

Eavesdropping: A Cyber Security Challenge in the Era of Internet of Things (IoT)

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Abstract:

In the era of Internet of Things (IoT), data or information search activity on the Internet is one of the negative effects of interconnection of Internet users (get interconnected) and the ease of data sharing on cyberspace. The lost of sensitive data or information or important documents could be done because there is no sufficient cyber security. Consequently, users must aware about information security through Internet access.

Keywords: Internet, Internet of Things (IoT), Eavesdropping, Cyber Security

I. INTRODUCTION

Nowadays, in the age of Internet of Things (IoT), many countries in the world are heavily use of Internet. On the other side, because of the adverse use of the Internet various resources on Internet can be utilized harm critical infrastructures or sensitive information systems that can threaten national interests. Internet dependency or cyberspace. Hiding terminology is an electronic attack, where digital communications are interrupted by an individual who is not intended to.

It is done in two main ways: directly listening to data loss or weakening of digital or analogue voice communication or any form of communication (Technopedia, 2019). According to Indonesian dictionary, wiretapping terminology is the process, form, gravitational act, means to listen (to record) without the knowledge of any person (confidential talk) for example, the phone sounds (or phone numbers) are a third party telephone and internet call monitoring that is monitored in secretly. User's phone communications may be monitored or recorded illegally by third party.

Nowadays, Internet broadcasts on Information and Communication Technology (ICT) progress are largely organized by state actors or non-state actors that can become a serious cyber attack. Cyber attacks on the Internet are different, ie hacking, phishing, IP spoofing, listening / wiretapping, etc., inspired many countries and then created their national Cyber Agency to protect their national interests from cyber threats or cyber attacks. For example, US Cybercom, Chinese PLA's Blue Army, Korean's KISA or Israeli's IDF 8200. Moreover, through National Institute of Standards and Technology (NIST), Cybersecurity has decided to protect or defend cybercrime from the cyberspace.

The Indonesia Government, in may 2017, established of the National Cybercrime and Coding Agency (BSSN), 2017 May 23. According to Hootsuite statistics, 2019 Indonesia ranked 5th in the world in January after the world's largest Internet users, China, India, US, and Brazil. As a matter of fact, the Internet users population in Indonesia has reached 150 million users. (see Fig. 1).



Figure 1. Internet users in Indonesia (in January 2019)

II. UNDERSTANDING THE GLOBAL DOMAIN CHALLENGES

Nowadays, in order to understand the challenges of cyber security in cyberspace, it requires understanding of the cyber issues. A nation should aware to fully imagine cyberspace is international boundary space, the universe is smaller and indefinitely, which brings new challenges to the IoT era.

The incompatible international understanding of the Cyber space and how the government deals with serious problems, especially if one nation tries to claim that the global domain (cybercrime) is part of the sovereignty of a country in unilaterally way. This contradicts with the requirements of those countries that adopt international treaties like the UNCLOS 1982.

It has been clearly defined in UNCLOS 1982 that state or nation has responsibility of a sovereign state in the use and management of the world's oceans or EEZ (Exclusive Economic Zone) and its natural and environmental resource management. In fact, cyberspace is viewed as non-physical, frontier, stateless, and endless for all.

The US Government through the US DoD has

declared Cyber Security as a global domain in information encompassing as a network of information technology infrastructure and residency information, as well as Internet telecommunication networks and computer network systems. The US DoD declares a definitive terms for cyber security as "the use of cyberspace capabilities where the primary goal is to achieve goals or via cybercrime (US DoD, 2011)."

Indonesia, will also facing global cybersecurity challenges as well as the same use of cybercrime (internet). This challenge can have an impact on cyber threats, such as cybercrime, cyber radicalism, cyber-terrorism, etc. for Indonesian state security. The infinite, incomprehensible and indefinite peculiarities and attributes of the Cyberspace make cybercrime as a transnational crime.

This condition makes global role of cyberspace is a national priority that should be comprehensive, complete and effective. Comprehensive understanding of the global domains of cybersecurity (Internet) in the international community plays an important role in preventing predictability of complex and dynamic cyber security challenges in the international community, so the country can protect its integrity and sovereignty from cyber threats or cyberattacks, that is, Internet telephony or wiretapping - cybercrime through legal framework development.

III. INTERNET EAVESDROPPING CASES

In terms of eavesdropping or wiretapping issues, there are many incidents in the world (including Indonesia):

In 2007-2009, BBC said that according to Lieutenant General Marciano Norman, the chief of BIN (Indonesia intelligence agency), Australian intelligence agency, has tapped phone communication with several Indonesian leaders (BBC, 2013).

