

Europe-China Grid InterNetworking

European Sixth Framework STREP FP6-2006-IST-045256



Introducing EC-GIN: Europe-China Grid InterNetworking

Sven Hessler

Institute of Computer Science, NSG team

University of Innsbruck, Austria

sven.hessler@uibk.ac.at

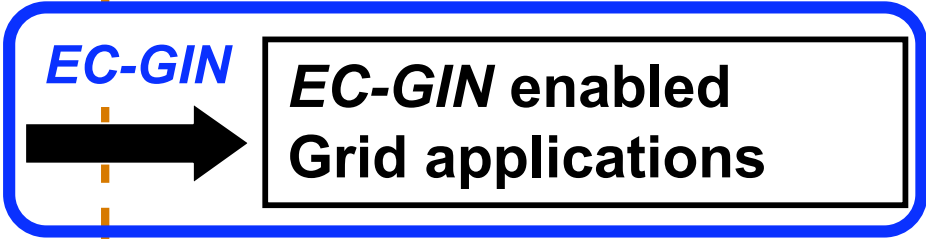
What is EC-GIN about?

Original Internet technology

Enriched with customised network mechanisms

Bringing the Grid to its full potential !

Today's Grid applications



Driving a racing car on a public road

Applications with special network properties and requirements

Traditional Internet applications (web browser, ftp, ..)

Real-time multimedia applications (VoIP, video conference, ..)

Project facts

- **STREP in FP6 Call 6, total funding: € 2.2 M**
- **Start date: 1 November 2006; duration: 3 years**
- **Consortium: 11 partners**

7 European partners

- Universität Innsbruck, UIBK, Austria (*coordinator*)
- University of Zürich, UniZH, Switzerland
- Institut National de Recherche en Informatique et Automatique, INRIA, France
- Lancaster University, ULANC, U.K.
- Justinmind, JIM, Spain
- EXIS IT, Greece
- University of Surrey, UniS, U.K.

4 Chinese partners

- Beijing University of Posts and Telecommunications, BUPT
- Institute of Software, Chinese Academy of Sciences, ISCAS
- China Telecommunication Technology Labs, CTTL
- China Mobile Group Design Institute Co., Ltd, CMDI



Objectives

“The EC-GIN project, based on a number of properties that make Grids unique from the *network* perspective, aims at developing a tailored network technology in dedicated support of Grid applications. These technical solutions will be supplemented with a secure and incentive-based Grid Services network traffic management system, which will balance the conflicting performance demand and the economic use of resources in the network and within the Grid.”

- **Enhancement of communication capabilities of Grid applications**
- **Realistic long-distance demonstrator case**
- **Economic Grid service / network traffic management**
- **“Snowball effect” in European and Chinese research community**

Research Challenges

- **How to model Grid traffic?**
 - Much is known about web traffic (e.g. self-similarity) - but the Grid is different!
- **How to simulate a Grid-network?**
 - Necessary for checking various environment conditions
 - May require traffic model (above)
 - Currently, Grid-Sim / Net-Sim are two separate worlds (different goals, assumptions, tools, people)
- **How to specify network requirements?**
 - Explicit or implicit, guaranteed or “elastic“, various possible levels of granularity
- **How to align network and Grid economics?**
 - Grid service model, charging model for grid services, and network model for such Grid services
 - Network Mgmt mechanisms in support of those areas in an integrated fashion

Key technology advancements

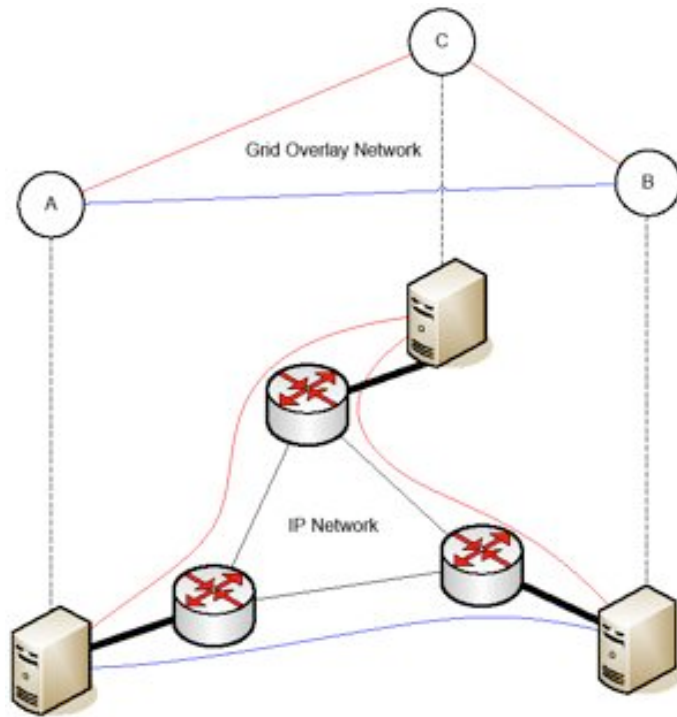
- **Faster Grid: network mechanisms based on Grid peculiarities**
 - Take special properties into account
 - Example: Grid scheduler's ability to specify future traffic occurrences (*e.g., for sending a message which tells routers about future traffic*)
 - Satisfy special requirements
 - Example: prediction of file transfer delay

- **Economic Grid traffic management and security**
 - Securely balance conflicting demand of performance and economic use of resources
 - Example: A4C enhancements and security, application of network management methods
 - Incentive-driven use-based pricing
 - Example: Grid services and pricing models for events/short-lived connections

