Conceptual Framework of High Security System Using Internet of Things of Digital Forensic of Educational Institutions in Southern Border Province

Tuannurisan Suriya, Panita Wannapiroon, and Prachyanun Nilsook

Abstract—The purpose of this study to designed Framework of High Security System using Internet of Things of Digital Forensic of Educational Institutions in Southern Border Province. The research procedures were divided into two phases: 1) designing a framework Conceptual Framework of High Security System using Internet of Things of Digital Forensic of Educational Institutions in Southern Border Province. 2) evaluation the appropriateness of the framework. The samples are 5 experts selected by purposive sampling. The research instrument used in this study were as follows: 1) the framework for a High Security system and 2) the appropriateness measurement of High Security system. The data is analyzed by means and standardized deviations statistically.

The research findings were as follows:

1. The Framework of High Security System using Internet of Things of Digital Forensic of Educational Institutions in Southern Border Province consisted of 4 components as followed: 1) Internet of Things, 2) High Integrated Security Management System, 3) Notification System, and 4) Digital Forensic.

2. The results of the evaluation of a Framework of High Security System using Internet of Things of Digital Forensic of Educational Institutions in Southern Border Province. as absolutely appropriate in overall ($\overline{X}$ =4.66, S.D.=0.28).

Index Terms—High security system, internet of thing, digital forensic, educational institutions, southern border province.

I. INTRODUCTION

"National Security Policy 2015 – 2021" is the national policy set by the National Security Council. This is a guideline for maintaining the interests and security of the nation to keep up with the changing situation and to solve more diverse problems. It aims to address issues that affect the core of the country with the emphasis on maintaining the core institutions of the nation, to harmony people in the nation and to create a peaceful environment in the southern border provinces. Moreover, it aims to promote security and prevent or mitigate the effects of threats. [1] National Security Policy 2015 - 2021 has set policy priorities that drive the policy into two parts: 1) it is an important policy to strengthen the core of national security which aims to strengthen the security base and strengthen the peace environment in the southern border provinces and 2) It is a general national security policy to build the immunity of

society at all levels for addressing the issues and threats, to reduce the risk of the effects of security threats. In addition, it has to be prepared to prevent and solve the problem of all security, to have a strong national defenses and to strengthen the international environment conducive to the preservation of national interests. The security policy is set out in fifth policy which aims to strengthen the capacity to prevent and address transnational threats. It consists of 4 parts: 1) to develop strong system, mechanisms and measures for the prevention and resolution of transnational terrorism and crime. Moreover, to strengthen the capacity of government agencies, especially the news and the legal system to be strengthened, and promote cooperation and coordination between government agencies to unity. 2) To take action to prevent and address all forms of terrorism focused on mitigating factors and conditions that contribute to terrorism and every person or group of people supporting terrorism who use the territory of Thailand as a refuge, an area that seeks to support terrorism or a violent or terrorist area. All of these focus on the protection and security of the urban area. 3) To support and develop the international cooperation at all levels, including international organizations, under the ASEAN framework for the prevention and resolution of transnational terrorism and crime, and to raise the appropriate of Thailand's position on terrorism. 4) To raise the conscious and awareness in the issues of terrorism and transnational crime to the private sector, the public sector and civil society. Furthermore, to build a strong network in cooperation with the government to protect all forms of transnational threats. [2]

The unrest situation happen in three provinces of southern Thailand: Pattani, Yala, Narathiwat and the six districts of Songkhla such as Sadao, Chana, Nathawee, Hat Yai and Saba Yoi. It is caused by the conflict in the southern border provinces, which is the problem of national security. There are various forms of terrorism, including assaults on government officers and the public, ambush, arson of government offices, schools and shops, bullying and bombing. [3] This situation is serious and continuous. It creates skepticism and misery to people's lives in the area, and it also results in significant losses in the public and government sector: physical, mental, life and property, which affect the overall development of the country, social, economic and political.

