

# A Circuit-Based Scalable and Low-Complex Optical Datacenter Network

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## BACKGROUND

The ever-increasing bandwidth requirements of modern datacenters have led researchers to propose networks based upon optical circuit switches, but these proposals face significant deployment challenges. In particular, previous proposals dynamically configure circuit switches in response to changes in workload, requiring network-wide demand estimation, centralized circuit assignment, and tight time synchronization between various network elements—resulting in a complex and unwieldy control plane. Moreover, limitations in the technologies underlying the individual circuit switches restrict both the rate at which they can be reconfigured and the scale of the network that can be constructed; a new approach is necessary.

## TECHNOLOGY DESCRIPTION

Researchers at UC San Diego have devised a new solution called RotorNet, a circuit-based network design to overcome the limitations listed above. While RotorNet dynamically reconfigures its constituent circuit switches, it decouples switch configuration from traffic patterns, obviating the need for demand collection and admitting a fully decentralized control plane. At the physical layer, RotorNet relaxes the requirements on the underlying circuit switches—in particular by not requiring individual switches to implement a full crossbar—enabling them to scale to 1000s of ports. RotorNet outperforms comparably priced Fat Tree topologies under a variety of workload conditions, including traces taken from two commercial datacenters. We've also demonstrated a small-scale RotorNet operating in practice on an eight-node testbed.

## APPLICATIONS

This novel invention is useful as an interface to any circuit switched network and does not currently exist commercially or in the literature.

## ADVANTAGES

- ▶ Scalable to 1000s of ports
- ▶ Decouples switch configuration from traffic patterns
- ▶ Fully decentralized control panel

## STATE OF DEVELOPMENT

A working prototype of a small-scale RotorNet operating in practice on an eight-node testbed was constructed

## INTELLECTUAL PROPERTY INFO

A provisional patent has been submitted and the technology is available for licensing.

## RELATED MATERIALS

- ▶ William M. Mellette, Rob McGuinness, Arjun Roy, Alex Forencich, George Papan, Alex C. Snoeren, and George Porter. RotorNet: A Scalable, Low-complexity, Optical Datacenter Network In Proceedings of SIGCOMM '17, Los Angeles, CA, USA, August 21-25, 2017 - 08/21/2017

## PATENT STATUS

Country	Type	Number	Dated	Case
Patent Cooperation Treaty	Published Application	2019014263	01/17/2019	2017-247

Additional Patent Pending

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## OTHER INFORMATION

### KEYWORDS

datacenter, optical, circuit-based  
network, RotorNet

### CATEGORIZED AS

- ▶ **Communications**
  - ▶ Networking
  - ▶ Optical
- ▶ **Computer**
  - ▶ Hardware

### RELATED CASES

2017-247-0

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