

China Initiates Ambitious On-Orbit Supercomputing Project with Satellite Launch

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China has commenced a groundbreaking initiative to establish an on-orbit supercomputing network, spearheaded by the China Aerospace Science and Technology Corporation (CASC). This ambitious project, launched last week with the deployment of 12 satellites, is the initial phase of a planned 2,800-satellite constellation designed to collect and process data directly in space, reducing reliance on terrestrial computing infrastructure.

Developed by the startup ADA Space and Zhejiang Lab, these satellites will form a “Three-Body Computing Constellation.” Each satellite is equipped with an 8-billion parameter AI model, capable of 744 tera operations per second (TOPS). Collectively, the initial 12 satellites can deliver 5 peta operations per second (POPS), significantly exceeding the processing power required by most current AI models. The complete 2,800-satellite network aims to achieve a remarkable 1,000 POPS in orbit.

The satellites are engineered to achieve high-speed data transfer, reaching up to 100 gigabits per second (Gbps) through laser inter-satellite links and remote sensing payloads. This on-board data collection and processing capability is expected to minimize data loss and reduce the hardware requirements typically associated with relaying information to ground-based computing networks. Traditional satellite-to-terrestrial transmissions often suffer substantial information loss, with less than 10% of data reaching ground receptors due to factors such as limited bandwidth and the availability of ground stations. Orbital supercomputers, conversely, can process data sustainably on-device, utilizing solar power to minimize their carbon footprint.

Each satellite also integrates a cosmic X-ray polarimeter, a collaborative development by Guangxi University and the National Astronomical Observatories of the Chinese Academy of Sciences. This instrument is designed to detect, determine, and classify cosmic events, including gamma-ray bursts.

Furthermore, the satellites are capable of generating 3D digital twin data, which holds potential applications in diverse fields such as emergency response, gaming, and tourism, according to ADA Space.

This Chinese endeavor is part of a broader global trend, with Europe and the United States previously testing edge computing in space to address bottlenecks in satellite data transmission and processing. However, China's proposed supercomputing network is poised to be the first to feature AI-loaded satellites in orbit. The project's ultimate success will depend on overcoming challenges such as satellite congestion, security risks, and maintenance in the orbital environment.