Publications Template

#	Research Title	Field	Abstract	Year of Publication Publishing	Publishing Link "URL"
1	Survey on Applications of Machine Learning in Low-Cost Non-Coherent Optical Systems: Potentials, Challenges, and Perspective	Communications	Direct Detection (DD) optical performance monitoring (OPM), Modulation Format Identification (MFI), and Baud Rate Identification (BRI) are envisioned as crucial components of future-generation optical networks. They bring to optical nodes and receivers a form of adaptability and intelligent control that are not available in legacy networks. Both are critical to managing the increasing data demands and data diversity in modern and future communication networks (e.g., 5G and 6G), for which optical networks are the backbone. Machine learning (ML) has been playing a growing role in enabling the sought-after adaptability and intelligent control, and thus, many OPM, MFI, and BRI solutions are being developed with ML algorithms at their core. This paper presents a comprehensive survey of the available ML-based solutions for OPM, MFI, and BFI in non-coherent optical networks. The survey is conducted from a machine learning perspective with an eye on the following aspects: (i) what machine learning paradigms have been followed; (ii) what learning algorithms are used to develop DD solutions;	2023	https://www.mdpi.com/2304-6732/10/6/655

			and (iii) what types of DD monitoring tasks have been commonly defined and addressed. The paper surveys the most widely used features and ML-based solutions that have been considered in DD optical communication systems. This results in a few observations, insights, and lessons. It highlights some issues regarding the ML development procedure, the dataset construction and training process, and the solution benchmarking dataset. Based on those observations, the paper shares a few insights and lessons that could help guide future research.		
2	DbSWPT: A Novel Distance-based Switch for Efficient Wireless Power Transfer in Battery-less Wireless Capsule Endoscopy	Communications	The restricted power supply of batteries hampered the development of capsule endoscopy. Accordingly, a distance-based switch is proposed for efficient wireless power transfer (WPT) system. It targets battery-less wireless capsule endoscopy (WCE). The proposed system consists of two separate coils with distance significant impact. To tackle problem, a distance-based switch configuration is proposed between two variable load resistances according to distance between transmitting and receiving circuits. Results proved high efficiency at short distances using potentiometer in decreasing direction which starts with high resistance values and then decreases to a certain value of resistance according to measured distance whereas the other has a high efficiency at long distances using potentiometer in increasing direction which starts with low resistance values and then increases to certain value of resistance according to measured distance. The results illustrated that the system performance using series-series (S-S)	2022	https://journals.ekb.eg/article_259361.html

			configuration is superior to using the parallel-parallel (P-P) configuration. It is found that the minimum efficiency for the proposed P-P distance-based switch is 51%, while for the proposed P-S is 83.33% . Accordingly, the proposed switch-based S-S configuration achieved minimum efficiency 90.91%. It increases the efficiency by 8.34%.		
3	Chromatic dispersion compensation based on chirped fiber Bragg grating	Communications	In this paper, a chirped fiber Bragg grating (CFBG) has been designed for a long-haul communication system in order to compensate its chromatic dispersion. First of all, a complete transceiver has been utilized and designed for testing the effect of the presence of linear chirped fiber Bragg grating in such system. Moreover, quality factor Q-factor and bit error rate BER have been estimated in both case studies; without and with the FBG. Our case study has been developed according to a fiber cable with length 100 KM with a grating length of only 10 cm. Experimental results show that quality factor has been enhanced from 2.6 dB to 27.14 dB. Accordingly, bit error rate has been decreased from 0.0038 to 1.49e-162. Those results guarantee the effectiveness of the FBG with long fiber cables.	2022	https://ieeexplore.ieee.org/abstract/document/9855723
4	Raised Cosine Multicore Fibers For High-Density Space Division Multiplexing (H-DSDM) Systems	Communications	Space division multiplexing (SDM) over multicore few mode fibers (MC-FMFs) is considered among the latest technological drive towards high data rates in next generation optical communication systems. In this paper, we propose and design novel (MC-FMFs) that we refer to as raised cosine multicore fibers MC-RCFs and Trenched-raised cosine multicore Fibers (MC-TRCFs). the designed MCFs has seven cores	2022	https://ieeexplore.ieee.org/abstract/document/9809851

			each of which supports seven orthogonal spatial modes with large effective mode area (min A eJ J =96μm 2) and with low differential mode delay (DMD) (max DMD =33 ps\\\\\\\\km). The intercore crosstalk of each designed fiber and their associated relative core multiplicity factor (RCMF) are assessed, discussed and compared with recently reported MCFs. The designed fibers are promising candidates for next generation short and medium haul interconnect dense-SDM systems.		
5	Reconfigurable photonics-based millimeter wave signal aggregation for non-orthogonal multiple access	Communications	A reconfigurable optical-to-electrical signal aggregation is proposed, for the first time, using optical signal processing and photo-mixing technology. Two optically modulated quadrature phase-shift keying (QPSK) signals are aggregated into a single 16-quadrature amplitude modulation (16-QAM) signal and, simultaneously, carried over a 28-GHz millimeter wave (MMW) carrier using an optimized heterodyne beating process through a single photodiode. To demonstrate the system reconfigurability, aggregation of two optical binary phase-shift keying signals is mapped into MMW QPSK or four-level pulse amplitude modulation signals by controlling the relative phases and amplitudes, respectively, of the input signals. In addition, the aggregation of two 16-QAM signals into a 256-QAM signal and the aggregation of three QPSK signals into a 64-QAM format are achieved. Besides, we report the effect of laser phase noise on signal aggregation performance. The de-aggregation of the aggregated MMW signals is performed	2022	https://opg.optica.org/oe/fulltext.cfm?uri=oe-30-10-16812&id=472409

