

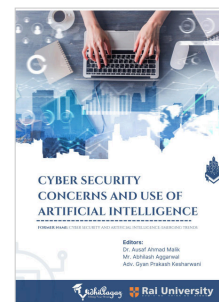
CHAPTER 15

Cyber Crime: Law Enforcement and Procedural Challenge

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CYBER CRIME: LAW ENFORCEMENT AND PROCEDURAL CHALLENGE

Dr. Poonamdeep Kaur¹⁹ and Prerna²⁰

ABSTRACT

Cybersecurity has emerged as a major concern for people, businesses, and governmental entities, because of the growing need for digitalisation and the changing nature of cyber threats. This study explores the most recent developments in cybersecurity, such as the increase in phishing schemes, ransomware attacks, and the use of vulnerabilities in key infrastructures. The rising use of artificial intelligence (AI) and machine learning (ML) by cybercriminals to automate assaults and take advantage of system flaws is making these threats more complex. Predictive analytics, automated threat response, and anomaly detection are more defensive uses for AI and ML. Cybersecurity plans have become more complex due to the dynamic and ever-escalating conflict between cyber attackers and defenders brought about by these technologies. The Internet of Things (IoT) and cloud computing are growing at a rapid pace, which has increased the attack surface for hackers significantly in addition to AI-driven threats. Although they provide flexibility and scalability, cloud services come with hazards including data breaches and unauthorised access to private information. In a similar view, a lot of Internet of Things (IoT) devices lack strong security features, which leaves them open to widespread Distributed Denial of Service (DDoS) assaults and unapproved access. Therefore, protecting personal data, guaranteeing cyber resilience in essential infrastructures, and maintaining financial systems have become major priorities for all parties involved in the digital ecosystem. Concerns about the future are raised by the growing dependence on networked digital platforms, since vulnerabilities will grow if strict security measures are not implemented. Cybercrime continues to be a rising threat despite several preventive measures, and its global nature makes law enforcement operations more difficult. Because cyberspace is globalised, cybercriminals can operate internationally by taking advantage of legal frameworks that are out of date and regulatory inadequacies. To counter these dangers, legal measures like the General Data Protection Regulation (GDPR) in Europe and cybersecurity regulations in the US, China, and India have been implemented. To solve jurisdictional and enforcement difficulties, international coordination and flexible legal frameworks are necessary, as existing laws are unable to keep up with the fast evolution of cyberattacks. The enforcement of laws is complicated by jurisdictional overlaps and the absence of clear international agreements, necessitating coordinated international efforts to simplify legal responses. The most recent developments in cybersecurity strategies, methods, and future directions are also included in this study. For the purpose of identifying and automating responses to cyber threats, emerging developments in AI, ML and other advances are essential. The report emphasises how crucial it is for academics, decision-makers and business leaders to work together to create practical plans for handling the current state of cyberthreats. In order to secure information systems, preserve privacy and reduce threats in the future, it is imperative that cybersecurity measures be continuously adopted and that international efforts are coordinated.

INTRODUCTION

Cybercrime refers to illegal actions carried out via digital devices, networks or the internet. These crimes are difficult to control and prosecute because they frequently cross national borders. A significant international convention called the Budapest Convention on Cybercrime outlines a broad range of offences, such as financial fraud, cyberterrorism, hacking and data breaches. This wide scope

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which targets not just individuals but also organizations and governments, underscores the complex nature of cybercrime.

The development in cybercrime in the twenty-first century has changed the criminal environment by presenting both opportunities and difficulties due to technical advancements. Any illegal activity involving computers, networks and the internet can be categorized as cybercrime. These crimes frequently cross international borders which presents difficult jurisdictional issues. The Budapest Convention on Cybercrime defines cybercrime as a broad category of offences that includes financial fraud, cyberterrorism, hacking, data breaches and child exploitation. This broad definition highlights the variety of hazards that cybercrime presents to governments, businesses and private citizens.

