



The Citizen Lab

Research Brief
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Hacking Team Reloaded?

US-Based Ethiopian Journalists Again Targeted with Spyware

Authors: Bill Marczak, John Scott-Railton and Sarah McKune

Media coverage: [Washington Post](#), [Motherboard](#), [Associated Press](#), [CPJ](#), [BoingBoing](#), [Boston Globe](#), [Engadget](#), [New Zealand Herald](#), [Miami Herald](#), [CTV News](#).

[Read the statement](#) by Human Rights Watch.

[Read our open letter](#) to Hacking Team.

SUMMARY

- On February 12, 2014, Citizen Lab published a report¹ documenting how journalists at the Ethiopian Satellite Television Service (ESAT) were targeted by a governmental attacker in December 2013, with what appeared to be Hacking Team's Remote Control System (RCS) spyware.
- This report details the events of November 5 and 10 and December 19, 2014, when **the same attacker again targeted ESAT journalists based in the United States with what appear to be two updated versions of [Hacking Team](#)'s RCS spyware.**
- We link the governmental attacker to Ethiopia. **The attacker may be the Ethiopian Information Network Security Agency (INSA).**²
- Hacking Team has a customer policy concerning the human rights implications of its products,³ and claims it investigates and may take action in response to reported cases of abuse.⁴ **The research findings documented in this report suggest that Hacking Team may have continued to provide updated versions of its spyware to the same attacker, despite reports of use of the spyware against journalists.**

INTRODUCTION

In November and December 2014, several Washington DC-based journalists with the Ethiopian Satellite Television Service (ESAT) were targeted, unsuccessfully, with what appear to be two new versions of Hacking Team's RCS spyware.⁵ This report details these attempts to infect the journalists' computers with

RCS and monitor their activity.

Our research suggests the involvement of a governmental attacker that may be the **Ethiopian Information Network Security Agency (INSA)**. Notably, the attacker appears to be the same entity as that involved in a December 2013 attack -- also incorporating RCS -- against ESAT journalists based in Belgium and the US, on which Citizen Lab previously reported.⁶

Hacking Team (HT) is a Milan-based developer of “offensive security” technology.⁷ In its customer policy, Hacking Team encourages direct reporting to the company of apparent misuse of its technology.⁸ It further notes that it monitors news for “expressed concerns about human rights abuses by customers or potential customers,” and that when “questions [are] raised about the possible abuse of HT software in human rights cases,” it will investigate and “take appropriate action.”⁹

The November and December 2014 attacks against ESAT, however, call into question the effectiveness of this policy in preventing use of RCS in a manner that undermines human rights. The December 2013 attack on ESAT journalists and Citizen Lab’s research regarding that attack were reported on in the media, including on the front page of the Washington Post.¹⁰ Additionally, the Washington Post,¹¹ Human Rights Watch,¹² and the Citizen Lab¹³ have all contacted Hacking Team about the case.

In spite of these indications to Hacking Team that RCS was deployed against ESAT journalists in December 2013, our current research suggests that Hacking Team RCS software utilized by the attacker remained in operation and received support -- at a minimum, in the form of software updates -- through November 2014.

BACKGROUND

Ethiopian Satellite Television Service¹⁴ is an independent satellite television, radio, and online news media outlet run by members of the Ethiopian diaspora. The service has operations in Alexandria, Virginia, as well as several other countries.¹⁵ ESAT’s broadcasts are frequently critical of the Ethiopian government. Available in Ethiopia and around the world, ESAT has been subjected to jamming from within Ethiopia several times in the past few years.¹⁶ A 2013 documentary shown on Ethiopian state media warned opposition parties against participating in ESAT programming.¹⁷

The Washington Post says this about ESAT:¹

"The biggest fear among journalists is that spies have accessed sensitive contact lists on ESAT computers, which could help the government track their sources back in Ethi-o-pia."

The Washington Post reports the main concern of ESAT journalists with respect to spyware:¹⁹

"The news service mainly employs journalists who left Ethi-o-pia in the face of government harassment, torture or criminal charges. Though avowedly independent, ESAT is viewed as close to Ethiopia’s opposition forces, which have few other ways of reaching potential supporters."

As we note in our previous report, the Committee to Protect Journalists (CPJ) reports that Ethiopia jails more journalists than any other African country besides Eritrea, and says that the Ethiopian government has shut down more than seventy-five media outlets since 1993.²⁰ CPJ statistics also show that seventy-nine journalists have been forced to flee Ethiopia due to threats and intimidation over the past decade, more than any other country in the world.²¹

A 2013 Human Rights Watch report detailed ongoing torture at Ethiopia's Maekelawi detention center, the first stop for arrested journalists and protests organizers. Former detainees described how they were "repeatedly slapped, kicked, punched, and beaten," and hung from the ceiling by their wrists. Information extracted in confession has been used to obtain conviction at trial, and to compel former detainees to work with the government.²²

TECHNICAL ANALYSIS

The remainder of this report provides detailed analysis of the November and December 2014 attacks on ESAT. First, we examine the December 19, 2014 attack in which ESAT's Managing Director was targeted with spyware. We explain the links to Hacking Team RCS and Ethiopia. Then, we compare the November and December 2014 attacks on ESAT, and conclude that the attacker's spyware was likely updated during this period.

December 19, 2014: ESAT's Managing Director is Targeted

The Managing Director of ESAT, Neamin Zeleke, forwarded us the following e-mail, which he received on December 19, 2014. The e-mail contains a Microsoft Word document attachment, which he reports that he did not open:

----- Forwarded message -----
 From: **freweini araya** <fretar19@yahoo.com>
 Date: Fri, Dec 19, 2014 at 6:36 AM
 Subject: "ዎርደራ" 2007
 To: [REDACTED]

Dear Neamin,
 Please find attached a word document regarding what the Woyanes are stealthily up to here in Addis for the "election" they say they are going to held around the end of this year. Please note that I have temporarily changed my email to this one.

