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DESIGN OF A NEW NETWORK INFRASTRUCTURE USING RPC FOR THE UNIVERSITY OF HUDDERSFIELD CAMPUS GRID

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Computing and Engineering

Abstract: *The University of Huddersfield campus grid QGG and its computer clusters provide key services for resolution of complex calculations and research purposes. These clusters are distributed across the campus and linked via a network. The addition of new equipment has meant that further clusters will be installed to provide additional processing power which will further support a growing research community at the University of Huddersfield. This poster presents a new network design and implementation, which will enable more efficient load balancing and faster data transfer particularly between the head node and the network area storage (NAS).*

Keywords: computer networks, routing, data transmission, device discovery, data plane, topology, packets, planes, protocols, switching

Background

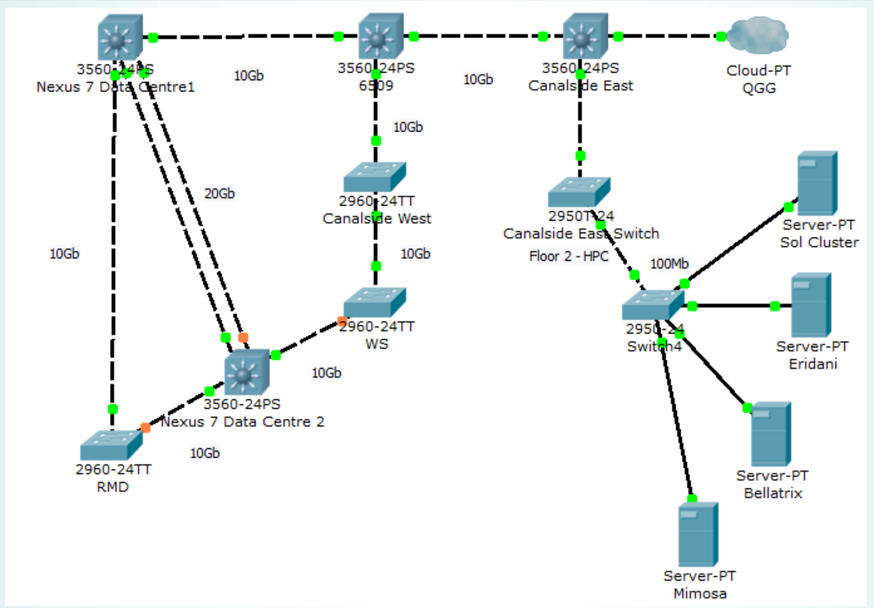
- HPC provides 2690 cores across 5 clusters.
- Currently the university network is limited to a maximum bandwidth of 2Gb.
- Local computers connect at 100Mb. This change in speed of data transfer can result in performance degradation, loss of packets and latency.
- Recently there has been some failure to retrieve data possibly caused by bottlenecks.

Project Aims

- Design and deploy a new network infrastructure for the University of Huddersfield campus grid QGG.
- Improve network load balancing and data throughput.
- Enable efficient transfer of large files and complex processing through high speed interconnects.
- Improve network monitoring to maintain high performance.

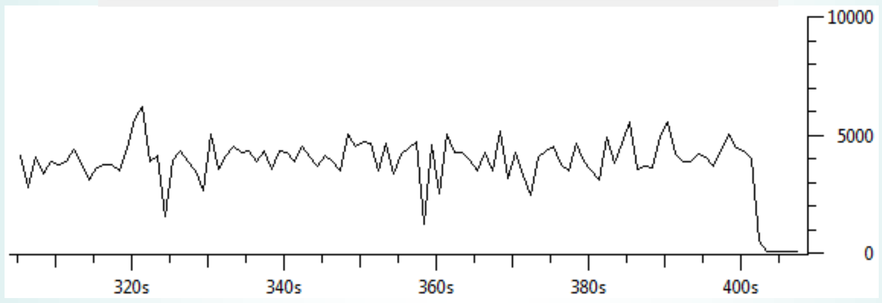
Conclusion

- Positioning the SOL cluster in the data centre and implementing new network configuration in the QGG will provide high speed access and allow more complex processing to be performed.
- The reduction in the number of interconnecting devices will substantially reduce the encapsulation process.
- Network performance for data transfer will improve.

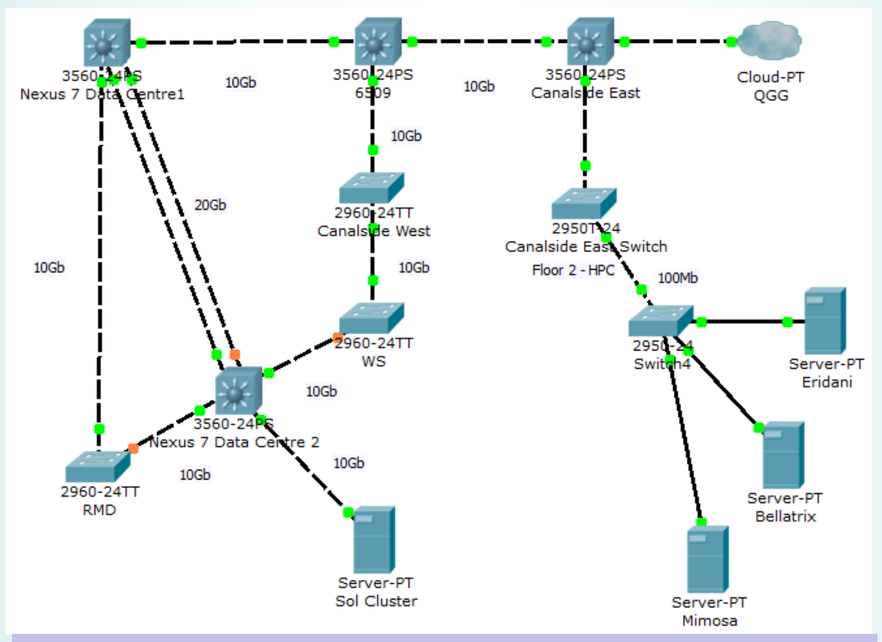


Current network configuration of Data Centre and Canalside East HPC subnets

Traffic	Captured	Displayed
Packets	1566938	1566938
Between first and last packet	407.913 sec	
Avg. packets/sec	3841.350	
Avg. packet size	997.129 bytes	
Bytes	1562439478	
Avg. bytes/sec	3830322.130	
Avg. MBit/sec	30.643	



Data collected through Wireshark showing network throughput



Network configuration after deployment of SOL cluster to the Data Centre

QGG Network configuration with new Cluster—SOL

- Current work on SOL involves moving the cluster from HPC research facility to data centre to enable:
- Faster data communications.
- Direct route across network to SOL by reducing the number interconnection devices.
- Establishing 40Gb interconnects between the Nortel 5510-T switches to allow fast processing of data.
- Benefiting the HPC infrastructure through the reduction in network traffic as well as creating a more direct link for end users.
- Reduce the number of time a packet is encapsulated and decapsulated and increase data transfer rates.

Nortel 5510-T switches for Sol cluster with interconnects

Future Work

- Consider effects of bufferless networks, programmable NICs on data transfer rates and network reliability.
- Examine the role of devices on the network as well as the encapsulation process to identify increases in efficiency.