

# Incident Response tactics with Compromise Indicators

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# Outline

Basics

Standards

Tools

Sharing IOCs

IOCs composites

Case Study

More on Tools

Questions

# Introduction

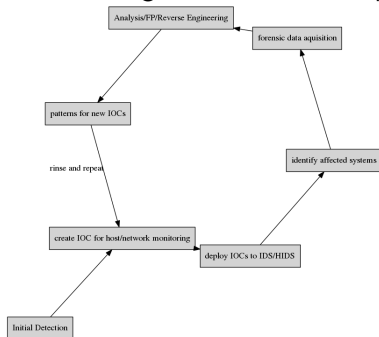
## Indicators of Compromise

Indicator of compromise (IOC) in computer forensics is an artifact observed on network or in operating system that with high confidence indicates a computer intrusion.

[http://en.wikipedia.org/wiki/Indicator\\_of\\_compromise](http://en.wikipedia.org/wiki/Indicator_of_compromise)

# IOC workflow

A typical flow with Indicators of Compromise allows to integrate dynamic threat intelligence into detection process:



source: Sophisticated indicators for the modern threat landscape, 2012 paper

# Standards: OpenIOC

OpenIOC - Mandiant-backed effort for uniform representation of IOC  
(now FireEye) <http://www.openioc.org/>

```
-<ioc id="6d2a1b03-b216-4cd8-9a9e-8827af6ebf93" last-modified="2011-10-28T19:28:20">
  <short_description>Zeus</short_description>
  <description>Finds Zeus variants, twexts, sdra64, ntos</description>
  <keywords/>
  <authored_by>Mandiant</authored_by>
  <authored_date>0001-01-01T00:00:00</authored_date>
  <links/>
-<definition>
  -<Indicator operator="OR" id="9c8df971-32a8-4ede-8a3a-c5cb2c1439c6">
    -<Indicator operator="AND" id="0781258f-6960-4da5-97a0-ec35fb403cac">
      -<IndicatorItem id="50455b63-35bf-4efa-9f06-aeba2980f80a" condition="contains">
        <Context document="ProcessItem" search="ProcessItem/name" type="mir"/>
        <Content type="string">winlogon.exe</Content>
      </IndicatorItem>
      -<IndicatorItem id="b05d9b40-0528-461f-9721-e31d5651abdc" condition="contains">
        <Context document="ProcessItem" search="ProcessItem/HandleList/Handle/Type" type="mir"/>
        <Content type="string">File</Content>
      </IndicatorItem>
    -<Indicator operator="OR" id="67505775-6577-43b2-bccd-74603223180a">
      -<IndicatorItem id="c5ae706f-c032-4da7-8acd-4523f1dae9f6" condition="contains">
        <Context document="ProcessItem" search="ProcessItem/HandleList/Handle/Name" type="mir"/>
        <Content type="string">system32\sdra64.exe</Content>
      </IndicatorItem>
      -<IndicatorItem id="25ff12a7-665b-4e45-8b0f-6e5ca7b95801" condition="contains">
        <Context document="ProcessItem" search="ProcessItem/HandleList/Handle/Name" type="mir"/>
        <Content type="string">system32\twain_32\user.ds</Content>
      </IndicatorItem>
      -<IndicatorItem id="fea11706-9ebe-469b-b30a-4047cfb7436b" condition="contains">
        <Context document="ProcessItem" search="ProcessItem/HandleList/Handle/Type" type="mir"/>
        <Content type="string">WINDOWS\system32\twext.exe</Content>
      </IndicatorItem>
    </Indicator>
  </definition>
```

# Standards: Mitre

Mitre CybOX: <http://cybox.mitre.org/>

<https://github.com/CybOXProject/Tools>

<https://github.com/CybOXProject/openioc-to-cybox> Mitre

CAPEC: <http://capec.mitre.org/> Mitre STIX:

