

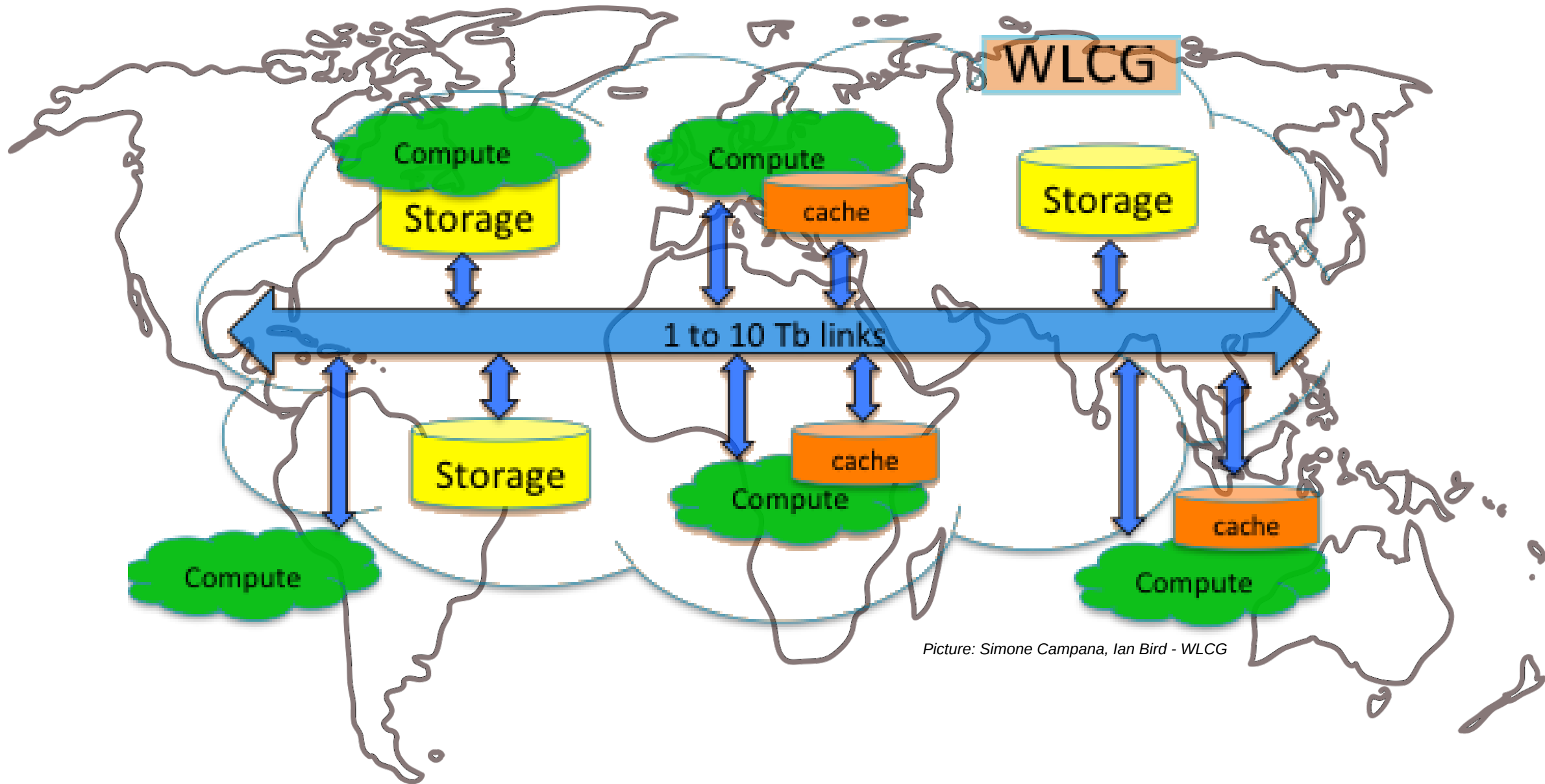
Smart WAN for data intensive science

project proposal

BNL, 5th April 2017
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Possible change of computing model



