

AGREEMENT

BETWEEN

THE EUROPEAN SPACE AGENCY

AND

CONSIGLIO NAZIONALE DELLE RICERCHE

FOR DEVELOPMENT AND USE OF GRID TECHNOLOGIES

CNR - ESA agreement

The European Space Agency, hereinafter referred to as "the Agency", represented by Mr. V. Liebig, Director of ESA-ESRIN and of the Earth Observation Programme,

and

The Italian National Research Council, hereinafter referred to as "CNR", represented by President, Mr. Fabio Pistella,

TAKING INTO ACCOUNT

- that the Agency is an international organisation, of which Italy is a member state, having among its objectives the research and development of space technologies and applications;
- that in the frame of its activities and programmes the Agency has the objective to facilitate the access to scientific results for the needs of European scientists;
- that a technological research area exists in the Frascati – Rome region and co-operation is ongoing with CNR, INFN, TOR VERGATA University and ENEA, and that various bilateral co-operation agreements already exist among the above mentioned institutions;
- that ESA-ESRIN and CNR intend to strengthen their reciprocal experience and co-operation in their field of competence with particular interest in the Earth Observation and Earth Science Domains;
- that ESA-ESRIN and CNR are both partners in various European DataGrid Initiatives, sharing part of the same European infrastructure and as such both committed to promote the use of the GRID infrastructure for Earth Observation and other scientific and industrial Applications;
- that ESA has established an internal GRID infrastructure at ESRIN;
- that CNR has established dedicated GRID infrastructures in Italy and in the Roma area, e.g. GRIDIS – GRID for Dissemination - and, within a Special Project funded by the Italian Ministry of Research on 'Grid Computing: qualifying technologies and applications for eScience' aimed at promoting the utilisation of GRID technology;

HEREBY AGREE AS FOLLOWS:

1. The Agency and CNR will interconnect in a wide-area-network, through dedicated terrestrial means and via their own connections to the Italian Research Network GARR, their respective GRID

CNR - ESA agreement

dedicated infrastructures and data, to grant shared access to identified research users, for joint demonstration applications and for joint GRID technology developments, within the scope of the mentioned GRID projects.

2. The Agency and CNR will support the development of a wider GRID infrastructure using high connectivity bandwidth, in the geographical area of Rome, to enlarge the utilisation of GRID to a wider scientific user community and for new applications of common interest so to promote the use of GRID technology in the scientific area of influence.
3. The Agency and CNR will reinforce their co-operation in the field of outreach activities such as joint conferences, Symposium, Exhibits, Open days.
4. The Agency and CNR shall elaborate a plan of the activities proposed for the next three years and the definition of subjects and projects of mutual interest. For this purpose the Agency and CNR will set up a joint Committee composed by four members, two of which appointed by ESA and two by CNR. The Committee shall be co-chaired by a representative of the Agency and a representative of CNR. The first specific collaboration plan is detailed in the annex.
5. The relationship between the Agency and CNR shall be carried out with no exchange formats
6. The present agreement shall have duration of three years from the date of signature.

Signed in Frascati

Signed in Rome

on.....

on

For the European Space Agency

For the CNR

ANNEX: ACTIVITY PLAN FOR 2004-2007

1. Introduction

The plan of activities must be structured in modules, that is it must identify several well defined activities to operate on initially, with the possibility to significantly broaden the base of cooperation between ESA and CNR in the future.

CNR and ESA will exchange information on their reciprocal research activities in order to identify potential joint projects to be carried out both in direct cooperation and/or in association with other Universities or Research Organisations.

During an initial phase of the Agreement implementation some specific topics that could be addressed include:

- Setting up of a dedicated high speed connectivity
- Joint participation to a Wide Metropolitan Area Networking in the area of Frascati and Rome South-East
- Development of GRID applications and distributed processing environment for:
 - Geographical Information Systems
 - Earth Observation and Environmental Applications

2. Joint Committee tasks and composition

The Joint Committee will meet at least twice a year to set up the proposed activities, review the plans and verify the status of the ongoing activities.