			electrically using a successive interference cancellation algorithm. Moreover, a proof-of-concept experiment is conducted to validate the numerical simulations. Two 1-Gbaud BPSK (1 Gbps) and QPSK (2 Gbps) optical signals are optically transmitted over a 20-km single-mode fiber as MMW over fiber signals. Then, the signals are aggregated into QPSK (2 Gbps) and 16-QAM (4 Gbps) 28-GHz MMW signals, respectively. The aggregated signal is further transmitted over a 1-m wireless channel. The performance of the proposed system is evaluated using bit error rate and error vector magnitude metrics.		
6	Mode Characterization of Ring Core Fibers for SDM Transmission	Communications	In this paper, the modal characteristics of ring core fibers (RCFs) have been studied and a comprehensive review of recent work of ring core fibers is presented. Next, we investigate the ring core fiber parameters and their effects on the design performance in terms of effective mode index, mode group delay, mode field diameter, and differential group delay. Finally, A RCF design considerations for achieving high mode channel count and low crosstalk performances in weakly coupled MIMO transmission have been examined.	2021	https://ieeexplore.ieee.org/abstract/document/9600488
7	Enhancement of Spectral and Energy efficiencies of MU-Massive MIMO Systems Employing one-bit A/Ds at Millimeter Waves	Communications	The energy efficiency (EE) is defined as the ratio of spectral efficiency (SE) to power consumption (PC). Therefore, to enhance the EE of the millimeter wave (mm-Wave) massive multiple-input multiple-output (MIMO) systems, the SE must be enhanced or the resolution bits of analogue to digital converters (A/Ds) and digital to analogue converters (D/As)	2021	https://ieeexplore.ieee.org/abstract/document/9600523

			must be reduced. However, reducing the resolution bits leads to SE degradation, it also reduces the PC and increases the quantization noise. To tackle this challenge, we introduce a hybrid precoding and beamforming structure (HP-BF) while using one-bit A/Ds at transceivers for multi-user (MU) massive MIMO systems. The proposed HP-BF mitigates the issues arising from using one-bit resolution via applying digital antenna array beamforming at the base station. The proposed HP-BF is based on the synthesis of the linear antenna array using the well-known GA/L 1 beamforming technique for maximum gain realization using the existing transmit antenna elements. This gain maximization enhances the received signal to noise ratio (SNR) giving rise to enhanced SE without adding any complexity to the system. In addition, the PC issue of A/Ds is eliminated due to using one-bit resolution. Thereby, the EE of the proposed HP-BF is enhanced due to SE enhancement and PC minimization. The simulation results exhibit a significant improvement in SE and EE of the proposed system.		
8	Modified canny detector-based active contour for segmentation	Communications	In the present work, an integrated modified canny detector and an active contour were proposed for automated medical image segmentation. Since the traditional canny detector (TCD) detects only the edge's pixels, which are insufficient for labelling the image, a shape feature was extracted to select the initial region of interest 'IROI' as an initial mask for the active contour without edge (ACWE), using a proposed modified canny detector (MCD). This	2021	https://erjeng.journals.ekb.eg/article_190353.html

			procedure overcomes the drawback of the manual initialization of the mask location and shape in the traditional ACWE, which is sensitive to the shape of region of region of interest (ROI). The proposed method solves this problem by selecting the initial location and shape of the IROI using the MCD. Also, a post-processing stage was applied for more cleaning and smoothing the ROI. A practical computational time is achieved as the proposed system requires less than 5 minutes, which is significantly less than the required time using the traditional ACWE. The results proved the ability of the proposed method for medical image segmentation with average dice 87.54%		
9	A novel inverse gaussian profile for orbital angular momentum mode division multiplexing optical networks	Communications	Orbital angular momentum modes have shown promising achievements, as data carriers, in ameliorating the transmission capacity and raising the spectral efficiency. This has leaded to an increasing interest in exploiting appropriate specialty fibers for supporting robust OAM channels. In this work, we propose a novel inner graded ring core fiber referred to as inverse Gaussian fiber (IGF). To the best of our knowledge, IGF has never been used as optical fiber profile before. We optimize IGF key parameters in order to design optimized IG-few mode fibers (FMF) supporting low radial modes with high intermodal separation that outperforms those reported in literature (minimum of $\Delta n_{eff} = 2.74 \times 10^{-4}$, this limits mode coupling and reduces channels crosstalk. We investigate the impacts of smoothness parameters (α & P) on the properties of OAM channels in the	2021	https://ieeexplore.ieee.org/abstract/document/9429400

			IG-FMFs. We evaluate and compare (with literature) their intermodal separation, their chromatic dispersion, and their associated differential group delay over the C+L ITU-T bands. The selected designs are proposed as favorable candidate to guide OAM modes in next generation OAM-MDM multiplexing optical networks.		
10	Pencil and shaped beam patterns synthesis using a hybrid GA/l_1 optimization and its application to improve spectral efficiency of massive MIMO systems	Communications	The synthesis of pencil beam and arbitrarily shaped beam patterns of linear antenna arrays (LAA) using reduced number of antenna elements attracts the attention of researchers in recent years. In this paper, a hybrid beamforming technique based on the combination of the genetic algorithm (GA) optimization technique and the l 1 minimization method denoted as (GA/l 1) is introduced for LAAs synthesis. The proposed GA/l 1 beamforming technique optimizes both the elements excitations and interelement spacing to synthesize the desired LAA pattern with a minimum number of antenna elements. The GA/l 1 technique provides an excellent approximation to the desired radiation pattern with high accuracy and low complexity (less number of iterations and computational time) compared to the other synthesis approaches introduced in the literature. In addition, as an application of this work, the proposed GA/l 1 technique is used to build up a proposed hybrid precoding and beamforming (HP-BF) structure for Massive Multi-input Multi-output (M-MIMO) systems. In this structure, the transmit antenna array is synthesized for maximum gain	2021	https://ieeexplore.ieee.org/abstract/document/9366754