Educational Institutions in the southern border provinces are one of the targets that insurgents want to attack. Based on terrorist attacks on schools and schools around the world, it appears that schools in Thailand ranked second in attack

inferior to Pakistan. [4] Researchers from Maryland University have collected information on the topic "Terrorist Attacks" during the period from 1970 to 2013 to study the intent of the school. It was found that at that time, there were 3,400 attacks in 110 countries. Pakistan has the highest number of terrorist attacks of 724 times. While Thailand has statistics collected by the Ministry of Education along with the Security Department, it found that the burning of schools in the southern border provinces from 2004 to 2019 had 325 state schools burned; there were 314 security cases and 11 general crime cases. The 109 teachers were killed and 130 got injured, and under the age of 15, there were 81 children died and 445 injured [5].

Security is a non-threatening condition, out of a dangerous situation or could be harmful to life and property. The body is free from accidents, and the property without damages. Those are what all people want. At present, the living conditions of people in the society have two problems. The first is social problems and natural disasters such as storms, floods, lightning strikes, earthquakes, landslides and fire. Second, the dangers from human actions are disclosure offenses such as riots, insurgencies, and attacks by opponents, and non-disclosure offenses such as theft, espionage, sabotage and terrorism. [6] Most finding ways to prevent or avoid all dangers and increasing security is using technology equipment to help alert the danger at some level. Because of the development of information and communication technology, computer technology and software, computers are rapidly advancing and the ability of various technologies is introduced. It is used to facilitate the daily operation of human communication. Besides, it can present information to users anywhere and anytime to perform various tasks or support decision making promptly. This will lead to full use of information and communication technology in living, and to develop a digital society in accordance with international standards, which aims to develop a vision to step into smart society or Smart Thailand. Smart Thailand is placed under the Information Technology and Communication Policy Framework to 2020. It is the objectives of the Master Plan for Information and Communication Technology (No. 3) of Thailand in 2014-2020, and based on the development of information and communication technology. [7]

With the rapid expansion of mobile devices in the present and the potential in the future as Gartner [8] expectation, it is predicted that the future technology in 2020 will expand and the internet can be accessed by devices increasing to 26-30 billion. Moreover, collaboration with information technology which applies mobile devices allows personal users in the present can access the information, technology, and connect with others easily. Moreover, IoT can be done easily as well so this is the opportunity to extend the potential in the development of system for the thoroughness and speed and allow devices to communicate each other or Internet of Things (IoT). It is the ecosystem that contains things which can communicate and connect others via communication protocol both wired and wireless. Things have the method to identify themselves, know the context of the environment, have the interaction, and work together [9]. This is the concept invented by Kevin Ashton in 1999 which have the infrastructure that can connect to the internet by sensor to communicate to each other [10] to be components in the development of security system which contains intelligent device control for risk location and area where need security in controlling the unrest situation and to receive security information in forms of digital information which can be analyzed, investigated, and reported immediately.

In the present, digital devices are essential for people living in the present so much until it can be said that they are part of our life. These digital devices may be parts of lawsuits. [11] Police officers need to search for evidence to investigate the offender which called Digital evidence. This process is called Digital Forensics which is the collection and preparation of related information from computers for legal proceedings. Analysis of evidence from computers is a process to get evidence from electronic media and store evidence. Implementation according to the investigation process needs to be conformed to an accepted standard. The basis of processes related to digital evidence investigation starts from 1. Evidence acquisition, 2. Evidence storage, 3. Evidence analysis, and 4. Report to court. [12]

Under the unrest situation in southern border provinces which intensifies by various factors, the security in southern border provinces especially educational institutions which are targets that insurgents want to attack. From statistics of attacks on schools and educational institutions around the world by terrorists, schools in Thailand is the 2nd place that attacked after Pakistan [4] From this, the author has a purposes to study the conceptual framework to develop high security conceptual framework by Internet of Thing for educational institutions to investigate digital evidence of educational institutions in southern border provinces to be the prototype system of the development of high security system by Internet of Thing to investigate digital evidence of educational institutions in southern border provinces.

In this paper, we propose a Framework of High Security System using Internet of Things of Digital Forensic of Educational Institutions in Southern Border Province. and To serve as a tool to Development of High Security System using Internet of Things of Digital Forensic of Educational Institutions in Southern Border Province.

II. PURPOSE OR THE RESEARCH

The purposes of the research are:
1) To design a High Security System using Internet of Things of Digital Forensic of Educational Institutions in Southern Border Province.
2) To evaluate a High Security System using Internet of Things of Digital Forensic of Educational Institutions in Southern Border Province.

III. SCOPE OF THE RESEARCH

A. Population

Population is the experts in the field of security system, information technology, and internet of thing.

