Evaluation of Dynamic Bandwidth Allocation Algorithms for G-PON Systems using a Reconfigurable Hardware Testbed

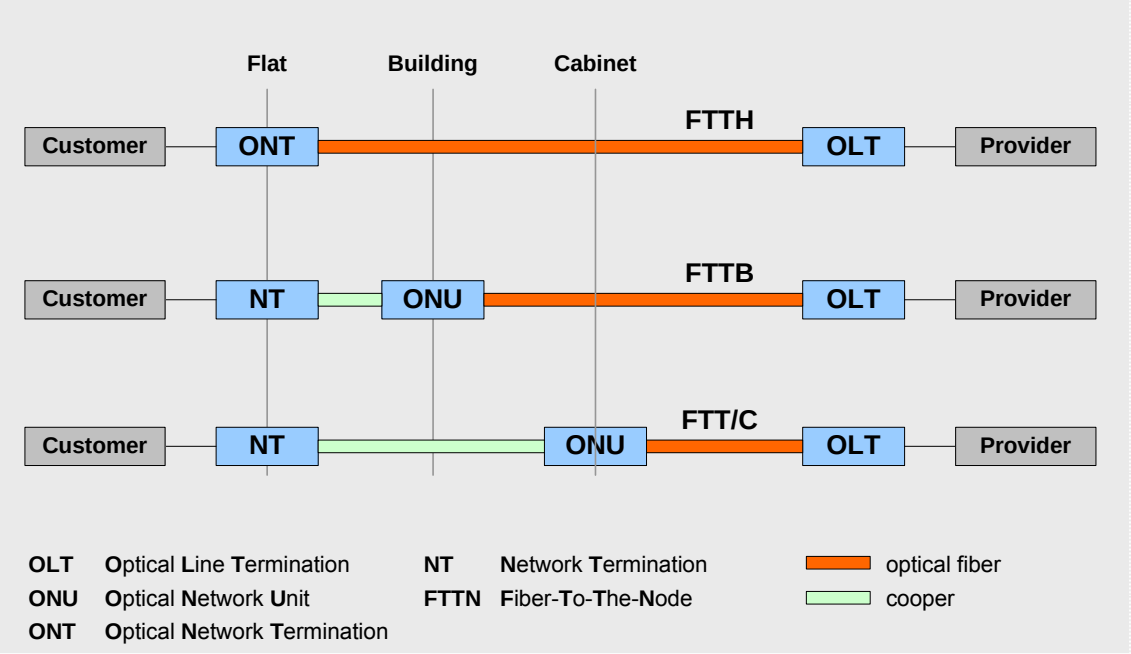
Andy Strzeletz, Harald Widiger, Dirk Timmermann
University of Rostock
Institute of Applied Microelectronics
and Computer Engineering

Outline

- Basics
- Concept of Testbed
- Options for DBA-Algorithm Implementation
- Model Implementation and Features
- Conclusion