			realization using the existing number of antenna elements. In the HP-BF structure, the proposed GA/l 1 technique is used to make full use of the existing transmit array elements to synthesize the radiation pattern of much larger size and higher gain arrays without the need for additional elements. Thereby, significant savings in the number of antenna elements and their corresponding radio frequency (RF) chains are achieved, which reduces the system complexity. In addition, the array gain maximization will maximize the received signal to noise ratio (SNR) giving rise to higher system performance in terms of spectral efficiency (SE) and power utilization.		
11	Channel Capacity and Polarization Diversity Study for Novel Compact UWB MIMO Antennas	Communications	This paper compares two dualpolarization (DP) MIMO systems with compact size, full isolation, and channel capacity for modern applications. Demonstrates two different designs of compact ultra-wideband (UWB) antennas. It presents two different designs of compact ultra-wide-band (UWB) antenna. These antennas are manufactured and designed to fit and compare to a four-element MIMO system. The first design is a compact UWB cup-antenna with a notch in the partial ground plane. The second design is a coplanar waveguide (CPW) UWB antenna. In this paper, the isolated coefficient for two dual-polarization (DP) and the channel capacity of the MIMO system is calculated to achieve the optimum antenna system for modern communications that are very low, approximately - 20 dB. Further, the BW and channel capacity of these designs are better than the	2021	https://scholar.google.com/citations?view_op=view_citation&hl=en&user=G3CTSxcAAAAJ&sortby=pubdate&citation_for_view=G3CTSxcAAAAJ:NhqRSupF_l8C

			other previous works. The simulation results are taken using CST STUDIO SUITETM 2018. Furthermore, there is a great agreement between simulations and fabricated results.		
12	Reduced OoB Emission and PAPR Using Partial-OSLM technique in 5G UFMC Systems	Communications	Universal-filtered multi-carrier (UFMC) waveform is considered as a potential candidate for next generation wireless systems due to its robustness against inter-carrier interference (ICI) and the low latency required in 5G systems. In this paper, a pulse shaping approaches in UFMC technique is studied to reduce the spectral leakage into nearby sub-bands. The performance of various types of window functions such as Chebychev, Hamming, Hanning and Blackman with UFMC are compared. This leads to different coefficients and attenuation shapes, that enabled to choose the proper window function. Finally, a new selective mapping (SLM) peak to average power ratio (PAPR) reduction technique is proposed to enhance the UFMC system performance. Results show that the BER performance of UFMC with all windows functions are the same. However, Blackman window function has a higher attenuation for sidebands compared with others.	2020	https://scholar.google.com/citations?view_op=view_citation&hl=en&user=G3CTSxcAAAAJ&sortby=pubdate&citation_for_view=G3CTSxcAAAAJ:_xSYboBqXhAC
13	Millimeter wave switching for single carrier and aggregated filter bank multi-carrier signals in radio over fiber networks	Communications	The 5G wireless communication systems promise to utilize the RF spectrum more efficiently and use advanced modulation and access techniques to provide ultra-high data rate speeds. Millimeter wave (MMW) signals and MMW based systems are playing a fundamental role in achieving these requirements. The modules and devices, proposed for	2020	https://www.sciencedirect.com/science/article/abs/pii/S1068520020303254

			these systems, are intended to use the robust capabilities of photonic technologies. In this paper, we consider MMW switching and wavelength conversion using a semiconductor optical amplifier (SOA) as a technique to support MMW transmission over fiber-based networks. In particular, we exploit the nonlinear special effects in SOA to generate a switched optical single-sideband signal that carries aggregated filter bank multicarrier (FBMC) 5G signals. First, we optimize the SOA for single FBMC band switching. Then, the switching of six FBMC aggregated signals is considered. The intention is to investigate the performance of such aggregated FBMC signals after applying either single or cascaded wavelength conversion. The results include analyzing the performance in terms of bit error rate, optical signal-to-noise ratio, and error vector magnitude.		
14	K-band centralized cost-effective all-optical sensing signal distribution network	Communications	In this work, we propose and experimentally demonstrate a centralized all-optical network for sensing signal distribution to a large number of remote sites. The reach range of high-resolution sensing systems is often limited due to atmospheric effects. Employing a centralized optical fiber network for signal distribution to different nodes increases the effective reach distance, decreases the power consumption, and reduces the overall cost of the sensing system. The proposed centralized all-optical network is structured such that it has an all-optical wavelength converter hosted at a central office to guide a sensing signal to a specific	2020	https://ieeexplore.ieee.org/abstract/document/9240985

