NDFIS
National Dark Fibre Infrastructure Service

The National Dark Fibre Infrastructure Service, a Facility for Network Experiments

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Service Development

- The EPSRC ICT Mid-Range Facilities Consultation established the need to provide a dark fibre networking facility accessible to the UK ICT research community

- janet confirmed support for future leasing of fibre in support of NDFIS

- EPSRC issued an EU tender for the provision of NDFIS

- Consortium comprising UCL, janet, Bristol, Cambridge, and Southampton Universities selected as preferred tenderer, May 2013

- Contract negotiations and fibre procurement completed November 2013

- Fibre is being installed and equipment is starting to be delivered

- It is planned to roll-out the service, starting end July 2014

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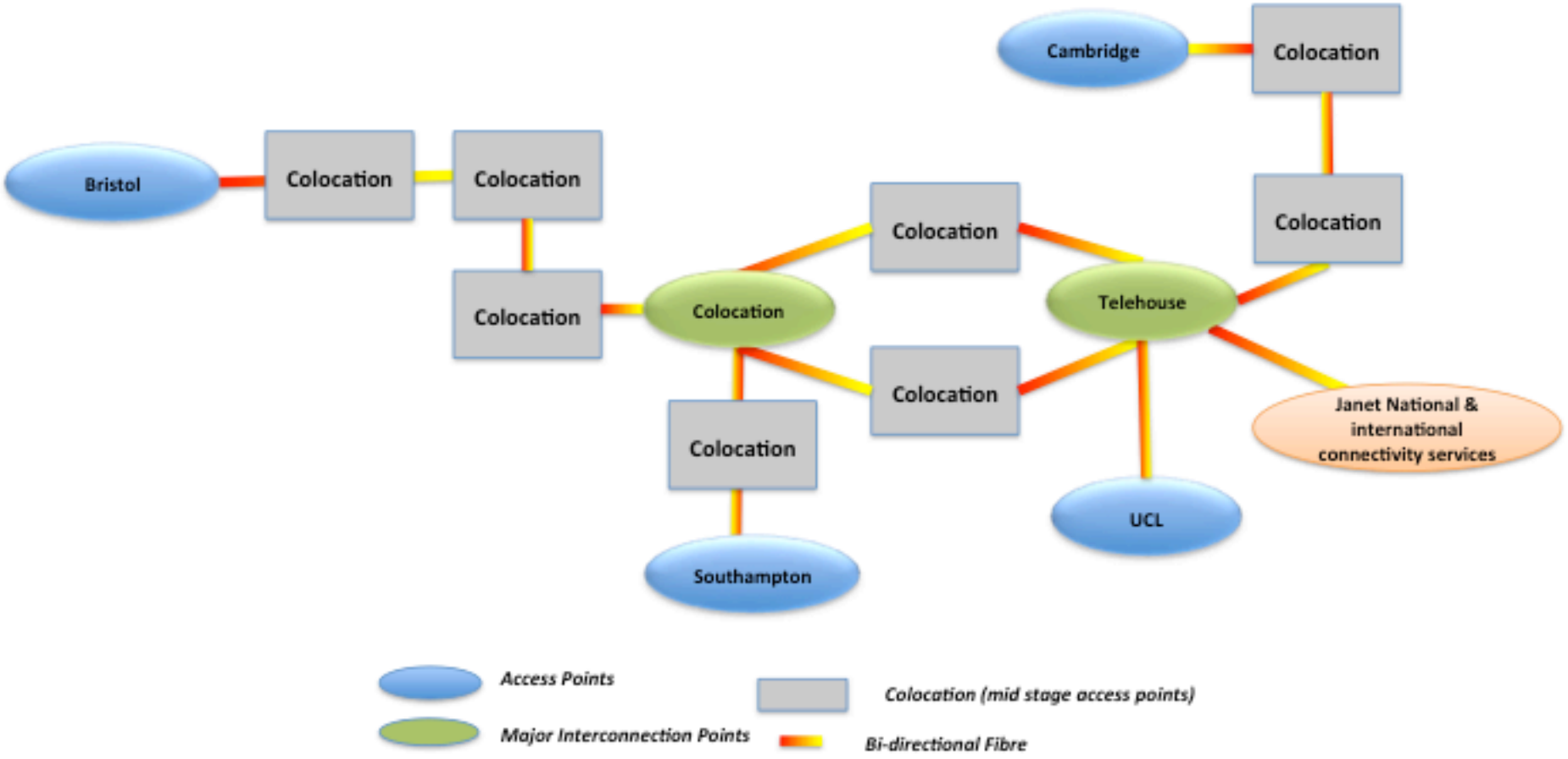
The New Aurora2 Dark Fibre Network



