

Inter-domain SDN Considerations

Ronald van der Pol – SURFnet

Ronald.vanderPol@SURFnet.nl

- Distinguish between:
 - Use OpenFlow for state of the art NREN network
 - Provide an infrastructure for (OpenFlow) network research

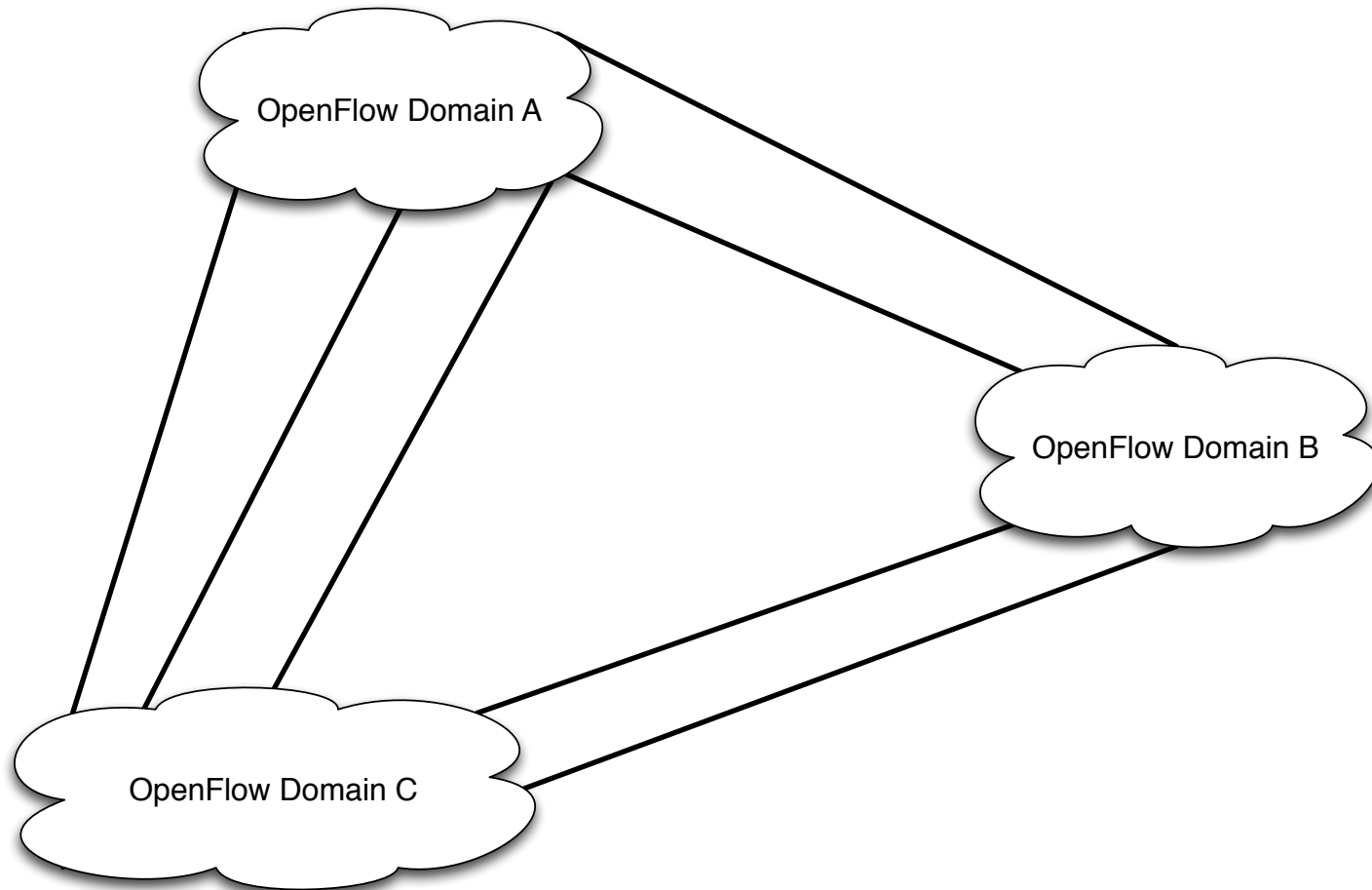
Requirements (1/2)

- Maximum flexibility and few assumptions
 - Not tied to middleware of GENI, Ofelia, JGN-X, ...
 - The multi-domain OpenFlow testbed should support them all at the same time
 - Allow networking concepts beyond packet and circuit switching
- Interconnect OpenFlow testbeds (of different NRENs, etc)
- Give OpenFlow network researchers access to resources in other OpenFlow testbeds

Requirements (2/2)

- Provide an infrastructure to network researchers to investigate inter-domain SDN architectures
- Preferably have multiple links between OpenFlow testbeds to allow experimenting with:
 - Multihoming
 - Multipathing
 - Looped topology
 - Traffic engineering
 - etc

Inter-Domain OpenFlow Topology



Virtualisation or Segmentation?

- Build a virtual OpenFlow testbed on top of the physical OpenFlow testbed
- Researchers want their own set of interconnected (virtual) OpenFlow switches in each domain
 - Virtual switches on a shared infrastructure
- Similar to VMs in a cloud
 - But in a cloud MMUs and pre-emptive multitasking can be used to map multiple virtual address spaces to one shared physical address space
 - OpenFlow header space cannot be shared in the same way, it can only be segmented (e.g. with flowvisor)
- Limited scalability until we have an MMU equivalent

Inter-domain OpenFlow

- Flowvisor's *flowspace* concept is a form of segmentation
- Possible solution:
 - Request flowspaces in each domain
 - Flowspaces on each side of an inter-domain link should be chosen such that (all) packets sent on the link are matching the flowspace on the other side (header space out intersects with header space in)
- Network researchers should be able investigate different information exchange models (network providers should not make assumptions about it)
- GENI/Ofelia/JGN-X/etc middleware should be usable on top of such a segmented OpenFlow switch infrastructure

Flowspace API

- Retrieve available flowspace
- Request flowspace (carve a piece out of the available flowspace)
- Authentication (who may use this API)
- Do we need future reservations?
- What is already out there? Build on flowvisor?
- Can we assume fair use initially?
 - Assume users request only what they need, e.g. not the whole flowspace?
 - Assume no need to restrict flow table space requests?
 - Assume no need to restrict flow entry insertion rate?
 - Etc.