In 2013, NSA outbreak news by former intelligence analyst Edward Snowden that reveals the activities of NSA, such as:

- a. Australian intelligence agency wiretapping phone calls President of Indonesia Mr. SBY and Mrs. Ani Yudhoyono (Kompas, 2013).
- b. Wiretapping German Chancellor, Angela Merkel phone calls.
- c. Wiretapping French President, Francois Hollande phone calls.
- d. Wiretapping Mexican government, phone calls.
- e. Wiretapping Brazilian President Dilma Rousseff phone calls.

In Panama, April 2016 In Panama (April 2016), There were "leaked" through Internet about 11.5 million classified documents in 2.6 Tera Bytes, consist of highly classified data from 214,000 institutions in the world which is hosted and leaked from Panama's famous service company, Mossack Fonseca.

Those confidential files are leaked, such as, 4,804,618 email files, 3,047,306 database files, 2,154,264 PDF files, 1,117,026 images files, 320,166 text files and 2,242 other format files. A suspicious "leakage" of 11.5 million sensitive files is made by hackers or by people from the internal "Mossack Fonseca" company it self (see Fig. 4).

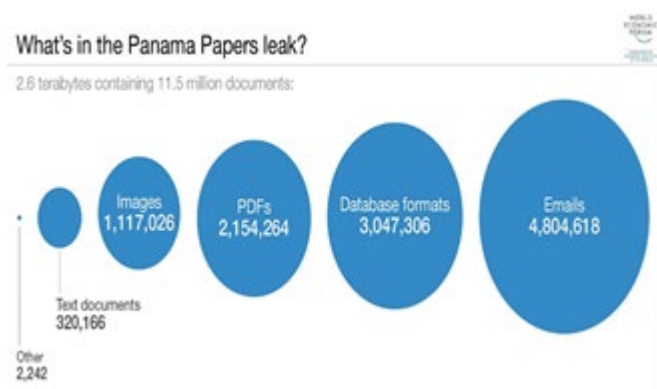


Figure 2. The Scale of Panama Papers Leak

In USA, October 2016, the US government

"blamed" the attacks on political hackers and wiretaps on the part of Russia's US President.

According to CIA agency intelligence, Russian hackers have successfully succeeded in wiretapping information and information systems directly linked to the US electronic voting system, although this "accused" was rejected by the Russian government. An important lesson that you can learn from this phone number is the need to pay attention and protection in a cybersecurity environment by choosing a presidential election or a regional leader by choosing an email system where the role of the encryption system is critical to avoiding the phone call or the internet.

IV. METHODS

In this article, authors focus on research that contributes to the phenomenon of wiretapping over the internet using the various data sources on Internet (Baxter and Jack, 2008). The use of real-time analysis to explore the depth of the different aspects of "real-life" issues of eavesdropping phenomenon that can jeopardize the important national infrastructure and sensitive information communications systems to ensure that phenomena are investigated and detected with a few lens oscillations.

This research has been done by method of qualitative, where data is taken from case study, which is related to the audition or phone call. The data obtained in the research design is quantitatively analysed and described on the basis of the researcher's thoughts. Comparative studies are performed by comparing cyber security issues that happens in many countries, where data required was collected via internet literature survey for recent 5 years (see Fig. 3).

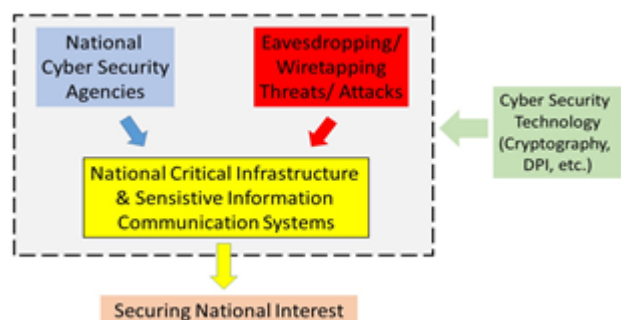


Figure 3. The Research Design Framework.

V. RESULT

Based on conventional telephone technology technique, authors try to concentrate on the eavesdropping or wiretapping through the Internet. The internet eavesdropping perspective terminology is now being considered by the BKD DPR RI (the office of the Indonesia House of Representatives) who prepared the wiretapping over Internet law. Because Internet eavesdropping is one of the clever fraudulent methods of the Internet access, which uses special obstacle tools and can only be done by "certain users or parties" that have special abilities or capabilities.

Internet eavesdropping activities are the same as theft data / information or trafficking victim network, which has become a direct target on the internet.

