

STATEMENT OF CONSIDERATIONS

REQUEST BY SAMSUNG FEDERAL, INC. (SAMSUNG)¹ FOR AN ADVANCE WAIVER OF DOMESTIC AND FOREIGN RIGHTS IN SUBJECT INVENTIONS MADE IN THE COURSE OF OR UNDER RFQ 2045198 UNDER PRIME CONTRACT NO. DE-NA0003525;

WAIVER DOCKET W(A)2023-003

The Petitioner, Samsung desires worldwide patent rights in any Subject Inventions made in the course of, or under, the above-identified proposal. Samsung also desires to retain all existing Intellectual Property Rights and Copyrights to the hardware and software IP used in Samsung's Memory Coupled Compute (MCC) technology, SmartCube products, and supernode technologies.

The scope of research issued by National Technology and Engineering Solutions of Sandia (NTESS) comprises understanding the unique High-Performance Computing (HPC) requirements of the Advanced Simulation and Computing (ASC) mission of the National Nuclear Security Administration (NNSA). The ultimate goal of the proposed project is to implement methodology to improve the applicability of the first and subsequent revisions of Samsung's MCC technology, SmartCube products, and supernode technologies to ASC mission applications and for the wider HPC community.

The source of funding is NTESS. The dollar amount and period of performance is approximately \$5M and 5 years (not yet specified in the RFQ). The figures are according to Sandia National Laboratories (SNL). Samsung's cost share is 40% of the \$5M. The scope of work is for Supercomputing/High Performance Computing technologies and is not intended for use in the production or utilization of special nuclear material or atomic energy.

Samsung is a recognized world leader in memory and silicon technology and has a long history with high-performance computing and supercomputing at the component level. Memory offerings from Samsung including DDR, High Bandwidth Memory (HBM), and Flash memory, have been the fundamental backbone of the memory and storage subsystems for HPC machines since the nineties and those offerings continue to supply memory needs into the exascale era. Furthermore, Samsung has acquired and utilized supercomputing infrastructure internally starting with a Cray in 1992 through its most recent SSC-21 system, an HPE machine that delivered ~30 PFlop/s and, debuted 11th in November, 2021 and was 18th on the most recent November 2022 Top 500 list.²

¹ Although this waiver is connected to an agreement with Samsung Federal, Inc, the provided waiver and all its associated obligations is also applicable to other Samsung affiliates, subsidiaries, and parent company. When the document refers to "Samsung" without additional modifiers, it is referencing Samsung Electronics, Co. LTD. and its various subsidiaries and affiliates.

² (<https://www.top500.org/>)

Samsung intends to build upon its industry leadership in memory technology. It is developing a supercomputer based on MCC technology. Samsung has hired leading and respected supercomputer experts into Samsung Advanced Institute of Technology (SAIT). SAIT is the central research institute of Samsung Electronics that has been established to lead the Company into the future and serve as an incubator of cutting-edge technologies. Specifically, Samsung is investing in a world class lab, Systems Architecture Lab, dedicated to the research and development of the supercomputer technologies. The supercomputer will be an energy and cost-efficient multi-exaflop capable system architecture with the potential to have the highest memory and network byte/flop characteristics among contemporary systems in the 2025-2030 post-exascale era.

Samsung's proposed design is built on the principles of scalability, symmetry, and simplicity. Samsung plans to architect and design simple, verifiable, reliable, and high-yielding MCC building blocks. These building blocks can be connected and scaled up to enable state-of-the-art, flexible and configurable HPC system designs with extreme power efficiency for real applications (not just peak numbers).

The capability of the Samsung supercomputer design will enable new science, run larger AI training models with greater power efficiency, and enable significant performance improvements over existing models. Furthermore, Samsung will demonstrate how new and diverse use of memory and communication architectures can break the cost constraints that have driven generations of supercomputers leading up to the exascale era to make a tradeoff for high compute performance at the expense of memory and communication performance.

