

Design of Programmable Logic System Based on FPGA Technology



(可编程逻辑系统设计与FPGA技术)

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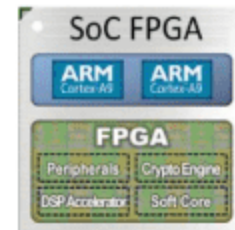
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Future Trend for FPGA Development

- ❑ System-on-Programmable-Chip (SoPC)
Integration for FPGA
 - ✓ Heterogeneous architecture embedded with application domain specified processing cores such as microprocessors, DSP accelerators, etc.
- ❑ Software-defined FPGA
 - ✓ High Level Synthesis (e.g. OpenCL)
 - ✓ Fusion with microprocessor applications
- ❑ Customized FPGA design based on novel parallel processing architecture for high computational efficiency
 - ✓ Neural networks
 - ✓ Video/image processing, Artificial Intelligence



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Future Trend for FPGA Development (cont.)

- Applications in the next generations of ultra high frequency communication systems
- The programmability of FPGAs provides a flexible implementation platform to lead the multiple standards, multiple frequency bandwidths, and multiple sub-networks technology advances



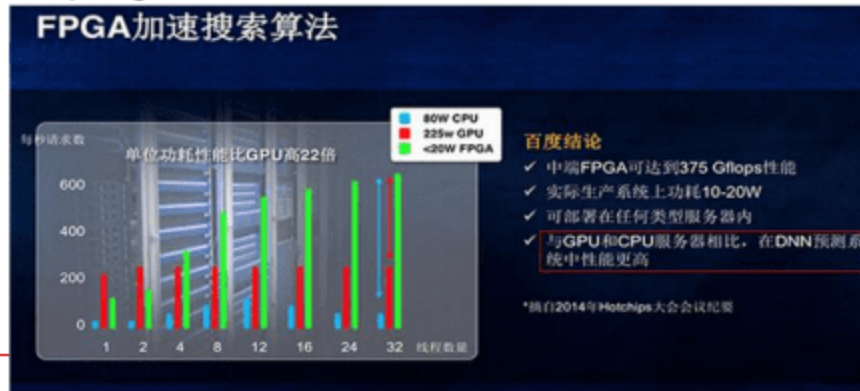
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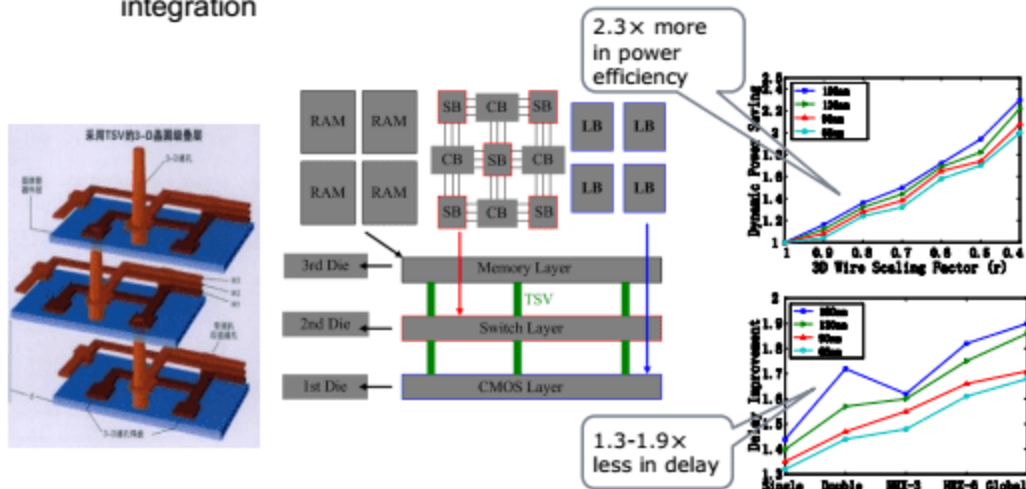
Future Trend for FPGA Development (cont.)

