



Enabling Grids for E-science

## Dual stack BDII server coding

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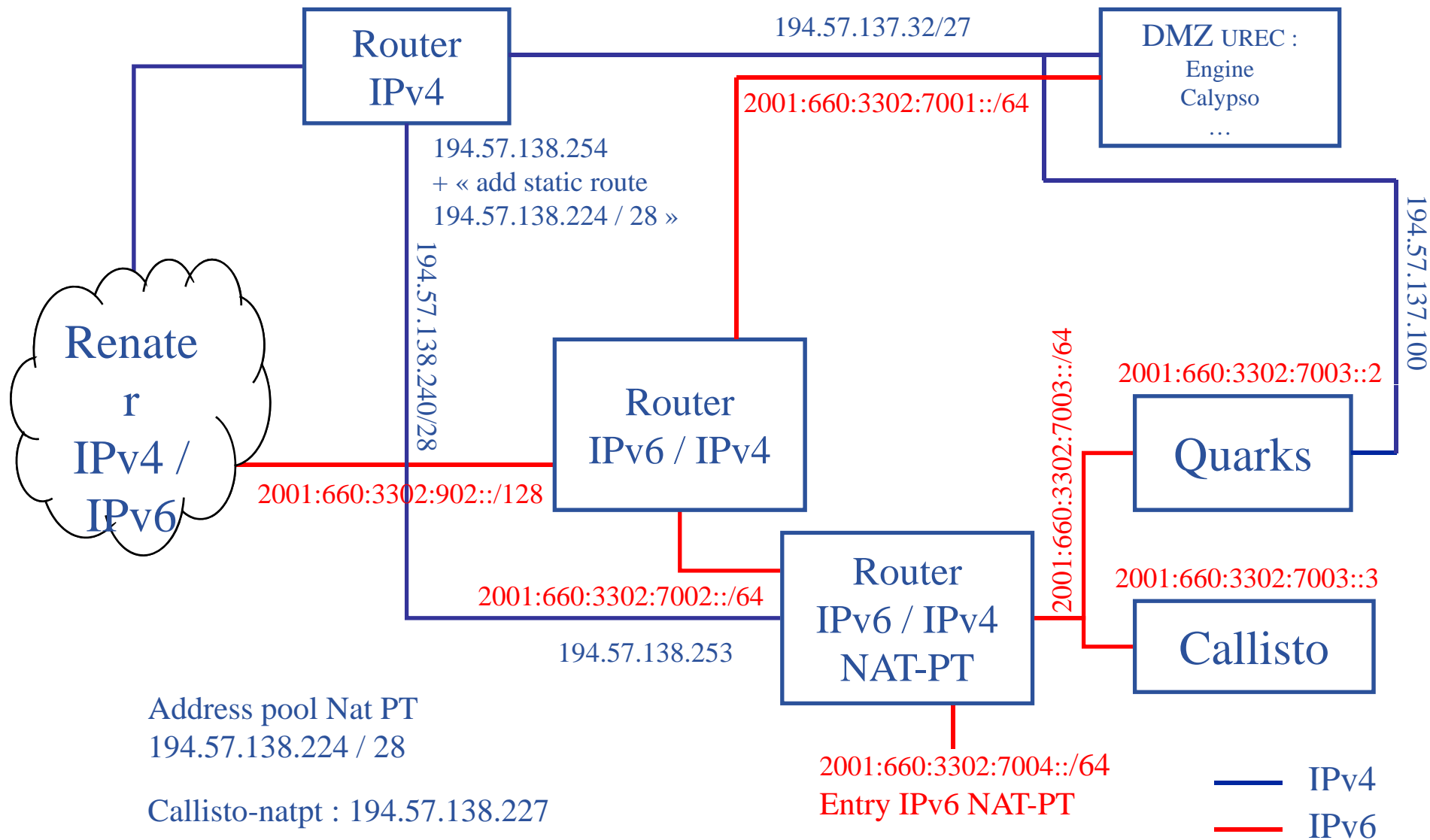
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- **A brief reminder of Paris testbed architecture**
- **2 different versions of dual stack server BDII**
- **A brief explanation of the different options to port an application on IPv6**
- **Note: we do not take advanced socket programming (raw socket) into consideration**



- **The machine Callisto hosts a BDII server that was patched to work only IPv6**
  - You can use Callisto with IPv6 client directly
  - You can use Callisto with IPv4 client through NAT-PT
- **The machine Quarks hosts a BDII server that was patched to work on dual stack machine**
  - You can use Quarks with IPv6 client directly
  - You can use Quarks with IPv4 client directly
  - There are 2 ways to program this server, with one or two sockets

1. The program can open 1 socket (Sa) that listens on the IPv6 address. To be able to answer to IPv4 client requests, the OS redirect the request to the socket Sa, it is the default behavior on SC3 (see `bindv6only`). To do that, the system maps the IPv4 address in the IPv6 address space: IPv4 mapped address

$u.x.y.z \rightarrow ::FF:u.x.y.z$

2. The program can open 2 sockets, one that listens on the IPv4 address and the other one that listens on the IPv6 address

The usage of the IPv4 mapped address depends on the OS, and can be changed by the software

**We develop the two versions of the code:**

- **The first, which corresponds to the previous first case (one socket), is easier to develop**
- **The second one needs to use a lower level library and to modify more the opening section of the server**

**You can test the two versions on quarks but one version is available at the same time**

**We send the first version to BDII developers**

The main point to take in consideration to choose are:

- First, you have to decide what is OS target (SC4, SC3, Windows) to check what were the features supported by the OS.
- The different socket options used by the program, you may not find the same option in INET and INET6 socket families and therefore IPv4 mapped address cannot be used.

- There is not a clear advise in this matter even in RFC
- For instance in "Guidelines for IP version independence in GGF specification", the authors are pro address mapped

#### “4.5 IPv4-mapped Address Handling

An IPv4 client application on an IPv4-only node can talk to an IPv6 application on a dual stack node using IPv4 packets between the nodes; however the IPv6 application will see the addresses as IPv4-mapped IPv6 addresses, of the form `::ffff:a.b.c.d` where a.b.c.d is the IPv4 address.

This mapping may occur in the API, or the mapped addresses could be seen on the wire. The latter is undesirable for security (spoofing) reasons [V6MAP-HARM].

Applications should handle IPv4-mapped IPv6 addresses correctly and securely”

- We continue to gather advice from specialists



- The gLite programmers have to take all these options in consideration and decide a rule to port gLite on IPv6 that could be written in a guide
- If several applications have to be installed on the same node, it would be better to have a guide line

## References

- RFC 1933 Transition Mechanisms for IPv6 Hosts and Routers
- RFC 3493 basic socket interface extensions for IPv6
- RFC 4038 Application aspects of IPv6 transition Programming guidelines on transition to IPv6, Miguel Castro
- IPv6 network programming jun-ichiro itojun hagino
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- Guidelines for IP version independence in GGF specification T Chown
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