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Digital Certificates: Success or Failure?

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Digital Certificates: Success or Failure?

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DIGITAL CERTIFICATES: SUCCESS OR FAILURE?

ABSTRACT

This paper examines a controversial topic – “Is digital certificate technology a success or failure?” The arguments and facts from both sides are presented in this paper. A high profile failure case in Hong Kong is discussed. Some problems of Certificate Authorities are presented. This paper differs from other security papers in that technical terms (such as algorithms, details of data frames, etc.) are minimized as far as possible.

IS DIGITAL CERTIFICATE TECHNOLOGY A SUCCESS OR FAILURE?

Whether or not digital certificates are a success is a controversial topic among IT professionals. If we only consider the number of digital certificates adopted in websites, it could be argued that they are a success. In fact, a large number of enterprises' websites (particularly banks) now employ such technology, known as "SSL/TLS", to protect their communications with clients. Through the use of digital certificates, communications between websites and clients are encrypted automatically and seamlessly without requiring any effort from users.

Nevertheless, from another perspective, digital certificates are a failure. The main reasons are as follows:

- They have failed to attract substantial public attention. Personal use of digital certificates is still very low. Only a small percentage of global individual Internet users own and use personal digital certificates, and the new adoption rate has remained stagnant for many years.
- Most Internet users do not possess much knowledge about digital certificates. For example, in addition to encryption, users can also check the identity of websites if the websites deploy a valid digital certificate. However, many users do not know how to verify the integrity of a website using digital certificates (Lopez et al., 2005).
- If the root certificate of a Certificate Authority (CA) is not pre-installed in an operating system (OS) and/or software packages, the user needs to decide whether to accept or reject the certificate. Unfortunately, this is not an easy decision for users to make because typically users do not possess adequate knowledge about the quality of these CAs. As a result, many users simply accept the certificate without considering possible consequences (Ellison & Schneier, 2000).

PROMOTION CAMPAIGN IN THE YEAR 2000

Promoting digital certificates has proven difficult, even with a large amount of funding and effort. One example of this kind of promotion is the Hong Kong Government's campaign in January 2000. Although the campaign was a failure, we can learn crucial lessons from it and avoid making similar mistakes in the future.

Hong Kong Post is assigned the role of recognized CA under the Electronic Transaction Ordinance in Hong Kong. The Hong Kong Government orchestrated many activities to promote it, such as spending a tremendous amount of money on promotion and advertisements, in such venues as newspapers and television.

The cost of a personal digital certificate is HKD\$50. In order to create a critical mass of personal users and to promote the development of electronic business, Hong Kong Post offered the general public an option to embed a digital certificate in their new smart identity card for one year for free. This free “e-Cert” program began in June 2003 and ended in March 2007.

This was an expeditious idea because Hong Kong law requires all citizens to carry their smart ID cards with them whenever they go outside of their home. Thus, users can always use the digital certificates because their card is always in their wallets. In this way, they are not burdened with having to carry an extra USB flash drive. This is a unique program to Hong Kong; it was generally expected it would be a success and that Hong Kong Post would generate a profit.

FAILURE OF THE PROGRAM

The Hong Kong Government and many IT professionals admitted that the program was a failure. This view is supported by the following facts:

- The average opt-in rate for the free e-Cert program was only 17.5%, with the renewal rate as low as 0.3%. A survey of the Census and Statistics Department in December 2002 showed there were about 3 million people who were aged 15 years or older with knowledge of using computers. Of this cohort, however, only 3.3% owned digital certificates (Director of Audit, 2007).
- Instead of earning a profit from the CA operations, the program accumulated a deficit of HK\$195.2 million up to March 2007. Finally, Hong Kong Post ceased this operation and out-sourced the service to a private company.
- Organizations and enterprises in Hong Kong tend to choose digital certificate services provided by other global, popular CAs, such as VeriSign.

- Very few companies employ Public Key Infrastructure (PKI) technology. For this reason, there is an insufficient number of applications available in the market to create a strong and sustainable demand for digital certificates (Legislative Council, 2005).

