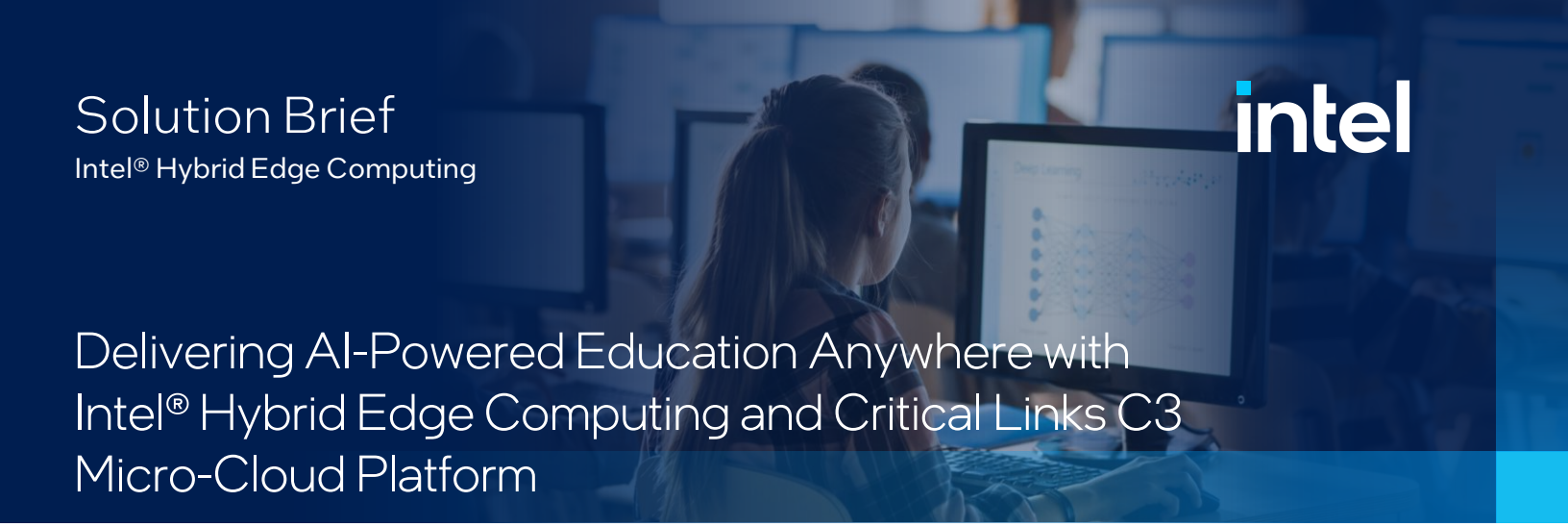


Solution Brief

Intel® Hybrid Edge Computing

Delivering AI-Powered Education Anywhere with Intel® Hybrid Edge Computing and Critical Links C3 Micro-Cloud Platform

Intel® Hybrid Edge Computing (Intel® HEC) technology transforms a single mini-PC into up to four independent student workstations, with offline private Generative AI.

This virtualization approach enables IT teams to deliver robust digital learning environments at scale— even in schools with unpredictable or constrained infrastructure —while providing affordable, incremental scalability, and centralized management capabilities.

Complementing the Intel® HEC setup, the Critical Links C3 Micro-Cloud Platform offers local AI capabilities by utilizing the Neural Processing Unit (NPU) and the iGPU (Integrated Graphics Processing Unit) within Intel hardware. This delivers advanced educational tools along with secure, locally hosted content and built-in data privacy, ensuring classrooms can operate confidently even without internet access.

Barriers to Scaling Generative AI Digital Learning

Education systems are operating in an environment where per-device costs are increasingly difficult to predict. As deployments scale, traditional approaches require repeating memory, storage, and core system components for every endpoint, driving higher capital investment and limiting flexibility as needs change. This economic reality is pushing institutions to look for ways to deliver the same computing capability with fewer physical systems and less duplicated hardware per classroom.

The path to scalable digital learning requires addressing fundamental infrastructure realities:

- **Network dependency:** Cloud-first AI and content services stall where connectivity is intermittent or expensive
- **Fragile infrastructure**: Conventional virtualization stacks assume stable power and bandwidth; classrooms don't
- **Endpoint contention**: Running heavy AI locally on student devices often cripples core teaching apps
- **Data governance and privacy**: Ministries and districts require student data to remain on premises with strict policy controls and often seek technology sovereignty
- **Lack of personalization and cultural customization**: General AI tools are not specific to education and do not reflect local culture.
- **Affordability:** Conventional solutions require monthly subscriptions per user and additional infrastructure investments.

To overcome these barriers, schools need a solution engineered to deliver AI and digital learning reliably, even in the most constrained environments.

