BdREN

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Annual Report 2022

Annual
Report
2022

Bangladesh Research and Education Network

"It's my utmost pride, privilege and pleasure to lead such a wonderful team which is capable of bringing marvels for the community."

CEO, BdREN

CONTENT NAVIGATION

CONTENT NAVIGATION

MESSAGE OF CHAIRPERSON

"It is a pleasure to put my notes on the third Annual Report illustrating the major achievements of Bangladesh Research and Education Network (BdREN). I feel proud to lead such a successful organization which has stepped into its fifth year growing better and moving higher over the years. In the midst of overwhelming challenges and the apocalyptic threat of global economic recession, BdREN is becoming financially and organizationally more stable than ever before"

It is a pleasure to put my notes on the third Annual Report illustrating the major achievements of Bangladesh Research and Education Network (BdREN). I feel proud to lead such a successful organization which has stepped into its fifth year growing better and moving higher over the years. In the midst of overwhelming challenges and the apocalyptic threat of global economic recession, BdREN is becoming financially and organizationally more stable than ever before - that is the highest level of achievement from my part sitting at the helm of the organization hierarchy.

You are aware that BdREN could establish its footprint as a truly philanthropic organization when the pandemic jolted the country as BdREN offered its Zoom licenses free of cost to thousands of faculty members serving both public and private universities. Even after the pandemic is over, the services are still on because of the shifting in the modality of pedagogy from onsite learning to hybrid learning. The challenge is prevalent to make this Zoom application licenses sustainable. I am hopeful that you will get the result soon as BdREN is working on it and I believe BdREN will emerge with a long-term sustainable plan.

As I mentioned in my earlier note that BdREN has been working both for the horizontal and vertical expansion of its network, BdREN could still hold its number of members at the same level as it was there during the pandemic while we witnessed an exponential growth in BdREN membership. This resulted mostly as the members were allured in having the video conferencing application services. The number is still intact after the pandemic waned out which implies that members are satisfied with BdREN's delivery of services.

At the same time, as a continuation of its horizontal expansion, I am elated to know that BdREN eduroam services are now available in Hazrat Shahjalal International Airport. It is heartening to know that the implementation of the service, which is the first of its kind in Asia-Pacific region, has been widely covered in local and foreign media generating more enthusiasm and intrigue in the international community about BdREN. I wish BdREN will continue its endeavour in bringing the other airports of the country under eduroam coverage.

Financially, BdREN could generate surplus in this financial year meeting its operating expenses and capital replace-

ment cost. Having said so BdREN needs to be cautious in devising out strategies so that the growth in revenue earning is continued. This can only be made possible if BdREN can diversify its services reducing its revenue earning dependence on traditional services. It is good to know that BdREN has signed a "Partnership Agreement" with National University to connect 120 Colleges. It is certainly a bold step forward for BdREN as it is going to charter into a new domain. In diversification of services BdREN should put focus on the much talked-about state-of-the-art services like Artificial Intelligence, Virtual and Augmented Reality, Machine Learning, Big Data, HPC and Others to align its goal with that of IR4.0 leading the country towards a "Smart Bangladesh".

I am pleased to let you know that two flagship projects supporting BdREN activities have been approved by the government recently. BdREN should keep a close look in developing infrastructure and designing applications and other resources leveraging on those projects.

I am delighted to reveal that BdREN has not only earned confidence of its members. Rather, in the international arena, BdREN's image is getting better and better. After successful hosting of APAN53 in the beginning of 2022, BdREN has organised a session in APAN55 at Kathmandu where it highlighted its successful delivery of services under two flagship distance learning projects. I was informed that the session could attract the attention of the distinguished participants from all around the globe who expressed their astonishment having a glimpse of the successes derived out of those projects.

I thank my Board Members for their unwavering support in making bold and dynamic decisions which could allow BdREN moving through the right track towards the right destination. At the same time, all the stakeholders of BdREN should also be duly acknowledged of their noteworthy contributions for the continuous development of BdREN.

At the end, I wish that BdREN will continue to prosper and progress with the help from its member institutions and with the support of its stakeholders.

Professor Dr. Kazi Shahidullah
Chairperson
Bangladesh Research and Education Network (BdREN) Trust

MESSAGE OF VICE-CHAIRPERSON

"I feel BdREN is right at the take-off stage. It has already established its footprint as a major NREN in the Asia Pacific region in terms of performance and maturity, and now it is set to emerge as one of the top NRENs in the global arena. For achieving so, BdREN needs to bank on adopting even more innovation and on embracing latest technologies in relevant fields."

BdREN has already accomplished an excellent track record for publishing this Annual Report as the organization enters into the fifth year of its operation as a Trust. For its endeavor in coming up with such a master-piece, I am very pleased to extend my heart-felt congratulations to BdREN. Updating all the stakeholders about what has been happening and thereby being transparent is a commendable and praiseworthy gesture from BdREN. I would like to take the privilege to acknowledge that in brief the previous year will be remembered as a year of BdREN's Service Expansion and Financial consolidation.

BdREN has achieved a number of extra-ordinary feats in last couple of years. I am very happy to note that as pledged BdREN has been expanding its services both horizontally and vertically, emerging out from conventional connectivity and internet services. Other than the services mentioned, offering HPC (High Performance Computing) service has stood out as BdREN's another forte which is constantly expanding. This HPC service has been the key to high-end research for country's renowned researchers leading BdREN towards becoming 'Researchers' Heaven' as they promised to be. Among other notable services BdREN has launched eduroam in Hazrat Shahjalal International Airport, developed a Certificate Verification Software, enabled Federated Log-in to get flexible access to Research Journals, built Campus Network in a few Universities, deployed eFile and LMS system in few other Universities and Institutions, and planned deploying University Management System [UMS] on a pilot basis. BdREN has turned out to be more customer focused which helped it in earning Customers' Trust and Loyalty. Financially, BdREN has crossed the bar of break-even in Gross Profit measurement and now it has reached very close to realizing positive Operational Profit. Also, when you add-up the non-operational income, BdREN is in surplus even after spending on Capital Expenditure in terms of procuring new equipment and replacement of outdated equipment.

Having said so, I strongly believe that BdREN shouldn't feel complacent and shouldn't give a pause for a single moment. It should try even diversifying its services and should try to move forward from the status of "Excellent" to "Outstanding". Personally, I feel BdREN is right at the take-off stage. It has already established its footprint as a major NREN in the Asia Pacific region in terms of performance and maturity, and now it is set to emerge as one of the top NRENs in the global arena.

For achieving so, BdREN needs to bank on adopting even more innovation and on embracing latest technologies in relevant fields. Especially I would like to mention mastering on Block Chain, Big Data, Machine Learning, Artificial Intelligence, VR/AR and thereby coming up with innovative services to make life easier for researchers and help accomplishing their tasks in more efficient and qualitatively in a better way. BdREN can even plan offering the service of Virtual Lab for Engineering and Medical students and make it cost-effective for the users. In addition, BdREN needs to go all the way to implement fully fledged UMS and gradually implement Smart Campus Concept. At the same time BdREN should start incorporating the concepts of 4th Industrial Revolution and STEM in planning its future initiatives.

I believe, huge potentiality is lying ahead for expanding the horizon of services to be developed and offered by BdREN. For doing so, it needs to make 'Innovation' its habit and needs to keep close contact, cooperation and collaboration with other prominent NRENs. Also, to better understand the need of member institutes, BdREN should focus on deeper and stronger association with its members through building rapport and earning the latter's trust and confidence. For achieving all these, BdREN needs to carry-out continuous restructuring and reshaping and thus strengthening the organization in such a way that it becomes future-proof, and well capable to overcome all the looming challenges in the years to come.

Finally, I would like to thank and congratulate BdREN family members for their untiring efforts in lifting its image at such a high level and for giving the Board the hope and confidence that BdREN is soon going to evolve as one of the top ranked NRENs in the world.

Joy Bangla, Joy Bangabandhu,
May Bangladesh live forever.

Professor Dr. Muhammed Alamgir
Vice-Chairperson
Bangladesh Research and Education Network (BdREN) Trust

MESSAGE OF CEO

"It is true that BdREN is still dependent on Internet Services as one of the cash-cow services. However, it will be difficult for other service providers to challenge BdREN which could attain an availability of 99.95% supported by its VPN backup. At the same time, BdREN has been spot on in offering "Computing and Virtualization" services as one of its mostly used services for promoting the research activities. The year-on-year growth in maximum CPU usage increased more than 200% during the year"

BdREN has just completed the fourth year of its operation and I am proud to say that it has been another successful year with a number of achievements to point out. With each passing year, BdREN is positioning itself in a better position in attaining the confidence of its members and at the same time in becoming financially more sustainable. This year's statistics is a sheer testament to my claim.

On a year-on-year comparison with 2021, BdREN's internet bandwidth has surged from 13Gbps to 16Gbps with a total usage soaring up to 82 peta-byte in 2022 from 55 peta-byte in 2021. In the arena of software development BdREN has emerged with its own financial management software which can be customized for any of the universities. In addition to that BdREN's first version of certificate verification system is already in place for commissioning. MoU has been signed with BUET for implementation of BdREN's eFile system. In the international arena we have kept our persuasion for acceptance of e-Compendium application to stamp BdREN's exclusive footprint in development of Asi@Connect compendium. It is to be mentioned that both the Asi@Connect 2018 and 2020 Compendium have been orchestrated and framed by BdREN.

We are equally focused in our drive to connect new public and private universities to BdREN network. In addition to that establishment of connectivity of colleges under National University is underway through CEDP project. The college connectivity is going to ajar a new chapter for BdREN. Initiative is also in place to connect Technical Institutes under ASSET project.

We could strengthen our regional cooperation and fortify our international footprint through organizing session at APAN55 in Kathmandu on "NRENs role during pandemic" which could attract a lot of focus and attention of the international community. It is a matter of utmost pride that BdREN is being treated as one of the trailblazing NRENs to be followed by other emerging NRENs.

Although proliferation of eduroam services in universities is not remarkable during this year, however a significant achievement is attained in bringing the most cherished public hotspot under eduroam coverage. In the process BdREN has become the first NREN in

Asia-Pacific region to introduce eduroam at the Hazrat Shahjalal International Airport, the only airport in the capital city Dhaka. The achievement has been widely covered in different international portal including Asi@-Connect and GÉANT.

At the same time BdREN could convert its flagship service – video conferencing using Zoom Application – as one of its signature services. The challenge is on in making Zoom Application a long-term sustainable service for its members. BdREN is striving hard to achieve that feat very shortly.

It is true that BdREN is still dependent on Internet Services as one of the cash-cow services. However, it will be difficult for other service providers to challenge BdREN which could attain an availability of 99.95% supported by its VPN backup. At the same time, BdREN has been spot on in offering "Computing and Virtualization" services as one of its mostly used services for promoting the research activities. The year-on-year growth in maximum CPU usage increased more than 200% during the year (from 695 GHz to 1599 GHz).

Talking about the financial accomplishments it can be claimed that financial stability is BdREN's pivotal strength. In the financial year 2021-2022, BdREN could earn a "Gross Surplus" of BDT 6.99 crore. The "Gross Surplus" is the "Total Revenue" minus "Operating Expenses". From this "Gross Surplus", BDT 3.80 crore was used for "Replacement of Capital" providing a net contribution of BDT 3.19 crore to its exchequer. However, BdREN's "Operating Revenue" is still partially less than its "Operating Expenses" which needs to be addressed to further strengthen BdREN's financial position.

We cannot deny that due to economic downturn the scope has dwindled in the field of International Consultancy. However, BdREN could manage one flagship consultancy work in the form of developing the textual and video documentation of an Application Software on "BGP Watch" portal developed by Tsinghua University, Beijing. This shows BdREN's capability in extending consultancy in diversified arena.

On the other hand, domestically BdREN has continued its consultancy services for video conferencing setup, campus network design, connectivity to REN, web portal development and on many other issues revolving state-of-the-art technologies.

In continuation of our focus on enhancing our members' satisfaction we have organized a number of "Meet & Greet" workshops at different places of the country. The events were widely acclaimed by the participants from the member institutions. A number of trainings as well as internship programs have taken place during the year to upskill the community workforce as a demonstration of our commitment to the society.

Finally, I pledge again, as I did before, BdREN's strive will continue in attaining its sustainability and success will certainly follow provided we get the cooperation of our members and stakeholders as we had it throughout our journey.

Mohammad Tawrit
Chief Executive Officer
Bangladesh Research and Education Network (BdREN) Trust

BdREN Governance - Board of Trustees

BdREN is being operated as a state-owned non-profit autonomous Trust with a board of trustees consisting of representatives from the UGC, Universities, MoE, and other members co-opted for their expertise and position in relevant industries.

Prof. Dr. Kazi Shahidullah, Chairman
University Grants Commission of Bangladesh, and Chairperson, BdREN Trust

Prof. Dr. Muhammed Alamgir, Member
University Grants Commission of Bangladesh, and Vice-Chairperson, BdREN Trust

Prof. Dr. Md. Forhad Hossain
Vice-Chancellor, Mawlana Bhashani Science and Technology University (MBSTU) and Member, BoT, BdREN Trust

Prof. Dr. M. Kamruzzaman
Vice-Chancellor, Hajee Mohammad Danesh Science and Technology University (HSTU) and Member, BoT, BdREN Trust

Professor Dr. M. Osman Gani Talukder
Vice-Chancellor, Varendra University and Member, BoT, BdREN Trust

Prof. Dr. Qumrul Ahsan
Vice-Chancellor, University of Asia Pacific (UAP) and Member, BoT, BdREN Trust

Prof. Dr. Swadesh Chandra Samanta
Vice-Chancellor, Patuakhali Science and Technology University (PSTU) and Member, BoT, BdREN Trust

Prof. Dr. A Z M Mostaque Hossain
Vice-Chancellor, Rajshahi Medical University and Member, BoT, BdREN Trust

Professor Dr. Mohammad Rafiqul Alam
Vice-Chancellor, Chittagong University of Engineering & Technology and Member, BoT, BdREN Trust

AKM Aftab Hossain Pramanik
Additional Secretary, MoE and Member, BoT, BdREN Trust
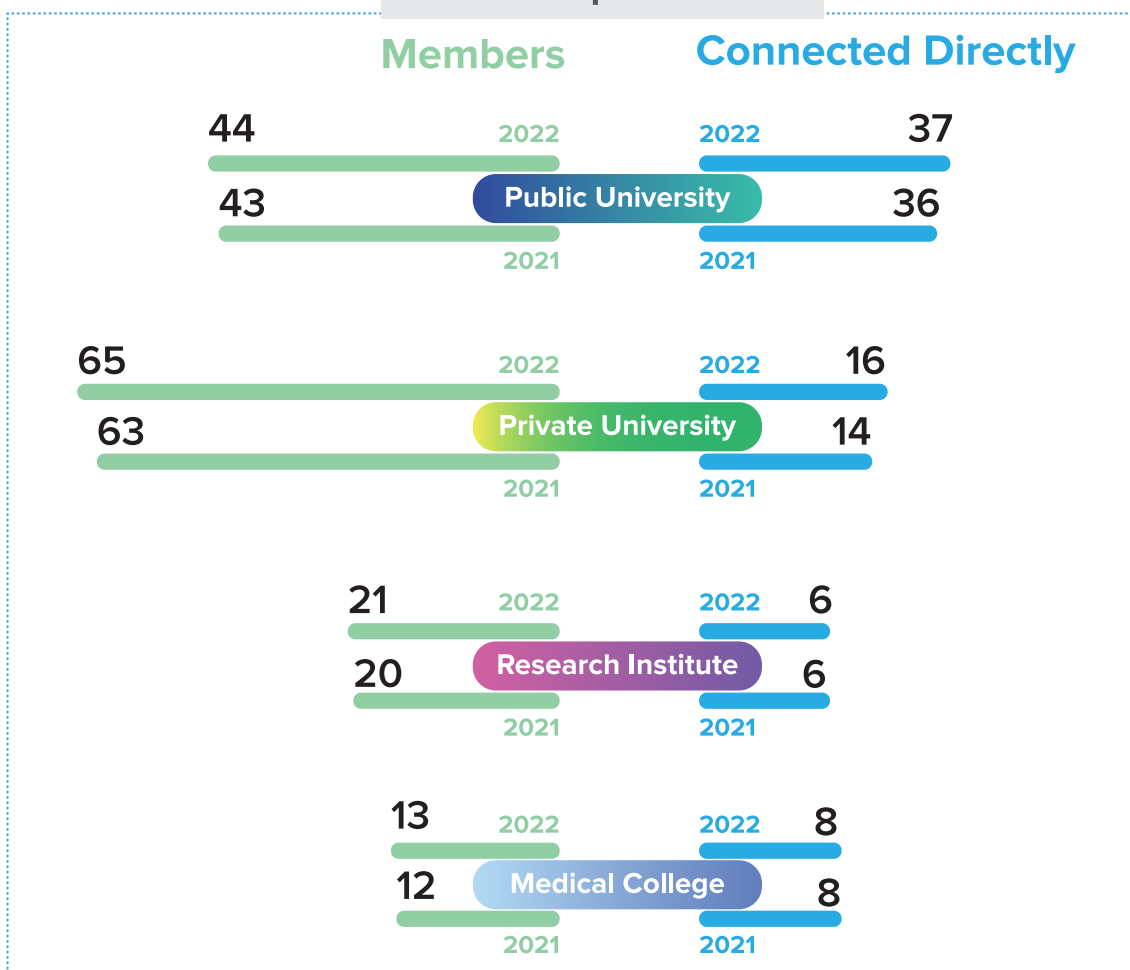
BdREN Team

BdREN team, comprised of skilled Engineers & Administrators and led by its Chief Executive Officer, discharges strategic and operational oversight of the network. They are responsible for the day-to-day operation and maintenance of the network and are accountable to the Board of Trustees

OUR JOURNEY

WHERE WE

Members   ## Connected Directly

Public University

	Members	Connected Directly
2022	44	37
2021	43	36

Private University

	Members	Connected Directly
2022	65	16
2021	63	14

Research Institute

	Members	Connected Directly
2022	21	6
2021	20	6

Medical College

	Members	Connected Directly
2022	13	8
2021	12	8

Traffic Scenario

June - 2021

13 Gbps Peak Traffic
269 TB Total Upload
Total Download 2599 TB

June - 2022

16 Gbps Peak Traffic
1622 TB Total Upload
Total Download 5467 TB

ARE NOW

Exponential Commodity Traffic Growth from 2016
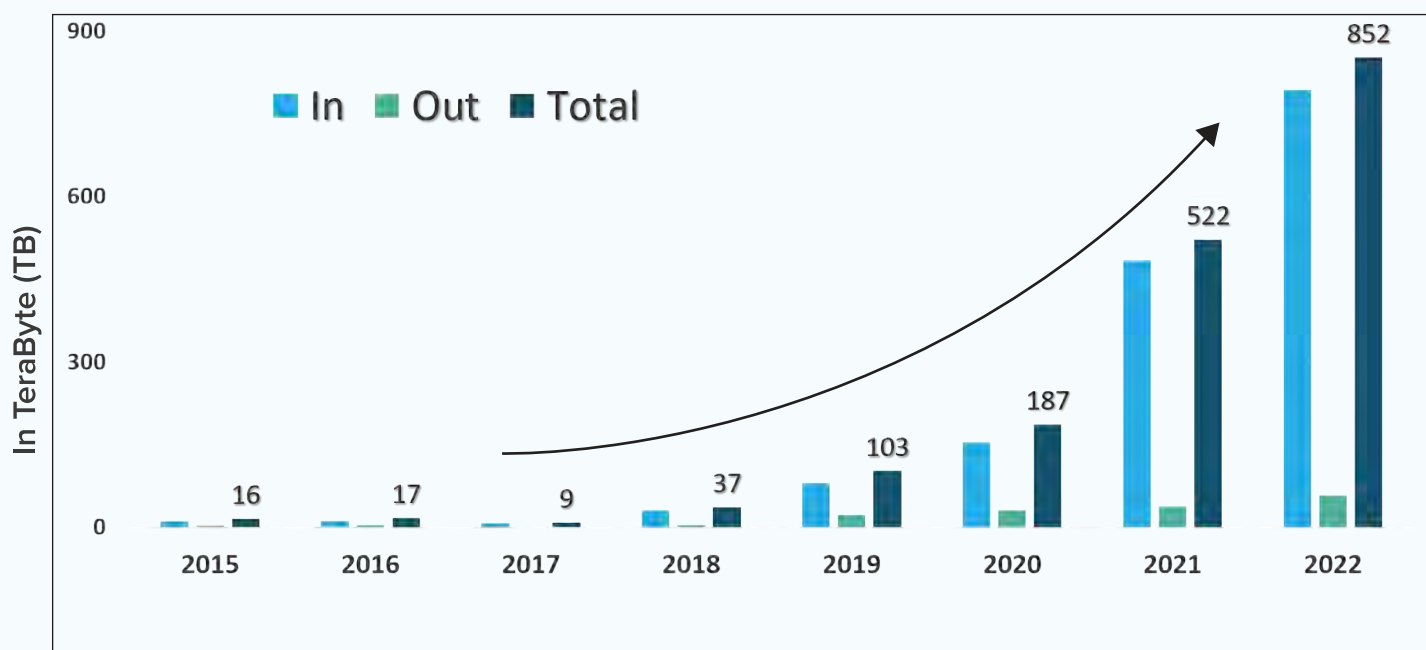
Exponential Research Traffic Growth from 2020

WHO WE ARE? BdREN

Zoom Provider

Video Conferencing Facility Provider

Connectivity Provider for Researchers and Academicians

Research Enabler

Grants Facilitator

Education Enabler

Researchers' Heaven

Infrastructure provider

Quality Assurer

Problem Solving Body for Researchers and Educationists

Safe home for Research data

Working for national Interest on Education & Research

Global Wi-Fi roaming partner

OUR VISION IS TO MOVE HERE...

