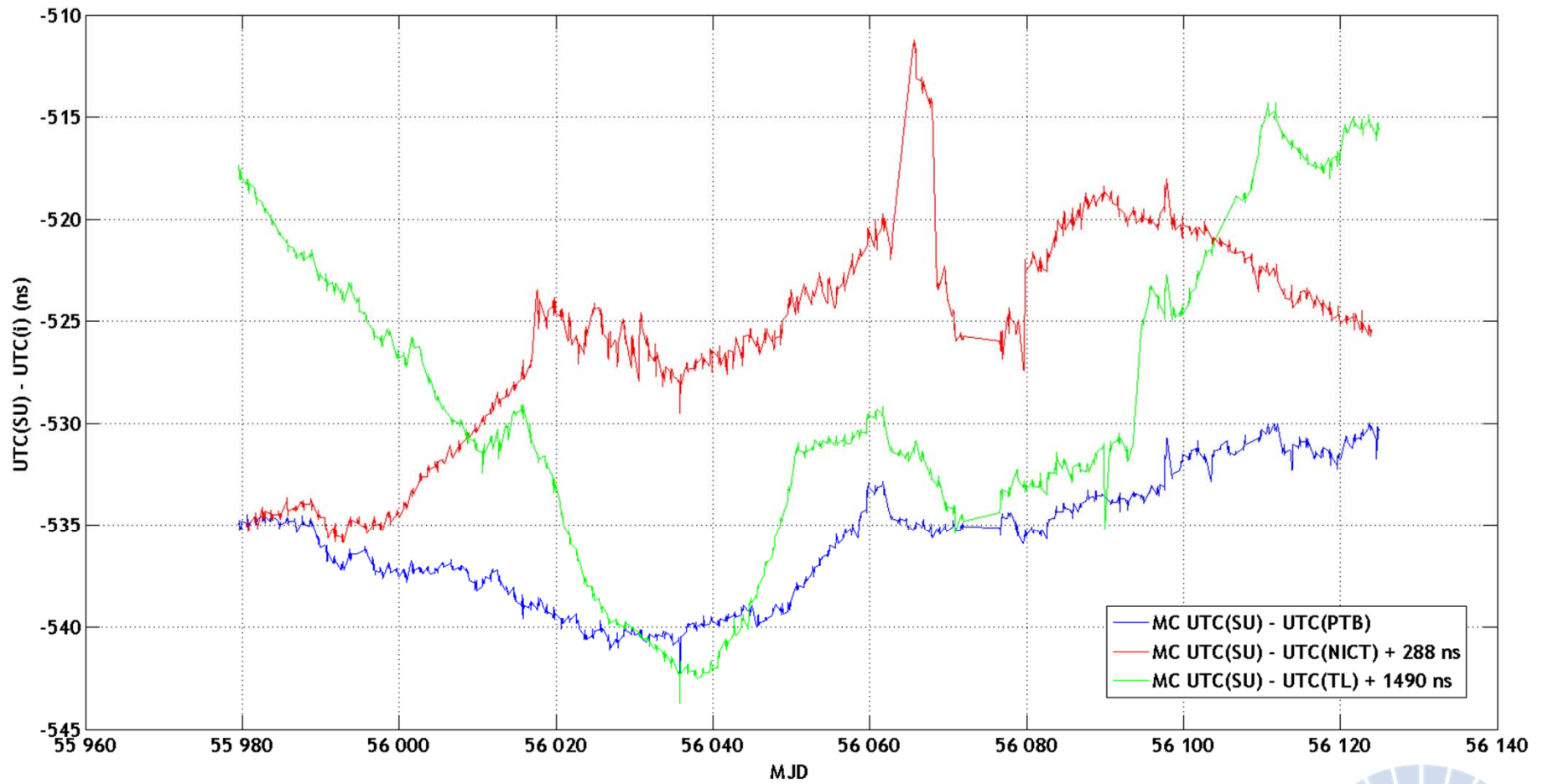
Telnet Start Stop



MC UTC(SU) – UTC(PTB)

