



IICT, BUET

# BDREN SUSTAINABILITY & CHALLENGES THAT NEED TO BE OVERCOME

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# OUTLINE

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- ◉ ICT indicators of a university
- ◉ Segments of REN and Challenges
- ◉ Campus best practices
- ◉ Services of NREN and BdREN in particular
- ◉ BdREN sustainability: Challenges
  - Technical
  - Operational
  - Budgetary
  - Training/workshop
  - Awareness creation etc.
  - ICT policy and computer hygiene
- ◉ Conclusion

# INTRODUCTION

- ⦿ Advances in ICT have accelerated knowledge generation and globalized communication, thereby need to change our traditional education system to keep pace with the current global trend.
- ⦿ The present global information economy age is heavily dependent on the strength and dynamics of qualitative, timely and appropriate research.
- ⦿ These scenarios implies the need for establishing a strong driving link among the universities for research & development and applying/adopting new teaching strategies.

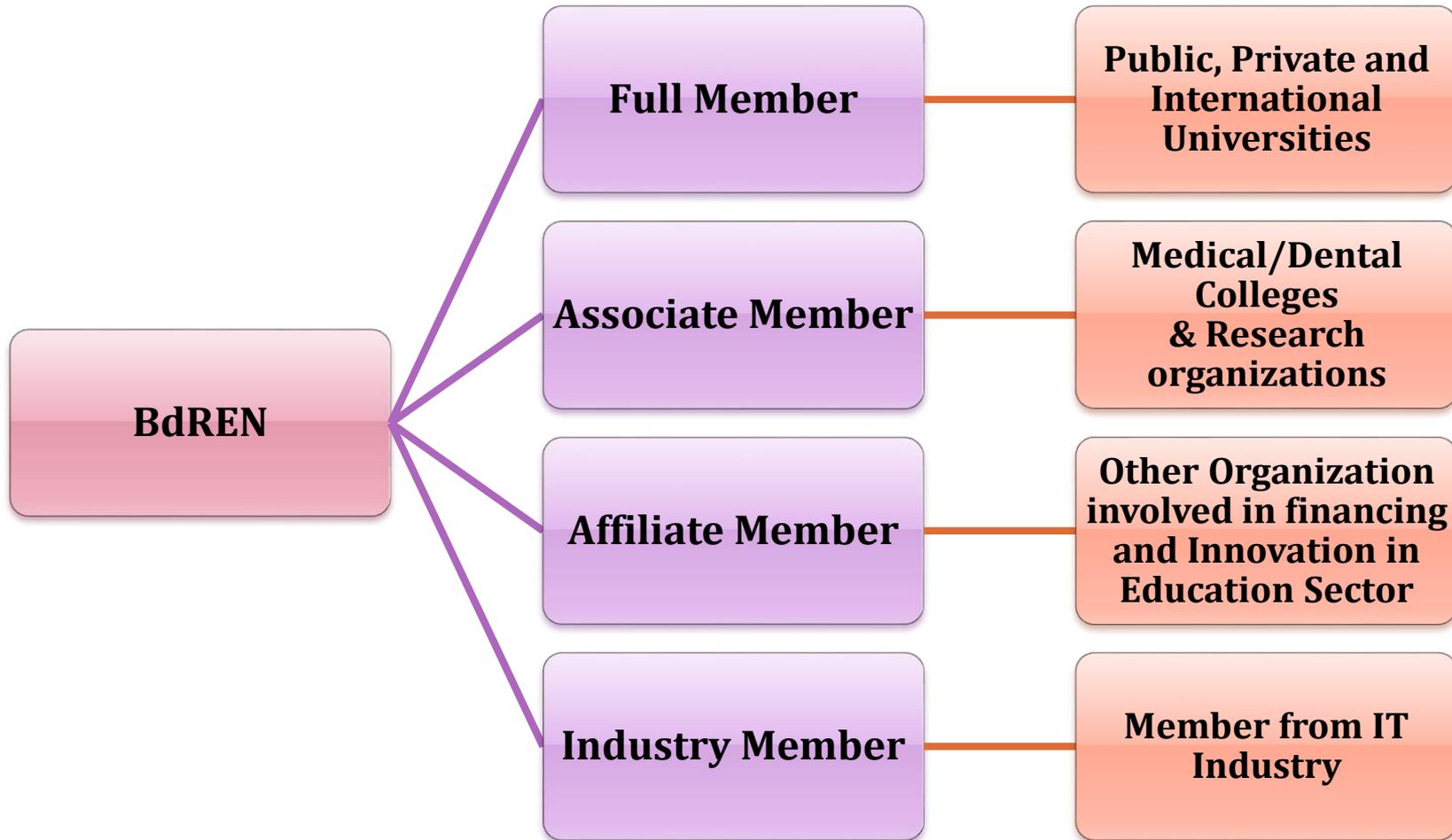
# WHY NATIONAL RESEARCH & EDUCATION NETWORK (NREN)?

