



AKOGRIMO Mobile Grids: Mobile Dynamic Virtual Organizations

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The Akogrimo Vision



*...to produce a breakthrough in
current practices for Grids with
the creation of a distributed,
mobile and pervasive
environment to make it a
business proposition for Telecom
Operators and Service Providers*


Akogrimo Overview -

3 Application Areas

- eHealth
- eLearning
- Desaster Handling and crisis mgmt

Technology areas

- Mobile Dynamic Virtual Organisations
- Service Level Agreements
- Execution Management
- Cross organisational authentication, authorization & accounting
- Context propagation
- Adaptive Workflows
- Network level QoS
- ...



Business Focus

- Business Models
- Application Integration
- Market and Regulation

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Collaborative Business Grids

- Are based on Services
 - The assembly of these services is dynamic
 - Structure, behaviour and location of Grid nodes can change
 - Collaboration is between **loosely** coupled services
- Resources are available as "Utilities"
 - On demand
 - Bound to certain conditions of operation (Service Level Agreements)
- Require the usage of semantics to
 - Facilitate the aggregation
 - Automate reaction on data such as context changes

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Mobile Collaborative Business Grids

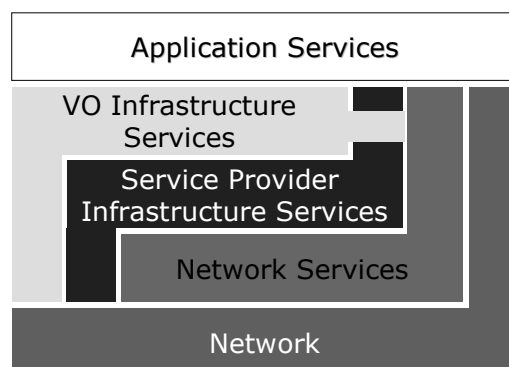


- Are Collaborative Business Grids but have additionally
 - Support different kind of Mobility
 - Mobility Aware core and application services
 - Enable cross-layer co-operation
 - Provide information from network to high layers (Identity, Context, Network Quality, ...)
 - Application needs are communicated to the lower layers (e.g. Bandwidth, ...)
 - Integrate with the network middleware
 - A4C for single sign-on.
 - SIP-based network services
 - Network QoS
 - Security Models

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Fundamental Concept



- Virtualization of all resources via Web Services
- No strict layer concept: Cross-Layer functions for:
 - Security
 - Policies
 - Authentication, Authorization, Auditing (A4C)
 - Context Management
 - Quality Of Service / SLA
 - Mobility
 - etc.

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Mobility in Grid.

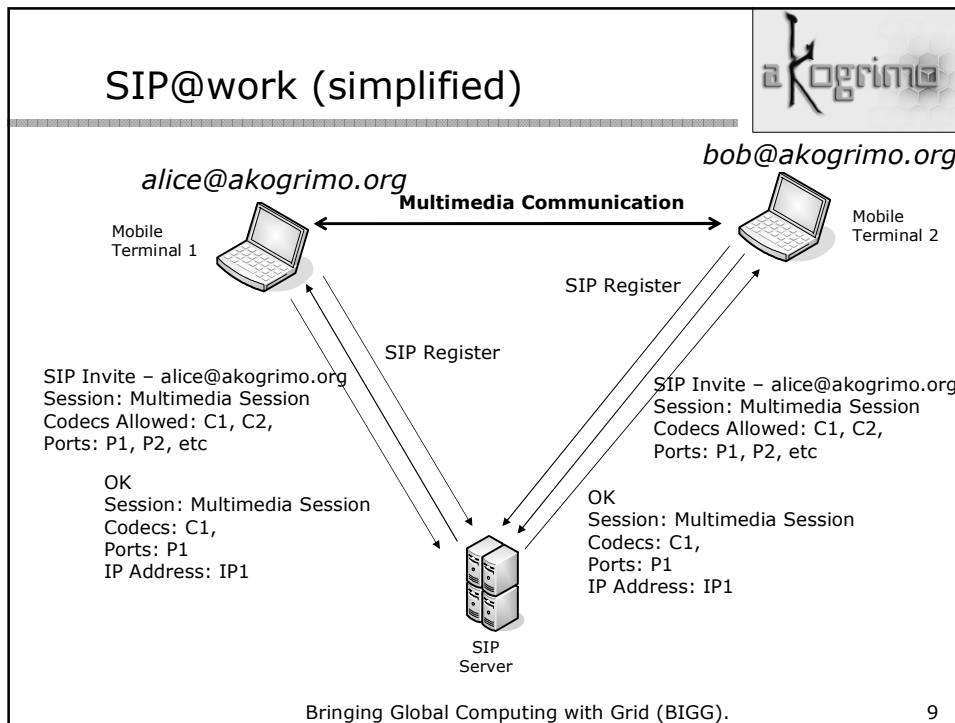


- Virtual Organization: composed by fixed services/resources. EPR can be defined from their IP/IPv6 Address.
- MDVO: composed by mobile/ubiquitous services. IP/IPv6 addresses may change.
 - Mobile service: The service is moving with the terminal.
 - Mobile IPv6 (MIPv6) makes this mobility transparent to applications.
 - Ubiquitous service: The service can be available in different terminals at different times.
 - Challenge already faced in traditional multimedia services (VoIP, Videoconferences).
 - Key Concept: SIP (Session Initiation Protocol)
 - But for Grid services like MDVO's ones ?

