

# ARED

# Shirikihub: Local-First Edge Infrastructure for Africa's Digital Future

**Powered by ShirikiOS, ShirikiEye, and ShirikiAI**

Public white paper | Prepared for ARED Group | July 2026

## **Positioning statement**

Shirikihub is ARED's local-first edge infrastructure platform. It helps organizations run digital services locally, stay cloud-connected when connectivity is available, and reduce dependence on fragmented infrastructure.

Public version. Detailed technical annex available under NDA for qualified partners.

# Table of Contents

- 1. Executive Summary
- 2. The Problem: Africa's Digital Infrastructure Gap Is Local
- 3. Why Edge Infrastructure Matters
- 4. Introducing Shirikihub
- 5. Platform Layers: Shirikihub, ShirikiOS, ShirikiEye, ShirikiAI
- 6. ShirikiOS: The Local-First Edge Operating Layer
- 7. Containerized Application Runtime
- 8. Offline-Ready Digital Services
- 9. ShirikiEye: Camera and Video Intelligence at the Edge
- 10. ShirikiAI: Intelligence, Monitoring, and Safe Automation
- 11. Cloud Coordination: Edge Plus Cloud
- 12. Use Cases Across Africa
- 13. Economic and Operational Value
- 14. Security, Trust, and Operational Safety
- 15. Deployment and Partnership Model
- 16. Validation Framework
- 17. Public Claims and Confidential Annex Boundary
- 18. Roadmap
- 19. Conclusion
- References

## **Public-safe design**

This white paper is intentionally written for the website and public partner discussions. It avoids internal repository names, service names, paths, scripts, security mechanisms, exact deployment logic, and detailed failure modes.

# 1. Executive Summary

Africa's digital transformation is accelerating, but the infrastructure model used in many markets is still too cloud-dependent, too connectivity-dependent, and too fragmented for many real-world African environments. Businesses, schools, clinics, transport operators, public programs, and smart buildings need digital services that can operate locally, synchronize intelligently, and remain useful when internet access is limited or expensive.

Shirikihub is ARED's local-first edge infrastructure platform. It is designed to turn affordable edge hardware into a managed digital infrastructure node that can support local connectivity, compute, storage, containerized applications, camera/video intelligence, AI-assisted monitoring, and cloud coordination.

Shirikihub does not replace the cloud. It makes the cloud more practical. The cloud remains important for fleet visibility, dashboards, analytics, remote management, software updates, and coordination. The edge executes locally, stores locally when needed, observes local behavior, and synchronizes when connectivity is available.

## Core thesis

The future is not cloud versus edge. The future is cloud plus edge. Shirikihub provides the local infrastructure layer that helps make cloud-connected services practical in African conditions.

The platform is presented publicly through four simple names: Shirikihub, ShirikiOS, ShirikiEye, and ShirikiAI. Shirikihub is the platform; ShirikiOS is the local-first operating layer; ShirikiEye is the camera and video intelligence layer; and ShirikiAI is the intelligence layer for analytics, monitoring, recommendations, and future safety-gated automation.

# 2. The Problem: Africa's Digital Infrastructure Gap Is Local

The infrastructure challenge is not only about whether internet access exists. In many environments, the deeper problem is whether local digital services can continue to function when connectivity, energy, bandwidth, and cost are constrained.

Africa continues to grow as a digital market, but the continent still holds less than 1% of global data center capacity while mobile data usage is growing rapidly. Local data hosting can improve speed, reduce costs, and strengthen cybersecurity and regulatory control. [1]

Connectivity infrastructure also faces energy and reliability pressure. In off-grid regions, energy can account for up to 60% of telecom tower operating expenses, and operators are increasingly using solar and hybrid systems to improve cost and reliability. [2]

The digital access challenge is not only coverage. A large usage gap remains, driven by barriers such as device affordability, cost, digital skills, and relevant services. Industry reporting has highlighted that billions of people remain unable to use mobile internet even when coverage exists. [3]

- Cloud-only applications can fail or become unusable when connectivity is weak.

- Video, AI, access control, payments-adjacent workflows, IoT, and operational apps often need local response.
- Small organizations cannot always justify a separate server, router, NVR, storage appliance, AI box, and cloud subscription.
- Public-service and transport deployments require resilience across many distributed sites.
- Bandwidth-heavy workloads such as video can become expensive when everything must be sent to the cloud.

**Problem statement**

Africa does not only need more cloud infrastructure. It needs a distributed edge layer that can run close to users, reduce infrastructure fragmentation, and synchronize with the cloud when it makes sense.

