

Broadcom Corporation

PHY Support for Diode Discovery Cost Analysis

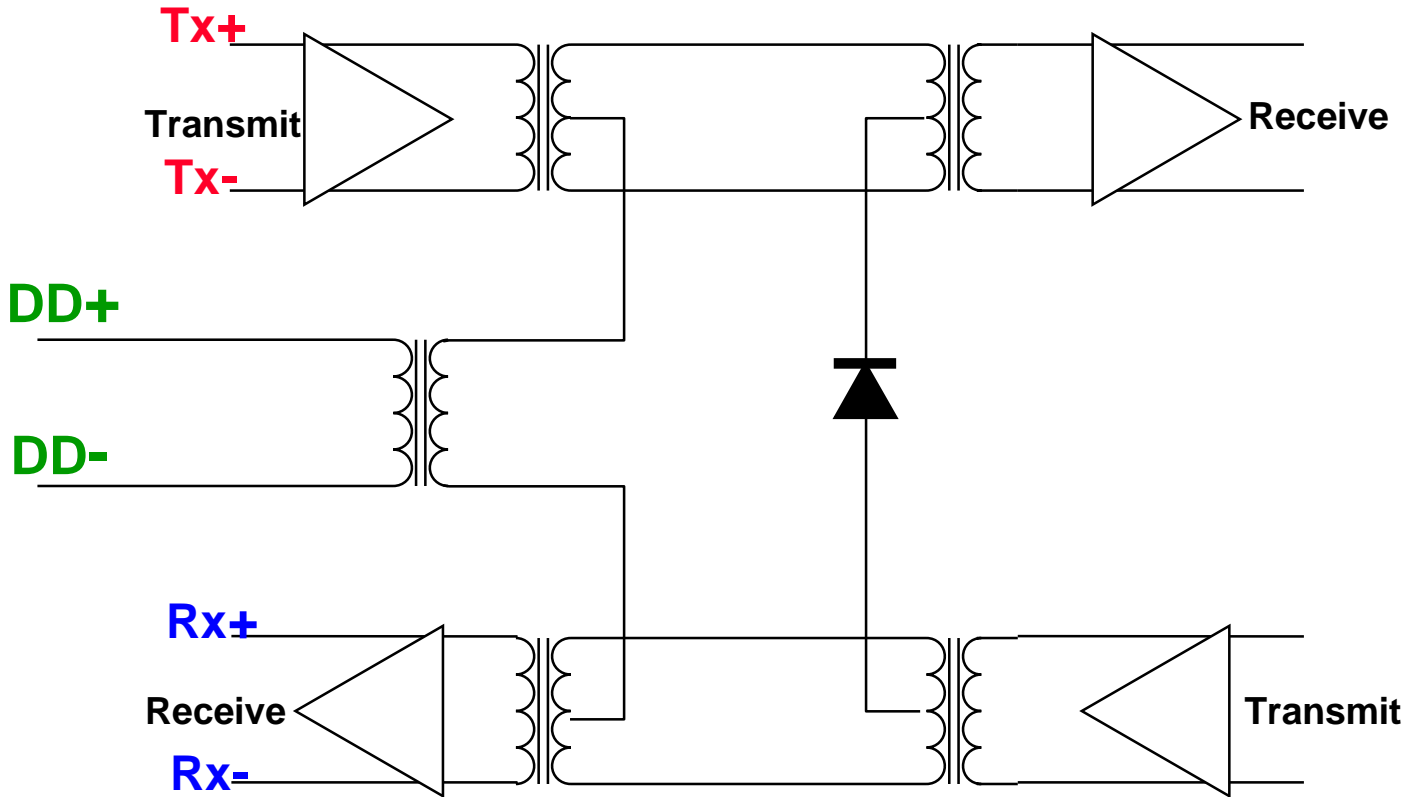
November - 2000



Diode Detection: Simplified Schematic

DTE Detecting Station

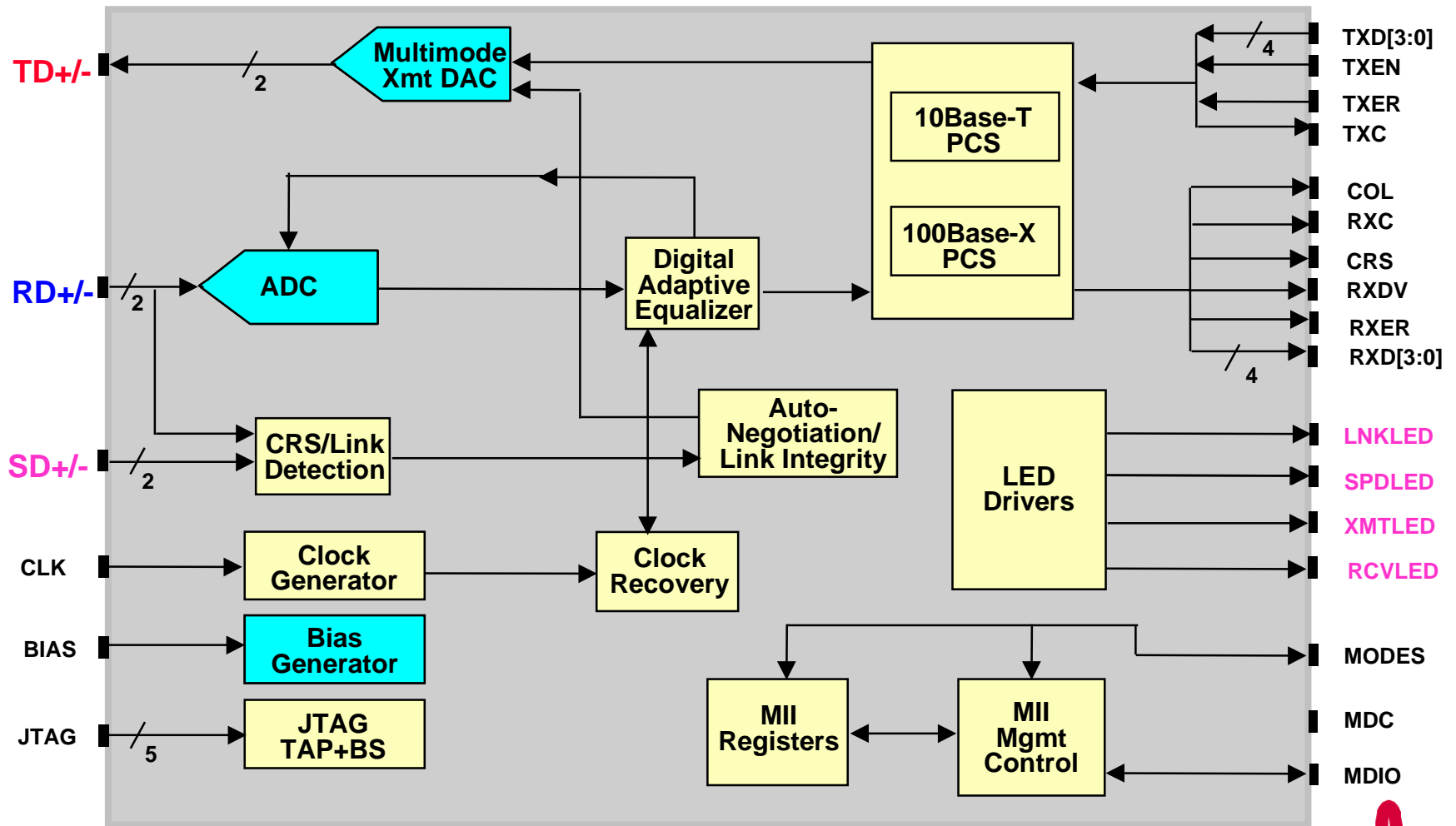
DTE Requiring Power



Supporting Diode Detection in the PHY

- **Transmit D/A Converter for driving differential signals**
 - Much simpler than typical 10BASE-T or 100BASE-TX driver
 - Can NOT share circuitry with existing 10/100 Transmit DAC
 - Increased capacitance would negatively affect return loss is 10/100 TransDAC and diode detection pins were connected.
- **Receive path with level detectors (slicer)**
 - Could be the same pads used for diode detection pulse transmission
- **Pad characteristics to support diode detection are significantly different than existing pads**
 - Multiplexing with Signal Detect or LED pins may not be possible

