LEADERSHIP FOR IT SECURITY & PRIVACY ACROSS HHS

HHS CYBERSECURITY PROGRAM

OFFICE OF THE CHIEF INFORMATION OFFICER

HC3 Threat Intelligence Briefing
Ryuk Ransomware

OVERALL CLASSIFICATION IS

UNCLASSIFIED

TLP:WHITE

8/30/2018

Agenda

- Intro
- Overview
- Ryuk Profile
- Ransom Note
- Lazarus Group
- Hermes
- Similarity Examples
- Indicators of Compromise
- Protections and Mitigations
- Conclusion

Slides Key:

Non-Technical: managerial, strategic and high-level (general audience)

Technical: Tactical / IOCs; requiring in-depth knowledge (sysadmins, IRT)

Overview

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Threat: *Ryuk Ransomware* (Check Point)

>ACTIVE SINCE: 13 August 2018

>Highly Targeted, well-resourced and planned

>Ransom is comparatively HIGH

>15 BTC – 50 BTC

>Attackers reportedly netted ~$640,000

Notables (id-ransomware**):**

>Attempts to encrypt network resources

>At the end of encryption, Ryuk destroys its encryption key and launches a BAT file that will remove shadow copies and various backup files from the disk.

>The structure of the encrypted file is identical to the structure used in Hermes Ransomware, including the HERMES distinctive token that this malware uses to identify the files that it has already encrypted.

> Ryuk may either be the work of the HERMES operators, the allegedly North Korean group, or the work of an actor who has obtained the HERMES source code.

Ryuk Profile

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Ryuk Ransomware (Check Point)

NOT LIKE COMMON RANSOMWARE

→ Systematically distributed via malicious spam (MALSPAM) campaigns

→ Exploit kits

SIMILAR TO SAMSAM CAMPAIGNS

→ Tailored to each victim (deliberate targeting)

→ Encryption scheme is intentionally built for small-scale operations

→ Only crucial assets and resources are infected in each targeted network

→ Infection and distribution carried out manually by the attackers

What This Means…

→ **Attackers are required to complete** extensive network mapping, lateral movement and credential collection prior to each operation.

