Hugues-Salas, E., Wang, R., Kanellos, G. T., Nejabati, R., & Simeonidou, D. (2019). Co-existence of 9.6 Tb/s Classical Channels and a Quantum Key Distribution (QKD) Channel over a 7-core Multicore Optical Fibre. In *2018 IEEE British and Irish Conference on Optics and Photonics (BICOP)* (pp. 1-4). [8658328] Institute of Electrical and Electronics Engineers (IEEE).
<https://doi.org/10.1109/BICOP.2018.8658328>

Peer reviewed version

License (if available):
Other

Link to published version (if available):
[10.1109/BICOP.2018.8658328](https://doi.org/10.1109/BICOP.2018.8658328)

[Link to publication record in Explore Bristol Research](#)
PDF-document

This is the accepted author manuscript (AAM). The final published version (version of record) is available online via IEEE at <https://doi.org/10.1109/BICOP.2018.8658328> . Please refer to any applicable terms of use of the publisher.

University of Bristol - Explore Bristol Research

General rights

This document is made available in accordance with publisher policies. Please cite only the published version using the reference above. Full terms of use are available:
<http://www.bristol.ac.uk/red/research-policy/pure/user-guides/ebr-terms/>

Co-existence of 9.6 Tb/s Classical and Quantum Key Distribution (QKD) Channels over a 7-Core Multicore Fibre

E. Hugues-Salas, R. Wang, G.T. Kanellos, R. Nejabati and D. Simeonidou. High Performance Networks Group. University of Bristol. UK. email: [e.huguessalas, gt.Kanellos]@bristol.ac.uk

Motivation

- Relies on laws of physics
- Security against brute force attacks (Classical Computers)
- Field trials with QKD

- Protects vs quantum computing threats
- DV-QKD units are commercially available

ICT infrastructure will not change to accommodate Quantum network functions

Depends on exchange of weak optical pulses (photons), being vulnerable to:

Excessive optical link losses

photon-induced noise in a quantum channel

Co-existence of classical (CC) / quantum channels (QC) is limited by these effects!

Record high transmission of 9.6Tb/s (CCs) and DV-QKD (QC) over a 1km long 7-core Multicore Fibre

Co-existence Methods

SDM with multicore fibre (MCF) offers:

- Enhanced channel isolation between cores
- Allows co-existence between QC and CCs.

Experimental Test-bed

CCs Spectrum - MCF Crosstalk

- Spectrum of the 8xCCs at the output of the Voyager/WSS
- 50GHz bandwidth/channel
- 0.8nm channel spacing (adjacent)

- Measured Crosstalk per core
- 51dBs crosstalk from other channels to core 6 (QC)

QKD System Performance