Researchers will be attracted to:
Come and get help in doing their research
Easy access to research papers and publications.

Fresh Graduates will voluntarily come to:
Get them prepared and be ready for job or entrepreneureship.

Research fund provider will come to:
Verify Research authenticity
Get funding recommendations

Suppliers (Equipment, Service, Bandwidth etc.) will come to:
Become affiliated with BdREN to get their Brand uplifted

Industry will come to:
Get their network plan verified
Get help in recruiting right human resource
Verify authenticity of certificates

WE ARE CUSTOMER FOCUSED

We
Care

We
Innovate

We
Deliver

We
Uplift
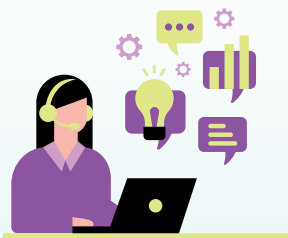
WE ARE CAPABLE

We are a strong team of capable, flexible and dedicated professionals, supported by strong entities like UGC and Education Ministry.

We are a customer-oriented team who understands customers' needs and look forward to addressing those needs in an innovative, future-looking, cost effective way, ensuring reliability of the solutions.

BdREN is a place where Customers and other stakeholders are welcomed and valued.

" *BdREN came up with innovative solution by providing equipment out of its own inventory and make the network up and running in a month. All those equipment were later replaced when the imported equipment became available reckoning warranty time from the new date of installation. This is exceptional service by the BdREN authority and generous support rendered to BSMRAAU. BdREN's solution was found to be member-centric and holistic - nothing short in it.*

Md Afzal Hossain, BUP,ndc,psc,PhD
Air Commodore (Retd), Distinguished Professor
Director, ICT Cell (In - Charge) BSMRAAU

STANDOUT ACHIEVEMENTS

Facilitating Global eduroam in Hazrat Shahjalal International Airport

In creating a research-friendly digital environment for faculty members, researchers and students, BdREN always endeavors to expand its services both horizontally and vertically. Following other developed countries, in Bangladesh this is the first time eduroam service is being available beyond educational campus. BdREN, in cooperation with the Civil Aviation Authority of Bangladesh (CAAB), launched the eduroam service – a global settlement free Wi-Fi roaming for research and education community - at the Hazrat Shahjalal International Airport (HSIA) in Dhaka. By means of this setup, HSIA becomes the First International Airport in the Asia-Pacific region to offer "eduroam" Service, and becomes one among more than 30 international airports in the world.

This enables the travelers to continue their academic and research pursuits without interruption, whether it's participating in remote lectures, accessing online resources, collaborating with colleagues, or online social interaction with their family or friend. The availability of "eduroam" at the airport opens up many possibilities for research and education activities and promotes international cooperation and knowledge sharing.
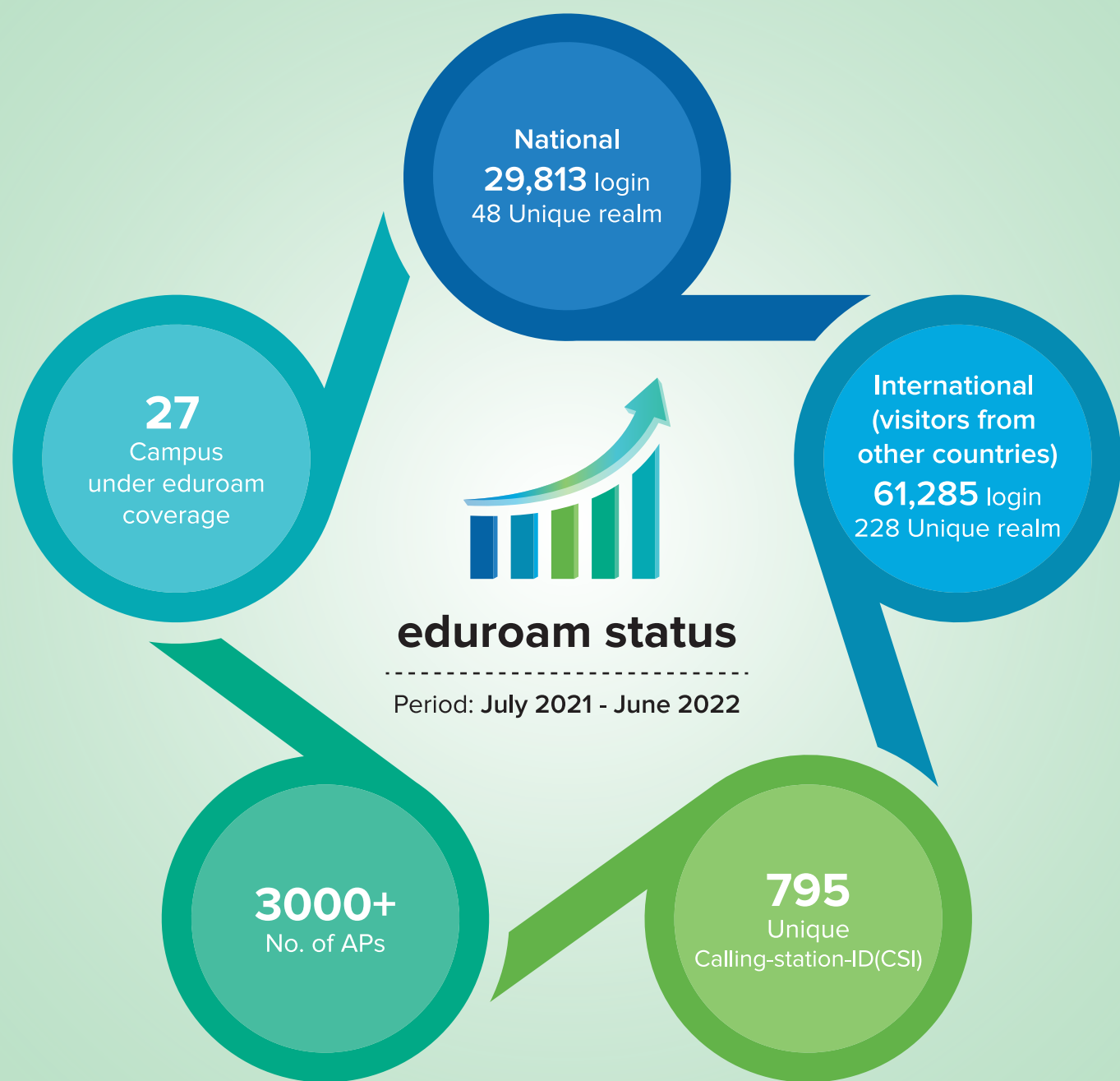

The activation of eduroam at HSIA did not happen overnight, but instead through several processes. BdREN had been striving to launch the "eduroam" service at HSIA since months. The process started with getting approval from the Bangladesh Telecommunication Regulatory Commission (BTRC) as telecom regulatory authority of Bangladesh. The next step was to obtain the permission from CAAB for broadcasting the "eduroam" SSID on HSIA's Wi-Fi network. Finally, on the 31st May 2023, permission from CAAB was obtained. It took around three (3) weeks more to test and commission the service - which finally became successful on 26th June 2023. The Wi-Fi infrastructure and Internet access for eduroam at HSIA are provided by ADN Telecom Limited, a local Internet Service Provider (ISP).
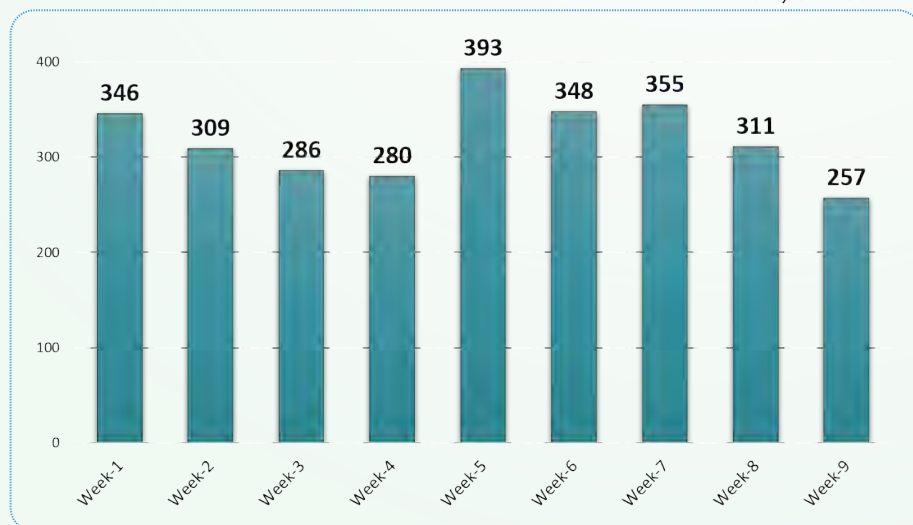
eduroam successful
login statistics at
HSIA [26 June to 31 August 2023]

BdREN is now looking forward to enabling "eduroam" service at other international airports in the country such as the Osmani International Airport, Sylhet, and the Shah Amanat International Airport, Chittagong. Then the local airports will be targeted. This is in line with CAAB's commitment to provide high-speed broadband internet access to the travelers.

National
29,813 login
48 Unique realm

27
Campus
under eduroam
coverage

**International
(visitors from
other countries)**
61,285 login
228 Unique realm

eduroam status

Period: **July 2021 - June 2022**

3000+
No. of APs

795
Unique
Calling-station-ID(CSI)

"eduroam" is currently available in 27 Universities in Bangladesh. The "eduroam" SSID is being broadcasted by more than 3000 Wi-Fi access points throughout the country, mainly at research and education premises.

BdREN Finding its New Nest

**Present and past BoT members along with other dignitaries
in new BdREN office at Niketon on 14 May, 2023**

**44th BoT meeting at new BdREN office at Niketon,
Gulshan-1 on 14 May, 2023**

In a noteworthy development, BdREN finally managed to procure its own office space at Niketon right beside Gulshan, the luxurious corner of Dhaka city. It was a long standing dream for BdREN and the activity was incorporated under HEQEP but could not be materialized due to a number of challenges. Overcoming all those challenges BdREN BoT approved the signing of the contract with Navana Real Estate in its 42nd meeting for procuring this space. It stands out to be a milestone for BdREN who could do it utilising its own fund in only 4 years time of its starting operation on its own. This procurement will bring dual benefits for BdREN. On the one hand BdREN can have a permanent location to start its office and on the other hand it will diversify BdREN's investment portfolio. The newly procured office space is going to be ready by December 2023.

Paying homage to the benefactors during APAN55 in Kathmandu

The COVID-19 pandemic has affected every aspect of life, and the National Research and Education Networks (NRENs) in South Asia are no exception. These NRENs had to deal with a significant disruption of services, which had a disastrous impact on research and education in the region. However, despite these challenges, NRENs in South Asia have shown remarkable resilience and have continued to provide essential services to their users.

In APAN55 event held in Kathmandu, Nepal, BdREN along with other beneficiary NRENs presented on the wide spread success of the two Asi@Connect projects namely facilitating Distance Learning using Digital Conferencing facility (fDLuDCf) and Building e-Learning Infrastructure in South Asian countries under TEIN (BeLISAC).

BdREN's CEO Mohammad Tawrit rendering the Opening Speech on March 15, 2023

One of the significant challenges NRENs faced during the pandemic was the sudden shift of the modality of education into remote learning pedagogy. However, with their experience in providing high-speed internet services, NRENs were quick to adapt and upgrade their infrastructure to mitigate the burgeoning demand. This allowed students, teachers, and researchers to continue their work uninterrupted and maintain the continuity of their research and education. It was made possible using available Zoom Licenses under the then ongoing fDLuDCf project and its subsequent BeLISAC project.

As Principal Investigator of both the mentioned projects, Mohammad Tawrit expressed his gratitude to both NORDUnet and TEIN*CC for their invaluable contribution to the execution of the fDLuDC project, which created facilities for distance learning in five beneficiary countries (Bangladesh, Bhutan, Nepal, Sri Lanka, and Thailand). Also, he appreciated both NORDUnet and TEIN*CC for the co-financing of the follow-up project BeLISAC for the continuation of facilitation of online education and the advancement of female engineers and students in the community.

Francis Lee, SingAREN

Chalermpol Charnsripinyo, ThaiREN

Representatives from the South and East Asian NRENs, NORDUnet and TEIN*CC spoke in the session. Speakers from the NRENs expressed their experiences in the difficult times during the pandemic and how both the projects helped them at the time of their need. They also thanked NORDUnet and TEIN*CC for their immense support.

Awards and Certificates

The session hosted an awarding ceremony at the end. Awards were given to NORDUnet and TEIN*CC for their strong support for BdREN and other Asian NRENs. A few of the NREN engineers also received awards for their outstanding contribution, which was instrumental in making the projects successful.

Mrs. Pramila Devi Bajracharya, Secretary, Ministry of Education, Science and Technology, Nepal distributing awards to the TEIN*CC and other NREN representatives

Delegates and awardees from NRENs, NORDUnet and TEIN*CC gathered at a photo session at the end
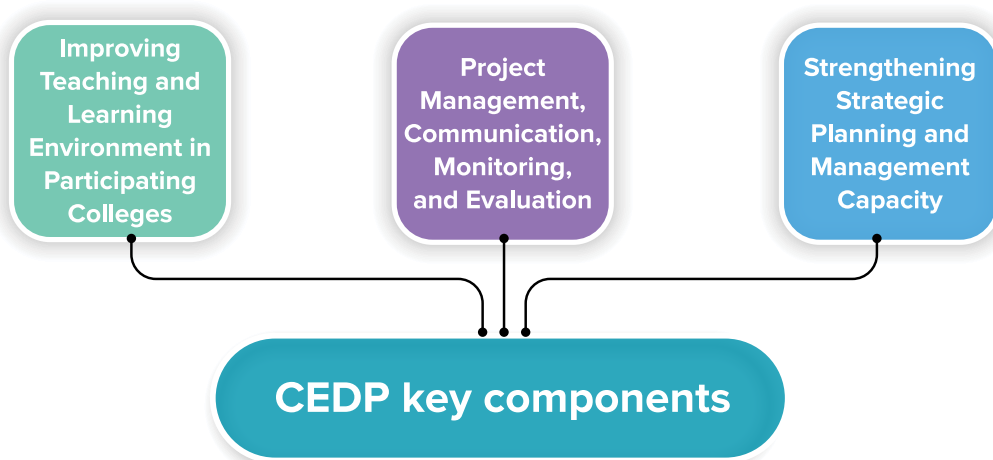
📚🕐 Chartering into a new domain - The College Connectivity

The Government of Bangladesh (GoB), in partnership with the National University, is executing the College Education Development Project (CEDP) with support from the World Bank. CEDP aims to enhance the strategic planning and management capacity of the college education subsector while improving the teaching and learning environment in 120 participating colleges. The World Bank's financial backing aids the government in achieving the project's objectives.

The University Grants Commission of Bangladesh and the National University are the implementing agencies, and the project is expected to run until December 2023.

| Improving Teaching and Learning Environment in Participating Colleges | Project Management, Communication, Monitoring, and Evaluation | Strengthening Strategic Planning and Management Capacity |

CEDP key components

One of the primary goals of CEDP is to establish connectivity between colleges and BdREN. This connectivity enables colleges to access the domestic and global Research and Education Network, facilitating high-speed and high-quality communication among colleges and universities. Additionally, through BdREN's infrastructure, faculty and students can utilize internet services within their campus networks.

Moreover, by joining BdREN, colleges will get access to eduroam, a global free-of-cost Wi-Fi roaming service. This service enables faculty members and students to visit other colleges having eduroam service and access the internet using their home credentials. Additionally, colleges can become members of the "TIGER-fed" research and education federation, unlocking access to federated services. The eduGAIN platform allows faculty members and students to utilize a wide range of services available globally.

As part of their membership, colleges can also benefit from BdREN's training and consultancy services. BdREN will establish optical fiber connectivity to each college either from BdREN's own network or from BTCL's nearest PoP. Operational and maintenance support will be provided to ensure internet service availability and to address any fault as soon as it occurs.

BdREN organized a Kick-off Workshop on Connectivity of 120 Colleges under IDG, CEDP on March 20, 2023 at UGC, Dhaka.

The kick-off meeting marked the start of the project implementation by BdREN, following the signing of a partnership agreement with National University on March 06, 2023.

Representatives from 13 beneficiary colleges of the CEDP in the capital, along with representatives from the World Bank, University Grants Commission of Bangladesh, National University, and the CEDP itself, attended the meeting. The event was hosted by BdREN, the project implementing partner.

Meeting with World Bank on CEDP's work progress at UGC conference room on May 24, 2023

The collaboration between BdREN and NU is going to make a significant stride in enhancing the standard of the college education subsector in Bangladesh. By providing robust connectivity, access to global research networks, and valuable services, BdREN empowers colleges, faculty members, and students to leverage cutting-edge technologies and resources for educational and research purposes. The progress made thus far is in line with the objectives outlined in the CEDP, and efforts will continue to strengthen the college education system in Bangladesh.

FLAGSHIP ACTIVITIES DURING THE YEAR

Empowering Women and Capacity Development

BdREN is forging ahead being aligned with global women empowerment initiative. Under Building e-Learning Infrastructure in South Asian Countries under TEIN (BeLISAC) project, the gender diversity has been addressed by recruiting one (1) female engineer for a period of one year accompanied by seven (7) female interns (2 for Laos) for varying periods from three to six months in each of the beneficiary countries as follows:

Country	Financing				Total No. of Female Interns
	Roles	Engineers	Interns	Interns	
	Duration	12 months	6 months	3 months	
BANGLADESH		1	2	5	8
BHUTAN		1	2	5	8
SRI LANKA		1	2	5	8
LAOS		1	2		3
NEPAL		1	2	5	8

31ST NORDUNET CONFERENCE AT REYKJAVIK, ICELAND

A visit of Female Engineers was organised under the project to NORDUnet conference in Reykjavik, Iceland on September 13-15, 2022 for developing women empowerment and leadership. 4 Female Engineers one each from Bangladesh, Laos, Nepal, and Sri Lanka participated in that workshop.

Female engineer recruited in Nepal Research and Education Network under BeLISAC project sharing her experience and knowledge at APAN55 event on 15 March 2023

BdREN Successfully Conducted 3 (Three) Months Female Internship Program Sponsored by TEIN under BeLISAC Project

Their journey with BdREN started on April 15, 2023 and ended up on July 19, 2023

Sadia
CSE, KUET

Rifat
CSE, Prime University

Lamia
CSE, KUET

Madhurjo
ECE, KUET

Joygun
CSE, KYAU

Research &
Development
Initiatives

Networking and
Transmission

Hands-on
Experience
gathered by
Female
Interns

Programming

BdREN's
Cutting-edge
Applications

Backup
and Storage

Proxmox
Virtualization
Environment

No. of Registrants		Registrants			Success		

No. of Registrants

Total 2,912
Male 2,468
Female 473

% of Completion

13%
87%

Incomplete　Complete

Registrants

	Male	Female
DLE-1	166	12
DLE-2	568	41
DLE-3	417	62
DLE-4	495	82
DLE-5	516	111
DLE-6	306	136

Success

	Male	Female
DLE-1	30	8
DLE-2	60	11
DLE-3	37	10
DLE-4	32	5
DLE-5	66	9
DLE-6	65	32

Male　Female

In the capacity development programs organized under fDLuDCf project, BdREN trained up 473 female trainees participated from around 16 countries.
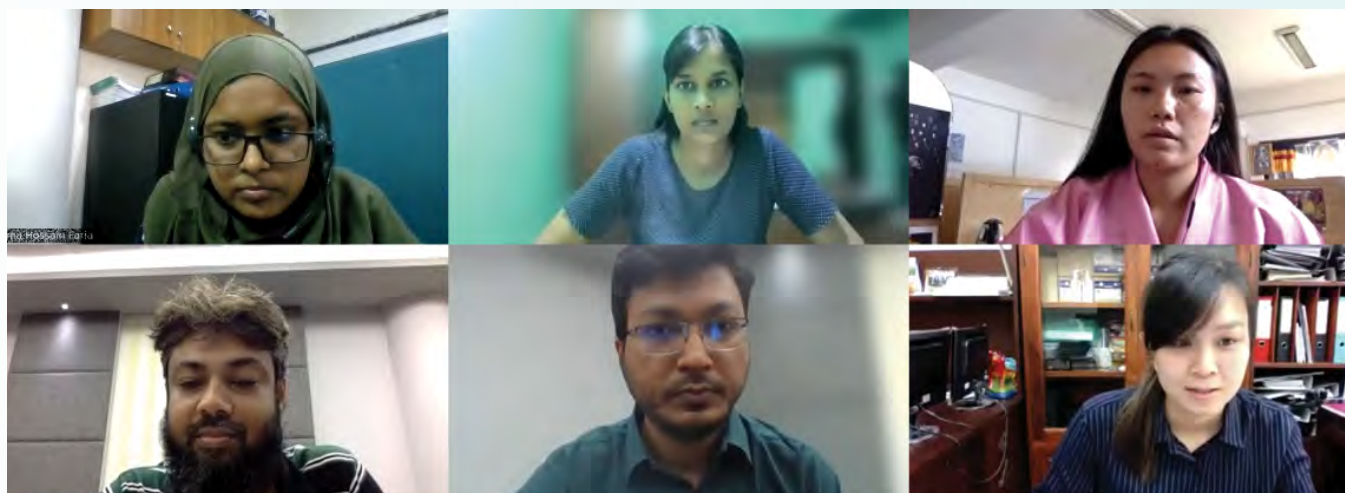
1 (One) year mentoring Program for 5 Female Engineers from different Asian countries under BeLISAC Project conducted by BdREN.

