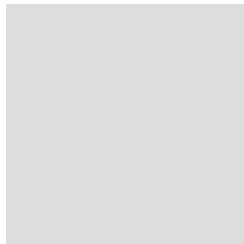
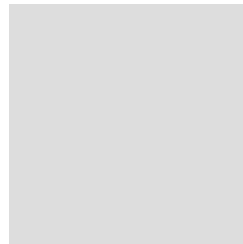
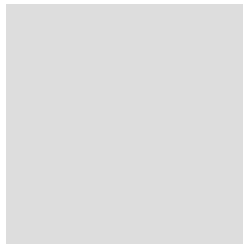


# OSGi Remote Management



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Date 20-11-2006

Miguel García Longarón - [mgl@tid.es](mailto:mgl@tid.es)



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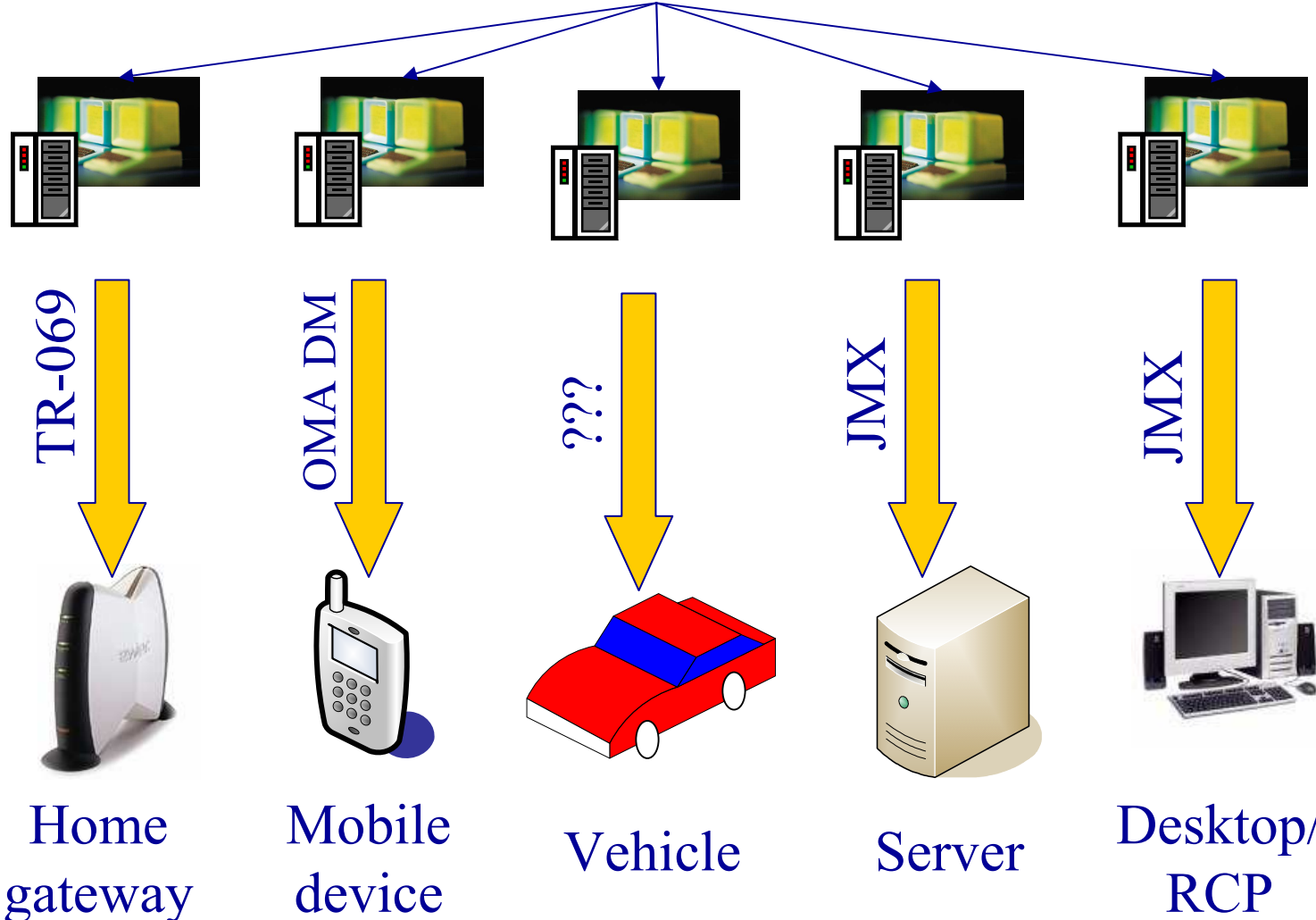
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## Present situation

