



PROGRESS THROUGH RESILIENCE

Annual Report 2021

FOREWORD BY THE BOARD CHAIR

On behalf of the Board of Directors of WACREN, I welcome you to read this Annual Report for the year 2021. We, indeed, recognize the ongoing paradigm and practical shift in the research and education space in our region as a result of the COVID-19 pandemic. Two schools of thought have different perspectives on the current situation across the research and education networks (RENs) – one considers the surge of COVID-19 as a debilitating onslaught against the continuity of R&E in our world, while, the other group sees the situation as a fine opportunity for RENs to brighten their corner where they are. The Board of WACREN aligns with the latter group, and in the year 2021, we took strategic decisions that influenced the direction of our regional REN towards taking advantage of the “good” of the COVID-19 pandemic.

In this annual report, you will read about some of the actions and activities that happened to realise our strategic objective. Saying this does not mean it was all rosy during the year under review. This pursuit of our strategic objectives was somewhat fraught with daunting challenges, including the usual telecom monopoly, procurement difficulties, challenges in getting buy-in and a lack of visible commitment on the part of key stakeholders of REN in our part of the world. Despite these daunting challenges, we continued to work hard to create opportunities and offer solutions to our ever-growing community.

In 2022, we will seek to expand the coverage of our network, which means connecting more countries, upgrading our network and ensuring its availability, accessibility and security for the benefit of our community of users. More importantly, we will seek to add value to our offering by fashioning out innovative digital services and infrastructure to advance research and education in West and Central Africa.

Let me take this opportunity to make a clarion call on all our members and national RENs to be more demonstrable in their support for WACREN activities. WACREN is members-driven and community-driven. Together we form WACREN, so let's advance the cohesion we have and collaborate to serve West and Central Africa.

On behalf of the Board, I would like to express gratitude to all our stakeholders, especially the European Commission (EC) for co-funding AfricaConnect3 (AC3) and the GÉANT – for providing coordination and the needed support; not forgetting our national RENs governments, partners and our entire community for the unalloyed commitment to the course of WACREN in 2021.

Thank you

Dr. Venant PALANGA
Board Chair, WACREN

CEO'S REPORT

Sir Isaac Newton once said, "If I have been able to see farther than others, it was because I stood on the shoulders of giants." I will like to start by first expressing my deepest gratitude to the Board Chair and the Board of Directors of WACREN for being the shoulders on which WACREN stood during 2021. We thank the Board for the immense support, wisdom and guidance they provided to help steer the affairs of our esteemed regional REN. On behalf of the Secretariat and the Community, I say bravo!

Allow me to thank the EC, particularly the Directorate-General Development Cooperation (DEVCO), for the demonstrable commitment toward digital transformation in our region's research and education space. Join me to thank our dedicated officers at the WACREN Secretariat, hardworking NREN managers in our region, and our AC3 project partners – Ubuntunet Alliance (UA), Arab States Research and Education Network (ASREN) and GÉANT. The collective support WACREN received from these partners helped to advance our operations in our region.

In 2021, we began running the second lap (Year 2) of AC3. A significant part of our efforts was dedicated to connecting new countries to our network, serving them with advanced services and building the capacity to scale their offerings to their respective communities. Through hard work and cooperation, we connected Bénin, Burkina Faso and Côte d'Ivoire to the WACREN backbone, bringing to six the number of countries on our network. But for the political turmoil and some administrative bottlenecks, Mali would have been connected before the close of 2021. Nevertheless, I congratulate MaliREN management for their clear commitment to getting the country on the WACREN link.

In 2021, we kept delivering and advancing in our core business, including connectivity and identity management, cloud services and, more significantly, capacity building. As we speak, our network is used by over 70 public and private higher learning institutions, research centres, and government establishments. Over a million academic community members directly benefitted from our network and its services, including identity and access management, collaboration services, and capacity building activities in 2021.