Women empowerment benefits not only women themselves but also the society as a whole. When women are empowered, they can contribute more effectively to the economic growth, poverty reduction, improved health outcomes, and social development. By promoting gender equality, empowering women, and challenging gender norms and biases, together we cherish to build a more inclusive, prosperous, and fair world for everyone.

BeLISAC Comprises

- 6 Countries
- 6 Servers
- Recruitment of Female Engineers
- Internship opportunities for female graduates
- Resource sharing
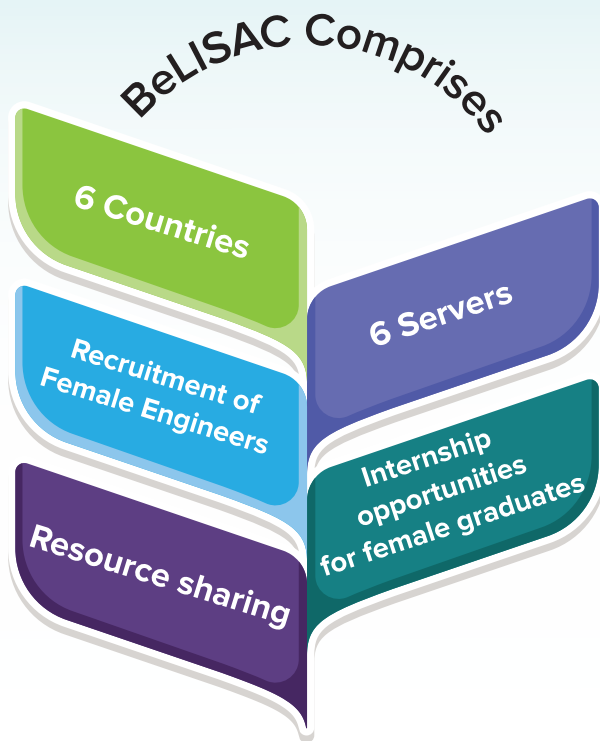
BdREN was awarded with a project named "facilitating Distance Learning using Digital Conferencing facility [fDLuD-Cf]" under CFP2 where NORDUnet was the technical advisor and Sri Lanka, Nepal, Bhutan, Philippines and Thailand were the beneficiary countries.

Jointly funded by Asi@connect, participating NRENs and NORDUnet, BeLISAC is the follow up project of the fDLuDCf project. It emphasizes on Distance Learning and diminishing gender inequality in the South and East Asian region.

ACHIEVEMENTS

1. **Increased Resilience through installation of computing equipment at Bangladesh, Bhutan, Nepal and Sri Lanka and allowing Laos and Cambodia to use that computing capacity.**

NREN
10% sharing
1 Server

DrukREN
1 Server

BdREN
20% sharing
2 Servers

LERNET
Use at least 10% of installed H/W

CamREN
Use at least 10% of installed H/W

LEARN
20% sharing
2 Servers

- Cost-sharing Beneficiaries with Infrastructure
- Beneficiary with Infrastructure
- Beneficiaries without Infrastructure
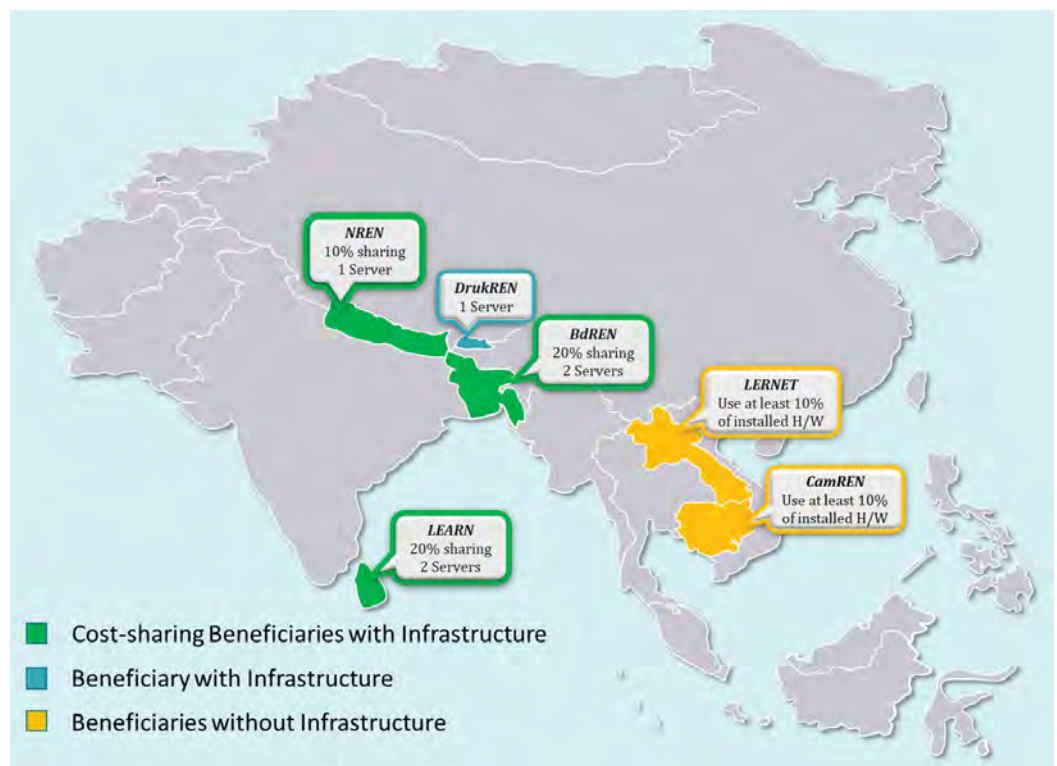
2. Women Empowerment under BeLISAC project

    a. Recruitment and Mentoring of female engineers.

    b. Capacity development of female interns.

3. Increased Collaboration among NRENs leading to NREN sustainability

Innovative Theme

Long-term Association and Strong Branding

Collaboration and Support

BdREN
DrukREN
LEARN
LERNET
NREN
ThaiREN

NORDUnet
Asi@Connect
World Bank, ADB
(in future)

Success Story
fDLuDCF
[Distance Learning DL]
BeLISAC Project
[DL and women Leadership/ Empowerment]

Magical Outcome

Sustainability of NRENs
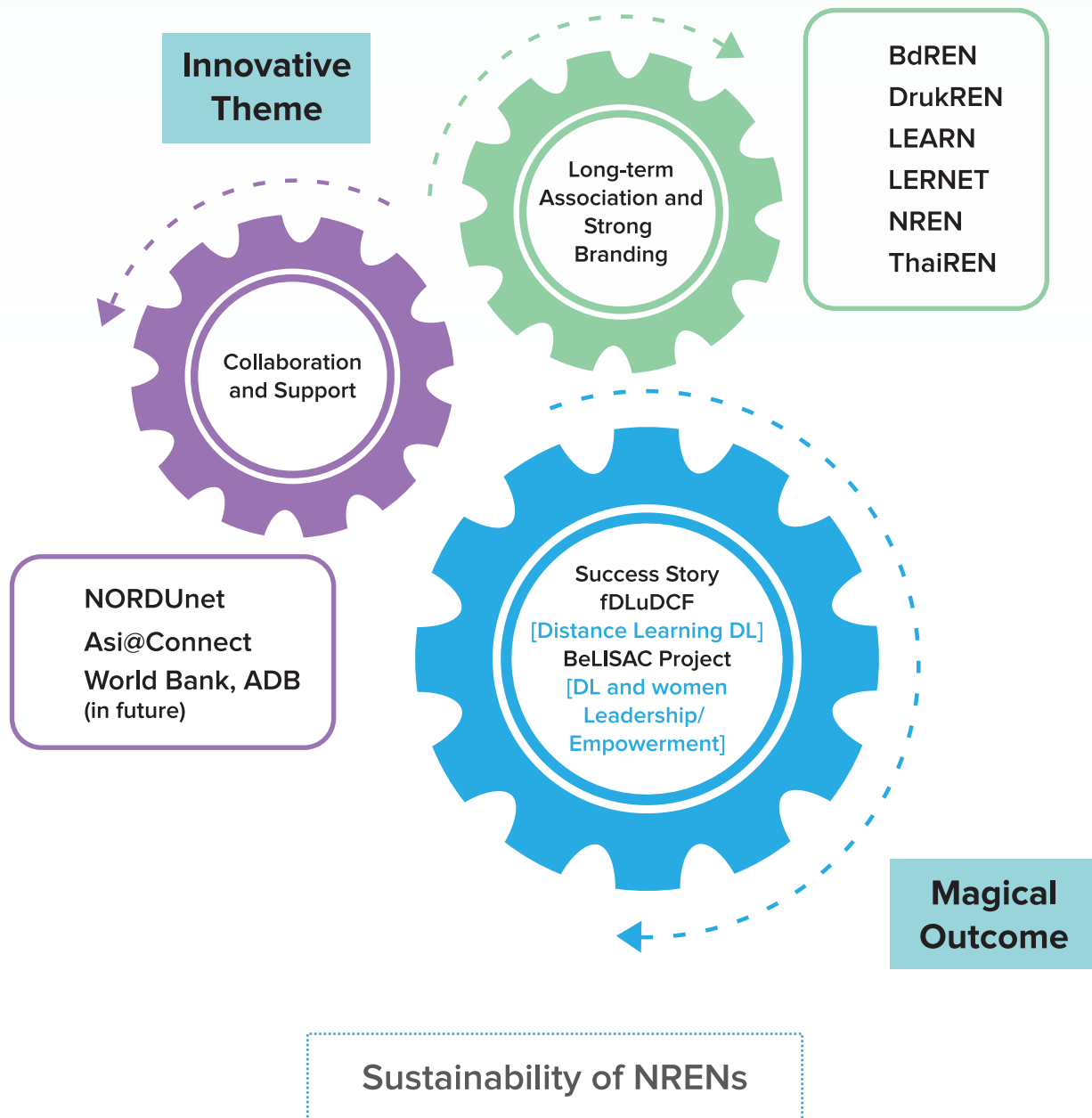
Connecting Voices: BdREN's VPLS Journey

BdREN had set its sights on enhancing communication between universities across the country. With the ambition to create a seamless and efficient telecommunication network, BdREN embarked on a ground-breaking initiative to provide IP Telephony Service to different universities using VPLS (Virtual Private LAN Service) technology.

In providing the IP telecommunication services to the universities VPLS, a technological marvel, emerged as the most befitting solution. This technology allows BdREN to create a virtual private network using its own MPLS backbone, connecting multiple universities as if they were all part of a single LAN (Local Area Network). The IP Telephony service leverages Voice over Internet Protocol (VoIP) technology, enabling its member universities to make phone calls using the internet instead of traditional phone lines. This digital transformation enhances communication efficiency, reduces costs, and provides advanced features such as call forwarding, conference calling, voicemail, and more. It reinforces BdREN's commitment to transforming educational institutions into smart campuses equipped with cutting-edge digital technology.

BdREN has a connectivity with one reputable IPTSP service provider of Bangladesh. At the BdREN data center, the aggregation link with the IPTSP service provider has been terminated. From this aggregation point, BdREN distributes this connectivity utilizing VPLS technology through its own MPLS backbone to the various universities.

This would enable direct voice communication between faculty members, researchers, and officials free of cost regardless of their physical locations. The service charge is very nominal compared to the service and quality it provides. BSMRAU and UGC are currently using this service, and several other universities are planning to do the same.

In the end, the story of BdREN's VPLS journey wasn't just about wires and routers; it was a tale of dreams sewn together, of voices connecting across space, and of a nation's commitment to education and progress. It would also serve as a reminder that innovation and collaboration can reshape not only how we communicate but also how we learn, inspire, and progress as a society.

The BdREN-implemented IP telephony service is performing just as we expected and as what we intended. Users of IP phones benefit from free telephonic conversations, face-to-face meetings with coworkers, extensive call management capabilities like call forwarding, voicemail, and call waiting, as well as crystal-clear voice communication. We also receive high-speed connectivity, resource sharing, access to international research networks, eduroam service, capacity building, and other services from BdREN in addition to IP phone.

Mohammed Akram Hossain
System Analyst, ICT Cell
Bangabandhu Sheikh Mujibur Rahman Agricultural University (BSMRAU)

Developing 500+ Security Professionals in Bangladesh: DASPiB

Under the targeted call for proposals initiated by Asi@Connect BdREN in collaboration with Daffodils International University submitted a proposal with the objective of developing a pool of cybersecurity professionals for ensuring security in the Cyberspace and to protect the country's application and data from potential hackers and intruders. The objective of the project also included Creating Cybersecurity Awareness and framing Recommendations for Cybersecurity Policy for National Research and Education Sector. The said proposal also contained creation of opportunities for a better Industry-Academy collaboration activity on Cybersecurity and preparing Industry Ready professional for SOC along with CERT / CSIRT around the country. The proposal was accepted by the Asi@Connect authority on 16 September 2022 and the kick-off program was held on 19 November 2022.

Achievements of the project so far

02 Courses Conducted

05 Regions across Bangladesh

86 Trainers Trained

300 Successful Trainees

Kick-off program on November 19, 2022 at DIU Ashulia Campus

Closing and Certificate giving ceremony for Chittagong region on May 18, 2023

Closing and Certificate giving ceremony for Dhaka region on June 11, 2023

Impacts

The creation of skilled cybersecurity professionals significantly bolstered the defense against digital threats.

The CyberSafe program improved cyber awareness among everyday internet users, enhancing their ability to safeguard their digital identities.

The trained professionals brought their knowledge to various organizations, strengthening institutional cyber defense mechanisms.

The project has considerably boosted the cybersecurity landscape of Bangladesh.

Partnership and Successful Collaboration: BdREN and Tsinghua University at APNIC ISIF Project

BdREN signed a contract with "Tsinghua University" under APNIC ISIF Project named "Developing a Collaborative BGP Routing Analysis and Diagnostic Platform" with the following scope of works:

In the fast-paced realm of technology, the most amazing ideas frequently come from teamwork. BdREN, as a dedicated entity for research and education networking, has consistently sought innovative collaborations that enhance the landscape of digital connectivity. One such notable collaboration was our involvement as a project partner in the APNIC ISIF Project, "Developing a Collaborative BGP Routing Analysis and Diagnostic Platform". This project, led by Tsinghua University, sought to develop the BGP Watch platform for better network analysis.

As a project partner, BdREN played a vital role in contributing to the project's success by providing important ideas and feedback to the project lead team. Through a sub-contract agreement with Tsinghua University, Beijing BdREN developed a "Technical Assistance Guide" for the BGP Watch portal which is available with the URL https://bgpwatch.cgtf.net .

BdREN's dedication and competence ensured the creation of comprehensive resources that would enable effective utilization of the BGP Watch platform. The documented manual and the video tutorial were well received in the Asia Pacific REN community and beyond. Highlighting our commitment to knowledge dissemination, BdREN proudly showcased its achievement by delivering a demonstration lecture at APAN55 in Nepal. This prestigious event provided an ideal platform to share insights, experiences, and the outcomes of our collaboration with a global audience of networking experts and enthusiasts.

Scope of works

1 To write the User Manual

2 To make the demonstration video

3 To deliver Demonstration Lecture at APAN55

4 To update User Manual and demonstration video

5 Recommending CompTIA Training Courses for the Engineers
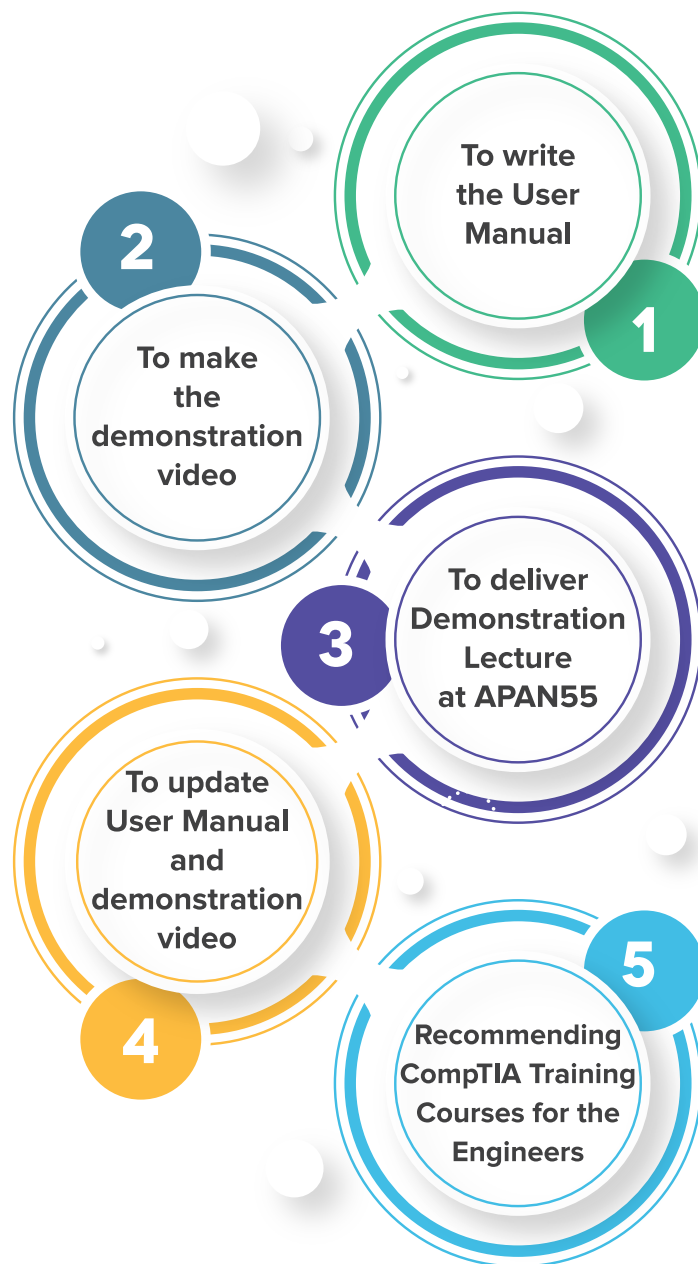
Delivering demonstration lecture on BGP Routing Analysis and Diagnostic Platform at APAN55 in Nepal by Md. Ariful Islam, Manager, BdREN in front of the Asia Pacific REN community on March 15, 2023.

After successful project demonstration, a grand social dinner enjoyed by BdREN team and Tsinghua University together on March 16, 2023.

To review on the project's progress reports and summaries, BdREN officials attended in the hybrid project meeting in Beijing, China at Tsinghua University. The topics of the meeting also focused on more detailed technical discussions, the work plans in the next few months, and DNSSEC training event by APNIC.

"

BdREN's collaboration with Tsinghua University on the creation of the BGP Watch manual and demonstration video has been instrumental to our project's success. These resources have proven to be invaluable assets, providing essential guidance and insights into BGP monitoring and security.

Additionally, BdREN's participation in investigating CompTIA training courses has been beneficial for NREN network operators. This initiative has helped enhance the skills and knowledge of network professionals, ultimately

Changqing An
Professor, Tsinghua University

contributing to improved network security.

Furthermore, BdREN's suggestions, such as the implementation of monthly/weekly summaries and hijacking alarm mechanisms to mitigate hijacking, have significantly enhanced the effectiveness of the BGP Watch Platform. Lastly, BdREN's participation in the APNIC ISIF Project Meeting at APAN55 and the BGP Watch demonstration by Md Ariful Islam (BdREN) were highly valuable contributions that showcased the project's capabilities and impact.