			site/sensor. This system enables using shared equipment in the transmitter which in turn reduces the overall cost of the network. The performance of the proposed system is investigated by transmitting a radar signal over various transmission media, i.e. fiber, free space optic (FSO), and hybrid fiber/FSO. Some empirical formulas for the signal power and dynamic range (DR) are derived. The results show that although optical signal switching introduces a penalty of 2.5-dB in the signal (DR), the signal still preserves its good shape and spectrum quality. In addition, the experimental results show the system performance with respect to target detection and range estimation.		
15	PAPR reduction in UFMC for 5G cellular systems	Communications	Universal filtered multi-carrier (UFMC) is a potential multi-carrier system for future cellular networks. UFMC provides low latency, frequency offset robustness, and reduced out-of-band (OOB) emission that results in better spectral efficiency. However, UFMC suffers from the problem of high peak-to-average power ratio (PAPR), which might impact the function of high power amplifiers causing a nonlinear distortion. We propose a comparative probabilistic PAPR reduction technique, called the decomposed selective mapping approach, to alleviate PAPR in UFMC systems. The concept of this proposal depends on decomposing the complex symbol into real and imaginary parts, and then converting each part to a number of different phase vectors prior to the inverse fast Fourier transform (IFFT) operation. The IFFT copy, which introduces the lowest PAPR,	2020	https://www.mdpi.com/2079-9292/9/9/1404

			is considered for transmission. Results obtained using theoretical analysis and simulations show that the proposed approach can significantly enhance the performance of the UFMC system in terms of PAPR reduction. Besides, it maintains the OOB emission with candidate bit error rate and error vector magnitude performances.		
16	Design of 12 OAM-Graded index few mode fibers for next generation short haul interconnect transmission	Communications	The exploitation of the spatial dimension in space division multiplexing (SDM) is a promising solution for increasing the transmission capacity and substantially improving the spectrum efficiency. Orbital angular momentum (OAM) is one of the most attractive approaches of SDM that observes increasing interest either in free space or in optical fiber communications. In this work, we design optimized graded index-few mode fibers (GI-FMFs) supporting 20 eigenmodes with high intermodal separation (≥1 × 10−4) between vector modes; hence limiting intermodal coupling and favoring the formation of 12 OAM modes. To the best of our knowledge, this is the highest OAM number reported in the well-known graded index fiber. We investigate numerically the effects of the shape parameter (α) on the supported vector modes and on the properties of OAM channels in the GI-FMFs. We evaluate their associated differential group delay (DGD) and purity. The selected designs are proposed as viable candidates for short haul connections.	2020	https://www.sciencedirect.com/science/article/abs/pii/S106852001930433X

17	Photonics-based multi-band/multi-mode radar signal generation	Communications	Microwave/millimeter-wave photonics is playing a prominent role in overcoming the challenges of RF signal generation and processing. This evolving technology has many advantages, such as RF carrier stability and broad operating bandwidth, and is applicable to a wide range of civil and military applications such as 5G communication networks, radar/jammer systems, and medical imaging. In this work, we leverage the multidimensional capabilities of microwave photonics in order to generate multi-band/multi-mode radar signals for multi-purpose applications. Our proposed system can generate up to five radar bands, simultaneously, with different modulation bandwidths, without hardware modifications. Additionally, various radar waveforms can be transmitted, simultaneously, over the corresponding radar bands. The RF radar signals are generated optically using a reconfigurable frequency comb source, which reduces the system cost significantly. The stability of the RF carriers is experimentally tested and compared with that of the mode-locked-loop-based laser sources, wherein a comparable performance is observed. Experimental results show the generation of four radar waveforms, including frequency modulated waveforms (pulsed linear frequency modulation and frequency modulated continuous wave) and polyphase codes (Barker-11 and Barker-13). Moreover, five carrier frequencies are used to transmit the various radar modulation schemes. These are 5.25, 9.325, 16.1, 26.4, and 28.15 GHz RF carriers. The signal quality is measured experimentally, and high signal-to-noise	2020	https://link.springer.com/article/10.1007/s11107-019-00859-7

			ratio (SNR) of 35, 30, 30, 25, and 20 dB SNR was observed in the C-, X-, Ku-, K-, and Ka-bands, respectively.		
18	Transmission of 128 Gb/s Optical QPSK Signal over FSO Channel under Different Weather Conditions and Pointing Errors	Communications	Free space optics (FSO) is a promising technology for high data rate transmission where data is transmitted wirelessly from one place to another. It has a variety of applications nowadays including indoor, outdoor, underwater, and deep space communications. However, the availability of link under various atmospheric conditions is a major concern. In this study, we evaluate the transmission of 128 Gb/s optical quadrature phase shift keying (QPSK) signal under different weather conditions and pointing errors. Simulation parameters such as FSO link range, atmospheric attenuation, pointing loss, and wavelength are taken into consideration. The system performance evaluation parameters including eye diagram, constellation, and received signal to noise ratio (SNR) are compared to find the best performance under different weather conditions. Numerical simulations show that the pointing errors up to 10 μrad and bad weather conditions up to 15 dB attenuation has sever effects on the system performance and we should use digital signal processing and equalization to enhance it.	2020	https://iopscience.iop.org/article/10.1088/1742-6596/1447/1/012055/meta
19	A Novel DoG-FMF Profile with Six LP Modes and Low Differential Mode Delay	Communications	In this paper, a novel difference of Gaussian (DoG) FMF profile index has been proposed supporting six linearly polarized (LP) modes for multiple-input multiple-output (MIMO)free transmission. The fiber parameters that meet the design consideration for low differential mode delay and large effective area have	2019	https://ieeexplore.ieee.org/abstract/document/8909334

