Access to Knowledge through the Grid in a Mobile World

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Introduction

- Akogrimo: *"Access to Knowledge through the Grid in a Mobile World"*
- Project FP6-IST programme
- July 2004 - June 2007
- Team comprises 14 European organisations
- **www.mobilegrids.org**

Akogrimo vision

- **Pervasively available Grid services meeting the needs of fixed, nomadic and mobile citizens.**
- **Based on personalized knowledge and semantics to allow ad-hoc, dynamic and federated formation of complex problem solving working groups (Mobile Dynamic Virtual Organizations, MDVO)**
- **Generation of added value in Telecom-oriented networks by introducing the intelligence of GRID technology**

What is Akogrimo?

- **Akogrimo blueprint of NGG**
  - Exploit mobile Internet infrastructures based on IPv6
  - Mobility and Context aware
  - Heterogeneous dynamic environments
  - Personalization, profiling, privacy, security and accounting integration
  - Cross-organizational distributed resources
- **Extend Grid HPC paradigm to a wider span**
  - e-health
  - e-learning
  - e-business
  - Crisis management

Slide 5

eHealth Scenario

Slide 6
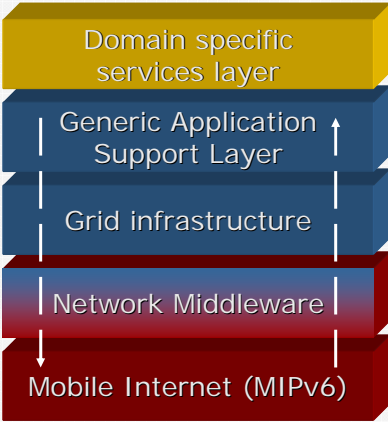
Objective: Interlayer cooperation

- More than a Grid accessed from a mobile network
- Common AAA
  - Integrate Security
  - Integrate Identity
  - SSO – Services and Networks
  - Bill Aggregation
  - Inter-domain operation
  - Common SLA for both network and Grid. e.g.: QoS reservation for Grid task
- Context Aware Grid
  - State connected/disconnected
  - Network availability (e.g. bandwidth)
  - Location
  - Terminal capabilities
  - Device discovery in range
  - Context Aware service discovery
- All-IP beyond 3G
  - Grid and Beyond 3G harmonized
  - Media independent (WLAN, UMTS…)
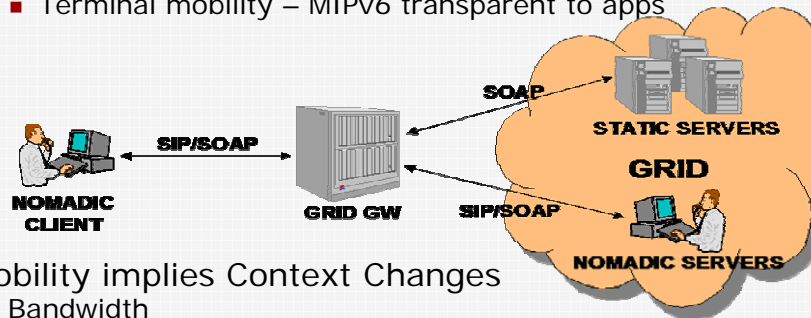- Mobility management based on SIP and MIPv6

Domain specific services layer

Generic Application Support Layer

Grid infrastructure

Network Middleware

Mobile Internet (MIPv6)

Mobility in Akogrimo

- Mobility
  - User Mobility – SIP
  - Session Mobility – SIP+SOAP
  - Terminal mobility – MIPv6 transparent to apps

- Mobility implies Context Changes
  - Bandwidth
    - Inter-domain SLA-QoS or GPRS, WLAN...
  - Network connection type (insecure)
  - Location
  - Change of device capabilities