800 km of single mode optical fibre

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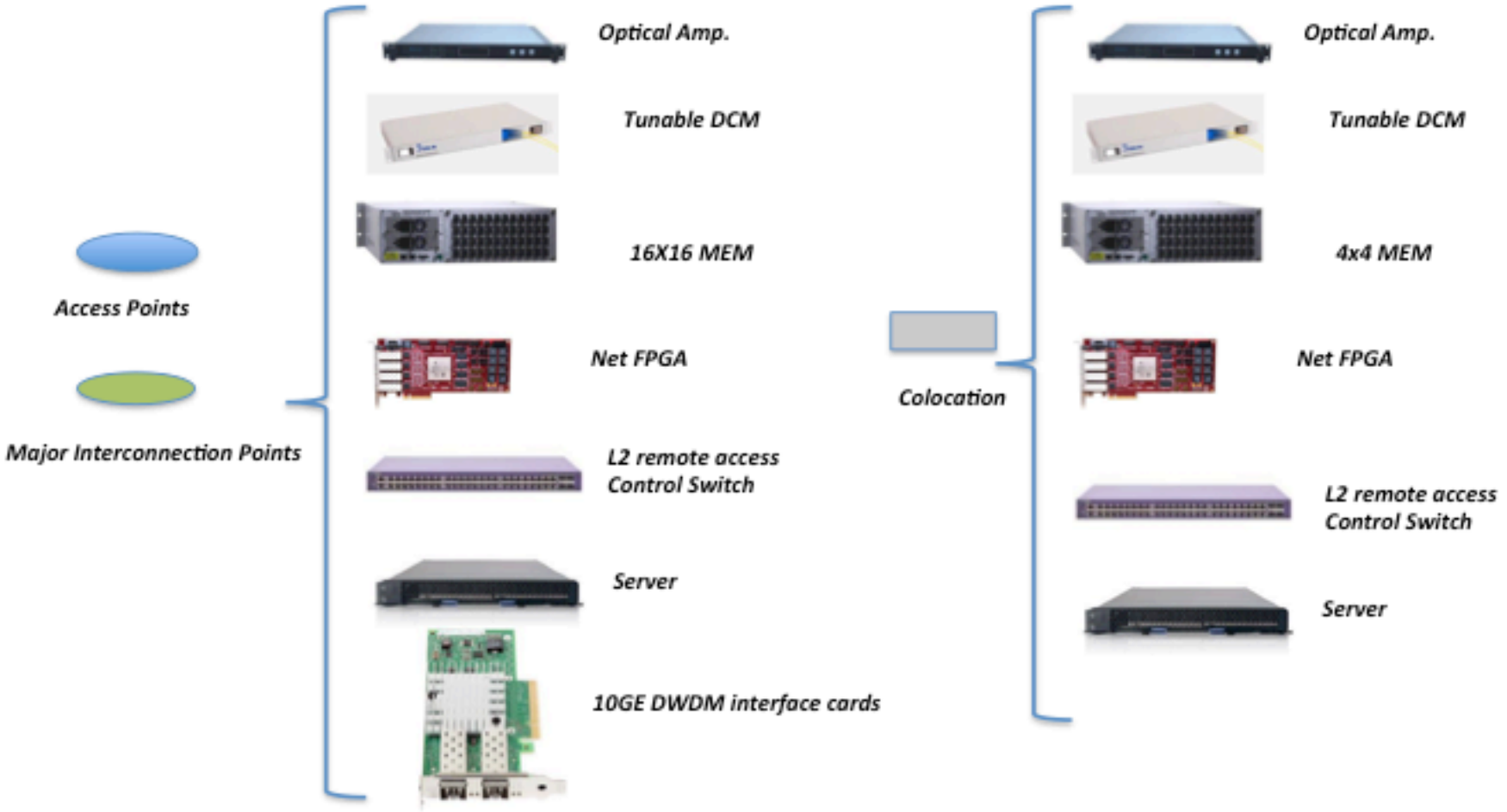
Node Hardware



