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

1.6X MORE SINGLE-CORE PACKET-FORWARDING THROUGHPUT

7% MORE MEMORY BANDWIDTH

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 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 16 USB 2.0 ports, eMMC 5.1, LPC, or eSPI

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

UP TO 100 Gbps throughput with integrated Intel Ethernet 800 Series technology
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 BALANCER⁴
5.6X WITH INTEL QAT⁵
16% WITH INTEL ETHERNET 800 SERIES TECHNOLOGY⁶

INTEL ATOM P5900 PROCESSORS – BASE TRANSCEIVER STATION SKUS

<table>
<thead>
<tr>
<th>PROCESSOR NAME</th>
<th>CPU CORES</th>
<th>BASE CPU SPEED</th>
<th>MAX. DRAM CAPACITY</th>
<th>MEMORY SPEED</th>
<th>INTEGRATED INTEL ETHERNET 800 SERIES TECHNOLOGY (THROUGHPUT)</th>
<th>INTEGRATED INTEL QAT</th>
<th>SWITCHING (CONNECTIVITY)</th>
<th>ETTEMP SUPPORT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intel Atom P5962B Processor</td>
<td>24</td>
<td>2.2 GHz</td>
<td>128 GB</td>
<td>Up to DDR4-2933 MT/s</td>
<td>Up to 100 Gbps</td>
<td>Up to 100 Gbps</td>
<td>Up to 440 Gbps</td>
<td>Yes</td>
</tr>
<tr>
<td>Intel Atom P5942B Processor</td>
<td>16</td>
<td>2.2 GHz</td>
<td>128 GB</td>
<td>Up to DDR4-2933 MT/s</td>
<td>Up to 100 Gbps</td>
<td>Up to 100 Gbps</td>
<td>Up to 440 Gbps</td>
<td>Yes</td>
</tr>
<tr>
<td>Intel Atom P5931B Processor</td>
<td>12</td>
<td>2.2 GHz</td>
<td>128 GB</td>
<td>Up to DDR4-2933 MT/s</td>
<td>Up to 50 Gbps</td>
<td>Up to 50 Gbps</td>
<td>Up to 300 Gbps</td>
<td>Yes</td>
</tr>
<tr>
<td>Intel Atom P5921B Processor</td>
<td>8</td>
<td>2.2 GHz</td>
<td>64 GB</td>
<td>Up to DDR4-2933 MT/s</td>
<td>Up to 50 Gbps</td>
<td>Up to 50 Gbps</td>
<td>Up to 180 Gbps</td>
<td>Yes</td>
</tr>
</tbody>
</table>
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1. Tested by Intel on 1/24/2020, 1x Intel Atom® P5952B processor (Running under A-3 Eng Silicon 20C, 2.2GHz) on Intel internal Frost Creek platform, 4x 32GB DDR4 2933MHz (128GB Total Memory), OS: Ubuntu 18.04 with Kernel: 5.3.0-26-generic, BIOS: JBVLCRB1.86B.0012.D75.1911700324a, uCode: 0x9b000006, Benchmark: SPECrate*2017_int_base (Estimated), Compiler: ICC 19.0.5.281, Storage: Intel® SSD DC S3520 800G.

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: 5.3.0-26-generic, BIOS: HAVLCR81.X64.0016.D06.1903270418b, uCode: 0x2e, Benchmark: SPECrate*2017_int_base (Estimated), Compiler: ICC 19.0.5.281, Storage: Intel® SSD DC S3520 800G.

3. Tested by Intel on 1/24/2020, 1x Intel Atom® P5952B processor (Running under A-3 Eng Silicon 20C, 2.2GHz) on Intel internal Frost Creek platform, 4x 32GB DDR4 2933MHz (128GB Total Memory), OS: Ubuntu 18.04 with Kernel: 5.3.0-26-generic, BIOS: JBVLCRB1.86B.0012.D75.1911700324a, uCode: 0x9b000006, Benchmark: STREAM_Triad (Estimated), Compiler: ICC 19.0.5.281, Storage: Intel® SSD DC S3520 800G.

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