- **OSGi is being applied in several domains**
- **Each domain has own solution for remote management**
  - **Home Gateways: DSL-Forum TR-069**
  - **Mobile Devices: OMA Device Management**
  - **Server: JMX (Java Management Extensions)**
  - **Desktop/RCP (Rich client platform): JMX**
  - **Vehicle: no standards ( perhaps will adopt mobile devices solutions...)**
- **The approach of the Mobile Expert Group has been to design OSGi management aligned with technologies already available in the mobile domain.**
- **Find a solution for tackling the heterogeneity of this situation is key.**

# Present management (short term)

Independent operators



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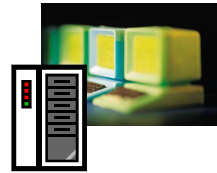
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# Integrated Management (medium/large term)



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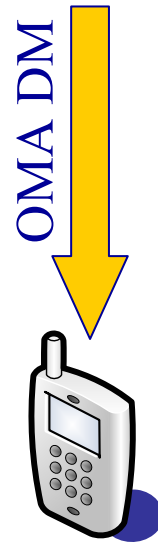
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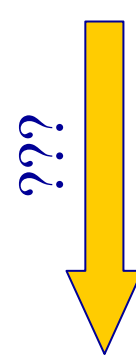
Integrated operator