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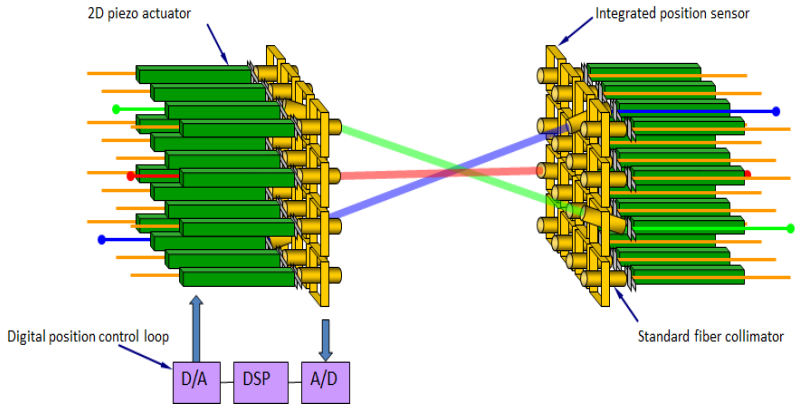
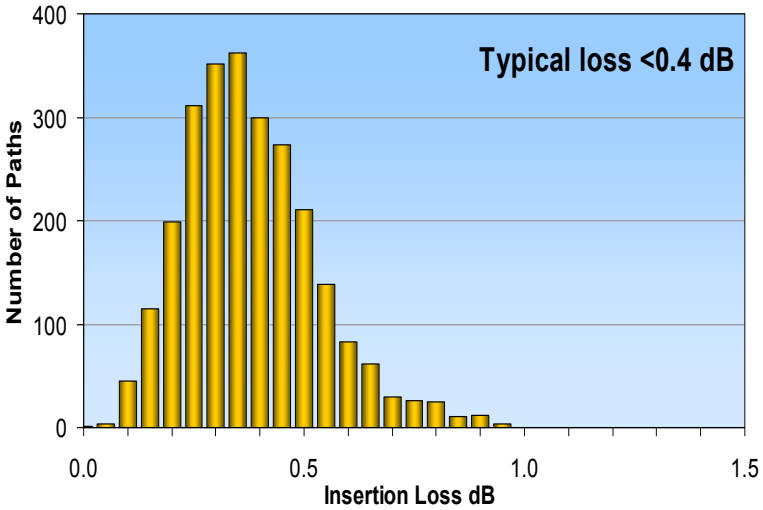
Optical Switching Technology

- Bidirectional, dark-fibre optical switch using beam-steered piezoelectric actuators
- Collimated fibre pairs are directly aligned for lowest loss & back-reflection
- Integral position control ensures reliable connections regardless of light level
- Modular architecture is scalable to non-blocking cross-connect of several hundred fibre ports
- Optical power monitors enable mesh protection switching and variable attenuation