Growth of Cyber Crime

In recent decades, there has been an exponential increase in cybercrime, primarily due to the growing dependence on digital technology. INTERPOL estimates that in 2020, cyberattacks will have a global economic impact of more than \$1 trillion. This growth is attributed to multiple factors:

1. Increased Internet Usage: As more people and companies move their operations online, cybersecurity vulnerabilities have expanded, giving thieves additional possibilities.
2. Technological Advancements: Cybercriminals now have a larger attack surface because to innovations like cloud computing, artificial intelligence, and the Internet of Things (IoT).
3. COVID-19 Pandemic: The widespread illness caused a sharp increase in ransomware attacks on vital industries including healthcare, which in turn caused a spike in cybercrime.

Impact of Cyber Crime

Cybercrime has a wide-ranging impact on various aspects of society, including:

1. Impact on the Economy: Cyberattacks cause large financial losses. Companies lose billions of dollars a year as a result of fraud, extortion and data breaches. Consequently, economies become unstable, operations become disrupted and reputations are harmed.
2. Social Impact: Identity theft, cyberbullying and cyberstalking victims frequently experience long-term psychological damage on a personal level. The adoption of new technologies is made more difficult by the erosion of public confidence in digital systems.
3. National Security: With the rise of cyberterrorism, cybercrime has become a serious threat to national security. Attacks against vital infrastructure, such financial institutions or energy systems, have the potential to destabilise entire countries and have a domino impact on world stability.

HISTORICAL EVOLUTION AND TRENDS

Cybercrime's origins may be traced back to the early days of computers, and its history is intimately linked to the advancement of digital technology. Cybercrime has become more sophisticated and sophisticated as technology has advanced, evolving from relatively basic acts of hacking to sophisticated, worldwide concerns that affect both the public and commercial sectors. Gaining

knowledge about the past development of cybercrime is essential to understanding its present patterns and potential future directions.

1. Early Developments (1960s - 1980s):-

The first large-scale computer systems appeared in the middle of the 20th century, sowing the seeds of cybercrime. In this time frame: Early hackers, frequently students and hobbyists, broke into computer systems in the 1960s and 1970s mostly out of curiosity and exploration rather than for financial gain. These early hacking techniques were mostly benign and aimed at testing the boundaries of computer technology. The first computer viruses appeared in the 1980s. For example, the 1982-discovered "Elk Cloner" virus was among the first known viruses to infect personal computers, despite its relative innocuous nature. Governments began recognizing the potential for malicious activities. In 1986, the U.S. passed the Computer Fraud and Abuse Act to address unauthorized access to computer systems, one of the earliest attempts to regulate cyber crime.

2. The Rise of the Internet (1990s)

With the development of the internet in the 1990s, cybercrime underwent a sea change in terms of reach and size. What started out as casual hacking or exploratory hacking soon turned into commercial hacking. Cybercriminals started making money by taking advantage of weaknesses in increasingly linked systems. An Overview The late 1990s saw a surge in online banking and e-commerce, which gave rise to crimes such as credit card fraud, identity theft, and internet frauds. During this time, phishing—a technique used to mislead people into. In 1995, the arrest of Kevin Mitnick, one of the most notorious early hackers, symbolized the growing seriousness of cyber crime. Mitnick's infiltration of major U.S. corporations demonstrated the economic impact and the national security risks posed by these crimes, disclosing financial and personal information—became very popular.

3. Cybercrime's Globalisation in the 21st Century

At the turn of the century, cybercrime became more widespread as the internet became a necessary tool for communication, trade, and day-to-day living: Illegal groups started taking use of the anonymity offered by the internet to carry out their illegal operations on a worldwide basis. These organisations were in charge of extensive financial fraud, drug trafficking, and even acts of terrorism, all of which were made possible by internet platforms. When the Dark Web first gained popularity in the early 2000s, it offered a covert, anonymous market for illegal goods and services, such as drugs, firearms, and data theft. The FBI closed down The Silk Road, one of the most notorious Dark Web marketplaces, in 2013, yet comparable websites still exist today. Viruses and worms are examples of malware attacks that have become increasingly complex. Millions of users worldwide were affected by the ILOVEYOU virus in 2000 and the Slammer worm in 2003, which showed how swiftly and destructively these attacks might spread. Over the last ten years, there has been a noticeable increase in ransomware assaults, in which hackers encrypt victims' data and demand payment to decrypt it. High-profile events like the 2017 WannaCry attack exposed the weaknesses of even vital infrastructure, devastating healthcare systems and businesses worldwide. States now frequently target other countries through cyber espionage and state-sponsored assaults in an effort to gain political, military, or economic leverage.