### 3. Why Edge Infrastructure Matters

Edge infrastructure moves compute, storage, and selected application logic closer to users, devices, and data sources. Research on wireless edge computing describes edge as a model that distributes computing, storage, and control services closer to end nodes, especially for latency-sensitive and compute-centric applications. [4]

In practice, edge infrastructure can reduce unnecessary data movement, improve local response time, lower dependency on constant connectivity, and support applications where real-time or near-real-time local execution matters.

However, edge infrastructure must be designed carefully. Edge nodes are distributed, resource-constrained, and physically closer to customers, which increases the importance of dependability, secure operations, observability, and controlled updates. [5]

Cloud-only model	Edge plus cloud model
Application behavior depends heavily on continuous connectivity.	Core local services can continue when connectivity is degraded.
Bandwidth-heavy data may be sent upstream by default.	Data can be processed locally, with selective cloud sync.
Latency depends on network path to cloud/data center.	Time-sensitive logic can run closer to the user or device.
Many local functions require separate appliances.	Connectivity, compute, storage, apps, and AI can be consolidated.
Cloud remains the primary execution layer.	Cloud coordinates; edge executes locally.

## 4. Introducing Shirikihub

Shirikihub is ARED's local-first edge infrastructure platform. It is designed for organizations that need digital services close to users, but still want the visibility, coordination, and scalability of the cloud.

A simple public definition is: Shirikihub turns affordable edge hardware into a managed local infrastructure node that can support connectivity, compute, storage, containerized applications, camera/video intelligence, AI-assisted monitoring, and cloud synchronization.

The platform is designed around three practical ideas: run locally, manage centrally, and scale through partners. This makes Shirikihub relevant for SMEs, venues, transport, public programs, smart buildings, education, health, and partner-led deployments.

Name	Public meaning	What to say publicly	What not to reveal publicly
Shirikihub	The full edge infrastructure platform	Local-first edge infrastructure for digital services	Internal hardware BOM, deployment scripts, exact orchestration logic
ShirikiOS	The edge operating layer	Purpose-built OS/runtime layer for local execution, resilience, telemetry, and cloud coordination	Internal services, paths, update mechanics, security details
ShirikiEye	Camera/video intelligence	Local visual analytics and camera intelligence at the edge	Device-node details, codec internals, model implementation
ShirikiAI	Intelligence layer	Monitoring, analytics, recommendations, and future safety-gated automation	Event schema, remediation logic, safety rules, ML pipeline details

## 5. Platform Layers: Shirikihub, ShirikiOS, ShirikiEye, ShirikiAI

The platform should be explained in layers. This makes the value clear without exposing internal implementation details.

Layer	Role	Public value
Hardware infrastructure	Compute, storage, networking, and acceleration-ready edge hardware	A physical footprint close to users, devices, and local data.
ShirikiOS	Local-first operating and runtime layer	Resilient local services, controlled updates, telemetry, storage, and secure cloud coordination.
Application runtime	Containerized applications	Modular services can be activated

	orchestrated locally	by site, customer, or use case.
ShirikiEye	Camera/video intelligence	Local visual analytics, safety, monitoring, and reduced cloud video dependence.
ShirikiAI	Operational intelligence and analytics	Risk detection, recommendations, insights, and future controlled automation.
Cloud coordination	Remote visibility, updates, dashboards, analytics, and partner operations	The cloud manages and analyzes; the edge executes and continues locally.

### How to describe the architecture

Do not describe Shirikihub as a box. Describe it as a local digital infrastructure node: one deployable system that combines edge hardware, ShirikiOS, local apps, video intelligence, AI-assisted observability, and cloud coordination.

## 6. ShirikiOS: The Local-First Edge Operating Layer

ShirikiOS is the operating layer that allows Shirikihub to run digital services locally while staying connected to cloud management when connectivity is available. It should be presented as a purpose-built edge OS, not as a generic Linux installation.

Publicly, ShirikiOS should be described through outcomes: local runtime, resilience, storage, updates, telemetry, identity, and application orchestration. The internal mechanics should remain confidential.

- Local-first runtime for digital services.
- Support for containerized applications.
- Designed for intermittent connectivity and last-known-good operation.
- Local storage and persistence for selected workloads.
- Secure cloud coordination for visibility, updates, and management.
- Telemetry and health monitoring to support operational intelligence.
- Resilience principles for field deployments where power, bandwidth, and maintenance access may be constrained.

