National Internet of Things Strategy

Bangladesh

Information and Communication Technology Division

Government of the People's Republic of Bangladesh

March 2020

Table of Contents

Abbreviations

BASIS	Bangladesh Association of Software and Information Services
BCS	Bangladesh Computer Samity
D2D	Device-to-Device
DSC	Digital Control System
FBCCI	Federation of Chamber of Commerce and Industries
GPS	Global Positioning System
HCI	Human-Computer Interaction
HMI	Human-Machine Interface
IoT	Internet of Things
ISPAB	Internet Service Providers Association of Bangladesh
MAN	Metropolitan Area Network
M2M	Machine-to-Machine
PLC	Programmable Logic Controller
RFID	Radio-Frequency Identification
SoC	System on a Chip
SCADA	Supervisory Control and Data Acquisition
SDG	Sustainable Development Goals
UI/UX	User Interface/User Experience
UID	Unique Identifier
WAN	Wide Area Network

Foreword

The Internet of Things is abbreviated as IoT, which means connecting different things to the Internet. Each device includes sensors that collect data, interact with the environment, and communicate over a network. In the consumer market, IoT technology is most synonymous with products pertaining to the concept of the "smart home", covering devices and appliances such as lighting fixtures, thermostats, home security systems and cameras, and other home appliances that can be controlled through internet, remotely or via smartphones and smart speakers. This saves time, efficiently and effectively completes work, saving cost.

The IoT creates opportunities for more direct integration of the physical world into computer-based systems, resulting in efficiency improvements, economic benefits, and reduced human exertions. The number of Internet-connected devices (12.5 billion) surpassed the number of human beings (7 billion) on the planet in 2011 and by 2025, there are expected to be more than 75 billion IoT devices worldwide. As the number of connected IoT devices grows, the amount of data generated by these devices will also grow. Moreover, a new term Internet of Everything (IoE) has recently emerged which is bringing together people, process, data, and things to make networked connections more relevant and valuable than ever before, turning information into actions that create new capabilities, richer experiences, and unprecedented economic opportunity for businesses, individuals, and countries.

The Government believes that the use of IoT is essential to effectively achieve all the ideas and goals set forth in the national development plans and its associated policies and strategies. In addition, IoT could be the key to the preparation of the fourth industrial revolution, the implementation of a sustainable development goal and the transformation of the developing economy into a technology driven economy. Therefore, the education of IoT, the creation of efficient human resources in IoT, the use of IoT at all levels of the state and society will help develop the local economy and improve the living standards of the people.

With the advent of the IoT, fed by sensors soon to number in the trillions, working with intelligent systems in the billions, and involving millions of applications, the IoT will drive new consumer and business behavior that will demand increasingly intelligent industry solutions, which, in turn, will drive billions of dollars in opportunity for IT industry and even more for the companies that take advantage of the IoT.

IoT offers avenues for device manufacturers, solution providers, telecom operators & system integrators to significantly boost their revenues through adoption of IoT applications and services being offered by the technology. Apart from direct IoT applications, the IT industry also has an opportunity to provide services, analytics and applications related to IoT. Among other things, IoT can help automate solutions to problems faced by various industries like agriculture, education, health services, transportation, energy, security, infrastructure, disaster management etc. through remotely connected devices.

Chapter 1

1.1 Vision

To develop a conducive and balanced Internet of Things (IoT) ecosystem in Bangladesh to cater to economic, societal, environmental and global needs.

1.2 Mission

To transform Bangladesh into a technology-based country by ensuring the use of Internet of Things in every sector as an enabler for growth, as envisioned in Vision 2021, Sustainable Development Goals 2030, and Vision 2041.