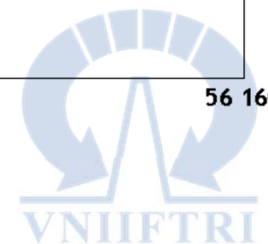
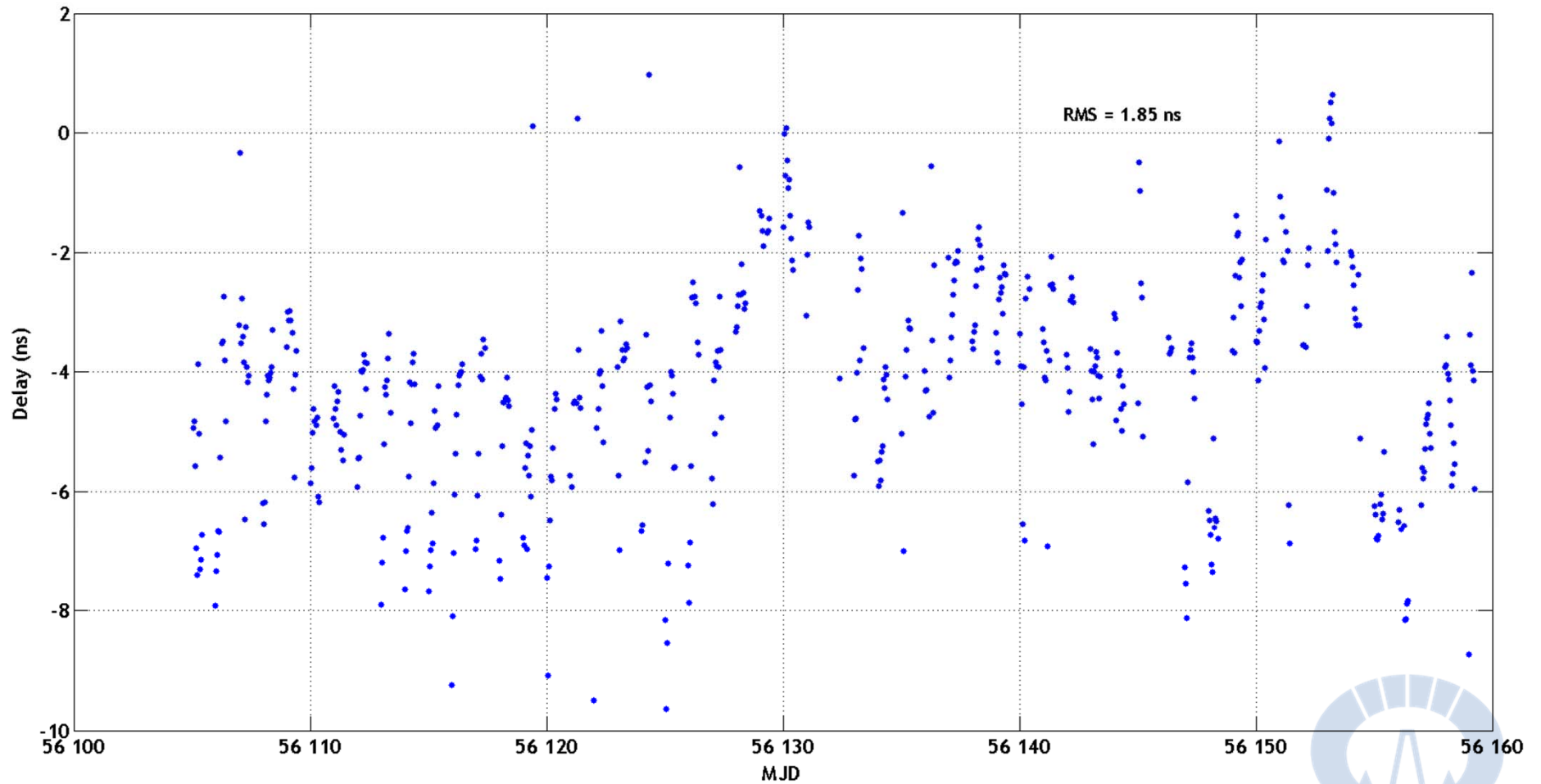


VNIIFTRI with PTB, TL and NICT



SATSIM on SU01 Station Loop Results

- one point per hour (6 SATSIM loops) from 00:00 to 11:00 UTC every day



SU02 Transportable TWSTFT Station Experiments

- Short base line SU01 – SU02, in VNIIFTRI;
- RIRT, Saint Petersburg - Local Time and Frequency standard (end of July this year). Results were confirmed with Transportable H maser clock.