Examples include attacks on Ukraine's electricity grids and Russia's purported meddling in the 2016 US elections. The emergence of cryptocurrencies has given rise to new avenues for cybercriminals, particularly in fraud and money laundering. Cryptojacking has also proliferated, in which cybercriminals mine bitcoin using the computer power of their victims.

LAW ENFORCEMENT AGENCIES

India has recognised the growing necessity for specialised law enforcement organisations capable of addressing the increasing complexity of digital offences and has established a multi-layered approach to combat cyber crime. These organisations function at the federal, state, and municipal levels, each focussing on particular facets of cybercrime and making an effort to stay up with the swift advancements in both technology and criminal strategies. Nonetheless, issues with funding, coordination, and training continue to have an impact on the effectiveness of cybercrime enforcement nationwide.

Cyber Crime Investigation Cells

The establishment of Cyber Crime Investigation Cells (CCICs) is one of the most important aspects of India's cybercrime enforcement environment. These specialised cells are largely in charge of looking into and responding to offences relating to cyberspace, and they have been established in several states. Dealing with a wide range of crimes, including hacking, identity theft, online financial fraud, data breaches, and cyber harassment, is part of their work. Through the use of digital forensics, CCICs are able to track down cybercriminals using their electronic footprints, examine trends in data, and gather proof for court cases. But in spite of their significance, many CCICs face obstacles like inadequate technology resources, a shortage of skilled staff, and lengthy legal procedural bureaucracy. Some states, such as Maharashtra, have led the way in developing well-equipped and efficient cybercrime units, but this degree of expertise is not shared by all regions.

The Indian Computer Emergency Response Team

At the national level, the Indian Computer Emergency Response Team serves as the key agency for responding to cybersecurity incidents. CERT-In, which reports to the Ministry of Electronics and Information Technology, is in charge of monitoring cybersecurity risks, issuing alerts, and coordinating responses to large-scale cyber attacks on vital infrastructure. This covers situations like ransomware assaults, denial of service (DoS) attacks, and data breaches, which can affect both the public and commercial sectors. CERT-In has played an important role in mitigating high-profile cyber threats, such as the WannaCry ransomware outbreak, which impacted many organisations and institutions in India. In addition to responding to incidents, CERT-In collaborates with both domestic and foreign organisations to combat cybercrime, which is critical given the global nature of digital threats.

The National Cyber Crime Reporting Portal

The National Cyber Crime Reporting Portal has strengthened India's ability to tackle cybercrime by providing a centralised, easily accessible platform for victims to report cybercrimes. This portal, which is part of the government's Cyber Crime Prevention against Women and Children (CCPWC) project, allows anyone, even anonymous users, to file complaints online regarding sensitive subjects such as

cyber harassment, cyberstalking, and revenge pornography. By making it simple for victims to report crimes, the portal reduces the hesitation that sometimes comes with traditional police reporting, especially in cases involving personal and financial harm. Once a complaint is filed, it is forwarded to the appropriate state or national agencies for investigation, resulting in a faster and more coordinated response.

In addition to national efforts, numerous states have made substantial headway in establishing cyber police stations and state-level cybercrime units. These specialised police stations only handle cybercrime cases, with trained officers and forensic professionals focussing on internet scams, hacking, and social media offences. For example, Maharashtra's cyber police deal with hundreds of cases per year, ranging from high-profile corporate espionage to internet harassment and identity theft. Similarly, Delhi's Cyber Crime Unit has achieved tremendous progress in combating cyberstalking, financial fraud, and crimes against women, underscoring the importance of gender-sensitive methods to cybercrime enforcement. These state-level initiatives are critical because they address region-specific cyber risks while reducing the pressure on overburdened national agencies.

