The Akogrimo Prototype

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Outline

- Quick Summary of Akogrimo objectives
- Overview of the Initial Akogrimo Prototype
- Assessment of current Grid Toolkits for Mobile Grids

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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

Business Focus
- Business Models
- Application Integration
- Market and Regulation

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

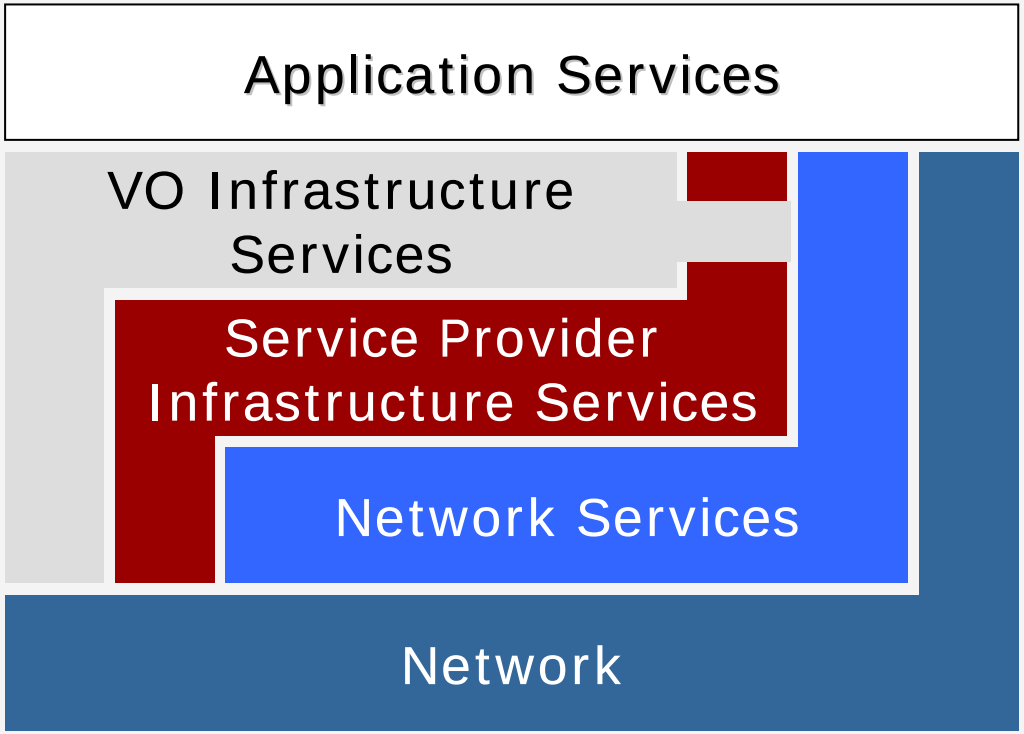
Collaborative Business Grids

- 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

Mobile Collaborative Business Grids

- Are Collaborative Business Grids but have additionally
  - 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, …)
  - Support different kind of Mobility
    - Mobility Aware core and application services
  - Integrate with the network middleware
    - AAA or A4C
    - SIP
    - Security Models

Fundamental Concept



- Virtualization of all resources via Web Services
- No strict layer concept (from a SOA perspective only two layers)
- Role sharing is more function based rather than a protocol stack
- Major principle is to allow bidirectional exchange of all information between the layers such as identity, context, ...

