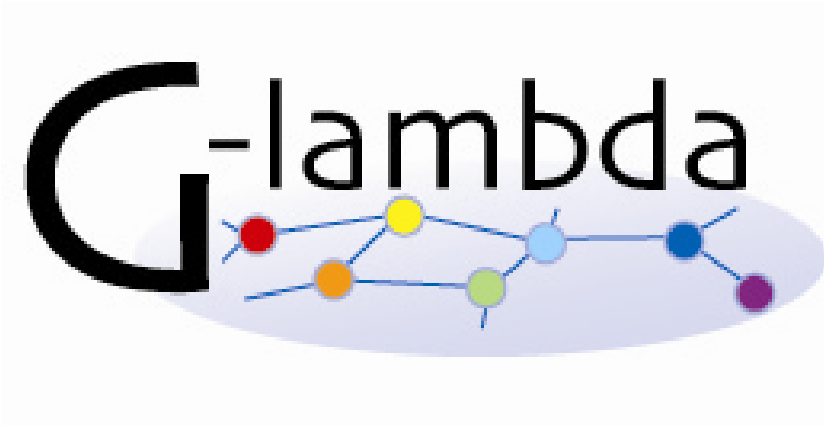
G-lambda

Tomohiro Kudoh

National Institute of Advanced Industrial Science and Technology (AIST)



G- lambda project overview

- Joint project of KDDI R&D labs., NTT, NICT and AIST.
- G-lambda project has been started in December 2004.
- The goal of this project is to establish a standard web services interface (GNS-WSI) between Grid resource manager and network resource manager provided by network operators.

GNS-WSI

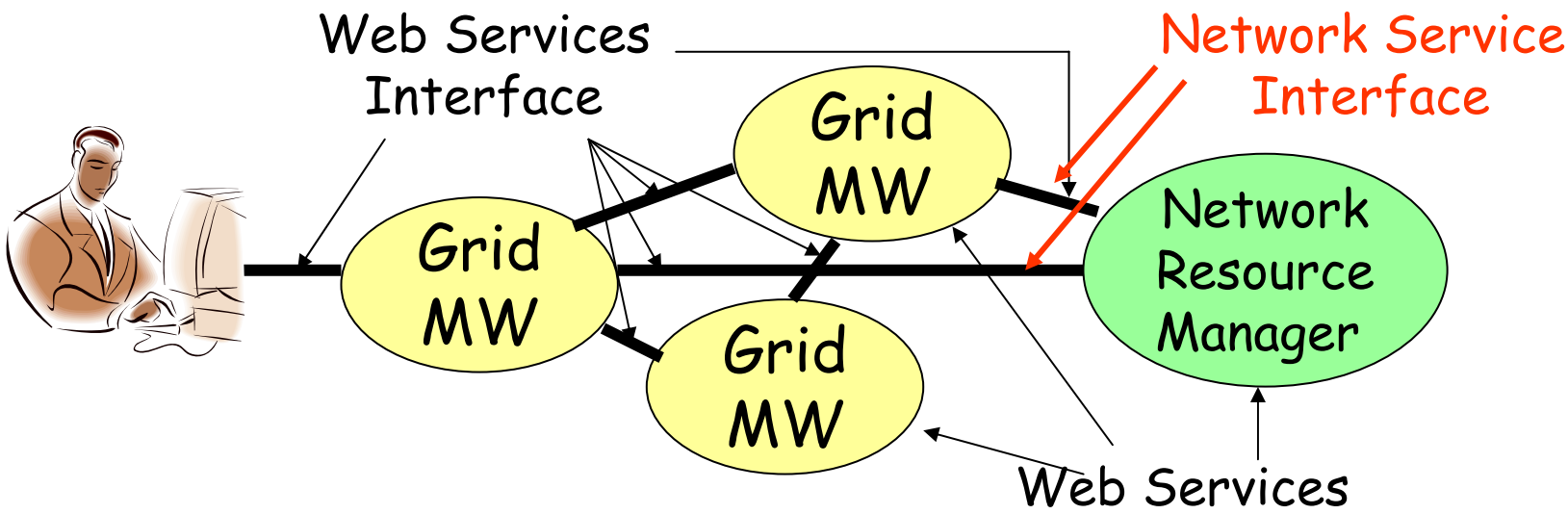
- Grid Network Service-Web Services Interface
- Interface to realize advance reservation of bandwidth
- Based on the Web Services interface technology
- Can be used for inter-domain coordination

GNS-WSI supports advance reservation

- Reserve lambda (or bandwidth) in advance to ensure availability at the time of use
  - On-demand protocols such as GMPLS do not have such capability
- GNS-WSI is an interface provided by a resource manager
  - Resource manager
    - accepts reservation request from user programs,
      - register the reservation to a reservation table,
      - and activate the lambda path (or bandwidth) when the reserved time arrives
- GNS-WSI is a higher layer interface which hides detailed implementation of the lambda path
  - Users don't have to (or can't) care about the detail such as intermediate switches and routers
  - Independent from underlying protocols such as GMPLS

