

Accelerating Cell Broadcast for Effective Early Warning Systems in Africa

Kenya's Experience & the Road to 2027

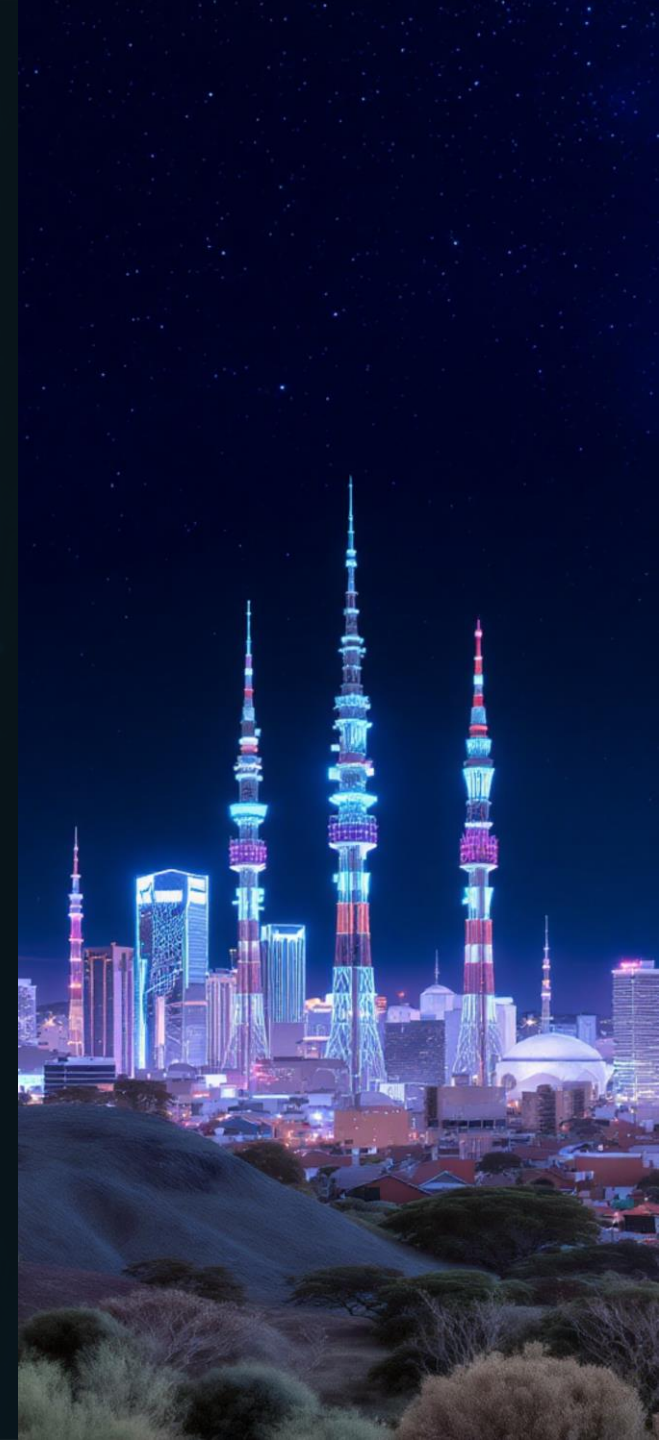
Presented to the ITU-D Workshop on Telecommunications/ICTs Resilience for Disaster Management Utilizing Emerging Technologies and Services Including AI

