

Maximize Blockchain Performance in Emerging Markets with Zenlayer High-Performance Edge Cloud Services

Zenlayer’s Bare Metal Cloud (BMC), Zenlayer Cloud Networking, and emerging market expertise give blockchains and Fintech companies instant access to low-latency and scalable infrastructure worldwide.

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Executive Summary

According to the United States Census Bureau, the world population has surpassed 7.9 billion. China, with 1.41 billion, leads India, with 1.39 billion.¹ According to Data Reportal, 5 billion people—63 percent of the population—now use the internet.² China, India, and Southeast Asia represent much of the emerging markets where the world’s companies seek new internet services customers, from business-to-business (B2B) and e-commerce to streaming and social media.

To continue their growth, many connected businesses will need to reach new consumers in these emerging markets. But, customers in these markets expect service providers to deliver the same low-latency, high-quality experiences as those in developed markets. Additionally, companies must meet customer expectations while preparing for the next generation of Web 3.0, which will rely on de-centralization and compute-intensive blockchain technology.

Zenlayer provides edge cloud services around the planet, with expertise in helping companies penetrate emerging markets, such as China, India, and Southeast Asia. Zenlayer edge cloud services are enabled by over 290 Points of Presence (PoPs) in more than 50 countries across six continents (Figure 1). Along with the company’s cloud networking capabilities, these edge nodes allow companies to reach over 85 percent of the world’s internet population in under 25 milliseconds (ms).³

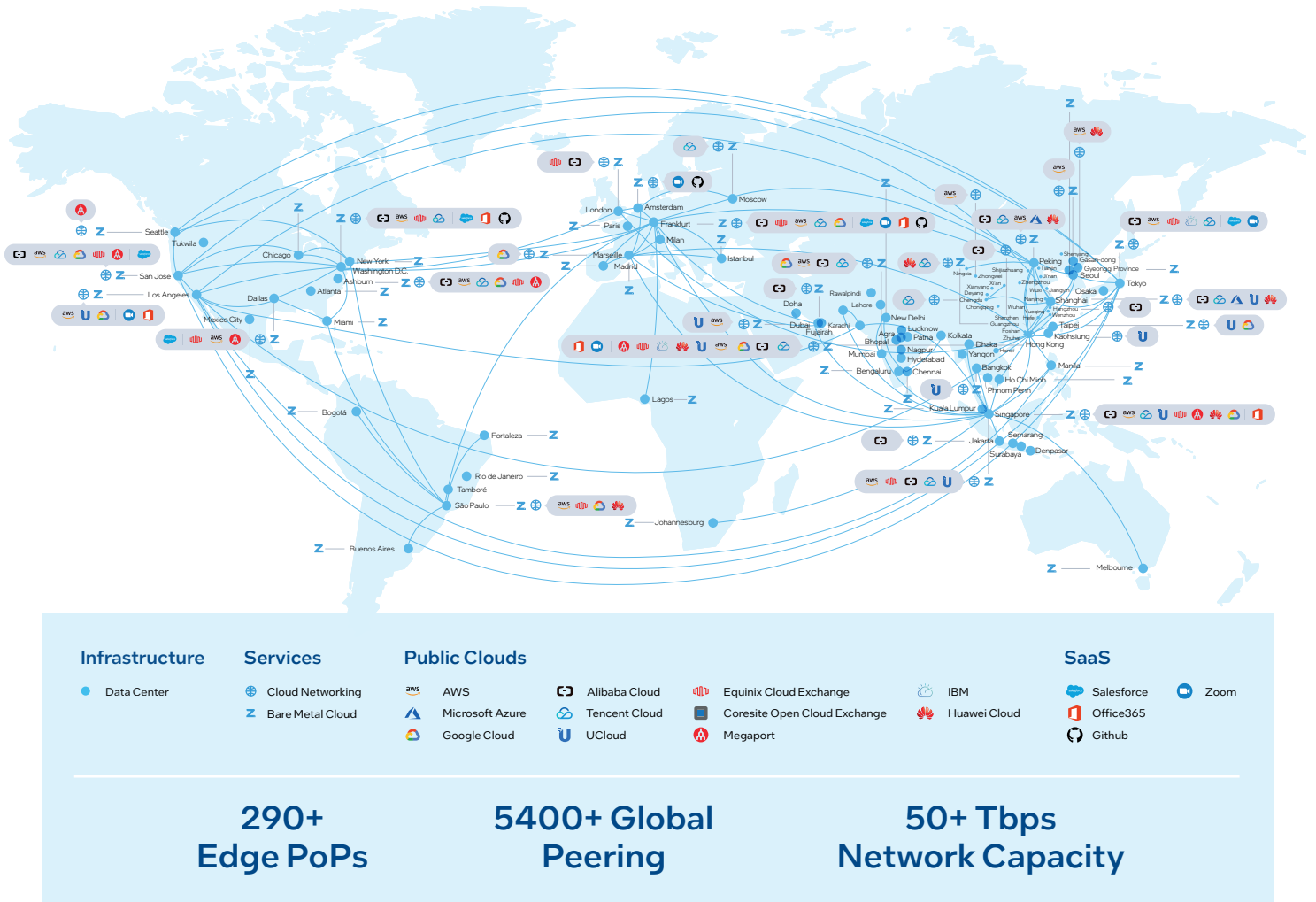
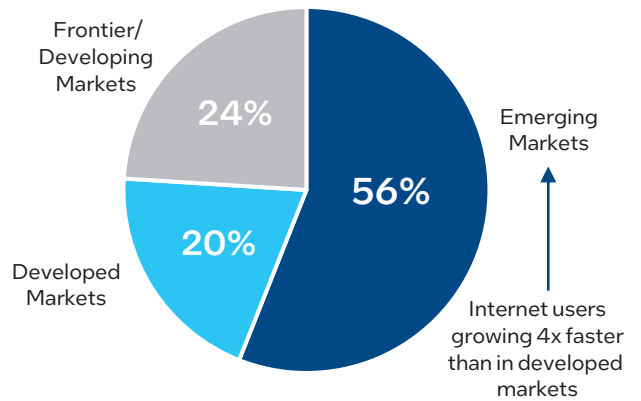