One of the critical activities in the year under review was our Strategy Development Session on Gorée Island in Senegal. We met as a family of stakeholders to reflect on WACREN and share ideas to chart a new course for our regional REN (RREN). Let me pause here to express my appreciation to all who showed demonstrable commitment by travelling to Dakar and active participation in this all-important exercise. We know you expect to see the WACREN Strategy for the next three years; the Secretariat is working hard to finalise it and share it with you all for perusal. Let me be quick to add that the development of the strategy is only one phase of the work; our joint commitment to make it work is what is most needful.

The LIBSENSE programme led by WACREN was a shining example of our efforts at driving open science in our region and beyond. LIBSENSE is fast becoming a household name in Africa and beyond in pro-African efforts at advancing open science.

As you know, the COVID-19 pandemic caused many challenges to establishments across the world; WACREN was not an exception; a shift of priorities that prevented governments from committing to contributions towards AC3, many members defaulted because their members did not pay their fees because universities were closed for more than a year. Students were not paying their tuition during that time, etc.

Given the foreseeable challenges awaiting us in 2022, it is pretty clear that we will need to work together more than ever to advance research and education in our region and make it relevant to our world's changing dynamics and realities.

Thank you

Dr Boubakar BARRY

CEO, WACREN

BOARD MEMBERS

Dr. Eyouleki T. G. Palanga	Chair, WACREN
Dr. Ousmane Moussa Tessa	CEO, NigerREN
Prof. Souleymane Oumtanaga	Board Member
Dr. Joshua Attah	CEO, NgREN
Mr Lucas Chigabatia	CEO, GARNET
Mr. Pierre C.B. Bakoroba	CEO, MaliREN
Dr. Boubakar Barry	CEO, WACREN

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WACREN SECRETARIAT

Dr Boubakar Barry (Senegal)	Chief Executive Officer
Omo Oaiya (Nigeria)	Chief Strategy Officer
Edward Banjo (Nigeria)	Senior Network & Infrastructure Engineer
Ivan Yeboah (Ghana)	Finance and Administration Officer
Eric Attou (Benin)	Network and Systems Engineer
Tiguidanke Bah (Guinea)	Executive Assistant
Kwaku Effah Amponsah (Ghana)	Communication and Marketing Officer

STRATEGIC DIRECTION AND FOCUS IN 2021

In pursuance of our mission, WACREN, in 2021, set out to extend the coverage of our network, advance the delivery of digital services, build capacity and create opportunities for collaborations among our national RENs for the advancement of research and education for development.

Below are the main activities WACREN will focus on in 2021:

- Network Expansion and Direct Support to NRENs
- Network Upgrade, Monitoring and Management
- Video Conference Service
- LIBSENSE (Library – RENs Collaborations)
- Capacity Building Activities
- Advocacy, Donor Engagement and Communication
- Human Resource and Secretariat Activities
- Procurement
- Conferences and Workshops

Network Expansion and Support to NRENs

WACREN activated three more NRENs on its backbone; they were RITER (Côte d'Ivoire), ADN/RBER (Bénin) and FasoREN (Burkina Faso) in Q3 2021. The official launch of RITER, RBER and FasoREN took place in mid-2021. These connections are under the AfricaConnect2 project. In the case of Mali, WACREN devices were installed at MaliREN by the equipment providers; they were tested and handed over; however, efforts toward connection were stalled due to the fallouts of the coup d'état in the country. This significantly destabilised effort to go live.

