PRODUCT BRIEF | Intel Atom® P5900 Processors

ADVANCED PERFORMANCE FOR 5G WIRELESS BASE STATIONS

As the radio access network (RAN) infrastructure of wireless carriers evolves to meet the intense demands of 5G, additional compute is required at the edge of the network. Careful consideration is critical across the board—from overarching design down to the selection of key components in base transceiver station equipment—for 5G networks to reliably meet the demands of next-generation service opportunities with lower latencies, higher bandwidth, and increased network capacity.

RAN INFRASTRUCTURE EVOLUTION

Intel has never had a stronger or more comprehensive portfolio of solutions to enable the RAN. From Intel® Xeon® Scalable processors to Intel Atom® processors, FPGAs, ASICS, and more, Intel continues to deliver cutting-edge hardware for 5G infrastructure. Even so, it's our significant investments in software that enable service providers to make the most of our hardware, from drivers and operating systems up through entire production-quality software stacks. This interconnected platform of hardware and software allows service providers to get to market quickly while still offering the flexibility needed to address various deployment scenarios.

Furthermore, with the increasing adoption of innovations found in cloud deployments, service providers are realizing the benefits of extending a platform combining common cloud software with Intel® architecture-based hardware from the core to the edge. A common software ecosystem for platform virtualization and customer applications—using a common Intel instruction set architecture across the infrastructure—enables faster deployment of new software and features while also making new service offerings and revenue models possible.

AN EXCITING NEW CLASS OF EDGE PROCESSORS

Intel Atom P5900 processors are the first of an all-new class of high-throughput, low-latency Intel Atom P processors for high-density network edge and security solutions. These new system-on-chip (SoC) processors are designed from the ground up to meet the demanding throughput, power, environmental, and latency requirements of 5G base transceiver stations, featuring advanced accelerators and exciting new levels of technology integration.

WITH SIGNIFICANT GAINS RELATIVE TO THE BEST-PERFORMING INTEL ATOM C3000 PROCESSORS, NEW INTEL ATOM P5900 PROCESSORS OFFER UP TO:

1.8X
MORE INTEGER THROUGHPUT[1]

1.6X
MORE SINGLE-CORE PACKET-FORWARDING THROUGHPUT[2]

7%
MORE MEMORY BANDWIDTH[3]

HIGH PERFORMANCE PER WATT

Power-efficient CPU core design

Intel's 10nm process technology

Fully integrated voltage regulators (FIVR)

ULTRA-LOW LATENCY

Hardware-based network acceleration technologies

Scalable coherent fabric interconnecting CPU cores and network accelerators

INTEGRATED PACKET PROCESSING

New Intel® Dynamic Load Balancer efficiently distributes traffic across CPU cores

Intel® QuickAssist Technology accelerates security and compression

Fully integrated switch for inline cryptography acceleration

Intel® Ethernet 800 Series technology to improve network performance

INTEL ATOM P5900 PROCESSOR FEATURE SPECIFICATIONS AT A GLANCE

UP TO **24** Intel Atom P5000 processor cores, based on the Tremont microarchitecture

L1 CACHE OF **32** KB per core

L2 CACHE OF **4.5** MB per 4-core cluster

and shared LLC cache up to 15MB

BASE FREQUENCY SUPPORT OF UP TO **2.2** GHz single thread performance

MEMORY CAPACITY OF UP TO **128** GB of DDR4 up to 2933 MT/s with server-class reliability, availability, and serviceability (RAS) and support for RDIMM, UDIMM, SODIMM, and memory down

UP TO **100** Gbps throughput with integrated Intel Ethernet 800 Series technology

UP TO **100** Gbps security processing with Intel QuickAssist technology

UP TO **440** Gbps network switching connectivity support with up to 20 fully integrated Ethernet SerDes

UP TO **16** lanes of flexible high-speed I/O configured as PCIe*, SATA, and/or USB 3.0

UP TO **16** lanes of PCIe Gen 3.0

UP TO **4** USB 2.0 ports, eMMC 5.1, LPC, or eSPI

EXTENDED TEMPERATURE SUPPORT OF **-40°C TO 85°C** with full dynamic temperature range

5G NETWORK EDGE ACCELERATION

INTEL® DYNAMIC LOAD BALANCER

Dynamically and efficiently distributes network traffic across cores for improved performance and reduced latency. Queue management operations historically handled in software are moved to hardware. Achieve up to 3.7X more packet processing versus software queue management.[4]

INTEL QUICKASSIST TECHNOLOGY (INTEL QAT)

Offloads compute-intensive security and compression algorithms to hardware, freeing up compute cycles for other tasks. Support for inline and look-aside encryption, decryption, and authentication with separate engines for symmetric cryptography, public-key encryption, and compression. Delivers up to 5.6X more secured network communication with Intel QAT versus software.[5]

FLEXIBLE PACKET PROCESSOR AND SWITCH

Accelerates inline cryptography processing and offers flexible parsing, classification and modification with integrated access control list (ACL) processing and dual-rate policing.