Figure 1. Zenlayer's global coverage.

Zenlayer provides a variety of deployment models, including Bare Metal Cloud (BMC), for many types of business: B2B, e-commerce, streaming media, and more. Bare Metal Cloud offerings include the 3rd Generation Intel® Xeon® Scalable processors and server configurations that can include other Intel® technologies to accelerate applications and services. The latest Zenlayer deployments are designed to enable Web 3.0 and support scalable blockchain services in emerging markets.

This white paper looks at Zenlayer's Bare Metal Cloud offering and how Intel technologies help Zenlayer deliver the performance and low latency that blockchain and other performance-demanding services need today.

Share of Global Internet Users



Two-thirds of Zenlayer's 270+ PoPs are in emerging countries, covering more than any other cloud provider.

The Benefits of Bare Metal Cloud

Public Cloud Versus Zenlayer BMC

Public cloud enables quickly scalable, easy-to-deploy, and cost-effective IT services for many use cases. The deployment model is a great choice for many business needs. But it is not suitable for all, leaving a critical gap in IT services that BMC fills between public cloud and on-premises dedicated servers.

Zenlayer BMC is a hybridized methodology that uses cloud orchestration technology to quickly deploy dedicated bare metal servers in a highly scalable manner with predictable pricing. Consider these differences between public cloud and BMC:

- Cloud deployment shares node resources across many tenants, loading the node with overhead to support these multiple instances. Zenlayer BMC dedicates all node resources to the customer.
- Public cloud services offer elastic scalability, but the environment is shared and managed by the service provider. BMC delivers elastic scalability while giving organizations personal control over their own hardware environment and security.
- Today's cloud security technologies are strong, but a shared environment is still shared, giving sophisticated attackers opportunities on a single instance. BMC nodes are standalone, isolated from other customers.
- Public cloud offers a pay-for-what-you-use infrastructure that can be stood up and taken down in minutes. Such orchestration and cost model are not limited to cloud. Like public cloud, BMC eliminates the capital investment in standing up dedicated hardware, time to deploy, and maintenance required to run servers, while offering a low Total Cost of Ownership (TCO) through a predictable cost model.
- A shared environment means some CPU cycles go to overhead, and the system is optimized for the service provider, not the applications. BMC delivers standalone server performance for the most demanding use cases, and the server can be finely tuned to the needs of the application(s) running on it.