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Akogrimo Testbed – The Why

- Empirically test (M)IPv6 and Web Services (WS)
  - WS are the base on top of which the Akogrimo Grid will be built
- Behaviour of WS combining IPv4/MIPv6
  - IPv4 for legacy applications
- OS interoperability with IPv6 and WS
  - Different OS with different WS: Linux 2.6, Windows XP, Pocket PC 2003, Windows Server 2003
  - Historically
    - Windows more mature in WS
    - Linux more mature in MIPv6
- Interoperability between WS (C# .NET/Java Axis)
- Consider the need of network security (IPsec) due to mobility
- Impact of the previous in the Akogrimo architecture
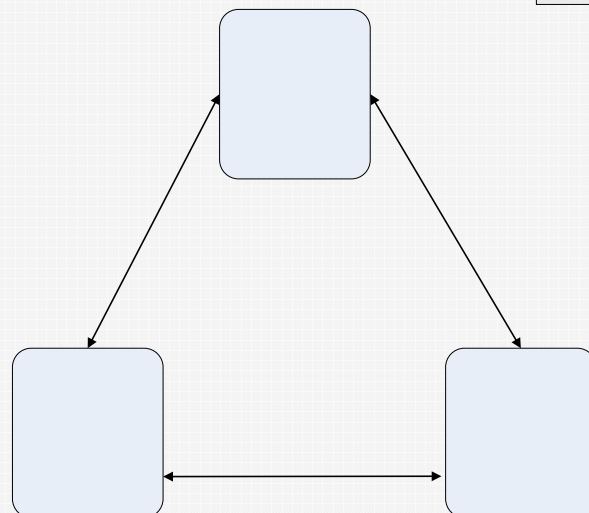- Akogrimo oriented test -> Not exhaustive

