DEPLOYMENT OF INTERNET PROTOCOL VERSION 6 (IPv6) IN AFRICAN COUNTRIES

Policy Recommendations Report

1. Executive Summary

In recent years, the global Internet ecosystem has accelerated its transition from Internet Protocol version 4 (IPv4) to Internet Protocol version 6 (IPv6). This shift is being driven by the depletion of IPv4 addresses and the rapid growth in demand for scalable connectivity from 5G, the Internet of Things (IoT), cloud computing, artificial intelligence (AI), blockchain-enabled services, and other digital innovations. By late 2025, global IPv6 coverage had surpassed the 40% mark, and several leading countries had reached or approached 80% IPv6 capability.

Despite this progress, IPv6 adoption across Africa remains below the global average. Findings from the research and situational analysis undertaken by Masterspace Solutions Ltd (MSS) in partnership with the Africa Telecommunications Union (ATU) indicate that, as of October 2025, the average IPv6 adoption rate in Africa was still below 10%, with wide disparities between countries due to differences in market structure, institutional readiness, governance commitment, and financing capacity. Yet, accelerating IPv6 deployment is essential to sustain Internet growth, reduce dependence on IPv4 address sharing, improve service scalability, and enable future-ready digital infrastructure.

Against this backdrop, this Policy Recommendations Report presents harmonized, Africa-relevant recommendations to create an enabling environment for effective and sustainable IPv6 transition. The report draws on lessons from high-adoption countries globally and emerging African adoption successes, while recognizing that no single approach fits all national contexts. It therefore proposes an optimal ecosystem model grounded in coordination, co-operation, and collaboration among governments, regulators, operators, private sector actors, academia, civil society, and development partners.

The report outlines policy objectives, guiding principles, institutional and governance arrangements, regulatory and legal measures, capacity-building interventions, infrastructure and research priorities, and financing mechanisms. It further provides an implementation matrix and a phased transition roadmap (preparation, dual-stack implementation, and continuous monitoring and improvement), alongside monitoring and evaluation measures, risk management considerations, and model regulatory provisions that African countries can adapt to their national circumstances.

Table of Contents

List of Acronyms

AfriNIC	The African Network Information Center
AI	Artificial Intelligence
AICTO	The Arab ICT Organization
ATU	Africa Telecommunications Union
AU	Africa Union
ECA	United Nations Economic Commission for Africa
RECs	Regional Economic Communities
EAC	East African Community
ECOWAS	Economic Community of West African States
SADC	Southern African Development Community
MNO / MNOs	Mobile Network Operator(s)
DNS	Domain Name System
DHCP	Dynamic Host Configuration Protocol
CPE / CPEs	Customer Premises Equipment
KPI / KPIs	Key Performance Indicator(s)
MCMC	Malaysian Communications and Multimedia Commission
STC	Saudi Telecom Company
400GE	400 Gigabit Ethernet
ICRIER	Indian Council for Research on International Economic Relations
APNIC	Asia Pacific Network Information Centre
ARCEP	Autorité de Régulation des Communications Électroniques, des Postes et de la Distribution de la Presse
ICT	Information and Communication Technology
IPv4	Internet Protocol version 4
IPv6	Internet Protocol version 6
IoT	Internet of Things
ISPs	Internet Service Providers
ITU	International Telecommunications Union
LACNIC	Latin American and Caribbean Internet Addresses Registry
MSS	Masterspace Solutions Ltd
OECD	Organisation for Economic Co-operation and Development
UN	United Nations
5G	Fifth Generation mobile networks

2. Aims and Objectives of this Report

The aim of this report is to develop harmonized policy recommendations aimed at creating an enabling environment for effective and sustainable IPv6 transition in Africa.

The overarching objectives will include:

- To review existing policy recommendations in a few worlds' leading countries in IPv6 transition.
- To review existing policy recommendations in a few Africa's leading countries in IPv6 transition.
- To develop harmonised policy recommendations suited to promoting IPv6 transition in Africa's context.

Specific key objectives to be achieved by this report are to:

- Establish clear objectives for IPv6 transition;
- Facilitate a smooth transition from IPv4 to IPv6 in public and private networks;
- Recommend enabling regulatory and institutional frameworks for IPv6 deployment, including the respective roles, and coordinating mechanisms of these institutions;
- Build national and regional technical capacity in IPv6 planning, deployment, and management;
- Encourage research, innovation, and local content development leveraging IPv6 technologies;
- Foster regional and international cooperation on IPv6 implementation standards;
- Provide a framework for monitoring and evaluation of progress.

3. Policy Recommendations for Accelerating IPv6 Adoption: Perspectives of Global Leading Nations

This section provides an overview of how strategic policy recommendations for top five (5) nations globally in IPv6 adoption have resulted into a remarkable growth in IPv6 adoption from less than 10% in most countries within the past decade to surpassing the 65% line as of the month of December 2025.

France

IPv6 end users' adoption in France has shown good progress in the last years, rising from 6% (2014) to 88% (in December 2025), with the strongest growth rates appearing after ARCEP's main actions and decisions. In 2018, ARCEP (France's Telecom regulator) published its annual edition of its barometer of the transition to IPv6. As in previous years, the purpose of this report was just informative as it was devoted to assessing the IPv6 status without imposing any obligation or enacting any regulation/guide. Additionally, ARCEP organized a workshop with major stakeholders (operators, hosting providers, device manufacturers, international associations, training institutes, etc.) to share the most relevant experience and any good practises identified when implementing IPv6.

According to ARCEP annual barometer[1], the transition to IPv6 has become a pressing issue in France, to prevent the internet from being split into two with IPv4 on one side and IPv6 on the other. Forecasts provided by operators show that the transition to IPv6 amongst residential customers should be virtually complete by the end of 2027 and could end in 2030 with the switch-off of the copper network. In a similar manner, the forecasts provided by France's four largest ISPs show that the transition of mobile access lines to IPv6 should be complete by the end of 2027, for both consumer and business customers.

[1] ARCEP, Arcep 2025 Barometer of the transition of to IPv6, Available Online: https://www.arcep.fr/fileadmin/reprise/observatoire/ipv6/Arcep_2025_Barometer_of_the_Transition_to_IPv6.pdf

France has successfully accelerated its IPv6 transition through a data-driven regulatory approach led by its telecom regulator, ARCEP. The primary policy recommendations for further acceleration focus on mandating the adoption of IPv6 in the public sector, encouraging content and hosting providers to migrate, and ensuring all network equipment is IPv6-compatible.