Home gateway



Mobile device



Vehicle



Server

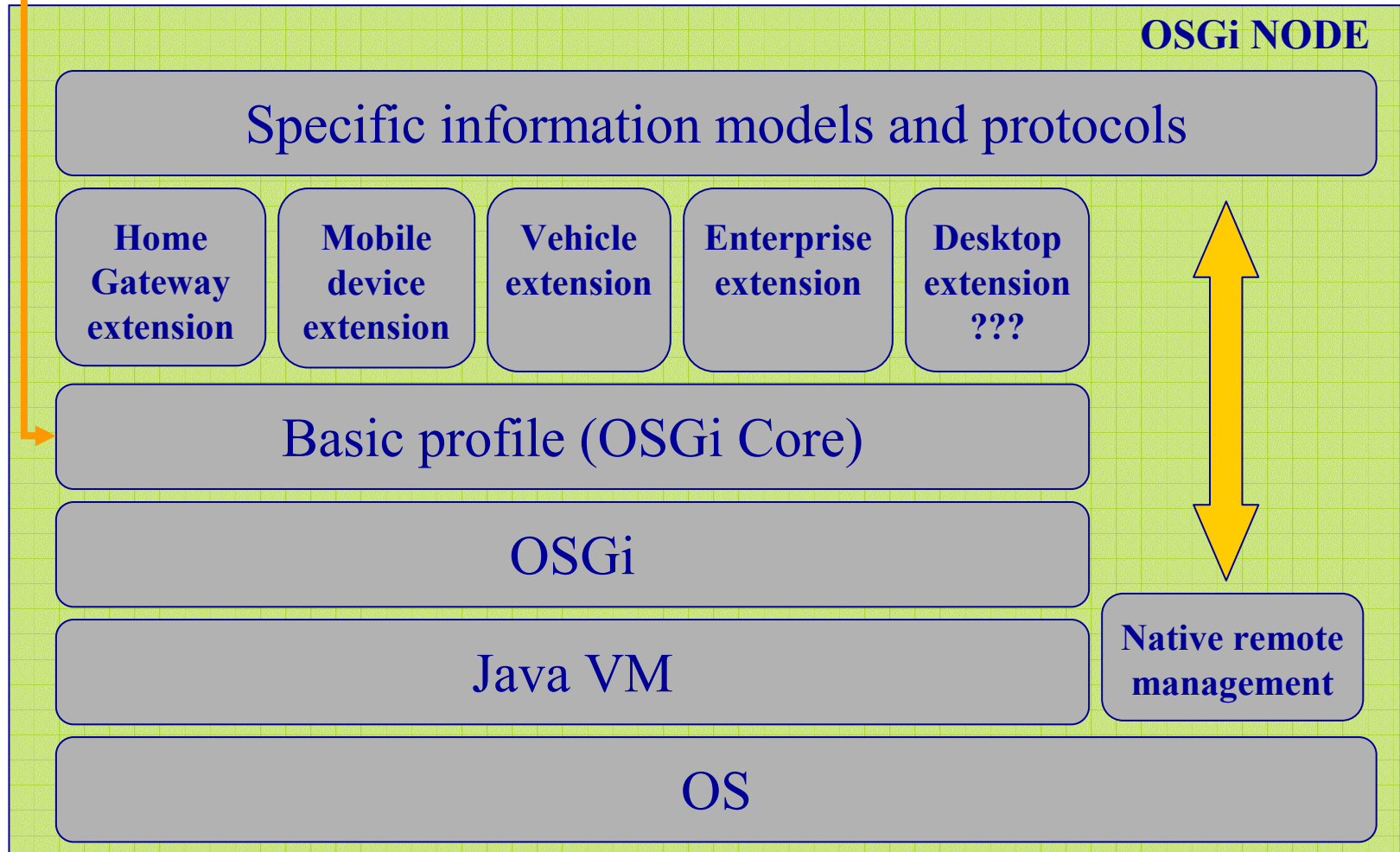


Desktop/  
RCP

# OSGi Remote Management Architecture

To define an API?

Integrated remote management (operator)

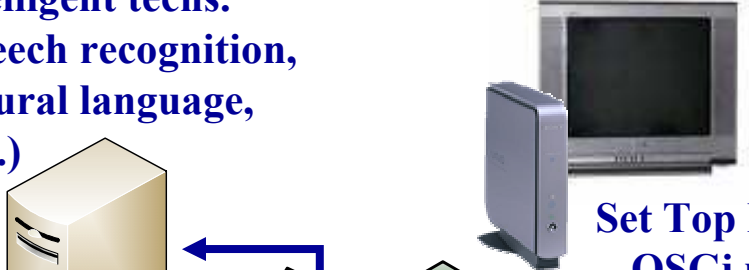


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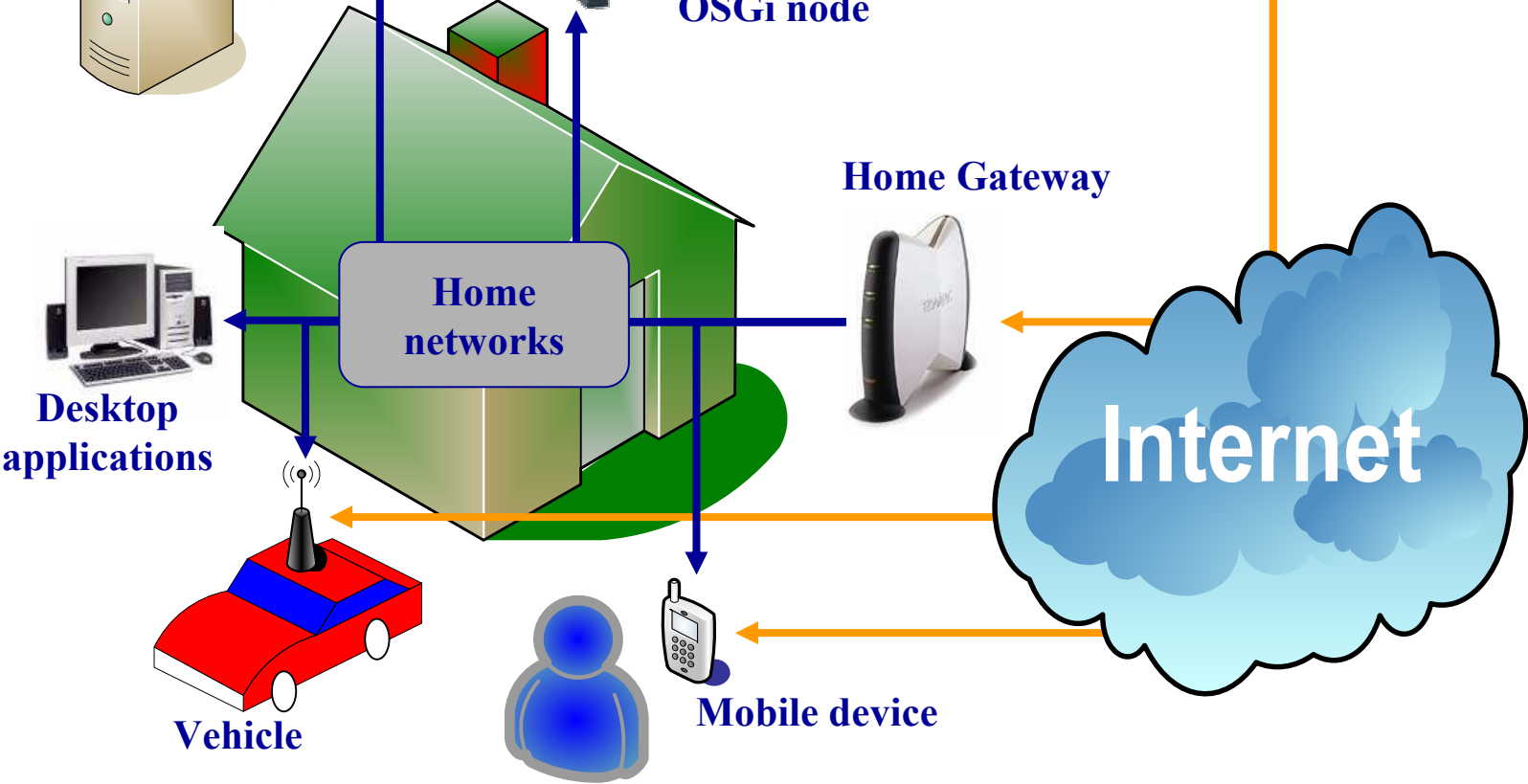
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# Future scenario based on HG