Deploying BMC solutions offers low latency, high throughput, and security-enabled services. Zenlayer's BMC offerings give businesses the features of co-located, dedicated servers with the speed of deployment, flexibility, and cost model of cloud services.

High-Performance Computing Power with Cloud Flexibility

Companies expanding into emerging markets need performance across their services to meet customer expectations. Besides high-performance, scalable BMC offerings, Zenlayer Cloud Networking capabilities and expertise in emerging markets are also available. These combined give companies the resources they need to quickly establish a low-latency service presence in major and emerging markets with direct connectivity to their own on-premises servers and public clouds around the world.

Zenlayer BMC offerings include a range of server configurations of up to 256 GB of memory and 40-core 3rd Gen Intel Xeon Scalable processors. Whether hardware is needed for high frame rate gaming, launching new 5G services, e-commerce, low-latency blockchains, financial technology and banking, or many other services, Zenlayer servers can support compute-intensive workloads and integrate advanced technologies, such as:

- 3rd Gen Intel Xeon Scalable processor SKUs that deliver an average 50 percent more performance compared to prior generations on a range of latency sensitive workloads.⁴
- Intel® Software Guard Extensions (Intel® SGX), a set of instructions that allow companies to build secure enclaves in memory to protect data and applications as they run.
- Intel® Advanced Vector Extensions 512 (Intel® AVX-512) accelerates a range of floating point calculations used in cryptography, error correction, and other functions.
- Intel® Deep Learning Boost (Intel® DL Boost) accelerates AI inferencing at the edge.
- Intel® Crypto Acceleration, a set of new cryptographic instructions, apply Single Instruction Multiple Data (SIMD) techniques and vectorization to efficiently increase the number of calculations performed in each clock cycle.

Additionally, network-optimized versions of 3rd Gen Intel Xeon Scalable processors are ideal for deployment of wireless core, wireless access, and network edge workloads and security appliances. They are available in a range of configurations with features and power to deliver low-latency, high-throughput, and deterministic performance.

Ready for Web 3.0 and Blockchains

Web 3.0 is coming. That means de-centralization, which requires a high level of data integrity, security, and protection since information is remotely stored across hundreds or thousands of platforms around the world. Data and transaction validation uses compute-intensive blockchain consensus mechanisms. Consensus demands high cryptography performance. Yet servers also need to support high transaction per second (TPS) throughput to enable growth of online services in these new markets, while ensuring exceptional customer experiences. Thus, servers need to deliver high-performance, low-latency processing and high-speed networking at the edge.

Initial blockchain technologies limited TPS throughput due to their intense computing requirements to support consensus. Web 3.0, with new blockchain approaches, focuses on power efficiency, security, and scalability, enabling higher throughput.

Cryptography and Network Performance are Essential

Cryptography is fundamental in blockchain technology to enable trust among participants and protect data. Cryptography is used for signing, verification, encryption, and hashing.


Hashing functions and crypto algorithms used in blockchains can include the following:

- SHA256 and SHA3 are hashing functions widely used by blockchains.
- SHA512 is being adopted for greater security and quantum-proof.
- Elliptic Curve Cryptography (ECC) schemes, including Elliptic Curve Digital Signature Algorithm (ECDSA) and Edwards-curve Digital Signature Algorithm (EdDSA), plus Boneh-Lynn-Shacham (BLS) signature scheme for public and private keys.
- Advanced Encryption Standard (AES) for data encryption.

The performance of hash functions and crypto algorithms across all blockchain operations is crucial to achieving the high transaction throughputs needed for Web 3.0. Thus, the type of consensus mechanism—Proof of Work (PoW) or Proof of Stake (PoS)—and choice of processor and networking for blockchain services are crucial to transaction throughput performance.

- PoW—Hashing dominates processing demand in PoW-based blockchains, such as Bitcoin and Ethereum 1.0. High CPU demand just for hashing in these types of blockchains limit transaction throughput and thus scalability for more transactions.
- PoS—This blockchain methodology use a different consensus approach and balances cryptography capabilities across encryption, signature, verification, and hashing. PoW processes demand less from the processor, allowing higher transaction throughput for the CPU, but it requires efficient, low-latency networking to ensure a node is standing in the blockchain.⁵

Zenlayer Bare Metal Cloud infrastructure with low-latency cloud networking helps ensure the high performance needed for scalability—especially for PoS blockchains. To achieve these, Zenlayer deploys servers built on—and with software stacks optimized for—3rd Generation Intel Xeon Scalable processors.



