



RESEARCH AND EDUCATION NETWORK FOR UGANDA

RENU@20

From Isolation to Impact: RENU's Journey in Building Uganda's Digital Research and Education Ecosystem

Twenty years ago, Uganda's research and education community faced a common challenge: institutions were largely working in isolation, with limited, unreliable, and prohibitively expensive Internet access.

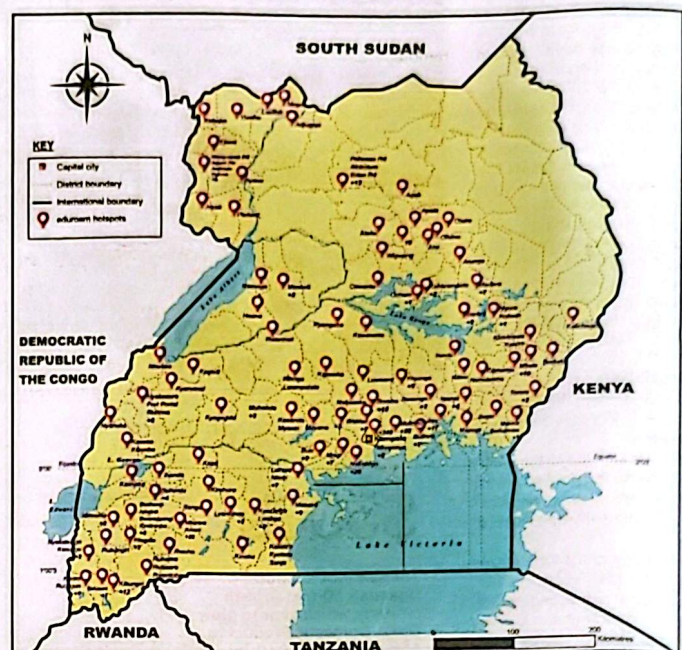
This restricted access to global knowledge resources had hindered collaboration among researchers and educators at a time when the world was rapidly embracing digital transformation. Access to scholarly content was limited, and the digital tools needed for modern teaching, learning, and research remained out of reach for many. Institutions needed to collaborate more, connect faster, and strengthen their internal digital capacity, yet the foundations to do so were weak.

It was from this need that the Research and Education Network for Uganda (RENU) was born. Today, RENU is not only a provider of high-speed connectivity but a key enabler of innovation, delivering specialised ICT services that continue to strengthen the quality of education and research in Uganda.

Chief Executive Officers of research institutions met and resolved to establish a research and education network. This network was envisioned as a platform for facilitating human networking, boosting intellectual output, and driving research-led transformation of higher education in Uganda. In the same year, RENU was established as Uganda's National Research and Education Network (NREN).

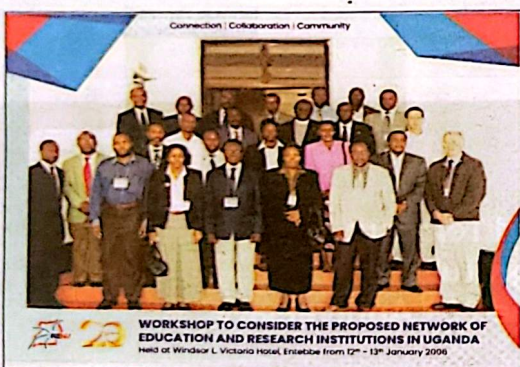
The organisation was incorporated in 2008 as a not-for-profit company limited by guarantee and operates as a member-based organisation. RENU's direction is shaped by the needs of its member institutions, ensuring that its services remain relevant and impactful. Over time, RENU has expanded its membership beyond universities and research institutions to include Other Tertiary Institutions (OTIs), health facilities, and schools, reflecting its growing role in strengthening Uganda's entire education and research ecosystem.

A Map of Uganda Showing eduroam Hotspots



1 The Birth of RENU

In January 2006, Vice Chancellors of leading public and private universities, together with



2 Early Years: Tackling the Cost of Connectivity

In its early years, the most immediate challenge was the high cost of bandwidth. At a unit price of over US \$3,000 per Mbps per month, Internet access was simply too expensive for universities and research institutions to consume at the levels required, and the quality of connectivity was insufficient to support modern teaching, collaboration, and research. RENU's initial response was the establishment of a bandwidth consortium, through which member institutions pooled demand to negotiate better pricing.

