Orbit Management Framework (OMF) Tutorial

Thierry Rakotoarivelo
Max Ott

Australian Government
Department of Communications, Information Technology and the Arts
Australian Research Council

NICTA Members

Department of State and Regional Development

The University of Sydney

NICTA Partners

Goals & Outline

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- **Introduce** OMF, and **demonstrate** how to use it
- **Create** interests, and **build** future collaboration
- Outline:
  1. Overview
  2. Getting Started: a simple example
  3. The Next Steps…
  4. Glimpse of Future Features
  5. Conclusion

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Overview

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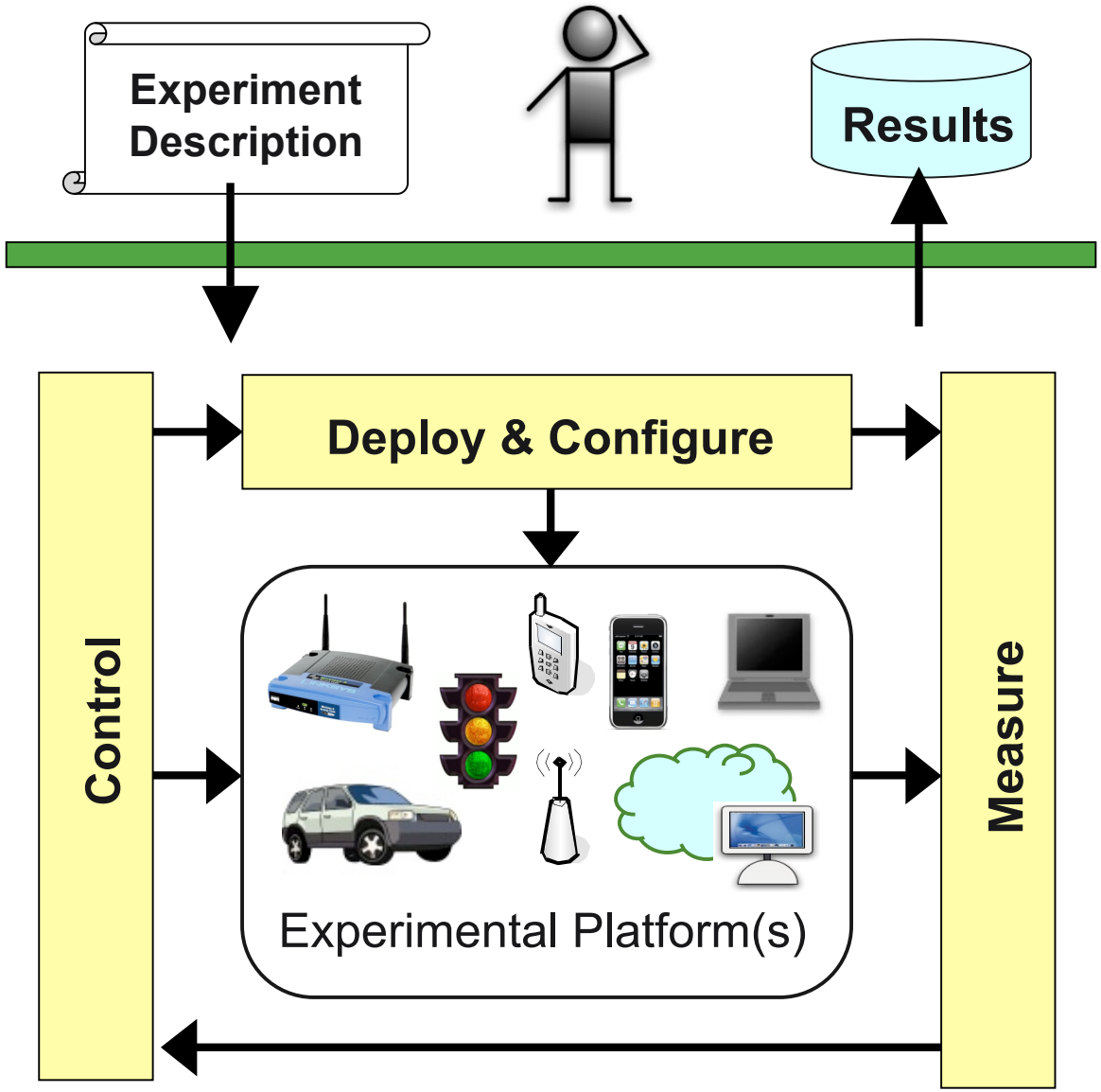
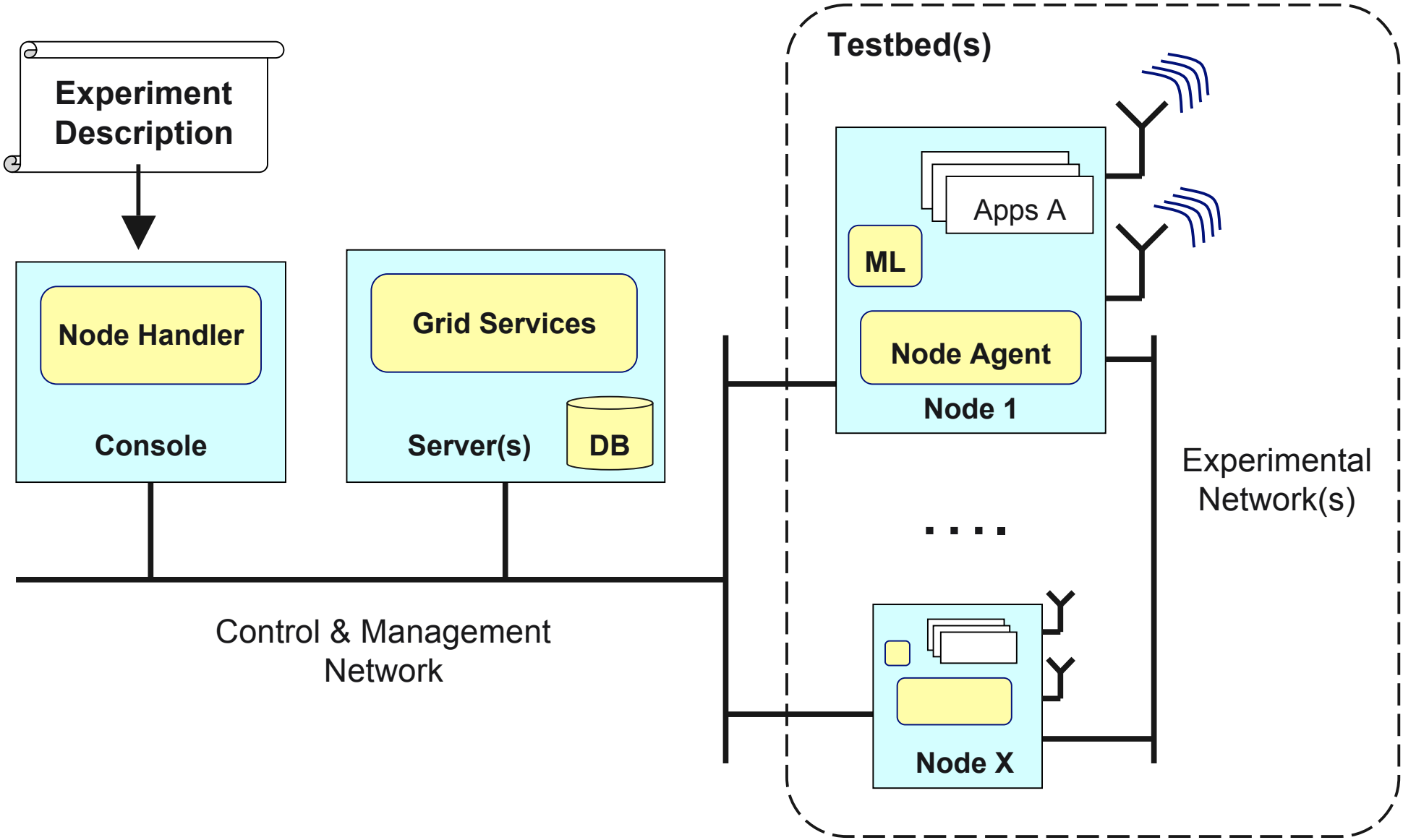
- Why do we need a framework to **use** and **manage** testbeds?
  - User
    - support "*experiment cycles*" + scientific rigour
    - validation, accuracy & reproducibility
  - Operator
    - ease management tasks
    - optimize resource utilization (intra / inter)
- Other existing frameworks: PlanetLab tools, Emulab
- **OMF** - support for *experiment cycles*
  - ease management tasks