GNS-WSI is based on Web Services

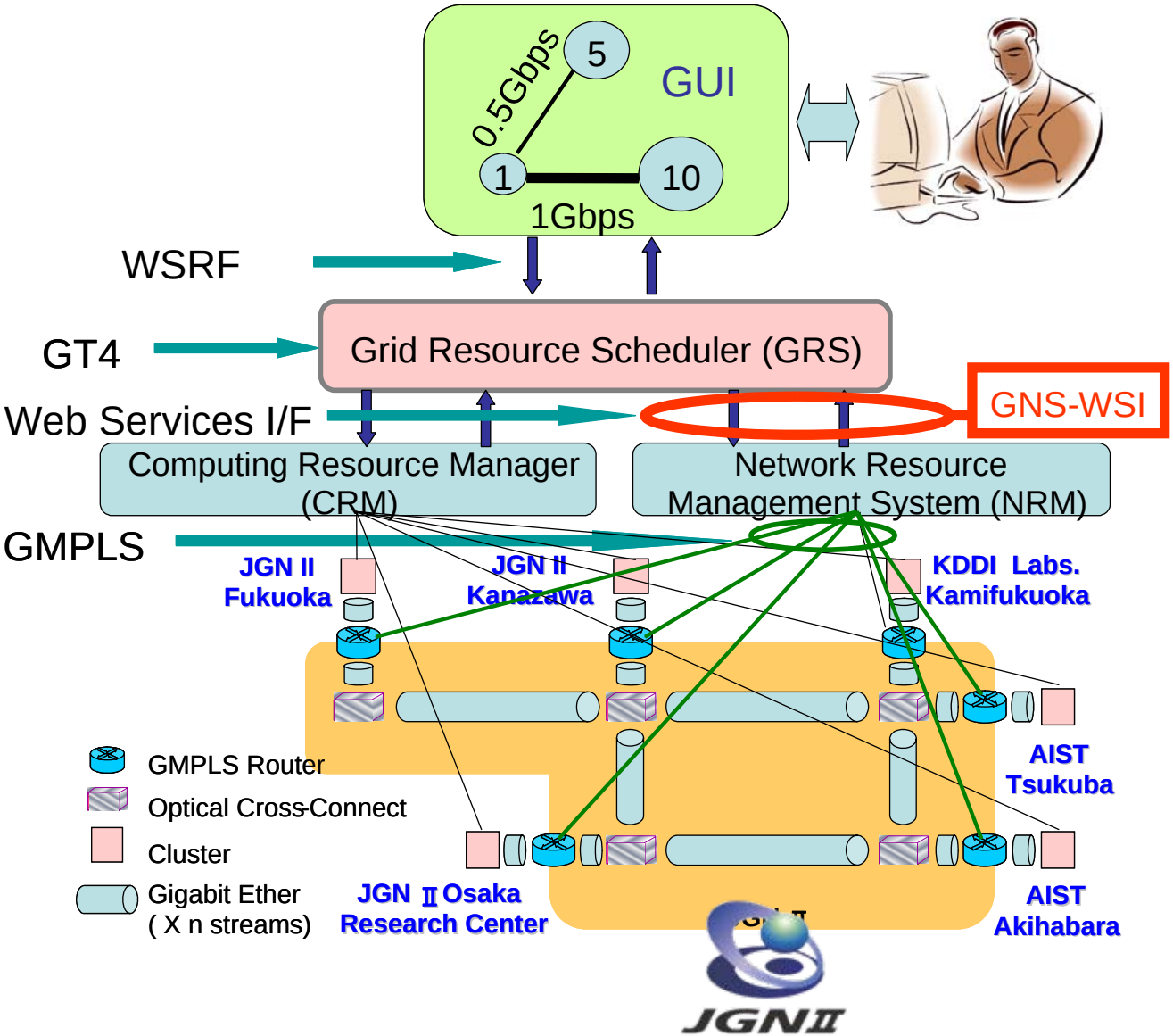
- Application components which can be accessed thorough open standard web protocols (XML, SOAP, etc.).
- Web Services interface enables interaction between application components
  - Very high level interoperability among the components.
- A standard Web Services based open interface between Grid middleware and network resource manager is required



An example XML exchanged through GNS-WSI

```
<requirements>
    <network
      aPoint=“AKB"
      zPoint=“RA1"
      startTime="2006-09-07T04:15:00Z"
      endTime="2006-09-07T06:15:00Z“
      bandwidth="1000000"
      latency="1000"/>
</requirements>
```

