Campus Cyberinfrastructure (CI) Plan
Central Michigan University
Rev. June, 2026

Central Michigan University (CMU), a public Carnegie R2 and Opportunity University in Mount Pleasant, Michigan, is dedicated to developing scalable cyberinfrastructure to meet its campus research and education needs. This Campus CI Plan describes CMU's current infrastructure investments across networking, computing, storage, cybersecurity, and external partnerships, and outlines near-term goals and a strategy for long-term sustainability. This plan provides a high-level overview of CMU's campus-wide CI strategy, supports campus units, and aligns with regional and national research computing resources.

Campus Network

Wide Area Network: CMU's campus is directly connected to Michigan's Regional Education Network (REN), Merit Network, via redundant 100 Gbps fiber. The campus core is dual-located across two physically separate buildings operating as a single logical core. The 100 Gbps connection to Merit serves as CMU's primary Internet Service Provider (ISP), through which Merit connects to the Chicago Super PoP, providing access to the broader higher education and research network fabric (e.g. Internet2) and national infrastructure.

Science DMZ: CMU maintains a Science DMZ to enable high-speed data transfer and sharing for campus researchers. This network segment sits outside the campus firewall and is directly attached to the 100Gbps Merit fiber, enabling high-speed, large-volume data transfers from assigned data transfer nodes (DTNs).

Campus Backbone: The campus data center is connected via redundant 100 Gbps links. Campus buildings are interconnected via a hub-and-spoke topology with redundant 50 Gbps connections, with capacity to support 100 Gbps as needed.

Edge Network: Edge devices with capable network interface cards support up to 10 GbE copper Ethernet connections with up to 90W Type 4 Power over Ethernet (PoE). Fiber Ethernet connections to servers in the data center support up to 100 Gbps, while single-run copper supports up to 5 GbE.

Wireless Network: Wi-Fi 6 is deployed across approximately 3,700 access points campus-wide, available at CMU's main campus and satellite locations. Guests and visiting researchers may connect via 'eduroam' or CMU's dedicated guest network. A Multi-Pre-Shared Key (MPSK) network is also available for use by Internet of Things (IoT) devices and those that do not support enterprise authentication.

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Network Monitoring: Network monitoring is a joint effort between the network and cybersecurity teams. CMU uses network backbone management software to monitor throughput, performance, and physical layer health across more than 47,000 ports. The platform supports proactive monitoring of error rates, UPS battery status, and layer 1 through layer 3 diagnostics.

Virtual Private Network: Remote access is provided via FortiGate, CMU's firewall, and the VPN appliance, which supports all major device operating systems. Windows-managed devices utilize an Always-On VPN configuration to maintain persistent, secure connectivity from off-campus locations.

Computing Resources

Regional Cluster: MSU ICER HPCC: CMU maintains an ongoing contract with Michigan State University's (MSU) Institute for Cyber-Enabled Research (ICER) for access to their High-Performance Computing Center (HPCC). Under this agreement, CMU purchases compute nodes when MSU acquires new clusters, granting CMU priority access to its own nodes and standard access to the broader cluster. This arrangement provides both institutions' researchers with access to additional nodes and greatly expands CMU’s high-performance computing capabilities.

Local Cluster: CMU operates an on-premises compute cluster custom-built for research, teaching, and learning workloads. While this cluster does not match the raw throughput of the MSU HPCC, it provides significantly greater flexibility. It can be reconfigured on demand to support bespoke workloads with complex, lengthy, or difficult-to-define requirements. It also serves as a staging and validation environment for workloads prior to migration to the MSU HPCC or other regional or national computing resources.

Data Storage

On-Premises Storage: CMU hosts several on-premises POSIX storage solutions for campus researchers, offering varying levels of data protection, archival capability, and auditing to meet diverse use cases and sponsor compliance requirements. At present, the maximum volume size for a single on-premises allocation is 60TB.

Open Storage Network (OSN) Pod: CMU hosts a single Open Storage Network (OSN) pod. This appliance provides 1.5 petabytes (PB) of total storage, of which 80% (approximately 1.2PB) is allocated to CMU researchers, and 20% supports national projects within NSF ACCESS. Storage allocations are aligned with project needs and scientific priorities. Researchers access their allocations via an S3 bucket or through a JuiceFS mount integrated with locally hosted research computing services.

Cloud Storage: Microsoft OneDrive: Through CMU's campus partnership with Microsoft, cloud storage via OneDrive (Microsoft 365) is available to all campus users. This service supports both

individual and collaborative workflows where the capacity or throughput of on-premises solutions is not required.

***Globus Data Transfer Node**:* CMU hosts a Globus DTN to enable high-speed transfer and sharing of research data across institutions. The Globus node is directly connected to the campus Science DMZ at 100 Gbps, supporting unimpeded transfer of large datasets, and a common platform to better integrate with regional and national research computing environments.

Cybersecurity

CMU's Information Security Office maintains a dedicated cybersecurity team overseeing the university's information security program. This program follows the Cyber Security Framework (CSF) defined by the U.S. National Institute of Standards and Technology (NIST) and consists of operational and strategic aspects implemented to protect, detect, and correct for reasonably anticipated or technically detected threats and risks to the confidentiality, integrity, and availability of the university's information and information systems. Aspects include, but are not limited to, identity and access management, vulnerability management, threat detection and mitigation, incident response, regulatory compliance, policy creation and enforcement, and awareness and training.