Zenlayer engineers performed benchmarks of their own on SHA512 and SHA256 crypto functions. Running tests on 3rd Gen Intel Xeon Scalable processors and other brand CPUs, the Intel processor-based servers achieved up to 8X faster public key encryption and decryption.⁶

Intel Xeon Scalable Processors Accelerate Blockchain Cryptography

Zenlayer is deploying servers built on 3rd Gen Intel Xeon Scalable platforms for low-latency services with high TPS at the edge. These server processors deliver unique features that give Zenlayer advantages in key workloads that customers want, including performance acceleration using built-in technologies, such as the following:

- Intel DL Boost for AI acceleration.
- Intel AVX-512 for faster vector processing.
- Intel® Crypto Acceleration for faster operations in cryptography.

Intel Crypto Acceleration introduces several new instructions to increase performance of cryptographic operations. These instructions offer a significant advantage for hashing and other operations found in blockchain consensus, including for AES, TLS, SHA-256, Galois hashes, and more. Intel benchmarks demonstrate gen-to-gen performance improvements on encryption, key, and hashing operations using Intel Crypto Acceleration.

Intel Crypto Acceleration SIMD techniques and vectorization take advantage of Intel AVX-512 to execute more operations per CPU clock cycle. Intel also enabled the most widely used cryptographic software primitives to execute the new instructions, increasing performance of applications that use these technologies. The enhancements deliver generational improvements across a range of algorithms run on 3rd Gen Intel Xeon Scalable processors and platforms, including the following:

- Up to 4.2X faster public key encryption and decryption (RSA, DH, ECDHE, ECDSA), benefiting SSL and Public Key Infrastructure (PKI) use cases.^{7[90]}
- At least 1.09X faster secure hash performance with secure hash algorithm-NI^{7[69]}, benefiting digital signatures, blockchains, and other use cases.

These performance gains can be achieved in the leading software ecosystems, including OpenSSL, BoringSSL, Linux Kernel, Java, GoLang, and Kubernetes (K8S).

Enabling Confidential Computing with Intel® SGX

Intel is investing with ecosystem partners on making blockchains more secure by incorporating Confidential Computing with Intel SGX into blockchain technology.

The blockchain software stack comprises many layers. At each layer, there is opportunity to protect data and code using secure enclaves as they traverses memory. Intel SGX can be used to create secure enclaves so data and code can be protected while in-use, adding new transaction, data, or process confidentiality elements to blockchains and related operations. 3rd Gen Intel Xeon Scalable processors support Intel SGX secure enclaves.

Zenlayer BMC High-Performance Offerings

Zenlayer now offers servers built on 3rd Gen Intel Xeon Scalable processors through their Bare Metal Cloud service. These new platforms offer high-performance computing power for new blockchain-based services and applications for improved digital experiences across a wide range of established and emerging markets.

The Need for Low-Latency Global Cloud Networking for High-Quality Customer Experiences

Low-latency edge cloud services require more than high-performance servers. For example, global financial services often maintain their own financial technology (fintech) infrastructure. Yet the latency of the network connections over the last mile and from customer to PoP can have a significant impact on customer experience and operations efficiency. These institutions need low-latency connectivity across the geographies they serve, including outlying branches and posts. Additionally, both local companies and international enterprises need fast network responses across their sales force, supply chains, manufacturing sites, and distributed offices.

Establishing low-latency connectivity worldwide is not an easy task. There are many network providers around the globe. Each one is constrained by a country's regulations and infrastructure. Navigating IP transport services across continents and jurisdictions can become a time-consuming, complicated, and costly endeavor for the average IT director.

Zenlayer has done the navigation, regulatory compliance, and network due diligence to provide low-latency connectivity. The company established physical resources for high-performance services, supported by a worldwide 40 terabyte per second backbone. The backbone comprises more than 440 private lines that connect the company's Point of Presence (PoPs) around the globe and onramp to other Cloud Service Providers. With the network's throughput, Zenlayer can minimize latency from continent to continent.