Session Initiation Protocol (SIP)



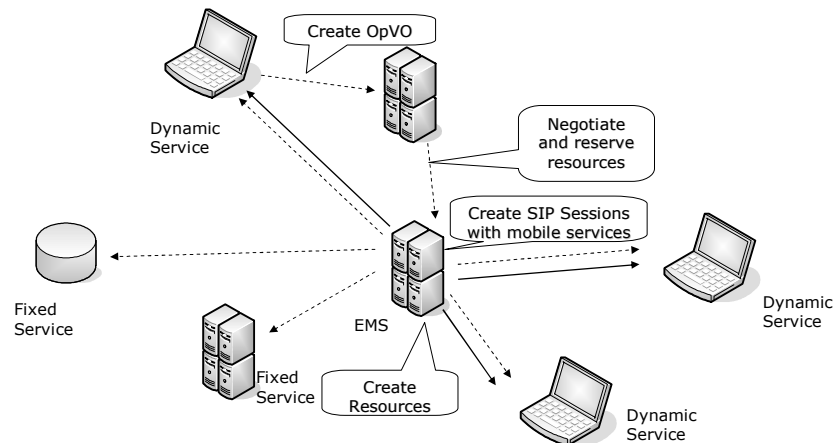
- SIP is a text-based protocol, similar to HTTP and SMTP, for initiating interactive communication sessions between ubiquitous users: voice, video, chat,....
- IETF standard: RFC 3261 (jun 02)
- Key features
 - Signaling Protocol:
 - Used to establish and manage sessions for other protocols
 - Session Content: any kind of communications:
 - RTP: Audio/Video communication
 - SOAP for Web Services ??
 - May include negotiation of specific session parameters
 - SDP: for multimedia communications. Codecs, ports, etc.



- ## Mobile Grids: SIP for SOAP sessions
- Previous proposals: SOAP over SIP
 - Internet-Drafts in 2000/2002
 - Proposing to use SIP as transport protocol for SOAP messages:
 - Not used: problems with UDP. Network Congestion Control, packet fragmentation, etc.
 - It would require modification of existing WS / Grid toolkits.
 - AKOGRIMO Approach:
 - SIP for establishing/managing SOAP sessions
 - SOAP for invocations inside an already established session
 - SIP as signalling protocol for managing SOAP sessions
 - All mobile/ubiquitous services will use SIP and will register in a SIP server
 - Operative VO: it will include a set of SIP sessions between the Grid Infrastructure and the Mobile / Ubiquitous services
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SIP Integration

- EMS (Execution Management Service): When creating an Operative Virtual Organization, it will create SIP sessions with Mobile / Ubiquitous services and maintain them during the OpVO life.



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Mobile / Dynamic VO

- Dynamic / Ubiquitous services. The Grid infrastructure should be prepared to:
 - Subscribe to the presence of the ubiquitous services (SIP Presence) in order to know its availability
 - Establish a SIP session with mobile service in order to get the data for further SOAP invocations
 - React to different situations:
 - A service is not active when the OpVO is being created
 - Look for alternatives.
 - A service which is part of an OpVO suddenly disappears:
 - Wait or look for alternatives
 - A service candidate for an OpVO suddenly reappears:
 - Analyze its inclusion in the OpVO

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Implementation Status



- EMS: establishes SIP sessions with users
- SIP Broker: gateway between EMS (SOAP) and services (SIP)
- GSDPApp: application in mobile services:
 - Accepts SIP-invites
 - Answers (200 OK) including a **GSDP** (Grid Session Description Protocol) payload:
 - Now, just IP Address for building an EPR
 - Future proposal: inclusion of parameters for Negotiation and Resource Reservation.
 - Could be a subject of standardization

Project Status



- Mobile Grid Infrastructure implemented
- Use Case for eHealth demonstrated:
 - Patient Subscription to a Health Monitoring Service
 - OpVO: Mobile Patient, Mobile ECG Generator, ECG Analyzer, MedicalDataLogger, Mobile Doctors.
 - Full Demonstration at IST'06 (November 2006)
 - Distributed demonstration (Patient@Stuttgart, Doctors@Madrid) in December 2006.
- Next step: implement and validate a Disaster Handling and Crisis Management scenario (2007)



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