We sincerely appreciate BdREN's partnership and dedication to the success of these initiatives, and we look forward to continuing our collaboration in the future. "

Boosting HYBRID Learning Approach for Higher Education in Bangladesh: A Transformative Impact

BdREN has always been at the forefront in supporting the higher education sector. When the pandemic hit, BdREN swiftly responded to the urgent need for a reliable solution by providing 5,000 free Zoom licenses to the higher education community. Recognizing the growing demand, BdREN increased the number of licenses to 7,500 which was eventually scaled up to an impressive figures of 15,000 licenses. All of these licenses were "on-premise" meaning Zoom servers were installed on BdREN's Data Center. Students and teachers connect to BdREN Data Center and as a result, traffic of online classes remain within the country, which reduces latency and makes smooth virtual class environment.

The implication of BdREN's Zoom service has had a profound impact on the education sector, empowering learners paving the transition from traditional onsite teaching to online pedagogy. This shift was seamless, facilitated by Zoom's user-friendly interface, which resulted widespread acceptance and eliminated any resistance from member institutes.
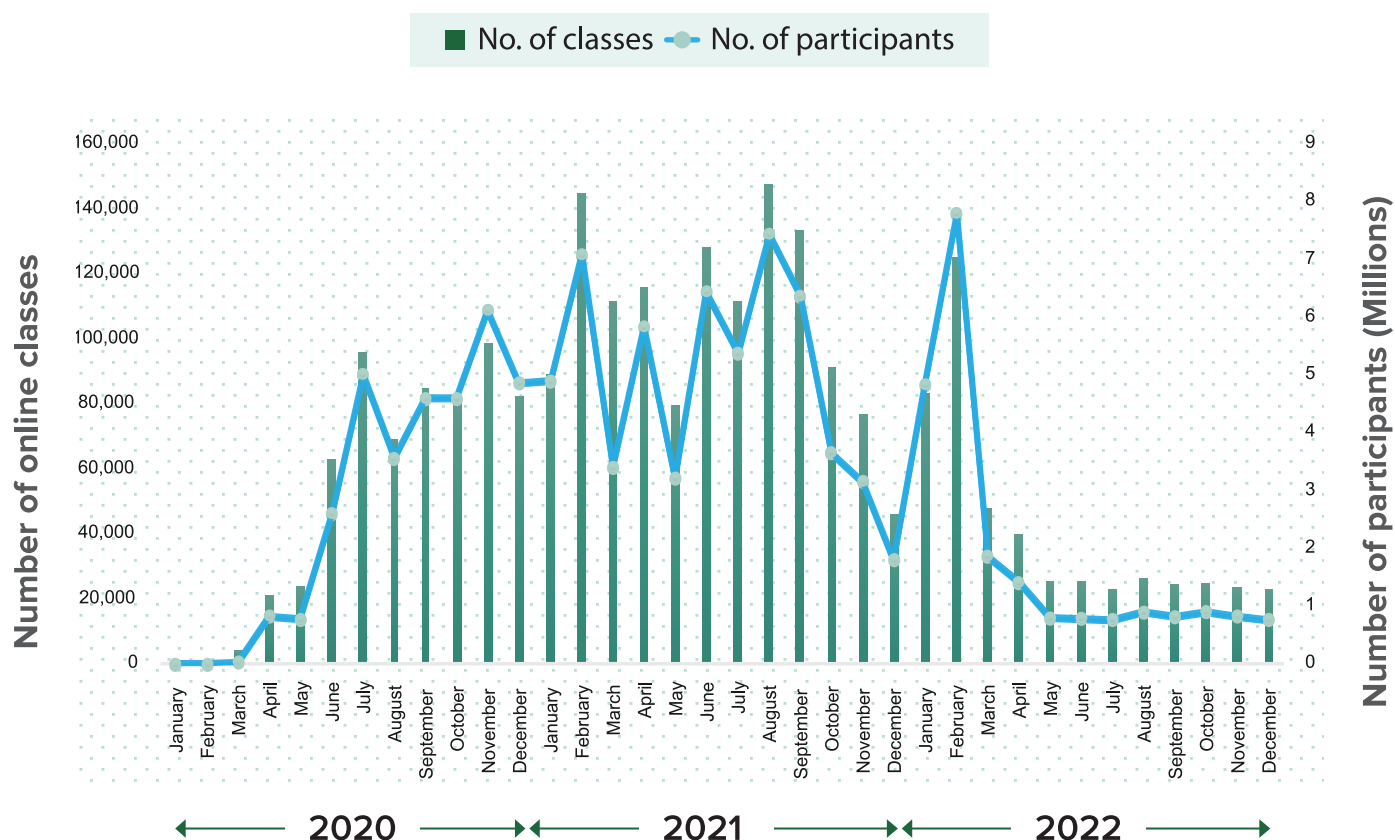
The graph shows the monthly statistics of number of classes and total participants in the associated month from the beginning of COVID-19 pandemic to December, 2022. This statistics clearly shows that still a significant number of classes are being conducted in online mode establishing the fact that "Hybrid Learning" is going to be the "New Normal". There is no doubt that we are better prepared than before in facing any future pandemic and it is undeniable that BdREN was the principal contributor in making this happen.

BdREN facilitates the framing of Blended Learning policies, incorporating Learning Management System applications and online assessment software, enabling institutions to enhance their instructional methods. By participating 80 million students and engaging over 25,000 faculty members from 120 universities, BdREN has made substantial progress towards achieving the United Nations' Sustainable Development Goals (SDGs).

Future education is HYBRID education. A significant number of onsite Courses/Programs which are possible, is going to be replaced by either "blended" education, if not by "fully online" mode of pedagogy. "Blended education" policy is being developed by the education ministry. In that respect the technology that BdREN is supporting at the moment is going to sustain in the long run.

VIDEO CONFERENCING STATISTICS
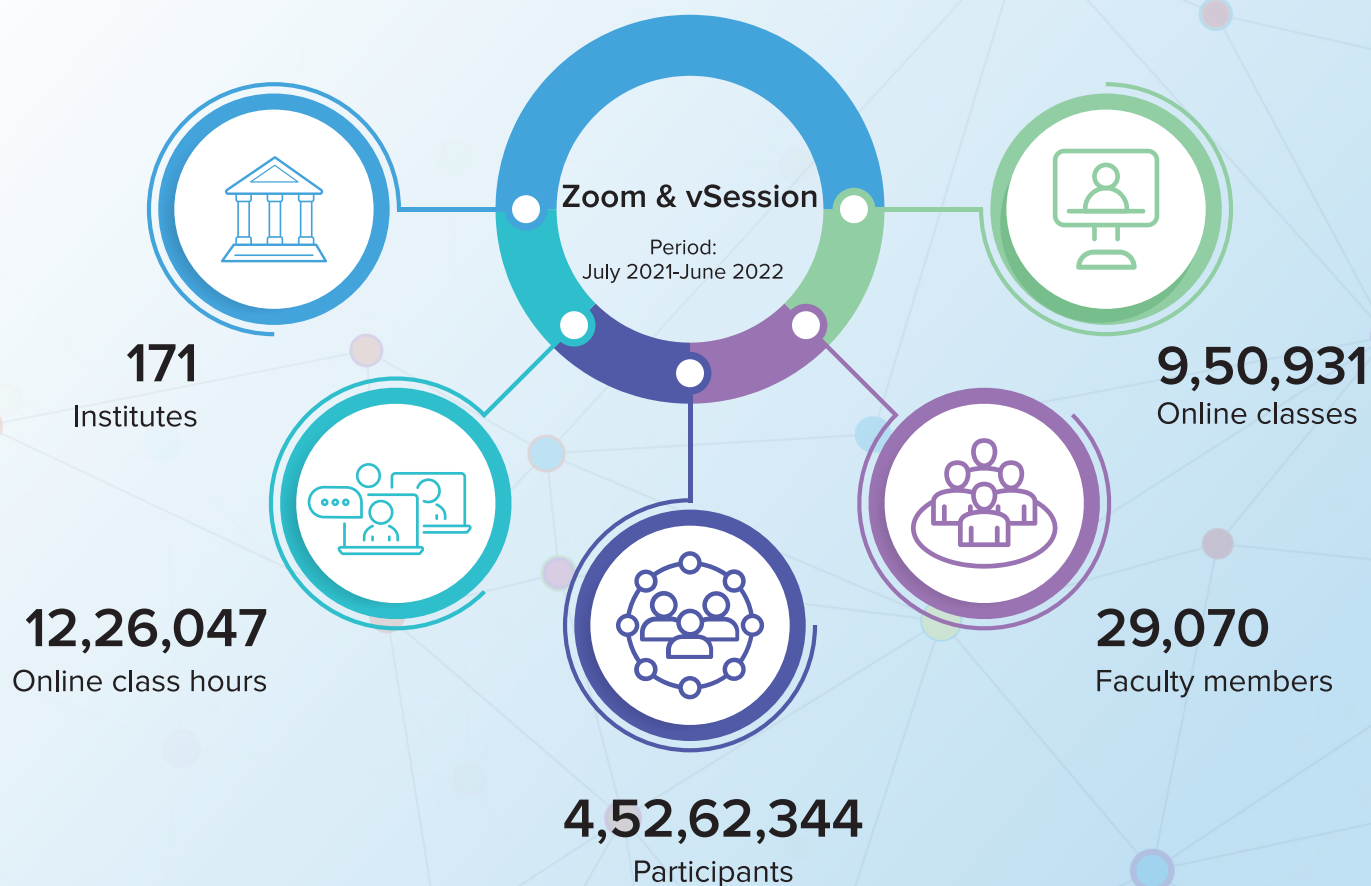
Zoom & vSession
Period:
July 2021-June 2022

171
Institutes

9,50,931
Online classes

12,26,047
Online class hours

29,070
Faculty members

4,52,62,344
Participants

In today's rapidly changing world, education must evolve. BdREN, dedicated to advancing higher education in Bangladesh, has empowered its member institutes through its Learning Management System (LMS) service.

BdREN's Zoom service facilitated a smooth shift from traditional to hybrid learning during the pandemic. With that transition of online education, it brought forward the requirement of establising a centralized platform of LMS for educators to create, manage, and deliver courses. Students can access coursework, engage in discussions, and submit assignments from anywhere, breaking down geographical barriers. Many institutes like DU, BUP, BSMRAAU, BeLISAC, IUS and BARC are using BdREN's LMS service currently.
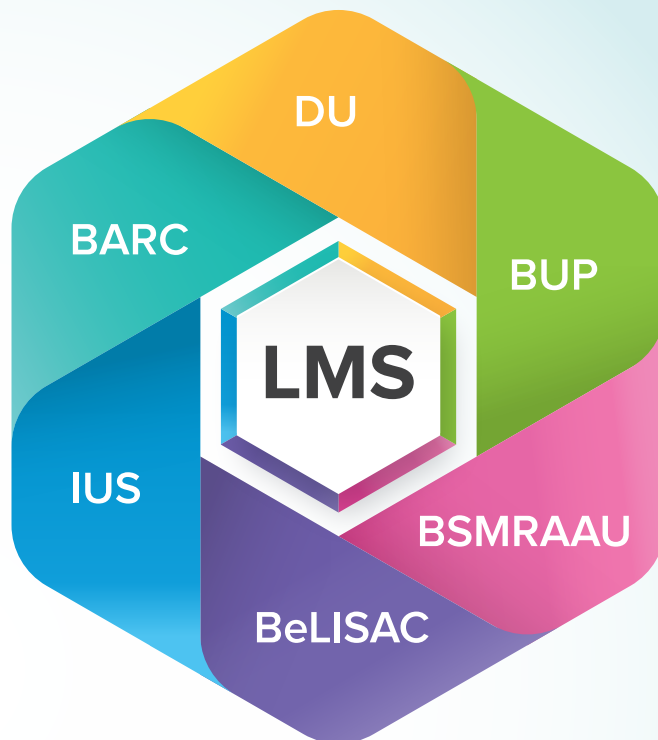
Recognizing the need for support, BdREN provided extensive training to its users. Both faculty members and students received training to navigate the LMS confidently as well as to enhance their teaching and learning experiences. BdREN LMS fosters collaborative learning through discussion forums, group projects, and virtual classrooms.

BdREN prioritizes data security while ensuring accessibility. Its cloud-based approach with mobile applications ensures users' easy and secured access. BdREN remains committed to expanding and improving its LMS service to meet evolving educational needs. We believe that blending tradition with technology will create a brighter educational landscape in Bangladesh. We look forward to shaping a better educational future in partnership with our member institutes. Together, we embrace the possibilities of tomorrow.

" *I want to express our heartfelt gratitude and appreciation to the Bangladesh Research and Education Network (BdREN) Trust for their outstanding work in deploying a Learning Management System (LMS) for our institution.*

Under a Memorandum of Understanding (MoU) signed on 01 October 2021, BdREN undertook the task of implementing an LMS for IER, University of Dhaka. The project was valued at BDT 10,00,000.00 (Ten Lac). BdREN's commitment to excellence and dedication to the project's success were evident throughout our collaboration. I would like to acknowledge that BdREN has not only completed the agreement task but has also gone above and beyond in ensuring its continued operation and maintenance until the contract completion on 31 December 2024, as per the agreement with IDRC, Canada (Grant No.109656-001) and IER, University of Dhaka.

Throughout this project, BdREN demonstrated exceptional professionalism and competence by conducting a thorough needs assessment to gain a deep understanding of our requirements and objectives. They proved their competence by designing an LMS solution that has significantly enhanced our teaching, learning, and administrative processes and extending the benefits of the LMS to forty high schools across four countries. They have also provided comprehensive training to our faculty and staff to ensure a seamless transition to the LMS and offering continuous technical support and assistance during the entire contract period.

We firmly believe that the LMS implemented by BdREN will continue to have a positive impact on our institution's academic environment, furthering our mission of providing quality education. We extend our best wishes for the future endeavors of the Bangladesh Research and Education Network (BdREN) Trust. Their continued efforts to develop and expand network infrastructure, services, and partnerships are commendable, and we are confident that they will continue to play a pivotal role in empowering the research and education community in Bangladesh. "

DR. MD. ABDUS SALAM

Professor of Education &
ICT Expert, GPE-KIX Project
Institute of Education and Research (IER)
University of Dhaka

Improving Administrative Efficiency with BdREN's eFile System

BdREN has developed a sophisticated yet easy to use eFile system enabling the rapid digital transition for our member institutes, which has a huge positive impact in streamlining administrative processes.

BUET has been utilizing BdREN's eFile System for over a year showcasing how this innovation can significantly enhance administrative efficiency. This achievement serves as a testament to the system's adaptability and its potential to benefit other universities. CUET piloted the system but later on moved to D-Nothi system offered by UGC.

eFile Key Benefits

- A Centralized repository for storing, managing, and retrieving documents securely.
- Documents approval without the need of getting them signed manually in many tables.
- Reduced Paperwork
- Quicker Document Retrieval
- Improved collaboration among staff members

BDREN conducted a workshop on e-filing system at BUET on August 06, 2022. Honorable Vice-Chancellor of BUET and CEO of BDREN were present there.

Contract Signing with BUET to implement e-filing system on June 17, 2023

"
The Institute of Information and Communication Technology (IICT) of Bangladesh University of Engineering and Technology (BUET) has been successfully using the eFile system developed by BdREN. The system has facilitated the activities within IICT. The other departments and offices of BUET are now in the process of using this e-Filing system.

Prof. Dr. Md Rubaiyat Hossain Mondal
Director, IICT, BUET

BdREN is committed to expanding the eFile System's adoption among its member institutes. We believe that modernizing administrative processes is pivotal in enhancing the overall efficiency and effectiveness of educational institutions. Although UGC's D-Nothi System is currently being promoted to the Universities, BdREN believes that eventually all the universities will switch to eFile system considering its availability, affordability and security.

TIGERfed

Identity and Access Federation

Unlocking Seamless Access: A new journey with Identity and Access Federation by TIGERfed, BdREN

A significant advancement is made through the implementation of the TIGERfed, the Identity Federation for Research and Education community in Bangladesh, operated by BdREN.

The TIGERfed is introduced to facilitate and simplify the modality of access to shared services across the Federation. This is accomplished by using Federation Technologies to extend the scope of a digital identity issued by one Federation Member to be valid across the whole Federation. The Federation relies on Home Organizations and Attribute Authorities to correctly and accurately assert information about the identity of End Users to Service Providers, that may use that information to grant (or deny) access to the services and resources they offer to End Users.

Presentation about Identity Federation at BUET on April 02, 2023 by CEO, BdREN

SIFULAN conducted successful Training Session at BdREN on IdP deployment from June 19 to June 22, 2023

A presentation session was organized at the Distance Learning Theater, IICT, BUET on ease and benefits of federated access thrusting particular focus on journal access using the power of federation.

It was revealed to the audience that BdREN has already established a federation titled "TIGERfed" and is able to integrate multiple "Service providers" (SPs) and "Identity Providers" (IdPs) to provide secured single-sign-on (SSO) facility and most notably ease of both "On-campus" and "Off-campus" access. It was also presented how the access to other services such as- Zoom, LMS and Cloud Storage can also be made available once BUET becomes part of the federation.

Muhammad Farhan Sjaugi, an experienced campaigner in federated services and eduroam technology, engaged in SIFU-LAN, a Malaysian Access Federation for higher educational and research institutes, recently visited Bangladesh to share his hands-on expertise and experience with BdREN Engineers and University professionals. The focus of the training was on implementing IdP-as-a-Service (IdPaaS) Application and associated framework.

Web Development

e-Compendium

NREN Maturity Calculator

eFile

Web/Email/DNS Hosting

Cloud Storage

IP Telephony

Campus Network

Domestic & International Consultancy

L2/L3 VPN

ERP Application

Event Broadcasting, Recording & Live Streaming

On-Prem Zoom

LMS

Certificate Verification

Smart Classroom

Internet Connectivity

File Sharing

High Performance Computing & Graphical Computing

Colocation

Content Delivery Network

Global Research Network

eduroam

Disaster Recovery

Financial Application

Backup

Workshop/ Training

eduGAIN

Services offered to our Valuable Members

- ● Connectivity
- ● Data Center
- ● Federation
- ● In-house Software
- ● Others

UPCOMING SERVICES

University Management System (UMS)

Application Load Balancing

Certificate Verification System

Virtual Desktop Infrastructure (VDI)

Federated Journal Access

BdREN Cloud

Total Resource Pool

1200 CPU Cores,
5.5 TB of Memory,
500 TB of Storage

BdREN has a high-performance computing Data Center, situated at UGC Bhaban and Disaster Recovery (DR) Center at IICT Building, BUET with a capacity of 1200 Core CPU, 5.5 TB Memory, 500 TB NVMe SSD Storage and 32 GB GPU. VMware, vSphere and KVM based Proxmox VE Virtualization platforms are deployed to provide Infrastructure as a Service (IaaS). To provide Data Loss Prevention (DLP), Commvault and Proxmox Backup Solutions are also installed at BdREN Data Center ensuring Full System Backup at every week and incremental backup at each day having a "Retention period" of one month.

Faculty Members and Researchers provide request for cloud services through
https://services.bdren.net.bd portal.

Month-on-Month Computing Resources Consumed by Researchers

Max CPU usage in GHz

Yearly max CPU usage 695 GHz — **2020-21**

Yearly max CPU usage 1599 GHz — **2021-22**

Month	2020-21	2021-22
July	389	985
August	234	1401
September	229	1339
October	339	1385
November	259	1396
December	410	1599
January	665	1581
February	679	1356
March	691	1548
April	689	1387
May	659	1327
June	695	1385

Max Memory usage in GB

Yearly max Memory usage 2,963 GB — **2020-21**

Yearly max Memory usage 4,669 GB — **2021-22**

Month	2020-21	2021-22
July	1928	2943
August	1516	3059
September	1476	2987
October	1801	3013
November	1638	2853
December	2107	4188
January	2854	4205
February	2897	4669
March	2935	4257
April	2903	4025
May	2806	3986
June	2963	4150

BdREN's Top Cloud Users

Published Paper: Strain Induced Thermoelectric Property Tunability of Single-Wall Carbon Nanotubes: A First-Principles Study

Authors: **Md. Mafizul Islam**, Ahmed Zubair

Publisher: IEEE

"I thank BdREN for providing the necessary computational facilities to conduct our research on theoretical modeling of electronic and thermoelectric materials. I appreciate the quick response of the BdREN team to solve any technical issue created in HPC system."

Md. Mafizul Islam
Assistant Professor
Dept. of Textile Machinery Design and Maintenance
Bangladesh University of Textiles

Published Paper: Halogenation as a Novel Scheme for Enhanced Photocatalytic Activity in AlSb Monolayer: A First-Principles Study,

Authors: Rifat Shahriar, Khondker Shihabul Hoque, and **Ahmed Zubair**

Impact Factor: 6.177, SCImago: Q1

"As a user of BdREN's HPC facility, I can say that BdREN enables researchers to handle complicated and computationally intensive scientific problems by providing access to HPC resources. BdREN's resources facilitate scientific discovery, data analytics, artificial intelligence, and simulations, propelling Bangladesh towards excellence in research and innovation. BdREN, as a non-profit trust organization, should enhance its HPC and network service facilities while maintaining the affordability of these facilities for academics and research institutions to meet its core values of sustainability, innovation, and creativity."