Germany

Germany has observed a progressive adoption of IPv6 among end users, reaching values around 77% by December 2025 according to Google Statistics on IPv6 adoption. According to Axon (2021)[2], Germany initially followed a soft approach, creating a Council that provided visibility and published non-binding guidelines to promote the adoption of IPv6 in both the public and private sectors. Additionally, the federal government has actively implemented IPv6, an example that seems to have driven other public organisations to follow the same path. Moreover, recent requirements, in IT systems procurement, to migrate to IPv6 (even without IPv4) are a clear statement by policymakers on their commitment to the new internet protocol. In late 2019, a stricter approach was defined in a roadmap requiring IPv6 migration in federal administrations, but subject to no deadline. As of today, Germany's policy recommendations for accelerating IPv6 adoption, is heavily based on public sector enabling support and resources for migration and establishing transparent data protection guidelines.[3]

Belgium

According to the Internet Society Pulse, Belgium led all countries, for the most part, from 2014 to early 2018, during which time it became the first country to pass 50% IPv6 capability briefly in November 2016[4]. As of December month in 2025, the Belgium IPv6 adoption stands at over 72%, primarily due to the agreement between mobile internet access service providers and public / fixed internet service providers with a strict regulatory constraint, combined with a market-driven approach and industry collaboration, incentivized major Internet Service Providers to deploy IPv6 to manage the exhaustion of IPv4 addresses.

[2] Axon Partners Group, December 2021, IPv6: Benefits and best practices of public policies, Final Report, Available Online: https://axonpartnersgroup.com/ipv6-benefits-and-best-practices-of-public-policies-2/
[3] Plum, 2018, Guidelines and Process: IPv6 for Public Administrations in Europe, Available Online: https://interoperable-europe.ec.europa.eu/sites/default/files/document/2019-12/Plum-EC-IPv6-Guidelines.pdf
[4] Internet Society Pulse, 2016, Which Country Will be The Next to Reach 50% IPv6 Capability, Available Online: https://pulse.internetsociety.org/blog/which-country-will-be-the-next-to-reach-50-ipv6-capability

India

According to Google's statistics, India has reached an IPv6 adoption rate of around 70.83% by mid December 2025[5]. The combination of an engaged private sector, and the policies and roadmap defined by the government have turned India into the country with currently among the highest IPv6 adoption of end users in the world, rising from 0% in 2016 to more than 70% by 2025. The Government of India developed and implemented a set of Policy initiatives on IPv6 transition in India[6], which promote the adoption of IPv6 in existing and developing network infrastructure. These initiatives focus on preparedness for the future of networking and internet technology by enabling networks to support IPv6 addresses and data packets. However, this critical transition should be done methodically and mindfully, with complete awareness of the benefits, challenges, and caveats surrounding the adoption of IPv6 to avoid any significant disruptions. The Policy recommendations that accelerated IPv6 adoption in India include but not limited to:

- **Assessment and monitoring**: This includes stricter monitoring of IPv6 adoption roadmap targets and performing an independent audit of IPv6 adoption.
- **Skill and technology development**: This includes capacity building and manpower training as well as research and development in IPv6 technologies.
- **Deployment and management of infrastructure**: This constitutes creation and trials of IPv6 only Root Server as well as participation in governance of DNS Root Server.

According to a study conducted by the Axon Partners Group[7], India can be defined as a clear success case in terms of IPv6 adoption. Early on, policy makers urged all public organisations to adopt IPv6 and adopted a mandatory transition plan. In addition, they transmitted certain requirements to private stakeholders, such as service providers and device manufacturers. These requirements defined actions required both immediately (i.e., new connections should be IPv6-capable) and progressively (e.g., switching CPEs to IPv6-capable).

[5] Google, Per Country IPv6 adoption, Available Online: https://www.google.com/intl/en/ipv6/statistics.html#tab=per-country-ipv6-adoption
[6] ICRIER 2020, Policy Brief on IPv6 Transition in India, Available Online: https://icrier.org/pdf/IPv6_Transition.pdf
[7] Axon Partners Group, 2021, IPv6: Benefits and best practices of public policies. Available Online: https://axonpartnersgroup.com/ipv6-benefits-and-best-practices-of-public-policies-2/

Saudi Arabia

As of December 2025, Saudi Arabia IPv6 adoption stands at over 66% according to the Google Statistics up from about 36% in 2021. This tremendous growth was Policy recommendations driven, in which the Saudi Ministry of Communications and Information Technology in April 2024 announced the launch of the 10Gbps City initiative, declaring the establishment of an end-to-end high-speed, high-quality network architecture based on IPv6 Enhanced[8]. Saudi telecommunication companies like STC and Zain have been proactively deploying advanced technologies, including 400 Gigabit Ethernet (400GE) for enhanced capacity, network slicing for efficient resource allocation, and digital mapping, thereby maintaining a pioneering stance in innovative deployments. Saudi Arabia continues leading regional IPv6 deployment in the Middle East. Government-led digital transformation efforts, as described in the Saudi Vision 2030 as well as other national economic frameworks, have proven decisive[9]. The country seeks to leverage emerging technologies to drive economic development, with digital transformation projects linked closely to national IPv6 strategies and Internet growth.

Malaysia

According to the Internet Society Pulse, Malaysia's IPv6 adoption stands at over 66% in December 2025 up from about 50% in 2020. This has been led by Malaysia's policy development for IPv6 adoption is characterized by early government initiatives and regulatory mandates led by the Malaysian Communications and Multimedia Commission (MCMC) to ensure a nationwide transition[10]. Malaysia excelled in the user readiness indicator, ranking 2nd globally – a further improvement from its 2022 standing, highlighting its leadership in ensuring users' capability to access the internet via IPv6. Malaysia's policy recommendations for accelerating IPv6 adoption involve mandatory certification, promoting a national internet registry, encouraging dual-stack deployment with an eventual shift to IPv6-only networks, and continuous public consultation and awareness initiatives[11]

[8] Roland Berger, Global IPv6 Development Report 2024, 19 August 2024, Available Online: https://www.rolandberger.com/en/Insights/Publications/Global-IPv6-Development-Report-2024.html

[9] ITU, 2022, Accelerating IPv6 update digital transformation, Available Online: https://www.itu.int/hub/2022/01/accelerating-ipv6-uptake-digital-transformation/

[10] Malaysia, 2025, Transitioning to IPv6 Only, Available Online: https://2025.apricot.net/assets/files/APAC945/transitioning-to-ipv_1740437384.pdf

