



Premium IP & the GN2 Advance Multi-domain Provisioning System (AMPS)

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OpenNet

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Introduction

- Premium IP (PIP) a service offered first by the GÉANT network, and now GÉANT2
 - Emulates a private circuit service, by removing/minimizing queuing delay
- GÉANT PIP purely single domain
 - used the GÉANT specific Provisioning System (Prov Sys, or PS)
- GÉANT2 PIP multi-domain
 - Uses the Advanced Multi-domain Provisioning System (AMPS)



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Background - SEQUIN

- Service Quality across Independent Networks (SEQUIN)
 - Nov 00 to Apr 02; 6 NRENs (National Research & Education Networks) + DANTE
- SEQUIN's findings: to ensure an uncongested IP path,
 - “Premium” traffic must be prioritised over non-premium traffic (e.g. using DiffServ)
 - Premium traffic must be policed to avoid mutual congestion caused by parallel premium flows
- Concession – if a network is “over provisioned”, then no policing (or prioritization) is required



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Background – GÉANT

- Based on SEQUIN findings, GÉANT Provisioning System (PS) developed in May 2003, and operational later that year
- Basic operation
 - Users requested, via web-based form, a Premium IP service between two edge points of the GÉANT network
 - PS calculated routed path between edge points (using cached topology model)
 - If spare capacity existed for new reservation, then request accepted
 - PS drafted router configuration (firewall filters) and e-mailed GÉANT NOC for action

OWD - BE traffic NL-IL circuit 01/06/05

5 BE test packets every 30s. Values red max, blue av, green min

Delay (ms)

