EXPReS OBJECTIVES

EXPReS will:

- Develop an operational production-grade e-VLBI network that is capable of transferring data at aggregate rates of up to 16 Gbps, from remote telescopes to the central data processor at JIVE via the infrastructure operated by national and international research and education networks.

- Expand the number of e-VLBI capable telescopes in Europe by supporting the provisioning of last-mile connections and upgrading existing fibre connections to Gigabit Ethernet standard. In total, at least 12 European telescopes will be available for astronomers for use in e-VLBI observations.

- Transparently include telescopes in the UK e-MERLIN array within the e-VLBI facility. This will give astronomers more flexibility to select the telescope array with the right characteristics for their observations.

- Support the connection of radio telescopes located outside of Europe, establishing network connections to telescopes in the United States, Asia, South Africa, Australia and South America.

- Upgrade the EVN data processor at JIVE to reliably service and process incoming e-VLBI data streams from up to 16 telescopes at 1 Gbps each.

- Ensure that this real-time e-VLBI network is able to conduct "Target of Opportunity" and "Rapid Response" science, reacting reliably and flexibly to unexpected astronomical events such as supernova explosions, giant magnetar and X-ray binary flares, gamma-ray bursts and other transient phenomena.

- Research the possibilities of advanced networking and new computing technology to support even higher bandwidths in the future. Increased bandwidth will allow fainter targets to be observed in the future using both new and existing radio telescopes.

- Research whether the computationally intensive process of correlation can be implemented on distributed computing infrastructure following the model of Grid computing.

- Investigate how the new radio astronomy facilities now under development (such as e-MERLIN in the UK and LOFAR in the Netherlands, Germany and Sweden) can further expand using e-VLBI as a model for their own use of communication networks.

- Promote and demonstrate the way in which communication research networks can be used to create enhanced, large-scale distributed scientific facilities, and organize interaction between radio astronomers, engineers, network operators and Grid computing experts.

PARTICIPATING ORGANIZATIONS

Radio Astronomy Institutes:
- Joint Institute for VLBI in Europe (Coordinator), The Netherlands
- Arecibo Observatory, National Astronomy and Ionosphere Center, Cornell University, USA
- Australia Telescope National Facility, a Division of CSIRO, Australia
- Institute of Radioastronomy, National Institute for Astrophysics (INAF), Italy
- Jodrell Bank Observatory, University of Manchester, United Kingdom
- Max Planck Institute for Radio Astronomy (MPIfR), Germany
- Metsähovi Radio Observatory, Helsinki University of Technology (TKK), Finland
- National Center of Geographical Information, National Geographic Institute (CNIG-IGN), Spain
- Hartebeesthoek Radio Astronomy Observatory, National Research Foundation, South Africa
- Netherlands Foundation for Research in Astronomy (ASTRON), NWO, The Netherlands
- Onsala Space Observatory, Chalmers University of Technology, Sweden
- Shanghai Astronomical Observatory, Chinese Academy of Sciences, China
- Torun Centre for Astronomy, Nicolaus Copernicus University, Poland
- Transportable Integrated Geodetic Observatory (TIGO), University of Concepción, Chile
- Ventspils International Radio Astronomy Center, Ventspils University College, Latvia

National Research Networks:
- AARNet, Australia
- DANTE, United Kingdom
- Poznan Supercomputing and Networking Center, Poland
- SURFnet, The Netherlands

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