Ransom Note

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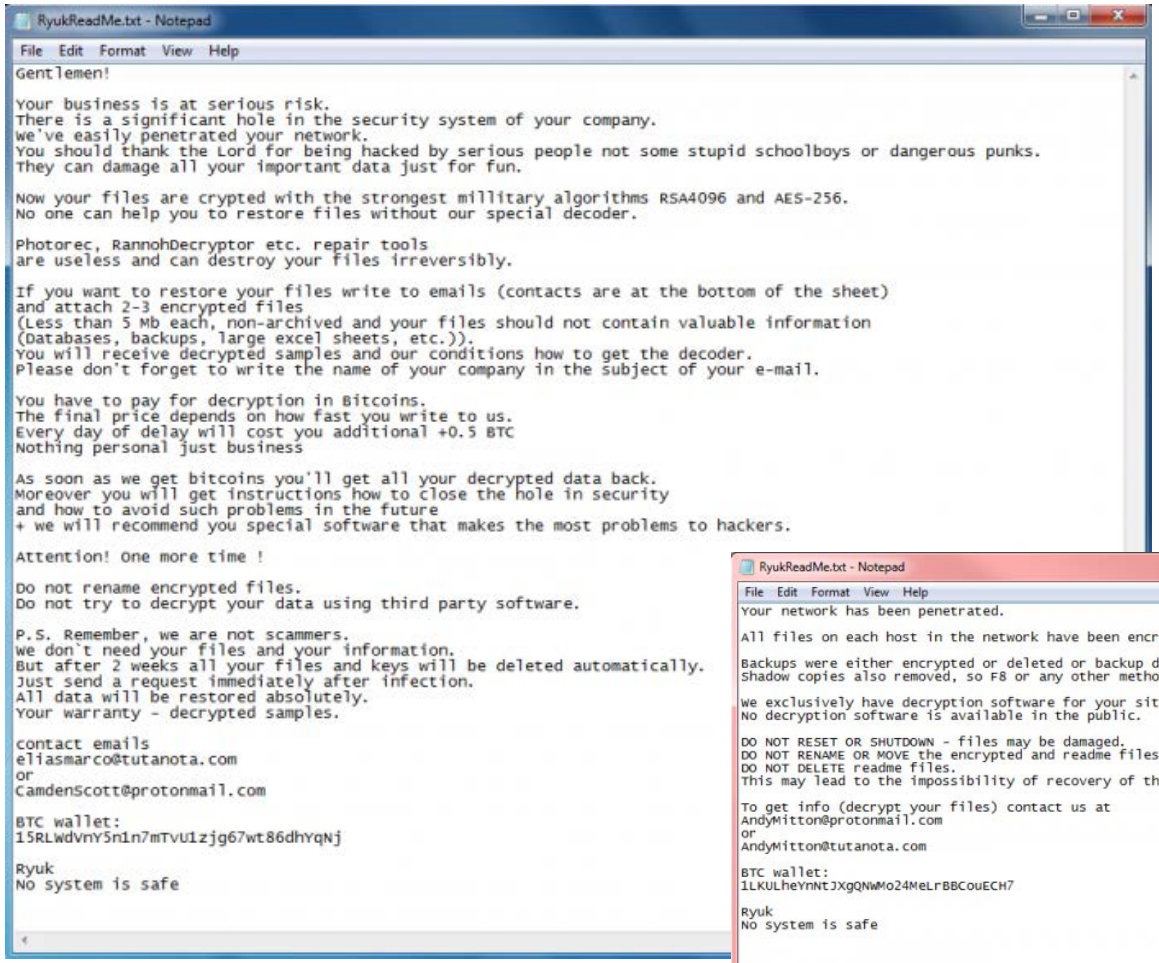
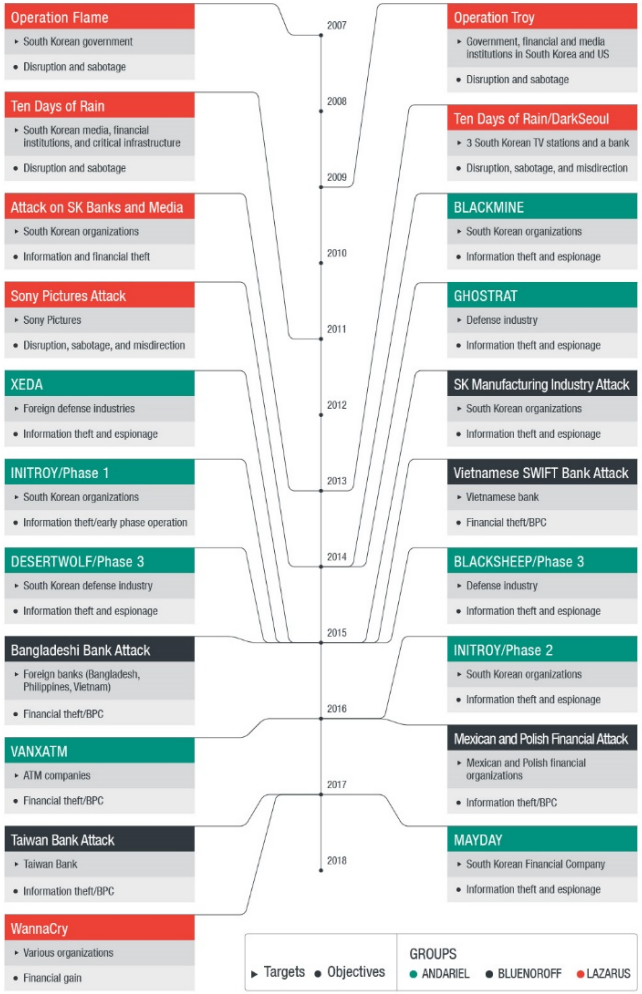