Dr. Ahmed Zubair
Associate Professor, Electrical and Electronic Engineering
Bangladesh University of Engineering and Technology (BUET)
Principal Investigator, Nanoscale Simulation, Characterization and Fabrication Lab

BdREN's Top Cloud Users

Published Paper: An ab initio DFT perspective on experimentally synthesized $CuBi_2O_4$

Authors: Dr. Imtiaz Ahmed, Quazi Shafayat Hossain

Impact Factor: 6.177, SCImago: Q1

BdREN has opened up a new horizon for cutting edge research endeavour by providing free access to high performance computing facilities. Indeed, their resources have transformed the way we do scientific research here in Bangladesh. I found their resource maintenance and troubleshooting capabilities to be outstanding. Hats off to BdREN!

Dr. Imtiaz Ahmed
Associate Professor
Department of Electrical and Electronic Engineering
Faculty of Engineering and Technology
University of Dhaka

BdREN has opened up a new horizon for cutting edge research endeavour by providing free access to high performance computing facilities. Indeed, their resources have transformed the way we do scientific research here in Bangladesh. I found their resource maintenance and troubleshooting capabilities to be outstanding. Hats off to BdREN!

Md. Ashraful Alam
Assistant Professor
Department of Physics
Mawlana Bhashani Science and Technology University (MBSTU)

BdREN Network

LEGEND

▬▬	40 Gigabit Ethernet	(icon)	Core Dist. Router
▬▬	TenGigabit Ethernet	(icon)	Regional Dist. Router
▬▬	Gigabit Ethernet	(icon)	
(icon)	Internet Router	(icon)	Edge Router
(icon)	BdREN Core Router	(icon)	Core Switch
(icon)	CE Router	(icon)	Bandwidth Manager
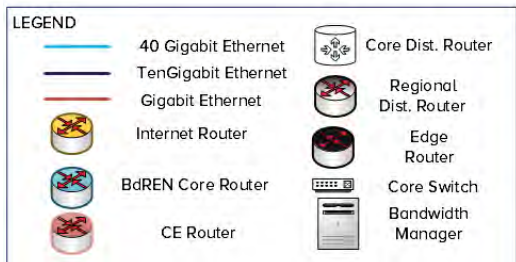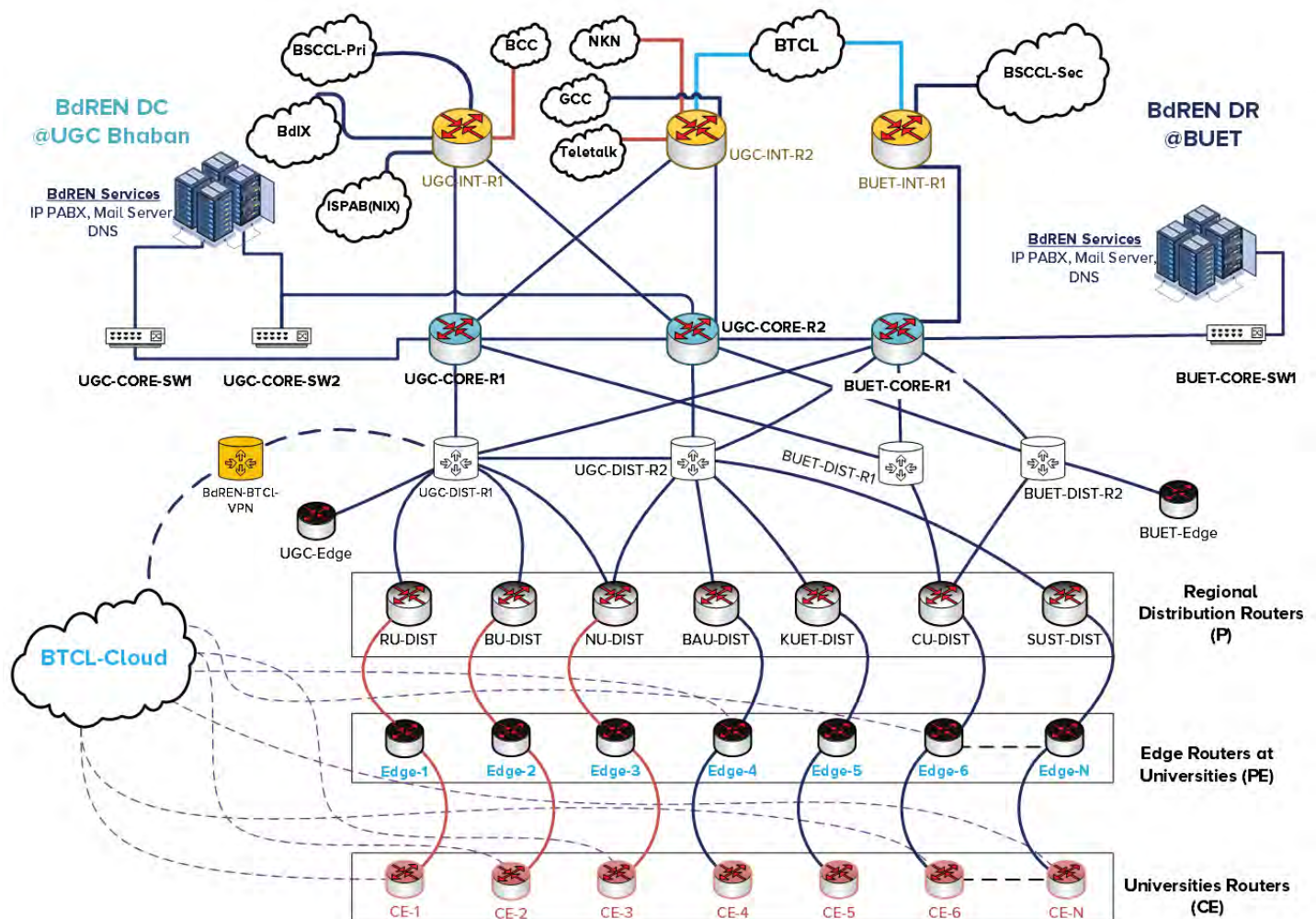
DWDM Transmission Backbone
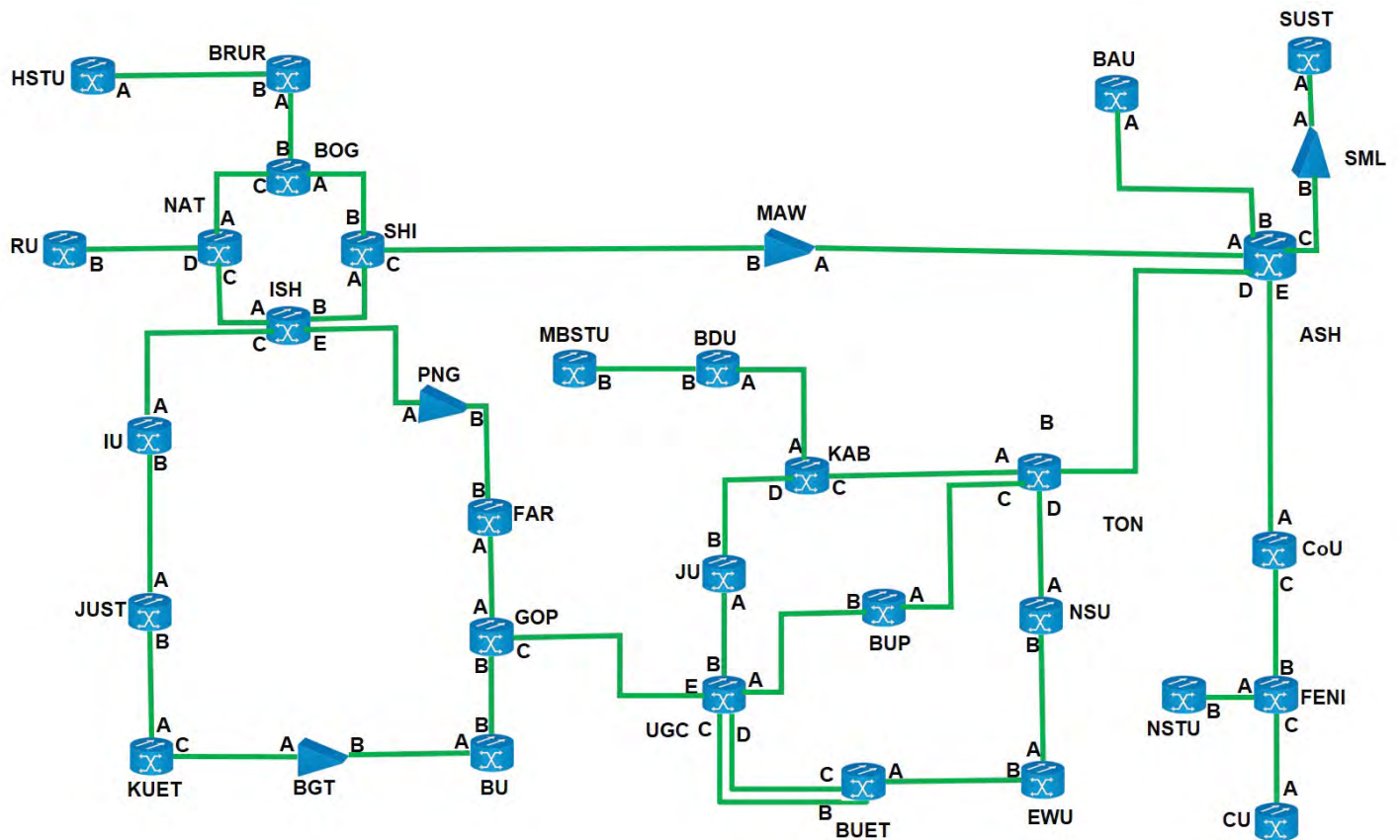
Legend

🔷 DWDM Node [30]

🔷 OLA DWDM Node [4]

──── DWDM 40 Lambda x 10G

Total DWDM Nodes = 34

Availability of BdREN Network
(with and without redundancy)

2020 - 21 | **2021 - 22**

2020 - 21		Month		2021 - 22
99.76%	◼	July	◼	99.72%
99.87%	◼	August	◼	99.79%
99.92%	◼	September	◼	99.78%
99.90%	◼	October	◼	99.77%
99.51%	◼	November	◼	99.85%
99.82%	◼	December	◼	99.66%
99.88%	◼	January	◼	99.88%
99.44%	◼	February	◼	99.75%
99.79%	◼	March	◼	88.83%
99.76%	◼	April	◼	99.81%
99.84%	◼	May	◼	99.95%
99.95%	◼	June	◼	99.84%

99% 0% 99%

Average yearly Availability 99.79% | **Average yearly Availability 99.80%**
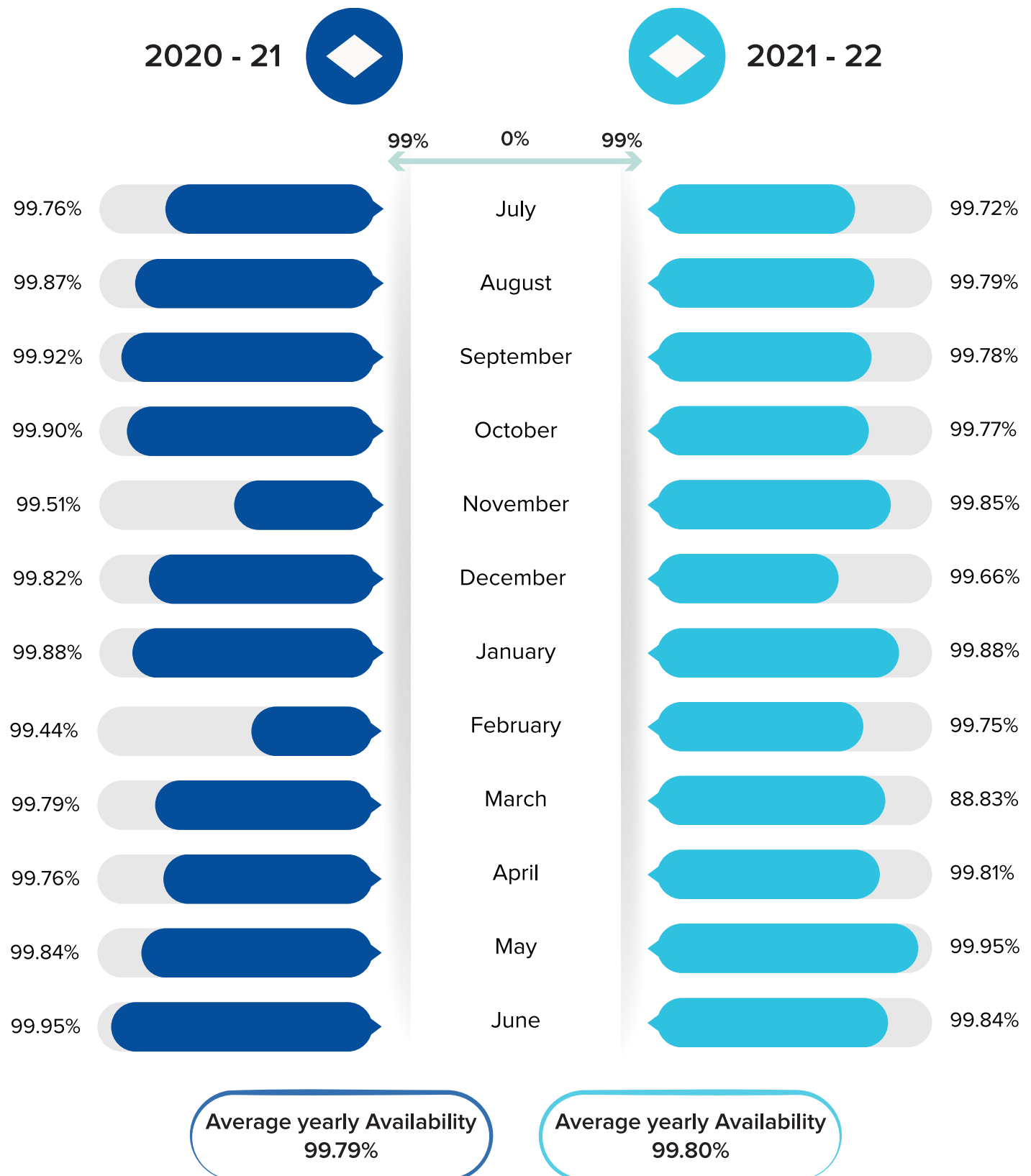
Institution-wise Availability
Under Different Bandwidth Category
(with redundancy)

1000 Mbps and above

Institution	Availability
BAU	99.76%
BUET	100.00%
CU	99.83%
CUET	99.83%
DU	100.00%
IU	99.96%
JU	100.00%
KUET	99.96%
PSTU	99.93%
RU	99.83%
RUET	99.89%
SUST	99.91%

300 Mbps - 599 Mbps

Institution	Availability
BDU	99.72%
BOU	99.60%
BRUR	99.78%
BSMMU	99.97%
BSMRSTU	99.46%
BUTex	99.76%
CoU	99.83%
CVASU	99.71%
HSTU	99.79%
JKKNIU	99.49%
KU	99.59%
MBSTU	100.00%
NSTU	99.11%
PUST	99.31%
SAU	99.70%
SBAU	100.00%

600 Mbps - 900 Mbps

Institution	Availability
BSMRAU	99.88%
BU	99.96%
BUP	99.94%
DUET	99.96%
JnU	99.09%
JUST	99.96%

Yearly total traffic volume of top Institutions whose Traffic Volume ≥ 1000 TB

Legend: ■ 2020-21 ■ 2021-22

Institution	2020-21	2021-22
DU	6337	4982
BUET	3232	4486
BAU	2085	3008
DIU	409	2577
RU	1675	2260
CU	1013	2234
CUET	911	2094
IU	397	1843
JU	1509	1491
RUET	344	1480
DUET	641	1205
PSTU	180	1079
CoU	604	1054
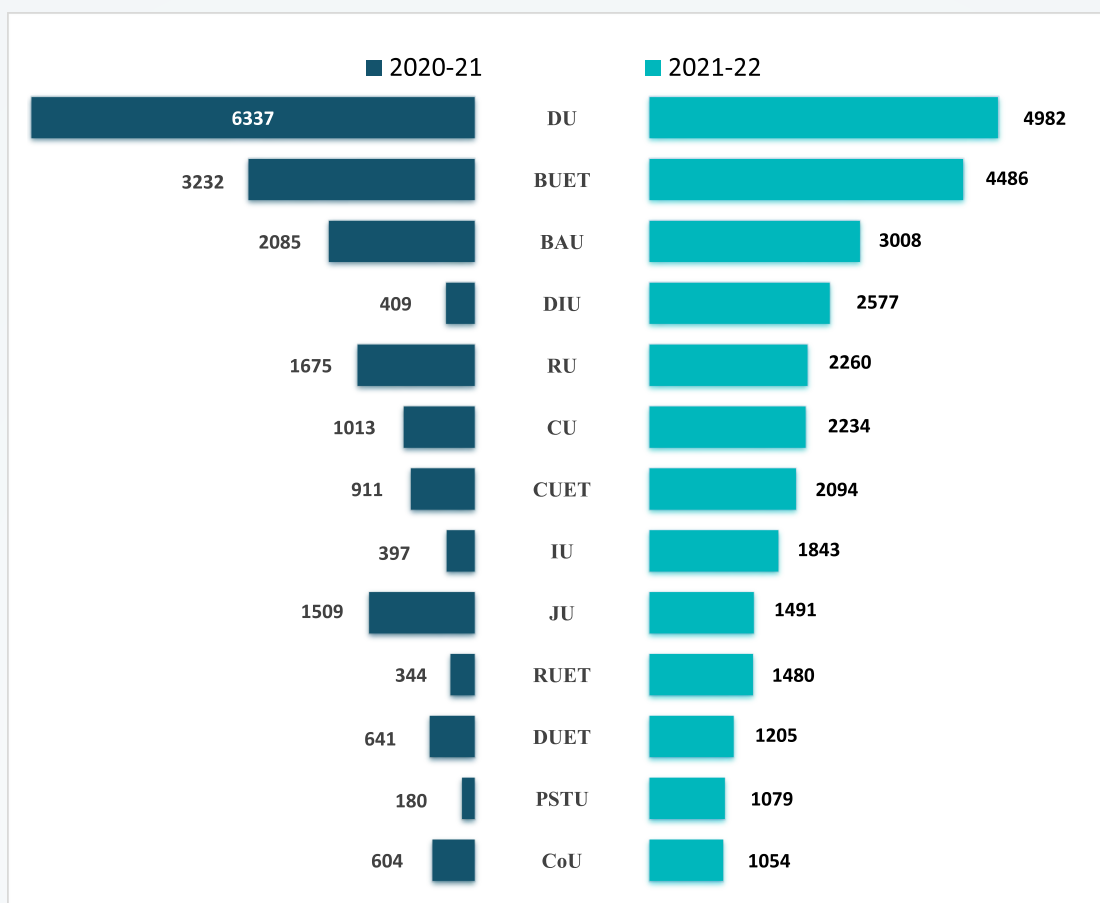
Upstream total traffic volume

Legend:
■ Traffic Volume in 2020-21, Grand Total: 44,558 TB
■ Traffic Volume in 2021-22, Grand Total: 74,459 TB

In TeraByte (TB)

Upstream	2020-21	2021-22
NKN	399	395
BTCL	18,302	38,346
Aamra	3,644	5,834
BdIX	11,479	12,284
AIX	1,295	1,212
GGC	8,797	15,058
BCC	642	1,330

←————— BdREN's Upstreams —————→
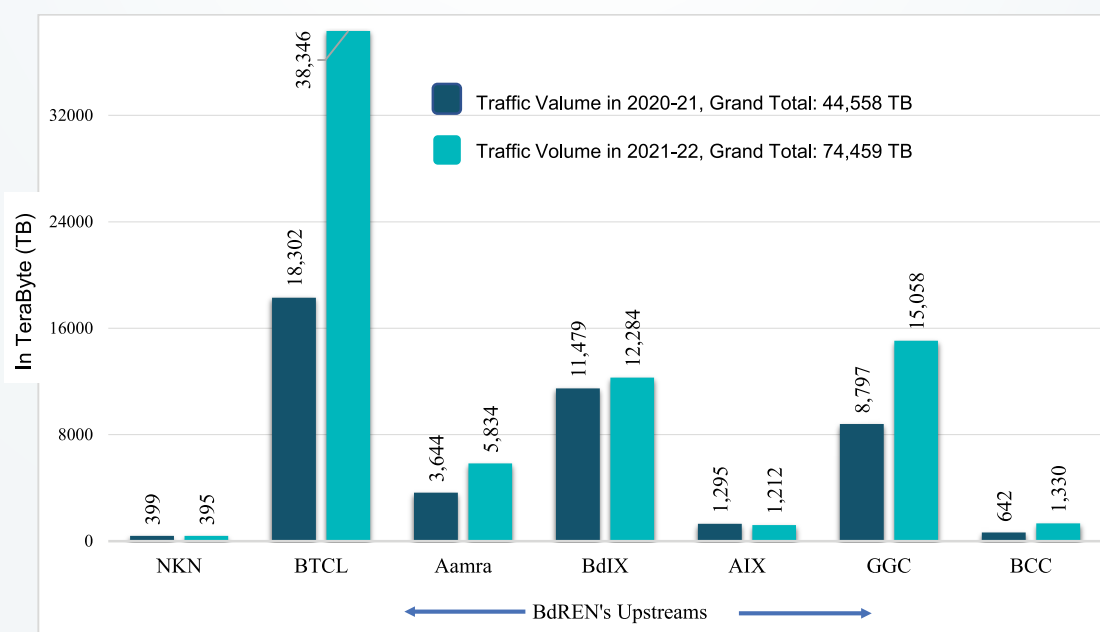
Strengthening Internet Facility at Students' Residential Halls under Campus Network

To overcome the interference and congestion of Wi-Fi signal in the densely populated students' residentials halls, BdREN has improved the Internet facility by establishing UTP (Unshielded Twisted Pair) to the room connectivity solution. Previously, students in the residential hall used to face slow Internet speed due to weak Wi-Fi signal and congestion problems. Currently, each room in the students' hall is connected by UTP cables having 1 (one) faceplate in each room. As of today, BdREN has implemented this UTP to the room connection in the following University's campus.

