Evaluation of AutoBahn Based High Speed Links and their use in the APEmille Project

Holger Leich

DESY Zeuthen

1. Introduction to AutoBahn

2. AutoBahn evaluation

3. Use of AutoBahn in the APEmille Project

- High speed, low latency PC or Workstation interconnection
- Serial interconnection between APEmille processing nodes
- PCI to APEchannel serial connection

Introduction to AutoBahn

The continuously growing performance of today‘s computers and peripheral components requires adequate data transfer technology. In new architectures high speed serial interconnections replace more and more traditional parallel implementations.

To serve the demand for high bandwidth data communication in computer and telecommunication environments Motorola introduced in 1994 a new serial bus concept - AutoBahn. Originally designed as a serial bus AutoBahn technology can also be used to implement point-to-point serial links.

Fig. 1 presents an overview over the main building blocks of the Autobahn chip.

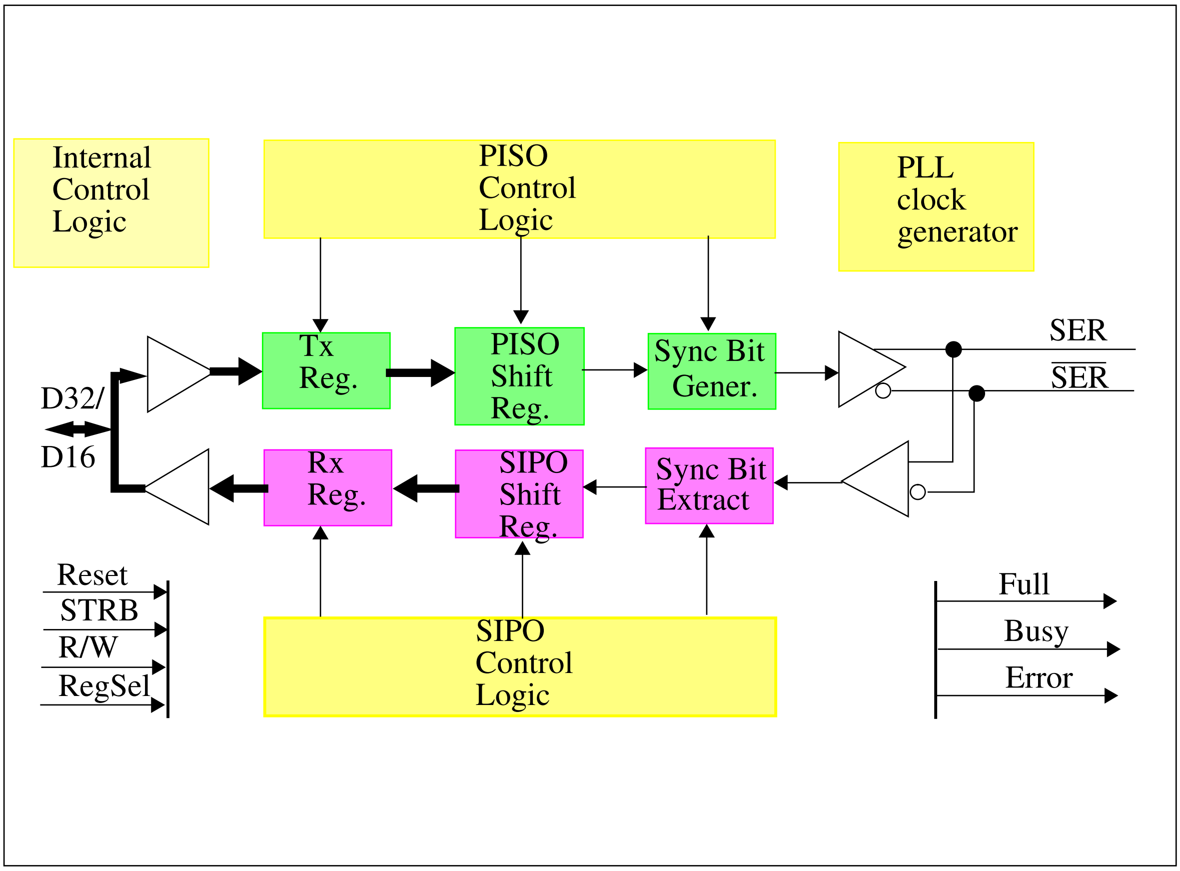

Fig. 1

The main architectural features of AutoBahn are:

- High bandwidth serial bus or serial point-to-point link
- Burst transfer rates of: 450, 900 (now) and 1800 (near future) MBit/s which corresponds to 50, 100, 200 MByte/s
- Variable data transfer rates: fixed burst transfer rates are combined with gaps in the data flow if no new data is written into the transmit register prior to the completion of a serial data burst
- 16/32 bit interface to a parallel bus system or other data sources
- Absence of a sophisticated transfer protocol (blocks, packets, ...). Thus the data transfer is nearly overhead free with only one synchronization bit for every byte.
- Use of wide-spread differential PECL technology at the physical level
- On-chip clock recovery and data synchronization
- One single chip for both sending and receiving data
- Space saving 64 pin SMD package

Serial bus protocol

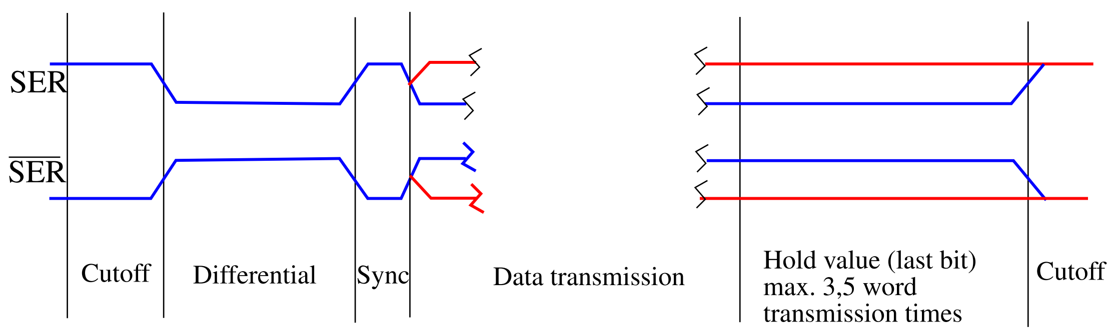

Fig. 2

AutoBahn device modes of operation :

- Idle
- Transmit
- Receive

After reset the device is in ***Idle Mode***. The serial bus is cut off and the receiver part of the device is listening to detect a bus activity.

The ***Transmit Mode*** is entered after data has been written into the parallel data register. The AutoBahn transfers the data to the serial transmit register, inserts framing information and shifts the data out (see Fig. 2).

In ***Receive Mode*** AutoBahn strips off the framing information and clocks the data into the serial register.

The following diagram illustrates these modes: