Research interests

My research focuses on the future dynamic optical networks with flexible network functions and fast network reconfigurations. The envisioned programmable optical networks could deliver network services automatically in an on-demand approach. The flexible network resource can accommodate network requests by providing just-enough network hardware to maximize the utilisation of network resources. The margin-reduced dynamic optical network will be one of the key research themes for intelligent optical transport. To achieve this, two key research directions are explored.

Artificial Intelligence-driven optical networks

Based on the proposed SDN-based multi-layer monitoring framework, AI-based network analytics could offer novel network functions and leverage the intelligence of SDN networks. Various field trial experiments demonstrated the advantages of AI in optical networks.

Programmable multi-dimensional networks

Programmable optical hardware is one of the key enabling technologies for dynamic networks. This research will investigate programmable network architecture, reconfigurable node functions and programmable transmission equipment. Our developed architecture-on-demand synthesized optical nodes and bandwidth programmable optical transmitters provide a solid foundation for hardware-programmable optical networks. The research intends to bring programmability in multiple dimensions (i.e. TDM/WDM/SDM in optical networks). The flexibility of network hardware can adapt the capability, according to network states and network requirements, to contribute to the vision of intelligent optical transport.

Employment

Senior Lecturer in High Performance Networking & Optical Networking

Department of Electrical & Electronic Engineering
Faculty of Engineering
United Kingdom
24 Aug 2020 → present

High Performance Networks Group (HPN)
Faculty of Engineering
United Kingdom
1 Jan 2014 → present

Research outputs

Toward Deployments of ML applications in Optical Networks
4 p., 9410240.

Distributed Abstraction and Verification of an Installed Optical Fibre Network

A Programmable ROADM System for SDM/WDM Networks
Toward Deployment of ML in Optical Networks, Transfer Learning, Monitoring and Modelling

An Efficient Hardware Generator for Massive Non-Stationary Fading Channels
Zhao, Z., Zhu, Q., Mao, K., Liu, W., Li, N., Yan, S. & Huang, W., 19 Sep 2020, (Accepted/In press) IEEE GLOBECOM 2020 Workshops: IEEE GLOBECOM 2020 Workshop on Wireless Propagation Channels for 5G and B5G. Taipei, Taiwan: Institute of Electrical and Electronics Engineers (IEEE), p. 6 1 p.

5G-CLARITY: Integrating 5GNR, WiFi and LiFi in Private 5G Networks with Slicing Support

Hybrid Learning Assisted Abstraction for Service Performance Assessment Over Multi-Domain Optical Networks

Dynamic Abstraction of Optical Networks with Machine Learning Technologies

ANN-Based Multi-Channel QoT-Prediction over a 563.4-Km Field-Trial Testbed

Hardware-Efficient ROADM Design with Fiber-Core Bypassing for WDM/SDM Networks

K-Means Assisted Adaptively Partitioned Entropy Loading for FBMC/OQAM System

ANN-Based Multi-Channel QOT-Prediction over A 563.4-KM Field-Trial Testbed

A Comparison of Impairment Abstractions by Multiple Users of an Installed Fiber Infrastructure

Deep Reinforcement Learning for BBU Placement and Routing in C-RAN

Field Trial of Machine-Learning-Assisted and SDN-Based Optical Network Management

Resource Analysis and Cost Modeling for End-to-End 5G Mobile Networks
Self-Learning Monitoring On-Demand Strategy for Optical Networks

Coordinated Fibre Span Power Optimisation and ROADM Input Power Management Strategy for Optical Networks

Field-Trial of Machine Learning-Assisted Quantum Key Distribution (QKD) Networking with SDN

Fully SDN-enabled all-optical architecture for data center virtualization with time and space multiplexing

Field trial of Machine-Learning-assisted and SDN-based Optical Network Planning with Network-Scale Monitoring Database

Data-driven network analytics and network optimisation in SDN-based programmable optical networks

Demonstration of Real-Time Modulation-Adaptable Transmitter

Programmable OPS/OCS hybrid data centre network

Field Trial of Gaussian Process Learning of Function-Agnostic Channel Performance Under Uncertainty

Field Trial of Monitoring On-Demand at Intermediate-Nodes Through Bayesian Optimization

Robust Self-Learning Physical Layer Abstraction Utilizing Optical Performance Monitoring and Markov Chain Monte Carlo

Demonstration of NFV content delivery using SDN-enabled virtual infrastructures
Field Trial of a Novel SDN Enabled Network Restoration Utilizing In-Depth Optical Performance Monitoring Assisted Re-Planning

Investigation of Optical Impacts on Virtualization using SDN-enabled Transceiver and Optical Monitoring

3.36-Tbit/s OAM and Wavelength Multiplexed Transmission over an Inverse-Parabolic Graded Index Fiber

Hardware Programmable SDM/WDM ROADDM

Demonstration of Bandwidth Maximization between Flexi/Fixed Grid Optical Networks with Real-Time BVTs

Multi-Layer Network Analytics With SDN-based Monitoring Framework

Control orchestration protocol: unified transport API for distributed cloud and network orchestration