			been investigated using the COMSOL multi-physics simulation tool. The obtained results show that the proposed fiber reduces the dispersion coefficient and the differential mode delay over the entire range of the C-L band.		
20	Analysis of beam wander and scintillation in ground-to-satellite fso system with dpsk	Communications	Turbulence and beam wandering are major factors that affect the performance of a laser beam traveling from a ground-to-satellite (uplink). In this paper the performance of the optical uplink with differential phase shift keying (DPSK) scheme is evaluated in order to determine the optimum beam size that minimizes the average bit error rate (BER) and outage probability. Considering the combined effect of turbulence, and beam wandering close-form expressions for BER and outage probability are derived. The accuracy of the derived close-form expressions are verified by applying appropriate simulation scenarios, and numerical results. The obtained results show that the optimum beam size is 2 with zenith angle changes from 0 to 35 ° . This paper also, studies the system performance on optimized beam size considering the effect of changing satellite altitude, transmit power and zenith angle.	2019	https://ieeexplore.ieee.org/abstract/document/8909337
21	Modulation format identification in mode division multiplexed optical networks	Communications	In this paper, we address the problem of modulation format identification (MFI) for few mode fiber (FMF) transmission in elastic optical networks (EONs). The MFI accuracy is studied under different FMF channel conditions including mode coupling (MC), optical signal-to-noise ratio (OSNR), and chromatic dispersion (CD). Artificial neural network,	2019	https://ieeexplore.ieee.org/abstract/document/8880641

			trained using features extracted from the asynchronous in-phase quadrature histogram (IQH), is proposed to investigate the identification accuracy. Extensive simulation results have been conducted to identify six modulation schemes widely used in polarization division multiplexing coherent optical networks. This includes PDM-BPSK, PDM-QPSK, PDM-8QAM, PDM-16QAM, PDM-32QAM, and PDM-64QAM transmitted at 10 Gbaud network transmission speed. The results show that the proposed MFI achieves a successful average identification accuracy exceeding 98% in the presence of low MC when the incoming signal OSNR is greater than 20 dB. However, the effect of high MC and CD = 1100 ps/nm reduces the average accuracy to 90%. Further, the MFI accuracy is investigated under different symbol rates such as 14 and 20 Gbaud.		
22	Optimized beam size of optical ground-to-satellite link over turbulence and beam-wandering	Communications	The performance of a laser beam traveling in uplink from a ground-to-satellite is subjected to turbulence, and beam wandering. This paper evaluates the performance of the optical uplink with the pulse position modulation (PPM) scheme in order to determine the optimum beam size that minimizes the symbol error rate (SER) and outage probability. Close-form expressions for SER and outage probability are derived by considering the combined effect of turbulence, and beam wandering. Appropriate simulation scenarios are applied, and numerical results are verified the accuracy of the derived close-form expressions. The results show that	2019	https://ieeexplore.ieee.org/abstract/document/8840526

			the optimum beam size is 2.5 with zenith angle changes from 0 to 30°. Furthermore, this paper studies the system performance on optimized beam size by considering the effect of changing the zenith angle, the transmitter power and the modulation orders.		
23	A novel iterative-SLM algorithm for PAPR reduction in 5G mobile fronthaul architecture	Communications	One of the main drawbacks of orthogonal frequency division multiplexing (OFDM) is the unpredictable significant increase in the peak-to-average power ratio (PAPR), due to the large dynamic range of the OFDM symbol waveforms. To overcome this problem, we propose a novel PAPR reduction technique in the transmitter DSP of a fiber mobile fronthaul network, named as iterative selective mapping (I-SLM). The proposed algorithm uses orthogonal phase vectors construction. Several alternative sets of the OFDM symbol are iteratively generated by deterministic sets of orthogonal phase vectors and the one which introduces the lowest peak power value is considered for transmission. Simulation results demonstrate a substantial PAPR reduction, comparing to the partial orthogonal selective mapping (POSLM), especially when the number of iterations increases in the presence of different variables, such as the number of OFDM subcarriers/frame and the modulation order.	2019	https://ieeexplore.ieee.org/abstract/document/8624445
24	Experimental demonstration for PAPR reduction in OFDM system using partial-OSLM technique	Communications	Orthogonal frequency division multiplexing (OFDM) modulation is proposed in 4G wireless communication systems, and is under consideration for the next generation 5G systems. This is due to the higher spectral efficiency (SE) and the better	2018	https://www.worldscientific.com/doi/abs/10.1142/S0218126618501062

			immunity to channel distortions. One of the shortcomings in OFDM is its high peak-to-average power ratio (PAPR). Several schemes have been proposed to reduce the PAPR in OFDM systems. This includes clipping, coding, and pre/post-distortion schemes with or without side information. In this paper, we experimentally demonstrate one of the most promising method, to mitigate the effect of PAPR, entitled the partial orthogonal selective mapping (POSLM). The experimental results show a comparable performance with respect to the simulation results in terms of PAPR reduction, power spectral density (PSD), and bit error rate (BER) metrics.		
25	Millimeter Wave Sparse Channel Estimation for Device-to-Device Communications Using Hadamard RF Codebook	Communications	Internet of Things (IoT) networks rely heavily on efficient device-to-device (D2D) communication links. Millimeter wave (mmWave) beamforming and precoding are two important techniques for enhancing the quality of D2D links in 5G cellular system. These two techniques however rely on efficient channel estimation algorithms. In this paper, we propose an iterative channel estimation algorithm that adaptively estimates millimeter wave channel by exploiting its sparse nature. A multi-resolution codebook is devised for building the training vectors in the proposed sparse channel estimation algorithm, using Hadamard transform. Hybrid precoding (HP) based on this channel estimation technique achieves higher spectral efficiency with 1- and 2- bit resolutions compared to HP based on Fourier matrices with 4- and 5-bit resolutions. Due to it's	2018	https://ieeexplore.ieee.org/abstract/document/8403747