Between 2006 and 2014, connectivity was delivered through this consortium model in partnership with a commercial telecom provider. While this approach reduced costs, it lacked scalability and sustainability and did not contribute to building national infrastructure. It became clear that Uganda's research and education sector needed more than affordable Internet; it required a dedicated, resilient network supported by specialised services and long-term infrastructure.

3 A Turning Point: Building a National Backbone

A major turning point came in 2013 when RENU joined the AfricaConnect Project through the UbuntuNet Alliance. At a time when the organisation's ambitions exceeded its available resources, this partnership provided the technical and financial support needed to transition from a consortium model to a dedicated national backbone. With support from the Uganda Communications Commission (UCC) and contributions from member institutions, RENU gained access to regional and global research and education networks, intercontinental connectivity, and a stronger technical foundation.

4 From First Connection to National Scale

In 2014, RENU commissioned its first Point of Presence (PoP) at Statistics House in Kampala and launched its own 1 Gigabit per second backbone, connecting its first institution. This marked the transition from reliance on third-party infrastructure to operating its own national network. By the end of 2014, three core Points of Presence (PoPs) were operational in Kampala, Mulago, and Mbarara.

In 2015, the network expanded rapidly, growing from three to six Points of Presence (PoP) and connecting 43 campuses across the country. During this period, RENU established a fully operational 24-hour Network Operations Centre (NOC) to monitor and manage network performance, significantly improving reliability and positioning the network as a mission-critical national service.

5 Scaling to Meet Growing Demand

As demand for connectivity grew, the backbone



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evolved to match it. In 2016, backbone capacity increased from 1 Gbps to 2 Gbps. Between 2017 and 2018, key network segments were upgraded to 10 Gbps, alongside improvements in international connectivity through enhanced links to London and Amsterdam. From 2019 onwards, the metropolitan network was strengthened to 20 Gbps, with additional redundancy links deployed across regional nodes, resulting in significantly improved service reliability.

In June 2025, RENU marked a significant milestone by connecting its 1,000th campus, an achievement that underscores its role in extending digital infrastructure to institutions across the country, including those in remote and underserved areas. These connected campuses span universities, research institutions, schools, and health facilities, many of which previously operated without reliable Internet access.

By the end of 2025, the scale of demand had transformed. Research institutions were generating large datasets, particularly in health and genomic research. Cloud adoption had accelerated, digital learning had become central to education delivery, and emerging technologies such as Artificial Intelligence required stable, high-capacity connectivity. In response, RENU upgraded its core backbone to 200 Gbps in October 2025, a twenty-fold increase from its earlier capacity. This upgrade created the headroom required to support data-intensive research, reduce congestion, and lower long-term bandwidth costs for member institutions.

6 Powered by Strong Partnerships

RENU's growth has been driven by strong partnerships. The Uganda Communications Commission provided foundational regulatory support through the Private Network Operator licence and later enabled infrastructure expansion. NITA-U supported backbone integration through national infrastructure, while commercial providers extended last-mile connectivity.

International partners also played critical roles. The UbuntuNet Alliance enabled regional and global connectivity integration. The Network Startup Resource Center (NSRC) provided hands-on technical training and engineering support. INASP supported capacity building programmes, while organisations such as SURF, FRENIA, IEEAF, and GMRE contributed equipment, funding, and technical expertise during critical stages of growth. These partnerships collectively built the credibility, capacity, and resilience that underpin RENU's success.

7 Impact

Connectivity: Digitising Ugandan Education and Research

At the core of RENU's impact is its role in

building and operating Uganda's dedicated research and education network. Today, RENU connects over 500 institutions and more than 1,100 campuses nationwide, providing the digital backbone that supports teaching, learning, research, and administration. This infrastructure has transformed institutions from isolated systems into fully connected digital environments.

Through these institutions, the RENU infrastructure supports over 260,000 university students and more than 300,000 learners in schools, many of whom previously lacked reliable Internet. In the health sector, health facilities connected to the RENU network collectively serve over 1 million patients annually, while enabling thousands of health workers and supporting over 2,000 medical students in training. Connectivity is no longer just infrastructure; it is a direct enabler of service delivery and human development.