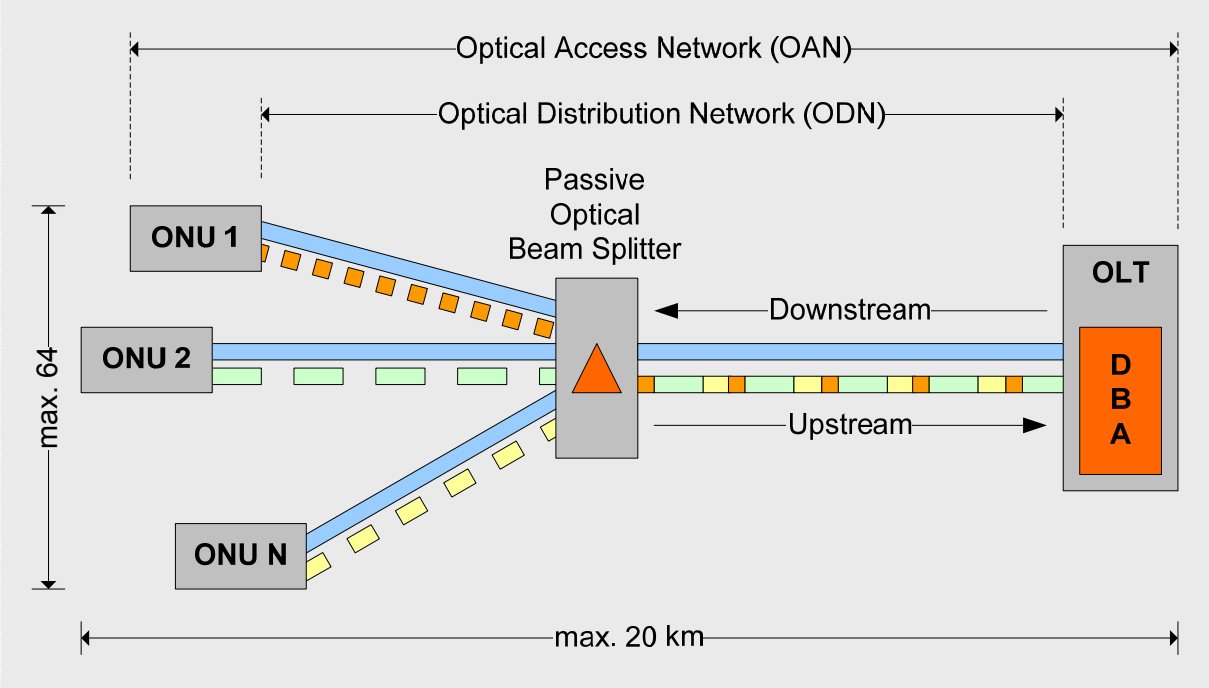
Basics • FTTx

- **F**iber-**T**o-**T**he-**x** → Wideband fiber network with different architectures



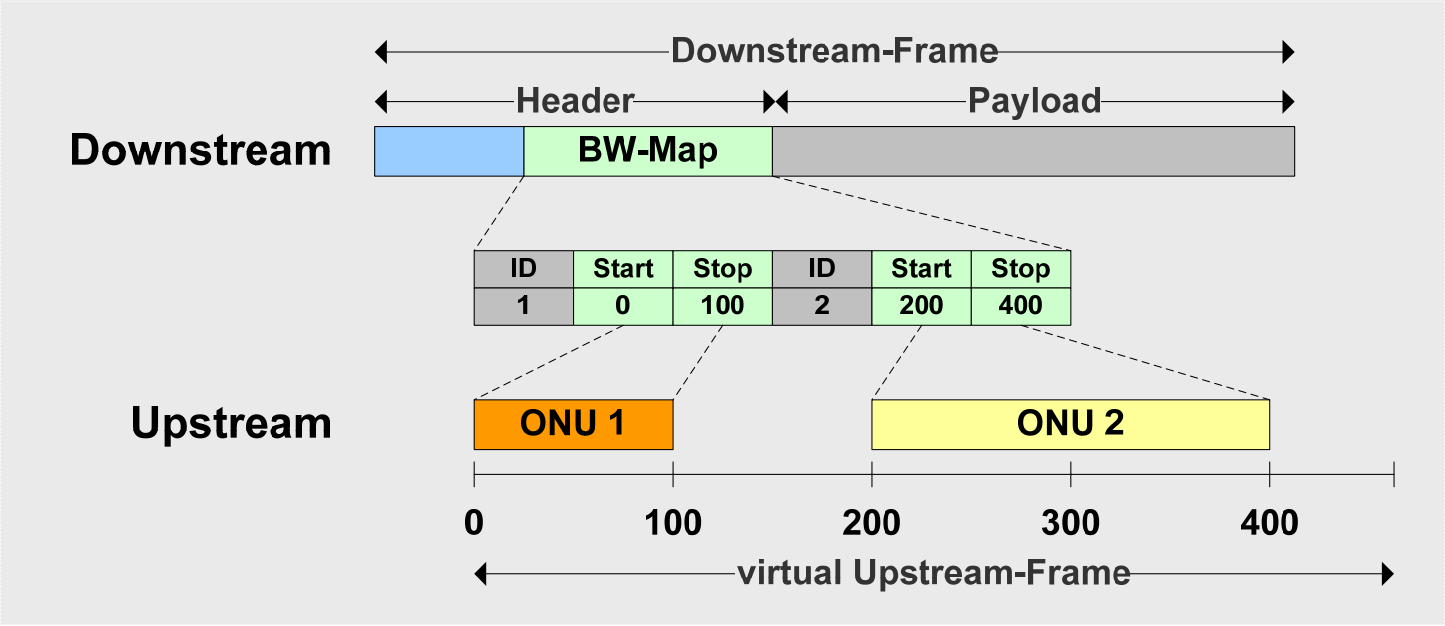
Basics • GPON

- **G**igabit-capable **P**assive **O**ptical **N**etwork
- Downstream → Broadcast
- Upstream → Time Division Multiplex (TDM)



