



IMPACT OF CYBER SECURITY IN DIFFERENT APPLICATIONS ON E-GOVERNANCE

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Introduction

Look around the world, you'll see that our daily lives are more dependent on technology. The benefits of this technology can range from access to simple information on the internet to automatic cars, robots, and many other concepts like Machine Learning, Internet of Things. With so much technology on our hands, it is hard to believe that darkness resides behind every device and platform. This concern forces every individual to ask themselves what Cyber Security is, why is it so important and what we must do to protect ourselves from the darkness of the Internet.

Cyber Security, in simple terms, means defending various systems, networks, programs, mobile devices, and the sensitive data which they hold from Cybercriminals, and hackers. Data is important whether it may be personal information or sensitive information of an organization, or any other type of data is considered a huge risk if falls into wrong hands. It is also known as Information technology Security/Electronic Information Security. The main task of Cyber Security is to reduce the risk of cyber-attacks and to protect against unauthorized entry into systems, networks, etc.

Over the past few years, Cyber-attacks were launched against important organizations, well-developed countries, and all over the world due to this, uncountable businesses confronted huge losses. There were over 2000 confirmed data breaches globally each year, with a loss of over \$3.9 million on an average and more. According to Forbes, 2022 will be facing much more complicated cyber security challenges and the losses are expected to reach around \$10 trillion annually by 2025, it is also predicted that global cybercrime will rise to 15% yearly for the next four years. Reasons like COVID-19, cryptocurrency and many others are favorable for cybercriminals to take advantage of.

Types of Cyber Threats:

- **Cyber Crime:** attackers use the computer for their own personal gain, such as committing fraud, stealing identities, or violating privacy.
- **Cyber Attack:** An attack targeting an organization and destroying the integrity of the data or stealing controlled information.
- **Cyber Terrorism:** as the term refers it uses the internet to carry out violent acts that may threaten or even lose a life, to achieve political gains through threat.

So, let's see how an attacker can gain control of systems using different methods:

- **Malware:** is any software intentionally designed to cause damage, to a server, or client. As there are different OS and different architectures so the number of malware is increasing exponentially. Malware is a superset of all malicious files, this malware is further divided into categories like trojan, virus, and ransomware.
 - a. **Virus:** is malware that destroys files and spreads throughout a computer system, infecting files with malicious code.
 - b. **Botnets:** it is a collection of compromised systems where every single system acts like a zombie and executes commands from the botnet controller, this controller sends a command, and each zombie must execute the same command.
 - c. **Backdoor:** is a type of malware that provides an attacker a connection with the capability to execute OS commands.
 - d. **Keylogger:** is a type of malware that records keystrokes pressed by the user and sends the key logs to the attacker.
 - e. **Adware:** advertising software that can be used to spread malware.
 - f. **Stealer:** is a type of malware that steals user credentials from a compromised host.
 - g. **Ransomware:** is malicious software that infects your computer by encrypting all your files and displays messages demanding money for your system to work again.
- **SQL Injection:** SQL injection is a web vulnerability that allows an attacker to retrieve data from the database. An attacker injects SQL queries to fetch data from the database so that he can also modify the data. In some cases, the attacker injects malicious code which can compromise the whole server. SQL injection is considered one of the major and critical web vulnerabilities in Web Applications.
- **Phishing:** where attackers target victims with emails that appear to be legitimate and fool them into handing over sensitive data. This is also known as Social Engineering attacks and is further divided into,
 - a. **Angler Phishing:** these are the kind of phishing attacks where customer service account is used on social media.
 - b. **Pharming:** in this attack web traffic is redirected from legitimate sites to malicious clones.
 - c. **Smishing:** text message is used to redirect users to a malicious website or bypass the two-factor authentication.
 - d. **Vishing:** attackers use phone calls to scam an individual.
 - e. **Baiting:** attacker uses tempting offer for compromising their security, like handing over vouchers for shopping websites.
 - f. **Dumpster Diving:** this is not an attack but a physical form of attack where users' garbage is searched for sensitive data.
- **Man-in-the-middle-attack:** is an attack where a hacker intercepts communication between two individuals to steal data.
- **DDOS:** distributed denial of service which means that it is not only limited to a single attacker, but he would use multiple computers on the internet to exploit the server by making thousands and thousands of requests from the computers, with this the server becomes unstable and actual clients who are trying access the services would not be able to access them.

As we know the primary objective of Cyber Security is to protect data. Cyber security is explained in terms of a few triads that describe the objectives of security professionals and the methods they use to ensure that the data is secure, which is known as the **CIA Triad**. These days businesses from small scale to large scale depend upon computer networks to complete their daily task, they must make sure that their systems and networks are reliable and secure to provide satisfactory services to their customers. To analyze the risk and the cost of protecting their networks, data, and systems, we must know about 3 main important goals.