Schedule of SU02

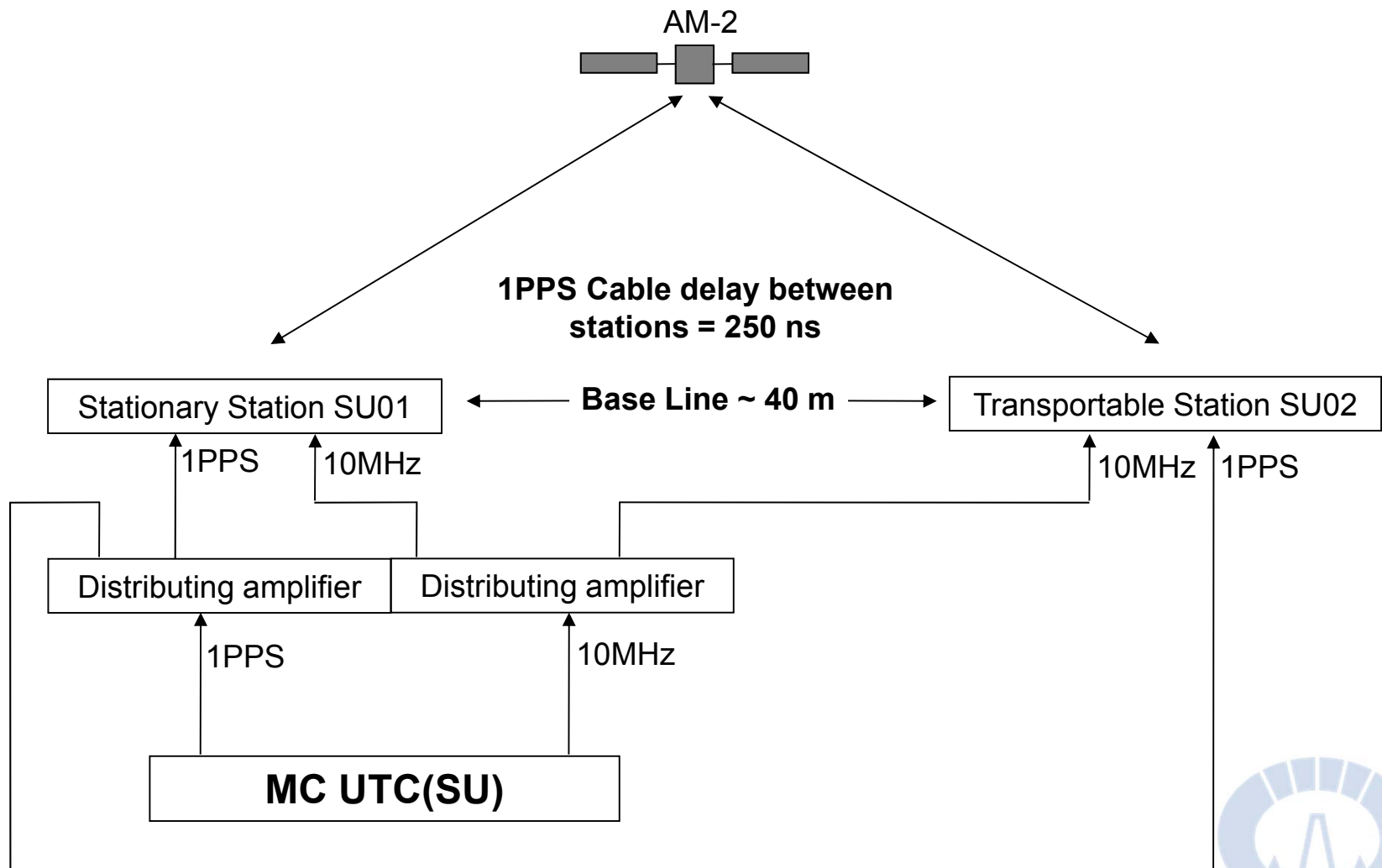
- 8 sessions of 5 minutes per hour with SU01 RX2
and
- 1 session of 5 minutes per hour with SU01 RX1