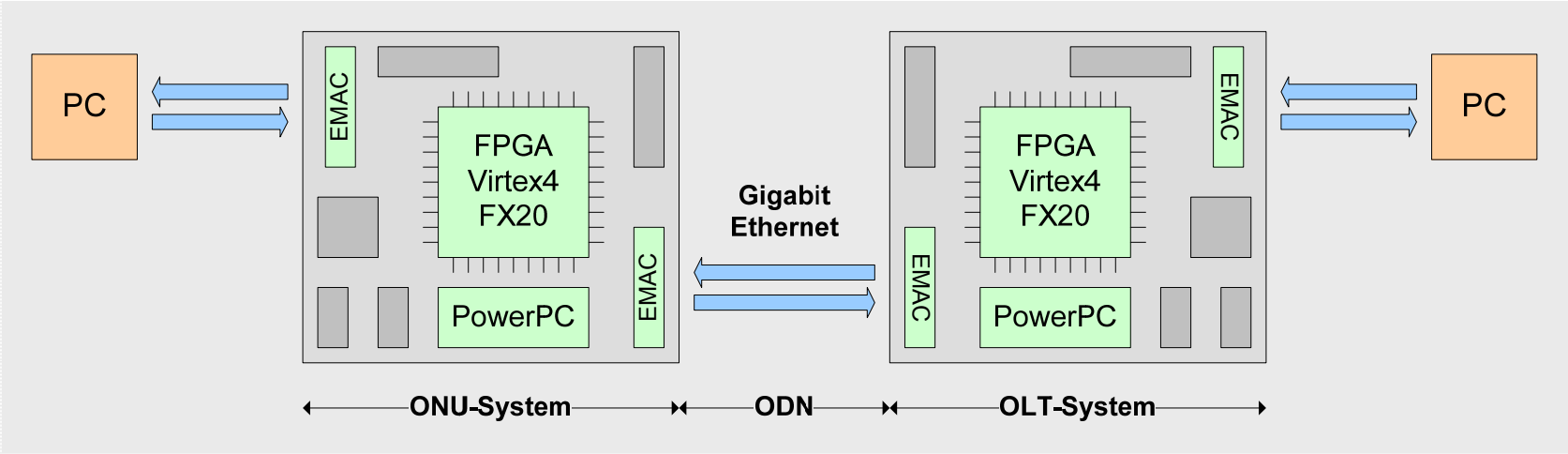
Basics • DBA

- **D**ynamic **B**andwidth **A**llocation → QoS-Feature
- Computation of TDM-Slots by DBA-algorithm
- Algorithm based on ONU management data