Picture: Simone Campana, Ian Bird - WLCG

“Consolidate storage in few locations to decrease costs”

WAN requirements

- Reliable and resilient: data accessible only via WAN
- Large bandwidth: between storage centres
- Flexible capacity: support for spiky traffic between compute and storage centres

May be difficult to ensure in multi domain networks

What can be improved

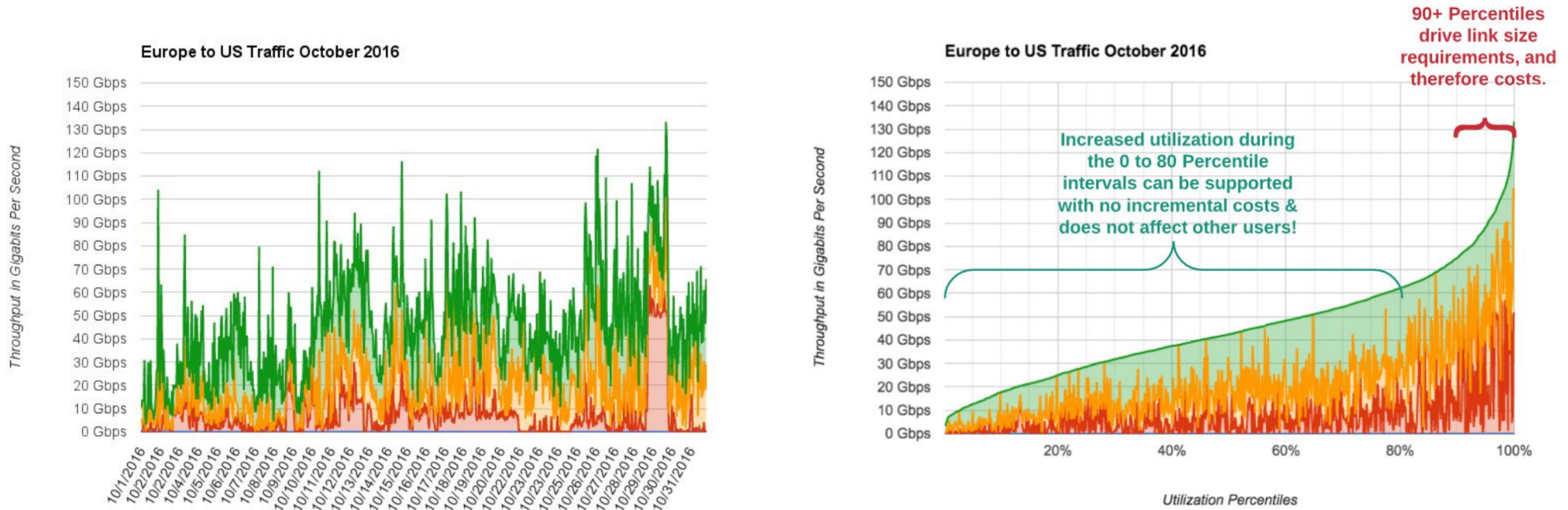
Multi domain, End-to-End:

- **traffic engineering**: avoid congested links and other bottlenecks, use of idle links
- **routing policies**: who can talk to whom (e.g. Commercial Cloud providers over R&E networks)
- **routing consistency**: bidirectional routing policies (e.g. symmetry for LHCONE)
- **security**: drop/throttle/re-route what shouldn't be there
- **monitoring**: quick detection of hot-spots (packet loss, congestion, flapping...)

What can be improved (cont.)