Patuakhali Science & Technology University (PSTU)
University of Barishal (BU)
Mawlana Bhashani Science and Technology University (MBSTU)
Khulna University of Engineering & Technology (KUET)
Chattogram Veterinary and Animal Sciences University (CVASU)

"

The campus network that has been established by BdREN deserves lot of acclaims, and most importantly, the way BdREN maintains the campus network has been improving day by day. It is appriciated that BdREN frequently arranges capacity development programs. In that note, I would request BdREN to focus more to upskill the capacity of the university professionals through those programs so that the latter can maintain the campus network by themselves.

Dr. SM Taohidul Islam
Professor and Chairman, EEE, PSTU

"

With the constant evolution of technology, it's vital that the campus network continues to adapt and grow to meet the ever-increasing demands of our digital age. Within a very short time, BdREN has established UTP to the room connection in our residential halls. This connectivity brings a huge impact on students' internet browsing experience and now they have no more complaints on Internet facility. I have my confidence in the BdREN team for their contribution in transforming Bangladesh into a land of innovation.

Rahat Hossain Faisal
Director, Networking and IT,
University of Barishal

OUR MEMBERS

PUBLIC UNIVERSITIES - 46

Bangladesh Agricultural University (BAU)

Bangabandhu Sheikh Mujibur Rahman Digital University (BDU)

Bangladesh Open University (BOU)

Begum Rokeya University, Rangpur (BRUR)

Bangabandhu Sheikh Mujibur Rahman Agricultural University (BSMRAU)

Bangabandhu Sheikh Mujibur Rahman Aviation and Aerospace University (BSMRAAU)

Bangabandhu Sheikh Mujibur Rahman Maritime University

Bangabandhu Sheikh Mujibur Rahman Science and Technology University (BSMRSTU)

Bangabandhu Sheikh Mujib Medical University (BSMMU)

Bangladesh University of Engineering and Technology (BUET)

Bangladesh University of Professionals (BUP)

Bangladesh University of Textiles (BUTex)

Comilla University (CoU)

Chittagong University of Engineering & Technology (CUET)

Chittagong Veterinary and Animal Sciences University (CVASU)

Chandpur Science and Technology University (CSTU)

Dhaka University of Engineering & Technology (DUET)

Habiganj Agricultural University (HAU)

Hajee Mohammad Danesh Science and Technology University (HSTU)

Islamic University (IU)

Islamic Arabic University (IAU)

Jahangirnagar University (JU)

Jagannath University (JnU)

Jashore University of Science and Technology (JUST)

Jatiya Kabi Kazi Nazrul Islam University (JKKNIU)

Khulna University (KU)

Khulna University of Engineering & Technology (KUET)

Khulna Agricultural University (KAU)

Military Institute of Science and Technology (MIST)

Mawlana Bhashani Science and Technology University (MBSTU)

Noakhali Science and
Technology University
(NSTU)

National University
(NU)

Pabna University
of Science and
Technology (PUST)

Patuakhali Science
and Technology
University (PSTU)

Rajshahi University
(RU)

Rangamati Science
and Technology
University (RMSTU)

Rabindra University,
Bangladesh (RBU)

Rajshahi University
of Engineering &
Technology (RUET)

Rajshahi Medical
University

Sheikh Hasina
University, Netrokona,
Bangladesh

Sher-e-Bangla
Agricultural University
(SBAU)

Sylhet Agricultural
University (SAU)

Shahjalal University of
Science & Technology
(SUST)

University of Dhaka
(DU)

University of
Chittagong (CU)

University of Barishal
(BU)

INTERNATIONAL UNIVERSITIES – 02

Asian University for
Women (AUW)

Islamic University of
Technology (IUT)

PRIVATE UNIVERSITIES – 55

Ahsanullah University of Science and Technology (AUST)

ASA University Bangladesh

Atish Dipankar University of Science and Technology

Asian University of Bangladesh (AUB)

Bangladesh Army University of Engineering and Technology (BAUET)

Bangladesh Army University of Science and Technology (BAUST)

BRAC University

Bangladesh Islamic University (BIU)

Bangladesh University of Business and Technology (BUBT)

Bangladesh University of Health Sciences (BUHS)

BGC Trust University Bangladesh

Canadian University of Bangladesh

Chittagong Independent University

City University

CCN University of Science and Technology

Dhaka International University (DIU)

Daffodil University

European University Bangladesh

East West University (EWU)

Eastern University (EU)

East Delta University

Exim Bank Agricultural University Bangladesh

Feni University

Green University of Bangladesh (GUB)

Gono Bishwabidyalay

Independent University, Bangladesh

International University of Business Agriculture and Technology (IUBAT)

International Islamic University Chittagong (IIUC)

International Standard University (ISU)

Leading University, Sylhet

Manarat International University (MIU)

North South University (NSU)

Notre Dame University Bangladesh

Northern University of Business and Technology, Khulna (NUBT)

North Western University (NWU)

Primeasia University

Premier University

Presidency University

Prime University

Port City International University

Ranada Prashad Saha University

Rabindra Maitree University

RTM Al-Kabir Technical University

Shanto-Mariam University of Creative Technology

State University of Bangladesh

Stamford University Bangladesh

Sonargaon University

United International University (UIU)

University of Liberal Arts (ULAB)

University of Information Technology and Sciences (UITS)

University of Asia Pacific (UAP)

University of South Asia

University of Science and Technology Chittagong (USTC)

University of Scholars

Varendra University

ZNRF University of Management Sciences (ZUMS)

Bangladesh
Agricultural Research
Institute (BARI)

Bangladesh
Academy for Rural
Development (BARD)

Bangladesh Agriculture
Research Council

Bangladesh Fisheries
Research Institute
(BFRI)

Bangladesh Institute
of Development
Studies (BIDS)

Bangladesh Institute
of Capital Market
(BICM)

Bangladesh Institute
Governance &
Management (BIGM)

Bangladesh Institute
of Management (BIM)

Bangladesh Institute
of Nuclear Agriculture
(BINA)

Bangladesh
Meteorological
Department (BMD)

Bangladesh Rice
Research Institute
(BRRI)

Bangladesh Livestock
Research Institute
(BLRI)

Institute of
Chartered Secretaries
of Bangladesh (ICSB)

International Centre
for Diarrhoeal Disease
Research, Bangladesh
(ICDDR,B)

National Institute of
Population Research
and Training (NIPORT)

National Institute of
Textile Engineering
and Research (NITER)

The Institute of Cost
and Management
Accountants of
Bangladesh (ICMAB)

MEDICAL COLLEGES – 12

Chittagong Medical
College

Dhaka Dental College

Dhaka Medical College

Faridpur Medical
College

Holy Family Red
Cresent Medical
College

Ibrahim Medical
College

Kumuduni Women's Medical College (KWMC)

North East Medical College

Sylhet MAG Osmani Medical College

Shaheed Suhrawardy Medical College, Dhaka

TMSS Medical College

US-Bangla Medical College & Hospital

OTHER INSTITUTIONS - 20

Bangladesh Academy for Securities Markets (BASM)

Bangladesh Securities and Exchange Commission (BSEC)

Cumilla Victoria Government College

Chandpur Government College

Dhamrai Govt. College

Eden Mohila College

Faridpur Engineering College

Govt. Ashek Mahmud College, Jamalpur
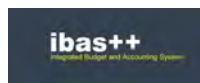
iBAS++, Finance Division

International VAT Training Institute

Lalmatia Mohila College

Local Government Engineering Department (LGED)

Mymensingh Engineering College

Military Institute of Science and Technology

National Institute of Ophthalmology & Hospital (NIOH)

Notre Dame College

Rajshahi Cantonment Public School & College

Savar Cantonment Public School and College

Shaikh Burhanuddin Post Graduate College, Dhaka

Sylhet Cadet College

We are a Family

With the spirit of unity and progress, BdREN has always cherished the idea of building and being part of larger academic and research family. Last year has been a testament to our commitment towards fostering collaboration and strengthening bonds with multiple public and private universities and other institutes across the country.

As part of our 'Academic-Family' program, BdREN regularly hosts 'Meet & Greet' program in different cities where we invite Faculty Members of the universities in those regions. We discuss openly like a family our strengths and shortcomings, our respective ambitions and areas of potential cooperation. Distinguished delegates including UGC Members and Vice-Chancellors guide us in these types of discussion.

'Meet & Greet' - Rajshahi on October 19, 2022

'Meet & Greet' - Dhaka
on August 09, 2022

'Meet & Greet' - Chittagong
on December 07, 2022

For the University students we arrange 'Industry Visit' programs where the young apprentices get insights in the much-needed areas of professional skill as well as life-skill as they get ready to enter into the highly competitive professional world soon. As part of mutual cooperation and knowledge sharing BdREN delegates also participate in different Conferences and Seminars arranged by universities on the topic of latest technologies and innovations.

Industry Visit - DUET students on October 09, 2023 at UGC Auditorium

Industry Visit - NITER students on August 23, 2023 at BdREN premise

International Conference on STEM and the 4th Industrial Revolution @Khulna University on July 01, 2022

BdREN - UGC Family

EVENTS
DURING THE YEAR

Meetings of Board of Trustees

BdREN is operated by Board of Trustees and the honorable members meet together whenever their assistance and guidance are solicited.

CME and BdREN signed an agreement for installing a Video Conference Room at CME on January 17, 2023

The signing ceremony of the agreement between 'Centre for Medical Education (CME)' and 'Bangladesh Research and Education Network (BdREN)' for installing a video conference room was held on January 17, 2023 at 01.00 pm at the CME office. Under this agreement, BdREN was slated to plan, install and manage a Video Conferencing Room at CME.

The event took off with the welcome speech from Prof. Dr. Syeda Shahina Subhan, Director, CME who shared her gratitude to BdREN for extending the latter's hand of cooperation. She also gave a warm welcome to the representatives from BdREN. Following her speech, Prof. Dr. Titu Miah, Honorable Director General of Directorate General of Medical Education (DGME) imparted his speech and acknowledged BdREN's contribution in providing digital services to the researchers and academics of the country. The DG and Director CME assured BdREN that they would advise the medical college authorities of the country to properly utilize BdREN facilities installed at their college premises.

Then, Mohammad Tawrit, the Chief Executive Officer of BdREN delivered his brief speech highlighting BdREN's effort for the government medical colleges across the country.

Video Conferencing Room at CME Implemented by BdREN

Prof. Dr. Syeda Shahina Subhan
Director, CME

"I am really excited to give review on BdREN's support to CME. So far, our experience on working with BdREN is wonderful. BdREN is a trustworthy organization on which one can rely upon when it is needed most. They are professional, committed and hard-working. We have worked together a lot in recent times as they have beautifully rebuilt our Video Conference Center at CME building at Mohakhali. We have plan to work in partnership in coming days. To my understanding, BdREN has been a key organization in digitalising country's higher education and research sector."

An MoU was signed between BdREN and Varendra University (VU), Rajshahi on November 09, 2022

In line with the MoU BdREN will build a dedicated underground fiber connectivity to VU new campus and will provide an Internet Bandwidth of 1Gbps with an availability of at least 99.95% on a monthly basis. Moreover, BdREN is going to provide Virtual Desktop Infrastructure and Virtual Private Servers for the students and the faculty members. Besides, BdREN will design and provide consultancy on framing of BoQ and assessing the budget requirement for Multimedia Classroom and Multipurpose Hall. CEO, BdREN also pledged to extend the consultancy support for VU in its campus network design and implementation if VU is in need of any such assistance. In pursuant to that commitment, CCTV policy and Wi-Fi policy for the campus were prepared by BdREN and were shared with VU.

This initiative was a part of BdREN's ongoing efforts to enhance unified communication infrastructure within academic environments. Under this contract, BdREN was scheduled to provide the IP Telephony service using its MPLS backbone along with supply of 500 Cisco IP phones. The IP Telephony service will leverage Voice over Internet Protocol (VoIP) technology, enabling BSMRAU to make phone calls using the internet instead of traditional phone lines. This digital transformation will enhance communication efficiency, reduce costs, and provide advanced features such as call forwarding, conference calling, voicemail, and more.

BdREN and BSMRAU Signed Contract for IP Telephony Service on June 07, 2023 at BSMRAU premises

BdREN Signs an Agreement with BSMRAAU for Building
Campus Network at its Lalmonirhat Campus on March 28, 2023

An agreement was signed between BdREN and BSMRAAU at the Registrar Office in its BSMRAAU Dhaka Campus. The agreement was signed by Honorable Registrar, BSMRAAU and CEO, BdREN from respective sides.

Under this agreement BdREN was assigned with the responsibility of building a state-of-the-art structured campus network in BSMRAAU Lalmonirhat campus. The network included both wired and wireless mode of connectivity, installation of Network for laboratory setup and installation of server room.

In line with the signed contract the 100Mbps internet connectivity in the Lalmonirhat campus is being delivered through VPN service established between BdREN and BSMRAAU through BTCL network.

Md Afzal Hossain, BUP,ndc,psc,PhD
Air Commodore (Retd)
Distinguished Professor
Director, ICT Cell (In - Charge)
BSMRAAU

I am amazed with the pace at which BdREN established the whole campus network in BSMRAAU's Lalmonirhat campus within a very short span of time in spite of having enormous limitations, like non-availability of electricity and sharing of working hours with multiple stake holders. It was beyond my expectation that such a mammoth hi tec work could be done in such a short time. In the active part of the campus network a number of imported equipment were listed for which the inherent lead time was more than three (3) months. BdREN supllied equipment from its own inventory to make the network up and running. Having said so, my suggestion goes like that: BdREN requires to be smarter in dealing with public procurement, compliance of various procurement rules and regulations, in particular. I wish every success and continued growth of BdREN in pursuit of its technical support towards enhancement of research and innovation capacity of universities under the University Grants Commission.

BdREN Signs an Agreement with BSMRSTU for
Maintenance of Campus Network at BSMRSTU on April 03, 2023

An agreement was signed between BdREN and BSMRSTU on 03 April 2023 at the Vice-Chancelor's Office in BSMRSTU, Gopalganj. The agreement was signed by Honorable Registrar, BSMRSTU and CEO, BdREN from respective sides.

Under this agreement BdREN has been assigned with the responsibility of maintaining the campus network built under G.74-AF package initiated under Higher Education Quality Enhancement Project (HEQEP). The maintenance package contains repair and replacement services of all the equipment and accessories delivered under the said package. Also under the contract one data technician is required to be employed in the BSMRSTU campus for providing full-time maintenance services.

Honorable Vice-Chancellor expressed his expectation that BdREN will deliver its services in strict compliance with the contract. He also unleashed his aspiration that BdREN might come up with additional work plan for betterment of the network even if it is not covered within the purview of the contract.

Installation and Administration of on-Prem Video Conferencing Platform under BeLISAC project at BdREN premise from January 08 to January 12, 2023

A Capacity Development Program on Installation and Administration of On-Prem Video Conferencing Platform was arranged by BdREN under Building e-Learning Infrastructure for South Asian Countries under TEIN (BeLISAC) project.

The duration of this program was from 8th to 12th January 2023. There were 10 participants in the event from different Universities who work in the ICT/IT/IICT departments. This hands-on program took place at BdREN Video Conferencing Room in the University Grants Commission of Bangladesh.

The trainers covered the topics of Virtualization and Cloud Computing, Proxmox as a virtualization platform, Deployment of Proxmox and its features in the first two days of this program. Then, in the last three days, the Installation and Administration of On-Prem Video Conferencing Platform were covered. There was a half-day recreational site-visit tour to the Bangladesh Liberation War Museum on 3rd Day of this event. After that, the participants enjoyed a social dinner event at The Pan Pacific Lounge Buffet, sponsored by BdREN.

Operation and Maintenance of DWDM under Asi@Connect Project at BdREN premise from Feb 05 to Feb 08, 2023

The training program was held in blended format to save the cost and to make sure that trainees get the maximum output from the program.

Virtual Training	Physical Training
8 classes 2 classes/ week 2 hours/ class	4 days (8 hours/ day) Mostly hands-on Held onsite in Dhaka
Total 54 Participants	**Total 20 Participants**

One from each of the 8 (eight) foreign countries who successfully completed the "VirtualTraining".

Twelve (12) from Bangladesh selected based on successful completion of the Virtual training and on basis of merit.

The successful candidates in both physical and virtual training were awarded with Digital Certificates on 08 February, 2023.

Operation and Maintenance of Mail and DNS Server

BdREN successfully arranged a training program on "Setting up Mail and DNS server with mail gateway." It was a 3 (three) days training program which commenced on 18 October and continued up to 20 October 2022. The hands on training program was organized at the UGC Auditorium. The trainers, were selected from BdREN and its member institutions:

- Jamilur Rahman, Network Engineer, BdREN.
- Md. Mahedi Hasan, Network Engineer, ICT Cell, University of Dhaka.
- Mahadi Hasan Tultul, Assistant Hardware Engineer, ICT Cell, Sylhet Agricultural University.

Twenty (20) participants from different Public and Private Universities attended the training.

After the successful completion of this 3 (three) days training program, the participants were awarded with certificates. The certificates are verifiable through a printed QR code stamped on them.

The following five (5) top-standing participants received enticing gadgets from BdREN.

1. Nasim Ahmed (Network Engineer, CVASU)
2. Rakib Ahmed (Network Engineer, SBAU)
3. Abdullah Al Noman (Server Administrator, DIU)
4. Nilay Mitra (Assistant Network Engineer, KUET)
5. Dilip Kumar Dhar (Assistant Director, EU)

BdREN's Chief Administrative and Finance Officer(CAFO) distributed the certificates and exclusive rewards to the participants in the closing ceremony. The participants expressed their satisfaction with the training program but were bit disappointed with the duration of the training which to their view was not sufficient enough.

Another fruitful training program named Workshop on eduroam for NRENs Campus Network (WENCN) under Asi@Connect was arranged by Patuakhali Science and Technology University (PSTU) in joint collaboration with BdREN. The program was held from **21st to 24th October, 2022** at Bangladesh Development Society (BDS) Conference Hall, Barishal.

At present, eduroam service is being extensively used by the users of universities. Without eduroam service, the users (faculty members, researchers, students and staffs) of the universities might be affected regarding execution of their research, education and academic activities because they will be deprived of single campus feeling. So, it is very important to enhance the skill of network personnel about eduroam to ensure the hassle-free internet service for the users. The target of the "Capacity Development for Implementing eduroam in NRENs (CDIEN)" project was to train the network personnel who are engaged in providing eduroam service. The workshop was organized in blended mode (onsite and virtual).

Instructors and 42 onsite local participants attended physically and participants from 9 Asi@Connect beneficiary countries (Afghanistan, Bangladesh, Bhutan, Cambodia, Nepal, Pakistan, Philippines, Sri Lanka, and Thailand) joined remotely through video conferencing.

The 4-days training course included all the major topics of eduroam configuration and its operation. The participants learnt configuring eduroam (IRS and NRS) through the hands-on exercises. The training program was followed by an Evaluation program to choose the successful candidates who were awarded with the certificates.

Without the help of BdREN, It was impossible to accomplish the project's goal and success. BdREN's instructors and their experience made this project more constructive and impactful. The participants received hands-on training on all aspects of campus-wide eduroam services (NRS configuration, IRS Configuration, User Authentication, etc.,). I hope, this kind of collaboration will continue in future.

Chinmay Bepery
Professor, PSTU and
Principal Investigator, WENCN Project

Industrial Visit of CSE Department of NITER at BdREN Data Center on August 23, 2023

In an endeavor to foster practical learning experiences and bridge the gap between academia and industry, students from the Department of Computer Science and Engineering at the National Institute of Textile Engineering and Research (NITER) undertook a comprehensive industrial visit at BdREN. Divided into two groups, the visit spanned across two days, each filled with insightful sessions and hands-on learning opportunities.