[11] The Star, 2024, Accelerating IPv6 adoption gateway to next generation connectivity, Available Online: https://www.thestar.com.my/tech/tech-news/2024/07/22/accelerating-ipv6-adoption-gateway-to-next-gen-connectivity

4. Policy Recommendations Accelerating Ipv6 Adoption: Cases of Leading Nations in Africa

This section introduces some typical policies released by top five (5) nations in Africa on IPv6 adoption, whose IPv6 adoption rate have crossed the 20% line on average as from December 2025. The White Paper released by AICTO, ATU, IPv6 Forum and Huawei in 2024 on IPv6: Trends, Innovations, and the Way Forward in the Digital Economy Era[12] shows several Policy recommendations required to accelerate IPv6 adoption in Arab and African states. The authors introduced the IPv6 framework developed by the IPv6 Enhanced Council that lays out the blueprint for what an "IPv6-driven digital transformation ecosystem" as a generic IPv6 framework should look like. This document further outlines the main areas where this innovative Internet is likely to have some impact and the opportunities it opens-up from two complementary IPv6 policy perspectives: society-oriented and business/market-oriented. In both cases, related policymakers can act in unison but with different expectations and in response to different needs. The instantiation and operationalization of this IPv6-driven digital transformation framework can help regional stakeholders implement both Arab Digital Strategy 2030 and Digital Transformation for Africa (2020-2030).

Congo Brazzaville

The Republic of Congo, i.e., Congo Brazzaville's IPv6 adoption rate was about 1.49% in 2020 and accelerated to nearly 30% on average by December 2025. This unprecedented shoot in IPv6 adoption rate has been enabled by the Policy Recommendations[13] such as a combination of strong regulatory push, operator enablement, and clear communication on future benefits is accelerating IPv6 in countries like Congo (Brazzaville).

Togo

As of 2020, Togo's IPv6 adoption rate was about 16% and as of December 2025, the IPv6 adoption rate stands at over 28% on average. This remarkable change is attributed to the Policy recommendations linked to the Government initiatives, including the formation of an IPv6 task force and official mandates enforcing all network service providers to accelerate transition.

[12] AICTO, ATU, IPv6 Forum and Huawei, 2023, Arab-Africa IPv6 Development White Paper, Available Online: https://carrier.huawei.com/~/media/cnbgv2/download/events/Arab-Africa-IPv6-Development-Whitepaper.pdf
[13] AICTO, ATU, IPv6 Forum and Huawei, 2023, Arab-Africa IPv6 Development White Paper, Available Online: https://carrier.huawei.com/~/media/cnbgv2/download/events/Arab-Africa-IPv6-Development-Whitepaper.pdf

Senegal

In 2020, Senegal's IPv6 adoption was about 0% average, while as of December 2025, the IPv6 adoption rate is 23% on average. This accelerate rate has been enabled by the Senegalese IPv6 Policy recommendations like establishing a national IPv6 Task Force (like the one created in 2021), mandating IPv6 in government procurement, upgrading public services, and running awareness campaigns, leveraging operators like Sonatel (an early adopter) to drive change and align with broader African digital strategies for sustainable growth[14].

Tunisia

Tunisia has witnessed growth in IPv6 adoption rate from 0% in 2020 to nearly 20% by December 2025. The substantial growth in IPv6 usage in Tunisia, which eventually saw user access rise to 16% by May 2025 to about 20% in December 2025, was a direct result of the government's 2021 task force and the official 2023 launch. Key recommendations for 2025-2028 include fostering public-private partnerships, leveraging ITU guidelines for national policies, creating incentives for service providers, and investing in training, aligning with broader African goals for a scalable, future-proof internet, especially for 5G and cloud services.[15]

South Sudan

South Sudan is leading in East Africa as of December 2025, with an IPv6 adoption rate at about 20% compared to 5 years ago in 2020, when its IPv6 adoption rate stood at less than 1%. It is expected that South Sudan will further accelerate its IPv6 adoption, when implementing key policies focused on National Strategy and Mandates, Capacity building (training, curriculum), infrastructure support (test beds, IPv6 ready equipment), incentives and reporting and leveraging international partnerships such as UN, ITU for funding and expertise.

[14] Internet Society Pulse, 2025, Available Online: https://pulse.internetsociety.org/wp-content/uploads/2025/04/Final_Pulse_Press_Release_West_Africa_March2025_English.pdf

[15] IAFRICA, 2025, Tunisia Launched Tartib 2.0, Available Online: https://iafrica.com/tunisia-launches-tartib-2-0-to-modernize-public-investment-decisions-and-drive-digital-transformation/

5. Gaps identified for Policy Recommendations

The research and situational analysis report and review on policy recommendations revealed that there is no universal solution to accelerate IPv6 adoption in Africa. While some countries or regions advocate for government intervention to accelerate IPv6 adoption, other regions underscore the role of regulatory frameworks, market forces and local priorities to shape the pace and methods of adoption. The accelerated solution of IPv6 deployment in Africa can only be achieved through embracing an optimal ecosystem model underpinned by the spirit of coordination, co-operation, and collaboration among multi-stakeholders.

This report will address the need for harmonised policy recommendations for promoting IPv6 adoption in Africa.

6. Introduction to Harmonized Policy Recommendations

In the recent years, the world has witnessed an unprecedented large-scale deployment transition of IPv6 from the IPv4. The transition has been precipitated by the rapid depletion of IPv4 addresses and the expanding demands from applications such as 5G, the Internet of Things (IoT), Cloud Computing, the Blockchains, Artificial Intelligence (AI) and other digital innovations[16]. As of today, towards the close of 2025, the global IPv6 coverage has surpassed 40% line. The research and situational analysis report developed by the Masterspace Solutions Ltd (MSS) in conjunction with the Africa Telecommunication Union (ATU) reveal that as of the month of October 2025, the leading nations globally have reached or neared 80% IPv6 coverage, with mobile traffic flowing through the IPv6 enabled networks overtaking that of the IPv4[17]. The world's top 5 nations being, France at average over 88%, Germany's average over 77%, Belgium's average over 70%, India's average over 70%, Malaysia's average over 66%, Saudi Arabia's average over 66%, according to Google IPv6 Adoption Statistics of December 2025[18].

The research and situational analysis attributed such tremendous IPv6 adoption rates globally to a combination of solid policy recommendations, impetus industry leadership, and sustained user demand enablers.