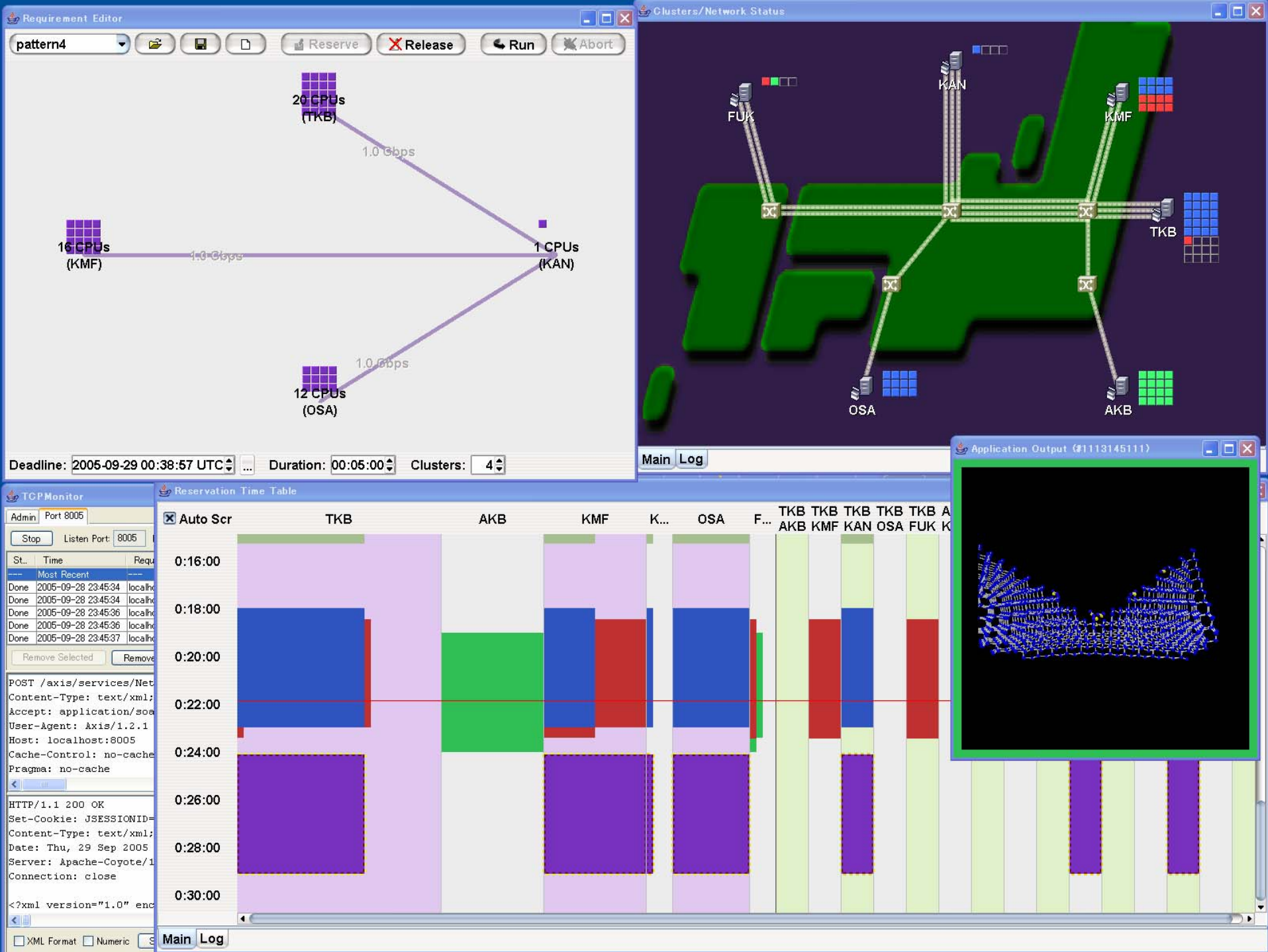
Demonstration at iGrid2005



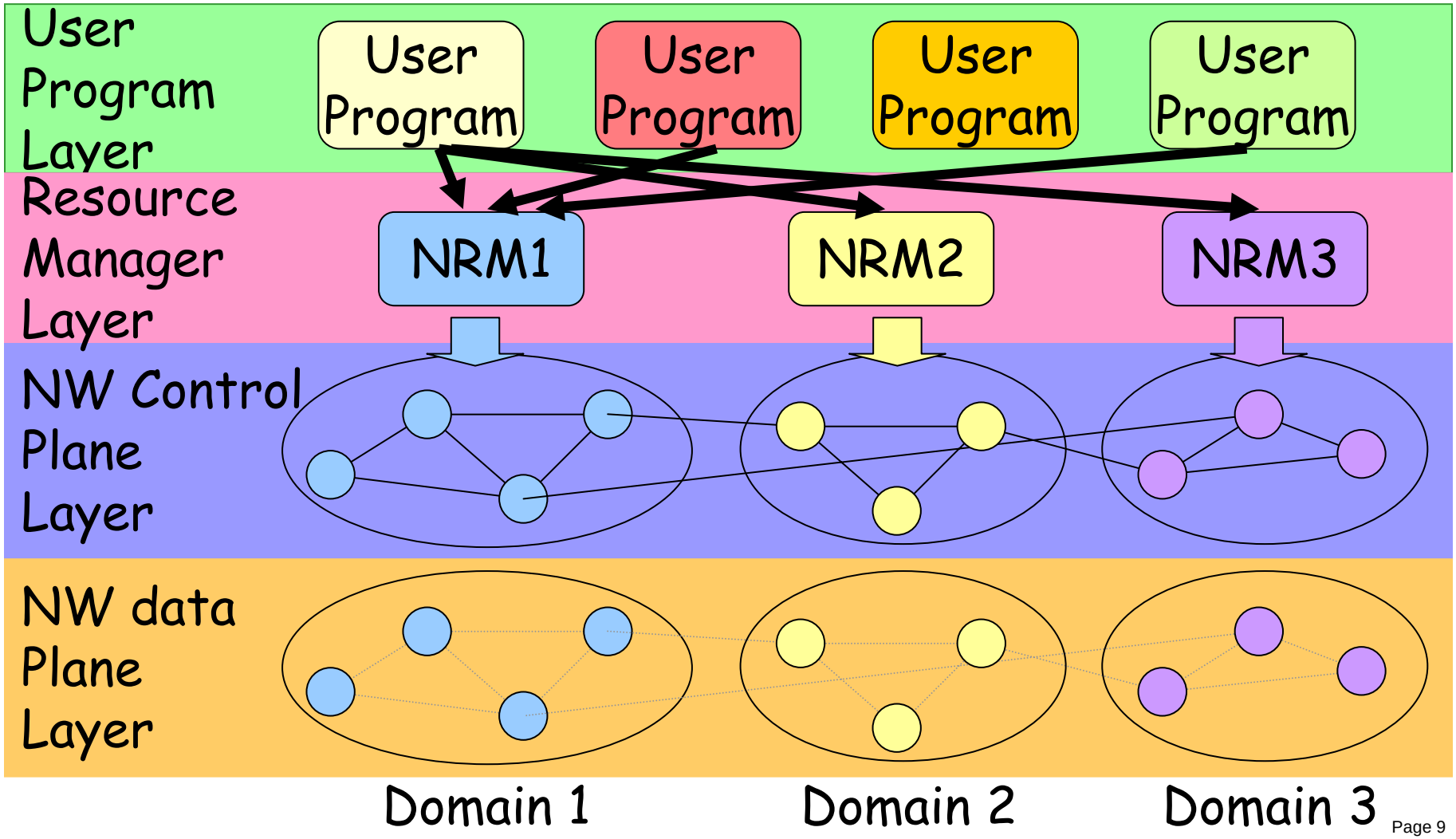
① User requests service via GUI, specifying the required number of computers and the network bandwidth needed

②The computing resources and GMPLS network resources are reserved as the result of interworking between the GRS and NRM using GNS-WSI (Grid Network Service / Web Services Interface)

③ A molecular dynamics simulation is executed using the reserved computers and lambda paths. Ninf-G2 and Globus Toolkit 2 (GT2) are used at each cluster.