By extending services to rural and underserved areas, RENU is steadily bridging the digital divide. Access to digital tools, knowledge, and global networks is no longer defined by geography, enabling more equitable participation in Uganda's digital transformation.

E-learning and Digital Platforms: Enabling Modern Education Delivery

RENU's contribution extends beyond connectivity. It has developed a broad ecosystem of services to address specific challenges within the research and education community. To translate connectivity into meaningful use, RENU enables member institutions to deploy e-learning platforms that are transforming how education is delivered. Learning Management Systems (LMS), web conferencing tools, and Open Distance and e-Learning (ODEL) models are now widely used, allowing flexible, blended, and fully online programmes hence institutions are now able to deliver blended and online education, which has expanded access to academic resources and improving flexibility in learning delivery.

With support from the European Union, a consortium of Ugandan and European institutions is also working towards strengthening the capacity for Open, Distance and eLearning (ODEL) in Uganda by advancing national quality assurance standards, enhancing institutional capacity, improving digital infrastructure, and deepening cross-border academic collaboration. The consortium consists of RENU, the National Council for Higher Education (NCHE), the regulator for higher education in Uganda, Kabale University, Mountains of the Moon University, Universidade de Lisboa (Portugal), and Universiteit Maastricht (Netherlands).

Complementing this, RENU delivers virtual labs, a free online platform which is designed to support and enhance science



The first national ORCID Workshop that was held at Hotel Africana in 2025, ahead of the official launch of the ORCID Consortium of Uganda.

education both for students and educators across member institutions, providing an opportunity to bridge gaps in access to practical learning, particularly for institutions with limited laboratory infrastructure.

Member institutions also leverage other RENU services such as web hosting, domain registration, information management systems, and web development to strengthen their digital presence and operations. Together, these tools are improving teaching quality, institutional efficiency, and resilience in an increasingly digital education landscape.

Expanding Access through eduroam and Digital Inclusion

eduroam is a free and secure Wi-Fi for students, lecturers and researchers. eduroam is one of the most visible expressions of RENU's impact. In Uganda, over 100,988 students and staff from 359 institutions accessed the eduroam service in 2025, generating over 62 million authentications.

With support from the Internet Society Foundation, RENU has expanded Metro eduroam from 300 to over 700 hotspots across Kampala and other towns, extending access beyond campuses into

public and community spaces. In addition, 229 of these hotspots are powered by the solar-powered routers, enabling connectivity even in areas with limited or no electricity.

The free and secure Wi-Fi connectivity service of eduroam is deployed both on campus and in off campus locations where students need it most. By bringing connectivity closer to where students live and learn, RENU is extending access beyond campuses and directly addressing barriers to digital inclusion.

Visibility of Uganda's Research Output

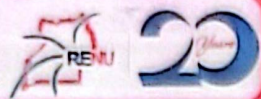
RENU is strengthening the visibility and accessibility of Uganda's research output through initiatives such as the ORCID Consortium of Uganda. ORCID is an internationally recognised system that assigns researchers unique digital identifiers to ensure accurate attribution of their work at the university level, nationally and globally, thereby strengthening the global visibility of Ugandan research output and participation in international academic discourse.

Also, through the partnership with the Uganda National Council for Science and



Enthusiastic staff of RENU after receiving equipment that was used to upgrade the RENU network to 200 Gbps.

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Technology (UNCST), RENU supports the integration of institutional repositories into the National Research Repository of Uganda (<https://nru.uncst.go.ug>), enabling institutions to digitise research outputs and expand access to locally produced knowledge.

By supporting institutions with digital repositories and persistent identifiers for researchers and research output, RENU is not only supporting academic excellence but also positioning Uganda as a more active contributor to global research and innovation.

Access to Premium Research Journals

Producing high-quality research largely depends on access to credible, up-to-date academic resources. For many institutions, premium journals and databases remain prohibitively expensive, limiting the quality and scope of research and teaching. RENU is addressing this gap by enabling free access to thousands of premium journals, e-books, and research databases through partnerships with global initiatives such as Research4Life and national partners like the Consortium of Uganda University Libraries (CUUL), significantly lowering barriers to knowledge.

