

## **Building the next generation Internet architecture for Big Science**

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Around the world there are several initiatives to develop the next generation canonical Internet network architecture. These initiatives are based on a least four significant developments, first: the concern that the current is ossifying and that it is increasingly difficult to deploy new architectures, secondly: the trend towards a two tiered Internet where the owners of the last mile control access by third parties, thirdly: the trend for more users to own, control and manage their own network resources and fourthly: the demand by big science and large enterprises to have dedicated network resources for the data flows generated by their high end applications. One solution to address all these issues is being developed by Canada in partnership with i2cat in Barcelona and other partners where a key assumption is made that there is no need for a canonical network architecture. Instead new features and enhancements are planned for the current implementation of the User Controlled LightPath (UCLP) software which will enable users to define their own packet or switched based network architecture including topology, routing, virtual routers, switches virtual machines and protocols based on the concept of many separate and independently managed Articulated Private Networks (APN) operating on top of one or more network substrates across different ownership domains. APNs can be considered as a next generation Virtual Private Network where, rather than signaling for a single end to end connection, a user can create a complex network structure, in any way they wish, by binding together layer 1 through 3 network links, instruments, computers, time slices and virtual or real routing and/or switching nodes. This capability is enabled through by representing all such network element, devices and links as web services, and by using web services workflow as the tool to allow the user to bind together their various web services to create a long lived APN instantiation. With web services workflow the user also has the ability to offer all, or portions of their APN as a web service (or set of services) in its own right to other downstream users.