Despite this growth, Africa's IPv6 adoption rate remains behind the global average with average IPv6 adoption rate being below 10%. It is without a doubt that the adoption of IPv6 is vital for addressing the depletion of IPv4 addresses as well as ensuring the growth of the Internet in developing and/or underdeveloped nations in Africa. The research and situation analyse report identified several challenges IPv6 adoption in Africa with Policy linked essential ones being,

[16] Roland Berger, Global IPv6 Development Report 2024, 19 August 2024, Available Online: https://www.rolandberger.com/en/Insights/Publications/Global-IPv6-Development-Report-2024.html
[17] Masterspace Solutions Ltd, Research and Situational Analysis of IPv6 Adoption in Africa, 14 November 2025, Submitted to ATU.
[18] Google, IPv6 adoption statistics, 8 December 2025, Accessed from: https://www.google.com/intl/en/ipv6/statistics.html#tab=per-country-ipv6-adoption

- Disparities across Africa in terms of market structure, institutional readiness and digital culture.
- Governance commitment (policy and regulatory) and financial challenges.

It is worth mentioning that these challenges have been addressed by multiple leading countries through developing and implementing policies, which have shifted from initial expansion of the IPv6 to the commercialization and large-scale application of IPv6 Enhanced technologies. IPv6 as a vital cornerstone in the construction of digital infrastructure, furnishes a colossal pool of address resources that underpin network technological innovations and industrial upgrades. IPv6 Enhanced by comprehensively enhancing IP network capabilities across six dimensions – ultra-broadband, extensive connectivity, determinism, low latency, automation, and security. IPv6 provides a high-quality network foundation capable of supporting the demands of massive interconnectivity, voluminous data, cloudification of production, convergence of cloud and networks, intelligent operations and maintenance, as well as secure and trustworthy services.

Moreover, International organisations such as LACNIC, OECD, CISCO[19] among others have undertaken a comprehensive evaluation of nation's IPv6 development classified in three dimensions namely, IPv6 address penetration, its effectiveness, and the realm of innovative applications as illustrated in Figure 1. This move has created a ranking methodology in IPv6 development across countries globally, with a view to publish progresses and create a platform for cross nations learning aimed at accelerating their IPv6 transition.

[19] APNIC November 2025, How we measure IPv6?, Available Online: https://blog.apnic.net/2025/11/14/how-we-measure-ipv6/

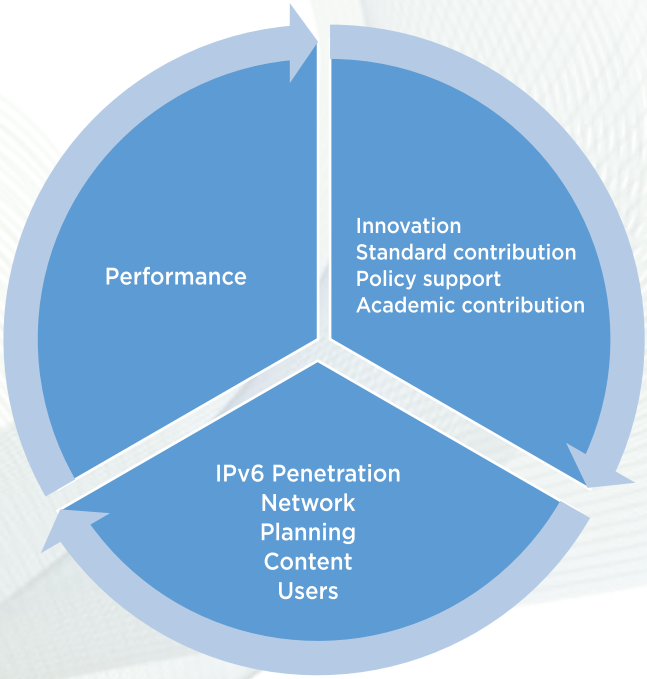


Figure 1: Methodology of IPv6 Development Index Informing Policy Recommendations (**Source:** Roland Berger, 2024)

In a recent spark, while speaking at the launch of "Africa IPv6 Development White Paper" by the African Telecommunications Union, African Union (AU) and Huawei at the 4th Broadband Africa Forum at AfricaCom 2022, the director of the AU's Management Information System, Anderson Amlamba underscored the critical role of policies in driving the first regional Internet Protocol version 6 (IPv6) adoption in Africa[20]. This document was the first on the African continent. It systematically analyses the development of IPv6 in Africa and shares the IPv6 innovation practices of several top operators in Africa[21]. This white paper provided several recommendations of industry policies for IPv6 transition. The government's industry policy plays a critical position in the IPv6 transition. This White Paper provided a set of principles outlining a set of policy actions and tools that Africa's governments (Figure 2) could apply to accelerate the IPv6 migration process from policy preparation to policy enforcement.

[20] Gugu Lourie, Africa's IPv6 Adoption Has to be Led Through Policies, 8 Nov 2022, Available Online : https://techfinancials.co.za/2022/11/08/africas-ipv6-adoption-has-to-be-led-through-policies-says-au/
[21] ATU and Huawei, Africa IPv6 Development White Paper, November 2022, Available Online: https://atuuat.africa/wp-content/uploads/2022/11/Africa-IPv6-Development-White-Paper_double-page-version.pdf