- **Confidentiality:** as the term refers, ensuring that sensitive data is kept private and accessible to those who need it, and are permitted to access it according to organization policies while blocking the rest who don't have authorization.
- **Integrity:** is to ensure data and systems are not modified without proper authorization. measures should be taken to prevent loss of sensitive data and recover from such incidents if occurs.
- **Availability:** refers to authorized users that can freely access the systems, networks, and data needed to perform daily tasks and are not hindered by system malfunction, or cyber-attacks.

“E-Governance” or “e-Gov” means using electronic media, or the web to provide information and services to the public. E-Governance allows citizens and various businesses to transact governance business, it also reduces paperwork with improved databases. With the latest technology and communication, we can improve the services which are provided to citizens, and with an increase in interaction between government and citizens, businesses, and the industry we can observe more efficient management. As I have mentioned before E-governance is not just tech tools but bringing a change in the society that every normal individual can interreact with government processes, so it is crucial to have good knowledge about the services offered by the government.

As a citizen, it is normal and important to pay bills like electricity, water, phone, tax by the end of the month and can be paid over the Internet. Internet is significant nowadays and everyone is dependent on it when a citizen wants to make use of government service it comes under e-governance.

There are 4 pillars of **E-GOVERNANCE:**

- **Connectivity:** is required to provide services to the citizens, so strong connectivity is required for efficient e-governance
- **Knowledge:** as in technical knowledge, it is important to hire engineers who can manage all the e-governance services and fix the errors to improve efficiency.
- **Data Content:** database is required to store data and to share knowledge over the internet.
- **Capital:** money required by the government to provide various services.

ICT

Information Communication Technology (ICT) is the backbone of E-governance and plays a key role in the development and Economic growth of Rural India. Can also be said ICT + Governance= E-Governance, the main goal of e-governance is to deliver SMART government, in simple terms to make services offered by the government to be more efficient, accessible, and convenient to citizens.

ICT is the channel that delivers information and knowledge to citizens to improve the range of choices for economic and social empowerment. In the coming, future people will be carrying a powerful computer in their hands with connected internet to get information around the world at their fingertips. The government is planning to transform India by converting all the interactions at all levels to electronic mode(e-governance) by 2020.

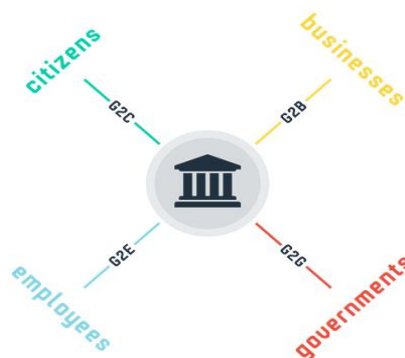
E-Governance Applications/Initiatives:

- **E-Payment:** with the help of e-payment service we can make transactions with any online merchant securely to traditional payments such as bank transfers, and checks, they are convenient and time-efficient. PayGov is a service initiated by the government for online payments.
- **Aadhaar:** a service that is mandatory and available to every citizen of India, this is a unique identification number issued by UIDAI that serves as proof of identity and address based on the biometrics of an individual.
- **UMANG:** Unified Mobile Application which provides access to central and state government services including Aadhar, Digital Locker, PAN, Employee Provident Fund services, etc.
- **Digital Locker:** this is an online platform that helps citizens to store and share important documents like 10th, and 12th Mark sheets, Passport, Aadhaar, PAN, and many more.
- **DARPAN:** it is a tool that is available online which enables us to view and monitor projects that are going on in India.
- **e-Education:** Since COVID-19 all the schools present in India shifted to online Education, with this situation government implemented Free Wi-Fi in all secondary and Higher Secondary Schools for efficient and convenient education.
- **SWAYAM:** this is under the domain of E-education, Massive Online Open Courses (MOOCs). It is an e-learning platform for students which provide course from class 10 to post-graduation which can be accessed from anywhere and anytime.
- **e-Seva:** a successful project initiated by the government with 'Government to Citizen' and 'e-Business to Citizen' services. E-Seva facilitates payment of utility bills, issuance of certificates, licenses and permits, and many more. This is one of the most successful projects initiated by the government.

Services Of E-Governance

Now let's discuss e-governance in more detail, we can say there are types of government, or the services offered by government when certain conditions are met, it can only happen if and only if the government makes plans and implement them like telecommunication infrastructure, budget resources, security and privacy, all necessary support from government departments and so.

Few main target groups that can be characterized by governance concepts are Government, Citizens, Business, and Employees.