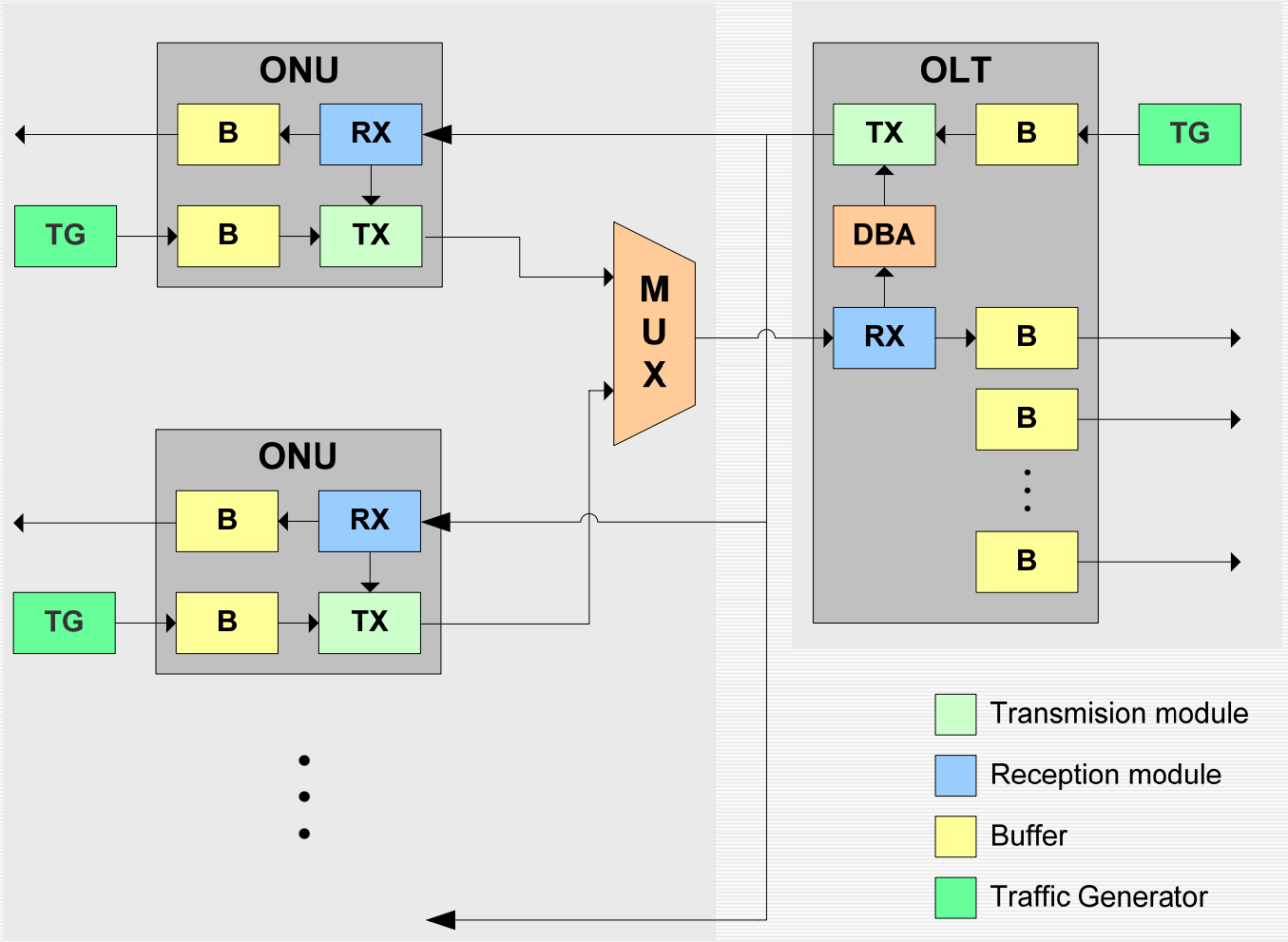


The Goal

Mapping of GPON onto an FPGA with an Ethernet-based System for analyzing different DBA-Algorithms