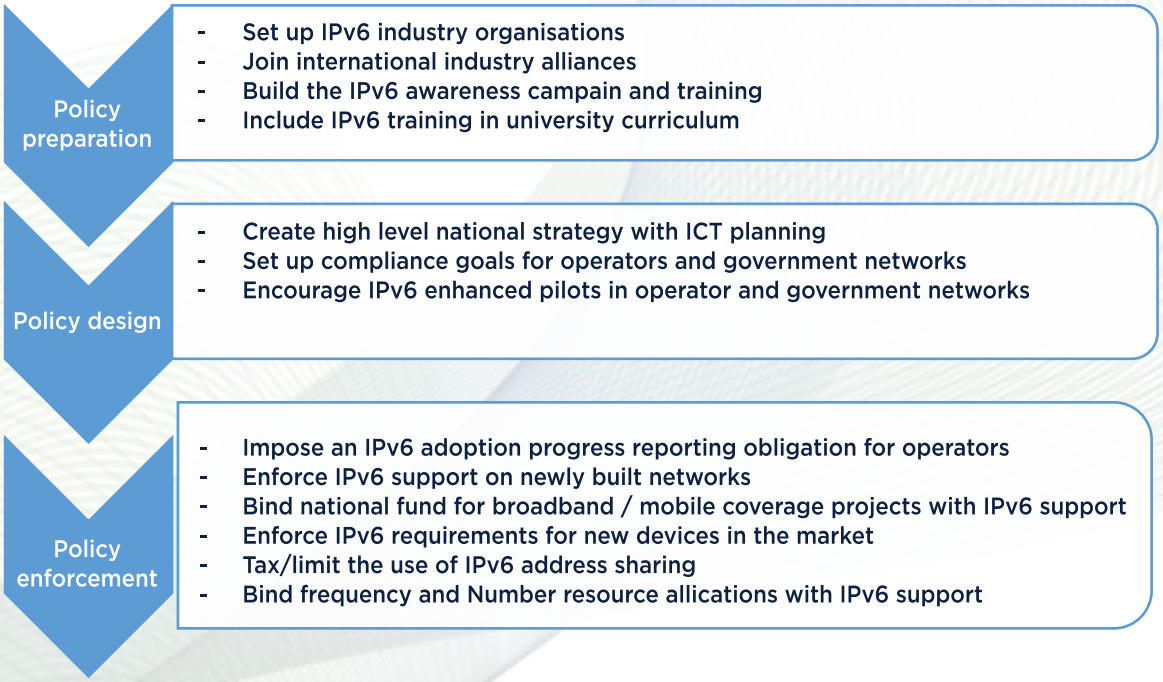


Figure 2: Promoting IPv6 Transition: Industry Policy Actions and Tools (**Source:** ATU and Huawei White Paper, October 2022)

7. Methodology

The methodology consisted of a systematic literature review of the existing policy recommendations vital for accelerating the IPv6 adoption globally, with a focus of top five leading nations outside Africa and in Africa. The review extracted contextual information from existing published white papers, policy documents, regulatory frameworks and the IPv6 situational analysis report submitted to the ATU in the month of November 2025.

8. Harmonized Policy Recommendations

This report seeks to provide policy recommendations for the transition from IPv4 to IPv6 across African countries. It outlines the policy objectives, institutional arrangements, regulatory mechanisms, and implementation strategies to ensure enhanced transition from IPv4 to IPv6 across African countries. It seeks to provide a harmonized framework adaptable to national contexts, enabling governments, regulators, service providers, private sector, academia, and development partners to coordinate their activities for the achievement of the objectives of full transition to IPv6.

The recommendations in this report are informed by the findings in the *Report on Research and Situational Analysis for IPv6 Adoption in Africa, IPv6 Implementation Guidelines for Africa*[22] *and Policy success stories from leading nations in IPv6 acceleration globally in the past five (5) to ten (10) years*.

8.1 Guiding Principles

The policy recommendations are informed by certain principles intended to ensure inclusivity and sustainability. These principles include—

(a) Inclusivity and collaboration – multi-stakeholder participation including government, private sector, academia, and civil society;

(b) Technology neutrality – policies to support diverse technological solutions for IPv6 transition;

(c) Capacity building and local empowerment – development of local technical expertise and institutional capacity;

(d) Security and resilience – ensuring secure and stable IPv6 deployment;

(e) Sustainability – promoting long-term economic, social, and environmental benefits;

(f) Regional harmonization – aligning national efforts with ATU, AfriNIC, ITU, and regional initiatives.

[22] Noah, November2025, IPv6 Implementation Guidelines, Unpublished Presentation made during the 26-30 November 2025 IPv6 Training Week by ATU & MSS in Nairobi, Kenya.

8.2 Policy Measures and Strategic Interventions for the IPv6 Adoption in Africa

To facilitate an effective and coordinated transition to IPv6 across Africa, several policy and strategic interventions are recommended across institutional, regulatory, capacity-building, infrastructure, and financing dimensions. These interventions that key stakeholders such as the governments, ICT Commissions or Departments, Internet Service Providers, Ministries of Finance or Treasury or Planning, Universities or Higher Education Institutions or Research and Development Councils should undertake include but not limited to the following—

A. Institutional and governance measures

To provide clear leadership and coordination for IPv6 transition, The Governments in various countries should implement institutional mechanisms such as—

(i) Establishing a national IPv6 steering committee including ICT ministries, regulators, ISPs, academia, research councils, funding agencies and private sector;

(ii) Designating a national IPv6 coordinator within the ICT ministries or regulators;

(iii) Developing national IPv6 transition plans with clear timelines and milestones;

(iv) Integrating IPv6 adoption into national digital transformation, broadband, and e-government strategies;

(v) Identifying the future needs of IP resources and leading the transition process;

(vi) Making directives and regulations that shall mandate all relevant stakeholders to deploy IPv6 on their respective networks;

(vii) Mandating IPv6 Support in procurement policies and contracts, ensuring that Government-funded projects and services are IPv6 complaint;

(viii) Championing the IPv6 adoption by implementing it in Government networks;

(ix) Providing incentives and support to hasten the adoption of IPv6.

B. Regulatory and legal measures

A robust regulatory framework enabled by the ICT Commissions or Departments is essential to incentivize IPv6 deployment and ensure compliance. Recommended measures include—

(i) Requiring all licensed ISPs, data centers, and public institutions to support IPv6 in networks and services;

(ii) Introducing IPv6 readiness as a condition for ICT licensing and spectrum allocation;

(iii) Mandating IPv6 compatibility for all government ICT procurements;

(iv) Encouraging open standards and interoperability through national ICT standards authorities;

(v) Providing fiscal or regulatory incentives (e.g., tax reliefs, grants) for IPv6 deployment.

(vi) Overseeing and facilitating IPv6 adoption process and developing regulatory frameworks to be applied by all stakeholders in public and private sectors;

(vii) Mandating all relevant stakeholders to carry out IPv6 readiness assessment on their respective networks;

(viii) Enforcing IPv6 migration plan with transition deadlines, in consultation with IPv6 task force, that can be enforced through regulatory measures for both Government and private sectors.

C. Capacity building and awareness

Developing the needed technical competencies and raising overall awareness are critical for successful IPv6 implementation. This can be achieved through—

(i) Establishing IPv6 training programs in partnership with AfriNIC, universities, and technical institutions;

(ii) Integrating IPv6 modules into ICT curricula;

(iii) Conducting awareness campaigns targeting policymakers, network operators, and the public;

(iv) Supporting hands-on IPv6 testbeds and innovation hubs;

(v) Providing IPv6 training to government technical officers regarding IPv6 and its related technologies.

