

ADDAPT

Adaptive Data and Power Aware Transceivers for Optical Communications

ADDAPT

Project reference: 619197

Instrument: STREP

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Timeline:

Start Date: 01/11/2013

End Date: 30/04/2017

Budget:

Overall Cost: 4 775 856 EUR

Funding: 3 138 508 EUR

Project Partners:

- Technische Universität Dresden (TUD), DE
- IBM Research GmbH (IBM), CH
- VI Systems GmbH (VIS), DE
- Argotech as (AT), CZ
- Politechnika Warszawska/ Warsaw University of Technology (WUT), PL
- Compound Semiconductor Technologies (CSTG), GB
- PrimeTel PLC (PTL), CY
- Tyco Electronics Nederland BV (TE), NL

Vision & Aim

Existing optical networks are driven by dynamic user demands but operate statically at their maximum performance and do not offer much adaptability. Thus the links are not energy-efficient. ADDAPT aims at the development and technology take-up of dynamic transceiver subsystems. By implementing performance and power adaptivity from system down to optical device, electrical circuit and transistor level, flexible energy-efficient optical transmission links are enabled which pave the way for massive reductions of CO₂ emission and costs.

The concept of ADDAPT is shown in Fig. 1. Depending on the actual data load, the number of activated link paths and individual device parameters like bandwidth, clock rate, modulation format and gain are adapted to enable lowering the supply power. Several control types are investigated: cognitive adaption based on predetermined or time averaged loads and real-time adaption. Driven by control units including smart algorithms, the devices can be tuned from 8 to 56 Gb/s. Novel adaptive directly modulated lasers and photodetectors designed for near-field light coupling are developed to allow self-aligned low-cost waveguide assemblies with minimum optical power losses. Laser bandwidths beyond 30 GHz and power consumption can be traded off and controlled by driver circuits. Circuits such as amplifiers, drivers and clock data recoveries are designed in energy-efficient 32 nm CMOS and can be adjusted via current sources, dc/dc converters and switches. High-speed, low-loss packaging solutions using glass or ceramics are developed. An optical communication platform tailored for data centers is designed with 12 link paths and 10 m link distance for verification of speed adaption from 0.672 Tb/s to 8 Gb/s with power saving factors of up to 20.

ADDAPT is market and standard driven and combines the complementary competences of 3 large companies, 3 SMEs and 2 universities including device manufacturers, suppliers of communication equipment and network operators. Involved EU and associated countries are the Netherlands, Czech Republic, Poland, United Kingdom, Cyprus, Switzerland and Germany.

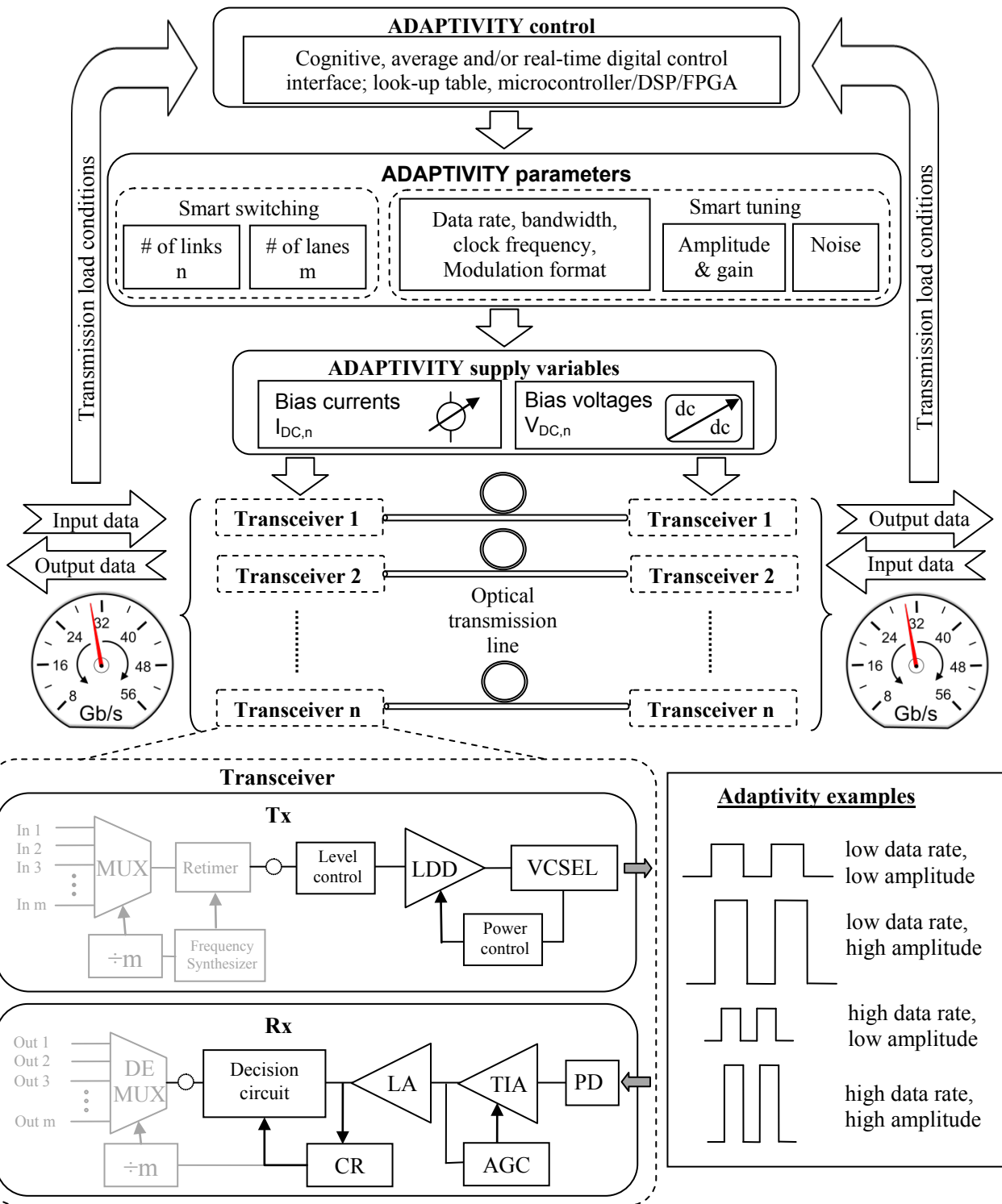


Figure 1: ADDAPT concept