

Telematics systems and security issues

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Abstract— Telematics system is essential because it is used in different areas. These areas can be supported by this system in order to tackle peoples' problem. Therefore, this system supports subscribers by using different services which is used in the system. These services can be taken from the system by using GPS navigation, wireless communications. Users also interact with the TSP and ASP to obtain right information at the right time. The aim of this paper is to detect security issues in telematics systems. This paper begins with the introduction of telematics system in different fields. Then, it explains how this system works. It also addresses the advantage and disadvantage of the system. Finally, it will look at case study and conclude this paper.

Index Terms— Telematics system, GPS navigation, wireless communications, TSP and ASP.

1 INTRODUCTION

Developing technology has an impact on organizations in order to change their services to customers. Telecommunication can be used in different areas. Therefore, it is used in several aspects in life with information by developers such as health care, vehicles, smart phones, automobiles and navigation information [5]. Organizations wish to use the correct information in the right way due to offer more services. Telematics is the convergence of telecommunication and information processing. The word telematics derived from tele from telecommunication and matics from informatics.

GPS (Global Positioning System) navigation, wireless communication, integrated hands-free cell phones and automatic driving assistance system derived from the telematics systems [17]. Telematics is a delivery service which is used to exchange information. This information relates to the services. Telematics is a service provider which has connection with user devices and ASP (Application Service Provider) [10]. These services need user information that is essential. As a result, the system service has to protect it. Therefore, integrity and protection of data are two important features in secure system in any organization which wants to use information.

Both of hardware devices and software are used in telematics system. These devices support the system to improve operational efficiency which includes maintenance, back-offline administration and repair some other devices which are out of service. Telematics services develop by 10%. However, they cannot reduce the number of accidents in vehicle telematics by 20 to 30% [9]. Telematics system installs on vehicle or any other machines which is needed to monitor or transferring information. Telematics monitoring systems is a factor to decrease or eliminate fraudulences and theft because of the ability of a telematics system to find places of vehicle.

In addition, web facilities support telematics systems.

Therefore, organization website can acquire information from other website. These facilities help organizations to work with others or sharing their services. However, it is difficult for the telematics system to have web service for all services in the society. For example, BBC website uses webcam service on vehicle road which they obtain from another web service [16].

Another aspect is health care which uses telematics system to service patients. Therefore, it improve the communication among patients and doctors. Patients had difficulties to contact doctors before using telematics systems. Nowadays, some developed countries use these systems to serve patients in order to look after them by the systems.

In recent years, this technology has developed in mobile phones which users can use software to ask the telematics service provider for obtaining information. This service provides facility for the users to find places which he/she wants such as tom-tom service in a mobile phone [17].

2 PRINCIPLE OF TELE-OPERATED DEVICES BEING CONTROLLED OVER A NETWORK

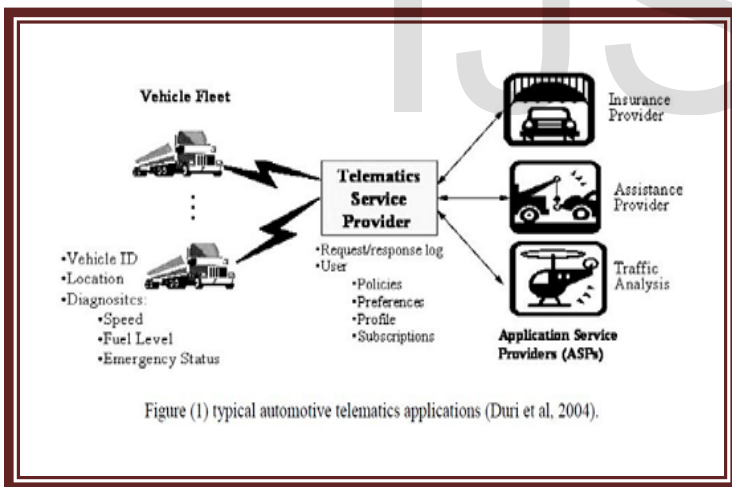
Tele-operated devices have principles to work over a network. Nowadays, many telematics systems exist in reality and purpose of telematics is to serve people and make their work easier than before. It is used in different aspects such as in medicine, vehicle road. In general, telematics system is used to control devices. These devices have a connection via wireless and different type of sensors. They have computers which have sufficient memory, display, and storage and can control complex applications. TSP (Telematics Service Provider) is another part of the telematics system. These devices, which telematics system wants to control them, subscribe the TSP to obtain several services from ASP (Application Service Provider). The ASP includes pay for using these services. These devices,

which system wants to control, collect data from their sensors and they send to TSP, then TSP, share this information about these devices with ASP [10].

These principles need to take an example of a telematics system for better understanding how the system works. Vehicle tracking is one of the systems which use telematics for controlling vehicles. Figure (1) shows that automotive telematics application system which includes three basic parts such as Vehicle Fleet, TSP and ASP. The vehicle provides by wireless communication and it has computer to display information to the user of the vehicle. It has storage to save information about the vehicle behavior and sensor. In the figure (1) sensor is GPS (Global Positioning System) which collects data about the vehicle itself and sends these data to TSP. The user has to subscribe from the TSP to acquire different services from ASP. In this typical figure, ASP contains pay for insurance by the user. The vehicle is controlled by the telematics system from fraud, crash and different type of services which depend on the system [10].