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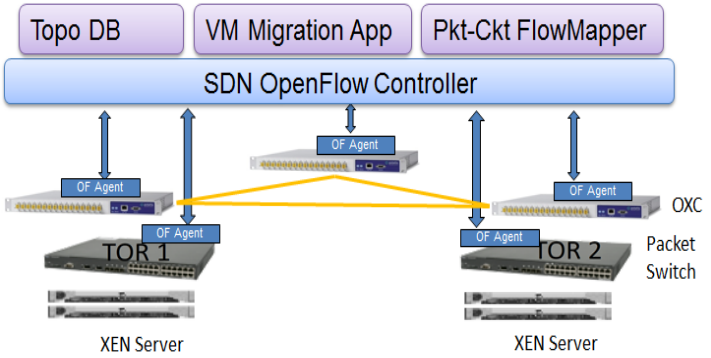
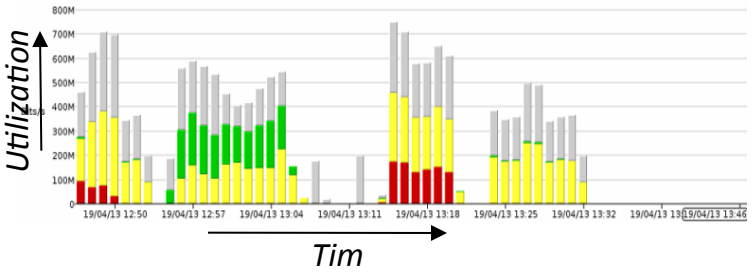
Software Defined Optical Cross-connects

- Collaboration between University of Bristol and Polatis to add optical circuit switching functions to software-defined networks
- Embedded OpenFlow agent enables rapid provisioning, protection and monitoring of dark fibre connections from an SDN controller
