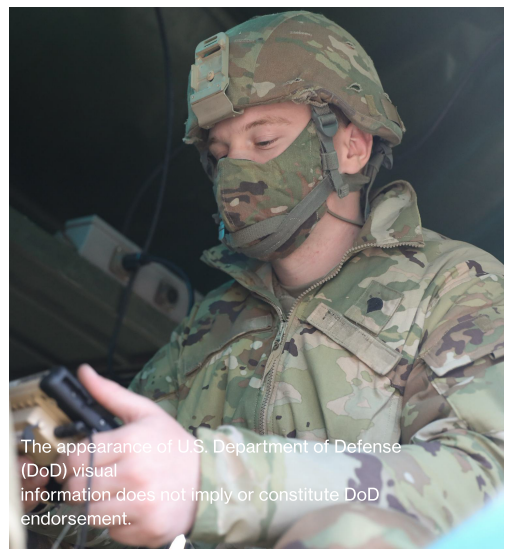
Primer

AI robustness for US Army DDIL environments

Field-ready AI: operate without the cloud

U.S. Army analysts and operators regularly work in denied, degraded, intermittent, or limited (DDIL) communications environments, where connectivity cannot be taken for granted. Today's most advanced AI solutions are often powered by large language models (LLMs) that rely on cloud computing—ideal for high-bandwidth conditions but present significant challenges when deployed in DDIL environments. Primer's AI tools are built specifically to meet the demands of DDIL contexts, ensuring Army personnel can rely on actionable insights where and when they need them most.


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The DDIL challenge for LLMs

While proprietary LLMs like GPT-4 (OpenAI), Gemini (Google), and Claude (Anthropic) achieve state-of-the-art performance, they often require cloud access and substantial computing resources to function optimally. When deployed downrange, Army personnel on reconnaissance missions, in tactical vehicles, or in remote command posts, often face limited or intermittent connectivity, rendering cloud-dependent AI useless. Even open-source models struggle in low-resource environments, as they demand high-powered local hardware not always available in the field.

Most LLM-powered solutions offer all-or-nothing functionality, which does not meet the needs of Army users operating in constrained or contested conditions. These environments demand AI solutions designed for adaptability and operational flexibility.

Achieving robustness with smaller models

To meet the demands of DDIL environments, Primer uses an architecture that combines both small and large language models, ensuring the ability to scale AI functionality even when cloud access is unavailable. By engineering small models with redundancy and reliability, Primer ensures critical AI capabilities remain functional regardless of external conditions.

Primer uses models that are specifically designed to perform optimally in limited-resource environments. While large models are effective in some situations, smaller language models (LMs) provide a robust solution when infrastructure and resources are constrained. Small LMs are tuned and optimized to function efficiently on hardware found in the field, such as rugged laptops and portable servers.

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Key advantages for DDIL environments:

Faster processing

Smaller language models (LMs) can perform tasks up to 10–100 times faster than larger LLMs by minimizing network latency and resource demands. This speed ensures Army personnel can access insights and make decisions faster, even in the most time-sensitive situations.

Predictable reliability

Smaller models offer more stable performance with easily detectable failure modes, which is crucial for mission planning in unpredictable environments. Users can anticipate reliably how the AI will perform and understand its limitations in a given context.

Local deployment

Smaller models can run on portable hardware, such as rugged laptops or field servers, eliminating reliance on cloud infrastructure. This ensures AI capabilities are accessible even in remote, disconnected areas.

Overcoming limitations of smaller models

While smaller LMs are advantageous for DDIL conditions, they do have some trade-offs:

Task-specific training

Unlike LLMs, which can handle a wide range of tasks out-of-the-box, smaller LMs require task-specific training. This means they may not be as flexible in rapidly changing environments.

Performance degradation

Small models require regular updates and retraining to maintain accuracy as real-world data changes. This means they can degrade in performance over time without fresh training.

Limited reasoning capabilities

Smaller models do not have the advanced reasoning abilities of larger LLMs, which can make them less effective for complex, open-ended tasks.

However, these trade-offs are outweighed by the key benefits of smaller models: faster processing, predictable reliability, and the ability to deploy them locally in the field. In DDIL environments, these advantages ensure that Army personnel can continue leveraging AI capabilities even when cloud access is unavailable or bandwidth is limited.

While LLMs still have their place for more complex tasks, smaller LMs are able to handle many of the day-to-day operations performed by AI, such as classification, entity recognition, and summarization—tasks that are commonly used for mission-critical operations. By combining small LMs with larger models where appropriate, Primer ensures that Army personnel have the right AI tools for every situation, delivering mission-ready insights, regardless of available resources.

About Primer

Primer provides trusted decision-ready AI to the world's most critical organizations. Our software is deployed by the U.S. government, strategic allies, and Fortune 100 companies to extract timely insight and decision advantage from massive datasets.

Contact us to learn more

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