D. Infrastructure and research development

Building robust, IPv6-ready infrastructure and fostering continuous innovation will support long-term sustainability. Recommended actions for research and development councils and institutions of higher learning may include—

(i) Promoting development of IPv6-enabled infrastructure including IXPs, cloud platforms, and IoT networks;

(ii) Supporting research and development in IPv6 applications, cybersecurity, and digital innovation;

(iii) Encouraging more research work in IPv6;

(iv) Collaborating with international research agencies and universities regarding IPv6 research and development;

(v) Support certification courses in IPv6;

(vi) Encouraging regional IPv6 knowledge-sharing and collaboration platforms;

(vii) Introducing courses on IPv6 (i.e., adding on syllabuses; placing greater emphasis on IPv6) in the institutions of higher learning.

E. Funding and resource mobilization

Securing adequate resources is essential for national and regional IPv6 transition efforts. Ministries of Finance or Treasury, Public and Private Funding Agencies may explore avenues such as—

(i) Establishing an IPv6 transition fund supported by government, industry contributions, and development partners;

(ii) Leveraging public-private partnerships for infrastructure modernization;

(iii) Accessing continental and international funding mechanisms for digital infrastructure development.

(iv) Ensuring that all Government agencies adopt the 'Buy IPv6' policy.

(v) Taking decisions to provide tax incentives to companies that adopt IPv6.

(vi) Taking decisions to exempt IPv6 hardware and software from taxes for a certain period.

(vii) Allocating Budget for Government Network Migration.

F. *Internet service provision*

IPv6 enabled internet access and service provision for internet customers is vital for quality and secure internet. Internet Service Providers (ISPs) require Policy interventions that can assist transition to IPv6, which may include-

(i) Procuring network devices that support IPv6.

(ii) Adopting IPv6 to their Core and Access networks

(iii) Adopting IPv6 to their Enterprise and Residential customers.

(iv) Internet Content Delivery Networks shall ensure that their content is reachable to future Internet customers by serving content via IPv6 in addition to existing IPv4.

9. Implementation Matrix

To clarify institutional responsibilities and for purposes of coordinated action, the following implementation matrix seeks to assign specific roles to the respective various actors—

Level	Institution/Actor	Key Roles
Continental	African Union Commission, AfriNIC, ATU, ECA	Policy harmonization, technical support, monitoring
Regional	RECs (EAC, ECOWAS, SADC, etc.)	Regional coordination, capacity-building programs
National	ICT Ministries, Regulators, ISPs	National policy implementation, funding, reporting, advocacy and compliance
Private Sector	Telecoms, ISPs, Data Centers	Infrastructure deployment, funding, innovation, investment
Academia and Research	Universities and research Institutions	Training, research, innovation
Civil Society and Users	NGOs, Professional Associations	Advocacy, awareness, consumer engagement

10. National IPv6 Transition Roadmap

10.1 Phase I: Preparing for the IPv6 Transition

This initial phase focuses on preparing the local ecosystem to adopt IPv6 by achieving the following objectives:

- **Training and Workforce Preparation:** Establishing a specialized training partnership to prepare the local workforce with IPv6 knowledge.
- **Resource Allocation:** Requesting additional IP address allocations for both IPv4 and IPv6 from AFRINIC to support current and future needs.
- **Community Engagement:** Ensuring adequate participation in local, regional, and global IPv6 workshops, conferences, and summit-related activities.
- **Testing and Validation:** Establishing pilot tests for hardware and software before deployment in a natural production environment.

10.2 Phase II: Implementation of Dual Stack Operation

This phase focuses on the technical implementation of IPv6 alongside the existing IPv4 infrastructure.

- **Strategy Approval:** Analyse and approve the appropriate dual-stack strategy for each stakeholder before implementing the infrastructure.
- **Core Network Enablement:** Enable dual-stack operation in the infrastructure networks of Internet Service Providers (ISPs), Internet Exchange Points (IXPs), and all other relevant stakeholders.
- **Service Preparation:** Preparing essential network services like Dynamic Host Configuration Protocol (DHCP) Server, Domain Name Service (DNS), and Web servers to support Dual-Stack operation.
- **Commercial Rollout:** Enable commercial IPv6 Internet service for customers.

10.3 Phase III: Monitor and Make Changes to IPv6 Strategy

This final phase involves continuous monitoring and adjustment to ensure the transition goals are met.

- **Monitoring:** Monitor the dual-stack IPv6 implementation and make changes to policy, strategy, and timelines to achieve the national Internet penetration target.
- **Service and Application Support:** Ensure that the targeted network services and applications are successfully supporting IPv6.
- **Target Achievement:** Ensure that the targeted Internet penetration rate is achieved within the specified timeframe.
- **Strategic Adjustments:** Make changes to the implementation strategy if the targets have not been achieved.

10.4 High Level Implementation Guidelines for the Roadmap

10.4.1 Core Policy Principles

These principles form the foundation of the transition plan:

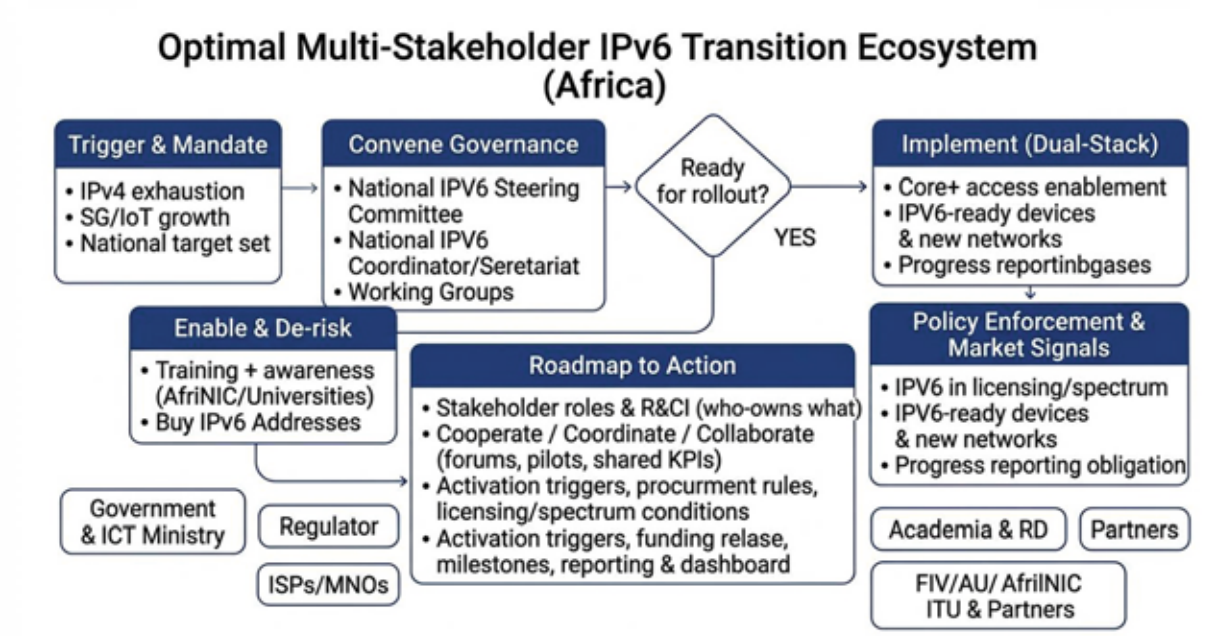
- **Mandate IPv6 Support:** The policy should mandate that all new IT procurement and services are IPv6-capable and support operating in an IPv6-only environment.
- **Establish Milestones:** Define clear, time-bound milestones for the transition.
- **Phase Out IPv4:** State the strategic intent to eventually phase out the use of IPv4 for all systems.
- **Security Integration:** Ensure that security plans, assessments, and monitoring processes address the use of IPv6 from the outset.