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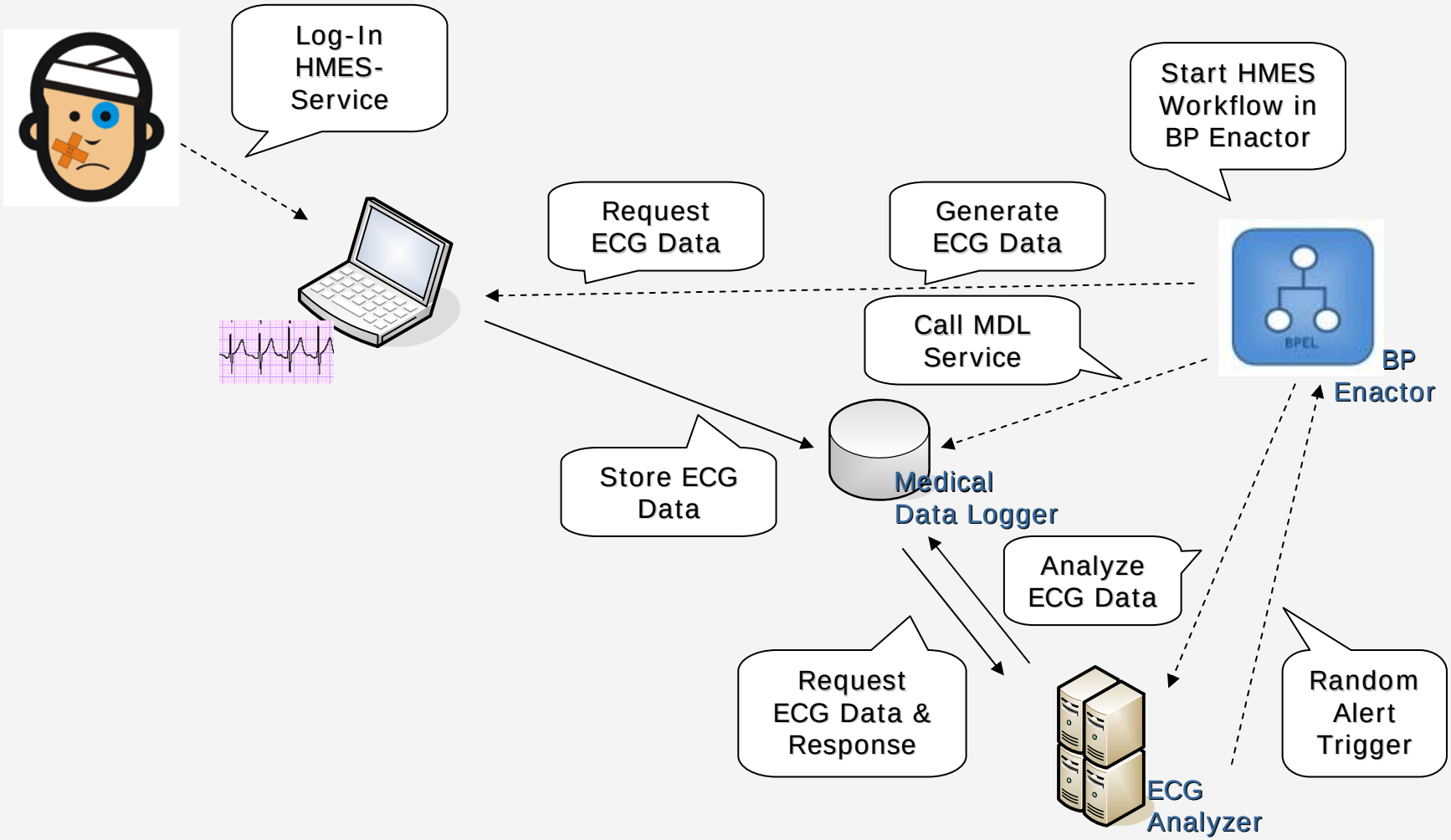