Two different versions of ransom notes have been seen sent to different victims (Checkpoint)

Lazarus Group

Threat group that has been attributed to the North Korean government (Kaspersky)

- Focus on espionage, data theft, and financial attacks
- Massive scale and growth
- Two related “spinoff” groups: Bluenoroff and Andariel
- Masquerades as Russian attackers
- Notable Attacks:
  - Operation Troy, 2013
  - Operation DarkSeoul, 2013
  - Sony Pictures Entertainment, 2014
  - Bangladesh Central Bank, 2016



Source: Trend Micro

Hermes

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Threat: *HERMES Ransomware* (Check Point)

>ACTIVE SINCE: October 2017

Notably targeted Far Eastern International Bank in Taiwan

- Fraudulent attempts to wire as much as $60 million.
- Stolen credentials were used to access the bank's SWIFT accounts

The Hermes Ransomware is installed on victims' computers after they open an unsolicited email attachment

Ransomware will drop an HTML file named 'DECRYPT_INFORMATION.html

Comparison between Ryuk and Hermes

- Researchers believe targeted Ryuk attacks were the work of HERMES operators (Lazarus) or an actor that has obtained the HERMES source code
- Both the nature of the attack and the malware's own inner workings tie Ryuk to the HERMES ransomware
- Similar encryption logic

Similarity Examples

Hermes

```
*(_DWORD *)s_HERMES = 'MREH';
*(_WORD *)&s_HERMES[4] = 'SE';
s_HERMES[6] = 0;
if ( v42.QuadPart > 0x4C4B40ui64 )
{
  SetFilePointerEx(v4, 0i64, 0, 2u);
  uid = 0;
  v28 = 0;
  v27 = 0i64;
  ml_num_to_uid_ex(num, &uid, 10);
  ml_strcat_a(&marker, L"|");
  ml_strcat_a(&marker, &uid);
  ml_strcat_a(&marker, L"|");
  ml_strcat_a(&marker, s_HERMES);
}
else
{
  ml_w_memmove(&marker, s_HERMES);
}
```

Ryuk 32-bit

```
strcpy(s_HERMES, "HERMES");
if ( *(_QWORD *)v25 > 0x4C4B40ui64 )
{
  SetFilePointerEx_0(hFile, 0, 0, 0, 2);
  v41 = 0;
  *(_QWORD *)uid = 0i64;
  ml_num_to_uid(num, uid);
  ml_strcat_a(marker, "|");
  ml_strcat_a(marker, uid);
  ml_strcat_a(marker, "|");
  ml_strcat_a(marker, s_HERMES);
}
else
{
  ml_w_memmove(marker, s_HERMES);
}
```

Marker generation in Ryuk and Hermes.

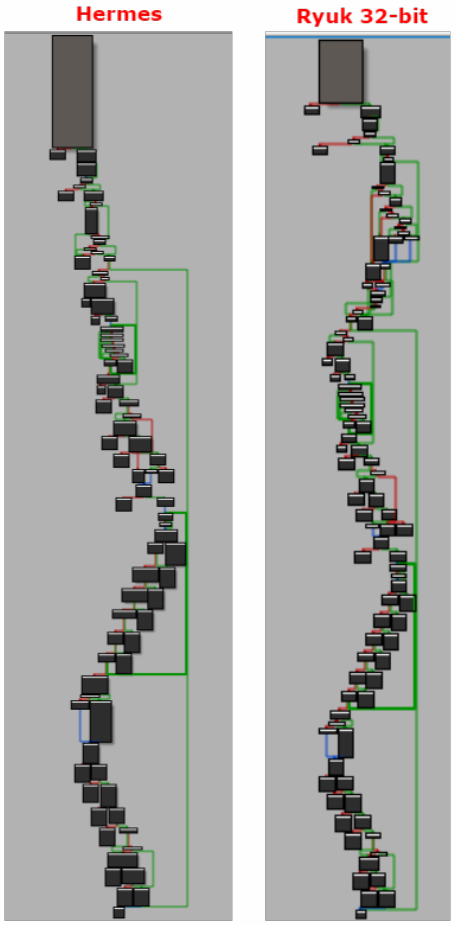
Hermes

```
do
{
  if ( *((_BYTE *)&v23 + v12) == 'H'
    && *((_BYTE *)&v23 + v12 + 1) == 'E'
    && *((_BYTE *)&v23 + v12 + 2) == 'R'
    && *((_BYTE *)&v23 + v12 + 3) == 'M'
    && *(&v24 + v12) == 'E'
    && v25[v12] == 'S' )
  {
    CloseHandle(v4);
    return 5;
  }
  ++v12;
}
while ( v12 < 0x14 );
```

