NINJA CORRELATION
OF APT BINARIES

EVALUATING THE EFFECTIVENESS OF FUZZY HASHING
TECHNIQUES IN IDENTIFYING PROVENANCE OF APT BINARIES

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-GEORGE P. BURDELL

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WHAT ADVANTAGE CAN KNOWING THE ORIGINS OF A MALICIOUS BINARY GIVE YOU??

• We can apply past analyses of motivations and capabilities of adversary

• Connect disparate events into one whole picture

• So what’s the best way to connect the dots?
AGENDA

• Methods to connect binaries
• Getting a test dataset and ground truth
• Results
• Sample clusters found
• Takeaways and Future direction
WHAT IS THE BEST WAY TO CONNECT SIMILAR BINARIES??

- Imphash— md5 hash of the import table
- ssdeep— Context triggered piecewise hashing
- SDhash— Bloom filters

How to:

1. Get non-trivial dataset of binaries related to targeted campaigns
2. Establish ground truth without static/dynamic analyses of hundreds of binaries?
GATHERING DATA

- Published Jan-March 2015
- e.g. “Project Cobra Analysis”, “The Desert Falcon Targeted Attacks”

APT Whitepapers

MD5s

Similarity Metrics

- Extract MD5s
- >10% Malicious on Virus Total
- Calculate for each binary
  - Import hash
  - ssdeep
  - SDhash

EXTRACT

CALCULATE
ASSESSING CORRELATIONS

Are these malware related?
ASSESSING CORRELATIONS

{Actor Names, Campaign Name, Malware Families, Aliases}

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SUMMARY RESULTS

- No one method found all the correlations
- Imphash had the most false positives
- Sdhash had maximum recall
- Both ssdeep and SDhash had near perfect precision
IMPHASHES
- 408 TRUE CORRELATIONS
- 172 FALSE POSITIVES
- HIGH FIDELITY TRUE POSITIVES
- 2 CORRELATIONS ACROSS CAMPAIGNS BY THE SAME ACTOR
- NO CORRELATIONS BETWEEN DIFFERENT VERSIONS OF THE SAME MALWARE
- NO CORRELATIONS ACROSS PARTS OF THE KILL CHAIN WITHIN CAMPAIGN
• SAV samples circa 2011
  • Used by the Waterbug Attack group
  • AKA Turla/Uruboros

• Version 1.5 of ComRAT (Turla Attackers)
  • Compiled on March 25, 2008
  • Other versions of the RAT in the dataset were not connected

• Wipbot 2013 Samples
  • Used by the Waterbug attack Group
  •Compiled on 15-10-2013
  • Also referred to as Tavdig/WorldCupSec/Tadj Makhal
• Both samples of ComRAT
  • Associated with Waterbug Group and Turla Attackers respectively

• Samples of the Carbon Malware
  • Related to Project Cobra and The Waterbug Attack Group
- Binaries from SIX different campaigns
- No common Actor or Malware Family
- Different parts of the Kill chain

- Credential stealer and dropper from OP Arid Viper
- Vs. Droppers used by Attacks on the Syrian Opposition Forces
- No common attribution or KNOWN link
• 856 TRUE CORRELATIONS
• 0 FALSE POSITIVES
• 1 CORRELATIONS FOUND CONNECTING CAMPAIGNS BY THE SAME ACTOR
• SEVERAL CORRELATIONS BETWEEN MINOR VERSIONS OF SAME MALWARE
• NO CORRELATIONS ACROSS PARTS OF THE KILL CHAIN WITHIN CAMPAIGN
SSDEEP

- SAV/Uruboros samples
- Used by the Waterbug Attack group
- Timestamped 2013

- Wipbot 2013
- Used by the Waterbug attack group

- Correlation across minor versions of ComRAT
- Compile dates span over 3 years
Backdoors used in OP Desert Falcon (Kaspersky)

630 Correlations. Average similarity score was 35.13

Different Versions of Carbon Malware complied in 2009

From Project Cobra and Waterbug Campaigns.
• THRESHOLD = 10

• 1412 TRUE CORRELATIONS

• 3 FALSE POSITIVES

• 1 CORRELATIONS FOUND CONNECTING CAMPAIGNS BY THE SAME ACTOR

• SEVERAL CORRELATIONS BETWEEN MINOR VERSIONS OF SAME MALWARE

• 1 CORRELATIONS ACROSS PARTS OF THE KILL CHAIN WITHIN CAMPAIGN
SDHASH

- Correlation between Dropper, Stage 1, Stage 2 and Injected Library of Cobra Campaign
- High similarity with Carbon Tool used by the Waterbug group
- Widely varying AV labels even controlling for vendor
- Correlations made by sdhash only

- SAV/Uruboros samples
- 30 different Binaries compiled over 3 months in 2013
• Backdoor used by OP Desert Falcon
• Vs. Scanbox sample (known to be related to Anthem attacks and Deep Panda)
• No known relationship between those actors/campaigns/malware families

• “HttpBrowser” malware used in Anthem attack
• “AmmyAdmin” tool used by the Carbanak group
WHAT NEXT?

• Imphash, ssdeep, SDhash— which is best?

• It pays to know your adversary

• APT binaries may share code within campaign and actor— Code similarity can be used to connect binaries from the same source.

• Connections can help make strategic decision to respond to an adversary, NOT infection.
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