Server for ambient intelligent techs. (speech recognition, natural language, etc..)



Integrated management



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## Our Current solutions

- **Several approaches have been followed:**
  - **SOAP/HTTP using Apache Axis**
    - Some methods that use basic functionality of Web Services (mainly Strings containing XML)
  - **kSOAP for mobile devices:**
    - Lightweight technology
    - Allows to manage mobile devices (absolutely transparent to the server whether there is Axis or kSOAP)
  - **JMX**
    - Standard solution for Java SE and Java EE.
    - Very popular approach in open source world
  - **Remote management API**
    - OSGi Access is LGPL-licensed and available at <http://osgi-access.forge.os4os.org/>
    - Without standards solutions, in each project the remote management solution could have been different. We have implemented this API for different solutions to reuse management logic at the management server.



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## Take into account OSS projects

- **Some efforts have been done in collaboration with other partners in projects related to Open Source Software:**
  - DIT at UPM (Universidad Politécnica de Madrid)
  - Telvent (Abengoa group)
  - Both involved in the OSGi Users' Forum Spain
- **Most relevant:**
  - Several OSGi resources, including some about OSGi remote management at OS4OS forge:
    - <http://forge.os4os.org/>
  - Integration with Apache Felix project:
    - JMood, JMX based management agent for OSGi developed by DIT-UPM, integrated in the codebase of Apache Felix
    - JMood is a very popular JMX management solution (5 thousand downloads)



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# Remote Management Group Scope

- **What is the scope?**
  - Defining an instrumentation model for the OSGi platform is probably the first step for the group
- **Instrumentation model**
  - Defining entities (attributes and operations), relationships and data structure (OSGi Mobile group has adopted OMA DMT)
  - Basic requirements to fulfill:
    - Handle life-cycle management, i.e. install, update, uninstall, start and stop bundles
    - Check OSGi node status: bundles, services, configurations and so on
    - Configuration of services
- **Operation and management capabilities**
  - execution of operations: transactions and security are key issues
  - polling, notifications, statistics, any other?
- **Communications layer:**
  - Pay special care to data types to ease remote operations
  - Offer different options to remotely access the instrumentation model

# Jmood@ApacheFelix



- **Jmood is a JMX-based OSGi management agent**
  - ASL 2.0 licensed
  - Currently is part of Apache Felix codebase, but only uses OSGi specs and thus can be used with other OSGi frameworks (also tested with Equinox)
- **Instrumentation model for OSGi R4 core:**
  - Main entities: Bundles, Services, Packages and Framework
  - Configuration Admin, User Admin and Log Service are exposed as JMX Mbeans
- **Different network interactions for different needs:**
  - Fined-grained access, suitable for point to point management interactions
  - Bulk-mode transfers, this kind of operations are necessary to reduce network overhead (round trips for getting each data)
- **Remote management has been tested with RMI and SOAP connectors**
- **MiShell prototype:**
  - Using dynamic languages based on JSR 232, e.g. Python or Ruby
  - Dynamic typing at the server side:
    - You don't need to add extra libraries to your management server
    - New types are easily discovered and accessed using reflection

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