REASONS FOR FAILURE

There are numerous reasons for the failure. We will discuss them one-by-one:

- Importing an e-Cert to a computer requires a smart card reader. However, smart card readers are not popular, which constitutes a major barrier to their adoption. A survey conducted by Lim (2004) reveals that, out of 140 associate degree students at the City University of Hong Kong, two-thirds were unaware that a smart card reader is necessary. Once they knew that they would be required to have such equipment, 95% of them indicated that they were either unsure or unlikely to buy one.
- Users do not have sufficient knowledge of digital certificates and their related objects. In the same survey conducted by Lim (2004), two-thirds of the students did not know what applications digital certificates could provide.
- It can be difficult, complex, and inconvenient to use (Mok, 2005; Mok, 2007; Hau, 2005) for a lot of users. This issue was even admitted by John Tsang, the Government's Secretary for Commerce, Industry, and Technology of Hong Kong at that time.
- The certificate only supports the Microsoft Windows OS, which dissatisfied many Apple Macintosh users.
- A lack of applications is also a critical reason for the failure. In essence, there was a "chicken-or-the-egg-problem". In other words, individuals have no incentive to buy a certificate if there are not enough applications. On the other hand, organizations have no incentive to develop applications that use certificates if there are not enough users who own certificates.

- Hong Kong Post made a number of advertisements to promote e-Cert. However, these advertisements were widely criticized as being conventional, stale, and ineffective (Mok, 2005; Mok, 2007).
- The Hong Kong Government was also criticized for frustrating the growth of e-Cert adoption. In 2002, some government departments relaxed the requirement of using digital certificates for their online services. In other words, instead of using digital certificates which can provide better security, users only need to use passwords to authenticate themselves.

CA PROBLEMS AND/OR DIFFICULTIES ASSOCIATED WITH CAS

Digital certificates are considered to be a perfect technology. However, problems do exist in the implementation of the CA and browsers. Several high profile incidents are listed below:

- 2001: VeriSign was tricked into issuing two digital certificates to someone who claimed to be a Microsoft employee (Hulme, 2001). Fortunately, VeriSign believed that no one actually used the certificates (Penta, 2001).
- 2011: An Iranian hacker, “comodohacker”, claimed credit for obtaining counterfeit digital certificates from Comodo through its Italian Registration Authority, GlobalTrust. The hacker gained access to GlobalTrust’s server and was able to submit Certificate Signing Requests and immediately received signed certificates from Comodo (Bright, 2011c; Schwartz, 2011).
- 2011: DigiNotar, a Dutch CA, was hacked on or around June 6. Hackers used this compromised access to issue a rogue 531 SSL certificate for Google and other domains, including Skype, Mozilla add-ons, and Microsoft update. It took a long time for DigiNotar to revoke these rogue certificates (Leyden, 2011). There were also other serious administrative/technical problems in DigiNotar. Since the issue was critical, Microsoft, Google, and Mozilla blacklisted the entire CA.
- 2011: KPN/Getronics, a Dutch CA, noticed a breach of a PKI-related web server with a distributed denial-of-service tool. Further investigation revealed that the tool had

apparently been residing on a PKI-related web server for more than four years. The CA then suspended issuing certificates (Higgins, 2011).

- 2012: Trustwave issued a digital certificate to a company which allowed it to issue valid certificates for any server. The company could decrypt the encrypted traffic sent and received by its staff when they used services, such as Google and Hotmail (Heise Media UK, 2012).

Internet browsers placed a lot of trust in root CAs. If a root CA starts issuing certificates to people that it should not, the entire system will collapse. There are also weaknesses in the verification process. For example, if a browser asks for the Certificate Revocation List (CRL) from a server and receives an “internal error” message, it will trust the certificate anyway. Clearly, the trust model that is used is not dependable and can be compromised.