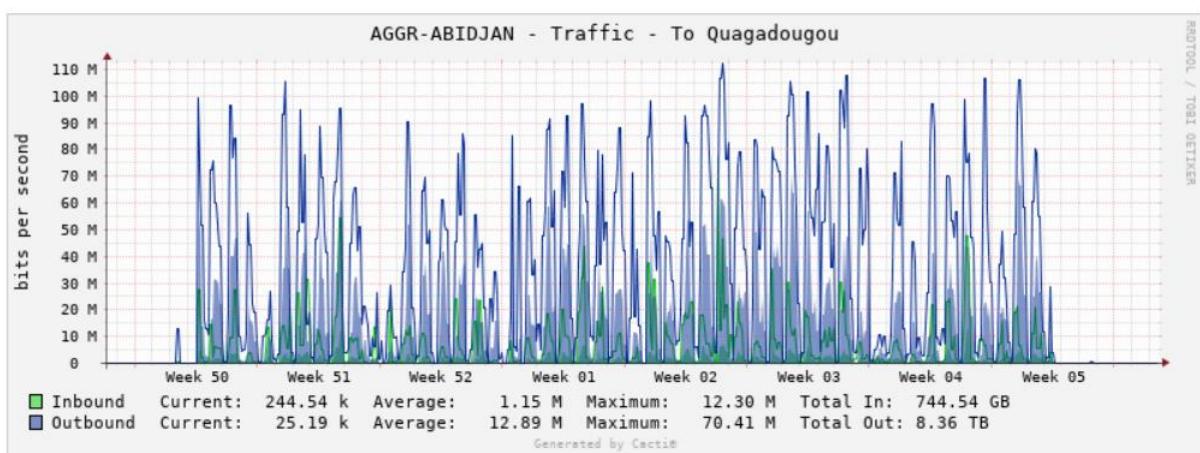


Figure 1: FasoREN traffic seen from WACREN

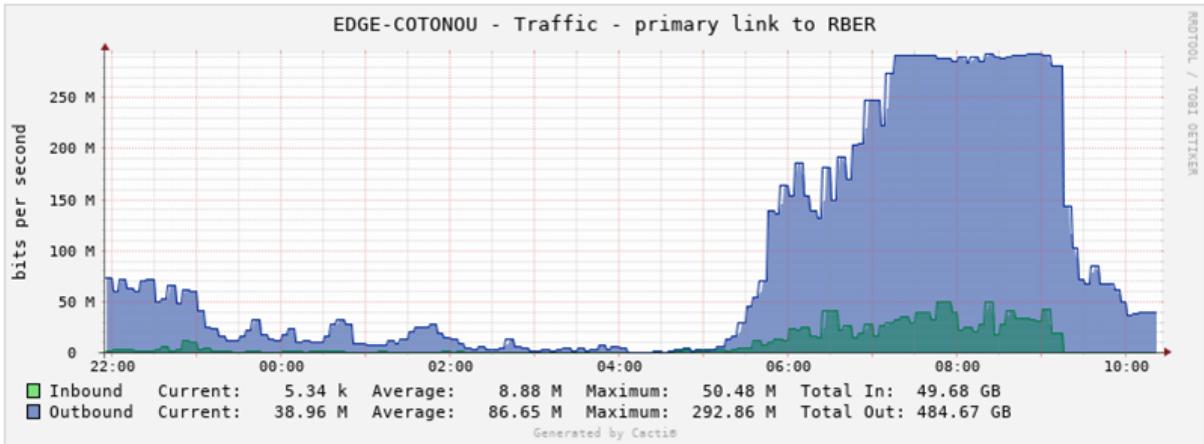


Figure 2: RBER traffic seen from WACREN (RBER, activation test day)