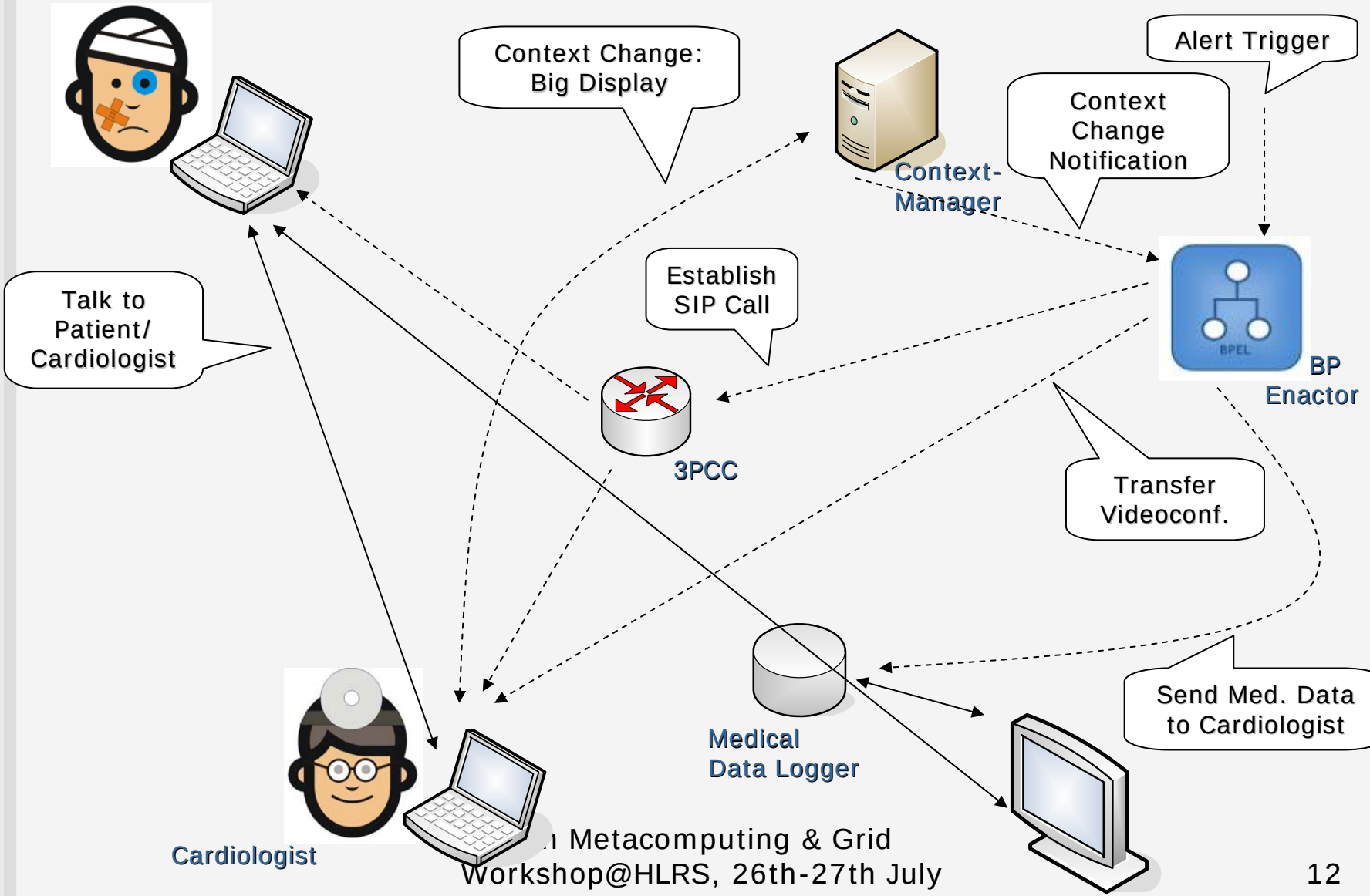
Demonstration Storyboard