90

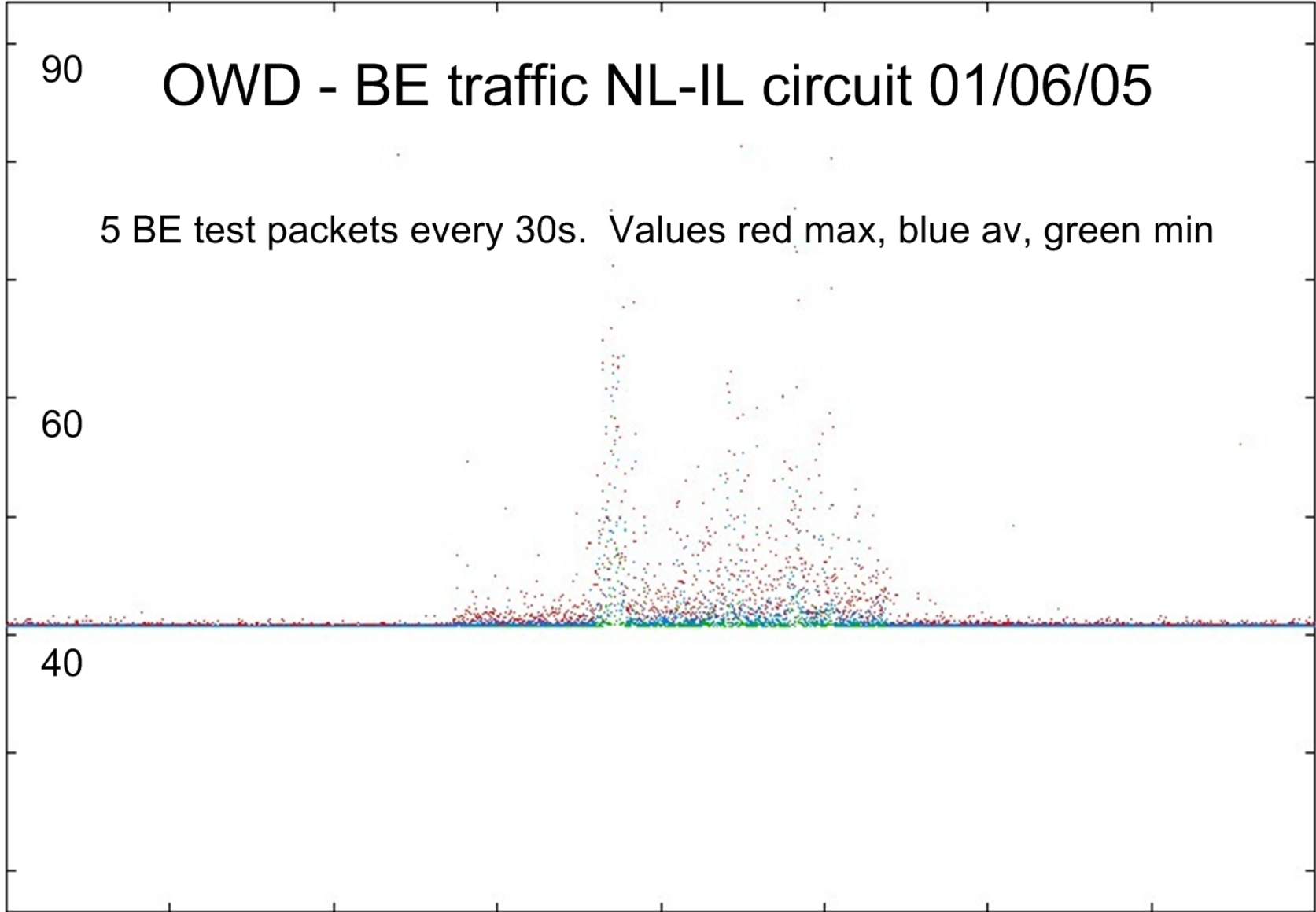
60

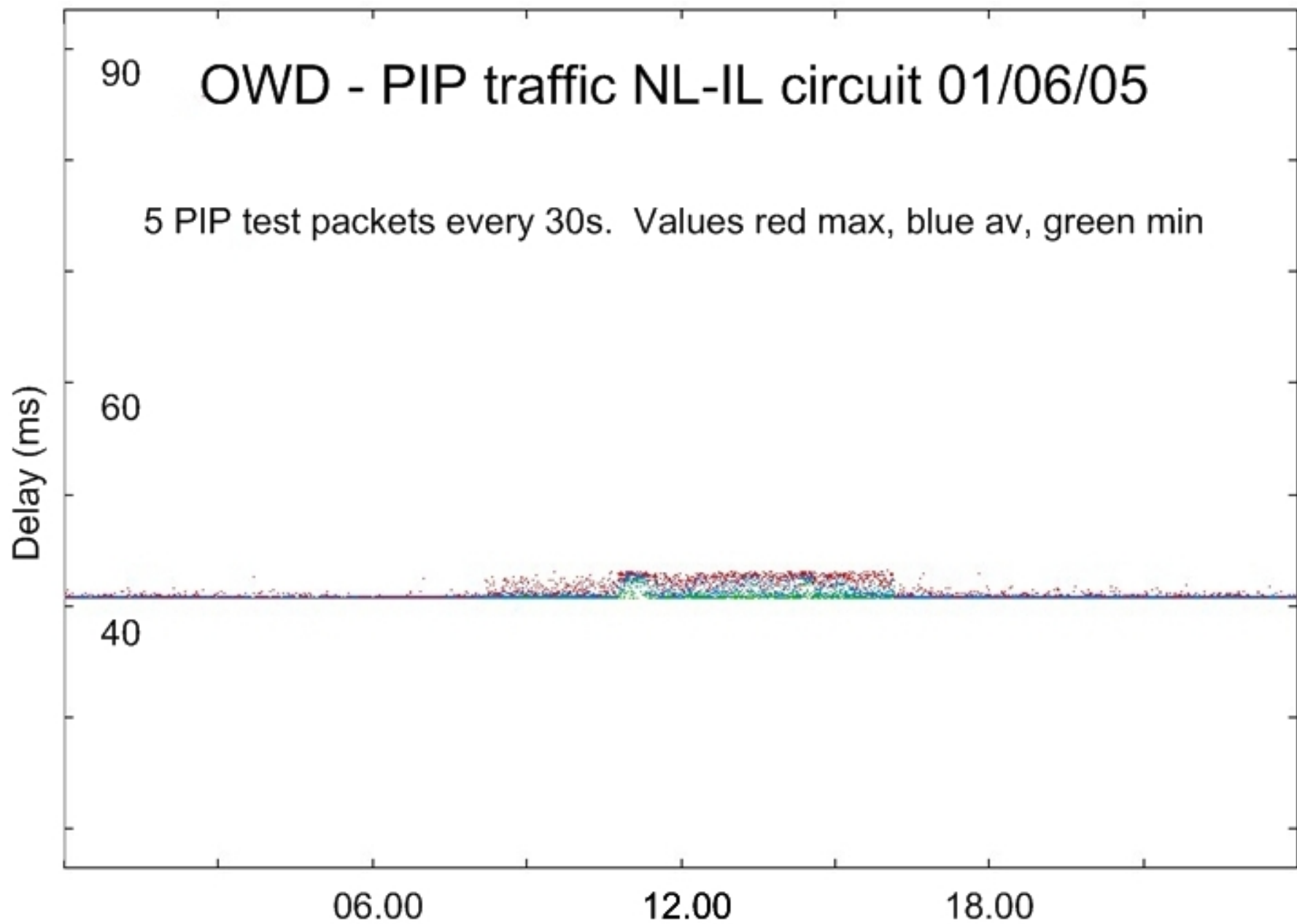
40

06.00

12.00

18.00







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PIP Approach

- Deliver PIP using current technologies and equipment
 - No new control plane
- As inclusive as possible
 - Encourage use of diffserv but allow ‘over provisioning’
- Reduce complexity
 - Exclude difficult ‘corner cases’
 - Over-engineer