Make effective use of existing bandwidth

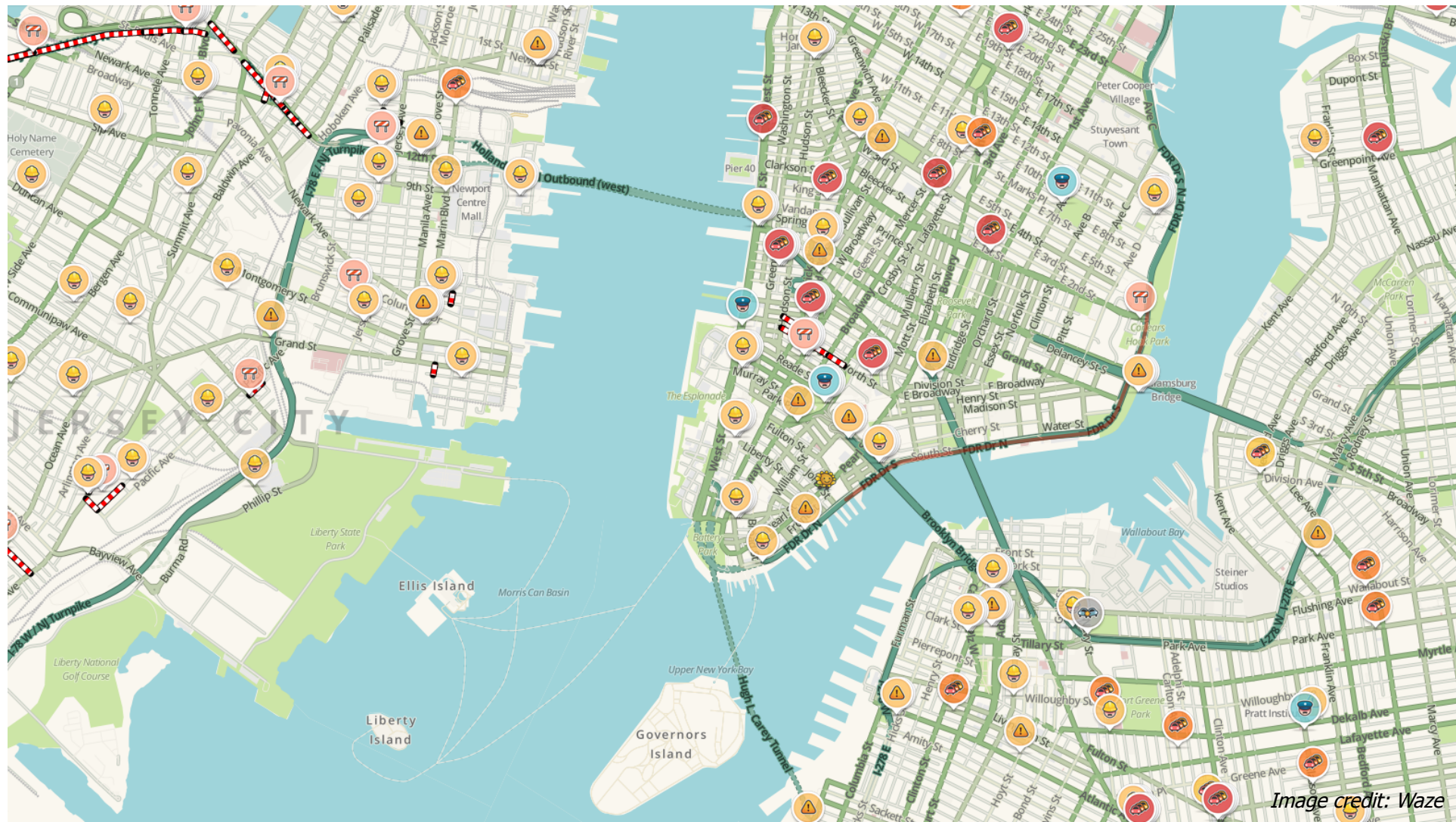
Many connections are under-utilized 80% of the time



Original slides: Joe Metzger – ESnet

https://indico.cern.ch/event/571501/contributions/2406189/attachments/1393360/2123279/2017-01-10_LHC_PRE-GDB_ESnet.pdf

Networks could be like roads



Drivers can choose their best path to destination using real time traffic information

