Cybersecurity in India: An Evolving Concern for National Security

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Abstract

Cybersecurity has become a complex and fast-moving security challenge in the age of Information Communication and Technology (ICT). As the dependence on ICT is deepening across the globe, cyberthreats appear likely to penetrate every nook and corner of national economies and infrastructure; indeed, the growing dependence on computers and Internet-based networking has been accompanied by increased cyberattack incidents around the world, targeting individuals, businesses, and governments. Meanwhile, ICT is increasingly being seen by some governments as both a strategic asset to be exploited for the purposes of national security and as a battlefield where strategic conflicts can be fought. This paper examines the primacy of cybersecurity in the contemporary security debate, deepening the analysis by looking at the domain of cybersecurity from the perspective of India.

Introduction

The concept of security is a core concept in the study of international relations. Traditionally, and until relatively recently, security analysis focused on state security, viewing it as a function of the levels of threats which states face from other states, as well as the manner and effectiveness of state responses to such threats (Rather and Jose 2014). However, after the end of the Cold War, scholars shifted focus from the state-centric notion of security, enlarging the concept to include the protection of the individual (Buzan 1991). At approximately the same time, the nature of threats changed from external aggression to intra-state conflicts arising due to civil wars, environmental degradation, economic deprivation, and human rights violation. It is in this context that national security came to include within its ambit other issues of security apart from territorial protection, such as poverty, industrial competitiveness, educational crises, environmental hazards, drug and human trafficking, and resource shortages. Finally, the recent Information, Communication and Technology (ICT) revolution — including the Internet, email, social websites, and satellite communications — has revolutionised every aspect of human life, posing new challenges to national security.

Indeed, in the digital age, the arena of the national security is confronted with previously unfamiliar threats aimed at destroying a state's technology infrastructure. It is an obvious truism that, in the globalized world, the Internet and ICTs are essential for economic and social development, forming a vital digital infrastructure upon which societies, economies, and governments rely to perform their essential functions. The relatively open nature of the Internet guarantees that it is, on numerous levels, an unsafe environment (Pillai 2012). As such, cybersecurity has come to encompass a wide range of issues such as critical infrastructure protection, cyberterrorism, cyberthreats, privacy issues, cybercrime, and cyberwarfare.

In the second decade of the twenty-first century, cyberthreats are evolving and increasing at a fast pace. They are still initiated by criminal actors but also come from new sources, such as foreign states and political groups, and may have motivations other than money making. These latter may include some types of "hacktivism" in the name of a political cause, political destabilisation (e.g., Estonia in 2007), cyberespionage, sabotage (e.g., Stuxnet), and even military operations (OECD 2012, 12). The sophistication of cybercriminals, the emergence of cyberespionage, as well as the well-publicised activities of hacker collectives have combined to create the impression that cyberattacks are becoming more organised and that the degree of sophistication has increased significantly, showing clear signs of professionalisation.

Given this backdrop, states have increasingly recognized cybersecurity as a top security issue, one that will only grow in importance as time goes on (Cavelty 2012). At the same time, cybersecurity has emerged as a national policy priority to be approached in a holistic manner, encompassing economic, social, educational, legal, law-enforcement, technical, diplomatic, military, and intelligence-related aspects. "Sovereignty considerations" have become increasingly important (OECD 2012).

Cybersecurity: Term and Definition

Network outages, computer viruses, data conceded by hackers, and other incidents affect our lives in ways that range from troublesome to life-threatening, as most government and financial institutions, military groups, corporations, hospitals, and other businesses store and process an abundant deal of confidential information on computers. Thus, with the increasing volume and sophistication of cyberattacks, there is an increased need to protect personal information and sensitive business as well as to safeguard national security.

Accordingly, the term "cybersecurity" refers to the collection of tools, policies, guidelines, training, actions, security concepts and safeguards, risk management approaches, assurance, and technologies that can be used to secure and protect the cyber environment as well as organisation and user assets (ITU 2009). In addition, cybersecurity aims to secure information technology and focuses on protecting computer programs, networks, and data, along with preventing access to information by unauthorised users as well as preventing unintended change or intended/unintended destruction.

Furthermore, cybersecurity plays a vital role in the ongoing development of information technology and Internet services (UNODA 2011). In the process, state security and countries' economic well-being have become increasingly reliant upon the successful protection of critical information infrastructures. Consequently, in many countries, making the Internet as safe as possible is now integral to the development of government policy as well as new services (Gercke 2009). The rest of this article examines the extent to which India has, to date, successfully dealt with this emergent challenge.