1.3 Objectives

a) To facilitate, undertake and promote IoT awareness, adoption, training, research & development, production and commercialization activities to increase efficiency, save costs, achieve transparency and improve services;
b) To undertake capacity development (Human & Technology) for IoT specific skillsets for the domestic and international market;
c) To attract and assist domestic and foreign investment, technology transfer and export growth in the IoT industry;
d) To ensure bringing all stakeholders together including innovator, researcher, investor, organizations, development centers, institutions to realize the importance of IoT;
e) To establish and strengthen a meaningful, and balanced collaboration between industry, academia, government and the community on IoT;

1.4 Goals

- Create a $1 billion IoT Industry in Bangladesh by 2023
- Create 10,000 skilled workforce in IoT for the domestic and international markets by 2023
- Establish a national IoT research & development center by 2023 to develop IoT products specific to local needs
- Establish Three training, research and development, innovation and exhibition centers related to IoT by 2025
- Create 100 IoT based startups by 2025 to slove local problems using home-grown IoT solutions
- Create a venture capital fund for IoT and electronics based startups by 2030
- Developing, incubating and financing IoT products in the areas of agriculture, health, water, natural disasters, transportation, security, automobiles, supply chains, smart cities, automated metering and monitoring of utilities, waste management, oil and gas, in the light of domestic market needs.

Chapter 2

2.1 Opportunities

- Buildings and home management: Home automation is done through IoT devices when the lights, fan, air conditioning, various media and security systems are connected to the Internet and automatically turn on and off. In addition to research and observation with IoT devices in the smart home and smart building, usage data is collected and analyzed. IoT devices are used to monitor and control mechanical, electrical, and electronic systems used in various types of buildings, such as public and private, industrial, institutional or residential systems. It saves energy and electricity, time and money.
- Healthcare: Smart healthcare connects healthcare products, services and organizations simultaneously, resulting in the creation of a digitized healthcare system. Also notable are remote health monitoring, emergency notification, clinical laboratory, low-cost point-of-care devices. Many sensors combine to create a network of intelligent sensors that are able to collect, process, transfer and analyze valuable information in a variety of environments, such as in-home monitoring devices that can be connected to hospital-based systems. To ensure a healthy lifestyle, personal use shoes, glasses, weight measuring instruments, especially wearable watches that monitor the use of heart rate monitors, ECGs, sleep analysis, calorie loss, workforce.
- Transportation: In almost all areas of transportation, IoT can be monitored, controlled and processed and analyzed, resulting in the creation of a smart transport system. The application of IoT extends to all aspects of transport systems such as vehicles, infrastructure, drivers and users. Also notable are smart traffic control, smart parking, automatic toll collection, logistics and fleet management, vehicle control, safety and road assistance.
- Industries: The endless combination of various IoT devices used for the production of sensing, detection, processing, communication, acquisition, and networking capabilities has opened up new possibilities in the industry. By controlling production equipment, resources, situation management and production processes, smart manufacturing is transformed into an intelligent system to allow faster production of new products, faster action against product demand and real-time optimization of production and supply chain.
- Agriculture: In smart agriculture, IoT devices collect data on temperature, rainfall, humidity, wind speed, insect infestation and soil erosion. These data are used to automate farming, improve quality and quantity, make informed decisions, reduce risk and waste, and reduce the physical labor of crop management. For example, farmers can now monitor soil temperature and humidity remotely, and even provide fertilizer using IoT-acquired data. This is precision agriculture.
- Infrastructure: One of the areas of implementation of IoT is the management and control of bridges, railways, electricity and solar, and other sustainable urban and rural infrastructure. Through the manufacturing industry, cost savings, reduced time,

improved working hours, paperless workloads and increased productivity. Data analysis makes quick decisions. Incident Management, Emergency Response, Quality of Service increases and management costs decrease. Even IoT can play a huge role in waste management.