Working time of SU02

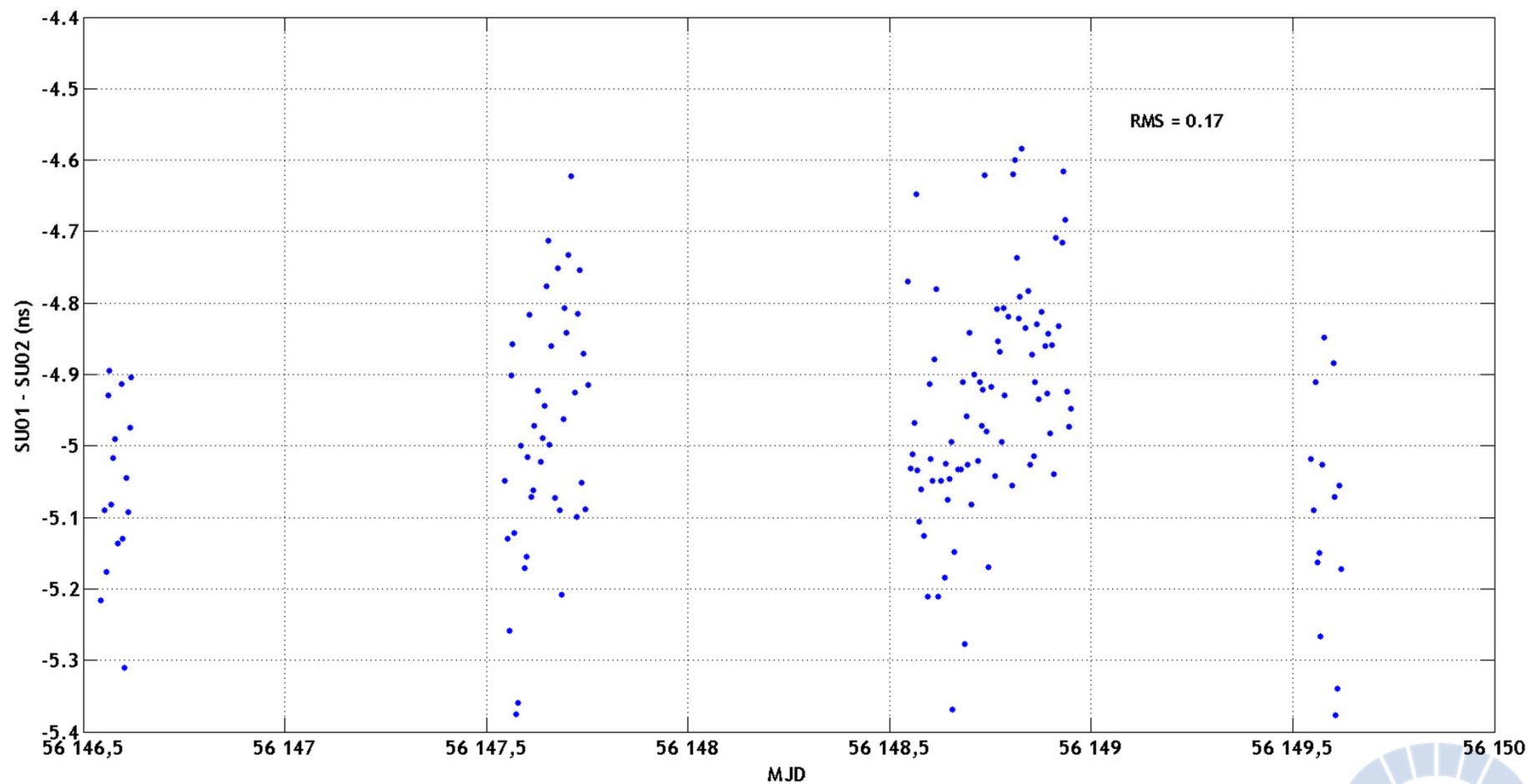
- 2-3 hours in one working cycle



VNIIFTRI SU01 – SU02 short base line connection schematic