10.4.2 Implementation Phases

Phase	Task
Phase 1: Initiation and Planning	**Form an Integrated Task Force:** Establish a team with members from acquisition, policy, and technical departments to govern the effort. **Gather Requirements:** Collect technical and business requirements across all technology pillars (networking, systems, applications, etc.). **Develop an Addressing Plan:** Plan addressing based on the total number of sites, reserving blocks for infrastructure, and using consistent subnet prefix sizes (e.g., a minimum of a /48 for each site). **Acquire Resources:** Obtain necessary IPv6 address blocks from a Regional Internet Registry (AFRINIC).
Phase 2: Assessment and Design	**Assess Current Readiness:** Perform an automated discovery to audit all current devices and software for IPv6 capability. **Identify Gaps:** Verify which hardware and software can be upgraded and plan for the replacement of non-compliant devices. **Conduct Pilots:** Identify opportunities for IPv6 pilots and complete at least one operational pilot of an IPv6-only system to gain experience and identify lessons learned. **Design Architecture:** Design the network architecture to support native IPv6 operation, considering dual-stack (IPv4/IPv6) as a transition mechanism.
Phase 3: Implementation and Deployment	**Implement in Phases:** Deploy the solution in a phased manner to minimize disruption to existing operations. **Upgrade Public Services:** Prioritize the upgrade of public-facing servers and services (web, email, DNS, etc.) to use native IPv6. **Enable Internal Systems:** Gradually enable IPv6 on internal client applications, servers, and supporting enterprise networks. **Leverage Vendor Support:** Work with procurement authorities to ensure vendors provide products and services that can operate in an IPv6-only environment.
Phase 4: Operations, Maintenance, and Security	**Monitor Compliance:** Continuously monitor and manage compliance with organizational guidance and industry best practices. **Address Security:** Ensure all security services (firewalls, identity management, logging) are fully functional in an IPv6 environment. Block unmanaged IPv6 traffic if necessary during the early stages to prevent security vulnerabilities. **Provide Training:** Offer capacity building and specialized training for network engineers and IT staff. **Conduct Audits:** Periodically perform conformance audits to measure the level of IPv6 implementation across the network.

10.4.3Governance Structure for the Roadmap

10.5 IPv6 Transition Ecosystem



This ecosystem explains how a country moves from recognizing the need for IPv6 to coordinating real implementation across all key actors, in a structured and repeatable way. It begins with **Trigger & Mandate**, where clear national pressure points—such as **IPv4 exhaustion**, rapid growth in **5G and IoT**, and the setting of a **national adoption target**—create the justification and political mandate to act. This stage frames IPv6 not as an optional technical upgrade, but as a national infrastructure priority that must be planned and delivered.

The next stage is **Convene Governance**, where the country establishes the structures that will organize and drive the transition. This includes setting up a **National IPv6 Steering Committee**, appointing a **National IPv6 Coordinator/Secretariat**, and forming **Working Groups**. These bodies translate political intent into a coordinated national program by providing leadership, oversight, stakeholder engagement, and decision-making pathways. In practice, they become the mechanism for aligning public and private actors around one roadmap, one set of priorities, and one reporting structure.

A decision gate then follows: **"Ready for rollout?"** This checkpoint ensures that the enabling conditions—such as capacity, planning, and resource availability—are sufficient to proceed at scale. It functions as a quality control stage, confirming that the transition is not rushed into implementation without preparation, governance, and risk controls.

To build readiness and reduce implementation risk, the ecosystem includes **Enable & De-risk** actions. These focus particularly on **training and awareness**, often delivered in partnership with organizations like **AfriNIC** and local **universities**, and on ensuring access to practical resources such as **Buy IPv6 Addresses**. This phase strengthens national technical capability, improves institutional readiness, and lowers adoption barriers so that implementation can proceed smoothly without avoidable disruptions.

Once readiness is confirmed, the country advances to **Implement (Dual-Stack)**. Here, IPv6 is enabled across **core and access networks**—including **ISPs, MNOs, and IXPs**—while ensuring key supporting services such as **DNS, DHCP, and web services** are IPv6-ready. The goal is to move beyond internal enablement into real-world adoption by enabling **commercial IPv6 services to**

customers, so IPv6 becomes an operational and user-facing capability, not just a policy objective.

In parallel, **Policy Enforcement & Market Signals** ensures the transition remains sustained and measurable, rather than voluntary or inconsistent. This includes embedding IPv6 requirements into **licensing and spectrum conditions**, requiring **IPv6-ready devices and new networks**, and enforcing **progress reporting obligations**. These measures send a consistent market signal that IPv6 is the default direction of travel, while creating accountability through reporting, monitoring, and compliance mechanisms.

Central to making the system work is the **"Roadmap to Action"** layer, which is the practical bridge between the national roadmap and stakeholder execution. It converts planning into delivery by defining **who does what** (using a clear RACI-style split of responsibilities), clarifying how stakeholders **cooperate, coordinate, and collaborate**, and specifying **activation triggers** that compel action. In this model, the **Government and ICT Ministry** acts as the policy owner and sponsor—approving the roadmap, issuing directives across government and State-Owned Enterprises, and embedding IPv6 into digital transformation, broadband, and e-government programmes—while also convening governance structures and ensuring cross-ministry compliance. The **Regulator** converts the roadmap into enforceable instruments through guidelines and licence conditions, embedding IPv6 into licensing/spectrum/resource assignment frameworks, defining reporting obligations and KPIs, and applying incentives or penalties where necessary. **ISPs and MNOs** implement the technical transition by deploying dual-stack in core and access networks, preparing operational services (DNS/DHCP, peering, security controls, NOC processes), rolling out IPv6 commercially to customers, and reporting progress. **Academia and R&D institutions** strengthen the ecosystem through training, curriculum updates, labs and testbeds, certification support, and independent technical advice and research. **Partners**—including AfriNIC, ITU, ATU, development partners, and vendors—provide technical assistance, tools, expert support, best practices, and sometimes funding for pilots and capacity building, while helping align equipment and services with national IPv6 requirements.