Narrowing the Gap with Offline Generative AI at the Edge

What our approach changes:

- **Local-first operations with no internet access required:** Teaching applications, AI services, and content repositories made for education are hosted inside the school, not dependent on connectivity. Local content can be uploaded. No monthly subscription required.
- **Resilient by design:** Local resources maintain functionality if connectivity drops. Optional power backup helps maintain uptime during outages. Remote online and offline manageability is available via a USB.
- **Purpose-built AI placement:** All AI inferences run on the C3 Micro-Cloud, so student devices can keep their full performance.
- **Administrative guardrails:** Policy and filtering are applied using the district's chosen tools and processes.

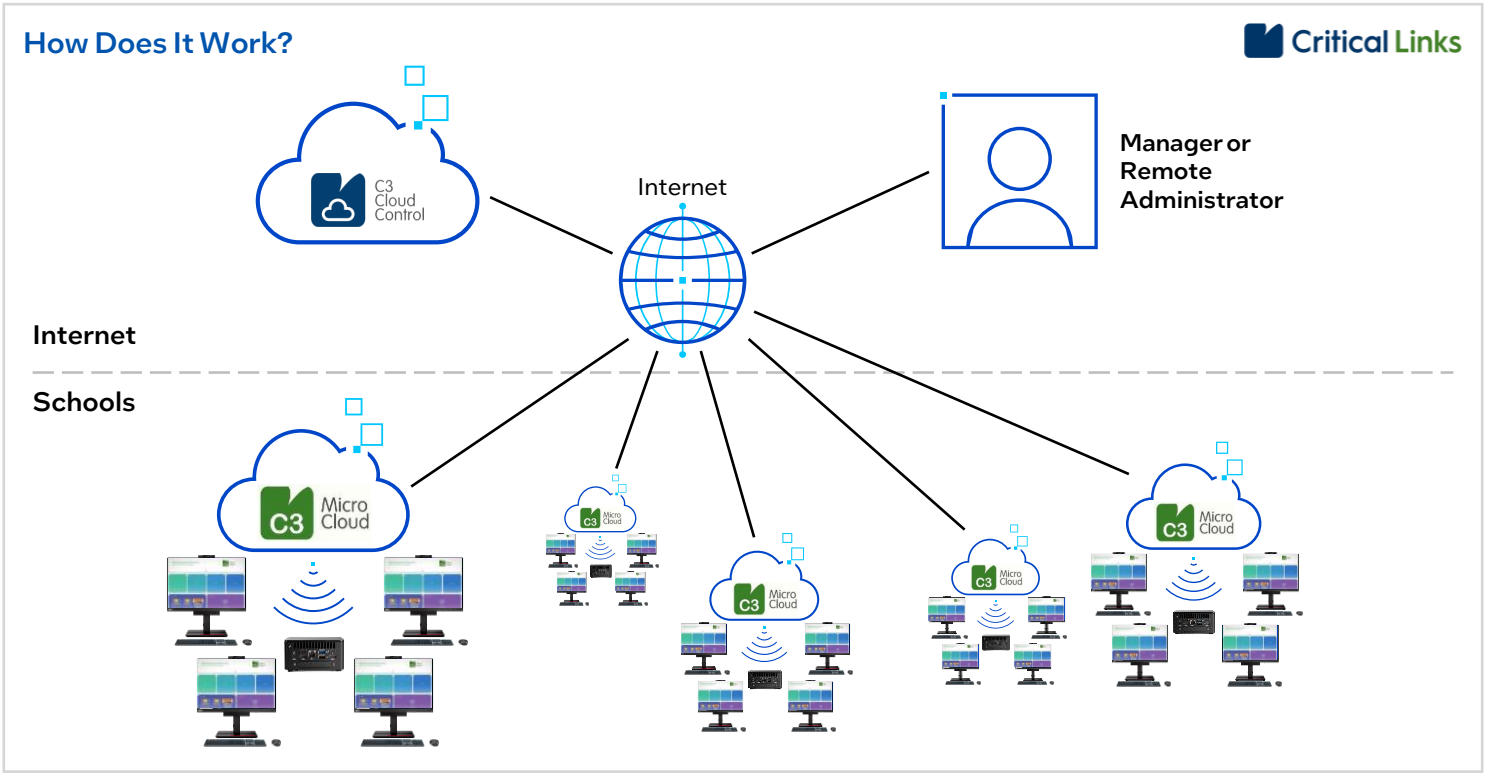


Figure 1: Integrated Solution Architecture

Architecture

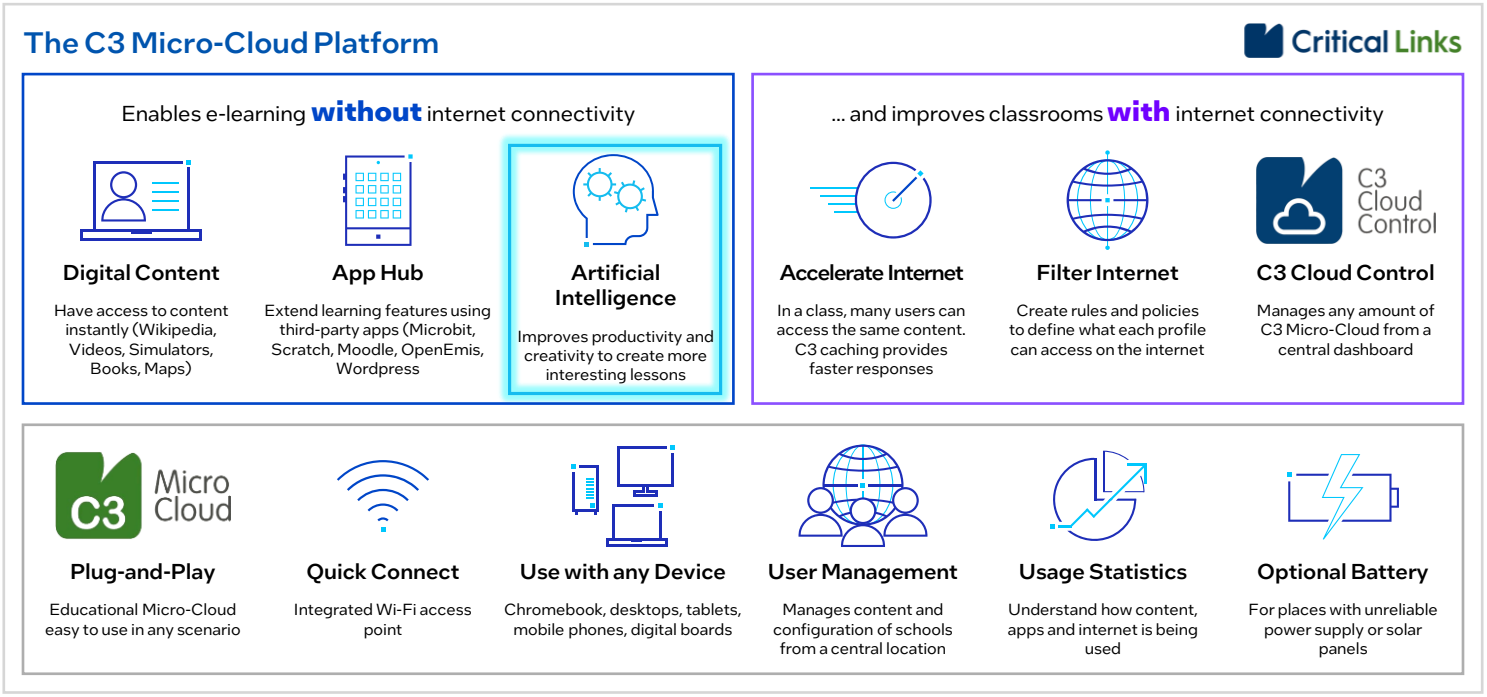
Each Intel® Hybrid Edge Computing setup operates with full capability, enabling students to participate in both individualized and collaborative learning experiences. The mini-PC runs virtualization software that creates four separate, full-featured Windows environments, each with its own dedicated display, keyboard, and mouse. Students experience complete desktop computers, but the school only needs to manage, power, and maintain one physical device instead of four. Because all applications, AI tools, and educational content run locally, classroom activities continue seamlessly—even if the network connection is lost. This technology is designed to succeed in environments where other approaches have struggled, bringing advanced educational technology to classrooms regardless of connectivity challenges.

Intel® HEC Technology

- **Centralized Local Compute**: One Intel-based mini-PC runs multiple virtual desktops, simplifying hardware management and reducing space and support requirements.
- **Serverless/Offline Initialization**: Specifically optimized for "disconnected" first-run setup, allowing system integrators to deploy entire labs using a single USB-based automation script
- **Optimized Endpoints**: Students have access to a full desktop experience enabling standard classroom applications, shared curriculum access, and collaborative learning
- **Resource Integrity**: Ensures near-native performance for Windows 11, Microsoft 365, Linux, and standard classroom software across all four users simultaneously.

The Critical Links C3 Micro-Cloud Edge Hub - Powered by Intel processors and optimized using Intel® OpenVINO toolkit, this unit serves as the classroom's content and AI services hub.