- ◉ The network services to be provided to the research & education (R & E) community are specific and different from the commercial networks.
- ◉ High performance, reliability, availability, security and trust are most important factors.
- ◉ NREN provides an experimental test bed for advanced network technology trials and applications.
- ◉ The R & E community consists mostly of faculty members and students who are very smart, innovative and creative.
- ◉ The R & E network is the best place for testing cutting-edge Internet technologies.

# BDREN: NREN OF BANGLADESH

- ◉ BdREN aims to connect all universities, research institutions and healthcare across Bangladesh.
- ◉ BdREN went in operation on pilot basis in 2011 in 5 public universities (BUET, DU, BSMMU, JU and SBAU).
- ◉ In 2014, BdREN started its full operation and connected to 34 public universities, 2 International universities (IUT & WUC) and 1 private university (NSU).
- ◉ BdREN backbone is constructed with country wide OPGW from Power Grid Company of Bangladesh (PGCB) Ltd.

# BDREN STAKEHOLDERS



# ORGANIZATIONAL STRUCTURE

- ◉ BdREN is non-profit Trust Organization and governed by a Board of Trustees.
- ◉ **Trustee Board consists of 11 members.**
- ◉ **Trustee Board Members are from:**
  - ◉ Universities (Public & Private)
  - ◉ University Grants Commission (UGC)
  - ◉ Ministry of Education (MoE) &
  - ◉ Other members co-opted for their expertise and position in relevant organizations.

# NETWORK & RESOURCES OF BDREN

## ◉ **BdREN Infrastructure & Capacity**

### **1.Backbone & Access Network**

- ◉ Total 3500+ KM backbone network
- ◉ 300 KM last mile
- ◉ 10G Core & 1G Access capacity

### **2. Point of Presence (POP)**

- ◉ 37 Universities & 11-PGCB Sub Station
- ◉ Supports up to 1G bandwidth for each university

### **3.Data Center (DC) & Disaster recovery site (DRS)**

- ◉ DC at UGC & DRS at BUET (3-tier )
  - 400 TB Storage
  - Virtual Machine

### **4.Virtual Classroom (Digital Classroom)**

- ◉ 34 Virtual Classroom

# FOUR ELEMENTS OF KNOWLEDGE ECONOMY

- ⦿ **An economic and institutional regime.**
  - Provides incentives for the efficient use of the existing knowledge, the creation of new knowledge, and the flourishing of entrepreneurship.
- ⦿ **An educated and skilled population.**
  - That can create, share and use knowledge well.
- ⦿ **A dynamic information & communication infrastructure.**
  - Comprising a network of universities & research centers.
- ⦿ **An effective national innovation system**
  - Create new knowledge and technologies and tap into the growing stock of global knowledge, assimilate and adapt it to local needs

# DEFERENT SEGMENTS OF A BDREN/NREN

- ◉ The **local network** called the campus network, is the internal institutional network.
- ◉ The **access network** is the portion between the institution and a high-speed backbone network.
- ◉ The **BdREN** or **national backbone** is the high-speed network linking major towns and cities in a country.
- ◉ The **international network** (TEIN4, Internet2 etc.) and **IIG** (BTCL, BSSCL etc.) connected to the **BdREN**.
- ◉ The access and national backbone segments of **BdREN** are collectively referred to as the **national infrastructure**.

# PRESENT SCENARIO: CHALLENGES

## ◉ Campus network at the Universities

- Most of the public/private universities do not have structured campus networking (physical infrastructure, cabling to each building/office etc.).
- 15 public universities built their campus network through HEQEP sub-project during 2012-2014
- BdREN took an initiative (through HEQEP fund) to build campus networks at 19 universities. Expected to be completed by June 2018.