Cybersecurity in India: Background

In the Indian context, the issue of cybersecurity has received relatively little attention from policymakers, to the extent that the government has been unable to tackle the country's growing needs for a robust cybersecurity apparatus. In short, India lacks effective offensive and defensive cybersecurity capabilities, exacerbated by the lack of access to mechanisms vital to confronting sophisticated malware like Stuxnet, Flame, and Black shades (Kaushik 2014).

Moreover, cybersecurity projects and initiatives in India are far fewer in number as compared to other developed nations. Many of the relevant projects proposed by the Indian government have remained on paper only. In addition, approved projects like the National Critical Information Infrastructure Protection Centre (NCIPC) and National Cyber Coordination Centre (NCCC) of India have failed so far to materialize. Worse, the 2013 National Cyber Security Policy of India has failed to bear fruitful results, as its implementation seems to be weak in numerous aspects, including privacy violation in general and intrusion into civil liberties in particular.

At the same time, India faces a vital need to protect critical infrastructures such as banks, satellites, automated power grids, and thermal power plants from cyberattacks (Kaushik

2014). Indeed, the Indian government has admitted that there has been a large spike in cyberattacks against establishments such as the banking and financial services sector. Malicious activity on the Internet in India has ranged from viruses, hacking, identity theft, spamming, email-bombing, web defacement, cyber defamation, to the denial of service.

For example, even though the country ranks eighty-fifth in net connectivity compared to other countries globally, it holds the seventh spot in terms of cyberattacks (Express News Service 2014). Strikingly, the number of cyberattacks rose from 23 in 2004 to 62,000 by mid-2014 (The Economic Times 2014a). The year 2013 alone saw a 136 percent increase in cyberthreats and attacks against government organizations as well as a 126 percent increase in attempts against Indian financial services organizations (Athavale 2014). Approximately 69 percent of attacks have targeted large enterprises (IANS 2014). Finally, according to a report by security software-maker Symantec, four out of ten attacks in 2014 were carried out on non-traditional services industries like business, hospitality, and personal services (Indo-Asian News Service 2014). A clear need, therefore, exists for India to develop an effective cyber-crisis management plan, in order to address these and similar challenges.

Cyber Security in India: In-Depth

The IT sector in India has emerged as one of the most significant catalysts for the country's economic growth, and as an integral part of the country's business and governance. The sector is positively influencing the lives of Indian citizens through direct or indirect contribution to the improvement of several socio-economic parameters, such as the standard of living, employment, and diversity. In addition, IT has played a key role in transforming India into a global player in providing business services as well as world-class technology solutions (DEITY 2011).

At the same time, the growth of the IT sphere has been accompanied by a tremendous and increasing need to secure the computing environment, as well as the necessity to build adequate confidence and trust in this sector (DEITY 2012). For example, most financial institutions as well as the banking industry have incorporated IT in their operations, opening up countless opportunities for growth while at the same time making these institutions vulnerable to cyberattacks in their daily activities and making the evident absence of strategies to deal with these types of threats particularly worrisome (Jain 2014).

For its part, the governmental sector has facilitated the increased adoption of IT-enabled services and programs, such as the Unique Identification Development Authority of India (UIDAI) and National e-Governance Programs (NeGP), creating a large-scale IT infrastructure and promoting corporate participation. Critical areas such as defence, finance, energy, telecommunication, transport, and other public services currently heavily depend on computer networks to relay data for commercial transactions as well as a source of information and for communication purposes. To date, the government has ambitious plans to further raise e-commerce services, cyber connectivity, and to generally enhance the use of IT in communications. Indian Prime Minister Narendra Modi's statement that "the cabinet has approved the ambitious 'Digital India' programme that aims to connect all gram panchayats by broadband internet, promote e-governance and transform India into a connected knowledge economy" is typical in this regard (The Economic Times 2014b). All of this governmental investment in the new technologies militates for the adoption of strong policies to provide robust security to these sectors (Verma and Sharma 2014).

Particularly worthy of note, an increased reliance on IT has made the systems supporting India's critical defence and intelligence community vulnerable to cyberattacks. Indeed, attacks on government machinery carry the increased threat of theft of military secrets and state secrets (Aiyengar 2010). Unsurprisingly, then, several organisations within the ambit of the Indian Ministry of Defence have taken on the responsibility of dealing with cybersecurity. For instance, in 2005 the Indian Army formed the Cyber Security Establishment to protect the army's networks at the division level as well as to conduct safe cybersecurity audits (Pandit 2005). Also, in 2010 the army established a cybersecurity laboratory at the Military College of Telecommunications Engineering in Madhya Pradesh, with a view to provide officers with specialised training in security protocols for its signal as well as data transmission networks (Governance Now 2010).