Building blocks

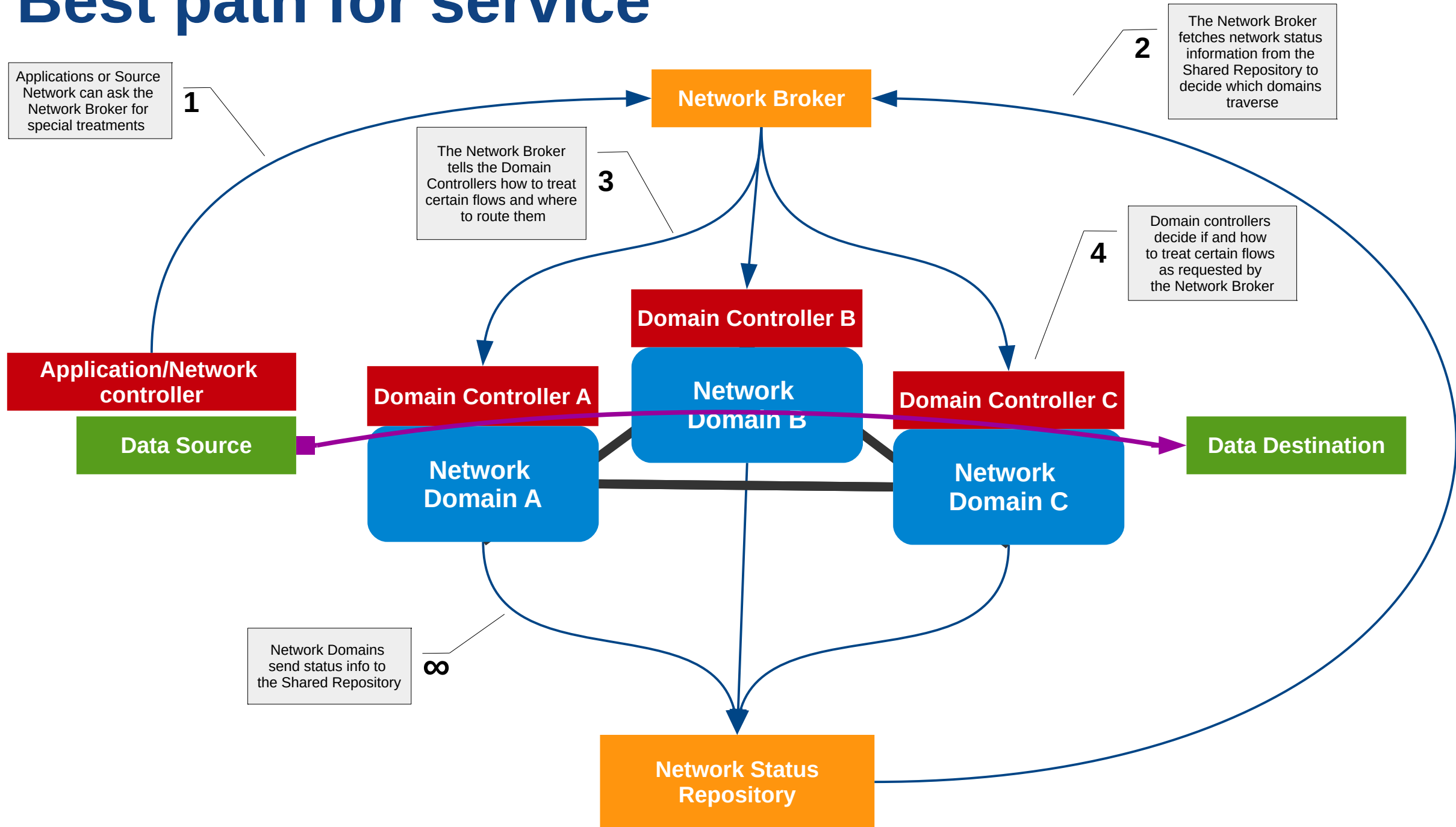
Repository of real-time network status information

Network broker that understands the status of all networks and suggests optimizations