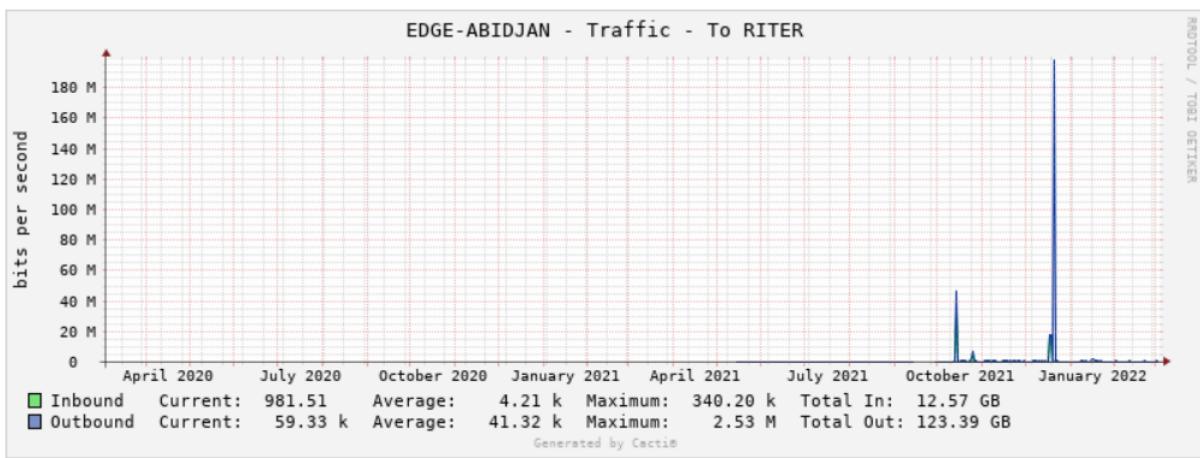


Figure 3: RITER traffic seen from WACREN

WACREN generated and sent a high-level traffic load balancing template to RENs that already have IP transit with local providers. However, some NRENs could not implement the load balancing due to their unresolved governance and technical capacity issues. WACREN began to provide support to address the problems.

Connections under AC3

There was no connection under the AC3 project. Consequently, Senegal, Equatorial Guinea, Guinea, Liberia, Sierra Leone or countries in Central Africa were not connected to the network. The identified main reasons were the lack of readiness of these countries, the non-availability of funding and administrative bottlenecks with Cluster 2 regional procurement strategy.

Network Topology

The topology below is the current approach being adopted, with Accra, Lagos and Abidjan being the cores. RENS will be connected to the core, as depicted. The three cores, Lagos, Accra and Abidjan (aggregate POPs), are all connected via coastal cables. The cities hosting the cores also have edge POPs connected within the cities via terrestrial links.

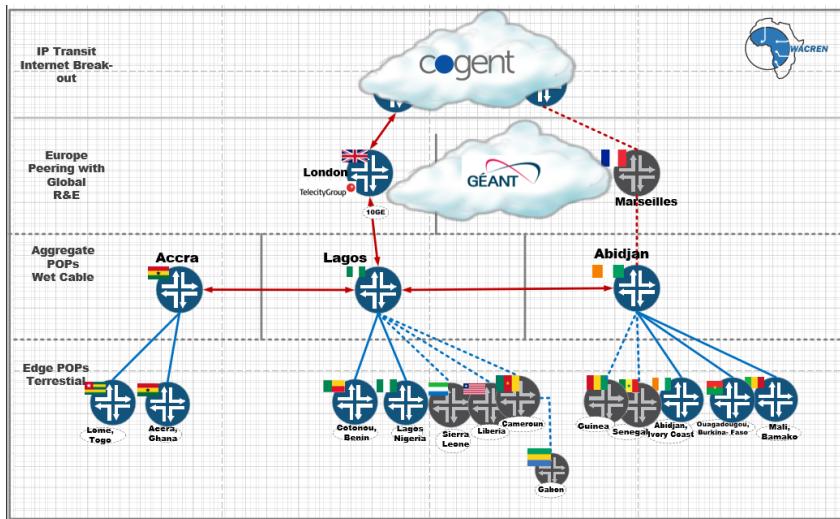


Figure 4: WACREN topology for 2021

With the above topology, the Abidjan aggregation PoP received NREN PoPs (Bamako, Ouagadougou) and other countries coming on board. The PoP was also earmarked as our alternate route to Europe (France). WACREN is flexible and open to topology changes due to the local realities of REN countries, including connectivity pricing offers and political instability.

Network Upgrade, Monitoring and Management

Day to day network operations involved network monitoring, configuration, fault, security, performance and accounting management at the NOC to ensure that the network was effectively and efficiently managed. The daily activities also involved Service Desk operations – handling incidents from service providers and NRENs through a [ticket management system](#) that tracked incidents and responses. Our NOC worked around the clock to ensure the network's availability, stability, performance, and security through constant monitoring and management. WACREN NOC utilised a proper open-source tool called Network Document for continuous network monitoring. The NOC continued using the Team Cymru Nimbus solution, providing a cloud-based net flow collection, analysis, and reporting platform.