In March 2011, the Indian Ministry of Communications and Information Technology released a draft National Cybersecurity Policy, which mainly focused on the security and protection of critical infrastructure, development efforts, and public-private partnerships (DEITY 2012). In June 2012, a proposal in line with the draft policy was developed under the auspices of the National Security Council, to create the National Critical Information Infrastructure Protection Centre (under the National Technical Research Organisation). The objective was to ensure the security of the state's critical infrastructure along with national and

sector-specific Computer Emergency Response Teams (CERTs) (Joseph 2012). In the same year in May, the Defence Research and Development Organisation established an indigenous system of cyber defence to ensure that network sectors are safe and secure. The project was reportedly about 50 percent completed as of May 2012 (UNIDIR 2012). Around the same time, the Technical Intelligence Communication Centre and the National Defence Intelligence Agency created a joint team to raise awareness within the government about potential cyber vulnerabilities (Singh and Philip 2010).

Energy and Cybersecurity

Securing the energy sector has emerged as a critical non-traditional security issue for India. The country ranks fourth in the world in terms of primary energy consumption; at the same time, the average level of consumption per capita is very low (TERI 2013). Due to insufficient regulation of information sharing and incomplete institutions to facilitate it, information on cyberattacks and equipment vulnerabilities in the Indian energy sector is nearly non-existent. But we can suppose from trends in international cybersecurity that the sector is increasingly targeted by the sophisticated attacks, particularly as India has embarked on linking it with modern technologies in order to meet growing energy needs (Walstrom 2016).

Indeed, with the advent of new technologies in this sector, several challenges began to appear on the scene. For instance, after India's nuclear test in May 1998, a group of hackers posted anti-India and anti-nuclear messages on the website of Bhabha Atomic Research Center (BARC) (Patil and Bhosale 2013). In addition, an online hacker called Phr OzenMyst hacked the official website of BARC and leaked some of its sensitive information; the attack was meant as a protest against ongoing government operations in the occupied part of Kashmir (The Pioneer 2013).

Furthermore, the critical infrastructure supporting every economic activity in India is fully dependent on the power sector; the dependence of this sector on ICT has highlighted several cybersecurity challenges. It is estimated that the period from 1994 to 2004 witnessed around 60 percent of all cyberattacks on the automatic power grids in India (Kumar et al. 2013). More recently, on July 30 and 31 2012, northern India witnessed a severe blackout that affected nearly 670 million people's normal life and work (Shuran et al. 2013), damaging all services in the region, including road traffic and railways. Chaos broke out on the roads as traffic lights and systems that supported them stopped working, with the police unable to cope with the

situation. Simultaneously, there were reports of devastating fires and explosions in major refineries, with extensive damage and loss of life, all while pipelines were ruptured and oil flow was disrupted (IDSA 2012).

Defence and Cybersecurity

India has an extensive defence industrial base and maintains the third-largest armed forces in the world (KPMG 2010). At the same time, it has linked its defence sector with the new technologies, in the process opening the country up to a set of ever-evolving threats due to a dependence on these technologies and the reliance on integrating networks. For instance, in 2012 a cyberattack was launched by hackers against the Indian Navy's eastern command computer systems which oversee the testing of India's ballistic missile submarines and maritime activities in the South China Sea. The naval computers were infected by a virus that secretly collected confidential documents and files and transmitted them to Chinese IP addresses.

While Indian officials have yet to disclose the type of information that was targeted in this attack (Pubby 2012), the Navy is not the only Indian defence institution to have faced such adverse events — the National Security Agency (NSA) and the Air Force have proved to be vulnerable as well. In 2010 the hackers targeted the NSA's office as well as several computers of the Indian Air Force, opening up numerous small windows through which classified files and documents were stolen (Unnithan 2012). In the same year, the country witnessed the biggest cyberattack yet, in which more than 10,000 email addresses of the top government officials were hacked, particularly military officials, the Prime Minister's Office (PMO), defence, home ministries, external affairs, and intelligence agencies (Singh 2012).