B. Sample Groups

Samples are 5 experts in the field of security system,

information technology, and internet of thing chosen by purposive sampling. They are highly-experienced experts in these fields for at least 5 years.

C. Variables of the Research

Independent variable is the High Security System using Internet of Things of Digital Forensic of Educational Institutions in Southern Border Province.

Dependent variable is the appropriateness of the High Security System using Internet of Things of Digital Forensic of Educational Institutions in Southern Border Province.
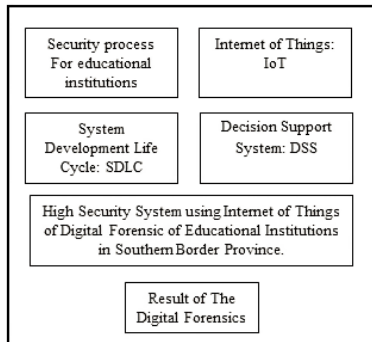
IV. RESEARCH FRAMEWORK

Fig. 1. The research framework of high security system using internet of things of digital forensic of educational institutions in southern border province.

V. METHODOLOGY

The Framework of High Security System using Internet of Things of Digital Forensic of Educational Institutions in Southern Border Province can be divided into two phases:

1) Design the framework of High Security System using Internet of Things of Digital Forensic of Educational Institutions in Southern Border Province.

i) Design the framework of High Security System using Internet of Things of Digital Forensic of Educational Institutions in Southern Border Province.

ii) Propose the framework of High Security System using Internet of Things of Digital Forensic of Educational Institutions in Southern Border Province to the advisor for further examination and revision and

iii) Create an instrument for assessing the appropriateness of the framework High Security System using Internet of Things of Digital Forensic of Educational Institutions in Southern Border Province.

2) Assessment of the appropriateness of the framework of High Security System using Internet of Things of Digital Forensic of Educational Institutions in Southern Border Province as the following:-

i) Propose the designed the framework of High Security System using Internet of Things of Digital Forensic of Educational Institutions in Southern Border Province. to the 5 experts for assessing the appropriateness and

ii) Analyze the output data by using appropriateness measurement scale based on 5-point Likert Scale as well as means ($\bar{X}$) statistics

1.00-1.49 means the assessment topic is absolutely inappropriate

1.50-2.49 means the assessment topic is inappropriate

2.50-3.49 means the assessment topic is neutral

3.50-4.49 means the assessment topic is appropriate

4.50-5.00 means the assessment topic is absolutely appropriate

VI. RESULT

Stage 1 The Framework of High Security System using Internet of Things of Digital Forensic of Educational Institutions in Southern Border Province or HISMS is composed of 4 key components which are
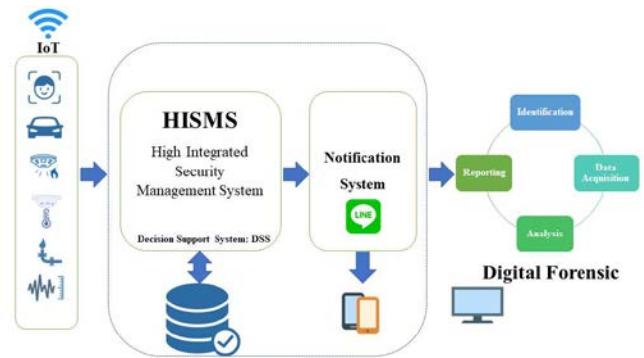

Fig. 2. The framework of high security system using internet of things of digital forensic of educational institutions in southern border province (HISMS).

From Fig. 2, high-security conceptual framework High Security System using Internet of Things of Digital Forensic of Educational Institutions in Southern Border Province consists of 4 parts as follows;

Part Internet of Thing: IoT or technology to connect things invented by Kevin Ashton in 1999 who needs electronic devices has the infrastructure which can connect internet and communicate with each other [10]. Therefore, using IoT is a prototype to design security system by IoT in educational institutions in southern border provinces where have the security problems because they are defined as risky area which need some processes to prevent and solve the unrest problems in the area according to policy of National Council for Peace and Order and the government under the framework of solving problems and developing plan (NCPO), the development and problem solution of southern border provinces to lead to Thailand 4.0, the model to drive Thailand to wealth, stability and sustainability to reform the economic structure of the country to "Value-Based Economy" or innovation-driven economy by assigning the development of digital internet technology which connect devices and artificial intelligence [13].