The Joint Committee will prepare a brief annual report to inform the principals: the Chair of CNR and the Director of ESA-ESRIN, on the overall progress of the collaboration.

The Joint Committee will be nominated for 3 years. Changes will take place by mutual agreement.

The nomination for the first 3 years is as follows:

- For the CNR
 - Mr. Paolo Perfetti, President of CNR Area della Ricerca di Roma II Tor Vergata
 - Mr. Maurizio Lancia, Head of the Data Processing Center - Department for Technical Services and Support - CNR Roma
- For ESA:
 - Mr. Stephen Briggs, Head of the Earth Observation Science and Applications Department, ESRIN
 - Mr. Luigi Fusco, Senior Advisor for EO Applications, ESRIN

Project 1:

Set up of high speed connectivity between CNR (Roma and Area Tor Vergata) and ESA-ESRIN (Frascati), for data sharing in GRID environment

Coordinated by:

- Mr. Luigi Fusco, Senior Advisor for EO Applications, ESRIN
- Mr. Gaetano Chionchio, Manager of the Network and Telecommunication Division - CNR Area della Ricerca di Roma II Tor Vergata

Objectives:

The project aims to realize a geographic high velocity connection for data and resources sharing, through optical fibre transmission. Such connection is mandatory to implement setup a complex computational system dedicated to the GRID computing. In continuation of European and national ongoing GRID projects, the infrastructure demands to make compatible the distributed computing resources currently present in the area.

The plan deals with the Scientific Campus shared between Rome (Tor Vergata) and Frascati, in the framework of the scientific and technological relationships between the following institutions:

- CNR - Area della Ricerca di Roma II Tor Vergata
- Università degli Studi di Roma II Tor Vergata.
- Policlinico Tor Vergata
- ENEA (Italian National Agency for New Technologies, Energy and the Environment) - Frascati
- INFN (Italian National Agency for Nuclear Physics) - Laboratori Nazionali di Frascati
- ESA (European Space Agency) - ESRIN (European Space Research Institute) - Frascati

In particular the present collaboration project involves infrastructures and computing resources to be deployed specifically at:

- ESA/ESRIN - Frascati
- CNR - Area della Ricerca di Roma II Tor Vergata

Technological reference in the CAMPUS

Present (August 2004) Primary Connectivity table:

| Institutions | Media | Max Speed | BGA | POP |
|--------------------------------|-------------------|----------------|--------------|----------|
| CNR-Area Ricerca Tor Vergata | Gigabit Ethernet* | 1 GBits/s** | --- | CNR-Sede |
| Università Roma II Tor Vergata | ATM | 30.720 MBits/s | 16.0 MBits/s | GARR-RM |
| Policlinico Tor Vergata | HDSL | 8.0 MBits/s | 8.0 MBits/s | RUPA-RM |
| ENEA - Frascati | ATM | 16.0 MBits/s | 16.0 MBits/s | GARR-Fra |

| | | | | |
|------------------------|-----|-----------------|--------------|----------|
| INFN - Frascati | ATM | 40.0 MBits/s | 32.0 MBits/s | GARR-Fra |
| ESA - ESRIN - Frascati | ATM | 32.0 MBits/s*** | 16.0 MBits/s | GARR-Fra |

Additional Connectivity table:

| Institutions | Media | Max Speed | BGA | Provider |
|---|-------------------|---------------|-------------------|----------|
| CNR Roma – CNR Area Ricerca Tor Vergata | FastEthernet | 100.0 MBits/s | 100 MBits/s | FastWEB |
| ESA-ESRIN to INFN | Gigabit Ethernet* | 1 GBits/s** | | |
| ENEA to INFN | Gigabit Ethernet* | 1 GBits/s** | | |
| ESA-ESRIN - sede di Frascati | Link Satellitare | 8.0 MBits/s | 8.0 MBits/s (tbc) | ESA |

