



Galileo IOV System Time Status

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CGSIC 53rd Meeting, 16 Sep. 2013, Nashville, Tennessee

User Performance	Specification
Frequency Accuracy (expressed as a normalised frequency offset relative to UTC, 2 sigma, over any 24 h interval)	$< 3 \times 10^{-13}$
User UTC determination uncertainty (2 sigma)	$< 30 \text{ ns}$

Galileo System Time (GST) shall be a continuous co-ordinate time scale in a geocentric reference frame, steered towards the UTC modulo 1 second.

GST start epoch: 00:00 on Sunday August 22nd 1999 (midnight between August 21st and 22nd). At the start epoch, GST shall be ahead of UTC by thirteen (13) leap seconds.

$GST-UTC = 16 \text{ s}$ (as of 01/07/2012)

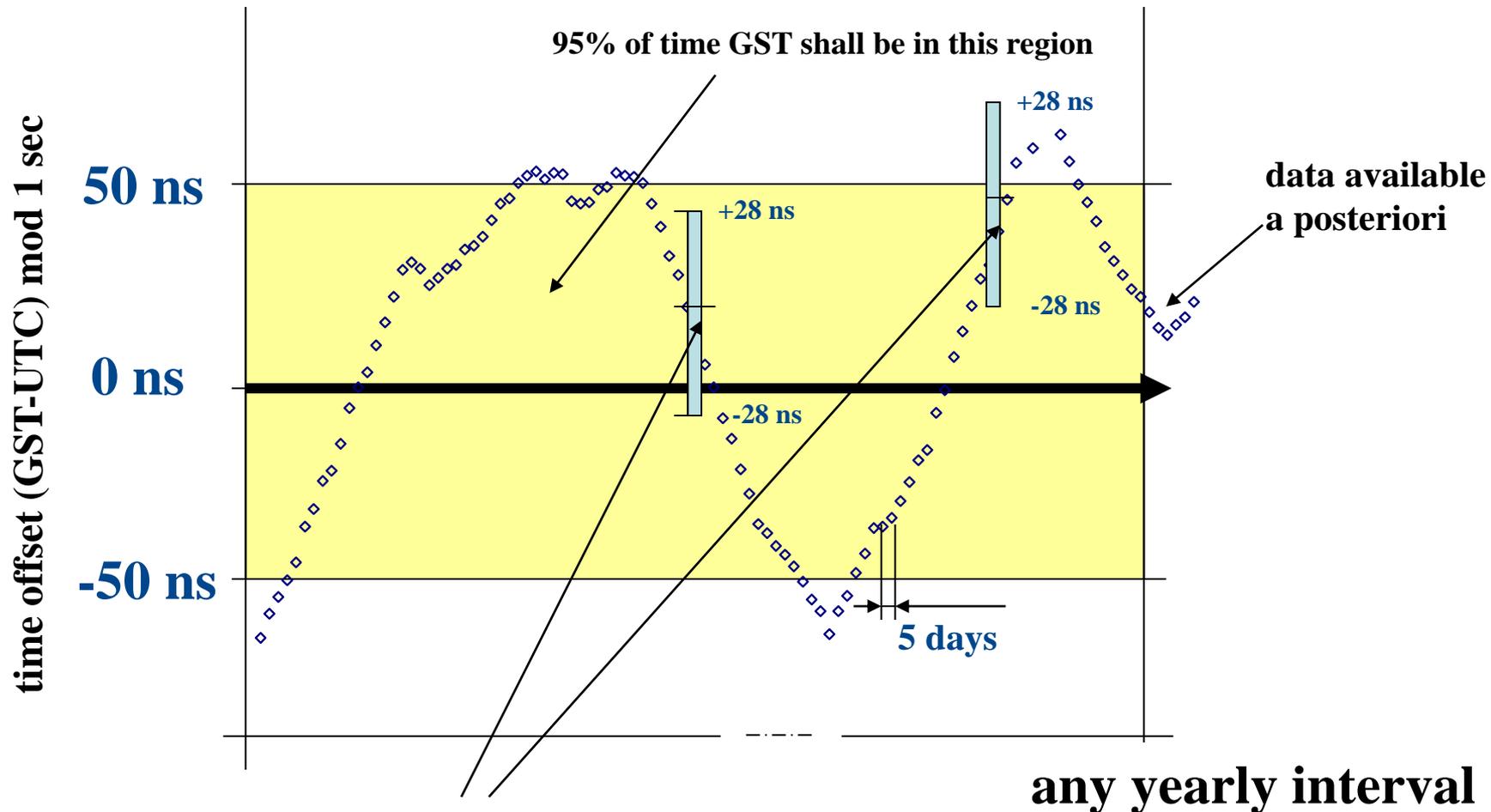
GST format as broadcast in the satellite navigation message