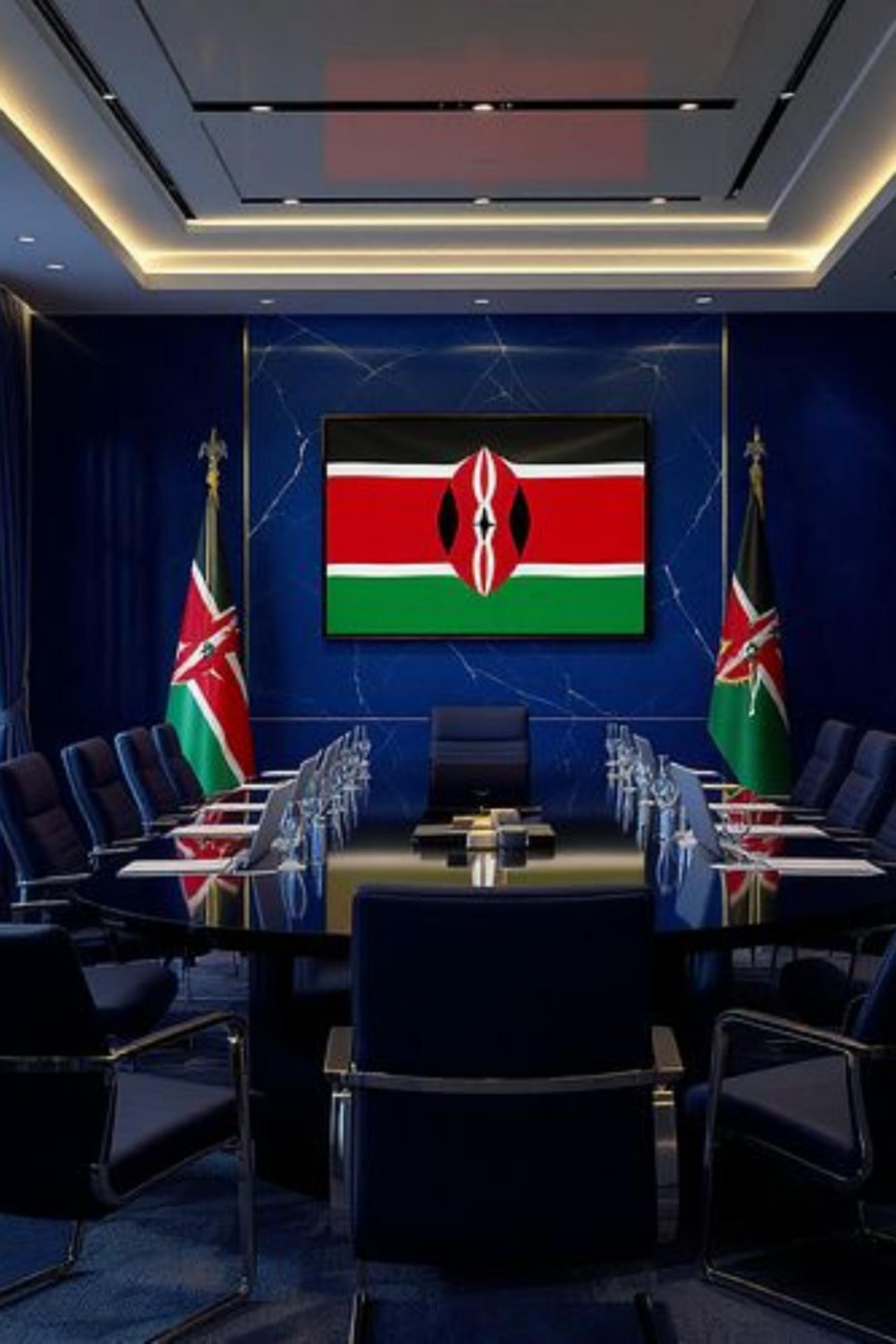
COMMUNICATIONS AUTHORITY OF KENYA

ITU-D WORKSHOP: TELECOM/ICTS RESILIENCE FOR DM & AI

ICTS FOR DISASTER MANAGEMENT

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Presentation Outline

1. Kenya's Disaster Risk Context — CBS Regulatory Imperative
2. CBS Deployment: Assessment, Architecture & Standards Alignment
3. Regulatory & Governance Framework
4. Costs, Timeline & Sustainability
5. Replicable Lessons for African Member States

The Cost of Inaction

Kenya ranks among the highest-risk disaster-exposure countries in the Greater Horn of Africa, with 70%+ of hazard events attributable to hydrometeorological extremes. Without a national CBS capability, alert delivery is subject to network congestion failure at peak-risk moments — the precise condition under which latency is operationally unacceptable.

3–4M

Kenyans affected by disasters annually

70%+

of Kenya's disasters caused by extreme climate events (floods, droughts)

98%

mobile network population coverage — CBS can reach almost everyone

"Every second of delay in an emergency costs lives. CBS eliminates that delay."

Kenya's Centralized CBS Architecture

Kenya's CBS implementation follows a three-tier architecture: alert origination, central aggregation, and simultaneous multi-MNO dissemination.