- Patient under treatment with a mobile ECG device connected permanently
- The sent data are analyzed. If there is a potential hazard:
  - The system triggers a videoconference between the patient and a doctor
  - The doctor searches for a place with a big screen
  - Automatically, the big screen is detected and the system:
    - Transfer the videoconference to the big screen
    - Launches a visualization of the ECG data in the big screen

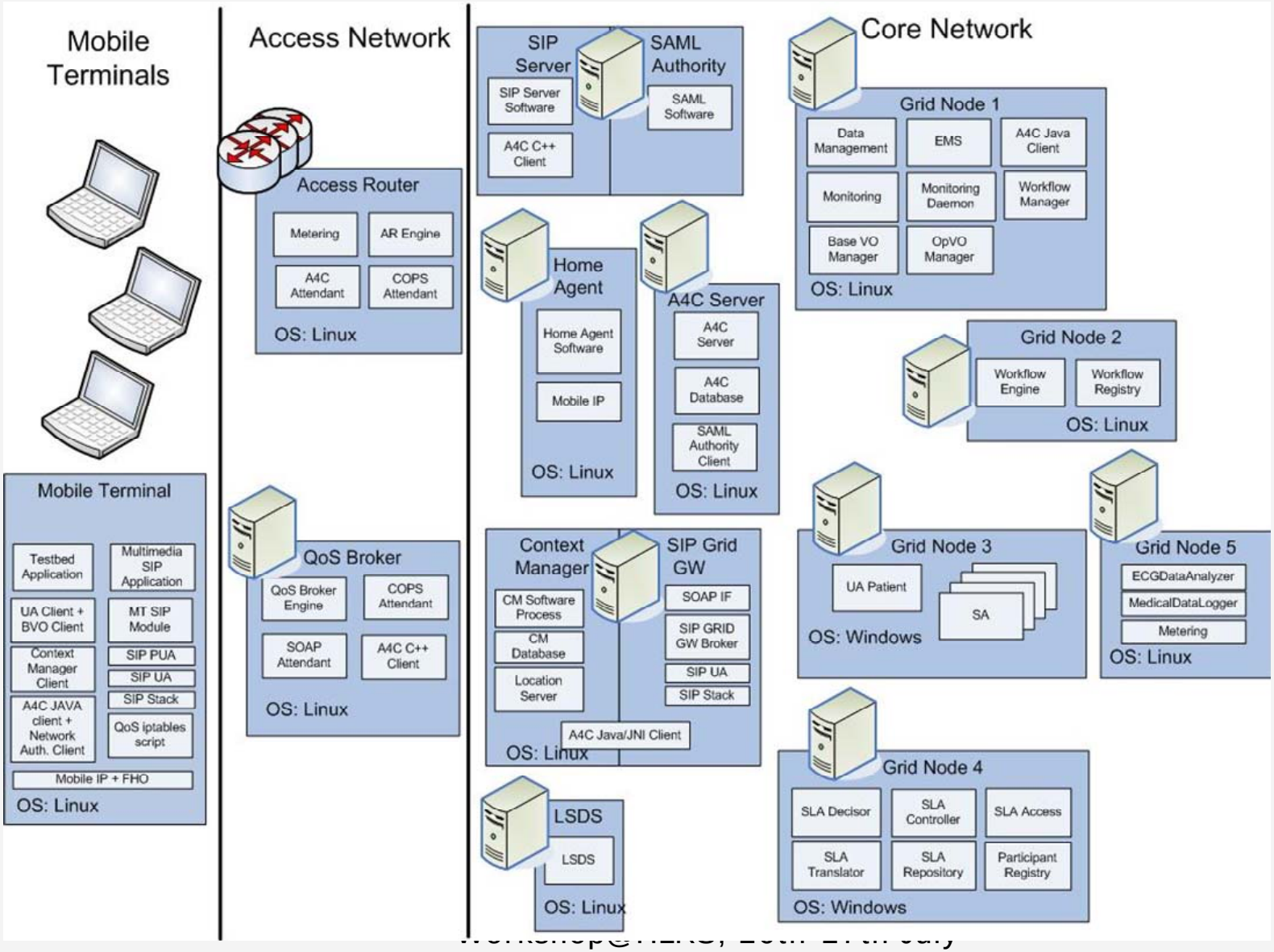
Prototype Scenario
Part A: Heart Monitoring