- Facilitates hybrid packet/optical circuit switched architectures under a common SDN control plane
- Live Polatis/Bristol SDN datacentre VM migration demonstration at ECOC 2013


1U 48x48 OXC





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OpenFlow

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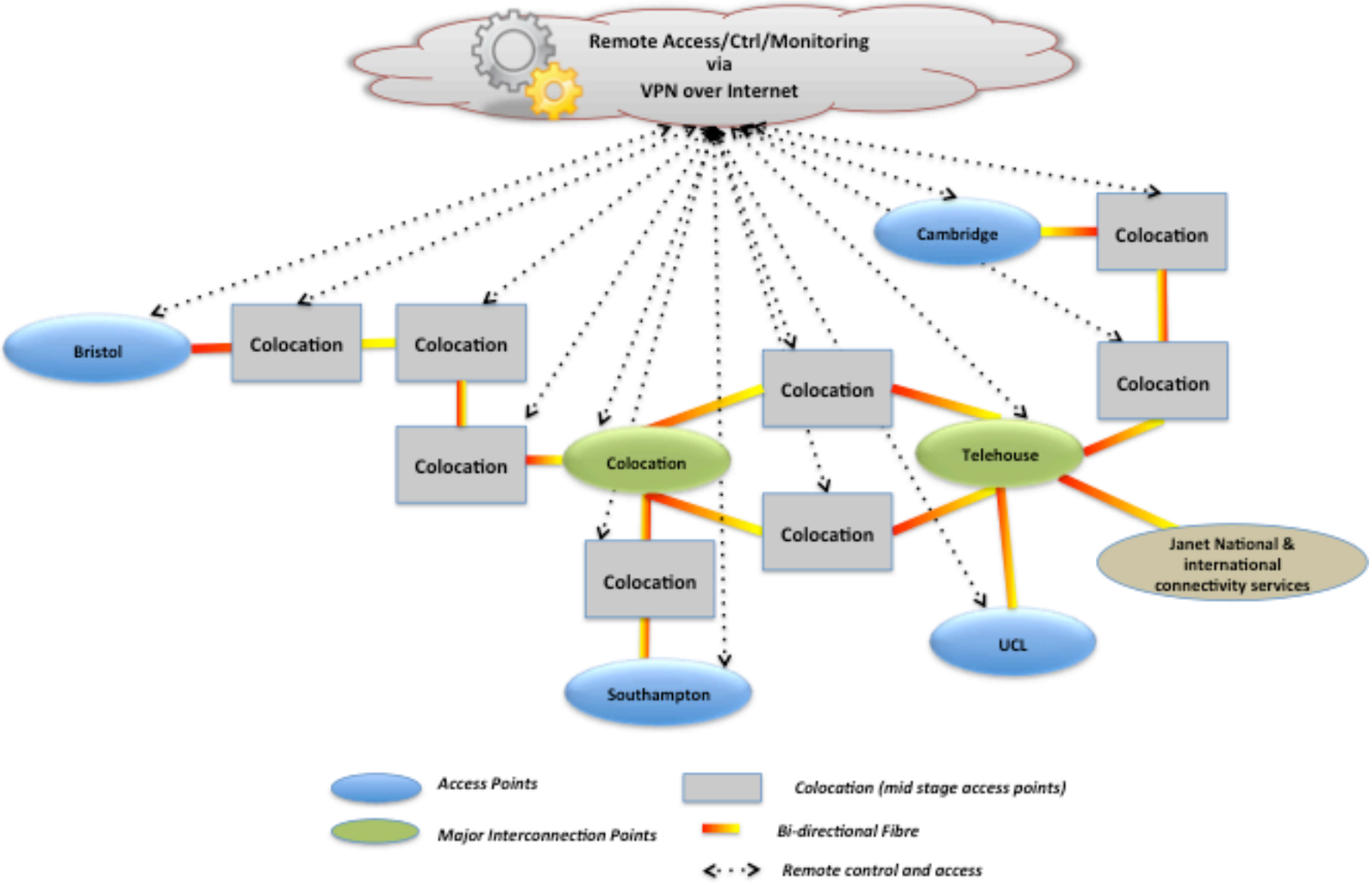
Network Control and Monitoring