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PIP Assumptions

- Domains are single homed (not multi- or dual-)
- A domain uses a link state routing protocol for its IGP
- IP flows follow the steady state path
 - The path between two network edge points is determined by running Dijkstra SPF against model of the steady state network
 - (But safety margin to allow for re-routing after link failure)
- Node configuration is (or may be) manual – therefore a minimum lead time of up to 2 days is required



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PIP Caveat

- The 'advance reservation' required by AMPS means PIP **incompatible** with 'on demand' QoS reservation systems, such as MPLS-TE
- To fully guarantee PIP, AMPS (or its equivalent) must be the only manager of expedited IP traffic in the domain



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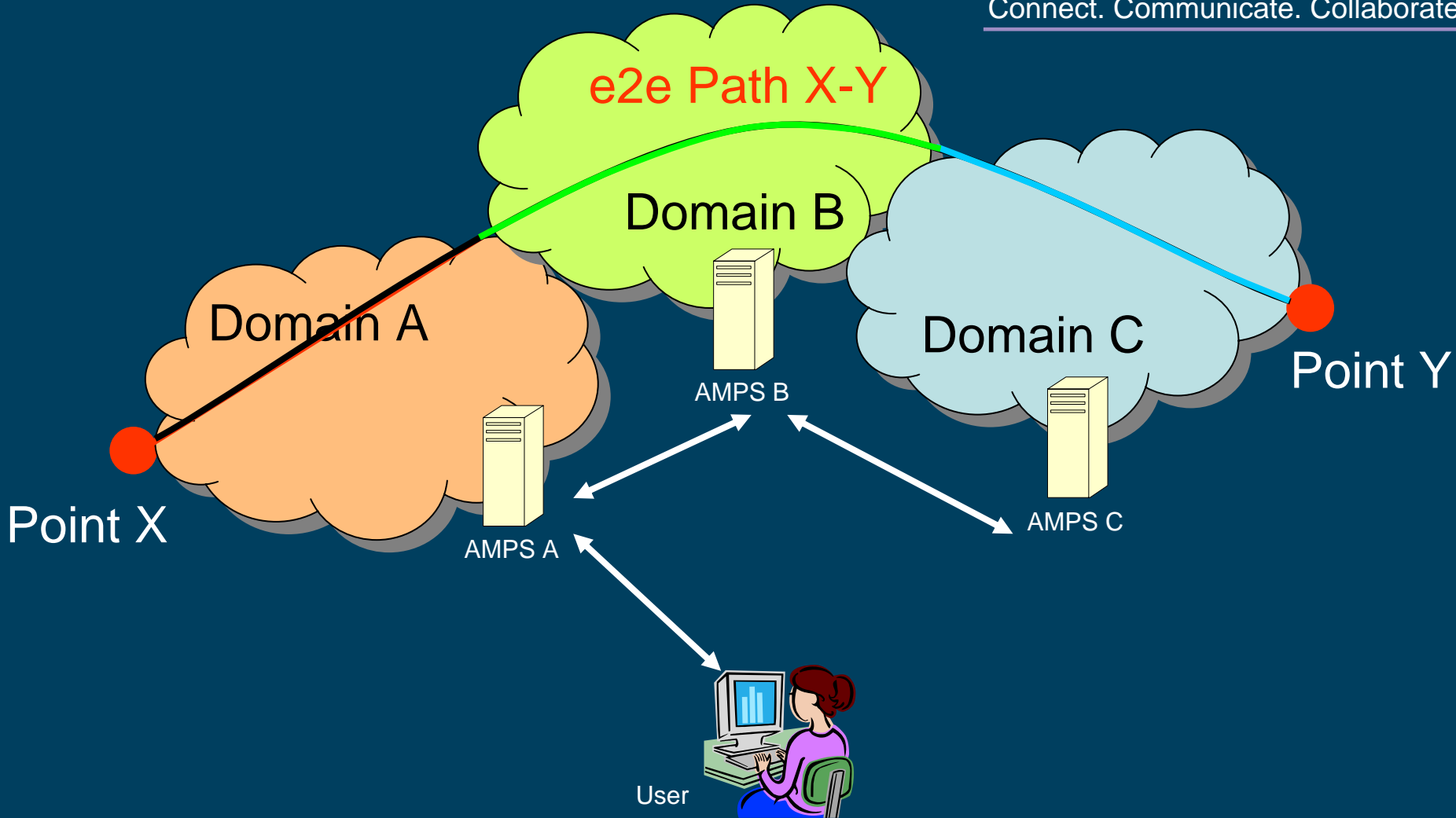
AMPS