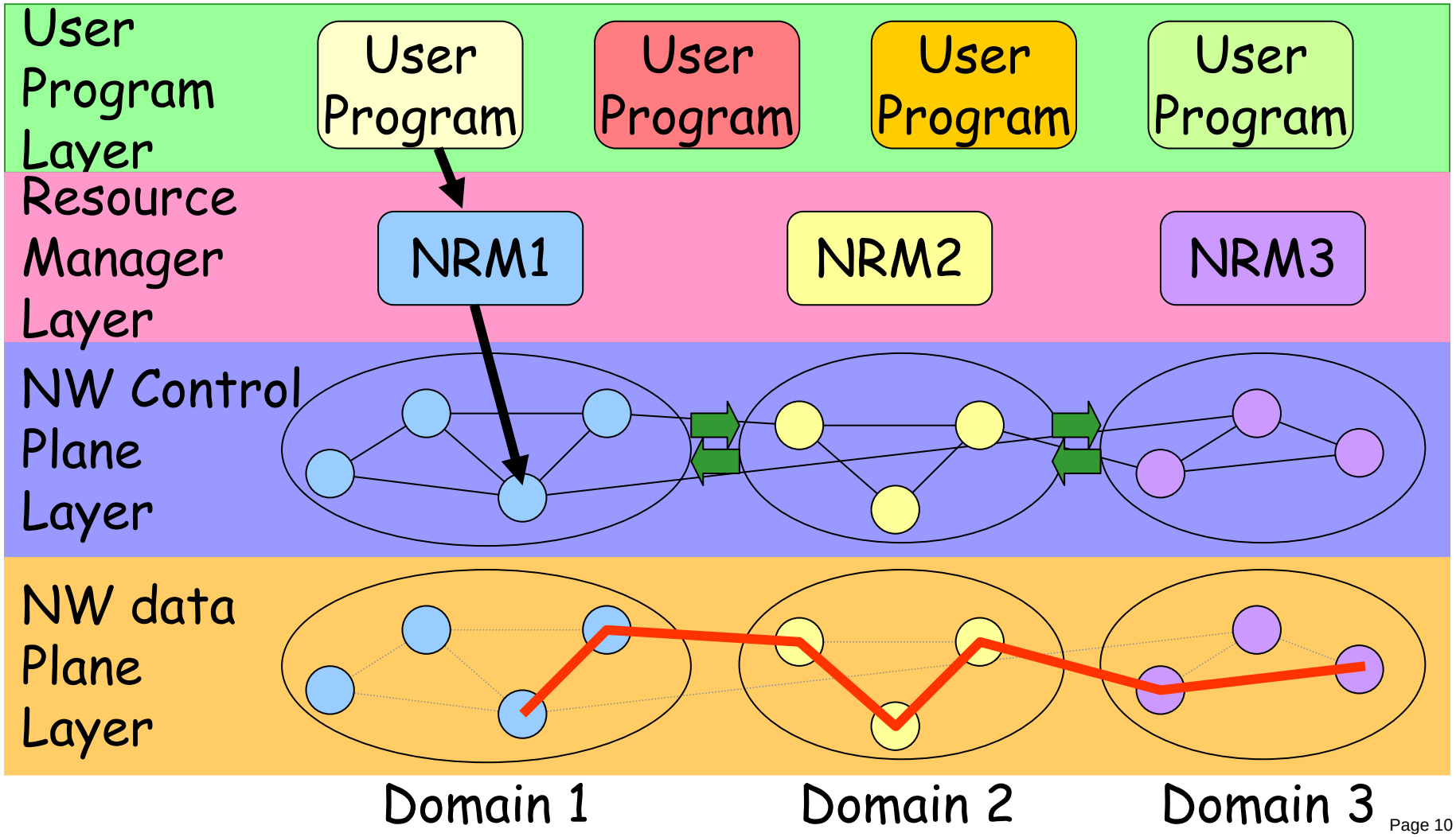

Requirement Editor
pattern4
Reserve
Release
Run
Abort
20 CPUs
(TKB)
1.0 Gbps
16 CPUs
(KMF)
1.0 Gbps
1 CPUs
(KAN)
1.0 Gbps
12 CPUs
(OSA)
Deadline: 2005-09-29 00:38:57 UTC
Duration: 00:05:00
Clusters: 4
Clusters/Network Status
FUK
KAN
KMF
TKB
OSA
AKB
Main
Log
Application Output (#1113145111)
TCPMonitor
Admin
Port 8005
Stop
Listen Port: 8005
St..
Time
Most Recent
Done 2005-09-28 23:45:34
Done 2005-09-28 23:45:34
Done 2005-09-28 23:45:36
Done 2005-09-28 23:45:36
Done 2005-09-28 23:45:37
Remove Selected
POST /axis/services/Net
Content-Type: text/xml;
Accept: application/soa
User-Agent: Axis/1.2.1
Host: localhost:8005
Cache-Control: no-cache
Pragma: no-cache
HTTP/1.1 200 OK
Set-Cookie: JSESSIONID=
Content-Type: text/xml;
Date: Thu, 29 Sep 2005
Server: Apache-Coyote/1
Connection: close
<?xml version="1.0" enc
XML Format
Numeric
Reservation Time Table
Auto Scr
TKB
AKB
KMF
K...
OSA
F...
TKB AKB
TKB KMF
TKB KAN
TKB OSA
TKB FUK
0:16:00
0:18:00
0:20:00
0:22:00
0:24:00
0:26:00
0:28:00
0:30:00
Main
Log

Extension to multi-user-programs, multi-domains



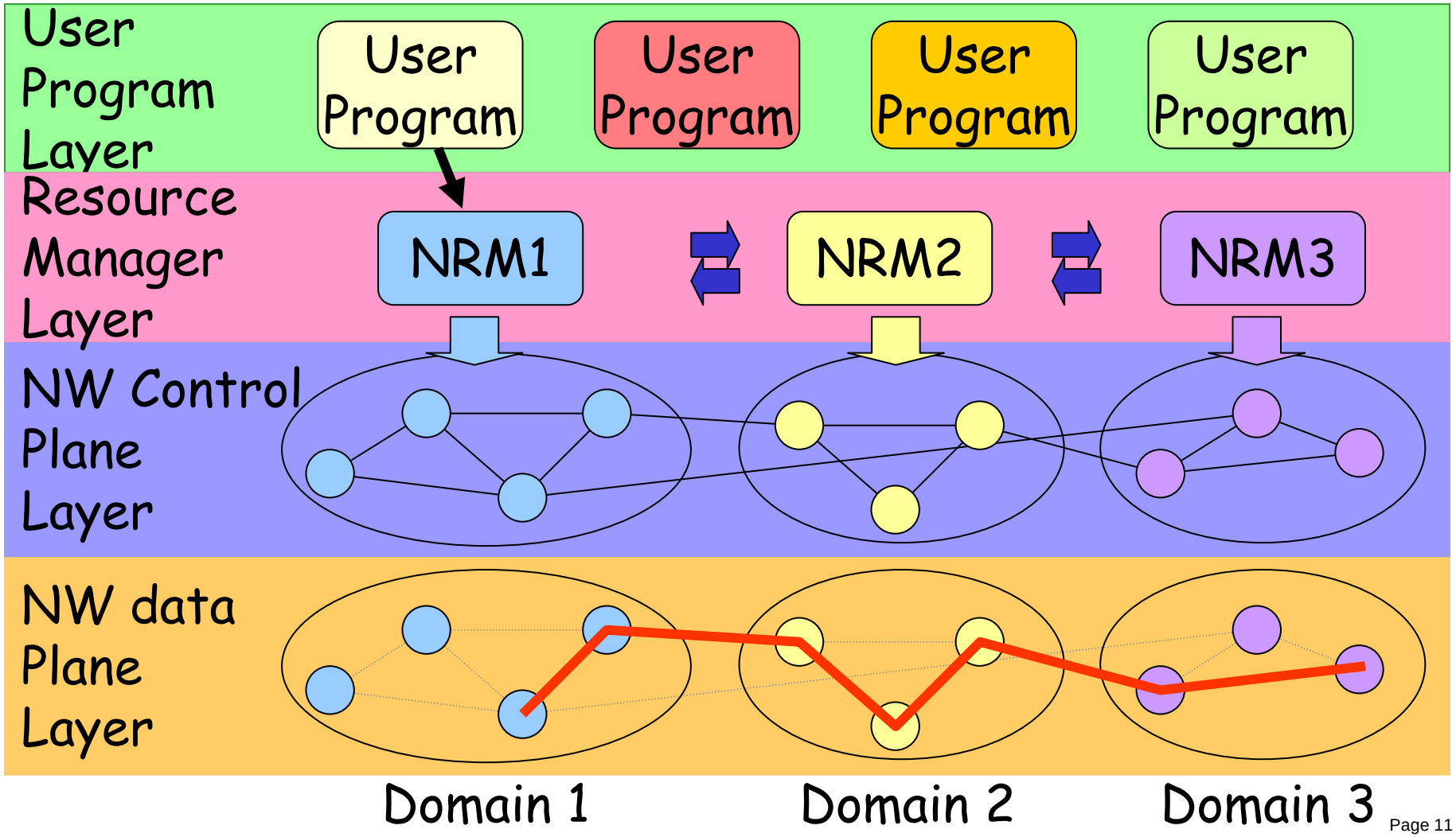
Inter-domain coordination - Three models -