Collaboration and Partnerships

***Michigan State University ICER HPCC**:* CMU participates in a long-term shared HPC agreement with MSU, providing prioritized compute node access and shared storage for CMU researchers.

***Merit Network**:* CMU is directly connected to Michigan's REN via redundant 100Gbps fiber, serving as both CMU's primary ISP and the gateway to national research networking.

***Beaver Island Biological Station**:* Located on the eastern shore of Beaver Island in northern Lake Michigan, the CMU Biological Station (CMUBS) provides residential facilities, teaching labs, research laboratories, and a modern computer lab that supports field courses, workshops, and externally funded research programs. Beaver Island is currently supported by a wireless internet connection to this remote field site. This connectivity is planned to be upgraded to high-bandwidth fiber through the ongoing underwater cable project, which will ultimately enable higher throughput data transfer, remote instrumentation, and tighter integration with CMU's campus CI environment.

InCommon: CMU is a longstanding member of InCommon and actively utilizes all three core services — Certificates, eduroam, and Federation — to enable frictionless integration with regionally and nationally available research computing services.

Notable CI Accomplishments

Campus Network Upgrade (2024): The CMU Board of Trustees approved a $7 million capital project in 2024 to upgrade approximately 70% of the campus network. This initiative replaced aging, multi-platform infrastructure with a new unified solution built on HPE Aruba. The upgrade improves overall network resiliency, enables new capabilities through modern management interfaces, and establishes the foundation for network-intensive work that advances CMU's institutional research mission.

NSF CC* Planning Project (2024): CMU was awarded $99,999 for the project *CC* Planning: Strengthening Central Michigan University's Cyberinfrastructure* (Award #2345749). This project engaged campus researchers to assess research computing needs, improve relationships between IT, researchers, and institutional leadership, and increase awareness of the importance of a strong campus CI.

Eduroam (2025): As a result of feedback from campus researchers requesting easier Wi-Fi connectivity for visiting scholars, CMU began broadcasting the 'eduroam' SSID across campus. This work also enabled campus researchers to connect to the eduroam network when visiting participating institutions.

Science DMZ and DTNs (2026): With increased collaboration with campus researchers, additional trust gained from leadership, and success of the campus network upgrade in 2024, an investment to host an Open Storage Network (OSN) pod and Globus data transfer node attached to a newly created 'Science DMZ' network outside the campus firewall.

Near-term CI Projects

perfSONAR Node Deployment: CMU plans to implement a perfSONAR node integrated with Merit to enable end-to-end active network performance monitoring across research and education network paths. perfSONAR is an open-source, federated monitoring architecture that measures throughput, packet loss, latency, jitter, and route changes — providing visibility into network performance between campuses and national CI resources.

Shared Graphics Processing Unit (GPU) Capabilities*:* CMU will expand GPU compute resources to address growing demand for Artificial Intelligence (AI)/Machine Learning (ML) and computational science workloads, particularly to complement the existing local cluster and MSU HPCC agreement. Deployment of a campus-hosted LLM enables local AI exploration and the implementation of AI-ready administrative workflows.

CI Sustainability and Long-term Goals

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***Expand OSN Storage**:* CMU plans to explore acquiring additional OSN pods to expand research data storage capacity and resilience, aligned with growing researcher demand.

Grow Linux Systems Administration Resources: Much of the research computing community is built upon the Linux platform and open-source projects. To meet the ambitions of the CI plan, Linux systems administration will need to be considered the primary skill set for the academic and research computing team moving forward.

Establish Research Project Facilitation: Campus researchers have expressed interest in additional project facilitation support from IT services staff. It has been acknowledged that this requires a unique skill set that combines technical, interpersonal, and potentially discipline-specific knowledge. This unique and valuable position will be a priority for the academic and research computing team.

IPv6 / MANRS: CMU's current IPv4 address space adequately supports existing campus needs and near-term anticipated growth. Transition to IPv6, along with evaluating participation in the Mutually Agreed Norms for Routing Security (MANRS) framework, will continue to be explored and considered to support stronger regional and community connections.

Wi-Fi 7 Rollout: The current wireless network infrastructure supports Wi-Fi 7 devices; however, the need to accommodate legacy 2.4GHz connections limits network administrators' ability to fully implement the new standard. Local testing and promotion of this emerging technology will be considered to support wireless connectivity research and educational initiatives.

***Data Center Upgrades**:* CMU will explore targeted upgrades to the campus data center, including investments in liquid cooling, power capacity, and rack modernization to support future high-density compute and storage deployments.

***Institutional CI Funding Strategy**:* CMU will implement a sustainable funding model that positions campus cyberinfrastructure as a core institutional service, integrated into the university's budget and planning processes rather than relying solely on grant funding.

Continued Pursuit of External Funding: Building on the work established through its 2024 NSF CC* Planning award (Award #2345749), CMU will actively pursue future NSF Campus Cyberinfrastructure (CC*) and other external funding opportunities to continue expanding and enhancing its research computing capabilities.

***Regional and National CI Community Engagement**:* CMU will sustain its participation in regional and national CI communities through conferences, workshops, and collaborative projects, ensuring CMU remains aligned with emerging best practices and funding opportunities in research computing.

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