As it can be concerned, the term "Internet eavesdropping" might be compared with "listening" on the Internet terminology. For Internet utilizations, users should consider fully understanding of the Internet network systems works and also various hacking utilities can be used by hackers. As it is known, Edward Snowden, formerly a National Security Agency analyst, that has uncovered sensitive NSA documents where the US government can control the digital activities of all Internet citizens in the world (Paramadina, 2015)

To answer question regarding how the internet eavesdropping works. Basically, the third party or the hacker "hear" or monitor the transmission of data or information transmitted through the LAN (Local Area Network) network between the targeted users.

When Internet users are communicating via a network, they send data transmission signal between internet users. The transmission of data signals use TCP/IP data communication protocol or Internet Protocol, based on 7th layers of Open Source Interconnection (OSI layers) data flow mechanism (see page 4).

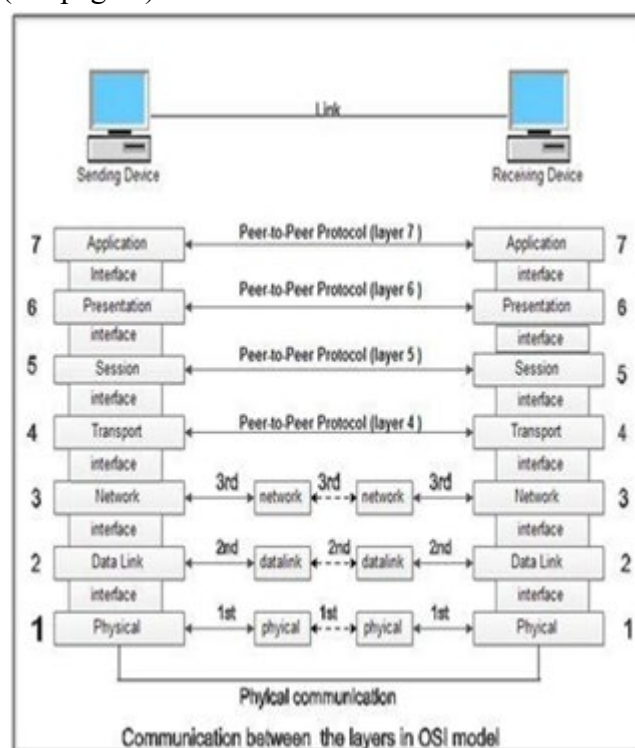


Figure 4. Data Communication through 7 Layers of OSI model

As it can be seen, from figure 4, data signal or information transmitted from sending device (PC, Laptop, etc) to the receiving device (PC, Laptop, etc) over the TCP/IP network. The data signal or information sent through Internet by following the 7 layers of OSI data flow mechanisms where the data signal or information can be easily "read" by third party users or hackers. Therefore to protect data signal or information we need data or information security mechanisms, i.e., encryption technique, etc. One of famous technique is Deep Packet Inspection (DPI), this technique is used as an advanced methods to monitor as well to protect data signal and sensitive information sent over the Internet. DPI is simply a tool for internet / packet data monitoring (see page 5).

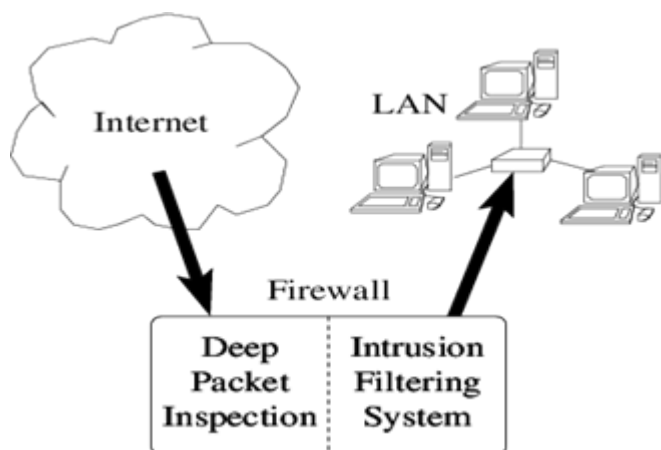


Figure 5. Deep Packet Inspection (DPI) combined with Firewall

The DPI provide depth analysis of data signal or information transmissions. DPI works properly by supporting parameters, i.e., the origin sending and receiving device information, types of data, content of data, and contain of keywords in the data signal transmission. These settings will be useful when there are too many data passing through the network. Knowing inaccurate data parameters might be accepted where specific data or information might be presented and analyzed. DPI inspects the upper stream (data origin) and the bottom (location data) and focus on minimizing the data that have been missed. DPI is implemented to achieve service quality improvement, Internet users protection from harmful contents, such as virus, hoax, etc. As we may know, Internet transmissions occurs in countries over the world. Some countries implement the law that states is strictly prohibited to wiretapp the secrecy of their citizens. Meanwhile, some countries allow the state to wiretapping their citizens in terms of nassional security matters.