(1) NW Control Plane Layer inter-working (ex. GMPLS E-NNI)



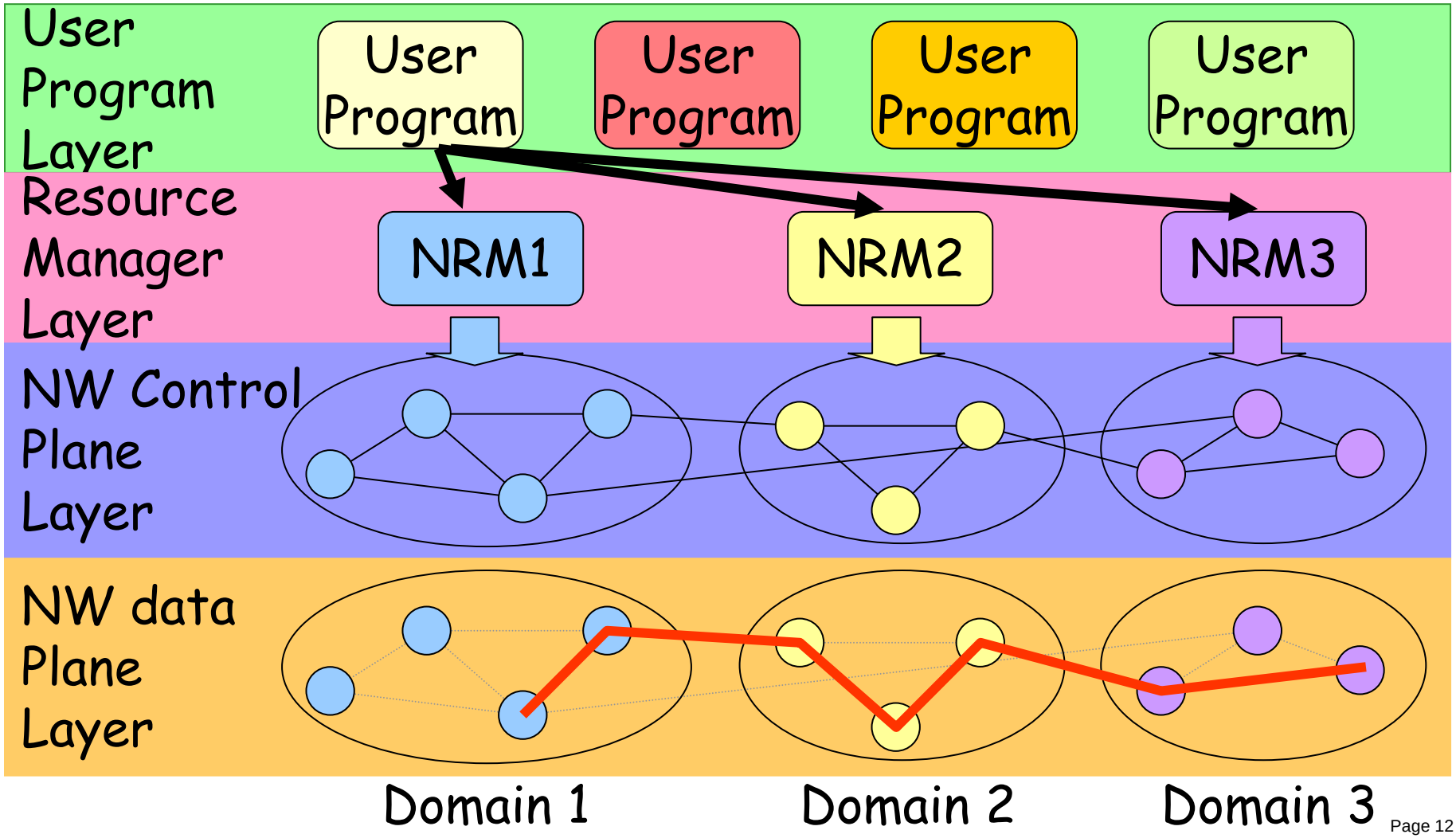
Inter-domain coordination - Three models -

(2) Resource Manager Layer inter-working



Inter-domain coordination - Three models -

(3) User Program Layer inter-working



LIVE DEMO planned for next week

Inter-domain advance reservation of coordinated network and computing resources over the Pacific