VNIIFTRI SU01 – SU02 Short base line experiment data



Trip Details to RIRT, St. Petersburg

In VNIIFTRI

Event

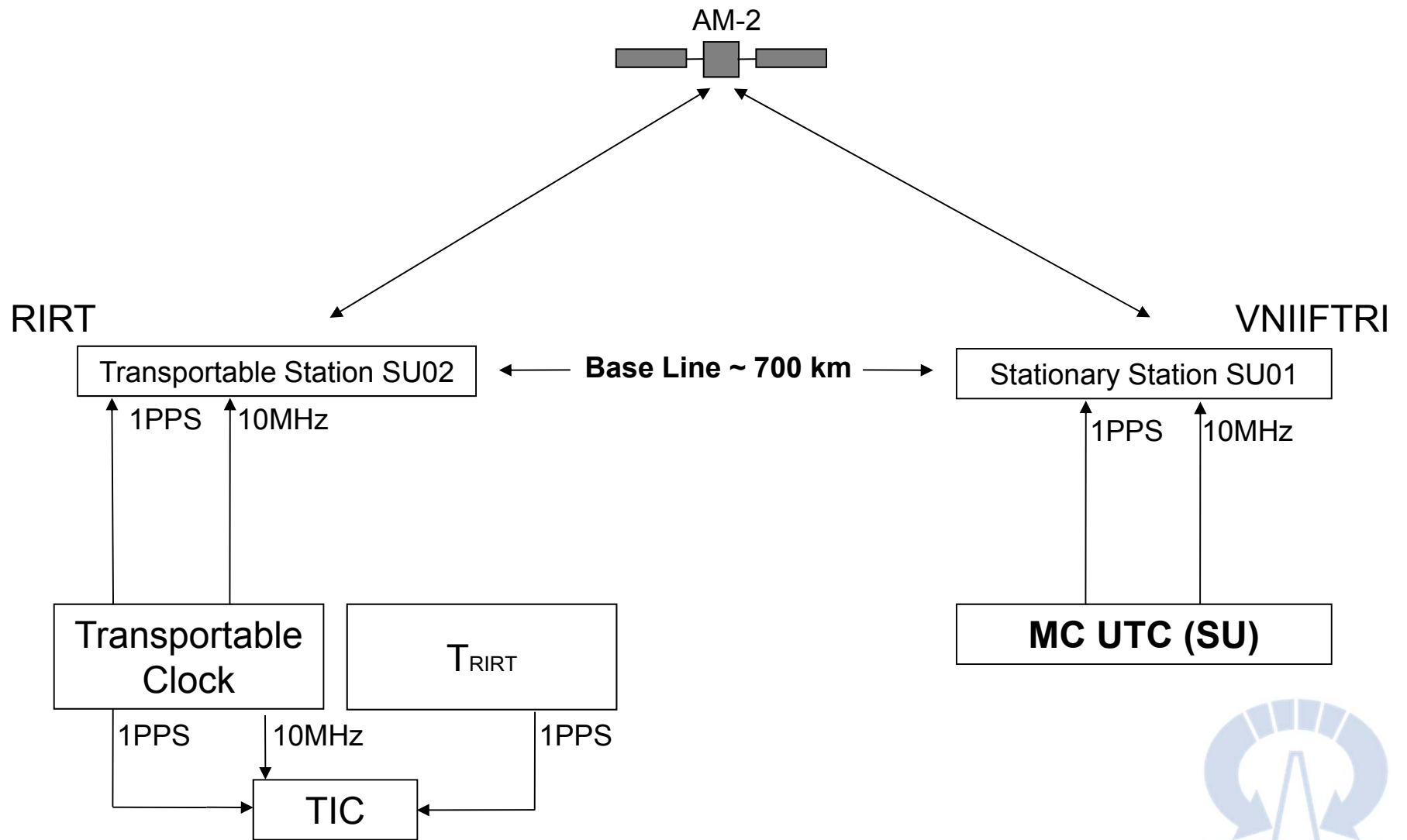
Result

source;

standard;