The physical NOC that was to be established at the WACREN headquarters in Accra was aborted owing to the fallout of the pandemic. WACREN could not finalise the tender for NOC equipment due to a counter-funding issue. The tender was frozen. However, WACREN technical team continued managing the network from the remote NOC. WACREN continued deploying the PerfSONAR infrastructure to monitor the network. In 2021, our network was primarily predominantly active throughout the year. However, a hardware failure in the WACREN Lagos Medallion POP logged an RMA with XON and the OEM Juniper. As a result, there was a recorded downtime of 72 hours, while a spare was sent from Cotonou.

The performance review meetings held during the year with the suppliers (MainOne, Togo Telecoms and CSquared) allowed the comparison of data and discussions about improving performance by reducing the number of incidents. The Lomé-Accra circuit connecting the Togolese NREN to the WACREN backbone, which experienced the worst performance, was remediated by providing an IP transit backup link by Togo Telecoms – the provider. This ensured continual service to TogoRER while any issues on the primary circuit were under investigation.

Direct network support is provided for routing configuration and creating the required objects in the respective AFRINIC databases. The engineering team also assist the connected NRENs in the procurement, testing and acceptance of new links to connect new members to their networks. Besides closely monitoring the backbone links to the NRENs, the team also monitored their traffic and alerted them when they noticed an unusual change in their usage.

The aggregated traffic on the WACREN backbone from connected NRENs (GARNET, TogoRER, NgREN, RBER, RITER, FasoREN) was over six Gigabytes per second in the year under review.

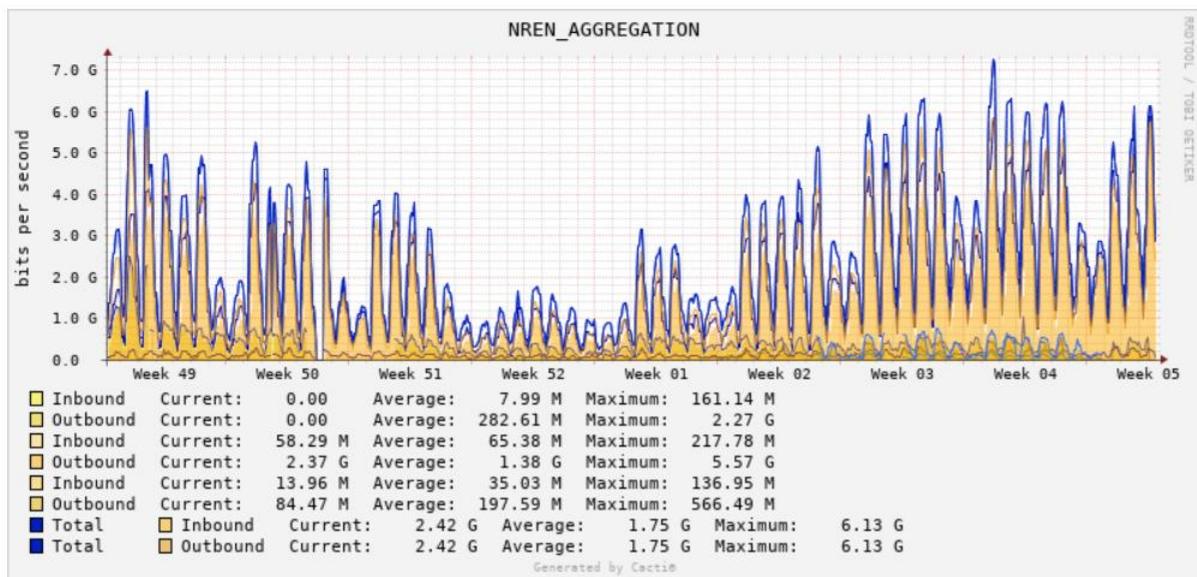


Figure 5: NRENs aggregated traffic as observed by WACREN

In the year, a direct peering was established in London with UA; this allowed traffic from the two partners to flow directly between them without routing through the GÉANT or other networks. Owing to challenges caused by COVID-19, the planned staff exchange between WACREN and GÉANT to strengthen the technical collaboration and capacity building was aborted.