# CAMPUS BEST PRACTICES (CBP)

In Europe, many academic institutions have implemented CBP to ensure maximum usages & exploitation of NREN resources and services:

- 1. Physical Infrastructure**
- 2. Campus networking**
- 3. Wireless**
- 4. Network monitoring**
- 5. Real time communication**
- 6. Security**

# DIFFERENT SERVICES OF NREN

- ◉ Access to a dedicated, reliable, high-speed physical telecommunications network.
- ◉ Network services and applications (such as web hosting, domain name services, cloud services etc.)
- ◉ Centralized advisory services and expertise that would be too expensive for each university to procure on its own.
- ◉ Capacity/ awareness building of its members through training/workshop/conference.
- ◉ Support linkages with other sectors, *i.e.*, between the academic community, industry, government, etc.

# DIFFERENT SERVICES OF NREN

## ○ **Type 1: Network for Education Internet**

- Online reference database access
- e-learning
- Tele-distance learning
- Teleconference/video conferencing, recording, streaming
- Internet access for education
- EduRoam, EduGAIN etc.

## ○ **Type 2: Network for Education and Research Internet**

- Network monitoring and measurement
- Network for virtual access
- Network for grid computing/HPC
- Network for continuous research
- Network for tele-medicine

## ○ **Type 3: Network for Education and Research Testbed**

- Network research for testbed
- Network research for demonstration

# PRESENT SERVICES OF BDREN

- ◉ Access to the connected universities within Bangladesh (inter-university) through high speed backbone and other International/regional REN like TEIN4, Internet 2 etc.
- ◉ Commodity Internet service (Internet bandwidth subscribed by each university as per their requirement) @ competitive rate.
- ◉ Capacity building (*i.e.*, training, workshop, conference etc).
- ◉ Collocation, hosting/DNS/email/cloud and FTP service
- ◉ Videoconferencing, streaming etc.
- ◉ Access to the international journals through UDL of UGC
- ◉ 7x24 NOC service

# BDREN SERVICES: CHALLENGES

- ◉ Most of the faculty members of the connected universities are not **aware about the services** of BdREN.
- ◉ Awareness program, training/workshop need to be arranged to encourage and exploit the full potential benefits of the offered services.
- ◉ Relevant personnel and faculty members of the university should be involved in those programs to ensure maximum usage and capacity building.
- ◉ Need to introduce more value added services like IP phone (VoIP), EduRaom, HPC, EduGAIN, Telemedicine, e-learning (Moodle, UMS, lecture) etc.
- ◉ Quality of services (QoS) need to be ensured.

# FUTURE OPPORTUNITIES: CHALLENGES

In BdREN platform the following application may be deployed:

- **Electronic Research Gateway**

- Thesis/research articles in under graduate/ post-graduate.

- **Graduate Record Verification**

- An online verification of graduates records.

- **Medical Data Sharing**

- Building a platform for sharing medical data for research purpose.

# OTHER CHALLENGES: NEED TO BE OVERCOME

- ◉ Technical
- ◉ Operational
- ◉ Redundancy of the backbone and last mile
- ◉ Budgetary issues
- ◉ Capacity building of the member institutions
- ◉ Drafting IT policy and Implementation
- ◉ Cyber security and computer hygiene

# BDREN SUSTAINABILITY: CHALLENGES

## Technical

- No enough skilled manpower to shoot trouble in the backbone network.
- Total dependency on the vendor under service level agreement (SLA).
- Even the vendors can't shoot the trouble within shortest possible time (depending on trouble type).

# BDREN SUSTAINABILITY: CHALLENGES

## ⦿ Operational

- About half of the universities situated are in remote places from the divisional town and loadshedding is frequent.
- Need proper maintenance of the generators and large online UPSs (3/4 hours back up) to keep the network up.
- Dearth of skilled manpower almost in every university to maintain the network and equipment/devices.
- In some universities there is no separate IT cell or no manpower to look after the BdREN connectivity/services and other ICT activities of the university.

# BDREN SUSTAINABILITY: CHALLENGES

## ○ **Redundancy link: Backbone and last mile**

- There is only redundancy link between DC-DR and also within some sub-region (among few universities in regions).
- BdREN's backbone is constructed with PCGB's OPGW, no other redundancy is there.
- In the last mile (300 KM+) link, there is no extra other links.
- Due to lack of link redundancy 100% uptime can't be ensured at the target institutions.

# BDREN SUSTAINABILITY: CHALLENGES

## ⦿ Budgetary issue

- The total CAPEX cost is borne by the World Bank (project period will end in 2018). Maintenance, salary and allowances of all personnel are also paid from the project.
- Specifically technical personnel at BdREN has relatively high technical skill and their salary is also higher than the national average.
- After the project period ends, the budgetary provision will be a big issue to look into for the sustainability of BdREN.