While certain states, such as Maharashtra, Karnataka, and Telangana, have established more modern cybercrime units, India's overall cyber law enforcement landscape remains unequal. Many jurisdictions still lack appropriate resources and skilled personnel, limiting their ability to combat increasingly complex cybercrimes. The challenges of under-resourced cybercrime cells, as well as the lack of suitable legislative and technical frameworks in some places, provide weaknesses for cybercriminals to exploit. Furthermore, the necessity for ongoing capacity-building programs and training workshops is critical, as law enforcement agents must stay current on the latest technology and cybercrime tactics.

DATA BREACHES IN AUSTRALIA

In December 2022, Australia faced a significant data breach involving Medibank, which affected around 9.7 million customers. The breach was orchestrated by the ransomware group REvil, believed to be linked to Russian cybercriminals. Sensitive data, including medical records, passport numbers, and birthdates, was leaked. Medibank opted not to pay the ransom, and the stolen data was reportedly made available on the dark web. While there were no immediate reports of financial fraud, authorities advised customers to remain vigilant regarding their personal information.

Also, The Optus data breach, which occurred in September 2022, is one of Australia's largest cyber incidents, affecting approximately 10 million customers. The breach involved unauthorized access to sensitive customer information, including names, dates of birth, phone numbers, email addresses, and, in some cases, driver's license and passport numbers.

The breach was allegedly carried out by a hacker who claimed to have accessed Optus' systems and offered to sell the stolen data on dark web forums. The attack raised significant concerns about Optus' data security practices and prompted investigations by the Australian Federal Police (AFP) and the Office of the Australian Information Commissioner (OAIC).

In response to the breach, Optus implemented several measures to enhance security and offered affected customers support, including credit monitoring services. The incident sparked discussions on the need

for stronger regulatory frameworks and cybersecurity measures across the telecommunications sector to protect consumer data more effectively.

CHALLENGES IN CYBER LAW ENFORCEMENT

India's law enforcement agencies are facing a variety of challenges when dealing with cyber crime, largely due to the dynamic and evolving nature of technology. Cybercriminals are constantly refining their tactics, making it difficult for the existing legal and enforcement frameworks to keep pace. These challenges are not just technical but also involve issues related to jurisdiction, capacity, and international cooperation. Below is an in-depth exploration of some of the primary challenges.

Technological Challenges

One of the most serious barriers to executing cyber laws in India is the presence of technological gaps among law enforcement authorities. As cybercriminals increasingly use modern technologies like AI and machine learning to automate assaults, exploit system weaknesses, and build sophisticated phishing schemes, many Indian law enforcement agencies struggle to keep up with the changes. They are unable to properly combat and investigate cybercrime because they lack access to cutting-edge technologies and tools.

- *Outdated Tools and Resources:* Many cybercrime units, particularly at the state level, rely on out-of-date software and forensic tools that are insufficient to combat complex cyber threats such as ransomware, Distributed Denial of Service (DDoS) attacks, and deepfake technologies. The lack of contemporary encryption-breaking technologies and data recovery processes limits investigators' capacity to collect key evidence from encrypted devices and networks, stalling investigations and resulting in incomplete data retrieval.
- *Limited Expertise:* As technology advances in cybercrime, law enforcement officials must keep their skill sets current. However, many units lack individuals with specialised knowledge in fields such as ethical hacking, network forensics, and virus analysis. In many circumstances, police personnel and investigators are not given appropriate training on the latest digital forensics technologies, AI-driven malware, or cloud-based criminal operations, further widening the gap between cybercriminals and law enforcement.
- *Inadequate equipment:* Aside from outmoded tools, many cybercrime cells work in conditions that lack the required equipment to conduct advanced cyber investigations. For example, some states' digital forensic labs may not have enough processing power to analyse enormous amounts of data, or they may lack the required cybersecurity safeguards to protect sensitive information during investigations.
- *IoT and Cloud Vulnerabilities:* With the advent of the Internet of Things (IoT) and cloud computing, the cyber attack surface has grown rapidly. Many IoT devices lack effective security safeguards, making it difficult for law enforcement agencies to secure and investigate crimes involving them. Similarly, cloud storage complicates data retrieval across borders

because some servers are located in nations other than India. The inability to quickly access and secure cloud data leaves investigators hamstrung in time-sensitive cases.