<http://stix.mitre.org/> Mitre TAXII <http://taxii.mitre.org/>

# Open-source tools

OpenIOC manipulation

<https://github.com/STIXProject/openioc-to-stix>

<https://github.com/tklane/openiocscripts>

Mantis Threat Intelligence Framework

<https://github.com/siemens/django-mantis.git> Mantis supports STIX/CybOX/IODEF/OpenIOC etc via importers:

<https://github.com/siemens/django-mantis-openioc-importer>

Search splunk data for IOC indicators:

<https://github.com/technoskald/splunk-search>

Our framework: <http://github.com/fygrave/iocmap/>

# Online Sharing of IOCs

`http://iocbucket.com/`

IOC Bucket

SearchUploadToolsFeedback

OVERVIEW

## Welcome,

We tried to make it as easy as possible for anyone to search for a particular IOC. When you perform a search you are searching all of the metadata we have on that IOC as well as the full contents.

### 10 Most Recent IOC Uploads

Upload Date	nickname / author	sponsor / country	type
03/22/2014 20:04:58	(n) <a href="#">yskimmer pos malware</a> (a) @iocbucket	(s) organized crime (c) unknown	<a href="#">OpenIOC1.0</a>
03/20/2014 23:22:27	(n) <a href="#">gearbot campaign</a> (a) jaime blasco	(s) nation-state sponsored (c) russia	<a href="#">OpenIOC1.0</a>
03/20/2014 23:21:20	(n) <a href="#">gearbot memory</a> (a) author not included	(s) nation-state sponsored (c) russia	<a href="#">YARA</a>
03/20/2014 23:20:10	(n) <a href="#">gearbot binary</a> (a) author not included	(s) nation-state sponsored (c) russia	<a href="#">YARA</a>
03/16/2014 00:57:11	(n) <a href="#">financial trojan rules</a> (a) @iocbucket	(s) unknown (c) unknown	<a href="#">YARA</a>



# Policies on Sharing

Policies on sharing IOCs:

- ▶ what to be shared/can be shared
- ▶ who to share with
- ▶ when to share

## Where to look for IOCs:

- ▶ Outbound Network Traffic
- ▶ User Activities/Failed Logins
- ▶ User profile folders
- ▶ Administrative Access
- ▶ Access from unusual IP addresses
- ▶ Database IO: excessive READs
- ▶ Size of responses of web pages
- ▶ Unusual access to particular files within Web Application (backdoor)
- ▶ Unusual port/protocol connections
- ▶ DNS and HTTP traffic requests
- ▶ Suspicious Scripts, Executables and Data Files

# Challenges

Why we need IOCs? because it makes it easier to systematically describe knowledge about breaches.

- ▶ Identifying intrusions is hard
- ▶ Unfair game:
  - ▶ defender should protect all the assets
  - ▶ attacker only needs to 'poop' one system.
- ▶ Identifying targeted, organized intrusions is even harder
- ▶ Minor anomalous events are important when put together
- ▶ Seeing global picture is a mast
- ▶ Details matter
- ▶ Attribution is hard

# Challenges

## All networks are compromised

The difference between a good security team and a bad security team is that with a bad security team you will never know that you've been compromised.

# An Example

A Network compromise case study:

- ▶ Attackers broke via a web vuln.
- ▶ Attackers gained local admin access
- ▶ Attackers created a local user
- ▶ Attackers started probing other machines for default user ids
- ▶ Attackers launched tunneling tools – connecting back to C2
- ▶ Attackers installed RATs to maintain access

# Indicators

So what are the compromise indicators here?