Ryuk 32-bit

```
do
{
  if ( *((_BYTE *)&v42 + v12) == 'H'
    && *((_BYTE *)&v42 + v12 + 1) == 'E'
    && *((_BYTE *)&v42 + v12 + 2) == 'R'
    && *((_BYTE *)&v42 + v12 + 3) == 'M'
    && *(&v43 + v12) == 'E'
    && v44[v12] == 'S' )
  {
    CloseHandle_0(hFile);
    return 5;
  }
  ++v12;
}
while ( v12 < 0x14 );
```

Marker check in Ryuk and Hermes



Call flow graphs of the encryption functions in Ryuk and Hermes.

Source: Checkpoint

Indicators of Compromise

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Ryuk Ransomware hashes (MD5):

- c0202cf6aeab8437c638533d14563d35
- d348f536e214a47655af387408b4fca5
- 958c594909933d4c82e93c22850194aa
- 86c314bc2dc37ba84f7364acd5108c2b
- 29340643ca2e6677c19e1d3bf351d654
- cb0c1248d3899358a375888bb4e8f3fe
- 1354ac0d5be0c8d03f4e3aba78d2223e

Malware Dropper hashes (MD5):

- 5ac0f050f93f86e69026faea1fbb4450

Protection & Mitigations

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Recommended Practices for Hermes (Researchers continue to analyze Ryuk) (BAE Systems)

- Firewall off SMB (445) for internal computers. If access to this service is required, it should be permitted only for those IP's that require access. i.e. 445 is required for SCOM to push an agent install, therefore 445 should only be allowed from that source server;
- Application blacklisting should be implemented to prevent the use of tools such as vssadmin.exe, cmd.exe, powershell.exe and similar;
- File Integrity Monitoring should be considered and configured to monitor file creations in "trusted" locations such as the System32 directory. This can also be used to monitor deletes, with an alert configured to fire on excessive deletes in a row;
- Windows Security Event logs should be monitored to capture Scheduled Task creation events – Event ID 4698;
- Registry Auditing should be enabled and monitored to capture any additions to HKLM\Software\Microsoft\Windows\CurrentVersion\Run;
- Excessive use of known administrative privilege accounts should be alerted on – specifically in a "one to many" behavioral configuration. i.e. is one specific IP connecting to a large number of devices using the same credentials in a short period of time;
- Ensure privileged accounts have a complex password that does not include any part of the username, or application it relates to.

Additional longer term recommendations for financial institutions:

- Practice incident response scenarios which include complex attacks combining covert payment fraud and overt network disruption through ransomware, DDoS, network downtime, etc.
- Ensure that you are progressing towards being able to attest against the SWIFT 27 controls.

Conclusion

Upcoming Briefs

- Chain Supply Threats
- Trends in Malicious Macro Usage
- Cryptomining Landscape
- Various APT/FIN Groups

Analyst-to-analyst webinars are available

Questions / Comments / Concerns?

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