

Introducing EC-GIN: Europe-China Grid InterNetworking

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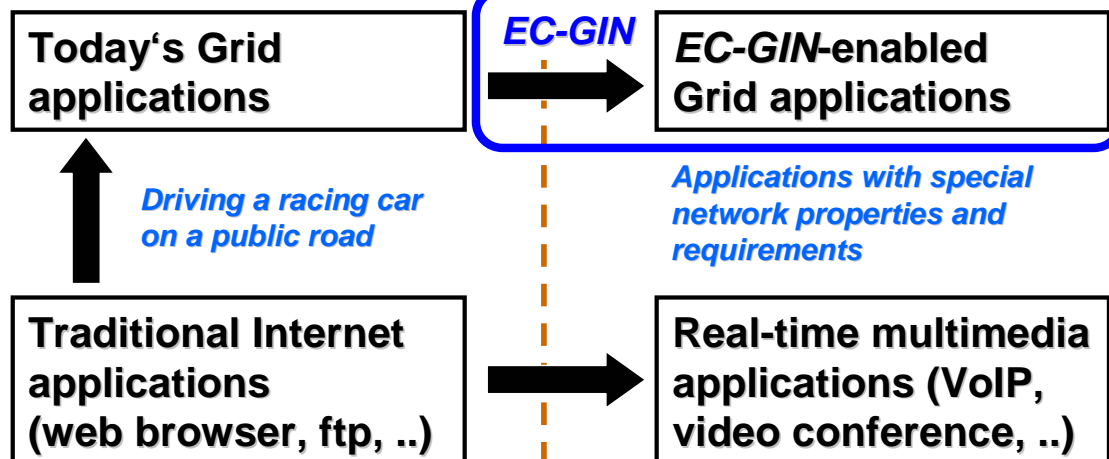


EC-GIN Overview

Original Internet technology

Enriched with customized network mechanisms

Bringing the Grid to its full potential!



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

- **Develop a Grid tailored network technology**
 - **Dedicated support of Grid applications**
 - **Supplemented with a secure and incentive-based Grid Services network traffic management system**
- **Balance conflicting performance demands and economic use of resources in the network and within the Grid**

Enhancement of communication capabilities of Grid applications

“Snowball effect” in European and Chinese research community

Realistic long-distance demonstrator case

Economic Grid service / network traffic management



Research Challenges

- **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 economics and Grid economics?**

- Grid service model, charging model for grid services (incentives in a decentralized environment), and network model for such Grid services
- Network Mgt mechanisms in support of those areas in an integrated manner



Key Technology Advancements

- **Key Technologies**

- **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 incentive/pricing models for events/short-lived connections



Expected Results and 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

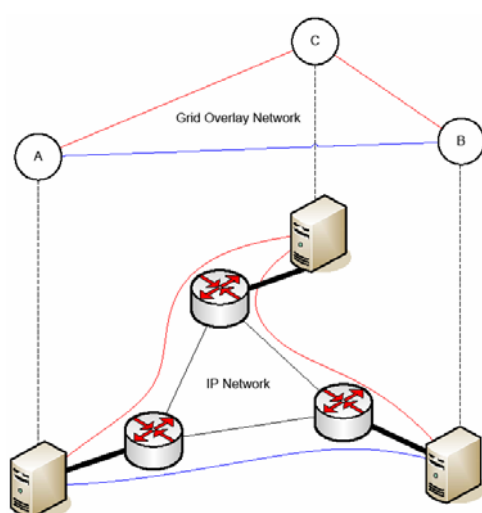
Re-enforcing commercial use of Grid services

Customized GINTONIC implementations

Performance improvements of partner Grids

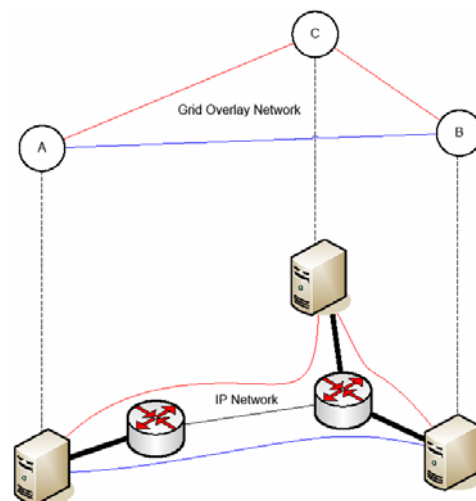


Example Scenario: Large File Transfer (LFT)