- ▶ Where did attackers come from? (IP)
- ▶ What vulnerability was exploited? (pattern)
- ▶ What web backdoor was used? (pattern, hash)
- ▶ What tools were uploaded? (hashes)
- ▶ What users were created locally? (username)
- ▶ What usernames were probed on other machines

## Good or Bad?

File Name	: RasTls.exe
File Size	: 105 kB
File Modification Date/Time	: 2009:02:09 19:42:05+08:00
File Type	: Win32 EXE
MIME Type	: application/octet-stream
Machine Type	: Intel 386 or later, and compatibles
Time Stamp	: 2009:02:02 13:38:37+08:00
PE Type	: PE32
Linker Version	: 8.0
Code Size	: 49152
Initialized Data Size	: 57344
Uninitialized Data Size	: 0
Entry Point	: 0x3d76
OS Version	: 4.0
Image Version	: 0.0
Subsystem Version	: 4.0
Subsystem	: Windows GUI
File Version Number	: 11.0.4010.7
Product Version Number	: 11.0.4010.7
File OS	: Windows NT 32-bit
Object File Type	: Executable application
Language Code	: English (U.S.)
Character Set	: Windows, Latin1
Company Name	: Symantec Corporation
File Description	: Symantec 802.1x Supplicant
File Version	: 11.0.4010.7
Internal Name	: dot1xtray

## It really depends on context

RasTls.DLL

RasTls.DLL.msc

RasTls.exe

http:

[//msdn.microsoft.com/en-us/library/ms682586\(v=VS.85\).aspx](http://msdn.microsoft.com/en-us/library/ms682586(v=VS.85).aspx)

Dynamic-Link Library Search Order





# Tools for Dynamic Detection of IOC

- ▶ Snort
- ▶ Yara + yara-enabled tools
- ▶ Moloch
- ▶ Splunk/Log search

# Tools for Dynamic Detection

## ► Moloch

- Moloch supports Yara (IOCs can be directly applied)
- Moloch has tagger plugin:

```
# tagger.so
```

```
# provides ability to import text files with IP and/or h
```

```
# into a sensor that would cause autotagging of all matc
```

```
plugins=tagger.so
```

```
taggerIpFiles=blacklist , tag , tag , tag ...
```

```
taggerDomainFiles=domainbasedblacklists , tag , tag , tag
```

# Sources of IOCs

ioc collection <http://iocbucket.com>

Public blacklists/trackers could also be used as source:

https:

[//zeustracker.abuse.ch/blocklist.php?download=ipblocklist](https://zeustracker.abuse.ch/blocklist.php?download=ipblocklist)

<https://zeustracker.abuse.ch/blocklist.php?download=domainblocklist>

## where to mine IOC

- ▶ passive HTTP (keep your data recorded)
- ▶ passive DNS

These platforms provide ability to mine traffic or patterns from the past based on IOC similarity

show me all the packets similar to this IOC

We implemented a whois service for IOC look-ups

```
whois -h ioc.host.com    attribute:value+attribute:value
```

# Mining IOCs from your own data

- ▶ find and investigate incident
- ▶ Or even read paper
- ▶ determine indicators and test it in YOUR Environment
- ▶ use new indicators in the future  
see IOC cycle we mentioned earlier

# Example

If event chain leads to compromise

```
http:// liapolasens [. ] info /indexm .html
```

```
http:// liapolasens [. ] info /counter .php?t=f&v=win%2011,7,700,169&a=true
```

```
http:// liapolasens [. ] info /354RIcx
```

```
http:// liapolasens [. ] info /054RIcx
```

What to do?

# Use YARA, or tune your own tools

```
rule susp_params_in_url_kind_of_fileless_bot_drive_by
{
    meta:
        date = "oct_2013"
        description = "Landing_hxxp://jdatastorelame.info/indexm.html_04.10.2013_13:14"
        description1 = "_Java_Sploit_hxxp://jdatastorelame.info/054Rlwj_"

    strings:
        $string0 = "http"
        $string1 = "indexm.html"
        $string2 = "054Rl"

    condition:
        all of them
}
```

## Use snort to catch suspicious traffic:

```
# many plugX deployments connect to google DNS when not in use
alert tcp !$DNS_SERVERS any -> 8.8.8.8 53 (msg:"APT_possible_PlugX_Google_DNS_TCP
port_53_connection_attempt"; classtype:misc-activity; sid:500000112;
rev:1;)
```