Beyond access, RENU simplifies how these resources are used through Single Sign-On (SSO), allowing students, lecturers, and researchers to use one institutional login to seamlessly access multiple platforms without managing separate credentials. This ease of access encourages greater use of global research resources, strengthening teaching, improving the quality of research outputs, and enabling Ugandan institutions to engage more actively in global academic discourse.

Research and Education Integrity

As access to digital content expands, maintaining academic integrity is critical. RENU provides anti-plagiarism tools that help institutions uphold academic standards and promote originality in teaching and research. These tools enable institutions to detect and prevent academic misconduct, ensuring the credibility of academic work. In an era of abundant digital content and emerging technologies, safeguarding integrity is essential.

By strengthening research and education integrity, RENU is protecting intellectual output and maintaining confidence in academic qualifications.

Cybersecurity and Child Online Protection

Increased connectivity brings increased cyber risk. RENU provides cybersecurity services that help institutions secure their networks, systems, and users, allowing institutions to control access to harmful or inappropriate content.

This is particularly important in schools, where protecting young learners is essential. These services help create safer digital environments while promoting responsible Internet use. Beyond

protection, they strengthen institutional resilience, ensuring that digital platforms remain secure, reliable, and trusted.

Greening the Internet: Sustainable Connectivity

RENU is advancing sustainable connectivity through innovations such as locally manufactured solar-powered routers, designed for environments with limited or no electricity. Over 300 solar-powered routers have been deployed within and outside Uganda. With support from the Internet Society Foundation, 229 eduoam hotspots are already powered using this approach. This model extends connectivity to underserved communities while reducing reliance on traditional energy sources. It aligns digital expansion with environmental sustainability.

Greening the Internet is not just about efficiency; it is about ensuring that connectivity can reach every community sustainably and inclusively.

Supporting Refugee and Underserved Communities

RENU's impact extends to some of the most vulnerable communities, including refugee settlements. In Rhino Camp Refugee Settlement, one of the largest in Northern Uganda, RENU deployed solar-powered routers as part of a community-centred connectivity pilot in partnership with the Internet Society.

In a setting with no electricity grid and limited connectivity, the project established digital hubs that enable refugees to access online education, seek employment, run businesses, and stay connected with family members. Connectivity, once scarce and unreliable, is now a gateway to opportunity.

Beyond infrastructure, the initiative focused on sustainability. Through local capacity building, 135 refugees and host community members were trained in network design and deployment, creating a skilled workforce capable of maintaining and expanding the network. This approach ensures long-term impact while reducing dependence on external support.

Capacity Building

Capacity building has also been a central pillar of RENU's role. Since 2014, RENU has trained over 2,500 ICT staff across member institutions, equipping them with the skills needed to design, manage, and maintain campus networks. Direct Engineering Assistance has provided hands-on support, in addition to the provision of critical network equipment, enabling member institutions to strengthen their internal infrastructure and reduce reliance on external support.

Alignment to National Development Goals

RENU's interventions are closely aligned with Uganda's national development agenda, where digital infrastructure is recognised as a key driver of

socio-economic transformation. Its work directly supports national frameworks such as the Education Digital Agenda and the Health Information and Digital Strategic Plan, which prioritise the use of ICT to improve service delivery, strengthen institutional capacity, and expand access to quality education and healthcare. By enabling reliable connectivity and digital services across institutions, RENU is helping translate these national priorities into practical outcomes.

This contribution reflects a broader national shift toward investing in digital infrastructure as a foundation for growth, as seen in initiatives under Uganda's Vision 2040 and National Development Plans. Through its network and services, RENU is supporting digital inclusion, strengthening research and innovation systems, and enabling institutions to participate more effectively in a knowledge-driven economy—ensuring that national development goals are not only defined at the policy level, but actively realised across the education and research ecosystem.