- Week Number (WN)
- Seconds of Week

GST and GPSTime:

- $GST-UTC = GPST-UTC$
- $WN(GST) = WN(GPSTime, \text{w. roll-over}) - 1024$
- Seconds of Week (GST) = Seconds of Week (GPSTime)

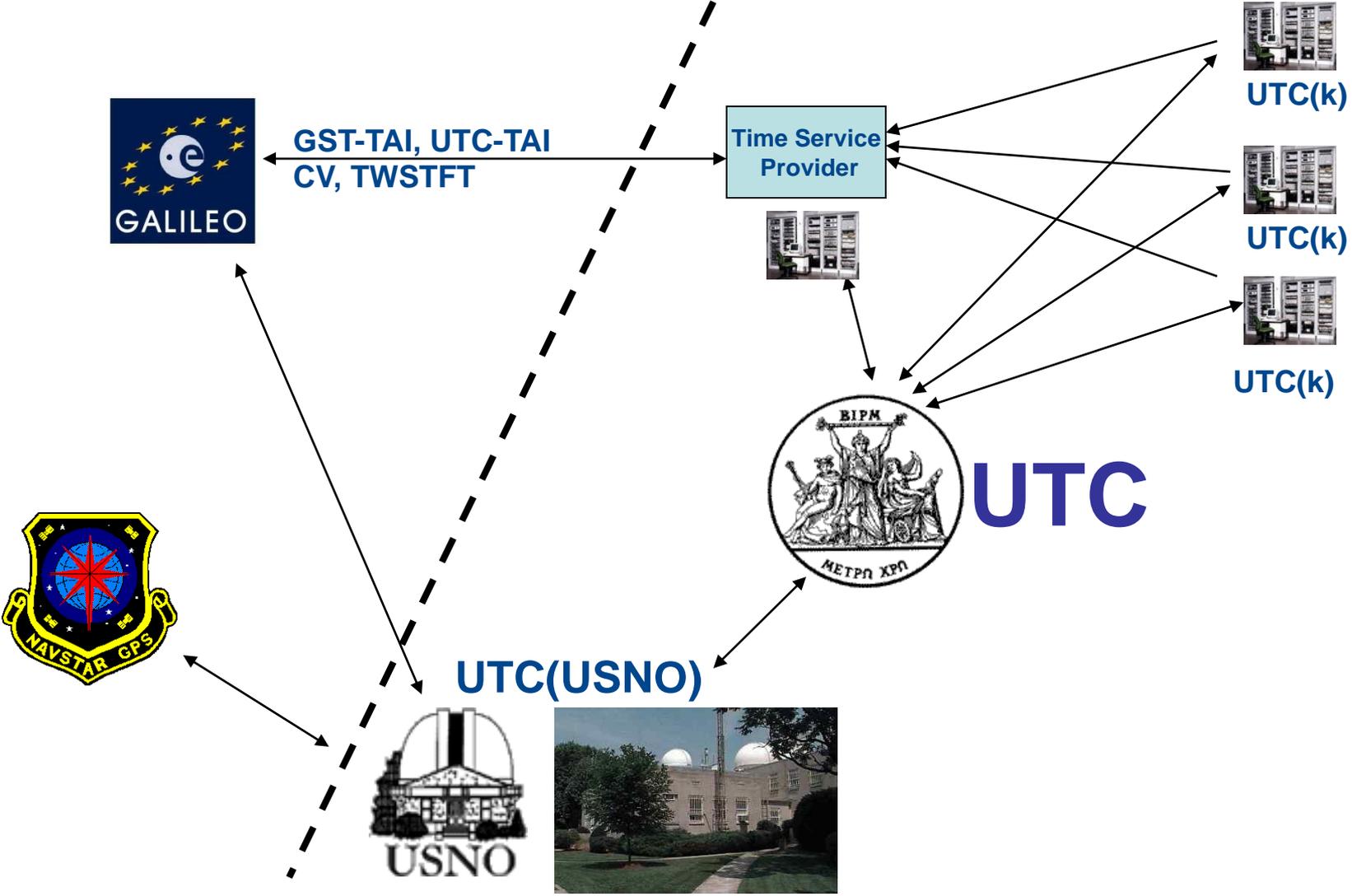
Galileo System Time vs. UTC mod 1 sec



predicted offset shall be in this region, 2sigma,
due to delay in UTC estimation (1.5 months)

not to scale

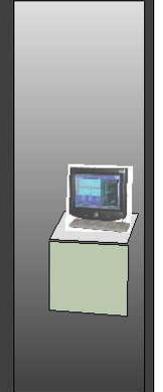
Galileo vs. BIPM, USNO, GPS



PTF in Galileo Control Center (Fucino)