OMF - User View

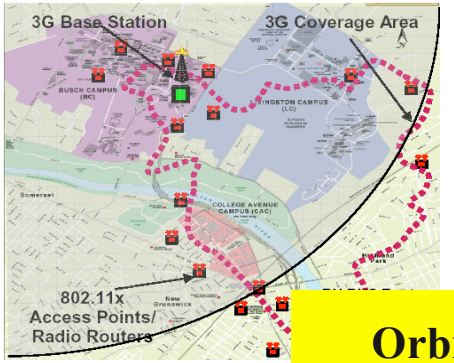


OMF- Operator View



Overview

- **Where ?**



Orbit, Winlab
Rutgers University

NICTA Sydney

- **How-To deploy OMF?**
  - Open source code & Debian-style packages
  - Installation Guide
  - Support (omf-deploy@lists.nicta.com.au)

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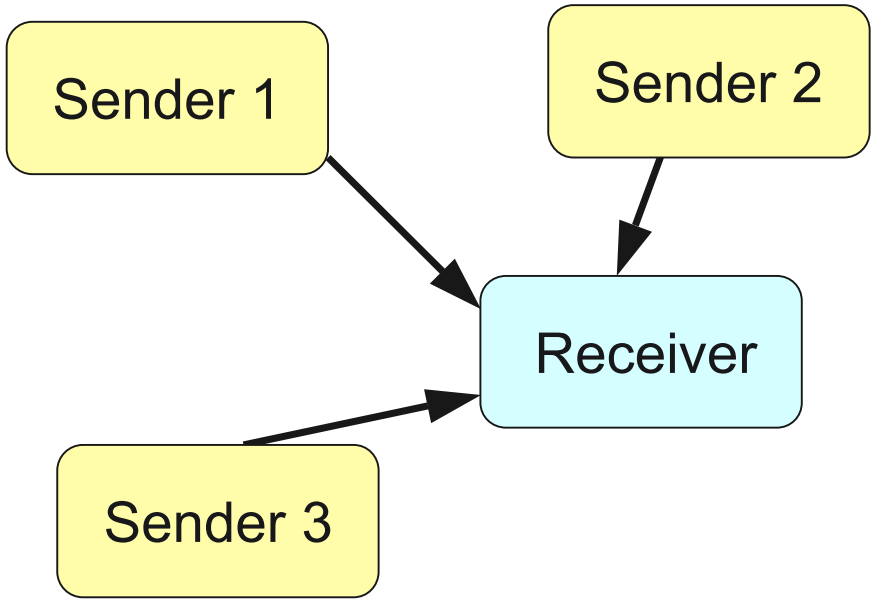
Getting Started: a simple example

- Simple Experiment
  - Scenario
  - Experiment script & description language



- Ad-Hoc
- 802.11a
- CBR
- Exp. Script…

Getting Started: a simple example

- Executing the experiment
  - Same experiment description on 2 different testbeds
  - 1st run at NICTA… ***- demo -***
  - 2nd run at Orbit Winlab… ***- demo -***