Regards
 Fre (ዮብልር ስዎ)

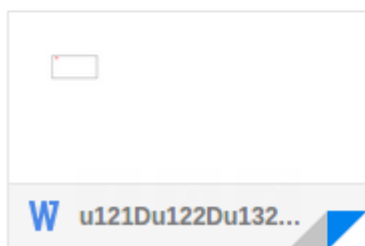


Figure 1: Spyware sent to Neamin Zeleke, Managing Director of ESAT, promises information on the upcoming elections.

```
sha256: b2683b3a214cda3f741fe5ff0850e69420d94174852a194ce9fc5f0db05c1633  
sha1: 03ae6619c2e6dc93d1d3cd218db337aa797b480a  
md5: 91961aad912dc790943a1cb23b6e8297
```

The attached Word document (u121Du122Du132B 2007.doc) contains an exploit, which appears to be the “Tran Duy Linh” MSCometLib.Toolbar.2 exploit:²³

The exploit drops and executes the following payload:

```
sha256: 5509462906e832350ea48f37e2e399669214c90b18023c94949036b254f7a681  
sha1: f9bebcc72bf7bb51e3e3cbd002bf7f8eea398f2c  
md5: f6a793a177447e3cab4108a707db65cd
```

The payload is a PE executable that appears to be protected with VMProtect, a commercial product for preventing reverse engineering and analysis of executable programs.²⁴ The payload did not run in any of the virtual machines in which we tested it. We ran the payload on a bare metal sandbox, and observed that it attempted to communicate with the IP address **46.251.239.xxx**.²⁵

```
inetnum: 46.251.239.0 - 46.251.239.255  
netname: POWERFULLSERVERS-1  
descr: POWER FULL SERVERS
```

Though the contact address for the server is listed in Pakistan, a traceroute shows that it appears to be geographically located in Germany. The payload is signed by the following code signing certificate:

```
Serial Number: 4fc13d6220c629043a26f81b1cad72d8
```

Issuer

```
CN = Certum Level III CA  
OU = Certum Certification Authority  
O = Unizeto Technologies S.A.  
C = PL
```

Subject

```
E = meicunge@gmail.com  
CN = Open Source Developer, meicun ge  
O = Meicun Ge  
C = CN
```

The signature is reported as valid by Windows:

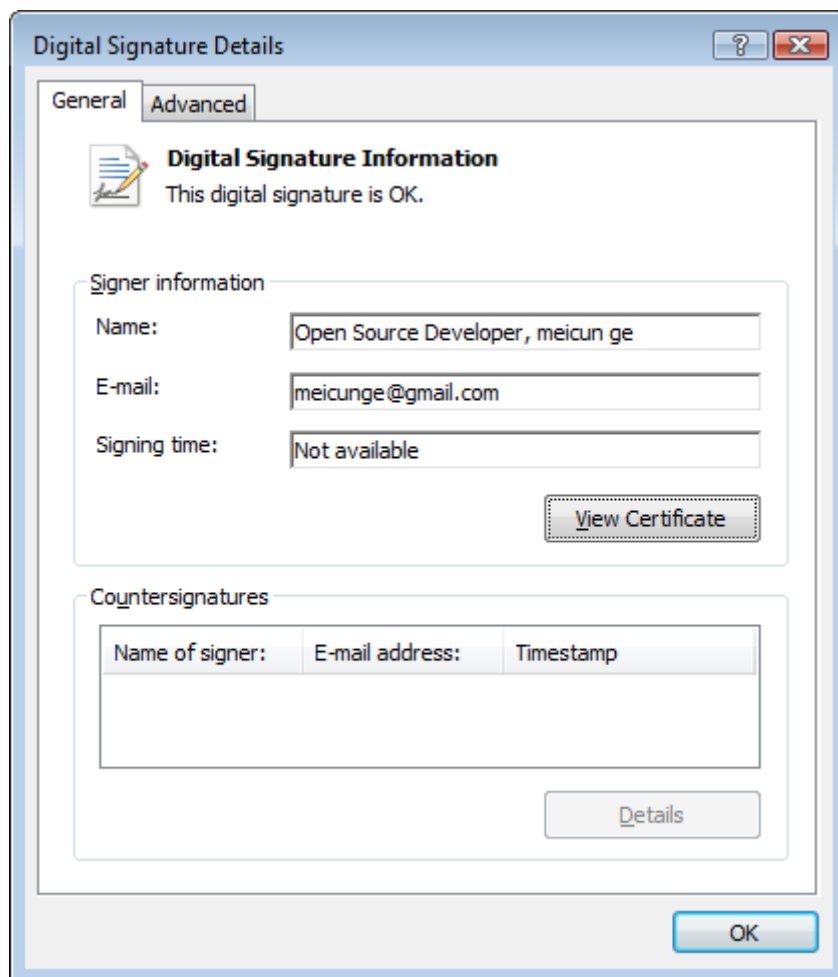


Figure 2: The spyware is signed by a certificate purportedly issued to “Meicun Ge” in China. Windows accepts the signature as valid.

The following two samples found in VirusTotal are signed by the same certificate:

```
e5cc130dbea95c78cf88807852fad7dcca3a1d6bd7ec86488b6157ba3451a0c9
299f1f25c268d814a85b37fb36e83b891b094baee95c8b739c04b5c134db84c8
```

Links to Hacking Team RCS

The spyware sent to ESAT on December 19, 2014, shares the same command and control infrastructure as that utilized in a December 20, 2013 attack against ESAT. The command and control server used in the 2013 attack returned an SSL certificate issued by “RCS Certification Authority” / “HT srl.”

