The future global VLBI2010 network of the IVS

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VLBI2010 Project Executive Group

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The IVS Directing Board decided in its meeting in Bordeaux on March 23, 2009, to establish the IVS VLBI2010 Project Executive Group. It will provide strategic leadership to the VLBI2010 project and guide the transition from the VLBI2010 development phase to the VLBI2010 implementation phase.
VLBI2010 in a nutshell

- **continuous observation** in 30s slew/track cycles
- **very fast radio telescopes**, ≥12m reflector class, kinematic parameters: $v_{Az} = 12^\circ$/s, $v_{El} = 6^\circ$/s, $a_{AzEl} = 3^\circ$/s$^2$
- **wideband** feed, 2-14 GHz (2-18 GHz)
- **digital** baseband converter
- **high-sampling** data acquisition rate, ≥ 8Gb/s
- e-transfer, e-VLBI
- distributed **remote controlled** continuous operation
- software correlator
- automated analysis
Why VLBI2010?

- IVS is a Service of International Association of Geodesy (IAG).
- IAG contributes to the Global Earth Observing System of Systems (GEOSS) with the Global Geodetic Observing System (GGOS).
- GGOS goal is to reach on a global scale:
  - 1mm position accuracy, 0.1mm/yr velocity accuracy
  - continuous observations
  - availability of results in near real-time

The realization of GGOS requires the application of the VLBI2010 concept to IVS components.
IVS Network Station Survey
December 2010

Objectives:

- gather information about VLBI2010 plans,
- trigger VLBI2010 discussion at network station level,
- get input on what the V2PEG can do to best support individual VLBI2010 projects.

31/31 network station responded to the survey.

An analysis report was redistributed to the IVS network stations in January 2011.
Six Questions

1. Specify plan to upgrade your site to full VLBI2010 capability.
2. Do you plan to acquire a new radio telescope that doesn't fully meet the VLBI2010 recommendations?
3. Do you plan to continue operating your existing legacy radio telescope in the future?
4. What is the best estimate of the year in which your VLBI2010 capability will become operational?
5. At what stage are you in the planning process?
6. What support do you need from the IVS?
VLBI2010 Network in 2011

- VLBI2010 very fast
  - ☻️ radio telescope
  - 😞 twin radio telescope

- VLBI2010 fast
  - ☻️ radio telescope

- upgrade legacy
  - 😔 radio telescope
VLBI2010 Network in 2012

VLBI2010 very fast
- radio telescope
- twin radio telescope

VLBI2010 fast
- radio telescope

upgrade legacy
- radio telescope
VLBI2010 Network in 2013

VLBI2010 very fast
- radio telescope
- twin radio telescope

VLBI2010 fast
- radio telescope

upgrade legacy
- radio telescope
VLBI2010 Network in 2014

- VLBI2010 very fast radio telescope
- twin radio telescope
- VLBI2010 fast radio telescope
- upgrade legacy radio telescope
VLBI2010 Network in 2015

- VLBI2010 very fast
  - radio telescope
  - twin radio telescope

- VLBI2010 fast
  - radio telescope

- upgrade legacy
  - radio telescope
VLBI2010 Network in 2016

VLBI2010 very fast
- radio telescope
- twin radio telescope

VLBI2010 fast
- radio telescope

upgrade legacy
- radio telescope
VLBI2010 Network in 2017

VLBI2010 very fast
- radio telescope
- twin radio telescope

VLBI2010 fast
- radio telescope

upgrade legacy
- radio telescope
VLBI2010 Network in 2017 including potential new sites

VLBI2010 very fast
- radio telescope
- twin radio telescope

VLBI2010 fast
- radio telescope

upgrade legacy
- radio telescope

potential new site
- radio telescope
Survey Summary VLBI2010

- **20 new radio telescopes** at 17 sites with full VLBI2010 compliance should become operational by 2017.
- Additional new stations might join in.
- 13 radio telescopes will operate with partial VLBI2010 compliance.
- By **2014/2015** a sufficient number of VLBI2010 compatible radio telescopes will be available for initial VLBI2010 operations.
- The American/Pacific region will lack presence of VLBI2010 network stations.
VLBI Network in 2015

S/X Network Stations

VLBI S/X-station

radio telescope
Conclusions

- IVS will implement the VLBI2010 concept within this decade successfully.
- The S/X operation mode will be maintained in parallel to the VLBI2010 operation at least until 2015.
- Large (legacy) radio telescopes will be useful for astrometry, space applications, data continuity also in the future.
- In the long term VLBI2010 will significantly outperform the current standard S/X operation.
- IVS will meet the goals of GGOS only by a new global infrastructure based on VLBI2010.
Announcement

IVS Workshop on

VLBI2010 Technical Specifications

Bad Kötzting / Wettzell

March 1, 2012: Radio Telescopes (Twin-Demo)
March 2, 2012: Front End, Back End

IVS General Meeting 2012

Madrid

March 5-9, 2012
Survey Report available