- Advance Multi-domain Provisioning System
- To ensure scalability, AMPS is distributed
 - One system per participating network
 - Each system peers with just its neighbours
- To improve interoperability with existing systems, AMPS is modularised
 - Web Services
- Policy Module will allow AMPS administrator to control who can reserve what (normally by group membership)

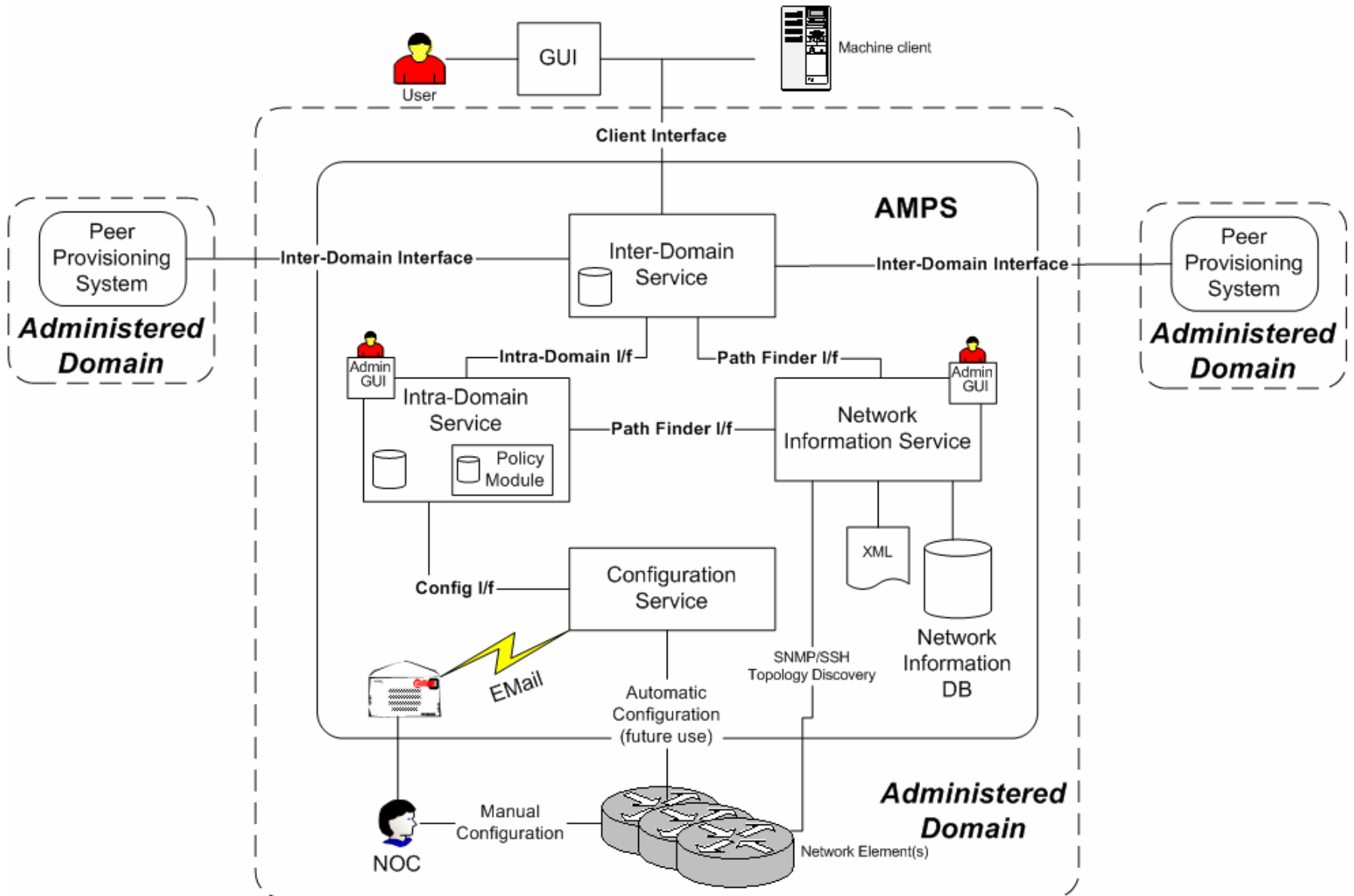
AMPS Operation



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GÉANT2 Advance Multi-domain Provisioning System High Level Architecture Design Jul 2007



Home

Reservation

NIS

Pathfinder

Create

Query

Cancel

[AMPS home](#) > [Reservation](#) > [Create](#)

Reservation page

User's Group

Source Address *

Destination Address *

Start Date *

Start Time

End Date *

End Time

Direction

Ingress

[What's this?](#)

Bandwidth *

Submit



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Current PIP/AMPS Status

- Multi-domain PIP between GÉANT2 and GRNET
 - GRNET uses combination of own local provisioning system (ANS) and AMPS inter-domain module
 - More info on ANS at http://anstool.grnet.gr:6080/help/manual_QoS_en.php
- AMPS Pilot Study: NRENs of Ireland, Switzerland, Slovenia, France and Italy
 - Currently testing Network Information Service



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Use of AMPS/PIP

- Access to GÉANT2 AMPS limited to NRENs and specified international projects e.g. EGEE NOC (ENOC)
- End-users need to make request for PIP via an NREN, GÉANT2 Ops, or approved project



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Future Plans

- Configuration service
- SLA module
- AA module
 - To make system compatible with eduGAIN (the planned NREN AA framework)
- AMPS NIS to be replaced by independent cNIS
- Standardisation of the interdomain interface (working with ESnet and Internet2 – all welcome!)
- MPLS functionality planned – will enable alternative paths to be specified



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Config Service

- Currently, only JUNOS configs created, by Intra-Domain service
- Polish NREN (PSNC) developing Config Service
 - Beta version expected Oct 07
- New, generic XML schema to describe configs
 - Driver sub-modules will convert generic XML to OS specific configurations
- Config may be applied automatically, or mailed to a NOC and applied manually



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SLA Module

- Greek NREN (GRNET) working on experimental SLA module
 - Beta version expected Oct 07
- Module will offer SLA (per domain)
 - Assumption: flow takes expected routed path
- Concatenating adjacent SLAs gives an “edge to edge” SLA
 - For OWD; other parameters harder to aggregate



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Conclusion

- AMPS will be the inter-domain IP QoS management system for the European academic/research backbone network
- AMPS is technology agnostic
 - DiffServ is recommended, but over-provisioning or any other type of QoS mechanism can be accommodated
- AMPS provides for advance, not ‘on demand’ QoS reservations
 - Admission control decision made by AMPS, so is basically incompatible with existing ‘on-demand’ QoS techniques, such as RSVP-TE



Thank You

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Any further Questions, Comments, Feedback or Suggestions

please contact

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