Judicial Challenges

Fragmented Legal Framework: In India, cybercrime is largely punished under the Information Technology Act of 2000, which offers a legal framework for dealing with offences such as hacking, identity theft, and data breach. However, the reach of the IT Act is limited to Indian borders, making it impossible to prosecute criminals stationed abroad. Furthermore, the lack of an internationally harmonised legal framework for cybercrime creates gaps that cybercriminals might exploit.

Extraterritorial Jurisdiction: While Indian law enforcement has the authority to pursue cyber offences affecting the country under the IT Act's extraterritorial jurisdiction clauses, applying these laws is difficult in practice. Requests for cooperation from foreign governments, particularly in acquiring digital evidence, are frequently delayed or ignored due to bureaucratic red tape, different legal systems, and competing agendas. Even when Indian police have identified the culprits of cybercrimes, extradition can be a lengthy and complicated process, further delaying justice.

Other Challenges

1. Complexity in Obtaining Digital Evidence:- It is challenging to gather digital evidence in a way that is legally admissible in court because of the nature of cybercrime. In contrast to physical crimes, where concrete evidence may be found at the scene of the crime, cybercrime investigations frequently need access to data that is held in many locations, such as encrypted platforms or foreign servers. The formalities involved in requesting access to such data might be cumbersome and impede prompt prosecution, particularly if the data is kept outside of India. Due to legal or procedural obstacles, law enforcement organisations frequently experience delays in receiving evidence from service providers, both domestically and internationally.

2. Chain of Custody for Digital Evidence:- In cybercrime investigations, keeping an appropriate chain of custody for digital evidence is essential to prevent tampering, but it is also one of the most difficult tasks. If not adequately secured, digital evidence—such as emails, logs, or malware—can be quickly changed or erased. In India, protocols for the management, preservation, and exhibition of digital evidence are still developing. Technological and knowledge deficiencies may give rise to procedural inaccuracies, rendering evidence inadmissible in court. It's possible that law enforcement personnel lack the necessary training to preserve the integrity of digital evidence while conducting investigations.

3. Slow and Complex Mutual Legal Assistance Treaties (MLATs):- When cybercrimes involve perpetrators or servers located outside India, law enforcement agencies must often rely on Mutual Legal Assistance Treaties (MLATs) to obtain evidence or extradite suspects. These treaties are slow and bureaucratic, often taking months or even years to process, which significantly hinders timely investigations. Cybercrimes, by their nature, evolve quickly, and this procedural delay makes it difficult for investigators to act within the necessary timeframes. The legal process for requesting cross-border cooperation is lengthy, often resulting in lost evidence or suspects fleeing jurisdiction.

4. Lack of Standard Operating Procedures (SOPs):- Cybercrime investigations across different states and jurisdictions in India often suffer from inconsistencies due to the lack of standardized operating procedures (SOPs) for cybercrime cases. This leads to different approaches in handling similar cases, causing inefficiencies and delays. The absence of a national framework for cybercrime investigation procedures, from data collection to prosecution, results in cases being handled differently across regions. For instance, some states may have more advanced cybercrime cells with updated forensic labs, while others lack the basic infrastructure, resulting in uneven enforcement.

5. Prolonged Judicial Procedures:- Even when law enforcement successfully gathers evidence and arrests suspects, the judicial process in India is often slow. Cybercrime cases can take years to proceed through the courts due to procedural delays, backlog of cases, and the lack of specialized knowledge among judicial officers. The absence of fast-track courts specifically for cybercrime means that cases are subject to the same delays as other criminal matters, leading to long waits for justice. Furthermore, many judges are not adequately trained in understanding the technicalities of cybercrime, which complicates the prosecution process.