			higher efficiency at low complexity, the proposed algorithm will be more suitable for implementation on portable devices for D2D communications.		
26	Multiplicative PIC detection for OCDMA systems with non-negativity constraints	Communications	Non-negativity constraints arise naturally in many applications such as medical and astronomical imaging. These constraints have been recently exploited in the optical communication field where a projected parallel interference cancelation detector has been developed within the context of cancelling multi-access interference in upstream on-off-keying optical code division multiple access passive optical networks; the latter possess the property that the transmitted data symbols are non-negative. The authors build upon these results and propose a new parallel interference cancellation structure with better features and improved performance. This detector is characterised by a multiplicative update equation and it exhibits a number of unique and desirable features such as stability and smooth convergence behaviour even for highly loaded systems. Up to our knowledge, this structure has not been proposed before either in optical or in wireless communication field. Simulation results are promising and further improvements are possible.	2018	https://ietresearch.onlinelibrary.wiley.com/doi/full/10.1049/iet-com.2017.0624
27	Radar signal transmission and switching over optical networks	Communications	In this paper, we experimentally demonstrate a radar signal distribution over optical networks. The use of fiber enables us to distribute radar signals to distant sites with a low power loss. Moreover, fiber networks can reduce the radar system cost, by sharing precise and expensive radar signal generation and processing equipment. In order to overcome the	2018	https://www.sciencedirect.com/science/article/abs/pii/S0030401817309793

			bandwidth challenges in electrical switches, a semiconductor optical amplifier (SOA) is used as an all-optical device for wavelength conversion to the desired port (or channel) of a wavelength division multiplexing (WDM) network. Moreover, the effect of chromatic dispersion in double sideband (DSB) signals is combated by generating optical single sideband (OSSB) signals. The optimal values of the SOA device parameters required to generate an OSSB with a high sideband suppression ratio (SSR) are determined. We considered various parameters such as injection current, pump power, and probe power. In addition, the effect of signal wavelength conversion and transmission over fiber are studied in terms of signal dynamic range.		
28	Trenched raised cosine FMF for differential mode delay management in next generation optical networks	Communications	Dispersion management in few mode fiber (FMF) technology is crucial to support the upcoming standard that reaches 400 Gbps and Terabit/s per wavelength. Recently in Chebaane et al. (2016), we defined two potential differential mode delay (DMD) management strategies, namely sawtooth and triangular. Moreover we proposed a novel parametric refractive index profile for FMF, referred as raised cosine (RC) profile. In this article, we improve and optimize the RC profile design by including additional shaping parameters, in order to obtain much more attractive dispersion characteristics. Our improved design enabled to obtain a zero DMD (z-DMD), strong positive DMD (p-DMD) and near-zero DMD (nz-DMD) for six-mode fiber, all appropriate for dispersion management in FMF system. In	2018	https://www.sciencedirect.com/science/article/abs/pii/S0030401817307381

			addition, we propose a positive DMD (p-DMD) fiber designs for both, four-mode fiber (4-FMF) and six-mode fiber (6-FMF), respectively, having particularly attractive dispersion characteristics.		
29	Effects of solar radio emissions on outdoor propagation path loss models at 60 GHz bands for access/backhaul links and D2D communications	Communications	This paper presents analytical and empirical data documenting the effects of solar radio emissions on outdoor propagation path loss at 60 GHz bands. Both line-of-sight (LOS) and non-LOS scenarios were considered. The setup used in the empirical studies emulates the future fifth-generation cellular systems for both access and backhaul services, as well as for device-to-device communications. Based on the measurement data collected in sunny weather with intense solar activities, we developed large-scale propagation path loss models at 60 GHz, and observed the effects of solar radio emissions on the path loss data. It is shown that solar radio emission can decrease carrier-to-noise ratio, and that this translates into a corresponding increase in the path loss exponent (PLE) values for the large-scale propagation path loss channel models. Empirical data show that 9.0%-15.6% higher PLE values were observed in hot and sunny weather during the day (41°-42 °C) compared with the counterpart measurements taken at night in cool and clear weather (20°-38 °C). This translates into a corresponding decrease in 60 GHz radio coverage in hot and sunny weather during the day. The empirical data are closely corroborated by analytical estimates presented.	2017	https://ieeexplore.ieee.org/abstract/document/8058494

30	Hybrid precoding-beamforming design with Hadamard RF codebook for mmWave large-scale MIMO systems	Communications	This paper proposes a hybrid structure for multi-stream large-scale multi-input multi-output (MIMO) beamforming systems, in single-user scenario, using a Hadamard radio frequency (RF) codebook with low-bit resolution phase shifters. We show that Hadamard transform can be used in RF beamsteering/beamcombining to achieve better performance in terms of average achievable spectral efficiency and low hardware cost using 1- or 2-b resolution APSs. In contrast, the state-of-the-art RF codebook designs available in the literature requires more than 7-b resolution to achieve the same performance as the proposed scheme, for large antenna arrays with up to 256 elements. The performance gains of the proposed RF codebook design is thoroughly investigated using MATLAB simulations for typical mmWave MIMO system, and the simulation results are closely verified by the analytical expressions.	2017	https://ieeexplore.ieee.org/abstract/document/7888485
31	Path loss channel models for 5G cellular communications in Riyadh city at 60 GHz	Communications	This paper presents propagation path loss channel models developed from real-field measurement campaigns that were conducted in indoor and outdoor Line-of-Site (LOS) propagation environments in Riyadh city, Saudi Arabia, using highly directional antennas at 60 GHz. The setup used in these measurements emulates the future fifth-generation (5G) cellular systems for both access and backhaul services, as well as for Machine-to-Machine (M2M) communications. We used our measurement data to develop the corresponding large-scale propagation path loss models at 60 GHz, using the log-distance	2016	https://ieeexplore.ieee.org/abstract/document/7510953