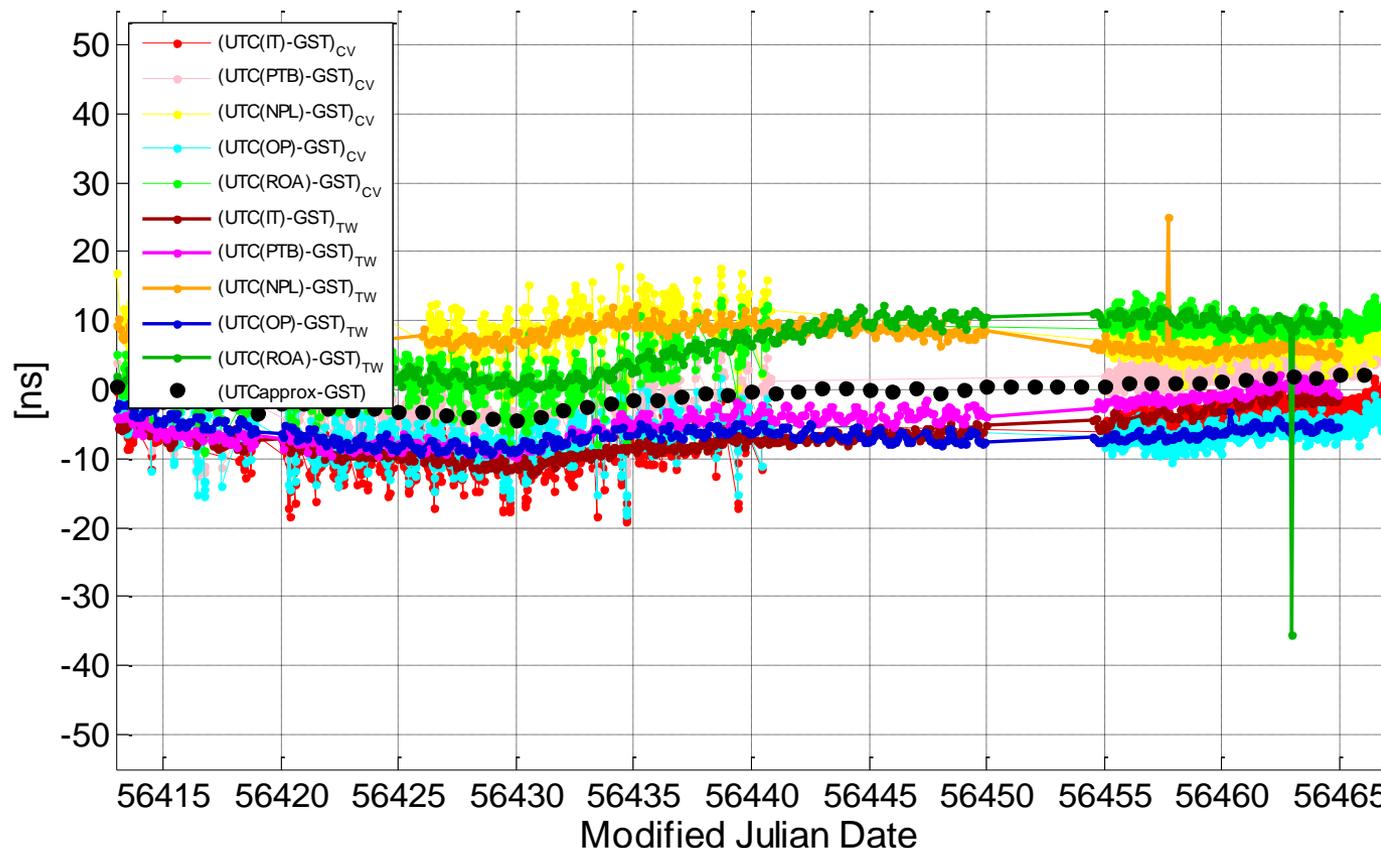
Controlled environment (+/- 0.1°C)