- Smart Cities: In the light of sustainable development goals, a city can be operated as a smart city by using IoT in terms of city management so that smart Wi-Fi, smart security, smart lighting, smart parking, smart transports, smart bus stops, smart kiosks, government service remote exports and Smart Education.
- Power: A significant number of power consuming devices such as switches, power outlets, bulbs, televisions, etc. are already connected to the Internet so that the production, distribution and distribution of electricity can be maintained and distributed on the basis of customer demand, this is called Smart Grid. The smart grid can also remotely control transformers and metering devices.
- Environment: The quality of air, water, soil and atmosphere can be monitored by sensors used for environmental protection and even the movement of wildlife, habitat and forest area can be monitored. Natural disaster forecasting, the use of IoT in the event of emergency assistance can be effective for a wide range of geographical areas.

2.2 Challenges

- Standards: there are global differences in technical standards and compatibility. Although most are open standards, value-paying companies are eager to establish their own standards
- Data protection and personal privacy: there are growing concerns on data protection, information consent, personal privacy and data traceability
- Security and Control: lack of security and personal safety standards and regulatory bodies currently in the use and enforcement of individuals and institutions
- Inter-operability: Problems of interconnectivity due to different standards and challenges of integration of IoT devices with IoT platforms

Chapter 3

3. Strategies

3.1. Engagement and incentives

3.1.1 Create awareness on IoT through seminar, symposium, workshop, training, competition, media and public relation activities

3.1.2 Promote IoT specific study tours by Industry Associations and supporting government organizations, to check the progress and global trends in IoT

3.1.3 Organize IoT related exhibition/fair and competitions for startups working on IoT to solve local problems

3.1.4 Imports of capital goods/ raw materials required for manufacturing IoT products imported with a duty benefit of up-to 80%

3.1.5 Capital goods/ raw materials purchased from domestic market will be entitled for reimbursements of excise duty and VAT

3.1.6 Setup an advisory committee, governance committee and program management unit that would help interface with various IoT attached industries and track the progress of IoT in the country.

3.2. Research & development and innovation

3.2.1 Create R&D labs for prototype development as well as hardware to hardware and hardware to software integration

3.2.2 Fund R&D in IoT for specific applications for common good

3.2.3 Disburse fund to innovative IoT projects in the form of grant and/or equity for approved projects after analyzing the capabilities

3.2.4 To stimulate private sector's investment in IoT related R&D, an innovative program named “IoT Research Collaboration scheme (IRCS)” to be initiated by ICT Division in support with an aligned business association/supporting organization

3.2.5 IRC scheme, the appointed organization will handle the whole process from Call for Proposal to project closures. government will collaborate and initiate joint projects for R&D in IoT on an 80% contribution basis

3.3. Skills enhancement and human resource development

3.3.1 Introduction of IoT Curriculum at Engineering level and Research activity/PhD

3.3.2 Introduction of Trade Course, Certificate Course and Diploma Course in IoT, 12-weeks/6-weeks/24-weeks training program and setup norms for accreditation of such courses

3.3.3 Organize trainings on IoT by inviting experts from other countries and participation in conferences for industry /educational Institutions

3.3.4 Promoting workshops for working level executives from industry & faculty/researcher form academic institutions

3.3.5 Faculty of Academic Institutions, Experts and other Professionals working in the area of IoT to be sponsored for Presenting Papers, attending - Conferences, Short-term courses, tutorials etc. both at the National as well as International level

3.4. Capacity building, incubation and financing

3.4.1 Establish a Center for 4th Industrial Revolution for creating state of the art fabrication facility and related research and development to boost industrial productivity. This center will connect Industry and Academia, academic institutions will undertake research and development after having requirements from industry

3.4.2 Promote Institutional capacity building through Bangladesh Hi-Tech Park Authority as the executing agency and 15 academic/ institutional partners. Under this program government will fund to create Resource Centers & Test-beds as a common experimental facility supporting heterogeneity in Internet of Things (IoT) domain to help the community to experiment IoT devices and applications by combining various IoT technologies with an allocation of BDT 20 Crores as 100% fund with BDT 1 Crores for each partner and BDT 5 Crores for executing agency over a period of 5 years.