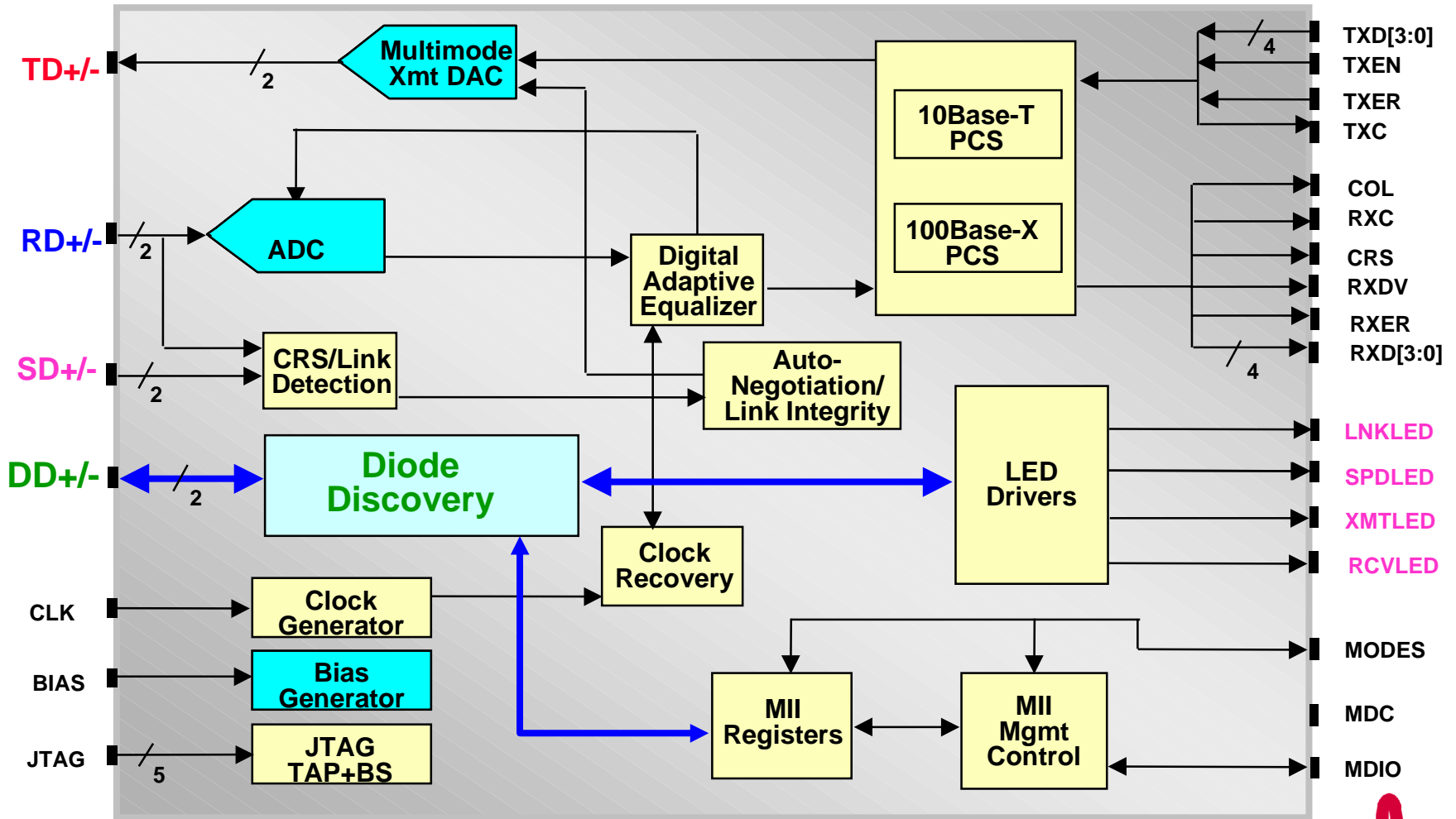
10/100 PHY: Representative Block Diagram



= Analog Block



10/100 PHY: Representative Block Diagram



Cost Impact on PHY

- **Year 2000 Typical 10/100 PHY for Switches:**
 - Octal PHY
 - 208 PQFP
 - average of 26 pins/per port
 - 0.2x micron CMOS
- **~10% extra Silicon area required in PHY core to support small additional transmit A/D (one per port)**
- **Extra silicon for receiver is insignificant**
- **May require 2 extra pads per port ($2/26 = 8\%$)**
 - Alternative is to give up existing functionality (e.g., LED or Signal Detect)
- **Maximum extra cost per PHY $\leq 10\%$**



Cost Impact on Switch

- **Assumptions:**

- Silicon cost (all IC's) typically 40-50% of the total assembled cost of a 10/100 switch WITHOUT support for DTE power
- PHY is typically 15-30% of total IC cost
 - Depends on functionality of switch (high end vs. low end)

- **PHY cost is typically 8-12% of the total switch cost**

- PHY cost could go up 10% to support diode detection

- **Cost adder for Diode detection in the PHY will be 0.8% to 1.2% of the total switch cost**

- Before adding cost of additional power supplies, et cetera to support DTE power

- **E.g., \$10.00/port total manufactured cost would increase to \$10.10**



Conclusion

- **Cost impact of implementing Diode Detection in a 10/100 PHY is not significant relative to total system cost of adding DTE power**
- **Silicon cost of diode detection is less than the cost of the additional transformer**