IoT technology can be used to communicate with each other by using sensors to communicate. The system consists of camera sensor for detection of face and license plate (RFID), card scanning (sensor), and detection of temperature, smoke, and gas to be the intermediary of internet communication for identification of persons, license plate, and the amount of temperature, smoke, and gas. Therefore, it can classify or identify the type of information which will be used as the input in Part 2 or HISMS system which can be accessed anywhere anytime from every device.

Part 2 High Integrated Security Management System

(HISMS) is high security database management system which is the main objective of this study that will develop High Security System using Internet of Things of Digital Forensic. This system can be used via IoT device in Part 1 and do the in-depth analysis and data management by Decision Support System.

Part 3 Notification System is the notification system for the result of security system of educational institutions in southern border provinces by using Line Application to present the notification of the system. This is the smartphone application that can access the notification anytime and anywhere.

Part 4 Digital Forensics or digital evidence investigation is the process of data analysis to investigate digital evidence. This consists of 4 sequences as follows; 1) Identification, 2) Data Acquisition, 3) Analysis to evaluate the risk, and 4) Reporting of high security for educational institutions [14].

Stage 2 The result of appropriateness measurement of the framework of High Security System using Internet of Things of Digital Forensic of Educational Institutions in Southern Border Province

TABLE I: THE ASSESSMENT RESULT OF FRAMEWORK OF HIGH SECURITY SYSTEM

Assessment Topics	$\bar{x}$	S.D.	Assessment Result
The framework of security system	4.63	.31	absolutely appropriate
The suitability of IoT devices in term of supporting the system	*4.60*	*.30*	absolutely appropriate
The suitability of Application Line for notification system	4.80	.40	appropriate
The suitability of digital forensic management	4.80	.40	absolutely appropriate
Workflow of High Security System using Internet of Things of Digital Forensic of Educational Institutions in Southern Border Province	4.70	.46	absolutely appropriate
Appropriate use a framework Appropriate use a framework of High Security System using Internet of Things of Digital Forensic of Educational Institutions in Southern Border Province	4.70	.46	absolutely appropriate
Total	**4.70**	**.38**	**absolutely appropriate**

Following Table I, the framework of High Security System using Internet of Things of Digital Forensic of Educational Institutions in Southern Border Province is rated as absolutely appropriate in overall ($\bar{x}$ =4.70, S.D.=0.38). Considering each item, every item was at absolutely appropriate level.

VII. CONCLUSION

This article presents the design framework which focuses on the connection with the concept of IoT (Internet of Thing) which is the main objective of the study that will develop the High Security System using Internet of Things of Digital

Forensic of Educational Institutions in Southern Border Province. The system will be based on information technology device which electronic devices' potential is developed in the present to able to communicate to each other according to the concept of Internet of Things (IoT) which invented by Kevin Ashton in 1999 who wants electronic devices have the infrastructure to connect the internet. Therefore, devices can communicate with each other [10]. Therefore, using IoT is a prototype to design security system by IoT in educational institutions in southern border provinces where have the security problems because they are defined as risky area which need some processes to prevent and solve the unrest problems in the area according to policy of National Council for Peace and Order and the government under the framework of solving problems and developing plan (NCPO), the development and problem solution of southern border provinces (Office of the Secretary of the Steering Committee for the Solving of Southern Border Problems, 2016) to lead to Thailand 4.0, the model to drive Thailand to wealth, stability and sustainability to reform the economic structure of the country to "Value-Based Economy" or innovation-driven economy by assigning the development of digital internet technology which connect devices and artificial intelligence [1].

Therefore, using IoT is a prototype to design security system by IoT in educational institutions in southern border provinces where have the security problems because they are defined as risky area which need some processes to prevent and solve the unrest problems in the area according to policy of National Council for Peace and Order and the government under the framework of solving problems and developing plan (NCPO), the development and problem solution of southern border provinces [15] to lead to Thailand 4.0, the model to drive Thailand to wealth, stability and sustainability to reform the economic structure of the country to "Value-Based Economy" or innovation-driven economy by assigning the development of digital internet technology which connect devices and artificial intelligence with the satiable country development.

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