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VLBI2010: A new VLBI system for geodesy and astrometry

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In 2003, the International VLBI Service for Geodesy and Astrometry (IVS) began a process of renewal. For the first two years, IVS Working Group 3 (WG3) laid out a framework for moving forward toward the goals of 1 mm position accuracy, continuous observations and 24 hr latency between observations and initial products. In the final report, strategies were proposed for achieving the 1 mm precision target, and a number of studies and prototyping efforts were suggested to help generate detailed specifications for the new system. Since then, the IVS VLBI2010 Committee (V2C) has been tasked with carrying out these studies and completing, by 2010, the final specification of the VLBI2010 system. Strategies under study include: a quantum increase in the number of observations per day; a quantum increase in the precision of the VLBI delay observable; the active application of source structure corrections; the use of a larger better distributed global network; and improved analysis strategies and atmosphere modeling. Monte Carlo simulators have been developed to study the impact of these strategies, and a NASA supported proof-of-concept program is under

way to validate the use of broadband (2-15 GHz) data acquisition systems to resolve phase ambiguities even at modest SNR, and at the same time to gain experience with the new systems. It is recognized that the realization of the anticipated performance improvements will require careful attention to systematic effects such as position dependent cable and instrumental offsets and thermal and gravitational deformation of the antenna structures.