### Public-safe statement

ShirikiOS is the operating layer that lets Shirikihub run locally, synchronize intelligently, and remain manageable at scale.

# 7. Containerized Application Runtime

Shirikihub should be positioned as a platform capable of running modular containerized applications. This is important because the value is not limited to one fixed application or one vertical market.

The public statement should be precise: Shirikihub can run containerized applications that meet the platform contract. That means applications should be compatible with the edge hardware profile, have defined health behavior, clear storage needs, safe configuration, and a deployment policy suitable for local operation.

Capability	What it enables
Modular application deployment	Different services can be activated by customer, site, or sector.
First-party application suites	ARED can package solutions for SMEs, venues, transport, smart buildings, and public programs.
Future partner ecosystem	Qualified partners can build edge-ready apps for the platform.
Local application execution	Critical workflows can run closer to users instead of relying only on distant cloud systems.
Cloud-coordinated management	Sites can remain locally useful while still reporting status, updates, and analytics to the cloud.

### Important wording

Avoid saying 'runs any app' without qualification. Say: Shirikihub runs containerized applications that meet the Shirikihub platform requirements.

# 8. Offline-Ready Digital Services

Offline-ready does not mean disconnected forever. It means the platform is designed so selected services can remain useful locally during connectivity disruption, and then synchronize or report when connectivity returns.

This is one of the strongest reasons Shirikihub matters. Many African deployments operate in environments where connectivity can be intermittent, power conditions can vary, and bandwidth can be expensive. A purely cloud-dependent model can create operational fragility.

- Local services can remain available during temporary internet disruption.
- Bandwidth-heavy workloads can be processed locally where appropriate.
- Data can be stored locally and synchronized selectively.
- Operators can manage distributed sites with cloud visibility without making the cloud the only execution layer.

- Customers get a more reliable digital experience in real-world conditions.

**Core phrase**

With Shirikihub, the internet becomes an accelerator, not the only foundation.

## 9. ShirikiEye: Camera and Video Intelligence at the Edge

ShirikiEye is the camera and video intelligence layer of the Shirikihub platform. It should be framed as local visual intelligence for operational insight, safety, analytics, and reduced dependence on cloud video processing.

Edge AI research highlights the importance of moving inference closer to devices and users when traditional cloud-assisted inference is limited by latency, network variability, or bandwidth pressure. [6]

- Local video analytics for selected camera workloads.
- Operational insights such as presence, activity, or usage patterns depending on deployed modules.
- Potential reduction in continuous cloud video upload by processing selected insights locally.
- Faster local response for use cases that benefit from on-site processing.
- Integration with Shirikihub storage, app runtime, and cloud reporting.

**Public-safe statement**

ShirikiEye enables camera and video intelligence at the edge, helping organizations process visual data locally and send only relevant insights to the cloud when needed.

## 10. ShirikiAI: Intelligence, Monitoring, and Safe Automation

ShirikiAI should be presented as the intelligence layer for monitoring, analytics, recommendations, and future controlled automation. It should not be presented publicly as fully autonomous self-healing unless that claim is independently field-validated and approved.

The safe public position is that ShirikiAI helps the platform understand local system behavior, detect risks, surface recommendations, and support future safety-gated automation.

ShirikiAI function	Public explanation	Boundary
Operational monitoring	Turns local signals into useful visibility for operators.	No internal event schema disclosed.
Analytics	Helps identify patterns in system, application, and site behavior.	No model internals disclosed.
Recommendations	Can suggest actions or operational follow-up.	No automatic action claim unless validated.
Future automation	Designed for controlled automation after validation.	Automation must remain safety-gated.

### Credible AI wording

ShirikiAI is designed to observe, analyze, recommend, and eventually support controlled automation. This is stronger and safer than claiming unrestricted autonomy.

## 11. Cloud Coordination: Edge Plus Cloud

Shirikihub is not anti-cloud. It is cloud-connected by design. The difference is that cloud is not the only place where value is created. Local execution happens at the edge, while the cloud coordinates fleet visibility, analytics, updates, dashboards, and management.

Cloud responsibility	Edge responsibility
Fleet visibility and dashboards	Local execution and service continuity
Remote management and policy coordination	Local storage and selected processing
Analytics aggregation	Local telemetry and event observation
Software update coordination	Runtime continuity and local app execution
Partner and customer portals	On-site application and user experience

This model supports a practical distributed infrastructure strategy: centralized coordination where it adds value, and local execution where resilience, latency, bandwidth, and cost matter.