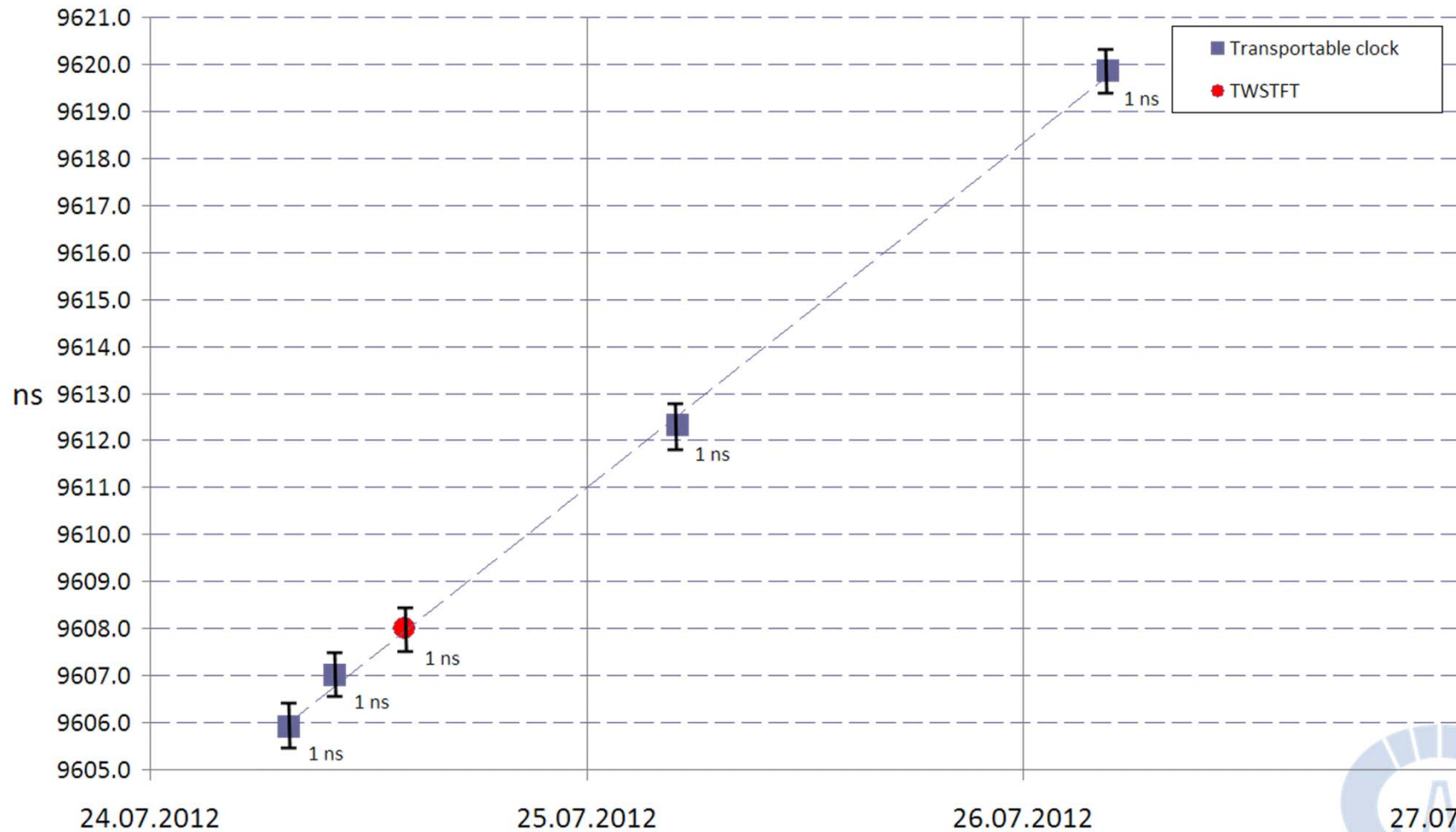


RIRT - SU02 experiment

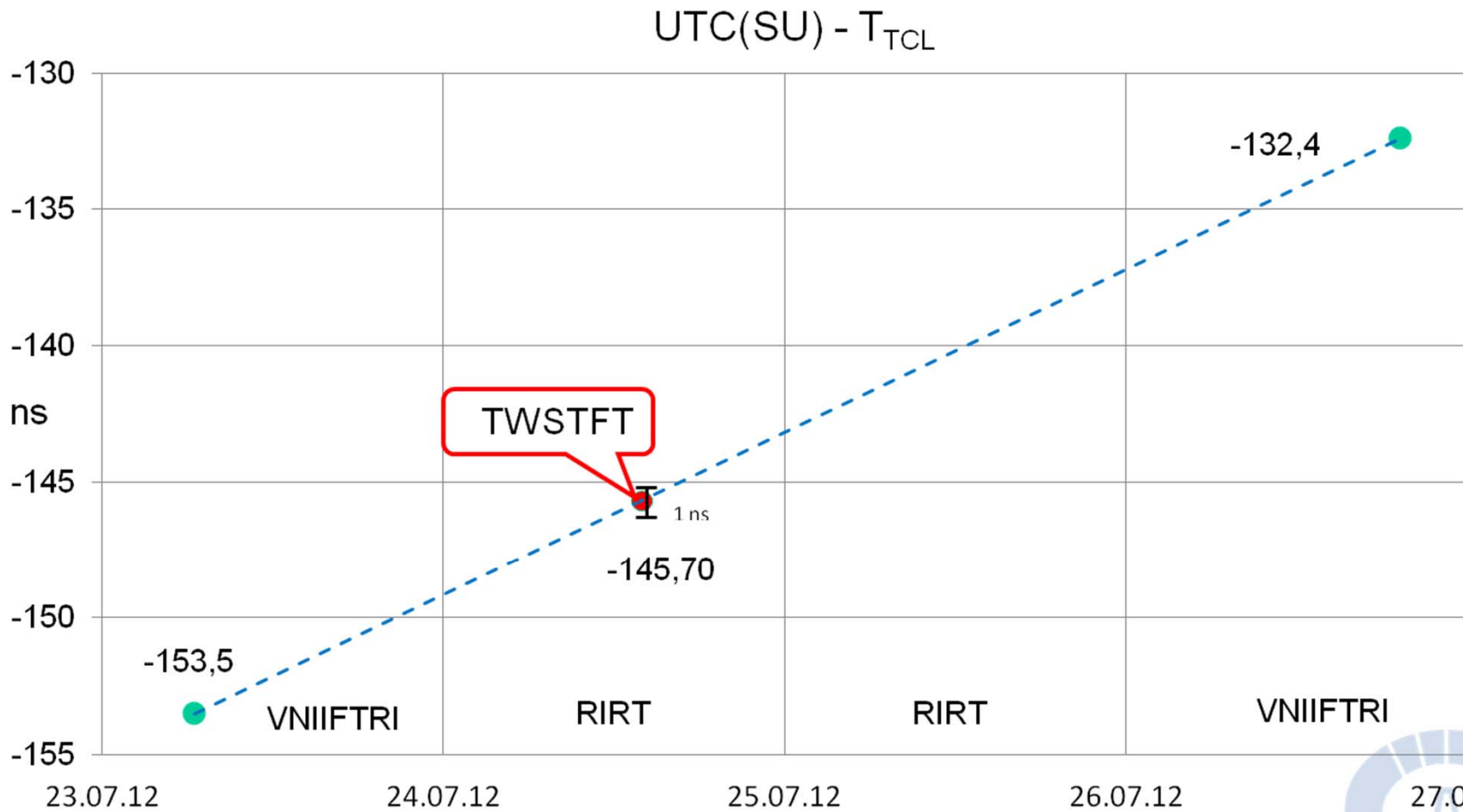