Similar SSL certificates were returned by servers registered to Hacking Team.²⁶ We traced the 2013 server to a broader command and control infrastructure, which includes the server used in the 2014 attacks. Below, we explain how we mapped out this infrastructure by examining SSL certificates shared between servers, and by

conducting IPID testing.

In our previous work,²⁷ we showed that Hacking Team's clients – which, according to HT, are governments or government agencies²⁸ -- appear to use one or more fixed circuits of “proxy servers” to exfiltrate data from computers infected with RCS, through third countries, before reaching an “endpoint.”

The endpoint appeared to represent the spyware's government operator. Leaked Hacking Team documentation refers to proxies as “anonymizers”²⁹ and data endpoints as “collectors,”³⁰ consistent with our understanding.

Anonymizing chain	(optional)	geographically distributed	<i>VPS (Virtual Private Server)</i>
Anonymizer	Anonymizer groups that guarantee anonymity and redirect collected data to protect servers from remote attacks. It transfers agent data to servers. Several Anonymizers can be set up in a chain to increase the level of protection. Each chain leads to one Collector.		

Figure 3: Hacking Team documentation obtained after our previous work is consistent with our understanding of the architecture of Hacking Team's hidden infrastructure.³¹

Several RCS servers that we identified in our previous work use a global sequential IPID. If a server has a global sequential IPID, we can measure whether it sends packets during an interval. We sent probes to each RCS server with a global sequential IPID, and measured the value of the IPID before and after each probe. Since this test yielded consecutive IPIDs from each server, we concluded that each RCS server with a global sequential IPID was an endpoint, i.e., it was not sending the probes onward to yet another server.

We then traced proxy servers to these endpoints by sending a probe to each proxy (which each proxy forwarded to its endpoint), and inspected IPID values of each endpoint, before and after each probe, to see which one received our probe and responded to the proxy. If an endpoint received a probe we sent to a proxy, our test would show a gap in the endpoint's IPID sequence. More details are available in our previous work.³²

LINKING THE 2013 AND 2014 ATTACKS AGAINST ESAT

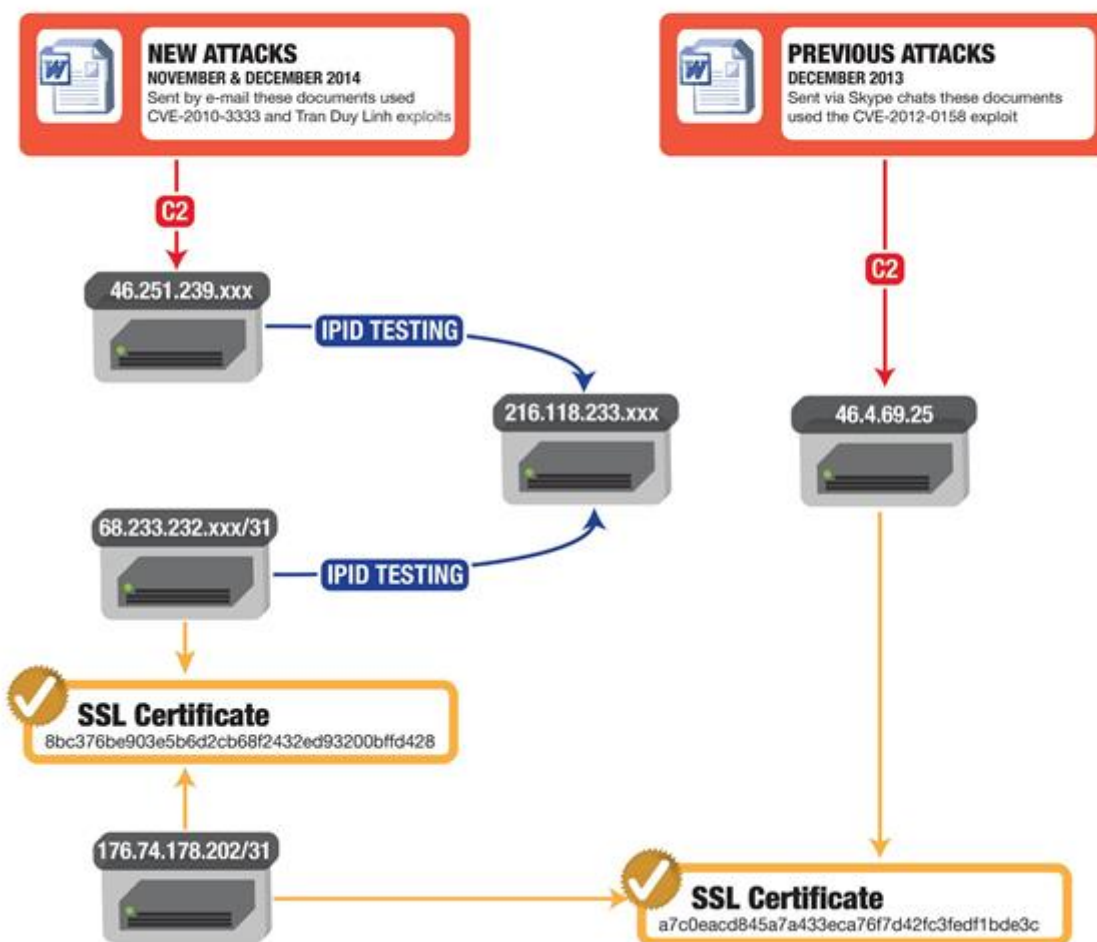


Figure 4: Command and control infrastructure shared between targeted digital attacks conducted against ESAT in December 2013, November 2014, and December 2014.

We used this IPID testing technique on **46.251.239.xxx**, the command and control server used in the December 19, 2014 attack on ESAT. The technique showed that **46.251.239.xxx** is apparently a proxy for **216.118.233.xxx**, an RCS server we had previously identified.