- The results ***- demo -***

  User-defined measurement points & filters

  Unified collection scheme

  SQL-based database

  User processing scripts

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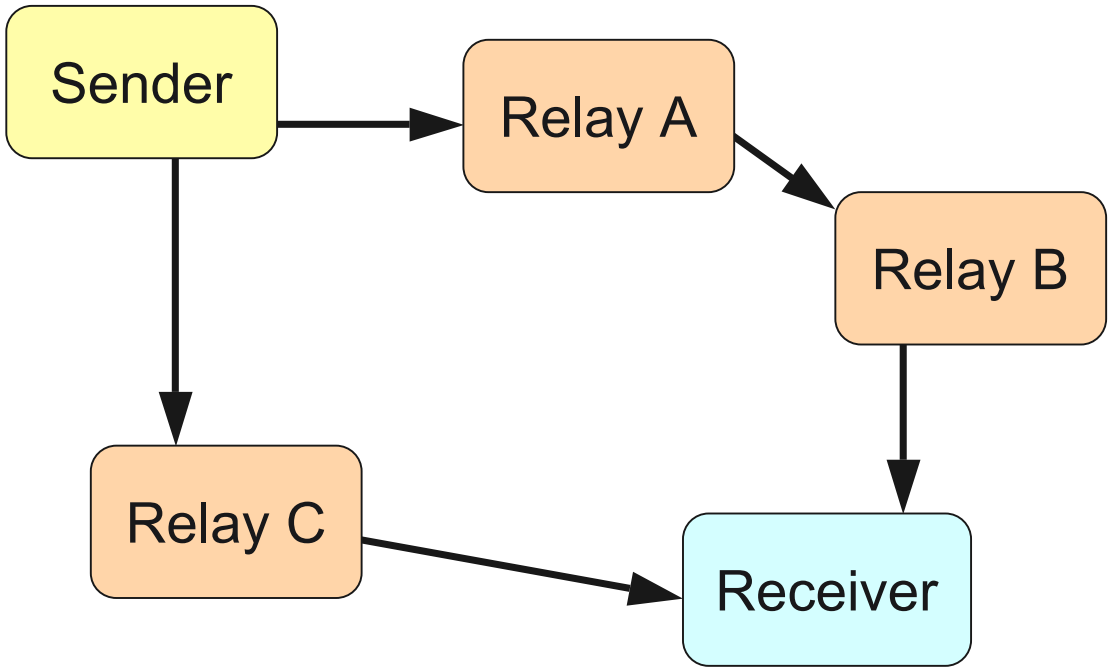
The Next Steps… a *'less simple'* example

- The Experiment
  - Scenario
  - Experiment script & description language



- Ad-Hoc
- OLSR daemon
- Multi-paths
- Mac filtering
- 802.11g
- CBR
- Exp. Script…

The Next Steps… a *'less simple'* example

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- Executing the experiment at NICTA…

  - demo -

- Processing the results

  - demo -

- What's next ?
  - Apps installation & node Imaging / Saving
  - Wrapper around other popular apps (e.g. iperf)
  - Your own scheme / algorithm ….

  Up for you to try… (http://www.orbit-lab.org/)

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Glimpse of Future Features

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- **Federation**:
  Experimentation **on** / **across** multiple testbeds

- A unique *description* → many instances
  - How to describe an experiment & required resources ?
  - How to discover/schedule resources & map descriptions ?
  - How to federate multiple organizations ?

- An experiment across testbeds → enhanced capabilities
  - Further description, discovery, scheduling, mapping issues
  - How to coordinate resource usage across locations ?

- PlanetLab's "Hello World" with OMF ***- demo -***

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Glimpse of Future Features

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- Resource Sharing: System & Communication abstractions
  → at which **level** and **layer** to **virtualize**?
- OS / Hardware virtualization
- Network / Link Layer virtualization
  → e.g. how to share wireless medium?
- Current trials: - Xen virtual machines on NICTA's testbed
  - Space and Frequency sharing
- Issues: **adapt** to user needs & to new technologies

Glimpse of Future Features

- Other features under development
  - Additional access methods (e.g. web interface)
  - Generic processing & visualization tools
  - Default context measurements (e.g. system stats)
  - “Disconnected” mode (e.g. mobile testbeds)
  - “Batch” mode
  - …

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Conclusion

- Need for a framework to use and manage testbeds
  - Support full experiment cycle & increase scientific rigour
  - Ease management & Optimize resource utilization
  - → **OMF:** deployed, used, and being actively improved
- Tutorial on using OMF
  - High-level experiment description
  - Controlled experiment execution
  - Unified measurement collection
- Future OMF… **v2**:
  - Federation of multiple testbeds
  - Resource Virtualization
  - Enhanced user experience
  - New / Other network technologies

Thank you

Any questions?

Thierry.Rakotoarivelo@nicta.com.au

Max.Ott@nicta.com.au

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From **imagination** to **impact**