Prototype Scenario
Part B: Emergency. Handling



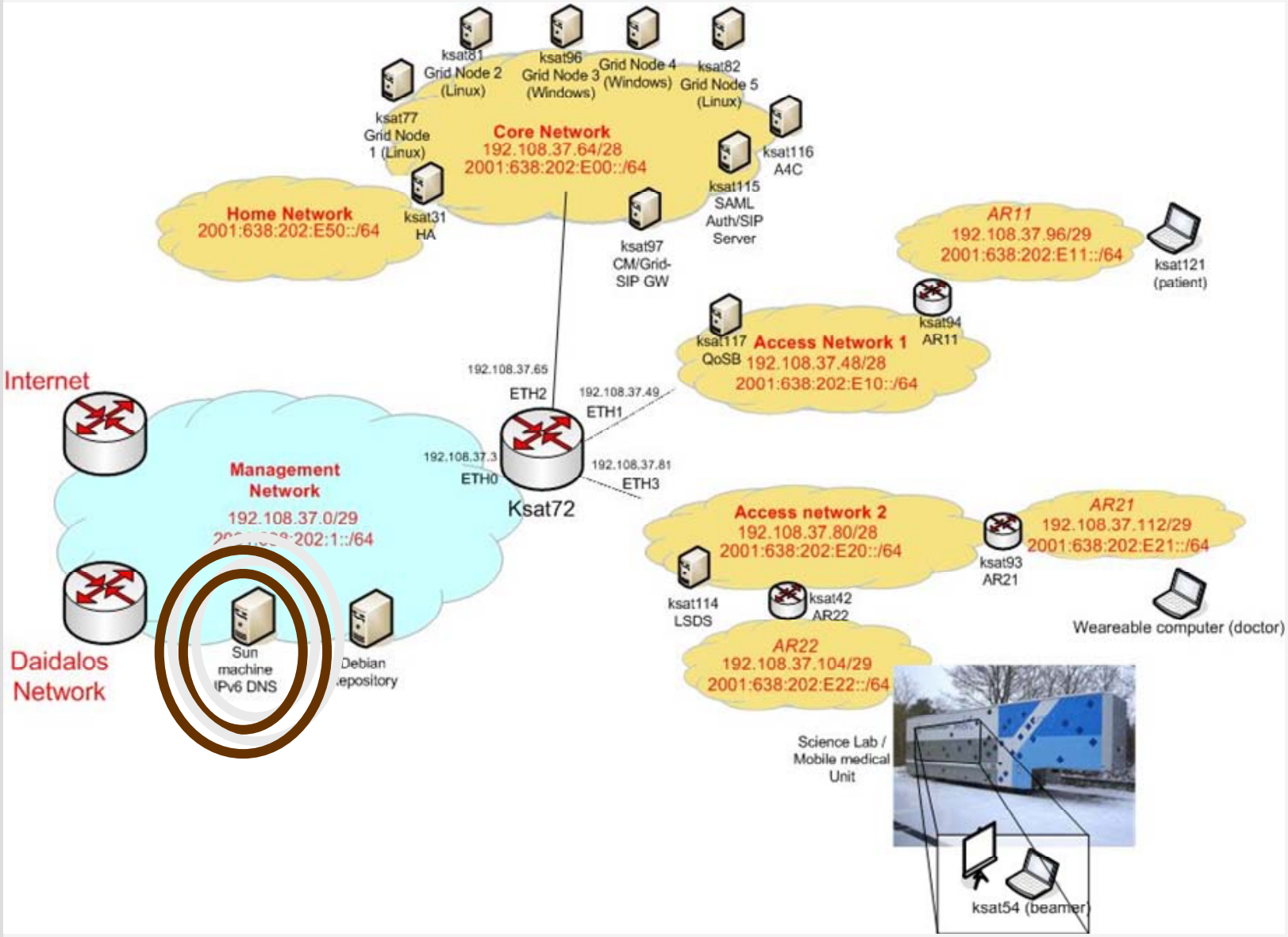
Akogrimo Physical Architecture



Demonstration Scenario

- Demonstration:17 computers
  - 3 Mobile Terminal (Mobile IPv6)
  - 3 Access Routers
  - Home Agent
  - QoS Broker
  - SIP Server + SAML Authority
  - A4C Server
  - Context Manager + SIP/Grid Gateway
  - LSDS (Local Service Discovery Service)
  - Grid Node 1: Grid middleware + VO Management
  - Grid Node 2: WorkFlow Related Modules
  - Grid Node 3: User Agent + Service Agents
  - Grid Node 4: SLA Infrastructure + Participant Registry
  - Grid Node 5: E-Health services + Metering
- All nodes with IPv6
- DNS server specific for IPv6 resolution

Demonstration Network



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Major challenges faced

- Heterogeneity of the infrastructure
  - Some services required Windows/Linux environment to operate
  - Some service could not be co-located on one physical entity due to conflicting requirements on the environment
- Immature technologies had been used
  - MIPv6 and network cards support of handovers
  - Grid Modules on top of IPv6
  - RFID readers
  - Audio/Video components

Major challenges faced

- Hardware constraints
  - Could not use “real” mobile clients such as PDAs
  - The used tablet PCs partially could not host the anticipated number of services
  - Complicated network infrastructure needed
  - Special equipment for Mobile Terminals (wearable terminals)
  - Middleware: very resources-demanding (JVM, WSRF, .NET, GT4, etc.)

Assessment of current Grid Toolkits for Mobile Grids

- Deployment of Grid Services on an (M)IPv6 has been successfully done for
  - Globus Toolkit 4
  - WSRF.NET
- Needed lots of testing as different operating systems need different java/axis versions…
- Demand of resources is far beyond our expectations for GT4
  - Lots of open file handles
  - Lots of Threads
  - High memory demand
- Integration with network services such as SIP based audio/video communication in a single workflow is possible
- The combination of local service discovery (e.g. using RFID) and global service discovery is not only a technical but also an organisational problem

Thank you !

Please visit us to see an advanced demo of this @IST2006 in Helsinki

For further information/slides look at
http://www.mobilegrids.org