Services

WACREN, with the support of NORDUNET, continued to offer zoom video conferencing services to its members using public meeting connectors. Close to a million users were on the Zoom service across the region: this greatly enhanced academic continuity and delivery of research, teaching and learning.

The installation of on-premises connectors did not happen as planned due to the availability of the remaining funds from the AC2 project (funds could not be transferred to the WACREN AC3 account at GEANT unless the AC2 audit is completed) and also due to the COVID-19 pandemic (ban of travels required to configure put in service the servers). Zooms connectors (servers) are expected to be deployed and used in the WACREN POPs in Accra, Lagos, Cotonou, Lomé, and Abidjan latest by the second half of 2022.

Ghana and Nigeria were identified for initial pilots for identity federation in WACREN; Nigeria was successfully supported to join the global eduGAIN federation. The [eduid.africa catchall federation](#) was also established, and an application to join the global inter-federation began.

The increase in cyberattacks during the pandemic made the need for good cooperation in handling cyber security threats and incidents more apparent. Before 2021, WACREN entered into a 3-year cooperation agreement with the OpenCSIRT Foundation (OCF) to work closely and constructively on increasing the maturity of the Computer Security and Incident Response Team (CSIRT) community of WACREN and Africa. The capacity building programme covered by the agreement includes training on TRANSITS I, CSIRT maturity, measurements, and improvements. A training agenda was developed for execution in 2021.

The inaugural TrustBroker Africa (TBA) Training and Community Event was successfully carried out in October 2021, preceded by the Train-the-Trainer event of identified security experts in the community for the program's long-term sustainability.



A membership model and cooperation framework for the NREN CSIRTs have been defined, and a new infrastructure service to support the framework has been developed. The TBA Service, which is open to all security teams in Africa, forms a trusted backbone of infrastructure services and serves as a clearinghouse for security and incident response teams.

Capacity Building Activities

One of WACREN's core values is collaboration and knowledge sharing. In 2021, we lived true to this by holding several diverse capacity-building sessions on pertinent subject matters for our members and communities of practice.

By the end of 2021, WACREN had organised three virtual NREN Management Academy webinars on business model design. The webinars were co-facilitated with DFN, RENATER and CYNET. Twenty (20) NREN managers (4 females, 16 males) participated in the serialised sessions. There was participation from the AC3 partners.

WACREN held an NREN Engineer Train The Trainers (TTT) in conjunction with the in-person [Service Outreach in Benin](#) in October 2021. The training was REN Architecture, Routing and Peering. Fifteen (15) NREN engineers from the REN member institutions participated.

Due to unfavourable circumstances, LIBSENSE converted its face-to-face training to serialised online sessions; these included:

1. The final session of the '[Co-Designing Open Access Publishing Infrastructures](#)' Workshop series in November 2021. The outcome has provided a foundation for the demonstrators of shared national repository pilots in Nigeria and Côte d'Ivoire and the regional repository being developed in partnership with RUFORUM.
2. Webinars on various topics:
 - a. [Open Access Publishing and Research Data Management](#) (Feb-March 2021)
 - b. [Researcher Engagement/Deposit Workflows and ORCID Repository Integrations](#) (April - May 2021)
 - c. [A dedicated session in French on the practical aspects of digital library design using social science classics as a case study.](#)
3. An Open Science training community call was hosted in collaboration with the Reimagining Educational Practices for Open (REPO) project to discuss lessons learnt from designing and conducting virtual open access and open science training and community building events in response to the COVID-19 pandemic.
4. This reporting period also saw the first of a series of policy development workshops collaborating with UNESCO and regional associations of higher education institutions in Africa. Established to complement the LIBSENSE National Open Science Roadmaps, it was co-located with the Ubuntunet Alliance Conference, and the workshops will be used to develop common ground on how to move from the high-level goals and principles in the UNESCO recommendations on Open Science to the role of institutions in implementing these policies.