* dark optical fiber

** possible upgrade to 10 GBits/s

*** in updating to 100 MBits/s

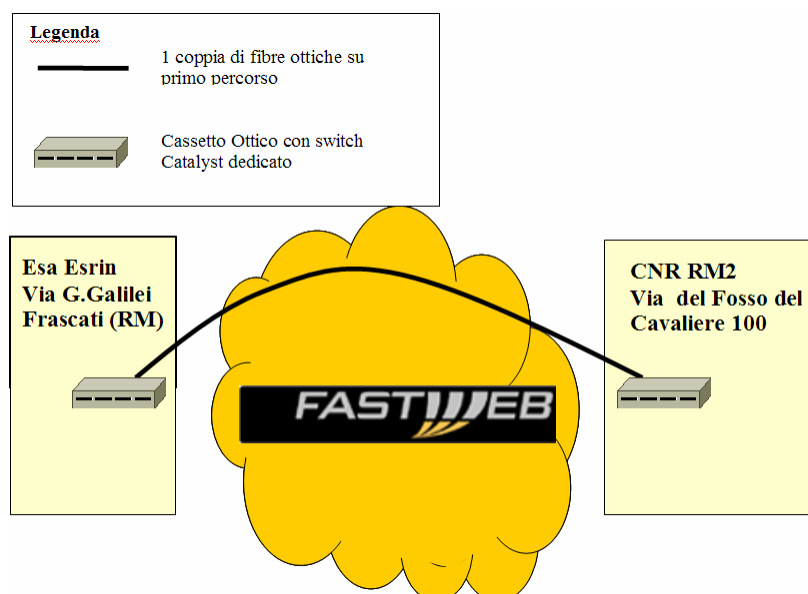
The transmission band of the GRID systems pushes the structures that wish to participate to the GRID to equip themselves of transmission data systems having Gigabit technology. At present, the local connectivity between the institutions of Frascati INFN, ENEA and ESA-ESRIN, is provided by optical fibre transmission. Inside the "Tor Vergata" Campus, CNR, University and Policlinico have the possibility of sharing the same infrastructure based on optical fibres; an agreement to activate such potentiality is in progress.

A connection with dark optical fibre between CNR-Area della Ricerca di Roma II and ESA-ESRIN will allow to complete a backbone among all the academic and scientific institutions of the CNR (Uni Roma 1) - Tor Vergata - Frascati research area.

Adding the CNR-ESA data connectivity:

A physical connectivity between CNR-Area della Ricerca di Roma II and ESA-ESRIN is considered for joint procurement by ESA-ESRIN and CNR:

- Physical connectivity service with the exclusive use of 1 single-mode optical fiber pair of type NZD (Non-Zero Dispersion) in agreement with the Recommendation ITU-T G.655.
- The cable containing the optical fiber pair granted in exclusive use will be matched from the carrier on supplied optical boxes



and installed in the respective racks located in each of the two research institute.

- The procurement will include the supply of a pair of switches Cisco Catalyst 2950-12G-EI, each equipped with 12 ports FastEthernet and two Giga up-link (one of them equipped of GBIC - ZX type)

The above connectivity will complement the already available connectivity described in the tables above and will allow the deployment and sharing of the existing GRID infrastructures at the different named sites (ENEA, INFN, CNR, ESA, Uni Tor Vergata). In particular it will be used to organise, to test and to enable end-to-end application experiments, which will demonstrate the effectiveness of the Data Grid in production quality operation over high performance networks.

The specific applications considered initially are:

- the CNR(ISAC)-ESA(Esrin) project "***Production of merged multi-sensor SST and Ocean Colour products for operational oceanography in the Mediterranean Sea based on grid and an e-collaboration infrastructure***" (already approved by ESA as CAT-1)
- the CNR/INAF Space Science project in cooperation with ASI Space Data Centre located in ESA-ESRIN.
- more under definition within the EGEE European project, within the Italian GRID-IT projects and within the ESA The-Voice project.