

# Board Test in 5-10 Years

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# High-speed vs. Low-speed Test

- › Gigabit serial links already dominates data transport on- and off-board
- › Today, relevant support for at-speed test of Gigabit serial links exists, e.g. PRBS generation and checking
- › BTW, is this functional or structural test?
- › But the links are designed to be robust, and subtle defects are sometimes not detected
- › Hence, 1149.6 will still be needed as a complement in the future
- › Beside the above, the majority of interconnects will still be slow speed signals, which will benefit from 1149.1, e.g. control signals, resets, interrupts and slow speed serial interfaces, like I2C, SPI, etc.



# Some Problems Will Be Solved

- › Today 1149.6 only works for FPGAs if they are loaded
- › 1149.6 often requires that the serial links are configured
- › This requires that the board processor is operational, but some 1149 vectors makes the SW crash, and disrupts subsequent functional test
- › We have even seen cases where 1149.6 only works OK at certain narrow TCK frequencies
- › The above issues must be solved!
- › Embedded discretes in the unpopulated PCB will drastically reduce the fault probability and simplify board testing
- › Testing DDR interconnect and memory banks is complex
- › This will be drastically reduced with Hybrid Memory Cubes with serial links and MBIST in the bottom logic chip



# New Challenges will Show Up

- › The increasing trends of M2M and IoT will call for better methods and techniques for HW self-test in the field
- › The self-test could also simplify production test of boards
- › But 1149 tests must also be capable of including the board processor
- › And BIST, in particular LBIST must work also for upcoming IC processes
- › Voltage drop is the major problem with LBIST, it must be solved
- › Further, on-board measurement capabilities, with little need for external equipment, must be enhanced
- › 3D devices may introduce new challenges for board test