# IOC management portal

Monitoring system Chatroom / Exit

Dashboard Tables Tables Analysis Settings Locations **IOC** Config

IOC AS Export to CSV  Search

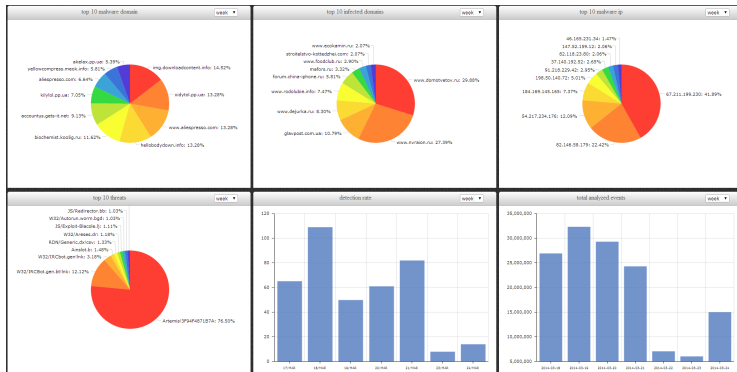
ioc	ioc type	ioc domain	description	comment	add date	add user	first seen	last seen	where seen	
48.165.249.237	IP	Network Traffic, Meta	http://i01files.dynodns.org/48165249237-na-planshethaamsung-gp-p5119.jpg	No comment	2014-03-20 18:24:00		3/Mar/2014	4/Mar/2014	pantheon.ru	<a href="#">Delete</a>
188.50.131.229	IP	Network Traffic, Meta	4nu075u4w9447T08-4-onethot06delandja	No comment	2014-03-20 18:24:00	SA	13/Mar/2014	13/Mar/2014	yellowcompass.mynet.info	<a href="#">Delete</a>
140.251.14.227	IP	Network Traffic, Meta	forumlana.com	No comment	2014-03-20 18:24:00	SA	13/Mar/2014	13/Mar/2014	www.agrona.com, forumlana.com, www.bugger.ru	<a href="#">Delete</a>
212.83.185.287	IP	Network Traffic, Meta	http://eph4hghnukmarm.com/8900aggsu6b79dnhrmpw=1333217	No comment	2014-03-20 18:24:00		5/Mar/2014	7/Mar/2014	xdj9nfp.pu.us, d8f8n.pu.us	<a href="#">Delete</a>
212.83.173.163	IP	Network Traffic, Meta	http://eph4hghnukmarm.com/8900aggsu6b79dnhrmpw=1333217	No comment	2014-03-20 18:24:00	7	14/Mar/2014	14/Mar/2014	xdj9nfp.pu.us	<a href="#">Delete</a>
95.156.236.14	IP	Network Traffic, Meta	No details/123333	No comment/12333	2014-03-20 18:24:00		4/Mar/2014	4/Mar/2014	discusslogistics.mothwented.pw	<a href="#">Delete</a>
48.165.250.238	IP	Network Traffic, Meta	http://i01files.dynodns.org/48165250238-na-planshethaamsung-gp-p5119.jpg	No comment	2014-03-20 18:24:00	SA	5/Mar/2014	5/Mar/2014	pantheon.ru	<a href="#">Delete</a>
183.24.180.79	IP	Network Traffic, Meta	vajztd8d4qm.dynodns.org, alabosca.dynodns.org, rymenauad.dynodns.biz	No comment	2014-03-20 18:28:00		4/Mar/2014	13/Mar/2014	www.supercar.ru	<a href="#">Delete</a>
140.151.134.144	IP	Network	a7abud028lu0313y-d8u.operand.ru, 7986156158-4.operand.ru	No comment	2014-03-20		4/Mar/2014	4/Mar/2014	discusslogistics.mothwented.pw, kdnha-refm0u0d0w0w.0w	<a href="#">Delete</a>

[add new](#)

ioc	ioc type	ioc domain	description	comment	first seen	last seen	where seen
<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>

[Add](#)

and every manager loves graphs :p



# Q and A

Or contact us at ...