## 12. Use Cases Across Africa

Shirikihub should be presented as a platform with multiple deployment environments. The white paper should avoid listing every possible application. Instead, it should explain where the platform applies and why local-first infrastructure matters in each environment.

Environment	Pain point	Shirikihub value
SMEs and venues	Need affordable digital services without complex infrastructure.	Connectivity, local apps, analytics, customer experience, and future add-ons.
Transport and buses	Connectivity changes by route; cloud-only services can be unreliable.	Onboard services, local content, camera intelligence, and sync when connected.
Hospitality and restaurants	Customer workflows need uptime during busy periods.	Local ordering, queue, access, analytics, and service continuity.
Education and training centers	Learning tools can be limited by bandwidth and cost.	Local content, controlled connectivity, offline-ready services,

		and cloud reporting.
Clinics and public services	Queues and local workflows must continue even with weak connectivity.	Local service workflows, queue systems, visibility, and data synchronization.
Smart buildings	Security, automation, sensors, and cameras need local response.	Camera intelligence, local automation, IoT integration, and operational insight.
IoT and infrastructure monitoring	Sensors create data that may not need immediate cloud upload.	Local processing, selective sync, and audit-ready workflows.

## 13. Economic and Operational Value

The strongest economic argument is infrastructure consolidation. Many deployments require multiple separate systems: access point, local server, storage appliance, NVR, AI box, cloud service, and separate management tools. Shirikihub is designed to reduce that fragmentation.

Traditional approach	Shirikihub approach	Potential benefit
Separate access point/router	Integrated local access layer	Lower deployment complexity.
Separate local server	Containerized application runtime	More flexible application deployment.
Separate NVR/storage appliance	Local storage and video intelligence capability	Reduced hardware sprawl and selective cloud upload.
Separate AI appliance or cloud-only AI	Edge AI readiness through Shirikihub layers	Faster local response and reduced bandwidth pressure.
Separate management tools	Cloud-connected fleet visibility	Simpler operations and partner scaling.

### Cost wording

Do not claim exact savings until a validated cost model exists. Say: Shirikihub is designed to reduce infrastructure fragmentation, deployment complexity, and unnecessary cloud bandwidth pressure.

## 14. Security, Trust, and Operational Safety

Because Shirikihub runs close to users and local data, trust and operational safety must be part of the public story. The white paper should show that ARED takes safety seriously, without exposing security implementation details.

- Secure device identity and controlled platform access.
- Privacy-aware telemetry and data minimization principles.

- Cloud visibility without making cloud connectivity the only execution path.
- Controlled updates and operational discipline for distributed deployments.
- Separation between observation, recommendation, and action.
- Technical details available only to qualified partners under NDA.

**Safety-first message**

Observe first. Recommend second. Automate only through controlled policy and validation.

## 15. Deployment and Partnership Model

Shirikihub can support several deployment models. This matters because the platform is not only a product sold to one customer type; it can become a repeatable infrastructure layer for partners, enterprises, and public programs.

Model	Best fit	How Shirikihub fits
Direct SME or venue deployment	Retail, hospitality, clinics, campuses	Deploy local services and scale modules over time.
Partner-led deployment	System integrators, ISPs, MSPs, local operators	Partners deploy and operate local infrastructure in their markets.
Public-sector programs	Service points, education, health, local administration	Distributed local services with central visibility.
Transport deployment	Buses, routes, terminals, mobility services	Local services that sync by route or when connected.
Managed edge/cloud service	Organizations that want deployment without owning hardware	ARED manages the infrastructure footprint and cloud coordination.
Future app ecosystem	Qualified developers and vertical partners	Curated applications extend platform value.

## 16. Validation Framework

A strong public white paper should explain how the platform is validated without publishing sensitive engineering details. This creates credibility while protecting implementation.

Validation area	What should be proven publicly
Offline operation	Selected services remain usable during connectivity disruption.
Application runtime	Containerized applications start, recover, and report status correctly.

Local storage	Data persists as expected across normal operations and updates.
Cloud synchronization	Data and status synchronize when connectivity is restored.
Camera/video workloads	Camera intelligence runs locally within defined workload limits.
AI monitoring	Operational insights are generated from local signals.
Power and thermal behavior	The device remains stable under realistic site conditions.
Update and recovery	Software updates follow controlled release and recovery processes.
Security and access	Identity, access, and telemetry policies are enforced.

The detailed test plans, commands, internal checks, and engineering evidence should remain in a confidential technical annex.