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Very short introduction to WS
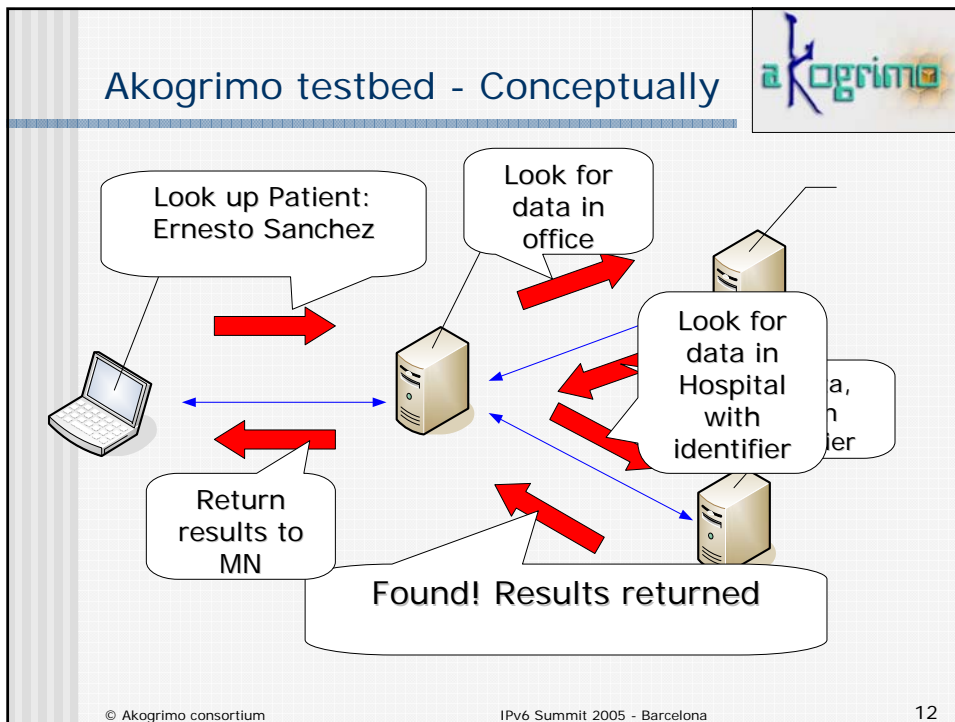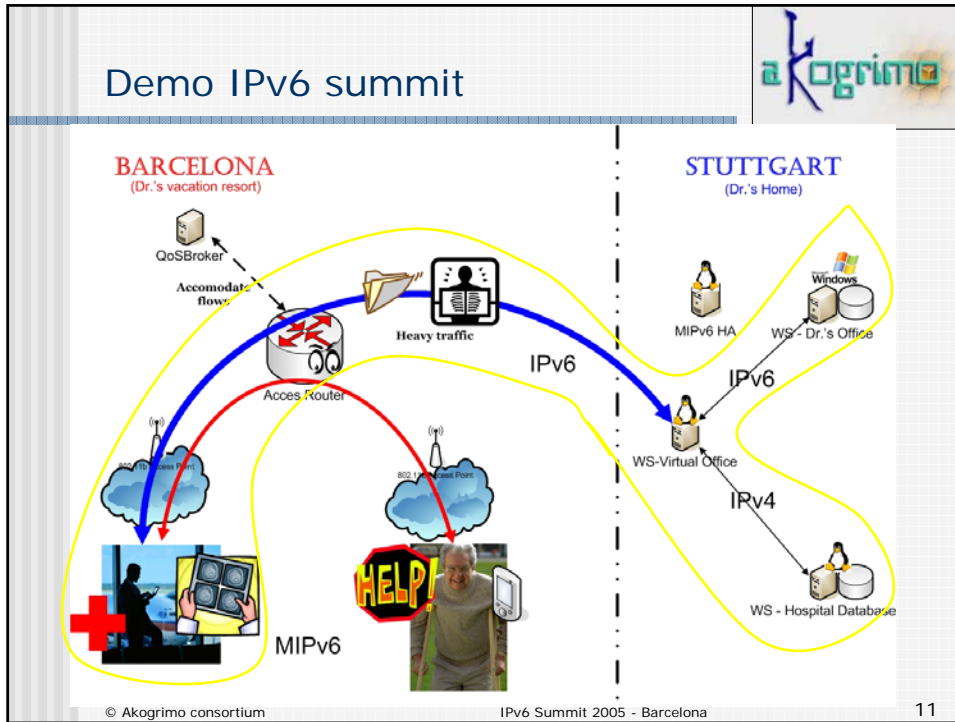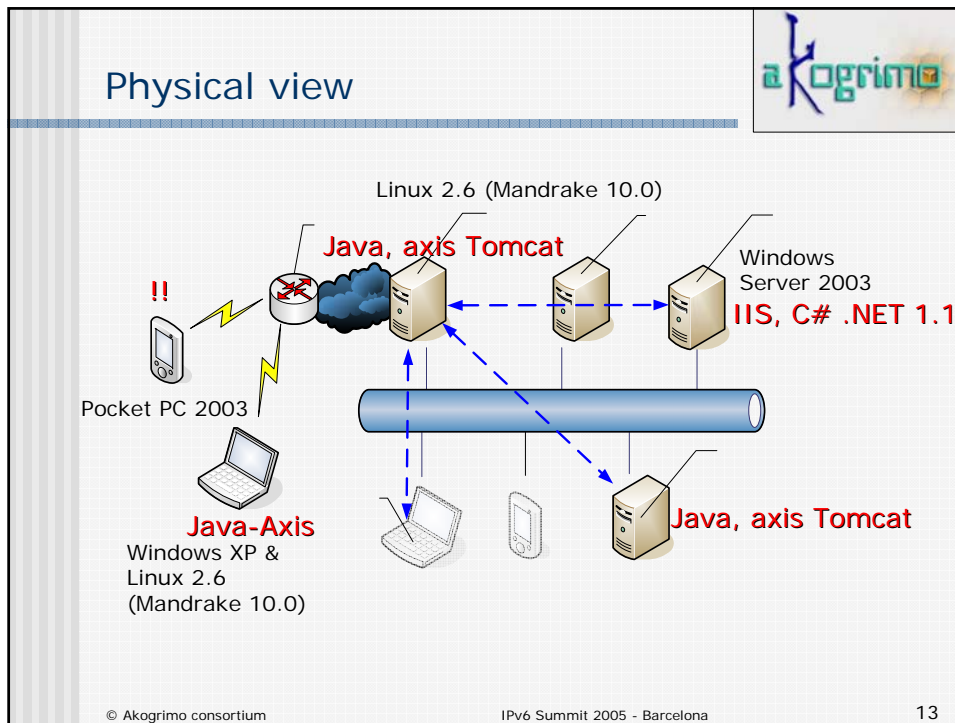
- ■ Web Services
  - ■ Distributed computing model on asynchronous messaging
    - • Support dynamic application integration over the Web
    - • XML messages for exchanging data and accessing services
    - • Automated on-the-fly software creation through the use of loosely coupled software components
    - • Transported over HTTP, SMTP, FTP or simply TCP