The Future

RENU's story is no longer only about building a network, but about transforming how Uganda's institutions teach, learn, conduct research, deliver services, and collaborate across borders. What began as a response to isolation has evolved into a national digital ecosystem that connects institutions to global knowledge, supports innovation, and strengthens the country's capacity for research and development. At the same time, this progress brings into focus the work that remains. As RENU marks 20 years, its 2026–2030 strategic direction signals a shift from building infrastructure to driving more impact. The organisation is positioning itself to contribute more directly to national development by enabling research excellence, strengthening digital learning, supporting innovation ecosystems, and preparing institutions for emerging technologies such as Artificial Intelligence and data-driven research. If the first twenty years were about overcoming isolation and building the backbone, the years ahead are about unlocking its full potential, ensuring that every learner, researcher, and institution can meaningfully participate in Uganda's transition to a more connected, inclusive, and knowledge-driven future.

On the Spot: Some RENU Services to Explore

eduoam: Free, Secure and Trusted Wi-Fi for Research and Education Roaming

Today, learning happens everywhere—lecture halls, libraries, hostels, research centres, and increasingly, in spaces in between. This means that it is not practical to confine the Internet to a single location on campus for students, lecturers, and researchers, and this is where eduoam comes in.

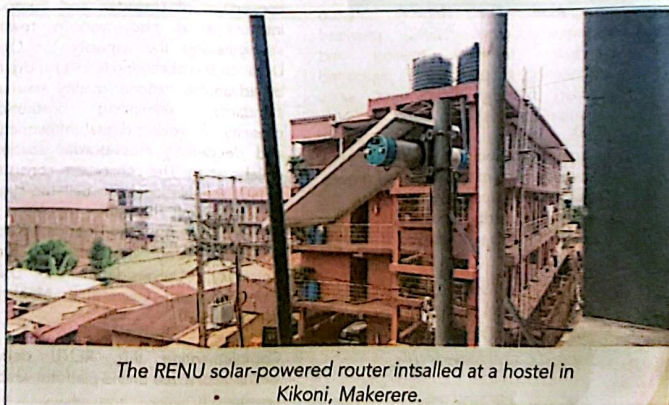
eduoam is a short name for education roaming. It is a free, secure, trusted global Wi-Fi service that allows users to connect to the Internet using their institutional logins across campuses, cities, and even countries without needing new passwords or accounts.

With eduoam, a student from one university can walk into another campus and connect instantly. A researcher attending a conference can remain online without interruption. A lecturer can access teaching resources from virtually anywhere, both within and outside Uganda.

In Uganda, eduoam has evolved beyond campus boundaries. Within institutions, it provides seamless connectivity across lecture halls, offices, libraries, and hostels, quietly powering everyday academic life. Beyond campus, RENU has extended this experience into urban spaces through Metro eduoam, bringing free, secure connectivity closer to where students of our member institutions live and study. Today, the network spans over 700 locations across the Kampala Metropolitan and other towns.

For more flexible environments, eduoam has been adapted into portable solutions—supporting fieldwork, academic events, and remote learning through eduoam on the Go. And in areas where electricity remains a challenge, solar-powered eduoam is extending connectivity to underserved communities, ensuring that access to digital learning is not limited by infrastructure.

For institutions, eduoam offers a consistent and secure network experience while reducing the complexity of managing multiple systems. For users, it means one login, continuous access, and the freedom to stay connected wherever they go.



The RENU solar-powered router installed at a hostel in Kikoni, Makerere.



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eduroam is not just a service, but one of the most visible, everyday expressions of membership value. It is something students and staff experience daily, making connectivity simple, reliable, and always within reach.

From campus corridors to city spaces and remote communities, eduroam is transforming connectivity into a seamless part of academic life, connecting people, ideas, and opportunities wherever learning happens.

Opening the World of Knowledge: Access to Premium Research Journals

For many years, one of the biggest barriers facing students and researchers in Uganda was not just connectivity, but access to knowledge. High-quality academic journals and research databases are often locked behind expensive subscriptions, placing them out of reach for many institutions.

By enabling institutions to move from information scarcity to knowledge abundance, RENU is directly strengthening the quality of teaching, the relevance of research and the global competitiveness of institutions.

In a knowledge-driven world, the difference is not who is connected, but what that connection allows you to achieve.

RENU Cloud: From Infrastructure Costs to Institutional Capability

For many institutions, the challenge is no longer whether to go digital, but how to sustain it. Running modern systems requires servers, storage, backups, and constant maintenance, yet such investments are costly and difficult to scale.