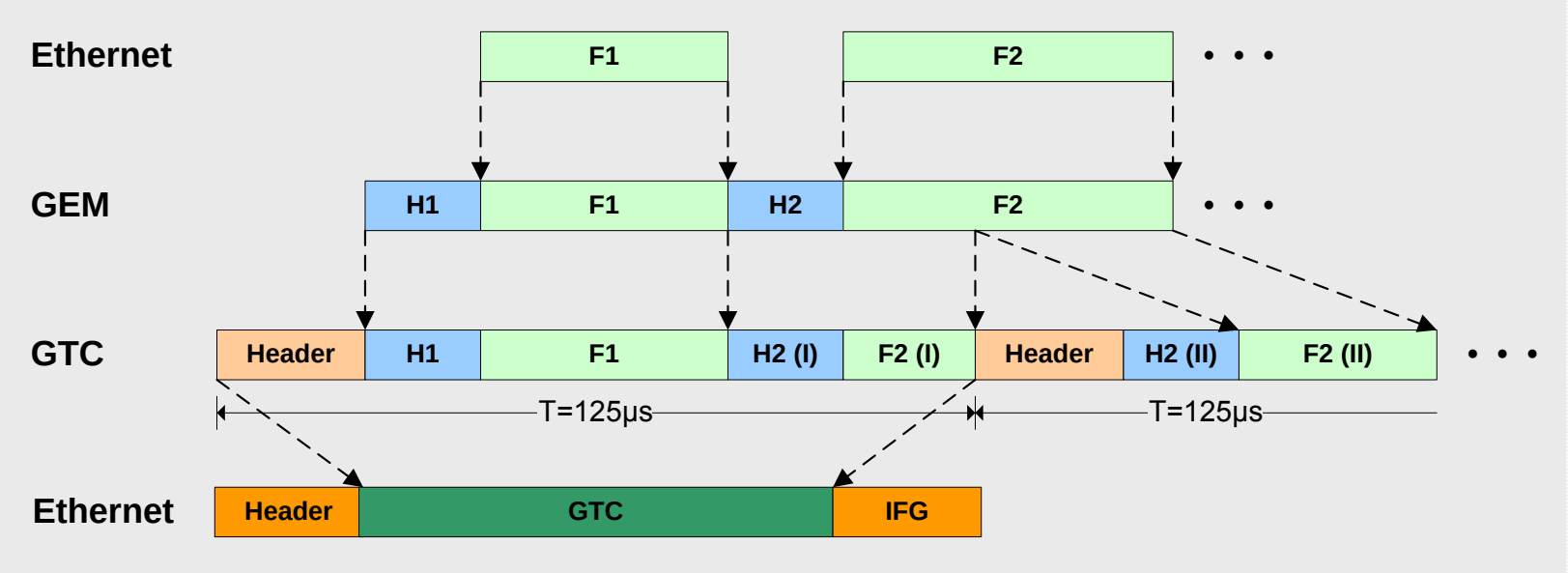


Model • Structure



Model • Functions

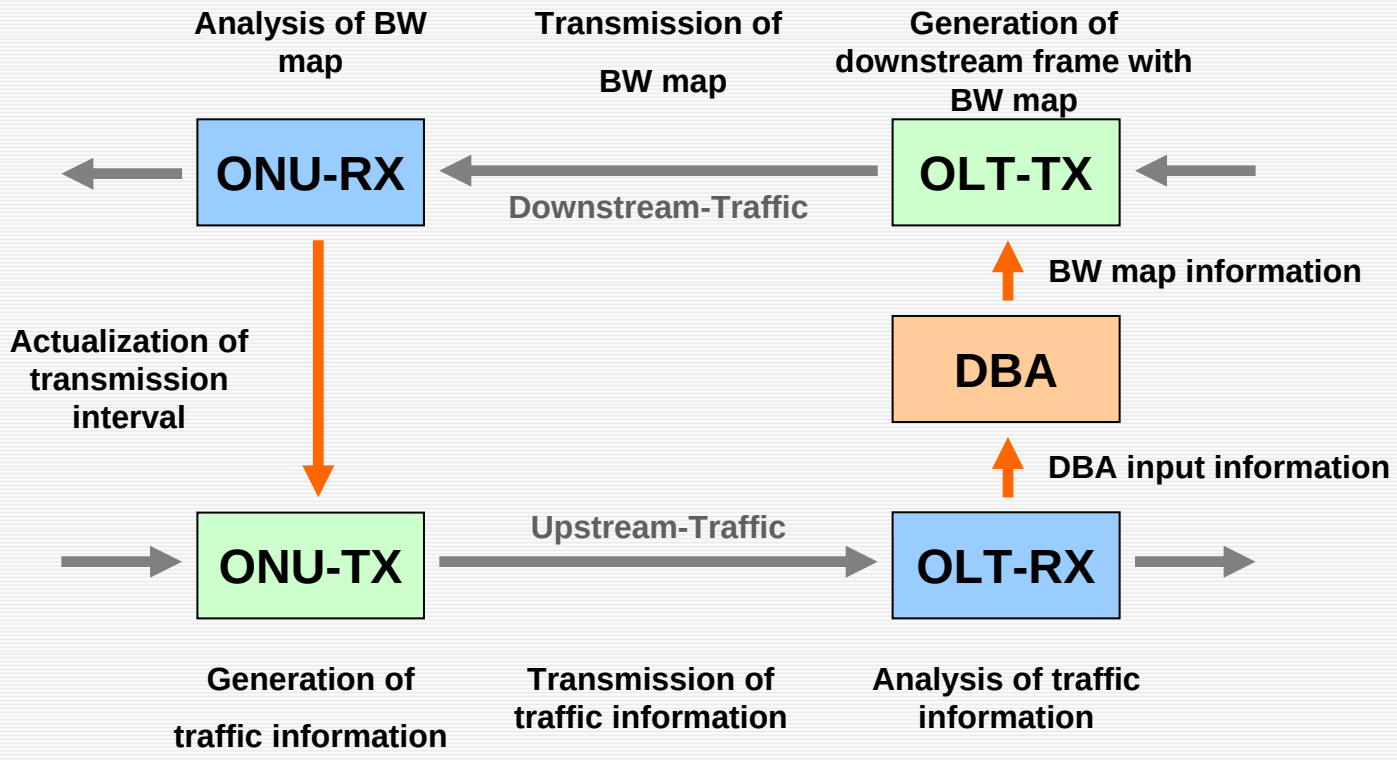
- Adaptation of payload to communication layer