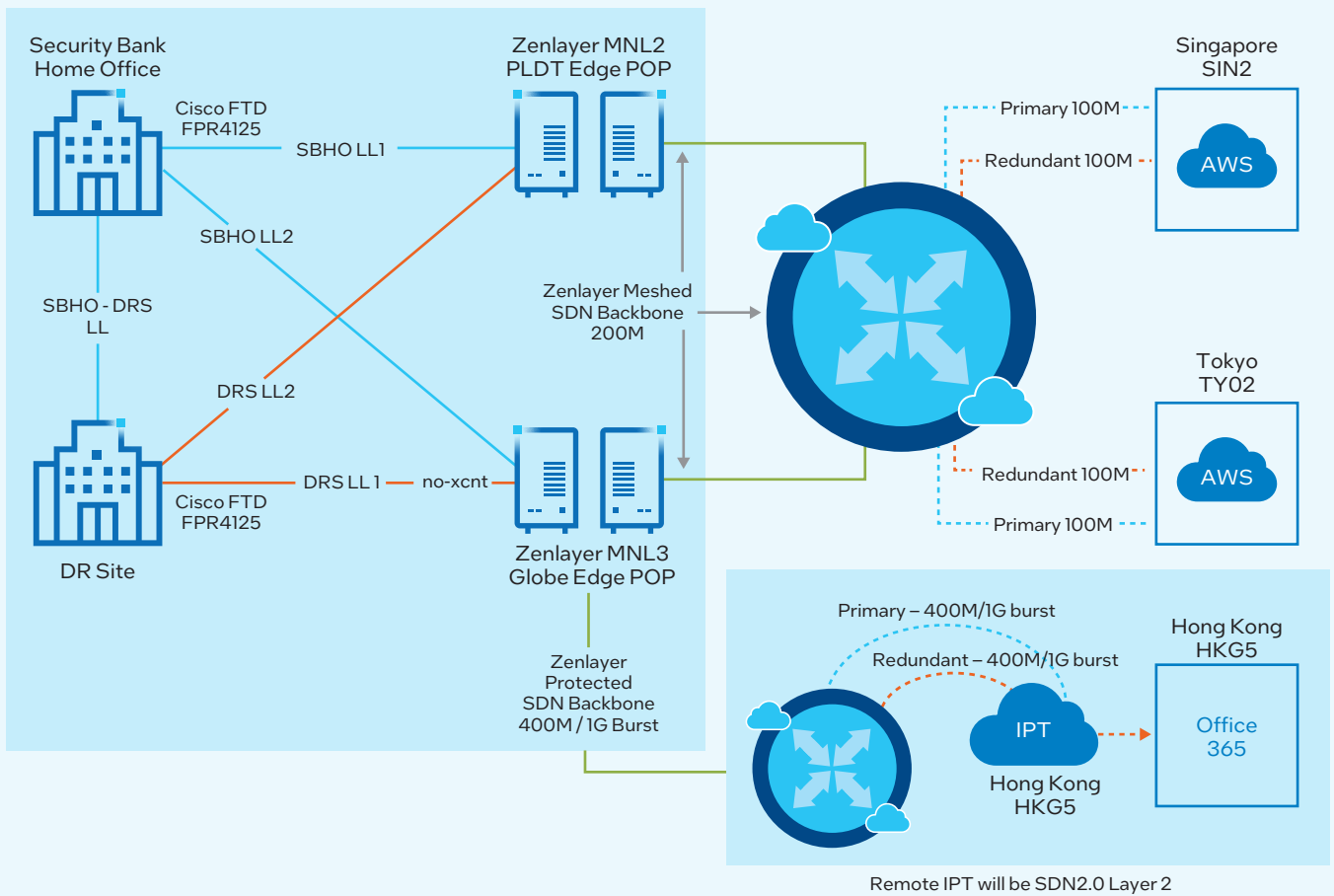
Case Study

Zenlayer Delivers Low-Latency Multi-National Connectivity for Philippine-Based Financial Services Company

A Philippine-based financial services company with over 500 employees across Asia suffered with poor cloud performance, resulting in undesirable user experiences for its distributed workers. The company needed to streamline access to its cloud applications by reducing latency and connectivity issues, while enhancing security.