Finally, the WACREN plan with the global eduroam operation team (OT) to co-host a series of workshops was not intended. However, a Bootcamp on the organisational and technical requirements for a National Roaming Operator (NRO) was held online. This featured a detailed presentation of the eduroam service so participants could fully understand the state-of-the-art and progress beyond the minimal viable eduroam scenario often deployed in Africa. The first of a series of promotion activities captioned the '[African eduroam Roadshow](#)' was also initiated in February 2021 to create visibility for the eduroam service, stimulate its uptake and discuss best practise in Africa.

Advocacy, Donor Engagements and Communication

Advocacy

In 2021, WACREN contributed to the AC3 Donor Engagement Strategy developed by the project partners. Besides this, WACREN, UA and ASREN, in collaboration with the Association of African Universities (AAU), reached out to some international donor organisations, including the World Bank, the African Development Bank, Sida, with a call to support NRENs for the African higher education and research communities to be resilient and able to respond to the COVID-19 pandemic and future challenges.

WACREN also implemented its NREN Ambassadors Programme with the induction of seven (7) NREN Ambassadors in September 2021 in Dakar. The group is composed of one former Minister of Higher Education and Scientific Research, three serving or retired Vice-Chancellors/Presidents of universities and two high-level Officers of a Ministry of Higher Education and Scientific Research. They are tasked with mapping out an apropos plan and leading local and regional advocacy efforts.



Most planned advocacy engagements with policy and decision-makers in the region could not be made due to the pandemic and the resulted travel bans. A discussion with the ministers in charge of Higher Education and ICT of Sierra Leone was re-activated in 2021. The objective was to have a standard plan for getting SLREN to participate in AC3, possibly with support from the World Bank.

Donor Engagements

WACREN honoured its obligations to European Commission directly and through GÉANT as part of donor engagements. WACREN was part of various meetings and honoured reporting schedules under the AfricaConnect3 project framework.

Also, in 2021, WACREN collaborated with the Institut de Recherche pour le Développement (IRD), a French public research institution, to put forward a funding proposal to AFD as part of an EU programme. This was successful and led to the [Africa Digital Campus \(ADC\) project](#), coordinated by the two partners. This project forms part of the WACREN eLearning strategy implementation plan. The project aims to, among other things, strengthen the online learning offers of universities in the WACREN region through an NREN-supported national training platform that offers a suite of tools and services around which faculty teams build a bank of reusable quality courses with appropriate pedagogical support. The pilot is scheduled to begin with Bénin and Burkina Faso in 2022.



As part of GÉANT-initiated discussions with the Austrian Development Agency (ADA) to explore synergies with AfricaConnect3 regarding the digitalisation of the research and education sectors, WACREN began promoting collaboration on a LIBSENSE proposal. The objective was to develop open science knowledge and provide data science support in open research practices and research data management for Early Career Researchers (ECR) within a collaborative research environment in selected universities and research institutions.