VSC Satellite Co. VSC-IPOWN1 (NET-216-118-224-0-1) 216.118.224.0 - 216.118.255.255
 Private Customer VSC-ARIAVE (NET-216-118-233-0-1) 216.118.233.0 - 216.118.233.255

We had previously identified **216.118.233.xxx** as an RCS server, as it matched one of our server fingerprints (gleaned from servers registered to Hacking Team)³³ as recently as April 7, 2014, according to Shodan.³⁴

```
/HTTP/1.1 200 OK\r\n(Connection: close\r\n)?Content-Type: text/html\r\nContent-[IL]ength: [0-9]+\r\n(Connection: close\r\n)?(Server: Apache.*\r\n)?\r\n/ =~ banner and
/Connection: close\r\n/ =~ banner and
/Apache/2.[0-9].[0-9] \ (Unix\ ) OpenSSL/1.0.0g Server/ =~ banner
```

Figure 5: The Hacking Team RCS fingerprint matched by 216.118.233.xxx, represented here as a Ruby boolean expression.

Most RCS servers we previously identified have now been updated so they no longer match the fingerprint. Using our IPID testing technique, we further determined that **68.233.232.xxx/31** are also apparently proxies for the same server, **216.118.233.xxx**.

```
network:Network-Name:Primary Assignments VPS's - 68.233.232.0/24
network:IP-Network-Block:68.233.232.0 - 68.233.232.255
network:Org-Name:Hivelocity Ventures Corp
```

The servers 68.233.232.xxx/31³⁵ returned an SSL certificate, 8bc376be903e5b6d2cb68f2432ed93200bffd428,³⁶ matching our fingerprint for Hacking Team RCS certificates.³⁷ The same SSL certificate (8bc376be903e5b6d2cb68f2432ed93200bffd428) was returned³⁸ by 176.74.178.202 and 176.74.178.203. These same servers earlier returned³⁹ a different SSL certificate, a7c0eacd845a7a433eca76f7d42fc3fedf1bde3c, that matched our fingerprint for Hacking Team RCS certificates.

This same SSL certificate (a7c0eacd845a7a433eca76f7d42fc3fedf1bde3c) was returned⁴⁰ by 46.4.69.25, the IP address of the proxy associated with the December 20, 2013 attack on ESAT, which as described in our prior report incorporated spyware that appeared to be Hacking Team RCS.⁴¹

Since the 2013 and 2014 attacks on ESAT share the same command and control infrastructure, it appears that both attacks were carried out by the same attacker(s). **Figure 4** summarizes the explanation above.

Links to Ethiopian Government and INSA

The same e-mail address used in the December 19, 2014 attack on ESAT, fretar19@yahoo.com, was used on June 30, 2014, to unsuccessfully target ESAT, as well as Dr. Berhanu Nega, Associate Professor of Economics at Bucknell University.⁴² We could not identify the type of spyware used in the June 30 attack or find any related samples, so we do not study it further in this report.

However, our analyses identified that servers at **216.118.233.252**⁴³ and **197.156.68.130** were part of its command and control infrastructure.⁴⁴ The former is in the same /28 as **216.118.233.xxx**, the Hacking Team RCS server we identified above. **197.156.68.130** is registered to Ethio Telecom, Ethiopia's state-owned telecommunications company.

Since both the December 19, 2014 attack and the June 30, 2014 attack were launched from the same e-mail address, the attacker in both cases appears to be the same. Since the second attack is linked to an Ethio Telecom address, the attacker appears to be linked to Ethiopia.

An individual not affiliated with ESAT was successfully infected by the same attacker⁴⁵ in January 2014. The victim noted ongoing unauthorized access to one of his GMail accounts from **216.118.233.250**,⁴⁶ most recently in October 2014. The attacker may have stolen the victim's GMail credentials with the spyware. After identifying the unauthorized accesses, the victim changed his password.

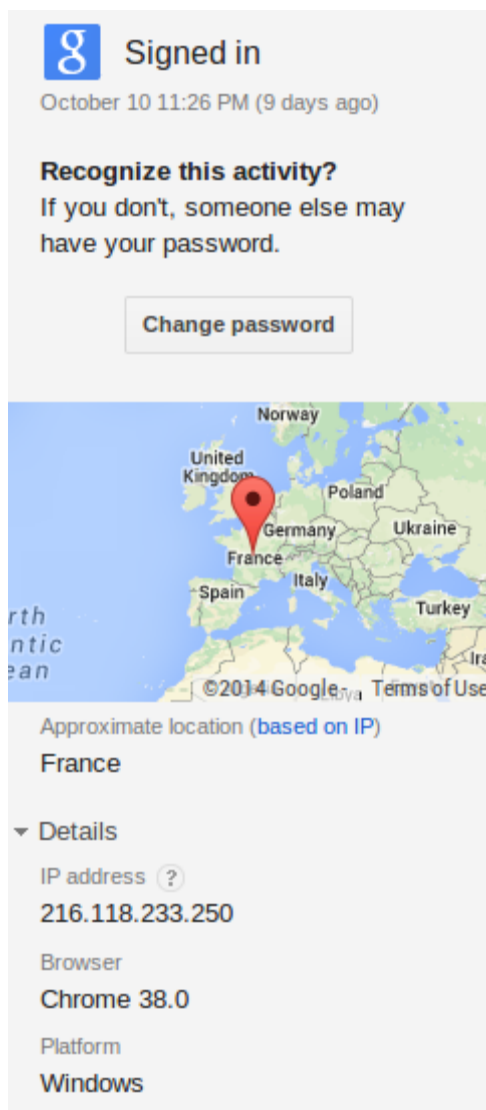


Figure 6: The GMail account of an individual infected by the same attacker was accessed from an IP address that hosted a computer called "INSA-PC." Google incorrectly geolocates the address in France.