01

Cell Broadcast Entities (CBEs) — Alert Originators

Authorized government agencies with write access to the CBC:

- Kenya Meteorological Department (KMD)
- National Disaster Risk Management Authority (NDRMA)
- National Drought Management Authority (NDMA)
- Kenya Red Cross Society (KRCS)
- Other designated government agencies

02

Cell Broadcast Centre (CBC) — Alert Aggregator

Operated by NDRMA; validates, geo-targets, and routes alerts to all MNOs simultaneously via CAP (Common Alerting Protocol).

03

Mobile Network Operators (MNOs) — Alert Disseminators

Safaricom, Airtel Kenya, Jamii Telecommunications, and Telkom Kenya broadcast over RAN to all compatible devices in the targeted cell area within 60 seconds.





Why Kenya Chose the Centralized Model

Unified Command

Single control point delivers simultaneous alerts across all four MNOs with no per-operator coordination overhead.

Stronger Governance

Centralized authorization enforces strict CBE whitelisting, eliminating unauthorized alert origination.

Cost Efficiency

One CBC platform eliminates duplicated infrastructure across operators.

Faster Deployment

MNOs require only a single CBC interface rather than independent CBC builds.

Interoperability

CAP-compliant interface enables direct integration with national disaster management systems.

Scalability

Architecture supports new MNO onboarding, expanded alert categories, and 5G NR CBS without structural changes.

CBS for Inclusive Early Warning

CBS delivers alerts independently of data connectivity, SIM registration, or device capability — addressing coverage gaps that SMS and app-based systems cannot resolve.

Feature Phones & Smartphones

Operates across 2G–5G radio access technologies; no data plan or smart device required.

Remote & Rural Communities

Coverage defined by cell broadcast area, not internet infrastructure or subscriber literacy.

Persons with Disabilities

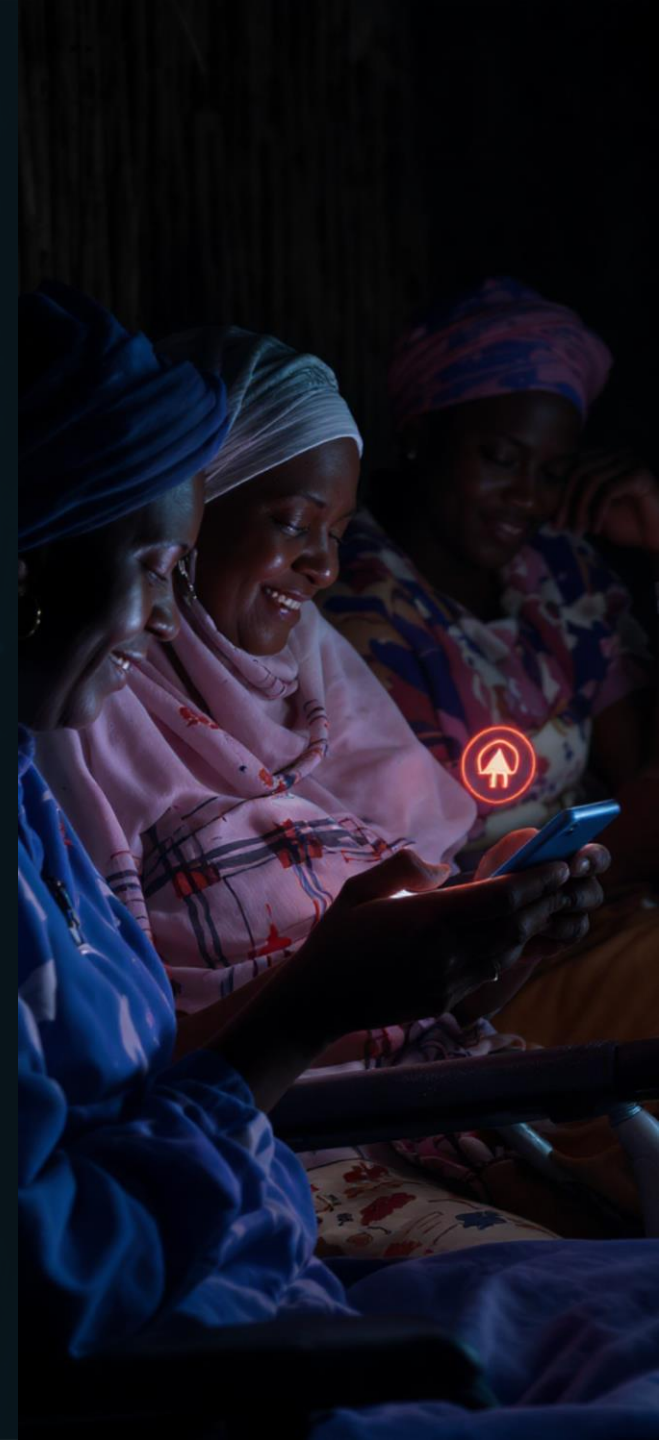
Alert triggers simultaneous audio, vibration, and visual pop-up per 3GPP accessibility requirements.