RIRT – VNIIFTRI experiment data

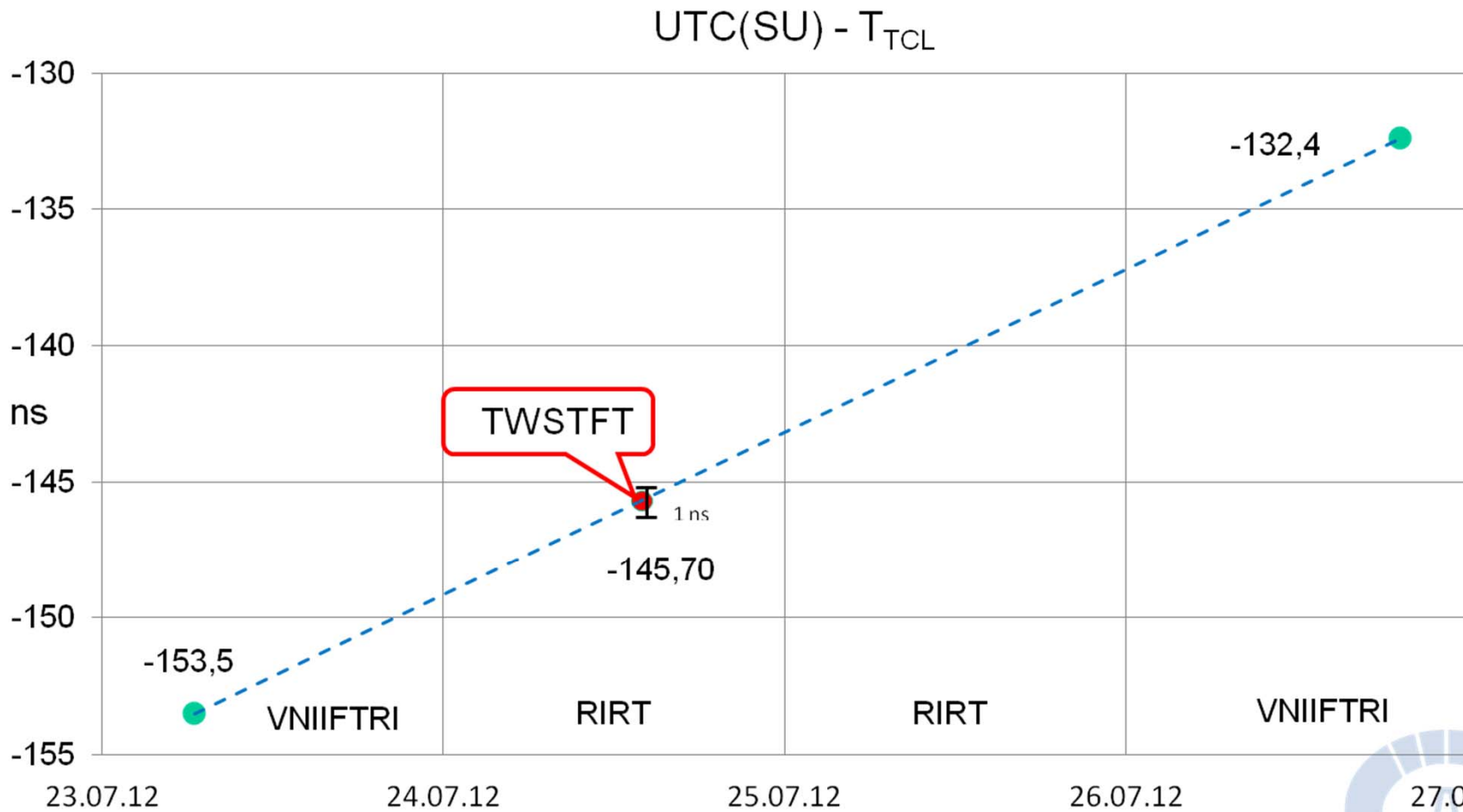
UTC(SU) - T_{RIRT}



RIRT – VNIIFTRI experiment data



RIRT – VNIIFTRI experiment data



Thank you for attention