- Applications in the new generation of data center, cloud computing, etc
- The parallel signal processing nature of FPGAs is capable of realizing the technology transitions of the Ethernet from 10G, 40G upto 100G, and the hardware acceleration for energy efficient computing



Research Directions in Giga-Scale FPGA

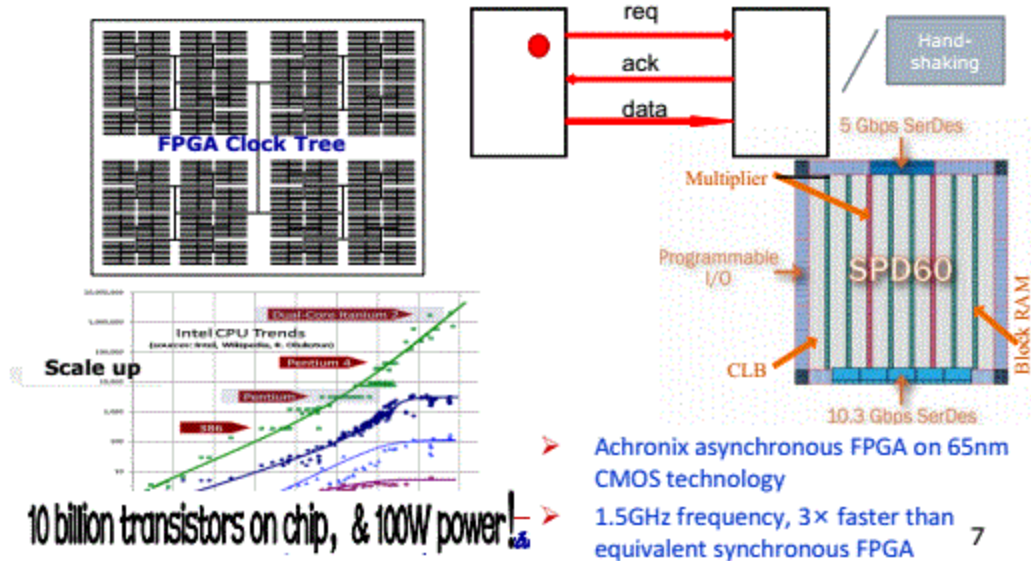
- Chip packaging technology innovation (more than Moore)—3D integration



Research Directions in Giga-Scale FPGA (cont.)



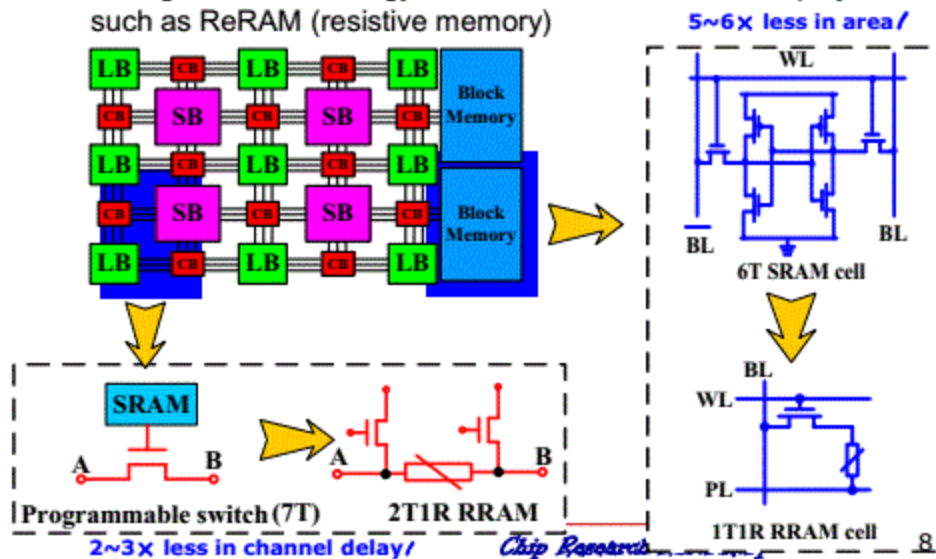
- Circuit technology innovation—asynchronous approaches



Research Directions in Giga-Scale FPGA (cont.)



- Configuration technology innovation—new devices employed such as ReRAM (resistive memory)



Research Directions in Giga-Scale FPGA (cont.)

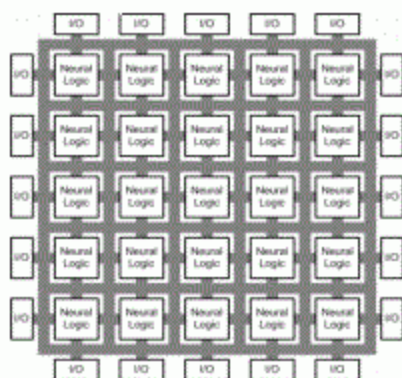


- System technology innovation SoPC
 - "FPGA+CPU"
 - "FPGA+DSP"
 - "FPGA+ASIC"

Research Directions in Giga-Scale FPGA (cont.)



- Architecture innovation reconfigurable microstructures for cognitive computing



Unmanned Vehicle
(Recognition of roads, vehicles and pedestrians)

Facial recognition and video surveillance

- In GOPS/W, 1000× more than CPU and 100× than GPU