Computer room

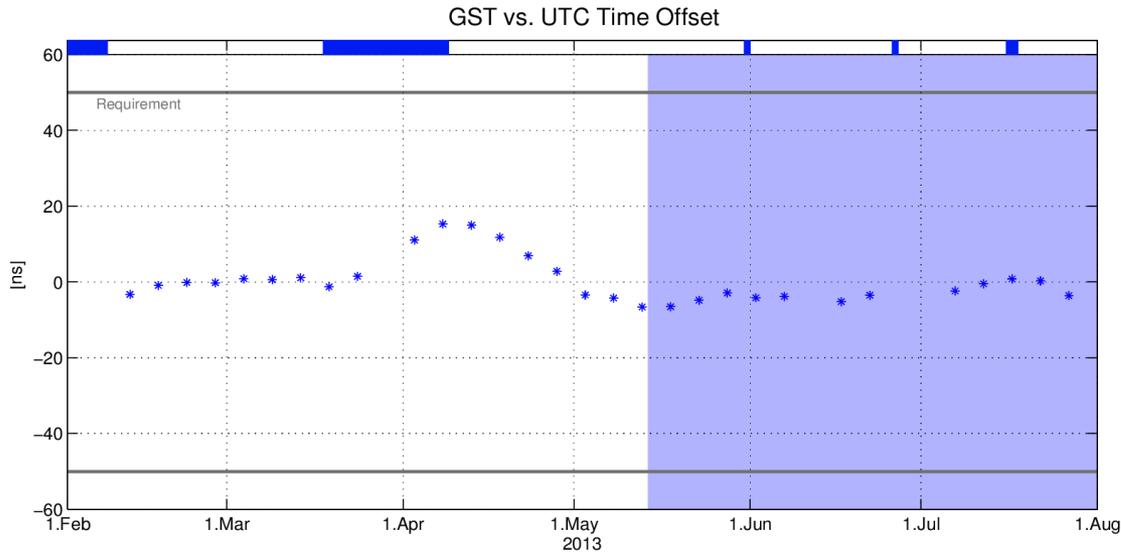
UTC(k) and UTCpredicted vs. GST (MC) Early Results

UTC(k)-GST & UTCapprox-GST (00 UTC)
from 01/05/13 to 24/06/13 (MJD 56413 - 56467)

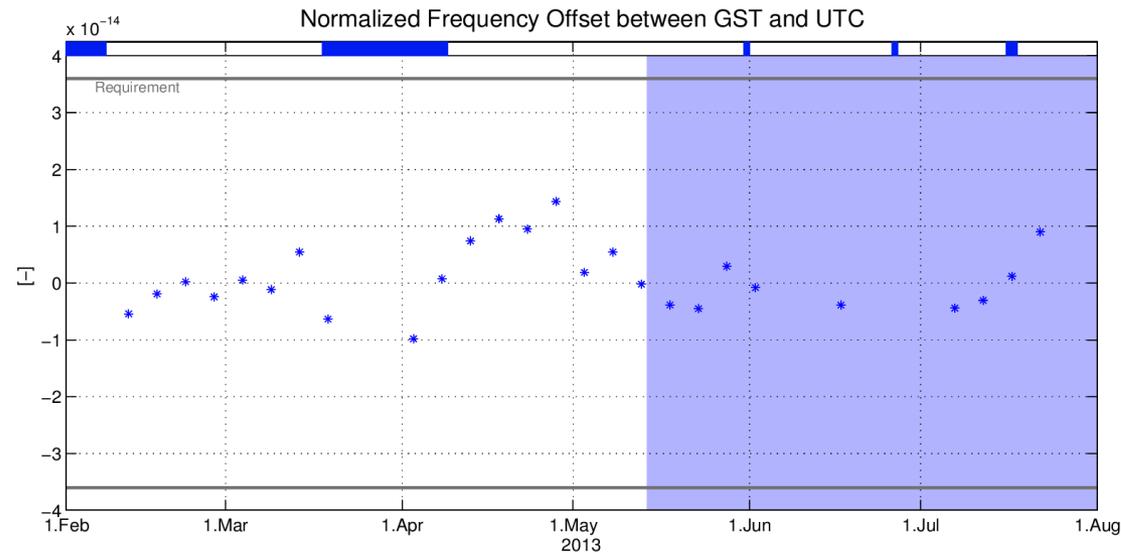


The plot shows daily average of GST(MC) offset to the national real-time realizations of UTC, named UTC(k). The offset UTC(k)-GST(MC) is measured using TWTFT and GPS CV techniques. The real time approximation of UTC named UTCapprox is the average of the five UTC(k)'s predicted vs UTC.