As previously mentioned, users typically do not possess sufficient knowledge of digital certificates and their related objects. Since there are no published guidelines for choosing the right CAs, they are unable to decide which CA to trust. Moreover, some users also disable the auto-update function of their software programs, which makes fraudulent certificates appear as genuine and trusted.

Since the trust model is not centralized, instead of having a central CA, there are a number of root CAs. As there is no unified list of trustworthy CAs, each CA needs to negotiate with software vendors to be included in the software program’s default trust list. Some software vendors employ very strict standard requirements that CAs must meet in order to become trusted.

OTHER PROBLEMS

Awareness of Internet Security Issues

Companies are still generally not concerned with Internet security, as stated by Badrul Hisham Mahari, a former CEO of a Malaysian CA. He asserted that companies should understand that Internet security is crucial if they aspire to use the Internet as part of their competitive strategy. “It is wise to spend the 5-10% of the information technology budget on security and companies will realize that it pays off in the end,” he advised (Low, 2001).

Possible Applications with Benefits

Even though numerous problems exist with using digital certificates, it is still quite possible to successfully deploy this technology as an effective countermeasure and obtain many resultant benefits. We discuss several relevant applications below:

Digital Cheques

As a result of the technology of digital signatures, paper cheques can be digitalized in the future. Instead of physical signatures or stamps, all digital cheques are signed with digital signatures. To make a payment, one simply “passes” the signed cheque to the payee through electronic means, such as email. Once the payee receives the email, he or she forwards the attached cheque to a bank to process the payment.

The benefits of using digital cheques include:

- For banks:

Digital cheques are more secure than traditional ones. A digital cheque cannot be repudiated and its integrity is verified by the attached digital signature. Because of the implementation of digital signatures, there is no need to confirm human signatures (which is time-consuming and prone to errors). Digital cheques can also be automatically processed by computers, which results in shorter processing time and fewer mistakes. The number of employees needed for processing cheques can be also reduced. In addition, banks will save a substantial amount of money in printing and delivering the paper cheques to their clients.

- For merchants:

Again, digital cheques are more secure than traditional ones. They are easier to process with computers. As the processing time of digital cheques is shorter, merchants can enjoy more cash flows. Furthermore, the number of employees required for processing cheques can be reduced.

- For consumers:

Consumers can benefit from safer transactions brought by digital cheques. Digital cheques are also more convenient, as time is saved that would have been spent writing traditional cheques, going to post offices, taking cheques to banks, etc. Moreover, digital cheques reduce posting fees.

- For society:

Digital cheques are more environmentally friendly, as they reduce the consumption of resources, particularly paper (i.e., trees). It also offers a viable solution to the security concerns involved in online shopping and transactions due to the use of digital certificates.

Digital graduation diplomas

Enterprises have complained that they have received a large number of fraudulent graduation diplomas in their recruitment efforts. In fact, with the help of an ordinary printer and a colour printer, printing a fraudulent diploma is quite simple. One can also purchase a fraudulent diploma from illegal organizations. Moreover, verifying a diploma is very difficult for a personnel department without the help of the issuing institute.

Digital graduation diplomas offer a complete solution to this problem. Each digital diploma bears a digital signature for verification purposes, following the same idea as signed emails. In this way, with an ordinary computer, one can verify the genuineness of a digital diploma in a few seconds. Such technology can also save time and the cost of verification.

Encryption and Authentication of Email Messages

Most people have received multiple fake email messages from hackers, sometimes each day. These hackers impersonate a bank employee or staff from the IT department of the users' organization. Assuming that the email is genuine, many users simply click on the link in the message. They then reveal their account and password to the hacker by logging onto the hacker's website.

If most of us used digital certificates, we could easily verify the identity of senders. The messages could also be encrypted, which would further increase the level of security. In this case, even if the message was intercepted, the hacker would not be able to understand message's content.

WHAT SHOULD BE DONE IN THE FUTURE?

Papers and books on wireless security problems are abundant. However, they fail to draw the attention of users and managers as they are written for "technical" people. Many users

believe their wireless Internet connections at home are safe and they do not realize the serious consequences of possible security breaches. This problem must be rectified quickly due to widespread use of Internet.

