Cybersecurity & Privacy: Information Security

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How 1.5 Million Connected Cameras Were Hijacked to Make an Unprecedented Botnet

As many predicted, hackers are starting to use your Internet of Things to launch cyberattacks.

Network live IP video cameras directory Insecam.com

Welcome to Insecam project. The world biggest directory of online surveillance security cameras. Select a country to watch live street, traffic, parking, office, road, beach, earth online webcams. Now you can search live web cams around the world. You can find here Axis, Panasonic, Linksys, Sony, TP-Link, Foscam and a lot of other network video cams available online without a password. Mozilla

Officials: DC security cameras hacked 8 days before inauguration by man, woman in London

by John Gonzalez/ABC7 | Friday, February 3rd 2017

Hacking intelligent buildings using KNX and Zigbee networks

A great many of us are living, staying or working in "smart" buildings, relying on automated processes to control things like heating, ventilation, air conditioning, lighting, security and other operation systems. We expect those systems to work without a glitch and withstand attacks but, unfortunately, the security of these systems is still far from perfect.
CWE-798: Use of Hard-coded Credentials - CVE-2013-3612
All DVRs of the same series ship with the same default root password on a read-only partition. Therefore, the root password can only be changed by flashing the firmware. Additionally, a separate hard-coded remote backdoor account exists that can be used to control cameras and other system components remotely. It is only accessible if authorization is done through ActiveX or the stand-alone client. Additionally, a hash of the current date can be used as a master password to gain access to the system and reset the administrator’s password.

Vulnerability Note VU#800094
Dahua Security DVRs contain multiple vulnerabilities

Original Release date: 13 Sep 2013 | Last revised: 04 Dec 2013

Overview
Digital video recorders (DVR) produced by Dahua Technology Co., Ltd. contain multiple vulnerabilities that could allow a remote attacker to gain privileged access to the devices.
Vulnerability Note VU#778696

Netgear D6000 and D3600 contain hard-coded cryptographic keys and are vulnerable to authentication bypass

Original Release date: 10 Jun 2016 | Last revised: 01 Jul 2016

Overview

The Netgear D6000 and D3600 routers are vulnerable to authentication bypass and contain hard-coded cryptographic keys embedded in their firmware.

Description

CWE-321: Use of Hard-coded Cryptographic Key -- CVE-2015-8288

The firmware for these devices contains a hard-coded RSA private key, as well as a hard-coded X.509 certificate and key. An attacker with knowledge of these keys could gain administrator access to the device, implement man-in-the-middle attacks, or decrypt passively captured packets.

CWE-288: Authentication Bypass Using an Alternate Path or Channel -- CVE-2015-8289

A remote attacker able to access the /cqi-bin/passrec.asp password recovery page may be able to view the administrator password in clear text by opening the source code of above page.
4G-WiFi Gateways
Used in Critical Infrastructure Deployments

Used, among others, at: gasoducts, oleoducts, traffic lights, smart grids, police cars and ambulancies

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Sierra Wireless Technical Bulletin: Mirai Malware

Products: Sierra Wireless LS300, GX400, GX/ES440, GX/ES450 and RV50

Date of issue: 4 October 2016

Sierra Wireless has confirmed reports of the “Mirai” malware infecting AirLink gateways that are using the default ACEmanager password and are reachable from the public internet. The malware is able to gain access to the gateway by logging into ACEmanager with the default password and using the firmware update function to download and run a copy of itself.

Advisory (ICSA-15-161-01)
Hospira Plum A+ and Symbiq Infusion Systems Vulnerabilities

Original release date: June 10, 2015 | Last revised: June 12, 2015

STACK-BASED BUFFER OVERFLOW

The researcher has evaluated the device and asserts that the device may be exploited to allow execution of arbitrary code on the device. This vulnerability is potentially serious.

However, acting out of an abundance of caution, ICS-CERT is including this vulnerability in this advisory to inform operators and providers’ awareness, so that additional monitoring and controls can be deployed.

CVE-2015-3955 has been assigned to this vulnerability. A CVSS v2 base score of 5.0 has been assigned; the CVSS vector string is (AV:N/AC:H/Au:N/C:C/I:C/A:C).

IMPROPER AUTHORIZATION

The communication module gives unauthenticated users root privileges on Port 23/TELNET by default. An unauthorized user could issue commands to the pump.

CVE-2015-3954 has been assigned to this vulnerability. A CVSS v2 base score of 10.0 has been assigned; the CVSS vector string is (AV:N/AC:L/Au:N/C:C/I:C/A:C).

INSUFFICIENT VERIFICATION OF DATA AUTHENTICITY

The device accepts drug libraries, firmware updates, pump commands, and unauthorized configuration changes from unauthenticated devices on the host network. The device listens on the following ports: Port 20/FTP, Port 23/TELNET, Port 80/HTTP, Port 443/HTTPS, and Port 5000/UPNP. Hospira has not validated claims of firmware updates and pump commands for Plum A+ and Plum A+3 from unauthorized devices on the host network.
Common ground in such diverse industries: Old problems

Zero concern with security
- “someone” will implement security[later]...
- firmware updates are not part of the requirements

Lack of authentication
- to connect and to receive commands
- for updates

Poor authentication and vendor “backdoors”
- default passwords, passwords of the day, “maintenance” passwords

WARNING: a wide range of industries is now develop software, but have no understanding of the process or the risks
- Patching and updates on the products’ life cycle?
- Secure Software Engineering?
- Product Security Incident Response Team?