3.4.3 Implement IoT test-bed comprising 3 tiered IoT test-bed architecture (plug and play, middleware and application) for heterogeneous legacy and possible new types of devices

3.4.4 To set up an Incubation center (National Centre of Excellence for IoT) under PPP mode with BASIS and/or other industry associations for supporting IoT industry.

3.4.5 Create eco-system for transfer of knowledge amongst startups and from industry, technology to startups and academia. The framework will help the startups from idea to prototype to product and necessary industry interface.

3.4.6 Promote Venture Funds specifically directed to support companies in IoT related domains like Memory, Processor, Sensors, Low power devices and solar electronics.

3.5. Internet of Things standardization

3.5.1 Create national expert committee for developing and adopting IoT standards in the country. The expert committee should comprise of industry experts/organizations

3.5.2 Facilitate global and national participation of industry and research bodies for promoting standards around IoT technologies developed in the country

3.5.3 Undertake initiatives on IoT standardization, Spectrum energy communication protocols standards, Standards for communication within and outside the cloud, International quality/integrity standards for data creation, data traceability, Standards for Energy consumption, Safety standards (for example, if devices/sensors are used on humans) and Privacy and Security Standards

3.5.4 Take part in the formation of standards and security parameters on the Steering committee of IEEE world Forum on IoT or similar forums

Chapter 4

4. Governance

4.1 Advisory Committee

An Advisory Committee (AC) including representatives from Government, industry, academia and community will be formed for providing ongoing guidance in the emerging areas of IoT. Committee should comprise of:

1. Government
    a. A State Minister for ICT - Chairman
2. Industry
    a. 3 Representatives from industry associations such as BASIS, BCS, BACCO, ECAB, ISPAB, AMTOB, CT Forum etc.
    b. 3 Industry experts on Devices (IoT), semiconductors and Nano-electronics, Sensor Technologies, Software dealing with device to device communication, integration and Networking, Cloud and application security
3. Academia
    a. 3 Representatives from BUET, Dhaka University and SUST
    b. 2 Representatives from Research and Development organizations

4.2 Governance Committee

A Governance Committee (GC) driven by Secretary, ICT Division including representatives from concerned Government organizations will be formed for governing all IoT initiatives, projects and their progress against planned timelines. Committee should be comprising of Post and Telecom Division, Ministry of Industries, NBR, BTRC, Ministry of Commerce, BSTI, BSCIC, SME Foundation, A2i Project, IDEA Project, Startup Bangladesh, Bangladesh Computer Council etc.

4.3 Program Management Unit

A Program Management Unit (PMU) at BCC led by ED, BCC or a nominated person will be established. The role of the PMU would be, but not limited to:

a. Provide ongoing support in identification of various initiatives for operationalization of the IoT Strategy
b. Provide ongoing implementation support to various initiatives within the IoT strategy
c. Track the performance of IoT initiatives vis-à-vis planned timelines and highlight issues (if any), suggest corrective actions to the Advisory Committee/ Governance Committee
d. Periodic reviews of the above-mentioned strategy would be undertaken with respect to changes proposed by the advisory or governing committee