			and the floating intercept modeling approaches. It is shown that cellular radio links can be established in short-range distances up to 134 m indoors, and up to 77 m outdoors, when employing highly directional antennas at both the transmitter and receiver sides. It is also shown that path loss at 60 GHz in hot and sunny weather during the day, is higher than those obtained in cool and clear weather at night. This is partly due to solar radio noise effect arising from the intense solar radiation that characterizes summer afternoon in Riyadh city, which can cause a decrease in carrier-to-noise ratio at the input of receiving antennas. It is also partly due to the increase in thermal noise when electronics components in the measurement device become hot. The results presented here are thus very useful in 5G cellular design and infrastructure planning in the gulf region, where daytime temperature could reach 43° C or more.		
32	Proposed Raised Cosine FMF for Dispersion Management in Next Generation Optical Networks	Communications	Spatial mode-division multiplexing (MDM) that exploits the emerging few-mode fiber (FMF) technology is one potential candidate for next-generation petabyte optical communication links. In this paper, we focus on the design issues and specifications of the next-generation FMF that will better enable future MDM networks. These systems suffer from two main optical fiber impairments: intermodal coupling and dispersion. In this paper, we focus on the dispersion management issues through an FMF optical link. We first define two potential differential mode group delay (DMD) management	2016	https://ieeexplore.ieee.org/abstract/document/7394106

			strategies, namely, sawtooth and triangular. Moreover, we propose and investigate a novel parametric refractive index profile few-mode fiber, referred to as raised cosine (RC) function, which has been extensively used in digital communication pulse shaping. We investigate the achievable DMD for a wide range of the RC shape parameter and identify the design values of a two-mode FMF fiber. We then improve the RC profile by including additional shaping parameters. This enabled us to develop one four-mode fiber (4-FMF) and one six-mode fiber (6-FMF) having particularly attractive dispersion characteristics for three kinds of FMF applications: nz-, p-, and n-DMD.		
33	Performance investigation of under/over-sampling for arbitrary DP-MQAM optical transmitter	Communications	In this paper, we experimentally investigate the effect of state-of-the-art digital to analog converter (DAC) circuit, on the performance of high speed optical transmitter. We particularly consider two operating regimes, we refers as over- and under-sampling conditions. It is well known that a sampling rate of 64GSa/s limits the maximum baud rate to 32Gbaud with a sampling rate of 2 sample/symbol as a standard oversampling. However, in a number of applications including test, characterization, and measurement of advanced communication systems, it is needed to test the capacity to use the hardware well above its normal operation regime. One important, yet attractive testing, is to examine the behavior of an overall communication system or its subsystems in case of 2-fold criterion is not respected. In these cases, the optical transmitter is constrained to generate and	2015	https://ieeexplore.ieee.org/abstract/document/7156447

			transmit optical symbols at a baud rate that is much higher than the half of the hardware limited sampling rate. In our case, we generate variable baud rates higher than 32Gbaud using an always fixed sampling rate 64GSa/s (i.e. limited by hardware). We hence constrain our symbols to be generated by less than 2 samples/symbol we refer as under sampling regime. Our experimental results show that in under sampling regime, we obtain a variable baud rate ranging from 32 up to 56Gbaud using a sampling ratio starting by 2 and decreasing down to 1.14 respectively. In addition we show, how these high and variable baud rates, have been achieved at the expense of much larger spectral bandwidth, important signal distortions especially for the highest frequency band, and a net decrease in the modulation order from 128 down to 4. We also investigate the performance of the generated signals in terms of bit error rate (BER) and error vector magnitude (EVM) and illustrate how the performance dramatically degrades as the sampling rate decreases. Furthermore, we digitally pre-emphasize the DP-MQAM Optical transmitter in o...		
34	Design tradeoffs of few-mode step index fiber for next generation mode division multiplexing optical networks	Communications	Next generation few mode fibers (FMF) promise to substantially increase the spectral efficiency of existing state-of-the-art optical communication networks by an order of magnitude [1]. In FMF, individual propagating modes are considered as independent optical communication channels that carry separate streams of data. The performance of these communication streams however, suffers from inter channel interference (ICI) that depends on the	2015	https://ieeexplore.ieee.org/abstract/document/7156472

			physical characteristics of the optical fiber. The ICI mainly results of two impairments, namely the mode coupling and the differential mode delay. It is known that step index (SI) FMF is the less expensive and the easiest to fabricate in addition to having a limited number of physical design parameters, i.e., step refractive index and core diameter. Our objective here is first to investigate the design trade-offs of SI-FMF and then identify the parameters intervals that minimize the inter channel interference by reducing: the mode coupling and the differential mode delay. Our numerical simulation identifies the desired design regions that minimize these impairments separately. Our analysis also illustrates the challenge to minimize both impairments simultaneously and get compromising design solutions.		
35	Two-stage multiuser access in 5G cellular using massive MIMO and beamforming	Communications	This paper explores the possibility of using multiuser massive MIMO and beamforming together as two-stage multiuser access methods in 5G cellular. Multi-carrier OFDM transmission as currently used in the 4G-LTE may be difficult to implement in 5G cellular because of the peculiarities of mmWave channels. Therefore, there is the need to analyze and propose suitable physical layer techniques suitable for 5G systems that are amenable to beamforming and/or massive MIMO. It turns out that both of these schemes are inherently multiuser access methods and can be used together in 5G cellular. Our results show that simple transmitter and receiver processing can be achieved when using the combined system. Moreover, the proposed approach will allow the system to	2015	https://link.springer.com/chapter/10.1007/978-3-319-24540-9_5

