

Thesis Defense of Kaoutar BENYAHYA on next 28 november.
You can communicate this information to colleagues, who may be interested.

Thesis Defense
Institut Foton – SP team
Thursday 28th november, 2:00 pm (at Nokia Bell-Labs, Nozay, France)

Mode-Group Division Multiplexing for Short Reach Optical Communications

Kaoutar BENYAHYA

Jury :

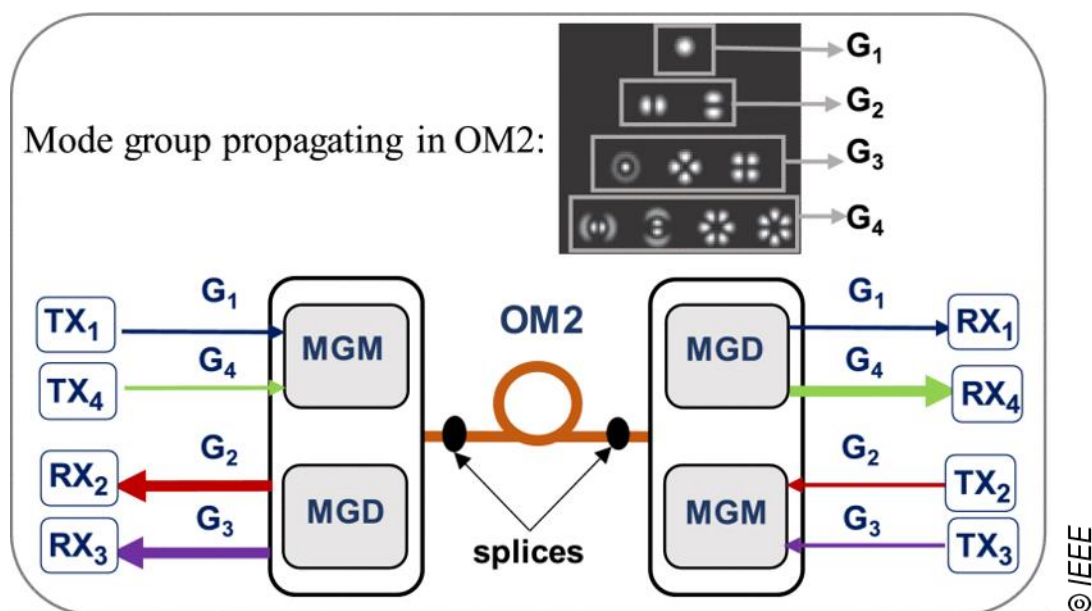
Sophie LAROCHELLE	<i>Professor, COPL, Université Laval, Québec</i>	Examinator
Yves JAOUEN	<i>Professor, Télécom Paris, Palaiseau</i>	Examinator
Christelle AUPETIT-BERTHELEMOT	<i>Professor, Xlim, Université de Limoges</i>	Member
Nicolas DUBREUIL	<i>Professor, IOGS, Talence</i>	Member
Marianne BIGOT-ASTRUC	<i>PhD., Prysmian Group, France</i>	Invited
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Abstract

The ever-growing demand of data traffic will be fueled by revolutionary technologies such as virtual reality (VR), augmented reality (AR) and Internet of things (IoT). Therefore, optical networks should support the requirements of these services in terms of high capacity, low latency and high reliability. In fact, large scale capacity is a critical need for fiber optic communication systems deployed in local area networks as well as in datacenters. For both applications, systems relying on intensity modulation and direct detection (IMDD) are highly demanded due to their low cost and compatibility with short range applications.

In this thesis, we address the need of increasing the data rates for short reach optical communication systems based on mode group division multiplexing and direct detection schemes. Firstly, we focus on increasing the capacity of already deployed standard multimode fibers in local area networks and intra-datacenters communication where the distance is shorter than 5 km. Secondly, we extend our solution to longer reach applications such as inter-datacenter interconnects. In both cases, optical link architectures, including transmitters, receivers and the optical fibers are analyzed. Moreover, modulation formats adapted to IMDD systems such as single carrier 4-PAM and multicarrier DMT are compared in the context of space division multiplexing transmission.

In this work we demonstrated the achievable benefit of mode group multiplexing combined with IMDD schemes. First, 5 Tb/s has been achieved over 2.2 km of conventional multimode fiber (OM2). Secondly, transmission record at the time of its realization of 14.5 Tb/s over OM2 fiber has been demonstrated. Finally, 200 Gb/s over 20 km of FMF has been achieved, which extends the benefit of mode group multiplexing to longer reach applications compared to LAN and intra-datacenter where the maximum distance is limited to 5 km.



KEYWORDS : Optical communications ; space multiplexing ; mode multiplexing ; data center interconnects