The Challenge
With global Internet traffic growing by ~25% per year, demand for bandwidth increases constantly, driven by requirements to transport real-time applications like video streaming and calls, mapping, cloud computing and storage. However, today's network is far from ready for the much-promised future of mobile high-definition video, autonomous vehicles, remote surgery, telepresence and interactive 3D virtual-reality gaming. Because the cost to lay additional fibre is relatively high, service providers are extremely interested in increasing the capacity of existing fibre resources while reducing cost via reduced footprint, lower power consumption, and improved throughput density.

The Solution
Monash has developed a technology enabling optimal bandwidth utilization for multiple independent lasers or an optical frequency comb; it provides ultra-high data rate interfaces for existing optical fibre infrastructure.

Key benefits
- World-record data transmission of 44.2 Tbps through a single optical fibre
- High spectral efficiency of 10.4 bits s⁻¹ Hz⁻¹
- Compatible with existing optical fibre infrastructure and COTS equipment
- Capable of leveraging powerful photonic integration technology
- Increases achievable data rates without requiring new fibre roll-outs

Development Stage
Working Prototype (TRL 5)

Brief Description & Differentiation
Our approach recognizes that to have ultra-high data rates, the signals we send and receive must be extremely precise with minimal noise. We have shown that, counter-intuitively, reducing the bandwidth of signals in a system can improve the overall data rate. This is in contrast to the standard approach of increasing signal bandwidth to increase data rates.

By sharing light from a single source with multiple optical modulators, we are able to spread the modulated signals over lower noise bandwidths, improving signal quality. Combined with optical filtering, this ensures that transmitter and receiver fibre optic communication systems can reach ultra-high data rates.

Research Team
Dr. Bill Corcoran, Department of Electrical and Computer Engineering.

Intellectual Property
Australian Provisional Patent application filed.

Key Publication

![Diagram](https://www.monash.edu/industry/license-technologies)