Operationally, the Roadmap to Action layer also establishes how stakeholders work together. Stakeholders **cooperate** through information-sharing—awareness events, guidance notes, roundtables—building common understanding and reducing fragmentation. They **coordinate** by aligning timelines, standards, dependencies, reporting templates, and shared KPIs, ensuring that progress in one area is not blocked by readiness gaps in another. They **collaborate** when joint execution is required, such as shared pilots, testbeds, co-funded labs, PPP initiatives, shared measurement infrastructure, and jointly maintained dashboards. These interactions are managed through the steering committee (strategic decisions and escalation), the secretariat/coordinator (day-to-day programme management and reporting), and specialized working groups across policy, procurement, network operations, government platforms, security, capacity building, and monitoring and evaluation.

Finally, this layer is activated by concrete trigger points that move the ecosystem from planning to delivery. **Procurement triggers** activate IPv6 requirements whenever government ICT tenders, renewals, or upgrades occur, ensuring IPv6 capability is embedded in specifications, acceptance tests, and SLAs. **Licensing and spectrum triggers** activate obligations at licence issuance/renewal and spectrum assignment/renewal, making IPv6 rollout milestones enforceable. **Funding triggers** tie universal service funds, broadband programmes, donor financing, and PPP disbursements to verified IPv6 readiness and deployment evidence. **Milestone triggers** activate at roadmap phase gates and deadlines, prompting cutovers, readiness checks, and remediation actions. **Reporting and dashboard triggers** activate on scheduled reporting cycles or when performance indicators show underachievement, driving corrective action plans, targeted audits, enforcement measures, and technical support deployments. Together, these triggers ensure the roadmap is not a static document, but a governed, measurable, and enforceable national programme that connects national intent to the specific actions of each stakeholder group.

11. Monitoring, Evaluation, and Reporting

To ensure accountability and to track progress toward IPv6 adoption targets, countries should implement a clear monitoring and evaluation mechanisms. These should include—

(a) Developing a national Ipv6 implementation dashboard to track adoption progress;

(b) Establishing key performance indicators (KPIs) such as Ipv6 penetration rate, number of Ipv6-enabled networks, devices, and number of trained professionals and users;

(c) Conducting annual multi-stakeholder review forums;

(d) Reporting periodically to the African Telecommunications Union monitoring dashboard and regional bodies on progress and challenges.

12. Risk Management

The transition to Ipv6 involves a number of risks that require proactive mitigation. Key risks and mitigation strategies that may be deployed include—

Risk	Mitigation Strategy
Lack or no policy/regulatory framework	Institute one with clear mandates and objectives
Low awareness and technical skill	Conduct capacity-building and training programs
Financial constraints	Seek public-private partnerships and donor funding support
Resistance from legacy systems	Incentivize early adopters and pilot projects
Fragmented national approaches	Regional harmonization and ATU/RECs coordination

13. Review and Amendments

To ensure continued relevance and responsiveness to emerging technologies and global trends, this policy recommendations, if adopted, should be reviewed periodically. Reviews may occur as necessary or in any case not more than every five (5) years or to incorporate technological advancements, global best practices, and regional/national priorities.

14. Model Regulatory Provisions

To support effective implementation of these policy recommendations, the following model regulatory clauses are proposed for adaptation by the respective African countries—

(a) All licensed network operators and service providers shall ensure that their infrastructure and services are IPv6-capable within three years of the policy's adoption.

(b) All government ICT systems, procurements, and digital platforms shall be IPv6-compliant.

(c) The national regulator should issue IPv6 transition guidelines/roadmap and monitor compliance annually.

(d) Non-compliance after the transition period should attract administrative sanctions or penalties.

(e) An IPv6 Capacity Building and Research Fund shall be established and managed jointly by the ICT regulator and the national ICT ministry.

(f) The national regulator shall establish an IPv6 Regulatory Sandbox Framework to facilitate time-bound and controlled pilots of IPv6 deployment and IPv6-enabled services, including eligibility criteria, safeguards (security and consumer protection), reporting requirements, and clear exit/scale-up procedures.

15. Conclusion

This report provides harmonized policy recommendations to accelerate the transition from IPv4 to IPv6 across African countries and to close the gap between Africa's adoption levels and global progress. The recommendations reflect evidence that sustainable IPv6 adoption is achieved not through isolated technical upgrades alone, but through an ecosystem approach that aligns policy, regulation, capacity, financing, and implementation across all stakeholder groups.

To operationalize the proposed framework, countries should prioritize: (i) establishing or strengthening national IPv6 governance structures (steering committee, national coordinator/secretariat, and working groups); (ii) integrating IPv6 targets into national broadband, digital transformation, and e-government strategies; (iii) enforcing IPv6 requirements through public procurement, licensing, and spectrum/resource allocation conditions; (iv) investing in capacity building through partnerships with AfriNIC, universities, and technical institutions; (v) enabling infrastructure modernization and pilot testbeds; and (vi) mobilizing resources through national budgeting, incentives, and public-private partnerships. A phased transition approach—preparation, dual-stack deployment, and continuous monitoring and adjustment—reduces operational risk while enabling measurable progress.

Finally, the report emphasizes the importance of accountability through monitoring, evaluation, and reporting mechanisms, including dashboards and KPIs such as IPv6 penetration, IPv6-enabled services and devices, and numbers of trained professionals. With coordinated national action and regional harmonization supported by ATU, AfriNIC, ITU, and Regional Economic Communities, African countries can accelerate IPv6 transition, strengthen digital resilience, and build a future-proof Internet foundation capable of supporting next-generation services and inclusive socio-economic development.

The recommendations have been informed by the findings in the *Report on Research and Situational Analysis for IPv6 Adoption in Africa and Policy success stories from leading nations in IPv6 acceleration globally in the past five (5) to ten (10) years*.

Contact us

Ramis Center, 2nd Floor, Suite # A,
Mombasa Road, NAIROBI

info@masterspace.co.ke

+254 754 906577
+254 758 045348