As part of Samsung's Supercomputer/HPC investments, Samsung is committed to both technology and economic development by expanding fabrication and technology partnership in the United States. Samsung will partner with and expand the base of integrators and silicon design vendors. Additionally, Samsung's has invested \$47B into the United States and has ~20,000 employees across the U.S. since beginning operations in 1978. In 2021, Samsung announced it is expanding its U.S. manufacturing capabilities with a \$17B factory investment in Taylor, Texas. The Taylor factory will boost the production of semiconductor solutions that will power next-generation technologies in areas like 5G, artificial intelligence (AI) and HPC. With greater manufacturing capacity, Samsung will be able to better serve the needs of customers and contribute to the stability of the global semiconductor supply chain.³

Referring to item 6, Gartner's 2022 ranking of semiconductor companies by revenue has Samsung at the #1 position. Gartner Says Worldwide Semiconductor Revenue Grew 1.1% in 2022.

Samsung's Semiconductor business is divided into Memory (storage) and System LSI (logical processing). Memory semiconductor is divided into RAM products (random access memory) and ROM products (read only memory). For System LSI products, there are many categories for

³ <https://www.samsung.com/us/sas/Taylor>

various applications. SoCs (system-on-a-chip) for mobile devices that are equipped with CPUs (central processing unit), GPUs (graphics processing unit), ISPs (image signal processors), and modems are Samsung's major products. Samsung manufactures mobile SoCs for smartphones and tablets, image sensors, and DDIs (display driver ICs) for OLED (organic light emitting diode). The Foundry Business makes customized semiconductors for other companies based on customer designs. The business resembles OEMs in the traditional manufacturing industry in the sense that companies consign the manufacturing of their products to fabrication plants, also called foundries or fabs.⁴

Currently, Samsung is not a prime contractor of the U.S. Government. The scope of work is associated with Samsung's MCC technology, SmartCube products, and supernode technologies.

Referring to item 7, Samsung is investing in building a supercomputer for its internal purposes using the MCC technology, SmartCube products and supernode technologies. One of the fundamental drivers of the MCC vision is to develop a scalable system architecture that is well suited to run HPC and AI applications built out of energy-efficient and tightly-coupled building blocks. Samsung intends to innovate new technologies designed for HPC and AI machines rather than take technologies for other markets and figure out how to use them in HPC and AI. Samsung has hired leading and respected supercomputer experts into the Samsung Advanced Institute of Technology (SAIT). SAIT is the central research institute of Samsung Electronics that has been established to lead the Company into the future and serves as an incubator of cutting-edge technologies. Samsung is investing in a world class lab in the United States, Systems Architecture Lab, focused on developing a supercomputer and dedicated to the research & development of supercomputer and AI technologies.

As part of Samsung's Supercomputer/HPC investments, Samsung is committed to both technology and economic development by expanding fabrication and technology partnership in the U.S. Samsung is partnering with and expanding the base of U.S. based silicon design and SOC vendors; board design vendors, and system integrators.

Additionally, recognizing the importance of the U.S. market and the U.S. Government, Samsung has created a separate federal operation, which will focus on services bidding and executing U.S. government enterprise supercomputer/HPC technology opportunities.

Referring to item 8, as stated above, Samsung is independently innovating and investing in technologies designed for HPC and AI machines. However, the U.S. government, specifically DOE has access to cross-sectorial resources and processes which would help further development of any commercial platform. To that end, a partnership with the DOE would be jointly beneficial as Samsung gains input allowing the design point to have broad ecosystem appeal, and DOE leverages the opportunity to influence the direction of the design point of the MCC components that will become ubiquitous.

⁴ Samsung's 2022 Business report: 2022-4q-Business-Report.pdf (samsung.com)

Referring to item 9, intellectual property activities are an integral part of Samsung's R&D strategies. Samsung registered its first U.S. patent in 1984 and currently holds 225,910 patents around the world. The Company holds the highest number of its patents in the U.S. The patents are mostly related to smartphones, smart TVs, memory, and system LSI products for Samsung's strategic business products or for future use. These patents protect the Company's business and help facilitate a healthy corporate bottom line. Additionally, Samsung is focusing on securing early patents in new technologies, in order to better place their innovation pipeline into future opportunities.