On the other hand, IT managers do not provide enough education and support for users' home connections. As technology alone will never be able to solve all security problems, enhancement of the coordination between employers and end-users are required. This issue is discussed in a non-technical way so it can reach a wider audience. It will convince corporations and Governments worldwide to take more actions.

GOVERNMENT

Automobile manufacturers are responsible for building good cars. On the other hand, the government needs to build solid infrastructure, such as highways, traffic lights, and parking lots. Without the proper infrastructure, the car industry could never succeed. In the same way, it is important for the government to establish infrastructure for digital certificates. It can do so in the following ways:

- The government should encourage companies to develop applications with digital certificates. For example, a certain amount of tax could be refunded to companies if they invest in developing applications with digital certificates.
- It should provide seminars to the general public to promote understanding and acceptance.
- It should encourage universities and high schools to teach about IT security and digital certificates to non-technical users. For example, additional funding should be allocated to universities and high schools with such courses or promotional activities.
- Many small companies do not have enough technical knowledge to develop applications with digital certificates. Governments can provide technical support (e.g., setting up a special government unit) to them. Alternatively, they can provide funding for universities to set up such technical support units.

- It is worth noting that some governments have stated that they do not trust the CAs of other countries (citation), particularly after the case of the disclosures of U.S. defense contractor Edward Snowden. They assert that completely relying on the digital certificates of foreign CAs to protect their confidential and sensitive communications could pose a major security risk. Indeed, some IT professionals contend that encrypted communication with digital certificates from foreign CAs can easily be decrypted by agencies of foreign countries. However, it is beyond the scope of this paper to discuss whether this issue may constitute a valid concern.

As a result of the above mentioned concern, many governments are beginning to set up their own CAs within their countries. However, one major problem with these new CAs is that their root certificates are not installed in OS or web browsers. This is because it is frequently extremely difficult and time-consuming for new CAs to negotiate successfully with OS manufacturers and browser vendors.

Governments should enact new laws to facilitate more widespread use of digital certificates. For example, for any new computers, the root certificate of local recognized CAs should be installed in the OS or browsers; otherwise, the product should not be allowed to be imported and sold in local markets. Every country has its own standards which govern imported products (e.g., car emissions, electric appliance voltage). Such practices are acceptable according to international law. If governments in different countries can form an alliance to agree on certain standards, OS and browser vendors will likely comply.

- According to Lopez et al. (2005), many CAs have ceased operations. Very few CAs actually make a profit from selling PKI products or services. Most of the CAs that are profitable are located in the U.S. This is not a healthy situation because governments in other countries will thus not invest money in promoting this technology. To remedy this, governments should provide more support to their local CAs, because a successful CA can generate substantial income for the government and solve a multitude of security issues.

CAs

- Enacting new laws can be time-consuming. It would probably take a long time for governments to force software vendors to install the root certificates of recognized CAs. Until this is accomplished, however, CAs should provide a small program to their users. With a single click by the user, this program should search the OS, browser, or other software packages on the computer and install the root certification and the user's personal certificate accordingly. This could be a viable short-term solution.
- CAs of different countries should form an alliance. Forming such an alliance will enable them to share resources (e.g., the above mentioned program or invite speakers to promote this technology) and experiences in solving problems. In addition, by acting as a group, they will possess greater negotiation power when they reach agreements with software vendors.
- This CA alliance could compile a list of trustworthy CAs and related information. This list should be placed in a central web site, where the public is allowed full access to the list. Alternatively, the CAs should enable users to set up an association to accomplish this goal.

EDUCATION

- Universities, other higher education institutions, and secondary schools should include security and the topic of digital certificates in their syllabi. Universities are now only offering these courses to students whose major is computer science (or related subjects). However, these kinds of courses should be provided to all (including non-technical) students.
- Many papers and books exist in these areas. However, these materials are normally written for a technical audience. Thus, researchers should write more teaching and learning materials in these areas for non-technical students.

