instituto de telecomunicações

IT-Aveiro

DSP for High Speed Optical Transmission Systems

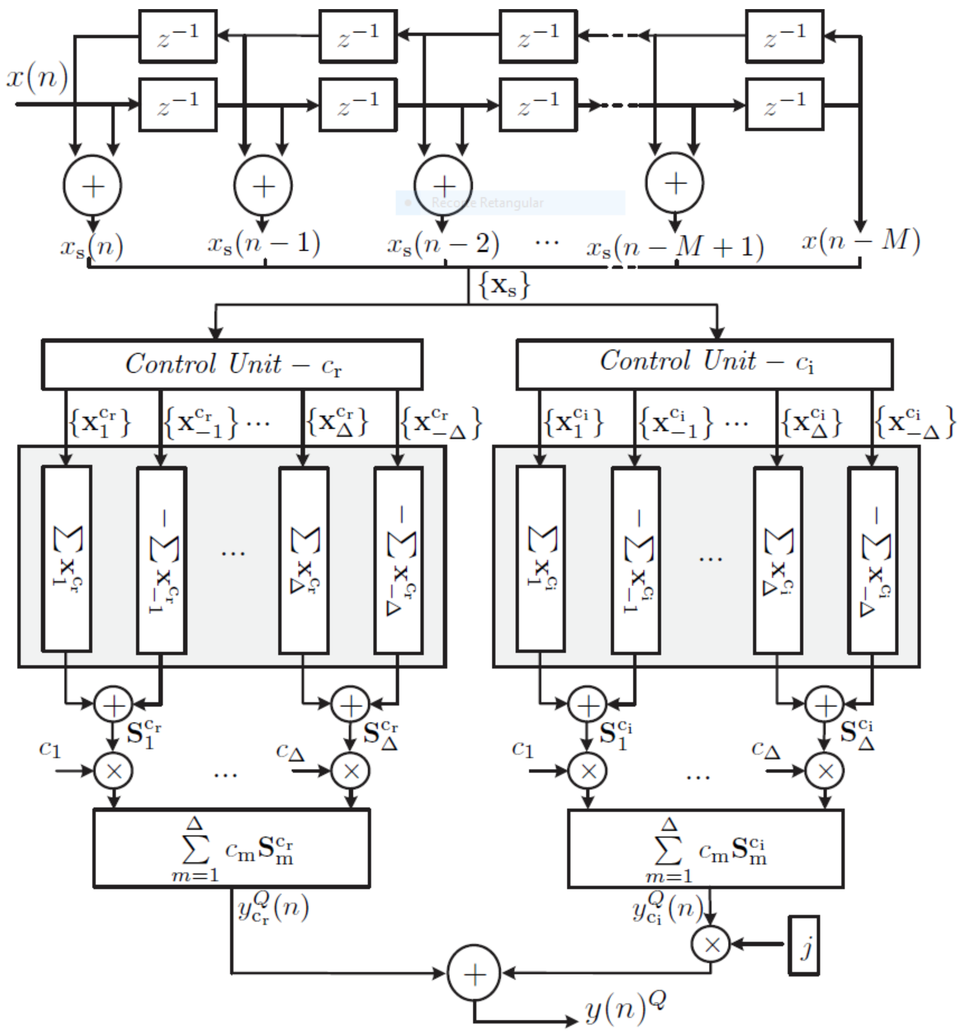
Optical Communications Systems

Background and challenges

- **Development** and **optimization** of digital equalization techniques for optical transmission systems:
  - Linear equalization (*Chromatic dispersion* equalization and *Laser phase noise* compensation);
  - Nonlinear compensation (*Split Step Fourier* and *Volterra series* based nonlinear techniques).
- **Experimental validation** and hardware implementation:
  - FPGA based implementation using VHDL.

Description and main innovation

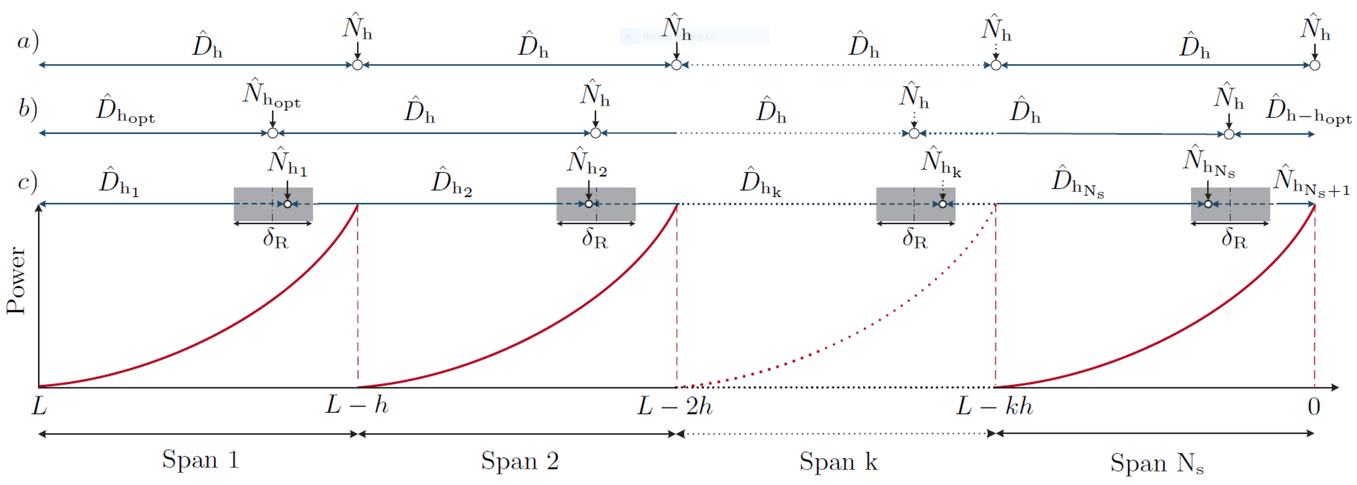
- **Low-Complexity Chromatic Dispersion Equalizer**