For example, in China, the internet users can not accessing foreign portals or websites, such as google, facebook, youtube and many others (see Fig. 6), where Chinese government has regulation to regulate incoming or outgoing data signal or information into its internet territory using Greatwall of China DPI mechanism. To monitor China's entire data traffic, DPI will be executed or checked to filter all web sites from outside China. China has also

placed a special keyword filter to protect their national interests.

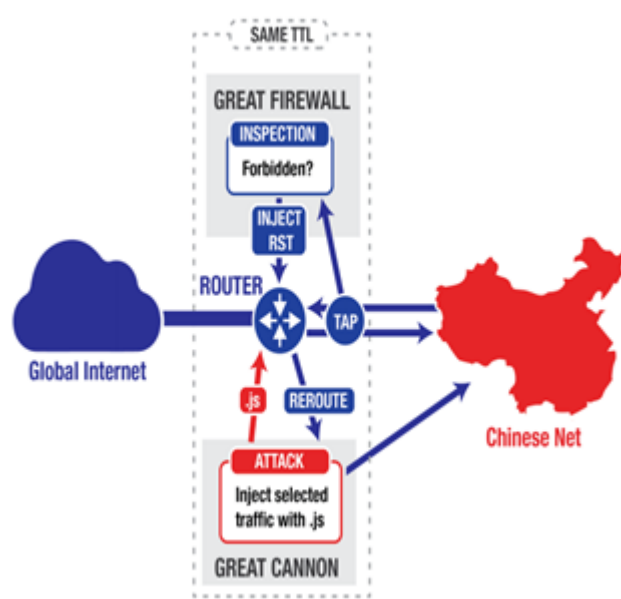


Figure 6. The Great Fire Wall of China & China's DPI Policy

Another example, Iran, this country has used a DPI mechanism similar with China. Iran purchased DPI tools from NSN or Nokia Siemens Network production which operating DPI mecjhanism national wide. In USA, NSA plays dominant role in DPI mechanism. The US has ability or capability to monitor the global Internet access network, because internet traffic in the world is associated with a large number of US servers. In terms of cyber security, one of the easiest tools that can be used in DPI mechanism is the development of the SSL protocol or Secure Socket Layer. SSL is protocol used by public when accessing the https or website. Https is one of the SSL security protocol contributions that will coding / embedding the data received and sent over internet. Another application tool is Darknet or Dark Web or well known as TOR Browser or Darknet browser. This is an interesting apploication, it can create identity of the Internet users and, of course, also encode their data (see Fig. 7). TOR is the US Naval Research Institute product.



Figure 7. Illustration of the Dark Net (Dark Web)

Another question is to learn how to act when the internet users becomes victims. There are Internet disconnection could contain information, if a single user calls someone, the ringing tone stops slowly or not smoothly when both sides have good call or good network service. In this case, if the network feels confused about it, it may be questioning the act of arrest that may be made by hackers or third parties. Therefore, we should pay attention to it, as it can also be a hacking act. Various techniques might prevent internet wiretapping, such as instantly changing phone number and also connecting with customer service reporting there is strange interference in communications you have made so you can report your phone number account to the operator to be reviewed. Perhaps the most perfect way is to restore phone number, where in some cases phone processor chips are characterized by permanent codes that are manufactured and that technician cannot work correctly. It is important to know the internet sounding techniques and responses, and it is also important to raise awareness of all our communications through mobile phones or the Internet.

VI. CONCLUSION

To conclude this papers, here are some recommendations:

- **Firstly**, law enforcement officials can use most efficient and efficient remediation technique in DPI for intelligence, surveillance and intelligence operations. It is necessary to take into account that DPI (Deep Packet Inspection) is used for special cases relating to unusual offenses such as terrorism, radicalism, fraud, propaganda, corruption, drugs, the Internet, eavesdropping and so on.
- **Secondly**, the law on internet eavesdropping should be able to handle proportionality and necessity basic principles to avoid human rights abuse, by collecting facts legally proven by court.
- **Thirdly**, in terms of Internet interception, eavesdropping or wiretapping Act must clearly firm Internet's tap activity, disable and record terminology, as well as the mounting technology used, borderline-less, state-less and time-less.
- **Fourthly**, in terms of cyber security, eavesdropping or wiretapping law can be combine with the cryptography law, to tackle criminals of extraordinary crime over the internet.

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