G2G (Government to Government)

This model deals with the interaction between different governments/agencies it can any e-commerce transaction whether it be sharing of data/resources. These activities are mainly aimed at improving the efficiency of government operations. An effective G2G has the necessary resources for alliance and communication between governments with the objective of better-serving citizens. The main motive of G2G is to support e-government services by improving communications, and data access/sharing.

This model will give access to governments to be more efficient with help of technology tools such as:

- Biometrics
- Electronic entry

G2C (Government to Citizens)

People are key to politics, government, as well as governance. In simple terms, it is e-commerce between government and people, the services provided by the government to the public come under this G2C model.

E-government applications are the best example of this business model. The main objectives of the G2C services are to ensure unbiased distribution of information for all, acceptance of citizens' feedback, and improve services. These services include electronic transactions between government and citizens i.e., registering land, registering vehicles, registration of birth, marriage certificates, death certificates, issuing of passports, ration cards, making an appointment for driving tests, renewing driver's license, filing income taxes, pay taxes, payment of bills, hospitals (linking of various hospitals in different parts of the country to ensures better medical services to citizens), education (availability of the e-learning modules to the citizens, right to education) and much more.

G2B (Government to Business)

This business model is similar to G2C instead of citizens in this model all the services are offered by the government to business agencies. Communication is done through the internet between government and business organizations which is more efficient. These organizations use business websites, applications, web services, etc. One of the best examples of the G2B model is government contracting, this service helps to organize various tasks related to viewing and applying for government contracts, making it easier to bid, win, and organize the contracts.

As mentioned before, information is shared via the internet, and business organization uses that information to start up new businesses. For businesses, G2B can result in increased awareness of opportunities to work with the government and can reduce cost with improved efficiency of transactions, and for businesses, G2B also reduces cost with increased efficiency.

Services Offered by G2B Business Model:

- E-learning
- Electronic Auctions
- Online Meetings
- Data Centres- SaaS, PaaS, IaaS
- Sending online Payments
- Sending filled out forms

G2E (Government to Employees)

As the term refers to G2E, the transaction that happens between government and their employees, it is the most crucial model among the four models of e-government. This extends everything from how the employees are hired, to payroll, training, and much more, this also includes software for maintaining sensitive information and records of employees.

G2C is an efficient way to keep the employees keep updated all the time instead of waiting for someone to send them, it is also the best way for employees to educate themselves through e-portals(distance learning). E-government services make it possible for employees to become paperless and send important documents without any delay.it is particularly important where field services are included, the field employees can log in from anywhere in the world and receives an update from time to time in a single touch.

Services provided by the G2E model:

- E-Seva
- CET (common entrance test)
- E-Mitra
- E-training
- Digital land management system
- Aadhaar
- NSDL-Pan

Although there are Different Applications and Models of E-Governance, there are few challenges to E-Governance in India

- **Language:** As we know our country is diversified into many cultures, with more cultures there are more language barriers, our country majorly consists of 22 languages and this challenge is considered crucial as all the e-governance applications are in English.
- **Low Literacy:** The literacy level of our country is considered low at 74.04% (82.14% for males, 65.14 for females) when compared to other countries, as illiterate citizens are not able to access e-governance applications there won't much success rate for government projects.
- **Low Digital Literacy:** Digital literacy as in the name suggest whether an individual can use technology efficiently or not, digital literacy in our country is higher than 61% so this is considered a major drawback for E-governance.
- **Lack of Integrated Services:** There are various departments in government, as there are many services offered at the state level and central level government it is seen that communication between different departments is not unified, this is a crucial issue as information delay is seen.
- **Awareness of e-governance:** As there are various services offered by the government, it is not well known among the citizens so awareness is a must.
- **Services are not accessible:** 68.84% is the rate of rural areas in India, there are as many as 597,608 inhabited villages in India and among them, 82,151villages have a population of less than 200. It can be seen how difficult it would be for the people to access government services.
- **Geography:** As I have mentioned before, all the rural areas are not able to access the services so communication networks must be established in each corner of our country for more efficiency in e-governance.
- **Per Capita Income:** The per capita income of India at current prices during 2020-21 is estimated to have attained a level of 128,829 Indian rupees, this is low as compared to other countries. For example, it's 10x times more in the USA compared to India (India-6390 PPP dollars, USA-66090 PPP dollars). with this issue, it would be difficult to afford online services which are offered by the government.
- **Privacy & Security:** A small bug in the software can lead to a huge loss as government servers contain citizens' private and sensitive information, so it is necessary to take measures and keep the data safe.

Conclusion

The government of India has come a long way from scratch and has taken remarkable steps toward the implementation of E-governance. In this Era, the role of E-governance is significant because countries all over the world can maintain a good relationship with each other, as quoted by **Sir Francis Bacon** “**Knowledge is Power**”, In e-governance, we can empower ourselves by accessing crucial information at a minimal time, cost, and price.