Visitors & Tourists

No SIM registration required; delivery is location-based, reaching all devices within the broadcast zone.

Multilingual Reach

Supports concurrent delivery in English and Kiswahili; architecture allows region-specific language additions.



Five Operating Lessons for Effective Early Warning Systems

These five operational principles, derived from multi-country forum findings, distinguish systems that achieve protective action from those that produce alerts without measurable impact.

Warnings Need Safe Destinations

Evacuation directives require pre-mapped routes, confirmed shelter capacity, and assisted-evacuation protocols for mobility-constrained populations.

Communities are Operating Partners

Local actors must be integrated into risk assessment, message design and drill validation — not limited to end-point message receipt.

Financing Must Cover the Life Cycle

Recurrent budgets must address staff, data licences, connectivity, maintenance, testing and redundancy — capex alone is insufficient.

Domestic Investment Anchors Ownership

National and sub-national budget allocations establish accountability and reduce exposure to short-cycle donor dependency.

Early Warning Is a Continuing Public Service

Systems require institutionalisation as essential infrastructure, with defined service standards and performance reporting frameworks.

"A system may issue technically accurate information but still fail when messages are inaccessible, arrive in an unfamiliar language, or instruct people to take an action that is unsafe or unaffordable."



AI & Emerging Technologies — Enabling Smarter CBS Deployment

AI and emerging ICTs enhance CBS effectiveness across four operational domains. ITU conditions apply: representative data, data-sharing agreements, cybersecurity protocols and mandatory human oversight.

Application	Operational Value	Examples
Connectivity Mapping	Identify populations outside reliable network coverage; prioritize alternative channels or infrastructure investment	ITU, Microsoft, Planet Labs, IHME — Early Warning Connectivity Map
Multilingual Delivery	Machine-translate forecasts into local-language text or voice with community validation of authoritative meaning	Daraja AI and similar tools
Field Situational Awareness	Transmit observations from low-access areas to support rapid operational decisions	Smart Help and related platforms
Mobile Public Warning (CBS)	Distribute geo-targeted alerts via cell broadcast within a multi-channel warning architecture	Governments, regulators, operators, ITU, GSMA

CBS + AI Integration

AI optimizes geo-targeting, automates CAP message translation, maps coverage gaps and models impact zones within the CBS alert chain.

Deployment Conditions

AI tools must be validated against national operational workflows before deployment. Human authorization remains mandatory for all alert origination.

Examples reflect forum presentations. They were not independently tested or ranked.



Lessons from Kenya

Kenya's CBS rollout offers a replicable model for EW4ALL Pillar 3 compliance by 2027.

1. Start with a Readiness Assessment GSMA completed a 12-module national assessment in 8 weeks.	2. Build Multi-Stakeholder Consensus Early Nairobi workshop aligned CA, NDOC, KMD, all 4 MNOs, and key partners.	3. Designate a Clear Lead Agency NDOC leads CBS; CA leads EW4ALL Pillar 3 — single-agency accountability.
4. Adopt a Centralized Architecture One CBC delivers lower cost and simultaneous dispatch across all MNOs.	5. Align CBS with National Policy Frameworks CBS embedded in EW4ALL roadmap, NDRMS 2025–2030, and KICA Act.	6. Plan for Sustainability from Day One CA funds CAPEX (USD 3.7M); OPEX shared by NDRMA, KMD, KRCS, MNOs.

Kenya's Regulatory & Governance Framework

Kenya's CBS governance spans telecoms/ICT and disaster management sectors, requiring coordinated legal and institutional mandates across multiple agencies.



