

## Chapter 3

# Towards Privacy Awareness in Future Internet Technologies

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### ABSTRACT

*With the increased use of the Internet to share confidential information with other users around the world, the demands to protect this information are also increasing. This is why, today, privacy has found its important place in users' lives. However, Internet users have different interpretations of the meaning of privacy. This fact makes it difficult to find the best way to address the privacy issue. In addition, most of the current standard protocols in use over the Internet do not support the level of privacy that most users expect. The purpose of this chapter is to discuss the best balance between users' expectation and the practical level of privacy to address user privacy needs and evaluate the most important protocols from privacy aspects.*

### INTRODUCTION

Today, Internet is used as a highway for exchanging data, data that might be confidential or sensitive for the owners who might be an individual, a company, an organization or a government. This is because there are thousands of Internet technologies (services) available to attract users to communicate through the Internet. Some examples of these technologies (services) are blogs, wikis, social networking and virtual worlds, online presentation tools and video and podcasting.

After Snowden's information leakage about NSA pervasive monitoring, unfortunately, Internet users are now aware of the fact that criminals are not the only people who are seeking to access their confidential data but also governments are trying to gather this information for different purposes.

This pervasive monitoring (Akko & Farrell, 2014) showed that the current Internet architecture and the whole TCP/IP protocol suite are not necessarily well designed to protect users' data from prying eyes.

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This is why the Internet Engineering Task Force (IETF) recently started activities to investigate privacy awareness for the current standard protocols; such activities might require the redesign of some of the existing protocols. This is especially true when users and devices should be authenticated by other devices automatically so that they can be authorized to access some resources in visited networks.

The major focus of this chapter is the privacy status of the current authentication protocols as well as the evaluation of some of the standard communications protocols.

The remainder of this chapter is organized as follows:

It first focuses on the meaning of privacy, its status in different countries and possible attacks to jeopardize user's privacy. It then introduces existing standard organizations that formed the current Internet architecture by their cooperation. It also focuses on the description of some of the existing protocols. It then evaluates the current privacy status of these protocols. Since authentication and authorization protocols are really important, it then describes them in more detail. It is because a misconfigured system might allow an unauthenticated user to have an unauthorized access to some confidential data. This chapter concludes by making some recommendations.

## **WHAT IS PRIVACY?**

The term privacy had come into existence when for the first time people declared themselves as owners of some items of physical property and wanted to protect them against intruders (Hirshleifer, 1980). Later, this term was used in a broader scope, especially in computer systems, and in combination with other terms such as anonymity, secrecy, etc.

Unfortunately, the broad scope of this term allowed it to be confused with other terms, such as security terms, whereby they were conceived

to be the same, which is not true. This fact leads to disagreement on the privacy definitions.

In computer terms, privacy which considered being a social term gives one the ability to choose what data he/she wants to expose to others and what data he/she wants to keep from others. In other words, privacy gives users to control their data disclosure. But when interactions are done via computers and networks, privacy often relies on technical tools for data confidentiality and data integrity. Security, on the other hand, gives one the ability to protect these data and preserve their confidentiality. These important data can be anything including user's bank information, names, date of birth, medical information, user's address and any information that can give an attacker a possibility to track this user.

This information might be of different nature when we are talking about privacy in a company. The data can indeed be company's product details (confidential data that are hidden from competitors), codes, employees' personal information, etc.

Sometimes, privacy and security are conflicting. One example of this scenario is where a company records the location of its users in order to use it as part of the authorization process – perhaps some applications or datasets may only be accessed from inside company premises. But although this helps the company maintain security, tracking and recording employees' location could violate their privacy.

## **Privacy and Its Scope in Different Countries**

The importance of protecting personal data motivated countries to work on an international privacy regulation. Finally, in 1970, the world's first data protection law was enacted in the Hesse in region of Germany (Rodrigues & et al., 2002). Since then, other countries have enacted their own national privacy regulations that describe the data protection during collection, storage and analysis.

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