Demonstration of Adaptive SDN Orchestration: A Real-time Congestion-aware Services Provisioning over OFDM-based 400G OPS and Flexi-WDM OCS

Simple Intradyne Receiver with Time-switched Phase Diversity for Optical Interconnects

Hardware-programmable Optical Networks

Optical network virtualization using multi-technology monitoring and optical virtualize-able transceiver
On the Filter Narrowing Issues in Elastic Optical Networks

Demonstration of Virtualizable and Software-Defined Optical Transceiver

Experimental Demonstration of Multivendor and Multidomain EON With Data and Control Interoperability Over a Pan-European Test Bed

Demonstration of an SDN Based Monitoring Framework for Converged Packet and Optical Networks Analytics


Optical Network Virtualization using Multi-technology Monitoring and Optical Virtualize-able Transceiver

SDN-Enabled Sliceable BVT Based on Multicarrier Technology for Multiflow Rate/Distance and Grid Adaptation

First demonstration of multi-vendor and multi-domain EON with S-BVT and control interoperability over Pan-European testbed
SDN-enabled Sliceable BVT Based on Multicarrier Technology for Multi-Flow Rate/Distance and Grid Adaptation

First experimental demonstration of a distributed cloud and heterogeneous network orchestration with a common Transport API for E2E services with QoS

Evaluation of Function-Topology Programmable (FTP) Optical Packet/Circuit Switched Data Centre Interconnects

100G Beyond Ethernet Transport for Inter- and Intra-DCN communication with Solutions and Optical Enabling Technologies in the ICT STRAUSS Project

Demonstration of Space-to-Wavelength Conversion in SDM Networks

DORIOS: Demonstration of an All-Optical Distributed CPU, Memory, Storage Intra DCN Interconnect

SDN-based network orchestration of variable-capacity optical packet switching network over programmable flexi-grid elastic optical path network

Archon: A Function Programmable Optical Interconnect Architecture for Transparent Intra and Inter Data Center SDM/TDM/WDM Networking

Real-Time Ethernet to Software-Defined Sliceable Superchannel Transponder

First demonstration of all-optical programmable SDM/TDM intra data centre and WDM inter-DCN communication
on Optical Communication (ECOC) 2014. Cannes, France: Institute of Electrical and Electronics Engineers (IEEE), 3 p. PD 1.2

Demonstration of Real-Time Ethernet to Reconfigurable Superchannel Data Transport over Elastic Optical Network

Programmable Optical Packet/Circuit Switched Data Centre Interconnects: Traffic Modeling and Evaluation

First international SDN-based Network Orchestration of Variable-capacity OPS over Programmable Flexi-grid EON

Software defined networking (SDN) over space division multiplexing (SDM) optical networks: features, benefits and experimental demonstration

Flexible optical infrastructure for Ethernet transport: Solutions and enabling technologies in the ICT STRAUSS project

First Demonstration of Software Defined Networking (SDN) over Space Division Multiplexing (SDM) Optical Networks

Generation of 64-QAM Signals Using a Single Dual-Drive IQ Modulator Driven by 4-Level and Binary Electrical Signals

Generation of Square or Hexagonal 16-QAM Signals Using a Dual-Drive IQ Modulator Driven by Binary Signals

Generation of Square or Hexagonal 16-QAM Signals Using a Single Dual Drive IQ Modulator Driven by Binary Signals

Low-Complexity and Phase Noise Tolerant Carrier Phase Estimation for Dual-Polarization 16-QAM Systems

Error-Free OTDM Demultiplexer Using the Supercontinuum Spectrum-Slicing Induced Clock Signal

Generation of 10 GHz, 1.9 Ps Optical Pulse Train Using Semiconductor Optical Amplifier and Silica-Based Highly Nonlinear Fiber
Simple Approach to Picosecond Pulse Generation Based on Semiconductor Optical Amplifier

SOA-Based Actively Mode-Locked Fiber Ring Laser by Forward Injecting an External Pulse Train
Yan, S., Zhang, J-G. & Zhao, W., 1 Jan 2010, In: Optics Communications. 283, 1, p. 87-92 6 p.

Linear-Cavity Mode-Locked Fiber Laser Based on Semiconductor Optical Amplifier

40-GHz Wavelength Tunable Mode-Locked SOA-Based Fiber Laser with 40-Nm Tuning Range

Broadly Tunable SOA-Based Active Mode-Locked Fibre Ring Laser by Forward Injection Optical Pulse

All-Optical RZ to NRZ Format Conversion Using Single SOA Assisted by Optical Band-Pass Filter

SOA-Based Polarity-Preserving All-Optical Wavelength Conversion at 80Gbit/s: Wide Conversion Range, Well Dynamic Characteristics and Polarization Insensitive

Activities

ECOC 2018
Shuangyi Yan (Participant)
23 Sep 2018

Opto-Electronics and Communications Conference & Photonics in Switching and Computing 2019 (Event)
Shuangyi Yan (Advisor)
1 Feb 2018 → 31 Jul 2019

IEEE Asia Communications and Photonics Conference 2017
Shuangyi Yan (Participant)
13 Oct 2017