Zenlayer delivered a single-source solution for diverse network requirements across multiple geographies. Zenlayer provided two local loops connecting the bank office and disaster recovery site in the Philippines with local edge PoPs in Singapore, Tokyo, and Hong Kong. Each edge PoP connected to public clouds using Zenlayer’s private redundant backbone network and Software-defined Network (SDN) switch. The solution ensured fast, reliable, and secure connectivity to end users.

The project resulted in 75 percent improved latency for the end customer with 99.99 percent availability uptime.⁶ The deployment was completed in just five days.



Conclusion

Zenlayer offers robust, high-performance edge nodes with the geo-technical expertise that can help companies reach emerging markets quickly at predictable costs. The company's BMC offerings and cloud networking allow companies to reach more than 85 percent of the world's internet population in under 25 ms.³ These offerings, with 3rd Gen Intel Xeon Scalable processors and their built-in Intel acceleration technologies, enable organizations to innovate and create a wide range of connected services while supporting Web 3.0 initiatives. Customers turn to Zenlayer to reach customers across the globe, including markets in China, India, Southeast Asia, Africa, South America, and other geographies. Their advanced edge cloud services enable enterprises to deliver the high-quality experiences at the edge that customers expect.

For additional information, visit the following resources:

www.zenlayer.com/blog/blockchain-cryptography-performance-intel-xeon-cpu/

www.zenlayer.com/blog/web-3-edge-computing-blockchain/

www.zenlayer.com/blog/blockchain-pos-chains-infrastructure-performance/

www.zenlayer.com/blog/What-is-blockchain-and-how-blockchain-integrates-with-edge-computing-technology/

www.zenlayer.com/press/hut-8-zenlayer-partnership-web-3-blockchain/



For more information about Zenlayer systems and offerings, visit zenlayer.com

Zenlayer BMC
Bare Metal Cloud – Zenlayer

Zenlayer Cloud Networking
Cloud Networking – Zenlayer

¹<https://www.census.gov/popclock/>

²<https://datareportal.com/global-digital-overview>

³Zenlayer proprietary research.

⁴BERT-Large SQuAD: 1.45x higher INT8 real-time inference throughput & 1.74x higher INT8 batch inference throughput & 1.22x performance/core: Platinum 8380: 1-node, 2x Intel® Xeon® Platinum 8380 processor on Coyote Pass with 512 GB (16 slots/ 32GB/ 3200) total DDR4 memory, ucode 0x261, HT on, Turbo on, Ubuntu 20.04 LTS, 5.4.0-65-generic, 1x Intel_SSDSC2KG96, Intel® SSDPE2KX010T8,

BERT - Large SQuAD, gcc-9.3.0, oneDNN 1.6.4, BS=1,128 INT8, TensorFlow- 2.5 (container-intel/intel-optimized-tensorflow:tf-r2.5-icx-b631821f), Model zoo: <https://github.com/IntelAI/models/tree/icx-launch-public/quickstart/>, test by Intel on 3/12/2021. Platinum 8280: 1-node, 2x Intel® Xeon® Platinum 8280 processor on Wolf Pass with 384 GB (12 slots/ 32GB/ 2933) total DDR4 memory, ucode 0x5003003, HT on, Turbo on, Ubuntu 20.04 LTS, 5.4.0-48-generic, 1x Samsung_SSD_860, Intel® SSDPE2KX040T8,

BERT - Large SQuAD, gcc-9.3.0, oneDNN 1.6.4, BS=1,128 INT8, TensorFlow- 2.5 (container-intel/intel-optimized-tensorflow:tf-r2.5-icx-b631821f), Model zoo: <https://github.com/IntelAI/models/tree/icx-launch-public/quickstart/>, test by Intel on 2/17/2021.

⁵Read more about the importance of infrastructure in blockchains at <https://www.zenlayer.com/blog/blockchain-pos-chains-infrastructure-performance/>

⁶Measured by Zenlayer.

⁷Performance varies by use, configuration, and other factors. For workloads and configurations, visit intel.com/performanceindex. Results may vary.

Performance results are based on testing as of dates shown in configurations and may not reflect all publicly available updates.

See backup for configuration details. No product or component can be absolutely secure.

Your costs and results may vary. Intel does not control or audit third-party data. You should consult other sources to evaluate accuracy.

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