Specifically, for MCC technologies, Samsung is actively partnering with ecosystem partners (Silicon design and SOC vendors; board design and manufacturing vendors; system integrators) to develop various component level technologies. The patent rights requested in this petition are critical to ensure these companies will want to do joint ventures and license the technologies for potential commercialization and broader adoption of the MCC technologies. To date, Samsung has filed ~20 provisional patents and has a pipeline of ~20 inventions.

Referring to item 10, as a new entrant to the Supercomputer/HPC segment, Samsung and its MCC technology, SmartCube products, and supernode technology will provide competition for well-established Supercomputer/HPC market players. The technology that Samsung is developing will not only be used for its internal use, but Samsung envisions that it will also be used for future HPC/AI commercial opportunities. Samsung has a proven track record of being a leading and formidable player in the various segments that it participates in, and Samsung envisions being the same in the HPC and AI sphere. Samsung is also committed to their long-term investments, which supports ecosystem enablement and execution.

Referring to items 11-13, Samsung would be a new entrant in the government contracting sector. Samsung is not aware of any governmental regulations which require, or which might require the use of the contract subject matter by the general public. Moreover, the work under the contract does not require an exploration into the fields which concern the public health, safety, or welfare of the general public.

As a condition of this waiver, to the extent that Subject Inventions are manufactured by Samsung, Samsung agrees to undertake commercially reasonable efforts to have products manufactured substantially in the US if Samsung determines in its discretion that there is a US-based supplier that meets all of Samsung's technical, business, and legal requirements for supply of such products under terms and conditions that are customary and reasonable for the industry.

Samsung also agrees not to manufacture the products incorporating the Subject Inventions in Countries of Risk (i.e., the People's Republic of China (PRC), Russia, North Korea, and Iran). This restriction does not apply to Taiwan and Japan. Samsung agrees to make this restriction for manufacturing of products incorporating the Subject Inventions binding upon any licensee, assignee, contractor, and any other entity receiving rights to the Subject Inventions including any manufacturer making products incorporating the Subject Inventions for Samsung.

Referring to item 15, Samsung's operating practice is to transfer all patent rights to Samsung Electronics Co., LTD. the parent company. As such, patents or patent applications relating to the MCC technology, SmartCube products, and supernode technology may have been transferred to Samsung Electronics Co., LTD. within the past six months.

A request for a U.S. manufacture waiver is being processed separately. This patent waiver, W(A)2023-003, will be subject to the U.S. competitiveness provision in paragraph (t) of the U.S. manufacture waiver, including any amendments thereto approved by the Assistant General Counsel for Technology Transfer and Intellectual Property (GC-62).

Considering the Samsung's developed and demonstrated capabilities in MCC technology, SmartCube products, supernode technologies, related fields, and its existing efforts to secure intellectual property that is associated with the process, it is believed that awarding this waiver will provide Samsung with the necessary incentive to invest their resources in commercializing the results of the award in a manner that will make the above technology available to the public in the shortest time.

Therefore, upon evaluation of the waiver petition and in view of the objectives and considerations set forth in 10 CFR §784, all of which have been considered, it is recommended that the requested waiver be granted.



Carmen Ekstrom
NNSA Patent Attorney

Date: _____

Based on the foregoing Statement of Considerations and the representations of the attached Waiver Petition, it is determined that the interests of the United States and the general public will best be served by a waiver of patent rights of the scope described above and, therefore, the waiver is granted.

CONCURRENCE:



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(NA-114)
National Nuclear Security Administration
US Department of Energy

Date: _____

APPROVAL:



Brian Lally
Assistant General Counsel
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Date: _____