INTEL ETHERNET 800 SERIES TECHNOLOGY

Reduces network latency and helps to accelerate network performance. Get up to 16% more packet throughput using this integrated connection versus the use of an external NIC.[6]

ACCELERATED THROUGHPUT GAINS OF UP TO

3.7X
WITH INTEL DYNAMIC LOAD BALANCER[4]

5.6X
WITH INTEL QAT[5]

16%
WITH INTEL ETHERNET 800 SERIES TECHNOLOGY[6]

INTEL ATOM P5900 PROCESSORS – BASE TRANSCEIVER STATION SKUS

PROCESSOR NAME	CPU CORES	BASE CPU SPEED	MAX. DRAM CAPACITY	MEMORY SPEED	INTEGRATED INTEL ETHERNET 800 SERIES TECHNOLOGY (THROUGHPUT)	INTEGRATED INTEL QAT	SWITCHING (CONNECTIVITY)	ETEMP SUPPORT
Intel Atom P5962B Processor	24	2.2 GHz	128 GB	Up to DDR4-2933 MT/s	Up to 100 Gbps	Up to 100 Gbps	Up to 440 Gbps	Yes
Intel Atom P5942B Processor	16	2.2 GHz	128 GB	Up to DDR4-2933 MT/s	Up to 100 Gbps	Up to 100 Gbps	Up to 440 Gbps	Yes
Intel Atom P5931B Processor	12	2.2 GHz	128 GB	Up to DDR4-2933 MT/s	Up to 50 Gbps	Up to 50 Gbps	Up to 300 Gbps	Yes
Intel Atom P5921B Processor	8	2.2 GHz	64 GB	Up to DDR4-2933 MT/s	Up to 50 Gbps	Up to 50 Gbps	Up to 180 Gbps	Yes

MORE INFORMATION ON INTEL ATOM P PROCESSORS AVAILABLE AT:

www.intel.com/atomp

1. Tested by Intel on 1/24/2020, 1x Intel Atom® P5962B processor (Running under B-0 Eng Silicon codenamed C6562 24C, 2.2GHz) on Intel internal Frost Creek platform, 4x 32GB DDR4 2933MHz (128GB Total Memory), OS: Ubuntu 19.10 with Kernel: 5.3.0-26-generic, BIOS: JBVLCRB1.86B.0012.D75.1912120439, uCode: 0x9b020002, Benchmark: SPECrate*2017_int_base (Estimated), Compiler: ICC 19.0. 5.281, Storage: Intel® SSD D3-S4510 Series 1.92TB compared to 1x Intel Atom® processor C3955, Intel internal Harcuvar platform with 4x 32GB DDR4 2400MHz (128GB Total Memory), OS: Ubuntu 19.10 with Kernel: 5.3.0-26-generic, BIOS: HAVLCRB1.X64.0016.D06.1903270418, ucode: 0x2e, Benchmark: SPECrate*2017_int_base (Estimated), Compiler: ICC 19.0. 5.281, Storage: Intel® SSD DC S3520 800GB.

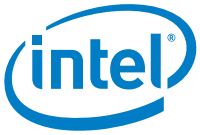
2. Tested by Intel on 1/27/2020, 1x Intel Atom® P5952B processor (Running under A-3 Eng Silicon 20C, 2.2GHz) on Intel internal Victoria Canyon platform, 16GB DDR4 2933MHz, OS: Ubuntu 18.04 with Kernel: 5.2.10-rt5, BIOS: JBVLCRB1.86B.0012.D17.1911070324, uCode: 0x90040006, Benchmark: DPDK L3FWD-ACL(1C/1T/1P) (Estimated), Software: DPDK 19.05, Compiler: GCC 7.3.0 with MKL, Network: Integrated Intel® Ethernet 800 series (100GbE) compared to 1x Intel Atom® processor C3955 (Eng Sample B-1, 16C, 2.1GHz), Intel internal Harcuvar platform with 32GB DDR4 2400MHz, OS: Ubuntu 18.04 with Kernel: 5.2.10-rt5, BIOS: HAVLCRB1.X64.0015.D62.1700310404, ucode: 0x0000001A, Benchmark: DPDK l3FWD-ACL (1C/1T/1P) (Estimated), Software: DPDK19.05, Compiler: GCC 7.3.0 with MKL, 1x Intel® Ethernet Network Adapter X710-DA4 (10GbE).