We noted that **216.118.233.250** identified itself as "INSA-PC" to Internet scanning service Shodan.⁴⁷

216.118.233.250

Country	Satellite Provider
Organization	VSC Satellite Co.
ISP	VSC Satellite Co.
Last Update	2014-12-02T11:38:12.932457
ASN	AS34105

Ports

137

Services

137 NetBIOS

NetBIOS Response
MAC: 00:1a:a0:e6:56:51

Names:
INSA-PC <0x0>

Figure 7: Shodan recorded that a computer at IP address 216.118.233.250 identified itself as “INSA-PC” as recently as December 2, 2014.

In summary, the entity that attacked ESAT on December 19, 2014, appears to be a government, since they apparently employed Hacking Team RCS, and Hacking Team states that it provides its “software only to governments or government agencies.”⁴⁸ The attacker is linked to Ethiopia via an Ethio Telecom address. The attacker also apparently controls a computer called INSA-PC, because (a) the GMail account of an individual infected by the attacker was accessed from the same IP address as INSA-PC, and (b) INSA-PC is located in between two other addresses known to be associated with this attacker. In relation to the Ethiopian Government, the acronym “INSA” refers to the **Ethiopian Information Network Security Agency (INSA)**.⁴⁹ Thus, this agency may be behind the attack on ESAT. Interestingly, INSA’s website carries a syndicated security alert about Hacking Team RCS, with tips on how to avoid being infected.⁵⁰

A report by Human Rights Watch⁵¹ suggests that targeting media organizations is within the purview of INSA:

One individual who was working with Egyptian-owned Nilesat on an unrelated technical issue told Human Rights Watch that individuals from INSA came and visited him in late 2010 to find the upload frequencies for Nilesat because they wanted to “jam one foreign station.”

Attacks on November 5 and 10, 2014

For completeness, we report on the November 5 and 10 attacks on ESAT. ESAT journalists received the following e-mails on November 5, 2014 and November 10, 2014:

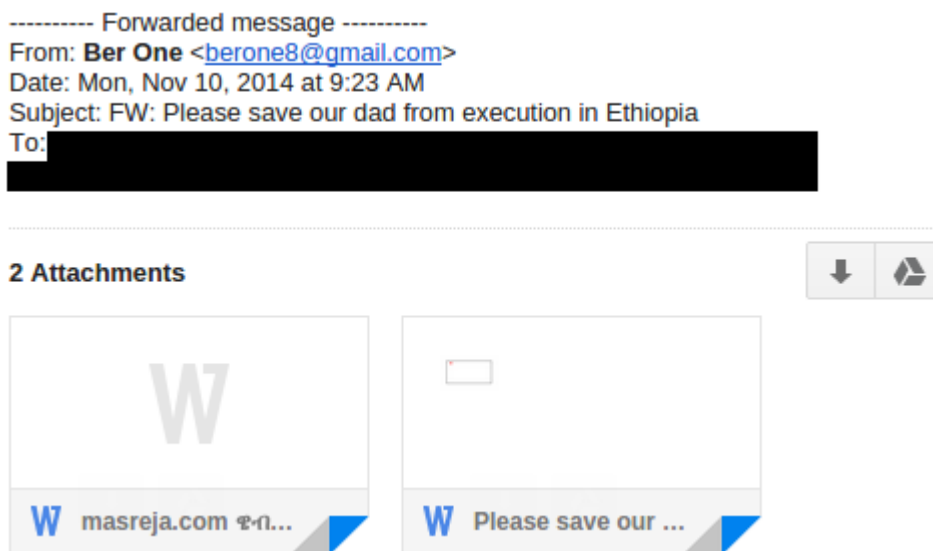


Figure 8: November 10, 2014 spyware e-mail implores “Please save our dad from execution in Ethiopia.”

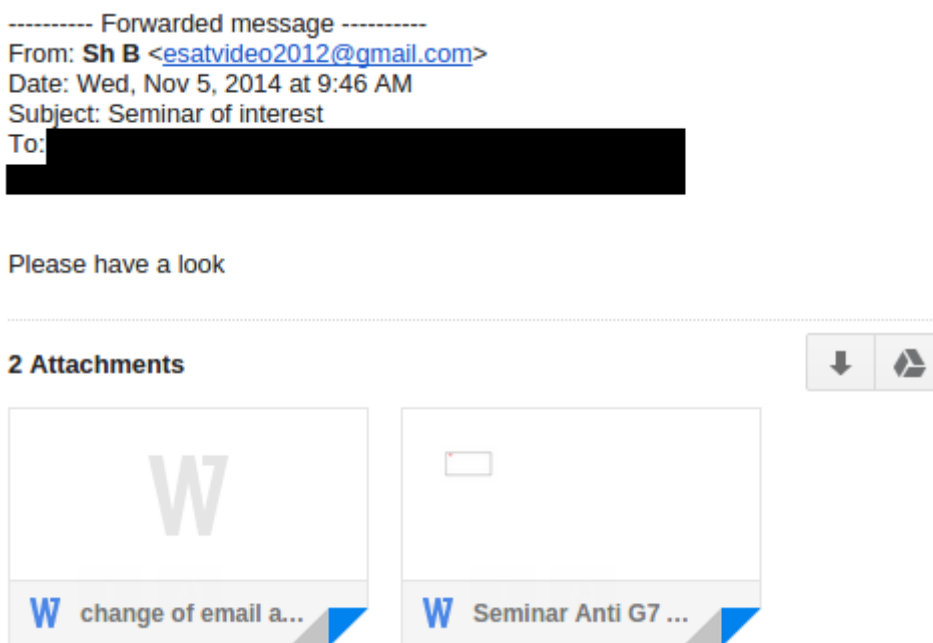


Figure 9: November 5, 2014 spyware e-mail promises a “Seminar of interest.”