Very short introduction to WS

Physical view

Linux 2.6 (Mandrake 10.0)

Java, axis Tomcat

!!

Windows
Server 2003
IIS, C# .NET 1.1

Pocket PC 2003

Java-Axis
Windows XP &
Linux 2.6
(Mandrake 10.0)

Java, axis Tomcat

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Access Router

IPv6 dependencies

	Windows Server 2003	Windows XP SP1	Power PC 2003	Linux 2.6 Mandrake 10.0
MIPv6	No. Cons: No route optimization	Yes. With MS MIPv6 Tech Preview. (Just for SP1) Interaction with MIPL 2.0 HA & CN OK!	Yes. With MS MIPv6 Tech Preview Interaction with MIPL 2.0 HA & CN OK!	Yes. With MIPL 2.0 (RFC 3775).
DNS over IPv6	Yes.	No. (IPv6 addressed are just resolved over IPv4)	No. (IPv6 addressed are just resolved over IPv4)	Yes.
IPsec (IPv6)	ESP encryption not supported. IKE not supported.	ESP supported with MS MIPv6 Tech Preview. (not tested) IKE not supported.	ESP supported with MS MIPv6 Tech Preview. (not tested) IKE not supported.	Yes. BU/BA.
Java 1.4 IPv6 support	Not fully supported	Not fully supported	Java 1.4 not supported. Earlier versions don't support IPv6.	Yes.
Java 5.0 IPv6 support	Yes.	Yes.	Java 5.0 not supported.	Yes.

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IPv6 dependencies

	Windows Server 2003	Windows XP SP1	Power PC 2003	Linux 2.6 Mandrake 10.0
Axis-1.1	Yes	Yes	Yes	Yes
Axis-1.1 standalone server IPv6 support	-	-	-	Yes
Axis-1.1 with Tomcat 4.x IPv6 support	Not fully supported.	Not fully supported.	-	Not fully supported.
Axis-1.1 with Tomcat 5.x IPv6 support	Yes.	Yes.	-	Yes.
.NET IPv6	Yes. .NET Framework >=1.1	Yes. .NET Framework >=1.1	Yes. .NET Compact Framework =>2.0 (Beta) (not tested yet)	MONO >= 0.26 Yes. (not tested)

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Non IPv6 dependencies

	Java 1.4	Java 5.0
Tomcat 5.0	Yes	No
Tomcat 5.5	Yes. With additional package (compact)	Yes. By default.

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Akogrimo Testbed - Conclusions

- Akogrimo will use Linux Mobile Nodes for now
  - Windows IPv6 needs DNS over IPv4
  - Pocket PC 2003 need to wait for .NET Compact Framework 2.0 to support WS with IPv6
- Avoid running real time apps (e.g. VoIP) in Windows Server 2003 (route optimization)
- Last releases of WS (except .NET CF) tested show perfect integration with
  - (M)IPv6
  - IPv4
  - (M)IPv6 + IPv4
- Step-by-step testbed description under: www.akogrimo.org

Next tests

- Mobile WS with SIP
- Context provision with SIP
- Test .NET CF 2.0 in Pocket PC 2003
- Test Grid environments
  - WSRF.NET
  - Globus toolkit 4
- Test MONO

Thank you! - Questions?

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