Enabling techniques for asynchronous coherent OCDMA

Features

Wave length ($\lambda$)

Time (t)

Optical code (OC)

OC: New dimension for multiplexing

Unique features

• Encoding/decoding is performed in optical domain in optical code division multiple access (O-CDMA) system
  • Fully asynchronous access
    ➢ “Tell-and-go”
  • Low-latency access
  • Soft-capacity on demand
  • Physical layer QoS control
  • Information confidentiality
    ➢ Optical layer security

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Applications

- Symmetric Broadband access
- High capacity transmission
- Secure optical communication
- etc

Enabling techniques

- High performance optical en/decoders
  - Spatial light phase modulator (SLPM)
  - Micro-ring-resonator (MRR)
  - Planar lightwave circuit (PLC)
  - Fibre Bragg grating (FBG)
- Advanced modulation format
  - Differential phase shift keying (DPSK)
  - Diff. quaternary PDK (DQPSK)
  - Code shift Keying (CSK)
  - M-ary modulation
- Optical thresholding and time gating
- Forward error correction
- etc.

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Achievements

511-chip, 640 Gchip/s SSFBG en/decoders

Supercontinuum-based optical thresholder

16×16 multi-port En/decoder

Field trial of WDM/DPSK-OCDMA
3λ×12-user×10Gbps

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Research interests (Collaboration opportunities)

- **OC base techniques and applications**
  - Encoding/decoding techniques
  - Optical thresholding
  - Multiple access and multiplexing
  - Coding theory

- **Secure optical communication**
  - Optical layer security: theory and experiment

- **Advanced modulation techniques**

- **Microwave photonics**
  - Radio over fibre (RoF)
  - Fibre delay line signal processing

- **Fibre gratings**
  - Design, fabrication & applications

- **Semiconductor and fibre laser systems for communication**

Contact: x.wang@hw.ac.uk