❑ **99%** reduction of Multipliers and processing latency over **90%** relatively to the benchmark implementation;

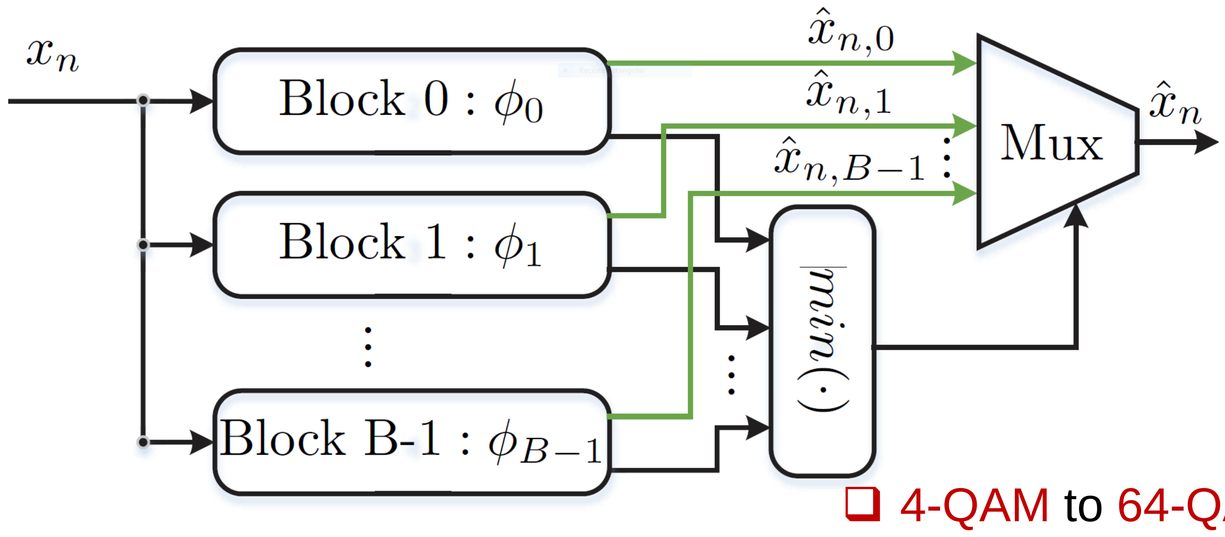
❑ Real-time implementation in FPGA.

- **Low-Complexity Time-Domain Digital Backprogation**



❑ **60%** complexity reduction relatively to the benchmark implementation.

- **M-QAM Blind Real-Time Carrier Recovery**



❑ 4-QAM to 64-QAM;

❑ Complexity reduction.

Achievements

- **Publications:**
  - C. S. Martins, et all, Low-Complexity Time-Domain DBP Based on Random Step-Size and Partitioned Quantization, *IEEE/OSA JLT*, 2018;
  - C. S. Martins, et all, Distributive FIR-Based Chromatic Dispersion Equalization for Coherent Receivers, *IEEE/OSA JLT*, 2016;
  - +3 conference papers as first author;
  - +2 journals and 4 conferences paper as a co-author;
  - +1 Patent.
- **PhD Grant:** PD/BD/113817/2015.

- **Collaborators:**
  - DET, Politecnico di Torino;
  - Istituto Superiore Mario Boella;
  - CPqD, Division of Optical Technologies.

POLITECNICO DI TORINO

OPTCOM

CPqD

- **Participation in Projects:**
  - UID/EEA/50008/2013 (SoftTransceiver);
  - POCI-01-0145-FEDER-029405(DSPMetroNet);
  - PTDC/EEI-TEL/3283/2012 (DiNEq).

FCT Fundação para a Ciência e a Tecnologia
MINISTÉRIO DA EDUCAÇÃO E CIÊNCIA
UID/EEA/50008/2013

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