UTC-GST(MC) Time and Freq. Offset Early Results

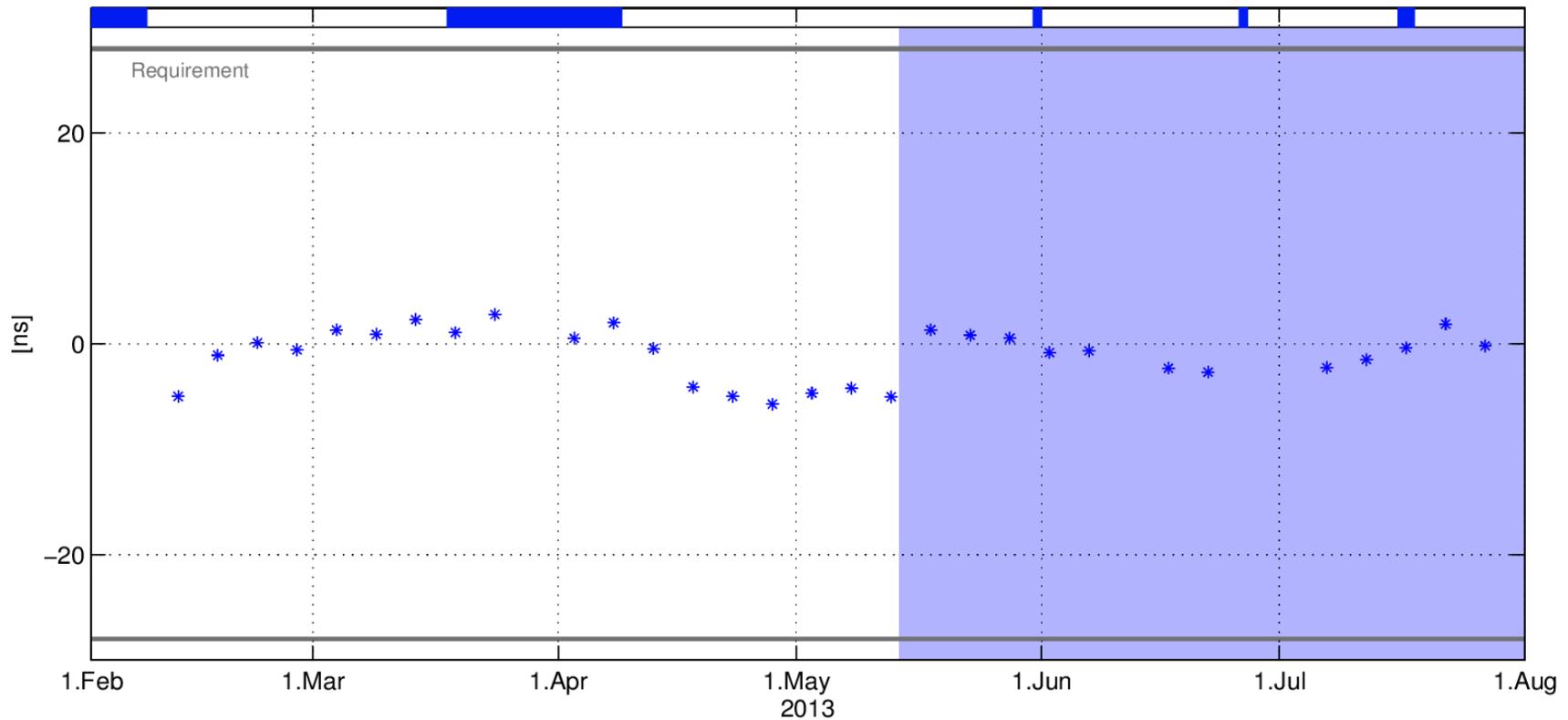


- UTC-GST(MC) offset is evaluated monthly using BIPM Circular T
- The period of the IOV campaign is highlighted with the blue shaded area



UTC-GST(MC) Prediction Error Early Results

GST vs. UTC (modulo 1 second) prediction accuracy



- TVF daily evaluates a prediction value for UTC-GST(MC) time offset. The prediction is broadcast in the Galileo navigation message.
- The UTC-GST(MC) prediction error is evaluated by TVF monthly when CircularT is available.
- Through-out the IOV campaign, UTC-GST(MC) prediction error remains within +/- 5 ns



http://www.esa.int/Our_Activities/Galileo

<http://ec.europa.eu/galileo>