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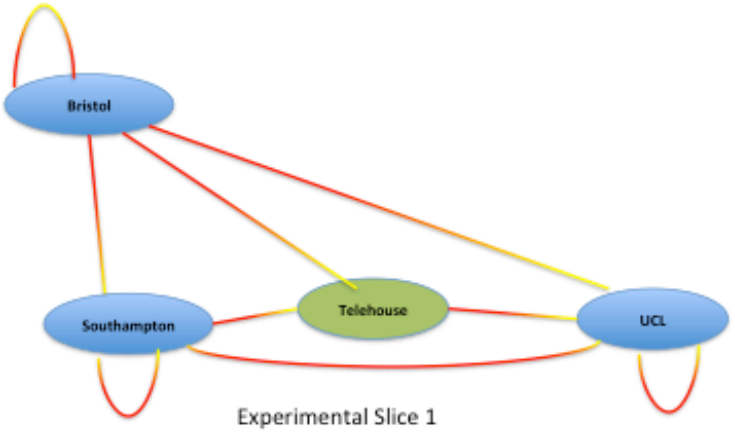
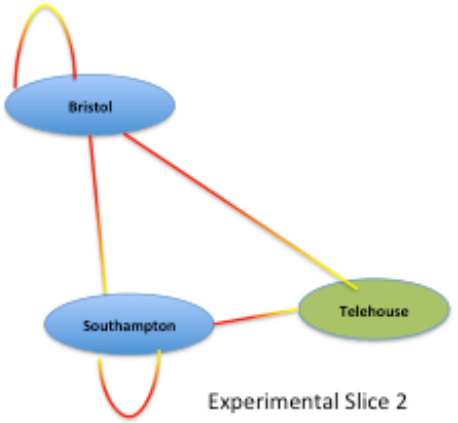
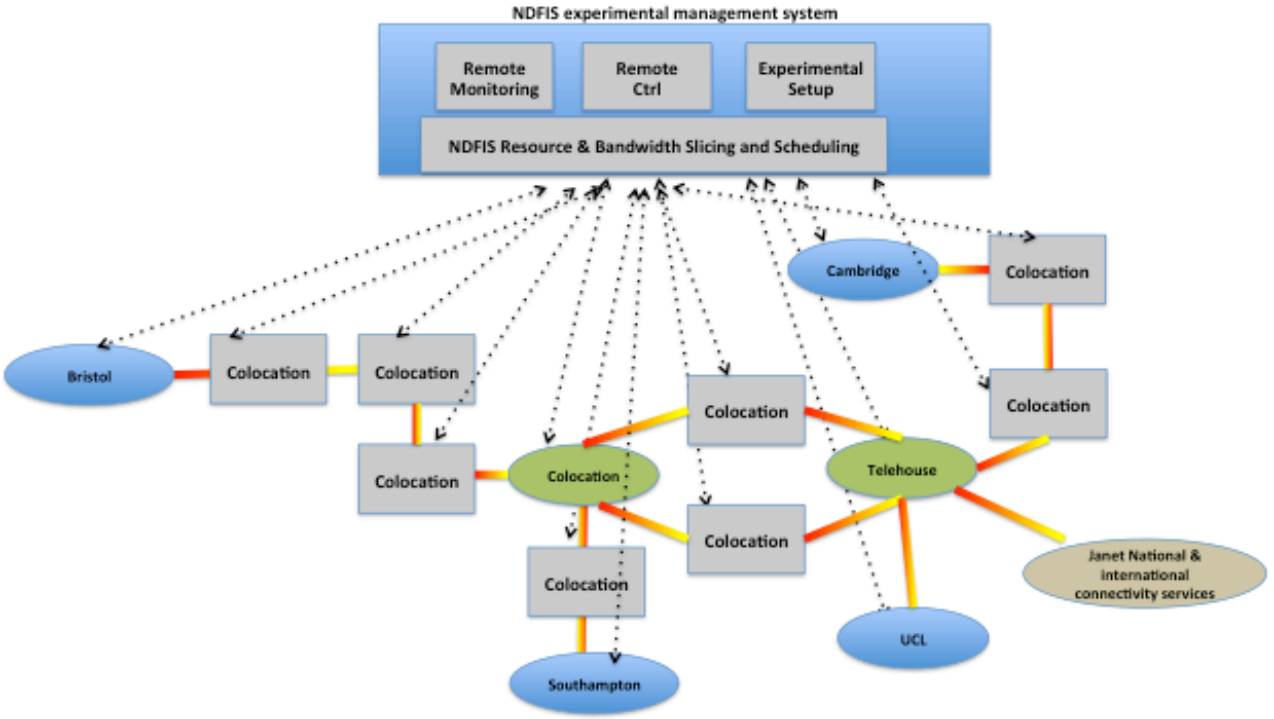
Network Slicing for User Experiments