Objectives of the Visit

- Network and system administration
- Knowledge Platform implementation
- Network monitoring and the operations of BdREN Network
- Data Center acquaintance
- Professional Experience
- Bridging the Skills gap

Study Tour at BdREN Data Center by the Final Year Students of Department of CSE, KUET on November 05, 2022

Internship of CUET Students at BdREN

Three final-year students from the Department of CSE, Chittagong University of Engineering and Technology (CUET) successfully completed their internship at BdREN. The duration of the internship program was **2 weeks** commencing from **October 24, 2022.**

At the end of the internship, the students managed to design and develop two small-scale web applications using Django Framework.

Annual Excursion

Annual picnic at Dream Square Resort on February 10, 2023

Friendly cricket match on January 07, 2023 at
Shaheed Zayan Chowdhury Playground, Banani

BdREN vs Spectrum Engineering Consortium Ltd.

BdREN Vice-Chairperson's Induction meeting with BdREN Team

Professor Dr. Muhammed Alamgir, a distinguished member of the University Grants Commission of Bangladesh, was assigned with the responsibility of the Vice Chairperson of BdREN Trust on **13 June, 2023.**

On his appointment the honorable professor decided to meet BdREN officials to get himself introduced to the BdREN team and to unleash his expectation from the team.

The meeting served as a platform for Professor Dr. Muhammed Alamgir to familiarize himself with the current activities and present status of BdREN. Mohammad Tawrit, the Chief Executive Officer of BdREN, delivered an insightful PowerPoint Presentation, providing an overview of BdREN's structure, services, financial status, goals and strategies. In the process, a detail SWOT analysis of BdREN was made which was placed before the audience.

HELPING ACHIEVING GLOBAL SUSTAINABLE DEVELOPMENT GOALS (SDG)

04 QUALITY EDUCATION

By 2030, ensure equal access for all women and men to affordable and quality technical, vocational and tertiary education, including university

In Mar 20-May 21 period 80 million students attended classes on BdREN Zoom Platform

By 2030, substantially increasing the supply of qualified teachers, including through international cooperation for teacher training in developing countries, especially least developed countries and small island developing states

More than 25,000 faculty members from 120 universities were updated with the latest technology and participated in the distance learning program using BdREN Zoom Platform

05 GENDER EQUALITY

End all forms of discrimination against all women and girls everywhere

Both male and female students squarely participated in the virtual classes

- Enhance the use of enabling technology, in particular information and communications technology, to promote the empowerment of women

Recruitment of Female Engineers and their visit to Reykjavik, Iceland was a demonstration of women empowerment and leadership. In addition, 120 person-months of female internship was organised under BeLISAC project across 5 countries

08 DECENT WORK AND ECONOMIC GROWTH
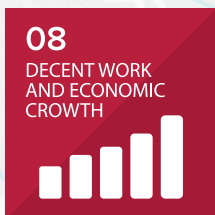
Sustain per capita economic growth in accordance with national circumstances and, in particular, at least 7 per cent gross domestic product growth per annum in the least developed countries

continuation of higher education during the pandemic contributed to the GDP growth.

- Achieve higher levels of economic productivity through diversification, technological upgrading and innovation, including through a focus on high-value added and labour-intensive sectors

Innovation in the form of development of Zoom scheduler software by BdREN software team and configuration of Zoom Licenses in BdREN Data Center by BdREN Network Engineers in consultation with Sri Lanka's Network Engineers highly contributed in achieving this SDG objective.

- Promote development-oriented policies that support productive activities, decent job creation, entrepreneurship, creativity and innovation, and encourage the formalization and growth of micro-, small- and medium-sized enterprises, including through access to financial services

A huge retrenchment, specially in terms of the faculty members of private universities could be avoided with introduction of virtual classes; and BdREN Zoom Platform was the chief contributor in making it happen.

09
INDUSTRY, INNOVATION AND INFRASTRUCTURE

Develop quality, reliable, sustainable and resilient infrastructure, including regional and trans border infrastructure, to support economic development and human well-being, with a focus on affordable and equitable access for all

The infrastructure that was developed truly found to be reliable, sustainable and resilient. BdREN infrastructure was shared with Nepal REN which is an example of transborder infrastructure sharing. Moreover, meetings created in the BdREN data center were used by Laos faculty members. The trainees in the capacity development program and relevant experts in the webinars had been from many different countries.

- By 2030, upgrade infrastructure and retrofit industries to make them sustainable, with increased resource-use efficiency and greater adoption of clean and environmentally sound technologies and industrial processes, with all countries taking action in accordance with their respective capabilities

Special focus has been given to develop regional infrastructure [in four South-Asian countries] and the technology is clean and environmentally sound

Significantly increase access to information and communications technology and strive to provide universal and affordable access to the Internet in least developed countries by 2020

Affordable internet was ensured by convincing the telecom operators to provide either free of cost [Teletalk] or very low cost [Other Operators] Zoom Services. To be mentioned that in Sri Lanka it was totally free of cost from all operators and we were imbued by the benevolence of Sri Lanka telecom operators

10
REDUCED INEQUALITIES

- Ensure enhanced representation and voice for developing countries in decision-making in global international economic and financial institutions in order to deliver more effective, credible, accountable and legitimate institutions

The virtual delivery of lectures could boost the confidence of both the policy makers and the academia to stand tall in the international community

Encourage official development assistance and financial flows, including foreign direct investment, to States where the need is greatest, in particular least developed countries, African countries, small island developing States and landlocked developing countries, in accordance with their national plans and programmes

Asi@Connect Financing in the fDLuDCf project was to the tune of 196K Euros and in the BeLISAC project it was 149K Euros.
NORDUnet Financing in both the fDLuDCf and BeLISAC project for Zoom Licensing at market value was 11.16m USD [for Bangladesh 5.4m USD] and in the BeLISAC project the direct investment for women resource development and empowerment was 66K Euros.

17 PARTNERSHIPS FORTHE GOALS

Technology

- Enhance North-South, South-South and triangular regional and international cooperation on and access to science, technology and innovation and enhance knowledge sharing on mutually agreed terms, including through improved coordination among existing mechanisms, in particular at the United Nations level, and through a global technology facilitation mechanism

NORDUnet's technological assistance was a symbol of North-South international cooperation and the South-South regional cooperation happened in the form of knowledge sharing among beneficiary countries.

Finance

- Strengthen domestic resource mobilization, including through international support to developing countries, to improve domestic capacity for tax and other revenue collection

Domestic resource mobilisation happened in the form of development of Telecom and ISP network in remotest part of the country to support the burgeoning traffic generated due to the proliferation of use of Internet.

Capacity building

- Enhance international support for implementing effective and targeted capacity-building in developing countries to support national plans to implement all the sustainable development goals, including through North-South, South-South and triangular cooperation

International Capacity development programs were there both onsite and online participated by a total of 3244 participants from 16 different countries combinedly under fDLuDCf and BeLISAC projects.

BdREN ACCOUNTS

FINANCIAL SNAPSHOT
(FY 2021-22)

BDT 2420.56 million

Total Asset

=

BDT 2370.52 million
(Equity 98%)

Trust Fund

BDT 50.04 million
(Debt 2%)

External Liabilities

Total Revenue
BDT 218.35 million

Depreciation and Amortization
BDT 181.00 million

Total Expense
BDT 341.11 million
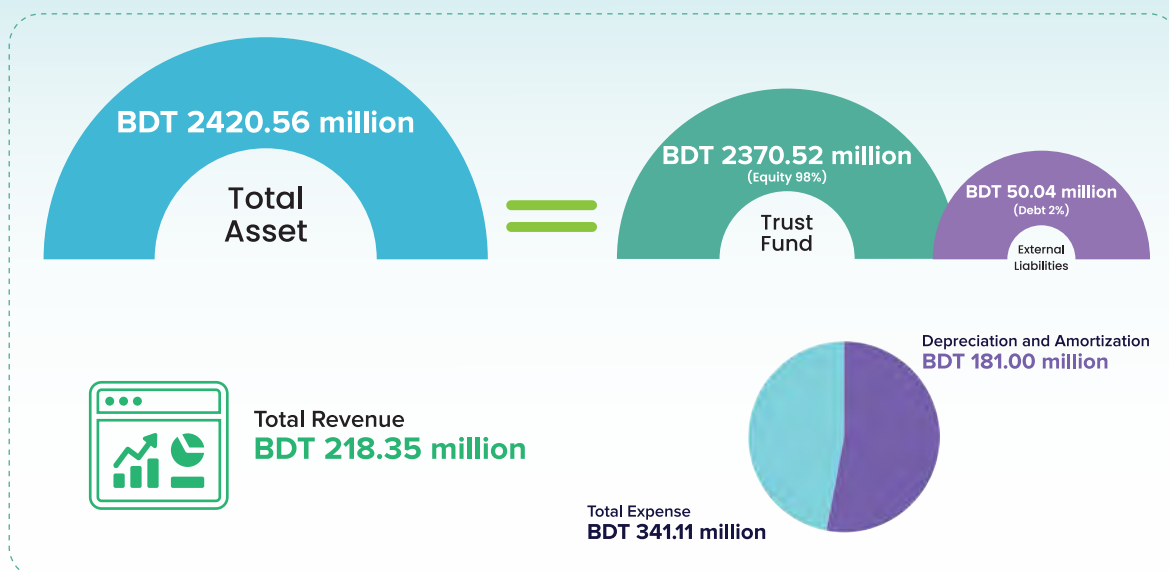
REVENUE

Our overall revenue for FY 2021-2022 of BDT 218.35 million represented an increase of 24.55 million (13%) compared with FY 2020-2021. The major heads of revenue were Bandwidth Service Revenue (BDT 122.56 million), Annual Membership Fee (BDT 5.02 million) other Operating Income BDT 23.27 million and Non-Operating Income BDT 67.50 million).

Breakdown of Revenue

122.56 million (56%)
Bandwidth fee

5.02 million (2%)
Membership subscription

23.27 million (11%)
Other income

67.50 million (31%)
Non-operating income
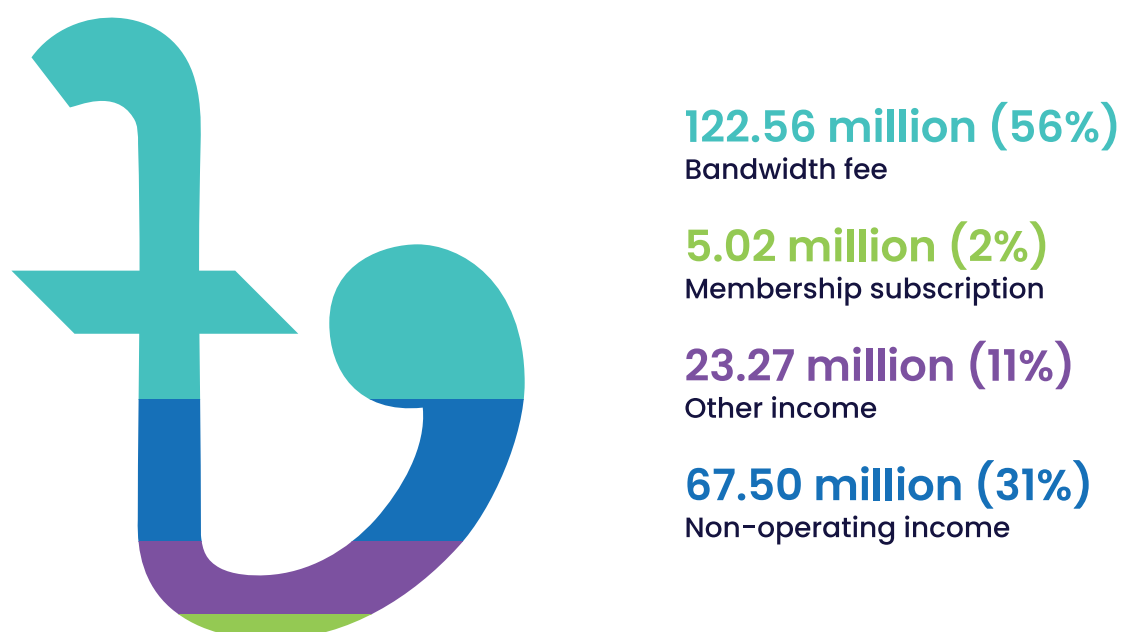
EXPENSES

The total expense of BdREN for FY 2021-2022 was BDT 341.11 million, an increase of BDT 14.74 million (4.52%) compared to FY 2020-2021. The major cost heads were Network Operational Expense (BDT 48.37 million), Network Maintenance Expense (BDT 59.14 million), General & Administrative Expense (BDT 40.87 million), Depreciation and Amortization Expense (BDT 181.00 million) and Non-operating Expense (BDT 0.80 million).

Breakdown of Expenses

0.80 million (0.23%)
Non - operating expense

40.87 million (12%)
General & administrative expense

59.14 million (18%)
Network maintenance expense

48.37 million (14%)
Network operational expense

181.00 million (53%)
Depreciation and amortization expense

10.93 million (2.77%)
Project expense
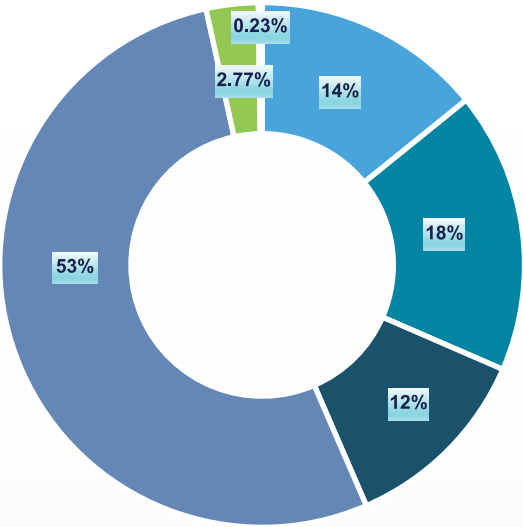
Total Expense

BDT 341.11 million

STATMENT OF COMPREHENSIVE INCOME

Total Income during this financial year 2021-2022 was found to be BDT 218.35 million and total Expense was BDT 341.11 million. Total income increased by 13% whereas total Expense increased by 4.52%. The expense is highly influenced by depreciation and amortization expense which contributed mostly in causing operating loss. As BdREN is constantly using the generated cash flow in replacing the outdated and depreciated equipment, the depreciation cost is not a major concern.

Operating Revenue
BDT 150.85m

Operating Expense
BDT 148.38m

[Except Depreciation & Amortization and Project expense]

Total Revenue
BDT 218.35m

Total Expense
BDT 341.11m

Considering Depreciation & Amortization and Project expense]
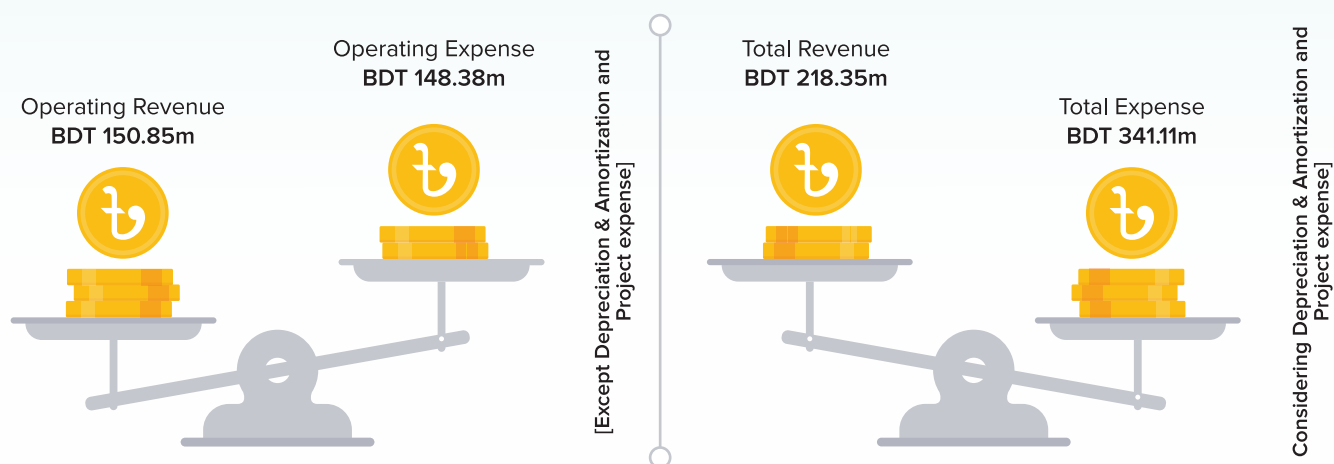
Operating and Non-operating Income

Total income includes BDT 150.85m Operating Income and BDT 67.50m Non-Operating Income.

69% **Operating Income**

Non-Operating Income 31%

ANALYSIS OF FINANCIAL STATEMENTS

Quick Ratio: 0.94

Current ratio: 2.35

Working Capital: BDT 1,144 million

Debt to Equity Ratio 0.98

Asset
50%
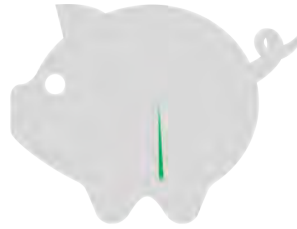
Liability
1%

Trust Fund
49%

STATEMENT OF CASH FLOW

BdREN Trust follows standard and best practices for cash and fund management. It manages its cash separately for operating activities, investment activities and financing activities.

Waterfall chart — Statement of Cash Flow

- 01.07.2022: 24.52m
- CF - Operating: 18.85m (Increase)
- CF - Investing: (31.67)m (Decrease)
- CF - Financing: (6.93)m (Decrease)
- 30.06.2023: 4.77m

Legend: Increase / Decrease — Amount in BDT
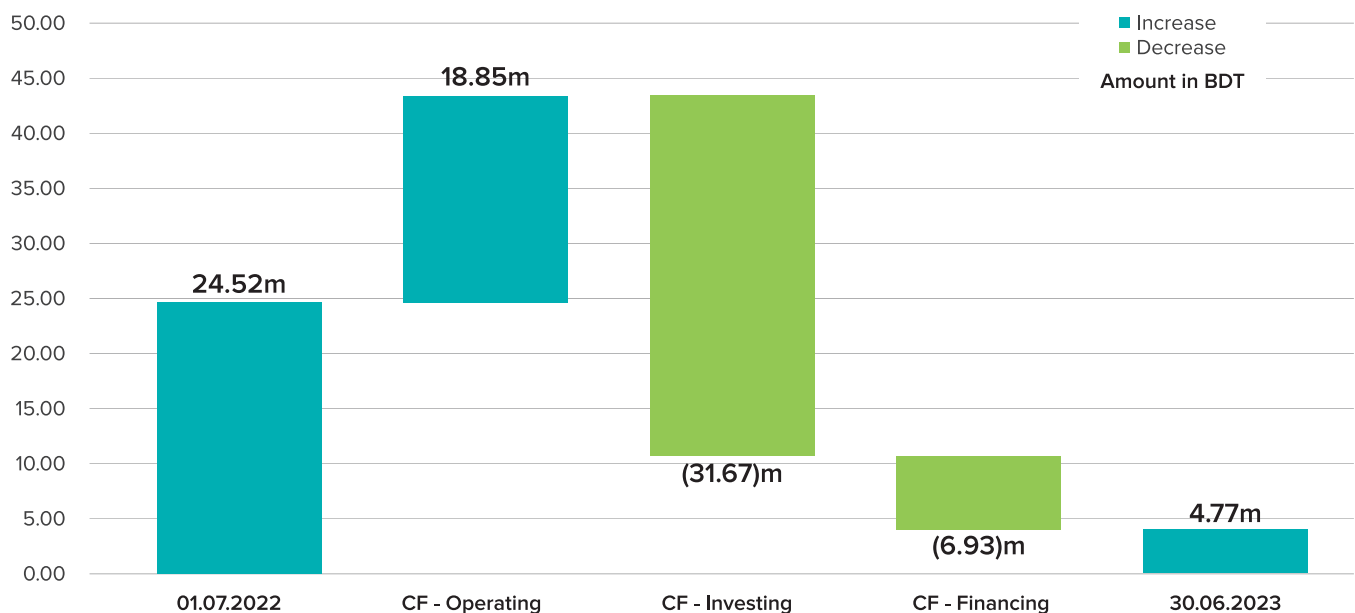
CHANGES IN EQUITY

BdREN's Financial achievement in FY 2021-2022 is demonstrated with an increase in its Accumulated Surplus of BDT 48.24 million and the percentage being 23%

ACCUMULATED SURPLUS

2018 - 2019
BDT 109.00m

2019 - 2020
BDT 174.00m

2020 - 2021
BDT 206.96m

2021 - 2022
BDT 255.20m
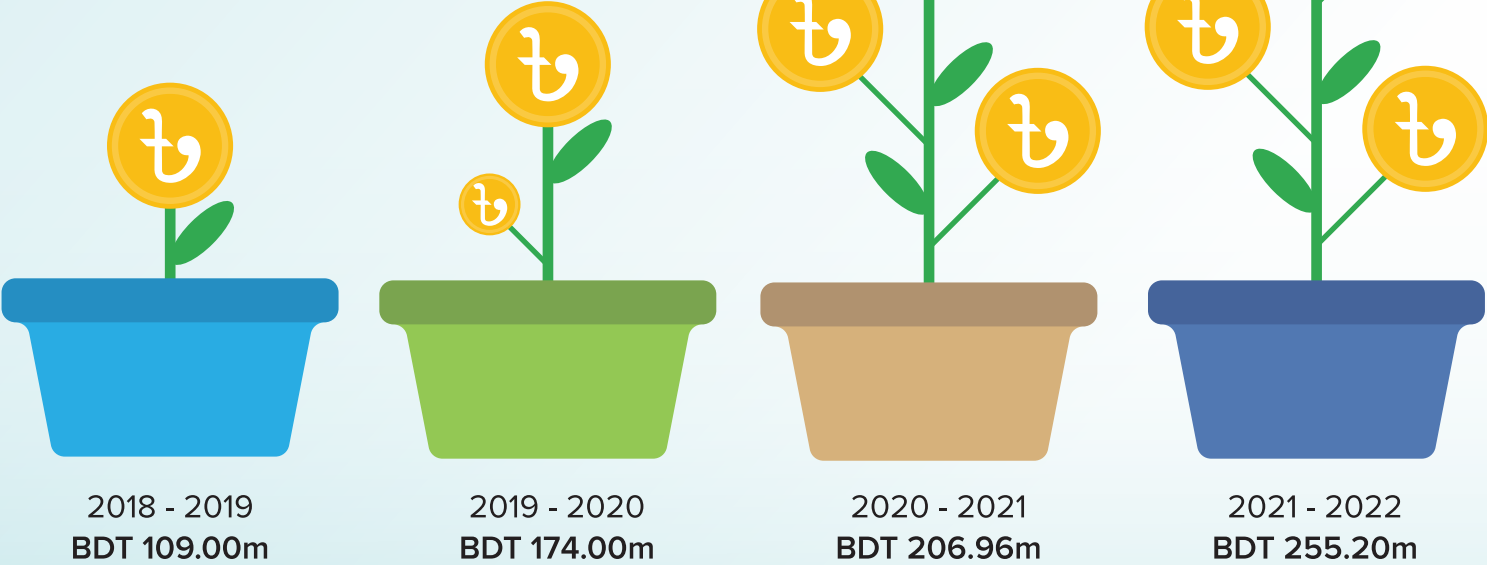
AUDIT REPORT

FY 2021-22

Independent Auditor's Report
&
Audited Financial Statements
Of

*Bangladesh Research & Education Network
(BdREN) Trust*

Plot: E-18/A, UGC Bhaban, Agargaon Administrative Area,
Sher-e-Bangla Nagar, Dhaka

For the year ended June 30, 2022

Independent Auditor's Report to the Board of Trustees
Of
Bangladesh Research & Education Network (BdREN) Trust

Report on the Audit of the Financial Statements

Opinion

We have audited the financial statements of *Bangladesh Research & Education Network (BdREN) Trust* (**"The Trust"**) which comprise the statement of financial position as at June 30, 2022, and the statement of profit or loss and comprehensive income, statement of changes in trust fund and statement of cash flows for the year then ended, and notes to the financial statements, including a summary of significant accounting policies.