CORPORATIONS

Corporations should provide related training or seminars to all of their staff. A security breach could compromise the entire IT system of the company; thus, it is obviously worthwhile for corporations to invest additional resources in this area.

Corporations can provide a list of trusted CAs to their users.

BIBLIOGRAPHY

Bright, P. (2011). *Another fraudulent certificate raises the same old questions about certificate authorities*. Ars Technica. Retrieved from <http://arstechnica.com/security/2011/08/earlier-this-year-an-iranian/>

Bright, P. (2011). *How the Comodo certificate fraud calls CA trust into question*. Ars Technica. Retrieved from <http://arstechnica.com/security/2011/03/how-the-comodo-certificate-fraud-calls-ca-trust-into-question/>

Bright, P. (2011). *Independent Iranian hacker claims responsibility for Comodo hack*. Ars Technica. Retrieved from <http://arstechnica.com/security/2011/03/independent-iranian-hacker-claims-responsibility-for-comodo-hack/>

Director of Audit (2007). *Director of Audit's reports*, No. 49, Ch. 2. Hong Kong.

Ellison, C. and Schneier, B. (2000). Ten risks of PKI: What you're not being told about public key infrastructure. *Computer Security Journal*, 16, 1.

Fratto, M. (2011). *Certificate Authority Compromises Are Global In Reach*. Network Computing. Retrieved from <http://www.networkcomputing.com/security/certificate-authority-compromises-are-gl/231601123>

Hau, L. (2005). *傳訊四圍炳：電子證書服務失敗的反思*. Apple Daily.

Heise Media UK. (2012). *Trustwave issued a man-in-the-middle certificate*. Retrieved from <http://www.h-online.com/security/news/item/Trustwave-issued-a-man-in-the-middle-certificate-1429982.html>

Higgins, K. (2011). *Certificate Authority Uncovers Old Breach*. Retrieved from <http://www.darkreading.com/attacks-breaches/certificate-authority-uncovers-old-breac/231902517>

Hulme, G. (2001). VeriSign authenticates hacker as Microsoft employee. *InformationWeek*, 830, pp.30.

Legislative Council Panel on Information Technology and Broadcasting (2005). *Business Review of the Hongkong Post Certification Authority*. Legislative Council.

Leyden, J. (2011). *Inside 'Operation Black Tulip': DigiNotar hack analysed*. The Register. Retrieved from http://www.theregister.co.uk/2011/09/06/diginotar_audit_damning_fail/

Lim, N. (2004). Internet Security and Digital Certificates: How Much Do You Know About Them? *Proceedings of the Fourth International Conference on Electronic Business*, pp. 1035-1037.

Lim, N. and Ferguson, C. (2005). E-Literacy in Pacific Asia. *Proceedings of the Fifth International Conference on Electronic Business*, pp. 452-456.

Lopes, J., Oppliger, R. and Pernul, G. (2005). *Why have public key infrastructures failed so far?* Internet Research, 15, 5, pp. 544-556.

Low, I. (2001). Creating awareness of digital certificates. *New Straits Times*, May 10,2001.

Mok, C. (2005). *從香港電子證書汲取教訓*. Hong Kong Economic Journal.

Mok, C. (2007). *政府推電子證書注定失敗*. Hong Kong Economic Journal.

- Penta, M. (2001). *Microsoft warns of impostor who obtained digital certificates*. Associated Press.
- Scheuerman, M. (2002). *Digital certificates raise trust*. Credit Union Magazine, 68, 6, pp. 44.
- Schwartz, M. (2011). Iranian Claims Credit for Comodo Hack. *InformationWeek*, Retrieved from <http://www.informationweek.com/attacks/iranian-claims-credit-for-comodo-hack/d/d-id/1096886>
- Wikipedia (n.d.). *Cheque*. Retrieved 27 Nov, 2013, from <http://en.wikipedia.org/wiki/Cheque>
- Wui, Y. (2001, October 17). Digicert urges endorsement for digital certificates. *New Straits Times*, pp. 3.

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