Both e-mails contain the same attachments as each other, though with different filenames. The two attachments are Microsoft Word documents with exploits. In addition to the “Tran Duy Linh” exploit apparently used in the December 19, 2014 attack, this attack also appears to make use of a CVE-2010-3333 exploit:

sha256: 47f9a2daa161eeb0f7c88af92d3b346ee140ffbb0c310d0e6fbc7c91d42faace
sha1: b39dcf93c88d202a582ab4a589caca3e5d6650c
md5: 4faeaed1065815e40bc7c4d9b943f439

Filename 1: Seminar Anti G7 Movement.doc

Filename 2: Please save our dad from execution.doc

Exploit: “Tran Duy Linh” MSCometLib.Toolbar.2 exploit; no known CVE

sha256: af6137a1fe785cc865ea5ba2310cb81b4c6996f224dda2425d0c5b6995983e3d
sha1: 519bb2b2c3d0c7e67be735c4d384d832fcc89d67
md5: 3a7ef9a8c216bcdbbfecef934196d9c1

Filename 1: change of email address.doc

Filename 2: masreja.com ዌብሳይት ጥያቄ አስነሳ.doc

Exploit: CVE-2010-3333; this particular exploit seems to require at least Office 2010

Both exploits drop and execute the following payload:

sha256: 84f87c6d85211fe7c7f7fb1321e7f4db917bc6a7f2e51b7a8357fb4351b5a58d
sha1: 669246636ec6e3422a81ee2cb77c78c8420f9006
md5: b7f54924450ae0675ce67c5edad1f243

As in the December 19, 2014 attack, the payload is a PE executable that appears to be protected with VMProtect. We ran the payload on a bare metal sandbox, and observed that it attempted to communicate with 46.251.239.xxx, the same IP address as that involved in the December 19, 2014 attack. As described above, this IP address is linked to Hacking Team RCS, and a government attacker linked to Ethiopia.

The payload is signed by the following code signing certificate:

Serial Number: 55086d0b1a4ee0e271f82dccc75233cb

Issuer

CN = COMODO Code Signing CA 2

O = COMODO CA Limited

L = Salford

S = Greater Manchester

C = GB

Subject

CN = Jagdeependra

OU = tech

O = Jagdeependra

STREET = r/o sehi kala

L = chirwa

S = rajasthan

PostalCode = 333026

C = IN

Evasion of Detekt as a mechanism to determine latest RCS version used by attacker

On November 19, 2014,⁵² security researcher Claudio Guarnieri released his Detekt⁵³ tool, which scans a computer's memory to check for active FinFisher and Hacking Team RCS spyware infections. Since we have samples sent to ESAT before and after that date, we examined each sample against Detekt.

Pre-Detekt RCS samples successfully detected

Detekt is able to successfully identify an infection resulting from the samples sent on November 5 and 10, 2014. The following rules, which search for humorous strings present in RCS, successfully detect this infection:

```
$lookma1 = /(O)wning PCI bus/ wide
$lookma2 = /(F)ormating bios/ wide
$lookma3 = /(P)lease insert a disk in drive A:/ wide
$lookma4 = /(U)pdating CPU microcode/ wide
$lookma5 = /(N)ot sure what's happening/ wide
$lookma6 = /(L)ook ma, no thread id\! \\\o\// wide
```

Figure 10: Some patterns used by Detekt to find Hacking Team RCS spyware infections.

Post-Detekt RCS samples are not detected

However, Detekt fails to detect an infection resulting from the sample sent on December 19, 2014, as these strings are not present. The nonpresence of the strings is indicative of an update to the software from Hacking Team in response to Detekt. According to leaked Hacking Team RCS documentation, installation of RCS updates requires a user license file from the company.⁵⁴ Moreover, Hacking Team states that without its continued support to a client, its product “soon becomes useless.”⁵⁵

A Timeline of ESAT and Hacking Team

The latest attacks are part of an ongoing campaign against ESAT that stretches back to at least December 20, 2013. We provide a brief timeline of the attacks below:



Figure 11: Timeline of Hacking Team spyware-related activity by governmental attacker linked to Ethiopia.

- **December 20, 2013** -- ESAT journalists targeted with what appears to be Hacking Team spyware
- **February 11, 2014** -- ESAT journalists targeted with what appears to be Hacking Team spyware
- **February 12, 2014** -- Citizen Lab and Washington Post reveal that ESAT journalists in the US and Belgium were targeted with what appears to be Hacking Team spyware
- **Between approximately February 12 - 17, 2014, and March 25 - 31, 2014** -- We observe no activity on the Ethiopian Hacking Team infrastructure
- **Between April 7, 2014 - April 16, 2014** -- Ethiopia's Hacking Team servers apparently get an update⁵⁶
- **November 5, 2014** -- ESAT journalists targeted with what appears to be Hacking Team spyware
- **November 10, 2014** -- ESAT journalists targeted with what appears to be Hacking Team spyware
- **December 19, 2014** -- ESAT journalists targeted with what appears to be Hacking Team spyware

CONCLUSION

Dissidents and others fleeing repressive regimes have long found a degree of protection by seeking refugee status in the West. Throughout the 20th century refugees from political persecution have established thriving diaspora communities where they have been able to continue their activity without fear of physical persecution. For at least as long, the security services from the countries they left have attempted to monitor and sometimes interfere with their activities.

We have documented a year-long campaign of spyware attacks against journalists at ESAT, using what appears to be Hacking Team's RCS spyware. Many of the journalists targeted in these attacks are legally considered US persons, and located in the US.