In our opinion, the accompanying financial statements give a true and fair view, in all material respects of the financial position of the Trust as at June 30, 2022, and of its financial performance and its cash flows for the year then ended and comply with the requirement of Trust act 1882, International Financial Reporting Standards (IFRSs), and other applicable laws and regulations.

Basis for Opinion

We conducted our audit in accordance with International Standards on Auditing (ISAs). Our responsibilities under those standards are further described in the Auditor's Responsibilities for the Audit of the Financial Statements section of our report. We are independent of the Trust in accordance with the International Ethical Standards Board for Accountant's code of Ethics for Professional Accountants (IESBA Code) together with the ethical requirements that are relevant to our audit of the financial statements in jurisdictions, and we have fulfilled our other ethical responsibilities in accordance with the IESBA Code. We believe that the audit evidence we have obtained is sufficient and appropriate to provide a basis for our opinion.

Responsibilities of Management and Those Charged with Governance for the Financial Statements

Management is responsible for the preparation of financial statements that give a true and fair view in accordance with (IFRSs) and comply with the Trust Act, 1882 and other applicable laws and regulations for such internal control as management determines is necessary to enable the preparation of financial statements that are free from material misstatement, whether due to fraud or error. In preparing the financial statements, management is responsible for assessing the Trust's ability to continue as a going concern, disclosing, as applicable, matters related to going concern and using the going concern basis of accounting unless management either intends to liquidate the Trust or to cease operations, or has no realistic alternative but to do so.

Those charged with governance are responsible for overseeing the Trust's financial reporting process.

Auditor's Responsibilities for the Audit of the Financial Statements

Our objectives are to obtain reasonable assurance about whether the financial statements as a whole are free from material misstatement, whether due to fraud or error, and to issue an auditor's report that includes our opinion. Reasonable assurance is a high level of assurance, but is not a guarantee that an audit conducted in accordance with ISAs will always detect a material misstatement when it exists. Misstatements can arise from fraud or error and are considered material if, individually or in the aggregate, they could reasonably be expected to influence the economic decisions of users taken on the basis of these financial statements.

As part of an audit in accordance with ISAs, we exercise professional judgment and maintain professional skepticism throughout the audit. We also:

❖ Identify and assess the risks of material misstatement of the financial statements, whether due to fraud or error, design and perform audit procedures responsive to those risks, and obtain audit evidence that is sufficient and appropriate to provide a basis for our opinion. The risk of not detecting a material misstatement resulting from fraud is higher than for one resulting from error, as fraud may involve collusion, forgery, intentional omissions, misrepresentations, or the override of internal control.

❖ Obtain an understanding of internal control relevant to the audit in order to design audit procedures that are appropriate in the circumstances, but not for the purpose of expressing an opinion on the effectiveness of the Trust's internal control.

❖ Evaluate the appropriateness of accounting policies used and the reasonableness of accounting estimates and related disclosures made by management.

❖ Conclude on the appropriateness of management's use of the going concern basis of accounting and, based on the audit evidence obtained, whether a material uncertainty exists related to events or conditions that may cast significant doubt on the Trust's ability to continue as a going concern. If we conclude that a material uncertainty exists, we are required to draw attention in our auditor's report to the related disclosures in the financial statements or, if such disclosures are inadequate, to modify our opinion. Our conclusions are based on the audit evidence obtained up to the date of our auditor's report. However, future events or conditions may cause the Trust to cease to continue as a going concern.

❖ Evaluate the overall presentation, structure and content of the financial statements, including the disclosures, and whether the financial statements represent the underlying transactions and events in a manner that achieves fair presentation.

We communicate with those charged with governance regarding, among other matters, the planned scope and timing of the audit and significant audit findings, including any significant deficiencies in internal control that we identify during our audit.

Report on Other Legal and Regulatory Requirements

In accordance with the Trust Act 1882, we also report the following:

a) we have obtained all the information and explanations which to the best of our knowledge and belief were necessary for the purposes of our audit and made due verification thereof;

b) in our opinion, proper books of account as required by the law have been kept by the Trust so far as it appeared from our examination of those books; and

c) the statement of financial position and statement of profit or loss and other comprehensive income dealt with by the report are in agreement with the books of accounts;

Md. Musfiqur Rahman FCA
Partner
Enrollment No:1023
For and on behalf of,
Mollah Quadir Yusuf & Co.
Chartered Accountants

November 07, 2022
Dhaka

DVC: 2211131023AS899223

Bangladesh Research & Education Network (BdREN) Trust

Plot: E-18/A, UGC Bhaban, Agargaon Administrative Area, Sher-e-Bangla Nagar, Dhaka
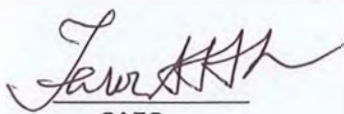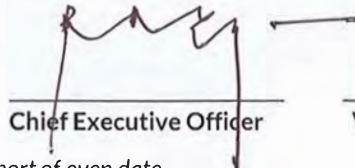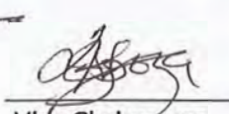
Statement of Financial Position

As at June 30, 2022

Amounts in Taka	Notes	June 30, 2022	June 30, 2021
ASSETS			
Non-Current Assets	3	1,234,888,045	1,384,297,701
Property, Plant & Equipment (Tangible)	3.1	1,079,507,339	1,220,710,882
Furniture & Fixtures	3.2	25,103,133	27,817,988
Intangible Assets	3.3	34,277,573	30,168,831
Long-Term-Advance	3.4	96,000,000	105,600,000
Current Assets	4	1,185,673,841	1,162,991,049
Cash and Cash Equivalents	4.1	4,766,355	24,519,941
Investment in FDR	4.2	1,090,000,000	1,080,000,000
Stationary	4.3	27,295	54,045
Advance, Deposite & Pre-payments	4.4	22,447,499	731,647
Accounts Receivables	4.5	33,575,910	32,605,312
Advance Income Tax (AIT)	4.6	34,856,783	25,080,104
Total Assets		2,420,561,886	2,547,288,750
LIABILITIES & TRUST FUND			
Current Liabilities	5	40,706,052	27,744,843
Accounts Payable	5.1	21,870,484	18,685,761
Expenses Payable	5.2	2,110,704	1,607,959
Audit Fee Payable	5.3	83,056	57,500
VAT Payable	5.4	194,040	474,631
Withholding Tax Payable	5.5	-	21,478
Provision for Income Tax	5.6	14,484,426	4,477,894
Asi@Connect Project Fund	5.7	941,831	1,173,710
fDLuDCf Project Fund	5.8	54,269	1,172,905
Unearned Revenue	5.9	4,227	4,227
Suspense Account	5.10	28,527	-
Advance Membership Fee	5.11	27,000	25,000
Other Funds	6	907,488	43,778
Non-Current Liabilities		9,337,188	16,562,188
Accounts Payable -dataedge Ltd.	7	9,337,188	16,562,188
Trust Fund	8	2,370,518,646	2,502,981,718
Capital Fund	8.1	896,700,000	896,700,000
Operational Fund	8.2	62,206,076	62,180,575
Revaluation Reserve	8.3	-	-
Donation and Grants	8.4	1,156,410,716	1,337,142,730
Accumulated Surplus	8.5	255,201,854	206,958,413
Total Liabilities & Trust Fund		2,420,561,886	2,547,288,750

The annexed notes form an integral part of these financial statements

CAFO   Chief Executive Officer   Vice-Chairperson   Chairperson

Signed in terms of our annexed report of even date

November 07, 2022
Dhaka

Md. Musfiqur Rahman FCA
Enrollment No. 1023
For and on behalf of,
Mollah Quadir Yusuf & Co.
Chartered Accountants

DVC: 22111 31023AS899223

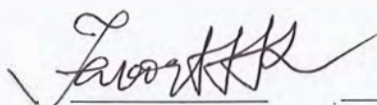# Bangladesh Research & Education Network (BdREN) Trust

Plot: E-18/A, UGC Bhaban, Agargaon Administrative Area, Sher-e-Bangla Nagar, Dhaka

Statement of Profit or Loss and other Comprehensive Income
For the year ended June 30, 2022

Amounts in Taka	Notes	June 30, 2022	June 30, 2021
Operating Income	9	150,848,232	113,428,946
Annual Membership fee	9.1	5,020,000	3,490,000
Service Revenue	9.2	126,898,232	108,640,346
Other Operating Income	9.3	18,930,000	1,298,600
Less: Operating Expenses	10	340,312,086	325,532,031
Network Operational Expense	10.1	48,370,663	36,119,757
Network Maintenance Expense	10.2	59,142,152	55,142,537
General & Administrative Expense	10.3	40,868,180	33,729,925
Depreciation and Amortization Expense	10.4	181,003,614	200,539,812
Project Expenses	10.5	10,927,477	-
Profit/(Loss) from Operations		(189,463,854)	(212,103,085)
Add: Non-Operating Income	11	67,503,315	81,671,507
Income from Bank Interest	11.1	67,306,865	80,665,139
Discount receipts on payment	11.2	5,200	266
Others receipts	11.3	191,250	1,006,102
Less: Non-Operating Expense	12	793,102	832,355
Financial Expense	12.1	773,802	821,000
Bank Charges	12.2	19,300	11,355
Profit/(Loss) before Tax		(122,753,641)	(131,263,933)
Less: Income Tax Expense		10,006,532	484,505
Profit/(Loss) after Tax		(132,760,173)	(131,748,438)

The annexed notes form an integral part of these financial statements

CAFO	Chief Executive Officer	Vice-Chairperson	Chairperson

Signed in terms of our annexed report of even date

Md. Musfiqur Rahman FCA
ICAB Enrollment No. 1023
For and on behalf of,
Mollah **Quadir Yusuf & Co.**
Chartered Accountants

DVC: 221113023AS899223

November 07, 2022
Dhaka

Bangladesh Research & Education Network (BdREN) Trust

Plot: E-18/A, UGC Bhaban, Agargaon Administrative Area, Sher-e-Bangla Nagar, Dhaka

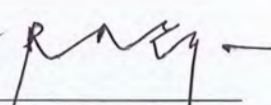### Statement of Changes in Trust Fund
For the year ended June 30, 2022

Amounts in Taka

Particulars	Capital Fund	Operational Fund	Donation & Grants	Accumulated Surplus	Total
Balance as at 01 July 2021	896,700,000	62,180,575	1,337,142,730	206,958,413	2,502,981,718
Add: Addition During the Year	-	-	271,600	-	271,600
Add: Adjustment	-	25,501	-	-	25,501
Add: Net profit for the year	-	-	-	(132,760,173)	(132,760,173)
Add/(Less): Depreciation & Amortization	-	-	(181,003,614)	181,003,614	-
Balance as at 30 June 2022	896,700,000	62,206,076	1,156,410,716	255,201,854	2,370,518,646
Balance as at 30 June 2021	896,700,000	62,180,575	1,337,142,730	206,958,413	2,502,981,718

CAFO

Chief Executive Officer

Vice-Chairperson

Chairperson

November 07, 2022
Dhaka

ACRONYMS & DEFINITIONS

ADB	Asian Development Bank
AIX	Aamra Internet Exchange
AP	Access Point
APAN	Asia Pacific Advanced Network
APNIC	Asia Pacific Network Information Center
ASSET	Accelerating and Strengthening Skills for Economic Transformation
BARC	Bangladesh Agricultural Research Council
BAU	Bangladesh Agricultural University
BCC	Bangladesh Computer Council
BDIX	Bangladesh Internet Exchange
BdREN	Bangladesh Research and Education Network
BDT	Bangladesh Taka
BDU	Bangabandhu Sheikh Mujibur Rahman Digital University
BeLISAC	Building e-Learning Infrastructure for South Asian Countries
BGP	Border Gateway Protocol
BoT	Board of Trustees
BOU	Bangladesh Open University
BRACU	BRAC University
BRUR	Begum Rokeya University, Rangpur
BSMMU	Bangabandhu Sheikh Mujib Medical University
BSMRAU	Bangabandhu Sheikh Mujibur Rahman Agricultural University
BSMRAAU	Bangabandhu Sheikh Mujibur Rahman Aviation and Aerospace University
BSMRSTU	Bangabandhu Sheikh Mujibur Rahman Science and Technology University
BTCL	Bangladesh Telecommunications Company Limited
BTRC	Bangladesh Telecommunication Regulatory Commission
BU	University of Barishal
BUBT	Bangladesh University of Business and Technology
BUET	Bangladesh University of Engineering and Technology
BUP	Bangladesh University of Professionals
BUTex	Bangladesh University of Textiles
BW	BandWidth
CAAB	Civil Aviation Authority of Bangladesh
CamREN	Cambodia Research and Education Network
CCTV	Closed-Circuit Television
CE	Customer Edge
CDIEN	Capacity Development for Implementing eduroam in NRENs
CEDP	College Education Development Project
CEO	Chief Executive Officer
CERT	Computer Emergency Response Team
CFP2	Call for Proposal-2
CME	Centre for Medical Education
CompTIA	Computing Technology Industry Association
CoU	Comilla University
CPU	Central Processing Unit

CSE	Computer Science and Engineering
CSI	Calling-Station-ID
CSIRT	Computer Security Incident Response Team
CTO	Chief Technical Officer
CU	University of Chittagong
CUET	Chittagong University of Engineering and Technology
CVASU	Chattogram Veterinary and Animal Sciences University
DASPiB	Developing Advanced Security Professionals in Bangladesh
DFT	Density Functional Theory
DGME	Directorate General of Medical Education
DIU	Daffodil International University
DLE	Distance Learning and Education
DLP	Data Loss Prevention
D-Nothi	Digital Nothi
DNS	Domain Name System
DNSSEC	Domain Name System Security Extensions
DL	Distance Learning
DR	Disaster Recovery
DrukREN	Druk Research & Education Network
DU	University of Dhaka
DUET	Dhaka University of Engineering and Technology
DWDM	Dense Wavelength Division Multiplexing
eduGAIN	EDUcation Global Authentication INfrastructure
eduroam	Education Roaming
EEE	Electrical & Electronics Engineering
eFile	Electronic File
ERP	Enterprise Resource Planning
EU	European Union
fDLuDCf	Facilitating Distance Learning using Digital Conferencing facility
FY	Financial Year
GB	Giga Byte
Gbps	Gigabits Per SecondGEANT
GÉANT	GÉANT is the pan-European data network for the research and education community
GHz	Gigahertz
GGC	Google Cache Server
GoB	Government of Bangladesh
GPE-KIX	Global Partnership for Education Knowledge and Innovation Exchange
GPU	Graphics Processing Unit
HEQEP	Higher Education Quality Enhancement Project
HPC	High Performance Computing
HSIA	Hazrat Shahjalal International Airport
HSTU	Hajee Mohammad Danesh Science & Technology University
IaaS	Infrastructure as a Service
ICT	Information and Communications Technology
IDG	International Development Group
IdP	Identity Provider
IdPaaS	IdP-as-a-Service
IDRC	International Development Research Center

IEEE	Institute of Electrical and Electronics Engineers
IER	Institute of Education and Research
IICT	The Institute of Information and Communication Technology
IP	Internet Protocol
IPTSP	IP Telephony Service Provider
IR4.0	4th Industrial Revolution
IRS	Institutional Radius Server
ISIF	Information Society Innovation Fund
ISP	Internet Service Provider
IT	Information Technology
IU	Islamic University
JKKNIU	Jatiya Kabi Kazi Nazrul Islam University
JnU	Jagannath University
JU	Jahangirnagar University
JUST	Jashore University of Science and Technology
KU	Khulna University
KUET	Khulna University of Engineering & Technology
KVM	Kernel-based Virtual Machine
L2/L3 VPN	Layer 2 or Layer 3 Virtual Private Network
LAN	Local Area Network
LEARN	Lanka Education and Research Network
LERNET	Laos Education and Research Network
LMS	Learning Management System
Mbps	Megabits per second
MBSTU	Mawlana Bhashani Science and Technology University
MoE	Ministry of Education
MoU	Memorandum of Understanding
MPLS	Multiprotocol Label Switching
NKN	National Knowledge Network of India
NORDUnet	Regional Research and Education Networks (RRENs) of the five Nordic countries
NREN	National Research and Education Network
NREN	Nepal Research and Education Network
NRS	National Radius Server
NSTU	Noakhali Science and Technology University
NVMe	Non-Volatile Memory Express
NITER	National Institute of Textile Engineering and Research
OLA	Optical Amplifier
On-Prem	On Premise
PaaS	Platform as a Service
PoP	Point of Presence
PSTU	Patuakhali Science & Technology University
PUST	Pabna University of Science and Technology
REN	Research and Education Network
RU	University of Rajshahi
RUET	Rajshahi University of Engineering & Technology
SAU	Sylhet Agricultural University
SBAU	Sher-e-Bangla Agricultural University
SDG	Sustainable Development Goals

SingAREN	Singapore Advanced Research and Education Network
SIFULAN	Malaysian Access Federation for higher educational and research institutes
SOC	Security Operations Center
SP	Service Provider
SSO	Single Sign-On
SSD	Solid State Drive
SSID	Service Set IDentifier
STEM	Science, Technology, Engineering, and Mathematics
SUST	Shahjalal University of Science and Technology
TB	Tera Byte
TEIN*CC	Trans-Eurasia Information Network-star Corporation Center
ThaiREN	Thailand Research and Education Network
TIGERfed	Trust, Identity and Group management for Education and Research Federation
UGC	University Grants Commission of Bangladesh
UMS	University Management System
URL	Uniform Resource Locator
USD	United States Dollar
UTP	Unshielded Twisted Pair
VDI	Virtual Desktop Infrastructure
VoIP	Voice over Internet Protocol
VPN	Virtual Private Network
VPLS	Virtual Private LAN Service
VR/AR	Virtual Reality/Augmented Reality
VS	Versus
vSession	Virtual Session
Wi-Fi	Wireless Fidelity

BdREN

RESEARCHERS' HEAVEN

Default home of choice for Bangladeshi Researchers

Designed By Samia Sal Sabil

Graphic Designer

Bangladesh Research and Education Network (BdREN) Trust