Security Analysis of a Full-Body Scanner

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Abstract

Advanced imaging technologies are a new class of people screening systems used at airports and other sensitive environments to detect metallic as well as nonmetallic contraband. We present the first independent security evaluation of such a system, the Rapiscan Secure 1000 full-body scanner, which was widely deployed at airport checkpoints in the U.S. from 2009 until 2013. We find that the system provides weak protection against adaptive adversaries: It is possible to conceal knives, guns, and explosives from detection by exploiting properties of the device's backscatter X-ray technology. We also investigate cyberphysical threats and propose novel attacks that use malicious software and hardware to compromise the effectiveness, safety, and privacy of the device. Overall, our findings paint a mixed picture of the Secure 1000 that carries lessons for the design, evaluation, and operation of advanced imaging technologies, for the ongoing public debate concerning their use, and for cyberphysical security more broadly.

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