In its customer policy, Hacking Team notes:

"[I]n HT contracts, we require customers to abide by applicable law. We reserve the right in our contracts to suspend support for our software if we find terms of our contracts are violated. If we suspend support for HT technology, the product soon becomes useless."We will refuse to provide or we will stop supporting our technologies to governments or government agencies . . . who refuse to agree to or comply with provisions in our contracts that describe intended use of HT software, or who refuse to sign contracts that include requirements that HT software be used lawfully."⁵⁷

The policy suggests that Hacking Team will cease support for its technology when a client violates terms of its contract by failing to abide by applicable law. The lawfulness of government targeting of individuals based in the US with spyware, however, is in question; for example, a lawsuit brought by a US citizen against the government of Ethiopia in February 2014 claims that such actions violated the US Wiretap Act [18 U.S. Code § 2511(1)(a)].⁵⁸

Hacking Team has also publicly stated that they investigate abuses reported in the press and sometimes take action:

"... we have investigated cases either discovered internally or reported in the press that suggest abuse. We can and have taken action in such cases, however, we consider the results of our investigations and the actions we take based on them to be confidential."⁵⁹

Our 2014 report documenting the abusive use of RCS against journalists received widespread media coverage, and both the Washington Post⁶⁰ and Human Rights Watch⁶¹ corresponded with Hacking Team about our findings, and received specific responses.

In the wake of our 2014 reporting, we also sent an August 2014 open letter to Hacking Team, which inquired, *inter alia*, about investigation by the company into the reported misuse of the software against Ethiopian journalists in the United States.⁶² We posed further questions about their due diligence and accountability mechanisms, while applauding their efforts to incorporate human rights considerations into their customer policy. We have yet to receive a reply to this letter.

Despite the aforementioned public reports and correspondence, this report shows that the same attacker appeared to be receiving updated versions of the RCS spyware from Hacking Team as recently as November 2014.

Citizen Lab is sending an [open letter to Hacking Team](#), providing a copy of this report and highlighting our reasons for concern from these latest findings. Hacking Team has recently announced that it is “complying fully”⁶³ with export controls adopted within the framework of the Wassenaar Arrangement, which includes language covering “intrusion software.”

Still, our findings suggest continued reasons for concern about the effectiveness of the mechanisms Hacking Team has in place to ensure respect for human rights in the use of their products.

ACKNOWLEDGEMENTS

Thanks to ESAT, Irene Poetranto, Adam Senft, the Electronic Frontier Foundation, and Nicholas Weaver.

FOOTNOTES

¹ Bill Marczak, Claudio Guarnieri, Morgan Marquis-Boire, and John Scott-Railton, “Hacking Team and the Targeting of Ethiopian Journalists,” Citizen Lab, February 12, 2014, <https://citizenlab.org/2014/02/hacking-team-targeting-ethiopian-journalists/>.

² <http://www.insa.gov.et/>.

³ Hacking Team, “Customer Policy,” <http://www.hackingteam.it/index.php/customer-policy>.

⁴ Citizen Lab, 2014, “Open Letter to Hacking Team,” <https://citizenlab.org/2014/08/open-letter-hacking-team/>.

⁵ Hacking Team, “The Solution,” <http://www.hackingteam.it/index.php/remote-control-system>.

⁶ Bill Marczak, Claudio Guarnieri, Morgan Marquis-Boire, and John Scott-Railton, “Hacking Team and the Targeting of Ethiopian Journalists,” Citizen Lab, February 12, 2014, <https://citizenlab.org/2014/02/hacking-team-targeting-ethiopian-journalists/>.

⁷ Hacking Team, “About Us,” <http://www.hackingteam.it/index.php/about-us>

⁸ Hacking Team, “Customer Policy,” <http://www.hackingteam.it/index.php/customer-policy>

⁹ Id.

¹⁰ Craig Timberg, “Spyware lets regimes target U.S.-based journalists,” Washington Post, February 13, 2014, http://www.washingtonpost.com/wp-srv/tablet/20140213/A01_SU_EZ_DAILY_20140213.pdf.

¹¹ Craig Timberg, “Foreign regimes use spyware against journalists, even in U.S.,” Washington Post, February 12, 2014, http://www.washingtonpost.com/business/technology/foreign-regimes-use-spyware-against-journalists-even-in-us/2014/02/12/9501a20e-9043-11e3-84e1-27626c5ef5fb_story.html.

¹² Human Rights Watch, “The Know Everything We Do - Appendix 2: Correspondance,” March 25, 2014, <http://www.hrw.org/node/123976/section/12>.

