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Security

Crypto cadre cloud-cracks SHA-1 with just $75k of compute cost

Plans to retire cipher in 2017 may need to be brought forward

9 Oct 2015 at 05:02, Darren Pauli

39 185

A crypto cadre has busted the SHA-1 security standard after using $US75,000 of cloud computing resources, handily undercutting conservative crypto cracking estimates and putting such an attack within reach of well-resourced groups.

The work brings forward the beginnings of the death knell for the widely-used hash function by two years. Security minds estimated SHA-1 should be retired in 2017 in-line with then estimated advances in compute capacity.

It was estimated in 2012 that such attacks would cost $173,000 to pull off by 2017.

The work paves the way for SHA-1 collision attacks and while impressive ought not to spark panic.

Crypto mind Bruce Schneier says SHA-1 is known to be theoretically broken and the research merely adds weight to the argument that support for it among browser barons should not be extended.

"This is not that unexpected," Schneier says .

"All the major browsers are planning to stop accepting SHA-1 signatures by 2017 [and] Microsoft is retiring it on that same schedule.

"What's news is that our previous estimates may be too conservative."

Faster compute power, tweaked attacks, and new attack vectors all add up to circumstances in which it is hard to predict the end of life for crypto standards.

The cracking work was performed by researchers Marc Stevens of the Dutch research institute Centrum Wiskunde and Informatica with Pierre Karpman and Thomas Peyrin from Singapore’s Nanyang Technological University.

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The trio describes their work in in the paper *Freestart collision for full SHA-1* [PDF] and in a dedicated website bearing the tongue-in-cheek title *The SHAppening*.

The team writes that the freestart collision targeting the SHA-1 internal compression function is "the first practical break of the full SHA-1, reaching all 80 out of 80 steps".

It took 10 days for the researchers' Amazon-powered 64-GPU cluster, dubbed The Kraken, to pull off the attack. Here's how the researchers explain their efforts:

> **"Freestart collisions, like the one presented here, do not directly imply a collision for SHA-1. However, this work is an important milestone towards an actual SHA-1 collision and it further shows how graphics cards can be used very efficiently for these kind of attacks.**
> **We therefore recommend the industry, in particular internet browser vendors and Certification Authorities, to retract SHA-1 soon. We hope the industry has learned from the events surrounding the cryptanalytic breaks of MD5 and will retract SHA-1 before example signature forgeries appear in the near future."**

The researchers call on the tech industry to reject a proposal to extend the issuance of SHA-1 certificates by a year due to alleged difficulties in switch over to SHA-3.

The work, like most research, builds on the shoulders of others; the team credits its work as an extension of the recent freestart collision work on reduced-round SHA-1 from CRYPTO 2015 [PDF and EUROCRYPT 2013 PDF.] ®

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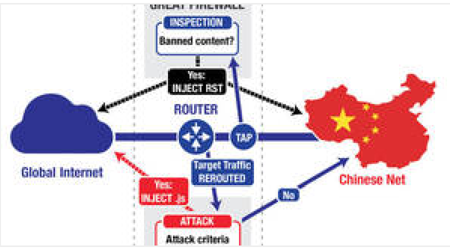

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