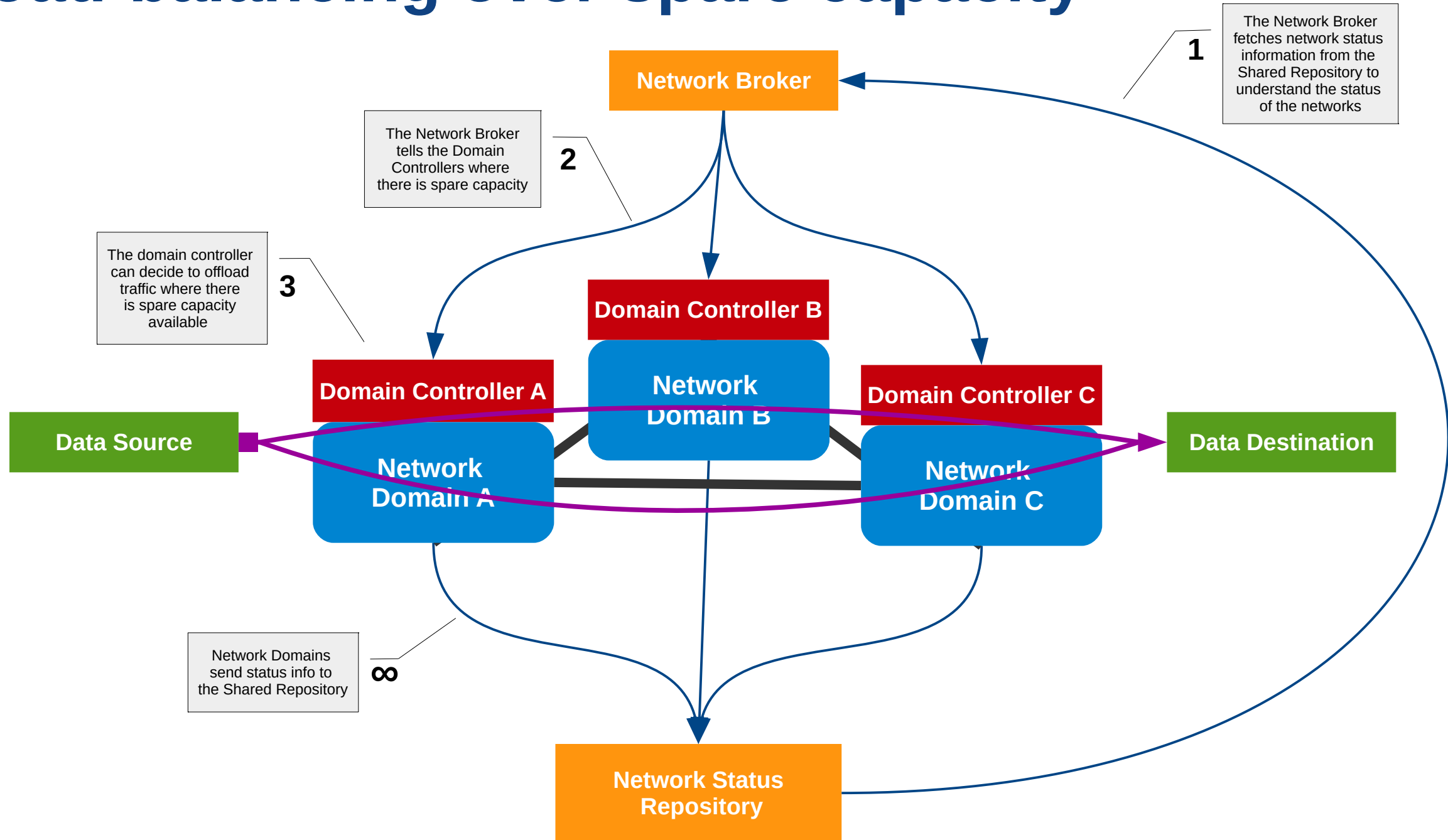
Domain controllers that take suggestions from the network broker, but decide autonomously how to treat the traffic inside their own domains

Technologies to dynamically steer the traffic

Best path for service



Load-balancing over spare capacity



Challenges

- Format of network status information
- Global collection of network status information
- Mapping information to topology
- Service classification for different domains
- Treating special traffic on top of default traffic

Next steps

- Identify interested parties

Questions?

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