

ECE 568: Assignment 2

Introduction

Please answer the following questions. Your answers should be written in full sentences, and any quantitative claims about security should be justified (*i.e.*, more than just "yes" or "it's much more secure"). The completed assignments should be submitted the week of Dec 5, 2016, and work must be done *individually*.

SSL

The transport phase of SSL performs the following operations to prepare data for transmission:

Step	Description
i	Messages are broken into 4kB fragments
ii	Each fragment is compressed
iii	A sequence number is appended to each chunk
iv	A MAC of each chunk is computed
v	Each chunk and MAC is encrypted

Indicate what the consequences would be if each of the following changes is made to the SSL transport phase protocol.

1. Omitting step i [1 mark]
2. Omitting step ii [1 mark]
3. Omitting step iii [1 mark]
4. Omitting step iv [1 mark]

Hash Functions

An attacker tries to attack a hash function H by brute force. For any string s , $H(s)$ is n bits long and, it's a well-implemented hash function, so all n -bit strings are equally probable as the output for any randomly-chosen input. Let h be a given n -bit string. The attacker wants to find an input (pre-image) m such that $H(m) = h$. To this end, the attacker tries random input strings every time.

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1. Is the attacker trying to commit a selective forgery or an existential forgery? **[1 mark]**
2. What is the probability that the attacker will succeed on its first attempt? **[2 marks]**
3. What is the probability that the attacker will succeed on the k 'th random try? **[2 marks]**
4. What is the expected number of attempts before success? **[2 marks]**

Web Security

The article "*Evaluation of TFTP DDoS amplification attack*" is available from the course website. It provides an overview of a class of DDoS attack tools, referred to as "amplification attacks", and introduces a particular amplification attack utilizing TFTP services.

1. Briefly describe what an amplification attack is and how it increases the impact of DDoS. **[1 marks]**
2. Briefly describe two mitigation approaches for DDoS attacks. **[4 marks]**
3. Briefly describe the format of the new amplification attack proposed this article. **[4 marks]**

Total: 20 marks.