Threats to the Indian defence sector usually originate from actors with political, economic, or quasi-political motivations, negatively impacting national security, public safety or economic well-being of the society (Reich and Gelbstein 2012). Thus, there exists a need to develop a cyber defence environment in order to protect the technologies and capabilities of the defence sector in real time vis-à-vis providing protection and incident response (DEITY 2011). In this context, V. K. Saraswat, the former Director-General of India's Defence Research and Development Organisation (DRDO), has said that "the DRDO in collaboration with some premiere institutions is developing India's own Operating System as a response to

the growing concern over cyberattacks as today we are mainly dependent on operating systems" (The Economic Times 2012).

Finance and Cybersecurity

India is one of the fastest growing economies in the world, with the adoption of IT acting as a catalyst behind this significant growth. But this reliance on IT has come at the cost of new vulnerabilities. It has generally been argued that the root cause of most cyberattacks is monetary or financial gain (KPMG 2014). Indeed, the complexity of modern banking and financial services makes them vulnerable to cyberattacks from both state as well as non-state actors (Singh 2013). The interconnective nature of modern technologies has exacerbated the problem, creating widespread opportunities for fraud, theft, and other forms of exploitation (Bamrara et al. 2013). Recognizing this, former Indian Telecom Minister, Kapil Sibal has said that "cybersecurity is critical for economic security, and any failure to ensure cybersecurity will lead to economic destabilisation" (Singh 2013).

Over the past few years the financial sector in India has seen a rise in network security breaches, data losses, identity thefts, data thefts, and other white-collar crimes, causing the banking industry to incur huge losses, in amounts far exceeding conventional methods of bank robbery. For instance, in 2013 cyberattacks in India resulted in huge financial loses for Indian companies in the amount of nearly four billion dollars. A year later, financial losses from such attacks had increased by 30 percent. It is also estimated that India is among the world's top five countries in terms of incidence of cybercrime such as identity theft (11percent), ransomware (11 percent), and phishing (9 percent) (The Hindu 2013). In addition, the Reserve bank of India (RBI) has released data on commercial banks being targeted for the purpose of fraud, for example through Internet banking and ATM (debit/credit) cards. The number of such cases rose from approximately 4,049 lakhs in 2010 to 5267 lakhs in 2012 (Madaan 2013). In these circumstances, the need for India to develop a comprehensive cybersecurity strategy to fully guarantee protection for the financial sector becomes self-evident.

Telecommunications and Cybersecurity

Telecommunications has emerged as a key driver of social and economic development in India. Today, India is assessed as one of the fastest growing telecom markets across the globe, with the number of telephone connections rising to 943 million by February 2012 alone.

The same month, the country counted as many as 911 million mobile phone connections (NTP 2012) and nearly 160 million Internet users, of whom almost half were on the social media. The Indian government has stated its intent to provide 600 million broadband connections as well as 100 percent teledensity by 2020 (Singh 2013).

At the same time, the substantial growth of this sector has been accompanied by a variety of cyber threats and attacks. It is argued that information holds the gravest risk to the telecommunication sector, due to the increasing number of cyber frauds. For instance, on August 7, 2013, hackers penetrated the database of India's *Bharat Sanchar Nigam Limited* (BSNL) and installed spyware in the systems. The BSNL's Office Domain was hacked again on October 12 of the same year, and some important information was stolen (Dilipraj 2014). Similarly, on June 9, 2013, some anonymous hackers breached the Mahanagar Telephone Nigam Limited (MTNL) website by using the DDoS technique; the intention behind the attack was to oppose Internet censorship allegedly supported by the MTNL (Reddy 2012).

Meanwhile, on the more individual level, mobile phones are being used for the storing of sensitive data like email, contact information, and passwords, in addition to other potentially vulnerable activities. And recent innovations in mobile commerce have enabled users to carry out money transactions by phone, processing point-of-sale payments and even paying at cash registers from their smart phone applications like Paytm, MobiKwik, and others. Such open and valuable networks have now become more and more vulnerable targets for attacks (Ruggiero and Foote 2011). As of 2014, nearly 7.9 percent of mobile devices had been targeted and the country ranked second on the list of cyberattacks on such devices (The Indian Express 2014).

Conclusion

As the preceding pages make clear, cyberattacks targeting critical information infrastructures in India, such as energy, financial services, defence, and telecommunications, have the potential of adversely impacting upon the nation's economy and public safety. From the perspective of national security, the securing of the critical information infrastructure has become a top priority, in line with policies already adopted by other digital nations (DSCI 2013). Indeed, the ever-growing interdependence of the digital sphere, across borders, has provoked the emergence of cybersecurity as a major component of national security strategies

in states across the globe (Kumar and Mukherjee 2013); India should not delay in following their example.

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