RENU Cloud changes this equation. Instead of investing heavily in physical

Because the service runs within the RENU network, access is faster and more stable for member institutions. In-country traffic is not capped, allowing institutions to move large volumes of data without incurring more cost per data packet, plus support is closer, more responsive, and tailored to the specific needs of research and education institutions.

The result is a shift from managing systems to focusing on what truly matters—teaching, research, and innovation.

Building the National AI Research Cloud: From Connectivity to Innovation Power

As the world moves deeper into the era of Artificial Intelligence (AI), a new divide is emerging—not between those who are connected and those who are not, but between those who can innovate and those who cannot.

a major step in strengthening the country's capacity for AI research and innovation. The platform provides high-performance computing to train AI models, secure storage for research datasets, and a shared environment for collaboration across institutions.

The national AI Cloud presents a fundamental shift; researchers and students can now build, test, and scale AI solutions locally without relying on expensive international infrastructure. More importantly, this effort reflects RENU's broader role in advancing Uganda's national development priorities. By investing in digital research infrastructure, RENU is directly supporting the country's ambition to build a knowledge-based economy, as outlined in national frameworks such as the Digital Uganda Vision and the Science, Technology and Innovation (STI) agenda.

The impact is already being felt. Through initiatives like the AI Innovation Academy, young innovators are moving from experimentation to real-world solutions, supported by the computing power they need to scale.

As Hon. Dr. Monica Musenero noted at the commissioning, "We should not position ourselves as consumers of Artificial Intelligence, rather, the creators of advantage."

That vision is now becoming tangible. From healthcare and agriculture to education and finance, the value of this platform goes beyond computing power. It lies in unlocking the ability to innovate at scale.

By lowering the infrastructure barrier, RENU is enabling institutions to compete globally, collaborate internationally, and develop solutions grounded in local realities. In this sense, RENU is no longer just supporting digital transformation. It is actively contributing to Uganda's transition into a digitally enabled, innovation-driven economy.

Free Access to Premium Journals

11,500 Registered Institutions	125 Countries	41,000 Journals	140 Databases
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RENU has changed that, not by simply connecting institutions to the Internet, but by unlocking access to the world's knowledge ecosystem. And importantly, it has made that access simple and seamless. Through a system known as Single Sign-On (SSO), students, lecturers, and researchers can use their institutional login—just one username and password to access multiple global research platforms without needing separate accounts for each one. In practice, this means less time navigating logins and more time engaging with knowledge.

Through partnerships and platforms such as Research4Life, RENU enables institutions to access thousands of premium journals, e-books, and global research databases, resources that would otherwise cost millions.

This is where the real value lies. A student is no longer limited to what is physically available on campus, a lecturer can teach using the most current global research, and a Ugandan researcher can contribute to international discourse on equal footing. This is not just access, it is academic empowerment.

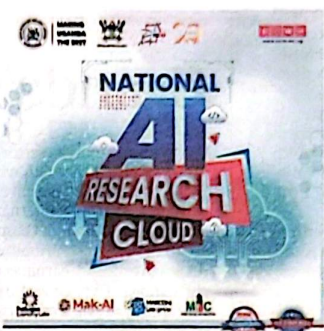
infrastructure, institutions can now access reliable cloud computing resources within the RENU network. But the real value is not in the technology itself; it is in what institutions are now able to do—deploy e-learning platforms faster, securely store and protect research data, maintain continuity through reliable backups, and scale systems as demand grows without the burden of managing complex infrastructure.

What Makes RENU Cloud Different?

Unlike many global cloud services, RENU Cloud is hosted locally, within Uganda and the region. This means that data does not have to travel long distances across continents to be accessed. In simple terms, systems respond faster and more reliably, with less delay (what is often referred to as low latency).

Institutions also have the confidence of knowing exactly where their data is hosted and who is managing it, an important consideration for sensitive research and institutional systems.

AI development requires more than ideas. It demands computing power, access to data, and specialised environments—resources that have often been out of reach. RENU is helping close that gap.



In partnership with Makerere University and national stakeholders, RENU supported the commissioning of Uganda's National AI Research Cloud in March 2026,



Hon. Dr. Monica Musenero during the launch of the AI Research Cloud at Makerere University.

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Connection | Collaboration | Community