# BDREN SUSTAINABILITY: CHALLENGES

- **Capacity building to the member institution**
  - Before 2014, there was no IT cell in most of the public universities.
  - 
  - In 2015, UGC recommended to create an IT cell in each university and approved the organogram.
  - Some university appointed IT personnel as per recommendation of UGC to maintain the IT activities of university & BdREN.
  - Need to impart training to the IT personnel to maintain the campus network as well as to provide services to the university.

# IT POLICY AND ITS ENFORCEMENT: CHALLENGES

- ◉ In the developed country, every university has its own ICT policy and guidelines for its users.
- ◉ ICT policy is a combination of national ICT guidelines and university's own rules and regulation.
- ◉ It encompasses lots of specific guidelines/code of ICT conduct for the user community what they can do and can't.
- ◉ BdREN may draft a general ICT policy/guideline and each member institution should implement it on priority basis.

# APPROPRIATE USE GUIDELINES: DO

- ◉ Use only those ICT facilities and services for which you have authorization.
- ◉ Use ICT facilities and services only for their intended purpose.
- ◉ Abide by applicable laws and university policies and respect the copyrights and intellectual property rights of others, including the legal use of copyrighted software.
- ◉ Respect the privacy and personal rights of others.
- ◉ Use ICT facilities and services in a manner which is ethical, lawful and not to the detriment of others.
- ◉ Use ICT facilities and services for teaching, learning and academic purposes.
- ◉ Use ICT facilities for personal use where such use is incidental and does not impose upon or adversely affect the university, such as using ICT facilities and services for occasional emails and web browsing.

# APPROPRIATE USE GUIDELINES: DON'T

- ◉ **Don't** access, copy, alter or destroy information, electronic mail, data, programs, or other files without authorization.
- ◉ **Don't** use resources you have not been specifically authorized to use.
- ◉ **Don't** use someone else's username and password or share your username and password with someone else.
- ◉ **Don't** upload, download, distribute or possess pornography, pirated software, movies, or other unlicensed digital media.
- ◉ **Don't** send unsolicited emails (spam).
- ◉ **Don't** use electronic resources for harassment or stalking.
- ◉ **Don't** possess any “hacking tools” such as packet sniffers, password crackers, vulnerability scanners without written authorization from
- ◉ **Don't** willfully waste resources associated with ICT facilities and services.

# CYBER SECURITY & COMPUTER HYGIENE

- ◉ Cyber Attack is an attempt to undermine or compromise the function of a computer-based system, or attempt to track the online movements of individuals without their permission.
- ◉ **Cyber hygiene** refers to steps computer users take to protect and maintain systems and devices.
- ◉ The practice of “safe” cyber hygiene can no longer be the responsibility of solely the ICT personnel/department.
- ◉ University should put in place training to educate, motivate and incentives all users to be vigilant and in a constant state of preparedness when it comes to cyber security.

# CONCLUSIONS

- ◉ **The true value of BdREN relied on services**, especially the higher level services that are required by and specific to, the needs of academia and that ISPs do not provide.
- ◉ BdREN is still in nascent stage of development and it does not have the technical skill sets or able to deliver all the expected services of a NREN within short time.
- ◉ End users, stakeholders, UGC and government decision makers must understand the importance of BdREN for its further development (expanding connectivity to other institutions and up-gradation) and sustainability.
- ◉ Need to develop and introduce new **services** – planning, developing and implementing advanced services in addition to basic connectivity only.
- ◉ Forging further **international partnerships**—establishing connectivity to regional and global RENS.

# CONCLUSIONS

- ◉ The university leaders need to look seriously to the readiness of their own institutions to benefit from the increased connectivity & services of BdREN. They need to invest in or seek funds to invest in:
  - An adequate and well-staffed campus physical network infrastructure and computing services.
  - The digital literacy of the academics, the students, and the administrators to transform their teaching and research, learning and administrative functions, respectively.
  - Draft, endorse and enforce ICT policy/guidelines throughout the university for safe and reliable use of ICT.

# FINAL REMARKS

- ◉ We have both opportunities and the creativity to overcome the challenges that we face and discuss here.
- ◉ If we have goodwill and support from our stakeholders; we are certainly hopeful and looking to the future with excitement to make the BdREN sustainable.

Q&A