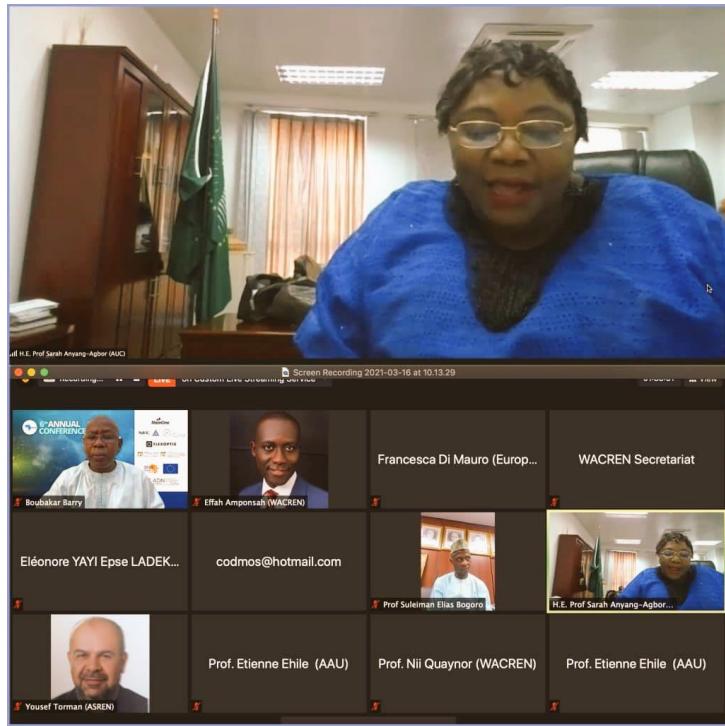
Communication

In 2021, WACREN enhanced its communication channels and added new ones to reflect the status and stature of the regional REN. For instance, WACREN launched a [new website](#) and a newsletter codenamed – [eNGAGE](#) in the year. Three issues of eNGAGE were published in 2021, and the subscription to the newsletter kept increasing. Also, the WACREN began assisting some national RENs, including TogoRER, with their communication efforts. Work on the [LIBSENSE website](#) also started in 2021. WACREN held a capacity-building workshop for national RENs on developing a communication strategy and plan.



WACREN 2021

The 6th flagship Conference themed - *Digital Transformation for Development*, was held online from March 15 to19 2021, with nearly 400 registered participants from 55 countries. Three workshops and nine sessions were held, and 40 panellists and 53 speakers participated in this annual event. The contributions to the sessions were [published](#), and the [video recordings](#) were made available on WACREN TV (YouTube channel).



Human Resources and Secretariat

The long-planned hiring process of new staff that was delayed due to the COVID-19 pandemic will be resumed on the staffing front. It is intended to hire a NOC Engineer for more professional handling of NOC operations, a DevOps Engineer to support the development of value-added services for the WACREN community, and a Project and Procurement Officer to assist in project management and procurement. It should be noted that WACREN hired a NOC Engineer at the onset of the year; the employee quit the job after a couple of months. A Projects and Procurement Officer was also employed, but she turned down the offer. Hopefully, in 2022, WACREN will get its full complement of critical staff. At the close of the year, two officers were working from the Secretariat in Accra.

WACREN successfully completed in July 2021, the Expenditure verification Audit for AfricaConnect3 (AC3) projects for the period 1 (15 November 2019 to 31 March 2021). Deloitte Ghana was the auditor. Following the audit, WACREN received the Tranche 2 of the AC3 Non-Connectivity funds to continue with the project for the next period.

WACREN engaged KPMG to conduct a systems audit to review the governance framework and effectiveness of risk management and internal controls. The overall objective of the systems audit is to enhance the effectiveness of WACREN's governance, operations, and internal control activities to drive the realization of its strategic objectives and to deliver value to stakeholders. The

systems audit exercise commenced in the last quarter of 2021 and due to be completed in the 1st quarter of the ensuing year.

OUTLOOK FOR 2022

In 2022, WACREN foresees much of its activities relating to AC3. The RREN will focus more on expanding the reach of the network, building human capital, enhancing the efforts of NRENs, and creating and rolling out relevant digital services and applications delivered through state-of-the-art infrastructure. The ultimate is to create new opportunities for our network users to explore unlimited possibilities. As we drive network reach, we will endeavour to raise the capacity of our community to match the requirements of available infrastructure and services.

In 2022, with the support of governments and development partners, WACREN intends to connect to its backbone the following NRENs: LRREN and SLREN. Despite the challenges of many natures, both commercial and political, WACREN intends to connect MaliREN to its backbone finally. Connecting snRER is also considered.

This will be done alongside increasing the capacity for GARNET and NgREN. A new connection from Abidjan to the GEANT PoP in Marseille or Paris is also under discussion for procurement. The planned procurement of servers for Zoom meeting connectors will also be implemented in 2022. This will significantly improve the videoconferencing service that WACREN is providing to its Members, which has proven very useful, especially during the COVID-19 crisis and the closure of hundreds of higher education institutions in Africa. Zoom meeting connectors (audio/video processing servers) will be deployed in the WACREN POPs in Accra, Lagos, Cotonou, Lomé and Abidjan.