- ¹³ Citizen Lab, 2014, “Open Letter to Hacking Team,” <https://citizenlab.org/2014/08/open-letter-hacking-team/>.
- ¹⁴ <http://ethsat.com>.
- ¹⁵ Id.
- ¹⁶ “ESAT Accuses China of Complicity in Jamming Signals,” Ethiopian Satellite Television, June 15, 2011, accessed February 13, 2014, <http://ethsat.com/2011/10/08/esat-accuses-china-of-complicity-in-jamming-signals>.
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- ²² “They Want a Confession,” Human Rights Watch, October 17, 2013, accessed February 13, 2014, <http://www.hrw.org/node/119814/section/2>.
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- ²⁴ <http://vmpsoft.com/>.
- ²⁵ We redact the last octet of any IP address that we suspect is an active spyware server.
- ²⁶ Bill Marczak, Claudio Guarnieri, Morgan Marquis-Boire, and John Scott-Railton, “Hacking Team and the Targeting of Ethiopian Journalists,” Citizen Lab, February 12, 2014, <https://citizenlab.org/2014/02/hacking-team-targeting-ethiopian-journalists/>.
- ²⁷ Bill Marczak, Claudio Guarnieri, Morgan Marquis-Boire, and John Scott-Railton, “Mapping Hacking Team’s Untraceable Spyware,” Citizen Lab, February 17, 2014, <https://citizenlab.org/2014/02/mapping-hacking-teams-untraceable-spyware/>.
- ²⁸ Hacking Team, “Customer Policy,” <http://www.hackingteam.it/index.php/customer-policy>.
- ²⁹ “Anonymizer” is defined on page x of the Hacking Team manual RCS 9: System Administrator’s Guide as “Protects the server against external attacks and permits anonymity during investigations. Transfers agent data to Collectors.” <https://s3.amazonaws.com/s3.documentcloud.org/documents/1348001/rcs-9-sysadmin-final.pdf>.
- ³⁰ “Collector” is defined on page xi of the Hacking Team manual RCS 9: System Administrator’s Guide as “Receives data sent by agents directly or through the Anonymizer chain.” <https://s3.amazonaws.com/s3.documentcloud.org/documents/1348001/rcs-9-sysadmin-final.pdf>.
- ³¹ Hacking Team, “RCS 9: System Administrator’s Guide,” <https://s3.amazonaws.com/s3.documentcloud.org/documents/1348001/rcs-9-sysadmin-final.pdf>.
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- ³³ <https://github.com/citizenlab/spyware-scan/blob/master/ht/http/sonar-http/sonar-http.rb#L24-L32>.
- ³⁴ <http://www.shodanhq.com/host/view/216.118.233.xxx>.
- ³⁵ This is based on data from the Sonar SSL scans, available at: <https://scans.io/study/sonar.ssl>; between March 31, 2014, and April 7, 2014.
- ³⁶ SSL certificates in this report are identified by their SHA1 fingerprint.

³⁷ <https://github.com/citizenlab/spyware-scan/blob/master/ht/ssl/sonar-ssl/sonar-ssl.rb#L33-L47>.

³⁸ This is based on data from the Sonar SSL scans, available at: <https://scans.io/study/sonar.ssl>; on March 31, 2014.

³⁹ Id. Between October 13, 2012, and February 10, 2014.

⁴⁰ Id. Between October 30, 2013, and January 20, 2014.

⁴¹ Bill Marczak, Claudio Guarnieri, Morgan Marquis-Boire, and John Scott-Railton, “Hacking Team and the Targeting of Ethiopian Journalists,” Citizen Lab, February 12, 2014, <https://citizenlab.org/2014/02/hacking-team-targeting-ethiopian-journalists/>.

⁴² <http://www.bucknell.edu/x45100.xml>.

⁴³ Different from 216.118.233.xxx.

⁴⁴ The spyware only attempted direct communication with 46.4.128.158 and 78.46.234.155. These two IPs returned a highly distinctive self-signed Google SSL certificate (25b734a9170e683bd05d66a7d3d8502232bb6b5f). The only other IPs in /0 that returned this certificate were 216.118.233.252 and 197.156.68.130. Thus we assume these two IPs are part of the spyware’s command and control infrastructure.

⁴⁵ We judged the attacker to be the same since the infection communicated with 46.4.69.25. The infection appeared to be Hacking Team RCS.

⁴⁶ Different from 216.118.233.xxx.

⁴⁷ <https://www.shodan.io/host/216.118.233.250>.

⁴⁸ Hacking Team, “Customer Policy,” <http://www.hackingteam.it/index.php/customer-policy>.

⁴⁹ <http://www.insa.gov.et/>.

⁵⁰ Ethio-CERT, “Legal Spyware Works on Both Android and iOS,”

http://ethiocert.insa.gov.et/web/guest/news/-/asset_publisher/nU0q/content/legal-spyware-works-on-android-and-ios.

⁵¹ Human Rights Watch, “‘They Know Everything We Do’: Telecom and Internet surveillance in Ethiopia,” March 2014, https://www.hrw.org/sites/default/files/reports/ethiopia0314_ForUpload_0.pdf.

⁵² <https://twitter.com/botherder/status/535252116622041088>

⁵³ <https://github.com/botherder/detekt>.

⁵⁴ Page 13 of the Hacking Team manual RCS 9: System Administrator’s Guide

<https://s3.amazonaws.com/s3.documentcloud.org/documents/1348001/rcs-9-sysadmin-final.pdf>.

⁵⁵ Hacking Team, “Customer Policy,” <http://www.hackingteam.it/index.php/customer-policy>.

⁵⁶ The last time Shodan recorded the servers matching our old scanning fingerprint was April 7 (<http://www.shodanhq.com/host/view/216.118.233.xxx>). The April 16 Sonar HTTP scan did not record the fingerprint (<https://scans.io/study/sonar.http>), yet the server continued to be reachable. The disappearance of this HTTP fingerprint is consistent with behavior we saw on other RCS servers.

⁵⁷ Hacking Team, “Customer Policy,” <http://www.hackingteam.it/index.php/customer-policy>.

⁵⁸ Electronic Frontier Foundation, “Kidane v. Ethiopia,” <https://www.eff.org/document/complaint-32>.

⁵⁹ Citizen Lab, 2014, “Open Letter to Hacking Team,” <https://citizenlab.org/2014/08/open-letter-hacking-team/>.

⁶⁰ Craig Timberg, “Foreign regimes use spyware against journalists, even in U.S.,” Washington Post, February 12, 2014, http://www.washingtonpost.com/business/technology/foreign-regimes-use-spyware-against-journalists-even-in-us/2014/02/12/9501a20e-9043-11e3-84e1-27626c5ef5fb_story.html.

⁶¹ Human Rights Watch, “The Know Everything We Do - Appendix 2: Correspondance,” March 25, 2014, <https://www.hrw.org/node/123976/section/12>.

⁶² Citizen Lab, 2014, “Open Letter to Hacking Team,” <https://citizenlab.org/2014/08/open-letter-hacking-team/>.

⁶³ Hacking Team, “About Us,” <http://www.hackingteam.com/index.php/about-us>.