			accommodate more users at minor error rate degradation.		
36	Efficient interference cancellation detector for asynchronous upstream optical code division multiple access-passive optical network with mixed Poisson–Gaussian noise	Communications	Optical code division multiple access (OCDMA) is a promising candidate for next generation passive optical networks (NG-PON). OCDMA-PON can potentially provide all customers with a Gb/s-class BW upstream with inherent flexibility. Unfortunately OCDMA suffers from multiple access interference (MAI) and various detection noises. In this study, the authors consider developing efficient interference cancellation detection under mixed Poisson–Gaussian noise. The latter is more realistic than considering Gaussian or Poisson noise alone. The authors first start by developing a maximum likelihood framework of the detection process under Gaussian, Poisson and Poisson–Gaussian noises, respectively. Then, the authors develop the proposed interference cancellation detector for the Poisson–Gaussian noise case after deriving the conventional expectation-maximisation (EM) detector for the Poisson noise case. Finally, the authors simulate the proposed detector and compare it to the projected parallel interference cancellation, EM and other detectors to validate its superiority and enhanced performance.	2014	https://ietresearch.onlinelibrary.wiley.com/doi/full/10.1049/iet-com.2013.0683
37	Penalised and doubly-penalised parallel/successive interference cancellation multi-user detectors for asynchronous upstream optical	Communications	Optical code division multiple access (OCDMA) is one of the emerging technologies for next generation passive optical networks that can offer customers a Gb/s-class experience in the upstream. However, OCDMA suffers from multiple access interference (MAI) that significantly reduces the capacity of the system. To mitigate MAI, three novel interference	2014	https://ietresearch.onlinelibrary.wiley.com/doi/full/10.1049/iet-com.2013.0064

	code division multiple access passive …		cancellation (IC) techniques have been proposed for incoherent direct sequence OCDMA systems that make use of some prior information to enhance their performance. Some of the IC structures exploit the non-negativity of the solution, while others exploit in addition to the non-negativity information the noise variance information. The proposed IC detectors outperform the conventional correlation receiver, the decorrelator detector, the linear parallel/successive interference cancellation detectors and even the linear minimum mean square error detector.		
38	A novel bandwidth efficient modulation scheme for asynchronous OCDMA with projected PIC multiuser detection	Communications	OCDMA is a promising multi-access scheme for future optical communication networks. We propose in this paper, a novel bandwidth efficient modulation scheme that offers higher spectral efficiency than OOK-OCDMA and PPM-OCDMA. This modulation scheme that we call circular shift modulation (CSM) - OCDMA is analyzed and simulated. As this new modulation scheme may result in increasing levels of multiple access interference (MAI), we couple this modulation scheme with a recently proposed parallel interference cancellation (PIC) technique that exploits the non-negativity of the incoherent OCDMA system to improve its performance. The proposed modulation scheme is analyzed in terms of data rate and Bandwidth efficiency. Simulation results reveal a considerable increase in system performance and bandwidth-utilization efficiency.	2013	https://ieeexplore.ieee.org/abstract/document/6579555
39	Performance enhancement of asynchronous overlapping PPM-OCDMA systems using	Communications	Overlapping pulse position modulation-optical code division multiple access (OPPM-OCDMA) is a well known technique to enhance spectral efficiency and to	2013	https://ieeexplore.ieee.org/abstract/document/6550749

	projected PIC multiuser detection		increase the number of effective users in the system. However, on the other hand overlapping may result in increasing levels of multiple access interference (MAI) that significantly reduces the capacity of the system. To mitigate MAI, we make use of a recently proposed parallel interference cancellation (PIC) technique that exploits the non-negativity of the incoherent direct detection OPPM-OCDMA system to boost its performance. Simulation results reveal a considerable increase in the spectral efficiency of the system.		
40	Projected parallel interference cancellation multiuser detector for asynchronous upstream OCDMA-PON	Communications	OCDMA is a promising candidate for Next Generation Passive Optical Networks (NG-PON). OCDMA-PON can potentially provide all customers with a Gb/s-cIass bandwidth upstream with inherent flexibility. Unfortunately OCDMA suffers from Multiple Access Interference (MAl) and various detection noises. To mitigate MAl we propose a novel parallel interference cancellation technique for incoherent DS-OCDMA that better exploits the positivity of the solution. The proposed PIC scheme incorporates this additional information into its structure. The proposed PIC detector is shown to outperform the conventional correlator detector, the decorrelator detector, the Linear Parallel Interference Cancellation (LPIC) detector and even the Linear Minimum Mean Square Error (LMMSE) detector. As a matter of fact, our detector achieves more than 1 dB enhancement in SNR at 10.3 average BER for 32 active users compared to the LMMSE detector. This	2012	https://ieeexplore.ieee.org/abstract/document/6421466

			gain can be used to reduce the code length required to support a higher number of users.		
41	A projected parallel interference cancellation for asynchronous upstream OCDMA-PON	Communications	OCDMA is a promising candidate for next generation passive optical networks (NG-PON). OCDMA-PON can potentially provide all customers with a Gb/s-class BW upstream with inherent flexibility. Unfortunately OCDMA suffers from multiple access interference (MAI) and various detection noises. To mitigate MAI, we propose a novel parallel interference cancellation technique for incoherent DS-OCDMA that better exploits the non-negativity of the solution. The proposed PIC scheme incorporates this additional information into its structure. The proposed PIC detector is shown to outperform the conventional correlator detector, the decorrelator detector, the linear parallel interference Cancellation (LPIC) detector and even the linear minimum mean square error (LMMSE) detector.	2012	https://ieeexplore.ieee.org/abstract/document/6313570