6. Procedural Gaps in International Cooperation:- Cybercrime is a worldwide phenomenon by definition, and procedural challenges frequently arise when international cooperation is required. While India has signed various international treaties, there is still a lack of smooth coordination between Indian officials and their overseas counterparts. The bureaucratic structure of foreign law enforcement cooperation causes delays in transmitting intelligence, evidence, and suspect information. Furthermore, disparities in cybercrime legislation and data privacy standards between nations present further procedural challenges for Indian law enforcement organisations seeking information from international firms.

7. Limited Use of Cybercrime Legislation:- Although India has laws to combat cybercrime, such as the Information Technology Act (2000), procedural gaps frequently arise when applying these laws to new and growing types of cybercrime. For example, many crimes involving AI-driven assaults, ransomware, or IoT vulnerabilities are not specifically covered by existing legislation, creating procedural confusion on how to address such instances. Furthermore, cyber laws in India are not always clear, causing delays in prosecution as courts try to interpret and apply outdated or unclear legislation to modern cybercrime scenarios.

The procedural hurdles in cyber law enforcement in India include difficulties in gathering, preserving, and presenting digital evidence, sluggish international collaboration, inconsistencies in investigative techniques, and lengthy judicial processes. To improve the effectiveness of cybercrime investigations, clearer guidelines, speedier legal frameworks, and greater cross-border collaboration will be required.

SUGGESTIONS AND CONCLUSION

1. Law enforcement organisations must be armed with cutting-edge forensic techniques, such as artificial intelligence (AI) and machine learning (ML). These tools would improve the ability to monitor cybercriminal activity, decipher encrypted data, and analyse blockchain networks.

2. Law enforcement personnel, especially judicial officials, should get specialised training in digital forensics and cyber investigations as part of ongoing professional development programs. Such training will help them to keep up with the changing nature of cybercrime.

3. The government should establish a set of thorough Standard Operating Procedures (SOPs) that apply to all cybercrime investigations across countries. This would standardise investigative procedures, assuring a consistent approach to the gathering, preservation, and presentation of digital evidence. The creation of dedicated cybercrime courts or a fast-track method for adjudicating cybercrime cases would shorten delays and assure swift justice. Also considering technical nature of cybercrime, specialised courts are required for effective judicial processes.

4. A concerted national campaign should be launched to raise public awareness of cyber risks, prevention measures, and reporting procedures. Such programs would help to address the issue of underreporting by encouraging residents to actively engage with law enforcement organisations.

5. India must prioritise the negotiation of more effective Mutual Legal Assistance Treaties (MLATs) to speed up evidence exchange and cross-border extradition of cybercriminals. Streamlined legal collaboration with other countries is critical in combating cybercrime's international nature.

6. India must prioritise the negotiation of more effective Mutual Legal Assistance Treaties (MLATs) to speed up evidence exchange and cross-border extradition of cybercriminals. Streamlined legal collaboration with other countries is critical in combating cybercrime's international nature. The development of dedicated legal standards for the prosecution of new-age cybercrimes will give clarity in legal interpretation and application, improving the efficiency of judicial proceedings in cybercrime matters.

7. Collaboration between government agencies and private enterprises, particularly in technology, finance, and cybersecurity, should be promoted. This cooperation would allow law enforcement and industry parties to share intelligence, technical expertise, and resources to their mutual benefit.

This study report investigated the varied environment of cybercrime in India, emphasising the enormous problems that law enforcement agencies face in combating this expanding menace. As technology advances at an unprecedented rate, the nature of cybercrime has changed, posing new difficulties that necessitate a comprehensive and adaptable response. Despite regulatory frameworks such as the Information Technology Act of 2000 and continuous efforts to improve cybercrime units, procedural challenges exist. Key difficulties include the challenges of digital evidence collecting, jurisdictional ambiguities, and insufficient training for law enforcement personnel. These problems not only impede timely and effective investigations, but they also have an impact on overall cybercrime conviction rates. Addressing these issues will need a collaborative effort from all stakeholders, including government agencies, law enforcement, and the general public. By fostering a proactive, collaborative, and informed approach to cybercrime enforcement, India can enhance its capacity to respond effectively to this evolving threat, ensuring the safety and security of its digital landscape.