3 TELEMATICS ADVANTAGES

Telematics system has safety features because of reducing the number of accidents in vehicles. For exam-



ple, installing a telematics system is a reason to slow down the speed by drivers. It means that it alerts the drivers before having an accident. It is also related into maintenance and fuel consumption. These points save up driver's money to 20% to pay bills monthly [4]. Having speech features in telematics system provides help to the drivers, they do not need to take their eyes on the way. Tracking vehicle system via GPS, the company can find its vehicle, if someone steals the vehicle. This system has affected on driver's behavior, route productivity and fuel saving. According to Donlen survey about fleet managers, while fuel saving was

number three. However, it ranked as number two because of saving money [4].

Telematics system saves time because it provides information on user in near real-time. Web service sends back answer to request in short time, when user sends the request. Using the web application in telematics is a reason for reducing cost because the user does not need to purchase software [4].

GPS wireless passive tracking saves money for the driver because after installing the system the driver does not need to purchase software and hardware. Telematics has advantages in health care. It is used to record patient information and communication between patients and doctors. It is used to monitor patients at home. Home hemodialysis (HD) is used for patients who have renal failure. This system transfers information about the patient such as plus rate, arterial pressure and plus oxymetry (Po2). These data are displayed on HD machine and monitored by nursing staff in Central Control Station (CCS). Telematics system increases patient's independence, while it does not reduce patient service [2].

Telematics system has provided service in education area such as email, computer conferencing and telematics-based distance which is "face to face teaching and learning at distance" [13].

4 TELEMATICS DISADVANTAGES

Telematics system has disadvantages. For example, GPS wireless passive tracking cannot send information about vehicle until the vehicle returns back to its company. The company does not have information about the vehicle when it is its own way [19].

Cost: installing a telematics system is expensive even, if user has ability to install the telematics system because it needs to purchase hardware and software. GPS types have different prices. Cellular based tracking has lowest price which is about \$700. However, the user has to pay about \$35 monthly for information which is displayed over the internet. Hardware price needs \$700, and \$800 for the database and network in wireless passive tracking. Furthermore, average cost for the Satellite based real-time tracking is between five and hundred dollars [19].

Tracking: user of the system gives a lot of privacy information to the system. It is easy to track the user because of sending his privacy information into the

system. Sometimes users do not want to control by systems because the system can find the user easily [19].

Distraction: automotive telematics have a disadvantage which is distracting the driver by looking at the navigation. Drivers may have an accident because of looking at the road and navigation at the same time [19].

Management issue in education area: this technology may have a management issue because of having an insufficient plan and isolating students from their colleagues and their teachers. As a result, it has a side effect on the education system [13].

5 SECURITY ISSUES

Information can be under the risk of attackers, while data are sent from telematics system to user and vice versa, transmitting data may be opportunities for the attackers obtain information, while the system does not have a strong architecture. Sometimes using different protocols makes security issues in telematics system. If UDP is used in the system, there is no guarantee that a packet of data is delivered or not. However, it may be delivered twice. In this case, it makes the problem in telematics system health care because of losing data about patients by UDP. As a result, it makes a dangerous situation for the patients [7].

Transmitting information across telematics network has a security issue. If the system does not use the strong method to encrypt customer's information, attackers can steal customer private information and enter into the database system which will be vandalized by the attackers [14].

Spending less money makes security holes in company system because it cannot be fully protected against new malicious attacks. The company requires having up to date software to protect its system [7].

Hijacking cars or robot by attackers is dangerous to the safety of customer because customers cannot protect the system against the attackers so sometimes the attackers can control system breaking into a customer's car and creating any accident which the attackers want to happen [14].

Using telematics system makes customer information available on the system. For instance, customers may not want the system knows where the customers are in the vehicle [14].

6 CASE STUDIES

Security is an essential feature in electronic system because the system stores a lot of customer's information. Telematics system is an electronic system which hackers may try to hijack or find holes to control the system.

6.1 Hacking telematics system

Disabling 100 cars in Texas and the horns of the cars was out of control. The attacker went through web-based-web immobilization system [18]. He obtained information about customers. The Texas Auto Center did not know about this event until they received more than one hundred complaints from their customers about going off horns in the middle of the night and disabling their cars. A customer could fix the horn only by removing the battery of their cars. Many customers were missing their work because of having these problems.

The Texas Auto Center can control these problems after five days, when they reset Webtech Plus passwords for all employees' account. Police found the attacker by tracing his IP address and arrested him.

The attacker was searching for a specific customer name for the first target, and then he went through a database system and started to vandalize customer's record, disabling their cars and setting off horns [18]. Having the threat on telematics system may create side effect on people who want to use this system. If an attacker controls cars or any other service, life of customer will be in danger.

7 CONCLUSIONS

Technology is developing every year and is used by developers of the system in many aspects in life. Telematics system is developing in different aspects. It seems that it provides a lot of services in human lives. It makes life faster and reducing accidents in vehicle car, monitoring patients at home. However, when the system does not have strong architecture and does not have insufficient methods for encrypting customer's information, it makes problems. In this case, customers lose their private information and sometimes they lose money. Likewise, telematics organizations lose customers because of losing the reliability of their system.

Organizations should aware about the security requirements, while they start to produce the system so the system may not have big issues in security. People need to understand the telematics system and encourage them to use it because each system provides sev-

eral services to them. For example, tracking vehicle is important since the vehicle is under monitoring. Nevertheless, some drivers do not like this service because it is easy to find vehicles. All in all, telematics organizations need to explain their system and increasing the security features of the system.

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