The Five Layers of African Digital Infrastructure

AiCE Africanism & Pan-African Studies — A layered model

A Layered Model of Digital Infrastructure

Digital infrastructure is not a single thing. It is a stack of interdependent layers, each of which must be functional for the layer above it to work. A smartphone without electricity cannot connect to a mobile network. A mobile network without undersea cable capacity cannot deliver international content. A website without a data centre has nowhere to run. A payment system without a digital identity layer cannot verify users. Understanding these dependencies clarifies both the current gaps and the priorities for infrastructure investment.

Infrastructure Layer	Current State in Africa — Gaps and Progress
Layer 1: Power	600 million Africans lack reliable electricity. Solar off-grid solutions are expanding rapidly but grid reliability remains poor across much of the continent. Data centres require 99.99% uptime power — achievable only with costly backup systems.
Layer 2: Connectivity (Undersea Cables)	Over 30 undersea cables now connect Africa internationally — up from 5 in 2010. Most are owned by foreign entities (Meta, Google, telecom consortia). New cables like 2Africa and Equiano add capacity but deepen foreign ownership.
Layer 3: Terrestrial Networks	Mobile coverage reaches approximately 85% of the population, but quality varies enormously — 4G in cities, often 2G in rural areas. Cross-border connectivity between African countries is often routed via Europe.
Layer 4: Data Centres and Cloud	Africa has approximately 2% of the world's data centre capacity despite having 17% of the world's population. Major hyperscale cloud providers have African regions, but these remain foreign-owned and controlled.
Layer 5: Payment Infrastructure	Mobile money is Africa's most successful digital infrastructure achievement, but interoperability between

Infrastructure Layer	Current State in Africa — Gaps and Progress
	systems is limited. PAPSS is building the continental payment backbone for seamless cross-border payments.
Layer 6: Digital Identity	Most African countries lack universal, reliable, machine-readable digital identity systems. Kenya, Nigeria, and Ghana are building national systems; continental harmonisation remains a long-term AU goal.

Key Takeaways

African digital infrastructure is a stack of six interdependent layers — power, undersea connectivity, terrestrial networks, data centres, payment systems, and digital identity — each partially built and, at almost every layer, predominantly foreign-owned. Understanding this stack is the foundation for everything that follows in this lesson series. The next lesson examines the layer that carries nearly all of Africa's international internet traffic: undersea cables.