Expected Results & Impact

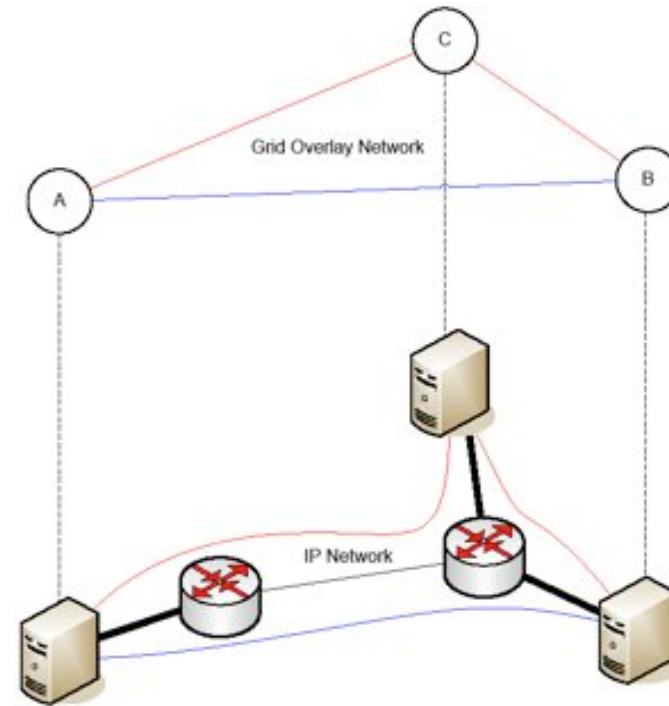
- **Network level analysis of Grid applications**
 - Increased Grid knowledge in network community
- **ns-2 code for Grid network simulation**
 - Fostering EC-GIN related research
- **Grid-specific network enhancements**
 - Snowball effect in research community
- **Economic Grid traffic management and security mechanisms**
 - Reinforcing commercial use of Grids
- **Customised GINTONIC implementations**
 - Performance improvement of partner Grids

Example Scenario: Large File Transfer



Multipath file transfer

(A→B + A→C→B) beneficial



Multipath file transfer not beneficial

due to shared bottleneck

Also consider: B wants to send to A; obtains prediction; does not know that C sends to A at the same time → prediction is wrong in right diagram

Large File Transfer Scenario: Questions

- **When does use of multiple paths make sense?**
 - **To increase overall throughput**
- **How could this functionality be exposed?**
 - **As a transport service?**
- **What constraints can be considered?**
 - **To allow the delivery of a certain level of QoS**
- **How could large file transfer be authenticated and authorized?**
 - **By intermediate nodes?**

Current activities

- **Defining architecture:**
 - **Design API**
 - Key element for collaboration with **XtreemOS**
 - **Decide how to handle “peer awareness“ (node discovery, topology mapping, ..)**
 - Necessary for tackling “large file transfer“ and “prediction“ scenarios
- **Questions raised for API:**
 - **What are the network requirements of Grid apps?**
 - **What is special about Grid network traffic?**
- **Our approach: questionnaire**
 - **Your help is required!**

Current activities /2

GridNets conference, 17-19 October 2007, Lyon

<http://www.gridnets.org>

➤ **Goals**

- Bring the networking and Grid communities together
- Show that there is more to Grid-Networking than optical signaling
- Convince others to join EC-GIN in its effort

➤ **Successful workshops (together with BroadNets) 2004-2006**

- Now for the first time stand-alone conference
- IEEE + ACM sponsorship, ACM proceedings
- 2 Satellite workshops (MetroGrid, Utility Computing)

➤ **EC-GIN members involved in several org. roles**

- So we need YOU to submit papers!

Thanks for your attention!

More information:
<http://www.ec-gin.eu>



The poster features a large, stylized globe in the center, with a red grid overlaying it. The globe is blue and white, with a red outline. The background is a light blue sky with white clouds. On the left, there is a vertical red bar with a white grid pattern. The text is arranged as follows:

- ECGIN** (Large red and black letters)
- Europe-China Grid InterNetworking
- Make Grids work, operate, and communicate better
- European STREP project, Duration: Nov 06-Oct 09
- <http://www.ec-gin.eu>
- Partners** (Section header)
- UNIVERSITÄT INNSBRUCK
<http://www.uibk.ac.at>
- UNIVERSITY OF ZÜRICH
<http://www.usz.ch>
- INSTITUT NATIONAL DE RECHERCHE EN INFORMATIQUE ET AUTOMATIQUE
<http://www.inria.fr>
- UNIVERSITY OF LANCASTER
<http://www.lancaster.ac.uk>
- JULIUS-MAXIMILIANS-UNIVERSITÄT ERLANGEN-NÜRNBERG
<http://www.julius-maximilians-erlangen.de>
- EXIS IT
<http://www.exis.com.sg>
- UNIVERSITY OF SURREY
<http://www.surrey.ac.uk>
- BEIJING UNIVERSITY OF POSTS AND TELECOMMUNICATIONS
<http://www.bupt.edu.cn>
- INSTITUTE OF SOFTWARE, CHINESE ACADEMY OF SCIENCES
<http://www.iscas.ac.cn>
- CHINA TELECOMMUNICATIONS TECHNOLOGY LAB
<http://www.chinatti.com>
- CHINA MOBILE GROUP DESIGN INSTITUTE CO., LTD.
<http://www.cmtdi.com.cn>

Logos for the European Commission and the Information Society Technologies (IST) program are visible in the bottom right corner. A mouse cursor is pointing at the URL.

At the bottom of the poster, there is a row of logos for the participating institutions: University of Zurich, Lancaster University, EXIS IT, UniS, and FOCAS.