Legal Mandate — KICA Section 23

CBS is anchored under KICA Cap 411A, Section 23 (emergency services via telecommunications). The National Disaster Risk Management Act (No. 16 of 2026), assented to 29 May 2026 and commenced 16 June 2026, formally establishes NDRMA and provides the primary legal foundation for CBS; a dedicated EWS Rule/Regulation governing CBS operations remains under development.



Institutional Roles — Who Does What

CA: National lead for EW4ALL Pillar 3; leads CBS procurement and implementation.

NDOC/NDRMA: CBS project lead agency; operates as Alert Aggregator (CBC); assumes system ownership post-deployment.

KMD: Alert originator (CBE); sole agency currently operating in CAP format.

MNOs (Safaricom, Airtel, Jamii, Telkom): Alert disseminators; integrate CBS into their networks.



Governance Agreements — MoU & TCA

Governance documents with implementing bodies underway. A Technical Cooperation Agreement (TCA) detailing financial commitments, timelines, and Board and Treasury OPEX allocations will follow MoU execution.



SOPs & Regulatory Updates Needed

Two critical gaps require resolution:

(1) Draft and gazette a dedicated EWS Rule/Regulation governing CBS operations.

(2) Develop SOPs covering alert creation, approval, dissemination, and escalation across all CBEs, the CBC, and MNOs.

Kenya's National CBS — What It Will Deliver

National Cell Broadcast Centre (CBC)

Centralized CAP-compliant aggregation platform interfacing all licensed MNOs via standardized API

Geo-Targeted Alerts

GIS polygon-based cell targeting; alerts restricted to affected TAI/CGI scope

Multi-Network Compatibility

Compliant across 2G, 3G, 4G and 5G air interfaces; no SIM or data plan required

Multilingual Dissemination

Dual-language broadcast in English and Kiswahili per ITU-T X.1303bis CAP schema

Device-Level Readiness

Firmware updates and type-approval certification aligned to 3GPP CBS specifications

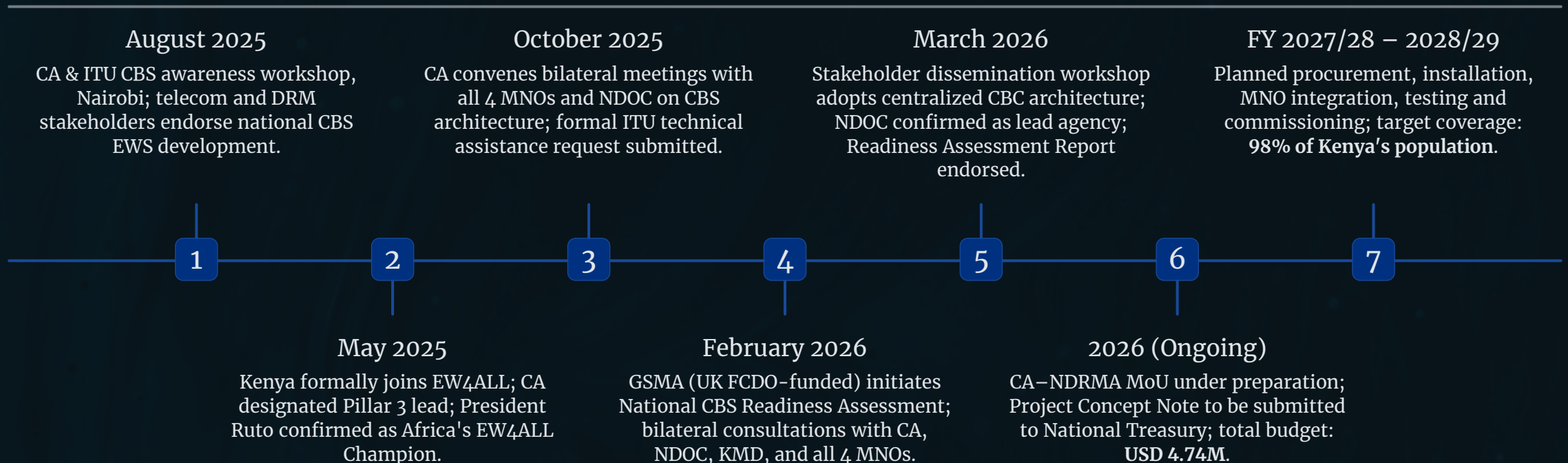
Public Awareness & Capacity Building

SOPs covering alert origination, approval workflows, and CBE/MNO operator training





Kenya's CBS Journey — Key Milestones



What Does CBS Cost? Kenya's Experience

Kenya's National CBS Readiness Assessment (ITU/GSMA-supported) establishes a replicable cost benchmark for centralized CBC deployment. Final costs are architecture-dependent, scaled by number of MNOs and existing national infrastructure.