- Synchronization of data stream
- Generation and Analysis of DBA information

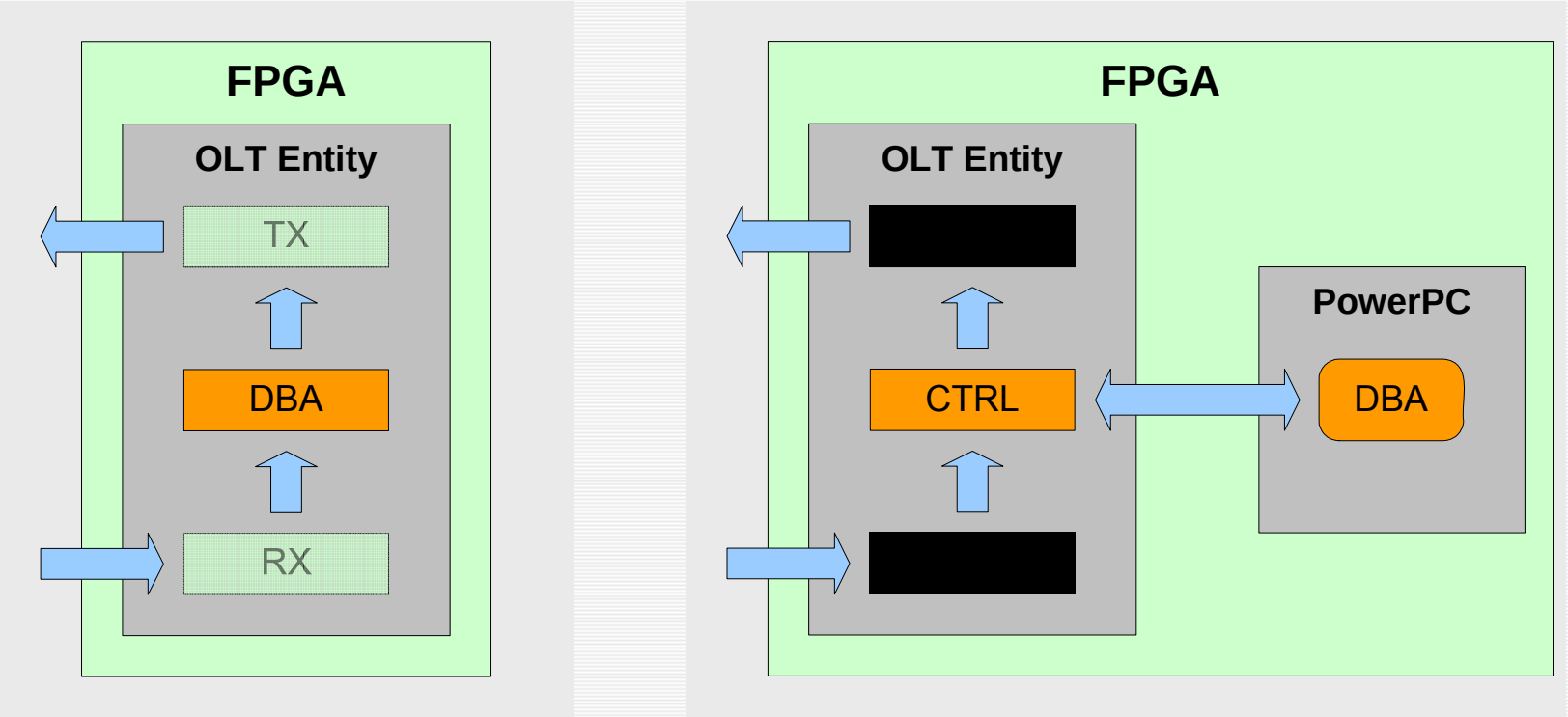
DBA • Computation

- Status Reporting and Non Status Reporting



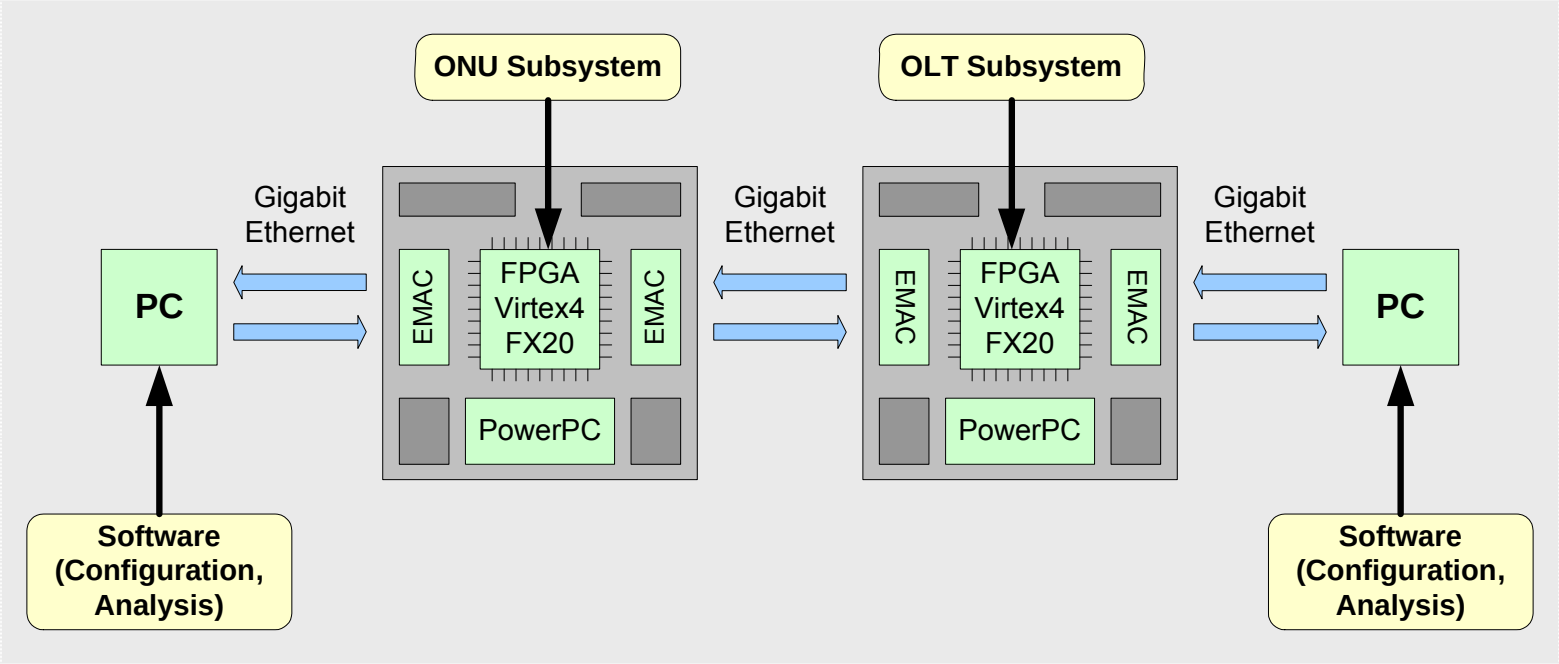
DBA • Hardware and Software

- Support of both Hardware and Software DBA-Algorithms



Prototype • FPGA

- Self-sustaining, bidirectional communication system
- Data rate → 1 GBit/s
- Online configuration and analysis



Results

- Parametrizable testbed as a model of GPON
- ITU-Standard G.984
- High data rate (1 GBit/s)
- Both hard- and software-DBA can be implemented and analyzed easily
- Configuration and Analysis at runtime

Effective test system for development and research of DBA-algorithms!

Final Page

Thank you!