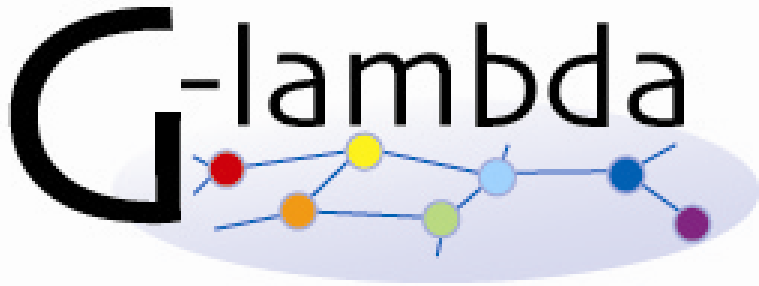
An G-lambda & Enlightened collaboration

At 11th floor of

THIS building

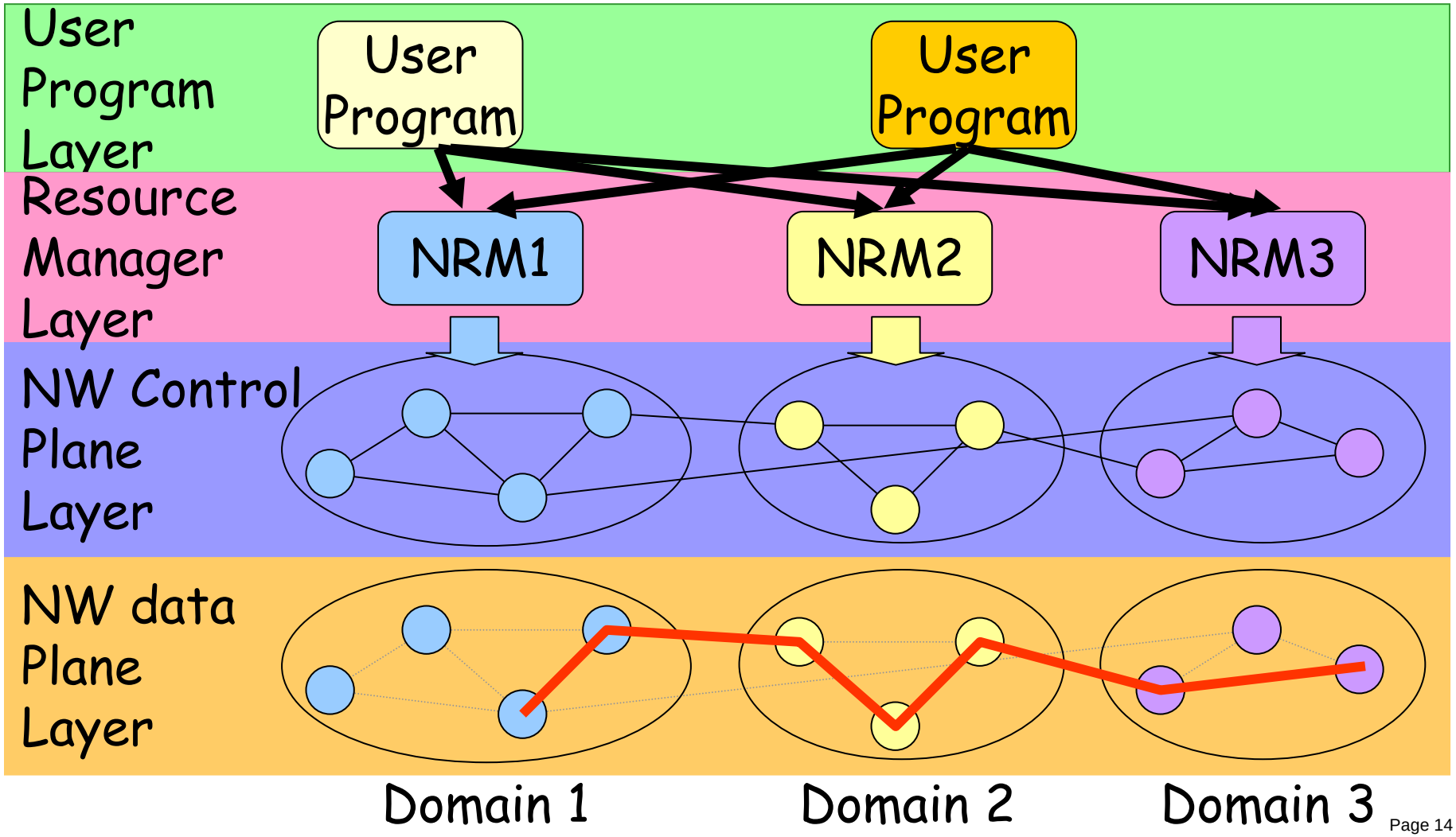
(AIST meeting room)

- Sep.11
  - 1:00PM-2:00PM
  - 6:00PM-
- Sep.12
  - 1:00PM-2:00PM
- Sep.13
  - 12:30PM-1:30PM

