

# Network Size Simulations

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## Abstract

A series of SKED/SOLVE simulations investigates the potential size and configuration of a fictitious network of identical stations characteristic of the recommendations of the VLBI2010 report. Standard observing strategies and bandwidths are applied.

## 1. VLBI2010 Simulations

In the VLBI2010 report, the authors suggest a VLBI network of 20-40 globally distributed small antennas. Unfortunately, at the time of writing, software used to insert simulated schedules into SOLVE was able to handle only 16 stations. Due to this restriction, fictitious networks of 6, 8, 12, and 16 stations were created and scheduled, and simulated results were put through SOLVE to determine Earth orientation uncertainties. Station positions were chosen to be globally distributed and placed without regard to landmass. A recording speed of 1 Gbps was used and data was recorded in X and S bands.

Table 1. Simulation results

Stations	No. Obs	$\sigma$ X-pole (uas)	$\sigma$ Y-pole (uas)	$\sigma$ UT1 (us)
6	2406	43.42	29.81	2.02
8	4512	7.18	7.53	0.97
12	8474	6.38	6.38	0.91
16	15966	4.60	4.52	0.60

## 2. Comments

As the number of observations grows large, the limits of the CALC/SOLVE analysis become apparent; eventually the improvements to the uncertainties become very small and unrealistic. Similarly, if we reduce the parameterization of the nuisance parameters in “traditional” simulations, the uncertainties of the desired parameters improve—in reality this is not the case. For further investigations of VLBI2010 strategies a more complete simulation tool will have to be designed. Similarly, VLBI2010 may represent a fundamental shift in the quantity of data produced by VLBI; many of the processing tools, from scheduling to solving, will have to be re-thought and possibly rebuilt.