Experimental Slice 1



Experimental Slice 2



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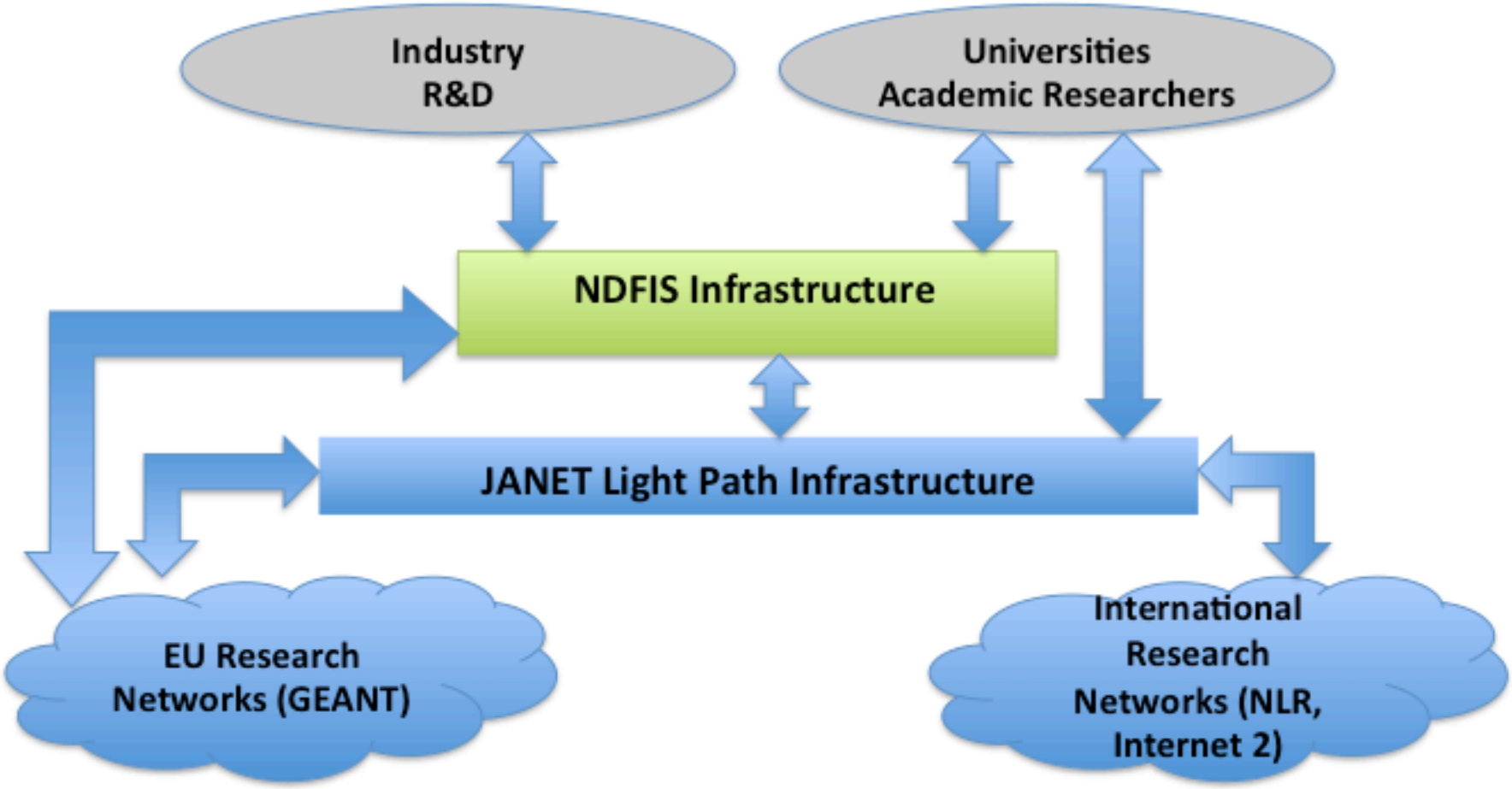
Accessing NDFIS



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Future Developments

- Initial experiments will be aimed at verifying the performance of the transmission infrastructure

- Software defined networking technologies will be developed and NDFIS welcomes proposals for SDN experiments using Aurora2

- It is planned that Aurora2 will interconnect with the NPL dark fibre network

- Aurora2 will also interconnect with the

- Users can access the Aurora2 network, both directly by installing equipment at the host universities and remotely using the janet Lightpath service

- NDFIS has proposed extending the reach of the Aurora2 network to give direct connection to other major centres for network research as part of the BIS Capital consultation

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Conclusion

- The future internet will depend on a transmission infrastructure of greatly increased capacity and flexibility

- The Aurora dark fibre network has enabled experimentation at the physical layer to study new devices, sub-systems and transmission formats to deliver the capacity and flexibility required

- The NDFIS, a collaboration between janet and universities with strong research records in optical communications and networking, will provide a platform for the development of software defined networks for the future internet

- NDFIS will have novel capabilities for software defined transmission path parameters and physical and logical connectivity

- NDFIS will also have strong connectivity to other experimental networks worldwide for collaborative research

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If your research could benefit from working with NDFIS please get in touch:

a.seeds@ucl.ac.uk

We look forward to working with you.