## 17. Public Claims and Confidential Annex Boundary

This section is important because it protects the technology while allowing the public white paper to be strong and credible.

Safe public claim	Do not disclose publicly
Shirikihub supports local-first edge services.	Internal OS service names, file paths, boot or update mechanics.
ShirikiOS supports containerized application runtime.	Exact orchestration handoff, internal configs, and operational commands.
ShirikiEye supports camera/video intelligence at the edge.	Hardware device details, codec pipeline, model internals, and probe mechanisms.
ShirikiAI supports analytics, monitoring, recommendations, and future controlled automation.	Event schema, ML pipeline, remediation rules, and safety gate mechanics.
The platform is designed for offline-ready operation.	Exact image lifecycle, cache strategy, and recovery logic.
The platform is cloud-connected.	Cloud API details, tokens, endpoints, and security flows.

### Recommended public note

A deeper technical architecture annex is available to qualified partners under NDA.

## 18. Roadmap

The roadmap should be strategic and product-facing, not implementation-facing. The goal is to show the direction of the platform while avoiding unfinished technical details.

- Expanded Shirikihub hardware profiles for different site sizes and workload needs.
- Additional ShirikiOS capabilities for edge runtime management and partner operations.
- Expanded ShirikiEye analytics modules for safety, operations, and business insights.
- Broader ShirikiAI recommendations and controlled automation after validation.
- Curated third-party application onboarding through the marketplace model.
- Sector-specific bundles for SMEs, transport, education, health, smart buildings, and public programs.
- Partner dashboards and fleet management tools.
- Additional cloud and telecom integration models.
- Stronger validation reporting for offline operation, power behavior, app runtime, and edge AI workloads.

## 19. Conclusion

Shirikihub is ARED's answer to a major infrastructure gap: the need for digital services that can operate locally while remaining connected to cloud coordination. It is designed for markets where bandwidth, power, cost, latency, and resilience are not theoretical concerns; they are daily operating realities.

Powered by ShirikiOS, ShirikiEye, and ShirikiAI, Shirikihub positions ARED as more than a hardware company and more than an app provider. It positions ARED as a builder of local-first edge infrastructure for Africa's digital future.

### Final message

Shirikihub is the missing local infrastructure layer between African users and the cloud: local execution, cloud coordination, and digital services designed for real-world conditions.

## References

The following public references support the market context and technical category framing used in this white paper. Product and platform descriptions are based on ARED's public positioning and internal product direction, with sensitive implementation details intentionally excluded from this public version.

**[1] Reuters. World Bank backs Africa digital data push with \$100 million Raxio deal.**

<https://www.reuters.com/world/africa/world-bank-backs-africa-digital-data-push-with-100-million-raxio-deal-2025-04-03/>. Cited for Africa's data center capacity gap, rapid mobile data growth, and the value of local data hosting.

**[2] Associated Press. Africa's cellphone towers turn to solar as diesel costs surge.**

<https://apnews.com/article/5ab1f050d9b0ba90d21a5d53f153ba2d>. Cited for energy cost and reliability pressure on telecom infrastructure.

**[3] Reuters. Telecom industry coalition to boost access to smartphones in poor countries.**

<https://www.reuters.com/business/media-telecom/telecom-industry-coalition-boost-access-smartphones-poor-countries-2024-07-10/>. Cited for the global mobile internet usage gap and barriers such as affordability, device access, and skills.

**[4] Research overview. Wireless Edge Computing with Latency and Reliability Guarantees.**

<https://arxiv.org/abs/1905.05316>. Cited for the edge-computing principle of moving compute, storage, and control closer to end nodes for latency-sensitive applications.

**[5] Research overview. 5G Multi-access Edge Computing: a Survey on Security, Dependability, and Performance.** <https://arxiv.org/abs/2107.13374>. Cited for the edge-computing security, dependability, and performance trade-offs.

**[6] Research overview. Edge AI: On-Demand Accelerating Deep Neural Network Inference via Edge Computing.** <https://arxiv.org/abs/1910.05316>. Cited for the rationale behind edge AI and local inference close to users and data sources.

## Appendix A: Website Page Copy Summary

The public website page should use the white paper as a readable web asset first, with the PDF download added once the final PDF is uploaded.

- Footer Resources link: White Paper -> /whitepaper/.
- Homepage Insights card: Featured White Paper -> /whitepaper/.
- White paper page: readable online summary with clear calls to action.
- PDF button: add only after the final PDF exists in /assets/.
- Technical annex request: route to email or contact form for qualified partners.