- **Offline AI at the Edge**: Delivers local artificial intelligence services and analytics without requiring continuous internet connectivity.
- **AI Acceleration**: Uses the dedicated NPU and iGPU to handle Generative AI, ensuring AI tools remain responsive without lagging other requests to the network, content, or education apps available in the C3 Micro-Cloud.
- **Secure Content Delivery**: Distributes curriculum, applications, and updates safely on-site, ensuring reliable access and data protection. Hosts the learning management system (LMS), digital library, and the Offline AI Knowledge Base with curriculum-specific content and allows preloaded education content and applications.
- **Network Services**: Provides internet caching, content filtering, and integrated Wi-Fi access point capabilities for connected classrooms



C3 Micro-Cloud Platform Delivers Safe and Customized AI Tools to Education

On top of a dependable infrastructure, the solution introduces a new generation of education-ready AI tools and capabilities. For example, students can ask an AI tutor to explain a math concept, teachers can generate a quiz on photosynthesis, or educators can translate lessons into different languages. The AI knowledge base, educational tools, and curriculum content are stored right in the classroom.

AI Tools for Teaching and Learning

- Seven purpose-built tools (Lesson Planner, Quiz Generator, Topic Explainer, Study Planner, Proofreader, Text Translator, and Educational Chatbot) run locally on Intel processors, reducing administrative workload while providing instant student learning assistance.
- **SAFE** AI Framework ensures solutions are **S**ecure, **A**ppropriate, **F**unctionally specific, and **E**conomically feasible (no monthly subscription fees).
- Teachers ask questions in natural language, even with typos or imperfect phrasing, and receive immediate guidance on lesson planning, curriculum integration, and student support. Educators start using AI productively on day one, building confidence through use rather than specialized classroom training.
- 50 concurrent users can be connected at any point in time with up to 8 AI sessions being handled simultaneously, accelerating the response time for each user.

Customized Content for Learning

- The solution offers curriculum-specific knowledge bases built on K-12 educational content curated for learning contexts. These are customizable with country-specific materials reflecting local pedagogical standards and approved curriculum frameworks.
- Educational guardrails and filtering block non-educational queries and redirect off-topic requests back to learning objectives, ensuring age-appropriate, curriculum-aligned responses rather than general AI chatbot behavior.
- Foundation LMS enables teachers to organize materials by class and learning objectives for streamlined curriculum delivery.

The solution delivers AI that truly supports—not disrupts—the learning experience.

Technical Advantages for Global Scale

Delivering these capabilities consistently across diverse regions requires a technical foundation engineered for global scale and efficiency. Intel delivers.

- Intel® Core™ Ultra processors (Series 2) for Critical Links uses dedicated NPU and iGPU to offload AI inference from CPU cores, enabling responsive Generative AI interactions while freeing compute resources for virtualization in AI-intensive configurations.
- Intel® Core™ Ultra processors (Series 2) processors for Intel HEC deliver multi-threaded performance for four simultaneous virtual machines with headroom for AI inference workloads, optimized for compact mini-PC thermal envelopes.

These processor-level advantages ensure the platform can deliver fast, reliable AI performance even in demanding multi-user environments.

Why Schools Choose This Solution

The solution's strong technical foundation translates directly into real-world benefits that matter to schools and education systems.

- **Distributed Architecture**
  Each Intel® Hybrid Edge Computing setup operates independently with full capability, so network outages affect internet access but not local applications, AI tools, or cached content. This eliminates single points of failure where server connectivity loss disables all learning stations and maintains classroom functionality during infrastructure disruptions.
- **Safe AI Framework**
  Student data never leaves school networks, simplifying privacy compliance without the need for complex cloud frameworks. Age-appropriate content filtering and curriculum alignment are built into AI responses from the ground up, enabling administrators to control exactly which tools and content reach classrooms.
- **Automation at Scale**
  IT can start with pilot classrooms and expand to district or national scale without replacing the full infrastructure. C3 Cloud Control pushes curriculum updates and approved applications to hundreds of distributed devices, with USB-based synchronization reaching offline schools without site visits. Deployment is handled via a single non-interactive script, designed for rapid rollout across thousands of districts.
- **Affordability & Accessibility**
  In regions lacking reliable high-bandwidth internet, schools run the risk of being left behind. Our solution bridges this gap with a single-payment and a small, compact device that functions independently of heavy infrastructure like data centers.
- **Sustainability:** Schools can minimize their physical and environmental footprint. By supporting multiple students per host, this shared architecture helps reduce energy consumption and long-term e-waste, delivering a high-tech lab that is both space-efficient and eco-friendly.

By uniting these capabilities, the solution empowers schools to modernize learning with reliability and ease. It removes barriers that have historically limited digital adoption, enabling educators to focus on teaching rather than technology. The result is a future-ready platform that brings reliable learning experiences to students everywhere.

Next Steps

Contact your local sales representative to learn more about how Intel® Hybrid Edge Computing coupled with Critical Links C3 Micro-Cloud can bring AI-powered education solutions tailored to your connectivity, curriculum, and deployment needs.

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Notices & Disclaimers