Multi-path file transfer

(A→B + A→C→B) beneficial



Multi-path file transfer not beneficial

due to shared bottleneck

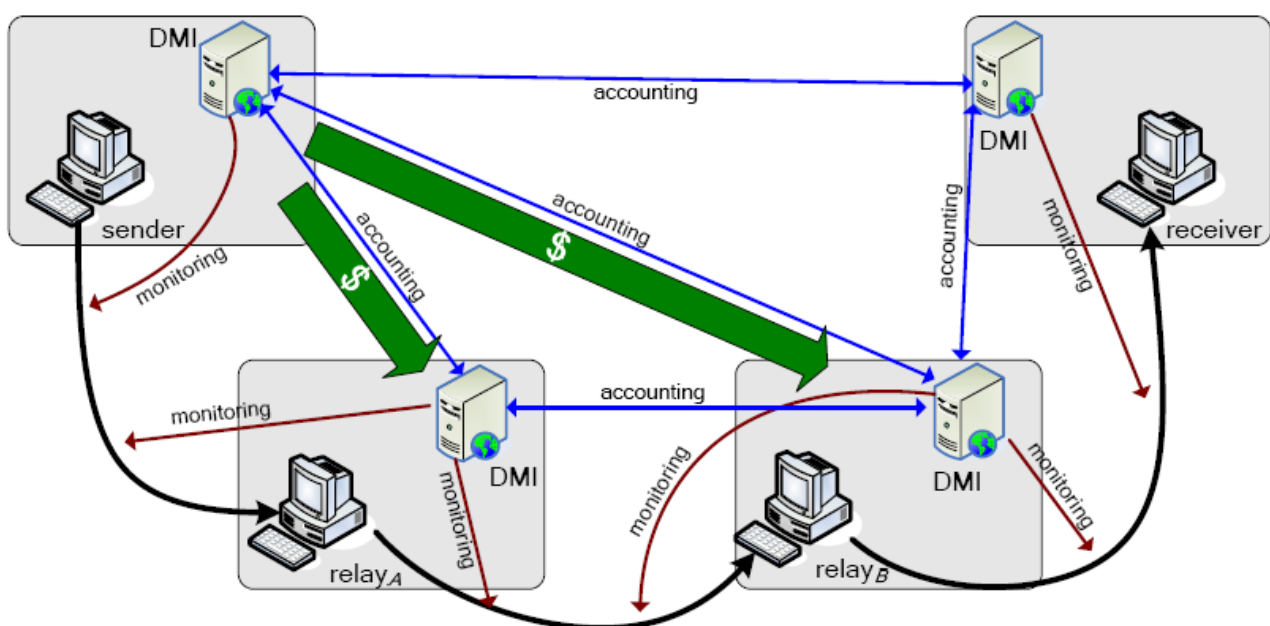
Also consider: B wants to send to A; obtains prediction; does not know that C sends to A at the same time → prediction is wrong in right diagram



Large File Transfer Scenarios: 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/incentives can be considered?**
 - To allow delivery of certain level of QoS, including relay nodes
- **Which security mechanisms necessary for a large file transfer?**
 - Means against MitM, re-routing (DoS), and authentication to prevent economic damage from Grid service users

LFT with Economic Management Actions



DMI: Domain Management Infrastructure (PKI, Acc, Char, Mon.)

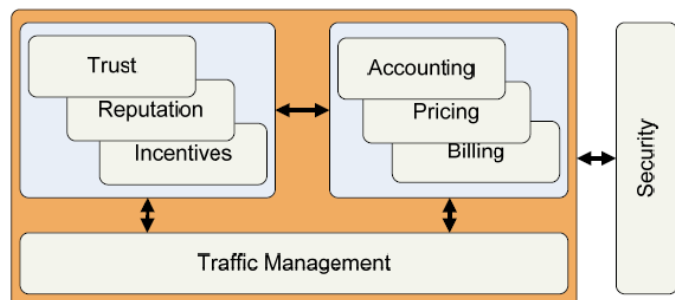
Recent Activities

- **Definition of EC-GIN architecture (GINTONIC)**
 - **API designed**
 - Key element for collaboration with **XtreemOS**
 - **Decision on how to handle “peer awareness” (node discovery, topology mapping, ..)**
 - Necessary for tackling “large file transfer” and “prediction” scenarios
- **Questions raised for the API**
 - **What are the network requirements of Grid apps?**
 - **What is special about Grid network traffic?**



Upcoming Activities

- **Fine design of EC-GIN economic management architecture**



- **GridNets conference, October 2008, Beijing, China**

- **Goals for the second time after Lyon, France 2007**

- 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

➤ See <http://www.gridnets.org> for more details!



**Thank you for
your attention!**

**For more information:
<http://www.ec-gin.eu>
and the coordinator
Dr. Michael Welzl
UIBK, Austria**

ECGIN

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

- UNIVERSITÄT INNSBRUCK
<http://www.salk.ac.at>
- UNIVERSITY OF ZÜRICH
<http://www.uzh.ch>
- INSTITUT NATIONAL DE RECHERCHE EN INFORMATIQUE ET AUTOMATIQUE
<http://www.sria.fr>
- UNIVERSITY OF LANCASTER
<http://www.lancaster.ac.uk>
- JUSTINIANO
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- 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.chinattl.com>
- CHINA MOBILE GROUP DESIGN INSTITUTE CO., LTD.
<http://www.cdci.com.cn>

Logos: Indonesian Society, European Commission, University of Zurich, LANCASTER, EXIS IT, UniS, JPCAS, etc.

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