3. Tested by Intel on 1/24/2020, 1x Intel Atom® P5962B processor (Running under B-0 Eng Silicon codenamed C6562 24C, 2.2GHz) on Intel internal Frost Creek platform, 4x 32GB DDR4 2933MHz (128GB Total Memory), OS: Ubuntu 19.10 with Kernel: 5.3.0-26-generic, BIOS: JBVLCRB1.86B.0012.D75.1912120439, uCode: 0x9b020002, Benchmark: STREAM_triad (Estimated), Compiler: ICC 19.0. 5.281, Storage: Intel® SSD D3-S4510 Series 1.92TB compared to 1x Intel Atom® processor C3955, Intel internal Harcuvar platform with 4x 32GB DDR4 2400MHz (128GB Total Memory), OS: Ubuntu 19.10 with Kernel: 5.3.0-26-generic, BIOS: HAVLCRB1.X64.0016.D06.1903270418, ucode: 0x2e, Benchmark: STREAM_Triad (Estimated), Compiler: ICC 19.0. 5.281, Storage: Intel® SSD DC S3520 800GB.

4. Tested by Intel on 1/27/2020, 1x Intel Atom® P5952B processor (Running under A-3 Eng Silicon 20C, 2.2GHz) on Intel internal Victoria Canyon platform, 16GB DDR4 2933MHz ,OS: Ubuntu 18.04 with Kernel: 5.2.10-rt5, BIOS: JBVLCRB1.86B.0012.D17.1911070324, uCode: 0x90040006, Benchmark: DPDK Event Device Ordered Scheduling (3 stages) (Estimated), Software: RDK19.11, Compiler: GCC 7.3.0 with MKL, Network: 1x Intel® Ethernet Network Adapter X710-DA4 (10GbE) compared to 1x Intel Atom® P5952B processor (Running under A-3 Eng Silicon 20C, 2.2GHz) on Intel internal Victoria Canyon platform, 16GB DDR4 2933MHz, OS: Ubuntu 18.04 with Kernel: 5.2.10-rt5, BIOS: JBVLCRB1.86B.0012.D17.1911070324, uCode: 0x90040006, Benchmark: DPDK Event Device Ordered Scheduling (3 stages) (Estimated), Software: RDK19.11, Compiler: GCC 7.3.0 with MKL, Network: 1x Intel® Ethernet Network Adapter X710-DA4 (10GbE).

5. Tested by Intel on 1/27/2020, 1x Intel Atom® P5952B processor (Running under A-3 Eng Silicon 20C, 2.2GHz) on Intel internal Frost Creek platform, 16GB DDR4 2933MHz, OS: Ubuntu 18.04 with Kernel: 5.2.10-rt5, BIOS: JBVLCRB1.86B.0011.D44.1909191126, uCode: 0x90010006, Benchmark: DPDK IPSec (using Intel® QAT) (1420B packet size) (1C/1T/1P) (Estimated), Software: DPDK 19.05, Compiler: GCC 7.3.0 with MKL, Network: Integrated Intel® Ethernet 800 series (100GbE) compared to 1x Intel Atom® P5952B processor (Running under A-3 Eng Silicon 20C, 2.2GHz) on Intel internal Frost Creek platform, 16GB DDR4 2933MHz, OS: Ubuntu 18.04 with Kernel: 5.2.10-rt5, BIOS: JBVLCRB1.86B.0011.D44.1909191126, uCode: 0x90010006, Benchmark: DPDK IPSec (using software cipher algorithm AES-128-CBC) (1420B packet size) (1C/1T/1P) (Estimated), Software: DPDK 19.05, Compiler: GCC 7.3.0 with MKL, Network: Integrated Intel® Ethernet 800 series (100GbE).

6. Tested by Intel on 1/27/2020, 1x Intel Atom® P5952B processor (Running under A-3 Eng Silicon 20C, 2.2GHz) on Intel internal Victoria Canyon platform, 16GB DDR4 2933MHz, OS: Ubuntu 18.04 with Kernel: 5.2.10-rt5, BIOS: JBVLCRB1.86B.0012.D17.1911070324, uCode: 0x90040006, Benchmark: DPDK L3FWD-ACL (1C/1T/1P) (Estimated), Software: DPDK 19.05, Compiler: GCC 7.3.0 with MKL, Network: Integrated Intel® Ethernet 800 series (100GbE) compared to 1x Intel Atom® P5952B processor (Running under A-3 Eng Silicon 20C, 2.2GHz) on Intel internal Victoria Canyon platform, 16GB DDR4 2933MHz, OS: Ubuntu 18.04 with Kernel: 5.2.10-rt5, BIOS: JBVLCRB1.86B.0012.D17.1911070324, uCode: 0x90040006, Benchmark: DPDK L3FWD-ACL (1C/1T/1P) (Estimated), Software: DPDK 19.05, Compiler: GCC 7.3.0 with MKL, Network: 1x Intel® Ethernet Network Adapter X710-DA4 (10GbE).



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