Annex 1

Work Plan

Sl. No	Activities	Implementing Ministries/Divisions	Expected Results	Short Term (2021)	Mid Term (2023)	Long Term (2030)
1	2	3	4	5	6	7
Strategy-1: Engagement and incentives						
4.1.1	Create awareness on IoT through seminar, symposium, workshop, training, competition, media and public relation activities	ICT Division/Ministry of Industries	Understanding of IoT at all levels	100%	✓	✓
4.1.2	Promote IoT specific study tours by Industry Associations and supporting government organizations, to check the progress and global trends in IoT	ICT Division/Ministry of Industries	Interest on IoT as a business will grow	100%	✓	✓
4.1.3	Organize IoT related exhibition/fair and competitions for startups working on IoT to solve local problems	ICT Division/Ministry of Industries	Promote businesses related to IoT	100%	✓	✓
4.1.4	Imports of capital goods/ raw materials required for manufacturing IoT products imported with a duty benefit of up-to 80%	ICT Division/Ministry of Industries/Infernal Resource Division	More IoT startups will grow	50%	100%	✓
4.1.5	Capital goods/ raw materials purchased from domestic market will be entitled for reimbursements of excise duty and VAT	ICT Division/Ministry of Industries/Infernal Resource Division	Home grown IoT startups will grow	50%	100%	✓
4.1.6	Setup advisory committee, governance committee and program management unit that would help interface with various IoT attached	ICT Division	Program management and tracking on activities on IoT	100%	✓	✓

	industries and track the progress of IoT in the country					
Sl. No	**Activities**	**Implementing Ministries/Divisions**	**Expected Results**	**Short Term (2021)**	**Mid Term (2023)**	**Long Term (2030)**
1	**2**	**3**	**4**	**5**	**6**	**7**
Strategy-2: Research & development and innovation						
4.2.1	Create R&D labs for prototype development as well as hardware to hardware and hardware to software integration	ICT Division/Ministry of Industries/Ministry of Science and Technology	Rapid prototyping and R&D will grow	50%	100%	✓
4.2.2	Fund R&D in IoT for specific applications for common good	ICT Division/Ministry of Industries/Ministry of Science and Technology	Application of IoT in public sector	50%	100%	✓
4.2.3	Disburse fund to innovative IoT projects in the form of grant and/or equity for approved projects after analyzing the capabilities	ICT Division	Number of Innovative IoT based projects will grow	100%	✓	✓
4.2.4	To stimulate private sector's investment in IoT related R&D, an innovative program named "IoT Research Collaboration scheme (IRCS)" to be initiated by ICT Division in support with an aligned business association/ supporting organization	ICT Division/Ministry of Industries	Private sector's investment in IoT related R&D will grow	100%	✓	✓
4.2.5	From IRC scheme, the appointed organization will handle the whole process from Call for Proposal to project closures. The Government will collaborate and initiate joint projects for R&D in IoT on an 80% contribution basis	ICT Division/Ministry of Industries	Private sector's investment in IoT related R&D will grow	100%	✓	✓

Sl. No	Activities	Implementing Ministries/Divisions	Expected Results	Short Term (2021)	Mid Term (2023)	Long Term (2030)
1	2	3	4	5	6	7
Strategy-3: Skills enhancement and human resource development						
4.3.1	Introduction of IoT Curriculum at Engineering level and Research activity/PhD	ICT Division/Ministry of Education/UGC	Number of IoT focused graduates will grow	50%	100%	✓
4.3.2	Introduction of Trade Course, Certificate Course and Diploma Course in IoT, 12-weeks/6-weeks/24-weeks training program and setup norms for accreditation of such courses	ICT Division/Ministry of Education/UGC	Technical workforce on IoT will grow	100%	✓	✓
4.3.3	Organize trainings on IoT by inviting experts from other countries and participation in conferences for industry /educational Institutions	ICT Division/Ministry of Industries	Education and awareness on IoT	50%	100%	✓
4.3.4	Promoting workshops for working level executives from industry & faculty/researcher form academic institutions	ICT Division/Ministry of Education/UGC	Promote startups on IoT	100%	✓	✓
4.3.5	Faculty of Academic Institutions, Experts and other Professionals working in the area of IoT to be sponsored for Presenting Papers, attending - Conferences, Short-term courses, tutorials etc. both at the National as well as International level	ICT Division/Ministry of Education/UGC	Research interest on IoT projects will grow among academicians	100%	✓	✓