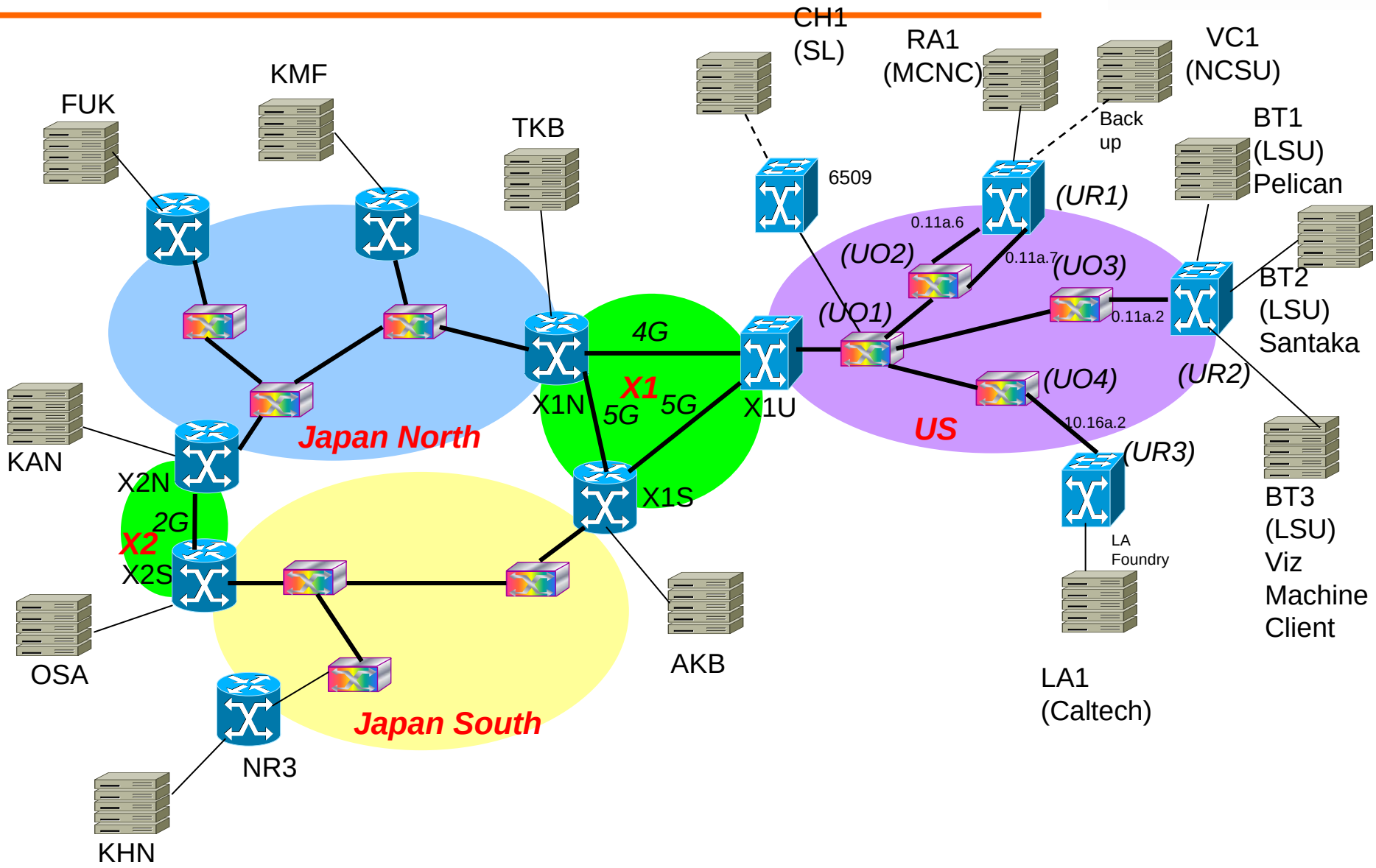


Model No.3 is used in the demo

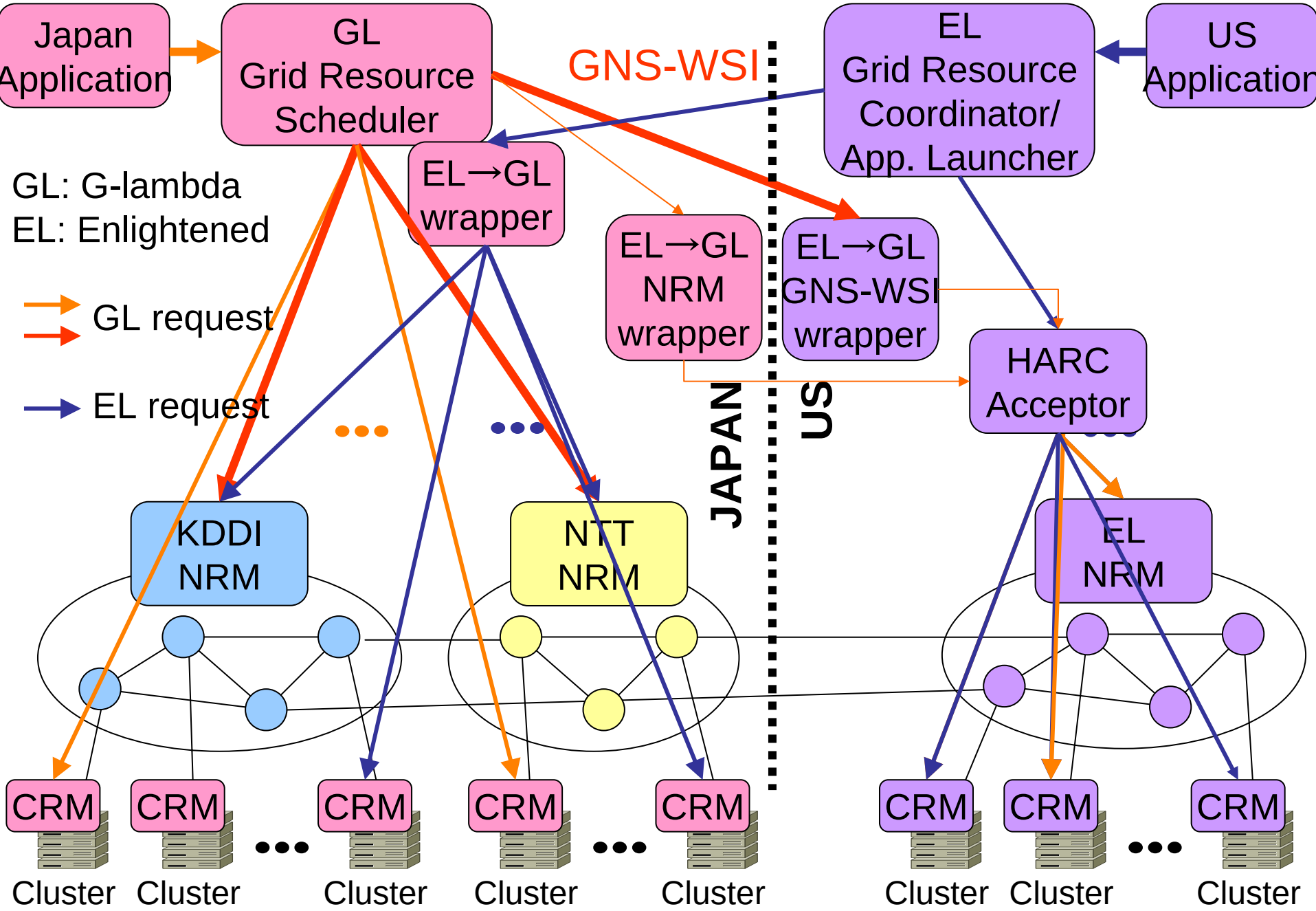
(3) User Program Layer inter-working

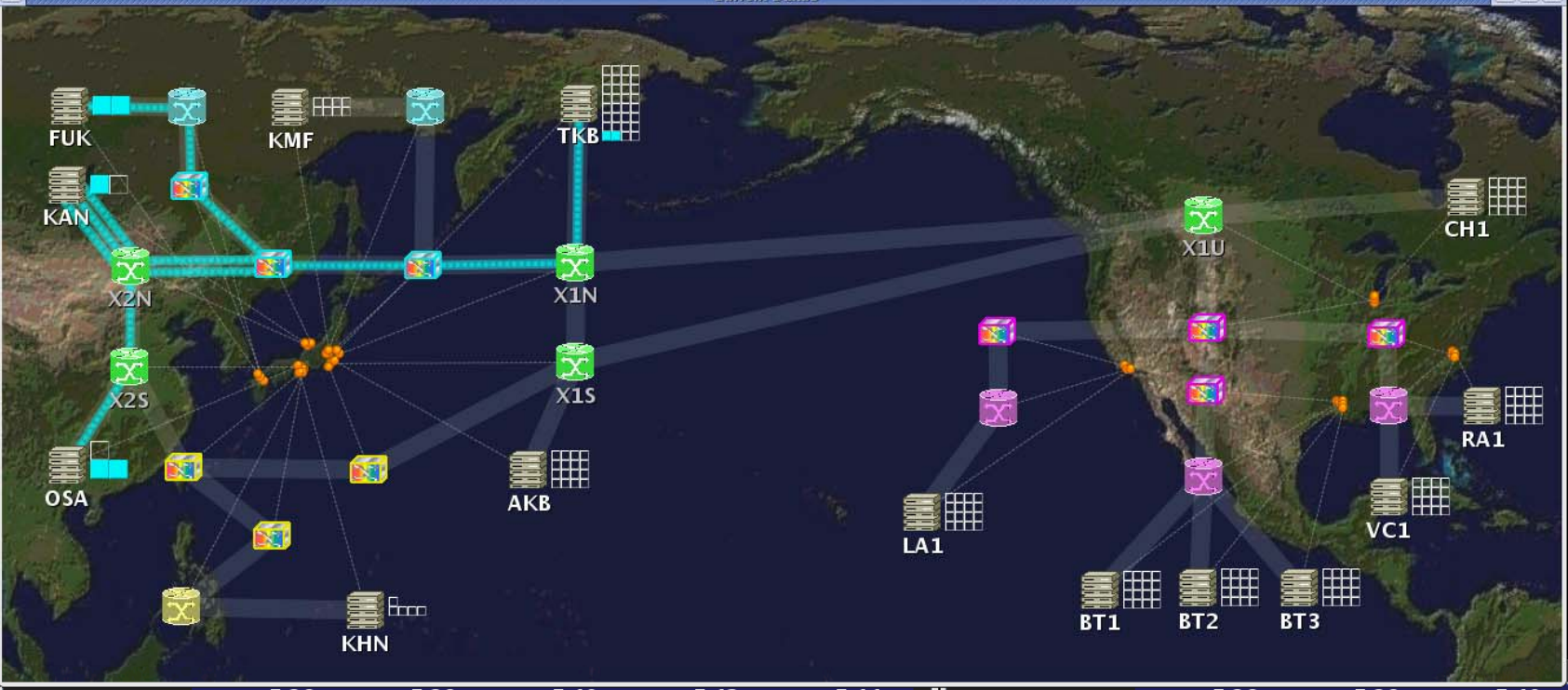


Resource map of the demo for next week

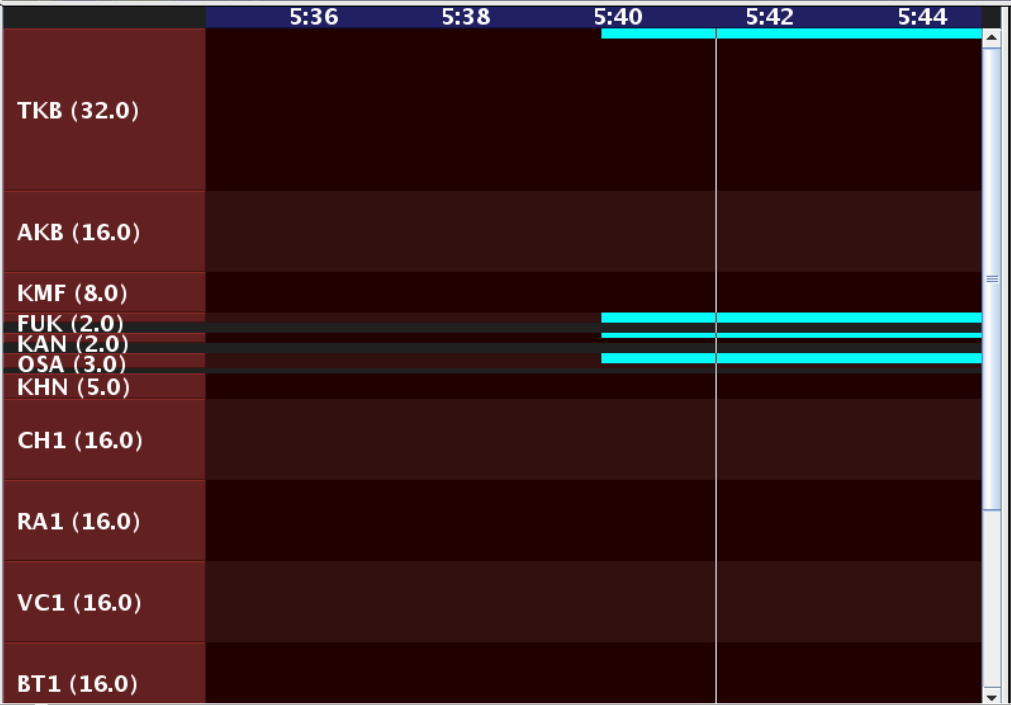


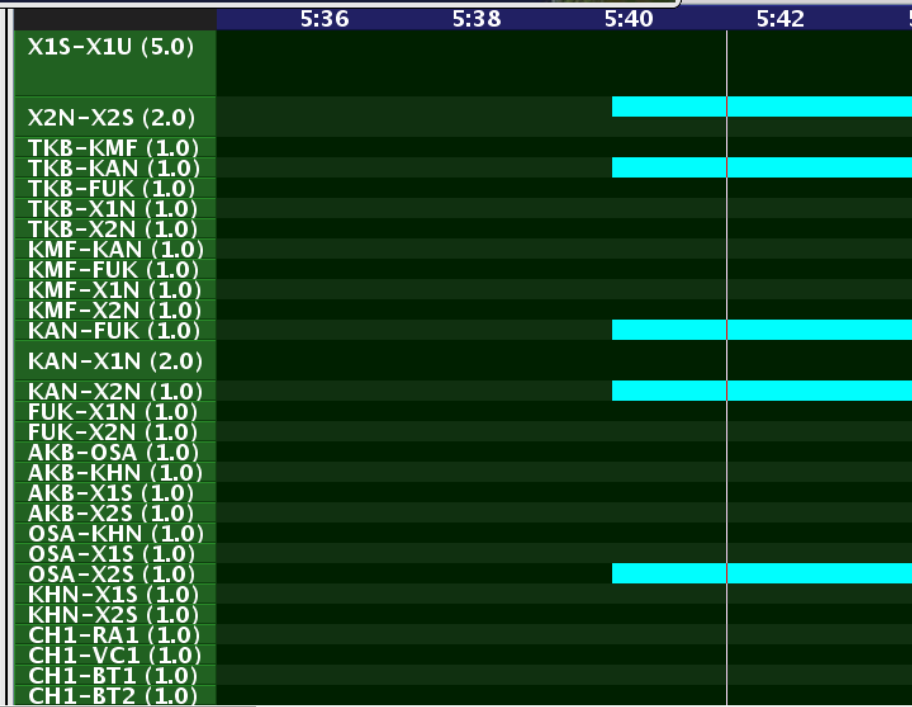
G-lambda/Enlightened middleware coordination diagram





/C=JP/O=AIST GTR
/C=JP/O=AIST GTR
/C=JP/O=AIST GTR
/C=JP/O=AIST GTR
/C=JP/O=AIST GTR
/C=JP/O=AIST GTR





Answers to the questions given in advance by the chair

- How the research will specifically contribute to enhancement of the larger network environment?
  - Obvious! (I hope)
  - Inter-domain inter-working brings scalability
- How the research will contribute to the goal of enhanced international communications exchange?
  - Unquestionable! (I believe)
  - Proposed three models of inter-domain inter-working
- Roadmap (Near term 2006/2007)
  - Continue developing and maturing the GNS-WSI interface
    - Accounting, SLA etc.
  - Initiate a process for defining standard interface to reserve bandwidth of network
    - OGF
    - International collaboration with other projects

Thank you

G- lambda project

http://www.g-lambda.net/

LIVE DEMO planned for next week

Inter-domain advance reservation of coordinated network and computing resources over the Pacific

An G-lambda & Enlightened collaboration

At 11th floor of

THIS building

(AIST meeting room)

- Sep.11
  - 1:00PM-2:00PM
  - 6:00PM-
- Sep.12
  - 1:00PM-2:00PM
- Sep.13
  - 12:30PM-1:30PM

enλIGHTened computing

G-lambda