Year	CAPEX Cost	OPEX Cost	Project Management Cost	Total (USD)
FY 2026/27	–	–	–	–
FY 2027/28	USD 2.16M	–	USD 106K	USD 2.27M
FY 2028/29	USD 1.54M	USD 0.9M	USD 32K	USD 2.47M
TOTAL	USD 3.7M	USD 0.9M	USD 138K	USD 4.74M

❑ Financing model: CA funds CAPEX as EW4ALL Pillar 3 lead; NDRMA, KMD, KRCS, and MNOs each bear institutional OPEX. Supplementary financing under FCDO, GCF, and UNDP mechanisms is under active negotiation.



Kenya's CBS Implementation Timeline

Kenya's CBS deployment is structured across two financial years (FY 2027/28–2028/29), covering procurement through full national rollout at 98% population coverage.

01

Internal Approval (By July 2026)

CA submits Project Concept Note to National Treasury; Board approval for project initiation and MoU with NDRMA.

02

System Design & Tender Preparation (By March 2027)

System design and tender documents finalized; MoU and TCA between CA and NDRMA executed.

03

Budget Approval (By June 2027)

National Treasury approves FY 2027/28 budget

04

Procurement & Installation (By Dec 2027)

Vendor contracted; equipment delivered and installed at ICT Authority government datacentre.

05

MNO Integration (By Jan 2028)

CBS integrated with all 4 MNOs — Safaricom, Airtel, Jamii, Telkom — with functional nodes and connectivity confirmed.

06

Testing & Commissioning (By Feb 2028)

End-to-end testing, simulation exercises, and user acceptance tests completed.

07

Full Operations (April 2028)

National CBS operational; NDOC/NDRMA assumes ownership with joint oversight committee established.



Sustainability & Key Implementation Challenges

Four structural challenges identified in Kenya's ITU-supported readiness assessment.

Key Challenges

💰 Funding

CAPEX _CA; OPEX distributed across CA, NDRMA, KMD, KRCS, MNOs. Donor co-financing under exploration.

📄 Regulatory Gaps

NDRMA established (Act No. 16, June 2026). EWS Rule pending; cloud hosting prohibited — virtual govt datacentre required.

📶 MNO Integration

4 MNOs (Safaricom, Airtel, Jamii, Telkom); centralized architecture agreed; formal integration agreements required.

📱 Device & Coverage

98% network coverage; 31.5M of 56.4M subscribers. No hazard-to-coverage GIS dataset; 2G handset compatibility survey needed.

Sustainability Model

During Implementation

CA leads procurement; joint CA–NDOC team provides oversight.

Post-Deployment

NDOC/NDRMA owns CBC; MNOs own integrated nodes; OPEX by agency.

Ongoing Governance

Joint committee (CA, NDOC, KMD, NDMA, KRCS, MNOs) governs operations and alert authorization.



Financing Early Warning Systems That Last

Project finance typically covers capital expenditure; recurrent costs — staffing, data licensing, connectivity, testing, maintenance — are frequently unbudgeted. A credible investment case requires full life-cycle costing, a defined operating model, and a recurrent appropriation pathway.

Financing Approaches

Mechanism	Use	Key Consideration
Domestic Budgets	Dedicated national and local allocations for institutions, operations and preparedness	Anchors ownership and secures predictable recurrent finance
Climate & Development Finance	Grants, concessional finance and technical assistance aligned with national roadmaps	Targets system strengthening and capability gap closure
Disaster Risk Finance	Contingency funds, contingent credit, reserves, insurance and regional risk pools	Pre-positions liquidity before or immediately after shock onset
Anticipatory Finance	Pre-arranged funds released against agreed forecasts or impact triggers	Enables pre-impact action; requires defined trigger thresholds
Universal Service Funds	Possible support for public-warning connectivity or last-mile access	Requires public-interest justification, additionality and transparent governance

"Domestic investment anchors ownership. External finance can accelerate delivery, but national budgets establish accountability and reduce dependence on short project cycles."