Sl. No	Activities	Implementing Ministries/Divisions	Expected Results	Short Term (2021)	Mid Term (2023)	Long Term (2030)
1	2	3	4	5	6	7
Strategy-4: Capacity building, incubation and financing						
4.4.1	Establish a Center for 4th Industrial Revolution for creating state of the art fabrication facility and related research and development to boost industrial productivity. This center will connect Industry and Academia, academic institutions will undertake research and development after having requirements from industry	ICT Division/ Ministry of Industries/Finance Division	Capacity development of R&D on IoT for industrial productivity	100%	✓	✓
4.4.2	Promote Institutional capacity building through Bangladesh Hi-Tech Park Authority as the executing agency and 15 academic/ institutional partners. Under this program government will fund to create Resource Centers & Test-beds as a common experimental facility supporting heterogeneity in Internet of Things (IoT) domain to help the community to experiment IoT devices and applications by combining various IoT technologies with an allocation of BDT 20 Crores as 100% fund with BDT 1 Crores for each partner and BDT 5 Crores for executing agency over a period of 5 years	ICT Division/ Ministry of Industries/Finance Division	Institutional capacity building on IoT will grow	✓	100%	✓
4.4.3	Implement IoT test-bed comprising 3 tiered IoT test-bed architecture (plug and play, middleware and application) for heterogeneous legacy and possible new types of devices	ICT Division/ Ministry of Industries/Finance Division	IoT testing facility will be increased	100%	✓	✓

Sl. No	Activities	Implementing Ministries/Divisions	Expected Results	Short Term (2021)	Mid Term (2023)	Long Term (2030)
1	2	3	4	5	6	7
4.4.4	To set up an Incubation center (National Centre of Excellence for IoT) under PPP mode with BASIS and/or other industry associations for supporting IoT industry	ICT Division/ Ministry of Industries/Finance Division	IoT incubation capacity will be increased	✓	100%	✓
4.4.5	Create eco-system for transfer of knowledge amongst startups and from industry, technology to startups and academia. The framework will help the startups from idea to prototype to product and necessary industry interface	ICT Division/ Ministry of Industries/Finance Division	IoT startups will grow	100%	✓	✓
4.4.6	Promote Venture Funds specifically directed to support companies in IoT related domains like Memory, Processor, Sensors, Low power devices and solar electronics	ICT Division/ Ministry of Industries/Finance Division	Funding for IoT based startups to be boosted	✓	100%	✓

Sl. No	Activities	Implementing Ministries/Divisions	Expected Results	Short Term (2021)	Mid Term (2023)	Long Term (2030)
1	2	3	4	5	6	7
Strategy-5: Internet of Things standardization						
4.5.1	Create national expert committee for developing and adopting IoT standards in the country. The expert committee should comprise of industry experts/organizations	ICT Division/Post and Telecom Division/Ministry of Industries/BSTI	Established national standard on IoT will be there	100%	✓	✓
4.5.2	Facilitate global and national participation of industry and research bodies for promoting standards around IoT technologies developed in the country	ICT Division/Post and Telecom Division/Ministry of Industries/BSTI	In country standards will be promoted	50%	100%	✓
4.5.3	Undertake initiatives on IoT standardization, Spectrum energy communication protocols standards, Standards for communication within and outside the cloud, International quality/integrity standards for data creation, data traceability, Standards for Energy consumption, Safety standards (for example, if devices/sensors are used on humans) and Privacy and Security Standards	ICT Division/Post and Telecom Division/Ministry of Industries/BSTI	Locally produced IoT products to be of high standard	100%	✓	✓
4.5.4	Take part in the formation of standards and security parameters on the Steering committee of IEEE world Forum on IoT or similar forums	ICT Division/Post and Telecom Division/Ministry of Industries/BSTI	Contribution in setting the global standard	100%	✓	✓
4.5.5	Create standards for framework, architecture, integration, interoperability, compatibility, network, firmware, signal processing etc.	ICT Division/Post and Telecom Division/Ministry of Industries/BSTI	Nationally recognized commo standard for all IoT products	100%	✓	✓