Lots of vulnerabilities
“There is hardly anything in the world that some man cannot make a little worse and sell a little cheaper, and the people who consider price only are this man's lawful prey.”

– John Ruskin(?)
Privacy Concerns

We need to consider more carefully the unintended consequences of technologies:

- almost everything is now on “the cloud”
  - voice activated services depend on it (TVs, personal assistants like “Alexa”, etc)
  - centralized analysis has huge beneficial potential for sustainability and public welfare if we can have better data on energy consumption, global temperatures, traffic, health issues, etc

- examples of privacy implications
  - voice activated devices: everything you say is potentially public
  - fitness bands: data being sold to insurance companies
  - smart grids: energy consumption patterns can be mapped to specific uses, easy to identify when there is someone home or traveling, for example

.Dynamic energy-consumption indicators for domestic appliances: environment, behaviour and design
What is Information Security?
Information resides in multiple places and its security depends on multiple factors.

**McCumber Information Security Model**

Risks are inherent to systems/devices connected to the Internet

- unavailability
- privacy breaches
- data leak
- financial losses
- damages to the image
- society loosing trust in the technology

**Internet Connected Systems**

**Risks**

- project does not consider security requirements
- software defects
- configuration errors
- inadequate use
- weaknesses due to the systems’ complexity

**Attackers**

- criminals
- industrial espionage
- nation states
- vandals

**Vulnerabilities**
Even “Secure and Certified” Products Fail

COMpletely BROkEn —

Millions of high-security crypto keys crippled by newly discovered flaw

Factorization weakness lets attackers impersonate key holders and decrypt their data.

DAN GOODIN - 10/16/2017, 9:00 AM

The flaw resides in the Infineon-developed RSA Library version v1.02.013, specifically within an algorithm it implements for RSA primes generation. The library allows people to generate keys

Enlarge / 750,000 Estonian cards that look like this use a 2048-bit RSA key that can be factored in a matter of days.

This is the second time in four years that a major crypto flaw has been found hitting a crypto scheme that has passed rigorous certification tests. In 2013,
“... the real security challenge is not the mathematics of cryptosystems; it is engineering, specifically the design and implementation of complex software systems.”

– Keys Under Doormats, Abelson et. al

A new data leak hits Aadhaar, India's national ID database

Exclusive: The data leak affects potentially every Indian citizen subscribed to the database.

Known as Aadhaar, the government ID database is packed with identity and biometric information -- like fingerprints and iris scans -- on more than 1.1 billion registered Indian citizens, official figures show. Anyone in the database can use their data -- or their thumbprint -- to open a bank account, buy a cellular SIM card, enroll in utilities, and even receive state aid or financial assistance. Even companies, like Amazon and Uber, can tap into the Aadhaar database to identify their customers.

A data leak on a system run by a state-owned utility company Indane allowed anyone to download private information on all Aadhaar holders, exposing their names, their unique 12-digit identity numbers, and information about services they are connected to, such as their bank details and other private information.
What about metrics?
What can surveys measure?

Compliance to standards (ISO, COBIT, ITIL, etc)?
- Do you have policies?
- Do you have X or Y procedures?

Perception of security problems?
- How many incidents did you have?
  (What about those that were not detected?)

Challenges
- You can’t measure what you don’t know
  • In security almost everything that fails is part of the unknowns
- Compliance ≠ Security
- Certification does not apply to software
  • it is possible to certify maturity processes
  • software is bound to have bugs and defects
    - a percentage will bring security issues
CERT.br Passive Metrics of Internet Health: Mirai botnet propagation (1/2)

Unique IPs infected with Mirai: 5 RIRs

Period: 2016-09-15--2017-05-20
CERT.br Passive Metrics of Internet Health: Mirai botnet propagation (2/2)

Unique IPs infected with Mirai: Top 10 CCs, LAC Region

Period: 2017-01-01--2017-05-20
Challenges for the Future

Professional qualification
- Networking, system administration, information security, secure software development

Although proposed by some “experts”, device certification is a bad idea
- There is no way to certify software (firmware is software)

Vulnerabilities will always exist
- How one handles them is the important point

We need a global discussion about maturity and security requirements for device manufacturers
- ALL products need a software/firmware update lifecycle
- ALL companies need a PSIRT (Product Security Incident Response Team) or at least a well defined contact for product security issues

References:
- FIRST PSIRT Services Framework
  https://first.org/education/Draft_FIRST_PSIRT_Service_Framework_v1.0
- The Building Security In Maturity Model
  https://www.bsimm.com/
Security is inherently multistakeholder: Cooperation for a Healthy Ecosystem

No organization or agency alone will be able to secure the digital environment – everyone has a role

- academia
  - needs to include security thinking in all disciplines
  - secure development has to be a priority from the beginning
- developers / companies
  - security needs to be a requirement from early development stages
- managers / executives
  - think about security as in investment and allocate appropriate resources
- system and network administrators and security professionals
  - care about which type of traffic is leaving your network
    - mindset: do no harm, do not pollute the Internet
    - adopt best current practices
- end users
  - understand the risks and follow security practices
  - keep all devices updated and apply all patches
“The stability, security and overall functionality of the network must be actively preserved through the adoption of technical measures that are consistent with international standards and encourage the adoption of best practices.”

– Principle 8: Functionality, security and stability
Principles for the Governance and Use of the Internet, CGI.br
Thank You
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@ cristine@cert.br    @ certbr

April 25, 2018

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