The Addis Ababa Call to Action on Early Warnings

Adopted at the Africa Early Warnings Forum, Addis Ababa, 2–4 September 2026 — directly applicable to CBS deployment and the ITU-D telecommunications resilience mandate.

"No person, community or country should face a predictable hazard without the means to anticipate it, receive a warning and act before lives and livelihoods are lost."

Five Collective Commitments



Carry Forward Early Warnings for All

Accelerate and sustain African progress under national ownership and leadership.



Bridge the Gaps — Reach the Last Mile

Effective coverage must reach every person — in a form they can understand and act upon.



Make MHEWS a Core Public Investment

Classify MHEWS as essential infrastructure with sustained, multi-component budget allocations.



Enable Early Action Based on Warnings

Pre-arrange warning-to-action linkages, trigger thresholds and anticipatory finance across all sectors.



Make Universal Protection a Shared, Measurable Responsibility

Measure warning reach, response rates and loss reduction — not system existence.

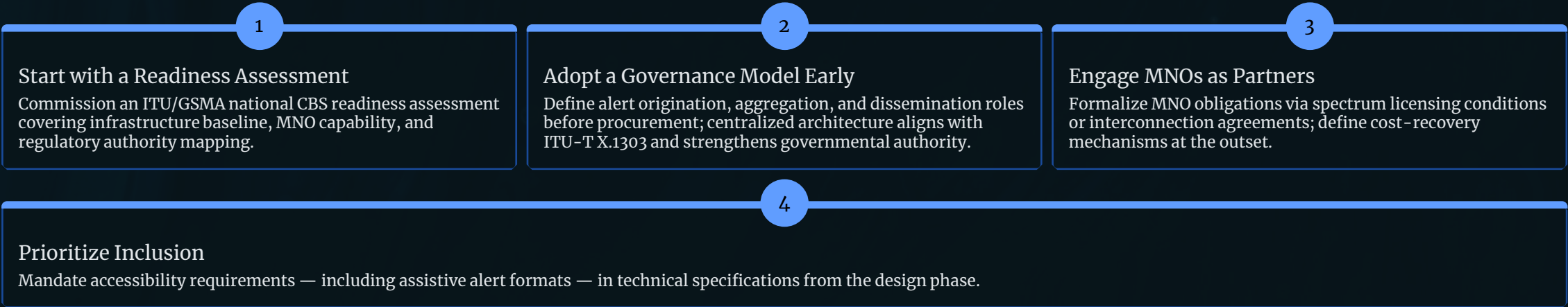
ADDIS ABABA, SEPTEMBER 2026

AFRICA EARLY WARNINGS FORUM



The Road Ahead — Africa's CBS Opportunity

With the EW4ALL 2027 deadline approaching, Cell Broadcast is a standards-compliant, network-independent mass alerting mechanism scalable across African ITU Member States. Kenya's deployment — documented at the ITU-D Workshop on Telecommunications/ICTs Resilience for Disaster Management Utilizing Emerging Technologies and Services Including AI — constitutes a replicable technical reference model.



ITU-D Calls to Action

- Request an ITU CBS Readiness Assessment**

Initiate a formal ITU-D national assessment covering CBS infrastructure, regulatory framework, and MNO readiness to produce a binding deployment roadmap.
- Join the ITU CBS Knowledge Network**

Access Kenya's implementation documentation and technical specifications through ITU's CBS community of practice.
- Commit to a 2026 CBS Roadmap**

Each Member State should submit a national CBS deployment plan by end-2026 to meet the EW4ALL universal coverage target by 2027.



COMMUNICATIONS AUTHORITY OF KENYA

Thank You

ITU-D Workshop: Telecommunications/ICTs Resilience for Disaster Management Utilizing Emerging Technologies and Services Including AI

Kenya's CBS implementation documentation is available for peer reference and technical exchange. Questions, technical feedback, and bilateral engagement are welcome.

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ITU-D Resources: www.itu.int/en/ITU-D/Emergency-Telecommunications